SE178-A1-OMP-010

TECHNICAL MANUAL
OPERATION AND MAINTENANCE, WITH PARTS LIST

INDICATOR-TRANSMITTER SET DIGITAL ELECTROMAGNETIC LOG AN/WSN-8 (7093036) AND AN/WSN-8A (7404776)

Space and Naval Warfare Systems Center
Charleston, Code 845
Little Creek Amphibious Base
2425 Stalwart Road, Building 1558 Annex
Norfolk, VA 23521-3325

CONTRACT NO. N65236-02-D-3823

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CERTIFICATION APPLIES TO: NEW MANUALS ☒ REVISION ☐ CHANGE ☐

APPLICABLE TMINS/PUB. NO.	PUBLICATION DATE (day, month, year)	READING GRADE LEVEL (RGL)
SE178-A1-OMP-010	March 31, 2006	9

TITLE

TECHNICAL MANUAL, OPERATION AND MAINTENANCE WITH PARTS LIST, INDICATOR-TRANSMITTER SET, DIGITAL ELECTROMAGNETIC LOG, AN/WSN-8 (7093036) AND AN/WSN-8A (7404776)

TMCR/TMSR/SPECIFICATION NUMBER

NDMS 030183-000

CHANGES AND REVISIONS:

PURPOSE

This new manual incorporates data pertinent to the operation, maintenance, repair, and installation of the AN/WSN-8 and AN/WSN-8A Digital Electromagnetic Log (DEML).

EQUIPMENT ALTERATION NUMBERS INCORPORATED

N/A

TMDER/ACN NUMBERS INCORPORATED

N/A

Continued on additional pages as needed.

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PRINTING RELEASE	Keith Barrale	Keith Barrale	SPAWARSYSCEN Charleston	J845KB	4/11/06

NAVSEA 4160/8 (Rev 7-2003)

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RECORD OF CHANGES

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FOREWORD

This technical manual provides information necessary for the operation, organizational level, intermediate level, and depot-level scheduled and corrective maintenance, repair and installation of the Digital Electromagnetic Log (DEML). This technical manual also provides information relative to training personnel to effectively operate, maintain, troubleshoot and repair the DEML. This technical manual supersedes Technical Manual Identification Number (TMIN) SE178-A1-MMM-010, Rev 1, dated 30 March 1998. This technical manual is applicable to the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEMLs. The AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs are installed on SSBN 726, SSGN 726, SSN 21, LCC, LHD Class submarines and ships. The AN/WSN-8A (7404776) DEML with AN/WSN-8A(V)1 software is installed on DDG Class ships. The AN/WSN-8A (7404776) DEML with AN/WSN-8A(V)2 software is installed on CVN Class ships.

The AN/WSN-8 (7093036) DEML provides 60-Hertz (Hz) Synchro, 400-Hz Synchro and MIL-STD-1553B interfaces. The AN/WSN-8 (7093036) DEML (w/FC-1) provides 60-Hz Synchro, 400-Hz Synchro, MIL-STD-1553B, and National Marine Electronics Association (NMEA) interfaces. The AN/WSN-8A(V)1 (7404776) DEML provides Navigation Sensor System Interface (NAVSSI) and NMEA interfaces, and is configured to provide an AN/USQ-82(V) Fiber Optic Data Multiplex System (FODMS) interface using a jumper setting on the Central Processing Unit (CPU) Circuit Card Assembly (CCA) and Auto-Detecting software. The AN/WSN-8A(V)2 (7404776) DEML provides a NAVSSI, and is configured to provide an AN/WSN-7(V) Ring Laser Gyro Navigator (RLGN) interface using a jumper setting on the CPU CCA and Auto-Detecting software.

This manual is a standard 8 chapter technical manual, and was written in accordance with Technical Manual Contract Requirement (TMCR) NDMS 030183-000 and Detail Specification MIL-DTL-24784.

This technical manual is developed as a Standard Generalized Mark-Up Language (SGML) document and is provided for printing in a Portable Document Format® (PDF®) file. If users are viewing an electronic version of this manual, they can navigate to a specific figure, table, or section using the PDF generated bookmarks and/or the links located within the textual content that appear highlighted in red. If viewing a paper copy of this manual, the links will appear as bold-face text. Additionally, bold text is used to indicate keypad controls and referenced steps not electronically linked. All tables, figures, and foldouts are located, in this order, at the end of each chapter.

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This technical manual is under the overall cognizance and maintenance philosophy of an In-Service Engineering Agent (ISEA) assigned to:

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Norfolk, VA 23521-3325

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- Telephone DSN 253-7750, Ext. 228, or Commercial number (757) 462-7750, Ext. 228;
- Telefax (757) 462-7657;
- Send e-mail to keith.barrale@navy.mil.

SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following general safety notices supplement specific danger, warning, and caution statements appearing elsewhere in the manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. Before performing any task, the DANGER, WARNING, and CAUTION statements, and NOTES included in that task shall be reviewed and understood. Users shall read and comply with the applicable safety precautions in the *Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.19 (Series), Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat*.

DO NOT REPAIR ALONE

Under no circumstances should repair of energized equipment be attempted alone. The immediate presence of someone capable of rendering first aid is required. Be sure to protect yourself against grounding. Even when power has been removed from equipment circuits, dangerous potentials may still exist due to the retention of charges by capacitors. Circuits must be grounded and all capacitors discharged prior to attempting repairs.

TEST EQUIPMENT

Be certain electronic test equipment is in good condition. If a test meter must be held, ground the case of the meter before starting measurement; do not touch live equipment or personnel working on live equipment while holding a test meter. Some types of measuring devices should not be grounded; these devices should not be held when making measurements.

ELECTROSTATIC DISCHARGE (ESD) WARNINGS

Circuitry installed in the AN/WSN-8 (7093036) and AN/WSN-8A (7404776) Digital Electromagnetic Logs (DEMLs) is highly susceptible to static discharge during servicing and troubleshooting. Ensure adequate grounding of equipment and personnel when operating around these units. Procedures that involve Electrostatic Discharge Sensitive (ESDS) components and require ESD precautions are identified by the following symbol:

SPECIFIC DANGERS, WARNINGS, AND CAUTIONS

The following specific dangers, warnings, and cautions are repeated in the text of this Technical Manual. If they are not strictly observed, injury or death of personnel may result, or the effectiveness of the equipment could be impaired.

DANGER

Voltages dangerous to life are present when the DEML is energized. Use extreme care when performing voltage measurements. Keep one hand clear. Do not work alone. (**Paragraph 5.2.2**)

DANGER

High voltage components may contain voltages dangerous to life. DEML input power must be de-energized before disconnecting cables. (**Paragraph 8.9.4**)

WARNING

If rodmeter sensing element has been partially or entirely sheared off, seawater will enter from top of sea valve. (**Paragraph 6.3.1.1**)

WARNING

Leakage may take place, if sea valve is dislocated or misaligned. (**Paragraph 6.3.1.3**)

WARNING

The crated and uncrated weights of the I/T are 90 and 52 pounds, respectively. Ensure sufficient number of personnel are on hand to safely handle the I/T to avoid the risk of injury due to heavy lifting. (**Paragraphs 8.6.1** and **8.9.4**)

CAUTION

DEML must not be energized in Underwater mode unless rodmeter is connected and extended into water. (**Tables 2-6**, **2-22**, **2-44**, and **2-67**)

CAUTION

Do not select the same number for both I/Ts. If this is done, it will cause both I/Ts to have the same RT ID address. The DEML will stay up and the Digital Data Bus will fail. (**Table 2-11**)

CAUTION

After completing configuration, DEML must be powered down and re-energized prior to any future use. (**Tables 2-11**, **2-27**, **2-49**, and **2-72**)

CAUTION

Pressing 2 will erase all data gathered during the calibration runs. Select this option only if the runs are declared invalid. (**Tables 2-14**, **2-17**, **2-18**, **2-20**, **2-21**, **2-31**, **2-33**, **2-35**, **2-36**, **2-38**, **2-39**, **2-53**, **2-55**, **2-57**, **2-59**, **2-61**, **2-62**, **2-76**, **2-78**, **2-80**, **2-82**, **2-84**, **2-86**, and **2-87**)

CAUTION

Do not press 1 if only a single rodmeter is available. Doing so will cause the DEML to lock up and require a restart. (**Tables 2-19** and **2-35**)

CAUTION

Automatic calibration depends on input from the MIL-STD-1553B bus. Automatic calibration cannot be performed if the MIL-STD-1553B bus is not installed, not connected, or not operational. Manual calibration procedures, **Paragraph 2.5.4** or **2.5.5**, should be performed. (**Paragraph 2.5.7.2**)

CAUTION

Do not megger across rodmeter coil! (Pins A and B or 1 and 6). (**Paragraph 5.2.15.3**)

CAUTION

Trunnions on jackscrew nut are displaced 1/32 inch from centerline of threaded hole, and nut may be incorrectly installed during reassembly, unless it is scribe marked with respect to valve body. (**Paragraph 6.3.3**)

CAUTION

Care must be taken when removing precision-ground valve gate. (**Paragraph 6.3.3**)

CAUTION

Electrostatic Discharge Sensitive (ESDS) Devices – Use proper procedures and an Electrostatic Discharge (ESD) strap for handling to prevent ESD damage. (**Paragraph 6.3.4**)

CAUTION

Handle assembly housing only. Do not touch CCA connector pins. Touching CCA connector pins may result in ESD damage. (**Paragraph 6.3.4.8**)

CAUTION

Power Supply/Card Cage Assembly must be supported as last card cage bolts are loosened. If this precaution is not observed, the assembly may fall, causing damage to components in the cabinet or injury to personnel. (**Paragraph 6.3.4.8**)

CAUTION

On the AN/WSN-8 (7093036) DEML, the Power Supply/Card Cage Assembly must not be allowed to scrape against bottom of cabinets' access opening during removal. Doing so will damage PROGRAM switch (3A1A1S1) on bottom of assembly. (**Paragraph 6.3.4.8**)

CAUTION

On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), ensure that the 60-Hz D/R CCA (3A1A1A5) and 400-Hz D/S CCA (3A1A1A6) are connected correctly. These CCAs and their associated connectors are identical in appearance. They can be distinguished only by inspection of part numbers. If the CCAs are exchanged, the system will not function and components could be damaged. (**Paragraphs 6.3.4.8**, **6.3.4.9.8**, and **6.3.4.9.9**)

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins. (**Paragraphs 6.3.4.9.2**, **6.3.4.9.2.1**, **6.3.4.9.3**, **6.3.4.9.4**, **6.3.4.9.5**, **6.3.4.9.6**, **6.3.4.9.7**, **6.3.4.9.8**, **6.3.4.9.9**, **6.3.4.9.10**, **6.3.4.9.11**, **6.3.4.9.12**, **6.3.4.10**, **6.3.4.15**, **6.3.4.16**, **6.3.4.17**, and **6.3.4.18**)

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage. (**Paragraphs 6.3.4.9.2**, **6.3.4.9.3**, **6.3.4.9.4**, **6.3.4.9.5**, **6.3.4.9.6**, **6.3.4.9.7**, **6.3.4.9.8**, **6.3.4.9.9**, **6.3.4.9.10**, **6.3.4.9.11**, **6.3.4.9.12**, **6.3.4.10**, **6.3.4.15**, **6.3.4.16**, **6.3.4.17**, and **6.3.4.18**)

CAUTION

SSBA must be supported as screws are removed. Failure to observe this precaution can result in damage to equipment or injury to personnel. (**Paragraph 6.3.4.13**)

CAUTION

Do not permit oil and grease to contact packing assembly when coating deck flange O-ring and groove. (**Paragraph 8.9.2**)

CAUTION

Do not tighten hull-bearing packing to obtain a watertight fit around dummy rodmeter. Packing is intended only to prevent or reduce vibration. (**Paragraph 8.9.2**)

CAUTION

Ground connection is critical and must be maintained at all times for the DEML system to operate properly. (**Paragraphs 8.9.4**, **8.9.5**, **8.9.6**, and **8.9.7**)

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION.

1.1.1 PURPOSE. This manual provides instructions for the installation, operation, checkout, and organizational level and intermediate level scheduled and corrective maintenance of the AN/WSN-8 (7093036), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) units.

1.1.2 SCOPE. This manual is a standard 8 chapter technical manual, and was written in accordance with Technical Manual Contract Requirement (TMCR) NDMS 030183-000 and Detail Specification MIL-DTL-24784. This manual contains general information, procedures for operation, theory of operation, scheduled maintenance, troubleshooting, corrective maintenance, parts list, and installation information.

1.1.3 APPLICABILITY. This manual is applicable to the AN/WSN-8 DEML, Part Number (P/N) 7093036; AN/WSN-8 DEML (w/FC-1), P/N 7093036; AN/WSN-8A(V)1 DEML, P/N 7404776; and AN/WSN-8A(V)2 DEML, P/N 7404776. These units can be configured as shown in **Figures 1-1** through **1-3**. Elsewhere in the manual, the Indicator-Transmitter (I/T) will be referred to as the "DEML" and the system as the "DEML system."

1.1.4 AN/WSN-8 (7093036) DEML CONFIGURATIONS. The AN/WSN-8 (7093036) DEML is available in two configurations. The first configuration consists of a Teknor AT4L or AT4L+ Central Processing Unit (CPU) Circuit Card Assembly (CCA) running first generation DEML software version 3.3. Due to obsolescence relating to the first configuration, an AN/WSN-8A (7404776) DEML, AT520L CPU CCA running newer generation, multi-platform DEML software version 4.31 was inserted into the AN/WSN-8 (7093036) DEML system design as part of Field Change 1 (FC-1), resulting in the second configuration. The AN/WSN-8 (7093036) DEML configuration provides a 60-Hz (Hertz) Synchro, 400-Hz Synchro, and MIL-STD-1553B interface. The AN/WSN-8 (7093036) DEML (w/FC-1) configuration provides a 60-Hz Synchro, 400-Hz Synchro, MIL-STD-1553B, and National Marine Electronics Association (NMEA) interface. Both configurations are installed on SSBN 726, SSGN 726, SSN 21, LCC, and LHD Class submarines and ships.

1.1.5 AN/WSN-8A (7404776) DEML CONFIGURATIONS. The AN/WSN-8A(V)1 (7404776) DEML with AN/WSN-8A(V)1, version 4.31 software, is configured using a jumper setting on the AT520L CPU CCA and Auto-Detecting software, to provide an AN/USQ-82(V) Fiber Optic Data Multiplex System (FODMS) interface. The AN/WSN-8A(V)1 (7404776) DEML also provides an NMEA interface. The AN/WSN-8A(V)1 (7404776) DEML is installed on DDG Class ships. The AN/WSN-8A(V)2 (7404776) DEML with AN/WSN-8A(V)2, version 4.31 software, is configured using a jumper setting on the AT520L CPU CCA and Auto-Detecting software to provide a Ring Laser Gyro Navigator (RLGN) interface. The AN/WSN-8A(V)2 (7404776) DEML is installed on CVN Class ships. Both the AN/WSN-8A(V)1 and AN/WSN-8A(V)2 DEML configurations provide an AN/SSN-6(V) Navigation Sensor System Interface (NAVSSI) interface.

1.2 MAINTENANCE PHILOSOPHY.

The DEML maintenance procedures covered in this manual can be performed at the organizational level. Scheduled maintenance procedures identified in this manual are inspection, cleaning, and performance checks of the equipment. **Chapters 5** and **6** contain information that will enable the technician to troubleshoot and repair and/or replace malfunctioning assemblies of the DEML. Other Department of the Navy publications containing information applicable to the DEML, which is not contained in this manual, are listed in **Table 1-4**.

1.3 GENERAL DESCRIPTION.

The DEML measures Own Ship's Speed (OSS) relative to the water, and distance traveled from a given starting point. The rodmeter generates a micro voltage based on the electromagnetic induction. This micro voltage is processed by the I/T which displays and transmits both speed and distance information. Speed is displayed in the range of 0 through 100 ±0.05 knots (k). Distance is displayed in the range of 0000.00 through 9999.99 nautical miles (Nm) ±5%.

1.3.1 MODES OF OPERATION. The DEML has seven modes of operation: Underwater, Calibration, Manual Dummy, Remote Dummy, Built-In Test (BIT), Configuration, and Status Check. The modes are selected at the I/T Control Display

Panel (CDP) keypad. When Underwater mode is selected, the speed input is generated by the selected rodmeter. On the AN/WSN-8 (7093036) DEML configuration with software version 3.3 and a Teknor AT4L or AT4L+ CPU CCA installed, the Calibration mode has three Calibration options: Electromagnetic Log Voltage Simulator (ELVS), Manual and Automatic. There is also a feature allowing calibration data to be modified. **Paragraph 2.5** describes these Calibration options. On the AN/WSN-8A(V)1 and (V)2 (7404776) DEML configurations, and on the AN/WSN-8 (7093036) DEML configuration with software version 4.31 and an AT520L CPU CCA installed, the Calibration mode has two Calibration options: Manual and Automatic. There is also a feature allowing the display, modification, and creation of calibration data in software versions 4.31 and higher. **Paragraph 2.6** describes these Calibration options. When Manual Dummy mode is selected, the operator can enter OSS via the CDP keypad. When Remote Dummy mode is selected, the operator can enter OSS via the INCREASE/DECREASE switch on the Remote Control Unit (RCU). When BIT mode is selected, the DEML will run a self-diagnostic test and report any faulty modules via the CDP display. In addition to running self-diagnostic tests, the BIT mode for the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML performs real-time performance monitoring. Errors detected are assigned specific fault codes, and are capable of being displayed and acknowledged via the CDP. Configuration mode allows certain operating parameters to be adjusted. Status Check mode permits the operator to observe certain operating status parameters.

1.4 REFERENCE DATA.

Table 1-1 lists data often required for quick reference. This data includes environmental and physical characteristics.

1.5 EQUIPMENT, ACCESSORIES, AND DOCUMENTATION SUPPLIED.

Table 1-2 contains a listing of all equipment and accessories supplied with the AN/WSN-8 (7093036) DEML, AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. Information provided includes reference designations (ref des), part numbers, names/functions, Allowance Parts List (APL) (if applicable), Repairable Identification Code (RIC) (if applicable), quantity, and notes (if applicable). **Table 1-3** contains a listing of all documentation supplied with the AN/WSN-8 (7093036) DEML, AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. Information provided includes Technical Manual Identification Number (TMIN), Volume Identification (VID), National Stock Number (NSN), title, and quantity (QTY).

1.6 EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

Test equipment, publications, and associated equipment required for operation and maintenance of the AN/WSN-8 (7093036) DEML, AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML, but not supplied are listed in **Table 1-4** and **Table 1-5**.

1.7 DEML CONFIGURATION MATRIX.

Table 1-6 contains a configuration matrix for the AN/WSN-8 (7093036) DEML, AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. Information provided includes supported interfaces, current software versions, CPU jumper settings, and type of ship class that DEML configurations are installed on.

1.8 FIELD AND FACTORY CHANGES.

Field and factory changes accomplished to the AN/WSN-8 (7093036) DEML, AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML which were available when this manual was prepared are included in **Table 1-7**. Refer to the Electronic Installation and Maintenance Book (EIMB) for any field changes issued subsequently to the printing of this maintenance manual (if applicable).

1.9 MAJOR EQUIPMENT UNITS.

Table 1-8 lists the units and assemblies which comprise the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1). **Table 1-9** lists the units and assemblies which comprise the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs. The following subsections describe the major units and assemblies of the equipment that comprise the DEML System.

1.9.1 RODMETER (UNITS 1, 6). The rodmeter (**Figure 1-4** and **Figure 1-5**) is the speed sensor for the DEML System. When the rodmeter is in the water and receiving electrical current, it develops a signal whose strength is proportional to OSS. This signal is passed to the I/T for processing, display, and speed data output to user systems.

1.9.2 INDICATOR-TRANSMITTER (3A1 OR 3). The I/T is the major unit of the DEML System. It performs all the signal processing, display, and transmitting functions. The AN/WSN-8 (7093036),

AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) I/Ts consist of the subassemblies described in the following subsections.

1.9.2.1 Control Display Panel (3A1A2A1 or 3A2A1). The CDP (3A1A2A1 or 3A2A1) is the principal Man-Machine Interface (MMI) of the DEML.

1.9.2.2 Card Cage (3A1A1 or 3A1). The AN/WSN-8 (7093036) DEML Card Cage Assembly (3A1A1) contains a CPU CCA (3A1A1A2), Analog-to-Digital (A/D) CCA (3A1A1A3), MIL-STD-1553B Interface CCA (3A1A1A4), 60-Hz Digital-to-Resolver (D/R) CCA (3A1A1A5), and a 400-Hz Digital-to-Synchro (D/S) CCA (3A1A1A6) [Not Applicable (N/A) to AN/WSN-8 (7093036) (SSN 21 Class only)] all mounted on an Industry Standard Architecture (ISA) electronic backplane.

The AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEML Card Cage Assembly (3A1) contains a CPU CCA (3A1A2), A/D CCA (3A1A3), and an Ethernet CCA (3A1A12), all mounted on an ISA electronic backplane.

1.9.2.3 Synchro Signal Booster Amplifiers (3A1AR1, 3A1AR2). Two SSBAs boost the power of the 60-Hz synchro speed outputs, enabling them to drive higher loads. The SSBAs are not applicable to the AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) I/Ts. They are installed in the AN/WSN-8 (7093036) I/T (1A3) configurations only.

1.9.2.4 Relay CCA (3A1A3 or 3A3). The Relay CCA (3A1A3 or 3A3) processes incoming signals from the RCU (Unit 4) and Rodmeter Switching Unit (RSU) (Unit 5), and outputs discrete status signals to external users.

1.9.2.5 Rodmeter CCA (3A1A4 or 3A4). The Rodmeter CCA (3A1A4 or 3A4) processes the rodmeter reference signal and rodmeter speed signal. It also outputs rodmeter coil current to external users.

1.9.2.6 Power Supply Assembly, 200 Watt (3A1A1A8 or 3A1A8). The 200-W (Watt) Power Supply Assembly (3A1A1A8 or 3A1A8) provides ±5 VDC (Volts Direct Current) and ±12 VDC power to the card cage.

1.9.2.7 Power Supply Assembly, 28 VDC (3A1A1A9 or 3A1A9). The 28-VDC Power Supply Assembly (3A1A1A9 or 3A1A9) provides operating power to the RCU (Unit 4) and Relay CCA (3A1A3 or 3A3).

1.9.2.8 Step-Down, 50 VAC Transformer Assembly (3A1A1A10 or 3A1A10). The Step-Down, 50-VAC (Volts Alternating Current) Transformer Assembly (3A1A1A10 or 3A1A10) provides excitation to the rodmeter coil.

1.9.2.9 Constant Voltage Transformer Assembly (3A1A1A11 or 3A1A11). The Constant Voltage Transformer Assembly (3A1A1A11 or 3A1A11) provides conditioned power to the Step-Down, 50-VAC Transformer Assembly (3A1A1A10 or 3A1A10).

1.9.2.10 Scott-T Transformer Assembly (3A1A5). The Scott-T Transformer Assembly (3A1A5) translates the distance output of the 60-Hz D/R CCA (3A1A1A5) to 60-Hz synchro format. The Scott-T Transformer Assembly (3A1A5) is not applicable to the AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) I/Ts. It is installed in the AN/WSN-8 (7093036) I/T (1A3) configurations only.

1.9.2.11 Fans (3A1B1 or 3B1) and (3A1A2B1, 3A1A2B2 or 3A2B1, 3A2B2). Three fans consisting of two Intake Fans (3A1A2B1, 3A1A2B2 or 3A2B1, 3A2B2) on the Front Access Panel Assembly (3A1A2 or 3A2), and one Circulating Fan (3A1B1 or 3B1) in the top of the I/T Cabinet (3A1MP1 or 3MP1), provide forced-air ventilation of the I/T enclosure.

1.9.2.12 Front Access Panel Assembly (3A1A2 or 3A2). The Front Access Panel Assembly (3A1A2 or 3A2) contains two Intake Fans (3A1A2B1, 3A1A2B2 or 3A2B1, 3A2B2), the CDP (3A1A2A1 or 3A2A1), and five fuses consisting of four 3-amp (ampere) fuses (3A1A2F1 through 3A1A2F4 or 3A2F1 through 3A2F4) and one 1-amp fuse (3A1A2F5 or 3A2F5) which protect the unit from input power surges. In addition to the fans, CDP, and fuses, the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEML Front Access Panel Assemblies (3A2) contain a fault indicator lamp that illuminates when a fault condition is detected.

1.9.2.13 Lower Access Panel (3A1MP6 or 3MP6). The Lower Access Panel (3A1MP6 or 3MP6) contains all external interface connectors.

1.9.3 REMOTE CONTROL UNIT (UNIT 4). The RCU (Unit 4) is used only in the Remote Dummy mode. It controls the speed setting on the I/T from a remote shipboard location. A switch on the unit allows the operator to increase or decrease the speed setting when OSS is being estimated from shaft speed.

1.9.4 RODMETER SWITCHING UNIT (UNIT 5). The RSU (Unit 5) controls the configuration of rodmeters to I/Ts. It is not used in single-rodmeter installations.

In dual I/T installations (using RSU P/N 50247-501) selecting NORMAL connects each I/T to its normal

rodmeter; selecting ALTERNATE cross-connects the rodmeters (i.e., I/T No. 1 is connected to Rodmeter No. 2 and I/T No. 2 is connected to Rodmeter No. 1).

In single I/T installations (using RSU P/N 1023D0221) selecting RODMETER NO. 1 or RODMETER NO. 2 determines which rodmeter furnishes the speed signal to the I/T.

1.9.5 RODMETER CUTOUT SWITCH (UNIT 9). The Rodmeter Cutout Switch (Unit 9) disconnects the 50-VAC excitation to the Rodmeter whenever the Rodmeter is not immersed in water.

Table 1-1. DEML Reference Data

EQUIPMENT	SPECIFICATIONS	
DEML System	Manufacturer:	See List of Manufacturers.
	Primary Power Requirements:	115 VAC ±6%, 60-Hz ±3%, single-phase, 230-W maximum
		115 VAC ±6%, 400-Hz ±5%, single-phase, 5-W maximum*
	Internal Fuses:	F1 - F4 3 amps F5 1 amp
	Inputs:	
AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) DEMLs	Rodmeter	325µ (micro) volt/knot
	Remote Control Unit	Dummy Speed
AN/WSN-8 (7093036) AN/WSN-8, (7093036) (w/FC-1) DEMLs	Command and Control System (CCS), Digital Data Bus (DDB) [AN/WSN-8 (7093036) (SSBN 726 Class only)]	Three-dimensional velocity and inertial health
	Ship Control Bus [AN/WSN-8 (7093036) (SSN 21 Class only)]	
AN/WSN-8A(V)1 (7404776) DEML	AN/USQ-82(V) FODMS (RS-422):	Heading Roll Pitch Velocity North Velocity East Latitude Longitude Time System Status
AN/WSN-8A(V)2 (7404776) DEML	AN/WSN-7(V) or AN/WSN-7A(V) RLGN (RS-422):	Roll Pitch Heading Yaw Rate Pitch Rate Roll Rate System Status

Table 1-1. DEML Reference Data - Continued

EQUIPMENT	SPECIFICATIONS	
AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) DEMLs	AN/SSN-6(V) NAVSSI (Ethernet):	Julian Date Roll Pitch Roll Rate Pitch Rate Heading Rate System Status
	Outputs:	
AN/WSN-8 (7093036) AN/WSN-8, (7093036) (w/FC-1) DEMLs	Synchro OSS (60-Hz):	40 KPR (knots per revolution) 100 KPR**
	Synchro OSS (400-Hz):	10 KPR** 40 KPR** 100 KPR**
	Synchro Own Ship's Distance (OSD) (60-Hz):	360 rev/Nm** (revolutions per nautical mile)
	Analog:	Mode Monitor Coil Current
	Digital Data Bus (MIL-STD-1553B):	Own Ship's Speed Own Ship's Distance Coil Current System Status System Mode Built-In Test
	Ship Control Bus (MIL-STD-1553B):	Own Ship's Speed Own Ship's Distance Coil Current System Status System Mode Built-In Test
AN/WSN-8 (7093036) (w/FC-1) DEML	NMEA	VBW Message
AN/WSN-8A(V)1 (7404776) DEML	AN/USQ-82(V) FODMS (RS-422):	Own Ship's Speed 10 knots Own Ship's Speed 40 knots Own Ship's Speed 100 knots Own Ship's Distance System Status
	NMEA	VBW Message
AN/WSN-8A(V)2 (7404776) DEML	AN/WSN-7(V) or AN/WSN-7A(V) RLGN (RS-422):	Longitudinal Velocity System Status
AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) DEMLs	AN/SSN-6(V) NAVSSI (Ethernet):	Own Ship's Speed 100 knots System Status

Table 1-1. DEML Reference Data - Continued

EQUIPMENT	SPECIFICATIONS		
AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) DEMLs	Modes of Operation:	Underwater Calibration Manual Dummy Remote Dummy Configuration Built-In Test Status Check	
	Power Outputs:		
	Rodmeter:	325µ VAC/knots ±5%	
	I/T to Rodmeter:	50 VAC, 60 Hz	
	Displayed Speed:	0 to 100 knots	
	Accuracy:	±0.05 knots	
	Displayed Distance:	0000.00 to 9999.99 Nm	
	Accuracy:	±5%	
	Rodmeter Electrodes:	Maximum quadrature voltage: 50 V	
	Rodmeter Coil:	Electromagnet Operating Voltage: 50 VAC, 60-Hz, 500 mA (milli-amp) ±100 mA	
	Cooling:	Forced air	
	Heat Dissipation:	683 Btu/h (British thermal unit per hour)	
	Relative Humidity Tolerance:	90% maximum	
	Ambient Temperature Tolerance:	-40°C (-40°F) to 70°C (158°F)	
	Shipping Data:		
	Crated Dimensions (inches) (Height x Width x Depth)	Rodmeter, IC/E28-6F:	33 x 11 x 11
		I/T:	32 x 19 x 20.50
		RCU:	4.25 x 6.25 x 8.25
		RSU:	12.5 x 14 x 18
	Crated Weight (pounds)	Rodmeter, IC/E28-6F:	52
		I/T:	90
		RCU:	2.5
		RSU:	9.5

Table 1-1. DEML Reference Data - Continued

EQUIPMENT	SPECIFICATIONS		
AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) DEMLs (cont.)	Uncrated Dimensions (inches) (Height x Width x Depth)	Rodmeter, IC/E28-6F:	29.38 x 7.88 x 7.38
		AN/WSN-8 I/T:	24.40 x 15.75 x 14.94
		AN/WSN-8A I/T:	25.40 x 16.00 x 15.50
		RCU:	5 x 5.5 x 2.69
		RSU:	8 x 6.88 x 6
	Uncrated Weight (pounds)	Rodmeter, IC/E28-6F:	33
		I/T:	52
		RCU:	2
		RSU:	5.5
* [N/A to AN/WSN-8 (7093036) (SSN 21 Class only) and AN/WSN-8A(V)1, (V)2 (7404776)] ** [N/A to AN/WSN-8 (7093036) (SSN 21 Class only)]			

Table 1-2. Equipment and Accessories Supplied

UNIT (REF DES)	CAGE/PART NO./NSN	NAME/DESIGNATION/ DESCRIPTION/FUNCTION	APL/RIC	QTY	NOTES
Unit 3 and/or 8	7093036	Indicator-Transmitter, AN/WSN-8		1 or 2	
Unit 3 and/or 8	7404776	Indicator-Transmitter, AN/WSN-8A(V)1 or (V)2		1 or 2	

Table 1-3. Documentation Supplied

TMIN/VID NO./ IDENTIFICATION NO.	NSN	TITLE/DESCRIPTION	QTY
Technical Manuals			
SE178-A1-OMP-010	0910-LP-102-3411	Indicator-Transmitter, Digital Electro-magnetic Log, AN/WSN-8 (7093036) and AN/WSN-8A (7404776) Technical Manual	1 ea
CD-ROMs			
N6523600067	0913-LP-101-7654	Indicator-Transmitter, Digital Electro-magnetic Log, AN/WSN-8 (7093036) and AN/WSN-8A (7404776) Technical Manual	2 ea

Table 1-4. Equipment Required but Not Supplied

CATEGORY	QTY	RECOMMENDED EQUIPMENT	ALTERNATE	APPLICATION	SCAT CODE
Rodmeter	1 or 2	IC/E28-6 IC/E28-6F IC/E-46-6 IC/E 72-6 IC/E 100-6	– – –	Speed Data Sensor	– – –
IC/E28-6		TBD			
External Hull Fitting	1	Determined by Installing Facility	– – –	Through-hull connection of submarine rodmeter cables	– – –
Junction Box	1	Determined by Installing Facility	– – –	Interconnection between rodmeters and I/Ts	– – –
RCU	1	50147-501	– – –	Speed inputs in Remote Dummy mode	– – –
RSU	1	50247-501 (SSBN 726 Class) or 1023D0221	– – –	Selects which rodmeter is connected to which I/T	– – –
Interconnecting Hardware	AR	Refer to Table(s) **8-3** through **8-8**	– – –	Interconnection between RCU, RSU, and I/T(s)	– – –
Megohmmeter	1	21260	– – –	Maintenance	4448
ELVS	1	Mk 1 Mod 0 SPMIG 2474	– – –	Calibration/Maintenance	TCE 0341
RMS Voltmeter	1	323-20 Mod 40	ME-30A/U	Maintenance	4205
Multimeter	1	77/AN SPMIG 0901	AN/PSM-4	Maintenance	4245
Oscilloscope	1	2456B-11	AN/USM-425	Maintenance	4308
Electronic Counter	1	5354A	– – –	Calibration	4296
Digital Multimeter	1	8600A-012	– – –	Maintenance	4212

Table 1-5. Publications Required but Not Supplied

TYPE	TITLE	NSN	QTY
PMS	Maintenance Requirement Cards (MRCs)	– – –	1 set
OP 4429 Vol 3 Part 6 OP 4429 Vol 3 Part 6D OP 4603 Vol 3 Part 9	Standard Maintenance Procedures (SMPs)	– – –	AR
SSP OD 63100	Navigation Standard Operating Procedures	– – –	1
Engineering Drawing	Top Level 7093036 (AN/WSN-8 DEML)	– – –	1
Engineering Drawing	Top Level 7404776 (AN/WSN-8A DEML)	– – –	1
Technical Manual	DOD-HDBK-263: Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices), 2 May 1980	– – –	1
Technical Manual	Installation Operation, Maintenance, Repair, and Parts Support; Hull Mounted Rodmeter Type IC/E28-6F	0965-LP-102-2010	1
Technical Manual SE178-AM-MMM-010	Maintenance Manual for Electromagnetic Log Voltage Simulator Mk 1, Mod 0	– – –	1
Technical Manual S9427-AN-MMO-010/ WSN-7	AN/WSN-7(V)1, -7(V)2, -7(V)3 Inertial Navigation System [CN-1695/WSN-7(V), CN-1696/WSN-7(V), and CN-1697/WSN-7(V) Ring Laser Gyro Navigator]	0910-LP-100-7047	1
Technical Manual EE170-AV-OMI-010 EE170-AV-OMI-020 EE170-AV-OMI-030 EE170-AV-OMI-040	Navigation Sensor System Interface (NAVSSI); AN/SSN-6	0913-LP-102-5112 0913-LP-102-5113 0913-LP-102-5114 0913-LP-102-5115	1 1 1 1
Technical Manual	Fiber Optic Data Multiplex System (FODMS); AN/USQ-82(V)	0910-LP-017-7080	1
SSBN 726 Class Interface Design Specification	T9410-CW-IDS-A10/DDB INTFC 6.0C/D	– – –	AR
SSN 21 Class Interface Design Specification	T9410-CW-IDS-A10/DDB INTFC 6.0C/D	– – –	AR
Installation Control Drawing (ICD)	7404414 (Digital Electromagnetic Log AN/WSN-8)	– – –	1
Installation Control Drawing	7404802 (Digital Electromagnetic Log AN/WSN-8A)	– – –	1

Table 1-6. DEML Configuration Matrix

UNIT NOMEN-CLATURE:	AN/WSN-8 (7093036)	AN/WSN-8 (7093036) (w/FC-1)	AN/WSN-8A (7404776) (V)1	AN/WSN-8A (7404776) (V)2	AN/WSN-8A (7665727) (V)3	AN/WSN-8A (7665728) (V)4
Supported Interfaces:						
60-Hz Synchro	X	X			X	X
400-Hz Synchro	X	X			X	X
MIL-STD-1553B	X	X			X	
FODMS			X			
NAVSSI			X	X		
RLGN				X		
NMEA		X	X			
Current Software:	AN/WSN-8, Version 3.3	AN/WSN-8, Version 4.31	AN/WSN-8A(V)1 Version 4.31	AN/WSN-8A(V)2, Version 4.31	AN/WSN-8A(V)3, Version 4.31	AN/WSN-8A(V)4, Version 4.31
CPU Jumper Setting:	**Figure 6-12 (Sheets 1, 2)**	**Figure 6-12 (Sheet 6)**	**Figure 6-12 (Sheet 4)**	**Figure 6-12 (Sheet 5)**	TBD	TBD
Installed On:	SSBN 726 Class SSN 21 Class LCC 19 LHD 3	SSBN 726 Class SSN 21 Class LCC 19 LHD 3	DDG 80-112	CVN 76	TBD	TBD
NOTE: Victor numbers (V)1, (V)2, (V)3, and (V)4 differentiate DEML configurations and are used to reference specific procedures for each configuration.						

Table 1-7. Field, Interim, and Factory Changes

CHANGE NO.	NAVSHIPS/EIB NO.	DESCRIPTION
Field Change 1 (FC-1)	Trident EC-0033	AN/WSN-8 Commercial Off-The-Shelf (COTS) technology refresh

Table 1-8. Summary of AN/WSN-8 (7093036) Units and Assemblies

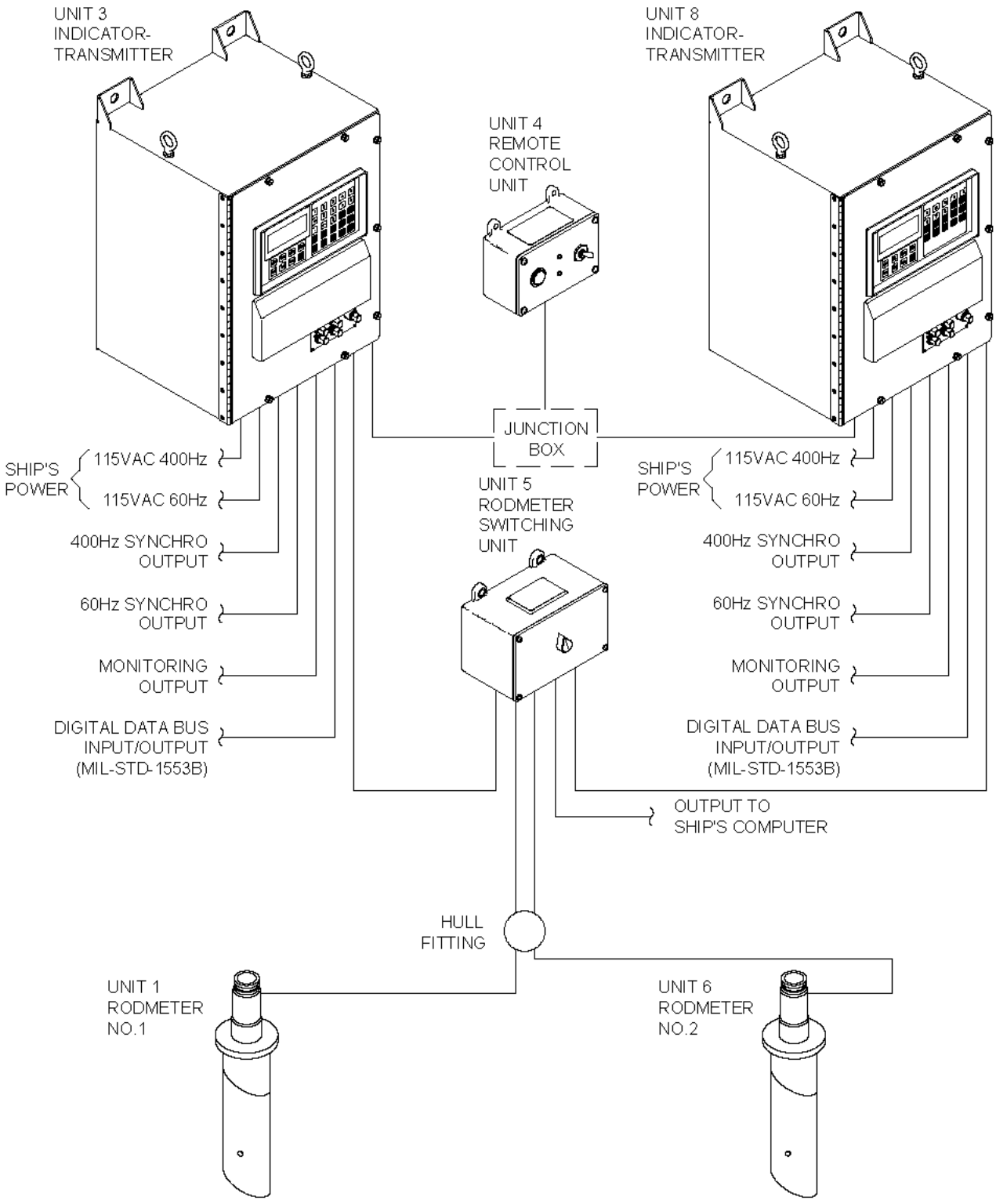
ASSEMBLY (REF DES)	NOTES	ASSEMBLY P/N	NAME/FUNCTION
Unit 2		H-3029	Sea Valve Assembly
Unit 3 and Unit 8 3A1		7093036	I/T Set, DEML AN/WSN-8
3A1AR1, 3A1AR2		175A394	Amplifier, Synchro Signal Booster, 60 Hz, 25 VA (Volt-Ampere)
3A1W1		7093066	Main Wiring Harness Assembly
3A1W2	1	7093053 or 7404794	Rodmeter CCA to A/D CCA Interface Cable Assembly
3A1W3	1	7093060-1 or 7404825	1553 Interface Cable Assembly
3A1W4	2	7093060-2	1553 Interface Cable Assembly
3A1A1		7093059	Power Supply/Card Cage Assembly
3A1A1W1		7093136	Wiring Harness, Power Supply/Card Cage Assembly
3A1A1W2		7093137	Wire, Jumper
3A1A1W3		7093063	CPU Programming Cable
3A1A1A2	1	7093040 or 7404787	CPU CCA
3A1A1A3	1	7093052 or 7404811	A/D CCA
3A1A1A4	1	7093041 or 7404824	MIL-STD-1553B Interface CCA
3A1A1A5		7093051	D/R CCA, 60 Hz
3A1A1A6		7093049	D/S CCA, 400 Hz
3A1A1A7		7093058	Backplane, Electronic
3A1A1A8		7093054	Power Supply Assembly, 200 W
3A1A1A9		7093048	Power Supply Assembly, 28 VDC
3A1A1A10		7093055	Transformer Assembly, Step-Down, 50 VAC
3A1A1A11		7093043	Transformer Assembly, Constant Voltage
3A1A2		7093069	Access Panel Assembly, Front
3A1A2A1		7093037	Control Display Panel
3A1A3		7093046	Relay CCA
3A1A4	1	7093050 or 7093045	Rodmeter CCA
3A1A5		7093039	Transformer Assembly, Scott-T
3A1A6		7093038	Filter Assembly, Power Line
Unit 4		50147-501	Remote Control Unit Assembly Type B
Unit 5		50247-501	Rodmeter Switching Unit Assembly
Unit 9		M151373-002	Rodmeter Cutout Switch

Table 1-8. Summary of AN/WSN-8 (7093036) Units and Assemblies - Continued

ASSEMBLY (REF DES)	NOTES	ASSEMBLY P/N	NAME/FUNCTION
NOTES:			
1. Part of Field Change 1:			
Rodmeter CCA to A/D CCA Interface Cable Assembly, P/N 7404794			
1553B Interface Cable Assembly, P/N 7404825			
CPU CCA, P/N 7404787			
A/D CCA, P/N 7404811			
MIL-STD-1553B Interface CCA, P/N 7404824			
Rodmeter CCA, P/N 7093045			
2. 1553B Interface Cable Assembly, P/N 7093060-2 N/A to AN/WSN-8 (7093036) DEML (w/FC-1).			

Table 1-9. Summary of AN/WSN-8A (7404776) Units and Assemblies

ASSEMBLY (REF DES)	NOTES	ASSEMBLY P/N	NAME/FUNCTION
Unit 2		H-3029	Sea Valve Assembly
Unit 3 and Unit 8 3		7404776	I/T Set, DEML AN/WSN-8A
3W1		7404780	Main Wiring Harness Assembly
3W2		7404794	Rodmeter CCA to A/D CCA Interface Cable Assembly
3W3		7404795	Ethernet Cable Assembly
3A1		7404777	Power Supply/Card Cage Assembly
3A1W1		7404778	Wiring Harness, Power Supply/Card Cage Assembly
3A1W2		7093062-1	Cable Assembly, Ribbon RS 422
3A1W3		7093062-2	Cable Assembly, Ribbon RS 422
3A1W4		7404793	Cable Assembly, Ribbon RS 232
3A1A2		7404787	CPU CCA
3A1A3		7093042	A/D CCA
3A1A7		7093058	Backplane, Electronic
3A1A8		7093054	Power Supply Assembly, 200 W
3A1A9		7093048	Power Supply Assembly, 28 VDC
3A1A10		7093055	Transformer Assembly, Step-Down, 50 VAC
3A1A11		7093043	Transformer Assembly, Constant Voltage
3A1A12		7404784	Ethernet CCA
3A2		7404785	Access Panel Assembly, Front
3A2A1		7093037-2	Control Display Panel
3A3		7093046	Relay CCA
3A4		7093045	Rodmeter CCA
3A6		7093038	Filter Assembly, Power Line
Unit 4		7404797	Remote Control Unit Assembly, Type B
Unit 5		50247-501	Rodmeter Switching Unit Assembly
Unit 9		M151373-002	Rodmeter Cutout Switch



AN/WSN-8 (7093036) and AN/WSN-8
(7093036)(w/FC-1) Configurations

Figure 1-1. Dual I/T/Dual Rodmeter DEML Installations (Sheet 1 of 3)

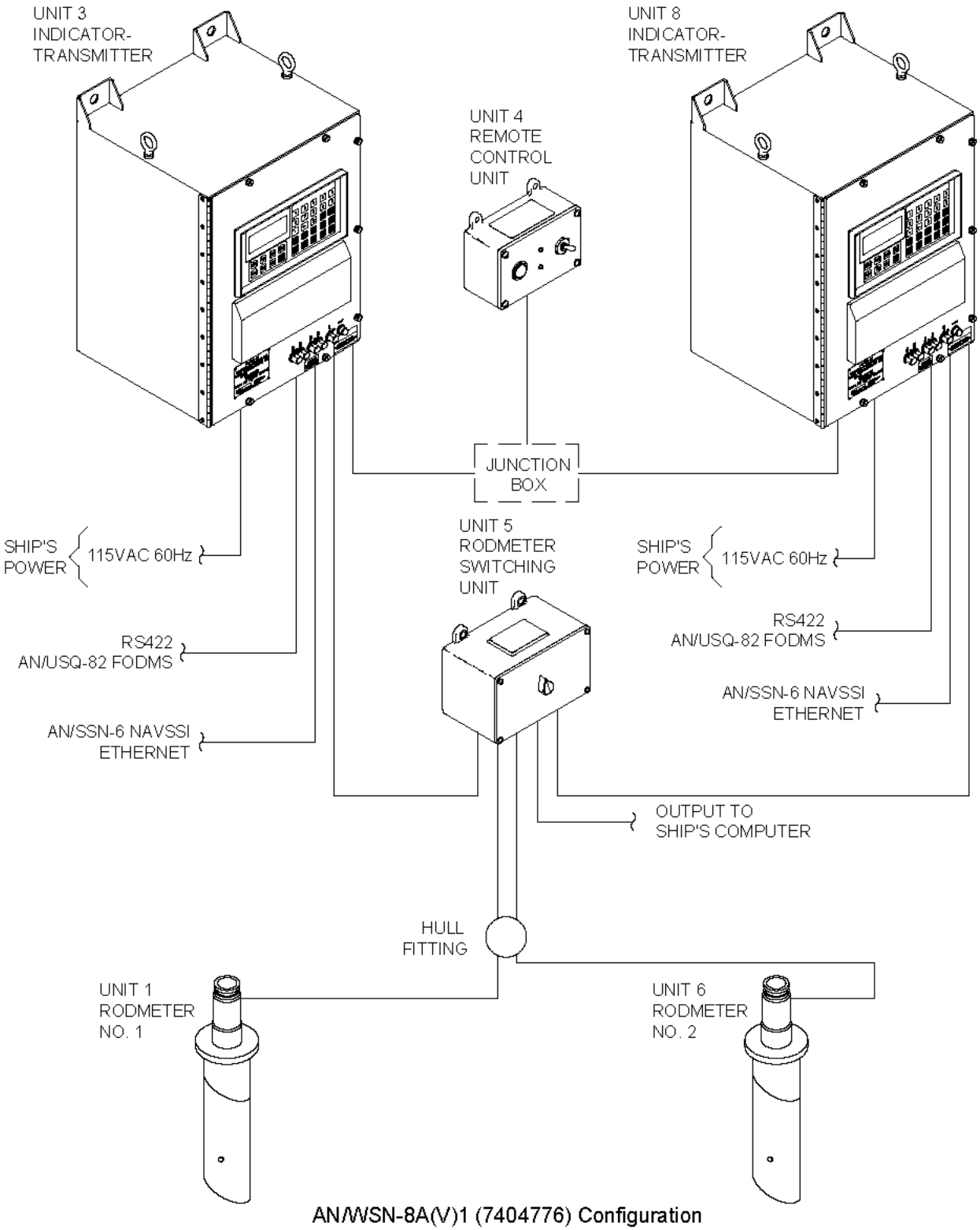


Figure 1-1. Dual I/T/Dual Rodmeter DEML Installations (Sheet 2)

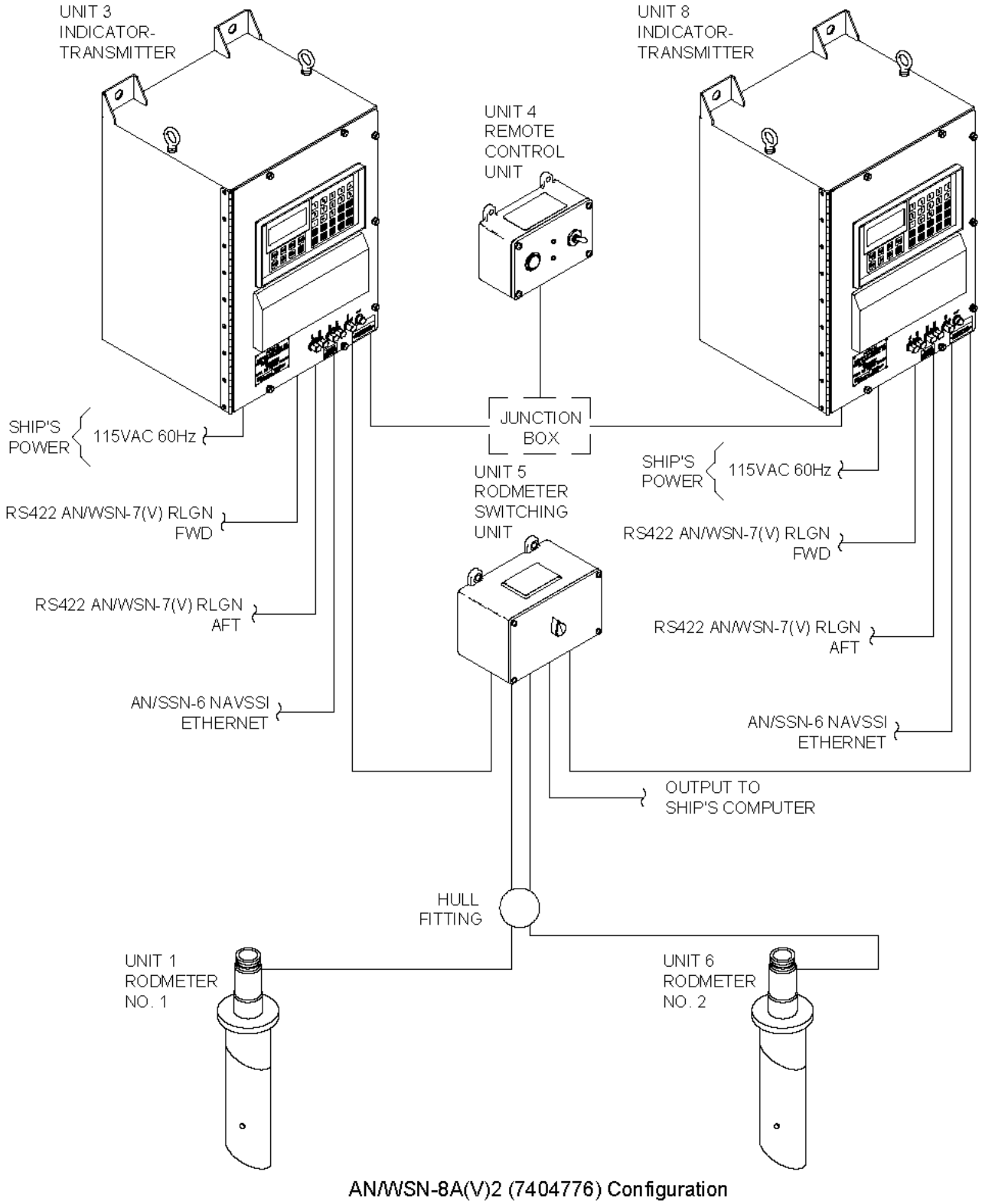
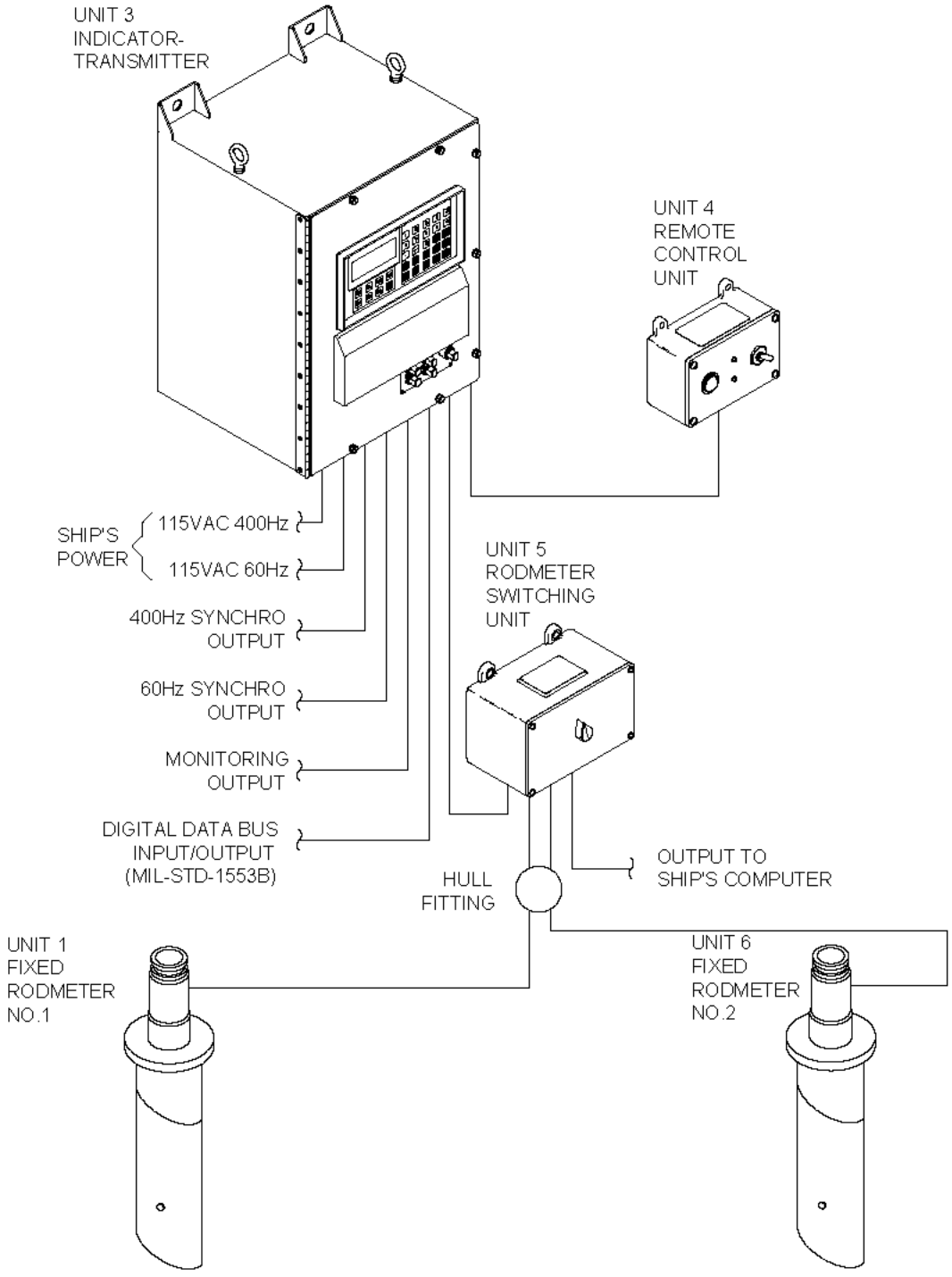
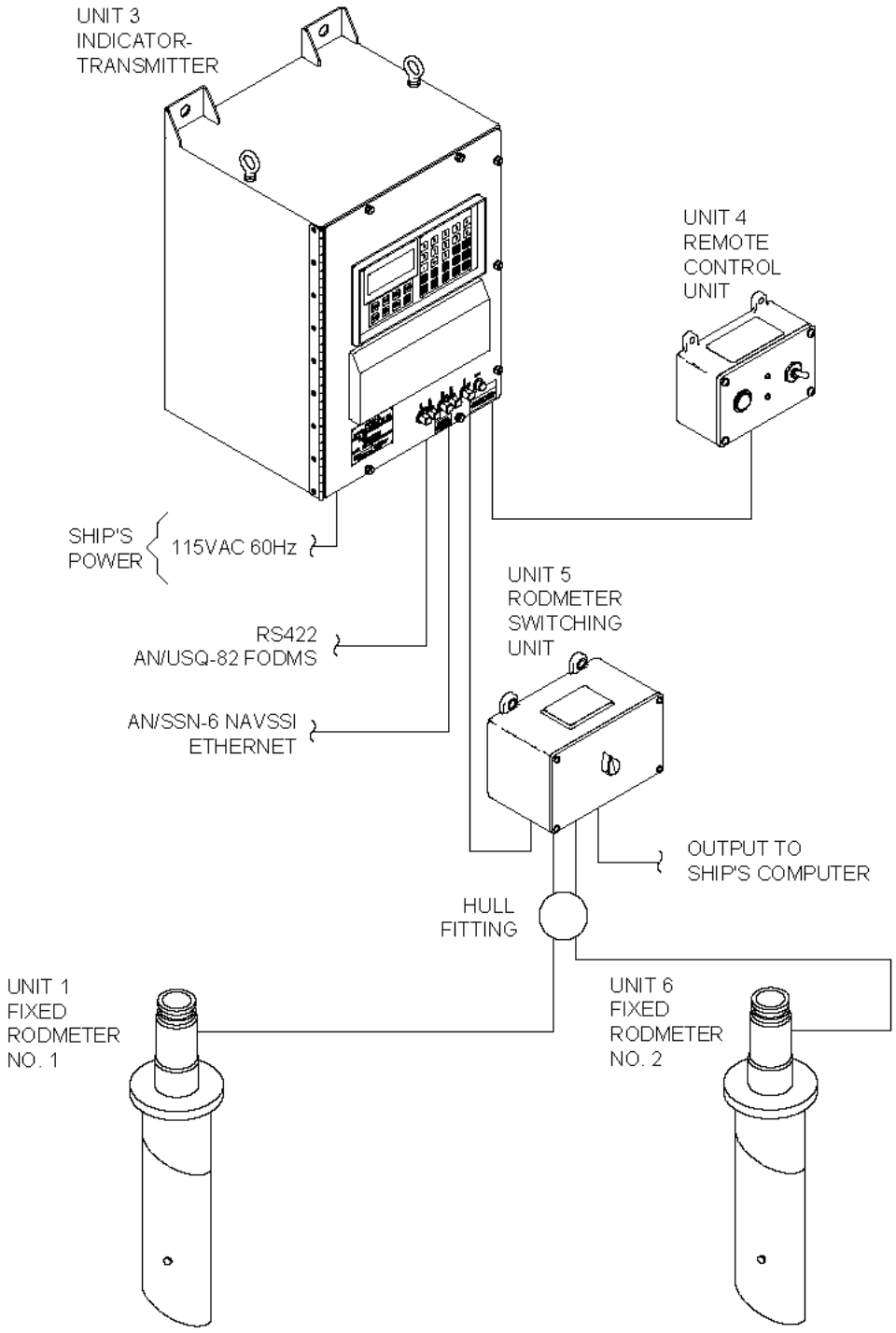


Figure 1-1. Dual I/T/Dual Rodmeter DEML Installations (Sheet 3)



AN/WSN-8 (7093036) and AN/WSN-8 (7093036)(w/FC-1) Configurations

Figure 1-2. Single I/T/Dual Rodmeter DEML Installations (Sheet 1 of 3)



AN/WSN-8A(V)1 (7404776) Configuration

Figure 1-2. Single I/T/Dual Rodmeter DEML Installations (Sheet 2)

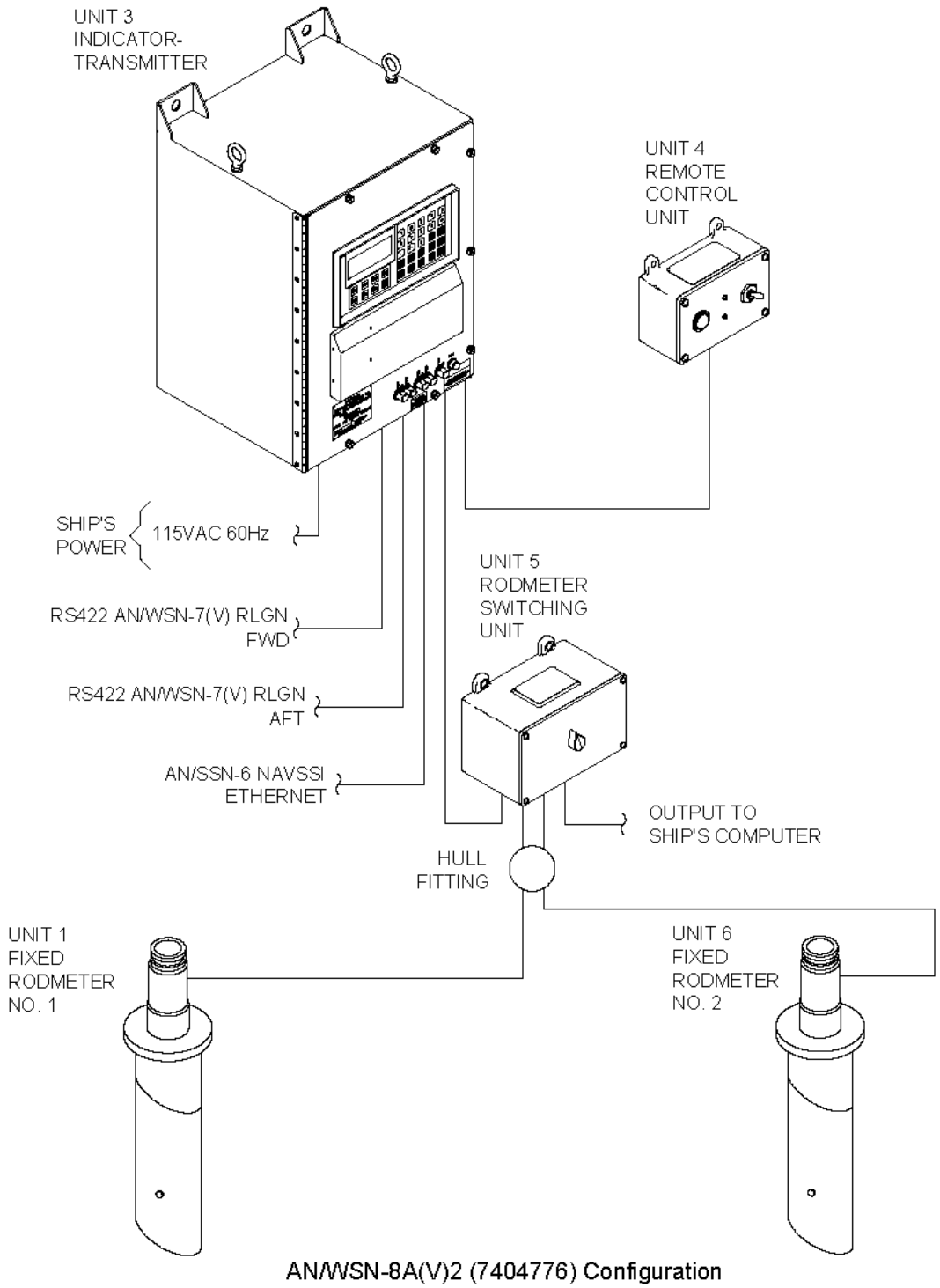
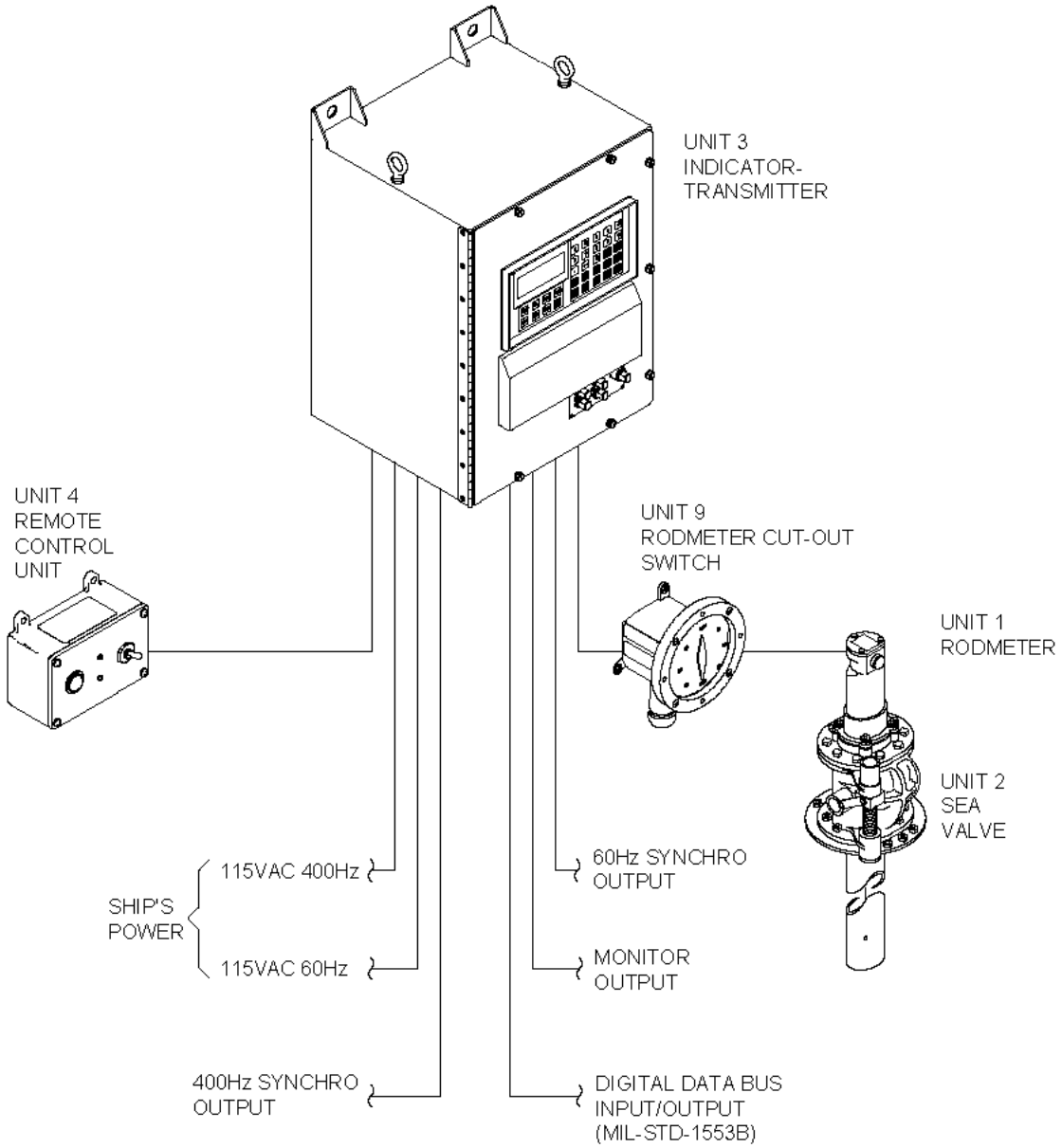
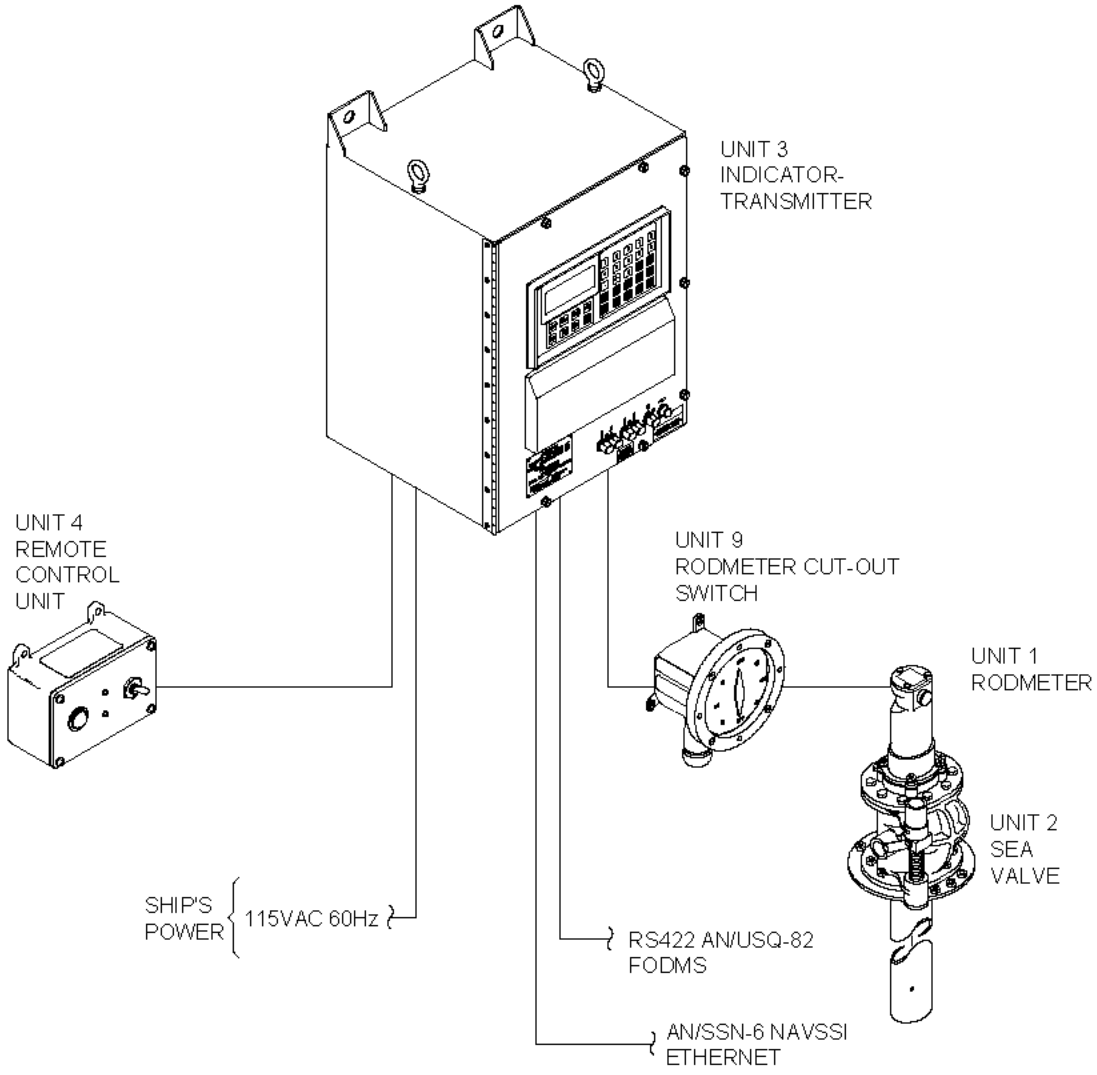


Figure 1-2. Single I/T/Dual Rodmeter DEML Installations (Sheet 3)



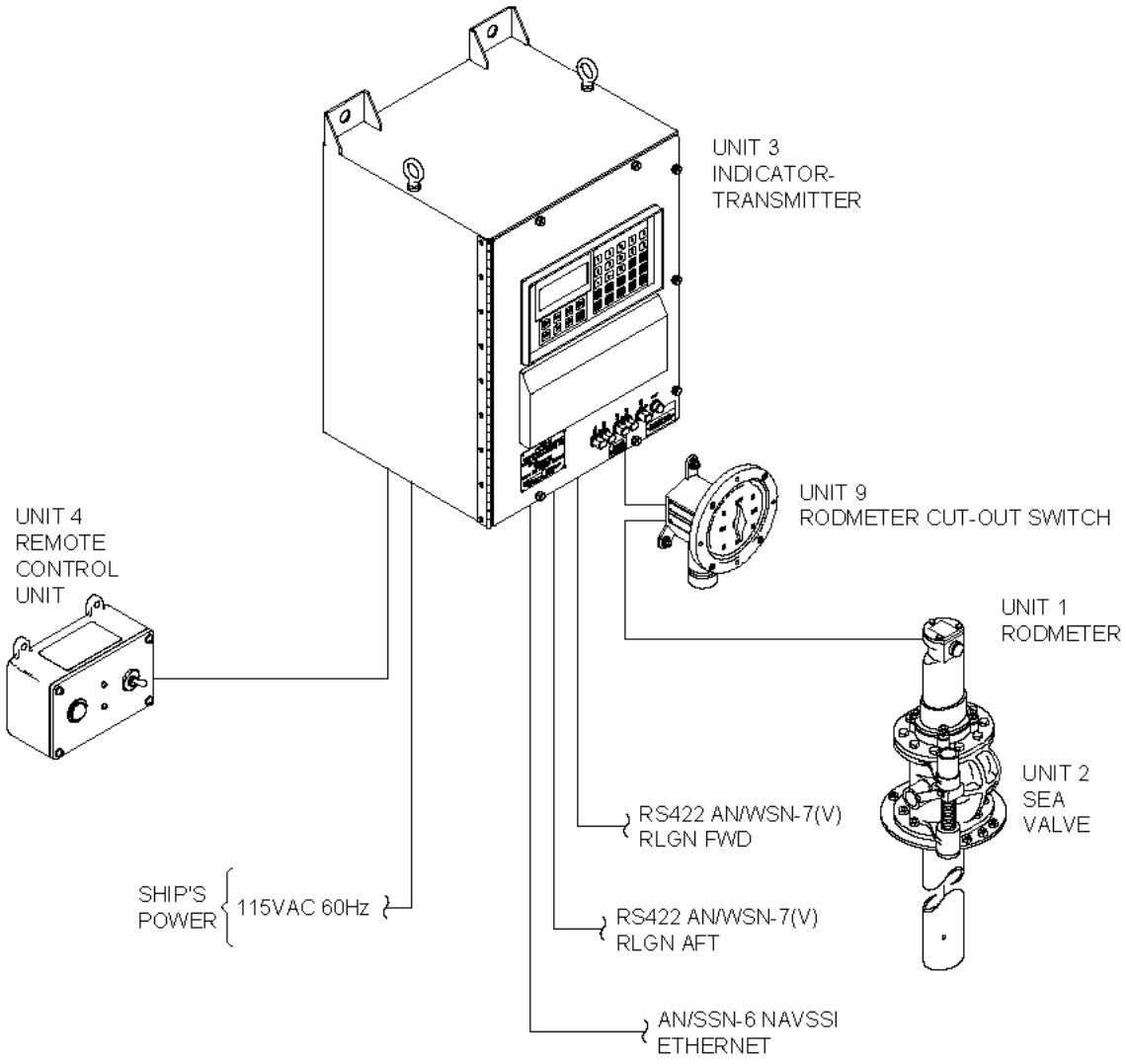
AN/WSN-8 (7093036) and AN/WSN-8 (7093036)(w/FC-1) Configurations

Figure 1-3. Single I/T/Single Rodmeter DEML Installations (Sheet 1 of 3)



AN/WSN-8A(V)1 (7404776) Configuration

Figure 1-3. Single I/T/Single Rodmeter DEML Installations (Sheet 2)



AN/WSN-8A(V)2 (7404776) Configuration

Figure 1-3. Single I/T/Single Rodmeter DEML Installations (Sheet 3)

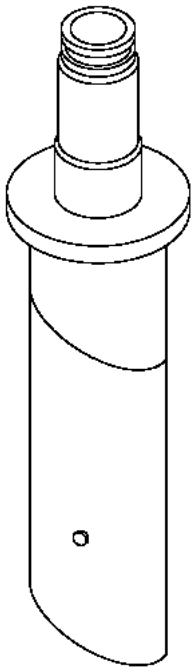


Figure 1-4. Fixed Rodmeter

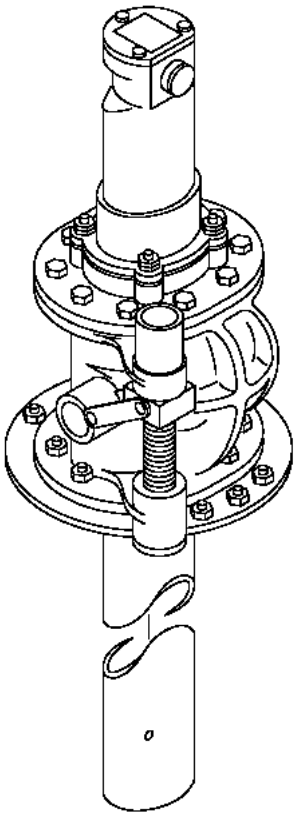


Figure 1-5. Retractable Rodmeter and Sea Valve Assembly

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CHAPTER 2
OPERATION

2.1 INTRODUCTION.

Chapter 2 identifies the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) units modes of operation; operator control functions, and operator controls and indicators; describes their use; and provides procedures for turning on and operating these DEML units. (Refer to **Table 1-6** for the DEML configurations.) Since this document has been developed as a Standard Generalized Mark-Up Language (SGML) document with bookmark reference to tables and figures, Chapter 2 tables, then figures are provided at the end of the chapter.

This chapter is divided into four sections. Section I - AN/WSN-8 (7093036) DEML Operating Procedures contains procedures for turning on and operating the AN/WSN-8 (7093036) DEML. Section II - AN/WSN-8 (7093036) DEML (w/FC-1) Operating Procedures contains procedures for turning on and operating the AN/WSN-8 (7093036) DEML (w/FC-1). Section III - AN/WSN-8A(V)1 (7404776) DEML Operating Procedures contains procedures for turning on and operating the AN/WSN-8A(V)1 (7404776) DEML. Section IV - AN/WSN-8A(V)2 (7404776) DEML Operating Procedures contains procedures for turning on and operating the AN/WSN-8A(V)2 (7404776) DEML.

The primary function of the DEML Indicator-Transmitter (I/T) is to provide ship's speed and distance traveled data to a variety of user systems and remote indicators. Own Ship's Speed (OSS) through the water and Own Ship's Distance (OSD) are displayed on the I/T front panel display and are supplied to other shipboard systems.

Front panel controls allow selection among seven modes of operation: Underwater, Calibration, Manual Dummy, Remote Dummy, Built-In Test (BIT), Configuration, and Status Check. The modes are selected at the Control Display Panel (CDP). When Underwater mode is selected, the speed input is generated by the selected rodmeter. When Manual Dummy mode is selected, the operator can enter OSS via the I/T keypad. When Remote Dummy mode is selected, the operator can enter OSS via the INCREASE/DECREASE switch on the dummy log Remote Control Unit (RCU). When BIT mode is selected, the DEML will run a self-diagnostic test and report any faulty modules via the I/T CDP. In addition to running self-diagnostic tests, the BIT mode for the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML performs real-time performance monitoring. Errors detected are assigned specific fault codes, and are capable of being displayed and acknowledged via the CDP. For the AN/WSN-8 (7093036) DEML, the Calibration options are: Electromagnetic Log Voltage Simulator (ELVS) (Pre-calibration), Manual and Automatic. There is also a feature allowing calibration data to be modified. **Paragraph 2.5** describes these Calibration options. For the AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEMLs, the Calibration options are: Manual and Automatic. There is also a feature allowing the display, modification, and creation of calibration data in software versions 4.31 and higher. **Paragraph 2.6** describes these Calibration options. Configuration mode permits selection of certain operating parameters. Status Check mode permits the operator to observe certain operating status parameters.

2.2 CONTROLS AND INDICATORS.

Operator controls and indicators are listed and described in **Table 2-3**. I/T CDP controls and indicators are shown in **Figure 2-1**. RCU controls and indicators are shown in **Figure 2-2**. Rodmeter Switching Unit (RSU) controls and indicators are shown in **Figure 2-3**.

2.3 OPERATING PROCEDURES.

2.3.1 GENERAL INFORMATION. Where two rodmeters are installed, either rodmeter may be put into service if the other becomes inoperative. When a single rodmeter is installed and becomes inoperative, or if both rodmeters in a dual installation become inoperative, the DEML can still be operated in either Manual Dummy or Remote Dummy mode. These alternate modes allow speed outputs to be maintained when rodmeter inputs are not available. When operating in either Remote or Manual Dummy modes, status bits on digital interfaces can be overridden to match the Underwater mode status bits. Override can be accomplished by enabling "Not Normal Override" when entering Remote or Manual Dummy modes. External systems connected to DEML digital interfaces will indicate and process data as if the rodmeter sensor was operable when the "Not Normal Override" is enabled. In rodmeter

casualty conditions, the "Not Normal Override" allows weapon systems to operate normally when dependent on OSS. All operating procedures apply to both I/Ts (Units 3 and/or 8). If both I/Ts are to be used, repeat the desired operating procedure(s) for each. The Operation Mode Matrix in **Table 2-1** refers to Normal and Valid operating conditions for SSBN 726 Class use. **Table 2-2** provides status of built-in testing of circuits for DEML operational status.

2.3.2 SAFETY PRECAUTIONS. Operating personnel must observe safety precautions at all times. See Safety Summary.

2.3.3 STARTUP. Refer to Section I, **Table 2-6** for AN/WSN-8 (7093036) DEML Startup Procedures. Refer to Section II, **Table 2-22** for AN/WSN-8 (7093036) DEML (w/FC-1) Startup Procedures. Refer to Section III, **Table 2-44** for AN/WSN-8A(V)1 (7404776) DEML Startup Procedures. Refer to Section IV, **Table 2-67** for AN/WSN-8A(V)2 (7404776) DEML Startup Procedures.

2.3.4 UNDERWATER MODE. The Underwater mode is used during normal operation. In this mode, OSS data is furnished by the rodmeters. Underwater mode is the default startup mode. To select the Underwater mode manually on the AN/WSN-8 (7093036) DEML, perform the procedure in Section I, **Table 2-7**. To select the Underwater mode manually on the AN/WSN-8 (7093036) DEML (w/FC-1), perform the procedure in Section II, **Table 2-23**. To select the Underwater mode manually on the AN/WSN-8A(V)1 (7404776) DEML, perform the procedure in Section III, **Table 2-45**. To select the Underwater mode manually on the AN/WSN-8A(V)2 (7404776) DEML, perform the procedure in Section IV, **Table 2-68**.

2.3.5 CALIBRATION MODE. To achieve maximum accuracy of the DEML, it is necessary to calibrate the system for nonlinear speed characteristics that may be caused by local accelerations of the water due to hull size and shape, viscous boundary layers, or wakes from sonar domes or other appendages. The calibration also corrects the nonuniform group delays in the DEML data acquisition hardware. For the AN/WSN-8 (7093036) DEML, the Calibration options are: ELVS (Pre-calibration), Manual and Automatic. These Calibration options are described in **Paragraph 2.5**. For the AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A (V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEMLs, the Calibration options are: Manual and Automatic. These Calibration options are described in **Paragraph 2.6**.

2.3.6 MANUAL DUMMY MODE. Manual Dummy mode is used when the rodmeter is inoperative and it is desired to set a specific speed manually at the I/T. In this mode, the speed indication can be set to any desired speed by entering the value on the CDP keypad. To operate in the Manual Dummy mode on the AN/WSN-8 (7093036) DEML, perform the procedure in Section I, **Table 2-8**. To operate in the Manual Dummy mode on the AN/WSN-8 (7093036) DEML (w/FC-1), perform the procedure in Section II, **Table 2-24**. To operate in the Manual Dummy mode on the AN/WSN-8A(V)1 (7404776) DEML, perform the procedure in Section III, **Table 2-46**. To operate in the Manual Dummy mode on the AN/WSN-8A(V)2 (7404776) DEML, perform the procedure in Section IV, **Table 2-69**.

2.3.7 REMOTE DUMMY MODE. Remote Dummy mode is used when the rodmeter is inoperative and it is desired to base OSS on shaft speed. The desired speed setting is determined by converting Own Ship shaft revolutions per minute (rpm) to equivalent speed values. The speed indication is set by toggling the INCREASE/DECREASE switch on the RCU. To operate in the Remote Dummy mode on the AN/WSN-8 (7093036) DEML, perform the procedure in Section I, **Table 2-9**. To operate in the Remote Dummy mode on the AN/WSN-8 (7093036) DEML (w/FC-1), perform the procedure in Section II, **Table 2-25**. To operate in the Remote Dummy mode on the AN/WSN-8A(V)1 (7404776) DEML, perform the procedure in Section III, **Table 2-47**. To operate in the Remote Dummy mode on the AN/WSN-8A(V)2 (7404776) DEML, perform the procedure in Section IV, **Table 2-70**.

2.3.8 BIT MODE. BIT mode causes the DEML to run a self-diagnostic test and report any faulty modules on the CDP display. To operate in BIT mode, perform the procedure in Section I, **Table 2-10** for the AN/WSN-8 (7093036) DEML. Perform the procedure in Section II, **Table 2-26** for the AN/WSN-8 (7093036) DEML (w/FC-1). Perform the procedure in Section III, **Table 2-48** for the AN/WSN-8A(V)1 (7404776) DEML. Perform the procedure in Section IV, **Table 2-71** for the AN/WSN-8A(V)2 (7404776) DEML.

In addition to the high-level diagnostic tests, real-time performance monitoring is available for the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. Performance monitoring assesses the health of onboard electronics hardware and status of the external interfaces. Errors detected are assigned specific fault codes, and are capable of being displayed and acknowledged via the CDP. Fault codes are listed in **Table 5-1**. If active faults are present, a flashing "FLT" is displayed on the lower-right

corner of the CDP during Underwater mode. In addition to the flashing "FLT" indication, a fault light is illuminated for all faults that have not been acknowledged on the AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML.

To display and acknowledge the active faults, perform the procedure in Section II, **Table 2-26** for the AN/WSN-8 (7093036) DEML (w/FC-1). Perform the procedure in Section III, **Table 2-48** for the AN/WSN-8A(V)1 (7404776) DEML. Perform the procedure in Section IV, **Table 2-71** for the AN/WSN-8A(V)2 (7404776) DEML.

2.3.9 CONFIGURATION MODE. The Configuration mode on the AN/WSN-8 (7093036) DEML allows the operator to reset hours of operation and distance, select MIL-STD-1553B Remote Terminal (RT) address, and return to default settings. The Configuration mode on the AN/WSN-8 (7093036) DEML (w/FC-1) allows the operator to reset hours of operation and distance, select MIL-STD-1553B RT address, enable interfaces, return to default settings, and shut down the DEML system.

The Configuration mode on the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs enables the operator to reset hours of operation and distance, enable interfaces, return to default settings, and shut down the DEML system.

To operate in the Configuration mode on the AN/WSN-8 (7093036) DEML, perform the procedure in Section I, **Table 2-11**. To operate in the Configuration mode on the AN/WSN-8 (7093036) DEML (w/FC-1), perform the procedure in Section II, **Table 2-27**. To operate in the Configuration mode on the AN/WSN-8A(V)1 (7404776) DEML, perform the procedure in Section III, **Table 2-49**. To operate in the Configuration mode on the AN/WSN-8A(V)2 (7404776) DEML, perform the procedure in Section IV, **Table 2-72**.

2.3.10 STATUS CHECK MODE. Status Check mode enables the operator to check settings and conditions of the DEML. To operate in the Status Check mode on the AN/WSN-8 (7093036) DEML, perform the procedure in Section I, **Table 2-12**. To operate in the Status Check mode on the AN/WSN-8 (7093036) DEML (w/FC-1), perform the procedure in Section II, **Table 2-28**. To operate in the Status Check mode on the AN/WSN-8A(V)1 (7404776) DEML, perform the procedure in Section III, **Table 2-50**. To operate in the Status Check mode on the AN/WSN-8A(V)2 (7404776) DEML, perform the procedure in Section IV, **Table 2-73**.

2.3.11 NORMAL SHUTDOWN. Refer to Section I, **Table 2-13** for AN/WSN-8 (7093036) DEML Shutdown Procedures. Refer to Section II, **Table 2-29** for AN/WSN-8 (7093036) DEML (w/FC-1) Shutdown Procedures. Refer to Section III, **Table 2-51** for AN/WSN-8A(V)1 (7404776) DEML Shutdown Procedures. Refer to Section IV, **Table 2-74** for AN/WSN-8A(V)2 (7404776) DEML Shutdown Procedures.

2.3.12 EMERGENCY OPERATION. There are no emergency operating procedures for the DEML.

2.3.13 EMERGENCY SHUTDOWN. Emergency shutdown procedure is the same as normal shutdown procedure in **Paragraph 2.3.11**.

2.4 TURNON/CHECKOUT PROCEDURE.

Refer to Section I, **Table 2-6** to turn on the AN/WSN-8 (7093036) DEML. Refer to Section II, **Table 2-22** to turn on the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to Section III, **Table 2-44** to turn on the AN/WSN-8A(V)1 (7404776) DEML. Refer to Section IV, **Table 2-67** to turn on the AN/WSN-8A(V)2 (7404776) DEML. The DEML performs a self-test automatically at startup. Operational readiness of the DEML during operation is verified by performing BIT as described in **Paragraph 2.3.8**.

2.5 AN/WSN-8 (7093036) DEML CALIBRATION.

2.5.1 PERIODICITY. The DEML should be calibrated as follows:

a. After initial installation

b. After Central Processing Unit (CPU) replacement

c. After rodmeter replacement

d. After 36 months have elapsed since last calibration

e. As operational requirements dictate.

2.5.2 DESCRIPTION. There are three Calibration options: ELVS (Pre-calibration), Manual, and Automatic. All Calibration modes are accomplished at the CDP (**Figure 2-1**).

2.5.2.1 ELVS Calibration (Pre-calibration). ELVS calibration (pre-calibration) uses an ELVS as the source of speed data. Its primary purpose is to provide a zero reference point and to assist in determining any nonuniform group delays through the DEMLs data acquisition hardware. It must be performed prior to initiating any of the at-sea calibration procedures. To perform an ELVS calibration (pre-calibration), refer to **Paragraph 2.5.3**.

2.5.2.2 Manual Calibration. The manual calibration operation consists of three sub-options:

a. Measured-Mile Course. This option uses a predetermined course to perform the classic

log calibration procedure. To perform a manual calibration using a measured-mile run, proceed to **Paragraph 2.5.4**.

b. Inertial Reference. This option uses an inertial navigator for the precision distance reference. To perform a manual calibration using inertial reference, proceed to **Paragraph 2.5.5**.

c. Velocity Reference Correction (VRC). This option, available for SSBN 726 Class only, uses the average inertial forward velocity provided by the CON navigation software. To perform a manual calibration using VRC, proceed to **Paragraph 2.5.6**.

Measured-Mile and Inertial calibration procedures require the use of an external distance/speed reference. Any method to determine ship's movement which has an accuracy that results in a true ship's speed accuracy greater than 0.05 knots is acceptable to calibrate the DEML to an accuracy of ±0.10 knots. The following methods have the required accuracy: Inertial Navigation Systems (INS), satellite navigation systems, underwater sound array ranges, RAYDIST, CUBIC, and measured-mile courses.

2.5.2.3 Calibration Table Modification. Calibration data is stored in "tables" in the DEML memory. The procedures in **Paragraphs 2.5.4.4**, **2.5.4.5**, and **2.5.7.6** provide the ability to re-run individual phases in the event that required accuracy is not met at the completion of a manual calibration operation.

2.5.2.4 Automatic Calibration. Automatic calibration requires no manual inputs of speed data. It depends entirely on the DEML software interface to the MIL-STD-1553B bus. Because of this, Automatic calibration cannot be used on a vessel that is not equipped with the MIL-STD-1553B bus. To perform an Automatic calibration on the AN/WSN-8 (7093036) DEML, refer to **Paragraph 2.5.7**.

2.5.3 ELVS CALIBRATION (PRE-CALIBRATION) PROCEDURE. The ELVS Calibration (Pre-calibration) procedure is designed to ensure that all units of the DEML are in the proper state of readiness to conduct a system calibration. This procedure is to be performed dockside prior to performing any of the underway calibration procedures. To perform an ELVS Calibration (Pre-calibration), proceed as follows:

a. Perform rodmeter cleaning and inspection as described in **Chapter 4**.

b. Perform rodmeter coil, insulation, and button resistance measurement as described in Chapter 4.

c. Perform BIT as described in Section I, **Table 2-10**.

d. Verify presence of proper coil excitation current by performing status check as described in Section I, **Table 2-12**. Proceed to step 5 and read the coil current. Acceptable value is 0.5 ±0.1 Volts Alternating Current (VAC). Continue to the end of the procedure until the DEML returns to Underwater mode.

e. Shut down the DEML as per Section I, **Table 2-13**.

f. Connect ELVS to RSU or I/T in accordance with ELVS Technical Manual or applicable Standard Maintenance Procedure (SMP). When using ELVS, connect ground line between ELVS GND E1 and vessel's hull.

g. Calibrate ELVS for sensitivity setting of applicable rodmeter if available. If sensitivity is not available, a value of 325 µV should be used.

h. Power up the DEML as per Section I, **Table 2-6**.

NOTE

In dual I/T installations, the calibration procedures must be performed for both I/Ts. The DEML uses only one ELVS calibration table for both normal and alternate rodmeter positions. Therefore, only one ELVS calibration is needed for each I/T.

2.5.4 MANUAL CALIBRATION PROCEDURE, MEASURED-MILE RUN (SURFACE ONLY). To perform a manual calibration using a measured-mile run, proceed as follows:

2.5.4.1 Initial Conditions.

a. To obtain results free of shallow water effects, calibration of the DEML system must be conducted on a measured-mile course where the minimum depth of water in feet is three times the square root of the product of the vessel's beam in feet and the mean draft in feet, or 0.3 times the square of the vessel's maximum speed in knots, whichever is greater.

b. Select a suitable measured-mile course.

c. Wind and sea conditions should not exceed moderate state. This is equivalent to sea state 3 on the Beaufort and Hydrographic office scale or sea state 2 on the International scale. Ground swells, heavy seas, heavy

tide, and strong winds tend to contribute error factors adversely affecting the calibration.

d. Runs over the measured-mile course should be conducted with the vessel at average draft and trim.

e. Vessel's heading over the measured-mile course must be held steady within ±1°, with the same track repeated for every run. Excessive rudder action will contribute an error factor adversely affecting the calibration.

f. A steady ship's speed over the measured-mile course should be maintained. Propeller revolutions must be held to within ±1 rpm.

2.5.4.2 Preparation.

NOTE

In dual I/T installation, these steps must be completed for both I/Ts.

a. Complete ELVS Calibration (pre-calibration) Procedure described in **Paragraph 2.5.3** if applicable.

b. If vessel has dual rodmeters, set the RSU to NORMAL.

c. Establish communication between the port or starboard pelorus (surface ship only), the space containing the I/T(s), and the pilot house/ship control station.

d. Station an operator at the I/T(s), a phone talker in the pilot house/ship control station, and an observer equipped with a stopwatch and calibration data sheet (**Figure 2-5**) at the selected pelorus or periscope.

e. Position the vessel in line with the measured-mile course, a sufficient distance from the starting point to allow course and speed to be stabilized prior to entering the course.

f. Steer toward the measured-mile course.

g. Observe and record gyrocompass heading on the calibration data sheet. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

2.5.4.3 Execution.

NOTE

For best results, all runs/intervals should be performed over the same course. Example: Maximum speed of 12 knots at 4-knot speed intervals. Each 4-, 8-, and 12-knot base run and the respective reciprocal runs should be performed over the same course.

a. Proceed to Section I, **Table 2-15** for the AN/WSN-8 (7093036) DEML.

b. If vessel has dual rodmeters, set the RSU to ALTERNATE and repeat the procedure. The I/Ts will detect the different configuration and build new tables.

2.5.4.4 Verification.

a. Calibration verification should be performed by re-running the measured-mile course **in DEML underwater mode** at 4, 8, and 12 knots. A steady ship's speed (as indicated on DEML CDP) and steady ship's heading (±1° of ordered heading) over the measured-mile course should be maintained throughout each phase of the verification runs. Propeller revolutions must be held to within ±1 rpm. Perform steps (1) through (7) for the AN/WSN-8 (7093036) DEML.

(1) When vessel completes first measured-mile run, the observer simultaneously starts stopwatch and gives a "mark" to the operator to record initial DEML distance displayed on the CDP. Record run number (ex. 4b for a 4-knot base run; or 4r for a 4-knot reciprocal run), initial heading, time, and distance on calibration data sheet, **Figure 2-5**.

(2) When vessel completes second measured-mile run, the observer stops the stopwatch and simultaneously gives a "mark" to the operator to record final DEML distance displayed on the CDP. Record final data on calibration data sheet, **Figure 2-5**.

(3) Repeat steps (1) and (2) for the reciprocal run.

(4) Calculate DEML's average speed for the base and reciprocal runs. Refer to **Table 2-4**.

(5) The average DEML speed (arithmetic average) for each set of runs may be calculated by adding the average base and average reciprocal speed values and then dividing the sum by two. Record this average speed on calibration data sheet, **Figure 2-5**.

(6) Verify that average speed error for DEML (calculated in step 5 and compared to ordered speed) is within desired accuracy (0.2 knots). Record this value on calibration data sheet, **Figure 2-5**.

– If average speed error at each speed is within the desired accuracy, calibration is verified.

– If average speed error exceeds desired accuracy, calibration must be re-run for each speed that failed to meet desired accuracy.

(7) Repeat verification steps (1) through (6) for additional speed runs as applicable.

b. If any average speed error exceeds the desired accuracy, a Calibration Table Modification procedure should be performed. Refer to **Paragraph 2.5.4.5**.

2.5.4.5 Measured-Mile Calibration Table Modification. To modify a calibration table, proceed as follows:

a. Select the MEASURED-MILE calibration table as follows:

(1) Press **CAL** on the CDP.

(2) Press **1** to choose Select Table.

(3) Press **1** or **2** to select the newly built "MILE" calibration table and return to Underwater mode.

b. If vessel has dual rodmeters, set the RSU to NORMAL.

c. Using communications established in original calibration procedure, proceed to Section I, **Table 2-16** for the AN/WSN-8 (7093036) DEML.

2.5.5 MANUAL CALIBRATION PROCEDURE, INERTIAL REFERENCE ENTERED MANUALLY. To perform a manual calibration using a manually entered inertial reference, proceed as follows:

2.5.5.1 Initial Conditions.

a. To obtain results free of shallow water effects, calibration must be performed in a minimum depth of 400 feet below the vessel's keel, in an area free of gravity anomalies (20-30 miles from continental shelf or seamounts) where water current gradients are at a minimum.

b. Wind and sea conditions should not exceed moderate state (i.e., Sea State 3 of the Beaufort scale or 2 on the international scale). Ground swells, heavy seas, heavy tide, and strong winds tend to contribute error factors.

c. Runs should be conducted with vessel at average depth and trim.

d. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

e. Vessel's speed during the calibration run must be held steady to ±1 shaft rpm.

f. The INS used as reference must be well settled and in a NAVIGATE mode.

2.5.5.2 Preparation.

NOTE

In dual I/T installations, these steps must be completed for both I/Ts.

a. Complete ELVS Calibration (Pre-calibration) Procedure described in **Paragraph 2.5.3**.

b. If vessel has dual rodmeters, set the RSU to NORMAL.

c. Establish communication between the inertial navigation system location, the space containing the I/T(s), and the pilot house/ship control station.

d. Station an operator at the I/T(s), a coordinator in the pilot house/ship control station, and an observer equipped with calibration data sheet (**Figure 2-6**) at the inertial navigation system.

e. Steer towards selected course.

f. Record gyrocompass heading on the calibration data sheet.

2.5.5.3 Execution.

a. Proceed to Section I, **Table 2-17** for the AN/WSN-8 (7093036) DEML.

NOTE

For best results, all runs/intervals should be performed over the same course. Example: Maximum speed of 12 knots at 4-knot speed intervals. Each 4-, 8-, and 12-knot base run and the respective reciprocal runs should be performed over the same course.

2.5.5.4 Verification.

a. Calibration verification should be performed by re-running the manual inertial course **in DEML underwater mode** at 16 knots (submarine) or 8, 16, and 24 knots (surface vessel). A steady ship's speed (as indicated on DEML CDP) and steady ship's heading (±1° of ordered heading) should be maintained throughout each phase of the verification run. Propeller revolutions must be held to within ±1 rpm.

(1) To begin verification run, the observer shall simultaneously direct the operator to initiate a position typeout at Input/Output (I/O) console, mark the current time and record DEML distance displayed on the CDP. Record Initial data (run number, heading, time, DEML distance, inertial position) on calibration data sheet, **Figure 2-6**.

(2) Continue for 10 minutes. Upon completion, the observer shall simultaneously direct the operator to initiate the final position typeout at I/O console, mark the final time and record DEML distance displayed on the CDP. Record final data on calibration data sheet, **Figure 2-6**.

(3) Repeat steps (1) and (2) for the reciprocal run.

(4) Calculate DEML and Inertial average speed for the base and reciprocal verification runs. Refer to **Table 2-4** for average speed calculation using DEML distance and **Table 2-5** for using inertial position.

(5) The average DEML speed (arithmetic average) for this set of runs may be calculated by adding the average base and average reciprocal speed values and then dividing the sum by two. The average inertial speed may also be calculated this way. Record average DEML and average inertial speeds on calibration data sheet, **Figure 2-6**.

(6) Subtract average DEML speed from average inertial speed and record this value on calibration data sheet, **Figure 2-6**. Verify that this average speed error is within the desired accuracy.

– If average speed error at each speed is within the desired accuracy, calibration is verified.

– If average speed error exceeds desired accuracy, calibration must be re-run for each speed that failed to meet desired accuracy.

(7) Repeat verification steps (1) through (6) for additional speed runs as applicable.

b. If any average speed error exceeds the desired accuracy, a Calibration Table Modification procedure should be performed. Refer to **Paragraph 2.5.5.5**.

2.5.5.5 Inertial Reference Calibration Table Modification. To modify an inertial reference calibration table, proceed as follows:

a. Select the Inertial calibration table as follows:

(1) Press **CAL** on the CDP.

(2) Press **1** to choose Select Table.

(3) Press **1** or **2** to select the newly built "INS" calibration table and return to Underwater mode.

b. If vessel has dual rodmeters, set the RSU to NORMAL.

c. Using communications established in original calibration procedure, proceed to Section I, **Table 2-18** for the AN/WSN-8 (7093036) DEML.

2.5.6 MANUAL CALIBRATION PROCEDURE, VRC INPUT ENTERED MANUALLY. To perform a manual calibration using manually entered VRC input, proceed as follows:

NOTE

Refer to applicable Strategic Systems Program (SSP) OD 52591 or OD 61600 and perform steps in Section I, **Table 2-19** for the AN/WSN-8 (7093036) DEML.

2.5.7 AUTOMATIC CALIBRATION PROCEDURE. There are two approaches to automatic calibration: Calibration using known shaft speed and calibration using known inertial speeds.

2.5.7.1 Shaft Speed. If known shaft speed (rpm) is used, the operator may select shaft rpm for the individual calibration runs (e.g., 100 rpm, 200 rpm, etc.). For each run, the same shaft speed must be used for both the baseline and reciprocal run to cancel ocean current effects. Once the desired shaft speed is reached, it must be maintained to ±1 rpm.

2.5.7.2 Inertial Speed. If known inertial speeds (e.g., 4 knots, 8 knots, etc.) are used, the same

speed must be used for both the baseline and reciprocal run to cancel ocean current effects. Once the desired speed is reached, it must be maintained to ±1 rpm.

To perform an automatic calibration, proceed as follows:

CAUTION

Automatic calibration depends on input from the MIL-STD-1553B bus. Automatic calibration cannot be performed if the MIL-STD-1553B bus is not installed, not connected, or not operational. Manual calibration procedures, **Paragraph 2.5.4** or **2.5.5**, should be performed.

2.5.7.3 Initial Conditions.

a. To obtain results free of shallow water effects, calibration must be performed in a minimum depth of 400 feet below the vessel's keel, in an area free of gravity anomalies (20-30 miles from continental shelf or seamounts) where water current gradients are at a minimum.

b. Wind and sea conditions should not exceed moderate state (i.e., Sea State 3 on the Beaufort scale or 2 on the international scale). Ground swells, heavy seas, heavy tide, and strong winds tend to contribute error factors.

c. Runs should be conducted with vessel at average depth and trim.

d. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

e. Vessel's speed during the calibration run must be held steady to ±1 shaft rpm.

f. The INS used as reference must be well settled and in a NAVIGATE mode.

2.5.7.4 Preparation. Complete ELVS Calibration (Pre-calibration) Procedure described in **Paragraph 2.5.3**.

NOTE

In dual I/T installations, these steps must be completed for both I/Ts.

a. If vessel has dual rodmeters, set the RSU to NORMAL.

b. Establish sound-powered telephone or other voice communication between the INS location, the space containing the I/T(s), and the pilot house/ship control station.

c. Station an operator at the I/T(s), a phone talker in the pilot house/ship control station, and an observer equipped with calibration data sheet (**Figure 2-5**) at the INS.

NOTE

In dual I/T installations, the procedures in Section I, **Table 2-20** for the AN/WSN-8 (7093036) DEML must be completed for both I/Ts.

All heading and speed data recorded in Automatic Calibration is for reference only and is optional.

2.5.7.5 Execution. Proceed to Section I, **Table 2-20** for the AN/WSN-8 (7093036) DEML.

2.5.7.6 Automatic Calibration Verification. Automatic calibration verification for the AN/WSN-8 (7093036) DEML should be performed by following the procedure described in **Paragraph 2.5.5.4** at flank speed.

2.5.7.7 Automatic Calibration Table Modification. To modify a calibration table, proceed as follows:

a. If vessel has dual rodmeters, set the RSU to NORMAL.

b. Using communications established in original calibration procedure, proceed to Section I, **Table 2-21** for the AN/WSN-8 (7093036) DEML.

c. Select the automatic calibration table as follows:

(1) Press **CAL** on the CDP.

(2) Press **1** to choose Select Table.

(3) Press **1** or **2** to select the newly built "AUTO" calibration table and return to Underwater mode.

2.6 AN/WSN-8 (7093036) DEML (W/FC-1), AN/WSN-8A(V)1 (7404776) DEML, AND AN/WSN-8A(V)2 (7404776) DEML CALIBRATION.

2.6.1 PERIODICITY. The DEML should be calibrated as follows:

a. After initial installation

b. After CPU replacement

c. After rodmeter replacement

d. After 36 months have elapsed since last calibration

e. As operational requirements dictate.

2.6.2 DESCRIPTION. There are four calibration submodes: Select, Calibration, Verification, and Table Maintenance. All calibration modes are accomplished at the CDP (**Figure 2-1**).

2.6.2.1 Select Submode. The Select submode of calibration allows the operator to select the desired calibration table that the DEML will utilize when computing system speed. To perform a Select Calibration Table procedure for the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, or AN/WSN-8A(V)2 (7404776) DEML, refer to **Paragraph 2.6.3**.

2.6.2.2 Calibration Submode. Manual and Automatic calibration options are available to calibrate the DEML to ensure accurate performance.

2.6.2.2.1 Manual Calibration. Manual calibration consists of three sub-options:

a. Measured-Mile Course. This option uses a predetermined course to perform the classic log calibration procedure. To perform a manual calibration using a measured-mile run, proceed to **Paragraph 2.6.4**.

b. Inertial Reference. This option uses an inertial navigator for the precision distance reference. To perform a manual calibration using inertial reference, proceed to **Paragraph 2.6.5**.

c. VRC. This option, available for SSBN 726 Class only, uses the average inertial forward velocity provided by the CON navigation software. To perform a manual calibration using VRC, proceed to **Paragraph 2.6.6**.

Measured-Mile and Inertial calibration procedures require the use of an external distance/speed reference. Any method to determine ship's movement which has an accuracy that results in a true ship's speed accuracy greater than 0.05 knots is acceptable to calibrate the DEML to an accuracy of ±0.10 knots. The following methods have the required accuracy: INS, satellite navigation systems, underwater sound array ranges, RAYDIST, CUBIC, and measured-mile courses.

2.6.2.2.2 Automatic Calibration. Automatic calibration requires no manual inputs of speed data and depends entirely on inputs from external systems. The AN/WSN-8 (7093036) DEML (w/FC-1) automatic calibration interfaces with the Trident Signal Data Converter (TSDC) via the MIL-STD-1553B interface. The AN/WSN-8A(V)1 (7404776) DEML automatic calibration interfaces with the Navigation Sensor System Interface (NAVSSI) and Fiber Optic Data Multiplex System (FODMS) systems. The AN/WSN-8A(V)2 (7404776) DEML automatic calibration interfaces with the NAVSSI and Ring Laser Gyro Navigator (RLGN) systems. To perform an automatic calibration procedure on the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, or AN/WSN-8A(V)2 (7404776) DEML, refer to **Paragraph 2.6.7**.

2.6.2.3 Verification Submode. The Verification submode of calibration is performed to ensure that the DEML calibration is within the required system accuracy. Verifications can be accomplished manually or automatically. Manual verifications compute the average DEML velocities for calibration runs, and the operator must then compare them manually with the verification source. Automatic verification computes DEML average velocities and compares them with the external verification source automatically. The resultant comparison is then displayed on the CDP as a calibration error value, which can then be used to determine if the calibration was within system performance requirements. To perform verifications on the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, or AN/WSN-8A(V)2 (7404776) DEML, refer to **Paragraph 2.6.8**.

2.6.2.4 Table Maintenance Submode. The Table Maintenance submode of calibration allows the operator to display calibration and verification tables, delete calibration and verification tables, correct existing calibration tables, and enter a new calibration table via the CDP. To perform Table Maintenance on the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, or AN/WSN-8A(V)2 (7404776) DEML, refer to **Paragraph 2.6.9**.

2.6.3 SELECT CALIBRATION TABLE PROCEDURE. Two user tables are available for each rodmeter and are independent of each other. When performing the Select Calibration Table procedure, the calibration table number and the associated calibration technique will be displayed on the CDP. NONE will be displayed when a calibration has not been stored in the corresponding table number. The ability to store two tables allows for rotation of the tables when performing calibrations. Table rotation would involve the user storing the new calibration table in the location not currently being used as the active calibration. In the event of a failed calibration, by using the rotation method, the user can go back and select the previously good calibration table until the new calibration can be performed successfully. Any calibrations, verifications, and table maintenance will be performed on the table that

has been selected via the Select submode procedure.

NOTE

Any procedures that are performed in the DEML with respect to calibration tables, are done so with the table that was selected via the Select Calibration Table procedure.

To perform a Select Calibration Table procedure, perform the steps in Section II, **Table 2-30** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-52** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-75** for the AN/WSN-8A(V)2 (7404776) DEML.

2.6.4 MANUAL CALIBRATION PROCEDURE, MEASURED-MILE RUN. To perform a manual calibration using a measured-mile run, proceed as follows:

2.6.4.1 Initial Conditions.

a. Perform Select Calibration Table procedure in **Paragraph 2.6.3** to select the table to be calibrated. Ensure that desired calibration time is selected by performing the Status Check Procedure in Section II, **Table 2-28** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-50** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-73** for the AN/WSN-8A(V)2 (7404776) DEML. If calibration time is not correct, perform the Configuration Procedure in Section II, **Table 2-27** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-49** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-72** for the AN/WSN-8A(V)2 (7404776) DEML to set the calibration time to the desired interval.

b. To obtain results free of shallow water effects, calibration of the DEML system must be conducted on measured-mile course where the minimum depth of water in feet is three times the square root of the product of the vessel's beam in feet and the mean draft in feet, or 0.3 times the square of the vessel's maximum speed in knots, whichever is greater.

c. Select a suitable measured-mile course.

d. Wind and sea conditions should not exceed moderate state. This is equivalent to sea state 3 on the Beaufort and Hydrographic office scale or sea state 2 on the International scale. Ground swells, heavy seas, heavy tide, and strong winds tend to contribute error factors adversely affecting the calibration.

e. Runs over the measured-mile course should be conducted with the vessel at average draft and trim.

f. Vessel's heading over the measured-mile course must be held steady within ±1°, with the same track repeated for every run. Excessive rudder action will contribute an error factor adversely affecting the calibration.

g. A steady ship's speed over the measured-mile course should be maintained. Propeller revolutions must be held to within ±1 rpm.

2.6.4.2 Preparation.

NOTE

In dual I/T installation, these steps must be completed for both I/Ts.

a. If vessel has dual rodmeters, set the RSU to NORMAL.

b. Establish communication between the port or starboard pelorus (surface ship only), the space containing the I/T(s), and the pilot house/ship control station.

c. Station an operator at the I/T(s), a phone talker in the pilot house/ship control station, and an observer equipped with a stopwatch and calibration data sheet (**Figure 2-5**) at the selected pelorus or periscope.

d. Position the vessel in line with the measured-mile course, a sufficient distance from the starting point to allow course and speed to be stabilized prior to entering the course.

e. Steer toward the measured-mile course.

f. Observe and record gyrocompass heading on the calibration data sheet. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

2.6.4.3 Execution.

NOTE

For best results all runs/intervals should be performed over the same course. Example: Maximum speed of 12 knots at 4-knot speed intervals. Each 4-, 8-, and 12-knot base run and the respective reciprocal runs should be performed over the same course.

a. Proceed to Section II, **Table 2-33** for the AN/WSN-8 (7093036) DEML (w/FC-1).

Proceed to Section III, **Table 2-55** for the AN/WSN-8A(V)1 (7404776) DEML. Proceed to Section IV, **Table 2-78** for the AN/WSN-8A(V)2 (7404776) DEML.

b. If vessel has dual rodmeters, set the RSU to ALTERNATE and repeat the procedure. The I/Ts will detect the different configuration and build new tables.

2.6.4.4 Verification.

a. Calibration verification should be performed by re-running the measured-mile course **in DEML underwater mode** at 4, 8, and 12 knots. A steady ship's speed (as indicated on DEML CDP) and steady ship's heading (±1° of ordered heading) over the measured-mile course should be maintained throughout each phase of the verification runs. Propeller revolutions must be held to within ±1 rpm. Perform steps in Section II, **Table 2-34** for the AN/WSN-8 (7093036) DEML (w/FC-1). Perform steps in Section III, **Table 2-56** for the AN/WSN-8A(V)1 (7404776) DEML. Perform steps in Section IV, **Table 2-79** for the AN/WSN-8A(V)2 (7404776) DEML.

b. If any average speed error exceeds the desired accuracy, a Calibration Table Modification procedure should be performed. Refer to **Paragraph 2.6.4.5**.

2.6.4.5 Measured-Mile Calibration Table Modification. To modify a calibration table, proceed as follows:

a. Select the MEASURED-MILE calibration table as follows:

(1) Press **CAL** on the CDP.

(2) Press **1** to choose SELECT.

(3) Press **1** or **2** to select the newly built "MILE" calibration table and return to Underwater mode.

b. If vessel has dual rodmeters, set the RSU to NORMAL.

c. Using communications established in original calibration procedure, proceed to Section II, **Table 2-38** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-61** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-86** for the AN/WSN-8A(V)2 (7404776) DEML.

2.6.5 MANUAL CALIBRATION PROCEDURE, INERTIAL REFERENCE ENTERED MANUALLY.

To perform a manual calibration using a manually entered inertial reference, proceed as follows:

2.6.5.1 Initial Conditions. DEML software versions 4.3 or greater implement a table-centric approach for stored calibration tables. In previous software versions, a new calibration that was performed overwrote the previous calibration data stored in the selected calibration table location, and was limited by the number of calibration points entered at the beginning of the calibration process. The table-centric approach allows for an unlimited number of calibration points and the ability to add additional points, as well as, modification of existing points after the calibration has been completed. Calibrations are now performed on a point-by-point basis on the currently selected calibration table. If a calibration run is performed at a speed that is currently not in the selected calibration table, that point is added to the selected calibration table. If a calibration run is performed at a speed currently in the selected calibration table, the new calibration data overwrites the previously saved data for that point, leaving all other calibration points intact.

If a new calibration is required, the existing data in the calibration table for the selected calibration table must be deleted using the Delete Calibration Table procedure from the Table Maintenance Submode. To perform the Delete Calibration Table procedure, refer to Section II, **Table 2-40** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-63** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-88** for the AN/WSN-8A(V)2 (7404776) DEML.

a. Perform Select Calibration Table procedure in **Paragraph 2.6.3** to select the table to be calibrated. Ensure that desired calibration time is selected by performing the Status Check Procedure in Section II, **Table 2-28** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-50** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-73** for the AN/WSN-8A(V)2 (7404776) DEML. If calibration time is not correct, perform the Configuration Procedure in Section II, **Table 2-27** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-49** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-72** for the AN/WSN-8A(V)2 (7404776) DEML to set the calibration time to the desired interval.

b. To obtain results free of shallow water effects, calibration must be performed in a minimum depth of 400 feet below the vessel's keel, in an area free of gravity anomalies (20-30 miles from continental shelf or seamounts) where water current gradients are at a minimum.

c. Wind and sea conditions should not exceed moderate state (i.e., Sea State 3 of the Beaufort scale or 2 on the international scale). Ground swells, heavy seas, heavy tide, and strong winds tend to contribute error factors.

d. Runs should be conducted with vessel at average depth and trim.

e. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

f. Vessel's speed during the calibration run must be held steady to ±1 shaft rpm.

g. The INS used as reference must be well settled and in a NAVIGATE mode.

2.6.5.2 Preparation.

NOTE

In dual I/T installation, these steps must be completed for both I/Ts.

a. If vessel has dual rodmeters, set the RSU to NORMAL.

b. Establish communication between the inertial navigation system location, the space containing the I/T(s), and the pilot house/ship control station.

c. Station an operator at the I/T(s), a coordinator in the pilot house/ship control station, and an observer equipped with a stopwatch and calibration data sheet (**Figure 2-5**) at the inertial navigation system.

d. Steer towards selected course.

e. Record gyrocompass heading on the calibration data sheet.

2.6.5.3 Execution.

a. Proceed to Section II, **Table 2-31** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-53** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-76** for the AN/WSN-8A(V)2 (7404776) DEML. Calibration runs should be conducted at the corresponding platform speeds indicated by the Maintenance Requirement Card (MRC) or SMP.

NOTE

For best results all runs/intervals should be performed over the same course. Example: Maximum speed of 12 knots at 4-knot speed intervals. Each 4-, 8-, and 12-knot base run and the respective reciprocal runs should be performed over the same course.

b. Upon completion of calibration and verification, record calibration data on calibration data sheet, **Figure 2-4**. To view calibration data to be recorded on calibration data sheet (Figure 2-4), perform the View Calibration Table procedure in Section II, **Table 2-42** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-65** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-90** for the AN/WSN-8A(V)2 (7404776) DEML.

2.6.5.4 Verification.

a. Manual calibration verifications are conducted by running the base and reciprocal runs at the intervals listed in the respective MRC or SMP. During the verification runs, shaft rpm must be held to within ±1 rpm, and heading within ±1°. Base and reciprocal runs are to be conducted over the same body of water. Verification tables are stored along with the corresponding calibration tables, and verifications are performed on a point-by-point basis on the currently selected calibration table. An unlimited number of verification points can be performed, and like calibration tables, verification points can be added for new speeds or replaced for existing speeds. If a verification run is performed at a speed that is currently not in the verification table, that point is added to the selected calibration table. If a verification run is performed at a speed currently in the verification table, the new verification data overwrites the previously saved data for that point, leaving all other verification points intact.

b. If a new verification is required, the existing data in the verification table for the selected calibration table must be deleted using the Delete Verification Table procedure from the Table Maintenance Submode. To perform the Delete Verification Table procedure, refer to Section II, **Table 2-41** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-64** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-89** for the AN/WSN-8A(V)2 (7404776) DEML.

NOTE

Verification tables are automatically deleted when the corresponding calibration table is deleted. However, verification tables can be deleted without any impact to the corresponding calibration table.

c. Ensure that the desired verification time is selected by checking the calibration time via the Status Check Procedure in Section II, **Table 2-28** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-50** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-73** for the AN/WSN-8A(V)2 (7404776) DEML. If the calibration/verification time is not correct, perform the Configuration Procedure in Section II, **Table 2-27** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-49** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-72** for the AN/WSN-8A(V)2 (7404776) DEML to set the calibration time to the desired interval.

d. Proceed to Section II, **Table 2-32** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-54** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-77** for the AN/WSN-8A(V)2 (7404776) DEML.

e. If any average speed error exceeds the desired accuracy, it should be corrected by rerunning the calibration for the applicable speed run, or by modifying the speed entry for the corresponding calibration point. To rerun the calibration for the applicable speed run, proceed to **Paragraph 2.6.5.5**. To modify a calibration point, refer to Section II, **Table 2-38** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-61** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-86** for the AN/WSN-8A(V)2 (7404776) DEML.

f. Upon completion of calibration and verification, record calibration data on calibration data sheet, **Figure 2-4**. To view calibration data to be recorded on calibration data sheet (Figure 2-4), perform the View Calibration Table procedure in Section II, **Table 2-42** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-65** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-90** for the AN/WSN-8A(V)2 (7404776) DEML. Attach the completed calibration data sheet, Figure 2-4 to the side of the DEML I/T. The calibration data recorded on calibration data sheet, Figure 2-4 can be entered into a new CPU CCA in the event of a failure, thus avoiding the need to perform an additional calibration.

2.6.5.5 Inertial Reference Calibration Table Modification.

a. To modify an inertial reference calibration table, proceed to Section II, **Table 2-38** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-61** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-86** for the AN/WSN-8A(V)2 (7404776) DEML.

b. To rerun the manual inertial reference calibration for correcting a speed run with an average speed error that exceeds the desired accuracy, proceed to Section II, **Table 2-31** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-53** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-76** for the AN/WSN-8A(V)2 (7404776) DEML.

NOTE

Rerunning of the entire calibration is not required. It is only necessary to rerun the calibration for the speed run with the average speed error that exceeds the desired accuracy.

c. Upon completion of modification, record calibration data on calibration data sheet, **Figure 2-4**. To view calibration data to be recorded on calibration data sheet (Figure 2-4), perform the View Calibration Table procedure in Section II, **Table 2-42** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-65** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-90** for the AN/WSN-8A(V)2 (7404776) DEML. Attach the completed calibration data sheet, Figure 2-4 to the side of the DEML I/T. The calibration data recorded on calibration data sheet, Figure 2-4 can be entered into a new CPU CCA in the event of a failure, thus avoiding the need to perform an additional calibration.

