EEC3
Electronic Engine Controls
by Glendinning

Installation & Operation Manual v3.6a

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Chapters at a Glance

A word about the Symbols used in the Manual

When driving from one destination to another, road signs prove to be invaluable. Road signs are an important source of information. For example, road signs can warn you about potential problems ahead to help divert certain disaster or they can let you know where to turn off for a rest or a meal.

In an effort to help you navigate your way through this manual we will from time to time use the following symbols:

Throughout the manual the NOTES symbol will appear to support what has been mentioned in the text. A note can be used where further explanation is needed or where something needs highlighting. BE CAREFUL to read all NOTES.

Sometimes it is helpful to take a break and really absorb what you just read. The WARNING symbol will alert the reader to information that needs to be completely understood before you continue on in the reading of the manual. ALWAYS STOP and READ these points.

The TIP symbol will be used when something mentioned in the text need more “light” shed on it. The tip could explain or be a list of do’s and don’ts. Whatever the TIP is, you do not want to miss out on the information it contains.

1.0 System Description & Capabilities

With the advent of electronically controlled engines in the marine industry, *GLENDINNING* has developed the EEC3 to be compatible with all types of electronically governed engines and will provide the boat operator with total control over the boat's propulsion system. The EEC3 incorporates the following features:

- *Single or dual lever control* — What's your preference? Single lever control, where a single control handle controls both throttle and gear, provides the maximum convenience, but some boat operators prefer dual lever control. We offer you both options!
- *Adjustable control head detent / friction settings* — This feature allows for the setting of the control head detent and /or friction quickly and easily while underway, without disassembling the control head!
- *"Posi-lock" gear lockout* — A dedicated button (WARM) is provided to lockout the gear and allows engine RPM to be increased safely.
- *High idle mode* — Up to 7 idle speeds are available and can be adjusted through system calibration.
- *Bump mode* — Want to make minute adjustments in engine speed (approx. 10-15 RPM)? Simply press the WARM or TROLL buttons!
- *Slow mode* — Limits maximum RPM available to approximately 50% of normal WOT. Very useful for manuevering or slow speed cruising (SLOW).
- *Battery voltage warning indicator* — Our system alerts you when either too low or too high voltage exists. The control system will continue to operate.
- *System diagnostic warning indicator* — The EEC3 monitors many parameters and notifies you when conditions fall outside suitable operating range.
- *Gear position indicating lights* — You know that the transmission has shifted into the appropriate gear with this visual gear position indicator.
- *Audible neutral indicator* — Audible alert sounds when transmission has been shifted into neutral.
- *Control head light dimmer* — Bright lights are great for daylight conditions, but can be distracting at night. This feature allows you to dim the control head lights for each station individually.
- *Two button station transfer* — No more accidental transfer of control from one station to another. Our system's TAKE button must be depressed twice in order to transfer control from one station to another.

The features above are available with our 4-button FULL feature keypad control head only!

1.1 System Components

The EEC3 system consists of 4 separate components. They are:

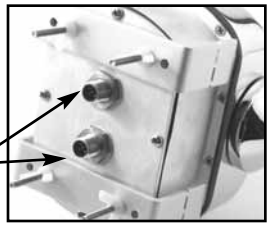
Control Head

The EEC3 control head was designed with a more contemporary, stylish look that is sure to accentuate any console—but good looks isn't all that it has going for it.

The EEC3 control head is by far the most informative control head in the industry today. The control head keypad has integrated switches and indicator lights which allow the boat operator to

EEC3 KEYPAD
(Close-up)

BOTTOM VIEW OF
CONTROL HEAD
CANBUS CONNECTION
POINTS



control all aspects of the boat's propulsion system.

Robust, watertight construction is a hallmark at Glendinning — we build our control heads to withstand the extreme conditions that exist in the marine environment.

Control Processor

The control processor is the hub of the EEC3 control system and could be considered it's "brain" (central processing unit). The primary function of the control processor is to receive commands from the control head station that is "active" and position the gear and throttle to the commanded position.