2.6.6 MANUAL CALIBRATION PROCEDURE, VRC INPUT ENTERED MANUALLY. To perform a manual calibration using manually entered VRC input, proceed as follows:

NOTE

Refer to applicable SSP OD 52591 or OD 61600 and perform steps in Section II, **Table 2-35** for the AN/WSN-8 (7093036) DEML (w/FC-1).

2.6.7 AUTOMATIC CALIBRATION PROCEDURE. Known shaft speed (rpm) must be used for the individual calibration runs (e.g., 100 rpm, 200 rpm, etc.). For each run, the same shaft speed must be used for both the baseline and reciprocal

run to cancel ocean current effects. Once the desired shaft speed is reached, it must be maintained to ±1 rpm.

2.6.7.1 Initial Conditions. DEML software versions 4.3 or greater implement a table-centric approach for stored calibration tables. In previous software versions, a new calibration that was performed overwrote the previous calibration data stored in the selected calibration table location, and was limited by the number of calibration points entered at the beginning of the calibration process. The table-centric approach allows for an unlimited number of calibration points and the ability to add additional points, as well as, modification of existing points after the calibration has been completed. Calibrations are now performed on a point-by-point basis on the currently selected calibration table. If a calibration run is performed at a speed that is currently not in the selected calibration table, that point is added to the selected calibration table. If a calibration run is performed at a speed currently in the selected calibration table, the new calibration data overwrites the previously saved data for that point, leaving all other calibration points intact.

If a new calibration is required, the existing data in the calibration table for the selected calibration table must be deleted using the Delete Calibration Table procedure from the Table Maintenance Submode. To perform the Delete Calibration Table procedure, refer to Section II, **Table 2-40** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-63** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-88** for the AN/WSN-8A(V)2 (7404776) DEML.

a. Perform Select Calibration Table procedure in **Paragraph 2.6.3** to select the table to be calibrated. Ensure that desired calibration time is selected by performing the Status Check Procedure in Section II, **Table 2-28** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-50** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-73** for the AN/WSN-8A(V)2 (7404776) DEML. If calibration time is not correct, perform the Configuration Procedure in Section II, **Table 2-27** for the AN/WSN-8 (7093036) DEML (w/FC-1), Section III, **Table 2-49** for the AN/WSN-8A(V)1 (7404776) DEML, or Section IV, **Table 2-72** for the AN/WSN-8A(V)2 (7404776) DEML to set the calibration time to the desired interval.

b. To obtain results free of shallow water effects, calibration must be performed in a minimum depth of 400 feet below the vessel's keel, in an area free of gravity anomalies (20-30 miles from continental shelf or seamounts) where water current gradients are at a minimum.

c. Wind and sea conditions should not exceed moderate state (i.e., Sea State 3 of the Beaufort scale or 2 on the international scale). Ground swells, heavy seas, heavy tide, and strong winds tend to contribute error factors.

d. Runs should be conducted with vessel at average depth and trim.

e. Vessel's heading during the calibration run must be held steady to ±1°, with the same track repeated for every run. Excessive rudder action contributes error factors.

f. Vessel's speed during the calibration run must be held steady to ±1 shaft rpm.

g. The INS used as reference must be well settled and in a NAVIGATE mode.

2.6.7.2 Preparation.

NOTE

In dual I/T installation, these steps must be completed for both I/Ts.

a. If vessel has dual rodmeters, set the RSU to NORMAL.

b. Establish sound-powered telephone or other voice communication between the INS location, the space containing the I/T(s), and the pilot house/ship control station.

c. Station an operator at the I/T(s), a phone talker in the pilot house/ship control station, and an observer equipped with calibration data sheet (**Figure 2-5**) at the INS.

NOTE

In dual I/T installation, the procedures in Section II, **Table 2-36** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-57** or **Table 2-59** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-80** or **Table 2-82** or **Table 2-84** for the AN/WSN-8A(V)2 (7404776) DEML must be completed for both I/Ts.

All heading and speed data recorded in Automatic Calibration is for reference only and is optional.

2.6.7.3 Execution.

a. For the AN/WSN-8 (7093036) DEML (w/FC-1), proceed to Section II, **Table 2-36** to auto calibrate via the MIL-STD-1553B interface.

b. For the AN/WSN-8A(V)1 (7404776) DEML, proceed to Section III, **Table 2-57** to auto calibrate via the FODMS interface; or proceed to Section III, **Table 2-59** to auto calibrate via the NAVSSI interface.

c. For the AN/WSN-8A(V)2 (7404776) DEML, proceed to Section IV, **Table 2-80** to auto calibrate via the NAVSSI interface; or proceed to Section IV, **Table 2-82** to auto calibrate via the RLGN 1 interface; or proceed to Section IV, **Table 2-84** to auto calibrate via the RLGN 2 interface.

2.6.8 VERIFICATION PROCEDURE.

a. Automatic calibration verifications are conducted by running the base and reciprocal runs at the intervals listed in the respective MRC or SMP. During the verification runs, shaft rpm must be held to within ±1 rpm, and heading within ±1°. Base and reciprocal runs are to be conducted over the same body of water. Verification tables are stored along with the corresponding calibration tables, and verifications are performed on a point-by-point basis on the currently selected calibration table. An unlimited number of verification points can be performed, and like calibration tables, verification points can be added for new speeds or replaced for existing speeds. If a verification run is performed at a speed that is currently not in the verification table, that point is added to the selected calibration table. If a verification run is performed at a speed currently in the verification table, the new verification data overwrites the previously saved data for that point, leaving all other verification points intact.

b. If a new verification is required, the existing data in the verification table for the selected calibration table must be deleted using the Delete Verification Table procedure from the Table Maintenance Submode. To perform the Delete Verification Table procedure, refer to Section II, **Table 2-41** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-64** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-89** for the AN/WSN-8A(V)2 (7404776) DEML.

NOTE

Verification tables are automatically deleted when the corresponding calibration table is deleted. However, verification tables can be deleted without any impact to the corresponding calibration table.

c. Ensure that the desired verification time is selected by checking the calibration time via the Status Check Procedure in Section II, **Table 2-28** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-50** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-73** for the AN/WSN-8A(V)2 (7404776) DEML. If the calibration/verification time is not correct, perform the Configuration Procedure in Section II, **Table 2-27** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-49** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-72** for the AN/WSN-8A(V)2 (7404776) DEML to set the calibration time to the desired interval.

d. For the AN/WSN-8 (7093036) DEML (w/FC-1), proceed to Section II, **Table 2-37** to perform the MIL-STD-1553B interface Automatic Calibration Verification procedure.

For the AN/WSN-8A(V)1 (7404776) DEML, proceed to Section III, **Table 2-58** to perform the FODMS interface Automatic Calibration Verification procedure; or proceed to Section III, **Table 2-60** to perform the NAVSSI interface Automatic Calibration Verification procedure.

For the AN/WSN-8A(V)2 (7404776) DEML, proceed to Section IV, **Table 2-81** to perform the NAVSSI interface Automatic Calibration Verification procedure; or proceed to Section IV, **Table 2-83** to perform the RLGN 1 interface Automatic Calibration Verification procedure; or proceed to Section IV, **Table 2-85** to perform the RLGN 2 interface Automatic Calibration Verification procedure.

e. If any average speed error exceeds the desired accuracy, it should be corrected by rerunning the calibration for the applicable speed run, or by modifying the speed entry for the corresponding calibration point.

NOTE

Rerunning of the entire calibration is not required. It is only necessary to rerun the calibration for the speed run with the average speed error that exceeds the desired accuracy.

To rerun the AN/WSN-8 (7093036) DEML (w/FC-1) MIL-STD-1553B interface Automatic Calibration for correcting a speed run with an average speed error that exceeds the desired accuracy, proceed to Section II, **Table 2-36**.

To rerun the AN/WSN-8A(V)1 (7404776) DEML FODMS interface Automatic Calibration or NAVSSI interface Automatic Calibration

for correcting a speed run with an average speed error that exceeds the desired accuracy, proceed to Section III, **Table 2-57** or **Table 2-59** respectively.

To rerun the AN/WSN-8A(V)2 (7404776) DEML NAVSSI interface Automatic Calibration or RLGN 1 interface Automatic Calibration or RLGN 2 interface Automatic Calibration for correcting a speed run with an average speed error that exceeds the desired accuracy, proceed to Section IV, **Table 2-80** or **Table 2-82** or **Table 2-84** respectively.

To modify a calibration point, refer to Section II, **Table 2-38** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-61** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-86** for the AN/WSN-8A(V)2 (7404776) DEML.

f. Upon completion of calibration and verification, record calibration data on calibration data sheet, **Figure 2-4**. To view calibration data to be recorded on calibration data sheet (Figure 2-4), perform the View Calibration Table procedure in Section II, **Table 2-42** for the AN/WSN-8 (7093036) DEML (w/FC-1); or Section III, **Table 2-65** for the AN/WSN-8A(V)1 (7404776) DEML; or Section IV, **Table 2-90** for the AN/WSN-8A(V)2 (7404776) DEML. Attach the completed calibration data sheet, Figure 2-4 to the side of the DEML I/T. The calibration data recorded on calibration data sheet, Figure 2-4 can be entered into a new CPU CCA in the event of a failure, thus avoiding the need to perform an additional calibration.

2.6.9 TABLE MAINTENANCE PROCEDURE.

a. For the AN/WSN-8 (7093036) DEML (w/FC-1), proceed to Section II, **Table 2-38** to correct a calibration table; or Section II, **Table 2-39** to create a calibration table; or Section II, **Table 2-40** to delete a calibration table; or Section II, **Table 2-41** to delete a verification table; or Section II, **Table 2-42** to view a calibration table; or Section II, **Table 2-43** to view a verification table.

b. For the AN/WSN-8A(V)1 (7404776) DEML, proceed to Section III, **Table 2-61** to correct a calibration table; or Section III, **Table 2-62** to create a calibration table; or Section III, **Table 2-63** to delete a calibration table; or Section III, **Table 2-64** to delete a verification table; or Section III, **Table 2-65** to view a calibration table; or Section III, **Table 2-66** to view a verification table.

c. For the AN/WSN-8A(V)2 (7404776) DEML, proceed to Section IV, **Table 2-86** to correct a calibration table; or Section IV, **Table 2-87** to create a calibration table; or Section IV, **Table 2-88** to delete a calibration table; or Section IV, **Table 2-89** to delete a verification table; or Section IV, **Table 2-90** to view a calibration table; or Section IV, **Table 2-91** to view a verification table.

Table 2-1. Operation Mode Matrix

OPERATION MODE	DATA 0=NORMAL 1=NOT NORMAL	DATA 0=VALID 1=NOT VALID	COMMENTS
Underwater Mode (No Calibration)	0	0	Speed input from rodmeter
Underwater Mode (Auto Calibration)	0	0	Speed input from rodmeter
Underwater Mode (Manual Calibration)	0	0	Speed input from rodmeter
Dummy Mode	1	0	Speed value set by operator
BIT Mode	1	1	Synchro output/speed data is not updated; MIL-STD-1553B data bus is offline.
Configuration Mode	1	1	Synchro output/speed data is not updated; MIL-STD-1553B data bus is online (speed data is not updated).

Table 2-2. BIT Status Matrix

BUILT-IN TEST	STATUS	COMMENTS
Central Processing Unit Circuit Card Assembly (CCA)	Failed	CPU failure, system inoperable
Analog-to-Digital (A/D) CCA	Failed	If system is in Dummy Mode, data is valid. If system is in other mode, data is not valid.
MIL-STD-1553B Digital Data Bus (DDB) CCA [Not Applicable (N/A) to AN/WSN-8A (7404776) DEML]	Failed	If RT failure (both channels failed), the MIL-STD-1553B status word bit, Terminal flag will be set. If complete CCA failure, MIL-STD-1553B communication will cease.
60-Hertz (Hz) Digital-to-Resolver (D/R) CCA [N/A to AN/WSN-8A (7404776) DEML]	Failed	60-Hz synchro data not valid (speed and distance data in MIL-STD-1553B format is still valid).
400-Hz Digital-to-Synchro (D/S) CCA [N/A to AN/WSN-8 (7093036) DEML (SSN 21 Class only)] [N/A to AN/WSN-8A (7404776) DEML]	Failed	400-Hz synchro data not valid (speed data in MIL-STD-1553B format is still valid).
Ethernet CCA [N/A to AN/WSN-8 (7093036) DEML]	Failed	CCA failure results in NAVSSI Ethernet communication failure.
Rodmeter CCA [N/A to AN/WSN-8 (7093036) DEML]	Failed	If system is in Dummy Mode, data is valid. If system is in other mode, data is not valid.
Coil Current	Failed	Data accuracy is compromised; therefore, data is not valid in any format.

Table 2-3. Operator Controls and Indicators

CONTROL/ INDICATOR	REF DES	PURPOSE	NORMAL POSITION/ INDICATION
I/T #1 and I/T #2	3[1] 3A1[2] 8[1] 8A1[2]		
Fault Lamp[1]	A2DS1	When illuminated, indicates an active fault.	Extinguished
CDP	A2A1		
LED Display		4 X 20 array of full-character Light-Emitting Diodes (LEDs) (4 rows of 20 characters each)	Rows 1-3: Varies with operating mode Row 4: Operating mode
Numeric (0-9) Keys		Press to enter numeric data.	
Decimal (.) Key		Press to enter a decimal point in numeric data entries.	
Backspace (←) Key		Press to delete numeric data entries.	
ENTER (E) Key		Press to complete entry of numeric data.	
Underwater (UDW) Key		Press to select Underwater mode.	
Manual Dummy (MAN) Key		Press to select Manual Dummy mode.	
Remote Dummy (REM) Key		Press to select Remote Dummy mode.	
Calibration (CAL) Key		Press to select Calibration mode.	
Configuration (CON) Key		Press to select Configuration mode.	
Built-In Test (BIT) Key		Press to select BIT mode.	
Status (STA) Key		Press to select Status Check mode.	

Table 2-3. Operator Controls and Indicators - Continued

CONTROL/ INDICATOR	REF DES	PURPOSE	NORMAL POSITION/ INDICATION
Escape (ESC) Key[3]		Press to interrupt calibrations.	
Program Switch[4]	A1S1	(Used only by manufacturer for software revisions.)	NORMAL
RCU	Unit 4		
INCREASE/DE-CREASE Switch	4S1	When set to INCREASE (up), causes speed indicator reading to increase. When set to DECREASE (down), causes speed indicator reading to decrease.	Center
Lamp	4DS1	When illuminated, indicates that Remote Dummy mode is enabled.	Extinguished
RSU	Unit 5		
ROD SELECT Switch	5S1	Dual I/T Installations: When set to NORMAL (left), connects Rodmeter No. 1 (Unit 1) to I/T No. 1 (Unit 3) and Rodmeter No. 2 (Unit 6) to I/T No. 2 (Unit 8). When set to ALTERNATE (right), connects Rodmeter No. 1 (Unit 1) to I/T No. 2 (Unit 8) and Rodmeter No. 2 (Unit 6) to I/T No. 1 (Unit 3). Single I/T Installations: When set to RODMETER NO. 1 (left), connects Rodmeter No. 1 (Unit 1) to I/T (Unit 3). When set to RODMETER NO. 2 (right), connects Rodmeter No. 2 (Unit 6) to I/T (Unit 3).	NORMAL or ALTERNATE as required NO. 1 or NO. 2 as required

NOTES:

(1) Applicable to the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs only.

(2) Applicable to the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs only.

(3) Applicable to the AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776), and AN/WSN-8 (7093036) (w/FC-1) DEMLs only.

(4) Applicable to the AN/WSN-8 (7093036) DEML only.

Table 2-4. Measured-Mile Average Speed Calculation

(T) TIME **(D) DISTANCE** **(c) COURSE**	**(V_{AVG}) AVERAGE SPEED**
ΔD_c = 1 Nm	(Course distance)
$\Delta T_c = \frac{(T_f - T_i)}{60}$	[Where ΔT_c is in hours and (T_f – T_i) is in Minutes]
$V_{AVG} = \frac{\Delta D_c}{\Delta T_c}$	(Where V_{AVG} is in Knots)

Example: Base run at 5 Knots

	Time Reading (Min)	Reference Position
Start	T_i = 0	ΔD_c = 1 Nm
End	T_f = 11	

$\Delta T_c = \frac{(T_f - T_i)}{60} = \frac{11}{60}$ = .183 Hrs

$v_{AVG} = \frac{\Delta D_c}{\Delta T_c}$ = 5.46 Knots ← Average speed to be entered

Note: Repeat for reciprocal run (5 + 180°).

Table 2-5. Inertial Average Speed Calculation

(T) TIME (D) DISTANCE (c) COURSE	(L) LATITUDE (λ) LONGITUDE (V_{AVG}) AVERAGE SPEED

$\Delta T_c = \frac{(T_f - T_i)}{60}$ (Where ΔT_c is in hours and $T_f - T_i$ is in Minutes)

$\Delta L = L_f - L_i$ (Where ΔL is in Degrees and Minutes)

$L_m = \frac{(L_f - L_i)}{2}$ (Where L_m is in Degrees and Minutes)

$L_m' = L_m$ in Degrees only (Where L_m' is in Degrees only)

$\Delta\lambda = \lambda_f - \lambda_i$ (Where $\Delta\lambda$ is in Degrees and Minutes)

$\Delta\lambda' = \Delta\lambda \cos L_m'$ (Where $\Delta\lambda'$ is in Nautical Miles and L_m' is L_m in Degrees only)

$\Delta D_c = \sqrt{\Delta L^2 + \Delta\lambda'^2}$ (Where ΔD_c is in Nautical Miles)

$V_{AVG} = \frac{\Delta D_c}{\Delta T_c}$ (Where V_{AVG} is in Knots)

Example: Base run at 32 Knots

	Time Reading	Reference Position	
	Minutes	Latitude	Longitude
Start	T_i = 0	L_i : 35 Deg 48.49 Min	λ_i : 71 Deg 23.07 Min
End	T_f = 10	L_f : 35 Deg 53.88 Min	λ_i : 71 Deg 23.00 Min

$\Delta D_c = \frac{(T_f - T_i)}{60} = \frac{10}{60}$ = .167 Hrs

$\Delta\lambda = \lambda_f - \lambda_i$ = 0.07 Min

$\Delta L = L_f - L_i$ = 0 Deg 5.39 Min

$L_m = \frac{(L_f + L_i)}{2}$ = 35 Deg 51.19 Min

$L_m' = (\text{DEG} + \frac{MIN}{60}) = 35.84$ Deg

$\Delta\lambda' = \Delta\lambda \cos L_m' = 0.06$ Nm

$\Delta D_c = \sqrt{\Delta L^2 + \Delta\lambda'^2} = 5.39$ Nm

$v_{AVG} = \frac{\Delta D_c}{\Delta T_c}$ = 32.28 Knots ← Average speed to be entered

Note: Repeat for reciprocal run (32 + 180°).

SECTION I AN/WSN-8 (7093036) DEML OPERATING PROCEDURES

2.7 AN/WSN-8 (7093036) DEML OPERATING PROCEDURES.

This section includes **Table 2-6** through **Table 2-21** which contain the procedures for turning on and operating the AN/WSN-8 (7093036) DEML.

Table 2-6. AN/WSN-8 (7093036) DEML Startup Procedure

STEP	DISPLAY	ACTION
	CAUTION DEML must not be energized in Underwater mode unless rodmeter is connected and extended into water. **NOTE** Rodmeter Cutout Switch must be verified in the "ON" position prior to performing DEML startup (if installed).	
1	Fans operate. CDP display shows a flashing cursor for approximately 30 seconds. CDP displays the following, with a slight pause between each: DIGITAL EMLOG DEML VERSION: 3.3 INITIALIZING . . . .* CPU .....PASS MODE: BIT D/R 60HZ.....PASS MODE: BIT SSBA 1 .....PASS SSBA 2 .....PASS MODE: BIT	Energize 60-Hz and 400-Hz (400-Hz N/A to the SSN 21 Class) external power sources. **NOTE** *This will flash until initializing is complete. **NOTE** If screen shown does not appear after approximately 30 seconds, check PROGRAM switch. If it is in PROGRAM position, de-energize external power sources, set switch to NORMAL, and re-energize external power sources. **NOTE** Due to power panel locations, another person may be required to observe DEML I/T display.

Table 2-6. AN/WSN-8 (7093036) DEML Startup Procedure - Continued

STEP	DISPLAY	ACTION
	D/S 400HZ .....PASS MODE: BIT A/D .....PASS MODE: BIT 1553.....PASS MODE: BIT	
2		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6.**
3	Rotating Synchros * After 1-30 seconds, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	After completing initial self-test, the DEML positions synchro outputs from initial condition to current I/T output, then automatically goes to Underwater mode. **NOTE** *CDP display will only flash if there is a difference between OSS and entered speed.
4		Verify proper Calibration Table is loaded in the DEML by performing the Status Check Procedure (**Table 2-12**). Step 9 of Table 2-12 will be where the Calibration Table number and Calibration type will be observed. Refer to **Paragraph 2.5** for Calibration Table explanation and ship applicability.

Table 2-7. AN/WSN-8 (7093036) DEML Underwater Mode Procedure

STEP	DISPLAY	ACTION
1		Press **UDW** on the CDP keypad.
2	Rotating Synchros * After 1-30 seconds, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	**NOTE** When started, the DEML goes to Underwater mode after completing initial self-test. It is only necessary to select Underwater mode manually when shifting from a different mode. **NOTE** *This display will only be present and flashing if there is a difference between OSS and entered speed.

Table 2-8. AN/WSN-8 (7093036) DEML Manual Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **MAN** on the CDP keypad.
2	NOT NORMAL OVERRIDE (1) ENABLE (2) DISABLE MODE: MAN DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a “not normal” indication to external users. (Routine operation.)
3	ENTER DUMMY SPEED > ❑ XX.XX MODE: MAN DUMMY ❑ Denotes a blinking cursor.	Enter the desired speed via the numeric keys on the CDP keypad and press **E**.
4	_____.____ENTERED CORRECT? (1) YES (2) NO MODE: MAN DUMMY Rotating Synchros *	If entered speed is incorrect, press **2** on the CDP keypad and repeat step 3. If entered speed is correct, press **1** on the CDP keypad. **NOTE** *This display will only be present and flashing if there is a difference between OSS and entered speed.

Table 2-8. AN/WSN-8 (7093036) DEML Manual Dummy Mode Procedure - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, after 1-30 seconds, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: MAN DUMMY	
5		To change speed, repeat steps 1 through 4.

Table 2-9. AN/WSN-8 (7093036) DEML Remote Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **REM** on the CDP keypad.
2	NOT NORMAL OVERRIDE 1) ENABLE 2) DISABLE MODE: REM DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a “not normal” indication to external users. (Routine operation.)
3	SPEED: _____.___KT DIST: _____.___NM MODE: REM DUMMY	Operate RCU switch to increase or decrease speed. Observe that speed indication on the CDP display increases or decreases with RCU switch operation. **NOTE** When switch is held up or down, speed changes incrementally. Rate of change will increase as the switch is held longer.

Table 2-10. AN/WSN-8 (7093036) DEML BIT Procedure

STEP	DISPLAY	ACTION
1		Press **BIT** on the CDP keypad.
2	CCS GOING OFFLINE CONTINUE? 1) YES 2) NO MODE: BIT	Press **1** to continue with BIT. **NOTE** DEML will be offline on MIL-STD-1553B DDB. Press **2** to abort BIT and return to the previous mode.
3	CPU .....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
4	D/R 60HZ .....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
5	SSBA 1 .....PASS SSBA 2 .....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
6	D/S 400HZ .....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
7	A/D .....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
8	1553.....PASS (E)nter MODE: BIT	Press **E** on the CDP keypad.
9		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6.**
10	SPEED: _____.___KT DIST: _____.___NM MODE: (same as previously selected)	After completing BIT, the DEML will return to the previously selected mode. **NOTE** If there is a difference between OSS and entered speed, the Rotating Synchros CDP display will be present and flashing.

Table 2-11. AN/WSN-8 (7093036) DEML Configuration Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	CCS GOING OFFLINE CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** to continue with Configuration. **NOTE** DEML will be offline on MIL-STD-1553B DDB. Press **2** to abort Configuration and return to the previous mode.
3	ENTER PASSWORD > ❑ MODE: CONFIG ❑ Denotes a blinking cursor	Enter the password (**13**) and press **E** on the CDP.
CAUTION Do not select the same number for both I/Ts. If this is done, it will cause both I/Ts to have the same RT ID address. The DEML will stay up and the DDB will fail.		
4	DEML RT SELECT DEML# (1) DEML1 (2) DEML2 MODE: CONFIG	**NOTE** DEML # is DEML1 for I/T #1 and DEML2 for I/T #2. **NOTE** This identifies the DEMLs MIL-STD-1553B DDB address to external users. At I/T #1 (Unit 3), press **1** on the CDP keypad. At I/T #2 (Unit 8), press **2** on the CDP keypad.
5	RESET HOURS OF OPERATION (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the elapsed time to zero. Press **2** to skip to the next step.
6	RESET SYSTEM DISTANCE (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the distance count to zero. Press **2** to skip to the next step.
7	RESTORE SYSTEM DEFAULTS (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** to return to the previously selected mode.

Table 2-11. AN/WSN-8 (7093036) DEML Configuration Procedure - Continued

STEP	DISPLAY	ACTION
8	If 1 is pressed, the CDP display will change to: RESTORING DEFAULTS CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
9	If 1 is pressed, the CDP display will change to: ALL CAL DATA WILL BE DELETED! CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to previously selected mode.
10	If 1 is pressed, the CDP display will change to: LOADING DEFAULTS . . . * MODE: CONFIG After several seconds, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as previously selected)	**NOTE** *This will flash until DEFAULTS are loaded. **NOTE** After completing Configuration, DEML will automatically return to the mode prior to Configuration mode initialization.
CAUTION After completing configuration, DEML must be powered down and re-energized prior to any future use.		

Table 2-12. AN/WSN-8 (7093036) DEML Status Check Procedure

STEP	DISPLAY	ACTION
1		Press **STA** on the CDP keypad.
2	DEML SOFTWARE VERSION: 3.3 (E)nter MODE: STATUS	Press **E** on the CDP keypad.
3	OPERATION HOURS # (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" Denotes number of hours.
4	DEML NORMAL* (E)nter MODE: STATUS	Press **E** on the CDP keypad. "Normal" means that the DEML is in Underwater mode, Calibration mode, or any other mode with NOT NORMAL OVERRIDE enabled. **NOTE** *If system is not normal, this line reads **DEML NOT NORMAL**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
5	DATA VALID* (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** ***DATA NOT VALID** will appear if the DEML detects an internal problem with speed processing. If condition of DATA NOT VALID is observed, troubleshooting should be performed as directed in **Chapter 5**.

Table 2-12. AN/WSN-8 (7093036) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
		NOTE **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
6	COIL CURRENT ____.____ (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** Proper coil current is 0.5 ±0.1 VAC. Coil current is monitored and measured in volts ac.
7	DEML RT ADDRESS DEML# (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" will be DEML1 for I/T No. 1, DEML2 for I/T No. 2.
8	NORMAL ROD* SELECTED (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If RSU is set to ALTERNATE, this line reads **ALTERNATE ROD**.
9	COIL IN SPEC* (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If coil current is out of specification, this line reads **OUT OF SPEC**. COIL IN SPEC means that coil current is correct (see step 6). COIL OUT OF SPEC means that coil current is incorrect and troubleshooting should be performed as directed in **Chapter 5**.

Table 2-12. AN/WSN-8 (7093036) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
		NOTE **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults. Coil current is continuously monitored by the DEML.
10	CURRENT CAL TABLE n: XXXXXXX (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "n" is the calibration table number. "XXXXXXX" is the calibration type. See **Paragraph 2.5** for explanation of calibration types.
11	CCS 1553 BUS ONLINE* (E)nter MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If CCS 1553 bus is offline, this line reads **OFFLINE**.
12	Rodmeter Switch Unit PRESENT (E)nter MODE: STATUS	Press **E** on the CDP keypad.
13	SPEED: _____.___KT DIST: _____.___NM MODE: (same as previously selected)	**NOTE** After completing Status Check, the DEML will automatically return to the mode in which it was operating before Status Check (Underwater, Manual Dummy, or Remote Dummy).

Table 2-13. AN/WSN-8 (7093036) DEML Shutdown Procedure

STEP	DISPLAY	ACTION
1		De-energize 60-Hz and 400-Hz [400-Hz N/A to the AN/WSN-8 (7093036) (SSN 21 Class only) DEML] external power sources.
2	CDP display goes blank.	Fans cease operation.

Table 2-14. AN/WSN-8 (7093036) DEML ELVS Calibration (Pre-Calibration) Procedure

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **1** on the CDP keypad.
3	Select Table: NORM* 1)__ 3) ELVS 2)__ 4) DEFAULT MODE: CALIBRATION CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	Press **3** on the CDP keypad. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Option 4 will always read **DEFAULT**.
4		Press **CAL** on the CDP keypad.
5	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
6	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **1** on the CDP keypad.
7	ENTER MAXIMUM CALIBRATION SPEED > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	**NOTE** For best results, the desired maximum calibration speed is 40 knots for the ELVS calibration. Enter the desired value (40 knots) via the numeric keys on the CDP keypad and press **E**.
8	ENTER CAL INTERVAL > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	**NOTE** Calibration interval is the interval between readings of speed for calibration. No decimal points are used. The smallest interval is 1 knot. The usual interval is 10 knots. The following example is based on intervals of 10 knots Enter the desired calibration interval value (10 knots) via the numeric keys on the CDP keypad and press **E**.

Table 2-14. AN/WSN-8 (7093036) DEML ELVS Calibration (Pre-Calibration) Procedure - Continued

STEP	DISPLAY	ACTION
9	Bring ELVS to: 0 Knots (E)nter MODE: CALIBRATION	Set ELVS to 0 knots, wait 30 seconds, and press **E** on the CDP keypad.
10	Bring ELVS to: 10 Knots (E)nter MODE: CALIBRATION	**NOTE** This step assumes an interval of 10 knots. After pressing E on the CDP keypad, the CDP will display a flashing "calibrating" until calibration update is completed. Set ELVS to 10 knots, wait 30 seconds, and press **E** on the CDP keypad.
11	Bring ELVS to: 20 Knots (E)nter MODE: CALIBRATION	**NOTE** This step assumes an interval of 20 knots. After pressing E on the CDP keypad, the CDP will display a flashing "calibrating" until calibration update is completed. Continue the above sequence until the last value (entered in step 8) is reached.
12	CDP display will change to: Bring ELVS to: Calibrating . . . . * MODE: CALIBRATION	**NOTE** *This CDP display portion will flash until calibration update is completed.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
13	After approximately 6 minutes, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To store the calibration information, press **1** on the CDP keypad and perform step 14. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform step 15.

Table 2-14. AN/WSN-8 (7093036) DEML ELVS Calibration (Pre-Calibration) Procedure - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (STEP 14)	
14	If 1 is pressed, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 16).	**NOTE** *This CDP display portion will flash until table is stored.
	DISCARD TABLE (STEP 15)	
15	If 2 is pressed, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** to return to step 13 display screen.
16	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-15. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Measured-Mile Run (Surface Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **1** on the CDP keypad.
3	Select Table: NORM* 1)__ 3) ELVS 2)__ 4) DEFAULT MODE: CALIBRATION CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	Press **3** on the CDP keypad. **NOTE** This table selection will install the ELVS table, which will then be used as reference. Verify that the ELVS table is selected via the STATUS Mode (procedure described in **Paragraph 2.3.10**). If ELVS is not displayed in STATUS as the current calibration table, repeat the ELVS calibration procedure described in **Paragraph 2.5.3** until a valid ELVS table can be loaded. **A valid ELVS table must exist before any other calibrations are performed.** **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Option 4 will always read **DEFAULT**.
4		Press **CAL** on the CDP keypad.
5	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
6	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **2** on the CDP keypad.
7	1) Measured-Mile 2) Inertial Reference 3) NAV VRC Input MODE: CALIBRATION	Press **1** on the CDP keypad.

Table 2-15. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
8	ENTER MAXIMUM CALIBRATION SPEED > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
9	ENTER CAL INTERVAL > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	**NOTE** Calibration interval is the interval between readings of speed for calibration. The smallest interval is 1 knot. The usual interval is 4 knots. No decimal points are used. Enter the desired calibration interval value (4 knots) via the numeric keys on the CDP keypad and press **E**.
10	Calibrate for interval: # Knots 1) YES 2) NO MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Press **1** on the CDP keypad to calibrate at the interval that appears on the screen. Press **2** to skip to the next interval. Press **1** to calibrate at the interval that appears.
11	Bring HULL to: # Knots (E)nter MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a "mark" to operator to press **E** on the CDP keypad.
12	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**).

Table 2-15. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
		When the **RECIPROCAL RUN** screen appears, advise pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad.
13	Bring HULL to: # Knots (E)nter MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION At end of reciprocal run, the CDP display will change to **Calibrate for interval** screen (step 10).	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. After the reciprocal run is complete, the **Calibrate for interval** screen will appear. When this happens, advise pilot house/ship control to turn the vessel around for the base run at the next speed and return to step 10 display screen. Repeat steps 10 through 12 until the top speed (entered in step 8) is reached.
15	After approximately 6 minutes, the CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	Calculate average speeds from times over the measured-mile course. Refer to **Table 2-4**. **NOTE** "#" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds from times over the measured-mile course and press **E**.
16	CDP display will change to: RECIPROCAL RUN Enter average speed # Knots: MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval value for the reciprocal run. Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 15 and 16 until the top speed is reached.

Table 2-15. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
17	CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	For the last reciprocal run (at the highest speed), go to the next step. **NOTE** "#" Denotes calibration speed.
18		Enter the calculated average speed of the reciprocal run at the last listed speed in step 16 and press **E**.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
19	After E is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 20 and 21. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 22 and 23.
	BUILD TABLE (steps 20 and 21)	
20	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)nter	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it. Press **E** and the display will change back to the previous mode.

Table 2-15. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
21	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display in step 23).	**NOTE** *After selecting table on CDP keypad, this CDP display portion will flash until table is stored.
DISCARD TABLE (steps 22 and 23)		
22	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
23	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-16. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Measured-Mile Run (Surface Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
3	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **4** on the CDP keypad.
4	Modify Run? # Knots (1) YES (2) NO MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval for modification. Modification can only be performed on one calibration interval at a time. Modification procedure must be re-run for each interval. Press **1** on the CDP keypad to continue. Press **2** to skip to the next interval. **NOTE** If one calibration interval was performed, pressing 2 will abort the modification procedure and return the DEML to the previously selected mode.
5	If 1 is pressed, the CDP display will change to: 1) Measured-Mile 2) Inertial Reference 3) Auto MODE: CALIBRATION	Press **1** on the CDP keypad.
6	Bring HULL to: # Knots (E)nter MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Advise pilot house/ship control to make turns for the listed calibration speed and steer for the measured-mile course as in **Table 2-15**. When vessel crosses first measured-mile pylon, observer starts stopwatch and gives a "mark" to operator to press **E** on the CDP keypad.

Table 2-16. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
7	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION After interval that will vary with speed, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad.
8	CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION	Repeat steps 6 and 7 until the top speed is reached. **NOTE** *This CDP display portion will flash until calibration update is completed.
9	After approximately 6 minutes, the CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	Calculate average speeds from times over the measured-mile course. Refer to **Table 2-4**. **NOTE** "#" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds from times over the measured-mile course and press **E**.
10	CDP display will change to: RECIPROCAL RUN Enter average speed # Knots: MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval value for the reciprocal run. Enter the calculated average speed of the reciprocal run at the listed speeds and press **E**.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		

Table 2-16. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
11	After E is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 12 and 13. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 14 and 15.
BUILD TABLE (steps 12 and 13)		
12	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)nter	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select the table created by the last calibration. Press **E** and the display will change back to the previous mode.
13	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 15).	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.

Table 2-16. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Measured-Mile Run (Surface Only) - Continued

STEP	DISPLAY	ACTION
DISCARD TABLE (steps 14 and 15)		
14	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 11 display screen.
15	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **1** on the CDP keypad.
3	Select Table: NORM* 1) ___ 3) ELVS 2) ___ 4) DEFAULT MODE: CALIBRATION CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	Press **3** on the CDP keypad. **NOTE** This table selection will install the ELVS table, which will then be used as reference. Verify that the ELVS table is selected via the STATUS Mode (procedure described in **Paragraph 2.3.10**). If ELVS is not displayed in STATUS as the current calibration table, repeat the ELVS calibration procedure described in **Paragraph 2.5.3** until a valid ELVS table can be loaded. **A valid ELVS table must exist before any other calibrations are performed.**

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
		NOTE *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Option 4 will always read **DEFAULT**.
4		Press **CAL** on the CDP keypad.
5	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
6	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **2** on the CDP keypad.
7	1) Measured-Mile 2) Inertial Reference 3) NAV VRC Input MODE: CALIBRATION	Press **2** on the CDP keypad.
8	ENTER MAXIMUM CALIBRATION SPEED > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
9	ENTER CAL INTERVAL > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	**NOTE** Calibration interval is the interval between readings of speed for calibration. The smallest interval is 1 knot. The usual interval is 8 knots. No decimal points are used. Enter the desired calibration interval value (8 knots) via the numeric keys on the CDP keypad and press **E**.
10	Calibrate for interval: # Knots 1) YES 2) NO MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Press **1** on the CDP keypad to calibrate at the interval that appears on the screen.

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
		Press **2** to skip to the next interval. Press **1** to calibrate at the interval that appears.
11	Bring HULL to: # Knots (E)nter MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity calibration run.
12	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed (approximately 6 minutes). **NOTE** Observer shall prepare for a position typeout precisely after 10 minutes from the initial position typeout. Failure to obtain a position typeout at exactly 10-minute intervals will result in average velocity errors and thus lead to calibration failures. Although the DEML will finish the calibration run prior to the final position typeout, maintain constant speed and heading until the final position typeout is achieved. After the final position typeout is achieved, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal calibration run.
13	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed (approximately 6 minutes).

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
	At end of reciprocal run, the CDP display will change to **Calibrate for interval** screen (step 10).	**NOTE** Observer shall prepare for a position typeout precisely after 10 minutes from the initial position typeout. Failure to obtain a position typeout at exactly 10-minute intervals will result in average velocity errors and thus lead to calibration failures. Although the DEML will finish the calibration run prior to the final position typeout, maintain constant speed and heading until the final position typeout is achieved. After the reciprocal run is complete, the **Calibrate for interval** screen will appear. When this happens, advise pilot house/ship control to turn the vessel around for the base run at the next speed and return to step 10 display screen. Repeat steps 10 through 13 until the top speed (entered in step 8) is reached.
14	After approximately 6 minutes, the CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	Calculate average speeds. Refer to **Table 2-5**. **NOTE** "#" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.
15	CDP display will change to: RECIPROCAL RUN Enter average speed # Knots: MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval value for the reciprocal run. Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 14 and 15 until the top speed is reached.
16	CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	For the last reciprocal run (at the highest speed), go to the next step. **NOTE** "#" Denotes calibration speed.
17		Enter the calculated average speed of the reciprocal run at the last listed speed in step 15 and press **E**.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
18	After E is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 19 and 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.
BUILD TABLE (steps 19 and 20)		
19	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)nter	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it. Press **E** and the display will change back to the previous mode.
20	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 22).	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.

Table 2-17. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
DISCARD TABLE (steps 21 and 22)		
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 18 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-18. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Inertial Reference Entered Manually (SSN and Surface Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
3	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **4** on the CDP keypad.
4	Modify Run? # Knots (1) YES (2) NO MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval for modification. Modification can only be performed on one calibration interval at a time. Modification procedure must be re-run for each interval. Press **1** on the CDP keypad to continue. Press **2** to skip to the next interval. **NOTE** If only one calibration interval was performed, pressing 2 will abort the modification procedure and return the DEML to the previously selected mode

Table 2-18. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
5	If 1 is pressed, the CDP display will change to: 1) Measured-Mile 2) Inertial Reference 3) Auto MODE: CALIBRATION	Press **2** on the CDP keypad.
6	Bring HULL to: # Knots (E)nter MODE: CALIBRATION	**NOTE** "#" Denotes calibration speed. Advise pilot house/ship control to make turns for the listed calibration speed and steer the same course as in **Table 2-17**. When vessel reaches desired course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad, records initial position and time on the calibration data sheet (**Figure 2-6**), and prepares for a position typeout on the INS I/O console. Maintain course and speed until the **RECIPROCAL RUN** screen appears.
7	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION After interval that will vary with speed, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-6**). When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet and obtain a position typeout. Operator advises pilot house to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad.
8	CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS Calibrating . . . . * MODE: CALIBRATION	Repeat steps 6 and 7 until the top speed is reached. **NOTE** *This CDP display portion will flash until calibration update is completed.

Table 2-18. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
9	After approximately 6 minutes, the CDP display will change to: BASE RUN Enter average speed # Knots: MODE: CALIBRATION	Calculate average speeds. Refer to **Table 2-5**. **NOTE** "#" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.
10	CDP display will change to: RECIPROCAL RUN Enter average speed # Knots: MODE: CALIBRATION	**NOTE** "#" Denotes calibration interval value for the reciprocal run. Enter the calculated average speed of the reciprocal run at the listed speeds and press **E**.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
11	After E is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 12 and 13. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 14 and 15.
BUILD TABLE (steps 12 and 13)		
12	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)nter	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select the table created by the last calibration. Press **E** and the display will change back to the previous mode.

Table 2-18. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Inertial Reference Entered Manually (SSN and Surface Only) - Continued

STEP	DISPLAY	ACTION
13	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 15).	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.
DISCARD TABLE (steps 14 and 15)		
14	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 11 display screen.
15	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-19. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, VRC Input Entered Manually (SSBN 726 Class Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **1** on the CDP keypad.
3	Select Table: NORM* 1) ___ 3) ELVS 2) ___ 4) DEFAULT MODE: CALIBRATION CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	Press **3** on the CDP keypad. **NOTE** This table selection will install the ELVS table, which will then be used as reference. Verify that the ELVS table is selected via the STATUS Mode (procedure described in **Paragraph 2.3.10**). If ELVS is not displayed in STATUS as the current calibration table, repeat the ELVS calibration procedure described in **Paragraph 2.5.3** until a valid ELVS table can be loaded. **A valid ELVS table must exist before any other calibrations are performed.** **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Option 4 will always read **DEFAULT**.
4		Press **CAL** on the CDP keypad.
5	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
6	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **2** on the CDP keypad.
7	1) Measured-Mile 2) Inertial Reference 3) NAV VRC Input MODE: CALIBRATION	Press **3** on the CDP keypad.

Table 2-19. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, VRC Input Entered Manually (SSBN 726 Class Only) - Continued

STEP	DISPLAY	ACTION
8	Enter True Speed > ❑ MODE: CALIBRATION ❑ Denotes a blinking cursor	Enter the speed from applicable data sheet and press **E**.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
9	After E is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 10 through 14. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 15 and 16.
	BUILD TABLE (steps 10 through 14)	
10	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it.
11	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.

Table 2-19. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, VRC Input Entered Manually (SSBN 726 Class Only) - Continued

STEP	DISPLAY	ACTION
	CAUTION Do not press 1 if only a single rodmeter is available. Doing so will cause the DEML to lock up and require a restart.	
12	After approximately 1 minute, the CDP display will change to: Calibrate Other Rodmeter (1) YES (2) NO MODE: CALIBRATION	**NOTE** If calibration data has been saved for both the normal and alternate rodmeter, the DEML will re-enter the mode it was in before calibration. Press **1** on the CDP keypad to calibrate the other rodmeter. Press **2** on the CDP keypad to end this procedure. The DEML will re-enter the mode it was in before calibration.
13	If 1 is pressed, the CDP display will change to: Switch Rodmeters on Switching Unit MODE: CALIBRATION	Set the RSU to the indicated rodmeter configuration.
14	CDP display will change to: SPEED: _____.___KT (E)nter when speed is stable +/-0.5 kt MODE: CALIBRATION	Press **E**, once ship's speed is stable. Repeat steps 8 through 12. **NOTE** When the **Calibrate Other Rodmeter** screen (step 12) appears, press **2**. The DEML will re-enter the mode it was in before calibration.
	DISCARD TABLE (steps 15 and 16)	
15	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 9 display screen.
	CAUTION Do not press 1 if only a single rodmeter is available. Doing so will cause the DEML to lock up and require a restart.	

Table 2-19. AN/WSN-8 (7093036) DEML Manual Calibration Procedure, VRC Input Entered Manually (SSBN 726 Class Only) - Continued

STEP	DISPLAY	ACTION
16	If 1 is pressed, the CDP display will change to: Calibrate Other Rodmeter (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to calibrate the other rodmeter. Repeat steps 13 and 14. Press **2** on the CDP keypad to end this procedure. The DEML will re-enter the mode it was in before calibration.

Table 2-20. AN/WSN-8 (7093036) DEML Automatic Calibration Procedure (SSN 21 Class Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **1** on the CDP keypad.
3	Select Table: NORM* 1) ___ 3) ELVS 2) ___ 4) DEFAULT MODE: CALIBRATION CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: UNDERWATER	Press **3** on the CDP keypad. **NOTE** This table selection will install the ELVS table, which will then be used as reference. Verify that the ELVS table is selected via the STATUS Mode (procedure described in **Paragraph 2.3.10**). If ELVS is not displayed in STATUS as the current calibration table, repeat the ELVS calibration procedure described in **Paragraph 2.5.3** until a valid ELVS table can be loaded. **A valid ELVS table must exist before any other calibrations are performed.** **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Option 4 will always read **DEFAULT**.
4		Press **CAL** on the CDP keypad.
5	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.

Table 2-20. AN/WSN-8 (7093036) DEML Automatic Calibration Procedure (SSN 21 Class Only) - Continued

STEP	DISPLAY	ACTION
6	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **3** on the CDP keypad.
7	Bring HULL to: Constant Speed/Turns (E)nter MODE: CALIBRATION	Bring vessel to flank speed. When vessel reaches desired course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad. (Record heading and speed information.)
8	After E is pressed, the CDP display will change to: Calibrating . . . . * MODE: CALIBRATION CCS 1553 BUS DOWN (E)nter After E is pressed, the CDP display will change to: Perform another calibration run? (1) YES (2) NO MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. If the MIL-STD-1553B DDB is not installed, connected, or operational, the CDP display will change to **CCS 1553 BUS DOWN**. Press (**E**)nter. **NOTE** Press **2** to revert to the previously selected mode, take corrective action to restore MIL-STD-1553B DDB, and return to step 1.
9	After interval that will vary with speed, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad.
10	Bring HULL to: Constant Speed/Turns (E)nter MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.

Table 2-20. AN/WSN-8 (7093036) DEML Automatic Calibration Procedure (SSN 21 Class Only) - Continued

STEP	DISPLAY	ACTION
11	After E is pressed, the CDP display will change to: Calibrating . . . . * MODE: CALIBRATION After 6 minutes, the CDP display will change to: Perform another calibration run? (1) YES (2) NO MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. Maintain course and speed until the **Perform another calibration run** screen appears. Press **2** on the CDP keypad.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
12	After 2 is pressed, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 13 and 14. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 15 and 16.
	BUILD TABLE (steps 13 and 14)	
13	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it.

Table 2-20. AN/WSN-8 (7093036) DEML Automatic Calibration Procedure (SSN 21 Class Only) - Continued

STEP	DISPLAY	ACTION
14	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 16).	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.
DISCARD TABLE (steps 15 and 16)		
15	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 12 display screen.
16	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

Table 2-21. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Automatic Calibration (SSN 21 Class Only)

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad
2	1) Select Table 2) Calibrate MODE: CALIBRATION	Press **2** on the CDP keypad.
3	1) ELVS 3) Auto 2) Manual 4) Modify MODE: CALIBRATION	Press **4** on the CDP keypad.
4	Modify Run? # Knots (1) YES (2) NO MODE: CALIBRATION If an Automatic Calibration has not been performed, the CDP display will change to: ERROR TABLE MODIFY (E)nter	**NOTE** "#" Denotes calibration interval for modification. Press **1** on the CDP keypad to continue. Press **2** to skip to the next interval. **NOTE** If only one calibration interval was performed, pressing 2 will abort the modification procedure and return the DEML to the previously selected mode. If this occurs, press **E** to revert to the previously selected mode.
5	If 1 is pressed, the CDP display will change to: 1) Measured-Mile 2) Inertial Reference 3) Auto MODE: CALIBRATION	Press **3** on the CDP keypad.

Table 2-21. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Automatic Calibration (SSN 21 Class Only) - Continued

STEP	DISPLAY	ACTION
6	Bring HULL to: Constant Speed/Turns (E)nter MODE: CALIBRATION	Advise pilot house/ship control to make turns for a steady speed and steer same course as in **Table 2-20**. When vessel reaches desired course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad and records initial position and time on the calibration data sheet. (Data recorded is for reference only.)
7	After E is pressed, the CDP display will change to: Calibrating . . . . * MODE: CALIBRATION After 6-8 minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)nter MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. Operator advises pilot house to turn the vessel around for the reciprocal run. (Data recorded is for reference only.) Press **E** on the CDP keypad.
8	CDP display will change to: Bring HULL to: Constant Speed/Turns (E)nter MODE: CALIBRATION	Press **E** on the CDP keypad.
9	CDP display will change to: Calibrating . . . . * MODE: CALIBRATION	**NOTE** *This CDP display portion will flash until calibration update is completed.

CAUTION

Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.

Table 2-21. AN/WSN-8 (7093036) DEML Calibration Table Modification Procedure, Automatic Calibration (SSN 21 Class Only) - Continued

STEP	DISPLAY	ACTION
10	After the reciprocal run, the CDP display will change to: 1) Build Table 2) Discard Table MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 11 and 12. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 13 and 14.
	BUILD TABLE (steps 11 and 12)	
11	Select Table: NORM* 1) _____ 2) _____ MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select the table created by the latest calibration.
12	After pressing 1 or 2 to select a table, the CDP display will change to: Storing table . . . . * MODE: CALIBRATION After approximately 1 minute, the CDP display will change to the mode it was in before calibration (see display at step 14).	**NOTE** *After selecting table on the CDP keypad, this CDP display portion will flash until table is stored.
	DISCARD TABLE (steps 13 and 14)	
13	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 10 display screen.
14	If 1 is pressed, the CDP display will change to: SPEED: _____.___KT DIST: _____.___NM MODE: (same as before calibration)	

SECTION II AN/WSN-8 (7093036) DEML (w/FC-1) OPERATING PROCEDURES

2.8 AN/WSN-8 (7093036) DEML (W/FC-1) OPERATING PROCEDURES.

This section includes **Table 2-22** through **Table 2-43** which contain the procedures for turning on and operating the AN/WSN-8 (7093036) DEML (w/FC-1).

Table 2-22. AN/WSN-8 (7093036) DEML (w/FC-1) Startup Procedure

STEP	DISPLAY	ACTION
	CAUTION DEML must not be energized in Underwater mode unless rodmeter is connected and extended into water. **NOTE** Rodmeter Cutout Switch must be verified in the "ON" position prior to performing DEML startup (if installed).	
1	Fans operate. CDP display shows a flashing cursor for approximately 30 seconds. CDP displays the following, with a slight pause between each: DIGITAL EM LOG VER: #.## WSN-8 INITIALIZING....* CPU .....PASS MODE: BIT A/D .....PASS MODE: BIT ROD PCB.....PASS MODE: BIT	Energize 60-Hz and 400-Hz (400-Hz N/A to the SSN 21 Class) external power sources. **NOTE** *This will flash until initializing is complete. **NOTE** Due to power panel locations, another person may be required to observe DEML I/T display.

Table 2-22. AN/WSN-8 (7093036) DEML (w/FC-1) Startup Procedure - Continued

STEP	DISPLAY	ACTION
	D/R 60HZ .....PASS MODE: BIT SSBA 1 .....PASS SSBA 2 .....PASS MODE: BIT D/S 400HZ .....PASS MODE: BIT 1553.....PASS MODE: BIT	
2		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
3	SLEWING SPEED * After 1-30 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	The DEML positions synchro outputs from initial condition to current I/T output, then automatically goes to Underwater mode. **NOTE** *CDP will display **SLEWING SPEED** until OSS is reached. **NOTE** A flashing “FLT” on the CDP indicates an active fault. **Refer to Chapter 5.**
4		Verify proper Calibration Table is loaded in the DEML by performing the Status Check Procedure (**Table 2-28**). Step 8 of Table 2-28 will be where the Calibration Table number and Calibration type will be observed. Refer to **Paragraph 2.6** for Calibration Table explanation and ship applicability.

Table 2-23. AN/WSN-8 (7093036) DEML (w/FC-1) Underwater Mode Procedure

STEP	DISPLAY	ACTION
1		Press **UDW** on the CDP keypad.
2	SLEWING SPEED * After 1-30 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	**NOTE** When started, the DEML goes to Underwater mode after completing initial self-test. It is only necessary to select Underwater mode manually when shifting from a different mode. **NOTE** *This display will only be present and flashing if there is a difference between OSS and entered speed. **NOTE** A flashing “FLT” on the CDP indicates an active fault. **Refer to Chapter 5**.

Table 2-24. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **MAN** on the CDP keypad.
2	NOT NORMAL OVERRIDE (1) ENABLE (2) DISABLE MODE: MAN DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a “not normal” indication to external users. (Routine operation.)
3	ENTER DUMMY SPEED > MODE: MAN DUMMY	Enter the desired speed via the numeric keys on the CDP keypad and press **E**.
4	##.## ENTERED CORRECT? (1) YES (2) NO MODE: MAN DUMMY SLEWING SPEED *	If entered speed is incorrect, press **2** on the CDP keypad and repeat step 3. If entered speed is correct, press **1** on the CDP keypad. **NOTE** *This display will only be present and flashing if there is a difference between OSS and entered speed.

Table 2-24. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Dummy Mode Procedure - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, after 1-30 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: MAN DUMMY	
5		To change speed, repeat steps 1 through 4.

Table 2-25. AN/WSN-8 (7093036) DEML (w/FC-1) Remote Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **REM** on the CDP keypad.
2	NOT NORMAL OVERRIDE 1) ENABLE 2) DISABLE MODE: REM DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a “not normal” indication to external users. (Routine operation.)
3	SPEED: ###.## KT DIST: #####.## NM MODE: REM DUMMY	Operate RCU switch to increase or decrease speed. Observe that speed indication on the CDP display increases or decreases with RCU switch operation. **NOTE** When switch is held up or down, speed changes incrementally. Rate of change will increase as the switch is held longer.

Table 2-26. AN/WSN-8 (7093036) DEML (w/FC-1) BIT Procedure

STEP	DISPLAY	ACTION
1		Press **BIT** on the CDP keypad.
2	1) PERFORM BIT 2) DISPLAY/ACK FAULTS MODE: BIT	To perform BIT, press **1** and perform steps 3 through 12. To display fault(s), press **2** and perform steps 13 through 15. To acknowledge fault(s), press **2** and perform steps 16 through 18.
3	CCS GOING OFFLINE CONTINUE? 1) YES 2) NO MODE: BIT	Press **1** to continue with BIT. **NOTE** DEML will be offline on MIL-STD-1553B DDB. Press **2** to abort BIT and return to the previous mode.
4	CPU .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
5	A/D .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
6	ROD PCB .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
7	D/R 60HZ .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
8	SSBA 1 .....PASS SSBA 2 .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
9	D/S 400HZ .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.

Table 2-26. AN/WSN-8 (7093036) DEML (w/FC-1) BIT Procedure - Continued

STEP	DISPLAY	ACTION
10	1553.....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
11		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
12	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing BIT, the DEML will return to the previously selected mode. **NOTE** If there is a difference between OSS and entered speed, the SLEWING SPEED CDP display will be present and flashing. **NOTE** *The mode displayed will be the same as previously selected.
DISPLAY FAULT(S) (steps 13 through 15)		
13	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **1** on the CDP keypad to display fault(s).
14	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: ### ### ### ### ### ACK ACK ACK* (E)NTER	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are displayed. **NOTE** *ACK displayed under fault indicates that fault has been acknowledged. Press **E** on the CDP keypad.

Table 2-26. AN/WSN-8 (7093036) DEML (w/FC-1) BIT Procedure - Continued

STEP	DISPLAY	ACTION
15	If E is pressed, CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.
ACKNOWLEDGE FAULT(S) (steps 16 through 18)		
16	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **2** on the CDP keypad to acknowledge fault(s).
17	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: FAULT: ### ACK (1) YES (2) NO	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are acknowledged. Press **1** on the CDP keypad to acknowledge fault. Press **2** on the CDP keypad if it is not desired to acknowledge a fault.
18	If E is pressed, CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The Mode displayed will be the same as previously selected.

Table 2-27. AN/WSN-8 (7093036) DEML (w/FC-1) Configuration Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **1** on the CDP keypad. **NOTE** To shut down the system, use **Table 2-29** Shutdown Procedure.
3	CCS GOING OFFLINE CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to proceed with configuration. **NOTE** DEML will be offline on MIL-STD-1553B DDB. Press **2** to abort configuration and return to the previous mode.
4	ENTER PASSWORD > MODE: CONFIG	Enter the password (**13**) and press **E** on the CDP keypad.
CAUTION Do not select the same number for both I/Ts. If this is done, it will cause both I/Ts to have the same RT ID address. The DEML will stay up and the DDB will fail.		
5	DEML RT SELECT DEML1 (1) DEML1 (2) DEML2 MODE: CONFIG	**NOTE** DEML1 is for I/T #1 and DEML2 is for I/T #2. **NOTE** This identifies the DEMLs MIL-STD-1553B DDB address to external users. At I/T #1 (Unit 3), press **1** on the CDP keypad. At I/T #2 (Unit 8), press **2** on the CDP keypad.
6	RESET HOURS OF OPERATION? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the hours of operation to zero. **NOTE** Hours of operation should be recorded before being reset to zero. Press **2** to skip to the next step.

Table 2-27. AN/WSN-8 (7093036) DEML (w/FC-1) Configuration Procedure - Continued

STEP	DISPLAY	ACTION
7	RESET SYSTEM DISTANCE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the distance count to zero. **NOTE** System distance should be recorded before being reset to zero. Press **2** to skip to the next step.
8	MODIFY INTERFACES? (1) YES (2) NO MODE: CONFIG	To modify interfaces, press **1** on the CDP keypad. **NOTE** Interface configuration of each ship class can be found listed in **Table 1-6** and should not normally require modification. Press **2** to skip interface modification and proceed to step 13.
9	60HZ SYN: ENABLED ENABLE 60HZ? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the 60Hz Synchro interface. Press **2** to disable the 60Hz Synchro interface and skip to the next step.
10	400HZ SYN: ENABLED ENABLE 400HZ? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the 400Hz Synchro interface. Press **2** to disable the 400Hz Synchro interface and skip to the next step.
11	CCS 1553: ENABLED ENABLE 1553? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the MIL-STD-1553B interface. Press **2** to disable the MIL-STD-1553B interface and skip to the next step.
12	NMEA: ENABLED ENABLE NMEA? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the National Marine Electronics Association (NMEA) interface. Press **2** to disable the NMEA interface and skip to the next step.
13	CAL TIME: ## MIN ## MIN (E)NTER MODE: CONFIG	If required, enter the CAL TIME via the numeric keys on the CDP keypad and press **E**. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes. If entry of CAL TIME is not required, press **E** to skip to the next step.

Table 2-27. AN/WSN-8 (7093036) DEML (w/FC-1) Configuration Procedure - Continued

STEP	DISPLAY	ACTION
14	NMEA OUTPUT RATE: ## ## HZ (E)NTER MODE: CONFIG	If required, enter the NMEA output rate via the numeric keys on the CDP keypad and press **E**. If entry of NMEA output rate is not required, press **E** to skip to the next step.
15	RESTORE SYSTEM DEFAULTS? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: RESTORING DEFAULTS CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: ALL CAL DATA WILL BE DELETED! CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of Nonvolatile Random Access Memory (NOVRAM) is complete. **NOTE** After completing Configuration, DEML will automatically return to the mode prior to Configuration mode initialization.

Table 2-27. AN/WSN-8 (7093036) DEML (w/FC-1) Configuration Procedure - Continued

STEP	DISPLAY	ACTION
	After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** **The mode displayed will be the same as previously selected.
	CAUTION After completing configuration, DEML must be powered down and re-energized prior to any future use.	

Table 2-28. AN/WSN-8 (7093036) DEML (w/FC-1) Status Check Procedure

STEP	DISPLAY	ACTION
1		Press **STA** on the CDP keypad.
2	DEML SOFTWARE WSN-8 VER: #.## (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
3	OPERATION HOURS ## (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "##" Denotes number of hours.
4	DEML NORMAL* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. "Normal" means that the DEML is in Underwater mode, Calibration mode, or Manual modes with OVERRIDE enabled. **NOTE** *If system is not normal, this line reads **DEML NOT NORMAL**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.

Table 2-28. AN/WSN-8 (7093036) DEML (w/FC-1) Status Check Procedure - Continued

STEP	DISPLAY	ACTION
5	DATA VALID* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** ***DATA NOT VALID** will appear if the DEML detects an internal problem with speed processing. If condition of DATA NOT VALID is observed, troubleshooting should be performed as directed in **Chapter 5**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
6	COIL CURRENT #.###### (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** Proper coil current is 0.5 ±0.1 VAC. Coil current is monitored and measured in volts ac.
7	NORMAL ROD* SELECTED (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If RSU is set to ALTERNATE, this line reads **ALTERNATE ROD**.
8	COIL IN SPEC* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If coil current is out of specification, this line reads **OUT OF SPEC**. COIL IN SPEC means that coil current is correct (see step 6). COIL OUT OF SPEC means that coil current is incorrect and troubleshooting should be performed as directed in **Chapter 5**.

Table 2-28. AN/WSN-8 (7093036) DEML (w/FC-1) Status Check Procedure - Continued

STEP	DISPLAY	ACTION
		NOTE **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults. Coil current is continuously monitored by the DEML.
9	CURRENT CAL TABLE #: XXX (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" is the calibration table number. "XXX" is the calibration type. See **Paragraph 2.6** for explanation of calibration types. If the currently selected table does not contain a calibration, **NOT CALIBRATED** will be displayed as the calibration type.
10	RODMETER SWITCH UNIT PRESENT (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CDP will read **RODMETER SWITCH UNIT NOT PRESENT** if installation is for a single rodmeter.
11	DEML RT ADDRESS DEML# (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" will be DEML1 for I/T No. 1, DEML2 for I/T No. 2.
12	CCS 1553: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **If CCS 1553 bus is offline, this line reads **OFFLINE**.
13	60HZ SYN: ENABLED* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode.

Table 2-28. AN/WSN-8 (7093036) DEML (w/FC-1) Status Check Procedure - Continued

STEP	DISPLAY	ACTION
14	400HZ SYN: ENABLED* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode.
15	NMEA: ENABLED* OUTPUT RATE: 1 HZ (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode.
16	CAL TIME: ## MIN (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes.
17	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing Status Check, DEML will automatically return to the mode in which it was operating before Status Check (Underwater, Manual Dummy, or Remote Dummy). **NOTE** *The mode displayed will be the same as previously selected.

Table 2-29. AN/WSN-8 (7093036) DEML (w/FC-1) Shutdown Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **2** on the CDP keypad.
3	SHUTDOWN SYSTEM? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to shut down the system.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CONFIG After several seconds, the CDP display will change to: SHUTDOWN COMPLETED SECURE POWER MODE: CONFIG	**NOTE** *This will flash until updating of NOVRAM is complete. De-energize 60-Hz and 400-Hz [400-Hz N/A to the AN/WSN-8 (7093036) (SSN 21 Class only) DEML] external power sources.
5	CDP display goes blank.	Fans cease operation.

Table 2-30. AN/WSN-8 (7093036) DEML (w/FC-1) Calibration Select Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **1** on the CDP keypad.
3	SELECT TABLE: NORM* 1) VRC 2) NONE MODE: CALIBRATION	Press **1** or **2** on the CDP keypad to select the applicable table to be used as reference. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals. Perform Calibration Select Table procedures in **Table 2-30**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE 3) NAV VRC INPUT MODE: CALIBRATION	Press **2** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity calibration run.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished calibrating, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal calibration run.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate actual speeds. **Refer to Table 2-5**. **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.

Table 2-31. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-32. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Inertial Reference

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity verification run.

Table 2-32. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . * At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished verifying, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.

Table 2-32. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal verification run.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation.

Table 2-32. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
		NOTE Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.

Table 2-32. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-33. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Measured-Mile Run

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Perform Calibration Select Table procedures in **Table 2-30**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE 3) NAV VRC INPUT MODE: CALIBRATION	Press **1** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-33. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears.
	At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.

Table 2-33. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.

Table 2-33. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate average speeds from times over the measured-mile course. **Refer to Table 2-4.** **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.

Table 2-33. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-34. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Measured-Mile

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-34. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears.
	At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-34. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.

Table 2-34. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.

Table 2-34. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-35. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, VRC Input Entered Manually

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Perform Calibration Select Table procedures in **Table 2-30**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE 3) NAV VRC INPUT MODE: CALIBRATION	Press **3** on the CDP keypad.
6	ENTER TRUE SPEED > MODE: CALIBRATION	Enter the speed from applicable data sheet and press **E**.

Table 2-35. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, VRC Input Entered Manually - Continued

STEP	DISPLAY	ACTION
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. To build a table (store calibration information), press **1** on the CDP keypad and perform step 8. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 12 and 13.
	BUILD TABLE (step 8)	
8	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	CAUTION Do not press 1 if only a single rodmeter is available. Doing so will cause the DEML to lock up and require a restart.	

Table 2-35. AN/WSN-8 (7093036) DEML (w/FC-1) Manual Calibration Procedure, VRC Input Entered Manually - Continued

STEP	DISPLAY	ACTION
9	After approximately 5 seconds, the CDP display will change to: CALIBRATE OTHER RODMETER? 1) YES 2) NO MODE: CALIBRATION	**NOTE** If calibration data has been saved for both normal and alternate rodmeter, the DEML will re-enter the mode it was in before calibration. Press **1** on the CDP keypad to calibrate the other rodmeter. Press **2** on the CDP keypad to end this procedure. The DEML will re-enter the mode it was in before calibration.
10	If 1 is pressed, the CDP display will change to: SWITCH RODMETERS ON SWITCHING UNIT MODE: CALIBRATION	Set the RSU to the indicated rodmeter configuration.
11	CDP display will change to: SPEED: ##.## KT (E)NTER WHEN SPEED IS STABLE +/-0.5KT MODE: CALIBRATION	Press **E**, once ship's speed is stable. Repeat steps 6 through 8. **NOTE** When the **CALIBRATE OTHER RODMETER** screen (step 9) appears, press **2**. The DEML will re-enter the mode it was in before calibration.
DISCARD TABLE (steps 12 and 13)		
12	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to the step 7, BUILD TABLE/DISCARD TABLE display screen.
CAUTION Do not press 1 if only a single rodmeter is available. Doing so will cause the DEML to lock up and require a restart.		
13	If 1 is pressed, the CDP display will change to: CALIBRATE OTHER RODMETER (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to calibrate the other rodmeter. Repeat steps 10 and 11. Press **2** on the CDP keypad to end this procedure. The DEML will re-enter the mode it was in before calibration.

Table 2-36. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Procedure, MIL-STD-1553B

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-30**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-36. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
	If MIL-STD-1553B interface is offline, or MIL-STD-1553B data is invalid, the CDP display will change to: CCS 1553 BUS DOWN (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND CALIBRATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 7.

Table 2-36. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
10	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 18. If no calibration runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 18. If no calibration runs have been completed, the DEML will return to the previously selected mode.

Table 2-36. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
		Skip to step 18.
SUSPEND CALIBRATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
17	If 2 is pressed, CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 18. If no calibration runs have been completed, the DEML will return to the previously selected mode.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
18	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 19. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 20 and 21.

Table 2-36. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 19)	
19	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 21).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 20 and 21)	
20	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 18 display screen.
21	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-37. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Verification Procedure, MIL-STD-1553B

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
5	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
6	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION If MIL-STD-1553B interface is offline, or MIL-STD-1553B data is invalid, the CDP display will change to: CCS 1553 BUS DOWN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. Press **E** and the display will change back to the previous mode.

Table 2-37. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Verification Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 7 through 10. If not, continue with step 6. Skip to step 11.
SUSPEND VERIFICATION (steps 7 through 10)		
7		Press **ESC** on the CDP keypad.
8	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 6.
9	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
10	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 4 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 17. If no verification runs have been completed, the DEML will return to the previously selected mode.

Table 2-37. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Verification Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
11	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad.
12	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification update is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 13 through 16. If not, continue with step 12.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 4 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 17. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 17.
SUSPEND VERIFICATION (steps 13 through 16)		
13		Press **ESC** on the CDP keypad.
14	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 12.

Table 2-37. AN/WSN-8 (7093036) DEML (w/FC-1) Automatic Calibration Verification Procedure, MIL-STD-1553B - Continued

STEP	DISPLAY	ACTION
15	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 11 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
16	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 4 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 17. If no verification runs have been completed, the DEML will return to the previously selected mode.
17	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
18	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
19	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-38. AN/WSN-8 (7093036) DEML (w/FC-1) Correct Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	**NOTE** This panel will repeat for all speed calibration points in the table. If displayed speed requires modifying, press **1** on the CDP keypad.

Table 2-38. AN/WSN-8 (7093036) DEML (w/FC-1) Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, the CDP display will change to: ENTER SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**.
	If 2 is pressed, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	If displayed speed does not require modifying, press **2** on the CDP keypad to display next speed calibration point. Repeat step 6 for all displayed speed calibration points in the table.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
7	After all speed calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 8. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 9 and 10.
BUILD TABLE (step 8)		
8	After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 10).
DISCARD TABLE (steps 9 and 10)		
9	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 7 display screen.

Table 2-38. AN/WSN-8 (7093036) DEML (w/FC-1) Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
10	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-39. AN/WSN-8 (7093036) DEML (w/FC-1) Create Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER # CAL POINTS > MODE: CALIBRATION	Enter the desired number of calibration points via the numeric keys on the CDP keypad and press **E**. **NOTE** The calibration table must have at least two calibration points. The first calibration point being zero and the second calibration point being some other non-zero calibration point.
6	ENTER PHASE OFFSET > MODE: CALIBRATION	Enter the phase offset and press **E**.
7	ENTER INTERP MODE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the interpolation mode by pressing 1 on the CDP keypad until the desired interpolation mode is selected. Press **E** to accept the selected interpolation mode.

Table 2-39. AN/WSN-8 (7093036) DEML (w/FC-1) Create Calibration Table - Continued

STEP	DISPLAY	ACTION
8	ENTER CAL TYPE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the calibration type by pressing 1 on the CDP keypad until the desired calibration type is selected. Press **E** to accept the selected calibration type.
9	After pressing E, the CDP displays the following, with a slight pause between each: CAL POINT: # SELECTED SPEED > MODE: CALIBRATION CAL POINT: # AVERAGE SPEED > MODE: CALIBRATION CAL POINT: # WEIGHT > MODE: CALIBRATION	**NOTE** These panels will repeat until all calibration points have been entered. **NOTE** SELECTED SPEED values signify the interval of the calibration run that was performed, and are integer values such as 8, 16, and 24 knots. AVERAGE SPEED values are actual computed speed values from the calibration process for each of the SELECTED SPEED runs. Due to hull characteristics and rodmeter sensitivities, the AVERAGE SPEED value will differ from the SELECTED SPEED. An example would be a calibration table with a SELECTED SPEED value of 8 knots and an AVERAGE SPEED value of 7.64 knots. The WEIGHT value is an internal DEML software filter parameter that correlates the AVERAGE SPEED value to the return signal from the rodmeter. It is important that all digits are recorded and entered with respect to the WEIGHT value.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
10	After all calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 11 and 12. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 13 and 14.

Table 2-39. AN/WSN-8 (7093036) DEML (w/FC-1) Create Calibration Table - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (steps 11 and 12)	
11	SELECT TABLE: NORM* 1) NONE 2) NONE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it.
12	After pressing 1 or 2 to select a table, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 14).
	DISCARD TABLE (steps 13 and 14)	
13	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 10 display screen.
14	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-40. AN/WSN-8 (7093036) DEML (w/FC-1) Delete Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	After pressing 1 or 2 to select a table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to delete the selected calibration table. Press **2** on the CDP keypad to cancel deletion of the selected calibration table and return to the previously selected mode.

Table 2-40. AN/WSN-8 (7093036) DEML (w/FC-1) Delete Calibration Table - Continued

STEP	DISPLAY	ACTION
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-41. AN/WSN-8 (7093036) DEML (w/FC-1) Delete Verification Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode.

Table 2-41. AN/WSN-8 (7093036) DEML (w/FC-1) Delete Verification Table - Continued

STEP	DISPLAY	ACTION
	If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER If a calibration verification was performed for the selected table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	If a calibration verification was not performed for the selected table, press **E** and the display will change back to the previous mode. Press **1** on the CDP keypad to delete the selected verification table. Press **2** on the CDP keypad to cancel deletion of the selected verification table and return to the previously selected mode.
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-42. AN/WSN-8 (7093036) DEML (w/FC-1) View Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: TYPE: MAN_INS INTERP MD: DIV DIF PHASE OFFSET: ### (E)NTER	Press **E** on the CDP keypad.

Table 2-42. AN/WSN-8 (7093036) DEML (w/FC-1) View Calibration Table - Continued

STEP	DISPLAY	ACTION
7	After pressing E, the CDP display will change to: SPEED: #.## WEIGHT: #.######## VOLTS: #.######## (E)NTER	**NOTE** This panel will repeat until all calibration points have been displayed. Press **E** on the CDP keypad.
8	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-43. AN/WSN-8 (7093036) DEML (w/FC-1) View Verification Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid verification tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid verification tables available, press **E** and the display will change back to the previous mode.

Table 2-43. AN/WSN-8 (7093036) DEML (w/FC-1) View Verification Table - Continued

STEP	DISPLAY	ACTION
	If there are valid verification tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, or **AUTO_1553** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	If a Manual verification was performed for the selected table, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER After pressing E, the CDP display will change to: AVG SPEED: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER If an Auto verification was performed for the selected table, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	**NOTE** Repeat step 6 until all calibration points have been displayed. Press **E** on the CDP keypad. Press **E** on the CDP keypad. Press **E** on the CDP keypad.

Table 2-43. AN/WSN-8 (7093036) DEML (w/FC-1) View Verification Table - Continued

STEP	DISPLAY	ACTION
7	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

SECTION III AN/WSN-8A(V)1 (7404776) DEML OPERATING PROCEDURES

2.9 AN/WSN-8A(V)1 (7404776) DEML OPERATING PROCEDURES.

This section includes **Table 2-44** through **Table 2-66** which contain the procedures for turning on and operating the AN/WSN-8A(V)1 (7404776) DEML.

Table 2-44. AN/WSN-8A(V)1 (7404776) DEML Startup Procedure

STEP	DISPLAY	ACTION
	CAUTION DEML must not be energized in Underwater mode unless rodmeter is connected and extended into water. **NOTE** Rodmeter Cutout Switch must be verified in the "ON" position prior to performing DEML startup (if installed).	
1	Fans operate. CDP display shows a flashing cursor for approximately 30 seconds. CDP displays the following, with a slight pause between each: DIGITAL EM LOG VER: #.## WSN-8A(V)1 INITIALIZING....* CPU .....PASS MODE: BIT A/D .....PASS MODE: BIT ROD PCB.....PASS MODE: BIT	Energize 60-Hz external power source. **NOTE** *This will flash until initializing is complete. **NOTE** Due to power panel locations, another person may be required to observe DEML I/T display.

Table 2-44. AN/WSN-8A(V)1 (7404776) DEML Startup Procedure - Continued

STEP	DISPLAY	ACTION
	ETHERNET.....PASS MODE: BIT	
2		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
3	SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	After completing initial self-test, the DEML positions outputs from initial condition to current I/T output, then automatically goes to Underwater mode. **NOTE** A flashing "FLT" on the CDP indicates an active fault. **Refer to Chapter 5**.
4		Verify proper Calibration Table is loaded in the DEML by performing the Status Check Procedure (**Table 2-50**). Step 8 of Table 2-50 will be where the Calibration Table number and Calibration type will be observed. Refer to **Paragraph 2.6** for Calibration Table explanation and ship applicability.

Table 2-45. AN/WSN-8A(V)1 (7404776) DEML Underwater Mode Procedure

STEP	DISPLAY	ACTION
1		Press **UDW** on the CDP keypad.
2	CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	**NOTE** When started, the DEML goes to Underwater mode after completing initial self-test. It is only necessary to select Underwater mode manually when shifting from a different mode. **NOTE** A flashing "FLT" on the CDP indicates an active fault. **Refer to Chapter 5**.

Table 2-46. AN/WSN-8A(V)1 (7404776) DEML Manual Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **MAN** on the CDP keypad.
2	NOT NORMAL OVERRIDE (1) ENABLE (2) DISABLE MODE: MAN DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a "not normal" indication to external users. (Routine operation.)
3	ENTER DUMMY SPEED > MODE: MAN DUMMY	Enter the desired speed via the numeric keys on the CDP keypad and press **E**.
4	##.## ENTERED CORRECT? (1) YES (2) NO MODE: MAN DUMMY If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: MAN DUMMY	If entered speed is incorrect, press **2** on the CDP keypad and repeat step 3. If entered speed is correct, press **1** on the CDP keypad.
5		To change speed, repeat steps 1 through 4.

Table 2-47. AN/WSN-8A(V)1 (7404776) DEML Remote Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **REM** on the CDP keypad.
2	NOT NORMAL OVERRIDE 1) ENABLE 2) DISABLE MODE: REM DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a "not normal" indication to external users. (Routine operation.)
3	SPEED: ###.## KT DIST: #####.## NM MODE: REM DUMMY	Operate RCU switch to increase or decrease speed. Observe that speed indication on the CDP display increases or decreases with RCU switch operation. **NOTE** When switch is held up or down, speed changes incrementally. Rate of change will increase as the switch is held longer.

Table 2-48. AN/WSN-8A(V)1 (7404776) DEML BIT Procedure

STEP	DISPLAY	ACTION
1		Press **BIT** on the CDP keypad.
2	1) PERFORM BIT 2) DISPLAY/ACK FAULTS MODE: BIT	To perform BIT, press **1** and perform steps 3 through 8. To display fault(s), press **2** and perform steps 9 through 11. To acknowledge fault(s), press **2** and perform steps 12 through 14.
3	CPU .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
4	A/D .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
5	ROD PCB .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.

Table 2-48. AN/WSN-8A(V)1 (7404776) DEML BIT Procedure - Continued

STEP	DISPLAY	ACTION
6	ETHERNET.....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
7		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
8	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing BIT, the DEML will return to the previously selected mode. **NOTE** *The mode displayed will be the same as previously selected.
DISPLAY FAULT(S) (steps 9 through 11)		
9	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **1** on the CDP keypad to display fault(s).
10	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: ### ### ### ### ### ACK ACK ACK* (E)NTER	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are displayed. **NOTE** *ACK displayed under fault indicates that fault has been acknowledged. Press **E** on the CDP keypad.
11	If E is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-48. AN/WSN-8A(V)1 (7404776) DEML BIT Procedure - Continued

STEP	DISPLAY	ACTION
ACKNOWLEDGE FAULT(S) (steps 12 through 14)		
12	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **2** on the CDP keypad to acknowledge fault(s).
13	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: FAULT: ### ACK (1) YES (2) NO	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are acknowledged. Press **1** on the CDP keypad to acknowledge fault. Press **2** on the CDP keypad if it is not desired to acknowledge a fault.
14	If E is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The Mode displayed will be the same as previously selected.

Table 2-49. AN/WSN-8A(V)1 (7404776) DEML Configuration Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **1** on the CDP keypad. **NOTE** To shut down the system, use **Table 2-51** Shutdown Procedure.
3	ENTER PASSWORD > MODE: CONFIG	Enter the password (**13**) and press **E** on the CDP keypad.
4	RESET HOURS OF OPERATION? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the hours of operation to zero. **NOTE** Hours of operation should be recorded before being reset to zero. Press **2** to skip to the next step.
5	RESET SYSTEM DISTANCE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the distance count to zero. **NOTE** System distance should be recorded before being reset to zero. Press **2** to skip to the next step.
6	MODIFY INTERFACES? (1) YES (2) NO MODE: CONFIG	To modify interfaces, press **1** on the CDP keypad. **NOTE** Interface configuration of each ship class can be found listed in **Table 1-6** and should not normally require modification. Press **2** to skip interface modification and proceed to step 10.
7	NAVSSI: ENABLED ENABLE NAVSSI? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the NAVSSI interface. Press **2** to disable the NAVSSI interface and skip to the next step.
8	FODMS: ENABLED ENABLE FODMS? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the FODMS interface. Press **2** to disable the FODMS interface and skip to the next step.

Table 2-49. AN/WSN-8A(V)1 (7404776) DEML Configuration Procedure - Continued

STEP	DISPLAY	ACTION
9	NMEA: ENABLED ENABLE NMEA? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the NMEA interface. Press **2** to disable the NMEA interface and skip to the next step.
10	CAL TIME: ## MIN ## MIN (E)NTER MODE: CONFIG	If required, enter the CAL TIME via the numeric keys on the CDP keypad and press **E**. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes. If entry of CAL TIME is not required, press **E** to skip to the next step.
11	NMEA OUTPUT RATE: ## ## HZ (E)NTER MODE: CONFIG	If required, enter the NMEA output rate via the numeric keys on the CDP keypad and press **E**. If entry of NMEA output rate is not required, press **E** to skip to the next step.
12	RESTORE SYSTEM DEFAULTS? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: RESTORING DEFAULTS CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: ALL CAL DATA WILL BE DELETED! CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.

Table 2-49. AN/WSN-8A(V)1 (7404776) DEML Configuration Procedure - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After completing Configuration, DEML will automatically return to the mode prior to Configuration mode initialization. **NOTE** **The mode displayed will be the same as previously selected.

CAUTION

After completing configuration, DEML must be powered down and re-energized prior to any future use.

Table 2-50. AN/WSN-8A(V)1 (7404776) DEML Status Check Procedure

STEP	DISPLAY	ACTION
1		Press **STA** on the CDP keypad.
2	DEML SOFTWARE WSN-8A(V)1 VER: #.## (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
3	OPERATION HOURS ## (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "##" Denotes number of hours.
4	DEML NORMAL* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. "Normal" means that the DEML is in Underwater mode, Calibration mode, or Manual modes with OVERRIDE enabled. **NOTE** *If system is not normal, this line reads **DEML NOT NORMAL**.

Table 2-50. AN/WSN-8A(V)1 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
		NOTE **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
5	DATA VALID* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** ***DATA NOT VALID** will appear if the DEML detects an internal problem with speed processing. If condition of DATA NOT VALID is observed, troubleshooting should be performed as directed in **Chapter 5**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
6	COIL CURRENT #.###### (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** Proper coil current is 0.5 ±0.1 VAC. Coil current is monitored and measured in volts ac.
7	NORMAL ROD* SELECTED (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If RSU is set to ALTERNATE, this line reads **ALTERNATE ROD**.

Table 2-50. AN/WSN-8A(V)1 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
8	COIL IN SPEC* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If coil current is out of specification, this line reads **OUT OF SPEC**. COIL IN SPEC means that coil current is correct (see step 6). COIL OUT OF SPEC means that coil current is incorrect and troubleshooting should be performed as directed in **Chapter 5**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults. Coil current is continuously monitored by the DEML.
9	CURRENT CAL TABLE #: XXX (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" is the calibration table number. "XXX" is the calibration type. See **Paragraph 2.6** for explanation of calibration types. If the currently selected table does not contain a calibration, **NOT CALIBRATED** will be displayed as the calibration type.
10	RODMETER SWITCH UNIT PRESENT (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CDP will read **RODMETER SWITCH UNIT NOT PRESENT** if installation is for a single rodmeter.
11	DEML IP ADDRESS 141.199.21.100 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.

Table 2-50. AN/WSN-8A(V)1 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
12	NAVSSI IP ADDRESS 141.199.21.120 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
13	NAVSSI PORT NUMBER 5003 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
14	NAVSSI: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **"ONLINE" or "OFFLINE" is displayed.
15	FODMS: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **"ONLINE" or "OFFLINE" is displayed.
16	NMEA: ENABLED* OUTPUT RATE: 1 HZ (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode.
17	CAL TIME: ## MIN (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes.
18	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing Status Check, DEML will automatically return to the mode in which it was operating before Status Check (Underwater, Manual Dummy, or Remote Dummy). **NOTE** *The mode displayed will be the same as previously selected.

Table 2-51. AN/WSN-8A(V)1 (7404776) DEML Shutdown Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **2** on the CDP keypad.
3	SHUTDOWN SYSTEM? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to shut down the system.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CONFIG After several seconds, the CDP display will change to: SHUTDOWN COMPLETED SECURE POWER MODE: CONFIG	**NOTE** *This will flash until updating of NOVRAM is complete. De-energize 60-Hz external power source.
5	CDP display goes blank.	Fans cease operation.

Table 2-52. AN/WSN-8A(V)1 (7404776) DEML Calibration Select Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **1** on the CDP keypad.
3	SELECT TABLE: NORM* 1) VRC 2) NONE MODE: CALIBRATION	Press **1** or **2** on the CDP keypad to select the applicable table to be used as reference. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals. Perform Calibration Select Table procedures in **Table 2-52**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **2** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity calibration run.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished calibrating, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal calibration run.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate average speeds. **Refer to Table 2-5.** **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.

Table 2-53. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-54. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity verification run.

Table 2-54. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . * At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished verifying, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.

Table 2-54. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal verification run.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation.

Table 2-54. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
		NOTE Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.

Table 2-54. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-55. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Perform Calibration Select Table procedures in **Table 2-52**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **1** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-55. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.

Table 2-55. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.

Table 2-55. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate average speeds from times over the measured-mile course. **Refer to Table 2-4**. **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.

Table 2-55. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-56. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-56. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears.
	At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-56. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.

Table 2-56. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.

Table 2-56. AN/WSN-8A(V)1 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-57. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, FODMS

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-52**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	1) AUTO CAL FODMS 2) AUTO CAL NAVSSI MODE: CALIBRATION	Press **1** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.

Table 2-57. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.
	If FODMS interface is offline, or FODMS data is invalid, the CDP display will change to: FODMS DATA UNAVAILABLE (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode.
	After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.

Table 2-57. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.

Table 2-57. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		

Table 2-57. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
19	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.
BUILD TABLE (step 20)		
20	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 22).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
DISCARD TABLE (steps 21 and 22)		
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-58. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, FODMS

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) AUTO VERIFY FODMS 2) AUTO VERIFY NAVSSI MODE: CALIBRATION	Press **1** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-58. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
	If FODMS interface is offline, or FODMS data is invalid, the CDP display will change to: FODMS DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-58. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification update is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.

Table 2-58. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, FODMS - Continued

STEP	DISPLAY	ACTION
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
20	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-59. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, NAVSSI

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-52**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	1) AUTO CAL FODMS 2) AUTO CAL NAVSSI MODE: CALIBRATION	Press **2** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-59. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	If NAVSSI interface is offline, or NAVSSI data is invalid, the CDP display will change to: NAVSSI DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.

Table 2-59. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.

Table 2-59. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
		Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
19	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.

Table 2-59. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 20)	
20	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 22).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 21 and 22)	
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-60. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) AUTO VERIFY FODMS 2) AUTO VERIFY NAVSSI MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-60. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	If NAVSSI interface is offline, or NAVSSI data is invalid, the CDP display will change to: NAVSSI DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-60. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification update is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.

Table 2-60. AN/WSN-8A(V)1 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
20	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-61. AN/WSN-8A(V)1 (7404776) DEML Correct Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	**NOTE** This panel will repeat for all speed calibration points in the table. If displayed speed requires modifying, press **1** on the CDP keypad.

Table 2-61. AN/WSN-8A(V)1 (7404776) DEML Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, the CDP display will change to: ENTER SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**.
	If 2 is pressed, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	If displayed speed does not require modifying, press **2** on the CDP keypad to display next speed calibration point. Repeat step 6 for all displayed speed calibration points in the table.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
7	After all speed calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 8. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 9 and 10.
	BUILD TABLE (step 8)	
8	After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 10).
	DISCARD TABLE (steps 9 and 10)	
9	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 7 display screen.

Table 2-61. AN/WSN-8A(V)1 (7404776) DEML Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
10	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-62. AN/WSN-8A(V)1 (7404776) DEML Create Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER # CAL POINTS > MODE: CALIBRATION	Enter the desired number of calibration points via the numeric keys on the CDP keypad and press **E**. **NOTE** The calibration table must have at least two calibration points. The first calibration point being zero and the second calibration point being some other non-zero calibration point.
6	ENTER PHASE OFFSET > MODE: CALIBRATION	Enter the phase offset and press **E**.
7	ENTER INTERP MODE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the interpolation mode by pressing 1 on the CDP keypad until the desired interpolation mode is selected. Press **E** to accept the selected interpolation mode.

Table 2-62. AN/WSN-8A(V)1 (7404776) DEML Create Calibration Table - Continued

STEP	DISPLAY	ACTION
8	ENTER CAL TYPE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the calibration type by pressing 1 on the CDP keypad until the desired calibration type is selected. Press **E** to accept the selected calibration type.
9	After pressing E, the CDP displays the following, with a slight pause between each: CAL POINT: # SELECTED SPEED > MODE: CALIBRATION CAL POINT: # AVERAGE SPEED > MODE: CALIBRATION CAL POINT: # WEIGHT > MODE: CALIBRATION	**NOTE** These panels will repeat until all calibration points have been entered. **NOTE** SELECTED SPEED values signify the interval of the calibration run that was performed, and are integer values such as 8, 16, and 24 knots. AVERAGE SPEED values are actual computed speed values from the calibration process for each of the SELECTED SPEED runs. Due to hull characteristics and rodmeter sensitivities, the AVERAGE SPEED value will differ from the SELECTED SPEED. An example would be a calibration table with a SELECTED SPEED value of 8 knots and an AVERAGE SPEED value of 7.64 knots. The WEIGHT value is an internal DEML software filter parameter that correlates the AVERAGE SPEED value to the return signal from the rodmeter. It is important that all digits are recorded and entered with respect to the WEIGHT value.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
10	After all calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 11 and 12. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 13 and 14.

Table 2-62. AN/WSN-8A(V)1 (7404776) DEML Create Calibration Table - Continued

STEP	DISPLAY	ACTION
BUILD TABLE (steps 11 and 12)		
11	SELECT TABLE: NORM* 1) NONE 2) NONE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it.
12	After pressing 1 or 2 to select a table, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 14).
DISCARD TABLE (steps 13 and 14)		
13	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 10 display screen.
14	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-63. AN/WSN-8A(V)1 (7404776) DEML Delete Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	After pressing 1 or 2 to select a table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to delete the selected calibration table. Press **2** on the CDP keypad to cancel deletion of the selected calibration table and return to the previously selected mode.

Table 2-63. AN/WSN-8A(V)1 (7404776) DEML Delete Calibration Table - Continued

STEP	DISPLAY	ACTION
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-64. AN/WSN-8A(V)1 (7404776) DEML Delete Verification Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode.

Table 2-64. AN/WSN-8A(V)1 (7404776) DEML Delete Verification Table - Continued

STEP	DISPLAY	ACTION
	If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER If a calibration verification was performed for the selected table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	If a calibration verification was not performed for the selected table, press **E** and the display will change back to the previous mode. Press **1** on the CDP keypad to delete the selected verification table. Press **2** on the CDP keypad to cancel deletion of the selected verification table and return to the previously selected mode.
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-65. AN/WSN-8A(V)1 (7404776) DEML View Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: TYPE: MAN_INS INTERP MD: DIV DIF PHASE OFFSET: ### (E)NTER	Press **E** on the CDP keypad.

Table 2-65. AN/WSN-8A(V)1 (7404776) DEML View Calibration Table - Continued

STEP	DISPLAY	ACTION
7	After pressing E, the CDP display will change to: SPEED: #.## WEIGHT: #.######## VOLTS: #.######## (E)NTER	**NOTE** This panel will repeat until all calibration points have been displayed. Press **E** on the CDP keypad.
8	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-66. AN/WSN-8A(V)1 (7404776) DEML View Verification Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid verification tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid verification tables available, press **E** and the display will change back to the previous mode.

Table 2-66. AN/WSN-8A(V)1 (7404776) DEML View Verification Table - Continued

STEP	DISPLAY	ACTION
	If there are valid verification tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_FODMS**, or **AUTO_NAVSSI** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	If a Manual verification was performed for the selected table, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER After pressing E, the CDP display will change to: AVG SPEED: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER If an Auto verification was performed for the selected table, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	**NOTE** Repeat step 6 until all calibration points have been displayed. Press **E** on the CDP keypad. Press **E** on the CDP keypad. Press **E** on the CDP keypad.

Table 2-66. AN/WSN-8A(V)1 (7404776) DEML View Verification Table - Continued

STEP	DISPLAY	ACTION
7	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

SECTION IV AN/WSN-8A(V)2 (7404776) DEML OPERATING PROCEDURES

2.10 AN/WSN-8A(V)2 (7404776) DEML OPERATING PROCEDURES.

This section includes **Table 2-67** through **Table 2-91** which contain the procedures for turning on and operating the AN/WSN-8A(V)2 (7404776) DEML.

Table 2-67. AN/WSN-8A(V)2 (7404776) DEML Startup Procedure

STEP	DISPLAY	ACTION
	CAUTION DEML must not be energized in Underwater mode unless rodmeter is connected and extended into water. **NOTE** Rodmeter Cutout Switch must be verified in the "ON" position prior to performing DEML startup (if installed).	
1	Fans operate. CDP display shows a flashing cursor for approximately 30 seconds. CDP displays the following, with a slight pause between each: DIGITAL EM LOG VER: #.## WSN-8A(V)2 INITIALIZING....* CPU .....PASS MODE: BIT A/D .....PASS MODE: BIT ROD PCB.....PASS MODE: BIT	Energize 60-Hz external power source. **NOTE** *This will flash until initializing is complete. **NOTE** Due to power panel locations, another person may be required to observe DEML I/T display.

Table 2-67. AN/WSN-8A(V)2 (7404776) DEML Startup Procedure - Continued

STEP	DISPLAY	ACTION
	ETHERNET.....PASS MODE: BIT	
2		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
3	SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	After completing initial self-test, the DEML positions outputs from initial condition to current I/T output, then automatically goes to Underwater mode. **NOTE** A flashing "FLT" on the CDP indicates an active fault. **Refer to Chapter 5**.
4		Verify proper Calibration Table is loaded in the DEML by performing the Status Check Procedure (**Table 2-73**). Step 8 of Table 2-73 will be where the Calibration Table number and Calibration type will be observed. Refer to **Paragraph 2.6** for Calibration Table explanation and ship applicability.

Table 2-68. AN/WSN-8A(V)2 (7404776) DEML Underwater Mode Procedure

STEP	DISPLAY	ACTION
1		Press **UDW** on the CDP keypad.
2	CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: UNDERWATER	**NOTE** When started, the DEML goes to Underwater mode after completing initial self-test. It is only necessary to select Underwater mode manually when shifting from a different mode. **NOTE** A flashing "FLT" on the CDP indicates an active fault. **Refer to Chapter 5**.

Table 2-69. AN/WSN-8A(V)2 (7404776) DEML Manual Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **MAN** on the CDP keypad.
2	NOT NORMAL OVERRIDE (1) ENABLE (2) DISABLE MODE: MAN DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a "not normal" indication to external users. (Routine operation.)
3	ENTER DUMMY SPEED > MODE: MAN DUMMY	Enter the desired speed via the numeric keys on the CDP keypad and press **E**.
4	##.## ENTERED CORRECT? (1) YES (2) NO MODE: MAN DUMMY If 1 is pressed, CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: MAN DUMMY	If entered speed is incorrect, press **2** on the CDP keypad and repeat step 3. If entered speed is correct, press **1** on the CDP keypad.
5		To change speed, repeat steps 1 through 4.

Table 2-70. AN/WSN-8A(V)2 (7404776) DEML Remote Dummy Mode Procedure

STEP	DISPLAY	ACTION
1		Press **REM** on the CDP keypad.
2	NOT NORMAL OVERRIDE 1) ENABLE 2) DISABLE MODE: REM DUMMY	Press **1** to enable Not Normal Override, which causes the DEML to output to external users in the same format as in Underwater mode. (Used only when rodmeters are disabled or faulty and DEML dummy speed is required.) Press **2** to disable Not Normal Override, which causes the DEML to output a "not normal" indication to external users. (Routine operation.)
3	SPEED: ###.## KT DIST: #####.## NM MODE: REM DUMMY	Operate RCU switch to increase or decrease speed. Observe that speed indication on the CDP display increases or decreases with RCU switch operation. **NOTE** When switch is held up or down, speed changes incrementally. Rate of change will increase as the switch is held longer.

Table 2-71. AN/WSN-8A(V)2 (7404776) DEML BIT Procedure

STEP	DISPLAY	ACTION
1		Press **BIT** on the CDP keypad.
2	1) PERFORM BIT 2) DISPLAY/ACK FAULTS MODE: BIT	To perform BIT, press **1** and perform steps 3 through 8. To display fault(s), press **2** and perform steps 9 through 11. To acknowledge fault(s), press **2** and perform steps 12 through 14.
3	CPU .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
4	A/D .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
5	ROD PCB .....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.

Table 2-71. AN/WSN-8A(V)2 (7404776) DEML BIT Procedure - Continued

STEP	DISPLAY	ACTION
6	ETHERNET.....PASS (E)NTER MODE: BIT	Press **E** on the CDP keypad.
7		If any of the above reads **FAIL**, the affected module is faulty and should be replaced. **See Chapter 6**.
8	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing BIT, the DEML will return to the previously selected mode. **NOTE** *The mode displayed will be the same as previously selected.
DISPLAY FAULT(S) (steps 9 through 11)		
9	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **1** on the CDP keypad to display fault(s).
10	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: ### ### ### ### ### ACK ACK ACK* (E)NTER	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are displayed. **NOTE** *ACK displayed under fault indicates that fault has been acknowledged. Press **E** on the CDP keypad.
11	If E is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-71. AN/WSN-8A(V)2 (7404776) DEML BIT Procedure - Continued

STEP	DISPLAY	ACTION
ACKNOWLEDGE FAULT(S) (steps 12 through 14)		
12	1) DISPLAY FAULTS 2) ACK FAULTS MODE: BIT	Press **2** on the CDP keypad to acknowledge fault(s).
13	If there are no active faults, the CDP display will change to: NO ACTIVE FAULTS (E)NTER If there are active faults, the CDP display will change to: FAULT: ### ACK (1) YES (2) NO	Press **E** on the CDP keypad. **NOTE** "###" signifies fault codes listed in the fault code table **(see Chapter 5)**. This panel will repeat until all active faults are acknowledged. Press **1** on the CDP keypad to acknowledge fault. Press **2** on the CDP keypad if it is not desired to acknowledge a fault.
14	If E is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The Mode displayed will be the same as previously selected.

Table 2-72. AN/WSN-8A(V)2 (7404776) DEML Configuration Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **1** on the CDP keypad. **NOTE** To shut down the system, use **Table 2-74** Shutdown Procedure.
3	ENTER PASSWORD > MODE: CONFIG	Enter the password (**13**) and press **E** on the CDP.
4	RESET HOURS OF OPERATION? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the hours of operation to zero. **NOTE** Hours of operation should be recorded before being reset to zero. Press **2** to skip to the next step.
5	RESET SYSTEM DISTANCE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to reset the distance count to zero. **NOTE** System distance should be recorded before being reset to zero. Press **2** to skip to the next step.
6	MODIFY INTERFACES? (1) YES (2) NO MODE: CONFIG	To modify interfaces, press **1** on the CDP keypad. **NOTE** Interface configuration of each ship class can be found listed in **Table 1-6** and should not normally require modification. Press **2** to skip interface modification and proceed to step 10.
7	NAVSSI: ENABLED ENABLE NAVSSI? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the NAVSSI interface. Press **2** to disable the NAVSSI interface and skip to the next step.
8	RLGN1: ENABLED ENABLE RLGN1? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the RLGN1 interface. Press **2** to disable the RLGN1 interface and skip to the next step.

Table 2-72. AN/WSN-8A(V)2 (7404776) DEML Configuration Procedure - Continued

STEP	DISPLAY	ACTION
9	RLGN2: ENABLED ENABLE RLGN2? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to enable the RLGN2 interface. Press **2** to disable the RLGN2 interface and skip to the next step.
10	CAL TIME: ## MIN ## MIN (E)NTER MODE: CONFIG	If required, enter the CAL TIME via the numeric keys on the CDP keypad and press **E**. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes. If entry of CAL TIME is not required, press **E** to skip to the next step.
11	NMEA OUTPUT RATE: ## ## HZ (E)NTER MODE: CONFIG	If required, enter the NMEA output rate via the numeric keys on the CDP keypad and press **E**. If entry of NMEA output rate is not required, press **E** to skip to the next step.
12	RESTORE SYSTEM DEFAULTS? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: RESTORING DEFAULTS CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: ALL CAL DATA WILL BE DELETED! CONTINUE? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to restore system default values. Press **2** on the CDP keypad to cancel restoration of system defaults and return to the previously selected mode.
	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.

Table 2-72. AN/WSN-8A(V)2 (7404776) DEML Configuration Procedure - Continued

STEP	DISPLAY	ACTION
	After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** After completing Configuration, DEML will automatically return to the mode prior to Configuration mode initialization. **NOTE** **The mode displayed will be the same as previously selected.
CAUTION After completing configuration, DEML must be powered down and re-energized prior to any future use.		

Table 2-73. AN/WSN-8A(V)2 (7404776) DEML Status Check Procedure

STEP	DISPLAY	ACTION
1		Press **STA** on the CDP keypad.
2	DEML SOFTWARE WSN-8A(V)2 VER: #.## (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
3	OPERATION HOURS ## (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "##" Denotes number of hours.
4	DEML NORMAL* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. "Normal" means that the DEML is in Underwater mode, Calibration mode, or Manual modes with OVERRIDE enabled. **NOTE** *If system is not normal, this line reads **DEML NOT NORMAL**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.

Table 2-73. AN/WSN-8A(V)2 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
5	DATA VALID* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** ***DATA NOT VALID** will appear if the DEML detects an internal problem with speed processing. If condition of DATA NOT VALID is observed, troubleshooting should be performed as directed in **Chapter 5**. **NOTE** **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults.
6	COIL CURRENT #.###### (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** Proper coil current is 0.5 ±0.1 VAC. Coil current is monitored and measured in volts ac.
7	NORMAL ROD* SELECTED (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If RSU is set to ALTERNATE, this line reads **ALTERNATE ROD**.
8	COIL IN SPEC* (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *If coil current is out of specification, this line reads **OUT OF SPEC**. COIL IN SPEC means that coil current is correct (see step 6). COIL OUT OF SPEC means that coil current is incorrect and troubleshooting should be performed as directed in **Chapter 5**.

Table 2-73. AN/WSN-8A(V)2 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
		NOTE **OVERRIDE ENABLED** will be displayed on the CDP if the DEML is operating in Manual or Remote Dummy mode, and the NOT NORMAL override was enabled. Enabling the NOT NORMAL OVERRIDE causes the DEML to set status indications to external user systems such that the DEML appears to be operating in the NORMAL/Underwater mode without any system faults. Coil current is continuously monitored by the DEML.
9	CURRENT CAL TABLE #: XXX (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** "#" is the calibration table number. "XXX" is the calibration type. See **Paragraph 2.6** for explanation of calibration types. If the currently selected table does not contain a calibration, **NOT CALIBRATED** will be displayed as the calibration type.
10	RODMETER SWITCH UNIT PRESENT (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CDP will read **RODMETER SWITCH UNIT NOT PRESENT** if installation is for a single rodmeter.
11	DEML IP ADDRESS 141.199.21.100 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
12	NAVSSI IP ADDRESS 141.199.21.120 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.
13	NAVSSI PORT NUMBER 5003 (E)NTER MODE: STATUS	Press **E** on the CDP keypad.

Table 2-73. AN/WSN-8A(V)2 (7404776) DEML Status Check Procedure - Continued

STEP	DISPLAY	ACTION
14	NAVSSI: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **"ONLINE" or "OFFLINE" is displayed.
15	RLGN1: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **"ONLINE" or "OFFLINE" is displayed.
16	RLGN2: ENABLED* ONLINE** (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** *CDP will read **DISABLED** if the interface has been turned off via the Configuration mode. **NOTE** **"ONLINE" or "OFFLINE" is displayed.
17	CAL TIME: ## MIN (E)NTER MODE: STATUS	Press **E** on the CDP keypad. **NOTE** CAL TIME is used to specify the time length of calibration and verification runs. CAL TIME is defaulted to 10 minutes.
18	SPEED: ###.## KT DIST: #####.## NM MODE: *	After completing Status Check, DEML will automatically return to the mode in which it was operating before Status Check (Underwater, Manual Dummy, or Remote Dummy). **NOTE** *The mode displayed will be the same as previously selected.

Table 2-74. AN/WSN-8A(V)2 (7404776) DEML Shutdown Procedure

STEP	DISPLAY	ACTION
1		Press **CON** on the CDP keypad.
2	1) CONFIG 2) SHUTDOWN MODE: CONFIG	Press **2** on the CDP keypad.
3	SHUTDOWN SYSTEM? (1) YES (2) NO MODE: CONFIG	Press **1** on the CDP keypad to shut down the system.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CONFIG After several seconds, the CDP display will change to: SHUTDOWN COMPLETED SECURE POWER MODE: CONFIG	**NOTE** *This will flash until updating of NOVRAM is complete. De-energize 60-Hz external power source.
5	CDP display goes blank.	Fans cease operation.

Table 2-75. AN/WSN-8A(V)2 (7404776) DEML Calibration Select Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **1** on the CDP keypad.
3	SELECT TABLE: NORM* 1) VRC 2) NONE MODE: CALIBRATION	Press **1** or **2** on the CDP keypad to select the applicable table to be used as reference. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table.
4	CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After several seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals Perform Calibration Select Table procedures in **Table 2-75**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **2** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity calibration run.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished calibrating, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal calibration run.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate average speeds. **Refer to Table 2-5**. **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.

Table 2-76. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Inertial Reference Entered Manually - Continued

STEP	DISPLAY	ACTION
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-77. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position typeout intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the velocity verification run.

Table 2-77. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . * At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation. After the final position typeout is achieved and the DEML has finished verifying, advise the pilot house/ship control to turn the vessel around for the reciprocal run at the same speed. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.

Table 2-77. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Operator shall direct the observer to initiate a position typeout at the I/O console and record the current time on calibration data sheet (**Figure 2-6**). After a position typeout is obtained, the operator shall press **E** to begin the reciprocal verification run.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Observer shall prepare for a position typeout precisely after the number of minutes set by CAL TIME (CONFIG mode) from the initial position typeout. Failure to obtain a position typeout at exactly the CAL TIME minute intervals will result in average velocity errors and thus lead to calibration failures and inertial system performance degradation.

Table 2-77. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
		NOTE Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.

Table 2-77. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Inertial Reference - Continued

STEP	DISPLAY	ACTION
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-78. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Perform Calibration Select Table procedures in **Table 2-75**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
5	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **1** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-78. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.

Table 2-78. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.

Table 2-78. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
19	If calibration points are valid, after CAL TIME minutes the CDP display will change to: BASE RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Calculate average speeds from times over the measured-mile course. **Refer to Table 2-4**. **NOTE** "##" Denotes calibration interval value for the base run. Enter the calculated average speed of the base run at each of the listed speeds and press **E**.
20	RECIPROCAL RUN ENTER AVERAGE SPEED ## KNOTS: MODE: CALIBRATION	Enter the calculated average speed of the reciprocal run and press **E**. Repeat steps 19 and 20 until top speed is reached. **NOTE** "##" Denotes calibration interval value for the reciprocal run.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
21	After E is pressed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 22. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 23 and 24.

Table 2-78. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Procedure, Measured-Mile Run - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 22)	
22	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 24).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 23 and 24)	
23	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 21 display screen.
24	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-79. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note the CAL TIME parameter value prior to the calibration/verification procedure to ensure proper position type-out intervals. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) MEASURED MILE 2) INERTIAL REFERENCE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel crosses first measured-mile pylon, observer simultaneously starts stopwatch and gives a “mark” to operator to press **E** on the CDP keypad.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-79. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
	If coil current is valid, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . * At end of base run, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When vessel crosses second measured-mile pylon, observer stops stopwatch and records time on the calibration data sheet (**Figure 2-5**). Maintain course and speed until the **RECIPROCAL RUN** screen appears. **NOTE** For reciprocal run, record same information on calibration data sheet (**Figure 2-5**). When the **RECIPROCAL RUN** screen appears, advise the pilot house/ship control to turn the vessel around for the reciprocal run and press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-79. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: DEML SPEED: ##.## ST DST ####.## END DST ####.## VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	At end of reciprocal run, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **DEML SPEED, ST DST, END DST** display screen in step 13.

Table 2-79. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER	Press **E** on the CDP keypad.
20	After E is pressed, the CDP display will change to: AVG SPD BASE: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER	Press **E** on the CDP keypad. **NOTE** Steps 19 and 20 will repeat until all verification points have been displayed.

Table 2-79. AN/WSN-8A(V)2 (7404776) DEML Manual Calibration Verification Procedure, Measured-Mile - Continued

STEP	DISPLAY	ACTION
21	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-80. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, NAVSSI

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-75**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	1) AUTO CAL NAVSSI 2) AUTO CAL RLGN1 3) AUTO CAL RLGN2 MODE: CALIBRATION	Press **1** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.

Table 2-80. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.
	If NAVSSI interface is offline, or NAVSSI data is invalid, the CDP display will change to: NAVSSI DATA UNAVAILABLE (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.
	If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode.
	After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	When the **RECIPROCAL RUN** screen appears, operator gives a "mark" to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.

Table 2-80. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.

Table 2-80. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
19	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.

Table 2-80. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	BUILD TABLE (step 20)	
20	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 22).	Press **E** and the display will change back to the previous mode. **NOTE** *This will flash until updating of NOVRAM is complete.
	DISCARD TABLE (steps 21 and 22)	
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-81. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) AUTO VERIFY NAVSSI 2) AUTO VERIFY RLGN1 3) AUTO VERIFY RLGN2 MODE: CALIBRATION	Press **1** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-81. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
	If NAVSSI interface is offline, or NAVSSI data is invalid, the CDP display will change to: NAVSSI DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-81. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.

Table 2-81. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, NAVSSI - Continued

STEP	DISPLAY	ACTION
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
20	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-82. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 1

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-75**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	1) AUTO CAL NAVSSI 2) AUTO CAL RLGN1 3) AUTO CAL RLGN2 MODE: CALIBRATION	Press **2** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-82. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
	If RLGN 1 interface is offline, or RLGN 1 data is invalid, the CDP display will change to: RLGN1 DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.

Table 2-82. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.

Table 2-82. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
19	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.
BUILD TABLE (step 20)		
20	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-82. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
	After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 22).	**NOTE** *This will flash until updating of NOVRAM is complete.
DISCARD TABLE (steps 21 and 22)		
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-83. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 1

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) AUTO VERIFY NAVSSI 2) AUTO VERIFY RLGN1 3) AUTO VERIFY RLGN2 MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-83. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
	If RLGN 1 interface is offline, or RLGN 1 data is invalid , the CDP display will change to: RLGN1 DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-83. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a "mark" to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.

Table 2-83. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 1 - Continued

STEP	DISPLAY	ACTION
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
20	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-84. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 2

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Perform Calibration Select Table procedures in **Table 2-75**.
2		Press **CAL** on the CDP keypad.
3	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
5	1) AUTO CAL NAVSSI 2) AUTO CAL RLGN1 3) AUTO CAL RLGN2 MODE: CALIBRATION	Press **3** on the CDP keypad.
6	ENTER DESIRED CALIBRATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
7	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
8	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-84. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
	If RLGN 2 interface is offline, or RLGN 2 data is invalid , the CDP display will change to: RLGN2 DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 9 through 12. If not, continue with step 8. Skip to step 13.
SUSPEND CALIBRATION (steps 9 through 12)		
9		Press **ESC** on the CDP keypad.
10	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 8.
11	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 7 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.

Table 2-84. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
12	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
13	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
14	After E is pressed, the CDP display will change to: MAINTAIN CONSTANT SPEED/TURNS CALIBRATING . . . . * MODE: CALIBRATION	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until calibration update is completed. The time to complete the calibration is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER CALIBRATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during calibration will suspend calibration. If it is necessary to suspend calibration, perform steps 15 through 18. If not, continue with step 14.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode. Skip to step 19.
SUSPEND CALIBRATION (steps 15 through 18)		
15		Press **ESC** on the CDP keypad.

Table 2-84. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
16	CDP display will change to: SUSPEND CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend calibration. Press **2** on the CDP keypad to return to the **MAINTAIN CONSTANT SPEED/TURNS** display screen in step 14.
17	If 1 is pressed, the CDP display will change to: RESUME CALIBRATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 13 display screen and resume calibration. Press **2** on the CDP keypad to end the calibration run.
18	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER CALIBRATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and perform another calibration run. Press **2** on the CDP keypad to exit out of the calibration process. If successful calibration runs have been completed, proceed to step 19. If no calibration runs have been completed, the DEML will return to the previously selected mode.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
19	If calibration points are valid, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 20. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 21 and 22.
	BUILD TABLE (step 20)	
20	If the calibration run failed, the CDP will display: CALIBRATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-84. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
	After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 22).	**NOTE** *This will flash until updating of NOVRAM is complete.
DISCARD TABLE (steps 21 and 22)		
21	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 19 display screen.
22	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-85. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 2

STEP	DISPLAY	ACTION
1		**NOTE** Refer to **Paragraph 2.6** prior to execution of this table. Note CAL TIME parameter (CONFIG mode) dictates the length of time that the calibration/verifications are performed for each base/reciprocal run. Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **3** on the CDP keypad.
3	1) MANUAL 2) AUTO MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) AUTO VERIFY NAVSSI 2) AUTO VERIFY RLGN1 3) AUTO VERIFY RLGN2 MODE: CALIBRATION	Press **3** on the CDP keypad.
5	ENTER DESIRED VERIFICATION SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**. If the vessel attains a speed higher than the speed entered, calibration values above that speed will be linearly extrapolated.
6	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	Bring vessel to desired speed. When vessel reaches desired course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad. (Record heading and speed information.) Ensure hull maintains ±1 rpm and heading is within ±1°.
7	If coil current is invalid, the CDP display will change to: COIL OUT OF SPEC VERIFICATION FAILED (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode.

Table 2-85. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
	If RLGN 2 interface is offline, or RLGN 2 data is invalid, the CDP display will change to: RLGN2 DATA UNAVAILABLE (E)NTER MODE: CALIBRATION If coil current is valid, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . * After CAL TIME minutes, the CDP display will change to: MAKE HULL READY FOR RECIPROCAL RUN (E)NTER MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. When the **RECIPROCAL RUN** screen appears, operator gives a “mark” to observer to record position and time on the calibration data sheet. (Data recorded is for reference only.) Operator advises pilot house/ship control to turn the vessel around for the reciprocal run. Press **E** on the CDP keypad. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 8 through 11. If not, continue with step 7. Skip to step 12.
SUSPEND VERIFICATION (steps 8 through 11)		
8		Press **ESC** on the CDP keypad.
9	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 7.
10	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 6 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.

Table 2-85. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
11	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
12	MAKE TURNS FOR ## KT (E)NTER MODE: CALIBRATION	When vessel reaches desired reciprocal course and speed, observer gives a “mark” to operator to press **E** on the CDP keypad.
13	After E is pressed, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## SPEED DELTA: ##.### VERIFYING . . . . *	**NOTE** *After pressing E on the CDP keypad, this CDP display portion will flash until verification is completed. The time to complete the verification is dependent on the CAL TIME parameter that is configurable via the CONFIG mode. Maintain course and speed until the **PERFORM ANOTHER VERIFICATION RUN** screen appears. Ensure hull maintains ±1 rpm and heading is within ±1°. **NOTE** Pressing ESC on the CDP keypad during verification will suspend verification. If it is necessary to suspend verification, perform steps 14 through 17. If not, continue with step 13.
	After CAL TIME minutes, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode. Skip to step 18.
SUSPEND VERIFICATION (steps 14 through 17)		
14		Press **ESC** on the CDP keypad.

Table 2-85. AN/WSN-8A(V)2 (7404776) DEML Automatic Calibration Verification Procedure, RLGN 2 - Continued

STEP	DISPLAY	ACTION
15	CDP display will change to: SUSPEND VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to suspend verification. Press **2** on the CDP keypad to return to the **REF SPEED, DEML SPEED, SPEED DELTA** display screen in step 13.
16	If 1 is pressed, the CDP display will change to: RESUME VERIFICATION (1) YES (2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 12 display screen and resume verification. Press **2** on the CDP keypad to end the verification run.
17	If 2 is pressed, the CDP display will change to: PERFORM ANOTHER VERIFICATION RUN 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to return to step 5 display screen and perform another verification run. Press **2** on the CDP keypad to exit out of the verification process. If successful verification runs have been completed, proceed to step 18. If no verification runs have been completed, the DEML will return to the previously selected mode.
18	If 2 is pressed, and verification points are valid, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete.
19	After approximately 5 seconds, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	Press **E** on the CDP keypad. **NOTE** This panel will repeat until all verification points have been displayed.
20	If all verification points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-86. AN/WSN-8A(V)2 (7404776) DEML Correct Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	Press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	**NOTE** This panel will repeat for all speed calibration points in the table. If displayed speed requires modifying, press **1** on the CDP keypad.

Table 2-86. AN/WSN-8A(V)2 (7404776) DEML Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
	If 1 is pressed, the CDP display will change to: ENTER SPEED > MODE: CALIBRATION	Enter the desired value via the numeric keys on the CDP keypad and press **E**.
	If 2 is pressed, the CDP display will change to: MODIFY SPEED? ##.## 1) YES 2) NO MODE: CALIBRATION	If displayed speed does not require modifying, press **2** on the CDP keypad to display next speed calibration point. Repeat step 6 for all displayed speed calibration points in the table.
	CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.	
7	After all speed calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform step 8. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 9 and 10.
	BUILD TABLE (step 8)	
8	After pressing 1, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 10).
	DISCARD TABLE (steps 9 and 10)	
9	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 7 display screen.

Table 2-86. AN/WSN-8A(V)2 (7404776) DEML Correct Calibration Table - Continued

STEP	DISPLAY	ACTION
10	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-87. AN/WSN-8A(V)2 (7404776) DEML Create Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
4	1) CORRECT TABLE 2) CREATE TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	ENTER # CAL POINTS > MODE: CALIBRATION	Enter the desired number of calibration points via the numeric keys on the CDP keypad and press **E**. **NOTE** The calibration table must have at least two calibration points. The first calibration point being zero and the second calibration point being some other non-zero calibration point.
6	ENTER PHASE OFFSET > MODE: CALIBRATION	Enter the phase offset and press **E**.
7	ENTER INTERP MODE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the interpolation mode by pressing 1 on the CDP keypad until the desired interpolation mode is selected. Press **E** to accept the selected interpolation mode.

Table 2-87. AN/WSN-8A(V)2 (7404776) DEML Create Calibration Table - Continued

STEP	DISPLAY	ACTION
8	ENTER CAL TYPE 1) XXXXXXX (E)NTER MODE: CALIBRATION	Enter the calibration type by pressing 1 on the CDP keypad until the desired calibration type is selected. Press **E** to accept the selected calibration type.
9	After pressing E, the CDP displays the following, with a slight pause between each: CAL POINT: # SELECTED SPEED > MODE: CALIBRATION CAL POINT: # AVERAGE SPEED > MODE: CALIBRATION CAL POINT: # WEIGHT > MODE: CALIBRATION	**NOTE** These panels will repeat until all calibration points have been entered. **NOTE** SELECTED SPEED values signify the interval of the calibration run that was performed, and are integer values such as 8, 16, and 24 knots. AVERAGE SPEED values are actual computed speed values from the calibration process for each of the SELECTED SPEED runs. Due to hull characteristics and rodmeter sensitivities, the AVERAGE SPEED value will differ from the SELECTED SPEED. An example would be a calibration table with a SELECTED SPEED value of 8 knots and an AVERAGE SPEED value of 7.64 knots. The WEIGHT value is an internal DEML software filter parameter that correlates the AVERAGE SPEED value to the return signal from the rodmeter. It is important that all digits are recorded and entered with respect to the WEIGHT value.
CAUTION Pressing 2 (Discard Table option) will erase all data gathered during the calibration runs. Select this option ONLY if the runs are declared invalid.		
10	After all calibration points have been displayed, the CDP display will change to: 1) BUILD TABLE 2) DISCARD TABLE MODE: CALIBRATION	To build a table (store calibration information), press **1** on the CDP keypad and perform steps 11 and 12. To discard a table (discard all calibration data gathered in the preceding steps), press **2** on the CDP keypad and perform steps 13 and 14.

Table 2-87. AN/WSN-8A(V)2 (7404776) DEML Create Calibration Table - Continued

STEP	DISPLAY	ACTION
BUILD TABLE (steps 11 and 12)		
11	SELECT TABLE: NORM* 1) NONE 2) NONE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table. **NOTE** It is preferable to select a table that reads **NONE**. Selecting a table containing data will overwrite it.
12	After pressing 1 or 2 to select a table, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration (see display at step 14).
DISCARD TABLE (steps 13 and 14)		
13	ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to discard all calibration data gathered in the preceding steps. Press **2** on the CDP keypad to return to step 10 display screen.
14	If 1 is pressed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-88. AN/WSN-8A(V)2 (7404776) DEML Delete Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	After pressing 1 or 2 to select a table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to delete the selected calibration table. Press **2** on the CDP keypad to cancel deletion of the selected calibration table and return to the previously selected mode.

Table 2-88. AN/WSN-8A(V)2 (7404776) DEML Delete Calibration Table - Continued

STEP	DISPLAY	ACTION
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration. **NOTE** **The mode displayed will be the same as previously selected.

Table 2-89. AN/WSN-8A(V)2 (7404776) DEML Delete Verification Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **3** on the CDP keypad.
4	1) DELETE CAL TABLE 2) DELETE VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode.

Table 2-89. AN/WSN-8A(V)2 (7404776) DEML Delete Verification Table - Continued

STEP	DISPLAY	ACTION
	If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table for deletion.
6	If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER	If a calibration verification was not performed for the selected table, press **E** and the display will change back to the previous mode.
	If a calibration verification was performed for the selected table, the CDP display will change to: ALL DATA WILL BE LOST!! CONTINUE? 1) YES 2) NO MODE: CALIBRATION	Press **1** on the CDP keypad to delete the selected verification table. Press **2** on the CDP keypad to cancel deletion of the selected verification table and return to the previously selected mode.
7	If 1 is pressed, the CDP display will change to: UPDATING NOVRAM . . . * MODE: CALIBRATION	**NOTE** *This will flash until updating of NOVRAM is complete. **NOTE** After approximately 5 seconds, the CDP display will change to the mode it was in before calibration.
	After approximately 5 seconds, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: **	**NOTE** **The mode displayed will be the same as previously selected.

Table 2-90. AN/WSN-8A(V)2 (7404776) DEML View Calibration Table

STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
5	If there are no valid calibration tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION If there are valid calibration tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION	If there are no valid calibration tables available, press **E** and the display will change back to the previous mode. **NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	After pressing 1 or 2 to select a table, the CDP display will change to: TYPE: MAN_INS INTERP MD: DIV DIF PHASE OFFSET: ### (E)NTER	Press **E** on the CDP keypad.