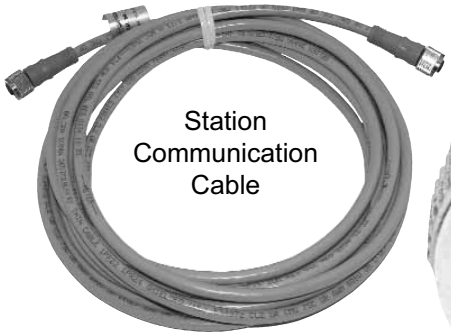
The control processor is completely sealed by a watertight cover to protect the electronics from moisture which could cause system failure.

Plug and play installation means you don't have to spend valuable time trying to figure out how to connect the engine and control heads to the control processor—just plug 'n play!

The Glendinning EEC3 allows the boat owner the ability to connect up to six (6) different control stations to one (1) control processor.

Station Cables

Glendinning's station cables are pre-terminated at the factory for ease of installation, and are completely shielded to eliminate problems caused by electromagnetic interference, complying with the latest and strictest standards in the industry. Both ends of the station cable has a connector which is identical on either end—no mistakes when it comes to plugging in the cable!



CLOSE-UP detail
Station Communication
Cable Connector

Engine / Gear Harnesses

The engine and gear harnesses relay information from the control processor to the engine and gear controls. Connecting your gear and engine to the EEC3 Control Processor has never been easier. Each engine harness and/or gear harness is clearly labelled and simply plugs into the appropriately labelled port on the control processor.

Engine Connector

CP Connector

2.0 Operating the EEC3

Operating the EEC3 system is just as easy as the installation process. The EEC3 Control Head will constantly monitor various parameters and will alert the boat operator if the system falls outside the normal operating range.

Familiarize yourself with the following functions BEFORE operation of the EEC3.

The functions necessary for operating the EEC3 are:

- System Startup Procedure
- Cruise Mode
- Warm Up Mode
- Slow Mode
- Automatic Synchronization Mode
- Troll Mode
- Station Transfer Process
- Warning Mode
- Alarm Mode

Position control handle to Neutral before starting EEC system

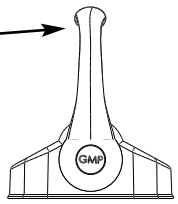


FIG. 1

TAKE light ON at startup during diagnostic test

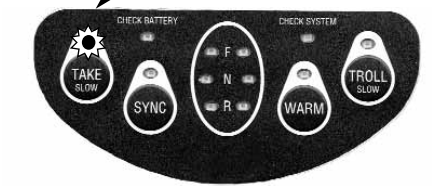


FIG. 2

TAKE & WARM lights fully illuminated

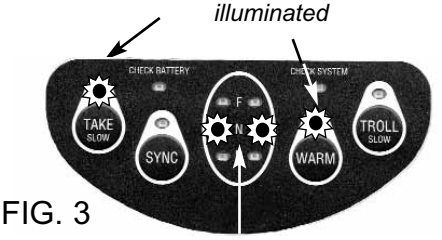


FIG. 3

(Gear Position Indicators)

2.1 System Startup

The procedure for starting up the EEC3 system is as follows:

1. Control Handles must be in the NEUTRAL position prior to starting the system (see FIG. 1).

2. Turn ON the EEC3 enable switch. The system will perform a brief diagnostic test (approx. 1 second), checking various system parameters (indicated by the TAKE light fully illuminated - see FIG. 2). Control handles should remain in **NEUTRAL** until system is operational.

3. The EEC3 system is operational when the TAKE light and WARM lights are fully illuminated (not blinking - see FIG. 3). The system is automatically placed in WARM Mode at startup (This feature can be changed if desired, see Section 5.8).

If the TAKE light flashes slowly, accompanied by a slow beep, the control handles are not in NEUTRAL. Leave control system enable switch ON and move one control handle at a time to verify that handles are in the neutral position. When both handles are in NEUTRAL, system will automatically complete startup procedure (TAKE light fully ON).

If all four (4) lights on the keypad blink in unison, the EEC system is in Alarm Mode. Restart the system by turning OFF the EEC enable switch and then turning back ON.