Table 2-90. AN/WSN-8A(V)2 (7404776) DEML View Calibration Table - Continued

STEP	DISPLAY	ACTION
7	After pressing E, the CDP display will change to: SPEED: #.## WEIGHT: #.######## VOLTS: #.######## (E)NTER	**NOTE** This panel will repeat until all calibration points have been displayed. Press **E** on the CDP keypad.
8	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.

Table 2-91. AN/WSN-8A(V)2 (7404776) DEML View Verification Table

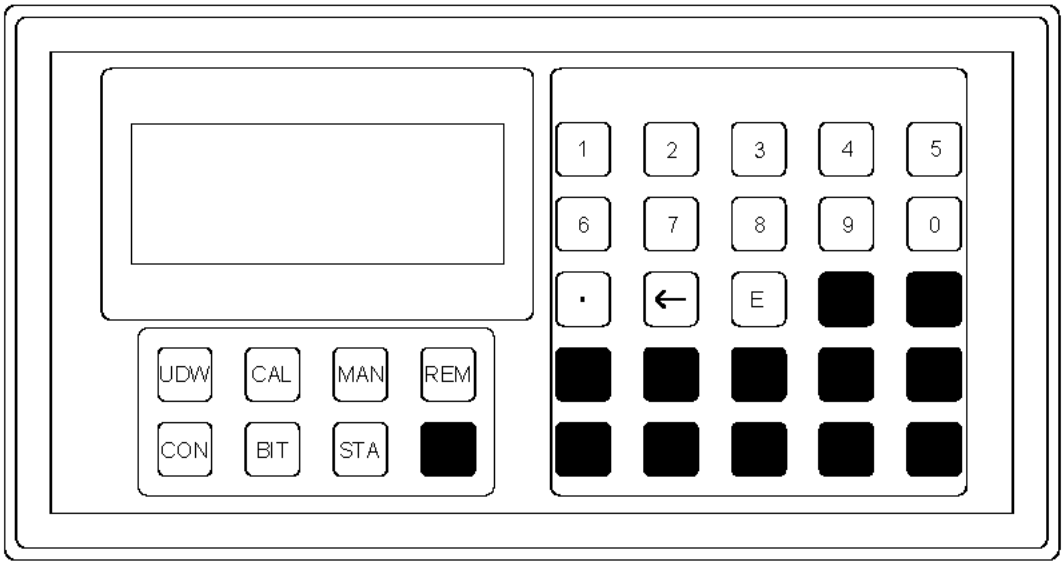
STEP	DISPLAY	ACTION
1		Press **CAL** on the CDP keypad.
2	1) SELECT 3) VERIFY 2) CAL 4) TABLES MODE: CALIBRATION	Press **4** on the CDP keypad.
3	1) VIEW TABLE 2) MODIFY TABLE 3) DELETE TABLE MODE: CALIBRATION	Press **1** on the CDP keypad.
4	1) VIEW CAL TABLE 2) VIEW VER TABLE MODE: CALIBRATION	Press **2** on the CDP keypad.
5	If there are no valid verification tables available, the CDP display will change to: NO TABLES AVAILABLE (E)NTER MODE: CALIBRATION	If there are no valid verification tables available, press **E** and the display will change back to the previous mode.

Table 2-91. AN/WSN-8A(V)2 (7404776) DEML View Verification Table - Continued

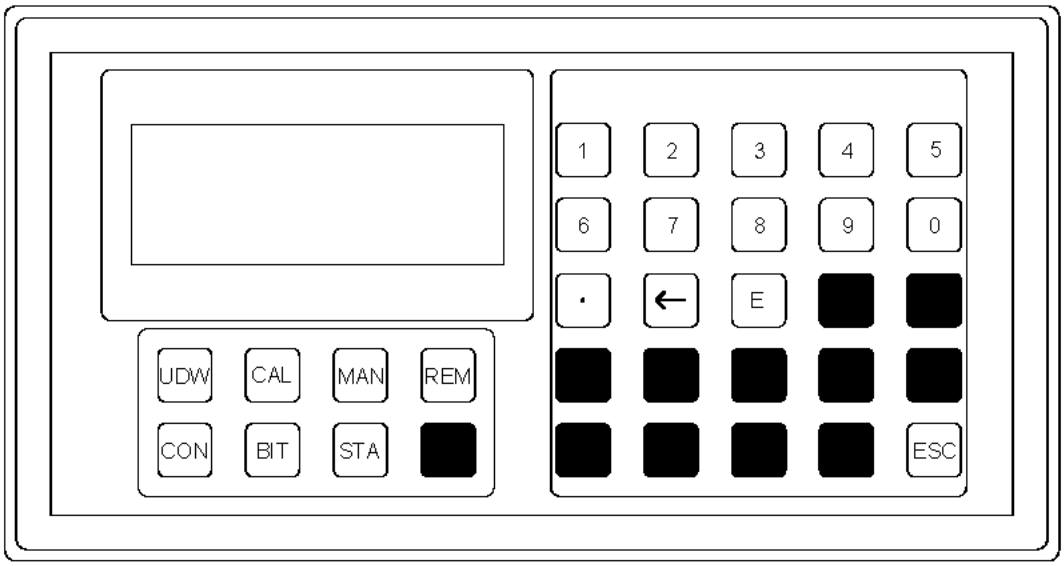
STEP	DISPLAY	ACTION
	If there are valid verification tables available, the CDP display will change to: SELECT TABLE: NORM* 1) INS 2) MILE MODE: CALIBRATION If a calibration verification was not performed for the selected table, the CDP display will change to: NO VERIFY DATA (E)NTER	**NOTE** *This line will read **ALT** if alternate rodmeter is selected. Options 1 and 2 will read **MILE**, **INS**, **VRC**, **AUTO_NAVSSI**, **AUTO_RLGN1**, or **AUTO_RLGN2** to reflect the calibration method that was used to build them, or **NONE** if no data is stored in the table. Press **1** or **2** on the CDP keypad to select a table.
6	If a Manual verification was performed for the selected table, the CDP display will change to: AVG SPEED: ##.## ST BASE: ####.## END BASE: ####.## (E)NTER After pressing E, the CDP display will change to: AVG SPEED: ##.## ST RECP: ####.## END RECP: ####.## (E)NTER If an Auto verification was performed for the selected table, the CDP display will change to: REF SPEED: ##.## DEML SPEED: ##.## CAL ERROR: ##.### (E)NTER	**NOTE** Repeat step 6 until all calibration points have been displayed. Press **E** on the CDP keypad. Press **E** on the CDP keypad. Press **E** on the CDP keypad.

Table 2-91. AN/WSN-8A(V)2 (7404776) DEML View Verification Table - Continued

STEP	DISPLAY	ACTION
7	If all calibration points have been displayed, the CDP display will change to: SPEED: ###.## KT DIST: #####.## NM MODE: *	**NOTE** *The mode displayed will be the same as previously selected.



AN/WSN-8 (7093036) Configuration



AN/WSN-8A(V)1 (7404776), AN/WSN-8A(V)2 (7404776) and AN/WSN-8 (7093036)(w/FC-1) Configurations

Figure 2-1. Control Display Panel Controls and Indicators

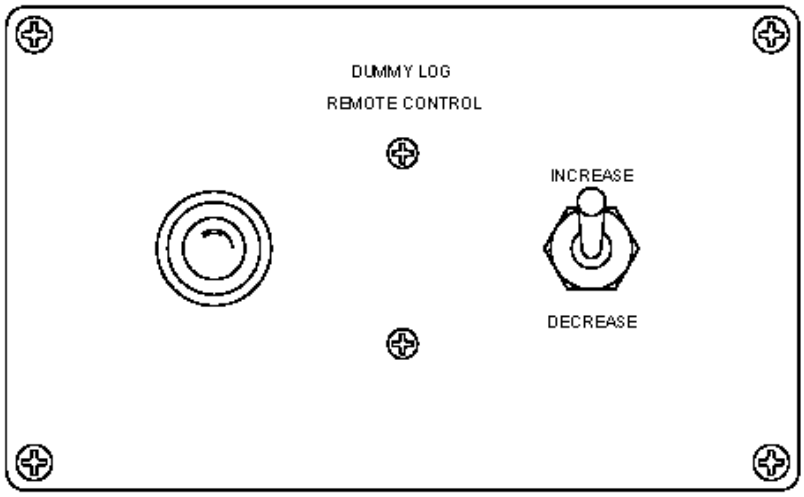
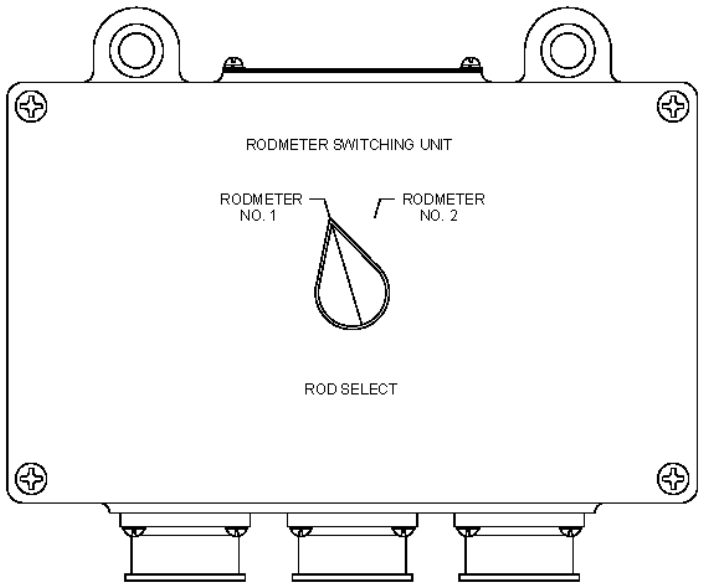
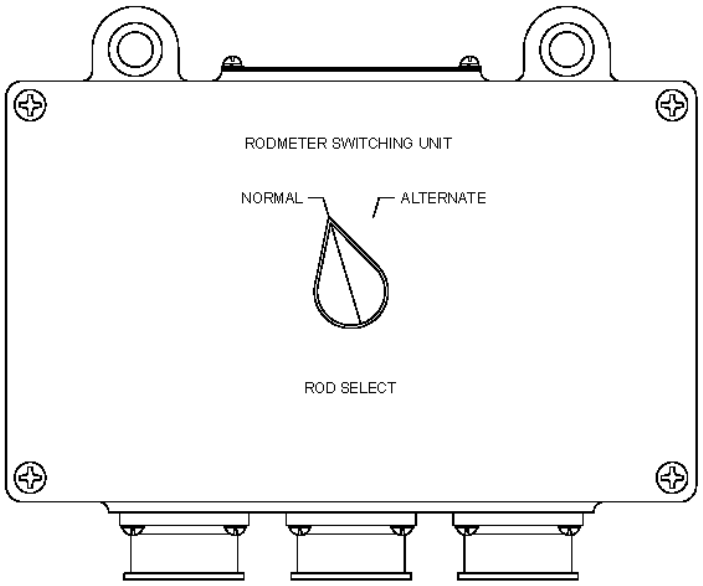


Figure 2-2. Unit 4 RCU Controls and Indicators



SINGLE I/T INSTALLATION



DUAL I/T INSTALLATION

Figure 2-3. Unit 5 Rodmeter Switching Unit Controls

DEML (AN/WSN-8/8A) CALIBRATION DATA SHEET

Ship/Hull Number: _____

DEML Serial Number: _____ Data Sheet Revision Date: _____
DEML Configuration: _____ Software Version: _____
DEML IP Address _____ NAVSSI Port _____
NAVSSI IP Address _____ CPU CCA S/N _____
A/D CCA S/N _____

DEML Configurations applicable above:
WSN-8A (V) 1 – DDG
WSN-8A (V) 2 – CVN
WSN-8A (V) 3 – Seawolf/Trident
WSN-8A (V) 4 – Non-Combatants (Synchro output only)
WSN-8 – Seawolf/Trident/LHD

INS Calibration Table
Phase Offset: _____ Current Calibration Table used: (1 or 2) _____

Table 1 Date of Calibration: _____
Speeds: (kts)

0	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____

Table 2 Date of Calibration: _____
Speeds: (kts)

0	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____
_____	Weight:	_____	Volts:	_____

* List the actual speeds displayed on DEML CDU, for remaining speeds.

Notes: _____

NOTE: NOTIFY ISEA OF ALL CHANGES. SPAWARSYSCEN AN/WSN-7 SUPPORT CENTER (888) 942-2232

Figure 2-4. DEML (AN/WSN-8/8A) Calibration Data Sheet

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MEASURED-MILE CALIBRATION DATA SHEET

USS: ____________________

Date: ____________________

Rodmeter No.: ____________________

CALIBRATION COURSE: ____________________

I-T No.: ____________________

Run	Heading	Initial Time T_i (Minutes)	Initial DEML Dist (Nm)	Initial Reference Position		Final Time T_i (Minutes)	Final DEML Dist (Nm)	Final Reference Position		Average DEML Speed (Knots)	Ordered Speed (Knots)	Average Speed Error
				Latitude (L_i)	Latitude (L_i)			Latitude (L_f)	Latitude (L_f)			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			

Figure 2-5. Measured-Mile Calibration Data Sheet

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INERTIAL CALIBRATION DATA SHEET

USS: ______________________

CALIBRATION COURSE: ______________________

Date: ______________________

Rodmeter No.: ______________________

I-T No.: ______________________

Run	Heading	Initial Time T_i (Minutes)	Initial DEML Dist (Nm)	Initial Reference Position		Final Time T_i (Minutes)	Final DEML Dist (Nm)	Final Reference Position		Average Inertial Speed (Knots)	Average DEML Speed (Knots)	Average Speed Error
				Latitude (L_i)	Latitude (L_i)			Latitude (L_f)	Latitude (L_f)			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			
(Base)				Deg Min	Deg Min			Deg Min	Deg Min			
(Recip)				Deg Min	Deg Min			Deg Min	Deg Min			

Figure 2-6 Inertial Calibration Data Sheet

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CHAPTER 3
FUNCTIONAL DESCRIPTION

3.1 INTRODUCTION.

This chapter provides functional descriptions of the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Logs (DEMLs); along with other units and subassemblies of the DEML System. Included are descriptions of the Power Distribution function, Control and Display function, and Input/Output (I/O) function.

Information in this chapter is divided into three levels of complexity:

a. Overall functional descriptions of the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEMLs.

b. Descriptions of units and subassemblies; their purpose and operation.

c. Detailed functional descriptions of power distribution, control and display, and I/O functions.

Each level of discussion is accompanied by block diagrams or functional schematic diagrams which show the subassemblies or circuits being described.

3.2 OVERALL FUNCTIONAL DESCRIPTION.

Figure 3-1 provides the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEML Simplified Block Diagrams. **Figure 3-2** and **Figure 5-1** provide Overall Functional Block Diagrams. The Simplified Block Diagrams provide general representations of system operation for the DEML configurations. The Overall Functional Block Diagrams identify the functional makeup (major function/subsystem) of the four DEML configurations.

115 VAC 60-Hertz (Hz) and 400-Hz [400-Hz Not Applicable (N/A) to AN/WSN-8 (7093036) (SSN 21 Class only) and AN/WSN-8A(V)1 and (V)2 (7404776) DEMLs] ship's power is provided to the DC Power Distribution subfunction and the I/O Function via the AC Power Distribution subfunction. The AC Power Distribution subfunction also provides 50 VAC (Volts Alternating Current) excitation to the rodmeter.

A 325-microvolt per knot signal is induced at the rodmeter which is passed on the rodmeter Circuit Card Assembly (CCA) within the Rodmeter subfunction. The rodmeter CCA also provides an indication of the rodmeter coil current to the Monitoring subfunction. The Analog-to-Digital (A/D) CCA digitizes the rodmeter speed signal and phase reference signal, and provides them to the Control and Display function.

The Central Processing Unit (CPU) CCA computes and processes the rodmeter and phase reference signals. The CPU provides speed, distance, and system status information to the Control Display Panel (CDP) and the I/O function.

In the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs, 60-Hz Digital-to-Resolver (D/R) and 400-Hz (400-Hz N/A to the SSN 21 Class) Digital-to-Synchro (D/S) Converters within the Synchro Output subfunction receive the speed and distance information, converting the information to synchro format. The 60-Hz Own Ship's Speed (OSS) outputs consist of 100 knots per revolution (KPR) (N/A to the SSN 21 Class), and 40 KPR, as well as 360 revolutions per nautical mile (Nm) Own Ship's Distance (OSD) (N/A to the SSN 21 Class). The 400-Hz OSS outputs (N/A to the SSN 21 Class) consist of 10 KPR, 40 KPR and 100 KPR. The Relay CCA provides status on four separate subfunctions to outside users. The MIL-STD-1553B CCA provides status, speed and distance information to external users in digital format. The CCA also reads in navigation data (used for auto calibration on the SSN 21 Class) provided by external users (N/A to the SSBN 726 Class).

In the AN/WSN-8A(V)1 (7404776) DEML with AN/WSN-8A(V)1, Version 4.31 software installed, an AT520L CPU CCA provides a bidirectional interface to the AN/USQ-82(V) Fiber Optic Data Multiplex System (FODMS) using jumper settings in **Table 3-4** and Auto-Detecting software. In the AN/WSN-8A(V)2 (7404776) DEML with AN/WSN-8A(V)2, Version 4.31 software installed, an AT520L CPU CCA provides a bidirectional interface to the AN/WSN-7(V) Fwd and Aft Ring Laser Gyro Navigators (RLGNs) using jumper settings in **Table 3-5** and Auto-Detecting software.

The AN/WSN-8A(V)1 and (V)2 (7404776) DEML configurations delete the Synchro Output subfunction and MIL-STD-1553B interface, and add

an Ethernet, 10BASE2 interface via a Network Interface Card (NIC) to the AN/SSN-6 Navigation Sensor System Interface (NAVSSI). The Ethernet CCA (3A1A12) provides status, speed, and distance information to external users in digital format via the Institute of Electrical and Electronics Engineers (IEEE) 803.2 specifications. The Ethernet CCA also receives navigation data provided by external users.

3.2.1 BIT FUNCTIONAL DESCRIPTION. The Built-In Test (BIT) mode causes the DEML Indicator-Transmitter (I/T) to run a self-diagnostic test and report any faulty modules on the CDP display. In addition to the high-level diagnostic tests, real-time performance monitoring is available for the AN/WSN-8 (7093036) DEML (w/FC-1), AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. Performance monitoring assesses the health of onboard electronics hardware and status of the external interfaces. Errors detected are assigned specific fault codes, and are capable of being displayed and acknowledged via the CDP. Fault codes are listed in **Table 5-1**. If active faults are present, a flashing "FLT" is displayed on the lower-right corner of the CDP during Underwater mode. In addition to the flashing "FLT" indication, a fault light is illuminated for all faults that have not been acknowledged on the AN/WSN-8A(V)1 (7404776) DEML, and AN/WSN-8A(V)2 (7404776) DEML. The self-diagnostic test occurs automatically upon DEML startup, or by the operator initiating BIT on the CDP keypad.

3.2.1.1 AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEML BIT Descriptions. The AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEML BIT functional processes are described in **Paragraphs 3.2.1.1.1** through **3.2.1.1.6**.

3.2.1.1.1 CPU BIT Description. The DEML performs the following operations in response to a CPU BIT request: Analyzes the internal status registers to ensure proper operation. Onboard Dynamic Random Access Memory (DRAM), Static Random Access Memory (SRAM), and Flash Erasable Programmable Read-Only Memory (EPROM) checks are also performed.

3.2.1.1.2 60-Hz D/R BIT Description. The DEML performs the following operations in response to a D/R BIT request: Analyzes the digital exitation of onboard D/R modules to ensure proper operation. The status register and communication port are also tested to ensure proper interfacing between the card and the system microprocessor. The BIT function does not provide testing of output signals and will not detect the loss of 60-Hz reference signals.

3.2.1.1.3 SSBA BIT Description. The DEML performs the following operations in response to a Synchro Signal Booster Amplifier (SSBA) BIT request: The SSBAs provide a BIT signal output (one for each SSBA) at pin 2 of jacks AR1J1/AR2J1. These two BIT signals are fed into inverters on the Relay CCA. When this BIT signal is logic “1”, the SSBA is in a fault or an overload condition. The CPU uses the parallel port, via the Relay CCA, to monitor the signals and provide appropriate SSBA operating conditions.

3.2.1.1.4 400-Hz D/S BIT Description. (N/A to the SSN 21 Class) The DEML performs the following operations in response to a D/S BIT request: Analyzes the digital excitation of onboard D/S modules to ensure proper operation. The status register and communication port are also tested to ensure proper interfacing between the card and the system microprocessor. The BIT function does not provide testing of output signals and will not detect the loss of 400-Hz reference signals.

3.2.1.1.5 A/D BIT Description. The AN/WSN-8 (7093036) DEML incorporates an RTI-850F High Resolution Data Acquisition CCA. The DEML performs the following operations in response to an A/D BIT request: It provides two test voltages to the RTI-850F CCA and performs a predetermined number of conversions to determine the reasonableness of each test voltage. If this BIT fails, two areas should be addressed. First, the supply of test voltages by the DEML Rodmeter CCA should be confirmed. Second, proper cabling to the RTI-850F CCA should be verified. If both of these tests are positive, then the proper operation of the RTI-850F CCA would be suspect.

The AN/WSN-8 (7093036) DEML (w/FC-1) incorporates a DM16S High Resolution Data Acquisition CCA. The DEML performs the following operation in response to an A/D BIT request: It performs a wrap-around test on the A/D module to ensure proper operation. If this BIT fails, the DM16S CCA should be replaced.

3.2.1.1.6 MIL-STD-1553B BIT Description. The DEML performs the following operations in response to a MIL-STD-1553B BIT request: Conducts memory tests to verify proper operation of the MS1553B CCA memory-mapped interface, and invokes the BIT function of the MS1553B CCAs primary controller. The controller self-test performs an internal wrap-around test between the Manchester encoder and the two Manchester decoders. A failure on either the primary or secondary channel will be detected. MIL-STD-1553B commands will be ignored until the test has been completed. This operation requires approximately 100 µs. Additionally, this BIT performs proprietary CCA checks provided by the manufacturer of the MS1553B CCA.

3.2.1.1.7 ROD PCB BIT Description. [N/A to the AN/WSN-8 (7093036) DEML] The AN/WSN-8 (7093036) DEML (w/FC-1) performs the following operations in response to a Rodmeter (ROD) Printed Circuit Board (PCB) BIT request: Monitors health signals from the Rodmeter CCA (3A1A4) to ensure that they are within the required tolerance.

3.2.1.2 AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEML BIT Descriptions. The AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEML BIT functional processes are described in **Paragraphs 3.2.1.2.1** through **3.2.1.2.4**.

3.2.1.2.1 CPU BIT Description. The DEML performs the following operations in response to a CPU BIT request: Analyzes the internal status registers to ensure proper operation. Onboard DRAM and Flash EPROM checks are also performed.

3.2.1.2.2 A/D BIT Description. The DEML incorporates a DM16S High Resolution Data Acquisition CCA. The DEML performs the following operation in response to an A/D BIT request: It performs a wrap-around test on the A/D module to ensure proper operation. If this BIT fails, the DM16S CCA should be replaced.

3.2.1.2.3 Ethernet BIT Description. The DEML performs the following operations in response to an Ethernet BIT request: Checks the validity of the configuration registers.

3.2.1.2.4 ROD PCB BIT Description. The DEML performs the following operations in response to a ROD PCB BIT request: Monitors health signals from the Rodmeter CCA (3A4) to ensure that they are within the required tolerance.

3.3 DETAILED FUNCTIONAL DESCRIPTION.

3.3.1 AC POWER DISTRIBUTION. (Refer to **Figure 3-20**) The AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEML AC Power Distribution function provides 115V 60-Hz ship's power to the DC Power Distribution function, Control and Display, and I/O function. It also provides 115V 400-Hz (N/A SSN 21 Class only) to the Synchro Output function. The AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEML AC Power Distribution function provides 115V 60-Hz ship's power to the DC Power Distribution function, Control and Display function, and I/O function.

3.3.1.1 Fuses [(3A1A2F1-3A1A2F4) or (3A2F1-3A2F4)]. On the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs, fuses F1 through F4 (Fuses F3 and F4 N/A to SSN 21 Class only.) protect the 115V 60-Hz and 400-Hz DEML circuits from excessive current. On the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs, fuses F1 and F2 (Fuses F3 and F4 not used.) protect the 115V 60-Hz DEML circuit from excessive current.

3.3.1.2 Power Line Filter (3A1FL1 or 3FL1). The Power Line Filter (3A1FL1 or 3FL1) filters radio frequency interference from the 115V 60-Hz ship's power input.

3.3.1.3 Over Voltage Protection Network [(3A1RV1-3A1RV3) or (3RV1-3RV3)]. The Over Voltage Protection Network consists of three varistors (RV1 through RV3) that are mounted on Power Line Filter (3A1FL1 or 3FL1). These varistors protect the DEML circuits from voltage transients.

3.3.1.4 Constant Voltage Transformer Assembly (3A1A1A11 or 3A1A11). The Constant Voltage Transformer Assembly (3A1A1A11 or 3A1A11) maintains a constant input voltage to the Step-Down Transformer (3A1A1A10 or 3A1A10).

3.3.1.5 Step-Down Transformer (3A1A1A10 or 3A1A10). The Step-Down Transformer (3A1A1A10 or 3A1A10) steps down 115V 60-Hz from the Constant Voltage Transformer (3A1A1A11 or 3A1A11) to provide 50V 60-Hz excitation to the rodmeter coil and reference for the Rodmeter function.

3.3.1.6 Fuse (3A1A2F5 or 3A2F5). Fuse F5 protects the rodmeter coil from excessive current.

3.3.2 DC POWER DISTRIBUTION. (Refer to **Figure 3-21**) The DC Power Distribution function provides +12V, -12V, +28V, +5V, and -5V power to the DEML subassemblies. The primary component of this function is the 200-Watt Power Supply (3A1A1A8 or 3A1A8).

3.3.2.1 200-W Power Supply (3A1A1A8 or 3A1A8). On the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs, the 200-W Power Supply (3A1A1A8) provides +5V to the CDP, Relay CCA, SSBAs, and Card Cage. On the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs, the 200-W Power Supply (3A1A8) provides +5V to the CDP, Relay CCA, and Card Cage. The 200-W Power Supply (3A1A1A8 or 3A1A8) also provides +12V and -12V to the Card Cage, and +15V, -15V, and +5V to the rodmeter CCA via the A/D CCA.

3.3.2.2 28 VDC Power Supply (3A1A1A9 or 3A1A9). The 28 VDC Power Supply (3A1A1A9 or 3A1A9) provides +28 VDC to the relay CCA for illumination of the Remote Control Unit (RCU).

3.3.2.3 Grounds and Returns. (Refer to **Figure 3-22**) On the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs, the grounds and return provide ground and return paths to the Monitoring function, Control and Display function, Rodmeter function, Synchro Output function, and Power Supply/Card Cage Assembly. On the AN/WSN-8A(V)1 (7404776) and

AN/WSN-8A(V)2 (7404776) DEMLs, the grounds and return provide ground and return paths to the Monitoring function, Control and Display function, Rodmeter function, and Power Supply/Card Cage Assembly.

3.3.3 CONTROL DISPLAY FUNCTION. (Refer to **Figure 3-3**) The Control Display Function manages data flow and distribution of all signals in the DEML. The two subsystems which perform this function are described below.

3.3.3.1 CPU CCA (3A1A1A2 or 3A1A2). (Refer to **Figure 3-4** and **Figure 6-12**) The CPU CCA computes, formats, and distributes all data in the DEML. The CPU CCA samples the rodmeter and reference signals at a 1-KHz rate.

The AN/WSN-8 (7093036) AT4L/AT4L+ CPU executes input information and commands from the CDP via serial port COM1, connector A1A2J6. Port COM2 (A1A2J4) is used to incorporate software revisions (**Figure 3-4, sheet 1**). Switch A1S1 must be in the program position to install software revisions.

The AN/WSN-8 (7093036) AT4L/AT4L+ CPU uses the parallel port (connector A1A2J7) via the relay CCA to:

a. Process input signals from the RCU when DEML is in Remote Dummy Mode.

b. Monitor rodmeter selection via the Rodmeter Switching Unit (RSU).

c. Monitor BIT from the SSBAs (if installed).

d. Provide DEML NORMAL/NOT NORMAL mode status to external users.

The AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEML systems utilize the AT520L CPU CCA. The AT520L CPU executes input information and commands from the CDP via serial port COM3, connector A1A2J6. In the AN/WSN-8A(V)1 (7404776) DEML configuration, Port COM1 (A1A2J9) is used for the interface to the AN/USQ-82(V) FODMS. In the AN/WSN-8A(V)2 (7404776) DEML configuration, Port COM1 (A1A2J9) is used for the interface to the AN/WSN-7(V) Fwd RLGN. Port COM2 (A1A2J14) is used for the interface to the AN/WSN-7(V) Aft RLGN. An engineering port utilizes COM4 (A1A2J7) and is used exclusively by the In-Service Engineering Agent (ISEA).

SRAM: Used for storage of important DEML information, including current calibration tables for each rodmeter, calculated distance, hours of operation, rodmeter switching unit present flag and system configuration parameters. The AT4L/AT4L Plus CPU CCA utilizes the SRAM as the primary Non-volatile Random Access Memory (NOVRAM) storage. The AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) DEMLs utilize the AT520L CPU CCA for primary NOVRAM storage. The SRAM has battery backup in case of power failure. (Refer to **Paragraph 6.3.4.9.2.1**.) SRAM is not utilized on the AT520L CPU CCA.

Flash EPROM: Stores the DEML system software (executable) and also acts as backup for the SRAM on the AT4L/AT4L+ CPU CCA. The Flash EPROM provides the primary NOVRAM storage on the AT520L CPU CCA. The information stored includes calibration tables (default calibration and at-sea) and configuration parameters.

DRAM: Used for normal system operation. DRAM is used while the system is powered. All information is lost upon power failure. The DEML system image in Flash EPROM is loaded into DRAM at boot time and the software runs out of DRAM. Any dynamic memory allocation when doing calibration is done in DRAM and then freed upon completion.

3.3.3.1.1 CPU Specifications.

AN/WSN-8 (7093036) DEML

Part Number:	AT4L/AT4L+
Power Requirements:	+5 VDC @ 2.0A, +12 VDC @ 0.015A, -12 VDC @ 5mA
CPU:	Intel 486DX2
Clock Speed:	66 MHz
Flash EPROM:	2 Mbyte (bootable)
SRAM:	128 Kbyte x 8
DRAM:	4 Mbyte

AN/WSN-8 (7093036) DEML (w/FC-1)

Part Number:	AT520L
Power Requirements:	+5 VDC @ 2.0A
CPU:	AMD SC520
Clock Speed:	133 MHz
Flash EPROM:	2 Mbyte (bootable)
DRAM:	16 Mbyte

AN/WSN-8A(V)1, -8A(V)2 (7404776) DEML

Part Number:	AT520L
Power Requirements:	+5 VDC @ 2.0A
CPU:	AMD SC520
Clock Speed:	133 MHz

Flash EPROM:	2 Mbyte (bootable)
DRAM:	16 Mbyte

3.3.3.1.2 AN/WSN-8 (7093036) DEML CPU CCA Jumper Settings. Jumpers not mentioned in **Tables 3-1** and **3-2** should be open. Refer to **Figure 6-12 (Sheet 1** and **Sheet 2**) for location of jumpers.

Table 3-1. AT4L Revision 1 Settings

CCA	JUMPER SETTINGS
COM2 (RS232):	W1: 1-2 W2: 1-2 W5: 1-2 W6: 1-2
Power Fail Detection:	W7: 1-2
SRAM Memory (128K x 8):	W8: 1-2
28FO20 Flash EPROM:	W9: 1-2
SRAM Battery Backup:	W10: 1-2
Flash Installed:	W14: 1-2
486DX2 CPU:	W17: 1-2 W18: 2-3 W19: 1-2
ASYNC BUSCLK:	W20: 2-3
66 MHz CPU Speed:	W21: 3-4 W21: 5-6
COM:	SW1: 3-4 SW1: 7-8 (Program Switch)

Table 3-2. AT4L Plus Settings

CCA	JUMPER SETTINGS
COM2 (RS232):	W1: 1-2 W2: 1-2 W3: Not Installed W4: Not Installed W5: 1-2 W6: 1-2

Table 3-2. AT4L Plus Settings - Continued

CCA	JUMPER SETTINGS
Power Fail Detection: 2.88MB HD Floppy:	W7: 2-3 W8: Not Installed W9: Not Installed
SRAM Battery Backup:	W10: 1-2
IOCHRDY Signal to IDE Interface:	W11: Not Installed
Watchdog Timer:	W12: Not Installed
Power Monitoring:	W13: Not Installed
Flash EPROM Write:	W14: 1-2
BIOS EPROM/Flash:	W15: Not Installed
Teknor BIOS Extension:	W16: Not Installed
Processor Selection:	W17: 1-2 W18: 2-3 W19: 1-2 W26: Not Installed; Factory Set; Do Not Alter
PS/2 Mouse:	W19A: Not Installed
BUSCLK Signal:	W20: 2-3; Factory Set; Do Not Alter
CPU Clock:	W21: 3-4, 5-6; Factory Set; Do Not Alter
Graphic Modes:	W22: Not Installed; Factory Set; Do Not Alter
ECP DMA Channel:	W23, W24: Not Installed; Factory Set; Do Not Alter
Parallel Port Interrupt:	W25: 1-2
CPU Power: 5.0V	W27: 1-2
SW1 Multi-Function Jumpers:	3-4
SW1:	7-8 (Program Switch)
SW2:	Not Installed

3.3.3.1.3 AN/WSN-8 (7093036) DEML (w/FC-1) CPU CCA Jumper Settings. Jumpers not mentioned in **Table 3-3** should be open. Refer to **Figure 6-12 (Sheet 4)** for location of jumpers.

Table 3-3. AN/WSN-8 (7093036) (w/FC-1) AT520L Settings

CCA	JUMPER SETTINGS
System Configuration:	JP2: *7-8
BOOTCS#:	J10: 3-4
ROMCS1#:	J11: 1-2
*JP2: 7-8 should not be installed on installations without an RSU. Failure to do so will result in the DEML system randomly switching calibration tables, and thus induces speed errors into the system.	

3.3.3.1.4 AN/WSN-8A (7404776) DEML (AT520L) CPU CCA Jumper Settings. Jumpers not mentioned in **Tables 3-4** and **3-5** should be open. Refer to **Figure 6-12 (Sheet 4)** for location of jumpers.

Table 3-4. AN/WSN-8A(V)1 (7404776) AT520L Settings

CCA	JUMPER SETTINGS
System Configuration:	JP2: 15-16
BOOTCS#:	J10: 3-4
ROMCS1#:	J11: 1-2

Table 3-5. AN/WSN-8A(V)2 (7404776) AT520L Settings

CCA	JUMPER SETTINGS
System Configuration:	JP2: 13-14
BOOTCS#:	J10: 3-4
ROMCS1#:	J11: 1-2

3.3.3.2 CDP (3A1A2A1 or 3A2A1). Displays speed data, distance data, status, configuration, and calibration results. Man-Machine Interface (MMI) is accomplished via the CDP, including entering calibration tables and dummy speed.

3.3.3.2.1 CDP Jumper Settings. The AN/WSN-8 (7093036) and AN/WSN-8A (7404776) DEML CDP jumper settings listed below are factory-set and not to be altered.

AN/WSN-8 (7093036) CDP jumper settings

- E1 open; E2, E3 closed
- E4 open; E5, E6 closed
- E7 open; E8, E9 closed
- E10 open; E11, E12 closed
- E13, E14 closed; E15 open
- E16 open; E17 closed
- E18 open; E19 closed
- E20 closed; E21 open
- E22 closed, E23 closed
- E24 open; E25 closed
- E26 open; E27 closed
- E28 open; E29 closed
- E30 open; E31 closed
- E32 open; E33 closed
- E34 open; E35 closed
- E36 open; E37 closed
- E38 closed; E39 open

AN/WSN-8A (7404776) CDP jumper settings

- E1 open; E2, E3 closed
- E4 open; E5, E6 closed
- E7 open; E8, E9 closed
- E10 open; E11, E12 closed
- E13, E14 closed; E15 open
- E16 open; E17 closed
- E18 closed; E19 open
- E20 closed; E21 open
- E22 open; E23 closed
- E24 closed; E25 open
- E26 open; E27 closed
- E28 open; E29 closed
- E30 closed; E31 open
- E32 open; E33 closed
- E34 open; E35 closed
- E36 open; E37 closed
- E38 closed; E39 open

3.3.4 I/O FUNCTION. The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) I/O Function processes signals from the rodmeter, remote control unit, rodmeter switching unit, rodmeter excitation transformer, and MIL-STD-1553B Digital Data Bus (DDB). The AN/WSN-8 (7093036) DEML (w/FC-1) adds a National Marine Electronics Association (NMEA) output utilizing the NMEA-0183 VBW message. The I/O Function outputs speed, distance, and status information via synchro outputs and MIL-STD-1553B DDB.

The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML I/O Function processes signals from the rodmeter, remote control unit, rodmeter switching unit, rodmeter excitation transformer, and Ethernet CCA (A1A12). The I/O Function outputs speed, distance, and status information via the Ethernet CCA. The Ethernet CCA provides a Local Area Network (LAN) architecture interface based on a topology and supports data transfer rates of 10 Mbps. The Ethernet CCA is based on the IEEE 802.3 standard and uses the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) access method to handle simultaneous demands.

3.3.4.1 Rodmeter Subfunction. (Refer to **Figure 3-6**)

3.3.4.1.1 Rodmeter (Unit 1). (Refer to **Figure 3-5**) The rodmeter consists of a rodmeter coil and an Electromotive Force (EMF) sensing element. The rodmeter coil produces a stationary magnetic field in the water in which the ship is floating. The magnetic field is produced when the rodmeter coil is excited by the 50V, 60-Hz output of the power control circuits. Because seawater is a conductor, and the magnetic field is stationary, an EMF is produced as water flows through the magnetic field. The EMF is proportional to ship's speed; the EMF increases as the water flow passing over the rodmeter increases, and vice versa. The EMF sensing element detects the EMF produced by the water flow through the magnetic field. The EMF sensing element consists of two pickup buttons in contact with the seawater and placed at right angles with respect to the magnetic field (rodmeter coil). The EMF produced is conducted between the two pickup buttons, producing the ship's speed signal voltage. This ship's speed signal will be approximately 325 microvolts per knot.

3.3.4.1.2 Rodmeter CCA (3A1A4 or 3A4). (Refer to **Figure 3-8** and **Figure 6-10**) The Rodmeter CCA takes in two analog signals for processing. The signals are discussed below:

a. The rodmeter signal is amplified and filtered by the Rodmeter CCA and passed on to the Control Display function for conversion to digital speed and distance information.

b. The rodmeter excitation transformer signal is also amplified and filtered. The signal is used by the Control Display function as a reference for the digital signal processing algorithm from which digital speed is derived. The reference coil current is also provided to the external monitoring subsystem.

U1 is an industry standard isolation module (5B series). The rodmeter signal is fed through A4J1, then amplified and conditioned through the 5B module, and provided to the A/D CCA through A4J4.

U2 is an industry standard isolation module (5B series). The reference signal is fed through A4J2, then amplified and conditioned through the 5B module, and provided to the A/D CCA through A4J4.

U3 is a balance line driver chip. It provides coil current voltage to the external monitoring system. This coil current voltage is derived from the reference voltage via a small sense resistor. The reference voltage comes in through A4J2. The line driver amplifies it with a gain of 2 and outputs it to the external system through A4J3.

On the AN/WSN-8 (7093036) DEML, +5V and 0V test signals are provided to Channel 6 and Channel 7 of the A/D CCA through A4J4. On the AN/WSN-8A(V)1 (7404776) DEML, AN/WSN-8A(V)2 (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), +5V and 0V test signals are provided to Channel 2 and Channel 3 of the A/D CCA through A4J4. The CPU monitors the A/D output to detect a failure based on known input signals.

3.3.4.1.3 A/D CCA (3A1A1A3 or 3A1A3). The A/D CCA converts the rodmeter input signal and reference input signal into digital format.

The AN/WSN-8 (7093036) DEML A/D CCA [refer to **Figure 3-7 (Sheet 1)** and **Figure 6-13 (Sheet 1)**] is a high-resolution converter that provides a 16-bit resolution with 14-bit accuracy. The AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) (w/FC-1) DEML A/D CCA [refer to **Figure 3-7 (Sheet 2)** and **Figure 6-13 (Sheet 2)**] provides a 16-bit resolution with 16-bit accuracy. These CCAs contain multiple differential input channels that acquire preconditioned signals from the rodmeter CCA. The inputs to the A/D CCAs include the rodmeter speed signal, a reference signal (60-Hz phase-locked signal), and 0 VDC and 5 VDC test signal. (Detailed description in the Rodmeter CCA **Paragraph 3.3.4.1.2**.) Refer to **Figure 3-7** for the Simplified Functional Block Diagrams.

The A/D CCAs contain eight differential input channels for the acquisition of ±10V (full span) analog signals. DEML is currently using four input channels described below. Channels 2 - 5 on the AN/WSN-8 (7093036) DEML A/D CCA are unused for future expansion. Channels 4 - 7 on the AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) A/D CCA are unused for future expansion.

AN/WSN-8 (7093036) DEML A/D CCA

Ch 0: Rodmeter speed signal

Ch 1: Reference signal (60-Hz phase-locked signal)

Ch 6: +5 VDC (test signal)

Ch 7: 0 VDC (test signal)

AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) A/D CCA

Ch 0: Rodmeter speed signal

Ch 1: Reference signal (60-Hz phase-locked signal)

Ch 2: +5 VDC (test signal)

Ch 3: 0 VDC (test signal)

The preconditioned analog input signals are provided by the rodmeter CCA through A1A3J1 on the AN/WSN-8 (7093036) DEML A/D CCA, and A1A3J6 on the AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) A/D CCA. The four input channels are individually switched by a differential analog input multiplexer to a single common output. The software-selected channel's analog signal is passed through to a differential instrumentation unity gain amplifier. The instrumentation amplifier provides the common-mode rejection necessary to make accurate high-resolution measurements. The output signal of the instrumentation amplifier is sent to a sample-and-hold amplifier. The sample-and-hold amplifier tracks the input voltage until an A/D conversion is about to occur. The output is then fed to the 16-bit A/D converter. At the end of the data acquisition cycle, the A/D converter has digitized the analog input signal into an equivalent 16-bit representation of the signal. The resulting discrete time sequenced is provided via bus transceiver through the Industry Standard Architecture (ISA) bus plane.

The A/D CCA is powered from the +5V supply through the ISA bus plane. An onboard DC/DC converter translates the +5V into the low noise ±15V/±12V power required for the rodmeter CCAs (both the +5V and ±15V/±12V are made available at connectors A1A3J1 and A1A3J6).

3.3.4.1.4 AN/WSN-8 (7093036) DEML A/D CCA (RTI-850F) Jumper/Switch Settings. Refer to **Figure 6-13 (Sheet 1)** for location of Dual Inline Package (DIP) switch and jumpers.

a. I/O Map Address Locations (DIP Switch SW1): To turn on an individual switch in DIP switch SW1, press down on the numerical end of the switch (labeled "1" through "6" see below). This puts the switch in the ON (logic "0") position. The setting is as follows:

1	2	3	4	5	6
ON	ON	ON	OFF	OFF	OFF

b. Default Jumper Settings:

Interrupt request setting: Set jumper at E12

Conversion cycle setting: Set jumper at E19

Manufacturer's default: Set jumpers at E2A to E2B

(The remaining jumpers should be open.)

3.3.4.1.5 AN/WSN-8 (7093036) DEML A/D CCA (RTI-850F) Specifications.

Part Number:	RTI-850F
Power Requirements:	+5V @ 3A max., +12 VDC @ 0.015A, -12 VDC @ 0.05A
Resolution:	16 bits
Sampling Speed:	1 kHz
Sample Rate Timer:	0 to 10 kHz
Analog Input Range:	+10V (full scale of span)

3.3.4.1.6 AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) A/D CCA (DM16S) Jumper/Switch Settings. Refer to **Figure 6-13 (Sheet 2)** for location of jumpers.

a. I/O mapped address, DMA, and IRQ (J6) set to 0x300:

- J6-4 Installed
- J6-5 Installed
- J6-6 Installed
- J6-7 Installed
- J6-8 Not Installed
- J6-9 Not Installed

b. Differential/Single-Ended Mode:

- J4-S

3.3.4.1.7 AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) A/D CCA (DM16S) Specifications.

Part Number:	DM16S
Power Requirements:	+5 VDC @ 0.5A max.
Resolution:	16 bits
Sampling Speed:	1 kHz
Sample Rate Timer:	0 to 10 kHz
Analog Input Range:	±10V

3.3.4.2 Monitoring Subfunction. (Refer to **Figure 3-9**)

3.3.4.2.1 Relay CCA (3A1A3 or 3A3). (Refer to **Figure 3-23** and **Figure 6-11**) The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) Relay CCA (3A1A3) performs four separate functions. The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML Relay CCA (3A3) performs three separate functions. These functions are described below:

a. [Applicable to the AN/WSN-8 (7093036) DEML; AN/WSN-8 (7093036) DEML (w/FC-1); AN/WSN-8A(V)1 (7404776) DEML; and AN/WSN-8A(V)2 (7404776) DEML] The Relay CCA monitors rodmeter selection via the RSU. Two NAND gates in Reset/Set (RS) flip-flop configuration are used to debounce the RSU. If the output of the flip-flop is "1," the normal rodmeter is selected. If the output is "0," the alternate rodmeter is selected. The rodmeter status information may be viewed on the CDP in the Status mode. This function also ensures that the correct rodmeter calibration table is selected. Connector A3J3 is the interface connector for the RSU. The CPU monitors the signal via connector A3J3.

b. [Applicable to the AN/WSN-8 (7093036) DEML; AN/WSN-8 (7093036) DEML (w/FC-1); AN/WSN-8A(V)1 (7404776) DEML; and AN/WSN-8A(V)2 (7404776) DEML] The Relay CCA processes RCU input signals when DEML is in Remote Dummy mode. A simple Resistor-Capacitor (RC) filter is used to debounce the RCU switch. The Schmitt trigger is used to smooth out the RCU switch signal. +28 VDC power is also provided to the RCU indicator lamp. +28 VDC is fed through A3J6 from A1A9PS1 into a relay (K2) module. When the DEML is in Remote Dummy mode, relay K2 will toggle and provide power out via connector A3J5.

c. [Applicable to the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1)] The Relay CCA monitors BIT condition of SSBAs 1 and 2. Two input BIT signals (one for each SSBA) are fed into inverters via A3J2. If the input is logic "1," the boosters are in faulty or under overload condition.

d. [Applicable to the AN/WSN-8 (7093036) DEML; AN/WSN-8 (7093036) DEML (w/FC-1); AN/WSN-8A(V)1 (7404776) DEML; and AN/WSN-8A(V)2 (7404776) DEML] The Relay CCA also provides DEML "Normal/Not Normal" mode status (Mode Monitor) to the external monitoring system. A relay module is used to accomplish this function. When DEML is in modes other than underwater and calibration, it is operating under a Not Normal condition. Relay K1 will toggle closing a Logic Input Circuit (LIC)/Logic Output Circuit (LOC) circuit indicating a Not Normal DEML condition (A3J4).

3.3.4.3 Digital Interface Subfunction. (Refer to **Figure 3-10**)

3.3.4.3.1 AN/WSN-8 (7093036) DEML MIL-STD-1553B CCA (3A1A1A4). (Refer to **Figure 6-14**) In the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), the MIL-STD-1553B CCA (3A1A1A4) provides DEML status, speed, and distance information to external users. The CCA also reads in navigation data (used for auto cals on SSN 21 Class) provided by external users (N/A to the SSBN Class). The I/Ts are assigned different RT addresses. Assigning the same address to both I/Ts will cause the system DDB to crash.

Communications with external users is conducted via a dual redundant bus. The DEML is a Remote Terminal in the MIL-STD-1553B application and its basic job is to transmit and receive data. Communications protocol is in accordance with MIL-STD-1553B.

The CCA is powered by +5 VDC, +12 VDC and -12 VDC via the ISA bus. The output is provided through two BJ-77 Twinax connectors (A1A4J1 and A1A4J2). The I/O characteristics are provided as follows:

Input Characteristics:

- Transformer Coupled 0.86 -14V (p-p)

Output Characteristics:

- Transformer Coupled 18 -27V (p-p)

3.3.4.3.2 AN/WSN-8 (7093036) DEML MIL-STD-1553B CCA Jumper Settings. Refer to **Figure 6-14** for location of jumpers.

AN/WSN-8 (7093036) MIL-STD-1553B CCA Jumper Settings

Transformer Coupled:

- Set jumpers at E3 (9-10) and E3 (11-12)
- Set jumpers at E4 (9-10) and E4 (11-12)

Memory Address:

- Set jumpers E2 (1-2) and E2 (5-6)

High Priority Interrupt:

- Set jumper E2 (9-10)

Interrupt setting:

- Set jumper E2 (15-16)

AN/WSN-8 (7093036) (w/FC-1) MIL-STD-1553B CCA Jumper Settings

Memory Address:

- Set jumpers at E14 (2-10), E14 (4-12), E14 (5-13)

3.3.4.3.3 AN/WSN-8A(V)1, -8A(V)2 (7404776) DEML Ethernet CCA (3A1A12). (Refer to **Figure 3-14** and **Figure 6-17**) In the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, the Ethernet CCA (3A1A12) provides DEML status, speed, and distance information through a 10 base 2 interface to external users. Protocol format is in accordance with the Interface Design Document (IDD) for the AN/WQN-2 Doppler Sonar Velocity Log (DSVL) to AN/SSN-6 NAVSSI Revision A.

3.3.4.3.4 AN/WSN-8A(V)1 (7404776) DEML AT520L CPU CCA (3A1A2). In the AN/WSN-8A(V)1 (7404776) DEML, with AN/WSN-8A(V)1, Version 4.31 software installed, the AT50L CPU CCA (3A1A2) using jumper setting b0001 and Auto-Detecting software provides a bidirectional interface to the AN/USQ-82(V) FODMS through the onboard COM1 RS-422 serial port. Interface protocol is in accordance with the IDD for the DEML over the FODMS DDG-51 Class, dated October 12, 2000. OSS and OSD are provided digitally to FODMS while receiving Heading, Roll, Pitch, Velocity, Latitude, Longitude, Time and Status from FODMS.

3.3.4.3.5 AN/WSN-8A(V)2 (7404776) DEML AT520L CPU CCA (3A1A2). In the AN/WSN-8A(V)2 (7404776) DEML with AN/WSN-8A(V)2, Version 4.31 software installed, the AT520L CPU CCA (3A1A2) using jumper setting b0010 and Auto-Detecting software provides a bidirectional interface to the RLGN system through the onboard COM2 RS-422 serial port.

3.3.4.4 AN/WSN-8 (7093036) DEML Synchro Output Subfunction. (Refer to **Figure 3-11**) In the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), speed and distance synchro information is provided to DEML users. There are three 60-Hz channels and three 400-Hz channels that are discussed in the following sections.

3.3.4.4.1 60-Hz D/R CCA (3A1A1A5). (Refer to **Figure 3-12** and **Figure 6-15**) The 16-bit, 60-Hz D/R CCA (3A1A1A5) converts digital speed and distance values to three 60-Hz signals shown as follows:

- Ch 0 = 40 KPR
- Ch 1 = 100 KPR (N/A to the SSN 21 Class)
- Ch 2 = 360 rev/Nm (N/A to the SSN 21 Class)

The D/R CCA is a 16-bit, 60-Hz, three-channel complete Personal Computer/Advanced Technology (PC/AT)-to-resolver output CCA. The D/R CCA converts digital speed and distance information into resolver format. There are two resolver speed outputs, 40 KPR and 100 KPR, and one distance output, 360/Nm. The D/R functional block diagram is depicted in **Figure 3-12**.

The digital speed and distance information is provided via the ISA bus plane to the D/R CCA. The data is stored in the 16-bit word level double-buffered register by the data transfer control logic. The speed data is then fed to the transformer-isolated D/R converters. Each converter is dedicated to a specific output channel as follows:

- Ch 0 = 40 KPR
- Ch 1 = 100 KPR (N/A to the SSN 21 Class)
- Ch 2 = 360 rev/Nm (N/A to the SSN 21 Class)

The 60-Hz D/R CCA requires an external Scott-T transformer for distance output channel. The function of the Scott-T transformer is to convert the resolver output of the 60-Hz D/R CCA to synchro format. With higher synchro loads on 40 KPR and 100 KPR outputs, SSBAs are required.

a. SSBA: The SSBA accepts a resolver input and generates a high-power, 90-V Line-to-Line (L-L) synchro output. The output is limited to 1A peak. The SSBAs are thermally protected and shut down when the internal temperature reaches 125°C. If the reference input is not present, the amplifiers'

outputs are shut down. All interfaces are done through one connector for each SSBA (AR1J1 or AR2J2). The SSBAs also provide a BIT output at pin 2 of AR1/AR2 J1. Logic "1" denotes either thermal overload or current overload.

The 60-Hz D/R CCA is powered by ±12 VDC and +5 VDC power through the ISA bus plane. The output signal level is 90V L-L. The CCA requires an external input reference power of 115 VAC, 60-Hz. The synchro outputs and reference power are provided through connector 3A1A1A5J3.

3.3.4.4.2 60-Hz D/R CCA Jumper Settings.

a. Engineering Concepts and Designs 60-Hz D/R CCA. Refer to DSP14–14C-6115Q1-6115QL-6115PL-0 **Figure 6-15 (Sheet 1)** for location of jumpers.

Address Select:
Set jumpers at JP1 (5, 6, 9, 10, 11, 12)

b. Computer Conversions Corp. 60-Hz D/R CCA. Refer to IBW-J7J7J5-X12 **Figure 6-15 (Sheet 2)** for location of jumpers.

Set jumpers at Pair 01 (P01) and Pair 23 (P23).

+12 VDC power from bus select:
Set jumpers at JP9 and JP10

Address Select:
Set jumpers at JP2 (4, 5, 7, 10, 11, 12, 13, 14, and 15)

3.3.4.4.3 60-Hz D/R CCA Specifications.

Power Requirements:	+5 VDC @ 0.5A, +12 VDC @ 0.14A, -12 VDC @ 0.18A
Reference Voltage:	115 VAC
Frequency:	60 Hz
Output Signal Level:	
Ch 0:	7V L-L
Ch 1:	7V L-L
Ch 2:	90V L-L
Drive:	1.2VA
Resolution:	16-bit

3.3.4.4.4 Fuses (3A1A2F1, 3A1A2F2). [Refer to **Figure 3-20 (Sheet 1)**] Fuses F1 and F2 protect the 60-Hz circuits from excessive current. A lighted neon lamp on a fuseholder indicates a blown fuse.

3.3.4.4.5 Synchro Signal Booster Amplifiers (3A1AR1, 3A1AR2). [Refer to **Figure 6-4 (Sheet 1)**] The two 60-Hz SSBAs increase the capacity of the 60-Hz D/R CCA's onboard load drive of 1.5VA up to 25VA.

3.3.4.4.6 60-Hz Synchro Output Scott-T Transformer (3A1A5). [Refer to **Figure 6-4 (Sheet 1)**] The 60-Hz Synchro Output Scott-T Transformer converts the 60-Hz D/R CCA's channel 2 output (distance) to synchro format.

3.3.4.4.7 400-Hz D/S CCA (3A1A1A6). (Refer to **Figure 3-13** and **Figure 6-16**) (N/A to the SSN 21 Class) The D/S CCA is a 16-bit, 400-Hz, three-channel complete PC/AT-to-synchro output CCA. The D/S CCA converts digital speed information into synchro format. The three 400-Hz synchro speed outputs are 10 KPR, 40 KPR, and 100 KPR.

The 10 knot, 40 knot, and 100 knot digital speed data is provided via the ISA bus plane to the D/S CCA. A separate 16-bit transparent latch is used to front-end each digital-to-synchro/resolver converter and latch the desired angular information that is received from the main controller. Each converter provides a continuous output (3- or 4-wire) that tracks the corresponding reference input. Each converter is dedicated to a specific output channel. The corresponding output channels are:

- Ch 0: 10 KPR
- Ch 1: 40 KPR
- Ch 2: 100 KPR

The D/S CCA is powered by ±12 VDC and +5 VDC power through the ISA bus plane. The output signal level is 90V L-L. The CCA requires an external input reference power of 115 VAC, 400-Hz. The synchro outputs and reference power is provided through connector 3A1A1A6J3.

3.3.4.4.8 400-Hz D/S CCA Jumper Settings. Refer to **Figure 6-16** for location of jumpers (N/A to the SSN 21 Class).

Address Select:
Set jumpers at JP1 (4, 6, 7)

3.3.4.4.9 400-Hz D/S CCA Specifications. (N/A to the SSN 21 Class)

Power Requirements:	+5 VDC; 1.2 W, +12 VDC; 7.2 W, -12 VDC; 7.2 W
Reference Voltage:	115 VAC
Frequency:	400 Hz
Output Signal Level:	
Ch 0:	90V L-L
Ch 1:	90V L-L
Ch 2:	90V L-L

Drive:	4.5 VA
Resolution:	14-bit

3.3.4.4.10 Fuses (3A1A2F3, 3A1A2F4). [Refer to **Figure 3-20 (Sheet 1)**] (N/A to the SSN 21 Class) Fuses F3 and F4 protect the 400-Hz D/S CCA from excessive current. A lighted neon lamp on a fuseholder indicates a blown fuse.

3.4 CARD CAGE FUNCTIONAL DESCRIPTIONS.

3.4.1 CARD CAGE ASSEMBLY (3A1A1 OR 3A1). The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) CCA (3A1A1) contains five CCAs mounted on an ISA Electronic Backplane (3A1A1A7). The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML CCA (3A1) contains three CCAs mounted on an ISA Electronic Backplane (3A1A7). The card cages house the 200-Watt Power Supply (3A1A1A8 or 3A1A8), 28 VDC Power Supply (3A1A1A9 or 3A1A9), Constant Voltage Transformer (3A1A1A11 or 3A1A11), 50 VAC Step-Down Transformer (3A1A1A10 or 3A1A10), and Terminal Board (3A1A1TB1 or 3A1TB1) .

3.4.2 ISA ELECTRONIC BACKPLANE (3A1A1A7 OR 3A1A7). The ISA Electronic Backplane (3A1A1A7 or 3A1A7) serves as a matrix for mounting power and I/O connections for the CCAs in the card cage. A series of Light-Emitting Diodes (LEDs) in the upper-left corner, when lit, indicate that ±5 VDC and ±12 VDC power are available to the ISA Electronic Backplane. **Table 3-6** provides the ISA bus pin assignments.

3.4.3 VOLTAGE TEST TERMINAL BOARD (3A1A1TB1 OR 3A1TB1). The Voltage Test Terminal Board (3A1A1TB1 or 3A1TB1) provides DC power for external test functions and permits testing of the 200-Watt and 28 VDC power supply output voltages.

Table 3-6. ISA Bus Pin Assignments

ROW B	PIN NO.	ROW A
GND	1	IOCHK
RESET	2	SD<7>
+5V	3	SD<6>
IRQ<9>	4	SD<5>
–5V	5	SD<4>
DRQ<2>	6	SD<3>
–12V	7	SD<2>
SRDY	8	SD<1>
+12V	9	SD<0>
GND	10	IOCHRDY
SMEMW	11	AEN $_{X}$
SMEMR	12	SA<19>
IOW	13	SA<18>
IOR	14	SA<17>
DACK<3>	15	SA<16>
DRQ<3>	16	SA<15>
DACK<1>	17	SA<14>
DRQ<1>	18	SA<13>
REFRESH	19	SA<12>
BCLK	20	SA<11>
IRQ<7>	21	SA<10>
IRQ<6>	22	SA<9>
IRQ<5>	23	SA<8>
IRQ<4>	24	SA<7>
IRQ<3>	25	SA<6>
DACK<2>	26	SA<5>
TC	27	SA<4>
BALE	28	SA<3>
+5V	29	SA<2>
OSC	30	SA<1>
GND	31	SA<0>
ROW D	PIN NO.	ROW C
MEMCS16	1	SBHE
IOCS16	2	LA<23>
IRQ<10>	3	LA<22>
IRQ<11>	4	LA<21>
IRQ<12>	5	LA<20>
IRQ<13>	6	LA<19>
IRQ<14>	7	LA<18>
DACK<0>	8	LA<17>

Table 3-6. ISA Bus Pin Assignments - Continued

ROW B	PIN NO.	ROW A
DRQ<0>	9	MEMR
DACK<5>	10	MEMW
DRQ<5>	11	SD<8>
DACK<6>	12	SD<9>
DRQ<6>	13	SD<10>
DACK<7>	14	SD<11>
DRQ<7>	15	SD<12>
+5V	16	SD<13>
MASTER16	17	SD<14>
GND	18	SD<15>

3.5 FANS.

Three fans provide forced-air ventilation of the I/T enclosure. Two Intake Fans (3A1A2B1, 3A1A2B2 or 3A2B1, 3A2B2) are mounted on the front access panel to blow air into the cabinet. One Circulating Fan (3A1B1 or 3B1) is mounted near the top of the cabinet to circulate air within it.

3.6 REMOTE CONTROL UNIT.

When the I/T is set to Remote Dummy mode, power is supplied to the RCU to light the indicator lamp. When the RCU switch is moved to INCREASE, a ground is supplied to the I/T, causing the speed readout to increase. When the RCU switch is moved to DECREASE, a ground is supplied to the I/T, causing the speed readout to decrease.

3.6.1 UNIT 4, REMOTE CONTROL UNIT. (**Figure 3-15**) Unit 4 RCU interfaces with Units 3 and 8 I/Ts to provide control in Remote Dummy mode from a remote operator station. Unit 4 RCU interfaces with Units 3 and 8 via the Interior Communications/Action Cutout (IC/ACO) (C4 SSBN) or Command and Control (C&C) (D5 SSBN) switchboard.

3.6.1.1 C-PWR-1 Power. Receives and distributes ground.

3.6.1.2 DS1. DUMMY LOG REMOTE CONTROL lamp illuminates when +28V DUMMY LAMP signal is received from Units 3 and 8.

3.6.1.3 S1. DUMMY LOG REMOTE CONTROL switch provides DUMMY INCREASE or DUMMY DECREASE signals to Units 3 and 8 when ground DUMMY MODE signal is received from Units 3 and 8 and switch is held in INCREASE or DECREASE positions respectively.

3.7 RODMETER SWITCHING UNIT.

The RSU contains a two-position selector switch. It is not used in single-rodmeter installations.

3.7.1 SINGLE I/T INSTALLATIONS. When the RSU is set to RODMETER NO. 1, Rodmeter No. 1 (Unit 1) is connected to the I/T (Unit 3). When the RSU is set to RODMETER NO. 2, Rodmeter No. 2 (Unit 6) is connected to the I/T (Unit 3).

3.7.2 DUAL I/T INSTALLATIONS. When the RSU is set to NORMAL, Rodmeter No. 1 (Unit 1) is connected to I/T No. 1 (Unit 3) and Rodmeter No. 2 (Unit 6) is connected to I/T No. 2 (Unit 8). When the RSU is set to ALTERNATE, Rodmeter No. 1 (Unit 1) is connected to I/T No. 2 (Unit 8) and Rodmeter No. 2 (Unit 6) is connected to I/T No. 1 (Unit 3). Ensure that jumper JP2 (7-8) is installed on the AT520L CPU CCA for AN/WSN-8 (7093036) and all AN/WSN-8A (7404776) DEML configurations with dual rodmeter installations.

3.7.3 SINGLE I/T/DUAL RODMETER SUBFUNCTION. (**Figure 3-16**) The Single I/T/Dual Rodmeter subfunction produces the rodmeter signal representing ship's speed for Unit 3 I/T. One of two rodmeters, Unit 1 rodmeter and Unit 6 rodmeter connects to Unit 3 through a switching unit, which allows selection of either rodmeter. The selected rodmeter receives 50 VAC, 60-Hz power to excite a coil, and produces a 60-Hz output signal scaled at 325 microvolts per knot which represents ship's speed.

NOTE

The circles with numbers inside represent the location of a function or subfunction on **Figure 3-16**.

3.7.3.1 Rodmeter Input Select. ① The Rodmeter Input Select function transfers ROD PWR HI and ROD PWR LO signals to Unit 1 rodmeter when the ROD SELECT switch is set to RODMETER NO. 1, and to Unit 6 rodmeter when the ROD SELECT switch is set to RODMETER NO. 2.

3.7.3.2 Sensing. The Sensing function produces a 60-Hz AC signal proportional to ship's speed and scaled at 325 microvolts per knot.

3.7.3.3 Rodmeter Output Select. ② The Rodmeter Output Select function selects ROD 1 STBD SIGNAL and ROD 1 PORT SIGNAL from Unit 1 when the ROD SELECT switch is set to RODMETER NO. 1, and from Unit 6 when the ROD SELECT switch is set to RODMETER NO. 2.

3.7.3.4 Rodmeter Select Signal. ③ The Rodmeter Select Signal provides DEML with position of ROD SELECT switch. DEML can provide Rodmeter Select information to external users as required via MIL-STD-1553B Bus [AN/WSN-8 (7093036) DEML], RS-422 Serial Interface [AN/WSN-8A (7404776) DEML] or hard-wired output.

3.7.4 DUAL I/T/DUAL RODMETER SUBFUNCTION. (**Figures 3-17** and **3-19**) The Dual I/T/Dual Rodmeter subfunction produces the rodmeter signals representing ship's speed for Units 3 and 8 I/T. Two rodmeters, Unit 1 rodmeter and Unit 6 rodmeter, interface with Units 3 and 8 for two independent rodmeter signal channels. Each rodmeter receives 50-VAC, 60-Hz power to excite a coil, and produces a 60-Hz output signal scaled at 325 microvolts per knot, which represents ship's speed. Unit 5 RSU allows selection of either the normal rodmeter interface connections or an alternate rodmeter interface connection. With the ROD SELECT switch set to NORMAL, Unit 1 is connected to Unit 3 and Unit 6 is connected to Unit 8. With the ROD SELECT switch set to ALTERNATE, Unit 6 is connected to Unit 3 and Unit 1 is connected to Unit 8.

NOTE

The circles with numbers inside represent the location of a function or subfunction on **Figure 3-17**.

3.7.4.1 Rodmeter 1 Input Select. ① The Rodmeter 1 Input Select function selects NO. 1 ROD PWR HI and NO. 1 ROD PWR LO signals from Unit 3 when the ROD SELECT switch is set to NORMAL, and from Unit 8 when the ROD SELECT switch is set to ALTERNATE.

3.7.4.2 Rodmeter 2 Input Select. ② The Rodmeter 2 Input Select function selects NO. 2 ROD PWR HI and NO. 2 ROD PWR LO signals from Unit 8 when the ROD SELECT switch is set to NORMAL, and from Unit 3 when the ROD SELECT switch is set to ALTERNATE.

3.7.4.3 Sensing No. 1. Sensing No. 1 produces a 60-Hz AC signal proportional to ship's speed and scaled at 325 microvolts per knot.

3.7.4.4 Sensing No. 2. Sensing No. 2 operates in the same manner as Sensing No. 1.

3.7.4.5 Rodmeter 1 Output Select. ③ The Rodmeter 1 Output Select function transfers ROD 1 STBD SIG and ROD 1 PORT SIG to Unit 3 when the ROD SELECT switch is set to NORMAL, and to Unit 8 when the ROD SELECT switch is set to ALTERNATE.

3.7.4.6 Rodmeter 2 Output Select. ④ The Rodmeter 2 Output Select function transfers ROD 2 STBD SIG and ROD 2 PORT SIG to Unit 8 when the ROD SELECT switch is set to NORMAL, and to Unit 3 when the ROD SELECT switch is set to ALTERNATE.

3.7.4.7 Rodmeter Selected Signal. The Rodmeter Selected Signal provides an external computer with the position of the ROD SELECT switch.

3.7.5 UNIT 5 RSU, P/N 1028C0220. (Figure 3-18) Unit 5 RSU [Part Number (P/N) 1028C0220] is only used on Single I/T, dual rodmeter configurations. Does not support Dual I/T, dual rodmeter configuration. Provides switching to interface two rodmeters with one I/T. Allows selection of either rodmeter.

3.7.5.1 C-PWR-1 Power. C-PWR-1 Power distributes ground.

3.7.5.2 S1-D2. S1-D2 provides signals to computer to indicate which rodmeter is selected.

3.7.5.3 S1-A. S1-A provides switching of ROD PWR HI signal to either Unit 1 Rodmeter No. 1 or Unit 6 Rodmeter No. 2.

3.7.5.4 S1-B. S1-B provides switching of ROD PWR LO signal to either Unit 1 or Unit 6.

3.7.5.5 S1-C1. S1-C1 provides switching of shield return to selected rodmeter.

3.7.5.6 S1-D1. S1-D1 switches ROD STBD SIGNAL from selected rodmeter.

3.7.5.7 S1-E. S1-E switches ROD PORT SIGNAL from selected rodmeter.

3.7.5.8 S1-C2. S1-C2 selects FULL SCALE 1 signal for Unit 1 or FULL SCALE 2 for Unit 6.

3.7.6 UNIT 5 RSU, P/N 50247-501. (Figure 3-19) Unit 5 RSU (P/N 50247-501) provides switching to interface two rodmeters with two I/Ts. Does not support Single I/T, dual rodmeter configuration. When the ROD SELECT switch is set to NORMAL, Unit 1 Rodmeter No. 1 is connected to unit 3 I/T No. 1 and Unit 6 Rodmeter No. 2 is connected to Unit 8 I/T No. 2. When the switch is set to ALTERNATE, the Rodmeters are connected to opposite I/Ts.

3.7.6.1 S1-E1. S1-E1 provides switching of either I/T NO. 1 ROD PWR HI from Unit 3 when the ROD SELECT switch is set to NORMAL, or I/T NO. 2 ROD PWR HI from Unit 8 when the switch is set to ALTERNATE to Unit 1.

3.7.6.2 S1-E2. S1-E2 provides switching of either I/T NO. 1 ROD PWR LO from Unit 3 when the ROD SELECT switch is set to NORMAL, or I/T NO. 2 ROD PWR LO from Unit 8 when the switch is set to ALTERNATE to Unit 1.

3.7.6.3 S1-F1. S1-F1 operates in the same manner as S1-E2 in the alternate vice normal position to provide switching to Unit 6.

3.7.6.4 S1-F2. S1-F2 operates in the same manner as S1-E2 in the alternate vice normal position to provide switching to Unit 6.

3.7.6.5 S1-A1. S1-A1 switches ROD 1 STBD SIGNAL to either Unit 3 when the ROD SELECT switch is set to NORMAL, or to Unit 8 when the switch is set to ALTERNATE.

3.7.6.6 S1-A2. S1-A2 operates in the same manner as S1-A1, but switches ROD 1 PORT SIGNAL.

3.7.6.7 S1-B1. S1-B1 operates in the same manner as S1-A1 in the alternate vice normal position to switch ROD 2 STBD SIGNAL.

3.7.6.8 S1-B2. S1-B2 operates in the same manner as S1-A1 in the alternate vice normal position to switch ROD 2 PORT SIGNAL.

3.7.6.9 S1-C1. S1-C1 provides switching of either I/T NO. 1 FULLSCALE 1 when the ROD SELECT switch is set to NORMAL, and I/T NO. 1 FULL SCALE 2 when the switch is set to ALTERNATE to Unit 3.

3.7.6.10 S1-C2. S1-C2 provides switching of either I/T NO. 2 FULLSCALE 1 when the ROD SELECT switch is set to NORMAL, and I/T NO. 2 FULL SCALE 2 when the switch is set to ALTERNATE to Unit 8.

3.7.6.11 S1-D1. S1-D1 provides signals to computer to indicate position of ROD SELECT switch.

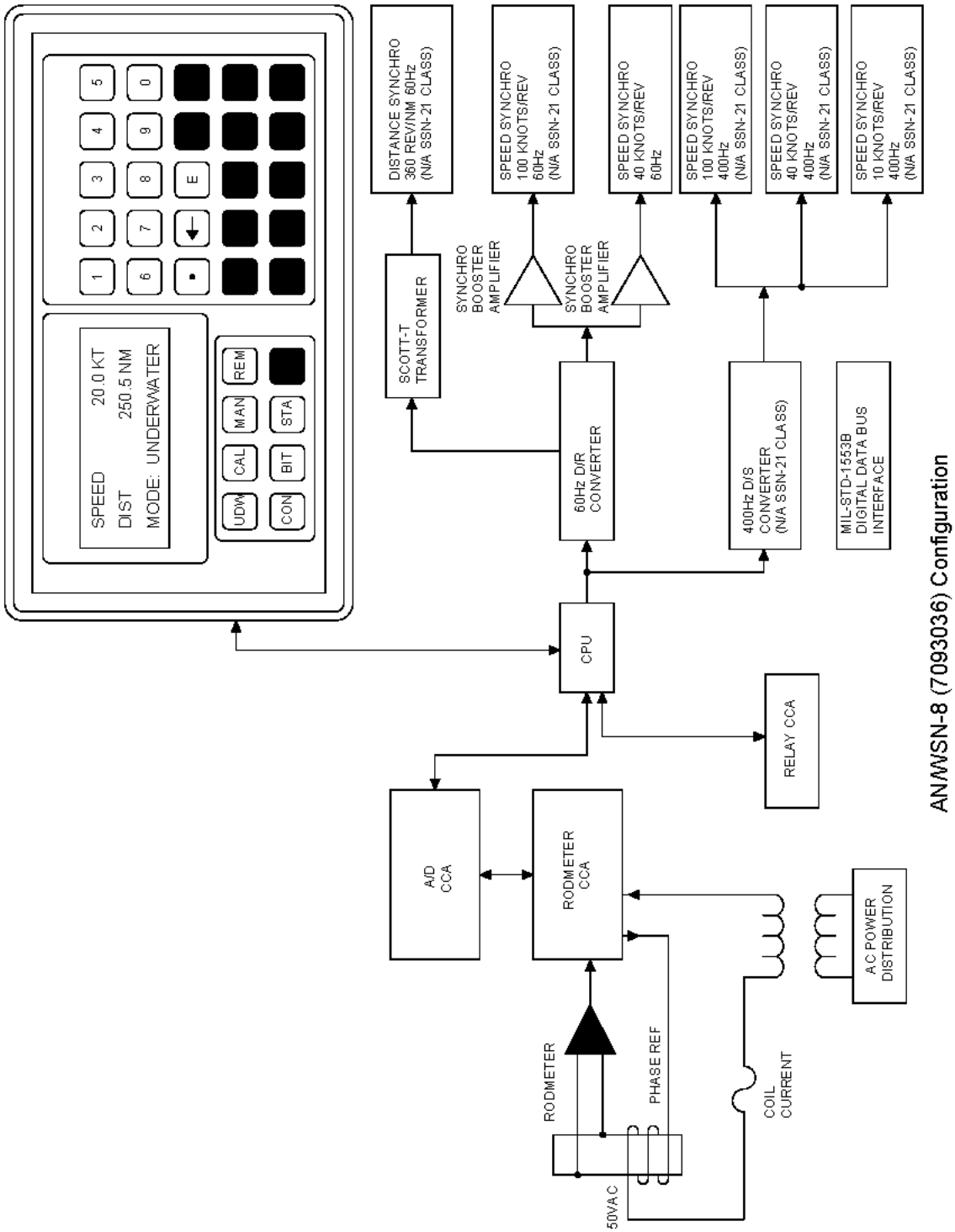


Figure 3-1. DEML Simplified Block Diagram (Sheet 1 of 3)

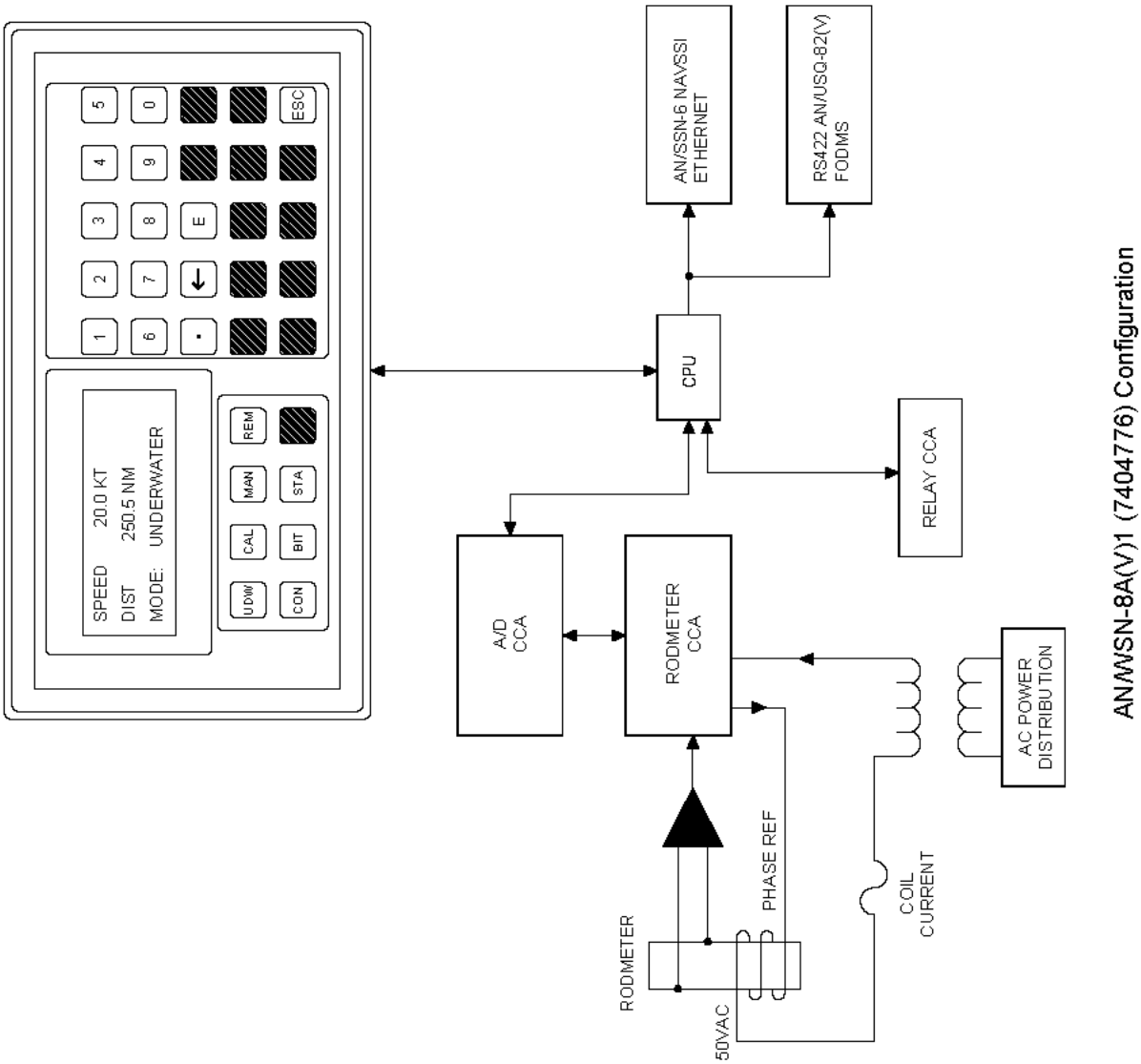


Figure 3-1. DEML Simplified Block Diagram (Sheet 2)

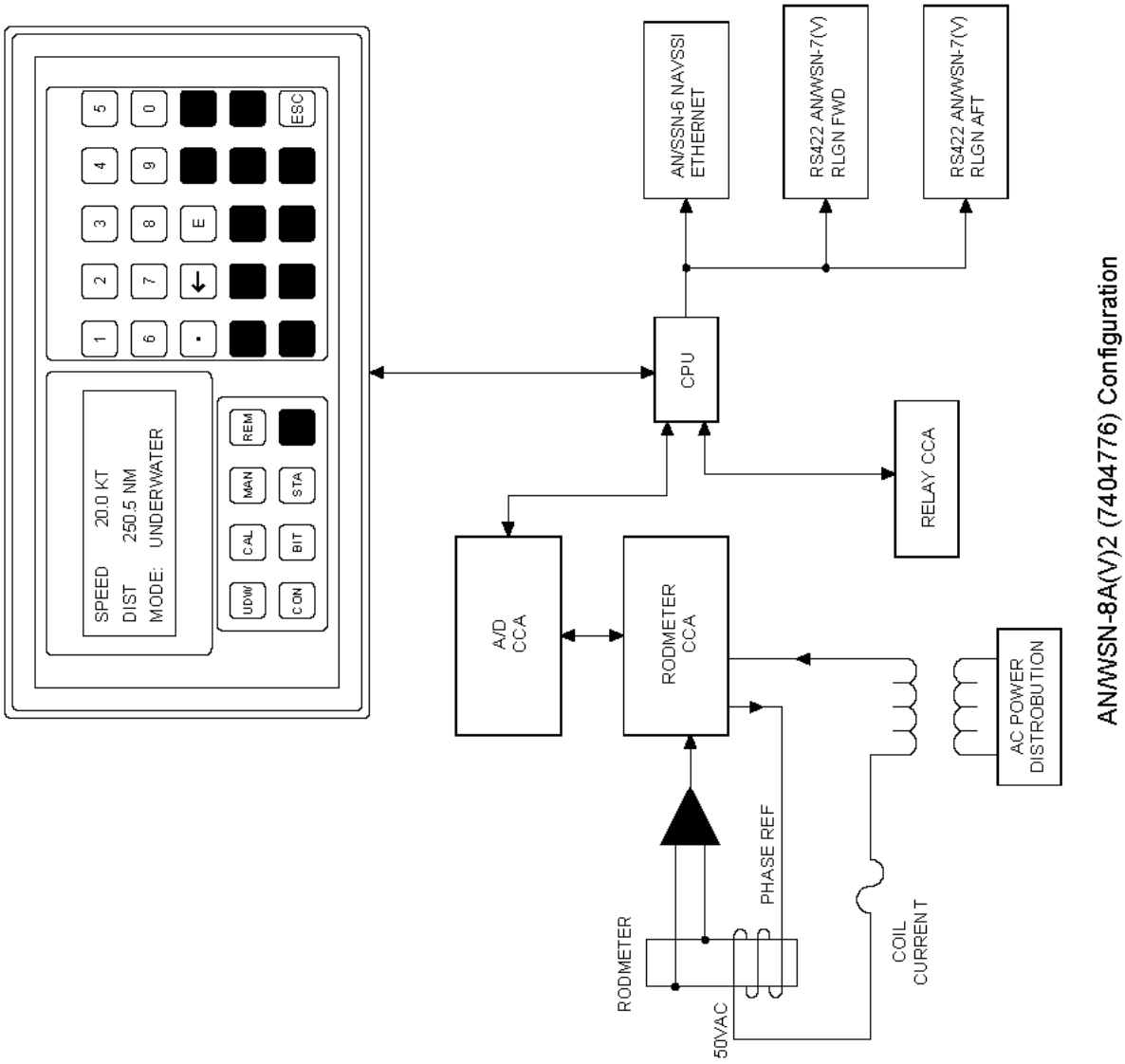


Figure 3-1. DEML Simplified Block Diagram (Sheet 3)

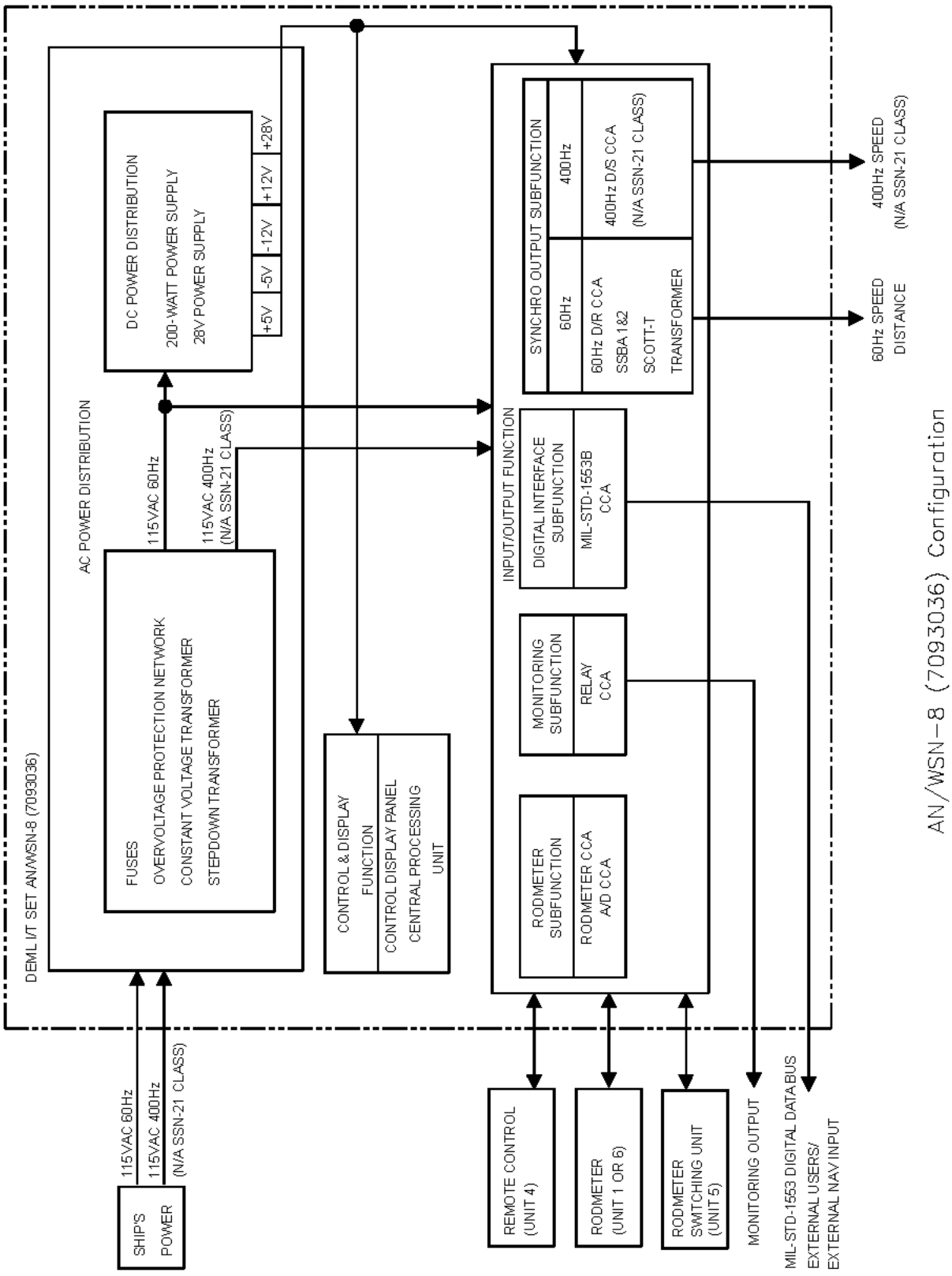


Figure 3-2. Overall Functional Block Diagram (Sheet 1 of 3)

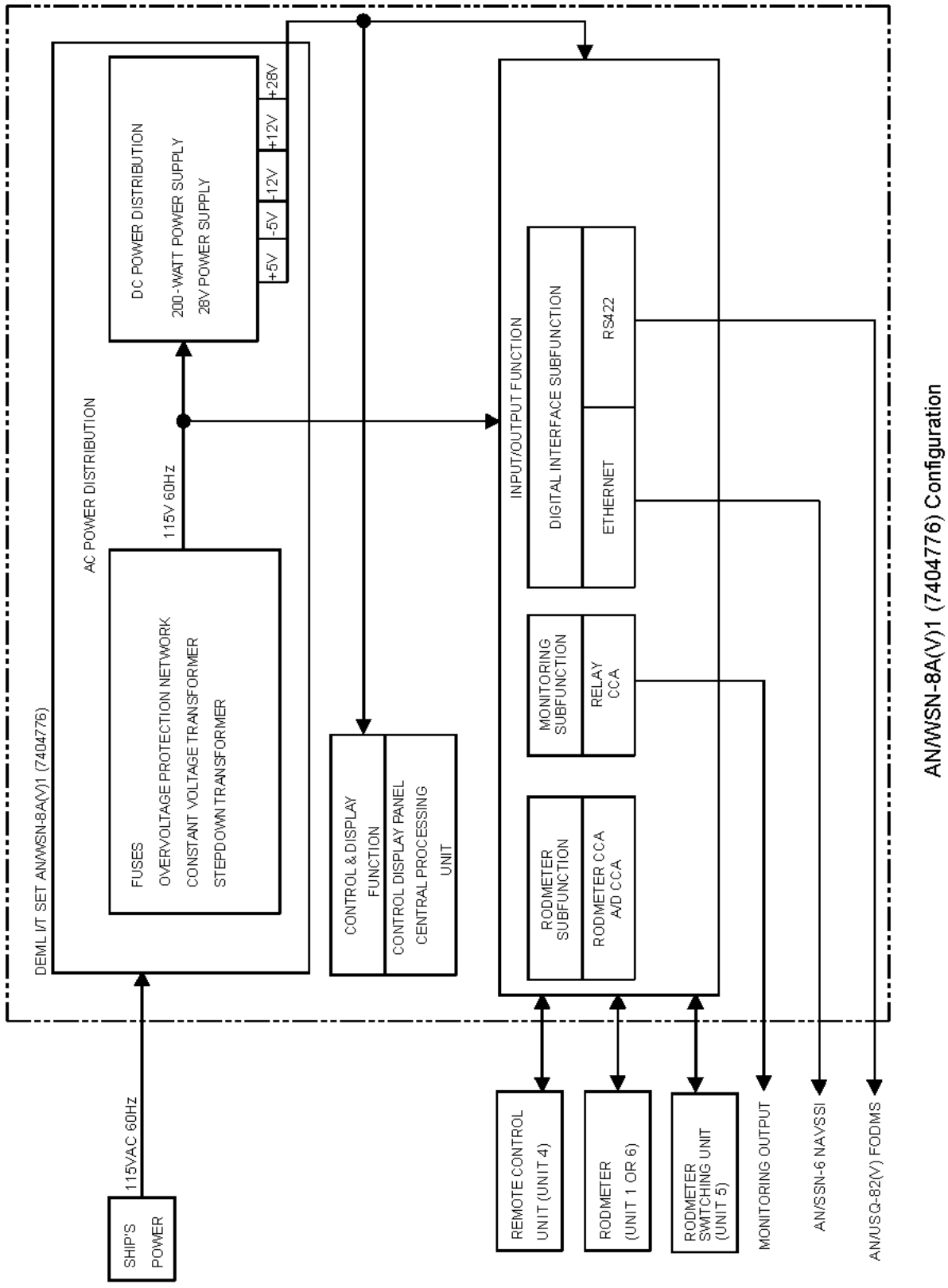


Figure 3-2. Overall Functional Block Diagram (Sheet 2)

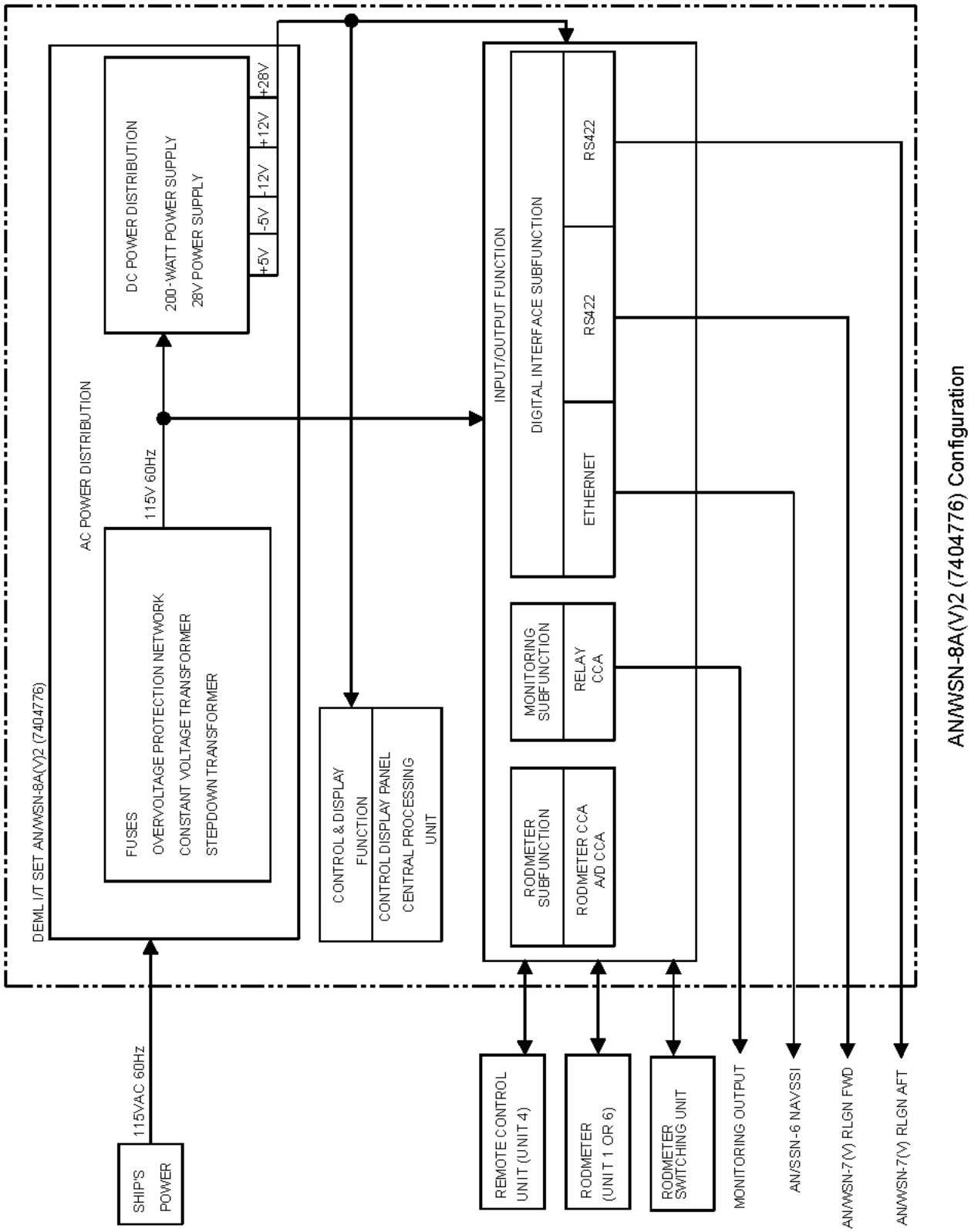


Figure 3-2. Overall Functional Block Diagram (Sheet 3)

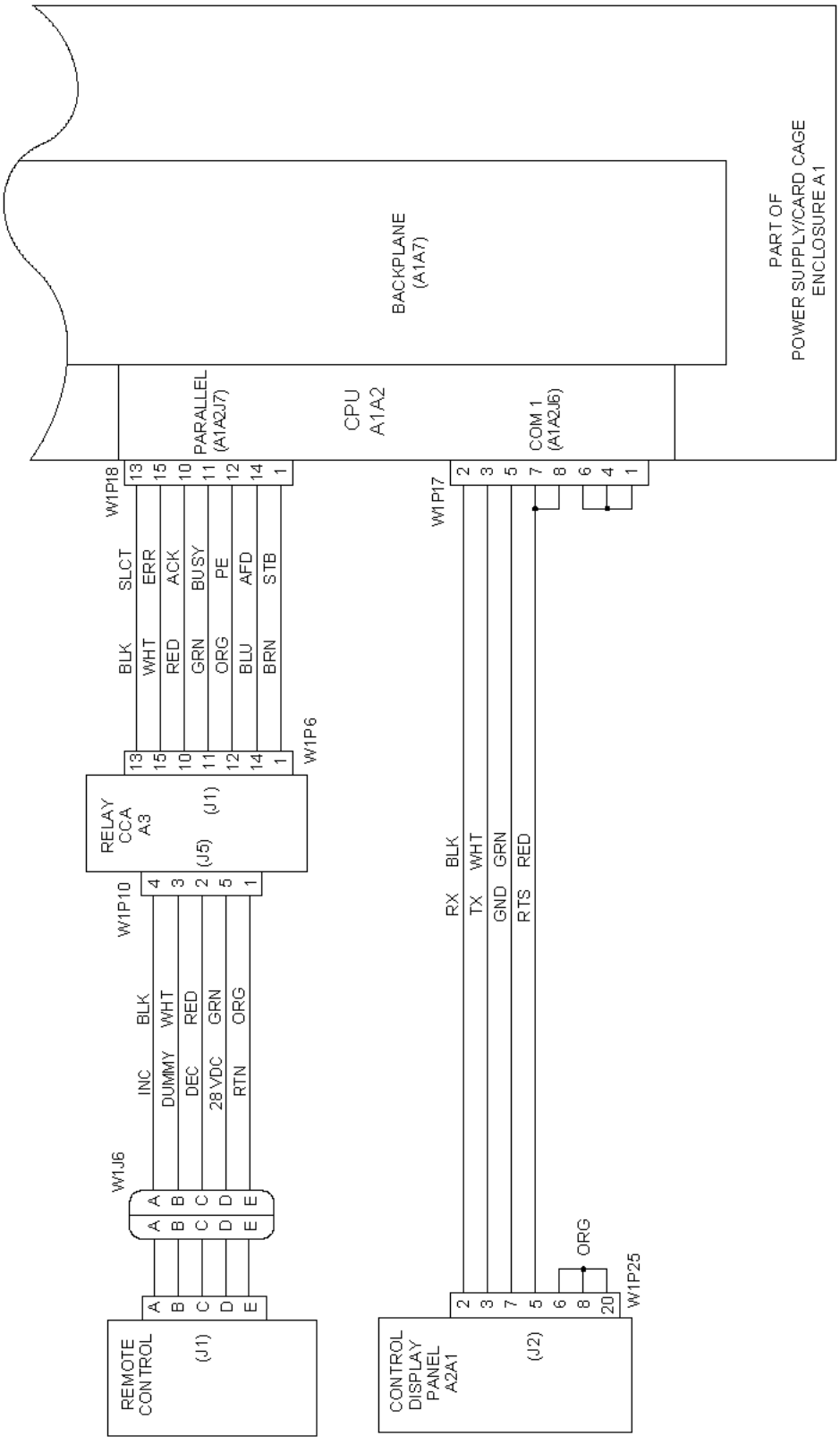
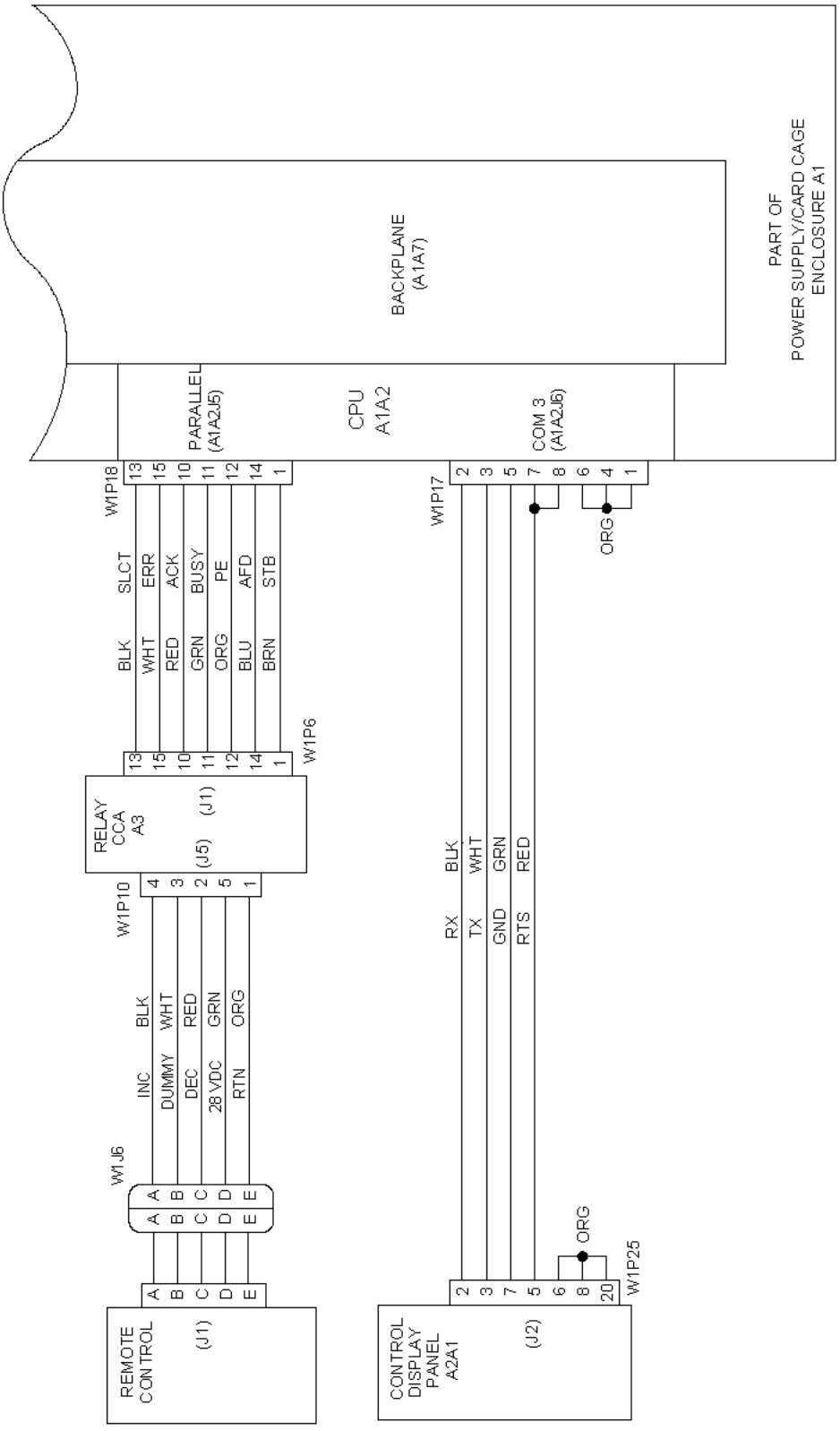
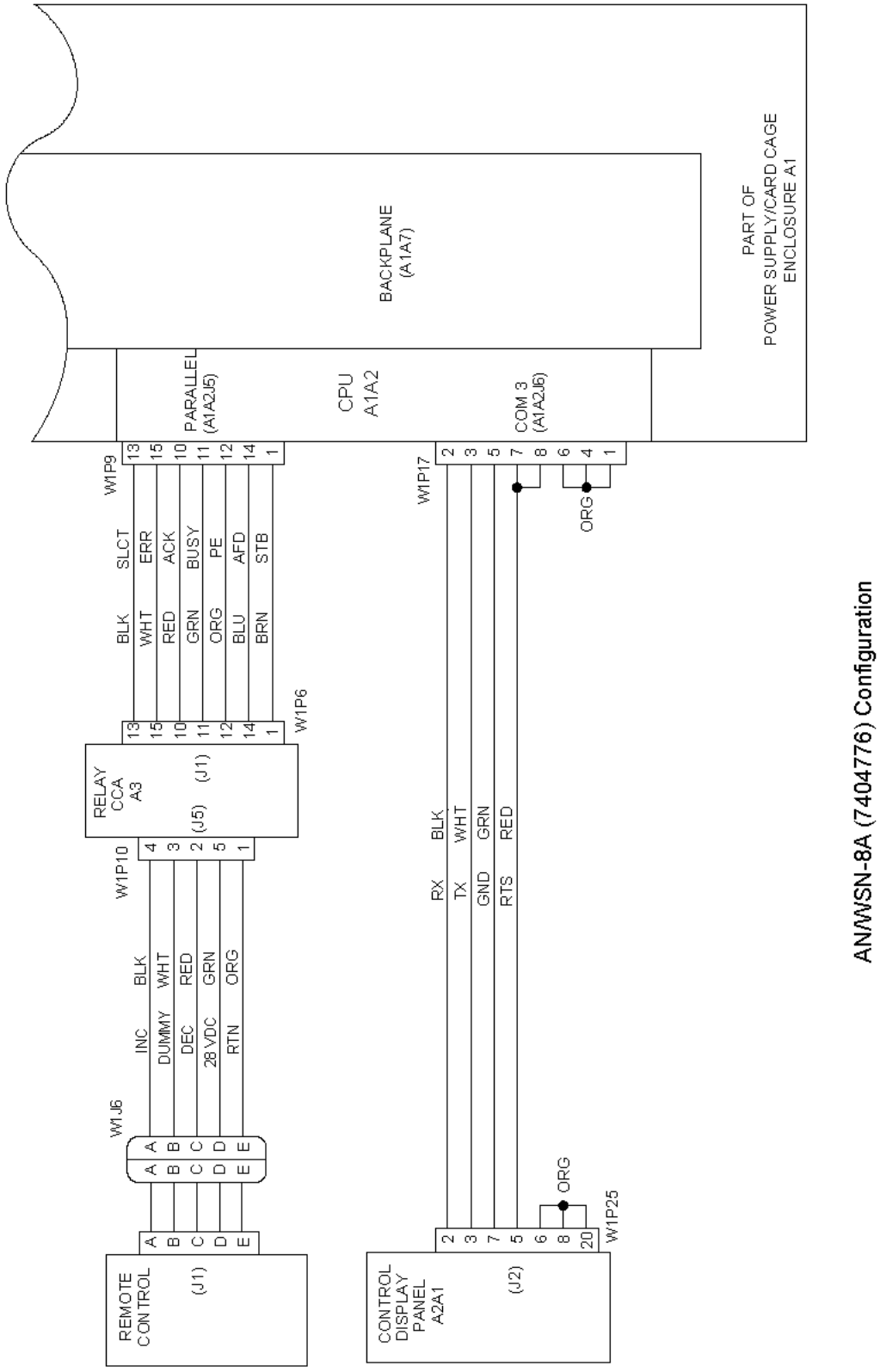


Figure 3-3. Control and Display Function (Sheet 1 of 3)



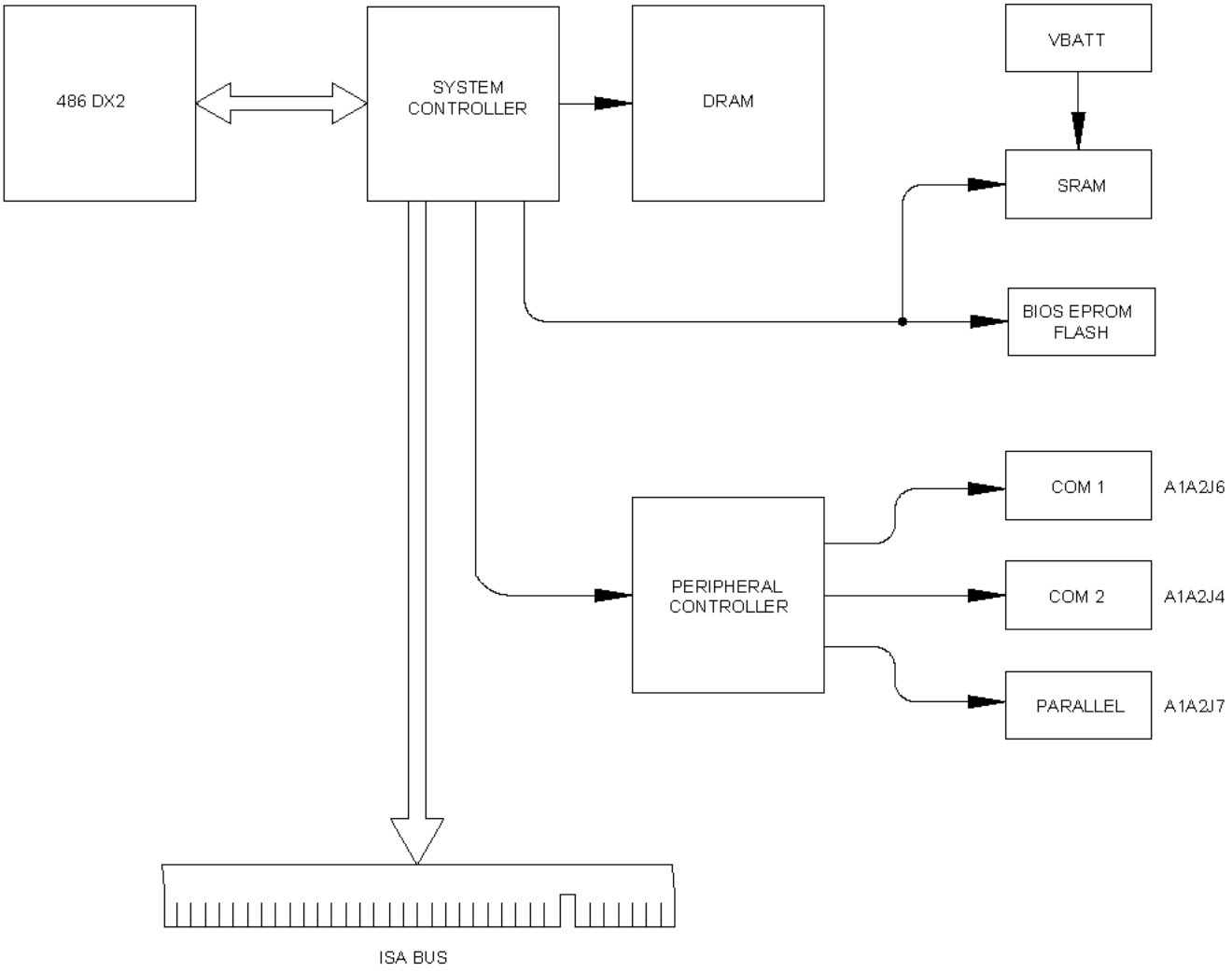
AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 3-3. Control and Display Function (Sheet 2)



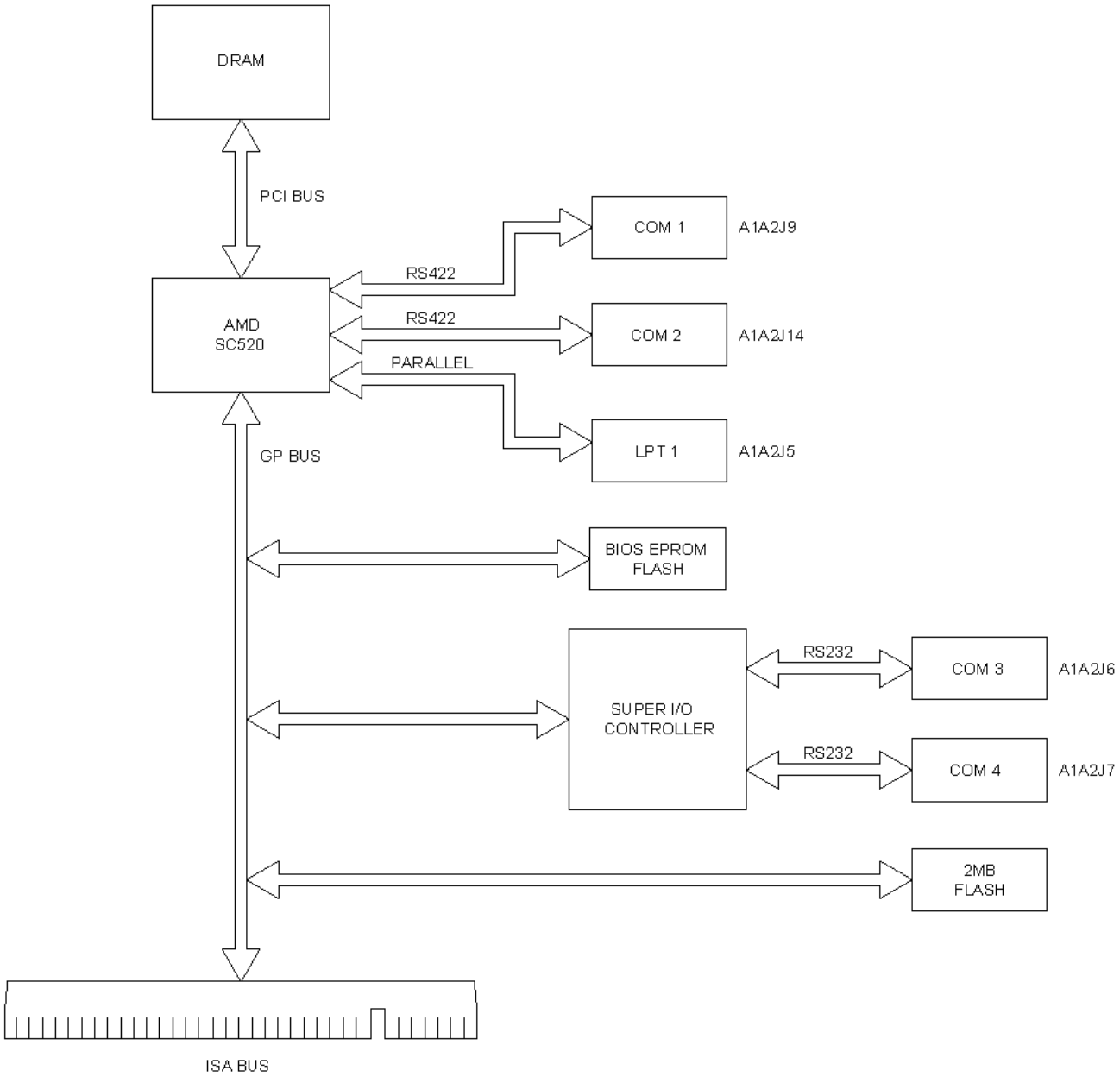
AN/WSN-8A (7404776) Configuration

Figure 3-3. Control and Display Function (Sheet 3)



AN/WSN-8 (7093036) Configuration

Figure 3-4. CPU Functional Block Diagram (Sheet 1 of 2)



AN/WSN-8A (7404776) and AN/WSN-8 (7093036) (w/FC-1) Configurations

Figure 3-4. CPU Functional Block Diagram (Sheet 2)

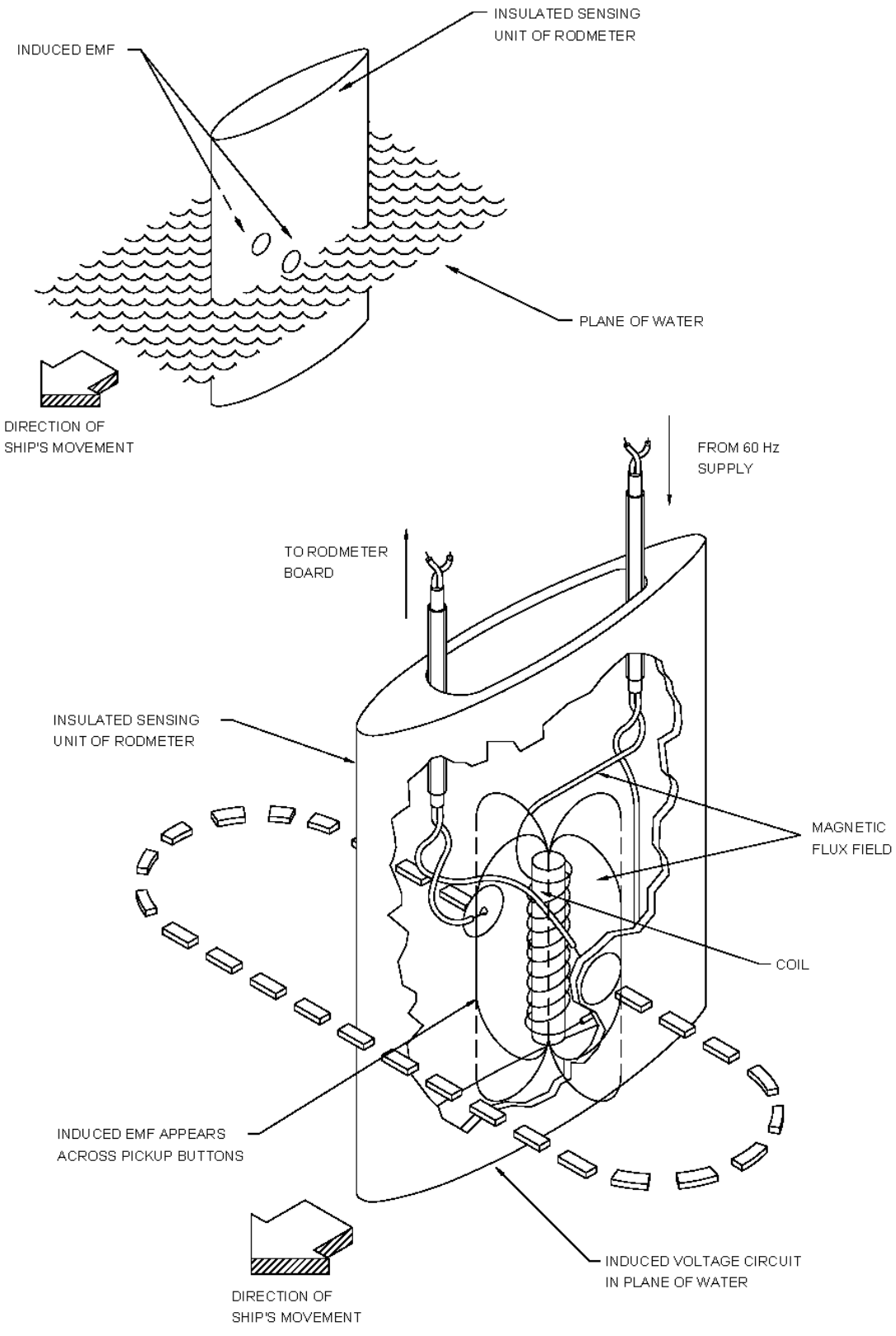


Figure 3-5. Rodmeter Operation

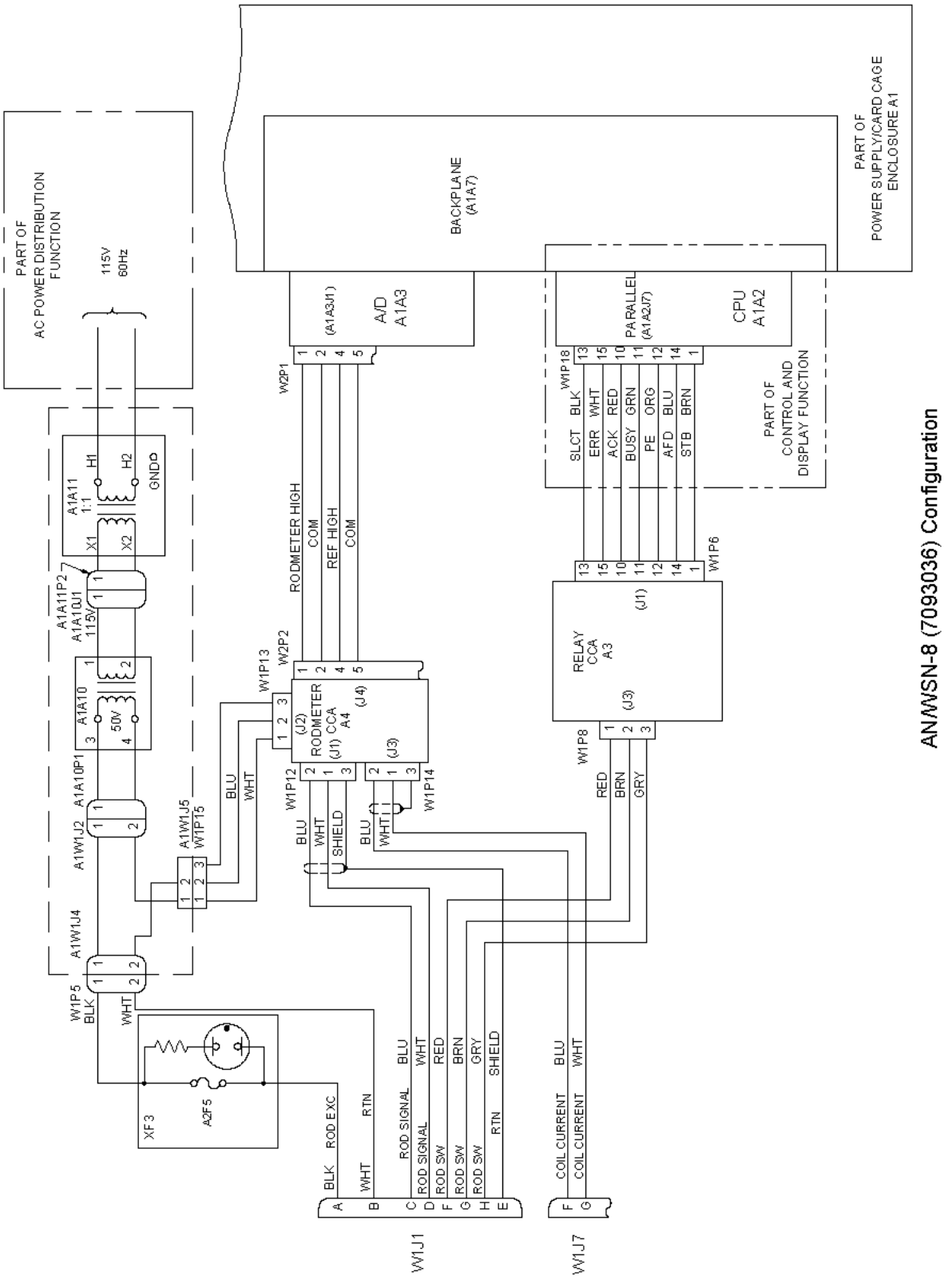


Figure 3-6. Rodmeter Subfunction (Sheet 1 of 3)

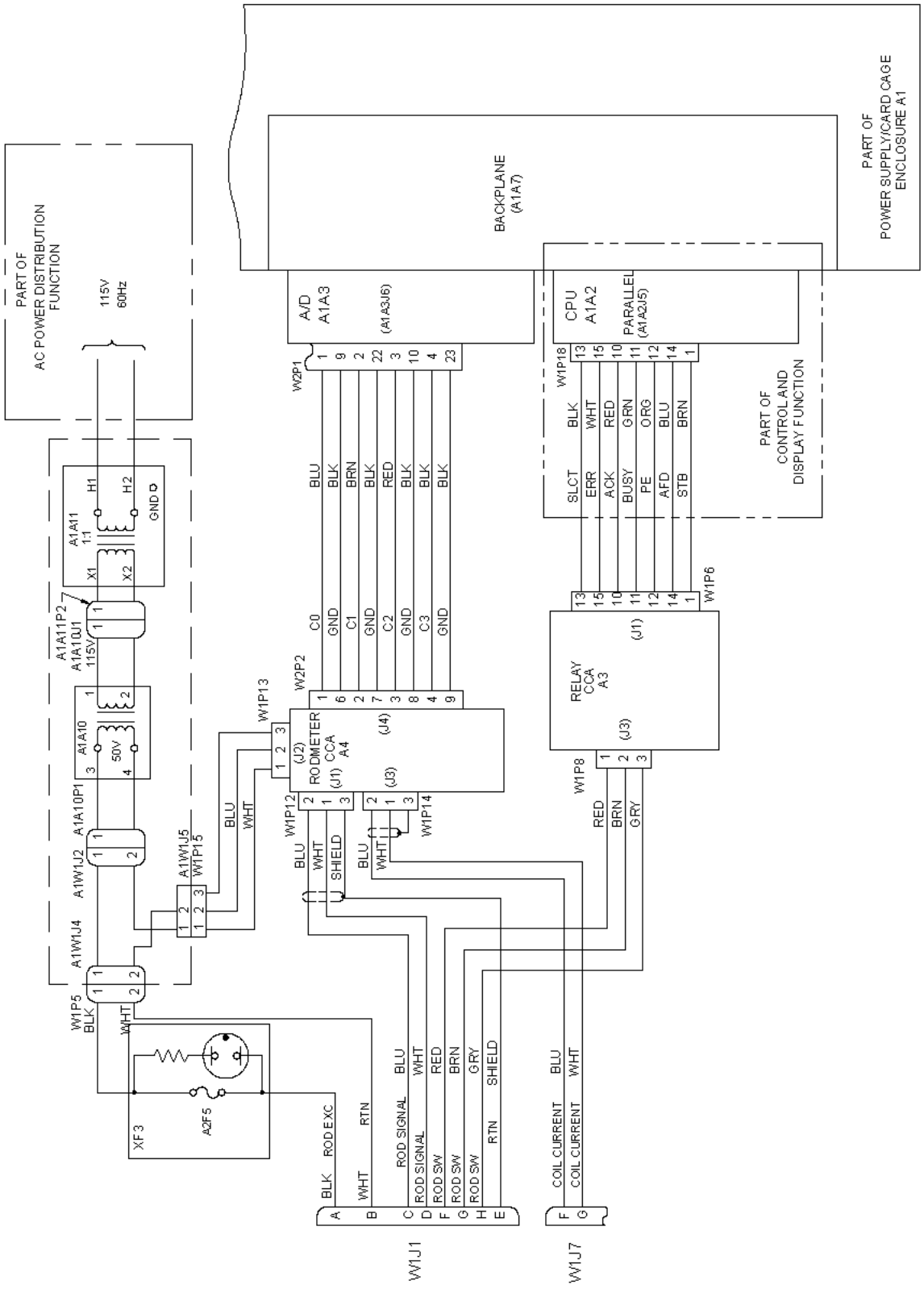


Figure 3-6. Rodmeter Subfunction (Sheet 2)