2.2 Cruise Mode

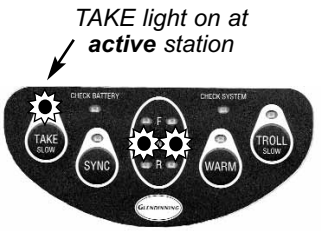
Cruise Mode is the normal operating mode for the EEC3. Other functions may be accessed while in Cruise Mode (see below):

The Control Head may respond in one of three ways during Cruise Mode:

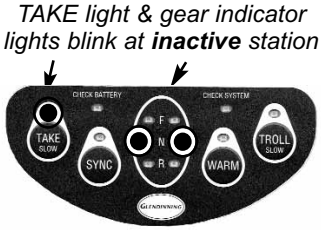
1. **ACTIVE STATION** — During normal operation only the active station will be in command. TAKE light will be fully illuminated (not blinking) indicating that the station is “active” and in command of boat’s propulsion system.

2. **INACTIVE STATION** — During normal operation all other stations are “inactive”. The TAKE light and Gear positioning lights on each inactive station will blink every 2 seconds indicating that the control head is an inactive station. The Check Battery/Check System lights will operate.

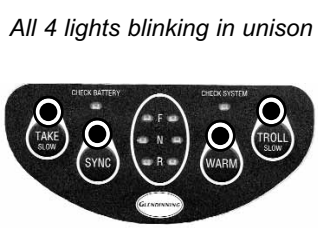
3. **ALARM MODE** — During normal operation, the EEC system continuously monitors parameters and will alert operator of alarm conditions when they exist. Alarm Mode is indicated by all four (4) keypad lights blinking in unison, if this happens.



***ACTIVE** STATION*



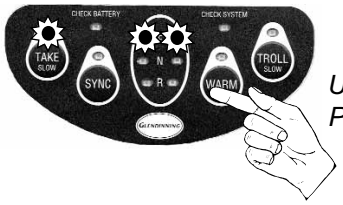
***INACTIVE** STATION*



ALARM CONDITION

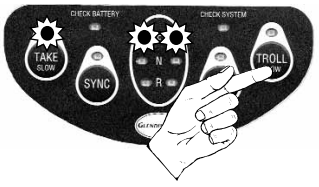
Other Functions available from Cruise Mode are:

1. THROTTLE “BUMP” MODE — During normal operation, small changes in engine speed (approximately 10-15 RPM) may be made by pressing and releasing the WARM (increase speed) or TROLL (decrease speed) buttons.



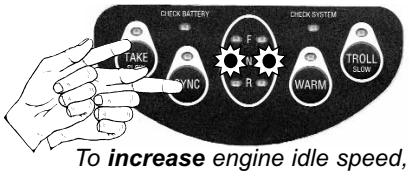
To Increase Engine Speed Using Bump Mode, Press and Release WARM button

To Decrease Engine Speed Using Bump Mode, Press and Release TROLL button

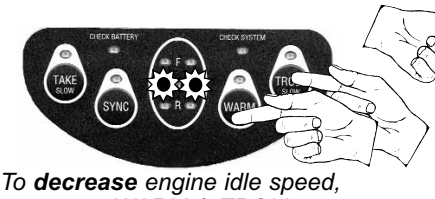


Engine speed can only be “bumped” when control handles are in gear and above idle speed. Amount of speed change per bump can be adjusted during system calibration

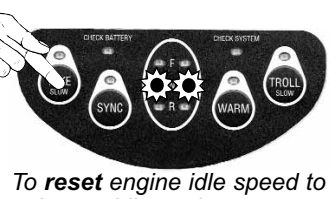
2. HIGH IDLE MODE — During normal operation, the boat operator is able to change the engine idle speed up to 7 different idle speed settings.



*To **increase** engine idle speed, press TAKE & SYNC simultaneously*



*To **decrease** engine idle speed, press WARM & TROLL simultaneously*

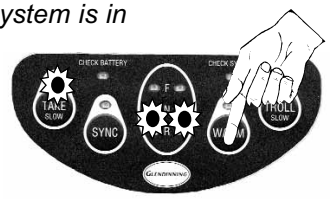


*To **reset** engine idle speed to lowest idle setting, press TAKE and release*

Idle speed can only be changed while control handles are in NEUTRAL. Idle speed change can be adjusted during system calibration.