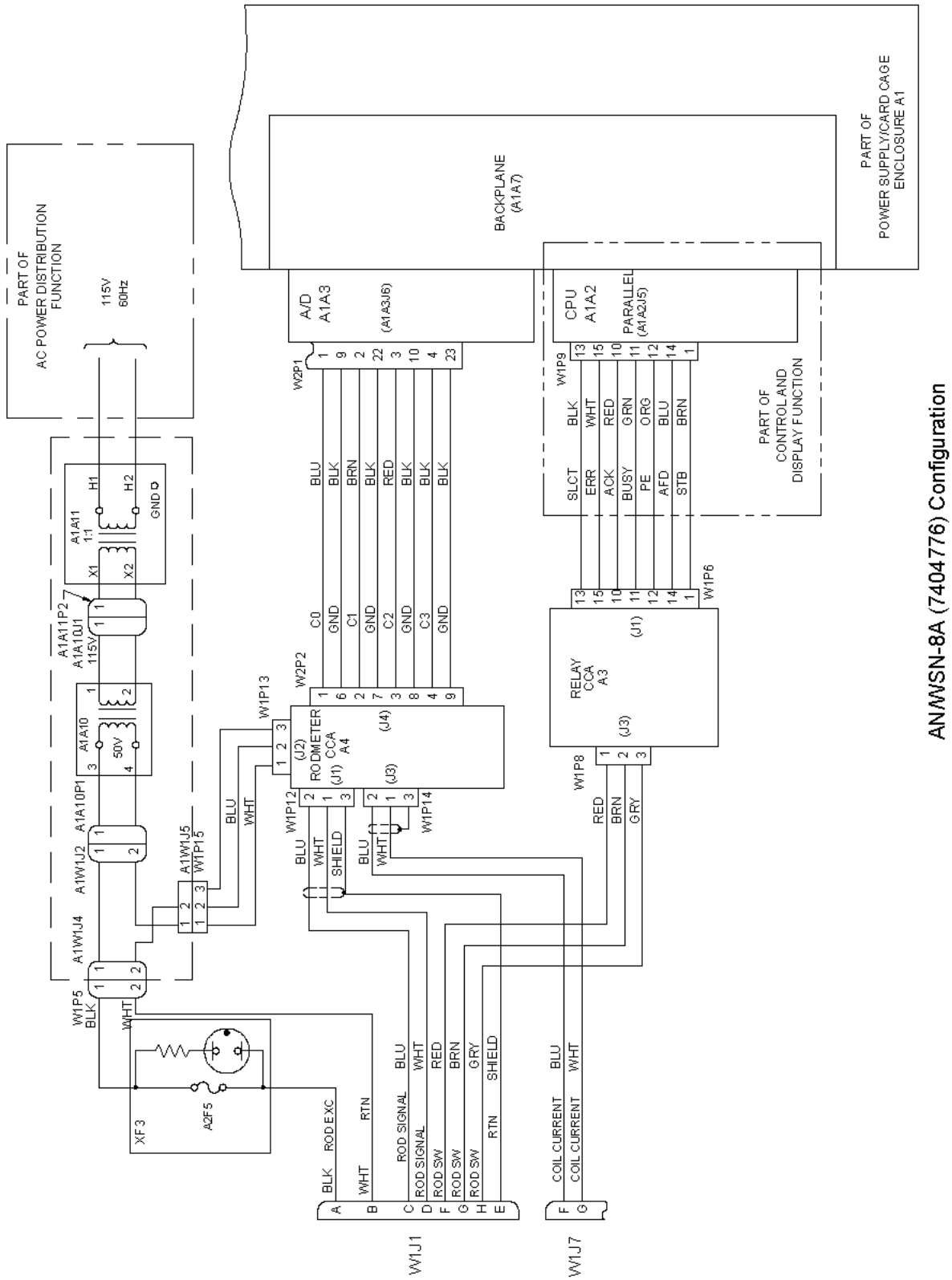


Figure 3-6. Rodmeter Subfunction (Sheet 3)

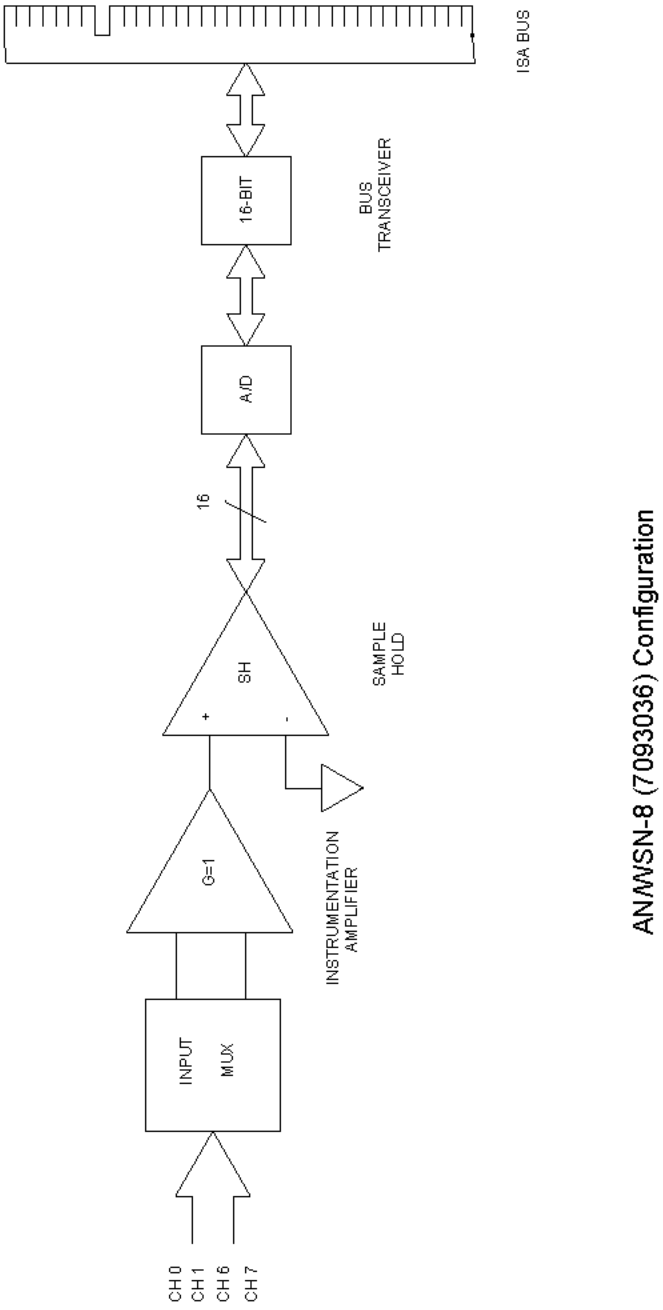


Figure 3-7. A/D Converter Functional Block Diagram (Sheet 1 of 2)

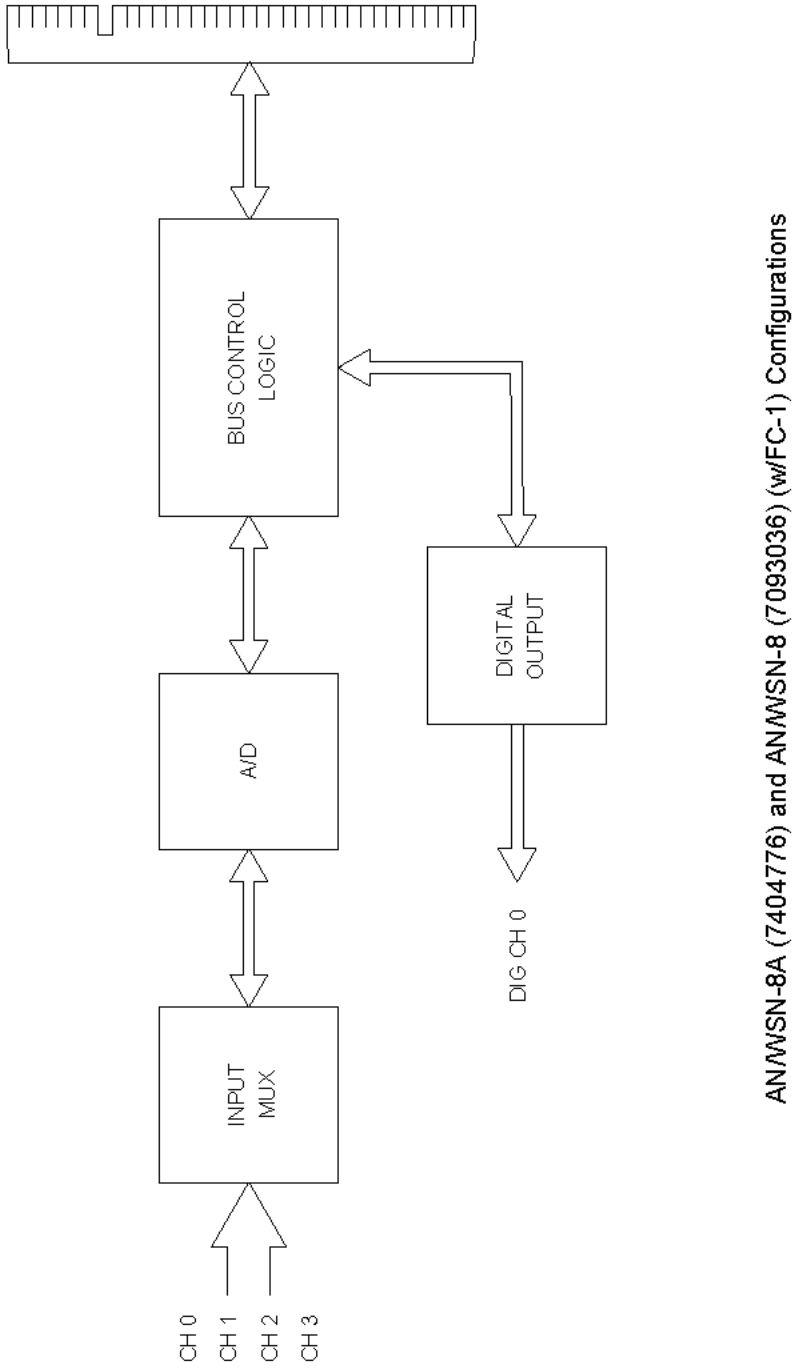
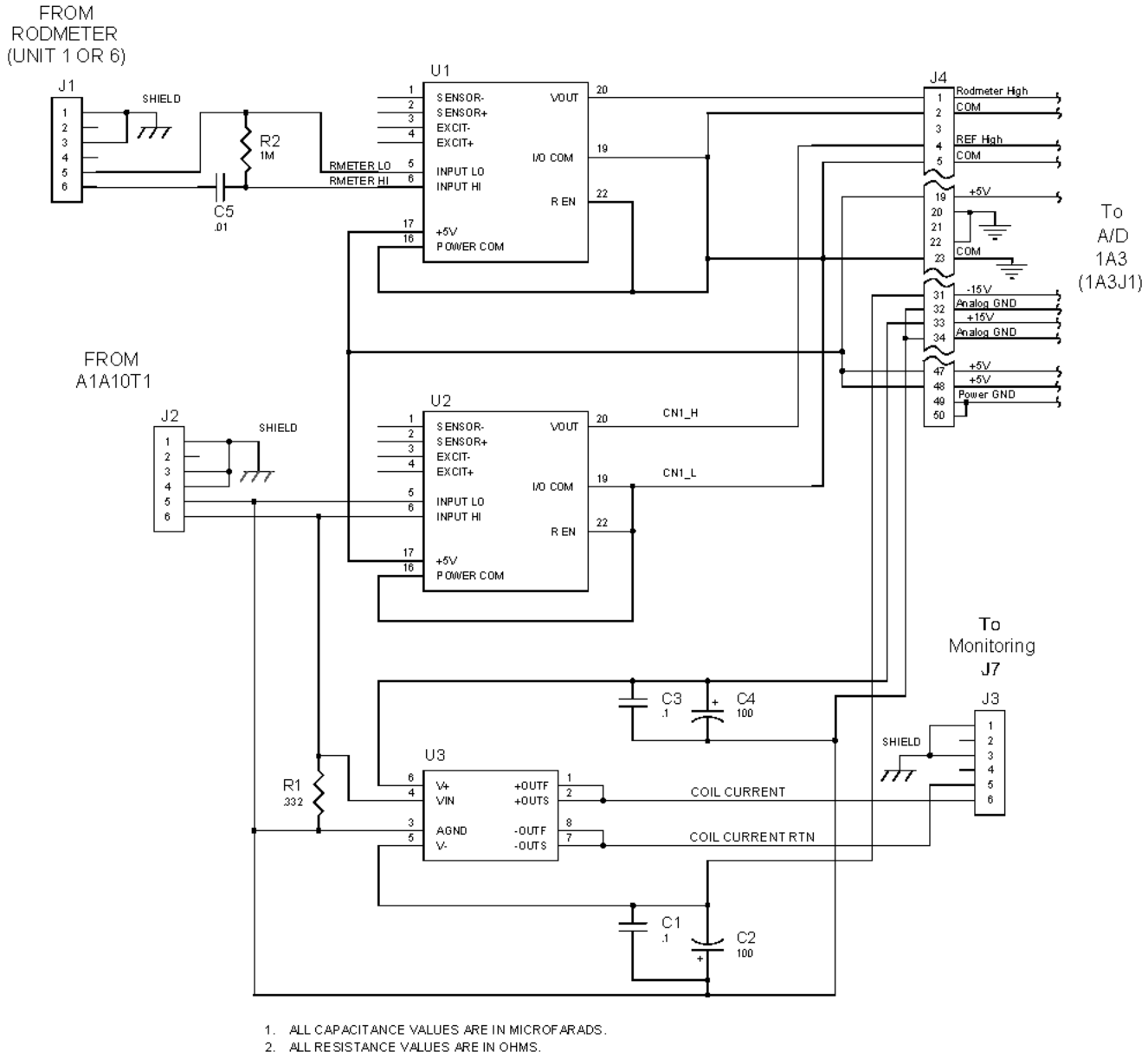


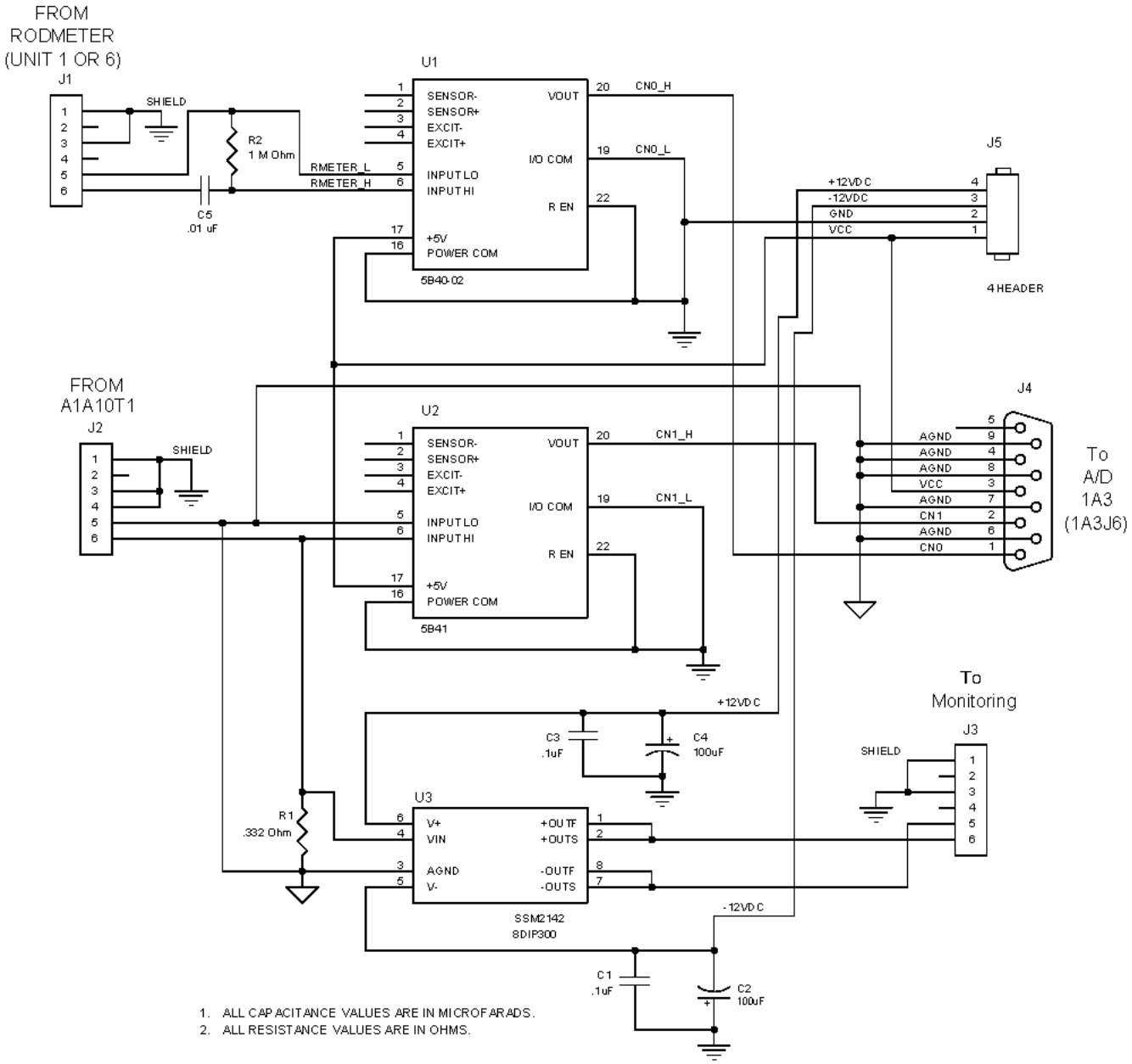
Figure 3-7. A/D Converter Functional Block Diagram (Sheet 2)



1. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2. ALL RESISTANCE VALUES ARE IN OHMS.

AN/WSN-8 (7093036) Configuration

Figure 3-8. Rodmeter CCA Schematic (Sheet 1 of 2)



AN/WSN-8A (7404776) Configuration

Figure 3-8. Rodmeter CCA Schematic (Sheet 2)

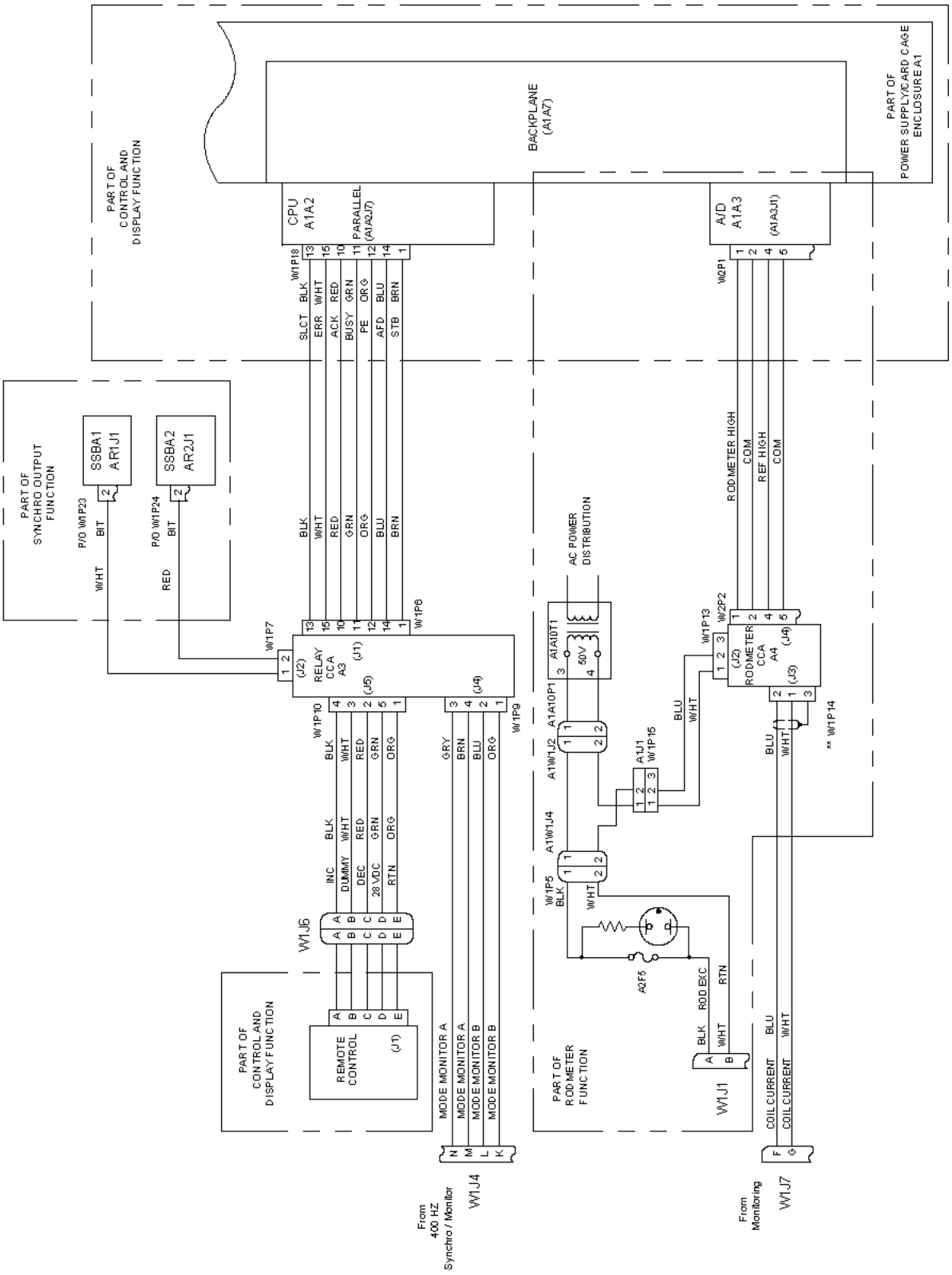


Figure 3-9. Monitoring Subfunction (Sheet 1 of 3)

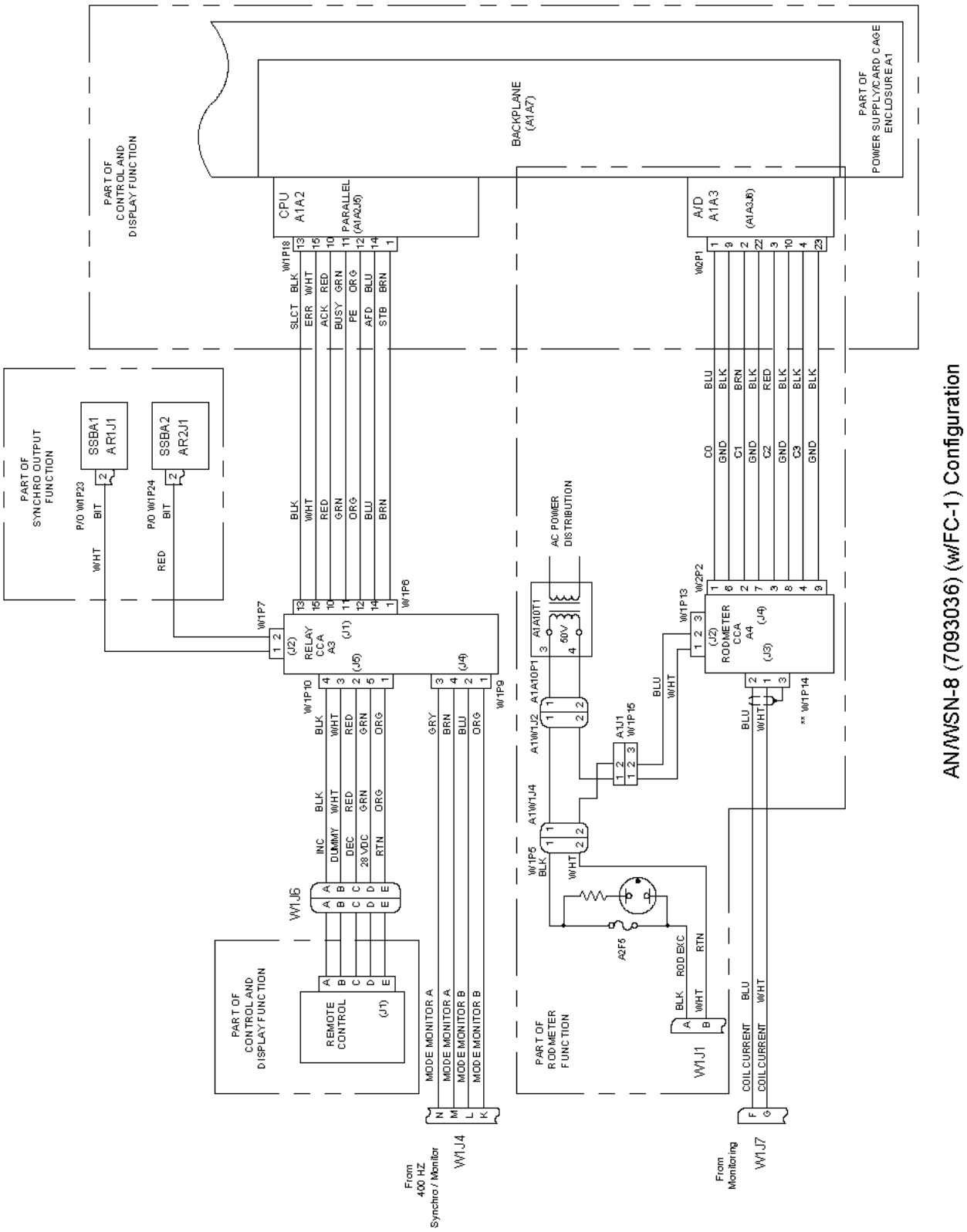
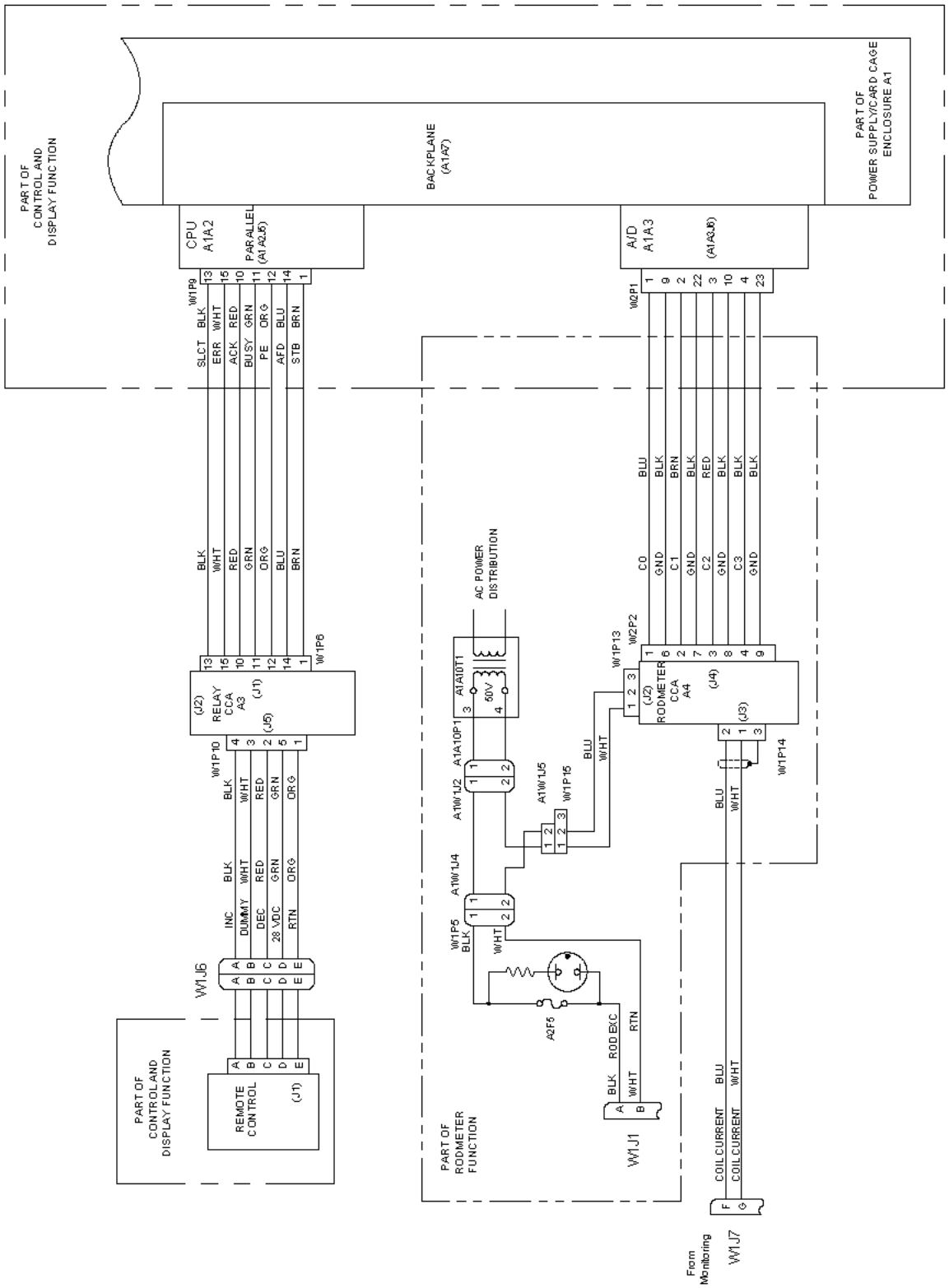
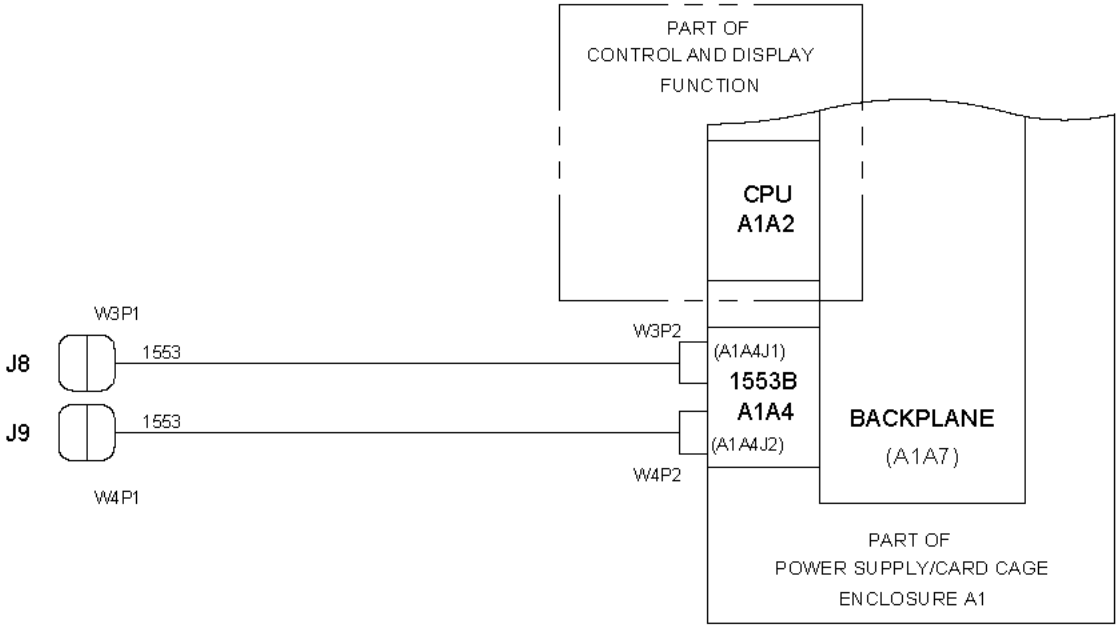


Figure 3-9. Monitoring Subfunction (Sheet 2)



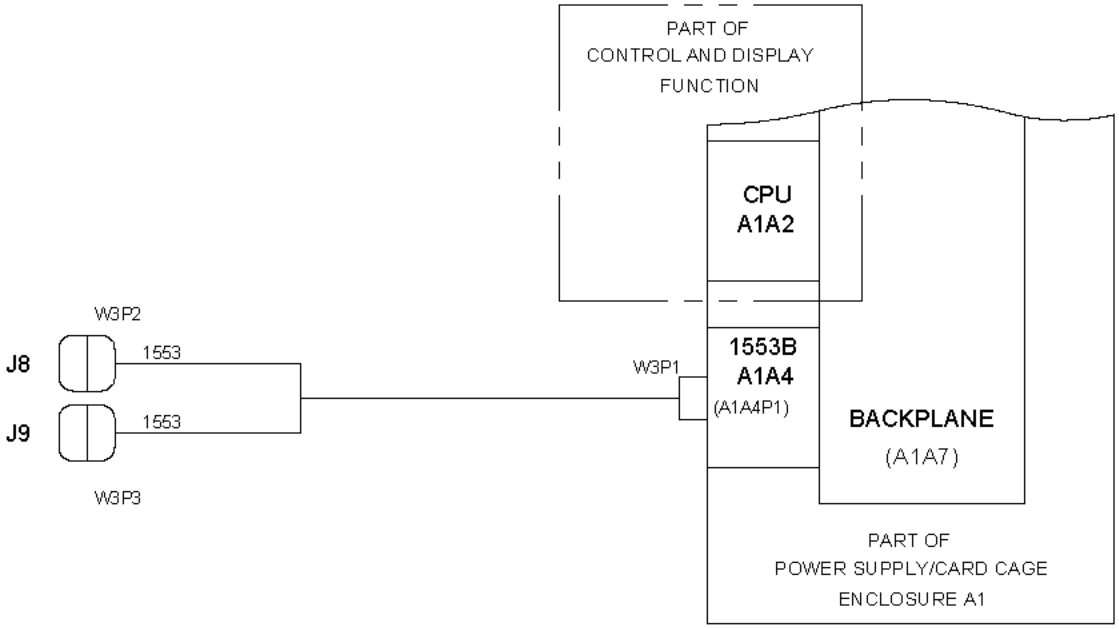
AN/WSN-8A (7404776) Configuration

Figure 3-9. Monitoring Subfunction (Sheet 3)



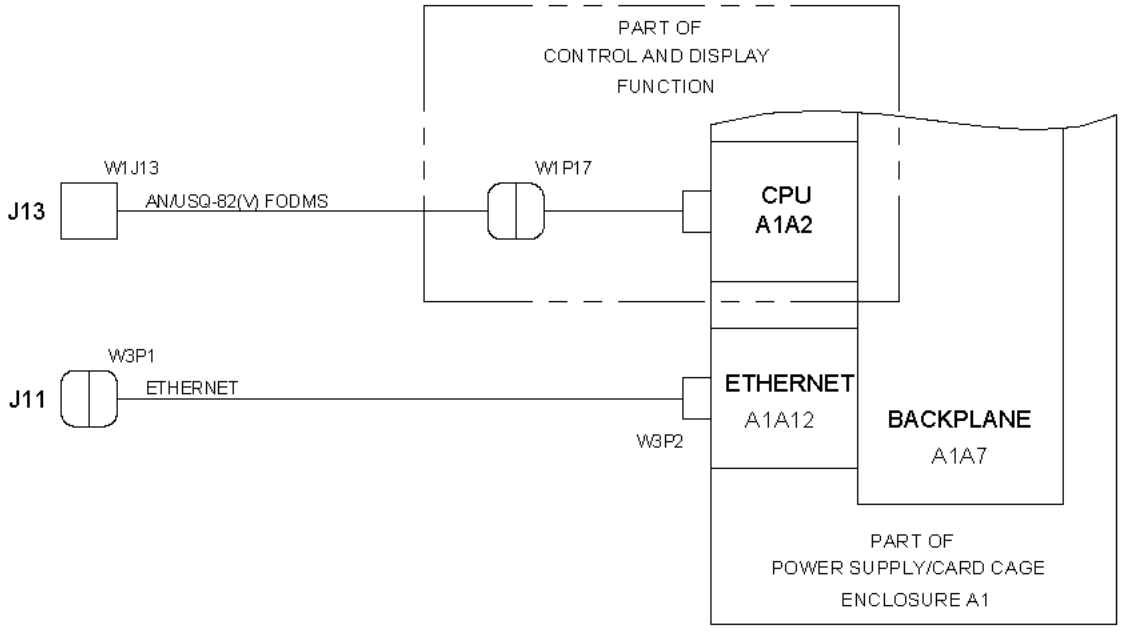
AN/WSN-8 (7093036) Configuration

Figure 3-10. Digital Interface Subfunction (Sheet 1 of 4)



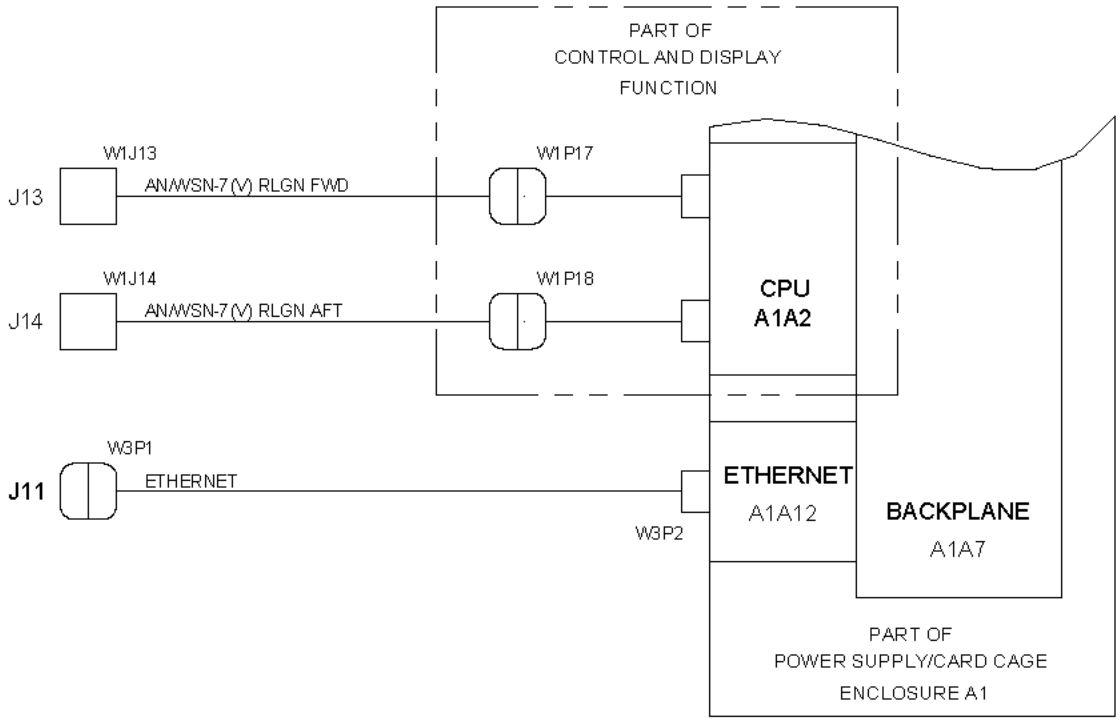
AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 3-10. Digital Interface Subfunction (Sheet 2)



AN/WSN-8A(V)1 (7404776) Configuration

Figure 3-10. Digital Interface Subfunction (Sheet 3)



AN/WSN-8A(V)2 (7404776) Configuration

Figure 3-10. Digital Interface Subfunction (Sheet 4)

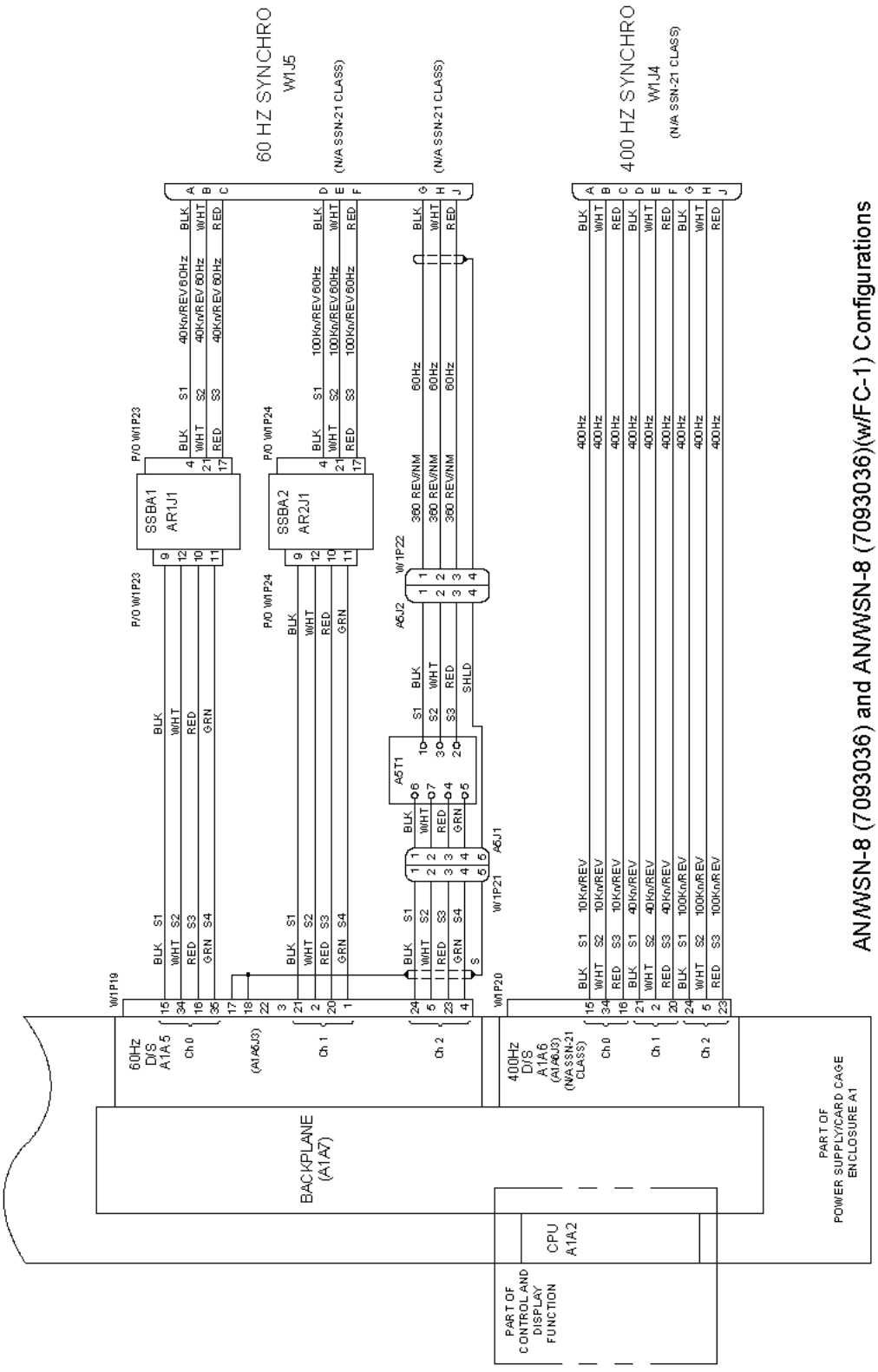


Figure 3-11. Synchro Output Subfunction

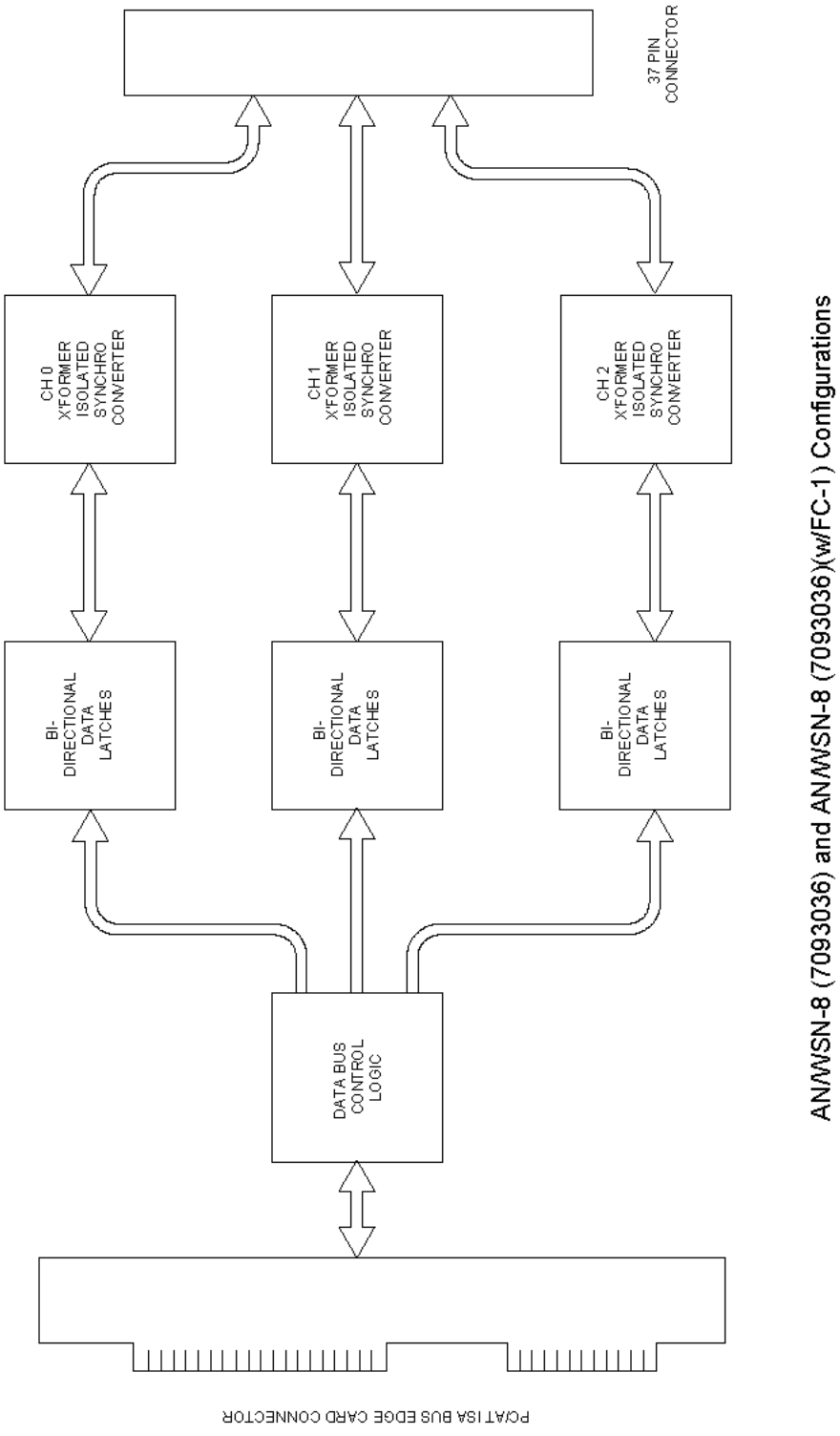
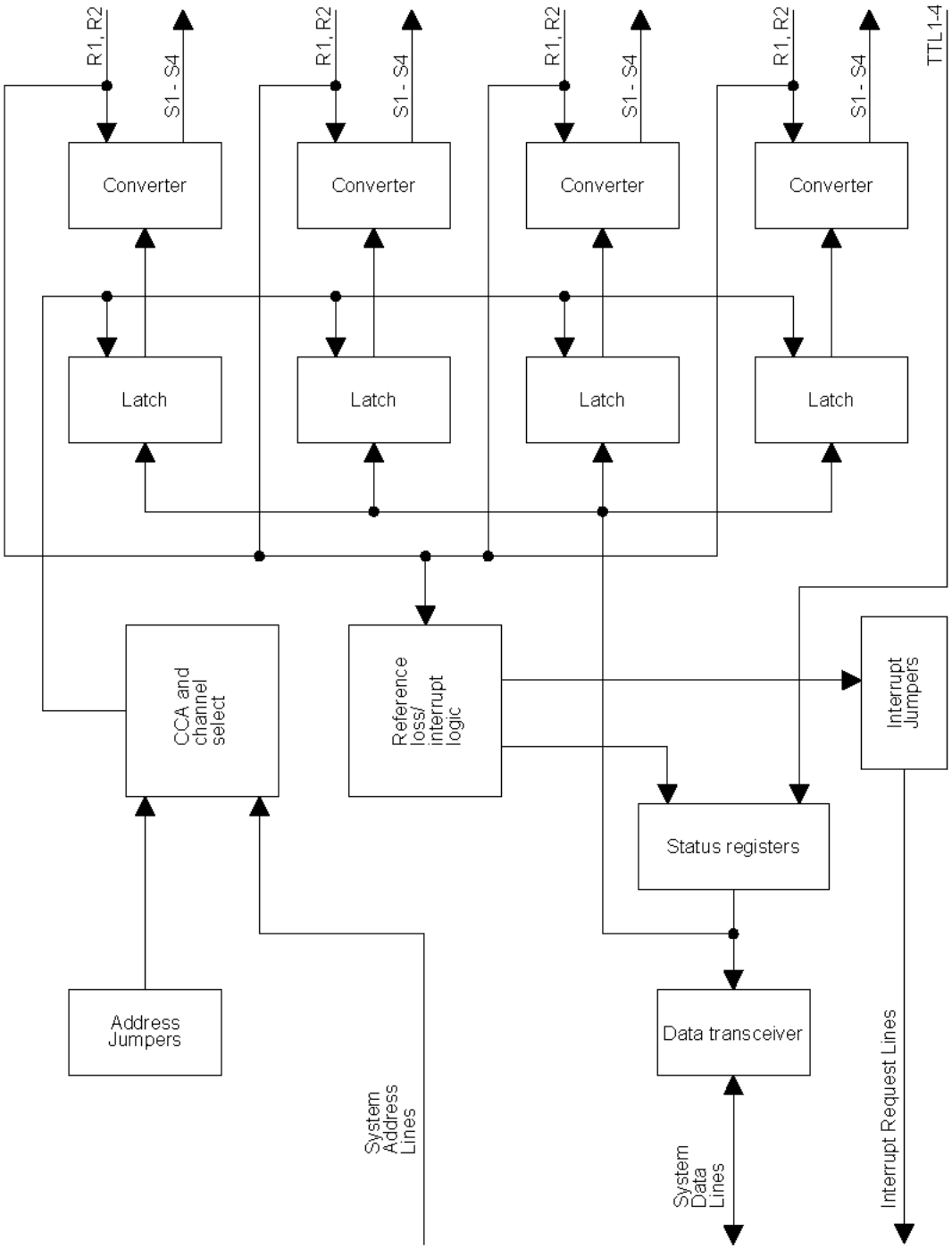


Figure 3-12. 60-Hz D/R CCA Simplified Functional Block Diagram



AN/WSN-8 (7093036) and AN/WSN-8 (7093036)(w/FC-1) Configurations

Figure 3-13. 400-Hz D/S CCA Simplified Functional Block Diagram (N/A SSN 21 Class)

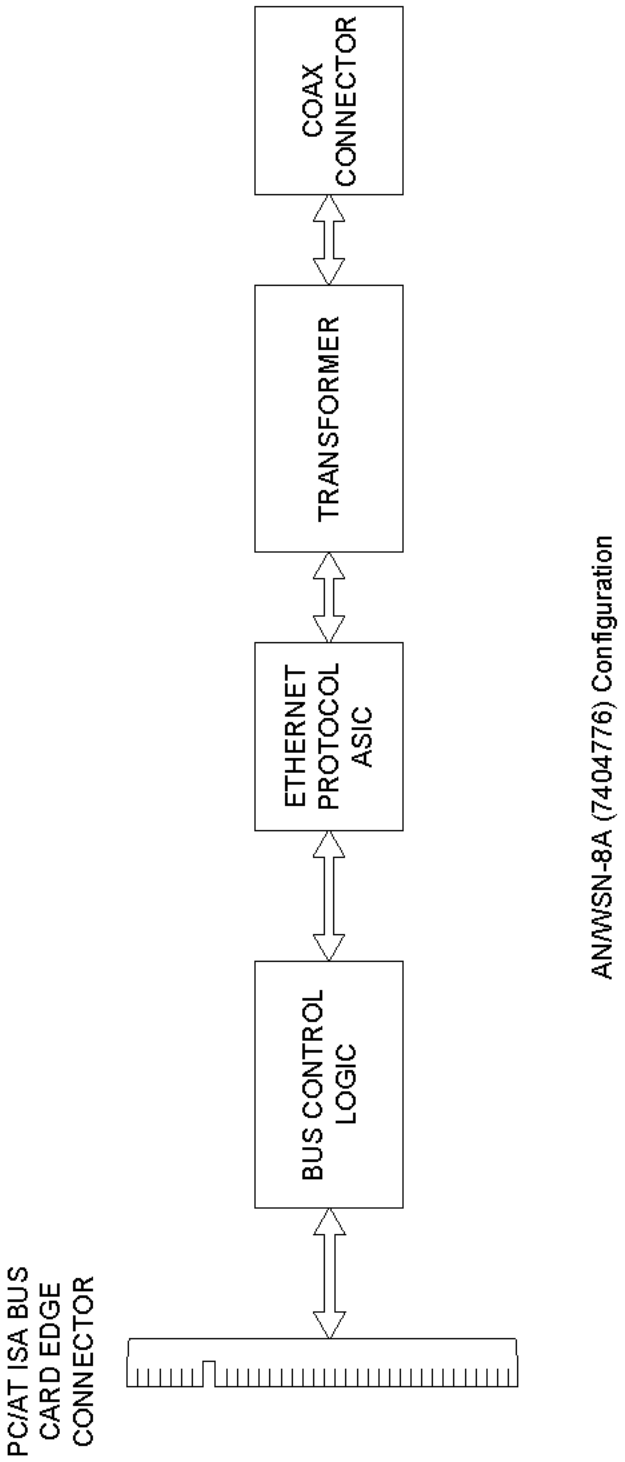


Figure 3-14. Ethernet CCA Simplified Functional Block Diagram

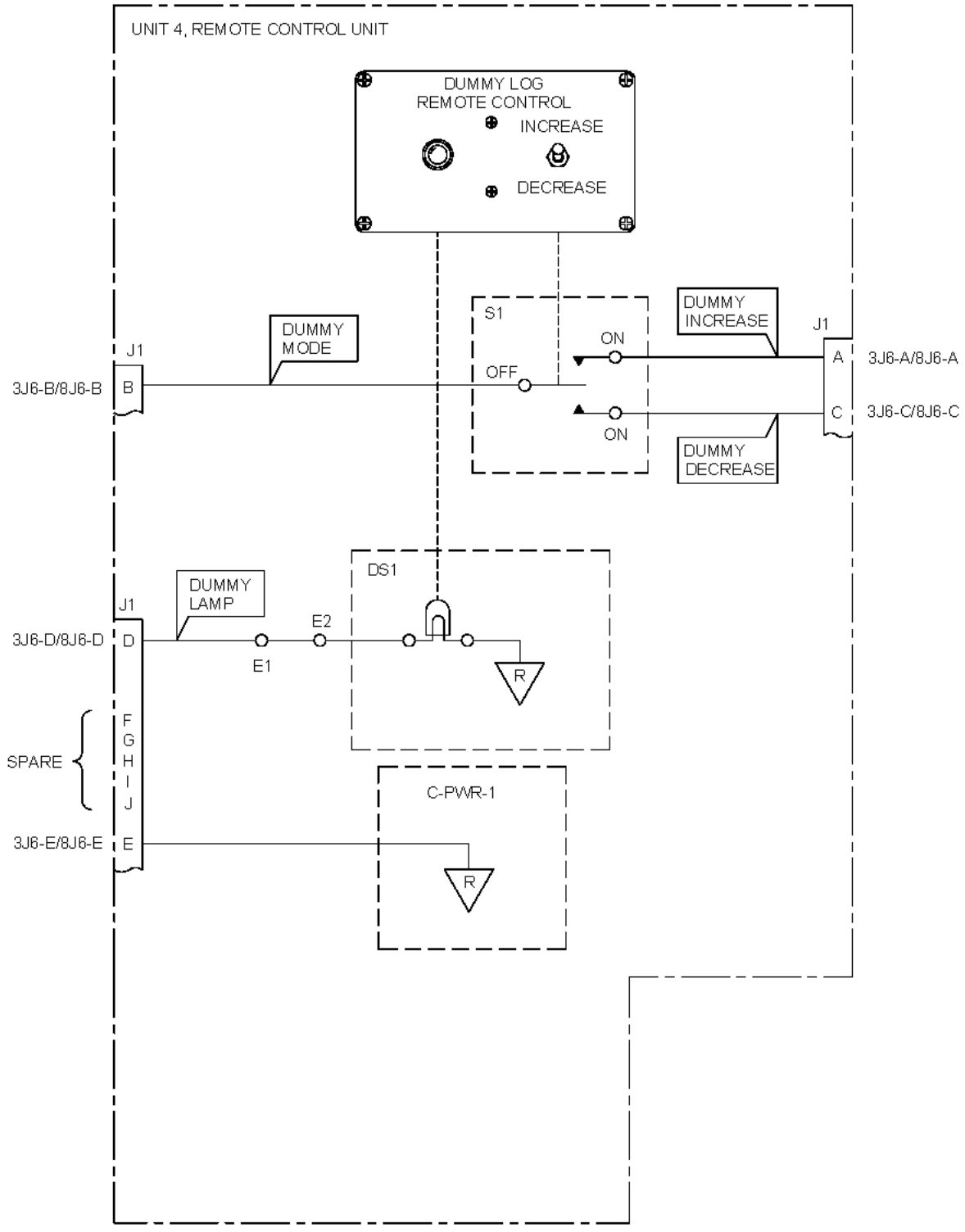


Figure 3-15. Unit 4, Remote Control Unit

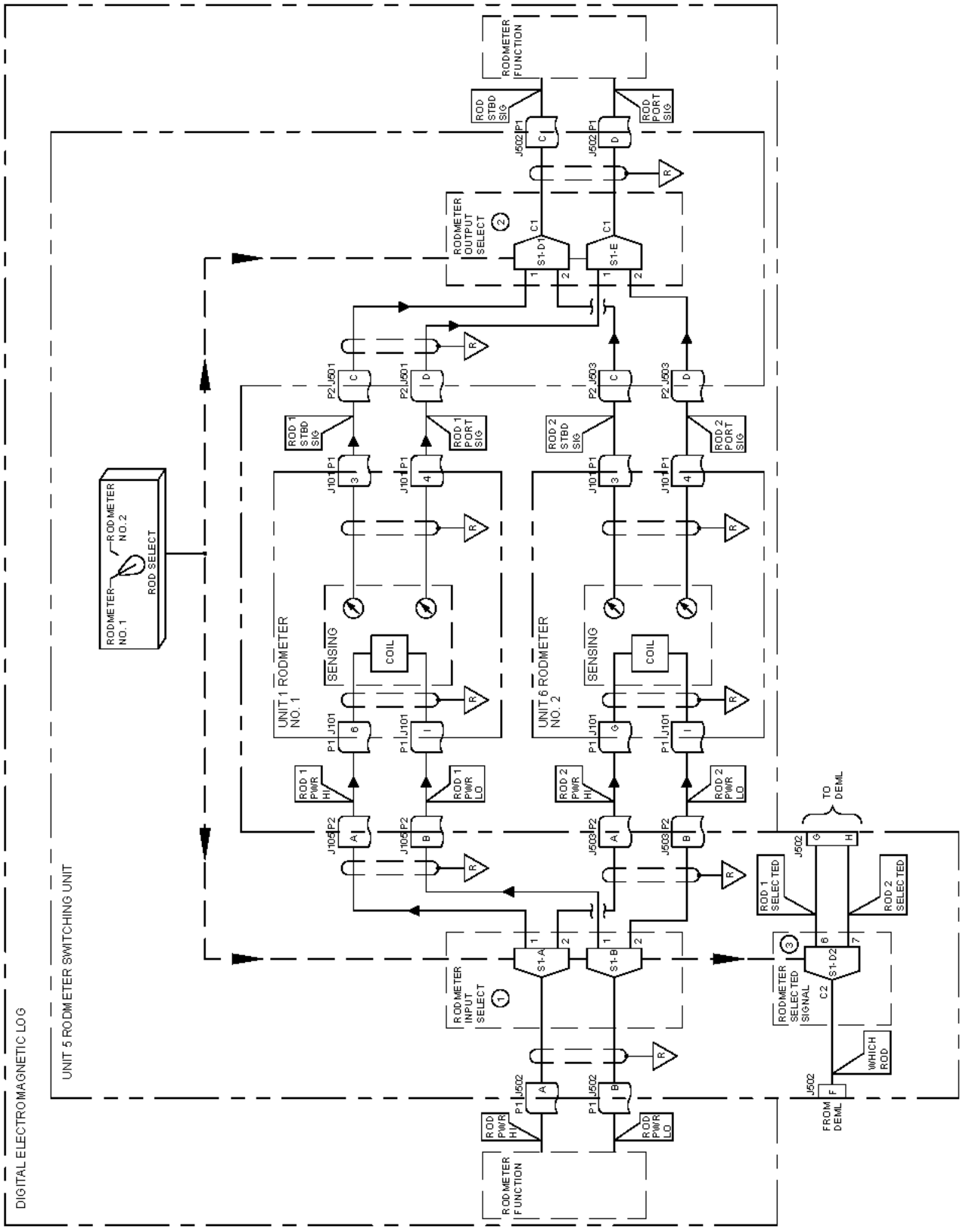


Figure 3-16. Single I/T, Dual Rodmeter Subfunction

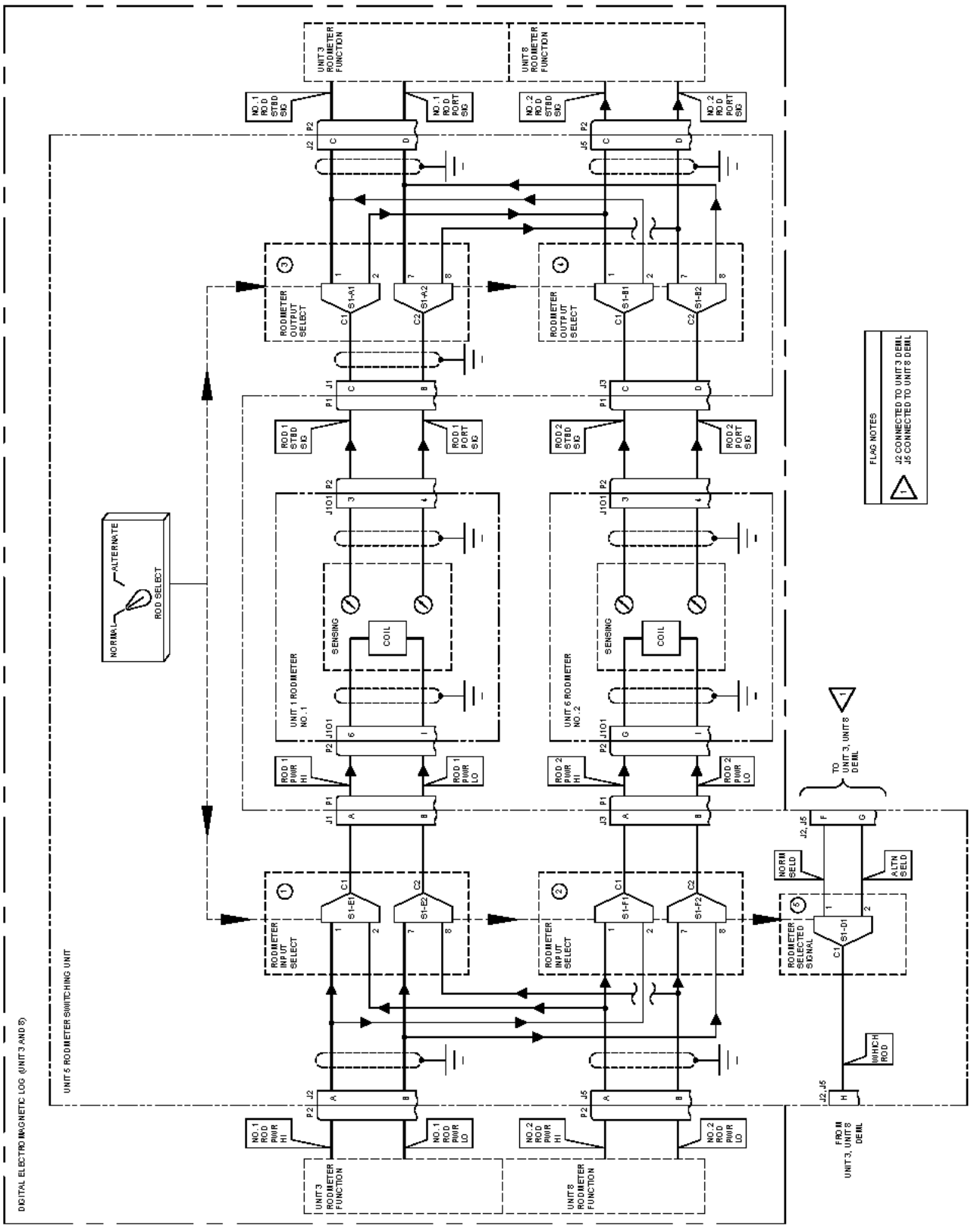


Figure 3-17. Dual Indicator-Transmitter, Dual Rodmeter Subfunction

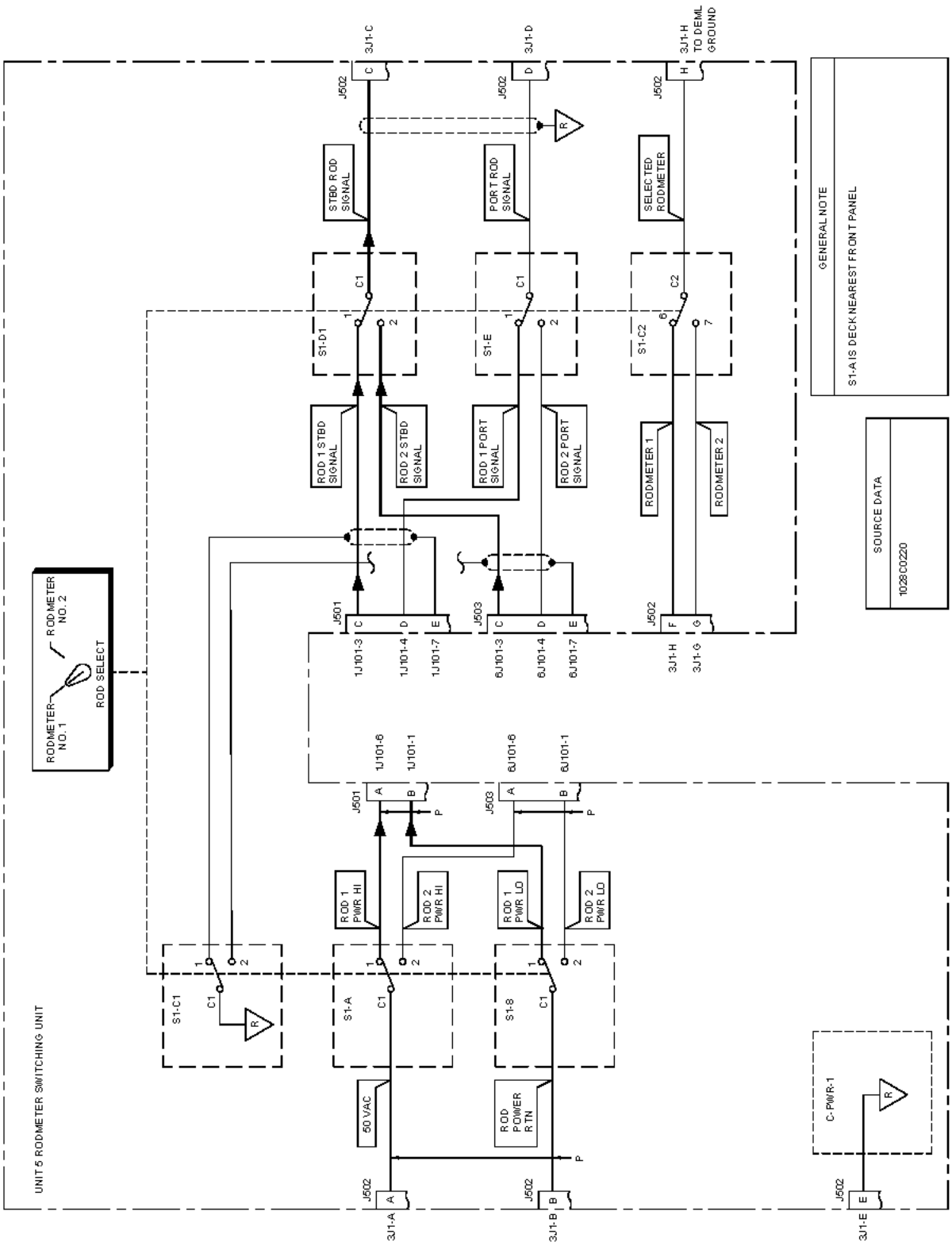


Figure 3-18. Unit 5 RSU Single I/T/Dual Rodmeter Configuration

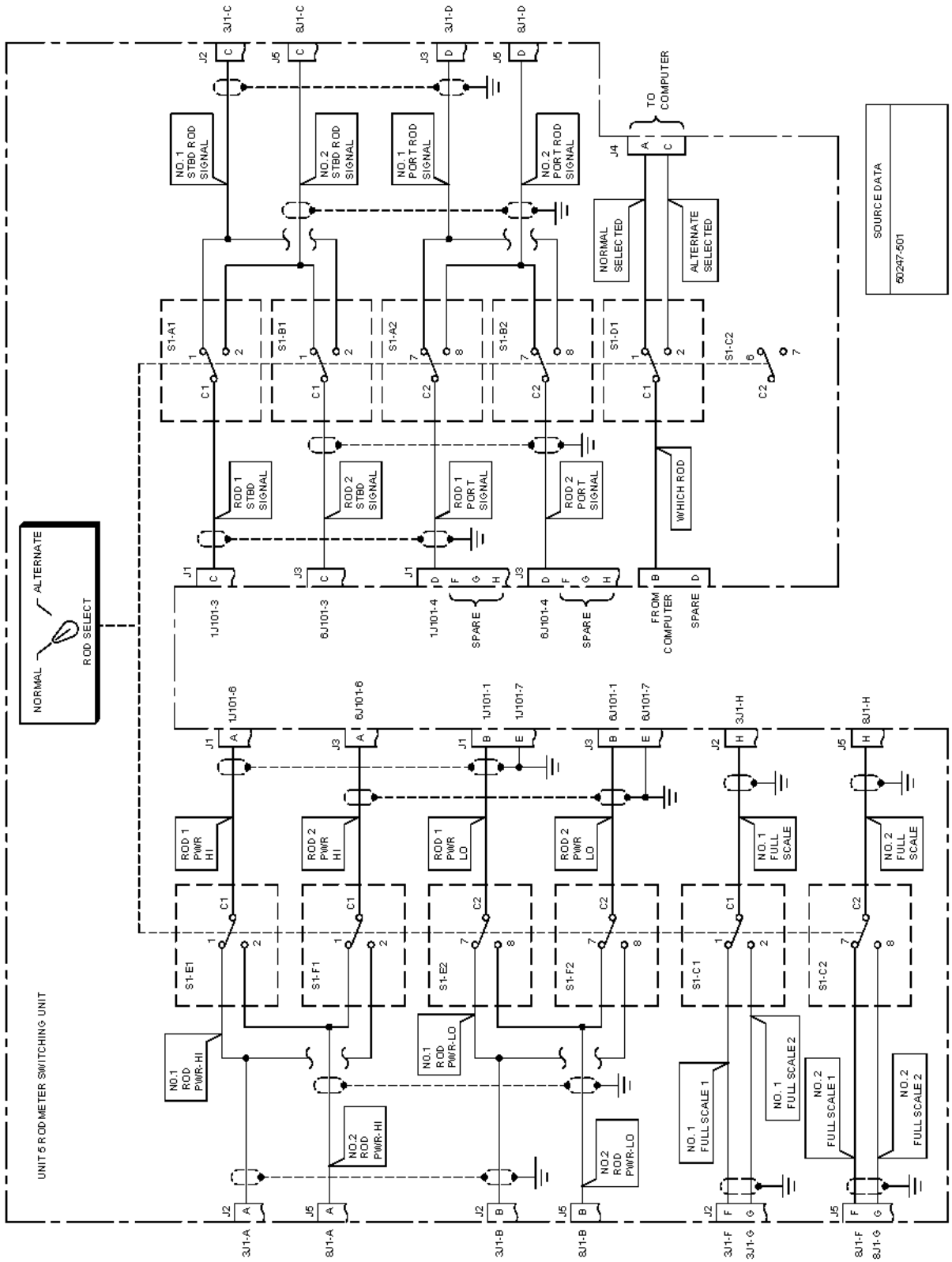
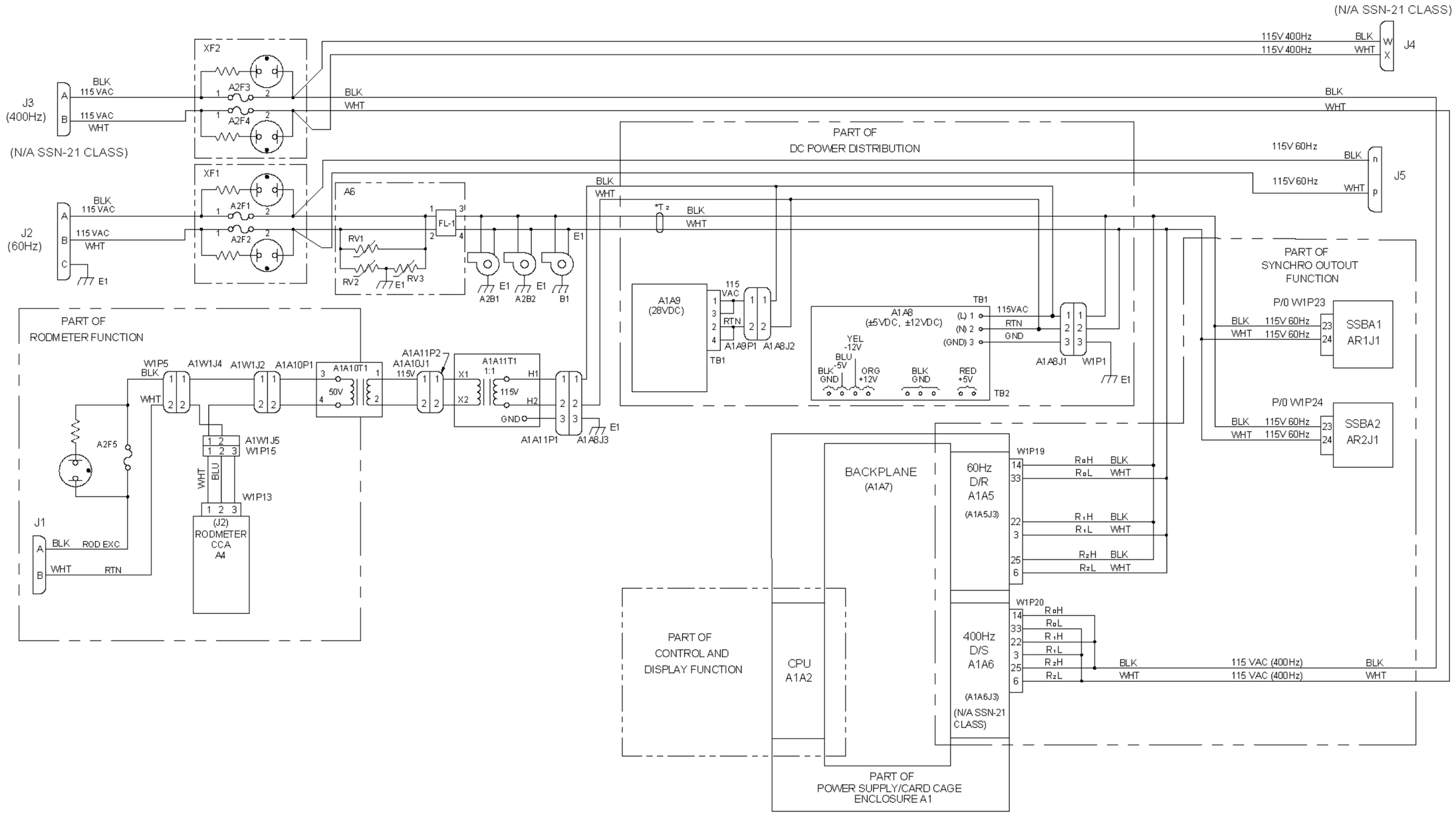


Figure 3-19. Unit 5 RSU, Dual I/T/Dual Rodmeter Configuration



AN/WSN-8 (7093036) Configuration

Figure 3-20. AC Power Distribution (Sheet 1 of 2)

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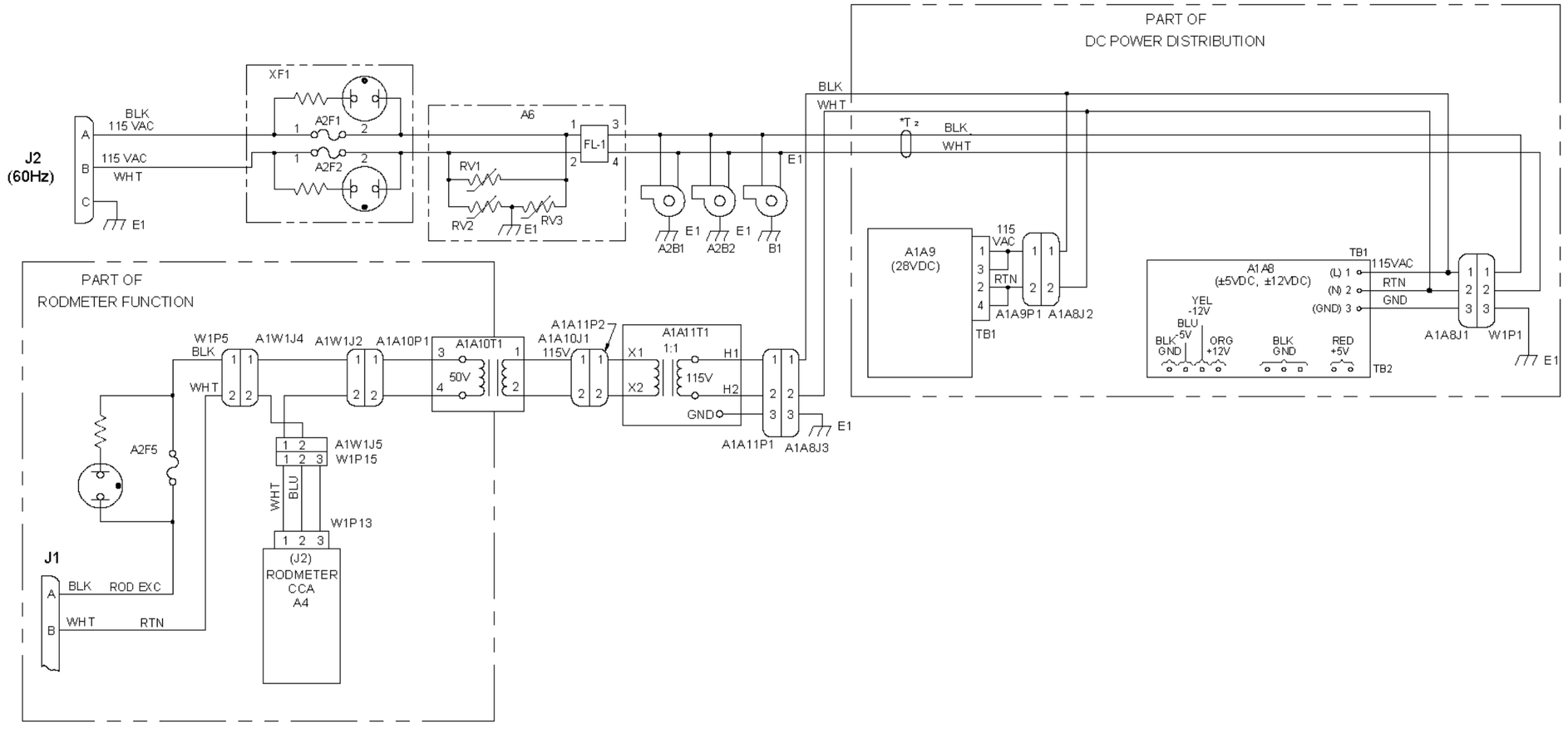

AN/WSN-8A (7404776) Configuration

Figure 3-20. AC Power Distribution (Sheet 2)

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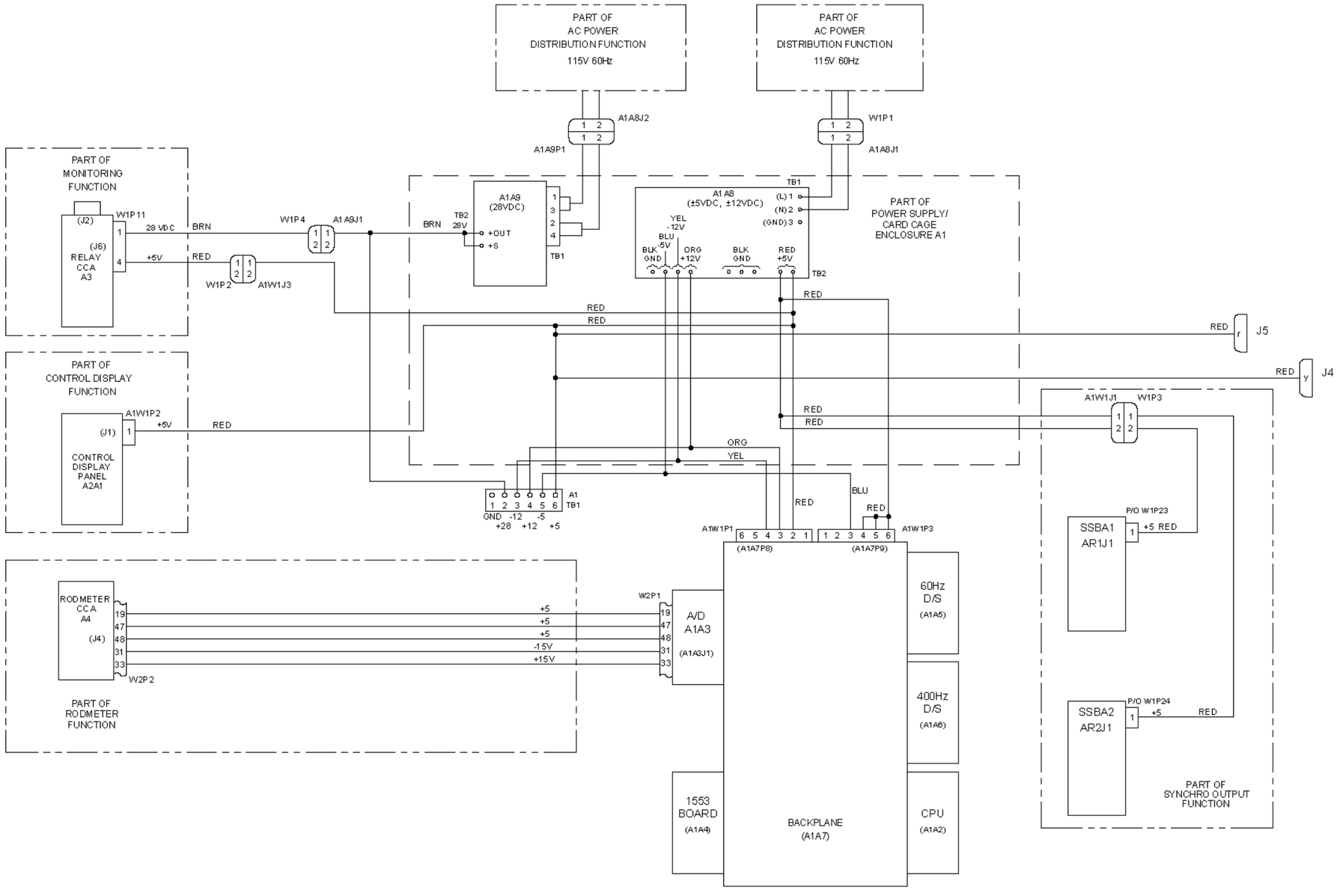

AN/WSN-8 (7093036) Configuration

Figure 3-21. DC Power Distribution (Sheet 1 of 3)

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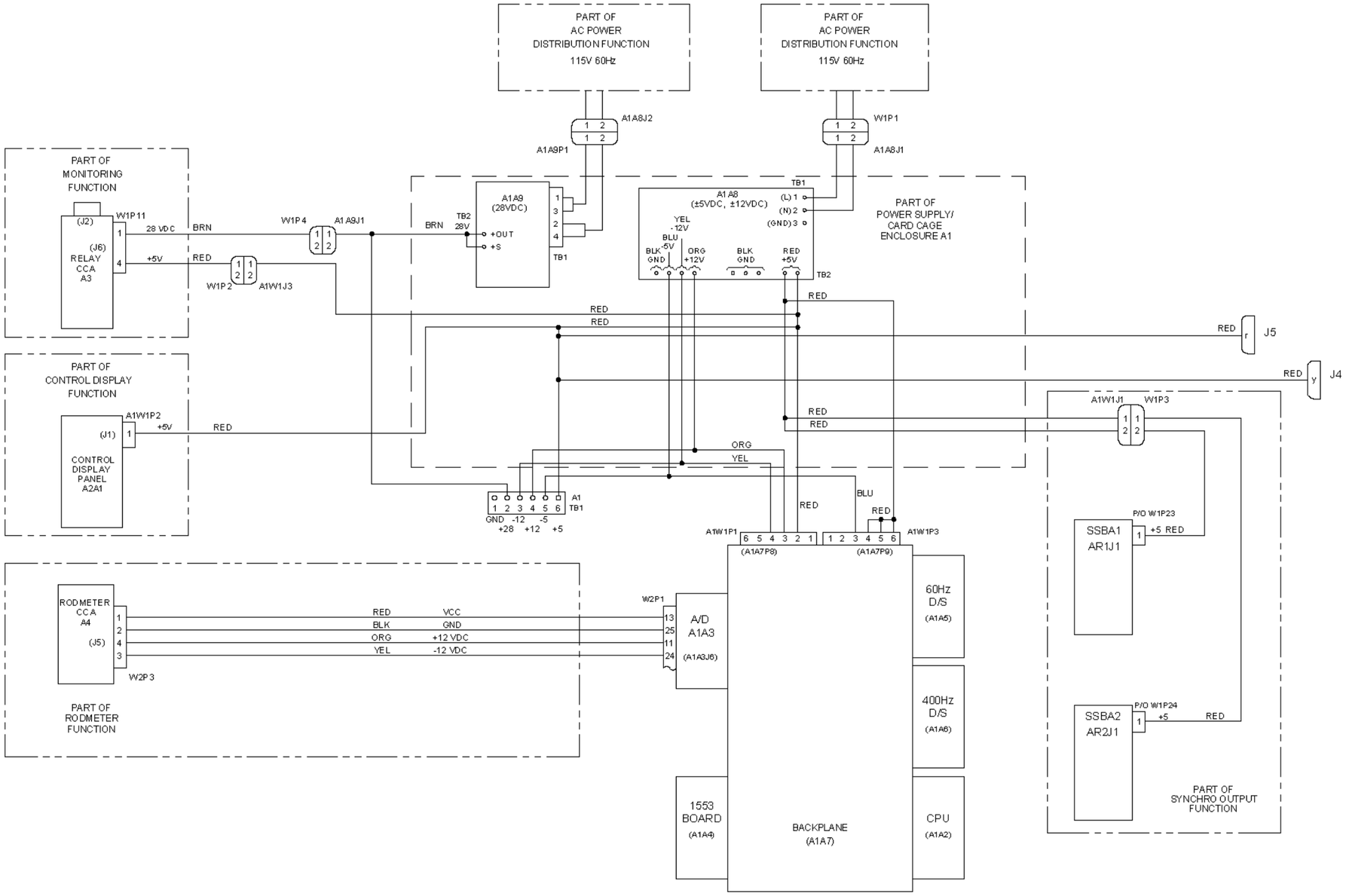

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 3-21. DC Power Distribution (Sheet 2)

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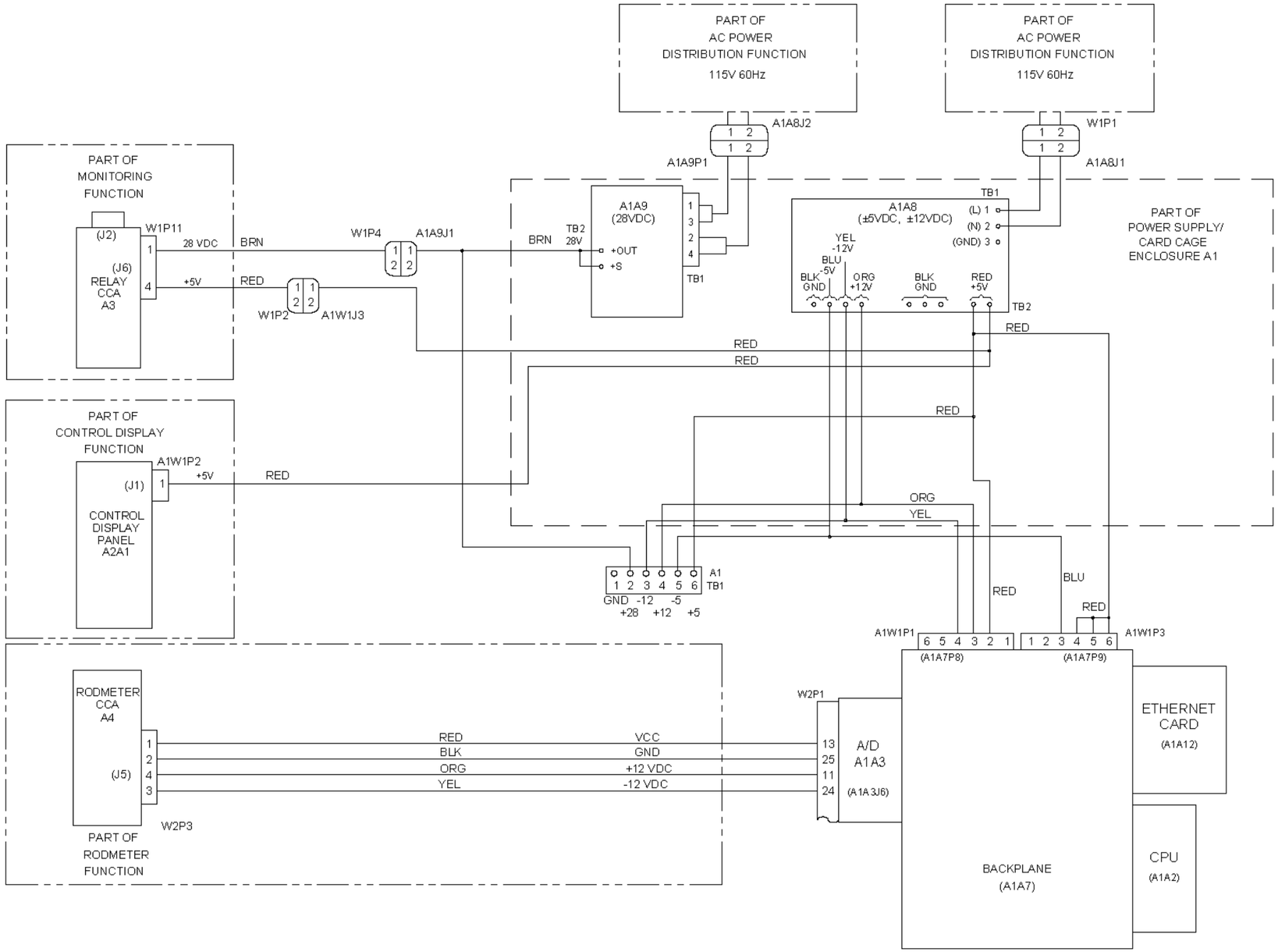

AN/WSN-8A (7404776) Configuration

Figure 3-21. DC Power Distribution (Sheet 3)

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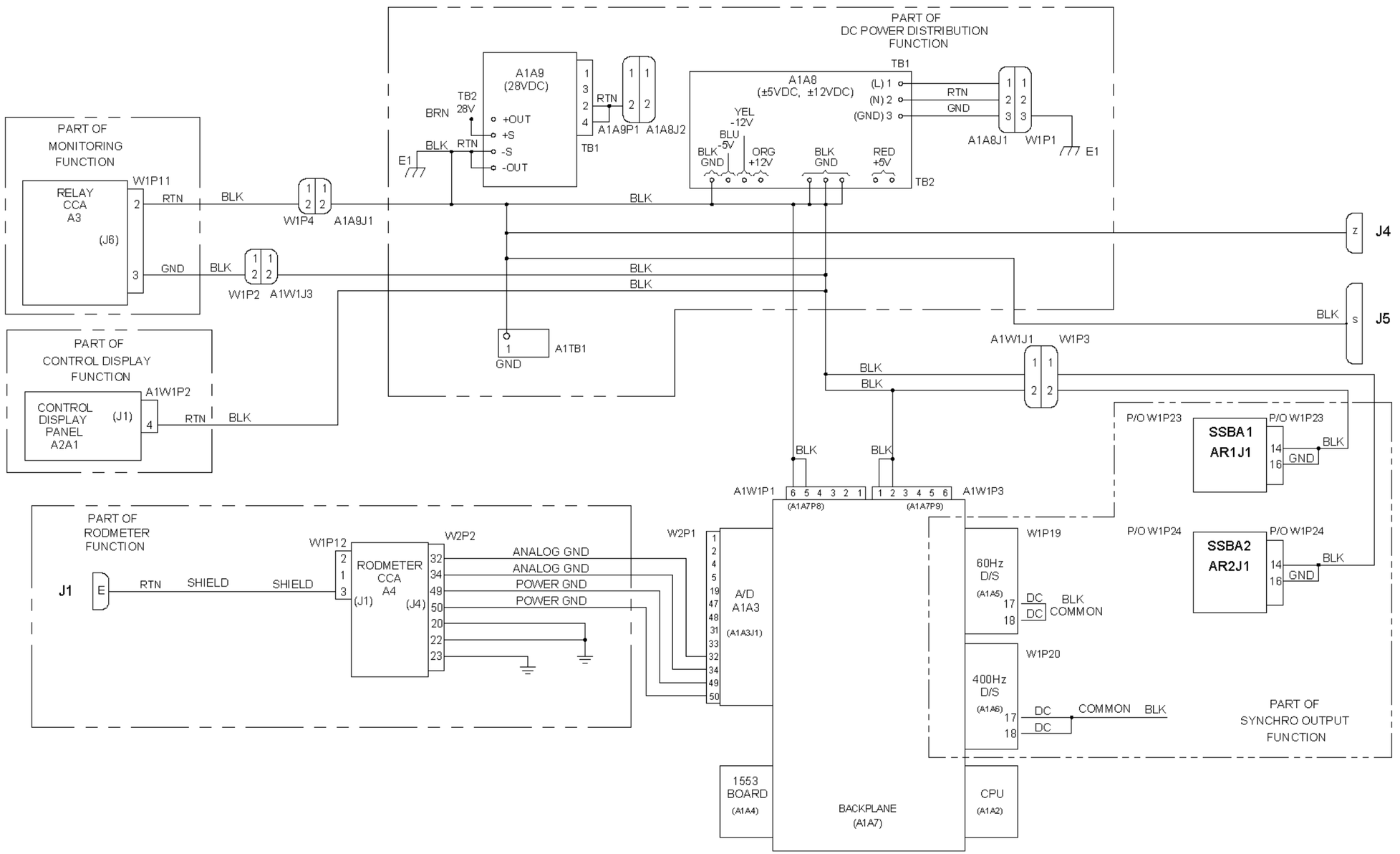

AN/WSN-8 (7093036) Configuration

Figure 3-22. Ground and Returns (Sheet 1 of 3)

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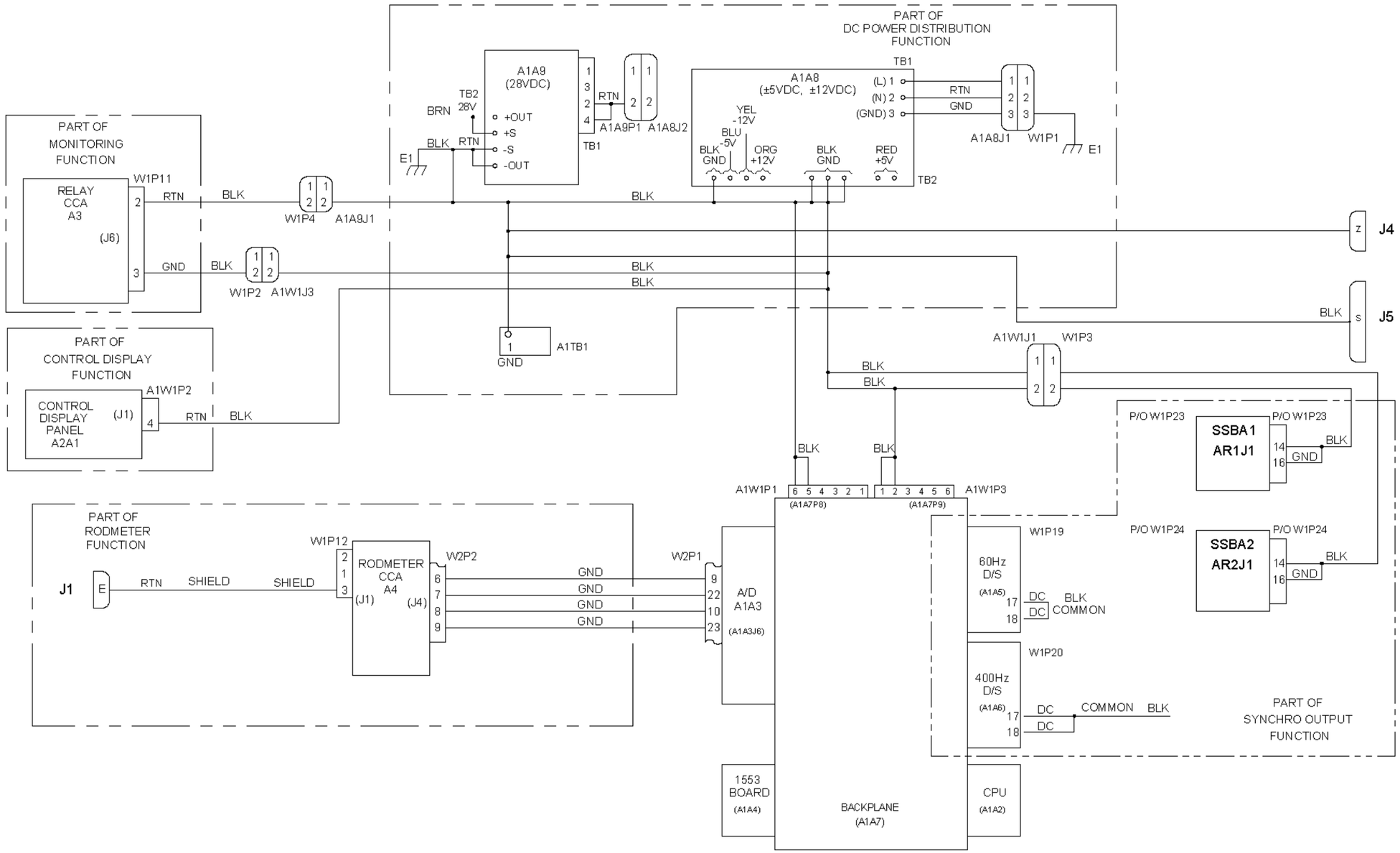

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 3-22. Ground and Returns (Sheet 2)

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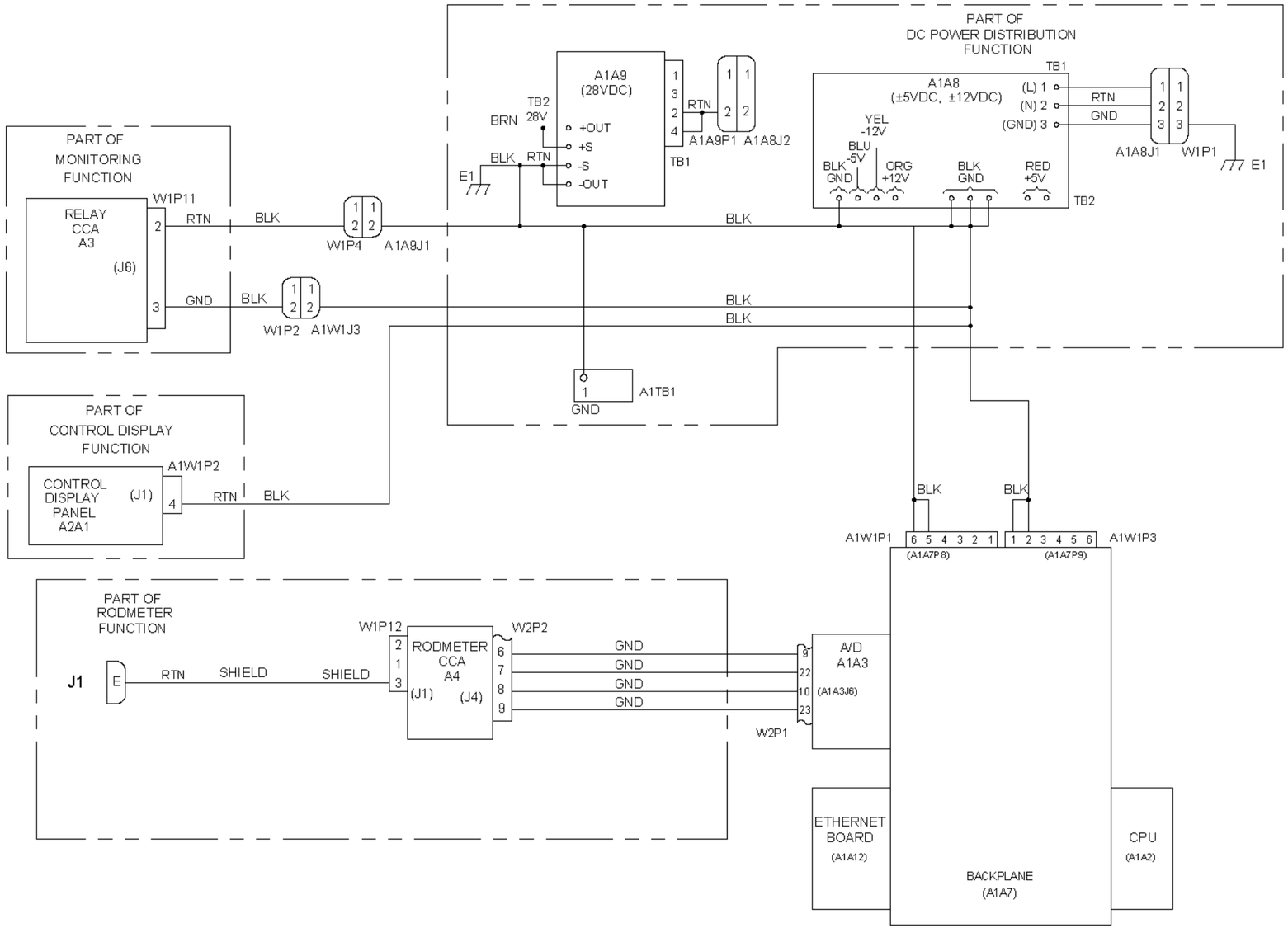

AN/WSN-8A (7404776) Configuration

Figure 3-22. Ground and Returns (Sheet 3)

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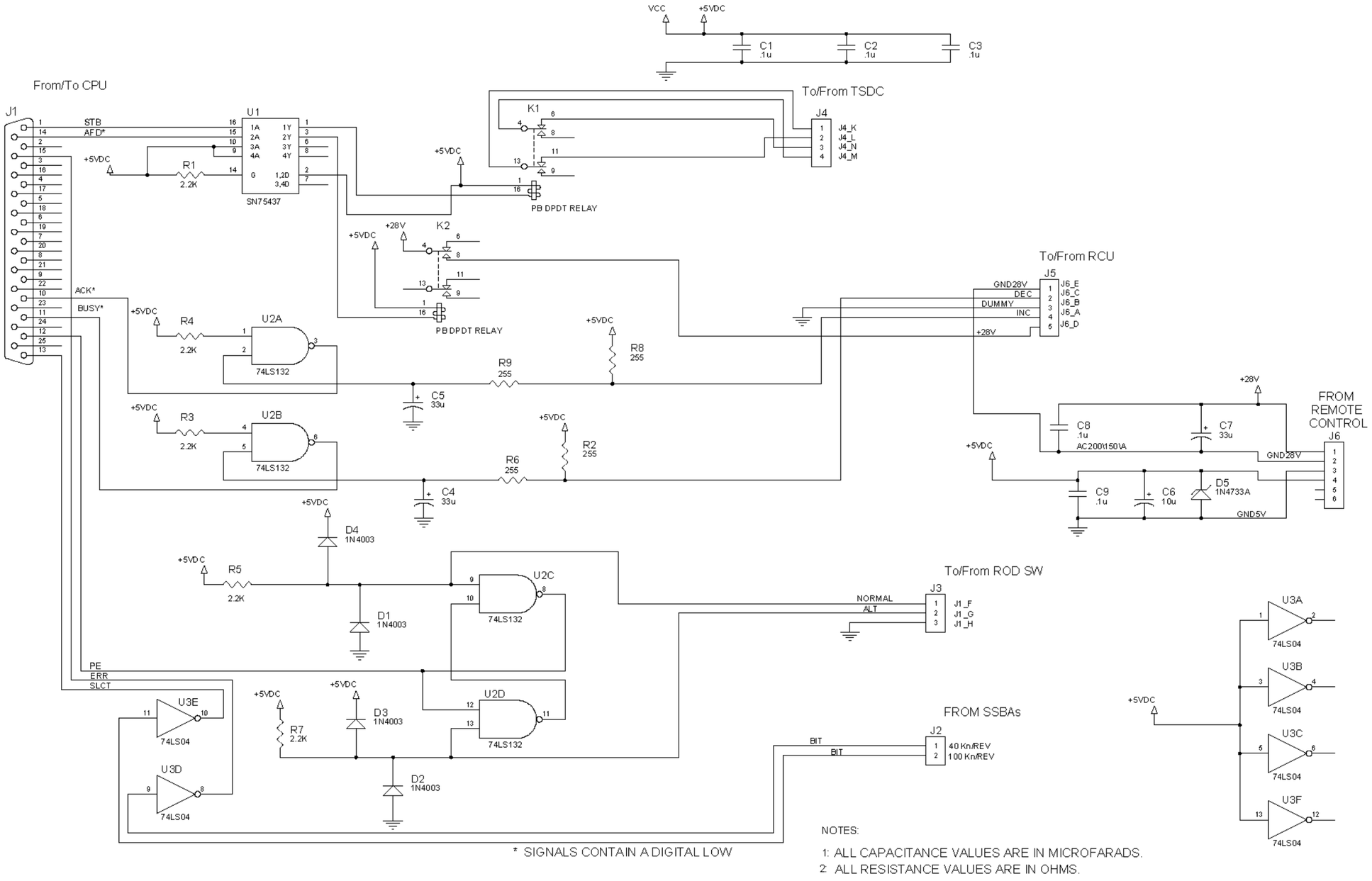

AN/WSN-8 (7093036) Configuration

Figure 3-23. Relay CCA Schematic (Sheet 1 of 2)

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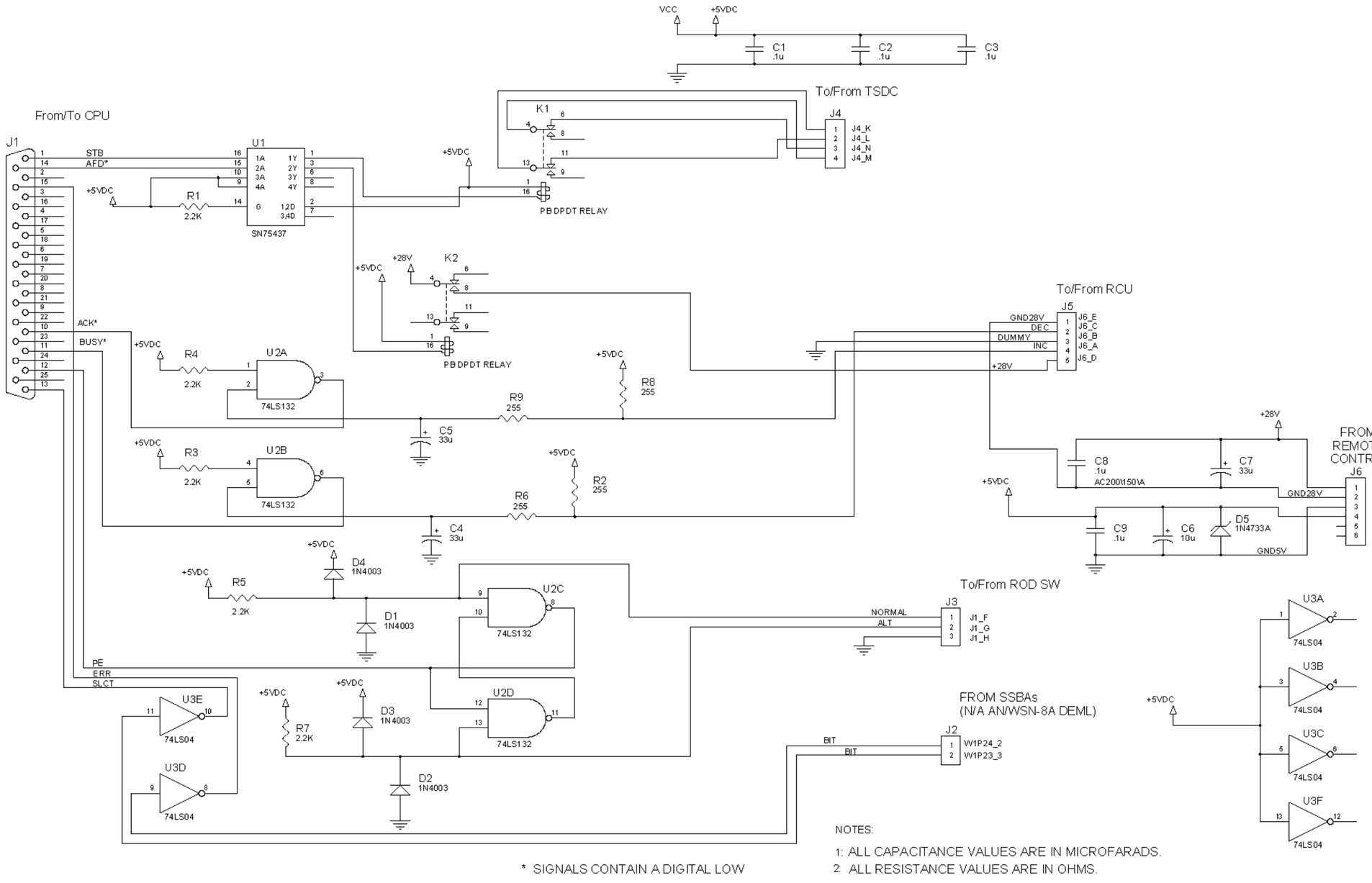

AN/WSN-8A (7404776) Configuration

Figure 3-23. Relay CCA Schematic (Sheet 2)

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CHAPTER 4
SCHEDULED MAINTENANCE

4.1 INTRODUCTION.

This chapter contains the scheduled maintenance requirements for the AN/WSN-8 (7093036), AN/WSN-8A(V)1 (7404776), and the AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) units. Scheduled maintenance consists of maintenance actions accomplished in accordance with the Planned Maintenance System (PMS) as described in OPNAVINST 4790.4, Maintenance and Material Management System (3M) Manual.

4.1.1 SCHEDULED MAINTENANCE REQUIREMENTS. Requirements for scheduled maintenance are based on such factors as hours of equipment operation, calendar elapsed time, and other special conditions that affect equipment operating efficiency. These individual requirements are covered in the applicable PMS Maintenance Index Page (MIP) and Maintenance Requirement Cards (MRCs) or Standard Maintenance Procedures (SMPs). The MIP, used by supervisory personnel for planning and scheduling maintenance, is retained at the applicable work center. The MRCs or SMPs, which contain the step-by-step maintenance procedures, are kept in a folder convenient to maintenance personnel.

4.2 SAFETY PRECAUTIONS.

The following information must be taken into account whenever the DEML is energized for performance testing. The DEML contains operating potentials that can be dangerous to life. Extreme care must be taken when taking measurements and making observations listed in these procedures to ensure that parts of the body or clothing do not touch any part of the DEML other than by intent. When performing any maintenance, comply with the applicable safety precautions in the *Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.19 (Series), Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat*.

4.3 SCHEDULED MAINTENANCE ACTION INDEX.

Table 4-1 identifies planned maintenance for the units of the DEML, as listed in MIP 4262/014. The first column identifies the maintenance tasks. The second column identifies the periodicity of the maintenance action. The third column identifies the section in this chapter where the maintenance description is provided.

4.4 STANDARD MAINTENANCE PROCEDURE ACTION INDEX.

Table 4-2 identifies SMPs for the units of the DEML installed on SSBN 726 Class submarines, as listed in OP4429 and OP4603. The first column identifies the maintenance tasks. The second column identifies the SMP document number. The maintenance description for SMPs is similar to the maintenance descriptions for Planned Maintenance tasks.

4.5 TOOLS, MATERIALS, AND TEST EQUIPMENT.

Table 1-4, Equipment Required but Not Supplied, provides a list of common tools and test equipment required for the completion of scheduled maintenance, and identifies the Standard PMS Identification Guide (SPMIG) Number. This number can be referenced in the SPMIG for stock number identification. For a detailed list of tools, materials, and test equipment required for specific maintenance procedure, refer to the MRC for that procedure.

4.6 PREVENTIVE MAINTENANCE PROCEDURES.

The following preventive maintenance procedures provide information necessary for cleaning, inspection, and lubrication of the DEML components. Each procedure contains tools, equipment, and materials needed to perform each task. When performing these procedures, take care to avoid loss of small or loose parts.

4.6.1 CLEAN AND INSPECT INDICATOR-TRANSMITTER. This procedure requires partially dismantling the Indicator-Transmitter (I/T) and cleaning it inside and outside, cleaning the filters, inspecting surfaces and components for evidence of corrosion, inspecting all electrical and mechanical connections for tightness, inspecting wiring for evidence of overheating or chafing, and inspecting insulation for fraying or chipping.

4.6.2 TEST OPERATION OF INDICATOR-TRANSMITTER. This procedure tests the operation of the I/T in Remote Dummy Mode and Manual Dummy Mode, and tests the internal speed performance, distance traveled, total speed data transmission, and external speed input performance of the I/T.

4.6.3 LUBRICATE RODMETER SLIDING SURFACE, EXTEND AND RETRACT RODMETER. This procedure requires lubricating the rodmeter sliding surface with soap and water, extending and retracting the rodmeter, and inspecting for signs of seawater leakage.

4.6.4 MEASURE RODMETER COIL, INSULATION AND BUTTON RESISTANCE. This procedure requires measuring the resistance of the rodmeter coil, rodmeter insulation, and rodmeter button resistance. It is accomplished on a suspect rodmeter before replacing, and on a new rodmeter before installation.

4.6.5 CLEAN, INSPECT, AND LUBRICATE RODMETER, RODMETER HOIST, AND SEA VALVE, AS APPLICABLE. This procedure requires inspecting the rodmeter surface for scratches, dents, warps, cracks, or marine growth, cleaning with a wooden scraper and scouring pads, checking the two Monel detecting buttons for damage, removing scratches and corrosion with fine sandpaper, and cleaning the rodmeter with a scouring pad.

Table 4-1. Scheduled Maintenance Action Index

MAINTENANCE ACTION (MIP 4262/014)	PERIODICITY	PARAGRAPH
Clean and inspect I/T.	A-1	**4.6.1**
Test operation of I/T.	S-1	**4.6.2**
Lubricate rodmeter sliding surface, extend and retract rodmeter.	R-1	**4.6.3**
Measure rodmeter coil, insulation and button resistance.	R-2	**4.6.4**
Clean, inspect, and lubricate rodmeter, rodmeter hoist, and sea valve as applicable.	R-3A	**4.6.5**

Table 4-2. Standard Maintenance Procedure Action Index

MAINTENANCE ACTION	SMP DOCUMENT NUMBERS
Built-In Test (BIT).	SMP 36-6710/36-6510/39-6510
Operational Test and Precalibration Using Electromagnetic Log Voltage Simulator (ELVS).	SMP 36-6711/36-6511/39-6511
Clean and Inspect I/T.	SMP 36-6713/36-6513/39-6513
Clean and Inspect Electromagnetic Log Rodmeters.	SMP 36-6714/36-6514/39-6514
Rodmeter Coil Resistance and Insulation Resistance Check.	SMP 36-6715/36-6515/39-6515
Clean and Inspect I/T Filter Elements.	SMP 36-6718/36-6518/39-6518

CHAPTER 5
TROUBLESHOOTING

5.1 INTRODUCTION.

This chapter provides troubleshooting information at the organizational and intermediate levels of the AN/WSN-8 (7093036), AN/WSN-8 (7093036) (w/FC-1), AN/WSN-8A(V)1 (7404776), and the AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) units. (Refer to **Table 1-6** for the DEML configurations.) For organizational level troubleshooting, this chapter provides overall information to test and isolate faults to a major function of the DEML. The overall function data is provided by overall function diagrams and fault logic diagrams. For intermediate level troubleshooting, this chapter provides information for troubleshooting Circuit Card Assemblies (CCAs) using Module Test and Repair (MTR)/Gold Disk facilities. The NAVSEA Gold Disk program is used to identify and troubleshoot problems with a CCA. It can determine faulty components by comparing test signals against known good signatures. A Gold Disk consists of several hundred test signatures of a specific CCA. Each Gold Disk CCA test package consists of a detailed, scaled diagram of the CCA, showing all components and test points, schematics of the CCA, a complete parts listing with corresponding National Stock Numbers (NSNs), an information page describing any special instructions, and a database. The database contains explicit instructions on how to test every component and test point on the CCA. It also contains the known good signatures as a basis for testing.

The following AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) CCAs are supported by the Gold Disk Program:

Central Processing Unit (CPU)	3A1A1A2
Analog-to-Digital (A/D)	3A1A1A3
MIL-STD-1553B	3A1A1A4
60-Hertz (Hz) Digital-to-Resolver (D/R)	3A1A1A5
400-Hz Digital-to-Synchro (D/S)	3A1A1A6 [Not Applicable (N/A) to the SSN 21 Class]

The following AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML CCAs are supported by the Gold Disk Program:

CPU	3A1A2
A/D	3A1A3
Ethernet	3A1A12

5.2 ORGANIZATIONAL LEVEL TROUBLESHOOTING PROCEDURES.

5.2.1 GENERAL TROUBLESHOOTING. In the event of any malfunction in the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), first check fuses F1-F5 on the Indicator-Transmitter (I/T) front access panel. Fuseholders A2XF1-A2XF3 are equipped with neon lamps that light to indicate blown fuses.

a. F1 and F2 protect the power supplies, fans, constant voltage transformer, 60-Hz D/R CCA, and Synchro Signal Booster Amplifiers (SSBAs) from surges in 115V 60-Hz power.

b. F3 and F4 protect the 400-Hz D/S CCA from surges in 115 VAC 400-Hz power (N/A to the SSN 21 Class).

c. F5 protects the rodmeter coil from surges in the 50 VAC rodmeter excitation voltage.

Replace any blown fuses. If a visual examination leaves any doubt as to the status of a fuse, use a multimeter or test lamp to check for continuity. If there is no continuity, replace the fuse. If no fuses are blown, proceed to **Paragraph 5.2.2**.

In the event of any malfunction in the AN/WSN-8A(V)1 (7404776) DEML and the AN/WSN-8A(V)2 (7404776) DEML, first check fuses F1-F5 on the I/T front access panel.

a. F1 and F2 protect the power supplies, fans, and constant voltage transformer from surges in 115V 60-Hz power.

b. F3 and F4 are N/A with AN/WSN-8A(V)1, Version 4.31 or AN/WSN-8A(V)2, Version 4.31 software installed.

c. F5 protects the rodmeter coil from surges in the 50 VAC rodmeter excitation voltage.

Replace any blown fuses. If no fuses are blown, observe the Fault Indicator lamp and Control Display Panel (CDP) on the I/T front access panel

for indications of an active fault, indicated by a lit Fault Indicator lamp and a three-digit fault code displayed on the CDP. Proceed to **Paragraph 5.2.2**.

5.2.2 BUILT-IN TEST PROCEDURE.

DANGER

Voltages dangerous to life are present when the DEML is energized. Use extreme care when performing voltage measurements. Keep one hand clear. Do not work alone.

5.2.2.1 AN/WSN-8 (7093036) DEML BIT Procedure. Built-In Test (BIT) causes the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) to run a self-diagnostic test and report any faulty modules on the CDP display. In addition to running a self-diagnostic test and reporting faulty modules on the CDP display, the AN/WSN-8 (7093036) DEML (w/FC-1) BIT function automatically generates Fault Codes when a fault condition is detected. If a fault condition is detected by BIT during normal operation, BIT generates one or more three-digit codes. The codes are based on the detected hardware fault, processing fault, or discrepancy in a monitored parameter. The BIT function also enables the operator to display and acknowledge all faults.

For the AN/WSN-8 (7093036) DEML, perform the BIT procedure provided in **Table 2-10**. For the AN/WSN-8 (7093036) DEML (w/FC-1), perform the BIT procedure provided in **Table 2-26**. If any of the results read **FAIL** instead of **PASS**, replace the affected CCA as described in **Chapter 6**. For the AN/WSN-8 (7093036) DEML (w/FC-1), if a fault condition is detected with a fault code displayed, acknowledge the fault and determine the fault type using information in **Table 5-1** and perform the required action. If the BIT does not identify the failure, proceed to **Paragraph 5.2.3**.

5.2.2.2 AN/WSN-8A (7404776) DEML BIT Procedure. In addition to running a self-diagnostic test and reporting faulty modules on the CDP display, the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML BIT function also automatically generates Fault Codes when a fault condition is detected. If a fault condition is detected by BIT during normal operation, BIT generates one or more three-digit codes and illuminates a fault lamp on the front access panel. The codes are based on the detected hardware fault, processing fault, or discrepancy in a monitored parameter. The BIT function also enables the operator to display and acknowledge all faults.

For the AN/WSN-8A(V)1 (7404776) DEML, perform the BIT procedure provided in **Table 2-48**. For the AN/WSN-8A(V)2 (7404776) DEML, perform the BIT procedure provided in **Table 2-71**. If any of the results read **FAIL** instead of **PASS**, replace the affected CCA as described in **Chapter 6**. If a fault condition is detected with a fault code displayed, acknowledge the fault and determine the fault type using information provided in **Table 5-1** and perform the required action. If the BIT does not identify the failure, proceed to **Paragraph 5.2.3**.

5.2.3 EXPLANATION OF FAULT LOGIC DIAGRAMS. Refer to the AN/WSN-8 (7093036) and AN/WSN-8A (7404776) DEML Overall Functional Family Tree diagrams in **Figure 5-1** and System Wiring Diagrams in **Figure 5-2** to identify the various functions. For preliminary fault identification, follow the Overall Fault Logic Diagrams in **Figure 5-3** for the AN/WSN-8 (7093036) DEML, **Figure 5-8** for the AN/WSN-8 (7093036) DEML (w/FC-1), **Figure 5-13** for the AN/WSN-8A(V)1 (7404776) DEML, or **Figure 5-18** for the AN/WSN-8A(V)2 (7404776) DEML. A fault logic diagram is a symbolic flowchart designed to isolate a fault by following a logical sequence of questions that can be answered by “yes” or “no,” and are based on observations during performance of the Turn on/Checkout Procedures. Questions requiring a “yes” or “no” response are represented by diamond symbols. Actions are statements that specify a step or action to be performed, such as changing a module or component, or that reference another area for further fault isolation. Steps or actions to be taken are represented by rectangular or box symbols. Circle symbols containing numbers represent the point at which the flowchart connects with another process. The number for the other process should appear within the circle. Flow lines indicate the sequence of steps and the direction of flow.

5.2.4 FUNCTIONAL FAMILY TREE. The Functional Family Trees, **Figure 5-1 (Sheet 1)** for the AN/WSN-8 (7093036) DEML and **Figure 5-1 (Sheet 2)** for the AN/WSN-8A (7404776) DEML, present the functional block diagrams of the DEML configurations. Each block represents a functional area of the DEML.

5.2.5 AC POWER DISTRIBUTION. The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) AC Power Distribution receives 115 VAC 60-Hz and 400-Hz ship’s power which is distributed to the Control and Display function and Input/Output (I/O) function. The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML AC Power Distribution receives 115 VAC 60-Hz ship’s power which is distributed to the Control and Display function and I/O function.

5.2.5.1 Fuses [(3A1A2F1, 3A1A2F2) or (3A2F1, 3A2F2)]. Fuses F1 and F2 protect the DEML 60-Hz circuits from overcurrent. A lighted LED (Light-Emitting Diode) on a fuseholder indicates a blown fuse.

5.2.5.2 AN/WSN-8 (7093036) DEML Fuses (3A1A2F3, 3A1A2F4). [N/A to the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML] Fuses F3 and F4 protect the 400-Hz D/S CCA (N/A to the SSN 21 Class) from overcurrent. A lighted LED on a fuseholder indicates a blown fuse.

5.2.5.3 Overvoltage Protection Network [(3A1RV1-3A1RV3) or (3RV1-3RV3)]. Varistors RV1-RV3 protect the DEML circuits from voltage transients.

5.2.5.4 Power Line Filter (3A1FL1 or 3FL1). FL1 filters radio frequency interference from the input power.

5.2.5.5 Constant Voltage Transformer (3A1A1A11 or 3A1A11). The Constant Voltage Transformer maintains a constant input voltage to the 50 VAC Step-Down transformer.

5.2.5.6 Step-Down Transformer (3A1A1A10 or 3A1A10). The Step-Down Transformer steps down the 115 VAC 60-Hz to provide 50 VAC excitation voltage to the rodmeter coil and reference for the I/O function.

5.2.5.7 Fuse (3A1A2F5 or 3A1F5). Fuse F5 protects the rodmeter coil from overcurrent.

5.2.6 60-HZ AC POWER TROUBLESHOOTING. Refer to the AC power distribution fault logic diagram **Figure 5-4** and DEML System wiring diagram **Figure 5-2 (Sheet 1)** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-9** and **Figure 5-2 (Sheet 2)** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figure 5-14** and **Figure 5-2 (Sheet 3)** for the AN/WSN-8A(V)1 (7404776) DEML. Refer to **Figure 5-19** and **Figure 5-2 (Sheet 4)** for the AN/WSN-8A(V)2 (7404776) DEML.

5.2.7 AN/WSN-8 (7093036) DEML 400-HZ AC POWER TROUBLESHOOTING. [N/A to the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML] (N/A to the SSN 21 Class) Refer to the AC power distribution fault logic diagram **Figure 5-4** and DEML System wiring diagram **Figure 5-2 (Sheet 1)** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-9** and **Figure 5-2 (Sheet 2)** for the AN/WSN-8 (7093036) DEML (w/FC-1).

5.2.8 DC POWER DISTRIBUTION. DC Power Distribution provides +12V, -12V, +28V, +5V, and -5V power to DEML subassemblies. The two main components in this function are the 200-Watt Power Supply (3A1A1A8 or 3A1A8) and the 28 VDC Power Supply (3A1A1A9 or 3A1A9). Refer to the DC power distribution fault logic diagram **Figure 5-5** and DEML System wiring diagram **Figure 5-2 (Sheet 1)** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-10** and **Figure 5-2 (Sheet 2)** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figure 5-15** and **Figure 5-2 (Sheet 3)** for the AN/WSN-8A(V)1 (7404776) DEML. Refer to **Figure 5-20** and **Figure 5-2 (Sheet 4)** for the AN/WSN-8A(V)2 (7404776) DEML.

5.2.8.1 200-Watt Power Supply (3A1A1A8 or 3A1A8). This power supply provides +12V, -12V, +5V, and -5V to the Card Cage, Relay CCA, SSBAs (if installed), and CDP.

5.2.8.2 28 VDC Power Supply (3A1A1A9 or 3A1A9). This power supply provides +28 VDC to the Relay CCA.

5.2.9 DC POWER TROUBLESHOOTING. If troubleshooting indicates a problem with DC power distribution, refer to the DC power distribution fault diagram in **Figure 5-5** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-10** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figure 5-15** for the AN/WSN-8A(V)1 (7404776) DEML. Refer to **Figure 5-20** for the AN/WSN-8A(V)2 (7404776) DEML.

5.2.10 CONTROL DISPLAY FUNCTION. Manages, computes and distributes all data in the DEML.

5.2.10.1 CPU CCA (3A1A1A2 or 3A1A2). The CPU CCA computes, formats, and distributes all data in the DEML. This CCA is supported by the MTR/Gold Disk Program.

5.2.10.2 CDP (3A1A2A1 or 3A2A1). The CDP displays speed and distance data, equipment status and configuration, and calibration results. All the related Man-Machine Interfaces (MMI) are also done via the CDP. Such interfaces include entering calibration table, dummy speed, and system configuration.

5.2.11 CONTROL DISPLAY TROUBLESHOOTING. Refer to the control display function fault logic diagram **Figure 5-6** and DEML System wiring diagram **Figure 5-2 (Sheet 1)** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-11** and **Figure 5-2 (Sheet 2)** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figure 5-16** and **Figure 5-2 (Sheet 3)** for the AN/WSN-8A(V)1 (7404776) DEML. Refer to **Figure 5-21** and **Figure 5-2 (Sheet 4)** for the AN/WSN-8A(V)2 (7404776) DEML.

5.2.12 I/O INTERFACE FUNCTION. The I/O Interface Function in the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1)

configurations processes signals from the Rodmeter, Remote Control Unit (RCU), Rodmeter Switching Unit (RSU), Rodmeter Excitation Transformer (3A1A1A10T1), and external MIL-STD-1553B Digital Data Bus (DDB) controller for DEML internal/external use and distribution.

The I/O Interface Function in the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML configurations processes signals from the Rodmeter, RCU, RSU, Rodmeter Excitation Transformer (3A1A1A10T1), external Ethernet controller, AN/USQ-82(V) Fiber Optic Data Multiplex System (FODMS) interface [AN/WSN-8A(V)1, Version 4.31 software], and AN/WSN-7(V) Ring Laser Gyro Navigator (RLGN) interface [AN/WSN-8A(V)2, Version 4.31 software] for DEML internal/external use and distribution.

5.2.12.1 Rodmeter CCA (3A1A4 or 3A4). The Rodmeter CCA (3A1A4 or 3A4) amplifies and filters both rodmeter and reference signals.

5.2.12.2 Relay CCA (3A1A3 or 3A3). The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) Relay CCA (3A1A3) monitors RSU, RCU, SSBAs and DEML I/T NORMAL/NOT NORMAL condition.

The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML Relay CCA (3A3) monitors RSU, RCU, and DEML I/T NORMAL/NOT NORMAL condition.

5.2.12.3 AN/WSN-8 (7093036) DEML MIL-STD-1553B CCA (3A1A1A4). [N/A to the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML] The 1553B CCA (3A1A1A4) provides digital DEML health, speed, and distance information to the external user. The CCA also reads in navigation data (used for auto cals on the SSN 21 Class) (N/A to the SSBN 726 Class). This CCA is supported by the MTR/Gold Disk Program.

5.2.12.4 A/D CCA (3A1A1A3 or 3A1A3). The A/D CCA (3A1A1A3 or 3A1A3) converts rodmeter and reference input signal into digital format. This CCA is supported by the MTR/Gold Disk Program.

5.2.12.5 AN/WSN-8A (7404776) Ethernet CCA (3A1A12). [N/A to the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1)] The Ethernet CCA (3A1A12) provides status, speed, and distance information to external users in digital format via the Institute of Electrical and Electronics Engineers (IEEE) 803.2 specification. The CCA also receives navigation data provided by external sensors. This CCA is supported by the MTR/Gold Disk Program.

5.2.13 AN/WSN-8 (7093036) DEML SYNCHRO DATA OUTPUT FUNCTION. [N/A to the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML] This function provides speed and distance synchro information to DEML users. There are three 60-Hz channels and three 400-Hz channels (400-Hz N/A to the SSN 21 Class).

5.2.13.1 60-Hz D/R CCA (3A1A1A5). The 16-bit, 60-Hz D/R CCA (3A1A1A5) converts digital speed and distance signals to three 60-Hz resolver signals shown below:

- Channel 0 = 40 KPR (Knots per revolution)
- Channel 1 = 100 KPR
- Channel 2 = 360 rev/Nm (nautical mile)

This CCA is supported by the MTR/Gold Disk Program.

5.2.13.2 SSBAs (3A1A1R1, 3A1A1R2). The two 60-Hz SSBAs (3A1A1R1, 3A1A1R2) increase the drive capacity of the 40 KPR and 100 KPR outputs from the 60-Hz D/R CCA. Additionally, the SSBA converts the 60-Hz D/R CCA outputs to standard synchro format.

5.2.13.3 60-Hz Synchro Output Scott-T Transformer (3A1A5T1). The Scott-T Transformer (3A1A5T1) converts the resolver output of the 60-Hz D/R CCA to standard synchro format.

5.2.13.4 400-Hz D/S CCA (3A1A1A6). (N/A to the SSN 21 Class) The 14-bit, 400-Hz D/S converter CCA (3A1A1A6) converts digital speed signals to three discrete 400-Hz signals shown below.

- Channel 0 = 10 KPR
- Channel 1 = 40 KPR
- Channel 2 = 100 KPR

This CCA is supported by the MTR/Gold Disk Program.

5.2.13.5 Fuses (3A1A2F3, 3A1A2F4). Fuses F3 and F4 protect the 400-Hz D/S CCA (N/A to the SSN 21 Class) from overcurrent. A lighted neon lamp on a fuseholder indicates a blown fuse.

5.2.14 I/O INTERFACE TROUBLESHOOTING. If troubleshooting indicates a problem with the I/O Interface Function, refer to the I/O function fault logic diagram **Figure 5-7** and DEML System wiring diagram **Figure 5-2 (Sheet 1)** for the AN/WSN-8 (7093036) DEML. Refer to **Figure 5-12** and **Figure 5-2 (Sheet 2)** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figure 5-17** and **Figure 5-2 (Sheet 3)** for the AN/WSN-8A(V)1 (7404776) DEML. Refer to **Figure 5-22** and **Figure 5-2 (Sheet 4)** for the AN/WSN-8A(V)2 (7404776) DEML.

5.2.15 RODMETER RESISTANCE TEST. The rodmeter resistance test verifies the resistance across coil and button pins inside the cabling jack on the rodmeter; verifies the insulation resistance

from coil and button pins to shield pin inside the cabling jack on the rodmeter; and verifies the insulation resistance on the plug end of the rodmeter cabling. To perform the rodmeter resistance test, proceed as follows:

5.2.15.1 Preparation. At the I/T, remove input cables from the rodmeter.

5.2.15.2 Rodmeter Resistance. With an ohmmeter, verify the resistance across the coil and button pins inside the cabling jack on the rodmeter.

a. Measure the resistance across the coil (pins A and B or 1 and 6). Reading should be 14.25 ±1.25 ohms. Record reading in **Table 5-2**.

b. Measure the resistance across the buttons (pins C and D or 3 and 4). Reading should be 400 - 40,000 ohms and is dependent on salinity. Record reading in **Table 5-2**.

5.2.15.3 Insulation Resistance of Rodmeter. With a 50-volt megger, verify the insulation resistance from the coil and button pins to the shield pin inside the cabling jack on the rodmeter.

CAUTION

Do not megger across rodmeter coil! (Pins A and B or 1 and 6).

Measure resistance from pin E (7) (shield) to pins A (1), B (6), C (3), and D (4). Megger should read infinity (≥1M ohm). Record reading in **Table 5-3.**

5.2.15.4 Insulation Resistance of Cables. With a 50-volt megger, verify the insulation resistance on the plug end of the rodmeter cabling.

Measure resistance from A to B, C to D, E to A, E to B, E to C, E to D, and E to Ship's GND. All readings should read (≥1M ohm). Record readings in **Table 5-4.**

Table 5-1. AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) Fault Code and Diagnostic Information

FAULT	DESCRIPTION	DIAGNOSTIC INFORMATION
100	Critical internal error on the CPU card	1. Ensure CPU jumper settings are correct. 2. Replace CPU CCA (3A1A1A2 or 3A1A2).
101	CPU Interrupt Service Routine circuitry error	1. Ensure CPU jumper settings are correct. 2. Replace CPU CCA (3A1A1A2 or 3A1A2).
102	CPU flash EPROM error	1. Replace CPU CCA (3A1A1A2 or 3A1A2).
200	A/D CCA failure	1. Ensure A/D jumper settings are correct. 2. Replace A/D CCA (3A1A1A3 or 3A1A3).
201	A/D Test Signal failure	1. Ensure A/D jumper settings are correct. 2. Replace A/D CCA (3A1A1A3 or 3A1A3).
300	Rodmeter CCA failure	1. Refer to fault codes 301-305 regarding details of rodmeter CCA (3A1A4 or 3A4) failure.
301	5 VDC test invalid	1. Ensure rodmeter CCA (3A1A4 or 3A4) is installed and connectors are seated properly. 2. Ensure continuity between W2P1 and W2P3 and between W2P1 and W2P2. 3. Replace rodmeter CCA (3A1A4 or 3A4).
302	GND test invalid	1. Ensure rodmeter CCA (3A1A4 or 3A4) is installed and connectors are seated properly. 2. Ensure continuity between W2P1 and W2P3 and between W2P1 and W2P2. 3. Replace rodmeter CCA (3A1A4 or 3A4).
303	Reference invalid	1. Refer to fault codes 304 and 305 regarding details of rodmeter CCA (3A1A4 or 3A4) reference failure.
304	Reference over voltage.	1. Ensure rodmeter CCA (3A1A4 or 3A4) is installed and connectors are seated properly. 2. Ensure rodmeter continuity checks are correct. 3. Ensure continuity between W1P5 and J1, between W1P12 and J1, between W1P14 and J1, between W1P1 and W2P3, between W2P1 and W2P2, and between W1P15 and W1P13. 4. Ensure proper operation of the constant voltage transformer (3A1A1A11 or 3A1A11). 5. Ensure proper operation of the 50 VAC step-down transformer (3A1A1A10 or 3A1A10). 6. Replace rodmeter CCA (3A1A4 or 3A4).

Table 5-1. AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) Fault Code and Diagnostic Information - Continued

FAULT	DESCRIPTION	DIAGNOSTIC INFORMATION
305	Reference under voltage	1. Ensure rodmeter CCA (3A1A4 or 3A4) is installed and connectors are seated properly. 2. Ensure rodmeter continuity checks are correct. 3. Ensure continuity between W1P5 and J1, between W1P12 and J1, between W1P14 and J1, between W1P1 and W2P3, between W2P1 and W2P2, and between W1P15 and W1P13. 4. Ensure proper operation of the constant voltage transformer (3A1A1A11 or 3A1A11). 5. Ensure proper operation of the 50 VAC step-down transformer (3A1A1A10 or 3A1A10). 6. Replace rodmeter CCA (3A1A4 or 3A4).
400	Ethernet CCA failure	1. Ensure Ethernet CCA (3A1A12) is installed and connectors are seated properly. 2. Replace Ethernet CCA (3A1A12) and return faulty asset to the ISEA.
500	MIL-STD-1553B CCA failure	1. Ensure MIL-STD-1553B CCA (3A1A1A4) jumpers are set correctly, and CCA is installed properly. 2. Replace MIL-STD-1553B CCA (3A1A1A4).
600	Synchro subsystem failure	1. Follow steps for additional fault codes 601-610.
601	60-Hz D/R CCA failure	1. Ensure 60-Hz D/R CCA (3A1A1A5) jumpers are set correctly, and CCA is installed properly. 2. 2. Replace 60-Hz D/R CCA (3A1A1A5).
602	400-Hz D/S CCA failure	1. Ensure 400-Hz D/S CCA (3A1A1A6) jumpers are set correctly, and CCA is installed properly. 2. Replace 400-Hz D/S CCA (3A1A1A6).
603	SSBA 1 failure	1. Ensure continuity between W1P19 and W1P23. 2. Replace SSBA 1 (3A1AR1).
604	SSBA 2 failure	1. Ensure continuity between W1P19 and W1P24. 2. Replace SSBA 2 (3A1AR2).
605	Synchro 60-Hz channel 0 reference loss	1. Ensure continuity between W1P19 and A2F1/A2F2. 2. Replace 60-Hz D/R CCA (3A1A1A5).
606	Synchro 60-Hz channel 1 reference loss	1. Ensure continuity between W1P19 and A2F1/A2F2. 2. Replace 60-Hz D/R CCA (3A1A1A5).

Table 5-1. AN/WSN-8A (7404776) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) Fault Code and Diagnostic Information - Continued

FAULT	DESCRIPTION	DIAGNOSTIC INFORMATION
607	Synchro 60-Hz channel 2 reference loss	1. Ensure continuity between W1P19 and A2F1/A2F2. 2. Replace 60-Hz D/R CCA (3A1A1A5).
608	Synchro 400-Hz channel 0 reference loss	1. Ensure continuity between W1P19 and A2F3/A2F4. 2. Replace 400-Hz D/S CCA (3A1A1A6).
609	Synchro 400-Hz channel 1 reference loss	1. Ensure continuity between W1P19 and A2F3/A2F4. 2. Replace 400-Hz D/S CCA (3A1A1A6).
610	Synchro 400-Hz channel 2 reference loss	1. Ensure continuity between W1P19 and A2F3/A2F4. 2. Replace 400-Hz D/S CCA (3A1A1A6).
700	AN/USQ-82(V) FODMS Interface failure	1. Ensure interface is enabled at FODMS. 2. Ensure continuity between W1P17 and J13 and between A1W2J6 and A1A2J9. 3. Replace CPU CCA (3A1A2).
701	AN/SSN-6(V) Navigation Sensor System Interface (NAVSSI) Interface failure	1. Ensure interface is enabled at NAVSSI. 2. Ensure continuity between W3P2 and W3P1. 3. Replace Ethernet CCA (3A1A12).
702	AN/WSN-7(V) RLGN 1 Interface failure	1. Ensure interface is enabled at RLGN. 2. Ensure continuity between W1P17 and J13 and between A1W2J6 and A1A2J9. 3. Replace CPU CCA (3A1A2).
703	AN/WSN-7(V) RLGN 2 Interface failure	1. Ensure interface is enabled at RLGN. 2. Ensure continuity between W1P18 and J14 and between A1W3J7 and A1A214. 3. Replace CPU CCA (3A1A2).
704	MIL-STD-1553B Interface failure	1. Ensure MIL-STD-1553B bus controller in online, and DEML interface is enabled. 2. Ensure continuity between W8P1 and J8/J9. 3. Replace MIL-STD-1553B CCA (3A1A1A4).

Table 5-2. Rodmeter Resistance

RODMETER RESISTANCE				
	A & B (Coil) 14.25 ±1.25 ohms	C & D (Buttons) 400 - 40,000 ohms	S/N	Sensitivity
Rodmeter				
Spare				

Table 5-3. Insulation Resistance/Rodmeter

INSULATION RESISTANCE/RODMETER				
All ≥ 1MΩ	A - E	B - E	C - E	D - E
Rodmeter				
Spare				

Table 5-4. Insulation Resistance/Cables

INSULATION RESISTANCE/CABLES							
All ≥ 1MΩ	A - E	C - D	A - E	B - E	C - E	D - E	E to GND
I/T #1							
I/T #2							

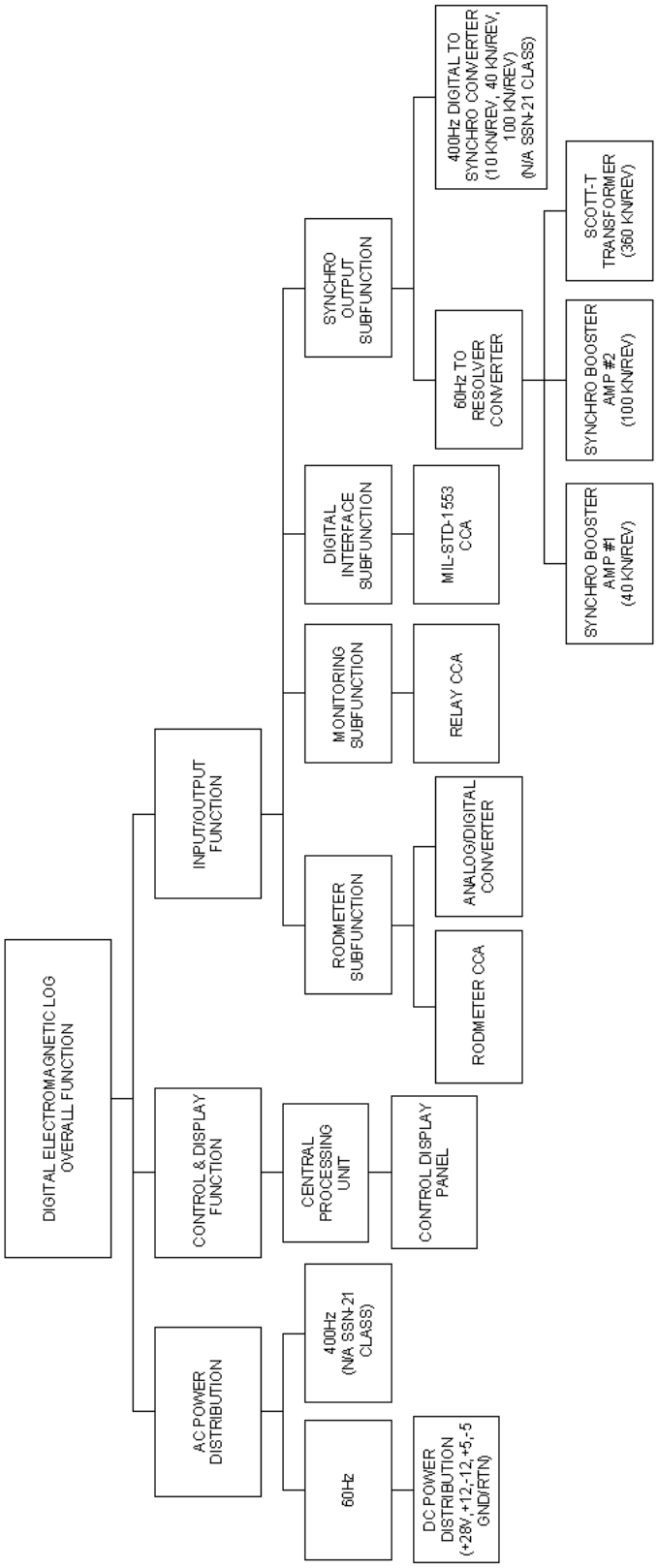

Figure 5-1. DEML Overall Functional Tree (Sheet 1 of 2)

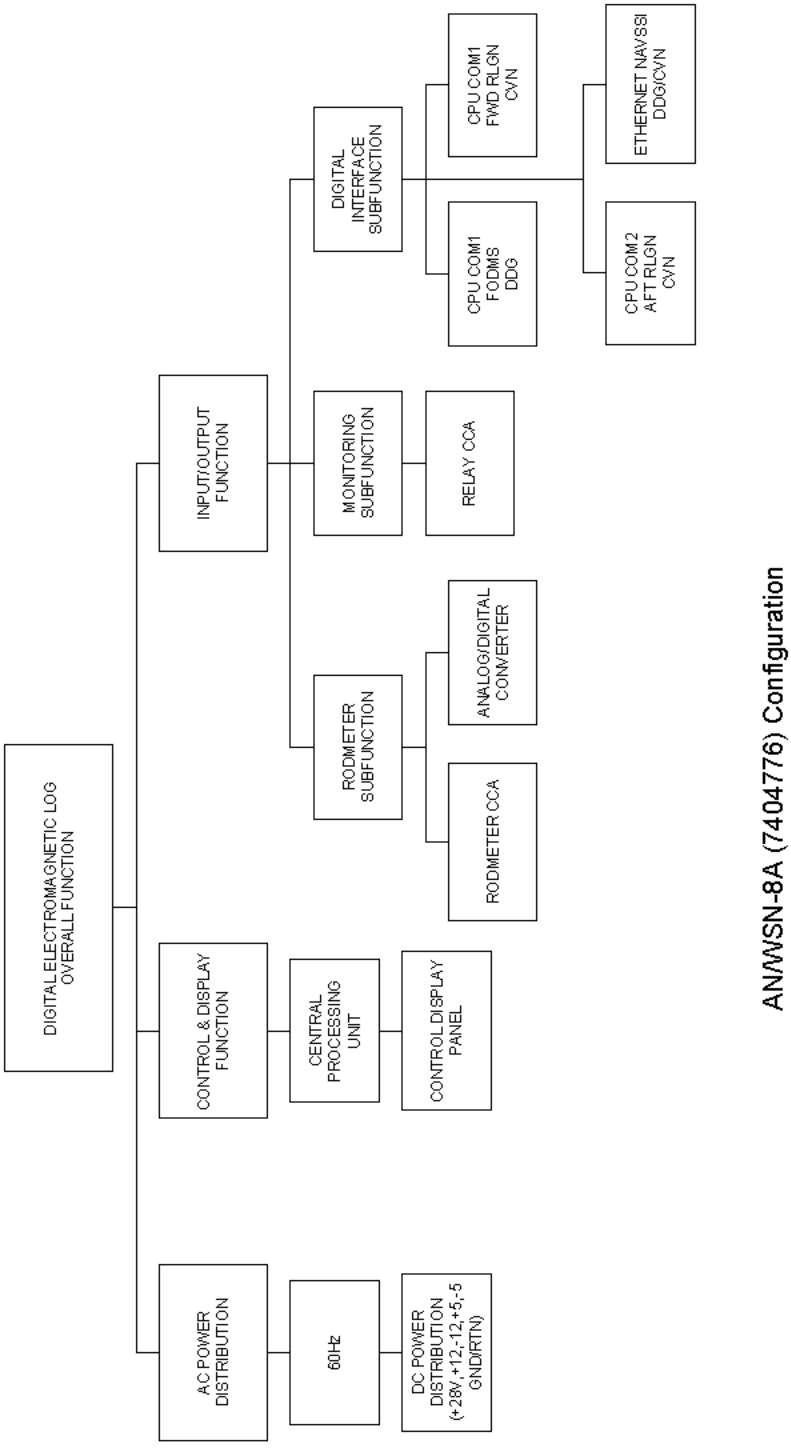

Figure 5-1. DEML Overall Functional Tree (Sheet 2)

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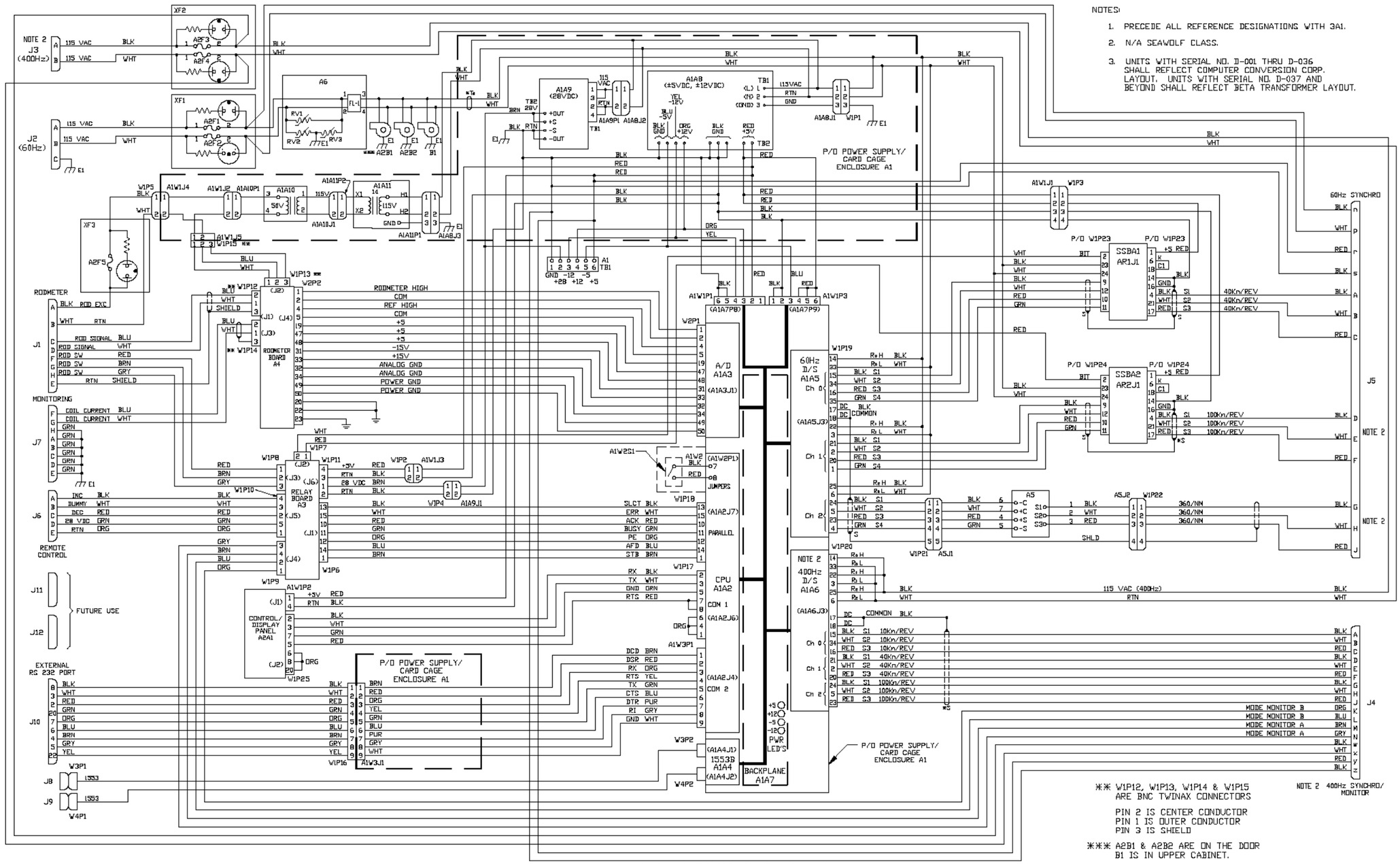

Figure 5-2. DEML System Wiring Diagram (Sheet 1 of 4)
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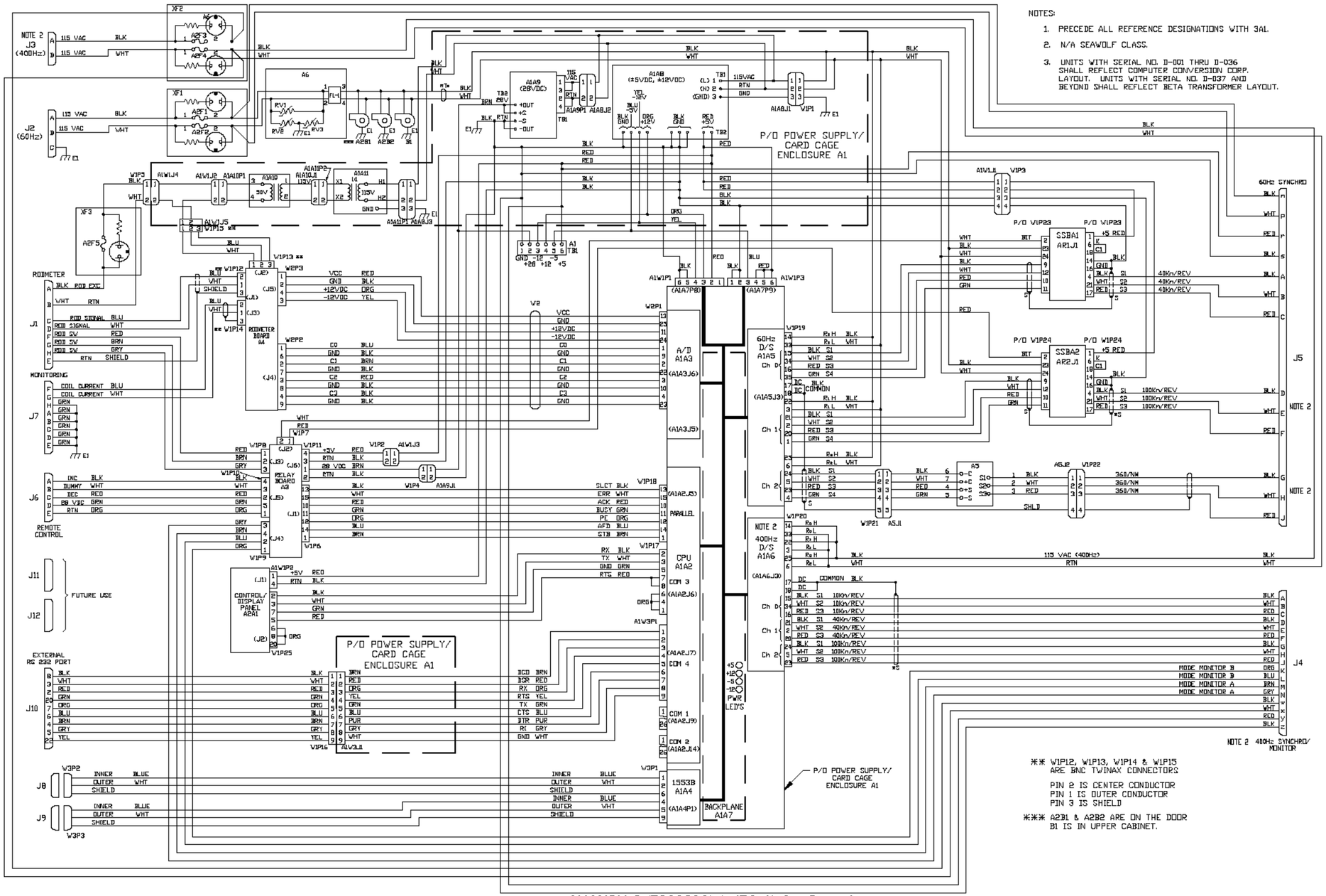

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 5-2. DEML System Wiring Diagram (Sheet 2)
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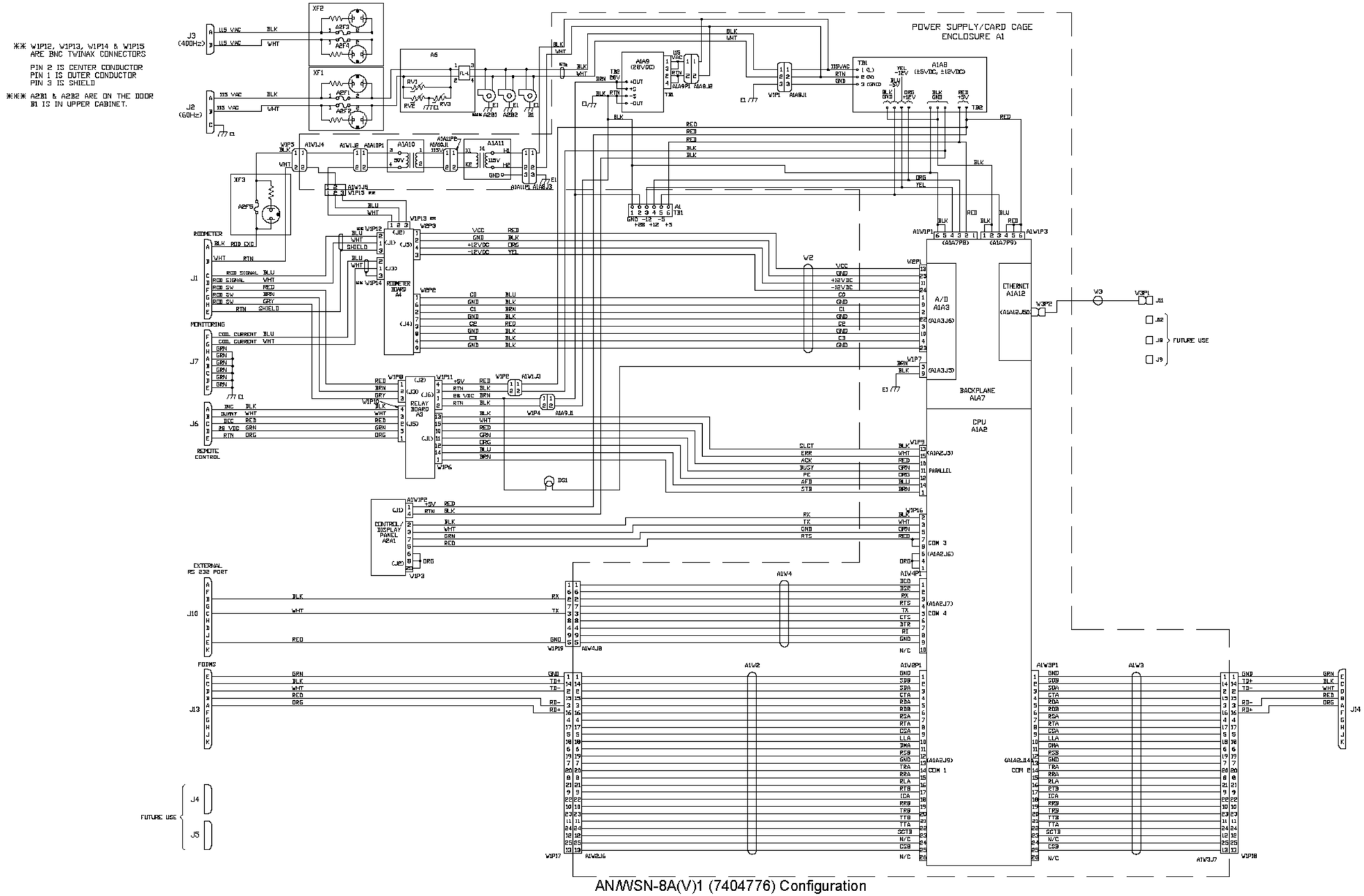

Figure 5-2. DEML System Wiring Diagram (Sheet 3)
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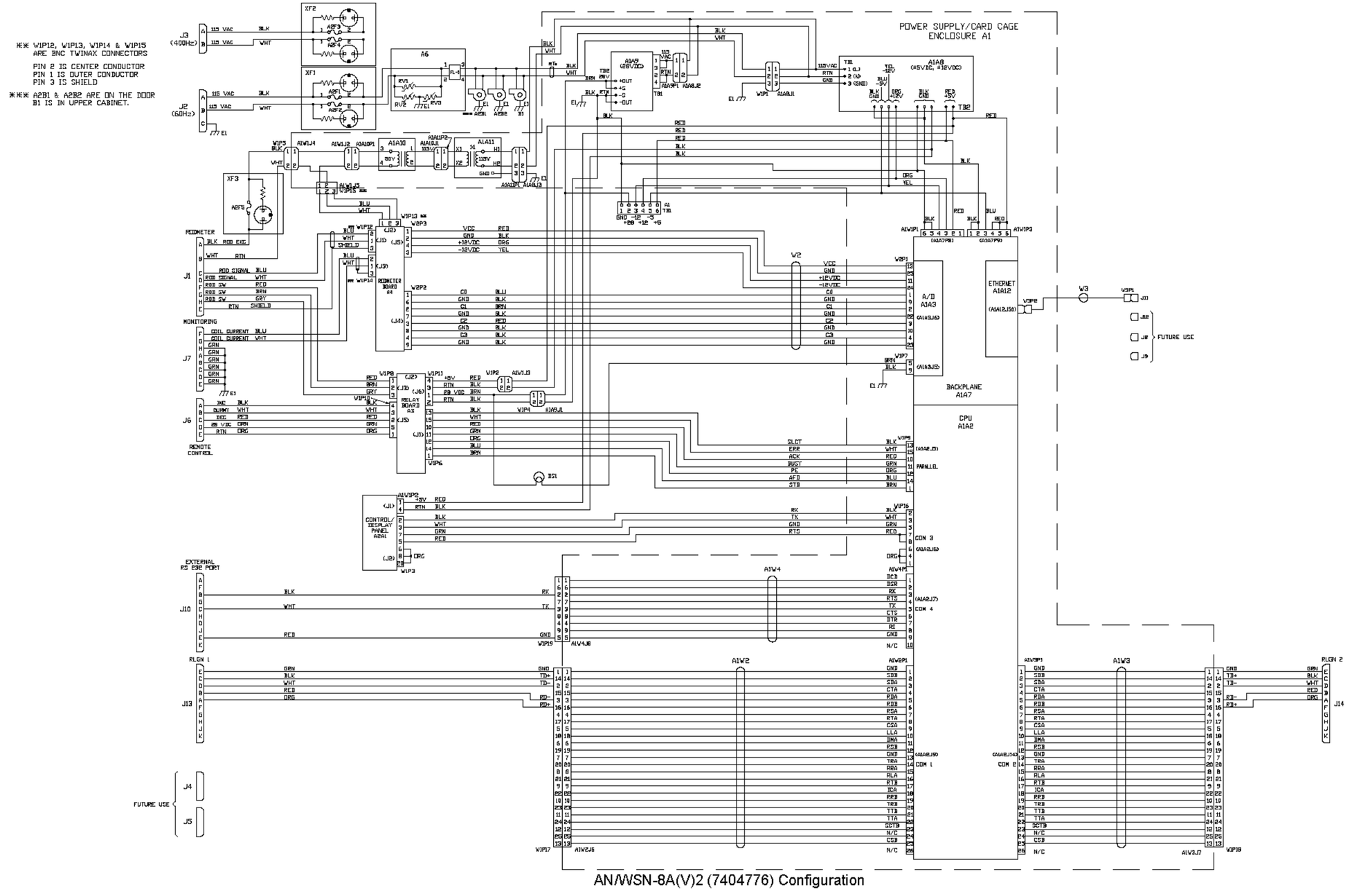

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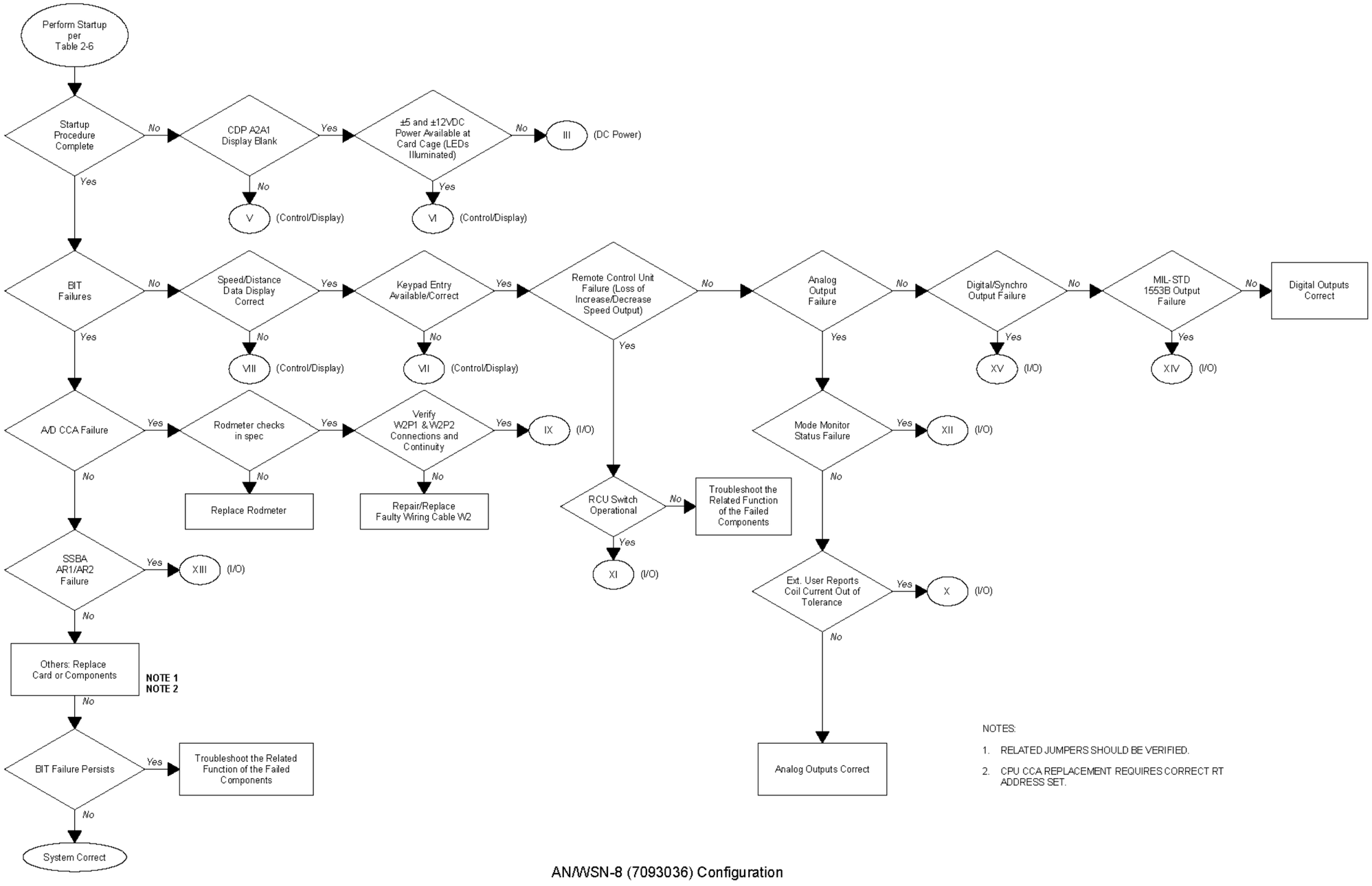

AN/WSN-8 (7093036) Configuration

Figure 5-3. AN/WSN-8 (7093036) Overall Fault Logic Diagram

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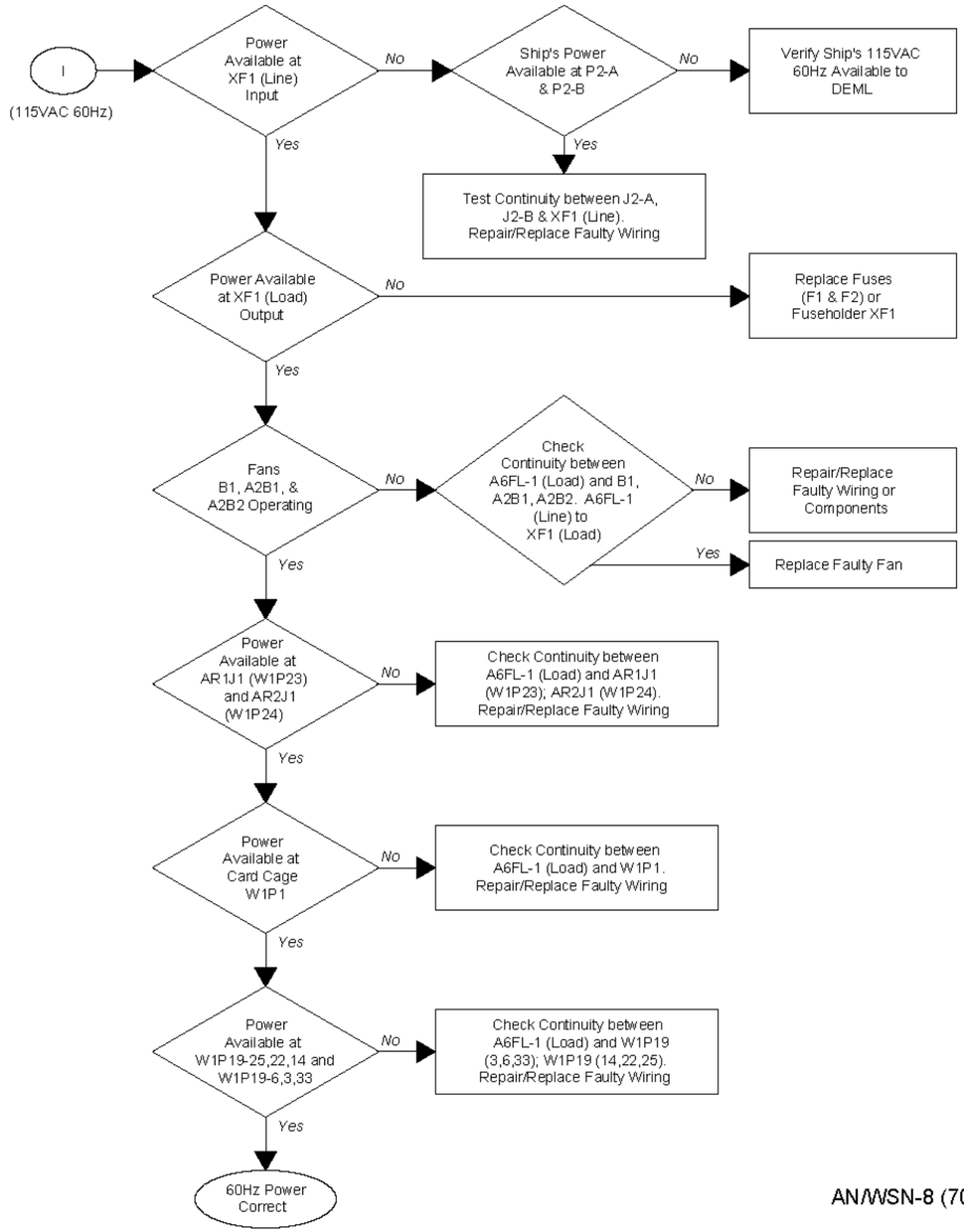

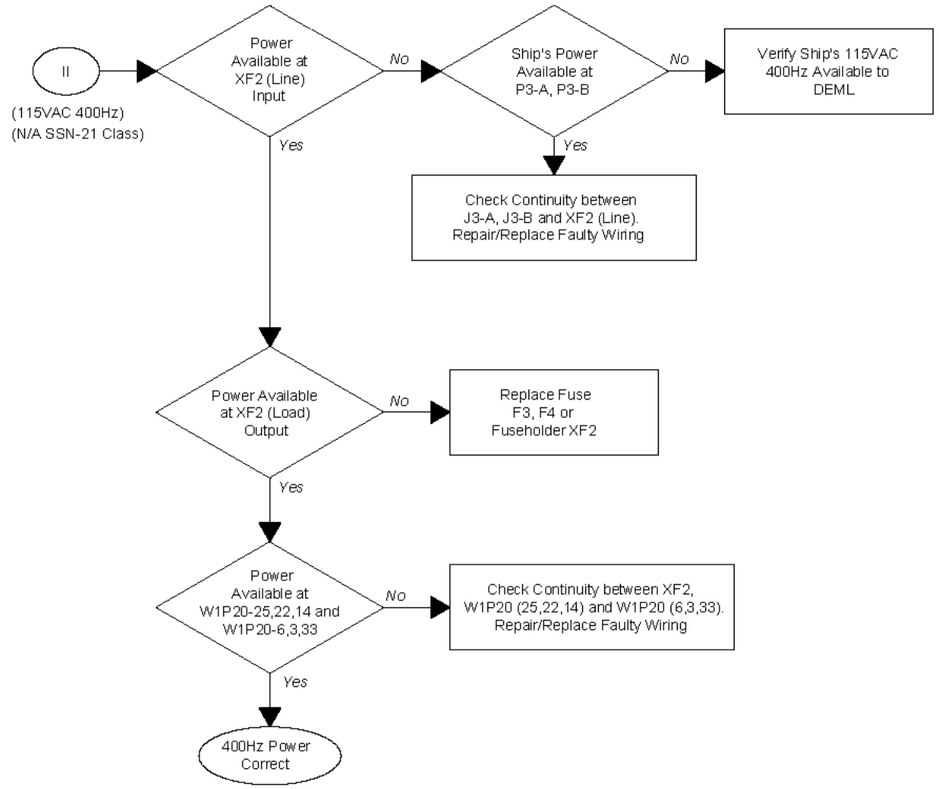

AN/WSN-8 (7093036) Configuration

Figure 5-4. AN/WSN-8 (7093036) AC Power Distribution Fault Logic Diagram

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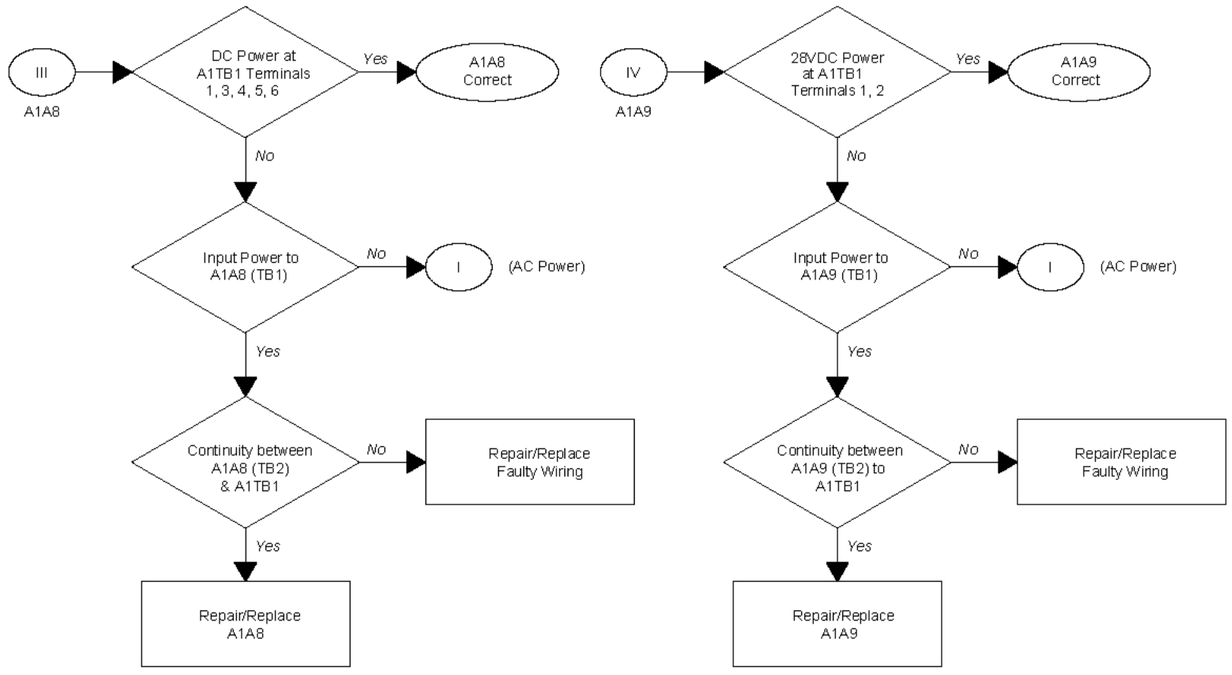

AN/WSN-8 (7093036) Configuration

Figure 5-5. AN/WSN-8 (7093036) DC Power Distribution Fault Logic Diagram

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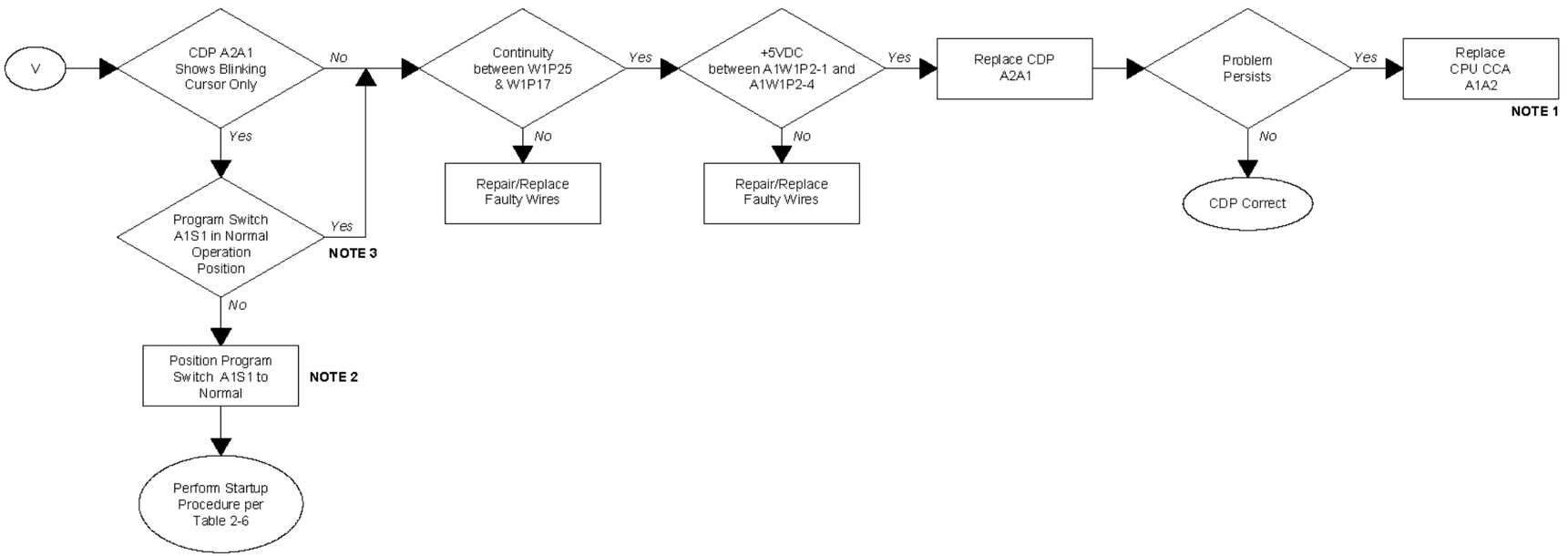
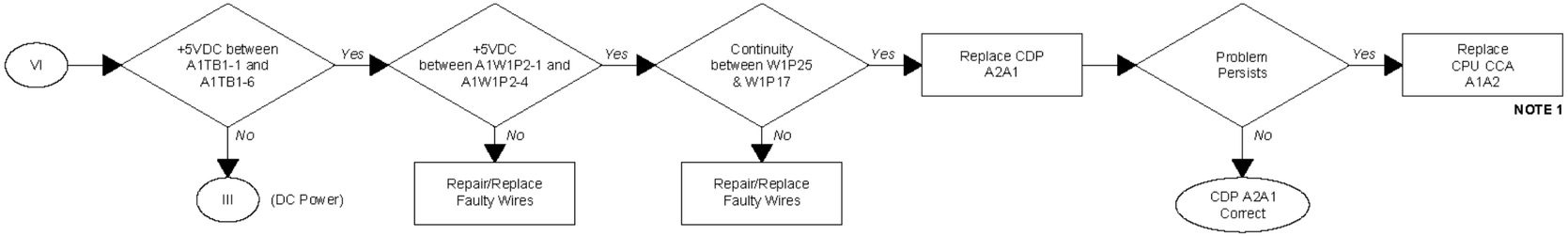
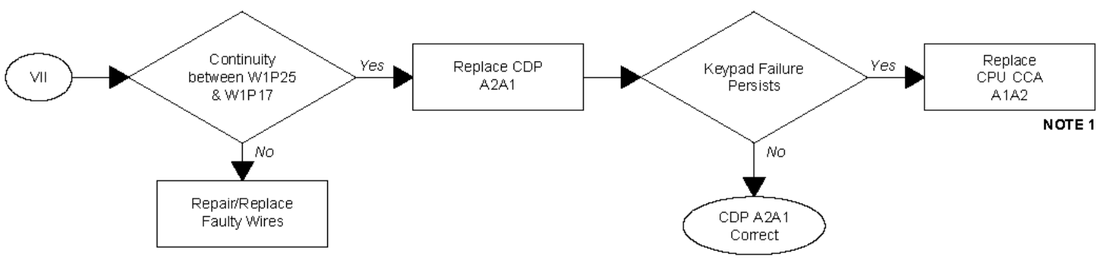
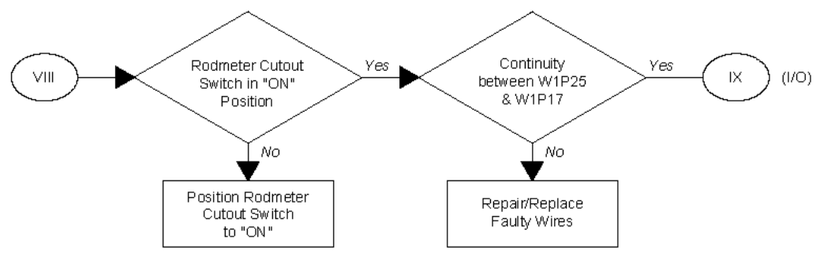


NOTES:

1. CPU CCA REPLACEMENT REQUIRES CORRECT RT ADDRESS SET FOR AN/WSN-8 DEML (7093036).
2. PERFORM DEML SHUTDOWN PRIOR TO REPOSITIONING PROGRAM SWITCH FOR AN/WSN-8 DEML (7093036).
3. PROGRAM SWITCH N/A TO THE AN/WSN-8A (7404776) DEML.







AN/WSN-8 (7093036) Configuration

Figure 5-6. AN/WSN-8 (7093036) Control Display Function Fault Logic Diagram

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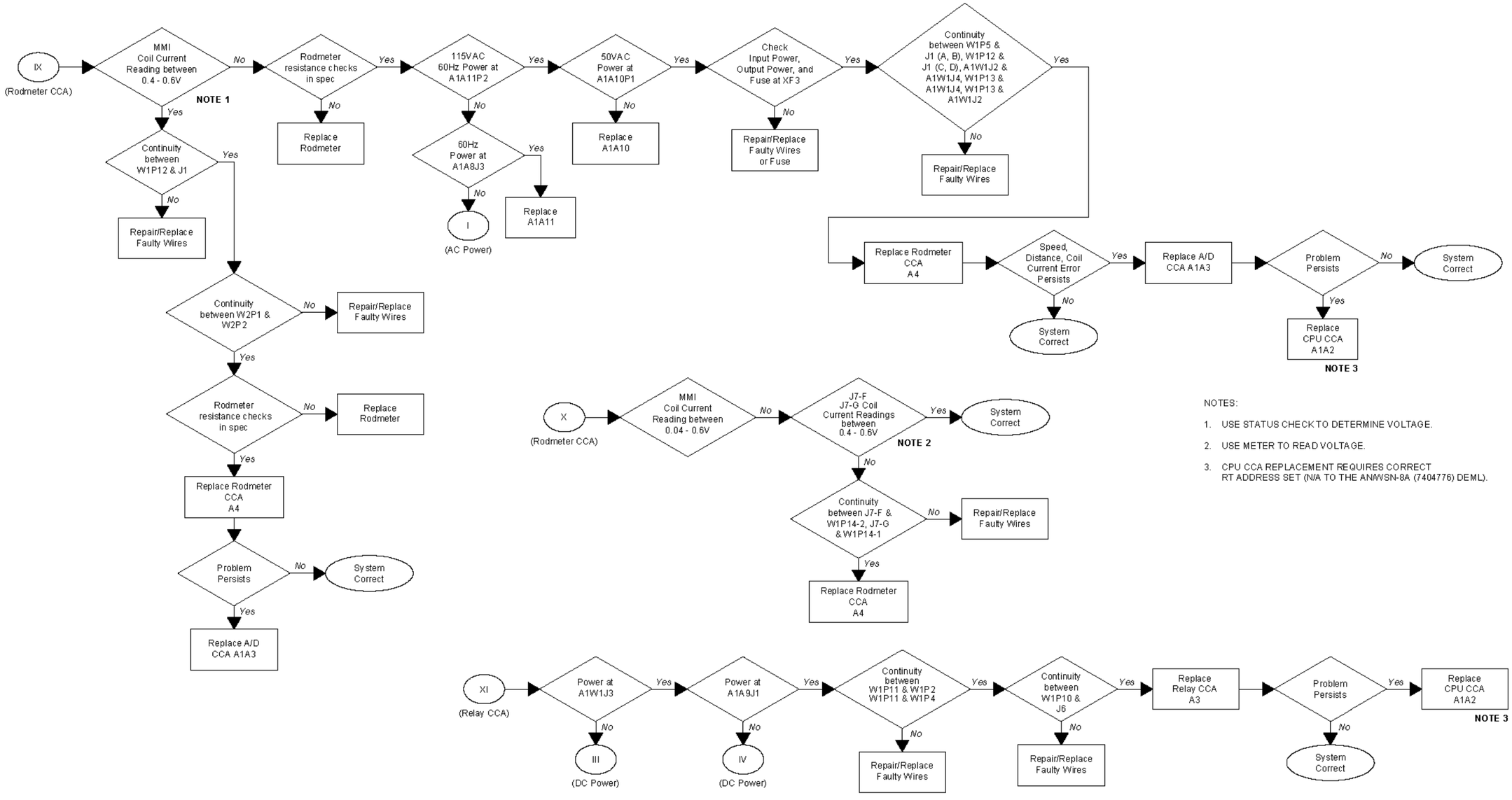

NOTES:

1. USE STATUS CHECK TO DETERMINE VOLTAGE.
2. USE METER TO READ VOLTAGE.
3. CPU CCA REPLACEMENT REQUIRES CORRECT RT ADDRESS SET (N/A TO THE AN/WSN-8A (7404776) DEML).

AN/WSN-8 (7093036) Configuration

Figure 5-7. AN/WSN-8 (7093036) I/O Function Fault Logic Diagram (Sheet 1 of 3)

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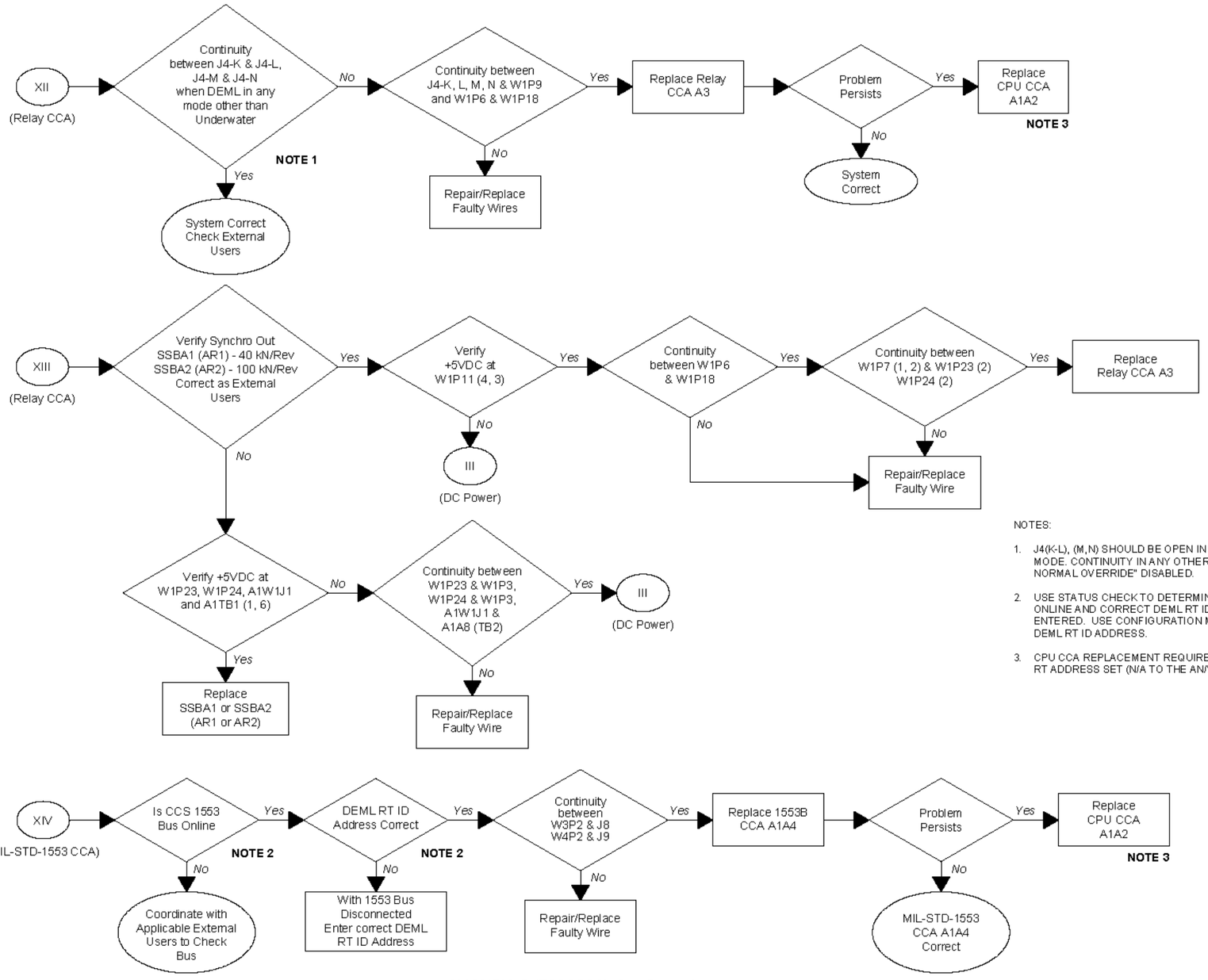

AN/WSN-8 (7093036) Configuration

Figure 5-7. AN/WSN-8 (7093036) I/O Function Fault Logic Diagram (Sheet 2)

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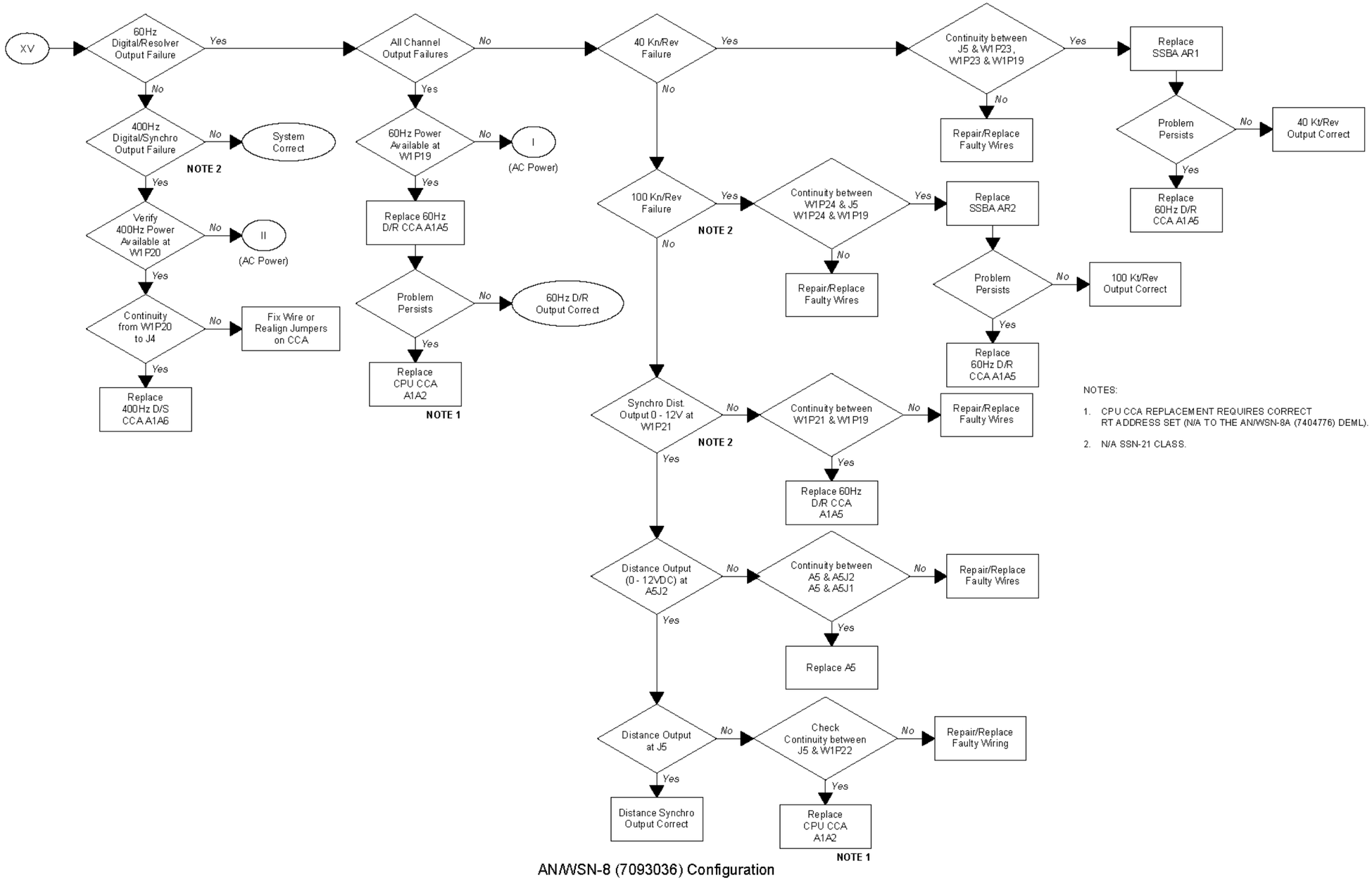

AN/WSN-8 (7093036) Configuration

Figure 5-7. AN/WSN-8 (7093036) I/O Function Fault Logic Diagram (Sheet 3)

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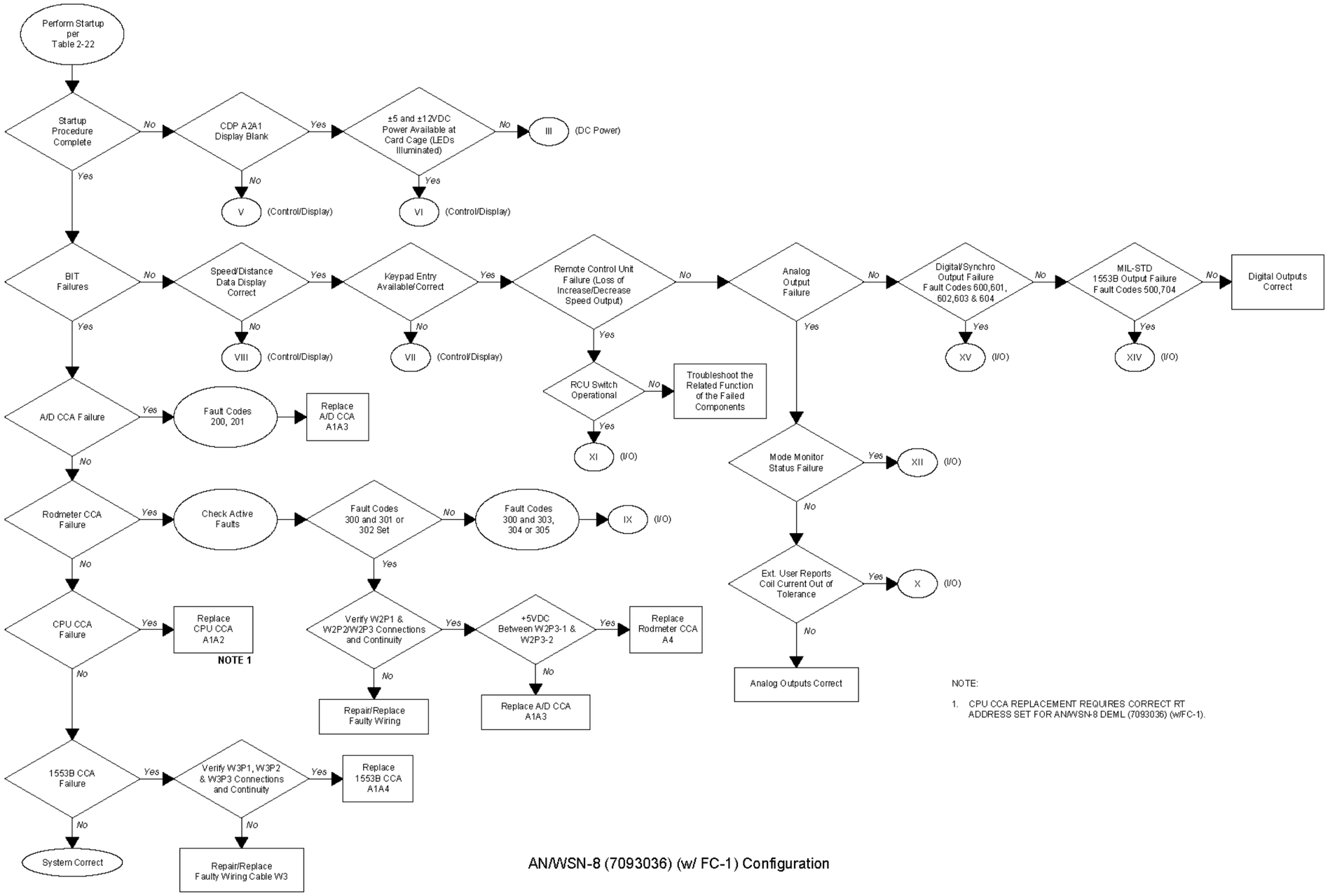

AN/WSN-8 (7093036) (w/ FC-1) Configuration

Figure 5-8. AN/WSN-8 (7093036) (w/FC-1) Overall Fault Logic Diagram

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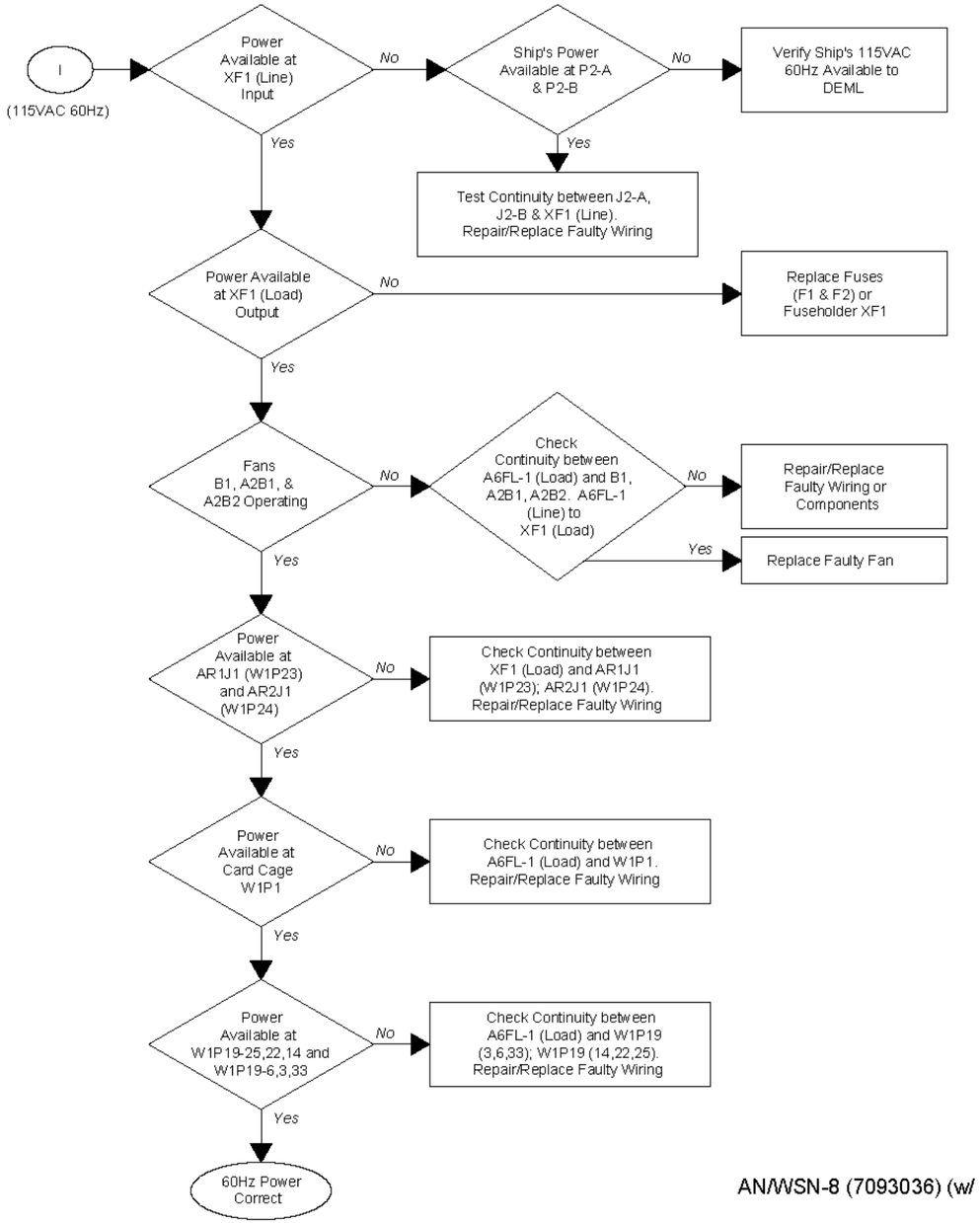

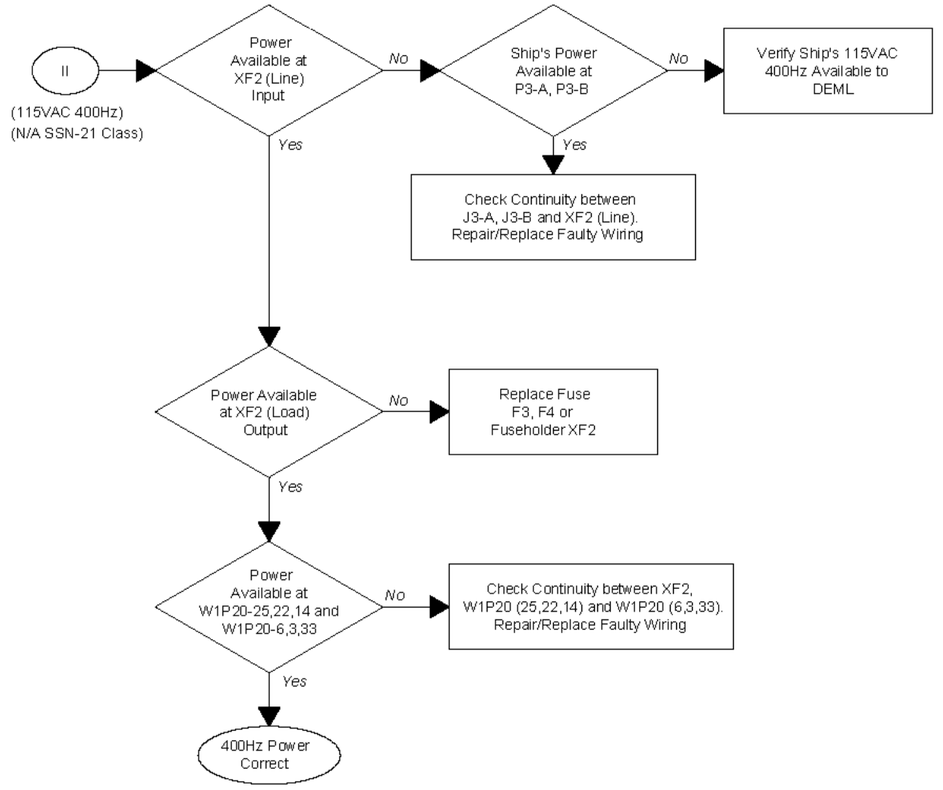

AN/WSN-8 (7093036) (w/ FC-1) Configuration

Figure 5-9. AN/WSN-8 (7093036) (w/FC-1) AC Power Distribution Fault Logic Diagram

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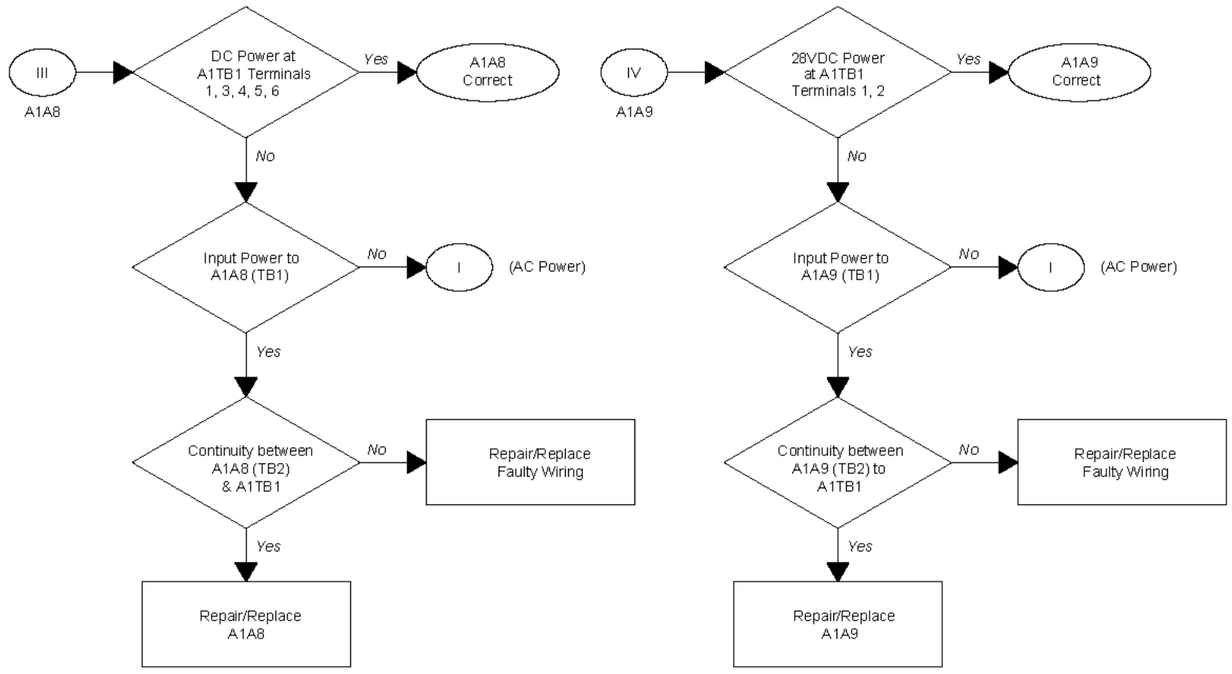

AN/WSN-8 (7093036) (w/ FC-1) Configuration

Figure 5-10. AN/WSN-8 (7093036) (w/FC-1) DC Power Distribution Fault Logic Diagram

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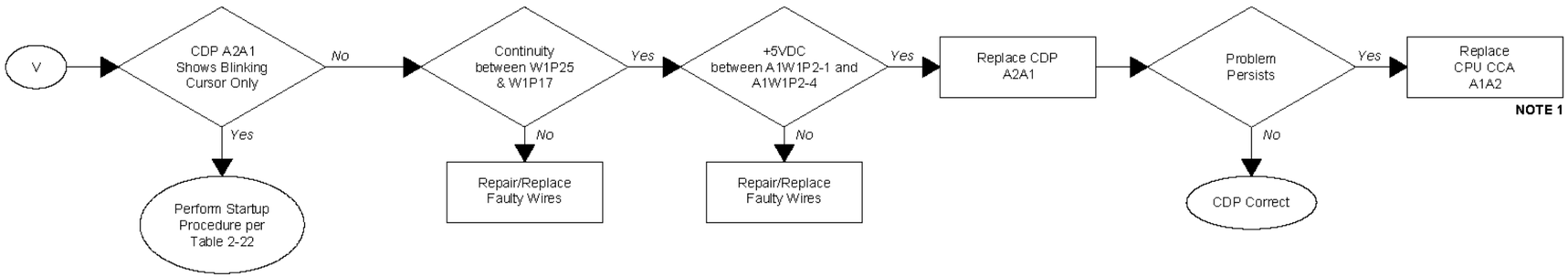
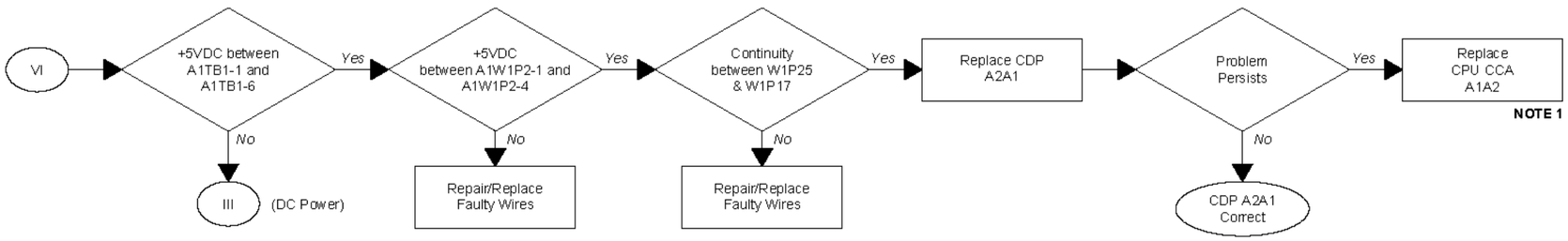
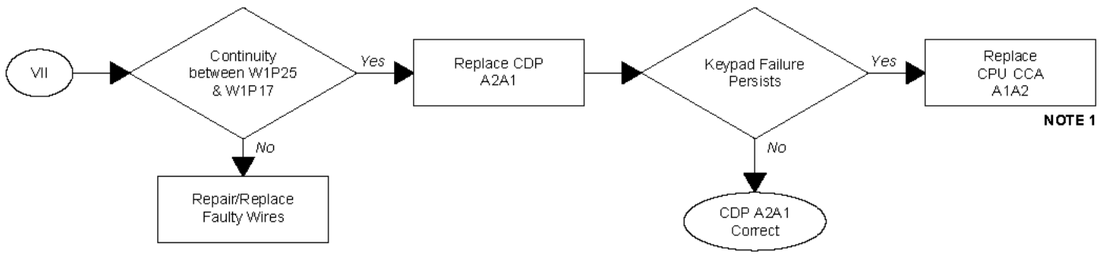
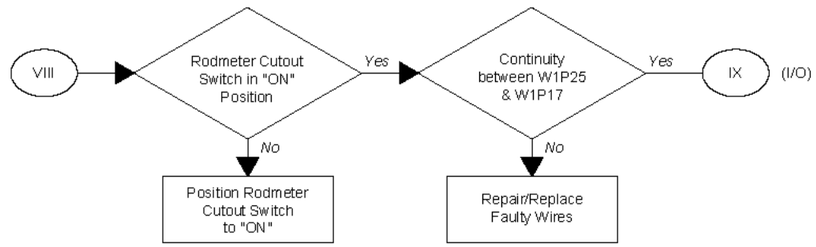


NOTE:

1. CPU CCA REPLACEMENT REQUIRES CORRECT RT ADDRESS SET FOR AN/WSN-8 DEML (7093036) (w/FC-1).







AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 5-11. AN/WSN-8 (7093036) (w/FC-1) Control Display Function Fault Logic Diagram

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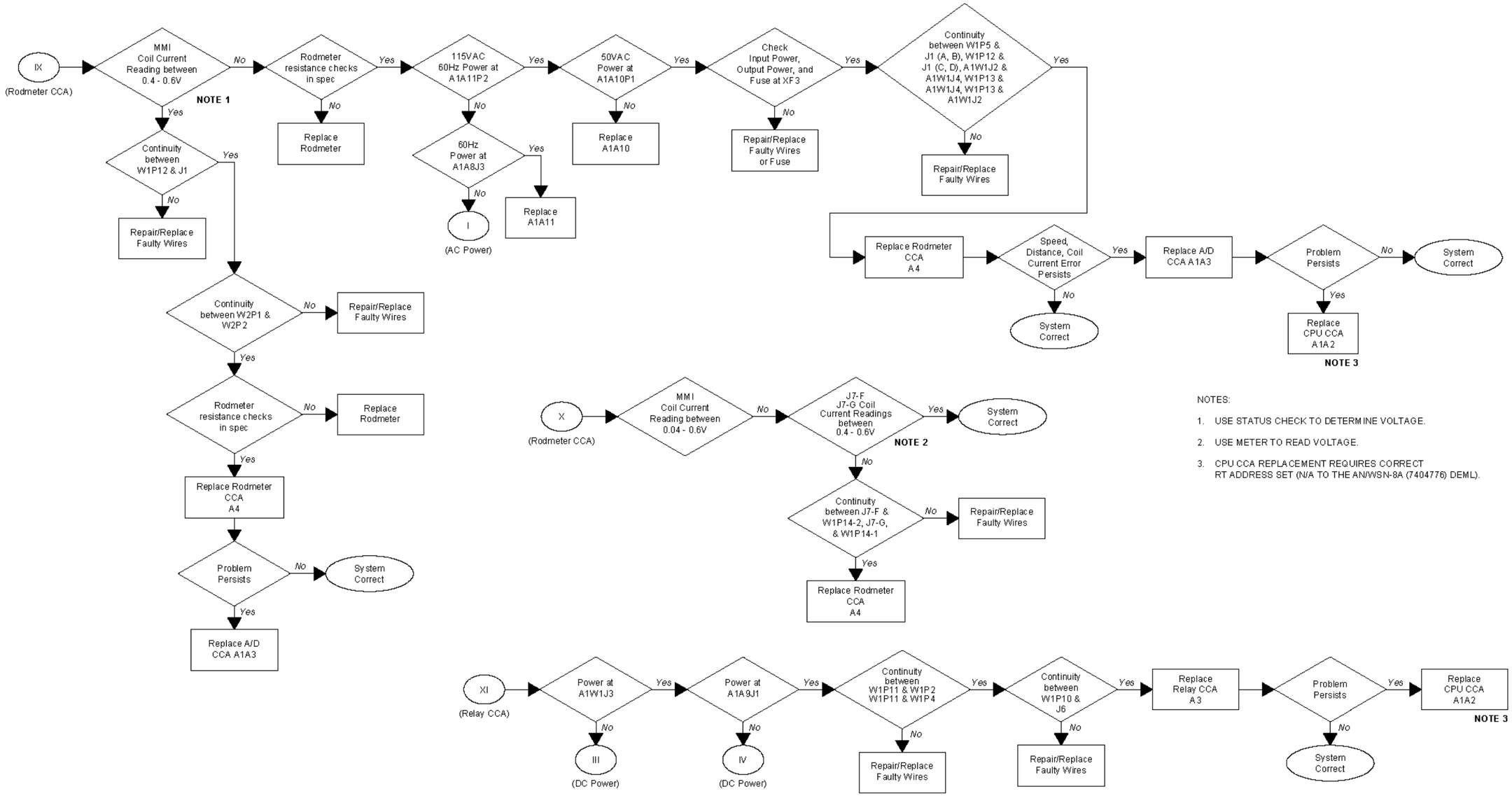

NOTES:

1. USE STATUS CHECK TO DETERMINE VOLTAGE.
2. USE METER TO READ VOLTAGE.
3. CPU CCA REPLACEMENT REQUIRES CORRECT RT ADDRESS SET (N/A TO THE AN/WSN-8A (7404776) DEML).

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 5-12. AN/WSN-8 (7093036) (w/FC-1) I/O Function Fault Logic Diagram (Sheet 1 of 3)

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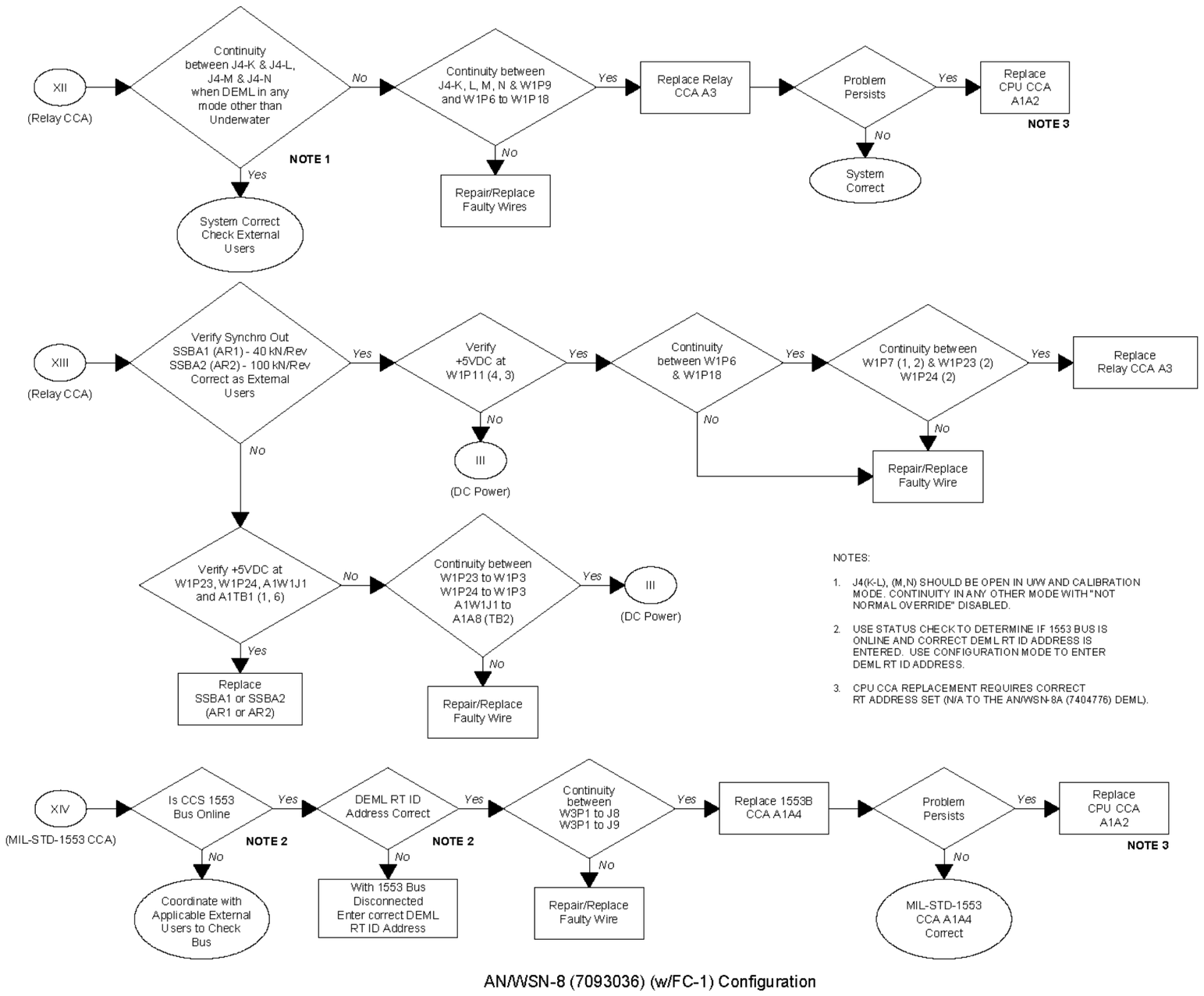

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 5-12. AN/WSN-8 (7093036) (w/FC-1) I/O Function Fault Logic Diagram (Sheet 2)

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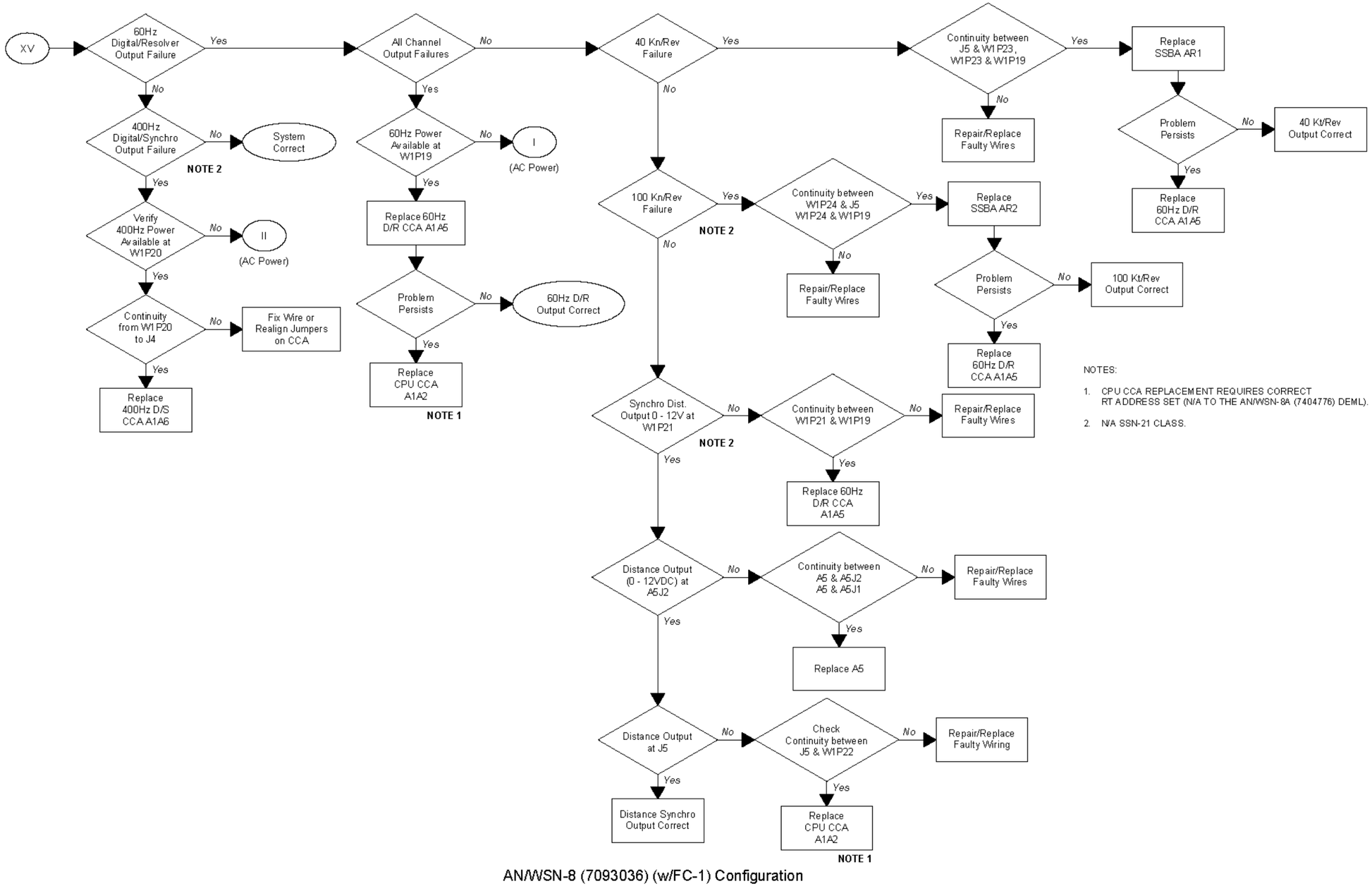

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 5-12. AN/WSN-8 (7093036) (w/FC-1) I/O Function Fault Logic Diagram (Sheet 3)

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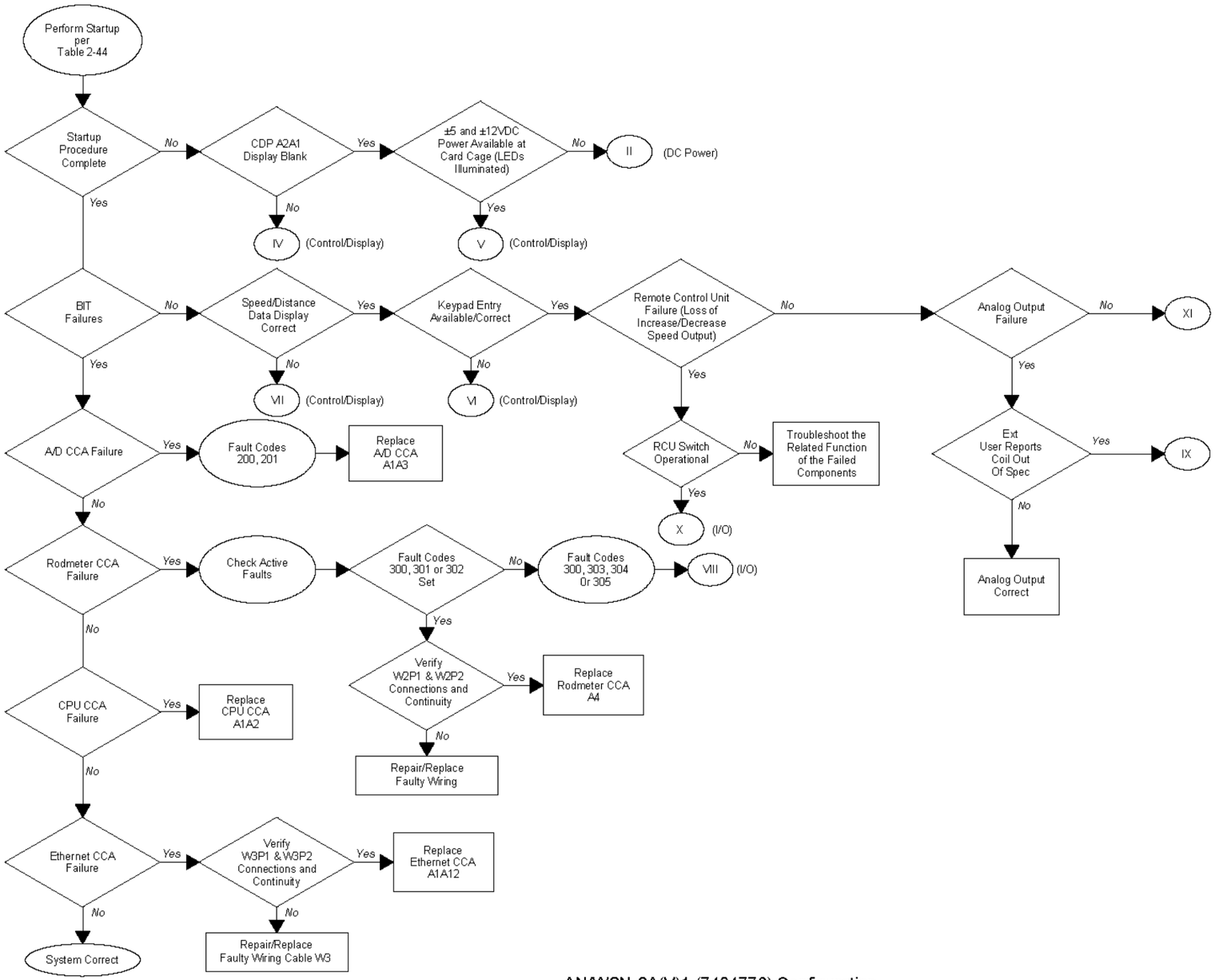

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-13. AN/WSN-8A(V)1 (7404776) Overall Fault Logic Diagram

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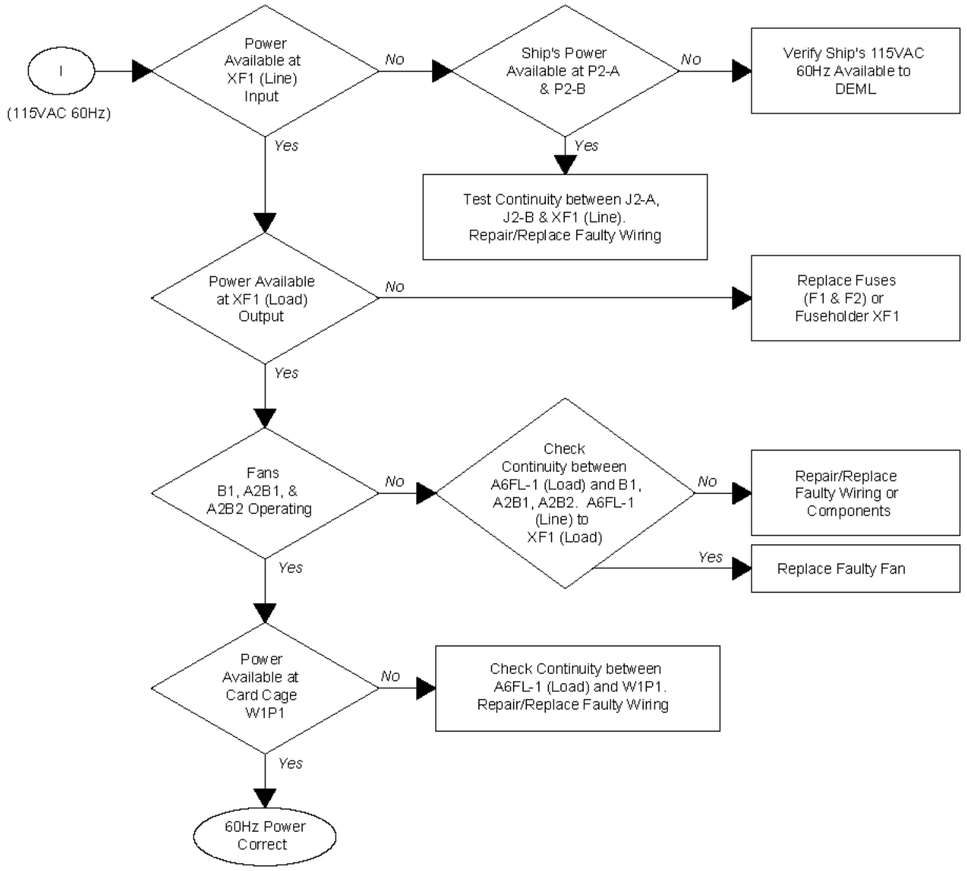

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-14. AN/WSN-8A(V)1 (7404776) AC Power Distribution Fault Logic Diagram

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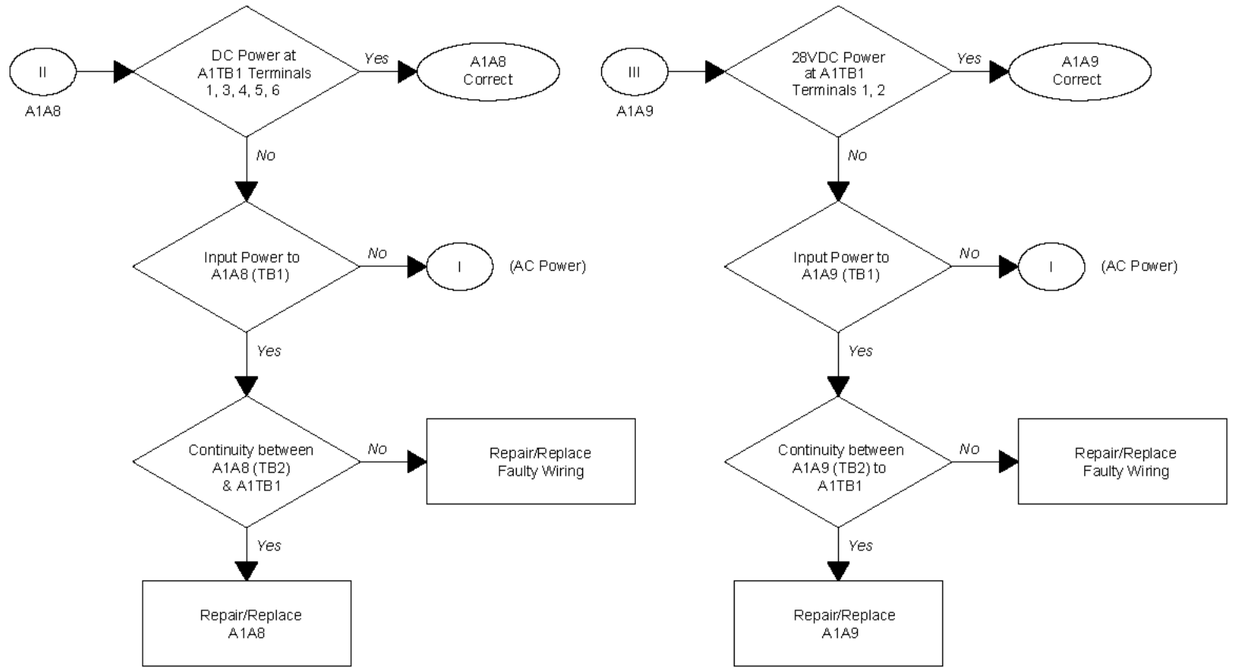

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-15. AN/WSN-8A(V)1 (7404776) DC Power Distribution Fault Logic Diagram

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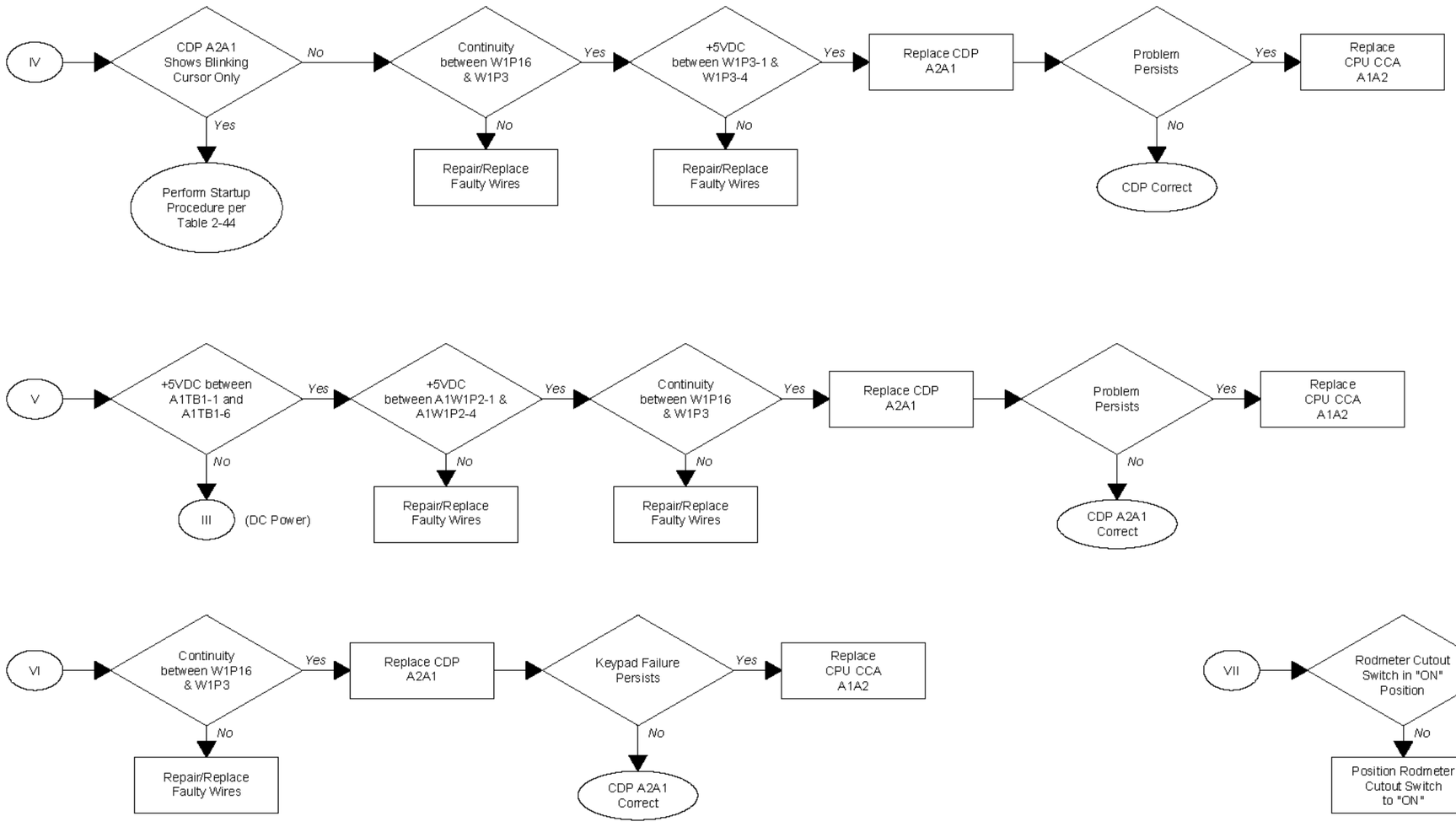

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-16. AN/WSN-8A(V)1 (7404776) Control Display Function Fault Logic Diagram

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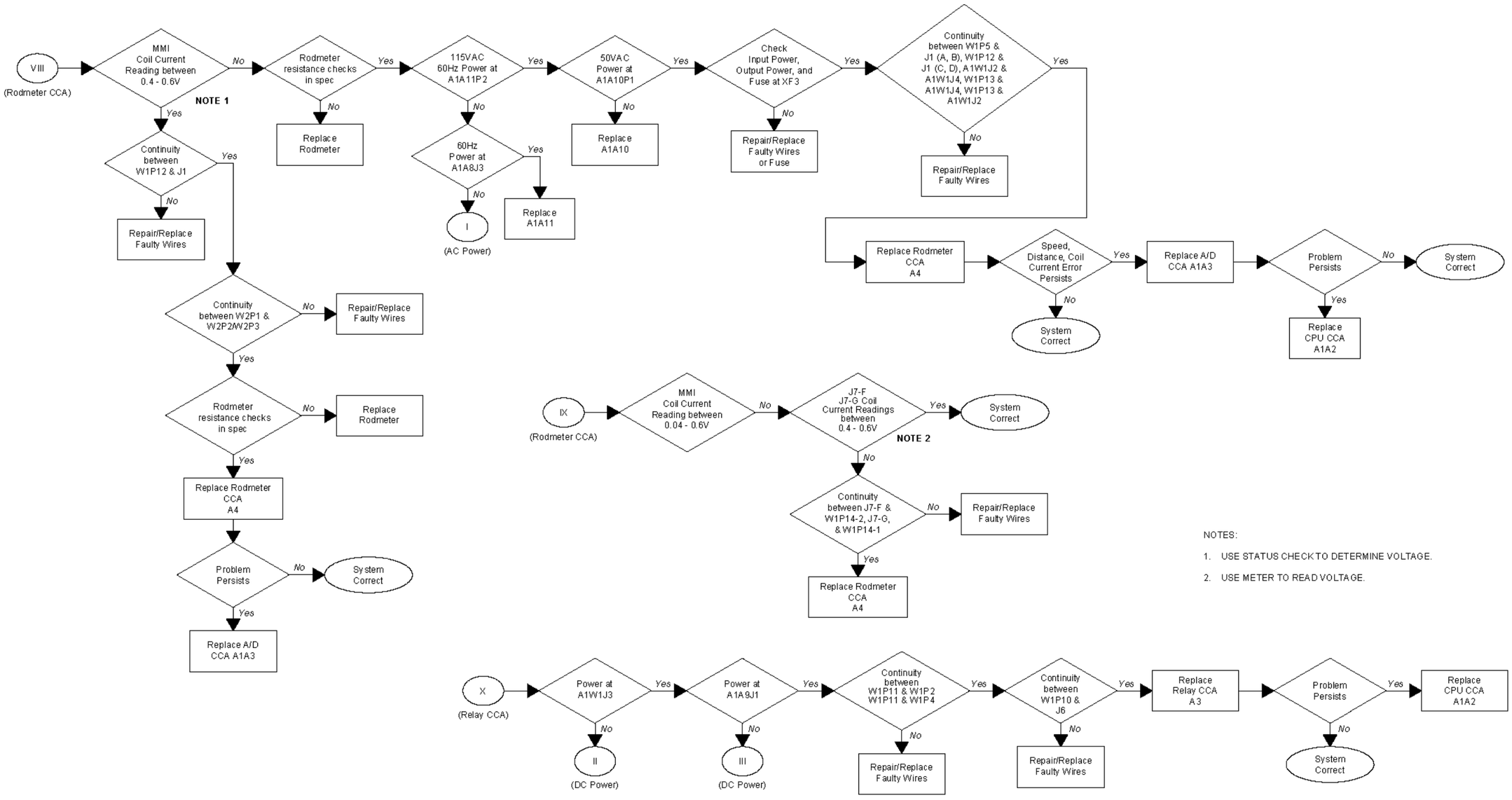

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-17. AN/WSN-8A(V)1 (7404776) I/O Function Fault Logic Diagram (Sheet 1 of 2)

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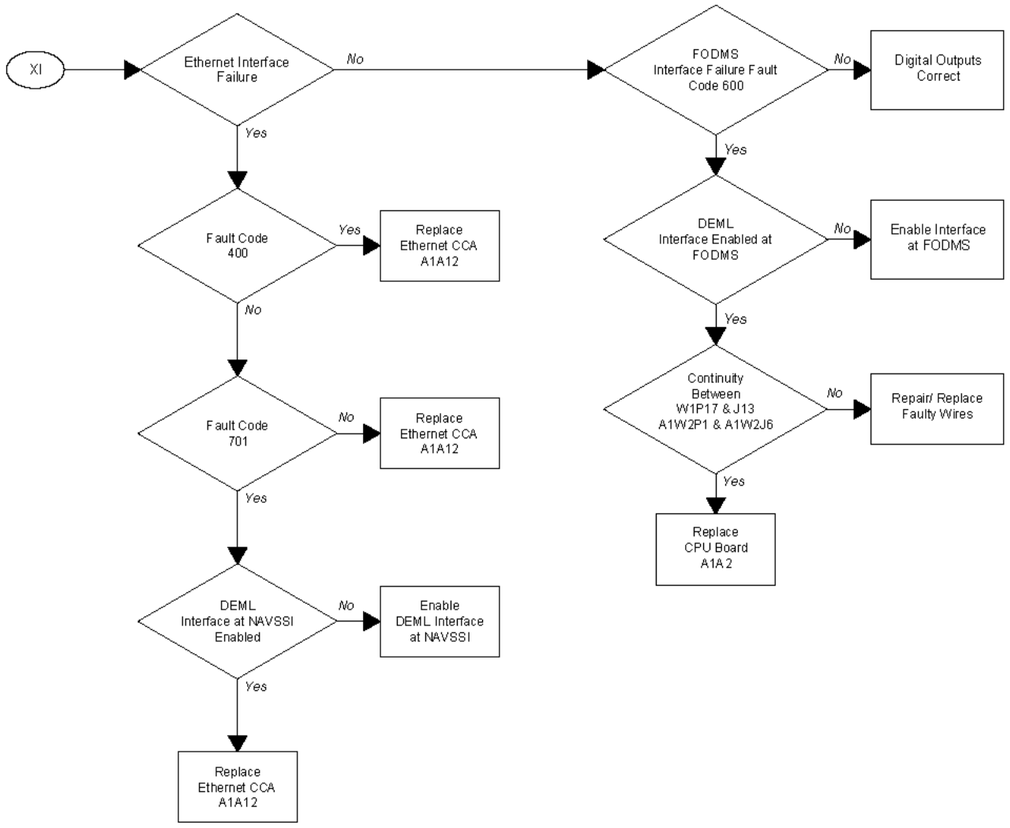