2.3 Warm Up Mode

WARM light will be illuminated when EEC system is in Warm Mode



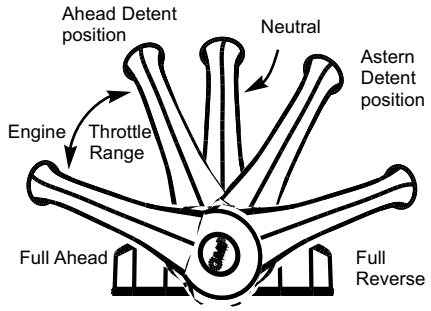
Warm up Mode allows the boat operator to operate the engine throttle by itself, while locking the transmission in NEUTRAL. It is **STRONGLY RECOMMENDED** that the EEC3 system be in Warm Up Mode **AT ALL TIMES** while boat is at the dock! This safety procedure will prevent the accidental engagement of transmission if the control head handles are inadvertently moved.

To utilize the Warm Up feature:

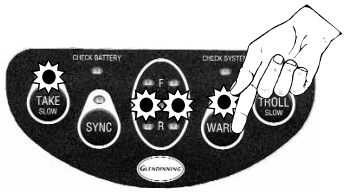
1. To engage, press and release the WARM button one time (control handles must be in NEUTRAL position to engage Warm Up Mode).

2. Advance the control lever into and beyond the Ahead detent position. The engine gear will remain in NEUTRAL while engine speed is increased.

3. To disengage, bring handles back to NEUTRAL and press and release the WARM button one time.



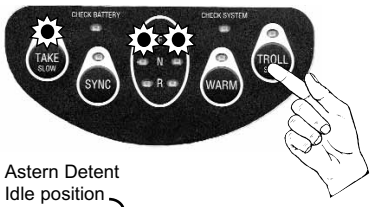
WARM light will go out when Warm Mode is turned off—EEC system is now in Normal Cruise Mode.



> ***It is STRONGLY RECOMMENDED that the EEC3 system be in Warm Up Mode AT ALL TIMES while boat is at the dock! This safety procedure will prevent the accidental engagement of transmission if the control head handles are inadvertently moved.***

2.4 Slow Mode

TAKE and TROLL / SLOW light will blink when EEC system is in SLOW Mode

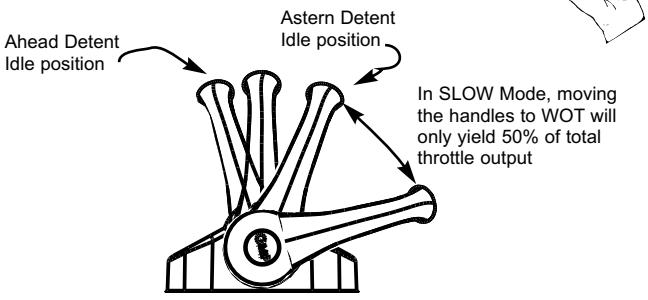


The Slow Mode limits the maximum RPM available to approximately 50% of normal WOT. This feature is very useful for manuevering or slow speed cruising.

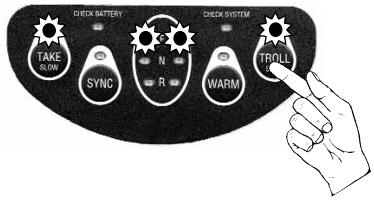
The Slow Mode is activated by:

1. To engage, press and release TAKE and TROLL buttons in unison, one time. Control handles must be in NEUTRAL position or Ahead/Astern detents to engage Slow Mode.

2. To disengage, press and release TAKE and TROLL buttons in unison, one time. Control handles must be in NEUTRAL position or Ahead/Astern detents to disengage Slow Mode.



SLOW light will go out when SLOW mode is turned OFF—EEC system is now in Normal Cruising Mode



2.5 Automatic Synchronization Mode

The Automatic Synchronization Mode allows the EEC system to automatically control one engine speed to exactly match speed of the other engine. Think of it as cruise control for your boat. Once underway, follow the instructions below to activate this feature and control both engines' speed with one handle.

To activate the Automatic Synchronization Mode:

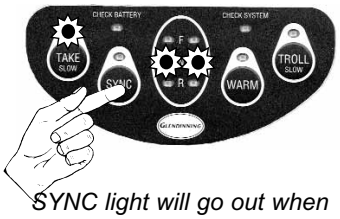
Before the SYNC function can engage, both engines must be in the Ahead gear and handles must be approximately matched — within 10% of total travel.