AN/WSN-8A(V)1 (7404776) Configuration

Figure 5-17. AN/WSN-8A(V)1 (7404776) I/O Function Fault Logic Diagram (Sheet 2)

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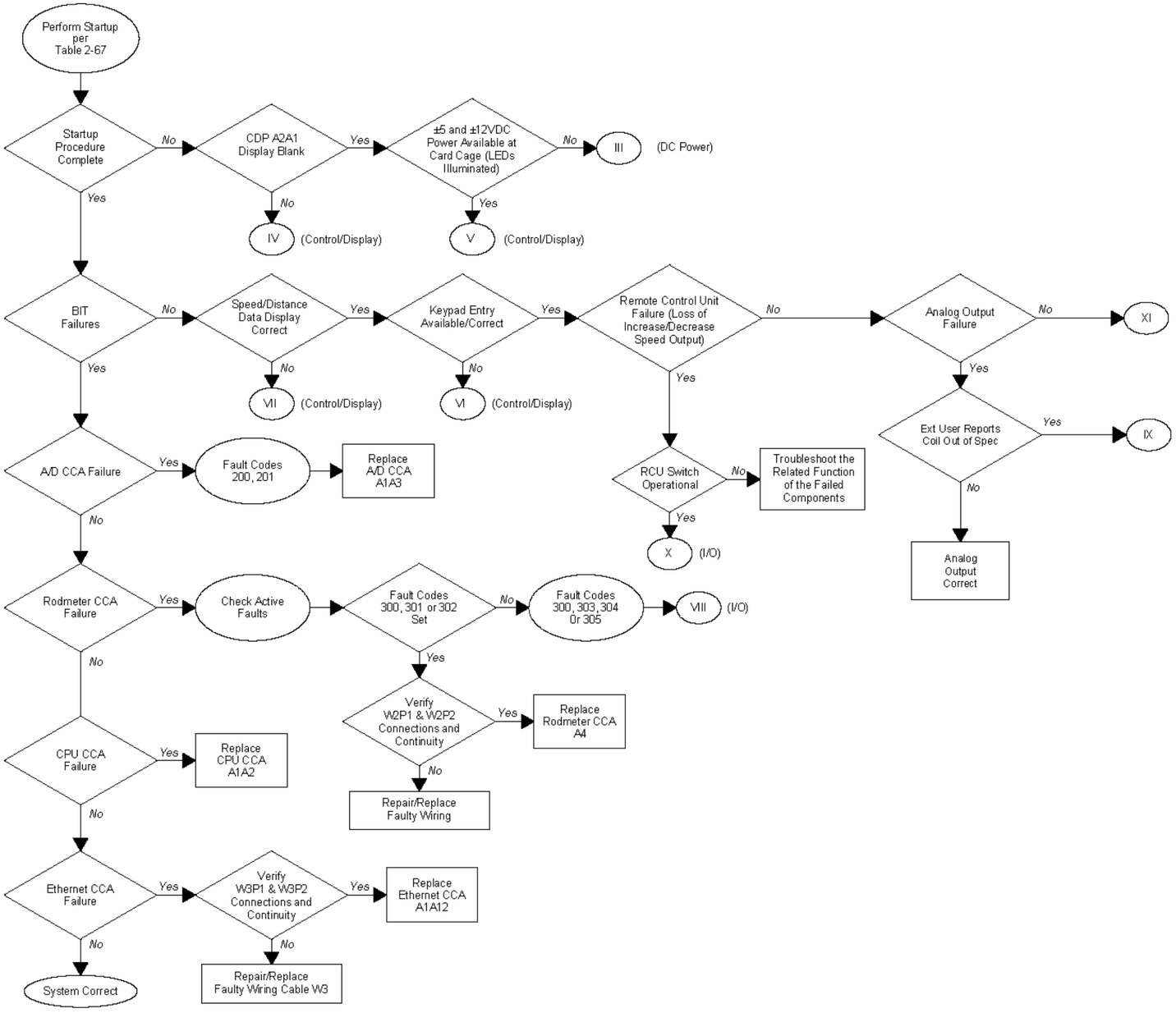

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-18. AN/WSN-8A(V)2 (7404776) Overall Fault Logic Diagram

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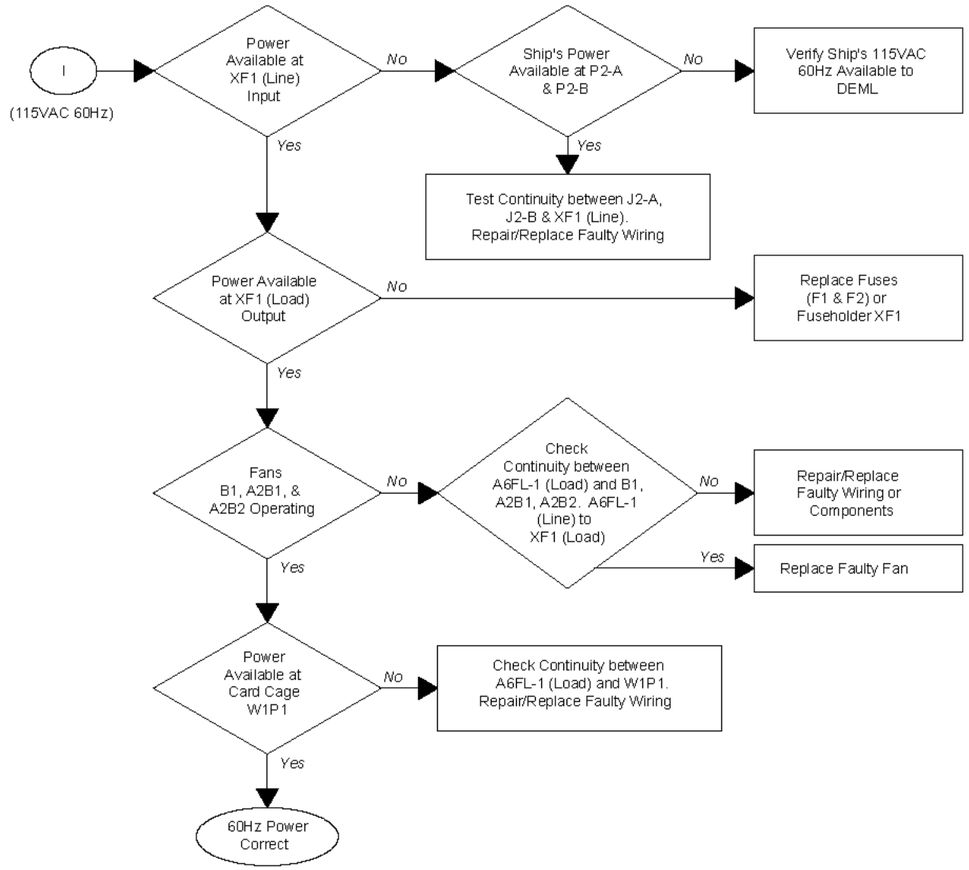

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-19. AN/WSN-8A(V)2 (7404776) AC Power Distribution Fault Logic Diagram

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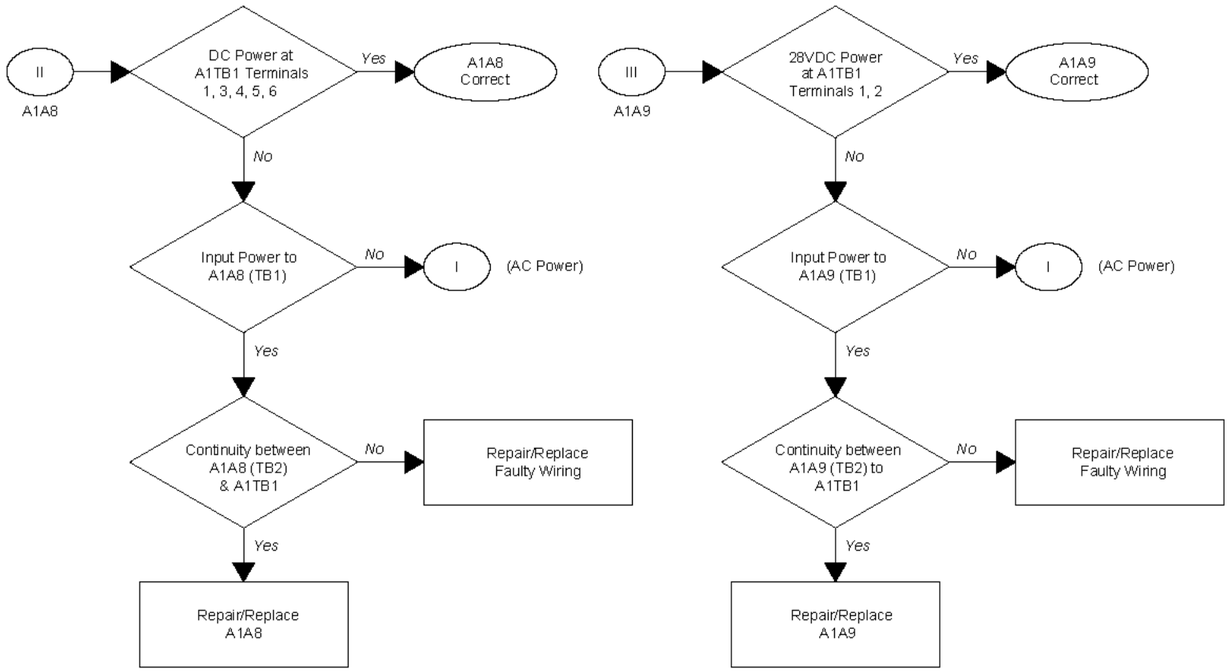

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-20. AN/WSN-8A(V)2 (7404776) DC Power Distribution Fault Logic Diagram

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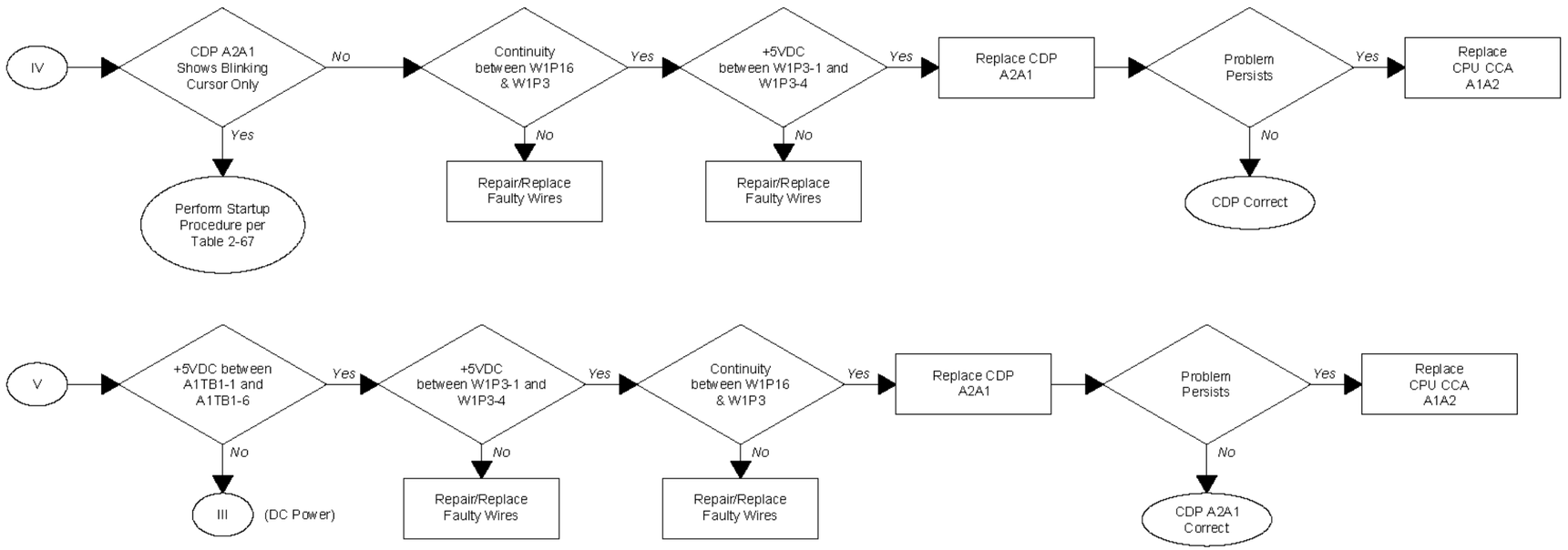

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-21. AN/WSN-8A(V)2 (7404776) Control Display Function Fault Logic Diagram

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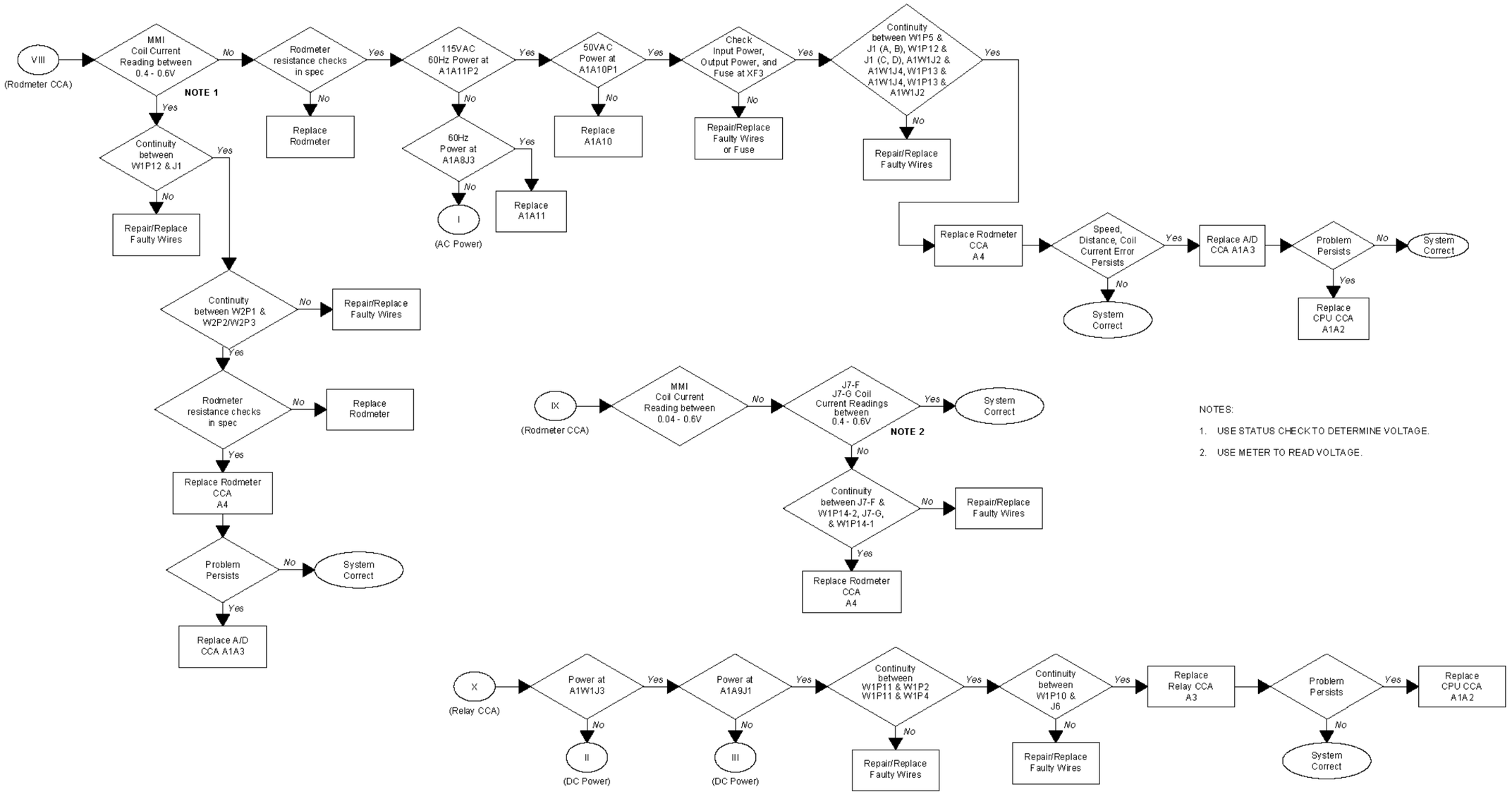

NOTES:

1. USE STATUS CHECK TO DETERMINE VOLTAGE.
2. USE METER TO READ VOLTAGE.

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-22. AN/WSN-8A(V)2 (7404776) I/O Function Fault Logic Diagram (Sheet 1 of 2)

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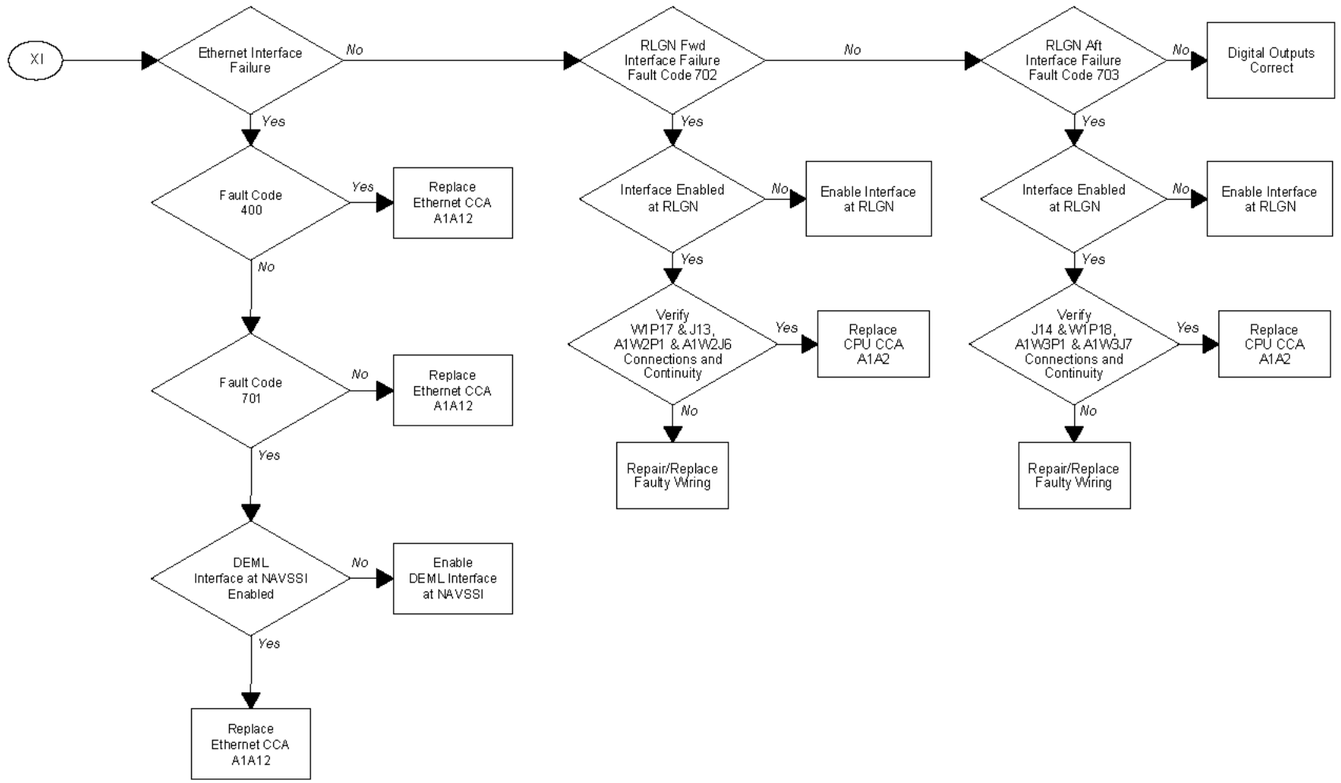

AN/WSN-8A(V)2 (7404776) Configuration

Figure 5-22. AN/WSN-8A(V)2 (7404776) I/O Function Fault Logic Diagram (Sheet 2)

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CHAPTER 6
CORRECTIVE MAINTENANCE

6.1 INTRODUCTION.

This chapter contains corrective maintenance procedures necessary for the repair of the AN/WSN-8 (7093036) and AN/WSN-8A (7404776) Digital Electromagnetic Log (DEML) systems. (Refer to **Table 1-6** for the DEML configurations.) DEML corrective maintenance consists of repair by replacing the Line Replaceable Units (LRUs) and/or assemblies with operational spares. Each LRU and assembly is provided with repair information arranged in reference designation order. Data contained in each section may consist of a parts location diagram, parts data, repair procedures, and wiring diagrams.

6.1.1 PARTS DATA. Parts data is provided for each repairable LRU and assembly of the DEML System. Parts data for the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) is located in **Table 7-3**. Parts data for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML is located in **Table 7-4**. Where exploded views are used, callout leaders and reference designations provide the cross-reference to the parts lists.

6.1.2 REPAIR. Instruction is provided for Organizational-Level maintenance to remove and replace AN/WSN-8 (7093036) and AN/WSN-8A (7404776) DEML System, assemblies, subassemblies, and parts. The Indicator-Transmitter (I/T) Circuit Card Assemblies (CCAs) shown in **Figure 6-7 (Sheet 1)** for the AN/WSN-8 (7093036) DEML, **Figure 6-7 (Sheet 3)** for the AN/WSN-8 (7093036) DEML (w/FC-1), and **Figure 6-7 (Sheet 2)** for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML are supported by the NAVSEA Gold Disk Program. Repair of these CCAs is limited to Intermediate-Level maintenance repair facilities equipped with Module Test and Repair (MTR)/Gold Disk capabilities.

Corrective maintenance requiring specialized equipment and procedures, or rebuilding and major overhaul of DEML parts, assemblies, and subassemblies beyond the capabilities of shipboard repair, shall be performed as Depot-Level maintenance.

6.1.3 WIRING DIAGRAMS. For LRUs or assemblies other than CCAs, overall system schematic diagrams are provided to indicate point-to-point wiring between circuit components and connectors. Refer to **Figure 5-3** for the AN/WSN-8 (7093036) DEML, **Figure 5-8** for the AN/WSN-8 (7093036) DEML (w/FC-1), **Figure 5-13** for the AN/WSN-8A(V)1 (7404776) DEML, or **Figure 5-18** for the AN/WSN-8A(V)2 (7404776) DEML

6.1.4 HARDWARE FAMILY TREE. The hardware family tree diagrams, **Figure 6-1 (Sheet 1)** for the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), and **6-1 (Sheet 2)** for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, provide equipment breakdowns to the LRU level where CCAs and assemblies are identified.

6.2 EQUIPMENT ALIGNMENT AND ADJUSTMENT.

The I/T requires no mechanical alignment or adjustment. Calibration is done electronically. Calibration procedures are listed in **Chapter 2**.

6.3 REMOVAL AND REPLACEMENT PROCEDURES.

6.3.1 RETRACTION, REPLACEMENT, AND EJECTION OF RODMETER NO. 1 (UNIT 1) AND RODMETER NO. 2 (UNIT 6) (TYPE IC/E72-6F AND IC/E100-6F).

NOTE

There are two basic types of rodmeters: retractable (IC/E72-6F and IC/E100-6F) and fixed (IC/28-6 and IC/E28-6F). A diver or drydock is required for replacement of fixed rodmeters. Refer to Technical Manual, *Operation, Maintenance, Repair, and Parts Support: Hull-Mounted Rodmeter, Type IC/E28-6F* (TMIN 0965-LP102-2010), for information on fixed rodmeters. Where dual rodmeters are installed, either one may be put into service, should the other be rendered inoperative. Different types of rodmeters cannot be interchanged.

6.3.1.1 Retraction. Retraction requires at least 98.5 inches of headroom, not including additional height required for use of lifting gear. To retract rodmeter, proceed as follows:

a. De-energize the main 60-Hz and 400-Hz (if applicable) input power to the I/T and tag "DANGER - DO NOT ENERGIZE". To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML shutdown procedure in Section I, **Table 2-13**. To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML shutdown procedure in Section II, **Table 2-29**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML shutdown procedure in Section III, **Table 2-51**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML shutdown procedure in Section IV, **Table 2-74**.

b. Loosen four jamnuts and hex nuts to release rodmeter from packing.

c. Using lifting gear, hoist rodmeter slowly until top edge of sensing element is visible.

d. Inspect for signs of seawater leakage.

WARNING

If rodmeter sensing element has been partially or entirely sheared off, seawater will enter from top of sea valve.

e. Prepare to secure sea valve immediately at first sign of leakage.

f. If no leakage occurs, continue to hoist rodmeter until bottom is clear of sea valve gate.

g. Secure sea valve by turning jack screw approximately 22 turns clockwise.

h. Safety tag sea valve shut.

i Continue hoisting until rodmeter is clear of sea valve body.

j. Remove rodmeter from lifting gear.

6.3.1.2 Replacement. To insert replacement rodmeter, proceed as follows:

a. Attach hoisting clamp to rodmeter.

b. Lubricate rodmeter and seal valve packing with common bar soap in accordance with MIL-S-591.

c. Using lifting gear, lower rodmeter into sea valve until it is fully inserted and touches closed valve gate.

d. Raise rodmeter 1/4-inch upward and lock lifting gear to maintain this height.

e. Remove safety tag and open sea valve gate fully by turning jack screw approximately 22 turns counterclockwise.

f. Release lifting gear lock and continue lowering rodmeter until fully inserted.

g. Fully tighten hex nuts and jamnuts previously loosened in **Paragraph 6.3.1.1**, step **b**.

h. After replacement, perform resistance tests listed in **Table 6-1**.

Table 6-1. Rodmeter Maintenance Data

MEASURE POINT	RESISTANCE
Resistance of Coil Assembly from J1-A to J1-B	14.25 ±1.25 ohms
Resistance of Monel Buttons from J1-C to J1-D	Out of water: 5 megohms, minimum In water: 400 - 40,000 ohms, depending on salinity of water

6.3.1.3 Ejection. To eject a badly damaged rodmeter under emergency conditions, proceed as follows:

a. De-energize the main 60-Hz and 400-Hz (if applicable) input power to the I/T and tag "DANGER - DO NOT ENERGIZE". To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML shutdown procedure in Section I, **Table 2-13**. To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML shutdown procedure in Section II, **Table 2-29**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML shutdown procedure in Section III, **Table 2-51**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML shutdown procedure in Section IV, **Table 2-74**.

b. Inspect sea valve for leakage; proceed to step **d** only if dislocation or misalignment is not present or can be corrected.

WARNING

Leakage may take place, if sea valve is dislocated or misaligned.

c. If leakage cannot be stopped, switch over to Dummy Log mode of operation and take immediate steps to stop leakage.

d. Remove hoisting clamp and junction box cover from rodmeter.

e. Retain clamp and cover.

f. Disconnect rodmeter wiring from connector J1.

g. Remove two bolts and O-ring seals securing junction box.

h. Remove junction box.

i. Remove additional seal located between box and rodmeter.

j. Retain bolts, seals, and junction box.

k. Position aluminum ejector-spacer tool on top of damaged rodmeter.

NOTE

Tool must be oriented so that ends marked FWD and AFT are facing the forward and aft ends of the rodmeter.

l. Secure ejector-spacer tool to damaged rodmeter using capscrew provided.

m. Loosen four jamnuts and hex nuts to release rodmeter from packing.

n. Push damaged rodmeter downward until ejector-spacer tool is flush with top of sea valve.

o. Attach rodmeter hoisting clamp to spare rodmeter.

p. Run spare rodmeter downward on top of ejector-spacer, thereby forcing damaged rodmeter through sea valve until it is ejected through ship's hull.

q. Connect spare rodmeter wiring to connector J1.

r. Reinstall seal and junction box removed in steps **g** and **h**.

s. Align box so that it occupies the same position as before removal.

t. Secure box using two bolts and O-ring seals removed in steps **f** and **g**.

u. Plug extra holes in junction box.

v. Install junction box cover.

w. Remove danger tags and energize the 60-Hz and 400-Hz (if applicable) input power to the I/T. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML startup procedure in Section I, **Table 2-6**. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML startup procedure in Section II, **Table 2-22**. To energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML startup procedure in Section III, **Table 2-44**. To energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML startup procedure in Section IV, **Table 2-67**.

6.3.2 REMOVAL AND REPLACEMENT OF HULL-MOUNTED RODMETER NO. 1 (UNIT 1) AND RODMETER NO. 2 (UNIT 6) (TYPE IC/28-6 AND IC/E28-6F) OR HULL PLUG. The removal and replacement of the hull-mounted rodmeter or temporary hull plug (installed whenever a hull-mounted rodmeter is removed and not replaced) is neither difficult nor time consuming provided that the necessary parts are accessible, and a diver is present outside the hull. **Paragraphs 6.3.2.1** and **6.3.2.2** contain procedures for the removal and replacement of either the hull-mounted rodmeter or the hull plug. **Figure 6-21** and **Figure 6-22** are provided to aid in the understanding of the removal and replacement techniques, and the identifying and locating of parts.

6.3.2.1 Removal. To remove the hull-mounted rodmeter (item 6, **Figure 6-21**) or hull plug (item 12, **Figure 6-22**), proceed as follows:

a. De-energize the main 60-Hz and 400-Hz (if applicable) input power to the I/T and tag "DANGER – DO NOT ENERGIZE". To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML shutdown procedure in Section I, **Table 2-13**. To de-energize the main 60-Hz and 400-Hz input power to the

AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML shutdown procedure in Section II, **Table 2-29**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML shutdown procedure in Section III, **Table 2-51**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML shutdown procedure in Section IV, **Table 2-74**.

b. Make certain that two side screws (items 4 and 7, **Figure 6-22**) are securely engaged in base assembly of hull-mounted rodmeter or hull plug.

NOTE

If hull-mounted rodmeter is to be removed, proceed to step **c**. If hull plug is to be removed, omit step **c**. and proceed to step **d**.

c. Remove electrical plug connector from receptacle connector on base assembly and install receptacle cover (item 1, **Figure 6-22**) on base assembly.

d. Remove retaining ring (item 11, **Figure 6-22**), nut (item 10), washer (item 9), and "O" ring (item 2) from base assembly or hull plug.

e. Install jacking device (consisting of items 1, 2, 3, 4, 5, and 13, **Figure 6-22**) on inside of hull liner as shown on Figure 6-22. (The jacking device, when properly installed, provides a water-tight seal around the mounting aperture on the hull liner during the removal and replacement of a hull-mounted rodmeter or hull plug).

f. Instruct diver that hull-mounted rodmeter or hull plug is about to be removed. Then back off two side screws (items 4 and 7, **Figure 6-21**) until they hit the stops (items 3 and 8).

g. Instruct diver to remove hull-mounted rodmeter or hull plug. If necessary, use jackscrew (item 1, **Figure 6-22**) on jacking device or hull plug removing bolt (item 9) to aid in removing the hull-mounted rodmeter or hull plug.

h. After the hull-mounted rodmeter or hull plug is completely removed, retract the jackscrew.

i. Install replacement hull-mounted rodmeter or hull plug by performing procedures in **Paragraph 6.3.2.2**.

6.3.2.2 Replacement. To install the replacement hull-mounted rodmeter (item 6, **Figure 6-21**) or hull plug (item 12, **Figure 6-22**), proceed as follows:

a. Make certain that jacking device (refer to **Paragraph 6.3.2.1** and **Figure 6-22**) is properly installed on the hull liner.

b. Install "O" ring (item 10, **Figure 6-22**) near flange on base of hull-mounted rodmeter or hull plug. If hull-mounted rodmeter is being installed, make certain that the receptacle cover (item 1, **Figure 6-21**) is installed on the base assembly.

c. Apply a coat of "Molycote" lubricant or soap solution to the body of the base assembly or hull plug.

d. Instruct diver to insert the hull-mounted rodmeter or hull plug into the mounting aperture from outside of the hull. Make certain that the dowel pin (item 8, **Figure 6-22**) on the base assembly flange is properly aligned and inserted into locating hole (item 7) on the hull liner.

NOTE

When the hull-mounted rodmeter or hull plug is properly installed, the flange on the base assembly or hull plug should be flush with the outside of the hull liner.

e. Tighten two side screws (items 4 and 7, **Figure 6-21**) in holes on base assembly or hull plug.

f. Open the petcock (item 4, **Figure 6-22**) on the jacking device and observe for water leakage around the hull-mounted rodmeter or hull plug.

g. If no water is observed, remove the jacking device. If water leakage is observed, close the petcock and check alignment and sealing of the hull-mounted rodmeter or hull plug.

h. Remove the receptacle cover (hull-mounted rodmeter only) and install and secure "O" ring (item 2, **Figure 6-21**), washer (item 9), nut (item 10), and retaining ring (item 11) on the base assembly or hull plug. Ensure mounting nut is tightened with a torque wrench to a minimal of 100 foot-pounds of torque.

i. Remove danger tags and energize the 60-Hz and 400-Hz (if applicable) input power to the I/T. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML startup procedure in Section I, **Table 2-6**. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8

(7093036) DEML (w/FC-1), perform the DEML startup procedure in Section II, **Table 2-22**. To energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML startup procedure in Section III, **Table 2-44**. To energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML startup procedure in Section IV, **Table 2-67**.

6.3.3 DISASSEMBLY OF UNIT 2 SEA VALVE NO. 1 AND UNIT 7 SEA VALVE NO. 2. (Figures 6-2 and 6-3)

CAUTION

Trunnions on jackscrew nut are displaced 1/32 inch from centerline of threaded hole, and nut may be incorrectly installed during reassembly, unless it is scribe marked with respect to valve body.

NOTE

Sea Valves are used only with retractable rodmeters. Removal of sea valves for disassembly purposes should be attempted only while the ship is in dry-dock. Partial disassembly without removal for maintenance purposes may be authorized by the responsible ship's officer.

To disassemble either Unit 2 Sea Valve No. 1 or Unit 7 Sea Valve No. 2, proceed as follows:

a. Close valve gate (MP74P23) to permit access to parts inside sea valve assembly.

b. If sea valve is to be removed from the hull, remove twelve nuts supplied by installing activity.

c. Remove four jamnuts and hex nuts from threaded studs.

d. Lift flange cap (MP1) off threaded nuts.

e. Remove packing materials from packing flange (MP7).

f. Unscrew four threaded studs from packing flange.

g. Remove ten hex nuts and lockwashers from under upper flange of sea valve assembly (MP10).

h. Lift out ten capscrews from assembly.

i. Lift packing flange from assembly.

j. Remove O-ring from top of assembly.

k. Remove four hex nuts and lockwashers securing assembly to deck flange.

l. Lift assembly from deck flange and set it aside for further disassembly.

m. Unscrew four threaded studs from top of deck flange.

n. Remove O-ring from top of deck flange.

o. Cut lockwire from each of six capscrews.

p. Remove screws from underside of deck flange.

q. Remove cover from underside of deck flange.

r. Remove four hex nuts and machine screws from underside of deck flange.

s. Remove two end caps and packing from underside of deck flange.

t. Remove O-ring from underside of deck flange.

u. Cut lockwire from bolt.

v. Remove bolt from link.

w. Remove link and spacer from link.

x. Remove link from crank shaft.

y. Extract dowel pin.

z. Remove collar and thrust washers from jack screw.

aa. Extract dowel pin from coupling.

ab. Pry coupling (MP1MP2) off jack screw (MP7MP4).

ac. Remove key from coupling.

ad. Remove thrust washer from jack screw.

ae. Lift jack screw out of sea valve body.

af. Remove jack screw nut.

ag. Loosen setscrew on crank.

ah. Remove dowel pin from crank.

ai. Tap out key from crank.

aj. Remove crank shaft from crank.

ak. Separate crank, packing retainer, and O-ring.

al. Reach inside valve body and remove two set screws from bottom.

am. Remove main shaft and key from arm.

an. Remove six thrust washers from arm.

NOTE

Note and record various types of washers, quantities of each, and order of removal for later reassembly.

ao. Remove two setscrews and hex nut from arm.

CAUTION

Care must be taken when removing precision-ground valve gate.

ap. Remove valve gate from arm by removing arm shaft.

aq. Cut lockwire from each of eight capscrews.

ar. Remove screws from top of sea valve body.

as. Remove valve seat with its attached gasket from bottom of sea valve body.

at. Remove O-ring from valve seat.

6.3.3.1 Inspection. Inspect inside of sea valve body. Check parts for security and for chips, cracks, dents, or other deformities.

6.3.3.2 Repair. Replace O-ring if it has separated from sea valve body. Replace defective, broken, or worn parts.

6.3.3.3 Reassembly. The following materials are required for reassembling the sea valve.

- New gaskets, packing, and O-rings
- One wire brush
- Two paint brushes (approximately 3/16 inches wide)
- One spray gun
- GACO Neoprene primer, type N-11
- GACO liquid Neoprene lining, type N-200
- GACO accelerator, type N-300-10
- GACO solvent, type N-450-1
- Silicone compound (MIL-I-8660)
- Instrument grease (MIL-G-15793)

Proceed as follows for sea valve reassembly.

a. Using wire brush, clean and smooth any irregularities in contour of valve seat groove and lip.

b. Apply one coat of GACO Neoprene primer (type N-11) with paint brush to clean, dry surface of valve seat groove. (Allow approximately one hour to dry.)

c. Mix GACO liquid Neoprene lining (type N-200) with GACO accelerator (type N-300-10) using mixing ratio of one gallon Neoprene lining to eight fluid ounces of accelerator.

d. Using second paint bush, apply accelerated mixture over dried primer on grooved surface of valve seat.

e. As coat is drying, spray surface with atomized GACO solvent (type N-450-1) using spray gun; this will disperse air bubbles that may have formed during brushing operation.

f. Allow approximately two hours drying time before applying second coat of accelerated mixture and an additional two hours after second coat has been applied.

g. Repeat solvent spraying operation to eliminate any additional air bubbles.

h. Apply third and final coat of accelerated mixture.

i. Repeat solvent spraying operation.

j. Allow last coat to dry at least 16 hours at room temperature.

NOTE

GACO solvent (type N-450-1) may be used to clean brushes.

k. Cure mixture by maintaining valve seat in dry environment at room temperature for a minimum of 14 days.

l. To accelerate curing process, place valve seat in an environmental chamber.

m. Raise temperature of chamber gradually to 175°F for a minimum of 10 hours.

n. Place new gasket on cured valve seat and firmly press into groove, using even pressure

so that the gasket makes good contact along entire surface.

o. Apply film of silicone compound (MIL-I-8660) to all O-ring grooves.

p. Seat O-rings in their respective positions.

q. Starting with **Paragraph 6.3.3,** step **at** and working back through step **ak**, begin to reassemble sea valve. (Be sure that thrust washers are reassembled in precisely the same position they occupied before disassembly.)

r. Continue reassembly of sea valve, working from step **aj** back through step **a**. Be sure that jack screw nut occupies same position as scribe marked.

s. Rotate jack screw until jack screw nut is in extreme upper position; this position determines the closed position of valve gate.

t. Measure distance between valve gate touching tip of setscrew and arm resting against nut.

u. Adjust setscrew until distance is 5/16 inch.

v. Lubricate jack screw with instrument grease (MIL-G-15793).

6.3.4 INDICATOR-TRANSMITTER (UNITS 3 OR 8). See **Figure 6-4 (Sheet 1)** for the AN/WSN-8 (7093036) I/T component/part locations. See **Figure 6-4 (Sheet 2)** for the AN/WSN-8A (7404776) I/T component/part locations.

CAUTION

Electrostatic Discharge Sensitive (ESDS) Devices – Use proper procedures and an Electrostatic Discharge (ESD) strap for handling to prevent ESD damage.

6.3.4.1 Preliminary. Before performing any removal and replacement of I/T parts or components, de-energize the main 60-Hz and 400-Hz (if applicable) input power to the I/T and tag "DANGER - DO NOT ENERGIZE". To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML shutdown procedure in Section I, **Table 2-13**. To de-energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML shutdown procedure in Section II, **Table 2-29**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML shutdown procedure in Section III, **Table 2-51**. To de-energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML shutdown procedure in Section IV, **Table 2-74**.

6.3.4.2 Remove and Replace Fuse [(3A1A2F1-3A1A2F5) or (3A2F1-3A2F5)].

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Press fuseholder cartridge in and rotate counterclockwise to disengage latch.

c. Grasp fuseholder cartridge by the sides and pull free of housing. Fuse will come out with fuseholder cartridge.

d. Remove fuse from fuseholder cartridge.

e. Position new proper ampere fuse in fuseholder cartridge.

f. Position fuseholder cartridge over fuseholder.

g. Press fuseholder cartridge in and rotate clockwise to engage latch.

h. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.3 Remove and Replace Fuseholder (A2XF1, A2XF2). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Remove cartridges from affected fuseholder(s).

c. Remove protective cover.

d. Note and record positions of wires. Remove nuts and washers and remove wires.

e. Remove two screws holding fuseholder in place on front access panel and remove fuseholder from the back of front access panel.

f. Position new fuseholder in opening, ensuring that keys on side of receptacles are aligned with hole in panel. Secure with two screws.

g. Connect wires to fuseholder terminals; replace washers and nuts.

h. Replace protective cover.

i. Ensure that proper ampere fuses (3 A, 3 AG, 120 VAC) are installed in fuseholder cartridges. Install fuseholder cartridges in new fuseholder(s).

j. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.4 Remove and Replace Fuseholder (A2XF3). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Remove cartridge from affected fuseholder.

c. Remove protective cover.

d. Note and record positions of wires. Desolder and remove wires.

e. Remove annular hex nut and internal-toothed lockwasher holding fuseholder in place on front access panel and remove fuseholder from front access panel.

f. Position new fuseholder in opening, ensuring that key on side of receptacle is aligned with hole in panel. Secure with annular hex nut and internal-toothed lockwasher.

g. Solder wires to fuseholder terminals.

h. Replace protective cover.

i. Install fuseholder cartridge in new fuseholder.

j. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.5 Remove and Replace AN/WSN-8A (7404776) I/T Fault Indicator (DS1). Refer to **Figure 6-4 (Sheet 2)** for component locations.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Note and record positions of wires. Disconnect wires.

c. Remove annular hex nut holding fault indicator in place on front access panel and remove fault indicator from front access panel.

d. Position new fault indicator in opening. Secure with annular hex nut.

e. Reconnect wires to fault indicator terminals.

f. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.6 Remove and Replace Control Display Panel (CDP) (3A1A2A1 or 3A2A1). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Disconnect 6-pin rectangular connector A1W1P2 from lower-right corner of CDP.

c. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), disengage slide lock (from left to right) and disconnect 25-pin D connector W1P25 from bottom center on back of CDP. On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, disengage slide lock (from left to right) and disconnect 25-pin D connector W1P3 from bottom center on back of CDP.

d. Remove 12 hex nuts, lockwashers and flatwashers and remove CDP from front access panel.

e. Ensure that jumpers in lower-left corner of new CDP are set to match those on the CDP being removed, as shown below:

AN/WSN-8 (7093036) CDP jumper settings

- E1 open; E2, E3 closed
- E4 open; E5, E6 closed
- E7 open; E8, E9 closed
- E10 open; E11, E12 closed
- E13, E14 closed; E15 open
- E16 open; E17 closed
- E18 open; E19 closed
- E20 closed; E21 open
- E22 closed; E23 closed
- E24 open; E25 closed
- E26 open; E27 closed
- E28 open; E29 closed
- E30 open; E31 closed
- E32 open; E33 closed
- E34 open; E35 closed
- E36 open; E37 closed

- E38 closed; E39 open

AN/WSN-8A (7404776) CDP jumper settings

- E1 open; E2, E3 closed
- E4 open; E5, E6 closed
- E7 open; E8, E9 closed
- E10 open; E11, E12 closed
- E13, E14 closed; E15 open
- E16 open; E17 closed
- E18 closed; E19 open
- E20 closed; E21 open
- E22 open; E23 closed
- E24 closed; E25 open
- E26 open; E27 closed
- E28 open; E29 closed
- E30 closed; E31 open
- E32 open; E33 closed
- E34 open; E35 closed
- E36 open; E37 closed
- E38 closed; E39 open

f. To replace CDP, reverse steps **a-d**.

g. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.7 Remove and Replace Intake Fan (3A1A2B1, 3A1A2B2) or (3A2B1, 3A2B2). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Disconnect power leads from fan to be replaced.

c. Remove four screws and washers holding fan in place on cabinet front access panel and remove finger guard, fan, gasket, and filter.

d. To replace fan, assemble washers, finger guard, fan, gasket, and filter, in that order, onto screws. Ensure that fan is oriented to draw air into cabinet. The fan housing has arrows showing direction of fan rotation and air flow.

e. Position fan over opening and secure with four screws.

f. Reconnect power leads.

g. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.8 Remove and Replace Power Supply/Card Cage Assembly (3A1A1 or 3A1). Refer to **Figure 6-6**.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), note and record positions of wires connected to terminals 1 and 6 on right-side terminal board 3A1A1TB1. Remove screws and terminal lugs for terminals 1 and 6 from terminal board.

c. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), disconnect plugs J1 through J10 and open lower access panel to provide access for removal of connectors in the Card Cage.

On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, disconnect plugs J1 through J14 and open lower access panel to provide access for removal of connectors in the Card Cage.

d. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), disconnect eight power and interface connectors from power supply/card cage as follows:

- W1P1 from A1A8J1
- W1P2 from A1W1J3
- W1P3 from A1W1J1
- W1P4 from A1A9J1
- W1P5 from A1W1J4
- W1P15 from A1W1J5 (on bottom of Card Cage housing)
- W1P16 from A1W3J1 (on bottom of Card Cage housing)
- A1W1P2 from A2A1J1 (on back of CDP)

On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, disconnect five power and interface connectors from power supply/card cage as follows:

- W1P1 from A1A8J1

- W1P2 from A1W1J3
- W1P4 from A1A9J1
- W1P5 from A1W1J4
- W1P15 from A1W1J5

e. On the AN/WSN-8 (7093036) DEML, disconnect seven interface connectors from card cage as follows:

- W1P17 from A1A2J6 [Central Processing Unit (CPU) CCA]
- W1P18 from A1A2J7 (CPU CCA)

NOTE

The ribbon cable and plug (WP21) to the Analog-to-Digital (A/D) CCA (3A1A1A3) does not have a lock assembly and must be removed carefully. DO NOT PULL on the ribbon cable.

- W2P1 from A1A3J1 (A/D CCA)
- W3P2 from A1A4J1 (MIL-STD-1553B CCA)
- W4P2 from A1A4J2 (MIL-STD-1553B CCA)
- W1P19 from A1A5J3 (60-Hz Digital-to-Resolver (D/R) CCA)
- W1P20 from A1A6J3 (400-Hz Digital-to-Synchro (D/S) CCA)

On the AN/WSN-8 (7093036) DEML (w/FC-1), disconnect six interface connectors from card cage as follows:

- W1P17 from A1A2J6 (CPU CCA)
- W1P18 from A1A2J5 (CPU CCA)
- W1P19 from A1A5J3 (60-Hz D/R CCA)
- W1P20 from A1A6J3 (400-Hz D/S CCA)
- W2P1 from A1A3J1 (A/D CCA)
- W3P1 from A1A4J1 (MIL-STD-1553B CCA)

On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, disconnect eight interface connectors from card cage as follows:

- W1P7 from A1A3J5 (A/D CCA)
- W1P9 from A1A2J5 (CPU CCA)
- W1P16 from A1A2J6 (CPU CCA)
- W1P17 from A1W2J6 (on bottom of Card Cage housing)
- W1P18 from A1W3J7 (on bottom of Card Cage housing)
- W1P19 from A1W4J8 (on bottom of Card Cage housing)
- W2P1 from A1A3J6 (A/D CCA)
- W3P2 from A1A12J50 (Ethernet CCA)

CAUTION

Handle assembly housing only. Do not touch CCA connector pins. Touching CCA connector pins may result in ESD damage.

CAUTION

Power Supply/Card Cage Assembly must be supported as last card cage bolts are loosened. If this precaution is not observed, the assembly may fall, causing damage to components in the cabinet or injury to personnel.

CAUTION

On the AN/WSN-8 (7093036) DEML, the Power Supply/Card Cage Assembly must not be allowed to scrape against bottom of cabinets' access opening during removal. Doing so will damage PROGRAM switch (3A1A1S1) on bottom of assembly.

f. On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, loosen eight card cage bolts holding Power Supply/Card Cage Assembly in place on shock mounts and remove assembly from cabinet. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), loosen eight thumb screws holding Power Supply/Card Cage Assembly in place on shock mounts and remove assembly from cabinet.

g. Place Power Supply/Card Cage Assembly on a suitable work surface.

h. If CCAs are to be removed, remove one retainer bracket from front of card cage on the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, or two re-

tainer brackets from front of card cage on the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1).

i. To replace Power Supply/Card Cage Assembly, reverse the above steps.

NOTE

On the AN/WSN-8 (7093036) DEML, verify Program switch (3A1A1S1) is in NORMAL position when replacing Power Supply/Card Cage Assembly.

CAUTION

On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), ensure that the 60-Hz D/R CCA (3A1A1A5) and 400-Hz D/S CCA (3A1A1A6) are connected correctly. These CCAs and their associated connectors are identical in appearance. They can be distinguished only by inspection of part numbers. If the CCAs are exchanged, the system will not function and components could be damaged.

j. On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), close the lower access panel and reconnect plugs J1 through J10.

On the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML, close the lower access panel and reconnect plugs J1 through J14.

6.3.4.8.1 Remove and Replace 200-W Power Supply Assembly (3A1A1A8 or 3A1A8). Refer to **Figures 6-8** and **6-9** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly per **Paragraph 6.3.4.8**.

b. Remove four flat-head phillips screws securing power supply to side of power supply assembly.

c. Disconnect A1A8J1 from W1P1; A1A8J2 from A1A9P1; and A1A8J3 from A1A11P1 and rotate power supply to access A1A8TB2.

d. Note and record positions of wires on A1A8TB2. Remove nine screws and carefully remove wire harness from power supply. Remove cable ties as necessary to free power supply.

e. To replace power supply, reverse the above steps. Install new cable ties as necessary.

f. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

g. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.8.2 Remove and Replace Constant Voltage Transformer Assembly (3A1A1A11 or 3A1A11). See **Figures 6-8** and **6-9** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly per **Paragraph 6.3.4.8**.

b. Disconnect A1A10J1 from A1A11P2 and A1A11P1 from A1A8J3.

c. Remove four screws securing constant voltage transformer to power supply enclosure.

d. Remove transformer from cabinet.

e. To replace transformer, reverse the above steps.

f. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

g. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.8.3 Remove and Replace 50 VAC Step-Down Transformer Assembly (3A1A1A10 or 3A1A10). Refer to **Figures 6-8** and **6-9** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect A1A10J1 from A1A11P2 and A1W1J2 from A1A10P1.

c. Remove two screws securing 50 VAC step-down transformer to power supply enclosure.

d. Remove 50 VAC transformer from Power Supply/Card Cage Assembly.

e. To replace transformer, reverse the above steps.

f. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

g. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.8.4 Remove and Replace 28 VDC Power Supply Assembly (3A1A1A9 or 3A1A9). Refer to **Figures 6-8** and **6-9** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect wires from A1TB1-1 and A1TB1-2.

c. Remove two pan-head screws holding terminal board bracket in place. Move terminal board aside.

d. Disconnect A1A9P1 from A1A8J2 and A1A9J1 from W1P4.

e. Remove four screws and lockwashers holding power supply bracket in place and pull power supply and bracket from enclosure. Remove cable ties as necessary.

f. Remove four screws and lockwashers securing power supply to bracket and remove power supply from bracket.

g. To replace power supply, reverse the above steps.

h. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.8.5 Remove and Replace Terminal Board (3A1A1TB1 or 3A1TB1). See **Figure 6-9** for location.

a. Shut down the I/T per **Paragraph 6.3.4.1**.

b. Remove protective cover.

c. Note and record positions of wires on 3A1A1TB1 or 3A1TB1. Remove six screws holding terminal lugs in place and carefully remove wires.

d. Remove two screws securing terminal board to bracket. Protective cover attaching clips will be removed during screw removal. Retain for reassembly.

e. To replace terminal board, reverse the above steps.

f. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.8.6 Remove and Replace AN/WSN-8 (7093036) I/T CPU Program Switch (3A1A1S1).

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Carefully pull CPU CCA out of card cage and disconnect jumper wire from CPU CCA.

c. Unscrew hex nut holding switch in place on power supply/card cage housing and remove switch.

d. To replace switch, reverse the above steps. Ensure switch is in the NORMAL position after replacing.

e. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

f. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9 Card Cage. For CCA removal and replacement, refer to **Figures 6-7 (Sheet 1)** and **6-9 (Sheet 1)** for the AN/WSN-8 (7093036) DEML and **Figures 6-7 (Sheet 3)** and **6-9 (Sheet 3)** for the AN/WSN-8 (7093036) DEML (w/FC-1). Refer to **Figures 6-7 (Sheet 2)** and **6-9 (Sheet 2)** for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML.

6.3.4.9.1 Preliminary. Perform the following steps before removing or replacing any of the CCAs in the card cage.

a. Shut down the I/T as per **Paragraph 6.3.4.1**.

b. Remove two retainer brackets from front of card cage for the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), or one retainer bracket for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML.

6.3.4.9.2 Remove and Replace AN/WSN-8 (7093036) I/T CPU CCA (3A1A1A2). Refer to **Figures 6-7 (Sheet 1)** and **6-9 (Sheet 1)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect cables from J8 and J9 (if installed) on the Lower Access Panel. Wrap cable connectors with suitable material to prevent damage.

c. Disconnect two "D" connectors (W1P18 and W1P17) from edge of CPU CCA.

d. Disconnect rectangular connector (A1W3P1) from front corner of CPU CCA.

e. Remove card retainer screw holding CPU CCA in place [**Figure 6-9 (Sheet 1)**].

NOTE

CPU CCA must be partially pulled out to obtain access in order to remove Program Switch jumper wire prior to removing CPU CCA.

f. Carefully pull CCA out of card cage and disconnect jumper wire (connected to program switch) from CCA.

g. Place removed CCA in antistatic bag.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

h. Ensure that jumpers on the new CPU CCA are set to match the jumper settings in **Tables 3-1** or **3-2**.

i. To reinstall CPU CCA, reverse the above steps.

j. Reverse the steps of **Paragraph 6.3.4.9.1**.

k. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

NOTE

Set correct RT (Remote Terminal) Address when CPU is replaced and perform Configuration Procedure (**Table 2-11**) to reset system variables and restore system defaults. An Electromagnetic Log Voltage Simulator (ELVS) pre-calibration and the appropriate at-sea calibration must also be performed after a CPU replacement.

l. Perform Configuration Procedure using **Table 2-11**. Ensure I/T is configured with the proper I/T address.

m. Shut down the I/T as per **Paragraph 6.3.4.1**.

n. Reconnect cables to J8 and J9 (if removed in step **b**) on Lower Access Panel.

o. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

p. Re-calibrate the I/T as per **Table 2-14**.

6.3.4.9.2.1 Remove and Replace AN/WSN-8 (7093036) CPU CCA Battery. [Refer to **Figure 6-12 (Sheet 3)**] The following procedure is to be performed at the Intermediate Maintenance Facility (IMF) level only and should not be attempted on board ship. This procedure can be utilized for the AT4L Revision 1 and AT4L PLUS CPU CCAs. The 3.6V Lithium battery (P/N 5186; CAGE SB880) is manufactured by Tadiran (**Table 7-7**)

NOTE

Failure to perform the following short procedure could be detrimental to the CPU CCA.

a. Remove the CPU CCA from the unit per **Paragraph 6.3.4.9.2**. Place on ESD workstation.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Remove jumper W10 from the CPU CCA. This disables the Static Random Access Memory (SRAM) battery backup circuit.

c. Remove the old battery. Note the polarity location. [**Figure 6-12 (Sheet 3)**]

d. Insert the new battery. Ensure correct polarity placement.

e. Replace jumper W10 on the CPU CCA.

f. Perform Complementary Metal-Oxide Semiconductor (CMOS) configuration procedure at the IMF configuration station.

6.3.4.9.3 Remove and Replace AN/WSN-8 (7093036) (w/FC-1) I/T CPU CCA (3A1A1A2). Refer to **Figures 6-7 (Sheet 3)** and **6-9 (Sheet 3)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect cables from J8 and J9 (if installed) on the Lower Access Panel. Wrap cable connectors with suitable material to prevent damage.

c. Disconnect two "D" connectors (W1P18 and W1P17) from edge of CPU CCA (A1A2).

d. Disconnect rectangular connector (A1W3P1) from J7 of CPU CCA (A1A2).

e. Remove card retainer screw holding CPU CCA (A1A2) in place [**Figure 6-9 (Sheet 3)**].

f. Carefully pull CCA out of card cage.

g. Place removed CCA in antistatic bag.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

h. Ensure that jumpers on the new CPU CCA (A1A2) are set to match the jumper settings in **Table 3-3**. Refer to **Figure 6-12 (Sheet 6)**.

i. To reinstall CPU CCA (A1A2), reverse the above steps.

j. Reverse the steps of **Paragraph 6.3.4.9.1**.

k. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

l. Perform Configuration Procedure using **Table 2-27**. Ensure I/T is configured with the proper I/T address.

m. Shut down the I/T as per **Paragraph 6.3.4.1**.

n. Reconnect cables to J8 and J9 (if removed in step **b**) on Lower Access Panel.

o. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9.4 Remove and Replace AN/WSN-8A (7404776) I/T CPU CCA (3A1A2). Refer to **Figures 6-7 (Sheet 2)** and **6-9 (Sheet 2)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect two “DSUB” connectors (W1P9 and W1P16) from edge of CPU CCA (A1A2).

c. Disconnect three rectangular connectors (A1W2P1, A1W3P1, and A1W4P1) from front corner of CPU CCA (A1A2).

d. Remove card retainer screw holding CPU CCA (A1A2) in place [**Figure 6-9 (Sheet 2)**].

e. Carefully pull CCA out of card cage.

f. Place removed CCA in antistatic bag.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

g. Ensure that jumpers on new CPU CCA are set to match the jumper settings in **Tables 3-4** or **3-5**.

h. To reinstall CPU CCA, reverse the above steps.

i. Reverse the steps of **Paragraph 6.3.4.9.1**.

j. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9.5 Remove and Replace AN/WSN-8 (7093036) I/T A/D CCA (3A1A1A3). Refer to

Figures 6-7 (Sheet 1) and 6-9 (Sheet 1) for component locations.

a. Perform steps in Paragraph 6.3.4.9.1.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect connector (W2P1) from edge of A/D CCA.

c. Remove card retainer screw holding A/D CCA in place [Figure 6-9 (Sheet 1)].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. Ensure that Dual Inline Package (DIP) switches and jumpers on new A/D CCA are set to match those on the CCA being replaced. Refer to Figure 6-13 (Sheet 1).

g. To reinstall A/D CCA, reverse the above steps.

h. Reverse the steps of Paragraph 6.3.4.9.1.

i. Restore the I/T to operating condition per Paragraph 6.3.4.19.

6.3.4.9.6 Remove and Replace AN/WSN-8 (7093036) I/T (w/FC-1) A/D CCA (3A1A1A3). Refer to Figures 6-7 (Sheet 3) and 6-9 (Sheet 3) for component locations.

a. Perform steps in Paragraph 6.3.4.9.1.

CAUTION

Removed or replacement CCA(s) covered by this procedure contains ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect connectors (W2P1) and (W1P7) from edge of A/D CCA (A1A3).

c. Remove card retainer screw holding A/D CCA (A1A3) in place [Figure 6-9 (Sheet 3)].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. Ensure that jumper settings on new A/D CCA are set to match those on the CCA being replaced. Refer to Figure 6-13 (Sheet 2).

g. To reinstall A/D CCA (A1A3), reverse the above steps.

h. Reverse the steps of Paragraph 6.3.4.9.1.

i. Restore the I/T to operating condition per Paragraph 6.3.4.19.

6.3.4.9.7 Remove and Replace AN/WSN-8A (7404776) I/T A/D CCA (3A1A3). Refer to Figures 6-7 (Sheet 2) and 6-9 (Sheet 2) for component locations.

a. Perform steps in Paragraph 6.3.4.9.1.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect connectors (W2P1) and (W1P7) from edge of A/D CCA (A1A3).

c. Remove card retainer screw holding A/D CCA (A1A3) in place [Figure 6-9 (Sheet 2)].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. Ensure that jumper settings on new A/D CCA are set to match those on the CCA being replaced. Refer to **Figure 6-13 (Sheet 2)**.

g. To reinstall A/D CCA (A1A3), reverse the above steps.

h. Reverse the steps of **Paragraph 6.3.4.9.1**.

i. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.9.8 Remove and Replace AN/WSN-8 (7093036) I/T MIL-STD-1553B CCA (3A1A1A4). Refer to **Figures 6-7 (Sheet 1)** and **6-9 (Sheet 1)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect two twin-ax connectors (W3P2 and W4P2) from edge of MIL-STD-1553B CCA.

c. Remove card retainer screw holding MIL-STD-1553B CCA in place [**Figure 6-9 (Sheet 1)**].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. Ensure that jumpers on new MIL-STD-1553B CCA are set to match those on the CCA being replaced. Refer to **Figure 6-14 (Sheet 1)**.

g. To reinstall MIL-STD-1553B CCA, reverse the above steps.

h. Reverse the steps of **Paragraph 6.3.4.9.1**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9.9 Remove and Replace AN/WSN-8 (7093036) I/T (w/FC-1) MIL-STD-1553B CCA (3A1A1A4). Refer to **Figures 6-7 (Sheet 3)** and **6-9 (Sheet 3)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect “D” connector (W3P1) from edge of MIL-STD-1553B CCA (A1A4).

c. Remove card retainer screw holding MIL-STD-1553B CCA (A1A4) in place [**Figure 6-9 (Sheet 3)**].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. Ensure that jumper settings on new MIL-STD-1553B CCA (A1A4) are set to match those on the CCA being replaced. Refer to **Figure 6-14 (Sheet 2**).

g. To reinstall MIL-STD-1553B CCA (A1A4), reverse the above steps.

h. Reverse the steps of **Paragraph 6.3.4.9.1**.

i. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.9.10 Remove and Replace AN/WSN-8 (7093036) I/T 60-Hz D/R CCA (3A1A1A5). Refer to **Figures 6-7 (Sheet 1** or **3)** and **6-9 (Sheet 1** or **3)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect "D" connector (W1P19) from edge of 60-Hz D/R CCA.

c. Remove card retainer screw holding 60-Hz D/R CCA in place [**Figure 6-9 (Sheet 1** or **3)**].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

CAUTION

On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), ensure that the 60-Hz D/R CCA (3A1A1A5) and 400-Hz D/S CCA (3A1A1A6) are connected correctly. These CCAs and their associated connectors are identical in appearance. They can be distinguished only by inspection of part numbers. If the CCAs are exchanged, the system will not function and components could be damaged.

f. Ensure that jumpers on new 60-Hz D/R CCA are set to match those on the CCA being replaced. Refer to **Figure 6-15 (Sheet 1)**.

g. To reinstall 60-Hz D/R CCA, reverse the above steps.

h. Reverse the steps of **Paragraph 6.3.4.9.1**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9.11 Remove and Replace AN/WSN-8 (7093036) I/T 400-Hz D/S CCA (3A1A1A6). (N/A to the SSN 21 Class) Refer to **Figures 6-7 (Sheet 1** or **3)** and **6-9 (Sheet 1** or **3)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect "D" connector (W1P20) from edge of 400-Hz D/S CCA.

c. Remove card retainer screw holding 400-Hz D/S CCA in place [**Figure 6-9 (Sheet 1** or **3)**].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

CAUTION

On the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1), ensure that the 60-Hz D/R CCA (3A1A1A5) and 400-Hz D/S CCA (3A1A1A6) are connected correctly. These CCAs and their associated connectors are identical in appearance. They can be distinguished only by inspection of part numbers. If the CCAs are exchanged, the system will not function and components could be damaged.

f. Ensure that jumpers on new 400-Hz D/S CCA are set to match those on the CCA being replaced. Refer to **Figure 6-16 (Sheet 1)**.

g. To reinstall 400-Hz D/S CCA, reverse the above steps.

h. Reverse the steps of **Paragraph 6.3.4.9.1**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.9.12 Remove and Replace AN/WSN-8A (7404776) I/T Ethernet CCA (3A1A12). Refer to **Figures 6-7 (Sheet 2)** and **6-9 (Sheet 2)** for component locations.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Disconnect coaxial connector (W3P2) from edge of Ethernet CCA.

c. Remove card retainer screw holding Ethernet CCA in place [**Figure 6-9 (Sheet 2)**].

d. Carefully pull CCA out of card cage.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

e. Place removed CCA in antistatic bag.

f. To reinstall Ethernet CCA, reverse the above steps.

g. Reverse the steps of **Paragraph 6.3.4.9.1**.

h. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.10 Remove and Replace Electronic Backplane (3A1A1A7 or 3A1A7). Refer to **Figure 6-20**.

a. Perform steps in **Paragraph 6.3.4.9.1**.

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

b. Remove all CCAs from card cage as per **Paragraphs 6.3.4.9.2** through **6.3.4.9.12**.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

c. Place removed CCAs in antistatic bags.

d. Note and record positions of connectors. Disconnect two connectors (A1W1P1 and A1W1P3) at corner of backplane board.

e. Remove four screws and washers holding backplane board in place in card cage and remove backplane board from card cage.

f. To replace backplane board, reverse the above steps. Ensure that backplane board is properly oriented, with LEDs (light-emitting diodes) at upper-left of card cage.

g. Reverse the steps of **Paragraph 6.3.4.9.1**.

h. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.11 Remove and Replace Circulating Fan (3A1B1 or 3B1). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Remove three screws holding fan in place on mounting bracket and remove fan. It may be necessary to remove Synchro Signal Booster Amplifiers (SSBAs) (3A1AR1, 3A1AR2) (if installed) (**Paragraph 6.3.4.13**) to gain access to screws.

c. Disconnect power leads from fan.

d. To replace fan, reverse the above steps. Ensure that fan is oriented to blow air downward. The fan housing has arrows showing direction of fan rotation and air flow.

e. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

f. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.12 Remove and Replace Power Line Filter Assembly (3A1A6 or 3A6). Refer to **Figure 6-4**.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel (**Figure 6-5**).

d. Remove two nuts and disconnect wires from the load side of the filter.

e. Remove two nuts, lockwashers and flatwashers securing the mounting bracket to the enclosure.

f. Remove three nuts and disconnect wires from the line side of the filter.

g. Remove two screws and lockwashers securing filter assembly to the mounting bracket.

h. To replace filter assembly, reverse the above steps.

i. Replace Power Supply/Card Cage Assembly by reversing the steps of **Paragraph 6.3.4.8**.

j. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.13 Remove and Replace AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) SSBA (3A1AR1, 3A1AR2). Refer to **Figure 6-4 (Sheet 1)** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

CAUTION

SSBA must be supported as screws are removed. Failure to observe this precaution can result in damage to equipment or injury to personnel.

b. Remove four screws and washers and remove SSBA from bracket on back of the I/T cabinet.

c. Disconnect 25-pin "D" connector (W1P23) or W1P24) from connector on bottom of SSBA.

d. To replace SSBA, reverse the above steps.

e. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

f. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.14 Remove and Replace AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) I/T Scott-T Transformer (3A1A5). Refer to **Figure 6-4 (Sheet 1)** and for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel [**Figure 6-5 (Sheet 1)**].

d. Disconnect A5J1 from W1P21 and A5J2 from W1P22.

e. Remove mounting plate, then four screws and washers holding transformer in place on mounting plate, and remove transformer.

f. To replace transformer, reverse the above steps.

g. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

h. Restore the I/T to operating conditions as per **Paragraph 6.3.4.19**.

6.3.4.15 Remove and Replace Relay CCA (3A1A3 or 3A3). Refer to **Figure 6-4** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel (**Figure 6-5**).

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

d. Note and record positions of cables. On the AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) DEMLs, disconnect five rectangular connectors (W1P7, W1P8, W1P9, W1P10, and W1P11) and 25-pin "D" connector

(W1P6) from CCA. On the AN/WSN-8A(V)1 (7404776) and AN/WSN-8A(V)2 (7404776) DEMLs, disconnect three rectangular connectors (W1P8, W1P10, and W1P11) and 25-pin "D" connector (W1P6) from CCA.

e. Remove four screws and washers and remove CCA from cabinet.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

f. Place removed CCA in antistatic bag.

g. To replace relay CCA, reverse the above steps.

h. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.16 Remove and Replace AN/WSN-8 (7093036) I/T Rodmeter CCA (3A1A4). Refer to **Figure 6-4 (Sheet 1)** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel [**Figure 6-5 (Sheet 1)**].

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

d. Note and record positions of wires. Disconnect three bayonet-type connectors (W1P12, W1P13, and W1P14) and 50-pin ribbon connector (W2P2) from CCA.

e. Remove four screws and washers and remove CCA from cabinet.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

f. Place removed CCA in antistatic bag.

g. To replace rodmeter CCA, reverse the above steps.

h. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.17 Remove and Replace AN/WSN-8 (7093036) I/T (w/FC-1) Rodmeter CCA (3A1A4). Refer to **Figure 6-4 (Sheet 1)** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel [**Figure 6-5 (Sheet 1**)].

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

d. Note and record positions of wires. Disconnect three bayonet-type connectors (W1P12, W1P13, and W1P14), 25-pin “D” connector (W2P2), and 4-pin rectangular connector (W2P3) from CCA.

e. Remove four screws and washers and remove CCA from cabinet.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

f. Place removed CCA in antistatic bag.

g. To replace rodmeter CCA, reverse the above steps.

h. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

i. Restore the I/T to operating condition per **Paragraph 6.3.4.19**.

6.3.4.18 Remove and Replace AN/WSN-8A (7404776) I/T Rodmeter CCA (3A4). Refer to **Figure 6-4 (Sheet 2)** for component locations.

a. Shut down the I/T and remove Power Supply/Card Cage Assembly as per **Paragraph 6.3.4.8**.

b. Disconnect all cables from bottom connector panel.

c. Release 10 quarter-turn fasteners and open lower access panel [**Figure 6-5 (Sheet 2)**].

CAUTION

Removed or replacement CCA(s) covered by this procedure contain ESDS devices. Handle CCAs by edges only. Do not transport them over carpeted floors. Do not touch printed circuitry or connector pins.

d. Note and record positions of wires. Disconnect three bayonet-type connectors (W1P12, W1P13, and W1P14), 25-pin "D" connector (W2P2), and 4-pin rectangular connector (W2P3) from CCA.

e. Remove four screws and washers and remove CCA from cabinet.

CAUTION

Removed CCA(s) must be placed in antistatic bag(s) immediately. If left exposed, they are vulnerable to ESD damage.

f. Place removed CCA in antistatic bag.

g. To replace rodmeter CCA, reverse the above steps.

h. Replace Power Supply/Card Cage Assembly in cabinet by reversing the steps of **Paragraph 6.3.4.8**.

i. Restore the I/T to operating condition as per **Paragraph 6.3.4.19**.

6.3.4.19 Restoration. To restore the I/T to operation, remove danger tags and energize the 60-Hz and 400-Hz (if applicable) input power to the I/T. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML, perform the DEML startup procedure in Section I, **Table 2-6**. To energize the main 60-Hz and 400-Hz input power to the AN/WSN-8 (7093036) DEML (w/FC-1), perform the DEML startup procedure in Section II, **Table 2-22**. To energize the main 60-Hz input power to the AN/WSN-8A(V)1 (7404776) DEML, perform the DEML startup procedure in Section III, **Table 2-44**. To energize the main 60-Hz input power to the AN/WSN-8A(V)2 (7404776) DEML, perform the DEML startup procedure in Section IV, **Table 2-67**.

6.3.5 REMOTE CONTROL UNIT (UNIT 4). Refer to **Figure 6-18** for component/part locations.

6.3.5.1 Disassembly. To disassemble Remote Control Unit (RCU):

a. Unscrew lamp lens.

b. Twist and pull out lamp.

c. Remove four screws, flat washers, and lockwashers securing cover to case.

d. Lift cover aside.

e. Note and record positions of wires. Desolder leads connected to J1.

f. Remove four screws, flatwashers, and lockwashers from J1.

g. Remove J1.

h. Note and record positions of wires. De-solder leads connected to lamp socket XDS1 on cover.

i. Remove lamp socket.

j. Note and record positions of wires. Unscrew leads connected to switch S1 on cover.

k. Remove switch S1 from cover.

6.3.5.2 Reassembly. To reassemble RCU, reverse disassembly procedure.

6.3.5.3 Test. Following reassembly and rewiring, test dielectric strength and insulation resistance as follows:

a. Apply 450 volts from each of pins A, B, and C of connector J1, in turn, to ground for 4

to 6 seconds with an AC high-potential tester (900V).

b. Reduce to 0 volts; no arcing or breakdown should occur.

c. Repeat steps **a** and **b** for pins D and E using 900 volts.

d. Measure insulation resistance between each pin of connector J1 and chassis in turn with a 500 volt megohmmeter. In each case, resistance should be no less than 10 megohms.

6.3.6 RODMETER SWITCHING UNIT (RSU) (UNIT 5). Refer to **Figure 6-19** for component/part locations.

6.3.6.1 Disassembly. To disassemble RSU:

a. Remove four screws, flat washers, and lockwashers securing cover to case.

b. Lift cover aside.

c. Tag all wires prior to removal for reconnection.

d. De-solder leads connected to J1 through J5.

e. Remove four screws, flat washers, and lockwashers from each jack (J1-J5).

f. Remove jacks.

g. De-solder leads connected to switch S1 on cover.

h. Remove knob and switch S1 from cover.

6.3.6.2 Reassembly. To reassemble RSU, reverse disassembly procedure.

6.3.6.3 Test. Following reassembly and rewiring, perform the following tests:

a. With DEML de-energized, check mechanical action of switch S1 to ensure freedom of movement, positive action, and alignment with front cover markings.

NOTE

DEML 1: J2 DEML 2: J5

ROD 1: J1 ROD 2: J3

b. Set switch S1 to NORMAL and test for continuity (zero ohms) between the following pairs of points:

J2-A / J1-A	J2-B / J1-B	J2-C / J1-C
J2-D / J1-D	J2-E / J1-E	J2-F / J2-H
J5-A / J3-A	J5-B / J3-B	J5-C / J3-C
J5-D / J3-D	J5-E / J3-E	J5-F / J3-H
J4-Q / J4-B		

c. Set switch S1 to ALTERNATE and test for continuity (zero ohms) between the following pairs of points:

J2-A / J3-A	J2-B / J3-B	J2-C / J3-C
J2-D / J3-D	J2-E / J3-E	J2-G / J2-H
J5-A / J1-A	J5-B / J1-B	J5-C / J1-C
J5-D / J1-D	J5-E / J1-E	J5-G / J5-H
J4-C / J4-B		

6.3.7 RODMETER CUTOUT SWITCH (UNIT 9).

6.3.7.1 Disassembly. To disassemble switch:

a. Remove four screws, flat washers, and lockwashers securing cover to case.

b. Lift cover aside.

c. Tag all wires prior to removal for re-connection.

d. Remove leads connected to switch.

e. Remove knob and switch from cover.

6.3.7.2 Reassembly. To reassemble switch, reverse disassembly procedures.

6.3.7.3 Test. Following reassembly and rewiring, perform the following tests:

a. With DEML de-energized, check mechanical action of switch to ensure freedom of movement, positive action, and alignment with front cover markings.

b. With DEML energized, verify switch operation removes 50 VAC to rodmeter.

6.4 OVERALL SCHEMATIC DIAGRAM.

See **Figure 5-2** for overall schematics of the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) and AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML.

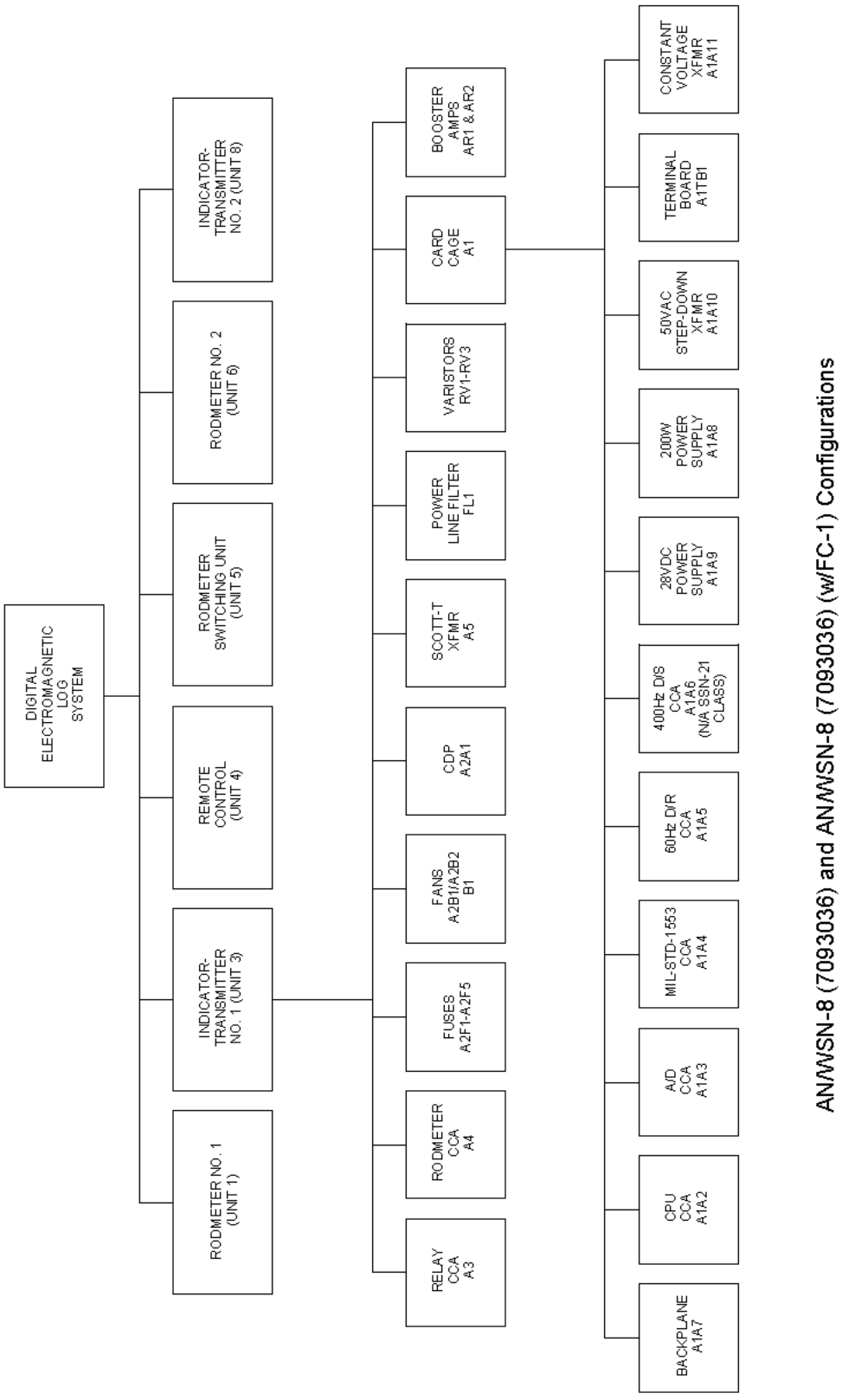


Figure 6-1. DEML Hardware Family Tree (Sheet 1 of 2)

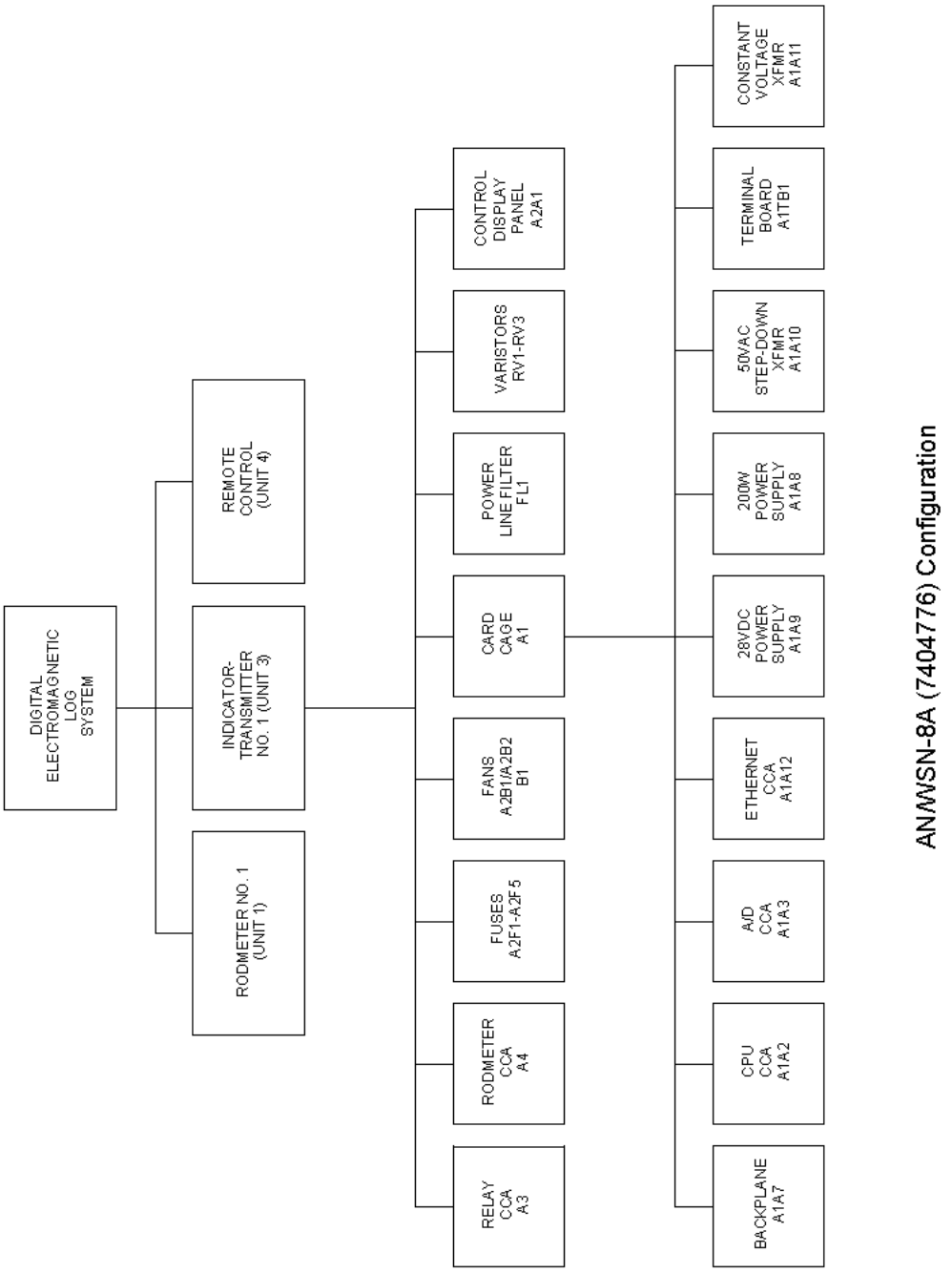


Figure 6-1. DEML Hardware Family Tree (Sheet 2)

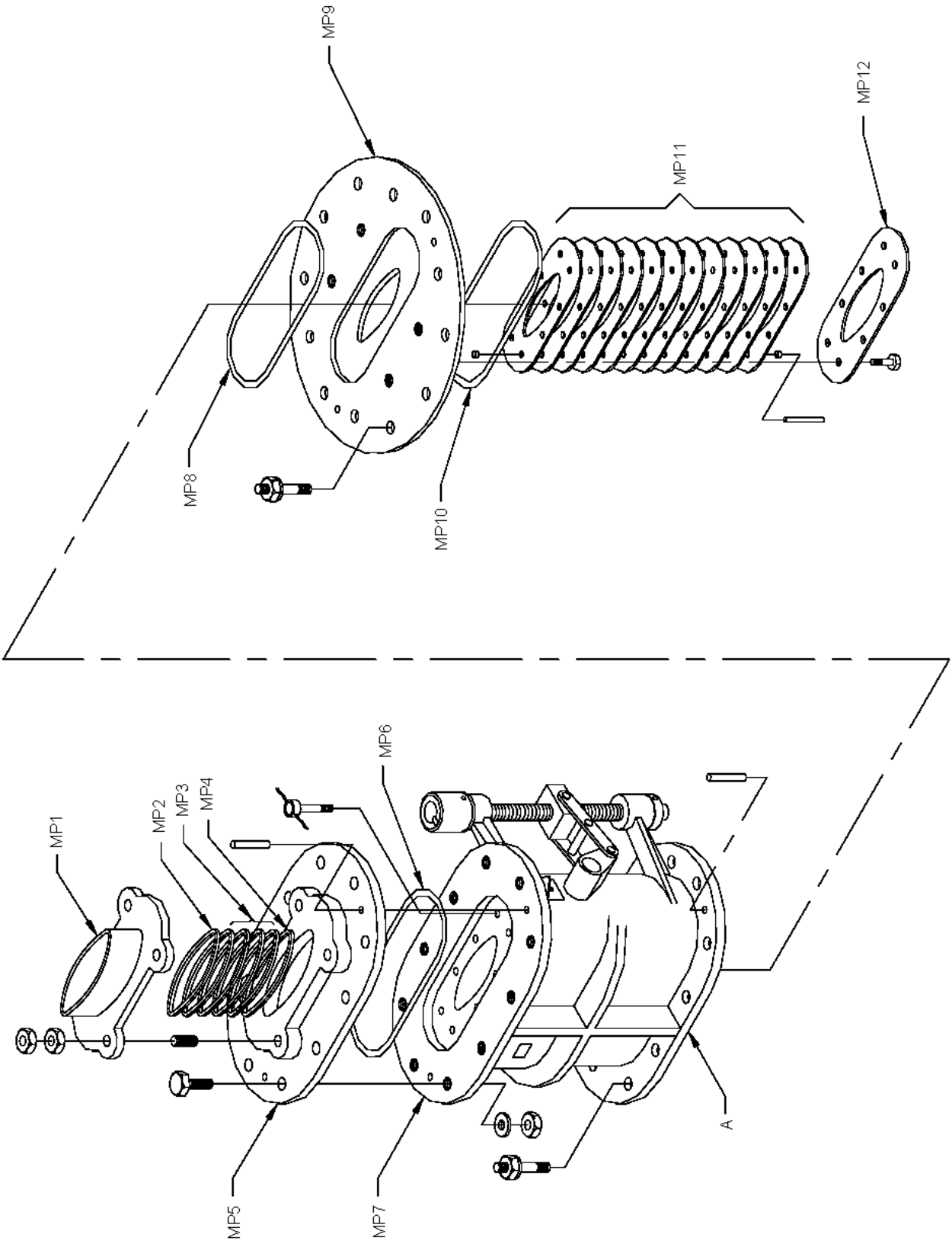


Figure 6-2. Sea Valve (Unit 2 or 7), Exploded View

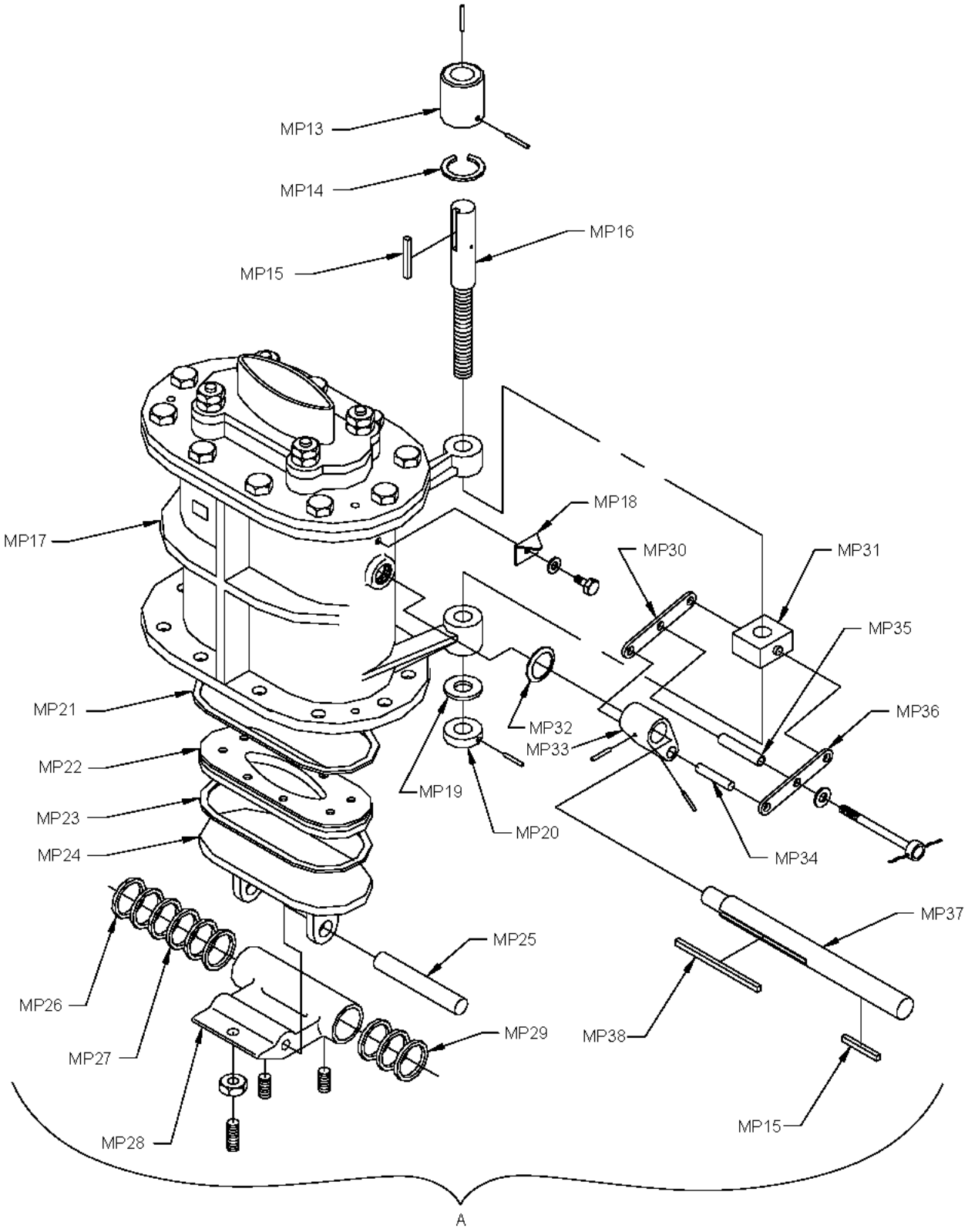
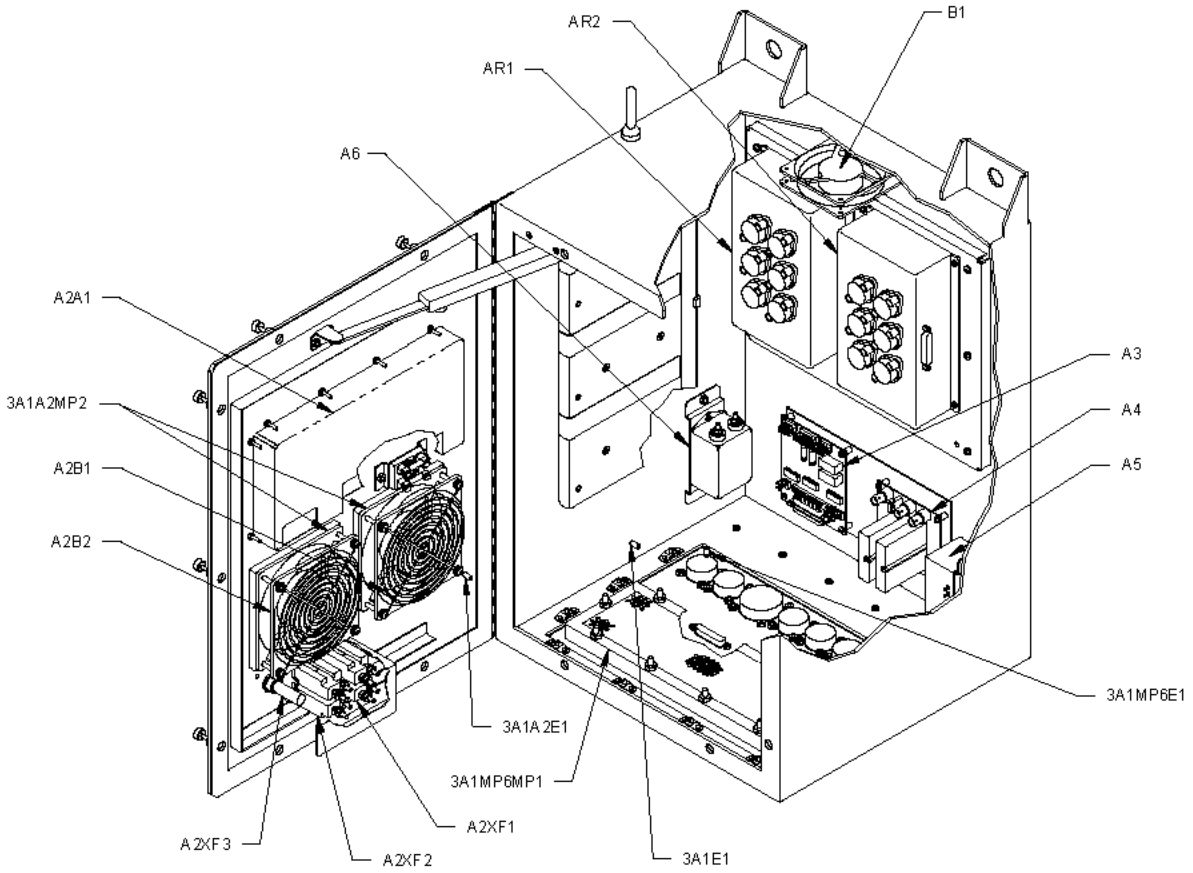


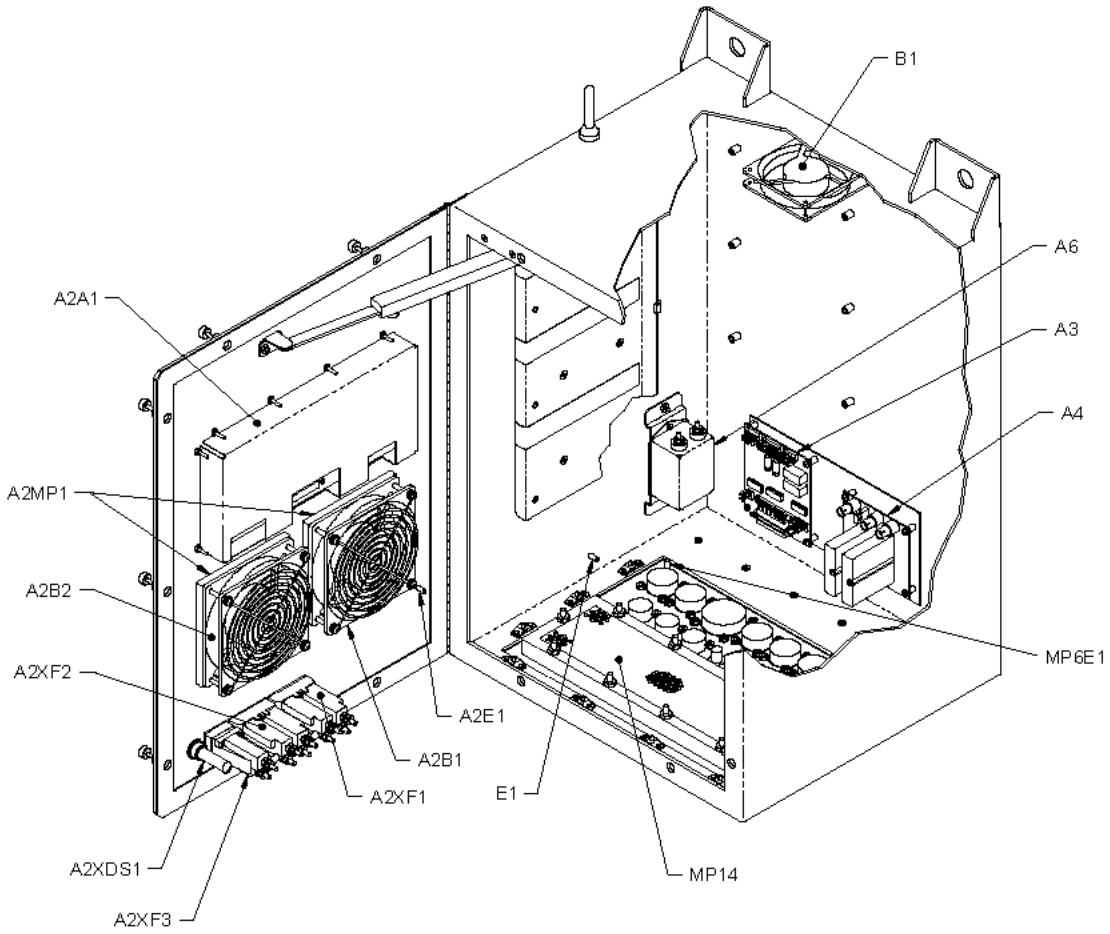
Figure 6-3. Sea Valve Assembly (Unit 2 or 7)



A2B1	INTAKE FAN	A5	SCOTT-T TRANSFORMER
A2B2	INTAKE FAN	A2XF1	FUSE HOLDER
A2A1	CDP	A2XF2	FUSE HOLDER
A6	POWER LINE FILTER	A2XF3	FUSE HOLDER
AR1	SSBA	3A1E1	GROUND STUD
AR2	SSBA	3A1A2E1	GROUND STUD
B1	CIRCULATING FAN	3A1MP6E1	GROUND STUD
A3	RELAY CCA	3A1A2MP2	EMI FILTER
A4	RODMETER CCA	3A1MP6MP1	EMI FILTER

AN/WSN-8 (7093036) and AN/WSN-8 (7093036) (w/FC-1) Configurations

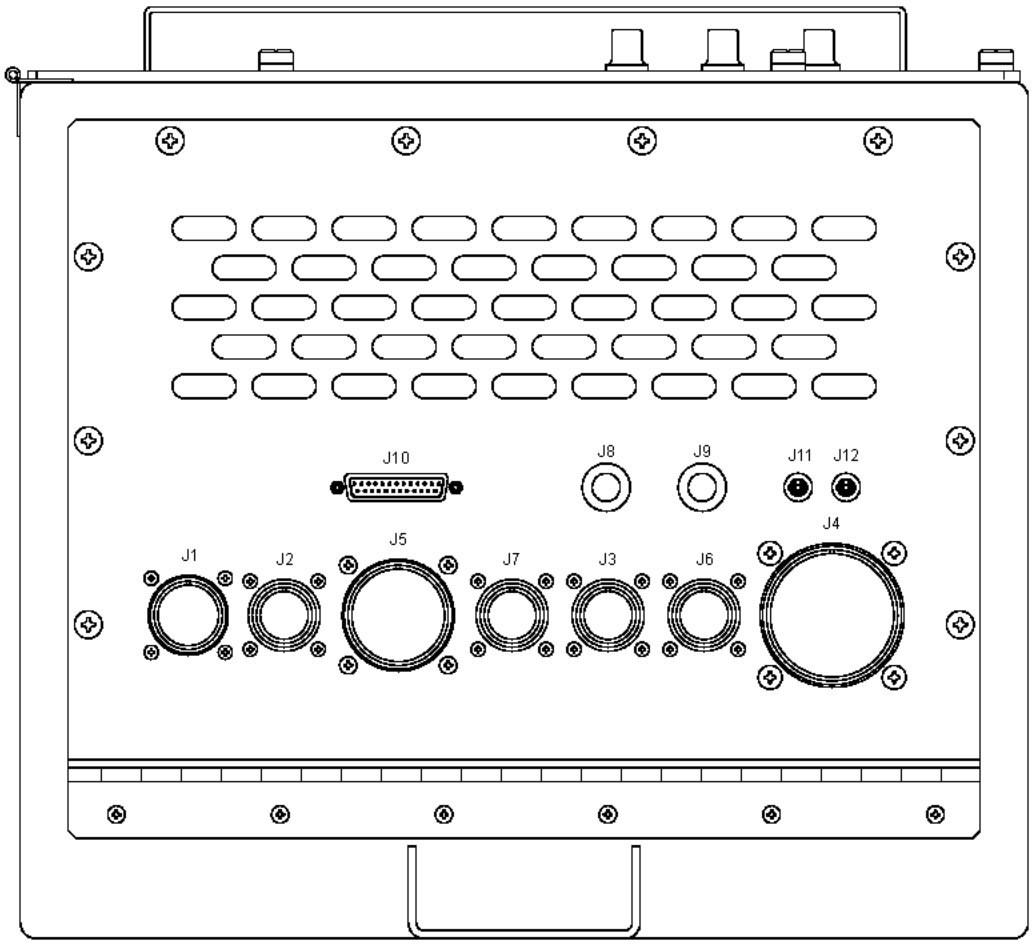
Figure 6-4. Cabinet-Mounted Components (Unit 3 or 8) (Sheet 1 of 2)



A2A1	CDP	A3	RELAY CCA
A2B1	INTAKE FAN	A4	RODMETER CCA
A2B2	INTAKE FAN	A6	POWER LINE FILTER
A2E1	GROUND STUD	B1	CIRCULATING FAN
A2MP1	EMI FILTER	E1	GROUND STUD
A2XDS1	INDICATOR LIGHT	MP6E1	GROUND STUD
A2XF1	FUSE HOLDER	MP14	FUSE HOLDER
A2XF2	FUSE HOLDER		
A2XF3	FUSE HOLDER		

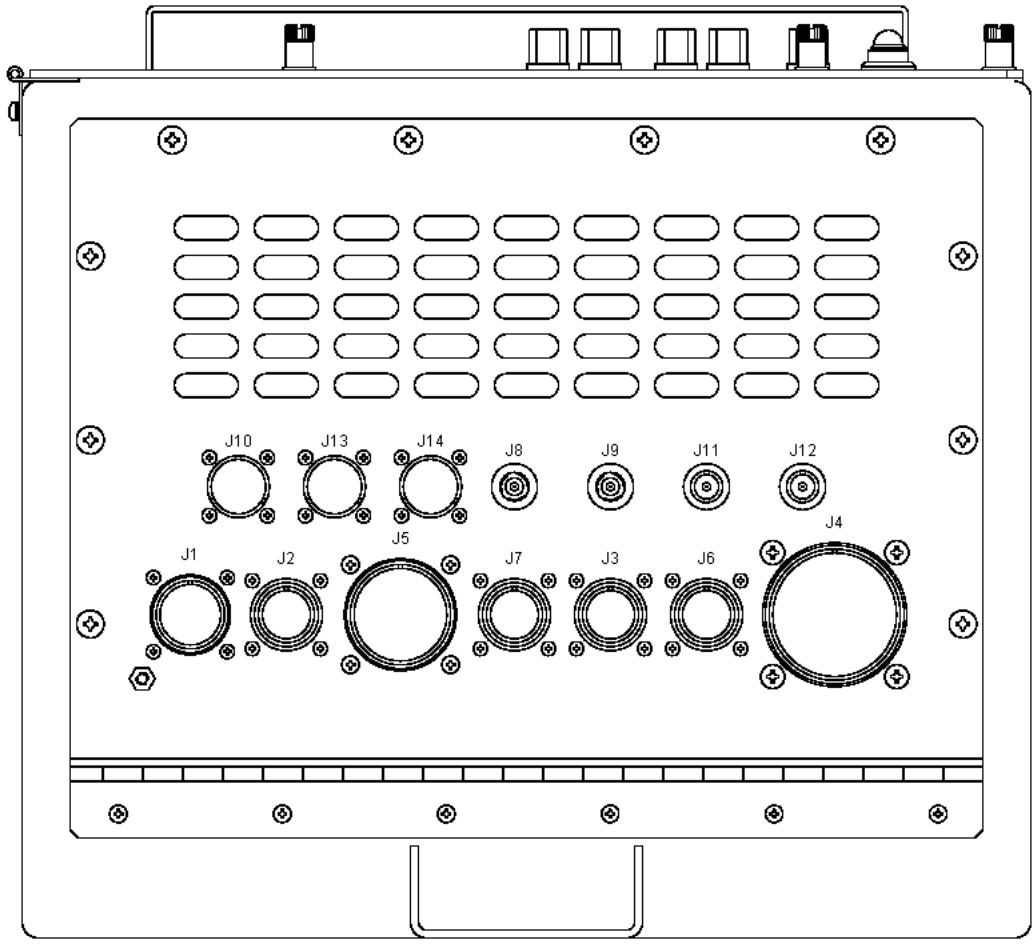
AN/WSN-8A (7404776) Configuration

Figure 6-4. Cabinet-Mounted Components (Unit 3 or 8) (Sheet 2)



AN/WSN-8 (7093036) Configuration

Figure 6-5. I/T Lower Access Panel (MP6) (Sheet 1 of 2)



AN/WSN-8A (7404776) Configuration

Figure 6-5. I/T Lower Access Panel (MP6) (Sheet 2)

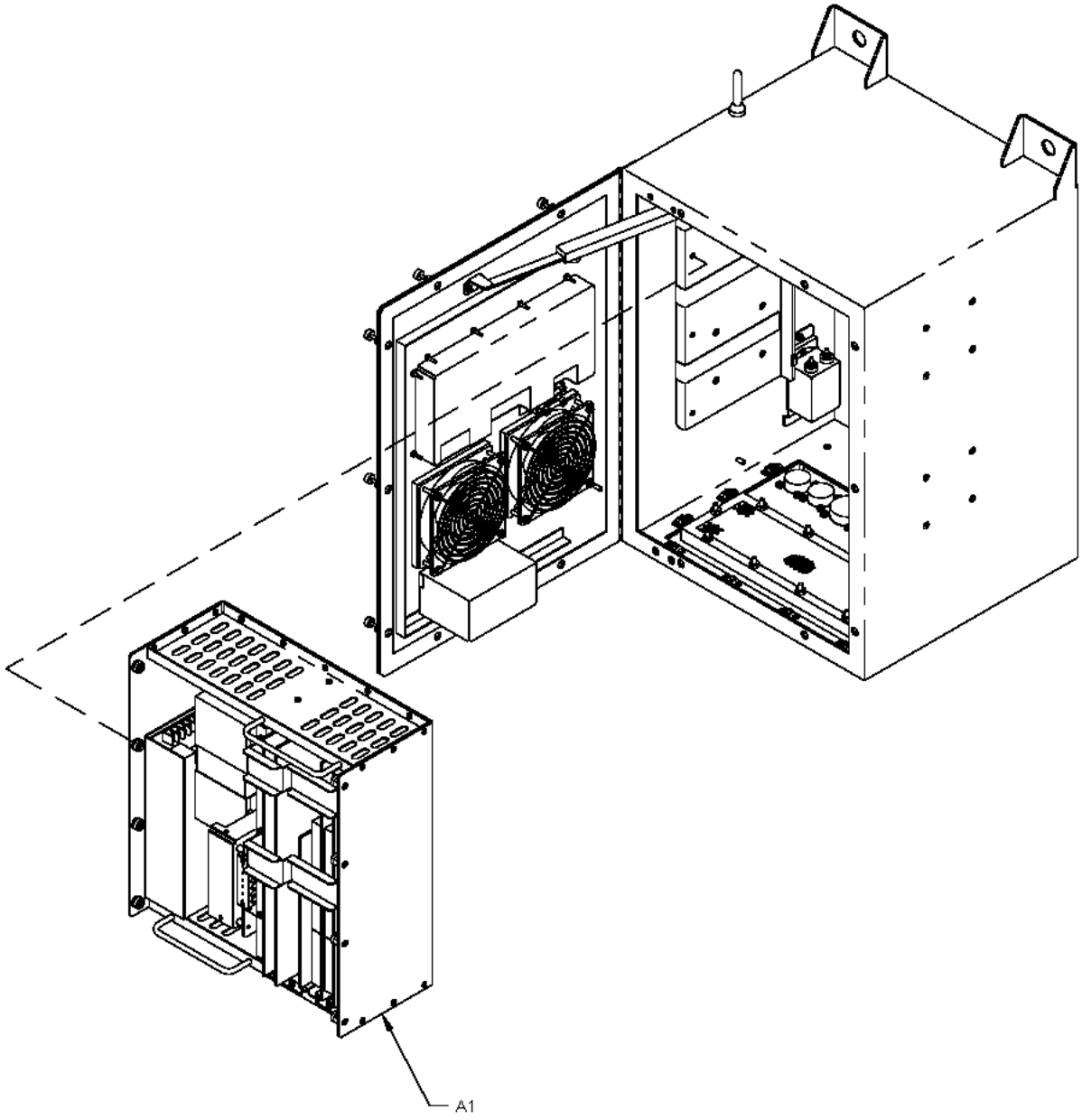
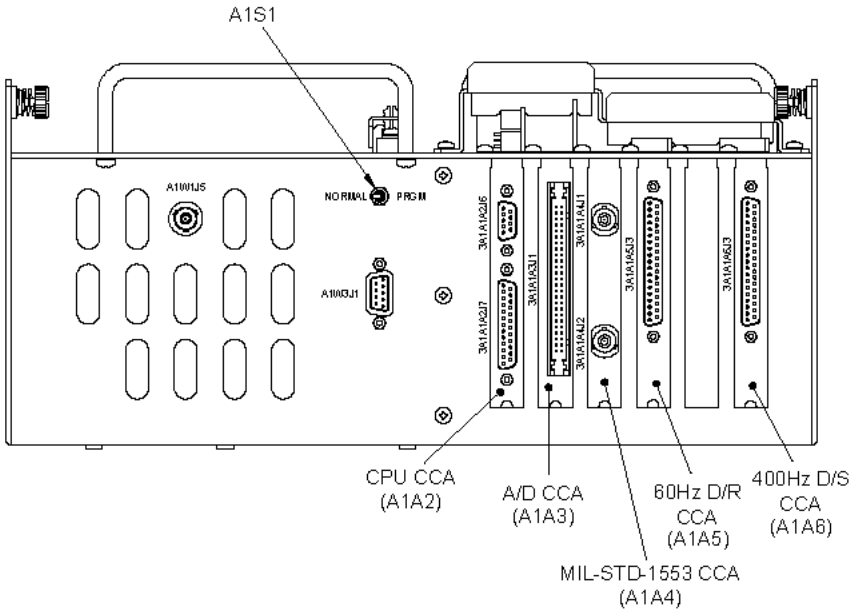
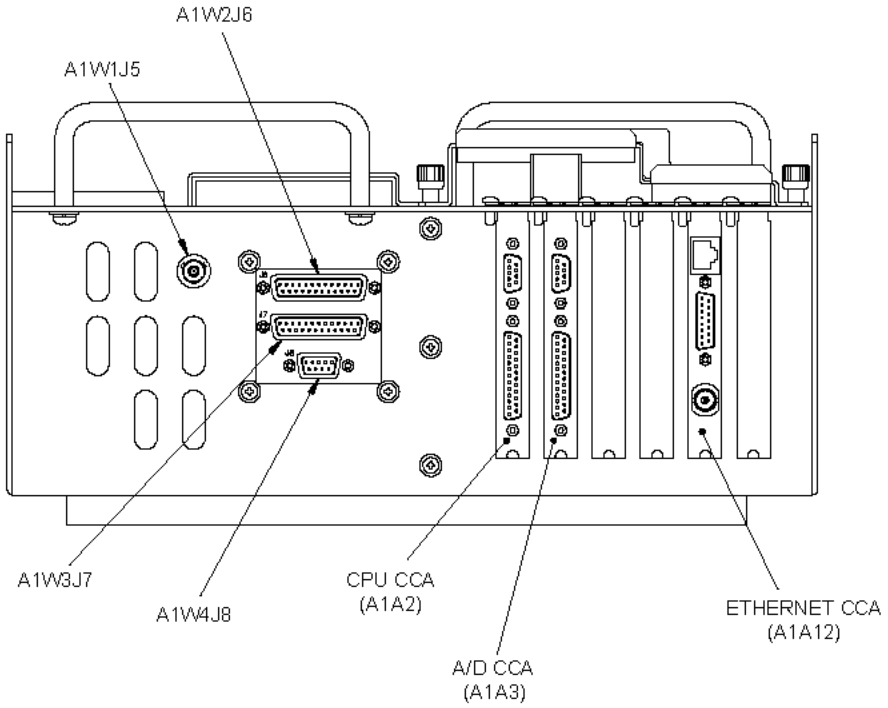


Figure 6-6. Removal of Power Supply/Card Cage Assembly (A1)



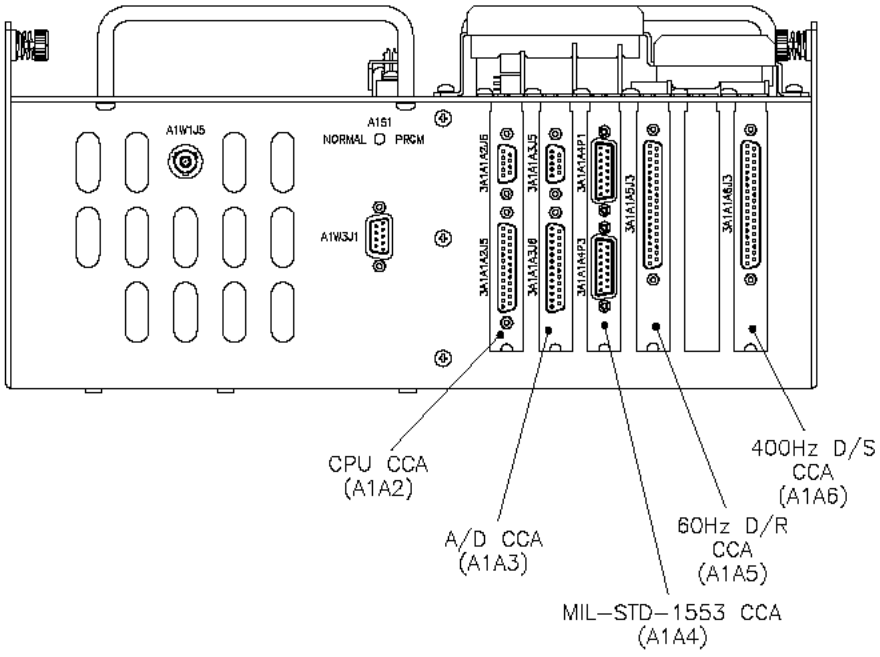
AN/WSN-8 (7093036) Configuration

Figure 6-7. Card Cage Assembly (A1), Bottom View (Sheet 1 of 3)



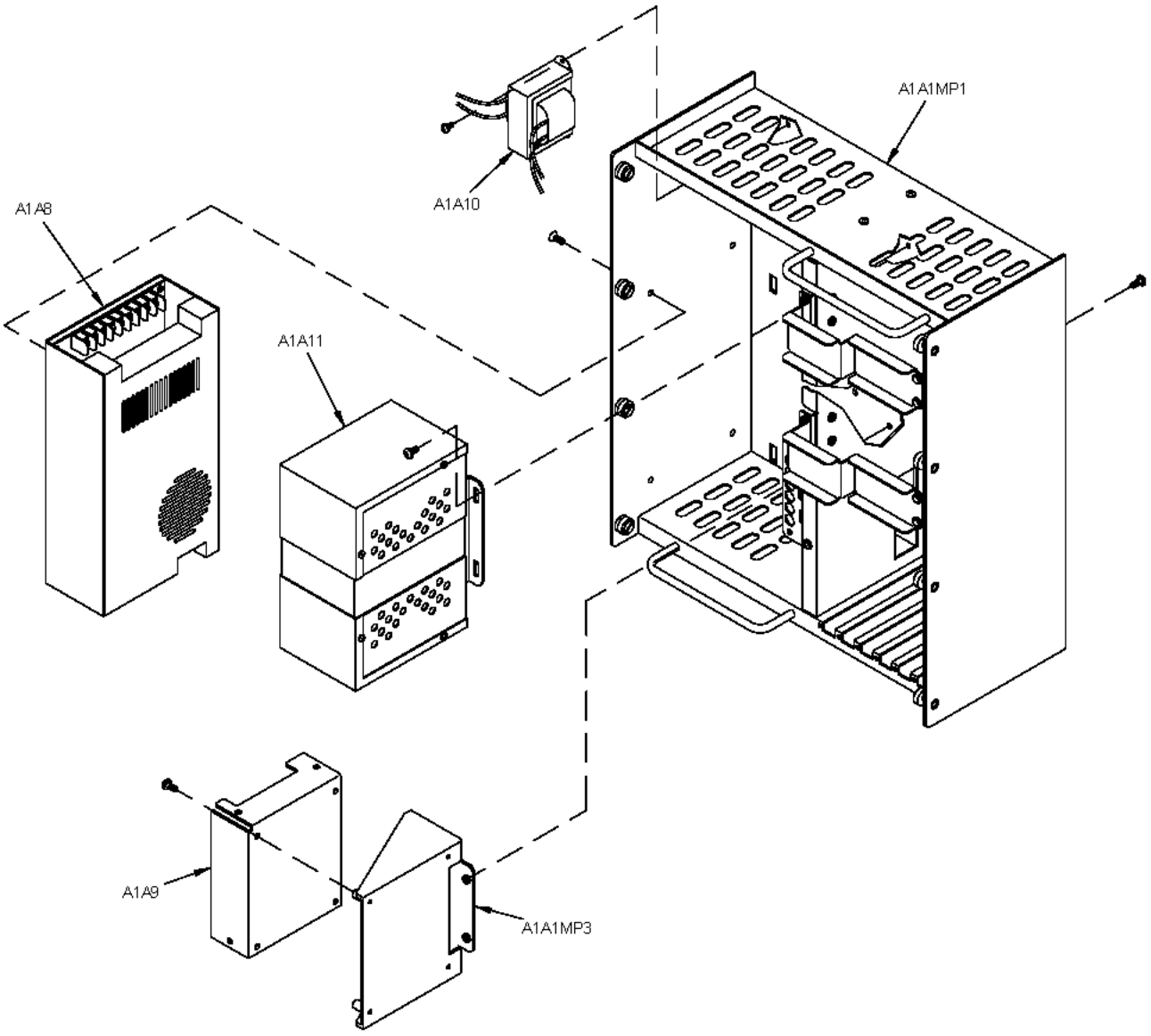
AN/WSN-8A (7404776) Configuration

Figure 6-7. Card Cage Assembly (A1), Bottom View (Sheet 2)



AN/WSN-8 (7093036) (w/FC-1) Configuration

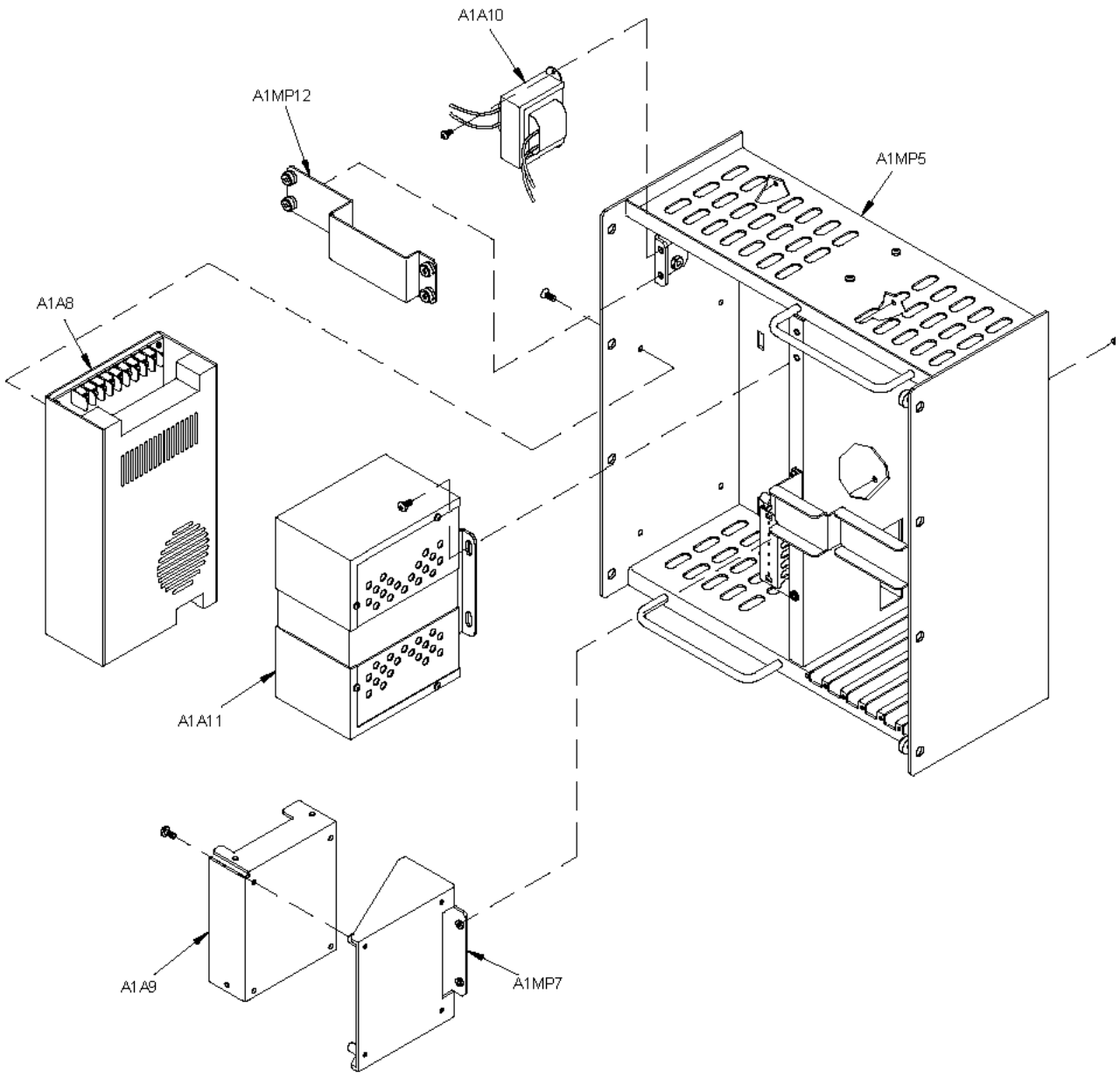
Figure 6-7. Card Cage Assembly (A1), Bottom View (Sheet 3)



A1A1MP1	POWER SUPPLY CARD CAGE SHELL	A1A9	28 VDC POWER SUPPLY
A1A1MP3	28 VDC POWER SUPPLY BRACKET	A1A10	50 VAC STEP DOWN TRANSFORMER
A1A8	200 WATT POWER SUPPLY	A1A11	CONSTANT VOLTAGE TRANSFORMER

AN/WSN-8 (7093036) Configuration

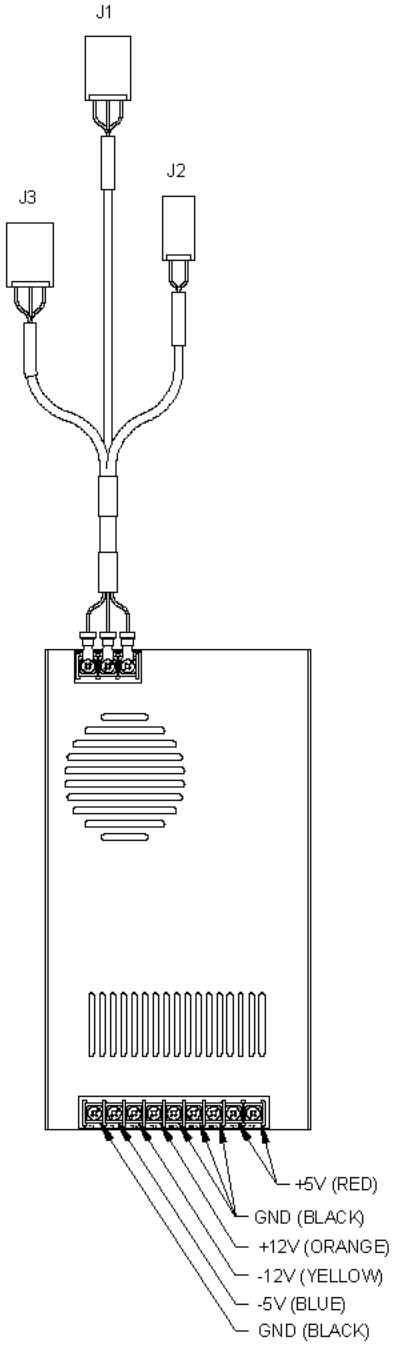
Figure 6-8. Power Supply/Card Cage Assembly (A1), Exploded View (Sheet 1 of 3)



A1A8	200 WATT POWER SUPPLY	A1MP5	POWER SUPPLY CARD CAGE SHELL
A1A9	28 VDC POWER SUPPLY	A1MP7	28 VDC POWER SUPPLY BRACKET
A1A10	50 VAC STEP DOWN TRANSFORMER	A1MP12	CONSTANT VOLTAGE RETAINER BRACKET
A1A11	CONSTANT VOLTAGE TRANSFORMER		

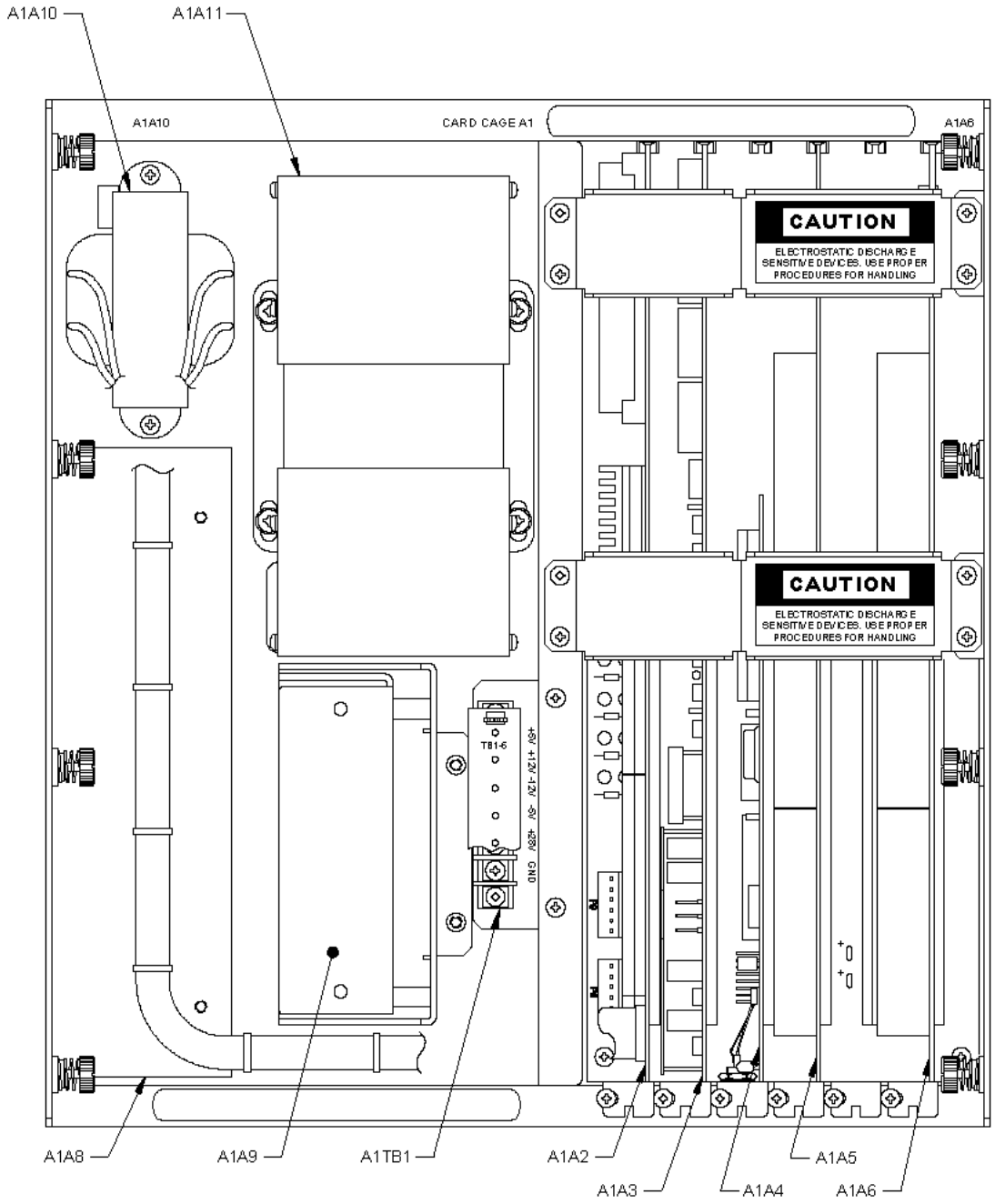
AN/WSN-8A (7404776) Configuration

Figure 6-8. Power Supply/Card Cage Assembly (A1), Exploded View (Sheet 2)



AN/WSN-8 (7093036) and AN/WSN-8A (7404776) Configuration

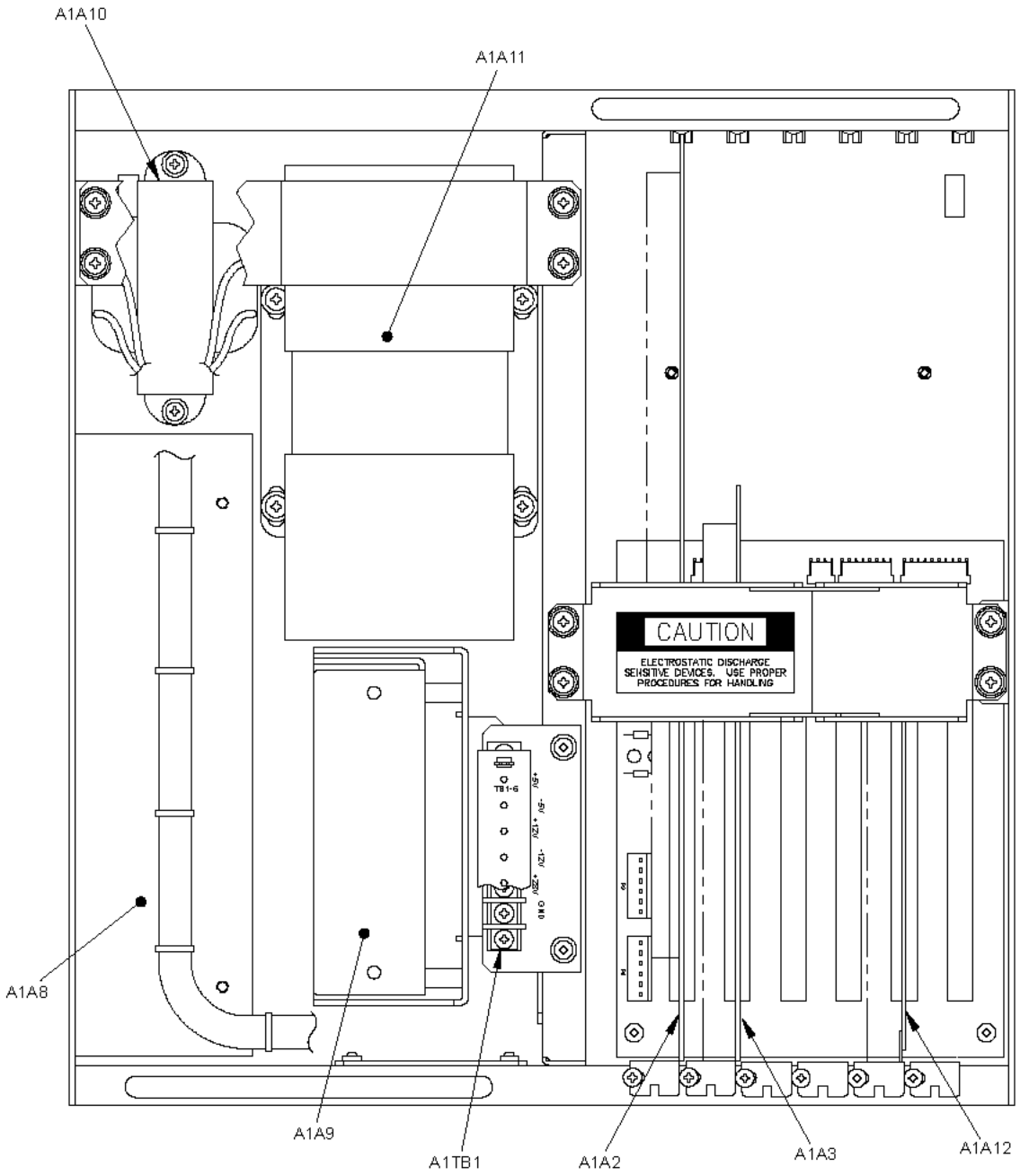
Figure 6-8. Power Supply/Card Cage Assembly (A1), Exploded View (Sheet 3)



A1A10	50VAC STEP DOWN TRANSFORMER	A1A3	A/D CCA
A1A11	CONSTANT VOLTAGE TRANSFORMER	A1A2	CPU CCA
A1A6	400Hz D/S CCA	A1TB1	TERMINAL BOARD
A1A5	60Hz D/R CCA	A1A9	28VDC POWER SUPPLY
A1A4	MIL-STD-1553 CCA	A1A8	200W POWER SUPPLY

AN/WSN-8 (7093036) Configuration

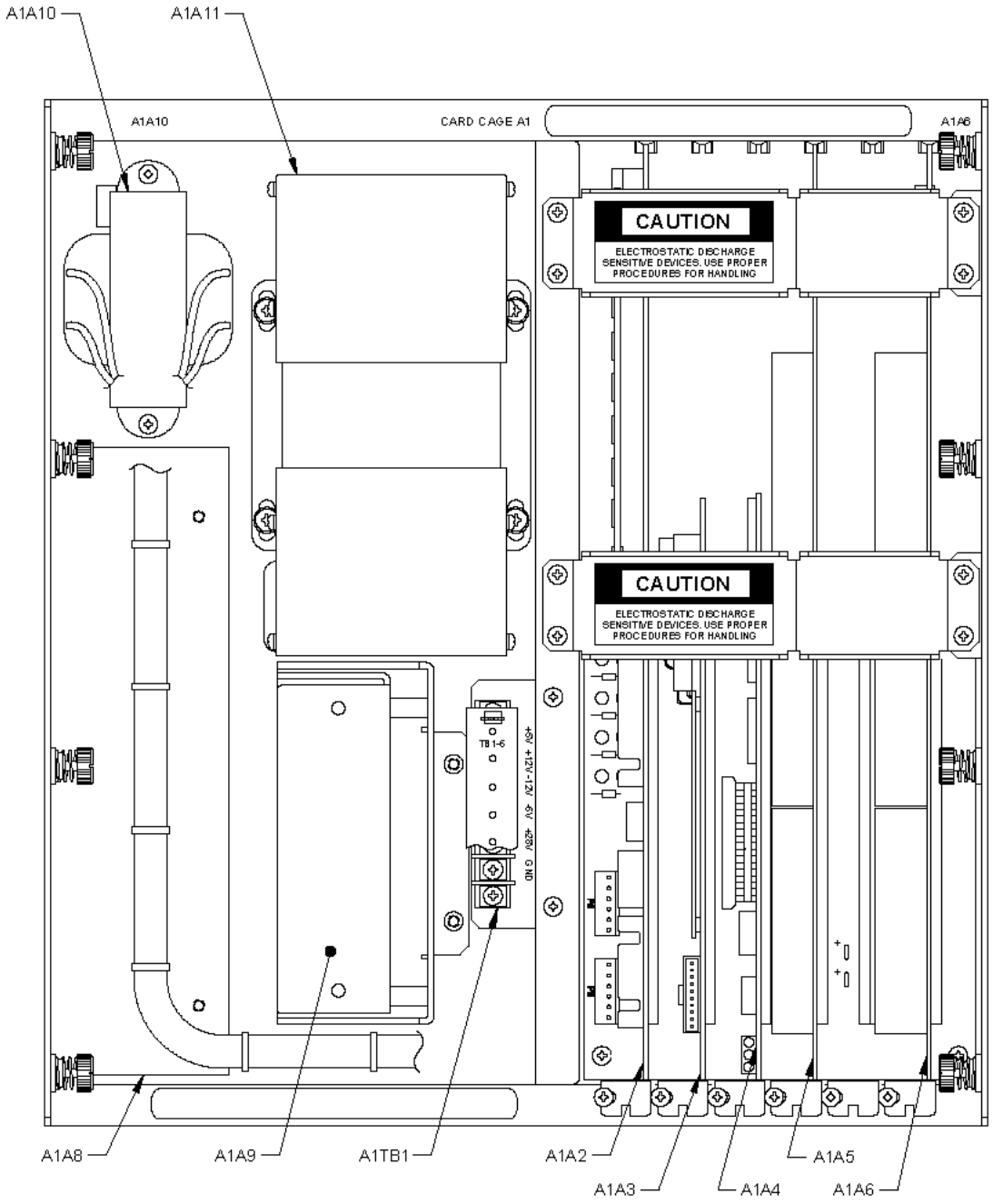
Figure 6-9. Components in Card Cage (A1) (Sheet 1 of 3)



A1A2	CPU CCA	A1A10	50 VAC STEP DOWN TRANSFORMER
A1A3	A/D CCA	A1A11	CONSTANT VOLTAGE TRANSFORMER
A1A8	200W POWER SUPPLY	A1A12	ETHERNET CCA
A1A9	28 VDC POWER SUPPLY	A1TB1	TERMINAL BOARD

AN/WSN-8A (7404776) Configuration

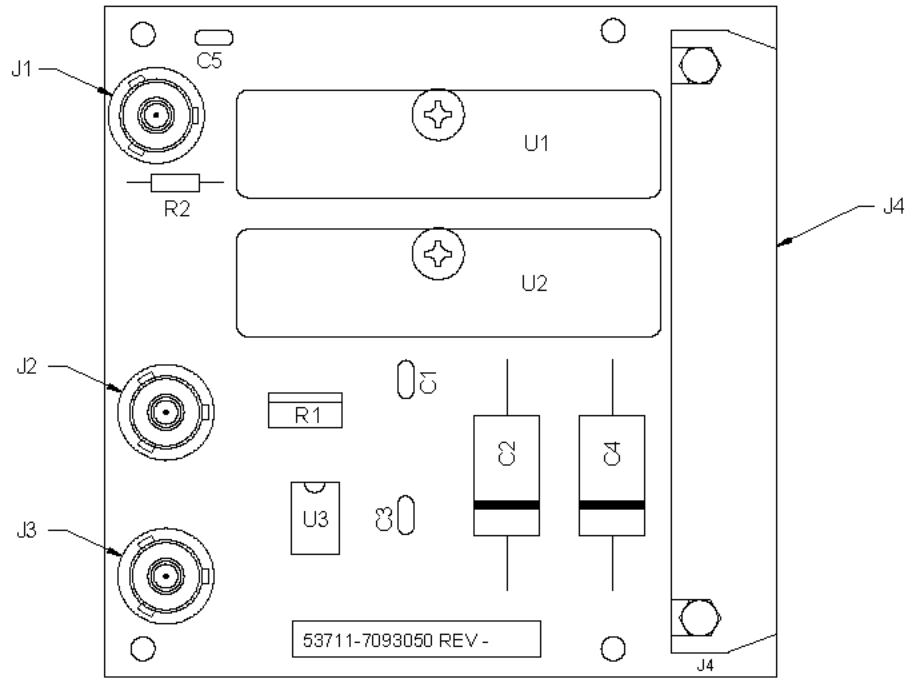
Figure 6-9. Components in Card Cage (A1) (Sheet 2)



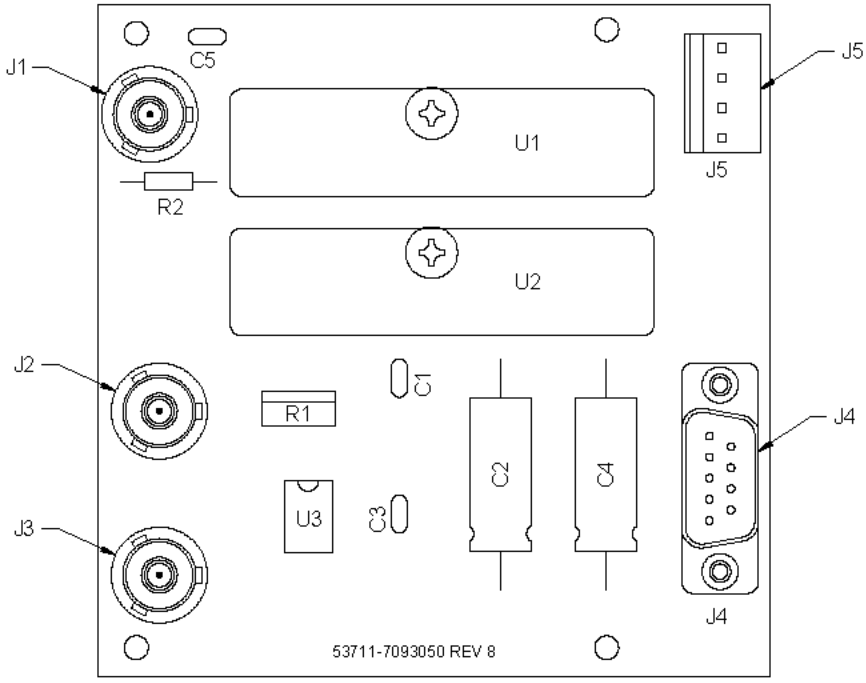
A1A10	50VAC STEP DOWN TRANSFORMER	A1A3	A/D CCA
A1A11	CONSTANT VOLTAGE TRANSFORMER	A1A2	CPU CCA
A1A6	400Hz D/S CCA	A1TB1	TERMINAL BOARD
A1A5	60Hz D/R CCA	A1A9	28VDC POWER SUPPLY
A1A4	MIL-STD-1553 CCA	A1A8	200W POWER SUPPLY

AN/WSN-8 (7093036) (w/FC-1) Configuration

Figure 6-9. Components in Card Cage (A1) (Sheet 3)



AN/WSN-8 (7093036) Configuration



AN/WSN-8A (7404776) and AN/WSN-8 (7093036) (w/FC-1) Configurations

Figure 6-10. Rodmeter Front-End CCA (3A1A4 or 3A4)

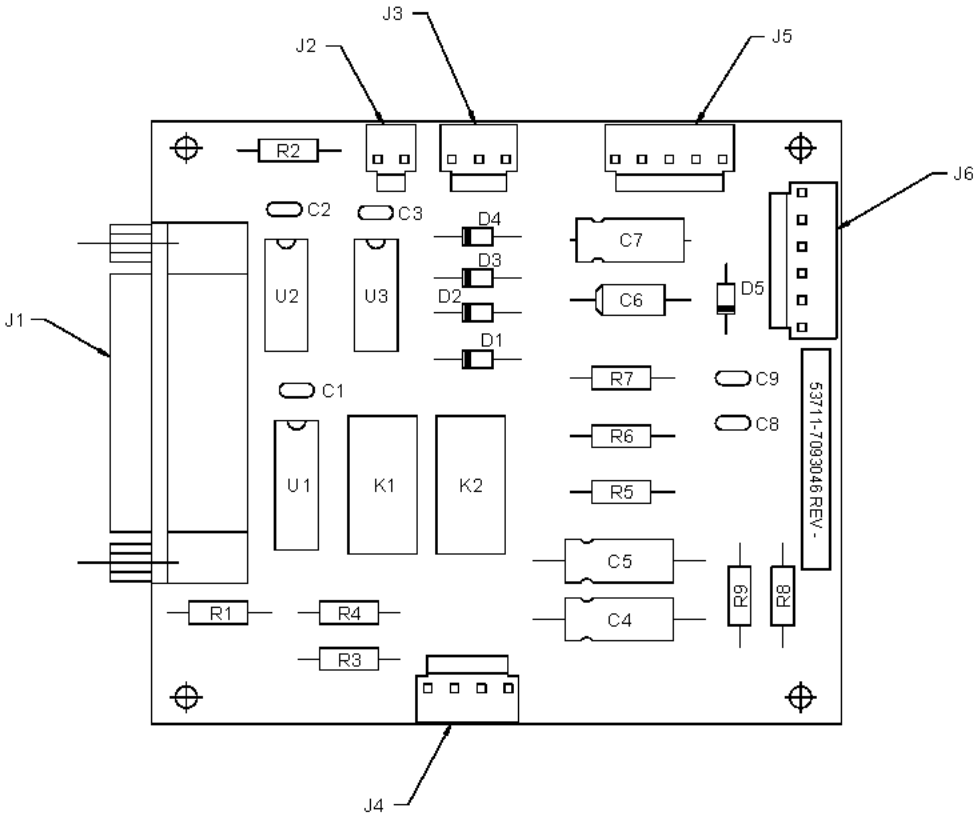


Figure 6-11. Relay CCA (3A1A3 or 3A3)

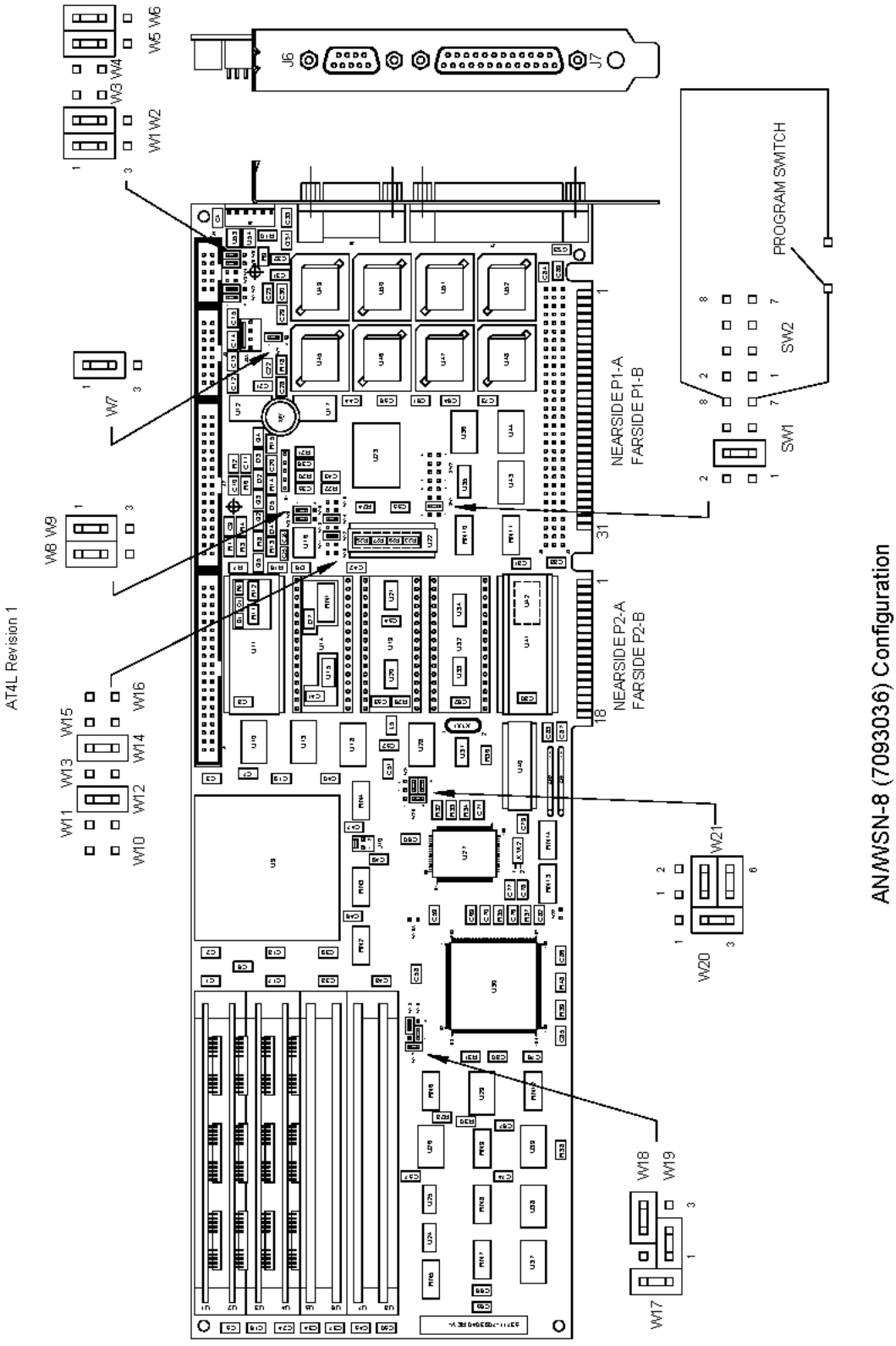


Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 1 of 6)

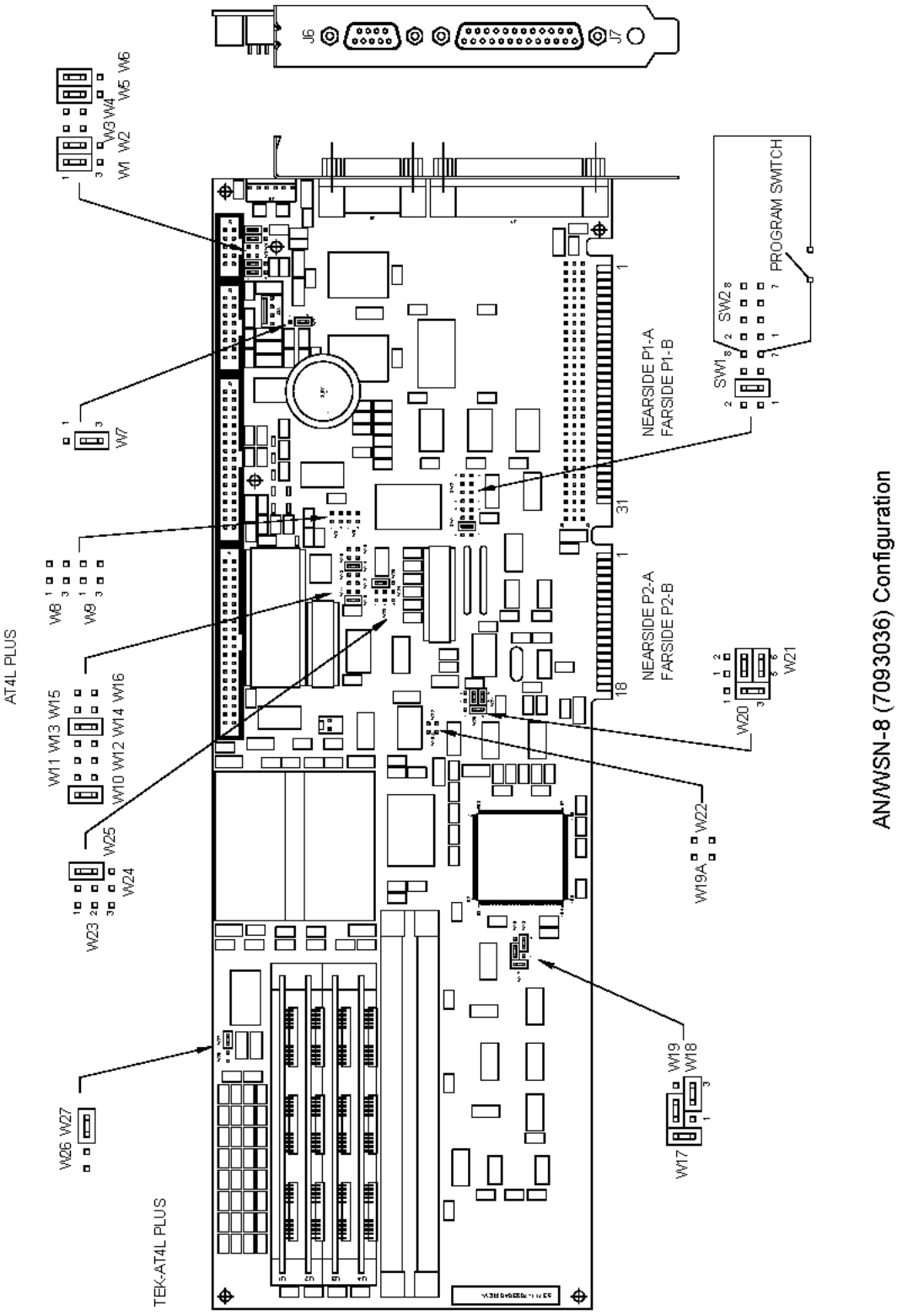
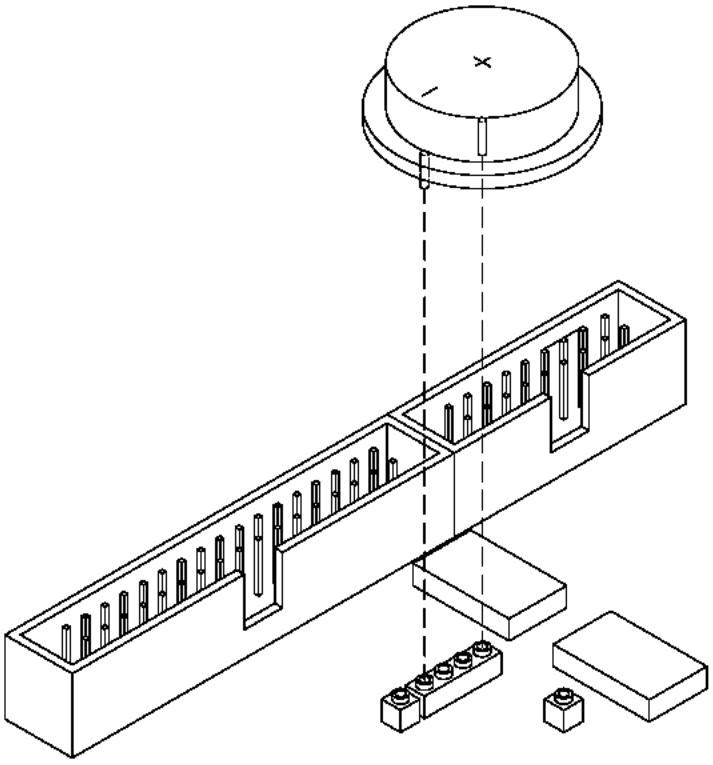


Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 2)



AN/WSN-8 (7093036) Configuration

Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 3)

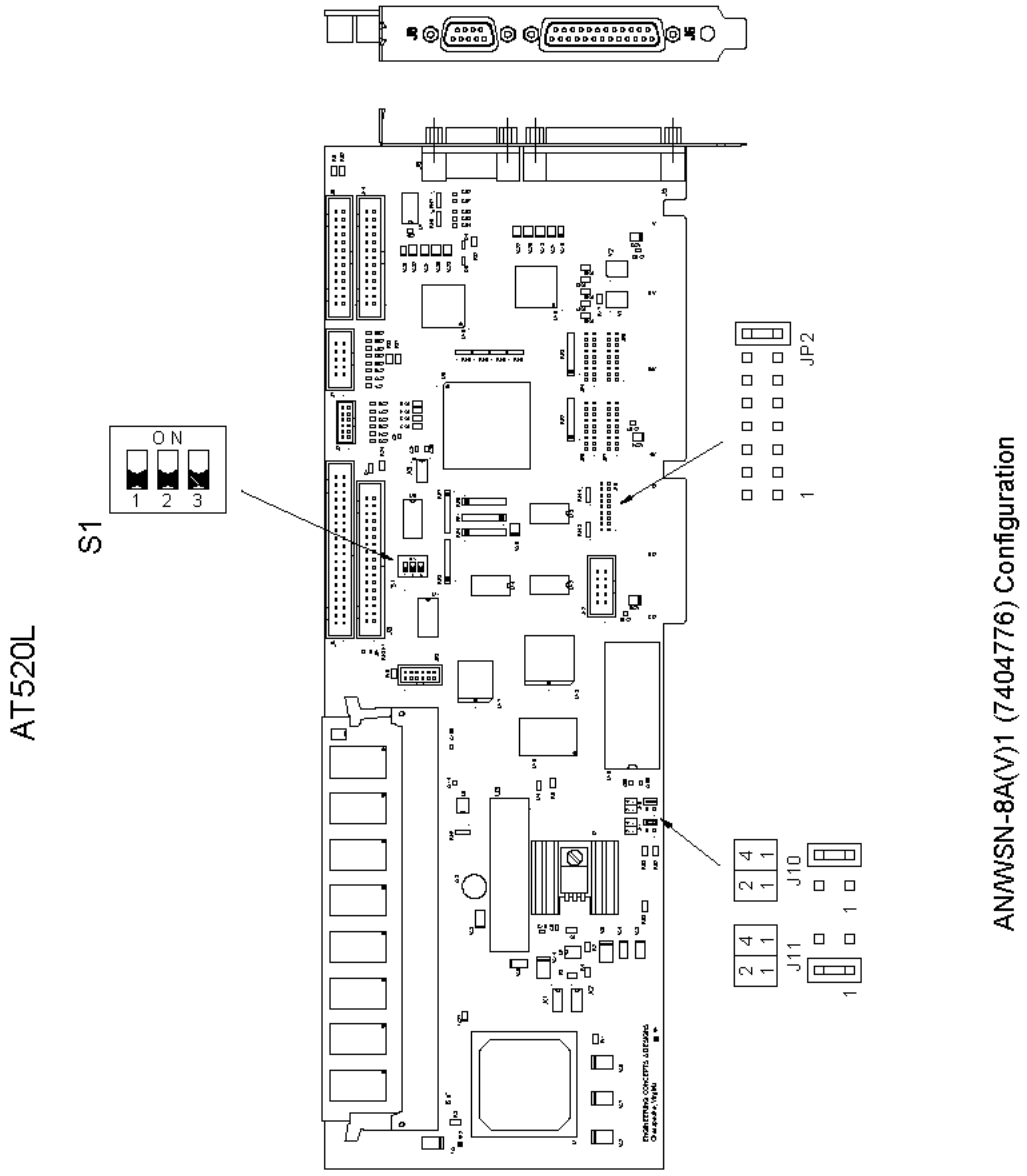


TABLE 1: JUMPER CONFIGURATIONS
AN/WSN-8A(V)1 (7404776)

JUMPER NO.	PINS	SETTING
JP2	1,2	OPEN
	3,4	OPEN
	5,6	OPEN
	7,8	OPEN
	9,10	OPEN
	11,12	OPEN
	13,14	OPEN
	15,16	CLOSED
J10	1,2	OPEN
	3,4	CLOSED
J11	1,2	CLOSED
	3,4	OPEN
S1	1	OFF
	2	OFF
	3	OFF

Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 4)

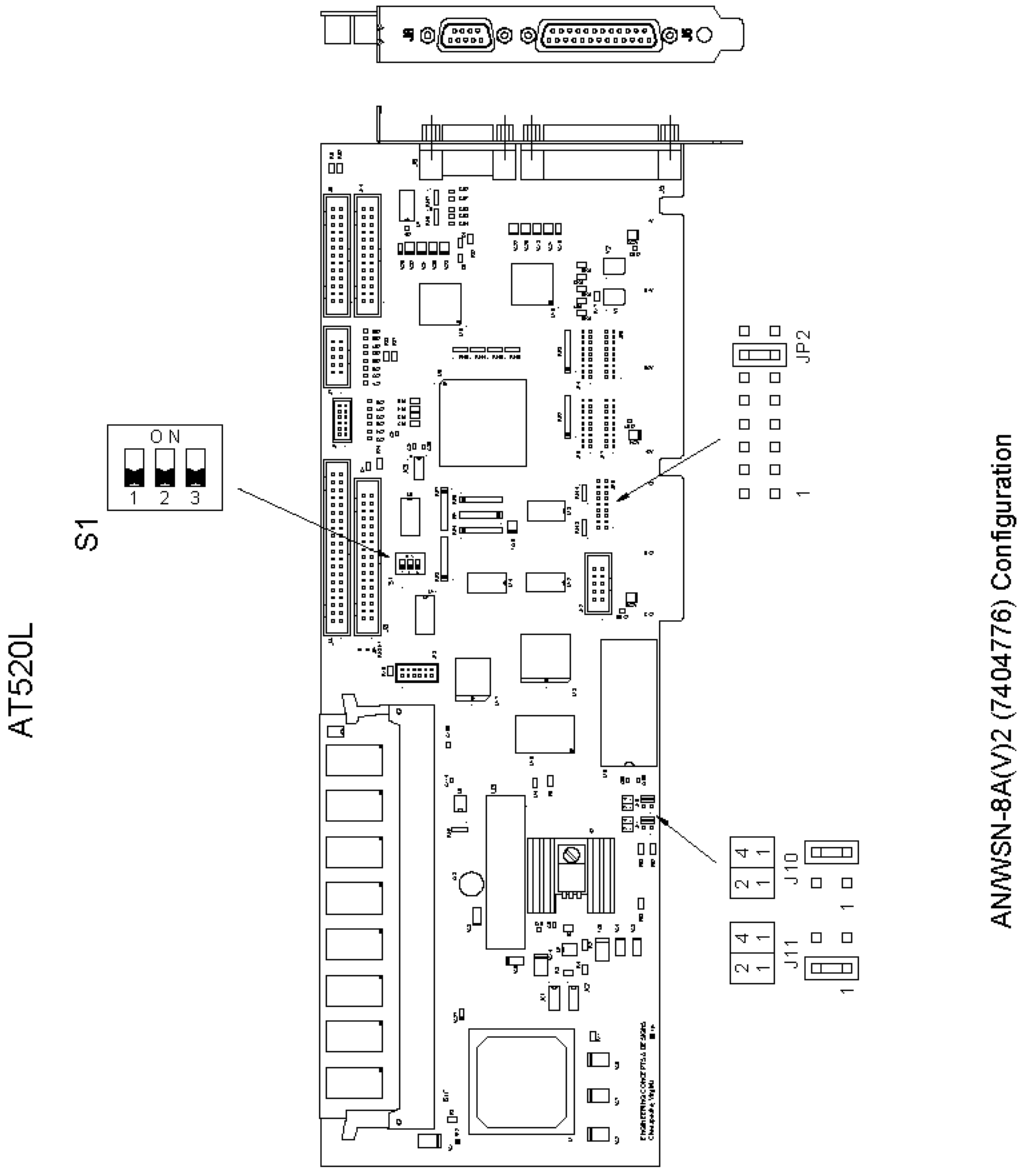


TABLE 1: JUMPER CONFIGURATIONS
AN/WSN-8A(V)2 (7404776)

JUMPER NO.	PINS	SETTING
JP2	1,2	OPEN
	3,4	OPEN
	5,6	OPEN
	7,8	OPEN
	9,10	OPEN
	11,12	OPEN
	13,14	CLOSED
	15,16	OPEN
J10	1,2	OPEN
	3,4	CLOSED
J11	1,2	CLOSED
	3,4	OPEN
S1	1	OFF
	2	OFF
	3	OFF

Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 5)

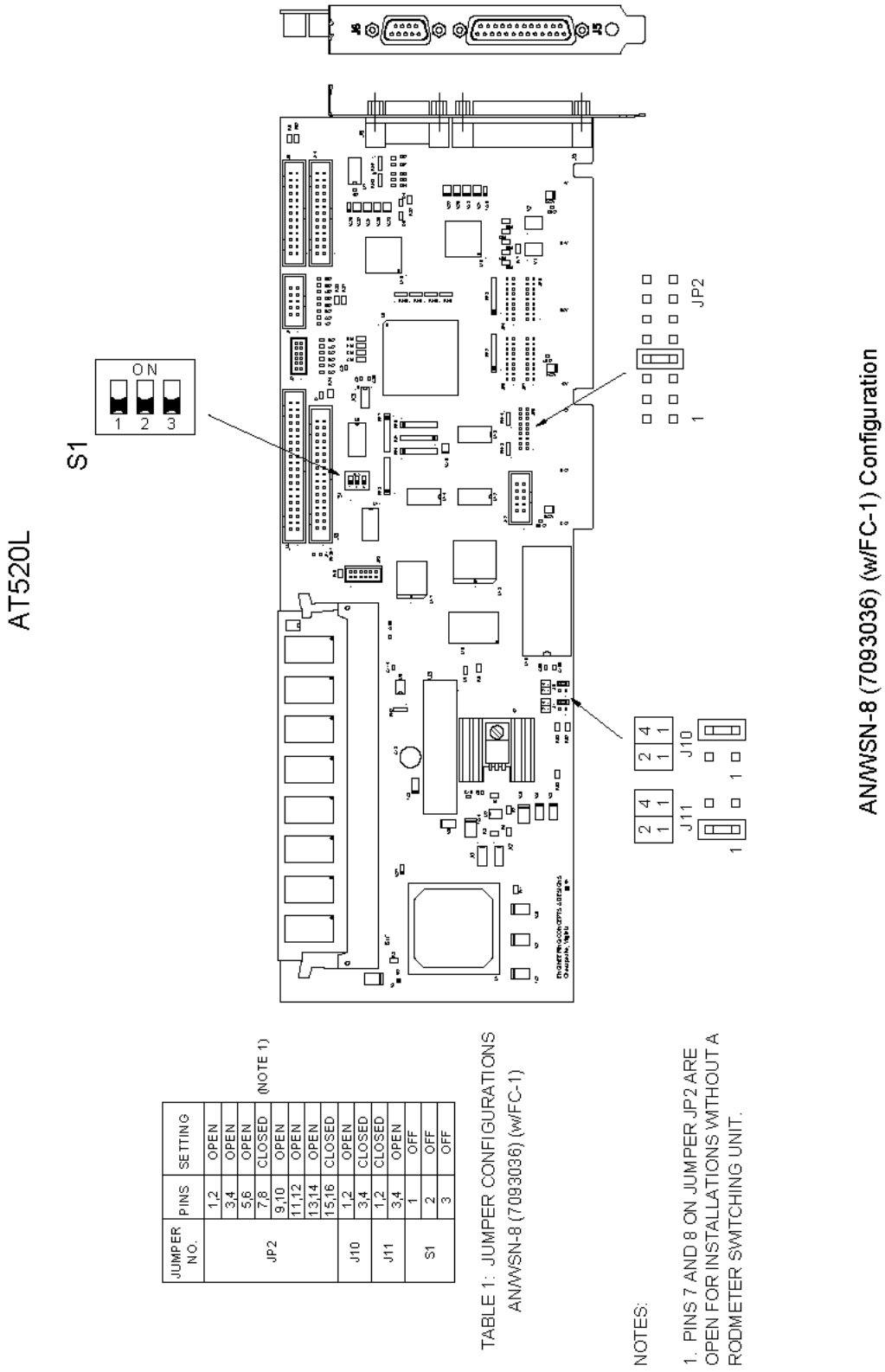


TABLE 1: JUMPER CONFIGURATIONS AN/WSN-8 (7093036) (w/FC-1)

JUMPER NO.	PINS	SETTING
JP2 (NOTE 1)	1,2	OPEN
	3,4	OPEN
	5,6	OPEN
	7,8	CLOSED
	9,10	OPEN
	11,12	OPEN
	13,14	OPEN
	15,16	CLOSED
J10	1,2	OPEN
	3,4	CLOSED
J11	1,2	CLOSED
	3,4	OPEN
S1	1	OFF
	2	OFF
	3	OFF

NOTES:

1. PINS 7 AND 8 ON JUMPER JP2 ARE OPEN FOR INSTALLATIONS WITHOUT A RODMETER SWITCHING UNIT.

Figure 6-12. Central Processing Unit CCA (A1A2) (Sheet 6)

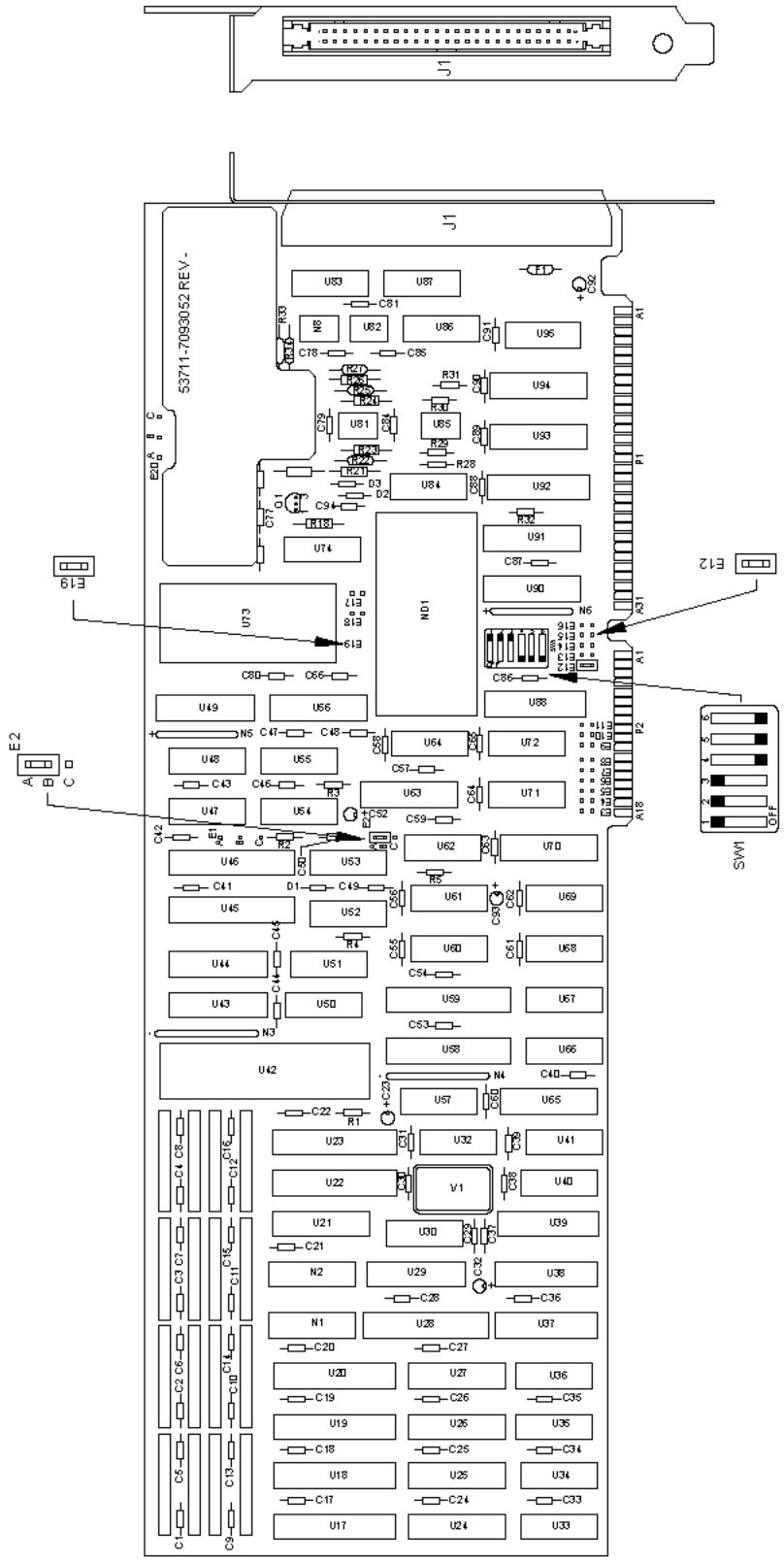


Figure 6-13. A/D Converter CCA (A1A3) (Sheet 1 of 2)

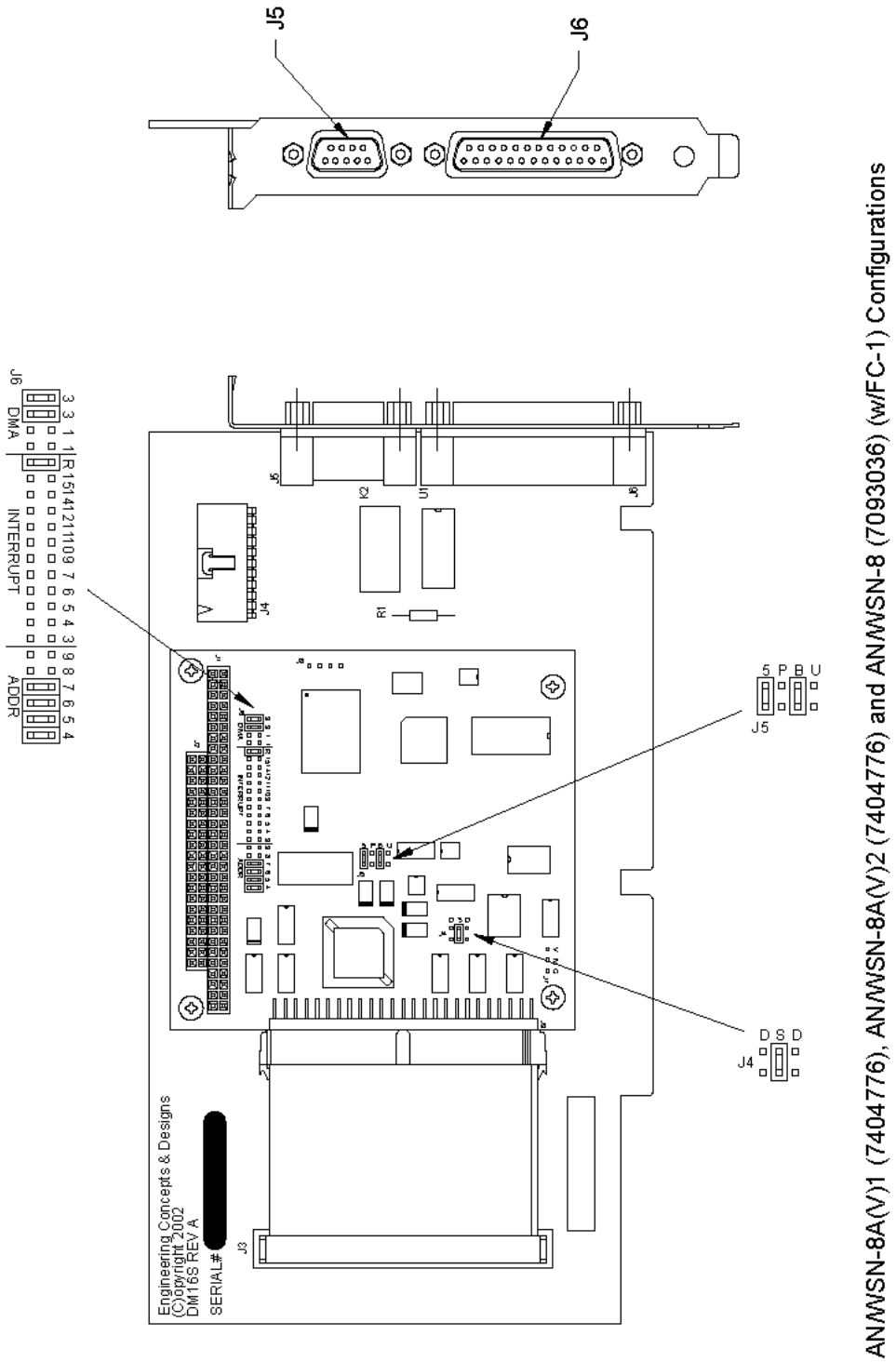


Figure 6-13. A/D Converter CCA (A1A3) (Sheet 2)

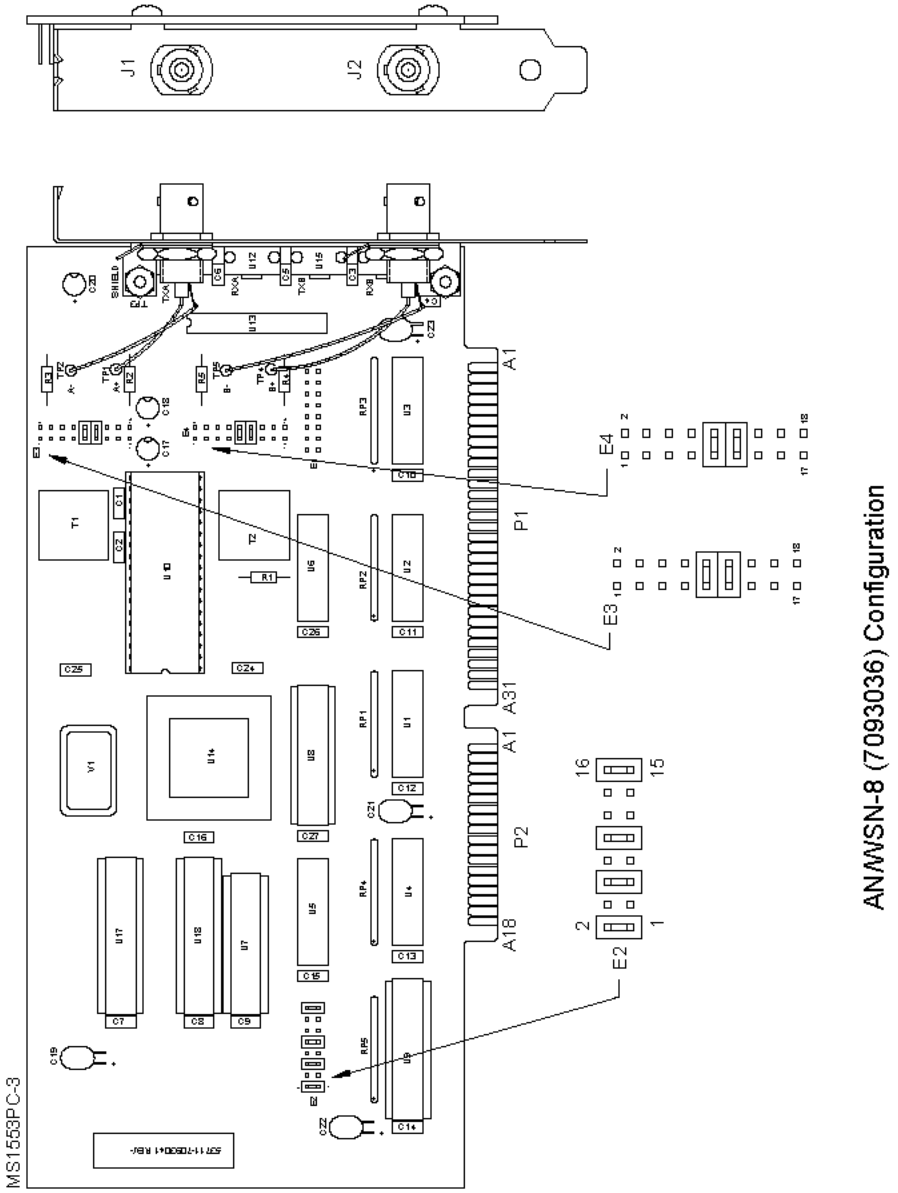


Figure 6-14. MIL-STD-1553B Digital Data Bus CCA (3A1A1A4) (Sheet 1 of 2)

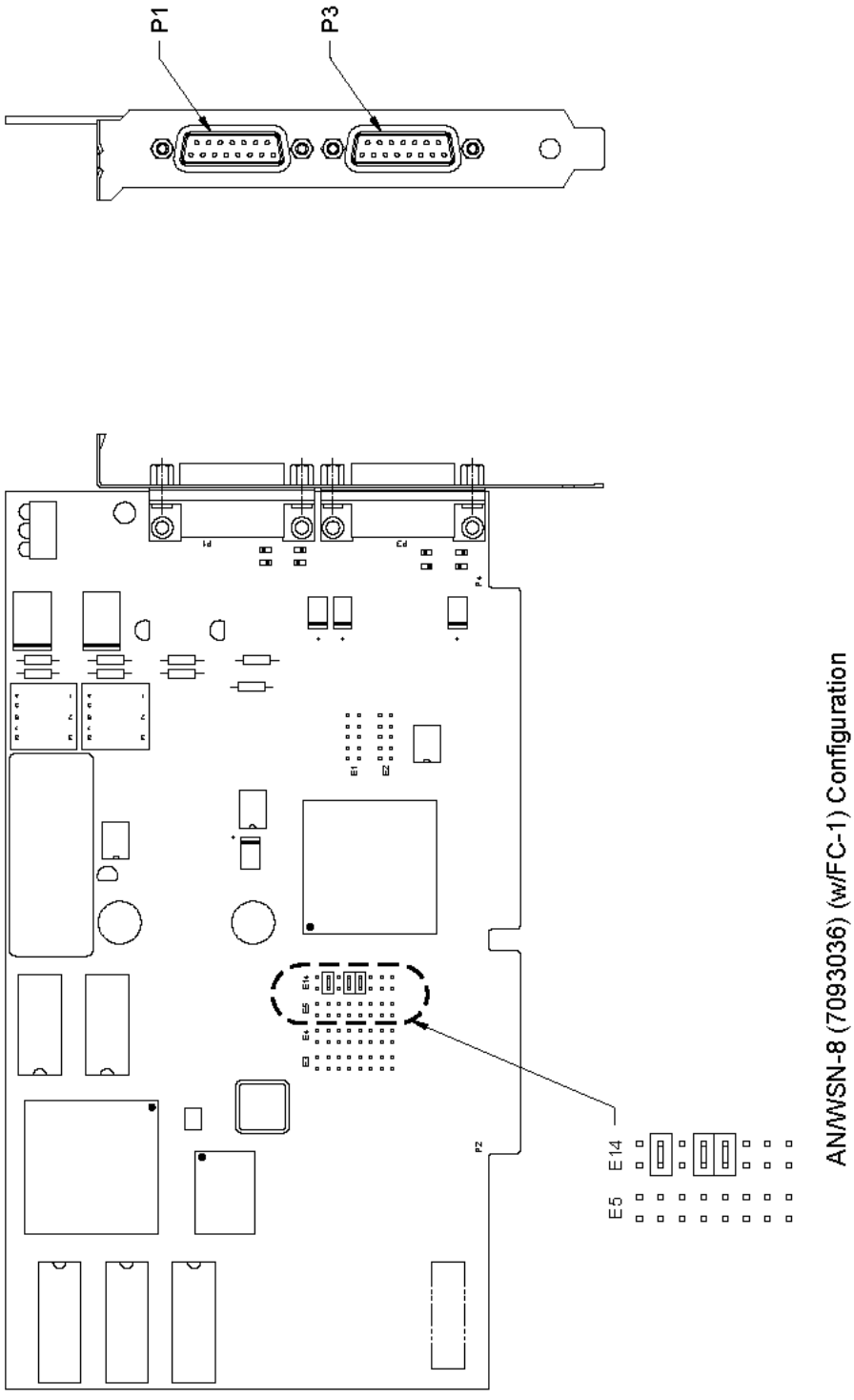


Figure 6-14. MIL-STD-1553B Digital Data Bus CCA (3A1A1A4) (Sheet 2)

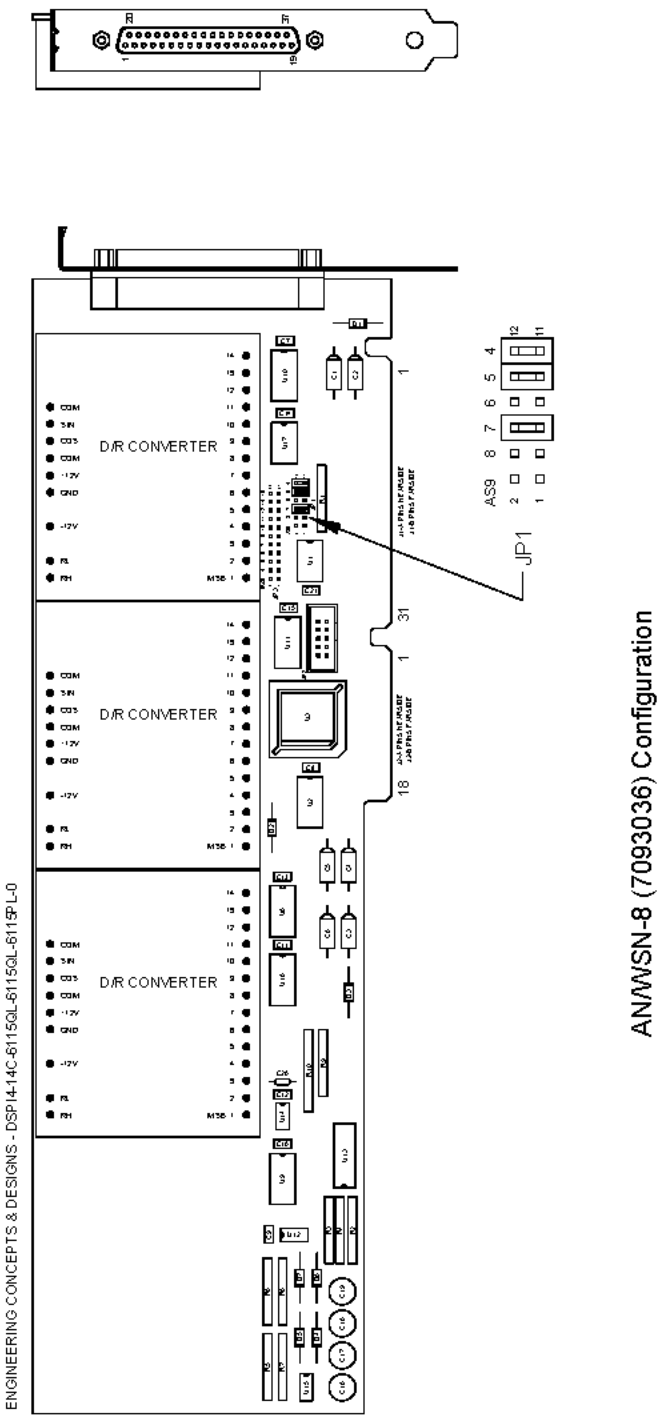


Figure 6-15. 60-Hz D/R Converter (3A1A1A5) (Sheet 1 of 2)

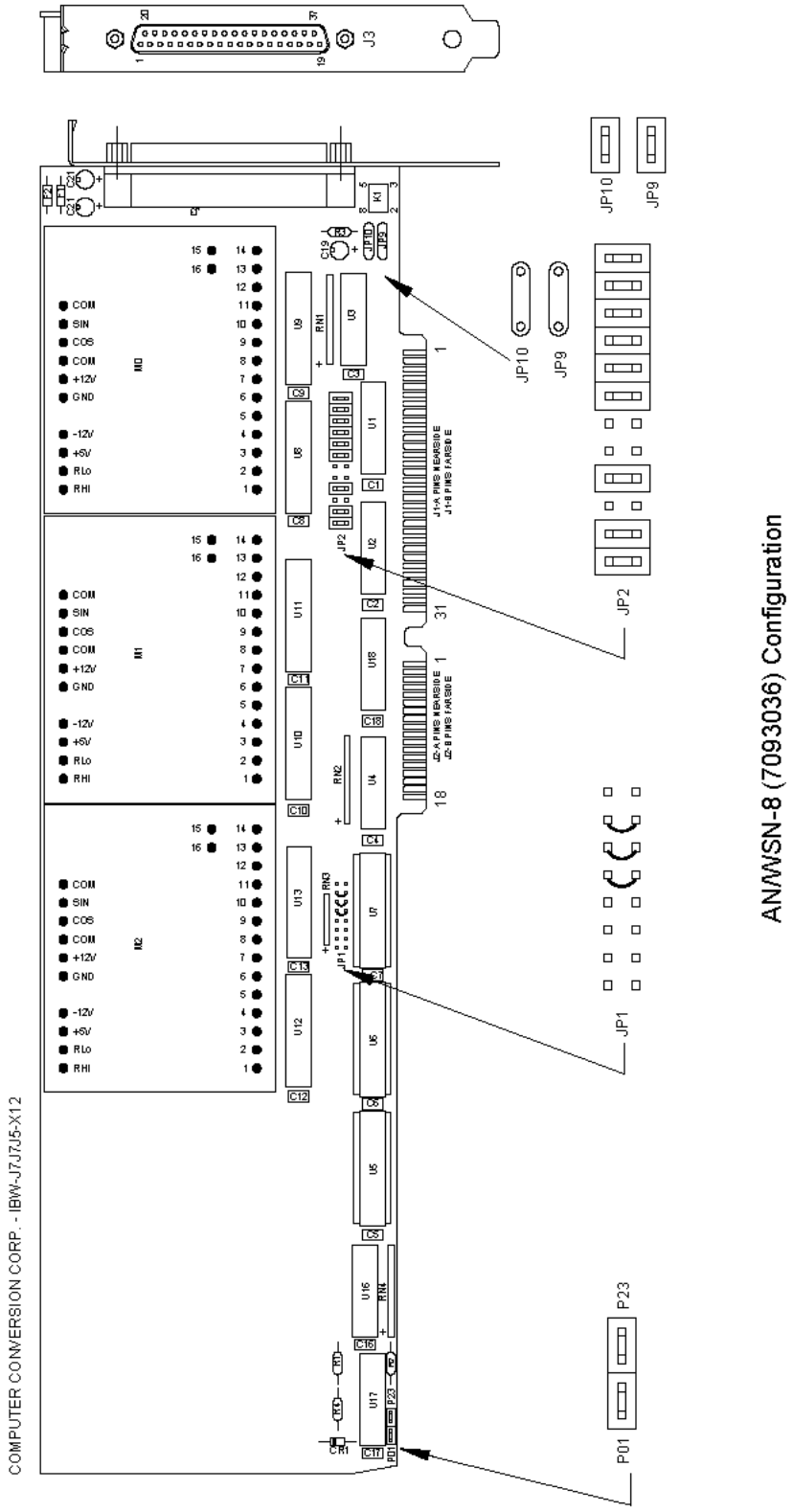


Figure 6-15. 60-Hz D/R Converter (3A1A1A5) (Sheet 2)

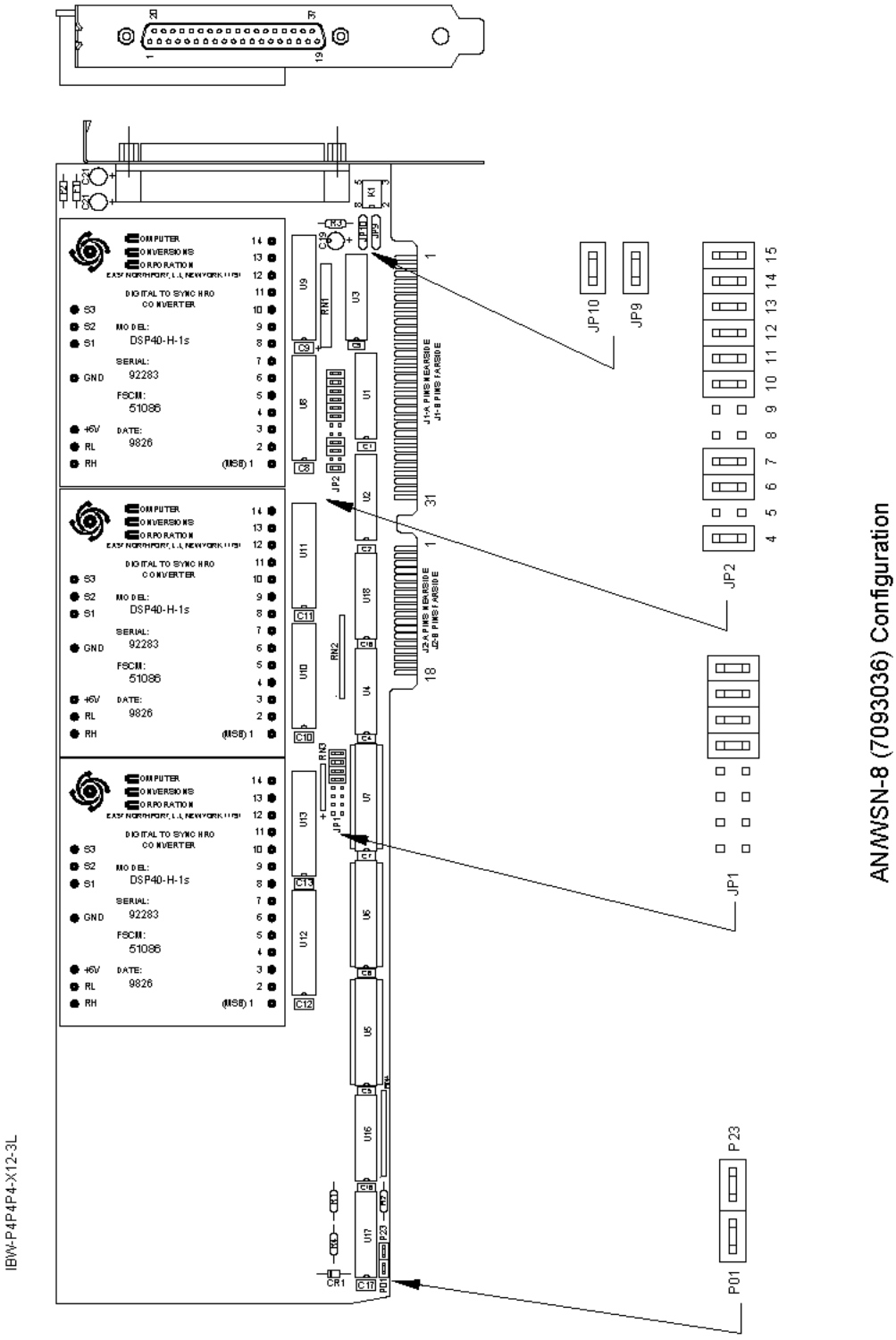


Figure 6-16. 400-Hz D/S Converter (3A1A1A6) (Sheet 1 of 2)

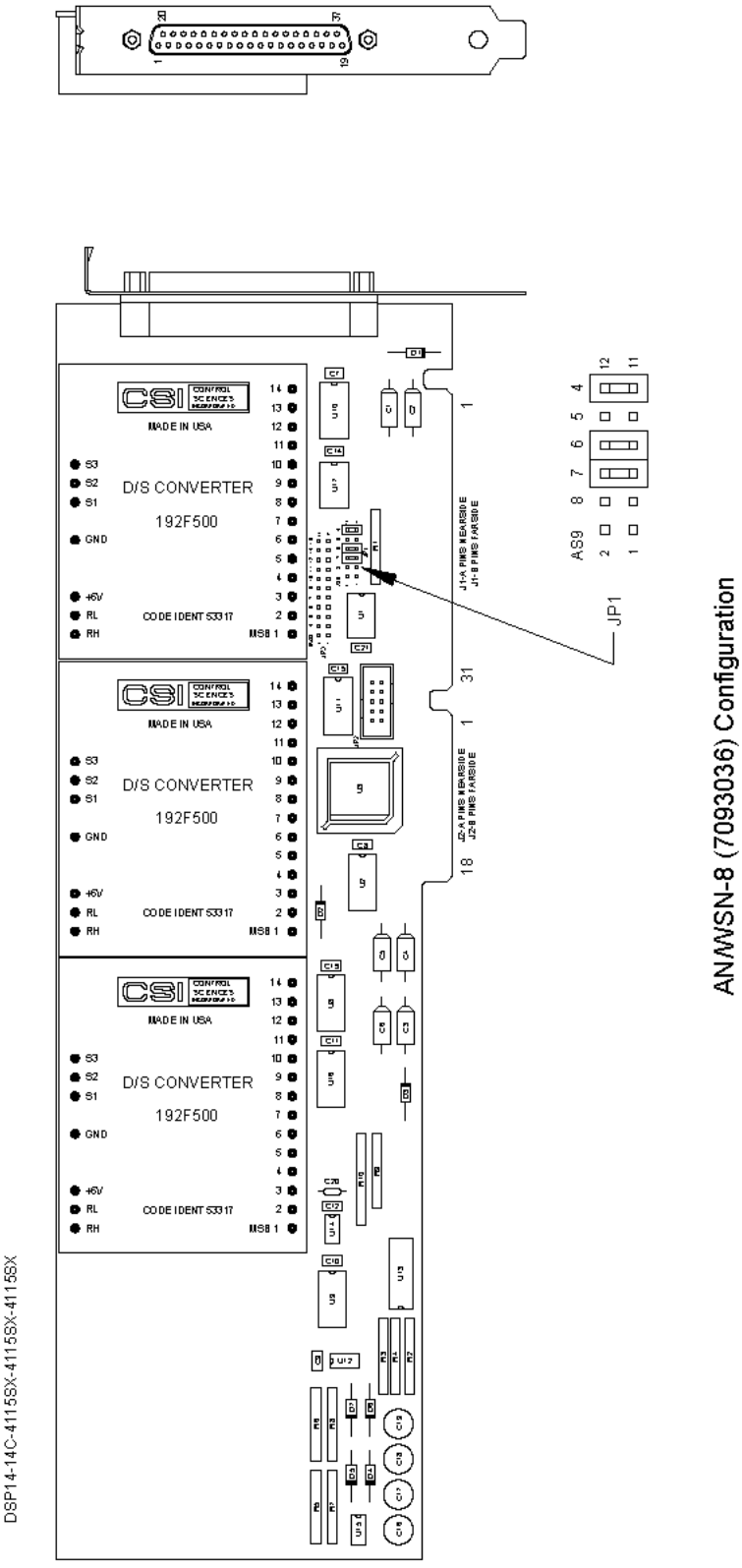


Figure 6-16. 400-Hz D/S Converter (3A1A1A6) (Sheet 2)

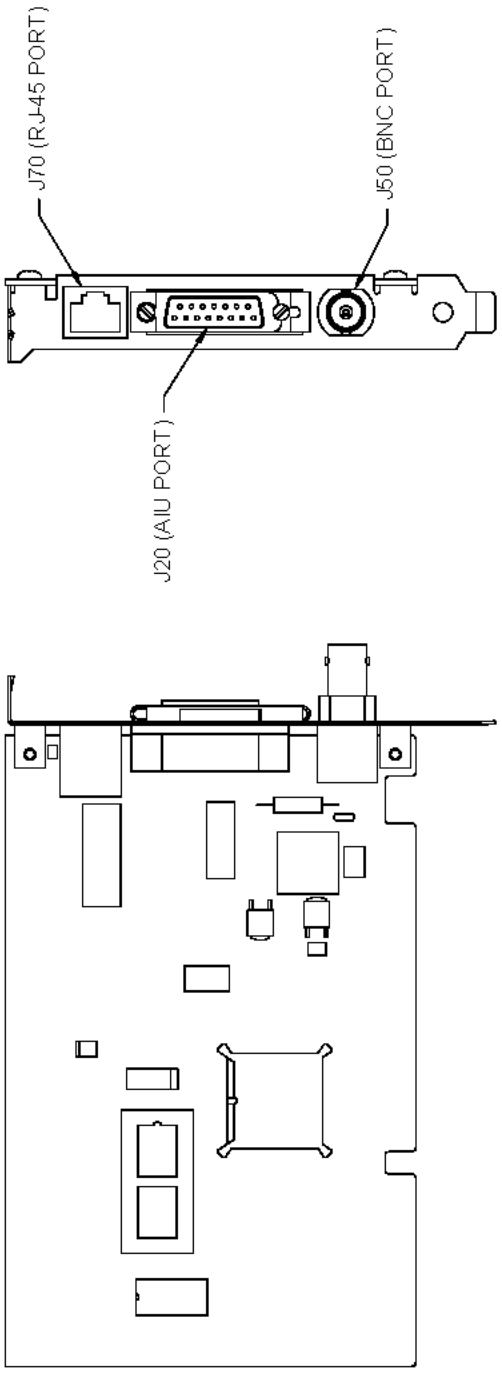


Figure 6-17. Ethernet CCA (3A1A12)

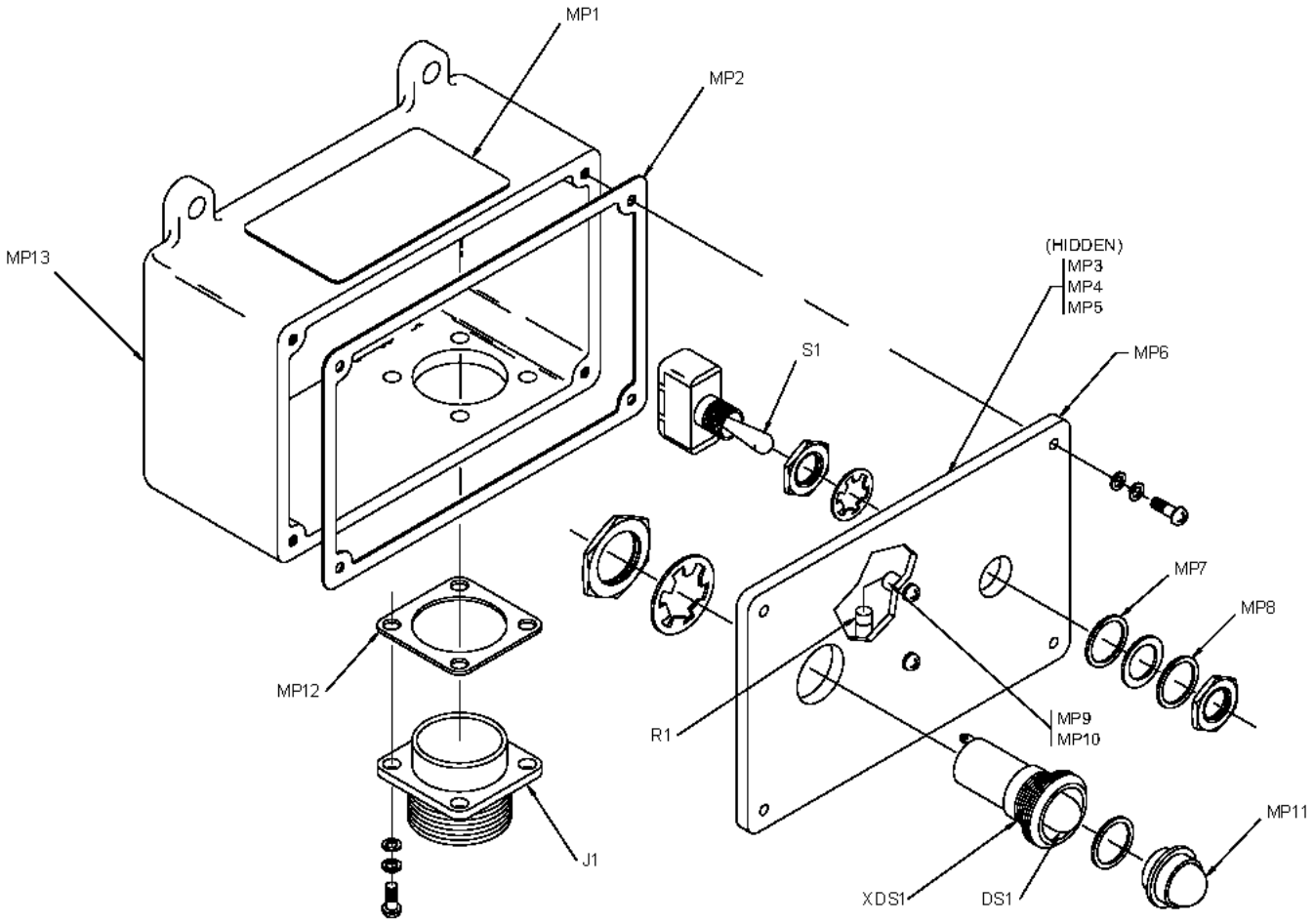


Figure 6-18. Remote Control Unit (Unit 4), Exploded View

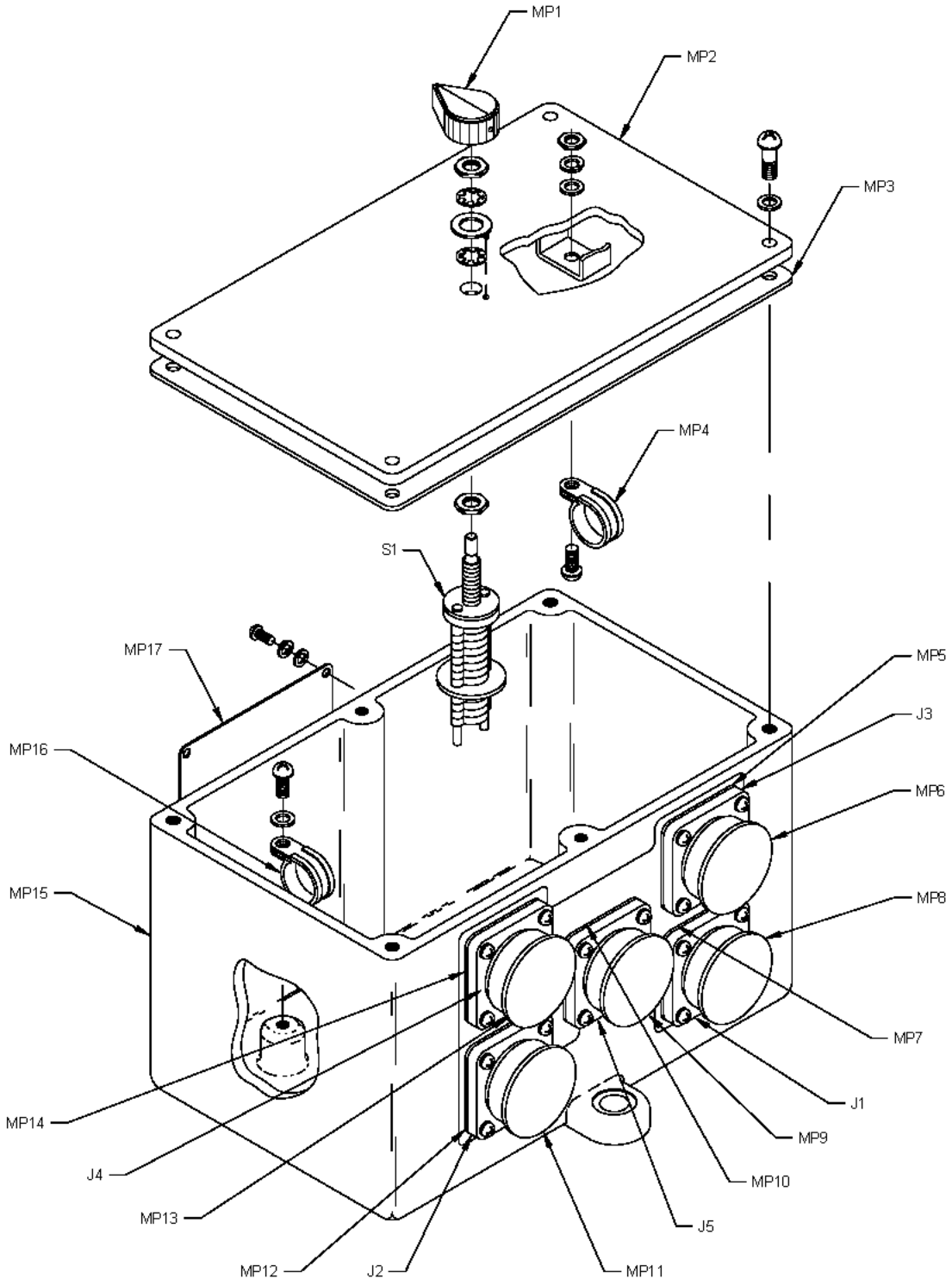


Figure 6-19. Rodmeter Switching Unit (Unit 5), Exploded View

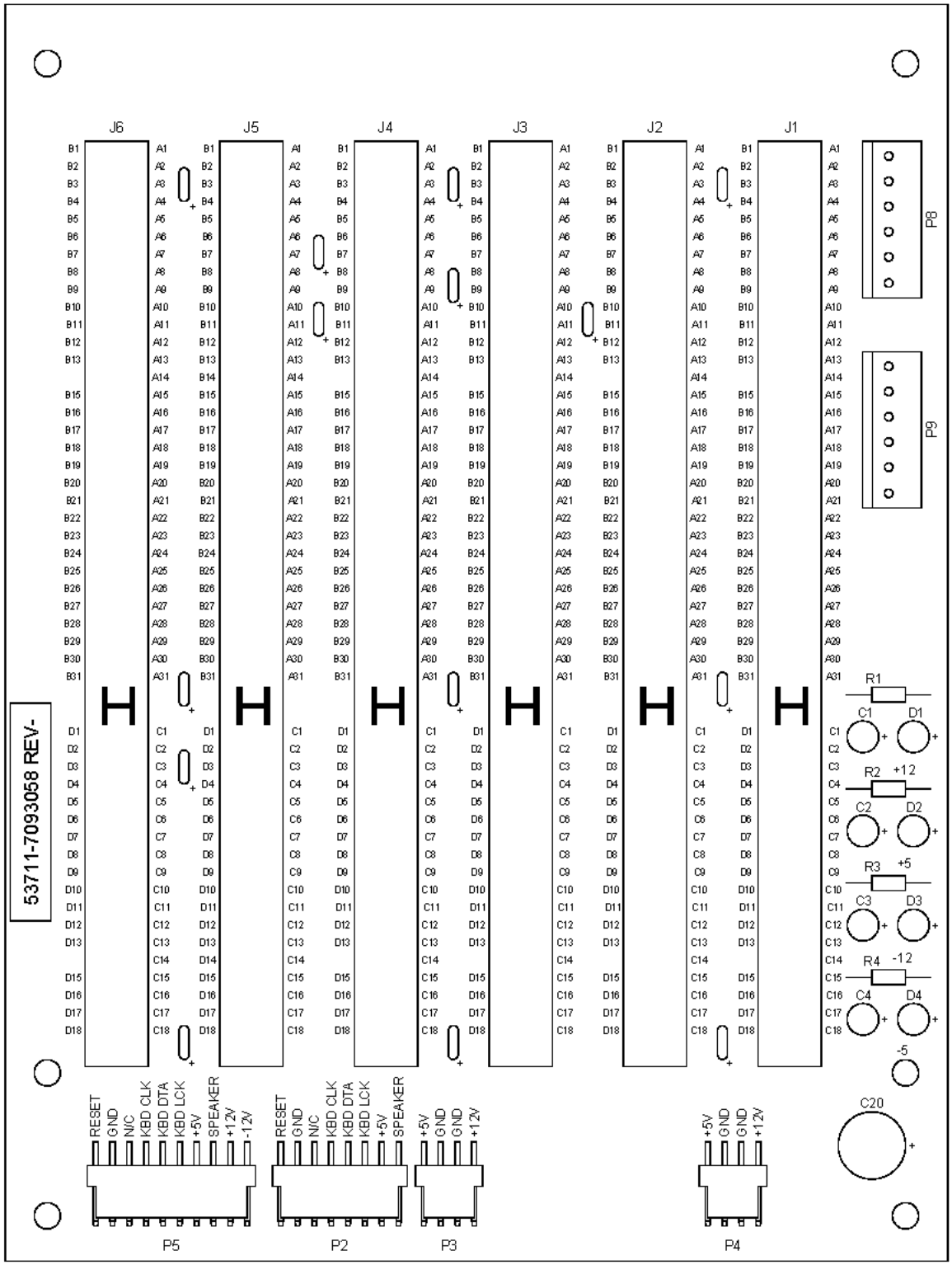
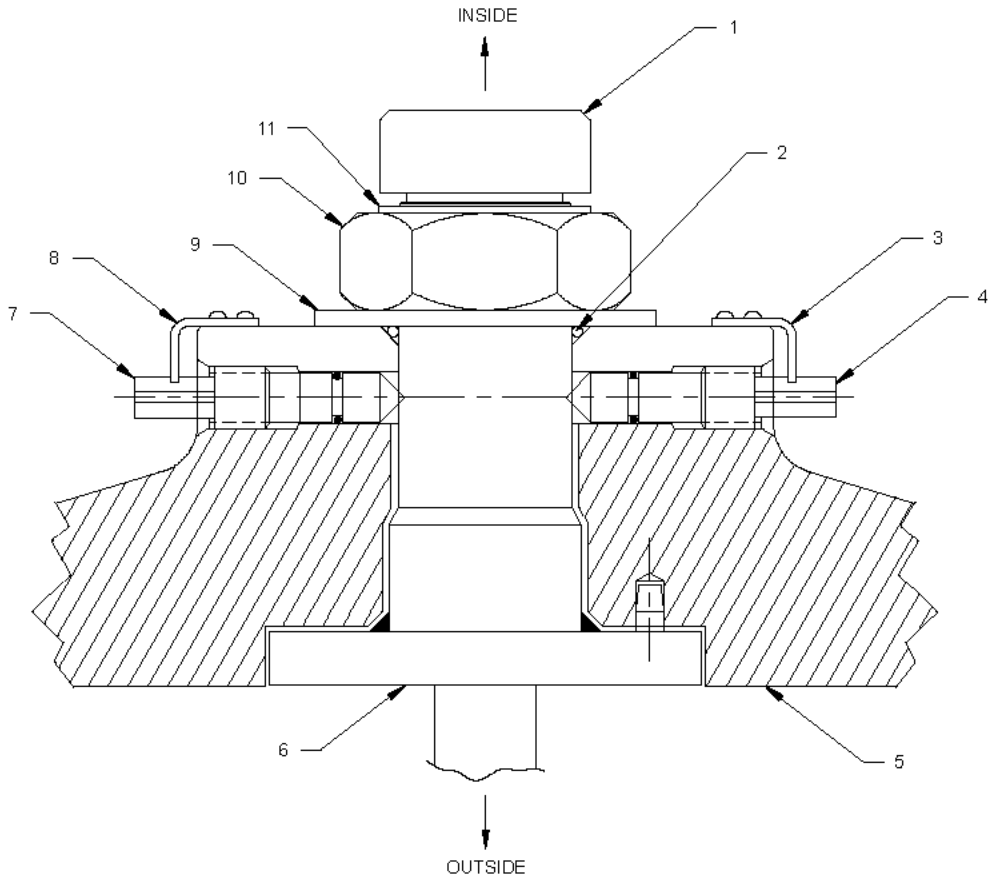
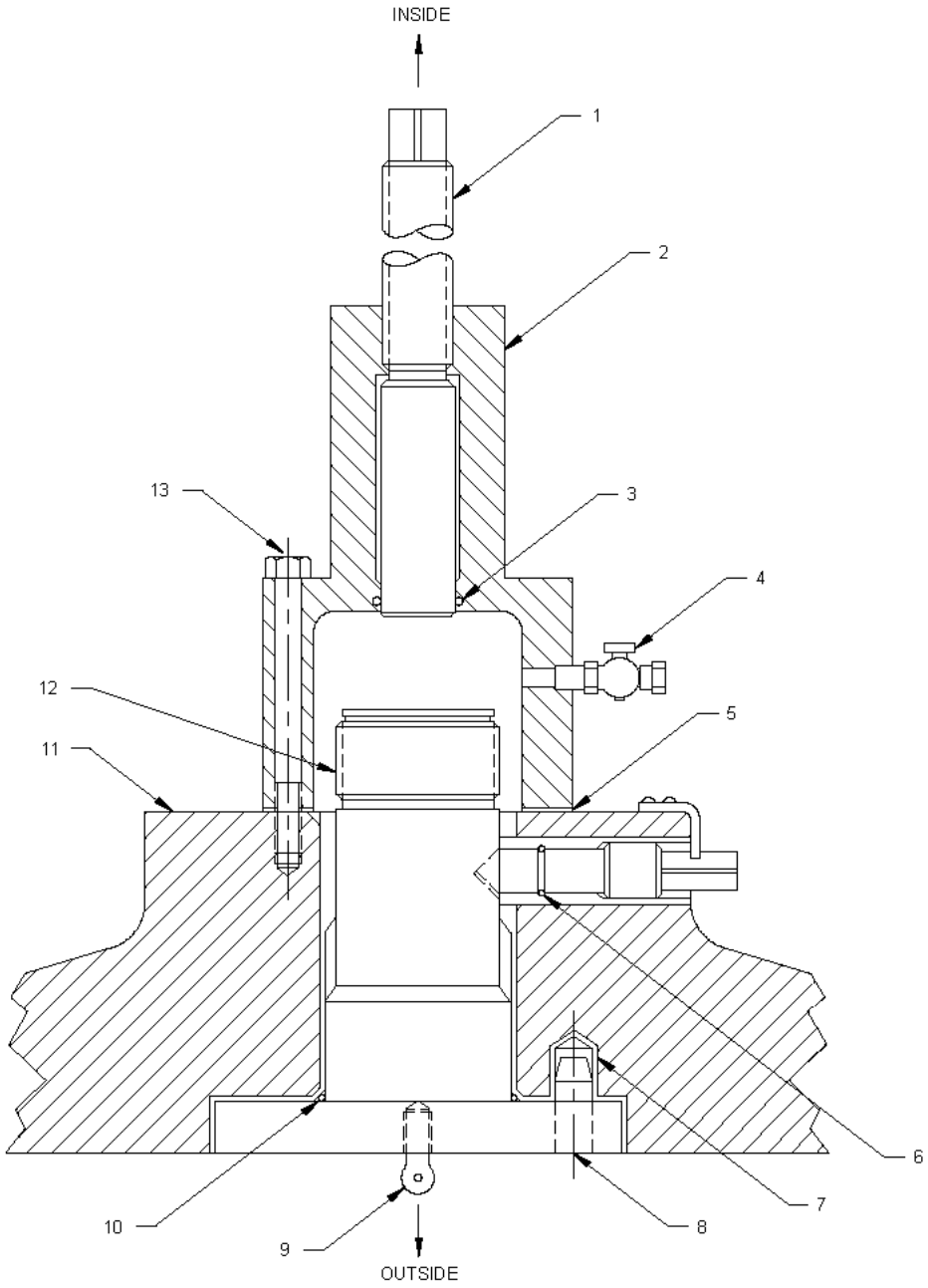


Figure 6-20. ISA Electronic Backplane (3A1A1A7 or 3A1A7)



1. RECEPTACLE COVER
2. "O" RING (2-3/8 IN. ID BY 2-3/4 IN. OD BY 3/16 IN. CS)
3. STOP
4. SIDE SCREW
5. HULL LINER
6. HULL-MOUNTED RODMETER FLANGE AND BASE ASSEMBLY
7. SIDE SCREW
8. STOP
9. WASHER
10. NUT
11. RETAINING RING

Figure 6-21. Removal and Installation of Hull-Mounted Rodmeter or Hull Plug



1. JACKSCREW
2. JACKING DEVICE HOUSING
3. "O" RING (1-1/8 IN. ID BY 1-3/8 IN. OD BY 1/8 IN. CS)
4. PETCOCK
5. GASKET ("NEOPRENE", 1/16 IN. THK)
6. "O" RING (1/2 IN. ID BY 11/16 IN. OD BY 3/32 IN. CS)
7. LOCATING HOLE
8. DOWEL PIN (LOCATING)
9. HULL PLUG REMOVING BOLT
10. "O" RING (2-5/8 IN. ID BY 2-3/4 IN. OD BY 3/16 IN. CS)
11. HULL LINER
12. HULL PLUG
13. BOLT (HEX TYPE, 5/8 IN. 11 UNC-2A BY 4-1/4 IN. LONG)

Figure 6-22. Mounting of Jacking Device and Installation of Hull Plug

CHAPTER 7
PARTS LIST

7.1 INTRODUCTION.

The parts list is divided into four major sections: (1) the List of Major Components; (2) the Alphanumeric List; (3) the List of Attaching Hardware; and (4) the List of Manufacturers. These lists support all assemblies used in the AN/WSN-8 (7093036), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) Indicator-Transmitter (I/T) Sets.

7.2 LIST OF MAJOR UNITS.

Table 7-1 lists the major units of the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1). **Table 7-2** lists the major units of the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML. The first column lists the unit number. The second column lists the name of each unit.

7.3 PARTS LIST.

Table 7-3 lists the parts for the repairable assemblies of the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1). **Table 7-4** lists the parts for the repairable assemblies of the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML. The Parts List is arranged in assembly order. For each assembly, the tabular listing is in alphanumeric sequence. The first column lists the applicable unit or assembly/subassembly reference designation (REF DES) for the part. The second column lists the figure where the part can be found. The third column lists the manufacturer's part number or military type designation as applicable. The fourth column contains the name and description of each unit or assembly/subassembly, and attaching hardware when applicable. The fifth column lists manufacturer Commercial and Government Entity (CAGE) codes for all part numbers listed in the third column.

7.4 LIST OF ATTACHING HARDWARE.

Table 7-5 lists the attaching hardware for the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1). **Table 7-6** lists the attaching hardware for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML. Attaching hardware, such as screws, nuts, washers, etc., is assigned an alphabetical code. Parts listed in Tables 7-3 and 7-4 that require attaching hardware reference the attaching hardware code letters, followed, in parentheses, by the quantity of the hardware item needed.

7.5 LIST OF MANUFACTURERS.

Table 7-7 lists the manufacturers of parts listed in Table 7-3 for the AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1). **Table 7-8** lists the manufacturers of parts listed in Table 7-4 for the AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML. The manufacturers are listed in numerical CAGE Code sequence by United States Federal Supply Code for Manufacturers, as listed in Cataloging Handbook H4-2.

Table 7-1. AN/WSN-8 (7093036) DEML List of Major Units

UNIT NO.	NOMENCLATURE
1	Rodmeter No. 1
2	Sea Valve Assembly No. 1 (Surface Ships Only)
3	Indicator-Transmitter No. 1
4	Remote Control Unit (RCU)
5	Rodmeter Switching Unit (RSU)
6	Rodmeter No. 2
7	Sea Valve Assembly No. 2 (Surface Ships Only)
8	Indicator-Transmitter No. 2
9	Rodmeter Cutout Switch

Table 7-2. AN/WSN-8A (7404776) DEML List of Major Units

UNIT	NOMENCLATURE
1	Rodmeter No. 1
2	Sea Valve Assembly No. 1 (Surface Ships Only)
3	Indicator-Transmitter No. 1
4	RCU
5	RSU
6	Rodmeter No. 2
7	Sea Valve Assembly No. 2 (Surface Ships Only)
8	Indicator-Transmitter No. 2
9	Rodmeter Cutout Switch

Table 7-3. AN/WSN-8 (7093036) DEML Parts List

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
2	6-2 and 6-3	H-3029	Sea Valve Assembly	03538
2MP1	6-2	C-3011	Cap, Flange [Attaching Hardware BG(4), Z(4), E(4)]	03538
2MP2	6-2	D-3035	Packing, Seal	03538
2MP3	6-2	D-3048	Packing, VEE Ring: (4 Supplied)	03538
2MP4	6-2	D-3043	Packing, Seal	03538
2MP5	6-2	H-3006	Flange, Packing [Attaching Hardware AB(2), B(10), Y(10), G(10)]	03538
2MP6	6-2	AN6227B-65	O-Ring: 6.750 in. OD x 0.250 in. thick	03538
2MP7	6-2	H-3040	Sea Valve [Attaching Hardware Y(4), BH(4), AC(2)]	03538
2MP8	6-2	AN6227B-72	O-Ring: 8.500 in. OD x 0.250 in. thick	03538
2MP9	6-2	H-3012	Flange, Deck [Attaching Hardware Y(12), BI(12)]	03538
2MP10	6-2	AN6227B-68	O-Ring: 7.500 in. OD x 0.250 in. thick	03538
2MP11	6-2	C-3064	Bearing, Cutlass: (12 Supplied) [Attaching Hardware AH(8), BJ(16)]	03538
2MP12	6-2	D-3013	Cover, Deck Flange [Attaching Hardware AN(8)]	03538
2MP13	6-3	H-3022	Coupling [Attaching Hardware AE(1)]	03538
2MP14	6-3	MS28782-25	Ring, Spiral Back-Up: 1.375 in. ID	03538
2MP15	6-3	B-3131-2	Key: 0.375 in. thick X 0.375 in. wide X 2.000 in. long (2 Supplied)	03538
2MP16	6-3	C-3028	Jackscrew	03538
2MP17	6-3	H-3010	Body, Valve	03538
2MP18	6-3	B-3031	Pointer [Attaching Hardware AO(2), O(2)]	03538
2MP19	6-3	B-3026-2	Washer, Thrust	03538
2MP20	6-3	B-3024	Collar [Attaching Hardware AE(1)]	03538
2MP21	6-3	AN6230B-33	O-Ring: 5.875 in. OD x 0.125 in. thick	03538
2MP22	6-3	C-3116	Seat, Valve [Attaching Hardware D(8), BP(1)]	03538
2MP23	6-3	C-3124	Gasket, Valve Seat	03538
2MP24	6-3	C-3106	Gate, Lapped/By-Pass	03538
2MP25	6-3	B-3107	Shaft, Arm/By-Pass	03538
2MP26	6-3	B-3025-1	Washer, Thrust (Number Required Varies)	03538

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
2MP27	6-3	B-3025-2	Washer, Thrust (Number Required Varies)	03538
2MP28	6-3	D-3003	Arm (Attaching Hardware AA(1), BE(2), BD(1), BF(1)	03538
2MP29	6-3	B-3025-3	Washer, Thrust (Number Required Varies)	03538
2MP30	6-3	B-3019-1	Link	03538
2MP31	6-3	B-3001	Nut, Jackscrew	03538
2MP32	6-3	AN6227B-28	O-Ring: 1.875 in. OD x 0.187 in. thick	03538
2MP33	6-3	C-3002	Crank [Attaching Hardware AD(1)]	03538
2MP34	6-3	B-3023	Crankshaft	03538
2MP35	6-3	B-3020	Spacer	03538
2MP36	6-3	B-3019-2	Link [Attaching Hardware H(1), A(1), BP(1)]	03538
2MP37	6-3	D-3030	Shaft, Main	03538
2MP38	6-3	B-3131-1	Key: 0.375 in. thick x 0.375 in. wide x 5.500 in. long	03538
3A1	6-4	7093036	I/T Set, DEML AN/WSN-8	53711
3A1AR1, 3A1AR2	6-4	175A394	Amplifier, Synchro Signal Booster, 60 Hertz (Hz), 25VA	53317
3A1B1	6-4	3906	Fan, Circulating [Attaching Hardware AV(3), L(3)]	62292
3A1E1	6-4	FHS-032-12	Ground Stud [Attaching Hardware X(2), N(1)]	9D475
3A1MP1	6-4	7093070	Cabinet, I/T	53711
3A1MP2	N/A	7093071	Mounting Bracket, Card Cage, Left [Attaching Hardware AM(8)]	53711
3A1MP3	N/A	7093072	Mounting Bracket, Card Cage, Right [Attaching Hardware AM(8)]	53711
3A1MP4	N/A	WR2-200-10	Shock Mounts (Qty. 10) [Attaching Hardware AM(20)]	24403
3A1MP5	N/A	7093073	Mounting Bracket, CCA [Attaching Hardware *(4)]	53711
3A1MP6	6-5	7093074	Access Panel, Lower [Attaching Hardware AT(6), L(6)]	53711
3A1MP6MP14	6-4	8302-3100-0412 MOD A	Filter, Electromagnetic Interference (EMI) [Attaching Hardware AA(10), N(10), BM(10)]	64411
3A1MP6E1	6-4	10F34PTMSSS	Ground Stud [Attaching Hardware *(2), *(2), *(1)]	9D475
3A1MP6J8, 3A1MP6J9	6-5	BJ-378	Connector, Panel Mount (1553)	14949

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3A1MP6J11, 3A1MP6J12	6-5	501381 REV C	Connector, Panel Mount (1773)	00779
3A1MP7	N/A	3040-1011-0697	Gasket, EMI	64411
3A1MP8	6-4	7093129	Mounting Bracket, Universal (Scott-T Transformer and Line Filter) [Attaching Hardware L(4), *(4), *(4)]	53711
3A1MP9	N/A	7093067	Plate, Fuse Identification [Attaching Hardware *(4), *(4)]	53711
3A1MP10	N/A	7093131	Mounting Bracket, Stay, Door [Attaching Hardware AK(2)]	53711
3A1MP11	N/A	7093132	Stay, Door [Attaching Hardware AT(2), V(2), L(2)]	53711
3A1MP12	N/A	7093133	Mounting Bracket, Booster Amplifier [Attaching Hardware AM(9), M(9)]	53711
3A1MP13	N/A	7093047 or 7404826-1 (Note 1)	Plate, Identification [Attaching Hardware K(4), AP(4)]	53711
3A1W1	5-2	7093066	Main Wiring Harness Assembly	53711
3A1W2	5-2	7093053 or 7404794 (Note 1)	Rodmeter CCA to Analog-to-Digital (A/D) CCA Interface Cable Assembly	53711
3A1W3	5-2	7093060-1 or 7404825 (Note 1)	1553B Interface Cable Assembly	53711
3A1W4	5-2	7093060-2 or 7404825 (Note 1)	1553B Interface Cable Assembly	53711
3A1A1	6-8	7093059	Power Supply/Card Cage Assembly	53711
3A1A1W1	5-2	7093136	Wiring Harness, Power Supply/Card Cage Assembly	53711
3A1A1S1	6-7	TT13A-2T	Switch Toggle	00779
3A1A1TB1	6-9	72106	Terminal Board [Attaching Hardware *(2), L(2)]	22978
3A1A1W2	5-2	7093137	Wire, Jumper	53711
3A1A1W3	5-2	7093063	Central Processing Unit (CPU) Programming Cable	53711
3A1A1MP1	6-8	7093142	Power Supply/Card Cage Shell	53711
3A1A1MP2	6-8	7093143	Power Supply/Card Cage Center Partition [Attaching Hardware AT(11), L(11)]	53711
3A1A1MP3	6-8	7093144	Bracket, 28 VDC Power Supply [Attaching Hardware AZ(4), M(4)]	53711

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3A1A1MP4	6-8	7093145	Mounting Bracket, Terminal Board [Attaching Hardware AU(2), L(2)]	53711
3A1A1MP5	N/A	7093146	Mounting Bracket, Retainer, CCA (Qty. 2) [Attaching Hardware V(4)]	53711
3A1A1MP6	6-9	7093147 or 7404812 (Note 1)	Retainer, CCA (Qty. 2) [Attaching Hardware AU(4), L(4)]	53711
3A1A1MP7	6-8	525	Handle (Qty. 2) [Attaching Hardware BA(4), N(4)]	91833
3A1A1MP8	N/A	CW01-6 (72 SERIES)	Cover, Terminal Board	13150
3A1A1A2	6-12	7093040 or 7404787 (Note 1)	CPU CCA [Attaching Hardware AJ(1)]	53711
3A1A1A3	6-13	7093052 or 7404811 (Note 1)	A/D CCA [Attaching Hardware AJ(1)]	24355
3A1A1A4	6-14	7093041 or 7404824 (Note 1)	MIL-STD-1553B Interface CCA [Attaching Hardware AJ(1)]	05RN8
3A1A1A5	6-15	7093051	Digital-to-Resolver (D/R) CCA, 60 Hz [Attaching Hardware AJ(1)]	1HAT2
3A1A1A6	6-16	7093049	Digital-to-Synchro (D/S) CCA, 400 Hz [Attaching Parts AJ(1)]	1HAT2
3A1A1A7	6-20	7093058	Backplane, Electronic [Attaching Hardware AU(4), L(4)]	0AYU9
3A1A1A8	6-8	7093054	Power Supply Assembly, 200 W [Attaching Hardware *(4)]	53711
3A1A1A9	6-8	7093048	Power Supply Assembly, 28 VDC [Attaching Hardware AY(4), M(4)]	53711
3A1A1A10	6-8	7093055	Transformer Assembly, Step-Down, 50 VAC [Attaching Hardware AT(2), L(2)]	53711
3A1A1A11	6-8	7093043	Transformer Assembly, Constant Voltage [Attaching Hardware AZ(4), M(4)]	53711
3A1A2	N/A	7093069	Access Panel Assembly, Front [Attaching Hardware AJ(9), L(9)]	53711
3A1A2A1	6-4	7093037	Control Display Panel [Attaching Hardware K(12), *(12)]	53711
3A1A2B1, 3A1A2B2	6-4	9906	Fan, Intake [Attaching Hardware AW(8), L(8)]	62292
3A1A2E1	6-4	FHS-032-8	Ground Stud [Attaching Hardware AA(1), N(1)]	53711

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3A1A2F1 through 3A1A2F4	N/A	312003	Fuse, 3A, 3AG, 120 VAC	75915
3A1A2F5	N/A	312001	Fuse, 1A, 3AG, 120 VAC	75915
3A1A2MP1	N/A	7093138	Access Panel, Front	53711
3A1A2MP2	6-4	8205-5005-0413	Filter, EMI (Qty. 2)	64411
3A1A2MP3	6-4	7093140	Mounting Bracket, Fuseholder Spare ([Attaching Hardware V(2)]	53711
3A1A2MP4	6-4	357002	Fuseholder, Spare [Attaching Hardware L(2), AT(2)]	75915
3A1A2MP5	N/A	312001	Fuse, 1A, 3AG, 120 VAC	75915
3A1A2MP6	N/A	312003	Fuse, Spare, 3A, 3AG, 120 VAC	75915
3A1A2MP7	6-4	7093068	Fan, Vibration Isolator (Qty. 2)	53711
3A1A2MP8	6-4	3040-1011-0696	Gasket EMI, Front Access Panel	64411
3A1A2MP9	6-4	LZ30	Finger Guard, Fan (Qty. 2)	62292
3A1A2MP10	6-4	7093065	Cover, Fuseholders [Attaching Hardware *(8), *(8), *(4)]	53711
3A1A2XF1, 3A1A2XF2	6-4	FHL10U	Fuseholder, Double, 115 VAC [Attaching Hardware *(4)]	71400
3A1A2XF3	6-4	FHL18G1-4	Fuseholder, Single, 50 VAC	81349
3A1A3	6-11	7093046	Relay CCA [Attaching Hardware AP(4), K(4)]	53711
3A1A4	6-10	7093050 or 7093045 (Note 1)	Rodmeter CCA [Attaching Hardware AP(4), K(4)]	53711
3A1A5	6-4	7093039	Transformer Assembly, Scott-T	53711
3A1A6	6-4	7093038	Filter Assembly, Power Line	53711
4	6-18	50147-501	RCU Assembly Type B	47496
4DS1	6-18	MS25231-1819	Lamp	96906
4J1	6-18	MS3102R18-1PZ	Connector, Receptacle, Electrical [Attaching Hardware AQ(4), BK(4), P(4)]	96906
4MP1	6-18	40823-1	Plate, Identification	47496
4MP2	6-18	40239-1	Gasket	47496
4MP3 through 4MP5	6-18	MS25036-2	Lug, Terminal (Crimp Style)	96906
4MP6	6-18	40238-1	Cover [Attaching Hardware BB(4), BM(4), S(4)]	96906

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
4MP7 and 4MP8	6-18	MS25196-1	Bushing Seal	96906
4MP9 and 4MP10	6-18	4868-1-0516	Terminal, Insulated [Attaching Hardware AP(1)]	K3105
4MP11	6-18	LC14RD3	Lens, Indicator-Light	47496
4MP12	6-18	40757-6	Gasket	47496
4MP13	6-18	50146-501	Case	47496
4R1	6-18	RC07GF104K	Resistor	81349
4S1	6-18	MS35058-27	Switch, Toggle	96906
4XDS1	6-18	LH76/3	Housing, Indicator-Light	96906
5	6-19	50247-501	RSU Assembly	47496
5J1	6-19	MS3102-R20-7SY	Connector [Attaching Hardware AS(4), BK(4), Q(4)]	96906
5J2	6-19	MS3102-R20-7P	Connector [Attaching Hardware AS(4), BK(4), Q(4)]	96906
5J3	6-19	MS3102-R20-7S	Connector [Attaching Hardware AS(4), BK(4), Q(4)]	96906
5J4	6-19	MS3102-R18-4P	Connector [Attaching Hardware AS(4), BK(4), Q(4)]	96906
5J5	6-19	MS3102-R20-7PW	Connector [Attaching Hardware AS(4), BK(4), Q(4)]	96906
5MP1	6-19	MS91528-2P2B	Knob, Control (Requires set screw)	96906
5MP2	6-19	40290-501	Cover Assembly [Attaching Hardware BC(4), BM(4)]	47496
5MP3	6-19	0000B4058	Gasket	03538
5MP4	6-19	MS21122-W8	Clamp [Attaching Hardware AX(1), BL(1), R(1), W(1)]	96906
5MP5	6-19	40757-7	Gasket	47496
5MP6	6-19	MS25178-20	Cap, Dust	96906
5MP7	6-19	40757-7	Gasket	47496
5MP8 and 5MP9	6-19	MS25178-20	Cap, Dust	96906
5MP10	6-19	40757-7	Gasket	47496
5MP11	6-19	MS25178-20	Cap, Dust	96906
5MP12	6-19	40757-7	Gasket	47496
5MP13	6-19	MS25043-18	Cap, Dust	96906
5MP14	6-19	40757-6	Gasket	47496

Table 7-3. AN/WSN-8 (7093036) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
5MP15	6-19	50242-501	Case	47496
5MP16	6-19	MS21122-W8	Clamp [Attaching Hardware AX(1), BL(1)]	96906
5MP17	6-19	40297-1	Plate, Identification [Attaching Hardware AP(4), BK(4), Q(4)]	47496
5S1	6-19	50251-1	Switch, Rotary [Attaching Hardware I(2), T(2), BO(1), J(1)]	47496
9	8-7	M151373-002	Rodmeter Cutout Switch	53711

NOTES

(1) Part of Field Change 1:

Plate, Identification, P/N 7404826-1

Rodmeter CCA to A/D CCA Interface Cable Assembly, P/N 7404794

1553B Interface Cable Assembly, P/N 7404825

Retainer, CCA, P/N 7404812

CPU CCA, P/N 7404787

A/D CCA, P/N 7404811

MIL-STD-1553B Interface CCA, P/N 7404824

Rodmeter CCA, P/N 7093045

Table 7-4. AN/WSN-8A (7404776) DEML Parts List

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
2	6-2 and 6-3	H-3029	Sea Valve Assembly	47496
2MP1	6-2	C-3011	Cap, Flange [Attaching Hardware AY(4), M(4), G(4)]	47496
2MP2	6-2	D-3035	Packing, Seal	47496
2MP3	6-2	D-3048	Packing, VEE Ring (4 Supplied)	47496
2MP4	6-2	D-3043	Packing, Seal	47496
2MP5	6-2	H-3006	Flange, Packing [Attaching hardware R(2), D(10), O(10), BJ(10)]	47496
2MP6	6-2	AN6227B-65	O-Ring: 6.750 in. OD x 0.250 in. thick	47496
2MP7	6-2	H-3040	Sea Valve [Attaching Hardware O(4), AZ(4), S(2)]	47496
2MP8	6-2	AN6227B-72	O-Ring: 8.500 in. OD x 0.250 in. thick	47496
2MP9	6-2	H-3012	Flange, Deck [Attaching Hardware O(12), BA(12)]	47496
2MP10	6-2	AN6227B-68	O-Ring: 7.500 in. OD x 0.250 in. thick	47496
2MP11	6-2	C-3064	Bearing, Cutlass: (12 Supplied) [Attaching Hardware W(8), BB(16)]	47496
2MP12	6-2	D-3013	Cover, Deck Flange [Attaching Hardware X(8)]	47496
2MP13	6-3	H-3022	Coupling [Attaching Hardware U(1)]	47496
2MP14	6-3	MS28782-25	Ring, Spiral Back-Up: 1.375 in. ID	47496
2MP15	6-3	B-3131-2	Key: 0.375 in. thick x 0.375 in. wide x 2.000 in. long (2 Supplied)	47496
2MP16	6-3	C-3028	Jackscrew	47496
2MP17	6-3	H-3010	Body, Valve	47496
2MP18	6-3	B-3031	Pointer [Attaching Hardware AD(2), BM(2)]	47496
2MP19	6-3	B-3026-2	Washer, Thrust	47496
2MP20	6-3	B-3024	Collar [Attaching Hardware U(1)]	47496
2MP21	6-3	AN6230B-33	O-Ring: 5.875 in. OD x 0.125 in. thick	47496
2MP22	6-3	C-3116	Seat, Valve [Attaching Hardware F(8), BU(1)]	47496
2MP23	6-3	C-3124	Gasket, Valve Seat	47496
2MP24	6-3	C-3106	Gate, Lapped/By-Pass	47496
2MP25	6-3	B-3107	Shaft, Arm/By-Pass	47496
2MP26	6-3	B-3025-1	Washer, Thrust (Number Required Varies)	47496

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
2MP27	6-3	B-3025-2	Washer, Thrust (Number Required Varies)	47496
2MP28	6-3	D-3003	Arm (Attaching Hardware K(1), AU(2), AT(1), AS(1)	47496
2MP29	6-3	B-3025-3	Washer, Thrust (Number Required Varies)	47496
2MP30	6-3	B-3019-1	Link	47496
2MP31	6-3	B-3001	Nut, Jackscrew	47496
2MP32	6-3	AN6227B-28	O-Ring: 1.875 in. OD x 0.187 in. thick	47496
2MP33	6-3	C-3002	Crank [Attaching Hardware T(1)]	47496
2MP34	6-3	B-3023	Crankshaft	47496
2MP35	6-3	B-3020	Spacer	47496
2MP36	6-3	B-3019-2	Link [Attaching Hardware BI(1), C(1), BU(1)]	47496
2MP37	6-3	D-3030	Shaft, Main	47496
2MP38	6-3	B-3131-1	Key: 0.375 in. thick x 0.375 in. wide x 5.500 in. long	47496
3	6-4	7404776	I/T SET, DEML AN/WSN-8A	53711
3B1	6-4	7093057	Fan, Circulating [Attaching Hardware AK(3), BD(3), BP(3), AV(3)]	43299
3E1	6-4	FHS-032–12	Ground Stud [Attaching Hardware K(1), BF(1), BR(1)]	46384
3E1	6-4	10F100PTMSSS	Ground Stud [Attaching Hardware K(2), BF(4), BR(3)] (Twinax)	9D475
3E2	N/A	7093151-2	Strap, Grounding	53711
3E3	N/A	7093151-3	Strap, Grounding	53711
3J4	N/A	MS3402D36-10S	Connector, Electrical (Shell Size 36)	96906
3J5	N/A	MS3402D28-21S	Connector, Electrical (Shell Size 28) [Attaching Hardware AH(4), Q(4)	96906
3J8, 3J9	6-5	BJ-378	Connector, Panel Mount (Twinax) [Attaching Hardware AH(4), Q(4)]	00795
3J11, 3J12	6-5	M55339/13-00492	Connector, Panel Mount (Coax)	14949
3MP1	6-4	7404786	Cabinet, I/T	53711
3MP2	N/A	7093149	Mounting Bracket, Card Cage, Left [Attaching Hardware AB(8)]	53711
3MP3	N/A	7093148	Mounting Bracket, Card Cage, Right [Attaching Hardware AB(8)]	53711
3MP4	N/A	7093150	Shock Mounts (Qty. 10) [Attaching Hardware AC(20)]	53711

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3MP5	N/A	7093073	Mounting Bracket, Circuit Board [Attaching Hardware AB(4)]	53711
3MP6	6-5	7404782	Access Panel, Lower [Attaching Hardware AH(6), BD(6), BP(6)]	53711
3MP7	N/A	7093075	Gasket, EMI, Access Panel	53711
3MP8	6-4	7093129	Mounting Bracket, Universal (Line Filter) [Attaching Hardware I(2), BD(2), BP(2)]	53711
3MP10	N/A	7093131	Mounting Bracket, Stay, Door [Attaching Hardware Z(2)]	53711
3MP11	N/A	7093132	Stay, Door [Attaching Hardware Q(2), BD(4), BP(2), AG(2)]	53711
3MP13	N/A	7404781	Plate, Identification [Attaching Hardware AE(4), BC(4), BO(4)]	53711
3MP14	6-4	7093128	Filter, EMI [Attaching Hardware K(10), BF(10), BR(10)]	53711
3MP15	N/A	4040-5031-2014	Gasket, EMI, Connector (Shell Size 14)	64411
3MP16	N/A	4040-5031-2018	Gasket, EMI, Connector (Shell Size 18)	64411
3MP17	N/A	4040-5031-2020	Gasket, EMI, Connector (Shell Size 20)	64411
3MP18	N/A	4040-5031-2028	Gasket, EMI, Connector (Shell Size 28)	64411
3MP19	N/A	4040-5031-2036	Gasket, EMI, Connector (Shell Size 36)	64411
3MP21	N/A	FS3	Eye Bolt [Attaching Hardware L(2), BH(4), BT(2)]	01599
3MP24	N/A	7404790	Hinge Plate	53711
3W1	5-2	7404780	Main Wiring Harness Assembly	53711
3W2	5-2	7404794	Rodmeter CCA to A/D CCA Interface Cable Assembly	53711
3W3	5-2	7404795	Ethernet Cable Assembly	53711
3A1	6-8	7404777	Power Supply/Card Cage Assembly	53711
3A1MP1	N/A	7093135	Cover, Terminal Board	53711
3A1MP2	N/A	1-3000000-0	Input/Output (I/O) Panel, Blank	0AYU9
3A1MP3	N/A	11633-2	Circuit Card Guide	KB732
3A1MP4	6-8	525	Handle (Qty. 2) [Attaching Hardware AP(4), BF(4), BR(4)]	91833
3A1MP5	6-8	7404791	Power Supply/Card Cage Shell	53711
3A1MP6	6-8	7404792	Power Supply/Card Cage Center Partition [Attaching Hardware AG(11), BD(11), BP(11)]	53711

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3A1MP7	6-8	7093144	Bracket, 28 VDC Power Supply [Attaching Hardware AM(4), BE(4), BQ(4)]	53711
3A1MP8	6-8	7093145	Mounting Bracket, Terminal Board [Attaching Hardware AG(2), BD(2), BP(2)]	53711
3A1MP9	N/A	7093146	Mounting Bracket, Retainer, CCA (Qty. 2) [Attaching Hardware Q(4), BD(4)]	53711
3A1MP10	6-9	7404783	Retainer, CCA	53711
3A1MP11	N/A	7404779	I/O Panel [Attaching Hardware AG(4), BD(4), BP(4)]	53711
3A1MP12	N/A	7093130	Retainer Bracket, Constant Voltage Transformer	53711
3A1TB1	6-9	72106	Terminal Board [Attaching Hardware AI(2), BP(2)]	13150
3A1W1	5-2	7404778	Wiring Harness, Power Supply/Card Cage Assembly	53711
3A1W2	5-2	7093062-1	Cable Assembly	53711
3A1W3	5-2	7093062-2	Cable Assembly	53711
3A1W4	5-2	7404793	Cable Assembly	53711
3A1A2	6-12	7404787	CPU CCA [Attaching Hardware AG(1), BD(1), BP(1)]	53711
3A1A3	6-13	7404811	A/D CCA [Attaching Hardware AG(1), BD(1), BP(1)]	53711
3A1A7	6-20	7093058	Backplane, Electronic [Attaching Hardware AV(1), AX(3), AG(5), BD(5), BP(5)]	53711
3A1A8	6-8	7093054	Power Supply Assembly, 200 W [Attaching Hardware AA(4)]	53711
3A1A9	6-8	7093048	Power Supply Assembly, 28 VDC [Attaching Hardware AO(4), BE(4), BQ(4)]	53711
3A1A10	6-8	7093055	Transformer Assembly, Step-Down, 50 VAC [Attaching Hardware AG(2), BD(2), BP(2)]	53711
3A1A11	6-8	7093043	Transformer Assembly, Constant Voltage [Attaching Hardware AM(4), BE(4), BQ(4)]	53711
3A1A12	6-17	7404784	Ethernet CCA [Attaching Hardware AG(1), BD(1), BP(1)]	53711
3A2	N/A	7404785	Access Panel Assembly, Front [Attaching Hardware AH(8), BD(8), BP(8)]	53711
3A2A1	6-4	7093037-2	Control Display Panel [Attaching Hardware H(12), BC(12), BO(12)]	53711
3A2B1, 3A2B2	6-4	7093056	Fan, Intake [Attaching Hardware AL(8), BD(8), BP(8)]	53711

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
3A2DS1	N/A	M6363/9-3	Lamp, Incandescent, T-3-1/4 Bulb	83330
3A2E1	6-4	FHS-032-8	Ground Stud [Attaching Hardware K(1), BF(1), BR(1)]	46384
3A2F1 through 3A2F4	N/A	312003	Fuse, 3A, 3AG, 120 VAC	75915
3A2F5	N/A	312001	Fuse, 1A, 3AG, 120 VAC	75915
3A2MP1	N/A	7404788	Access Panel, Front	53711
3A2MP2	6-4	7093139	Filter, EMI (Qty. 2)	53711
3A2MP5	6-4	7093141	Gasket EMI, Front Access Panel	53711
3A2MP6	6-4	7093042	Fan, Vibration Isolator (Qty. 2)	53711
3A2MP7	6-4	LZ30	Finger Guard, Fan (Qty. 2)	62292
3A2MP8	6-4	7093152	Cover, Fuseholders [Attaching Hardware AG(4), BD(4), BP(4)]	53711
3A2MP9	N/A	LC14RD3	Lens, Indicator Light	83330
3A2XDS1	6-4	LH76/3	Housing, Indicator-Light	83330
3A2XF1, 3A2XF2	6-4	7093061	Fuseholder, Double, 115 VAC [Attaching Hardware AJ(4)]	53711
3A2XF3	6-4	FHL30G-4	Fuseholder, Single, 50 VAC [Attaching Hardware AK(2)]	71400
3A3	6-11	7093046	Relay CCA [Attaching Hardware AF(4), BC(4), BO(4)]	53711
3A4	6-10	7093045	Rodmeter CCA [Attaching Hardware AF(4), BC(4), BO(4)]	53711
3A6	6-4	7093038	Filter Assembly, Power Line [Attaching Hardware AM(2), BE(2), BQ(2)]	53711
4	6-18	7404797	RCU Assembly, Type B	1BCK1
4DS1	6-18	M6363/9	Lamp	83330
4EP3 through 4EP5	6-18	MS25036-2	Lug, Terminal (Crimp Style)	96906
4EP9 and 4EP10	6-18	4868-1-0516	Terminal, Insulated [Attaching Hardware AE(4), BC(4), BO(4)]	K3105
4J1	6-18	MS3102R18-1PZ	Connector, Receptacle, Electrical [Attaching Hardware AF(4), BC(4), BO(4)]	96906
4MP2	6-18	7404799	Cover [Attaching Hardware AQ(4), BF(4), BR(4)]	53711
4MP3	6-18	7404800	Gasket	53711

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
4MP4	6-18	7404801	Plate, Identification [Attaching Hardware AE(11), BC(4), BO(4)]	53711
4MP5	6-18	LC14RD3	Lens, Indicator-Light	83330
4MP6	6-18	4040-5031-2018	Gasket, Connector	64411
4MP13	6-18	7404798	Case	53711
4R1	6-18	RW69V271J	Resistor	81349
4S1	6-18	MS35058-27	Switch, Toggle	96906
4XDS1	6-18	LH76/3	Housing, Indicator-Light	83330
5	6-19	50247-501	RSU Assembly	47496
5J1	6-19	MS3102-R20-7SY	Connector [Attaching Hardware AF(4), BC(4), BO(4)]	96906
5J2	6-19	MS3102-R20-7P	Connector [Attaching Hardware AF(4), BC(4), BO(4)]	96906
5J3	6-19	MS3102-R20-7S	Connector [Attaching Hardware AF(4), BC(4), BO(4)]	96906
5J4	6-19	MS3102-R18-4P	Connector [Attaching Hardware AF(4), BC(4), BO(4)]	96906
5J5	6-19	MS3102-R20-7PW	Connector [Attaching Hardware AF(4), BC(4), BO(4)]	96906
5MP1	6-19	MS91528-2P2B	Knob, Control (Requires set screw)	96906
5MP2	6-19	40290-501	Cover Assembly [Attaching Hardware AQ(4), BF(4)]	47496
5MP3	6-19	0000B4058	Gasket	47496
5MP4	6-19	MS21122-W8	Clamp [Attaching Hardware AN(1), BE(1), BQ(1), J(1)]	96906
5MP5	6-19	40757-7	Gasket	47496
5MP6	6-19	MS25178-20	Cap, Dust	96906
5MP7	6-19	40757-7	Gasket	47496
5MP8 and 5MP9	6-19	MS25178-20	Cap, Dust	96906
5MP10	6-19	40757-7	Gasket	47496
5MP11	6-19	MS25178-20	Cap, Dust	96906
5MP12	6-19	40757-7	Gasket	47496
5MP13	6-19	MS25043-18	Cap, Dust	96906
5MP14	6-19	40757-6	Gasket	47496
5MP15	6-19	50242-501	Case	47496

Table 7-4. AN/WSN-8A (7404776) DEML Parts List - Continued

REF DES	FIGURE	PART NUMBER	DESCRIPTION	CAGE CODE
5MP16	6-19	MS21122-W8	Clamp [Attaching Hardware AN(1), BE(1)]	96906
5MP17	6-19	40297-1	Plate, Identification [Attaching Hardware AE(4), BC(4), BO(4)]	47496
5S1	6-19	50251-1	Switch, Rotary [Attaching Hardware BK(2), E(2), BN(1), BL(1)]	47496

Table 7-5. AN/WSN-8 (7093036) DEML List of Attaching Hardware

CODE	DESCRIPTION	PART NO.	MFR. CODE
A	Bolt, Hex: Cres, Passivated, 3/8-16 x 3.000 in. long	B/M 1030-70	03538
B	Bolt, Hex: Cres, Passivated, 3/4-10 x 3.000 in. long	B/M 1030-71	03538
C	Capscrew, Hex, 1/4-20 x 3/4 in.	TYPE 1, STYLE 10S	96906
D	Capscrew, Socket Head, Modified: 5/16-18 x 1.750 in. long	B-3057	03538
E	Jamnut, Hex: Cres, Passivated, 5/8-11	B/M 1030-82	03538
F	Lockwasher, 1/4 in.	MS35338-139	96906
G	Lockwasher: Cres, Passivated, No. 3/4	B/M 1030-85	03538
H	Lockwasher: Cres, Passivated, No. 3/8	B/M 1030-86	03538
I	Lockwasher, Internal Tooth	30669-1	47496
J	Lockwasher, Internal Tooth	50247-40	47496
K	Lockwasher, Internal Tooth, Stainless, No. 4	MS35333-70	96906
L	Lockwasher, Internal Tooth, Stainless, No. 6	MS35333-71	96906
M	Lockwasher, Internal Tooth, Stainless, No. 8	MS35333-72	96906
N	Lockwasher, Internal Tooth, Stainless, No. 10	MS35333-73	96906
O	Lockwasher: Nickel-Copper Alloy, No. 6	B/M 1030-87	03538
P	Lockwasher, No. 4	MS35337-78	96906
Q	Lockwasher, No. 4	MS35338-135	96906
R	Lockwasher, No. 8	MS35338-137	96906
S	Lockwasher, No. 10	MS35338-81	96906
T	Nut, Hex	50247-42	47496
U	Nut, Hex, 4-40	MS35649-244	96906
V	Nut, Hex, 6-32	MS35649-264	96906
W	Nut, Hex, 8-32	MS35649-284	96906
X	Nut, Hex, 10-32	MS35649-204	96906
Y	Nut, Plain, Hex: Cres, Passivated, 3/4-10	B/M 1030-80	03538
Z	Nut, Plain, Hex: Cres, Passivated, 5/8-11	B/M 1030-81	03538
AA	Nut, Plain, Hex: Cres, Passivated, 10-32	MS35649-304	96906
AB	Pin, Dowel	A-3345-1	03538
AC	Pin, Dowel	A-3345-2	03538
AD	Pin, Dowel: Nickel-Copper Alloy, 0.250 in. dia. x 2.375 in. long	B/M 1030-55	03538

Table 7-5. AN/WSN-8 (7093036) DEML List of Attaching Hardware - Continued

CODE	DESCRIPTION	PART NO.	MFR. CODE
AE	Pin, Dowel: Nickel-Copper Alloy, 0.375 in. dia. x 1.750 in. long	B/M 1030-56	03538
AF	Post, Mounting, 4-40	Keystone 7228	91833
AG	Post, Mounting, 4-40	Keystone 7230	91833
AH	Rivet: Cres	B-3130	03538
AI	Screw, Flat Head, 4-40 x 5/8 in.	MS51959-18	96906
AJ	Screw, Flat Head, 6-32 x 5/16 in.	MS51959-27	96906
AK	Screw, Flat Head, 6-32 x 5/8 in.	MS51959-31	96906
AL	Screw, Flat Head, 8-32 x 5/16 in.	MS51959-42	96906
AM	Screw, Flat Head, 8-32 x 3/8 in.	MS51959-43	96906
AN	Screw, Machine: Nickel-Copper Alloy, Filister Head, 10-32 x 0.625 in. long	B/M 1030-75	03538
AO	Screw, Machine: Nickel-Copper Alloy, Pan Head, 6-32 x 0.250 in. long	B/M 1030-76	03538
AP	Screw, Pan Head, 4-40 x 5/16 in.	MS35216-13	96906
AQ	Screw, Pan Head, 4-40 x 3/8 in.	MS35216-14	96906
AR	Screw, Pan Head, 4-40 x 3/8 in.	MS51957-15	96906
AS	Screw, Pan Head, 4-40 x 1/2 in.	MS35216-16	96906
AT	Screw, Pan Head, 6-32 x 5/16 in.	MS51957-27	96906
AU	Screw, Pan Head, 6-32 x 1/2 in.	MS51957-30	96906
AV	Screw, Pan Head, 6-32 x 1-1/2 in.	MS51957-36	96906
AW	Screw, Pan Head, 6-32 x 1-3/4 in.	MS51957-57	96906
AX	Screw, Pan Head, 8-32 x 1/2 in.	MS35216-42	96906
AY	Screw, Pan Head, 8-32 x 5/8 in.	MS35216-46	96906
AZ	Screw, Pan Head, 8-32 x 5/16 in.	MS51957-42	96906
BA	Screw, Pan Head, 10-32 x 1/2 in.	MS35217-54	96906
BB	Screw, Pan Head, 10-24 x 1/2 in.	MS35216-55	96906
BC	Screw, Pan Head, 10-32 x 5/8 in.	MS35217-56	96906
BD	Setscrew: Nickel-Copper Alloy, Socket Head, Cup Point, 10-32 x 0.500 in. long	B/M 1030-66	03538
BE	Setscrew: Nickel-Copper Alloy, Socket Head, Cup Point, 3/8-16 x 1.000 in. long	B-3027	03538
BF	Setscrew: Nickel-Copper Alloy, Socket Head, Full Dog Point, 10-32 x 0.375 in. long	B/M 1030-67	03538
BG	Stud, Modified: Cres, Passivated, 5/8-11 x 4.000 in. long	B-3129	03538

Table 7-5. AN/WSN-8 (7093036) DEML List of Attaching Hardware - Continued

CODE	DESCRIPTION	PART NO.	MFR. CODE
BH	Stud, Tap End: Cres, Passivated, 3/4-10 x 2-1/2 in. long	B-3128	03538
BI	Stud, Tap End: Cres, Passivated, 3/4-10 x Length as Required	AS REQUIRED	03538
BJ	Washer, Flat: Cres, 0.128 in. ID x 0.250 in. OD X 0.190 in. thick	C-3063-2	03538
BK	Washer, Flat No. 4	MS15795-803	96906
BL	Washer, Flat No. 8	MS15795-807	96906
BM	Washer, Flat No. 10	MS15795-808	96906
BN	Washer, Flat 1/4-20	MS15795-810	96906
BO	Washer, Hex	50247-41	47496
BP	Wire, Lock: 0.040 in. dia.	MS20995-NC-40	96906
*	Screw, Pan Head, 6-32 x 3/4 in.	MS51957-32	96906
**	Screw, Flat Head, 8-32 x 1/4 in.	MS51959-41	96906
***	Screw, Pan Head, 6-32 x 1 in.	MS51957-34	96906
Δ	Screw, Flat Head, 8-32 x 3/16 in.	MS51960-79	96906

Table 7-6. AN/WSN-8A (7404776) DEML List of Attaching Hardware

CODE	DESCRIPTION	PART NO.	MFR. CODE
A	Bolt, Eye, Lifting: Cres, Passivated, 3/8-16 x 1.00 in. long	FS3	01599
B	Bolt, Hex: Cres, Passivated, 5/16-18 x 5/8 in. long	MS35307-331	96906
C	Bolt, Hex: Cres, Passivated, 3/8-16 x 3.000 in. long	B/M 1030-70	47496
D	Bolt, Hex: Cres, Passivated, 3/4-10 x 3.000 in. long	B/M 1030-71	47496
E	Nut, Hex	50247-42	47496
F	Capscrew, Socket Head, Modified: 5/16-18 x 1.750 in. long	B-3057	47496
G	Nut, Hex, Jam-Nut: Cres Passivated, 5/8-11	B/M 1030-82	47496
H	Nut, Hex, Plain: Cres, Passivated, 4-40	MS35649-244	96906
I	Nut, Hex, Plain: Cres, Passivated, 6-32	MS35649-264	96906
J	Nut, Hex, Plain: Cres, Passivated, 8-32	MS35649-284	96906
K	Nut, Hex, Plain: Cres, Passivated, 10-32	MS35649-304	96906
L	Nut, Hex, Plain: Cres, Passivated, 3/8-16	MS35649-2384	96906
M	Nut, Hex, Plain: Cres, Passivated, 5/8-11	B/M 1030-81	47496
O	Nut, Hex, Plain: Cres, Passivated, 3/4-10	B/M 1030-80	47496
P	Nut, Hex, Self-Locking: Cres, Passivated, 4-40	MS21083-C04	96906
Q	Nut, Hex, Self-Locking: Cres, Passivated, 6-32	MS21083-C06	96906
R	Pin, Dowel	A-3345-1	47496
S	Pin, Dowel	A-3345-2	47496
T	Pin, Dowel, Nickel-Copper Alloy, 0.250 in. dia. x 2.375 in. long	B/M 1030-55	47496
U	Pin, Dowel, Nickel-Copper Alloy, 0.375 in. dia. x 1.750 in. long	B/M 1030-56	47496
V	Post, Mounting, 4-40	572-4862-01-05-16	K3105
W	Rivet: Cres	B-3130	47496
X	Screw, Machine, Fillister Head, Nickel-Copper Alloy, 10-32 x 0.625 in. long	B/M 1030-75	47496
Y	Screw, Machine, Flat Head: Cres, Passivated, 4-40 x 1/2 in. long	MS51959-17	96906
Z	Screw, Machine, Flat Head: Cres, Passivated, 6-32 x 1/2 in. long	MS51959-30	96906
AA	Screw, Machine, Flat Head, Undercut: Cres, Passivated, 8-32 x 1/4 in. long	MS51959-41	96906
AB	Screw, Machine, Flat Head: Cres, Passivated, 8-32 x 3/8 in. long	MS51959-43	96906

Table 7-6. AN/WSN-8A (7404776) DEML List of Attaching Hardware - Continued

CODE	DESCRIPTION	PART NO.	MFR. CODE
AC	Screw, Machine, Flat Head, Stainless Steel: 8-32 x 7/16 in. long	MS51959-44	96906
AD	Screw, Machine, Pan Head, Nickel-Copper Alloy, 6-32 x 0.250 in. long	B/M 1030-76	47496
AE	Screw, Machine, Pan Head: Cres, Passivated, 4-40 x 5/16 in. long	MS35216-13	96906
AF	Screw, Machine, Pan Head: Cres, Passivated, 4-40 x 1/2 in. long	MS35216-16	96906
AG	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 3/8 in. long	MS51957-28	96906
AH	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 1/2 in. long	MS51957-30	96906
AI	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 3/4 in. long	MS51957-32	96906
AJ	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 1 in. long	MS51957-34	96906
AK	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 1-1/4 in. long	MS51957-35	96906
AL	Screw, Machine, Pan Head: Cres, Passivated: 6-32 x 1-3/4 in. long	MS51957-37	96906
AM	Screw, Machine, Pan Head: Cres, Passivated: 8-32 x 3/8 in. long	MS51957-43	96906
AN	Screw, Machine, Pan Head: Cres, Passivated: 8-32 x 1/2 in. long	MS51957-45	96906
AO	Screw, Machine, Pan Head: Cres, Passivated: 8-32 x 3/4 in. long	MS351957-47	96906
AP	Screw, Machine, Pan Head: Cres, Passivated: 10-32 x 1/2 in. long	MS51958-63	96906
AQ	Screw, Machine, Pan Head: Cres, Passivated: 10-32 x 5/8 in. long	MS51958-64	96906
AR	Screw, Machine, Truss Head: Cres, Passivated: 10-32 x 1.00 in. long	MS51958-67	96906
AS	Setscrew, Nickel-Copper Alloy, Socket Head, Cup Point, 10-32 x 0.375 in. long	B/M 1030-67	47496
AT	Setscrew, Nickel-Copper Alloy, Socket Head, Cup Point, 10-32 x 0.500 in. long	B/M 1030-66	47496
AU	Setscrew, Nickel-Copper Alloy, Socket Head, Cup Point, 3/8-16 x 1.000 in. long	B-3027	47496
AV	Standoff, Female-Female: Cres, Passivated: 6-32 x 1/2 in. long	HT8215-SS-0632	0PDR0

Table 7-6. AN/WSN-8A (7404776) DEML List of Attaching Hardware - Continued

CODE	DESCRIPTION	PART NO.	MFR. CODE
AW	Standoff, Female-Female: Cres, Passivated: 6-32 x 3.75 in. long	HT9751-240-SS-0632	0PDR0
AX	Standoff, Male-Female: Cres, Passivated: 6-32 x 1/2 in. long	HT9739-SS-0632	0PDR0
AY	Stud, Modified: Cres, Passivated, 5/8-11 x 4.000 in. long	B-3129	47496
AZ	Stud, Tap End: Cres, Passivated, 3/4-10 x 2-1/2 in. long	B-3128	47496
BA	Stud, Tap End: Cres, Passivated, 3/4-10 x Length As Required	AS REQUIRED	47496
BB	Washer, Flat: Cres, 0.128 in. ID x 0.250 in. OD x 0.190 in. thick	C-3063-2	47496
BC	Washer, Flat: Cres Passivated, No. 4 Nominal	MS15795-803	96906
BD	Washer, Flat: Cres Passivated, No. 6 Nominal	MS15795-805	96906
BE	Washer, Flat: Cres Passivated, No. 8 Nominal	MS15795-841	96906
BF	Washer, Flat: Cres Passivated, No. 10 Nominal	MS15795-808	96906
BG	Washer, Flat: Cres Passivated, 5/16 in. Nominal	MS15795-812	96906
BH	Washer, Flat: Cres Passivated, 3/8 in. Nominal	MS15795-814	96906
BI	Washer, Lock: Cres, Passivated, 3/8 in. Nominal	B/M 1030-86	47496
BJ	Washer, Lock: Cres, Passivated, 3/4 in. Nominal	B/M 1030-85	47496
BK	Washer, Lock, Internal Tooth	30669-1	47496
BL	Washer, Lock, Internal Tooth	50247-40	47496
BM	Washer, Lock, Nickel-Copper Alloy, No. 6 Nominal	B/M 1030-87	47496
BN	Washer, Hex	50247-41	47496
BO	Washer, Split-Lock: Cres, Passivated, No. 4 Nominal	MS35338-135	96906
BP	Washer, Split-Lock: Cres, Passivated, No. 6 Nominal	MS35338-136	96906
BQ	Washer, Split-Lock: Cres, Passivated, No. 8 Nominal	MS35338-137	96906
BR	Washer, Split-Lock: Cres, Passivated, No. 10 Nominal	MS35338-138	96906
BS	Washer, Split-Lock: Cres, Passivated, 5/16 in. Nominal	MS35338-140	96906
BT	Washer, Split-Lock: Cres, Passivated, 3/8 in. Nominal	MS35338-141	96906
BU	Wire, Lock, 0.040 in. dia.	MS20995-NC-40	96906

Table 7-7. AN/WSN-8 (7093036) DEML List of Manufacturers

CAGE CODE	NAME AND ADDRESS
0AYU9	Kontron America Inc., 14118 Stowe Dr., Poway, CA 92064-4147
00779	Tyco Electronics Corp./Amp Products, 2800 Fulling Mill Road, Mail Stop 38-43 Middletown, PA 17057-3142
03538	Lockheed Martin Corp., Maritime Systems & Sensors-Syracuse, 497 Electronics Pkwy., 5 Bldg., Liverpool, NY 13088-5394
05RN8	Condor Engineering Inc., 101 W. Anapamu St., Santa Barbara, CA 93101-1314
1HAT2	Engineering Concepts and Designs, 424 Flintlock Rd., Chesapeake, VA 23322-2548
13150	Axsys Technologies Inc., 4 Aviation Way, Laconia, NH 03246-6600
14949	Trompeter Electronics, Inc., 5550 East McDowell Rd., Mesa, AZ 85215-9605
22978	Measurement Systems, Inc., 777 Commerce Dr., Fairfield, CT 06825-5500
24355	Analog Devices, Inc., Div. Corporate Headquarters, 1 Technology Way, Norwood, MA 02062-9106
24403	Enidine Inc., 7 Centre Dr., Orchard Park, NY 14127-2293
47496	The Dewey Electronics Corp., 27 Muller Road., Oakland, NJ 07436-6131
51086	Computer Conversions Corp., 6 Dunton Court, East Northport, NY 11731-1704
53317	Control Sciences, Inc. 9509 Vassar Ave., Ste. B, Chatsworth, CA 91311-0882
53711	Naval Sea Systems Command, 1333 Isaac Hull Ave. S. E., Washington Navy Yard, D.C. 20376
62292	EBM Industries Inc., DBA EBM Pabst, 110 Hyde Rd., Farmington, CT 06034-4009
64411	Tech-Etch, Inc., 100 Riggenbach Road, Fall River, MA 02720-4708
71400	Cooper Bussman Industries, Inc., 114 Old State Rd., Ballwin, MO 63021-5942
75915	Littelfuse, Inc., 800 E. Northwest Highway, Des Plaines, IL 60016-3049
81349	Military Specifications Promulgated by Military
9D475	Tidewater Industrial Fasteners Corp., 2427 Ingleside Rd., Norfolk, VA 23513-4596
91833	Keystone Electronics Corp., 3107 20th Rd., Long Island City, NY 11105-2017
96906	Military Standard Parts Promulgated by Military
K3105	Wearnes Cambion Ltd., Mill Lane Castleton, Hope Valley, Derbyshire, S33 8WR United Kingdom
SB880	Tadrian Batteries, Ltd., Industrial Zone, P.O. Box 1, Kiryat Ekron 70500, Israel

Table 7-8. AN/WSN-8A (7404776) DEML List of Manufacturers

CAGE CODE	NAME AND ADDRESS
00795	Delta Electronics Mfg. Corp., 416 Cabot St., Beverly, MA 01915-0053
0AYU9	Kontron America Inc., 14118 Stowe Dr., Poway, CA 92064-4147
0PDR0	Hi-Tech Fasteners Inc., 4940 Winchester Blvd., Frederick, MD 21703-7400
01599	Reidtool Supply Co., 2265 Black Creek Rd., Muskegon, MI 49444-2684
1BCK1	W R Systems Ltd., 2500 Almeda Ave., Ste. 214, Norfolk, VA 23513-2403
13150	Axsys Technologies Inc., 4 Aviation Way, Laconia, NH 03246-6600
14949	Trompeter Electronics, Inc., 5550 East McDowell Rd., Mesa, AZ 85215-9605
43299	Newark Corporation, 1504 Santa Rosa Rd, Room 115, Richmond, VA, 23229-5109
46384	PENN Engineering and Manufacturing Corp., 5190 Old Easton Highway, Danboro, PA 18916-1000
47496	The Dewey Electronics Corp., 27 Muller Road., Oakland, NJ 07436-6131
53711	Naval Sea Systems Command, 1333 Isaac Hull Ave. S. E., Washington Navy Yard, D.C. 20376
62292	EBM Industries, Inc., DBA EBM PABST, 110 Hyde Road, Farmington, CT 06034-4009
64411	Tech-Etch, Inc., 100 Riggenbach Road, Fall River, MA 02720-4708
71400	Cooper Bussman Inc., 114 Old State Road, Ballwin, MO 63021-5942
75915	Littelfuse, Inc., 800 E. Northwest Highway, Des Plaines, IL 60016-3049
81349	Military Specifications Promulgated by Military
83330	Dialight Corp., 1501 Route 34, Farmingdale, NJ 07727-3932
9D475	Tidewater Industrial Fasteners Corp., 2427 Ingleside Rd., Norfolk, VA 23513-4596
91833	Keystone Electronics Corp., 3107 20th Rd., Long Island City, NY 11105-2017
96906	Military Standard Parts Promulgated by Military
K3105	Wearnes Cambion Ltd., Mill Lane Castleton, Hope Valley, Derbyshire, S33 8WR United Kingdom
KB732	APW Electronic Solutions Ltd., Flanders Road Hedge End, Southhampton, SO30 2LG United Kingdom

CHAPTER 8
INSTALLATION

8.1 INTRODUCTION.

Information necessary for shipboard installation of the AN/WSN-8 (7093036), AN/WSN-8A(V)1 (7404776), and AN/WSN-8A(V)2 (7404776) Digital Electromagnetic Log (DEML) units is contained in this chapter. Personnel installing the DEML system shall refer to the procedures and illustrations in this chapter for packing procedures and for all phases of installation, inspection, preliminary testing, and installation verification to ensure properly installed and operable equipment.

8.2 INSTALLATION DRAWINGS.

Installation drawings in this chapter are designed to show all equipment, dimensions for installation, interconnecting wiring and cabling, and input and output reference data. Installation data is provided in tabular and illustrative format for each major equipment unit.

8.3 SITE INFORMATION.

When planning the location and arrangement of the DEML system, sufficient space for ventilation and access to all equipment for periodic adjustments, troubleshooting, preventive and corrective maintenance, and efficient operator performance shall be provided.

8.3.1 RODMETER AND SEA VALVE. The rodmeter (Unit 1 or 6) and sea valve (Unit 2 or 7) should be located as close as possible to the ship's keel and the turning center of the ship, to minimize speed errors that develop when the ship turns, pitches, and rolls. The selected sea valve location shall provide for a 12-7/8-inch diameter mounting area on the hull, rodmeter removal (rodmeter length plus 26 inches), hand-wheel clearance, plus any additional headroom required for the rodmeter hoist. (The hoist must meet the requirements of Bureau of Ships Standard Plan 815-H-1197080.)

8.3.2 INDICATOR-TRANSMITTER. The Indicator-Transmitter (I/T) (Unit 3 or 8) should be mounted at a height which permits all operator controls and displays to be seen easily. Space must be allowed for swinging out the front access panel for servicing. The area directly beneath the I/T should be clear to allow for straight cable runs into the bottom of the unit, and for ventilation of the unit.

8.3.3 REMOTE CONTROL UNIT. The Remote Control Unit (RCU) (Unit 4) should be mounted on a bulkhead near a remote speed indicator, in a location that is convenient for remote control of Dummy Log speed.

NOTE

For SSBN 726 Class installation, the RCU cover with switch and indicator is removed from the enclosure and mounted in the Steam Plant Control Panel.

8.3.4 RODMETER SWITCHING UNIT (AS REQUIRED). The Rodmeter Switching Unit (RSU) (Unit 5) should be mounted on a bulkhead as close to the I/T as possible. The area directly beneath the RSU and the I/T should be clear to allow for interconnection of cabling between the two units.

8.4 REFERENCE PUBLICATIONS.

The General Maintenance Handbook (NAVSEA 0967-LP-000-0160) and Installation Standards (NAVSEA 0967-LP-000-0110) of the Electronics Installation and Maintenance Book (EIMB) series should be consulted for installation of interconnecting wires and cables, and for methods and procedures for proper installation of the DEML system.

8.4.1 REQUIRED PUBLICATIONS. The following underwater log publications are required for the installation of the DEML system: Technical Manual; Installation, Operation, Maintenance, Repair and Parts Support; Hull-Mounted Rodmeter Type IC/E28-6F; NAVSEA 0965-LP-102-2010; and Technical Manual; Operation and Maintenance Instructions (Organizational); Electromagnetic Log Voltage Simulator MK 1, MOD 0; NAVSEA SE178-AM-MMM-010.

8.5 TOOLS AND MATERIALS REQUIRED FOR INSTALLATION.

8.5.1 TOOLS. Hand tools normally found on board ship are required for installation of the DEML System. A multimeter (SCAT 4245 or equivalent) is required for the initial turnon and for preliminary tests conducted during installation checkout.

8.5.2 MATERIALS. Materials required for installation, but not supplied with the equipment, are listed

in **Table 8-1**. Materials supplied with the equipment are listed in **Table 8-2**. **Tables 8-3** through **8-8** give the cable running lists for input and output cables required for installation and operation of the AN/WSN-8 (7093036) and AN/WSN-8A (7404776) DEML systems.

8.6 PACKING.

8.6.1 INDICATOR-TRANSMITTER (UNIT 3 OR 8). (**Figure 8-1**) The following procedure shall be used for cleaning, preserving, and packing the I/T:

a. Prepare I/T per process C-1 of MIL-P-116 Series.

b. Preserve I/T per level A, MIL-E-17555 Series.

c. Enclose and secure 32 units of desiccant per MIL-D-3464 and Type 1 & A Humidity Indicator per MS20003-2.

d. Cut a piece of 3/8" plywood 10-3/8" x 5" and position over Control Display Panel (CDP). Secure in place by wrapping several layers of self-adhering plastic wrap around the cabinet.

e. Protect connectors by installing plastic caps.

f. Wrap and cushion item(s) using paper per MIL-P-17667, Type 1, and cushioning material per MIL-C-26861, CL 3, GR A.

WARNING

The crated and uncrated weights of the I/T are 90 and 52 pounds, respectively. Ensure sufficient number of personnel are on hand to safely handle the I/T to avoid the risk of injury due to heavy lifting.

g. Place I/T in heat-sealed bag that conforms to MIL-P-116. The type of material used is MIL-B-131, Class 1.

h. Place Method II warning label on package.

i. Check that container is a wooden box made of cleated plywood per PPP-B-601.

WARNING

The crated and uncrated weights of the I/T are 90 and 52 pounds, respectively. Ensure sufficient number of personnel are on hand to safely handle the I/T to avoid the risk of injury due to heavy lifting.

j. Place I/T in the wooden box and cushion it with 2-inch thick cellulose wadding.

k. Cushion sharp corners to prevent puncture of heat-sealed bag.

l. Brace I/T with 2 x 4 boards.

m. Screw container closed using a minimum of four screws per side.

n. Apply FRAGILE and THIS SIDE UP warning labels on box.

o. Mark applicable stenciling (in accordance with MIL-STD-129) on box.

8.6.2 RODMETER (UNIT 1 OR 6). (**Figure 8-2**) The following procedures shall be used for cleaning and packing the rodmeter.

a. Prepare rodmeter per process C-1 of MIL-P-116 Series.

NOTE

Preservation of rodmeter is not required.

b. Check that container is a wooden box that conforms to PPP-B-621, Class 1 (domestic), Style 4-1/2 (MOI), Grade B.

NOTE

Rodmeter is a watertight unit. When packing, make sure hull fitting cap is properly installed.

c. Install hull fitting cap on rodmeter.

d. Cover rodmeter buttons with a tag that reads “Before installation, make sure that pickup buttons at bottom of rodmeter are free of all foreign matter. Clean with fine emery cloth.”

e. Nail cleats to container with a minimum of five nails per cleat.

f. Install rodmeter in container, as shown in **Figure 8-2**.

g. Pack top and bottom of rodmeter with molded forms of polyethylene or 1-inch thick cellulose wadding in container, as shown in **Figure 8-2**.

NOTE

If technical manuals are included with shipment, they shall be packed in heat-sealed bag.

h. Nail packing container closed with a minimum of five nails per cleat.

i. Mark shipping container in accordance with MIL-STD-129.

j. Write on two sides of container the following: “REUSABLE-DO NOT DESTROY. (Unit is returnable to contractor for overhaul.)”

8.6.3 REMOTE CONTROL UNIT (UNIT 4). The following procedure shall be used for cleaning, preserving, and packing the RCU.

a. Prepare RCU per process C-1 of MIL-P-116 Series.

b. Preserve RCU per level A, MIL-E-17555 Series.

c. Place RCU in heat-sealed bag that conforms to MIL-P-116 Series. The type of material used is MIL-B-131 Series, Class 1.

NOTE

Maximum overall dimensions are 8.25 inches in length, 6.25 inches in width, and 4.25 inches in height. Maximum volume is 1.5 cubic feet. Maximum gross weight is 2.5 pounds when packed for shipment.

d. Package RCU, one unit of desiccant, and molded forms of polyethylene or 1-inch thick cellulose wadding in double cardboard containers.

8.6.4 RODMETER SWITCHING UNIT (UNIT 5). The procedure for cleaning, preserving, and packing the rodmeter switching unit is the same as that for the RCU.

NOTE

Maximum overall dimensions are 18 inches in length, 14 inches in width, and 12.5 inches in height. Maximum volume is 1.9 cubic feet. Maximum gross weight is 9.5 pounds when packed for shipment.

8.7 PREPARATION AND MOUNTING OF FOUNDATION.

Figures 8-3 through **8-7** in this chapter show dimensions required for installation of major units, including space allocations necessary to ensure unrestricted operation and maintenance. Before installing units, be sure that foundations have been prepared in accordance with ship’s requirements.

8.8 INPUT/OUTPUT REQUIREMENTS.

Input/Output (I/O) information is contained in **Tables 8-9** through **8-12**. The AN/WSN-8 (7093036) DEML and AN/WSN-8 (7093036) DEML (w/FC-1) requires input power from two AC power sources: 115 VAC, 60-Hertz (Hz), single phase and 115 VAC, 400-Hz, single phase (N/A to the SSN 21 Class). The AN/WSN-8A(V)1 (7404776) DEML and AN/WSN-8A(V)2 (7404776) DEML requires input power from one AC power source: 115 VAC, 60-Hz, single phase.

8.9 INSTALLATION PROCEDURES.

Procedures for installing DEML System equipment are presented in this section. Check off procedures listed on the installation procedures checklist (**Table 8-13**) as they are completed.

8.9.1 RODMETER (UNIT 1 OR 6) AND SEA VALVE (UNIT 2 OR 7) INSTALLATION. **Figure 8-3** contains outline drawings and dimensions for use in installing the rodmeter and sea valve. The sea valve must hold the rodmeter in its normal position, that is, perpendicular to the deck plane, with the long axis of the rodmeter cross section parallel to the ship’s centerline within ±75 minutes. In order to attain this degree of accuracy, a hull mounting plate must be fabricated by the installing activity and placed on the hull before installation of the rodmeter and sea valve.

8.9.2 SEA VALVE (UNIT 2 OR 7) INSTALLATION. The following step-by-step installation procedure for the sea valve is to be performed while the ship is in dry-dock.

a. Cut hole in hull at selected site (**Figure 8-3**).

b. Install hoisting gear (furnished by installing activity) directly above hole.

c. Suspend dummy rodmeter over hole, perpendicular to ship’s deck plane.

d. Use wooden wedges and other supporting pieces to position deck flange so that rodmeter can be lowered through hole with alignment maintained.

NOTE

This position determines exact alignment of hull mounting plate to be fabricated and installed.

e. Fabricate hull mounting plate (**Figure 8-3**) and set in place on hull. Do not secure permanently at this time.

CAUTION

Do not permit oil and grease to contact packing assembly when coating deck flange O-ring and groove.

NOTE

Hull mounting plate mounting surface shall have a 32-microinch finish. It shall also have a 7.125-inch diameter hole in exact location that deck flange will occupy, and shall be fitted with 12 threaded Monel studs secured around this hole.

f. Coat deck flange O-ring and O-ring groove with silicone oil, MIL-S-8660.

g. Install deck flange.

(1) Disassemble deck flange from sea valve body by removing four studs and nuts.

(2) Secure deck flange to six shorter studs on hull mounting plate with nuts and lockwashers provided.

(3) Torque nuts to 200 to 300 foot-pounds. (FWD mark on flange must face forward.)

(4) Carefully lower rodmeter through hole in deck flange to make sure that deck flange is aligned. Raise rodmeter.

h. Install sea valve body on deck flange.

NOTE

Sea valve body can be installed in either of two positions 180° apart on deck flange; convenience of installation and operation should determine the position selected.

i. Lubricate dummy rodmeter and packing with common bar soap, P-S-591.

CAUTION

Do not tighten hull-bearing packing to obtain a watertight fit around dummy rodmeter. Packing is intended only to prevent or reduce vibration.

j. Lower dummy rodmeter through body of sea valve and deck flange to check alignment.

NOTE

Sea valve is machined during manufacture to ensure proper alignment with respect to packing flange and deck flange.

k. After alignment check, raise dummy rodmeter and secure body of sea valve by tightening nuts and lockwashers on taller group of six studs.

l. Permanently secure hull mounting plate in place after rechecking alignment by lowering and raising dummy rodmeter.

8.9.3 RODMETER (UNIT 1 OR 6) INSTALLATION. This installation procedure is intended for initial installation of the retractable rodmeter.

NOTE

Before installing rodmeter, the sensitivity value stamped on the rodmeter must be obtained and recorded in applicable records for later use in calibration or alignment.

a. Loosen all four packing gland nuts to relax sea valve packing.

b. Install rodmeter in hoisting clamp, which is part of hoisting gear to be furnished by installing activity.

c. Insert rodmeter in top of sea valve body.

d. Lower rodmeter until it touches closed valve gate; then raise rodmeter approximately 1/4-inch.

e. Open sea valve gate all the way (approximately 22 turns of drive screw) until gate is fully housed in its cavity within sea valve body.

NOTE

External indicator on sea valve body shows fully closed and fully open positions.

f. Lower rodmeter to obtain maximum extension from ship's hull and to allow Monel buttons on rodmeter to clear hull by at least 20 inches.

g. Mark this position on hoisting gear.

h. Lock hoisting gear to hold rodmeter in place.

i. Tighten packing on top of sea valve body by turning packing gland nuts clockwise in cap of valve.

j. Remove top cover plate from junction box.

k. Remove two bolts, two plugs, and associated O-ring seals from junction box, being careful not to damage junction box wiring.

l. Rotate junction box by +90°, -90°, or 180°, as required, to achieve desired alignment of junction box connector.

m. Install two bolts, two plugs, and associated O-ring seals to secure junction box to rodmeter.

n. Replace junction box cover.

8.9.4 I/T (UNIT 3 OR 8) INSTALLATION. **Figure 8-4 (Sheet 1)** contains outline drawings and dimensions for use in installing the AN/WSN-8 (7093036) I/T and AN/WSN-8 (7093036) I/T (w/FC-1). **Figure 8-4 (Sheet 2)** contains outline drawings and dimensions for use in installing the AN/WSN-8A(V)1 (7404776) I/T and AN/WSN-8A(V)2 (7404776) I/T. Sufficient space must be allowed around the I/Ts for circulation of air. Ventilation is provided by force draft fans on the DEMLs. Installation instructions are described in the following procedure.

NOTE

If I/T is not replacing an existing unit, omit steps **a** through **e**.

a. De-energize existing I/T(s) and tag "DANGER-DO NOT OPERATE".

DANGER

High voltage components may contain voltages dangerous to life. DEML input power must be de-energized before disconnecting cables.

b. If the AN/WSN-8 (7093036) I/T or AN/WSN-8 (7093036) I/T (w/FC-1) is installed, disconnect cables from jacks J1 through J7 (J8, J9 if installed). If the AN/WSN-8A(V)1 (7404776) I/T or AN/WSN-8A(V)2 (7404776) I/T is installed, disconnect cables from jacks J1 through J14. Wrap connector plugs with bubble wrap or other suitable cushioning material to prevent damage.

c. Remove three 3/4-inch nuts, lockwashers, and flat washers from I/T mounting studs. Retain hardware for re-installation.

WARNING

The crated and uncrated weights of the I/T are 90 and 52 pounds, respectively. Ensure sufficient number of personnel are on hand to safely handle the I/T to avoid the risk of injury due to heavy lifting.

d. Remove existing I/T from bulkhead and prepare for removal from the ship.

e. Repeat steps **b** through **d** for second I/T, if installed.

WARNING

The crated and uncrated weights of the I/T are 90 and 52 pounds, respectively. Ensure sufficient number of personnel are on hand to safely handle the I/T to avoid the risk of injury due to heavy lifting.

f. Mount I/T on mounting studs in selected location using 3/4-inch lockwashers, 3/4-inch flat washers, and 3/4-inch hex nuts. Use hardware retained in step **c**, or new hardware if not a replacement.

CAUTION

Ground connection is critical and must be maintained at all times for the DEML system to operate properly.

g. Connect cables removed in step **b**, or new cables, if not a replacement. If the AN/WSN-8 (7093036) I/T or AN/WSN-8 (7093036) I/T (w/FC-1) is installed, connect P8 and P9 only after power-up and Central Processing Unit (CPU) slot verification. Set DEML Remote Terminal (RT) Address in accordance with **Table 2-11** for the AN/WSN-8 (7093036) I/T, or **Table 2-27** for the AN/WSN-8 (7093036) I/T (w/FC-1).

h. Repeat steps **f** and **g** for second I/T, if installed.

NOTE

The I/T is equipped with eyebolts for handling during installation.

i. Verify electrical continuity between I/T and vessel's hull using Multimeter, SCAT 4245, or equivalent.

j. Remove Danger tag(s) and energize I/T(s) in accordance with **Table 2-6** for the AN/WSN-8 (7093036) I/T, or **Table 2-22** for the AN/WSN-8 (7093036) I/T (w/FC-1), or **Table 2-44** for the AN/WSN-8A(V)1 (7404776) I/T, or **Table 2-67** for the AN/WSN-8A(V)2 (7404776) I/T.

8.9.5 RCU (UNIT 4) INSTALLATION. **Figure 8-5** presents outline drawings and dimensions for use

in installing the RCU. Installation instructions are described in the following procedure.

NOTE

For SSBN 726 Class installation, the RCU cover with switch and indicator is removed from the enclosure and mounted in the Steam Plant Control Panel.

a. Mount RCU to selected location on bulkhead using 1/4-inch bolts, 1/4-inch lockwashers, 1/4-inch flat washers, and 1/4-inch hex nuts.

CAUTION

Ground connection is critical and must be maintained at all times for the DEML system to operate properly.

b. Fasten ground strap from mounting stud on rear of RCU to a paint-free metal surface on ship's hull.

c. Verify electrical continuity between RCU and ship's hull using multimeter, SCAT 4245, or equivalent.

8.9.6 RSU (UNIT 5) INSTALLATION. **Figure 8-6** contains outline drawings and dimensions for use in installing the RSU. Installation instructions are described in the following procedure.

a. Mount RSU to selected location on bulkhead using 3/8-inch lockwashers, 3/8-inch flat washers, and 3/8-inch hex nuts.

CAUTION

Ground connection is critical and must be maintained at all times for the DEML system to operate properly.

b. Fasten ground strap from mounting stud on rear of RSU to a paint-free metal surface on ship's hull.

c. Verify electrical continuity between RSU and ship's hull using multimeter, SCAT 4245, or equivalent.

8.9.7 RODMETER CUTOUT SWITCH (UNIT 9) INSTALLATION. **Figure 8-7** presents outline drawings and dimensions for use in installing the Rodmeter Cutout Switch. Installation instructions are described in the following procedure.

NOTE

Rodmeter Cutout Switch Installation applies to SSN 21 Class and LST 1194 only.

a. Mount Rodmeter Cutout Switch to selected location on bulkhead using 3/8-inch bolts, 3/8-inch lockwashers, 3/8-inch flat washers, and 3/8-inch hex nuts.

CAUTION

Ground connection is critical and must be maintained at all times for the DEML system to operate properly.

b. Fasten ground strap from mounting stud on rear of Rodmeter Cutout Switch to a paint-free metal surface on ship's hull.

c. Verify electrical continuity between Rodmeter Cutout Switch and ship's hull using multimeter, SCAT 4245, or equivalent.

8.9.8 CABLE FABRICATION. Cables necessary for the DEML System operation are to be fabricated by (or for) the installing activity to suit the requirements of a particular ship. The following procedure shall be used to fabricate cables.

a. Verify that parts needed for cable fabrication (**Tables 8-3** through **8-8**) are available.

b. Determine routing, length, and other cable installation requirements.

c. Fabricate cables and attach AC power connectors, interconnecting connectors, and external interface connectors in accordance with installation control drawings listed in **Table 8-1**.

8.9.9 CABLE INSTALLATION. The AC power cables and signal cables shall be run between units. Installation standards to preserve watertight integrity shall be strictly followed. If any cables pass through bulkheads or beams, proper sized bushings and packing shall be installed. Cables shall be installed with sufficient slack allowed at each end to permit installation of connectors and later repair or replacement of connectors without installing new cables. All cables shall be properly supported and strapped to prevent insulation damage.

8.10 INSTALLATION CHECKOUT.

The DEML units are tested before shipment from the factory. Installation checkout consists of step-

by-step procedures to demonstrate that the equipment is installed correctly and that it operates within tolerance. Installation checkout is performed in three phases:

Phase 1 - Installation Inspection and Pre-energizing Procedures

Phase 2 - Initial Turnon and Preliminary Test

Phase 3 - Installation Verification Test

8.10.1 INSTALLATION CHECK SHEET USE. The Installation Check Sheets [**Table 8-14** for the AN/WSN-8 (7093036) I/T and AN/WSN-8 (7093036) I/T (w/FC-1) or **Table 8-15** for the AN/WSN-8A(V)1 (7404776) I/T and AN/WSN-8A(V)2 (7404776) I/T] shall be used to record information obtained during the installation verification test procedures and the initial voltage measurements. The information recorded is then used as a reference during subsequent scheduled performance tests.

8.10.2 PHASE 1 – INITIAL INSPECTION AND PRE-ENERGIZING PROCEDURES. Perform the following installation and pre-energizing procedures before applying power to the DEML.

a. Inspect mounting bolts of I/T, RCU, RSU, and rodmeter to ensure they are secured tightly.

b. Inspect grounding of I/T, RCU, and RSU for good physical connection.

c. Use multimeter, SCAT 4245 or equivalent, to test for continuity between hull of vessel and I/T, RCU, and RSU.

d. Test AC power cables and interconnecting cables (**Tables 8-3** through **8-6**) for continuity.

e. Secure cable connectors tightly, ensuring each plug is connected to the correct jack with sufficient slack at each unit.

f. Open I/T front access panel.

g. Ensure there is adequate clearance available for preventive and corrective maintenance.

h. Close I/T front access panel.

i. Inspect the vicinity of I/T air vents to ensure there are no obstructions to ventilation air flow.

j. Ensure Allowance Parts List (APL) is on board and Coordinated Shipboard Allowance List (COSAL) includes DEML data.

k. Report lack of APL or COSAL to ship's Supply Officer if either list is not on board.

l. Ensure all required test equipment listed in **Table 1-4** is onboard, serviceable, and in current calibration.

m. Inspect main fuses, F1 through F5 (as applicable), to ensure they are installed properly and are not blown.

n. Ensure all safety precautions and procedures for shipboard electrical/electronic equipment have been complied with and that the DEML is safe to turn on.

8.10.3 PHASE 2 – INITIAL TURNON AND PRELIMINARY TEST.

a. In Dual Rodmeter configuration, disconnect rodmeter input cable from J1 and/or J3 of RSU (Unit 5). If only one Electromagnetic Log Voltage Simulator (ELVS) is available, it will be necessary to test I/Ts in succession. RSU connections are as follows:

- J1 = Rodmeter No. 1 (Unit 1)
- J2 = I/T No. 1 (Unit 3)
- J3 = Rodmeter No. 2 (Unit 6)
- J5 = I/T No. 2 (Unit 8)

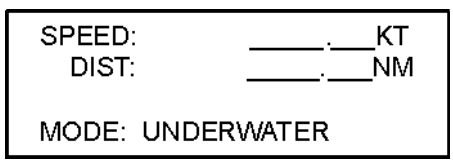
b. Connect ELVS output cable to J1 or J3 (as applicable) of RSU. If Dual Rodmeter is not installed, connect ELVS to I/T J1.

c. Set ELVS(s) to 0 knots.

d. Set RSU to NORMAL (if applicable).

e. Power up Unit 3 or 8 I/T(s) in accordance with **Table 2-6** for the AN/WSN-8 (7093036) I/T, or **Table 2-22** for the AN/WSN-8 (7093036) I/T (w/FC-1), or **Table 2-44** for the AN/WSN-8A(V)1 (7404776) I/T, or **Table 2-67** for the AN/WSN-8A(V)2 (7404776) I/T. Observe that each I/T follows the startup sequence described in the table.

f. If the AN/WSN-8 (7093036) I/T is installed, confirm that when the power-up sequence is complete, the CDP displays the following:



If the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T is installed, confirm that when the power-up sequence is complete, the CDP displays the following:

```
SPEED:          ###.## KT
  DIST:      #####.## NM

MODE:  UNDERWATER FLT**
```

A flashing “FLT” on the CDP indicates an active fault. Refer to **Chapter 5.

8.10.4 PHASE 3 – INSTALLATION VERIFICATION TEST.

a. Set the speed on the appropriate ELVS to 20 knots. If the AN/WSN-8 (7093036) I/T is installed, verify that the CDP displays the following, and that the DIST readout increases at the rate of one nautical mile every three minutes:

```
SPEED:          20.00KT
  DIST:      _____.__NM

MODE:  UNDERWATER
```

If the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T is installed, verify that the CDP displays the following, and that the DIST readout increases at the rate of one nautical mile every three minutes:

```
SPEED:          20.00 KT
  DIST:      #####.## NM

MODE:  UNDERWATER FLT**
```

A flashing “FLT” on the CDP indicates an active fault. Refer to **Chapter 5.

b. Press **MAN** on the CDP keypad. Observe that the CDP displays the following:

```
NOT NORMAL OVERRIDE
1) ENABLE    2) DISABLE

MODE:  MAN DUMMY
```

c. Press **1** on the CDP keypad. Observe that the CDP displays the following:

```
ENTER DUMMY SPEED
> ❑

MODE:  MAN DUMMY
```

❑ Denotes a blinking cursor

d. Enter "**10**" via the CDP keypad and press **E**. Observe that the CDP displays the following:

```
10:00 ENTERED
CORRECT?
(1) YES   (2) NO
MODE:  MAN DUMMY
```

e. Press **1** on the CDP keypad.

If the AN/WSN-8 (7093036) I/T is installed, observe that the CDP displays the following:

```
Rotating Synchros *
```

*CDP display will only flash if there is a difference between Own Ship’s Speed (OSS) and entered speed.

If the AN/WSN-8 (7093036) I/T (w/FC-1) is installed, observe that the CDP displays the following:

```
SLEWING SPEED *
```

*CDP display will only flash if there is a difference between OSS and entered speed.

If the AN/WSN-8A(V)1 (7404776) I/T or AN/WSN-8A(V)2 (7404776) I/T is installed, observe that the CDP displays the following:

```
SPEED:          10.00KT
  DIST:      #####.##NM

MODE:  MAN DUMMY
```

f. Verify that the DIST readout increases at the rate of one nautical mile every six minutes.

g. Press **REM** on the CDP keypad. Observe that the CDP displays the following:

```
NOT NORMAL OVERRIDE
1) ENABLE    2) DISABLE

MODE:  REM DUMMY
```

h. Press **1** on the CDP keypad.

If the AN/WSN-8 (7093036) I/T is installed, observe that the CDP displays the following:

```
SPEED:              10.00KT
  DIST:          _____.__NM

MODE:  REM DUMMY
```

If the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T is installed, observe that the CDP displays the following:

```
SPEED:              10.00 KT
  DIST:          #####.## NM

MODE:  REM DUMMY
```

i. Operate the RCU to increase the speed to 15 knots and decrease the speed to 5 knots. Observe that the speed increases and decreases incrementally as the switch is operated.

j. Perform Built-In Test (BIT) procedure check per **Table 2-10** for the AN/WSN-8 (7093036) I/T, or **Table 2-26** for the AN/WSN-8 (7093036) I/T (w/FC-1), or **Table 2-48** for the AN/WSN-8A(V)1 (7404776) I/T, or **Table 2-71** for the AN/WSN-8A(V)2 (7404776) I/T.

k. Perform configuration procedure per **Table 2-11** for the AN/WSN-8 (7093036) I/T, or **Table 2-27** for the AN/WSN-8 (7093036) I/T (w/FC-1), or **Table 2-49** for the AN/WSN-8A(V)1 (7404776) I/T, or **Table 2-72** for the AN/WSN-8A(V)2 (7404776) I/T.

l. Perform status check procedure per **Table 2-12** for the AN/WSN-8 (7093036) I/T, or **Table 2-28** for the AN/WSN-8 (7093036) I/T (w/FC-1), or **Table 2-50** for the AN/WSN-8A(V)1 (7404776) I/T, or **Table 2-73** for the AN/WSN-8A(V)2 (7404776) I/T.

If the AN/WSN-8 (7093036) I/T is installed, observe that at the completion of step 7 (Table 2-12), the CDP displays the following:

```
NORMAL ROD
SELECTED
(E)nter
MODE:  STATUS
```

If the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T is installed, observe that at the completion of step 6 (Table 2-28, or Table 2-50, or Table 2-73), the CDP displays the following:

```
NORMAL ROD
SELECTED
(E)NTER
MODE:  STATUS
```

m. When status check is complete in Dual Rodmeter configuration, set RSU to ALTERNATE and repeat status check.

If the AN/WSN-8 (7093036) I/T is installed, observe that at the completion of step 7 (Table 2-12), the CDP displays the following for dual I/T installations:

```
ALTERNATE ROD
SELECTED
(E)nter
MODE:  STATUS
```

If the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T is installed, observe that at the completion of step 6 (Table 2-28, or Table 2-50, or Table 2-73), the CDP displays the following for dual I/T installations:

```
ALTERNATE ROD
SELECTED
(E)NTER
MODE:  STATUS
```

n. If the AN/WSN-8 (7093036) I/T is installed, perform ELVS calibration (pre-calibration) as per **Table 2-14** using 4-knot increments. The ELVS calibration (pre-calibration) is not applicable to the AN/WSN-8 (7093036) I/T (w/FC-1), or AN/WSN-8A(V)1 (7404776) I/T, or AN/WSN-8A(V)2 (7404776) I/T.

NOTE

This calibration is a test of the calibration function. It does not provide accurate calibration data. It will be necessary to perform a calibration with the vessel under way to obtain a valid calibration.

o. Disconnect ELVS input cable from J1 or J3 of RSU and reconnect rodmeter input(s).

p. Return DEML to normal operating condition.

Table 8-1. Materials Required for Installation (Not Supplied)

ITEM NAME	QTY	PART, TYPE OR MODEL NUMBER	REMARKS
Rodmeter, Fixed	1 or 2	IC/E28-6F (Unit 5) IC/E28-6 (Unit 5) IC/E46-6 (Unit 5)	As required
Rodmeter, Retractable	1 or 2	IC/E72-6F(X) (Unit 3) IC/E100-6F(X) (Unit 3)	As required
Junction Box (watertight)	1 or 2	- - -	Furnished by installing activity
Hull Liner	1 or 2	- - -	Furnished by installing activity
Deck Flange	2	- - -	Furnished by installing activity
Remote Control Unit (Unit 4)	1	50147-501	
Rodmeter Switching Unit (Unit 5)	AR	50247-501 or 1023D0221	
Bolt, 1/2-13 UNC-2A x 1 in. lg	4	MS35307-409	- - -
Lockwasher 1/2 CRES	4	MS35338-143	- - -
Bolt, 1/4-20 CRES	3	MS35307-select length	- - -
Lockwasher, 1/4 CRES	3	MS35338-139	- - -
Nut, Hex, 1/4-20 NC-2 CRES	3	MS51971-1	- - -
Flat Washer, 1/4 CRES	3	MS15795-311	- - -
Bolt, 3/4-10 NC-2 CRES	3 or 6	MS35307-select length	- - -
Nut, Hex, 3/4-10 NC-2 CRES	3 or 6	MS51971-8	- - -
Flat Washer, 3/4 CRES	3 or 6	MS15795-323	- - -
Lockwasher, 3/4 CRES	3 or 6	MS35338-146	- - -
Nut, Hex, 3/8-16 NC-2 RES	3	MS51971-3	- - -
Bolt, 3/8-16 NC-2 CRES	3	MS35307-select length	- - -
Flat Washer, 3/8 CRES	3	MS15795-814	- - -
Lockwasher, 3/8 CRES	3	MS35338-141	- - -

Table 8-1. Materials Required for Installation (Not Supplied) - Continued

ITEM NAME	QTY	PART, TYPE OR MODEL NUMBER	REMARKS
Cable	AR	DSGU-*	- - -
	AR	DNW-3	- - -
	AR	MSCU-7	- - -
	AR	MSCU-14	- - -
	AR	2SJ-*	- - -
	AR	2SWU-3	- - -
	AR	TTRS-4	- - -
	AR	3SU-7	- - -
	AR	MCOS-4	- - -
	AR	TTRS-2	- - -
	AR	LS2SWU-1	For Digital Data Bus
	AR	2SU-7	- - -
	AR	MNW-7	- - -
	AR	3U-3	- - -
	AR	2SPR/16	- - -
	AR	2SWU-1	- - -
	AR	2XSAOW-3**	- - -
	AR	M17/183-00001**	- - -
Connector Plug, Molded	2	MIL-C-24231/3B	- - -
Connector Plug, Molded	2	MIL-C-24231/3C	- - -
External Hull Fitting (submarines only)	1	- - -	Furnished by installing activity
Sea Valve Assembly, Unit 2 or Unit 7	1	H3029	For use with retractable rodmeter
Hull Mounting Plate	1		Fabricated by installing activity
10-inch Diameter Handwheel	1		Provided by installing activity
Installation Control Drawings		To be developed	

NOTES:

* Cable size to be determined by installing activity.

** Applicable to the AN/WSN-8A (7404776) DEML.

Table 8-2. List of Materials Supplied with Equipment

ITEM NAME	QTY	PART, TYPE OR MODEL NUMBER	REMARKS
Indicator-Transmitter Unit 3 or 8	1 or 2	7093036 or 7404776	- - -
MIL-STD-1553B Connectors [N/A to the AN/WSN-8A (7404776) DEML]	2 or 4	PL375-47	2 per I/T, as required
Rodmeter Cutout Switch	1	M151373-002	- - -

Table 8-3. AN/WSN-8 (7093036) DEML List of Cables for Single I/T (Unit 3 or 8) Installation

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
Y(1)	2SWU-3	4	1J1	Junction Box	MIL-C-24231/3C	None
Y(2)	2SWU-3	4	6J1	Junction Box	MIL-C-24231/3C	None
Y(3)	TTRS-2	4	Junction Box	5J501	None	MS3106R20-7PY
Y(4)	TTRS-2	4	Junction Box	5J503	None	MS3106R20-7P
Y(5)	TTRS-4	4	5J502	3J1	MS3106R20-7S	MS3106R20-7PY
Y(6)	MCOS4	3	5J504	Computer	MS3106R18-4S	- - -
Y(7)	3SU-7	9	3J4	400-Hertz (Hz) Synchro Rcvr	MS3106R36-10P	None
Y(8)	MSCU-14	9	3J5	60-Hz Synchro Rcvr	MS3106R28-21P	None
Y(9)	MSCU-7	5	3J6	4J1	MS3106R18-1PZ	MS3106R18-1SZ
Cable 2	DSGU-	2	3J2	115 VAC 60 Hz	MS3106R18-1S	None
Cable 3	2SJ-	2	3J3	115 VAC 400 Hz	MS3106R18-1SW	None

Table 8-4. AN/WSN-8A(V)1 (7404776) DEML (with AN/USQ-82(V) FODMS Interface) List of Cables for Single I/T (Unit 3 or 8) Installation

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
Y(1A)	LS2SWU-3	4	1J1	Cutout Switch	MS3406D20-7PY	None
Y(1B)	LS2SWU-3	4	Cutout Switch	Rodmeter	None	MIL-C-24231/3-001
Y(2)	LSDSGU-3	2	1J2	115 VAC	MS3406D18-1S	None
Y(6)	LSMSCU-7	5	1J6	4J1	MS3406D18-1PZ	MS3406D18-1SZ
Y(11)	M17/183-00001	1	1J11	AN/SSN-6(V) NAVSSI	- - -	- - -
Y(13)	2XSAOW-3	5	1J13	AN/USQ-82(V) FODMS	MS27467T13B98P	None

Table 8-5. AN/WSN-8A(V)2 (7404776) DEML (with AN/WSN-7(V) RLGN Interface) List of Cables for Single I/T (Unit 3 or 8) Installation

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
Y(1A)	LS2SWU-3	4	1J1	Cutout Switch	MS3406D20-7PY	None
Y(1B)	LS2SWU-3	4	Cutout Switch	Rodmeter	None	MIL-C-24231/3-001
Y(2)	LSDSGU-3	2	1J2	115 VAC	MS3406D18-1S	None
Y(6)	LSMSCU-7	5	1J6	4J1	MS3406D18-1PZ	MS3406D18-1SZ
Y(11)	M17/183-00001	1	1J11	AN/SSN-6(V) NAVSSI	- - -	- - -
Y(13)	2XSAOW-3	5	1J13	AN/WSN-7(V) RLGN	MS27467T13B98P	M28840/16AB1P1
Y(14)	2XSAOW-3	5	1J14	AN/WSN-7(V) RLGN	MS27467T13B98P	M28840/16AB1P1

Table 8-6. AN/WSN-8 (7093036) DEML List of Cables for Dual I/T (Unit 3 or 8) Installation

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
Cable 1	DSGU-*	2	115 VAC 60 Hz	3J2	None	MS3106R18-1S
Cable 2	2SJ-*	2	115 VAC 400 Hz	3J3	None	MS3106R18-1SW
Cable 3	DSGU-*	2	115 VAC 60 Hz	8J2	None	MS3106R18-1S
Cable 4	2SJ-*	2	115 VAC 400 Hz	8J3	None	MS3106R18-1SW
Y1	3U-3	9	3J5	60-Hz Synchro Rcvr	MS3106R28-21P	None
Y2	3SU-7	13	3J4	IC/ACO Swbd	MS3106R36-10P	- - -
Y3	MSCU-7	5	3J6	4J1	MS3106R18-1PZ	MS3106R18-1SZ
Y4	3U-3	9	8J5	60-Hz Synchro Rcvr	MS3106R28-21P	None
Y5	3SU-7	13	8J4	IC/ACO Swbd	MS3106R36-10P	- - -
Y6	MSCU-7	5	8J6	9J1	MS3106R18-1PZ	MS3106R18-1SZ
Y7	3SU-3	7	3J1	5J2	MS3106R20-7PY	MS3106R20-7S
Y8	3SU-3	7	8J1	5J5	MS3106R20-7PY	MS3106R20-7SW
Y9	TTRS-2	4	5J1	Junction Box	MS3106R20-7PY	None
Y10	2SWU-3	4	Junction Box	1J1	None	MIL-C-24231/3C
Y11	TTRS-2	4	5J3	Junction Box	MS3106R20-7P	None
Y12	2SWU-3	4	Junction Box	6J1	None	MIL-C-24231/3C
Y13	TTRS-2	3	5J4	Computer	MS3106R18-4S	- - -

* Cable size to be determined by installing activity.

Table 8-7. List of Cables (SSBN 726 Class Only)

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
C-Y5	2SU-7	7	3J1	5J2	MS3106R20-7PY	MS3106R20-7S
C-Y6	2SU-7	7	8J1	5J5	MS3106R20-7PY	MS3106R20-7SW
C-Y7	DNW-3	2	Term Box C-Y1	3J2	None	MS3106R18-1S
C-Y8	DNW-3	2	Term Box C-Y1	8J2	None	MS3106R18-1S
C-Y9	2SU-3	2	Term Box C-Y1	3J3	None	MS3106R18-1SW
C-Y1	2SU-3	2	Term Box C-Y1	8J3	None	MS3106R18-1SW
C-Y110	3SU-7	13	3J4	Term Box C-Y1	MS3106R36-10P	None
C-Y12	3SU-7	13	8J4	Term Box C-Y1	MS3106R36-10P	None
C-Y13	3U-3	6	3J5	Term Box C-Y1	MS3106R28-21P	None
C-Y14	3U-3	2	8J5	Term Box C-Y1	MS3106R28-21P	None
C-Y15	MNW-7	5	3J6	Term Box C-Y1	MS3106R18-1PZ	None
C-Y16	MNW-7	5	8J6	Term Box C-Y1	MS3106R18-1PZ	None
C-Y17	2SWU-1	2	5J1	C-Y31	MS3106R20-7PY	- - -
C-Y18	2SWU-1	2	5J3	C-Y29	MS3106R20-7P	- - -
C-Y25	2SPR/16	4	EHF-66 Pos No. 1	1J101	- - -	MIL-C-24231/3B
C-Y26	2SPR/16	4	EHF-66 Pos No. 3	6J101	- - -	MIL-C-24231/3B
C-Y27	2SWU-1	2	5J1	C-Y32	MS3106R20-7PY	- - -
C-Y28	2SWU-1	2	5J3	C-Y30	MS3106R20-7P	- - -
C-Y29	2SWU-1	2	C-Y18	EHF-66	- - -	- - -
C-Y30	2SWU-1	2	C-Y28	EHF-66	- - -	- - -
C-Y31	2SWU-1	2	C-Y17	EHF-66	- - -	- - -
C-Y32	2SWU-1	2	C-Y27	EHF-66	- - -	- - -
R-PN8	2SU-7	6	3J7	SDC A5J11	MS3106R18-1PY	- - -

Table 8-7. List of Cables (SSBN 726 Class Only) - Continued

CABLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
R-PN7	2SU-7	6	8J7	SDC A5J12	MS3106R18-1PY	- - -
Cable 1	DSGU-	2	3J2	115 VAC 60 Hz	MS3106R18-1S	None
Cable 2	2SJ-	2	3J3	115 VAC 400 Hz	MS3106R18-1SW	None
Cable 3	DSGU-	2	8J2	115 VAC 60 Hz	MS3106R18-1S	None
Cable 4	2SJ-	2	8J3	115 VAC 400 Hz	MS3106R18-1SW	None
R-DDS100	LS2SWU-1	2	3J8	Bus Stub	PL 305-486-1	305-486-1
R-DDS101	LS2SWU-1	2	3J9	Bus Stub	PL 305-486-1	305-486-1
R-DDS102	LS2SWU-1	2	8J8	Bus Stub	PL 305-486-1	305-486-1
R-DDS103	LS2SWU-1	2	8J9	Bus Stub	PL 305-486-1	305-486-1

Table 8-8. List of Cables (SSN 21 Class Only)

CA-BLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
CY-1	LS2SWU-3	4	EHP-P19-5S Posn 1	Stbd Rodmeter	- - -	MIL-C-24231/3
CY-2	LS2SWU-3	4	EHP-P19-5S Posn 2	Port Rodmeter	- - -	MIL-C-24231/3
CY-3	2XSAWA-3	4	RSU-J1	EHP-P19-5S	MS3406DJ20A7PY	- - -
CY-4	2XSAWA-3	4	RSU-J3	EHP-P19-5S	MS3406DJ20A7P	- - -
CY-5	2XSAWA-7	7	RSU-J2	IT-1 J1	MS3406DJ20A7S	MS3408DJ20A7PY
CY-6	2XSAWA-7	7	RSU-J5	IT-2 J1	MS3406DJ20A7SW	MS3408DJ20A7PY
CY-7	3XSWA-3	6	IT-1 J5	Term Box CY-7	MS3408DJ28A21P	None
CY-8	MXCWA-7	5	IT-1 J6	Term Box CY-7	MS3408DJ18F1PZ	None
CY-9	3XSWA-3	6	IT-2 J5	Term Box CY-7	MS3408DJ28A21P	None

Table 8-8. List of Cables (SSN 21 Class Only) - Continued

CA-BLE	TYPE	ACTIVE CON-DUC-TORS	P1 MATES WITH	P2 MATES WITH	P1 TYPE	P2 TYPE
CY-10	MXCWA-7	5	IT-2 J6	Term Box CY-7	MS3408DJ18F1PZ	None
CY-11	MXCWA-14	10	RCU	Term Box CY-7	- - -	None
CY-12	DXWA-3	2	IT-2 J2	Term Box CY-7	MS3408DJ18F1S	None
CY-13	3XSWA-10	21	SCP J42	Term Box CY-7	MS3409DJ36G-10PX	None
CY-14	MXCWA-24	15	SCP J28	Term Box CY-7	MS3409EJ24A-28SX	None
CY-15	DXWA-3	2	IT-1 J2	Term Box CY-7	MS3408DJ18F1S	None
CY-16	Not Used	- - -	- - -	- - -	- - -	- - -
CY-17	Not Used	- - -	- - -	- - -	- - -	- - -
CY-18	DXA-3	2	BCP J77	Term Box CY-7	MS3409DJ13E-PZ	None
CY-19	DXA-3	2	BCP J78	Term Box CY-7	MS3409DJ13E-3P	None
K-SC35	LS2SWU-1	2	IT-2 J8	Bus Stub	PL 305-486-1	305-790-5
K-SC36	LS2SWU-1	2	IT-2 J9	Bus Stub	PL 305-486-1	305-790-5
K-SC37	LS2SWU-1	2	IT-1 J8	Bus Stub	PL 305-486-1	305-790-5
K-SC38	LS2SWU-1	2	IT-1 J9	Bus Stub	PL 305-486-1	305-790-5

Table 8-9. AN/WSN-8 (7093036) DEML Input Data

SIGNAL NAME	JACK PIN	PARAMETER	SIGNAL CHARACTERISTICS		
			Nominal	Minimum	Maximum
Speed Signal Voltage	J1-C J1-D	Amplitude Frequency	325µV/knot 60 Hz	309.75µV/knot 57 Hz	341.25µV/knot 63 Hz
Power In	J2-A and J2-B	Amplitude Frequency Power Power Factor Phase Voltage Surge Recovery Time Harmonic Content Total First Harmonic	115V 60 Hz 230W 0.72 Single - - - 2 seconds - - - - - -	109V 57 Hz - - - - - - - - - 105.7V - - - - - - - - -	121V 63 Hz - - - - - - - - - 124.6V - - - 5% 2%

Table 8-9. AN/WSN-8 (7093036) DEML Input Data - Continued

SIGNAL NAME	JACK PIN	PARAMETER	SIGNAL CHARACTERISTICS		
			Nominal	Minimum	Maximum
Power In (N/A to the SSN 21 Class)	J3-A and J3-B	Amplitude Frequency Power Power Factor Phase Voltage Surge Recovery Time Harmonic Content Total First Harmonic	115V 400 Hz 3W 0.07 Single - - - 2 seconds - - - - - -	109V 38 Hz - - - - - - - - - 105.7V - - - - - - - - -	121V 420 Hz - - - - - - - - - 124.6V - - - 5% 2%
Speed Signal Voltage (Remote)	J6-A and J6-C	Direct Current	0-5 VDC	-0.2V	5.2V
MIL-STD-1553B	J8 and J9	Amplitude	- - -	6.0 p-p	9.0 p-p

Table 8-10. AN/WSN-8A (7404776) DEML Input Data

SIGNAL NAME	JACK PIN	PARAMETER	SIGNAL CHARACTERISTICS		
			Nominal	Minimum	Maximum
Speed Signal Voltage	J1-C J1-D	Amplitude Frequency	325µV/knot 60 Hz	309.75µV/knot 57 Hz	341.25µV/knot 63 Hz
Power In	J2-A and J2-B	Amplitude Frequency Power Power Factor Phase Voltage Surge Recovery Time Harmonic Content Total First Harmonic	115V 60 Hz 230W 0.72 Single - - - 2 seconds - - - - - -	109V 57 Hz - - - - - - - - - 105.7V - - - - - - - - -	121V 63 Hz - - - - - - - - - 124.6V - - - 5% 2%
Speed Signal Voltage (Remote)	J6-A and J6-C	Direct Current	0-5 VDC	-0.2V	5.2V
RS-422	J13-A and J13-B	Direct Current	-15 VDC to 15 VDC	-15 VDC	15 VDC
RS-422	J14-A and J14-B	Direct Current	-15 VDC to 15 VDC	-15 VDC	15 VDC
Ethernet	J11				

Table 8-11. AN/WSN-8 (7093036) DEML Output Characteristics

SIGNAL NAME	JACK PIN	PARAMETER								
		Amplitude (Volts)			Frequency (Hz)			Power (Watts)		
		Nom	Min	Max	Nom	Min	Max	Nom	Min	Max
Rodmeter Voltage High	J1-A J1-B	50	45	55	60	57	63	37.5	- - -	- - -
Speed Synchro, 400 Hz, 10 Kt/Rev. (N/A to the SSN 21 Class)	J4-A J4-B	Note 1	0.04	99	400	380	420	- - -	- - -	- - -
Speed Synchro, 400 Hz, 40 Kt/Rev. (N/A to the SSN 21 Class)	J4-D J4-E J4-F	Note 1	0.04	99	400	380	420	- - -	- - -	- - -
Speed Synchro, 400 Hz, 100 Kt/Rev. (N/A to the SSN 21 Class)	J4-G J4-H J4-J	Note 1	0.04	99	400	380	420	- - -	- - -	- - -
Speed Synchro, 60 Hz, 40 Kt/Rev.	J5-A J5-B J5-C	Note 1	0.035	99	60	57	63	- - -	- - -	- - -
Speed Synchro, 60 Hz, 100 Kt/Rev. (N/A to the SSN 21 Class)	J5-D J5-E J5-F	Note 1	0.035	99	60	57	63	- - -	- - -	- - -
Distance Synchro, 60 Hz, 360 Rev/Nm	J5-G J5-H J5-J	Note 1	0.035	99	60	57	63	- - -	- - -	- - -
Coil Current	J7-F J7-G	0.50	0.40	0.60	60	57	63	- - -	- - -	- - -
1553B	J8	- - -	6.0	9.0	- - -	75.0K	1.0M	- - -	- - -	- - -
1553B	J9	- - -	6.0	9.0	- - -	75.0K	1.0M	- - -	- - -	- - -
RS-232	J10									
Not Used	J11									
Not Used	J12									
Note 1: These values are a function of speed.										

Table 8-12. AN/WSN-8A (7404776) DEML Output Characteristics

SIGNAL NAME	JACK PIN	PARAMETER								
		Amplitude (Volts)			Frequency (Hz)			Power (Watts)		
		Nom	Min	Max	Nom	Min	Max	Nom	Min	Max
Rodmeter Voltage High	J1-A J1-B	50	45	55	60	57	63	37.5	- - -	- - -
Coil Current	J7-F J7-G	0.50	0.40	0.60	60	57	63	- - -	- - -	- - -
RS-232	J10	-15 VDC to +15 VDC	-15 VDC	+15 VDC	- - -	- - -	- - -	- - -	- - -	- - -
RS-232	J13	-15 VDC to +15 VDC	-15 VDC	+15 VDC	- - -	- - -	- - -	- - -	- - -	- - -
RS-422	J14	-15 VDC to +15 VDC	-15 VDC	+15 VDC	- - -	- - -	- - -	- - -	- - -	- - -
Ethernet	J11 J12									

Table 8-13. Installation Procedures Checklist

Equipment Nomenclature: _____ Installation Date: _____

	YES	NO
1. Installation of DEML equipment, as applicable, consists of the following procedures performed in the order indicated.		
a. Planning location and arrangement of equipment		
b. Preparation and mounting of foundations		
c. Rodmeter and Sea Valve Assembly installation		
d. Rodmeter installation		
e. Indicator-Transmitter installation		
f. Remote Control Unit installation		
g. Rodmeter Switching Unit installation		
h. Cable fabrication and installation		
i. Installation checkout		
2. Planning Location and Arrangement:		
a. Sufficient space for ventilation and access		
b. Sea valve assembly and rodmeters located close to ship's keel		
c. Clearance above sea valve base, 124 inches		
d. Indicator-Transmitter mounted		
e. Sufficient space allowed for Indicator-Transmitter front access panel swinging out		
f. Area directly below Indicator-Transmitter clear for cable runs		
g. Remote control Type B mounted		
h. Rodmeter Switching Unit mounted		
i. Required tools and materials obtained		
3. Preparation and Mounting of Foundations:		
a. Hull mounting plate for sea valve fabrication to hold rodmeter perpendicular to deck plane		
b. Foundations prepared in accordance with ship's requirements		
c. Hull liner assembly and/or hull mounting fixture fabricated to hold fixed rodmeter perpendicular to deck plane		
4. Rodmeter Sea Valve Assembly Installation:		
a. Hole cut in hull and hull mounting plate positioned in place over hole		
b. Deck flange installed		
c. Dummy rodmeter lowered through hole and retracted to check alignment		
d. Sea valve body installed on deck flange		
e. Sea valve assembly and hull mounting plate secured		
f. Rodmeter inserted in sea valve and lowered		

Table 8-13. Installation Procedures Checklist - Continued

	YES	NO
g. Alignment of rodmeter junction box		
h. Fixed rodmeter installed		
5. Indicator-Transmitter Installation:		
a. Indicator-Transmitter mounted		
b. Ground strap installed		
c. Electrical continuity of Indicator-Transmitter to ship's hull verified		
6. Rodmeter Switching Unit Installation:		
a. Rodmeter Switching Unit mounted		
b. Ground strap installed		
c. Electrical continuity of Rodmeter Switching Unit to ship's hull verified		
7. Remote Control Unit Installation:		
a. Remote Control Unit mounted		
b. Ground strap installed		
c. Electrical continuity of Remote Control Unit to ship's hull verified		
8. Cable Fabrication and Installation:		
a. Routing, length, and installation requirements determined		
b. Cables fabricated in accordance with cable connector running lists		
c. Cables installed with sufficient slack		
d. Cables properly supported and strapped		
e. Watertight integrity of ship maintained		
9. Installation Checkout:		
a. Installation Check Sheet prepared		
b. Installation inspection performed		
c. Cable connectors installed and cable continuity checked		
d. Allowance Parts List (APL) and Coordinated Shipboard Allowance List (COSAL) onboard		
e. Safety precautions verified		
f. Performance test completed		
g. System aligned and adjusted		
h. Required test equipment onboard		

I certify that the equipment installation conforms to the statements checked and meets the requirements for DEML.

Technician _____ Date _____

Supervisor _____ Date _____

Inspector _____ Date _____

Table 8-14. AN/WSN-8 (7093036) DEML Installation Check Sheet

DIGITAL ELECTROMAGNETIC LOG (DEML) AN/WSN-8 (7093036)
INSTALLATION CHECK SHEET

Date _____ Serial Number: Unit 3 _____ Unit 8 _____

Installed in
(Ship or Station) _____

Paragraph No.	Step	Observed Results I/T No. 1 (Unit 3)	Observed Results I/T No. 2 (Unit 8)	Required Results
8.10.3	e			Startup sequence proceeds as per **Table 2-6** or **Table 2-22**.
	f			Underwater mode screen appears.
8.10.4	a			CDP display shows speed of 20 knots, distance readout increases.
	c			**ENTER DUMMY SPEED** screen appears.
	d			**MAN DUMMY** screen appears, shows speed of 10 knots, distance readout increases @ 1 mile/6 min.
	h			**REM DUMMY** screen appears, shows speed of 10 knots, distance readout increases @ 1 mile/6 min.
	i			Speed changes to 15 knots, then to 5 knots as described.
	j			CPU, D/R 60 Hz, SSBA 1, SSBA 2, D/S 400 Hz, A/D, and 1553 all pass as per **Table 2-10**; or CPU, A/D, ROD PCB, D/R 60 Hz, SSBA 1, SSBA 2, D/S 400 Hz, and 1553 all pass as per **Table 2-26**.
	k			Configuration check proceeds as per **Table 2-11** or **Table 2-27**.
	l(1)			Status check proceeds as per **Table 2-12** or **Table 2-28**.
	l(2)			At step 7 of **Table 2-12**, or step 6 of **Table 2-28**, CDP displays **NORMAL ROD SELECTED**.
	m(1)			Status check proceeds as per **Table 2-12** or **Table 2-28**.
	m(2)			At conclusion of step 7 of **Table 2-12**, or step 6 of **Table 2-28**, CDP displays **ALTERNATE ROD SELECTED**.
	n			Calibration proceeds as per **Table 2-14**.

Table 8-15. AN/WSN-8A (7404776) DEML Installation Check Sheet

DIGITAL ELECTROMAGNETIC LOG (DEML) AN/WSN-8A (7404776)
INSTALLATION CHECK SHEET

Date _____ Serial Number: Unit 3 _____ Unit 8 _____

Installed in
(Ship or Station) _____

Paragraph No.	Step	Observed Results I/T No. 1 (Unit 3)	Observed Results I/T No. 2 (Unit 8)	Required Results
8.10.3	e			Startup sequence proceeds as per **Table 2-44** or **Table 2-67**.
	f			Underwater mode screen appears.
8.10.4	a			CDP display shows speed of 20 knots, distance readout increases.
	c			**ENTER DUMMY SPEED** screen appears.
	d			**MAN DUMMY** screen appears, shows speed of 10 knots, distance readout increases @ 1 mile/6 min.
	h			**REM DUMMY** screen appears, shows speed of 10 knots, distance readout increases @ 1 mile/6 min.
	i			Speed changes to 15 knots, then to 5 knots as described.
	j			CPU, A/D, ROD PCB, and ETHERNET all pass as per **Table 2-48**; or CPU, A/D, ROD PCB, and ETHERNET all pass as per **Table 2-71**.
	k			Configuration check proceeds as per **Table 2-49** or **Table 2-72**.
	l(1)			Status check proceeds as per **Table 2-50** or **Table 2-73**.
	l(2)			At step 6 of **Table 2-50** or **Table 2-73**, CDP displays **NORMAL ROD SELECTED**.
	m(1)			Status check proceeds as per **Table 2-50** or **Table 2-73**.
	m(2)			At conclusion of step 6 of **Table 2-50** or **Table 2-73**, CDP displays **ALTERNATE ROD SELECTED**.

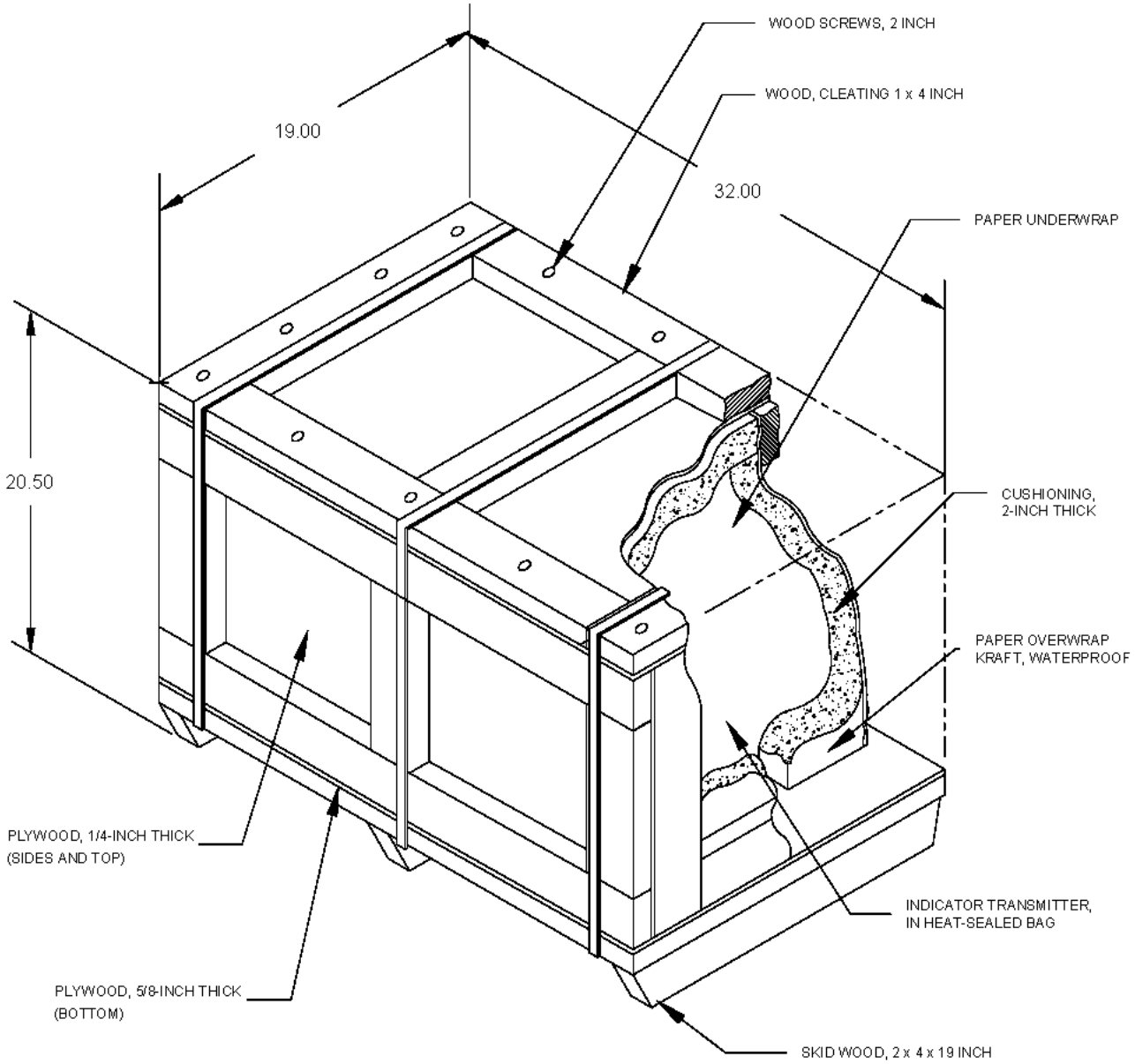


Figure 8-1. Unit 3 or 8 Indicator-Transmitter Packing

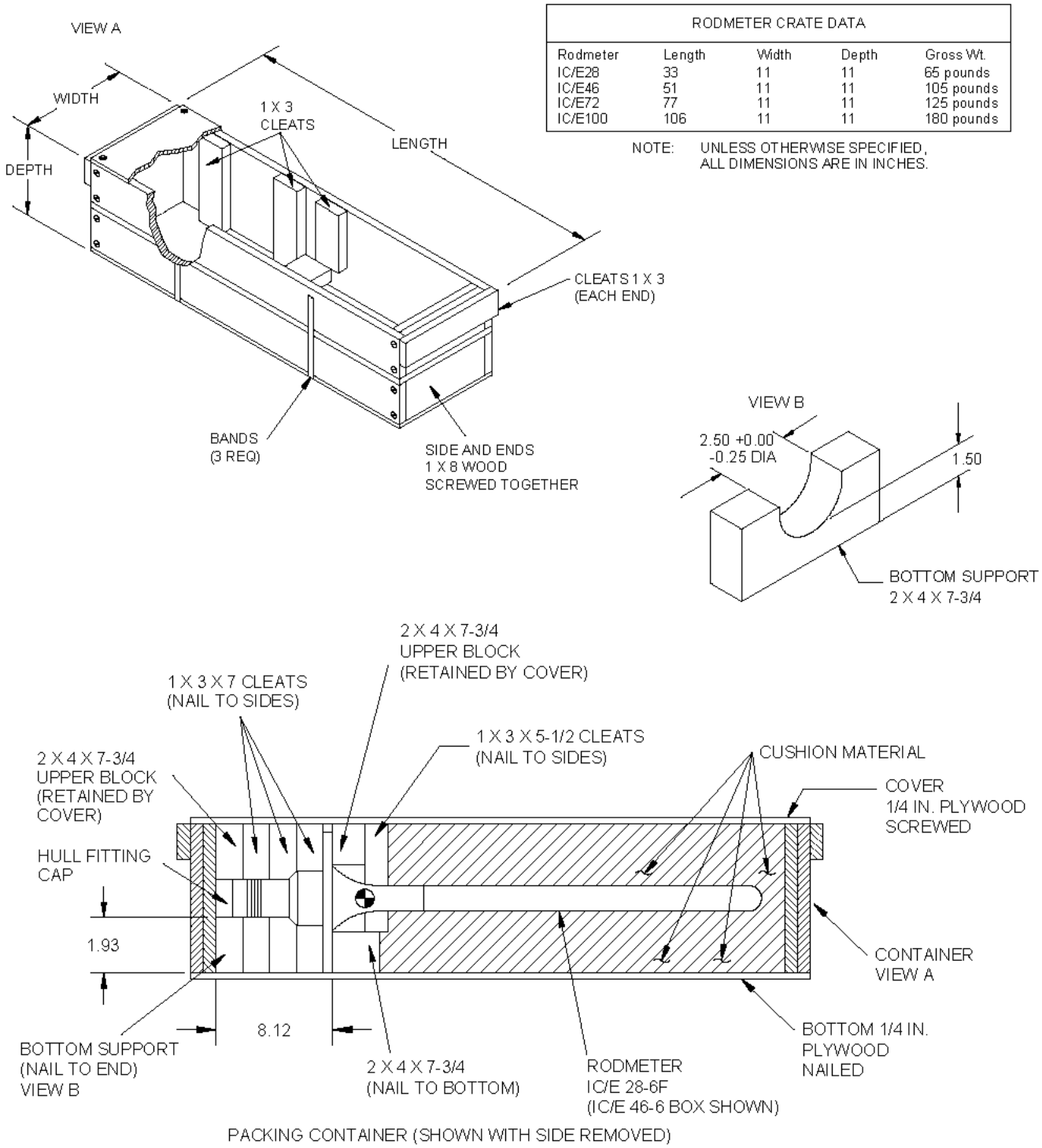


Figure 8-2. Unit 1 or 6 Rodmeter Packing

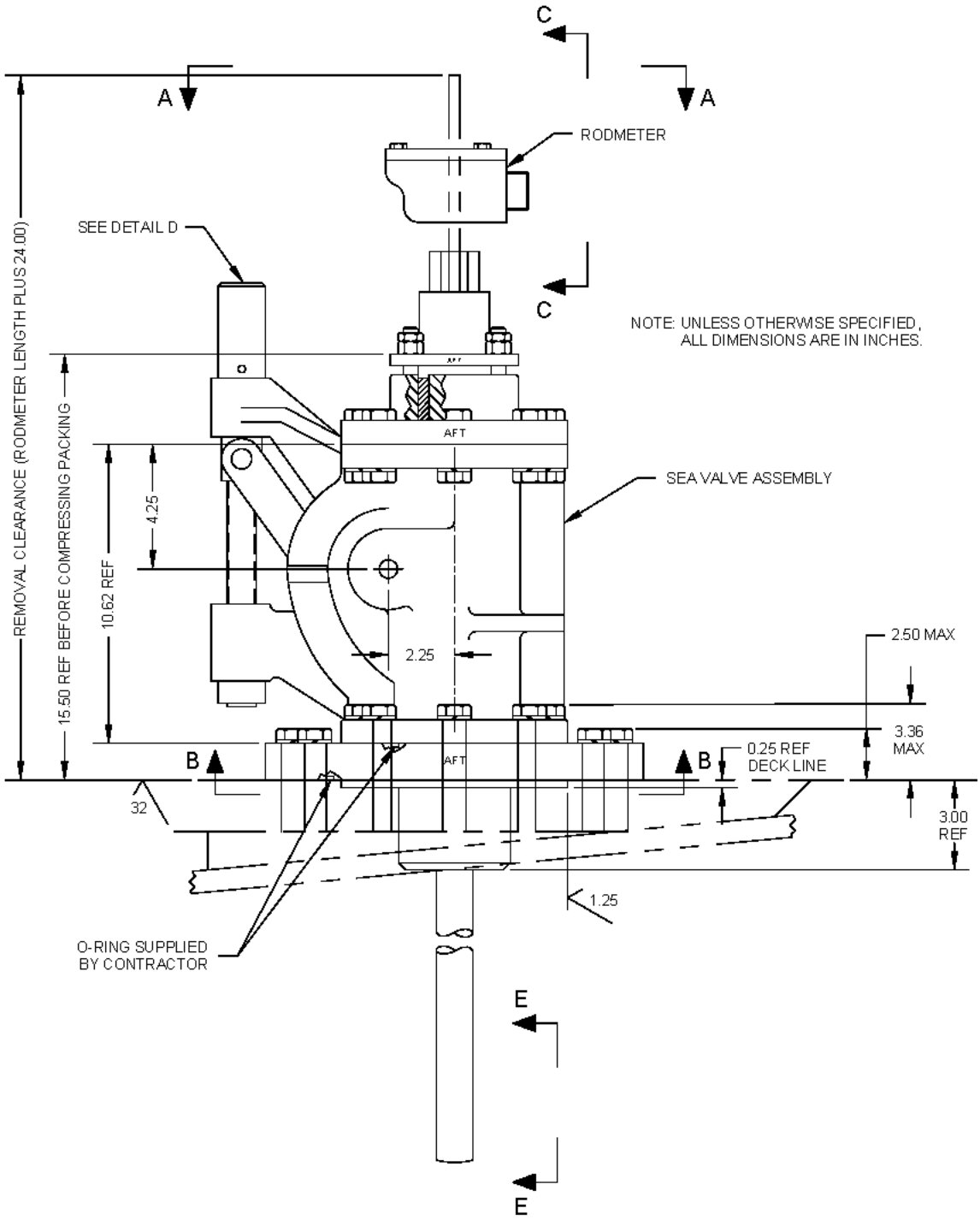


Figure 8-3. Unit 1 or 6 Rodmeter and Unit 2 or 7 Sea Valve Installation (Sheet 1 of 3)

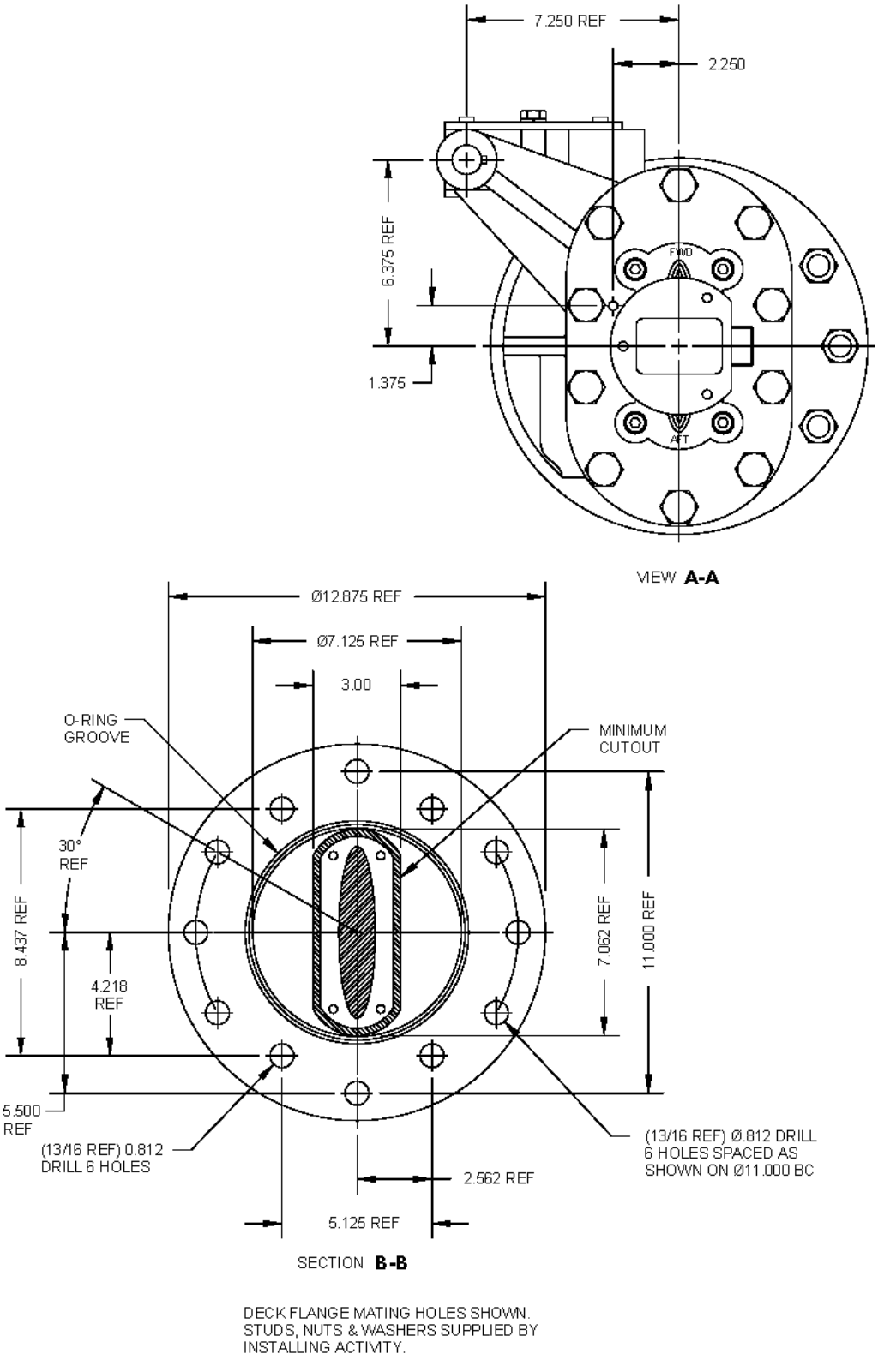


Figure 8-3. Unit 1 or 6 Rodmeter and Unit 2 or 7 Sea Valve Installation (Sheet 2)

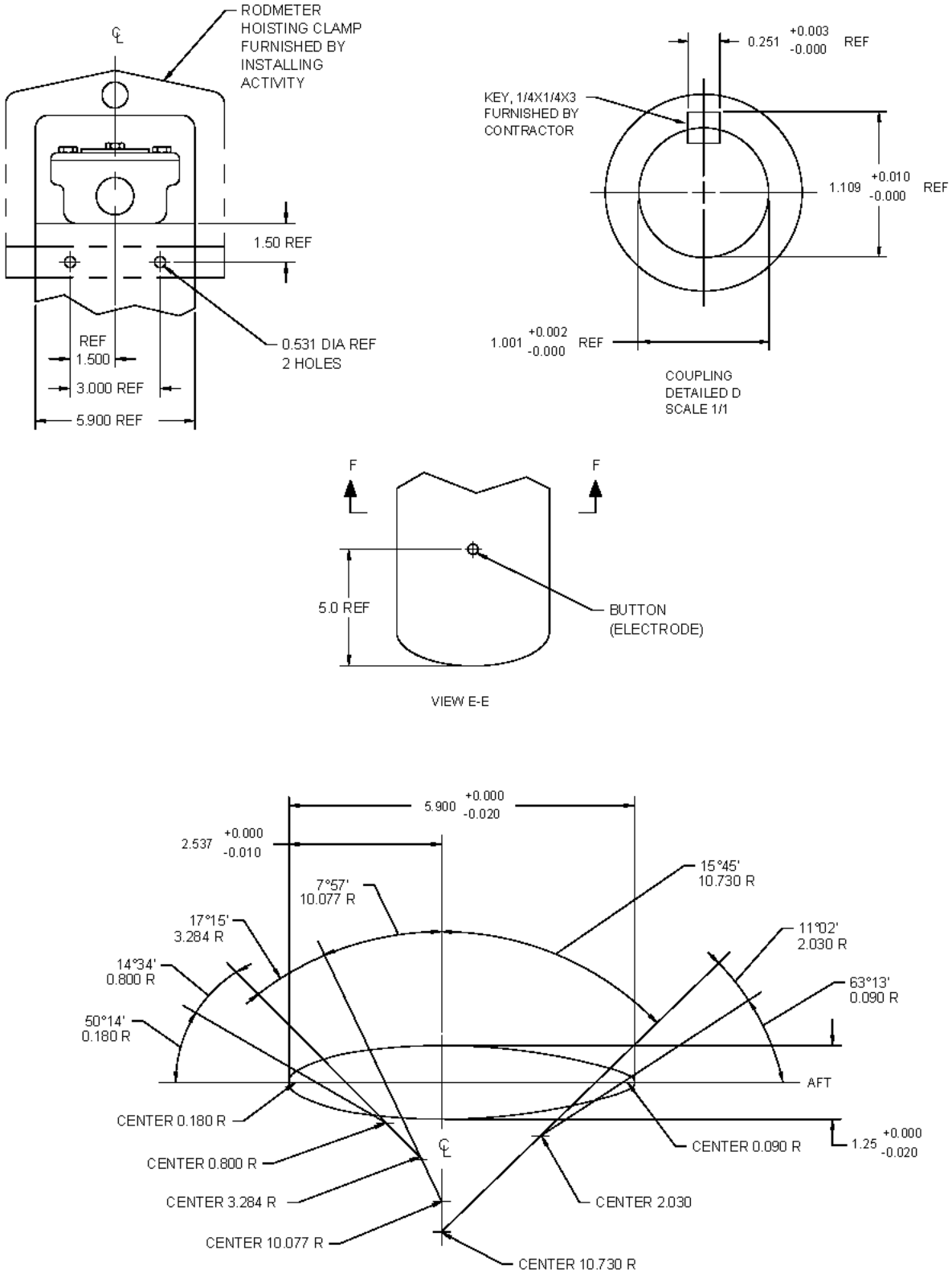
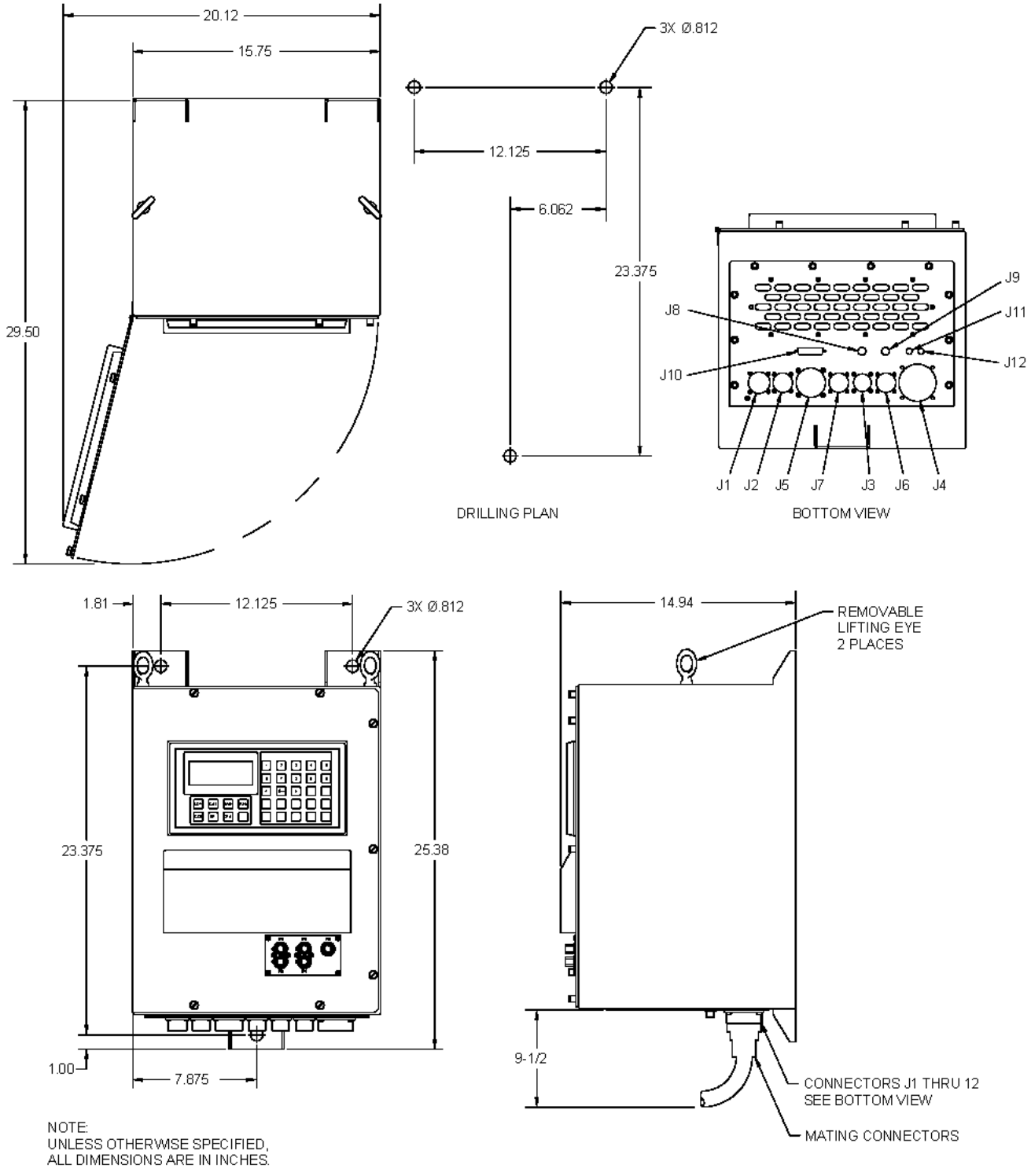
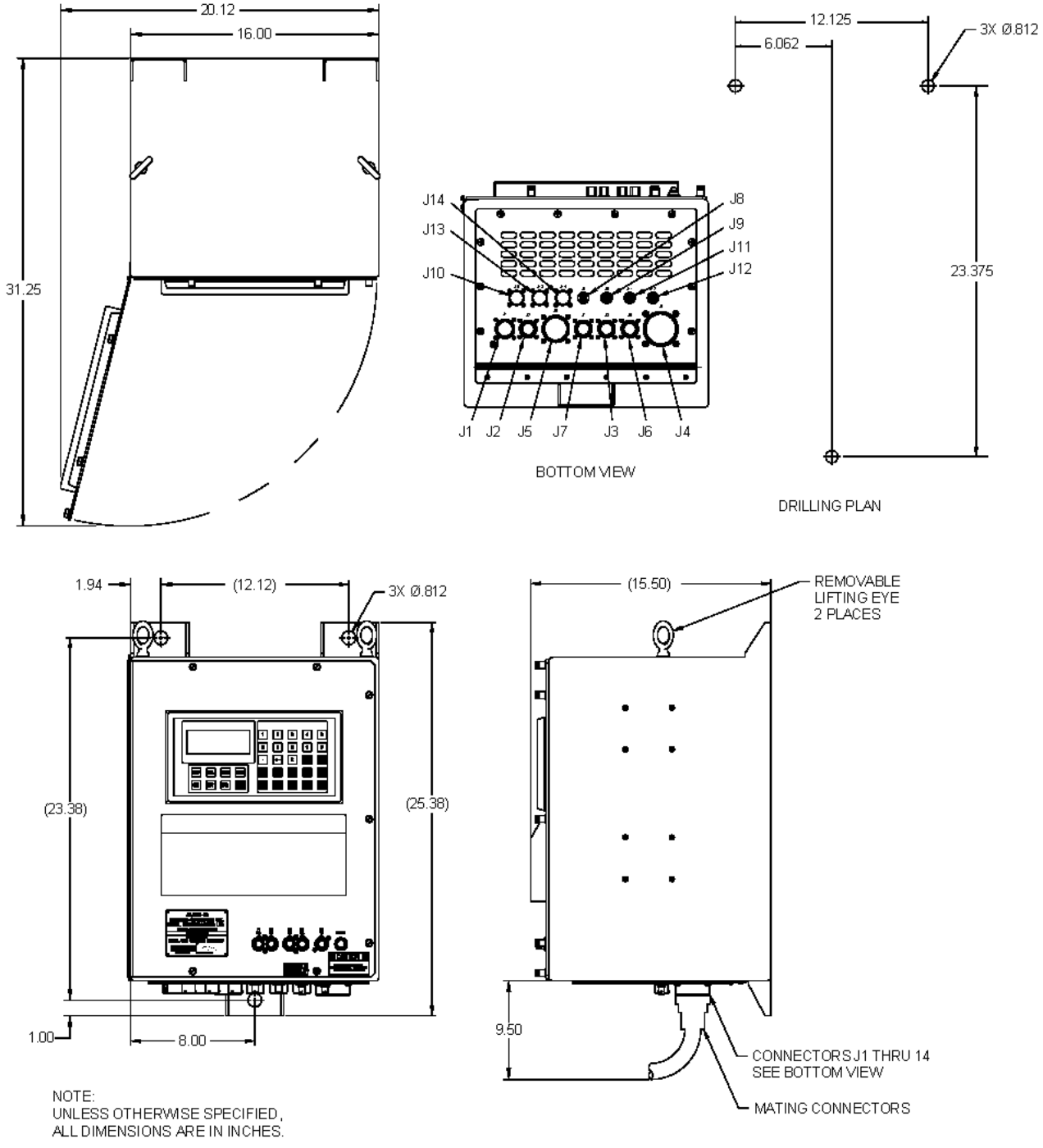


Figure 8-3. Unit 1 or 6 Rodmeter and Unit 2 or 7 Sea Valve Installation (Sheet 3)



AN/WSN-8 (7093036) Configuration

Figure 8-4. Unit 3 or 8 I/T Installation (Sheet 1 of 2)



AN/WSN-8A (7404776) Configuration

Figure 8-4. Unit 3 or 8 I/T Installation (Sheet 2)

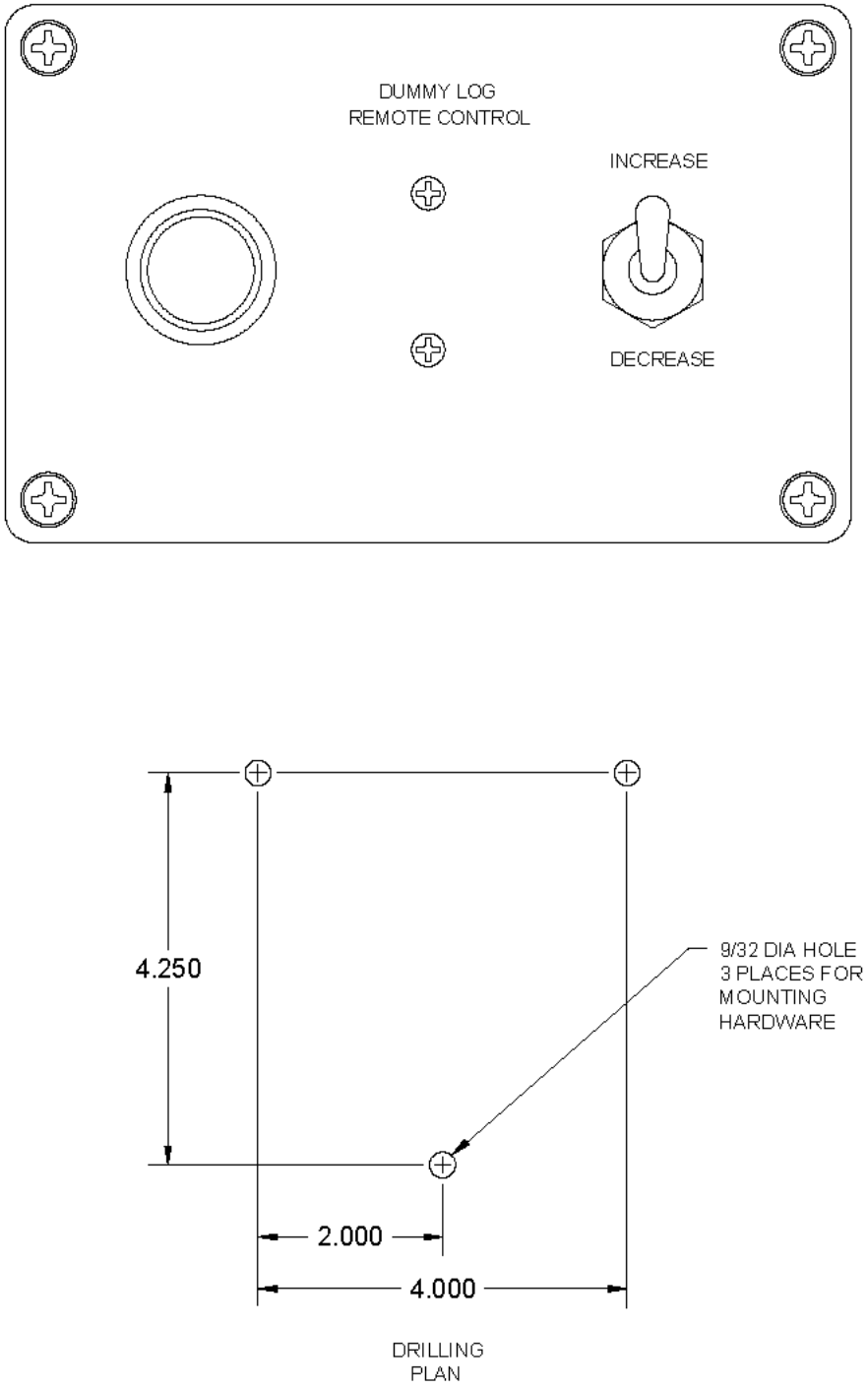


Figure 8-5. Unit 4 Remote Control Unit Installation

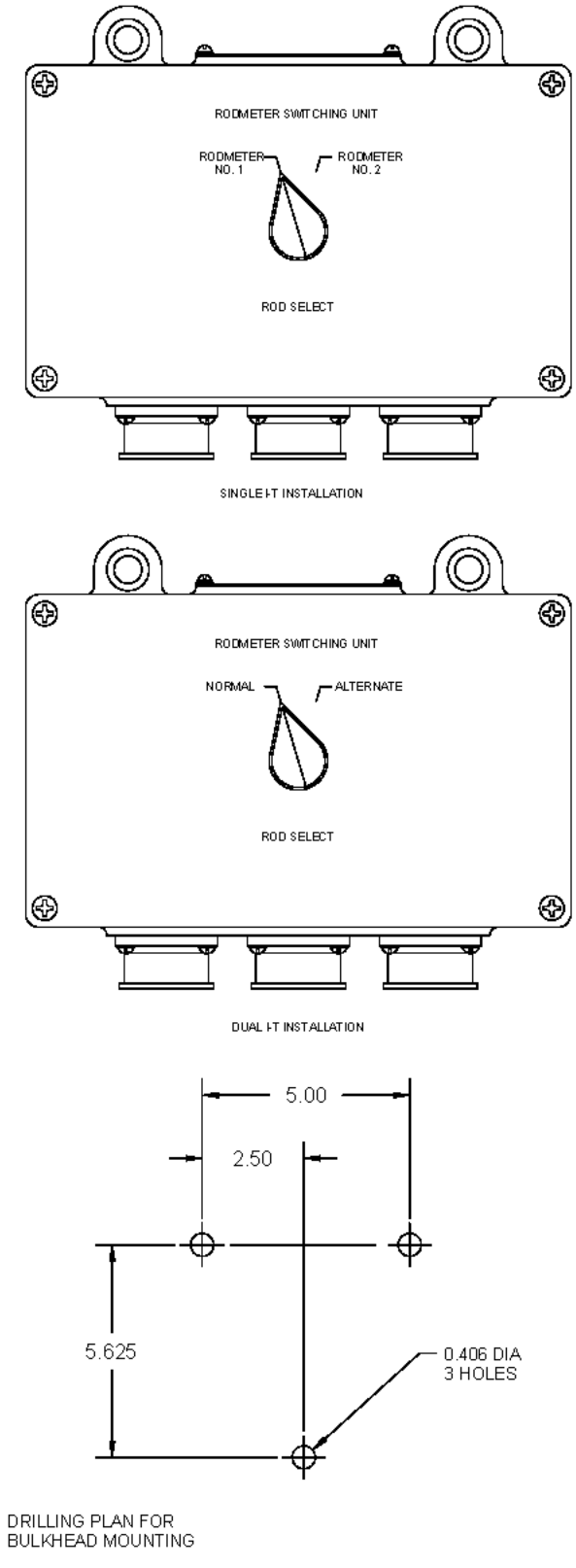


Figure 8-6. Unit 5 Rodmeter Switching Unit Installation

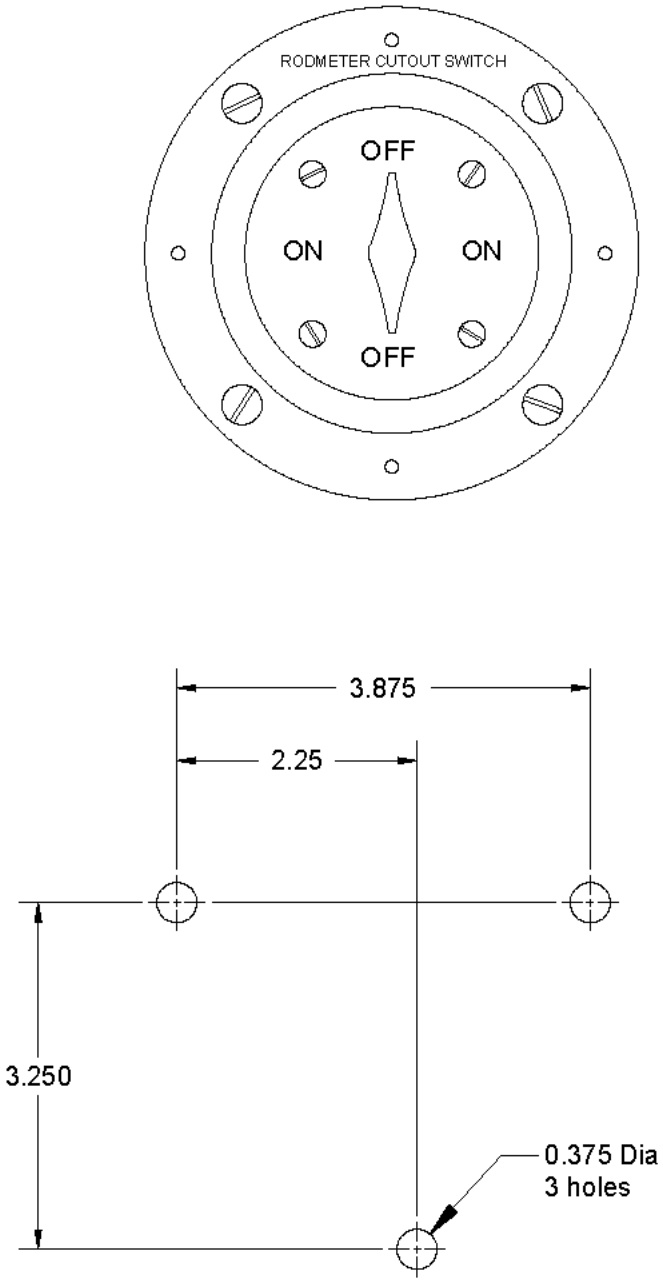


Figure 8-7. Unit 9 Rodmeter Cutout Switch Installation

GLOSSARY

µ	Micro
3M	Maintenance and Material Management System
A/D	Analog-to-Digital
AEN	Address Enable
ALT	Alternate
amp	ampere
APL	Allowance Parts List
BALE	Buffered Address Latch Enable
BCLK	Bus Clock
BIT	Built-In Test
Btu	British Thermal Unit
C&C	Command and Control
CAGE	Commercial and Government Entity
CAL	Calibration
CCA	Circuit Card Assembly
CCS	Command and Control System
CDP	Control Display Panel
CLK	Clock
CMOS	Complementary Metal-Oxide Semiconductor
CON	Control
CONFIG	Configuration
COSAL	Coordinated Shipboard Allowance List
COTS	Commercial Off-The-Shelf
CPU	Central Processing Unit
CRES	Corrosion Resistant Steel
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
D/R	Digital-to-Resolver
D/S	Digital-to-Synchro
DACK	DMA Acknowledge
DDB	Digital Data Bus
DEML	Digital Electromagnetic Log
dia.	Diameter
DIP	Dual Inline Package
DIST	Distance
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
DRQ	DMA Request
DSN	Defense Switching Network
DSVL	Doppler Sonar Velocity Log
DTA	Disk Transfer Area
E	Enter
EIMB	Electronics Installation and Maintenance Book
ELVS	Electromagnetic Log Voltage Simulator

EMF	Electromagnetic Force
EMI	Electromagnetic Interference
EPROM	Erasable Programmable Read-Only Memory
ESC	Escape
ESD	Electrostatic Discharge
ESDS	Electrostatic Discharge Sensitive
FC-1	Field Change 1
FLT	Fault
FODMS	Fiber Optic Data Multiplex System
GND	Ground
/h	per hour
Hz	Hertz
I/O	Input/Output
I/T	Indicator-Transmitter
IC/ACO	Interior Communications/Action Cutout
ICD	Installation Control Drawing
ID	Identification
ID	Inside Diameter
IDD	Interface Design Document
IEEE	Institute of Electrical and Electronics Engineers
IMF	Intermediate Maintenance Facility
in.	inch
INS	Inertial Navigation System
IOCHK	I/O Channel Check
IOCHRDY	I/O Channel Ready
IOCS	I/O Chip Select
IOR	I/O Read
IOW	I/O Write
IRQ	Interrupt Request
ISA	Industry Standard Architecture
ISEA	In-Service Engineering Agent
/knot	per knot
K	knot
KBD	Keyboard
Kbyte	Kilobyte
KHz	Kilohertz
KPR	Knots Per Revolution
L-L	Line-to-Line
LA	Latchable Address
LAN	Local Area Network
LCK	Library Construction Kit [Microsoft FoxPro]
LED	Light-Emitting Diode
LIC	Logic Input Circuit
LOC	Logic Output Circuit

LRU	Line Replaceable Unit
mA	Milli-amp
MAN	Manual
Max	Maximum
Mbps	Megabytes per second
Mbyte	Megabytes
MEMCS	Memory Chip Select
MEMR	Memory Read
MEMW	Memory Write
MHz	Megahertz
Min	Minimum
MIP	Maintenance Index Page
MMI	Man-Machine Interface
MRC	Maintenance Requirement Card
MTR	Module Test and Repair
/Nm	per nautical mile
N/A	Not Applicable
NAV	Navigation
NAVOSH	Navy Occupational Safety and Health
NAVSSI	Navigation Sensor System Interface
NIC	Network Interface Card
Nm	Nautical Mile
NMEA	National Marine Electronics Association
No. or NO.	Number
Norm	Normal
NOVRAM	Non-Volatile Random Access Memory
NSDSA	Naval Systems Data Support Activity
NSN	National Stock Number
OD	Operational Directive
OD	Outside Diameter
OPNAVINST	Office of the Chief of Naval Operations Instruction
OSC	Oscillator
OSD	Own Ship’s Distance
OSS	Own Ship’s Speed
P/N	Part Number
PC/AT	Personal Computer/Advanced Technology
p-p	Peak-to-Peak
PCB	Printed Circuit Board
PDF®	Portable Document Format®
PLAD	Plain Language Address
PMS	Planned Maintenance System
Qty or QTY	Quantity
RC	Resistor-Capacitor
RCU	Remote Control Unit

Rcvr	Receiver
REF DES or ref des	Reference Designation
REM	Remote
rev	revolution
REV	Revision
RIC	Repairable Identification Code
RLGN	Ring Laser Gyro Navigator
RMS	Root Mean Square
ROD	Rodmeter
rpm	Revolutions Per Minute
RS	Reset/Set
RSU	Rodmeter Switching Unit
RT	Remote Terminal
SA	System Address
SBHE	System Byte High Enable
SCAT	Subcategory
SD	System Data
SGML	Standard Generalized Mark-Up Language
SMEMR	System Memory Read
SMEMW	System Memory Write
SMP	Standard Maintenance Procedure
SPMIG	Standard PMS Identification Guide
SRAM	Static Random Access Memory
SRDY	Synchronous Ready
SSBA	Synchro Signal Booster Amplifier
SSBN	Ballistic Missile Submarine (Nuclear)
SSP	Strategic Systems Program
STA	Status
Swbd	Switchboard
TBD	To Be Determined
TC	Terminal Count
TDMIS	Technical Data Management Information System
TMCR	Technical Manual Contract Requirement
TMDER	Technical Manual Deficiency/Evaluation Report
TMIN	Technical Manual Identification Number
TSDC	Trident Signal Data Converter
UDW	Underwater
V	Volt(s)
VA	Volt-Ampere
VAC	Volts Alternating Current
VDC	Volts Direct Current
VID	Volume Identification
VRC	Velocity Reference Correction

w/	with
W	Watt(s)

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Ref: NAVSEAINST 4160.3A NAVSEA S0005-AA-GYD-030/TMMP

NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)

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