1. Press and release the SYNC button one time.

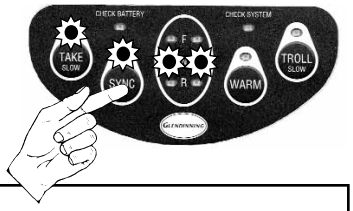
2. When SYNC function is energized, EEC system will automatically control one engine speed to match the speed of the other engine. If engine speed is changed manually by the boat operator, engine speed will automatically be changed to match.

3. To disengage, bring slave handle to match position of lead engine control handle and press and release SYNC button one time. *It is extremely important that the slave handle is brought back to a position relative to the lead handle prior to disengaging.*

SYNC light will be illuminated when EEC system is in SYNC mode



SYNC light will go out when SYNC mode is turned OFF—EEC system is now in Normal Cruising mode



1. Synchronization mode will be automatically disengaged if both control handles are moved to NEUTRAL position together.

2. If lead handle is moved to NEUTRAL gear position by itself, synchronization mode will be automatically de-energized. Slave engine operation will continue to match lead engine operation (gear and throttle) until slave control handle is matched to lead control handle position.

2.6 Troll Mode

The Troll Mode is available only if the boat has been equipped with trolling valves and allows the boat operator to control the position of the transmission trolling valves.

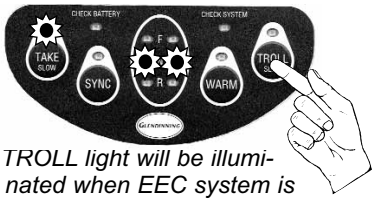
Docking while using trolling valves is NOT recommended by most transmission manufacturers. Check with your local transmission dealer if your transmission is suitable for this.

To activate Troll Mode:

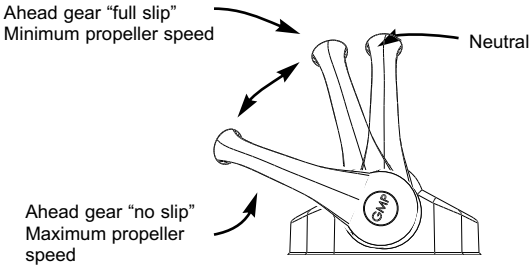
1. With control handles in NEUTRAL, press and release TROLL button one time (control handles must be in NEUTRAL to engage Troll Mode).

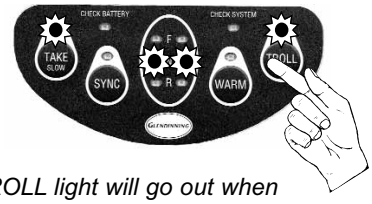
2. Control troll valve position by movement of control handle. Engine throttle speed is maintained at idle while system is in Troll Mode.

3. To disengage, move control handles back to NEUTRAL and press and release TROLL button one time.



TROLL light will be illuminated when EEC system is in TROLL Mode





TROLL light will go out when TROLL Mode is turned OFF—EEC System is now in Normal Cruising Mode

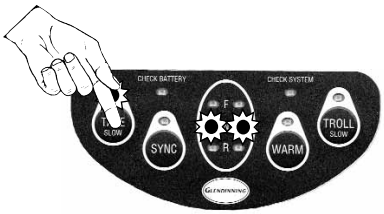
1. BUMP Mode (sec 2.2) is available while troll valve is in operation to make small changes in troll valve modulation.
2. Engine idle speed may be adjusted during troll valve operation (see Cruise Mode sec. 2.2 for more information).

2.7 Station Transfer Process

The Glendinning EEC3 allows the propulsion system control to be transferred from one control station to another control station. This process requires the operator to depress the TAKE button twice in order for the transfer to take effect thus avoiding any inadvertent transfers from taking place without the boat operator's knowledge.

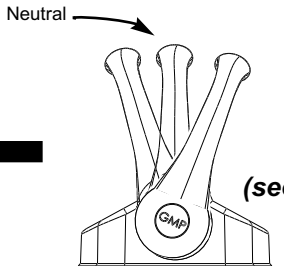
To transfer control follow these steps:

1. Press and release TAKE button one time, at the helm station where you want to take control (TAKE light will begin to blink and control head beeper will begin to sound).



INACTIVE STATION
Press TAKE button 1 time to begin process

Active Station Handle Position	Station Taking Control Handle Position
In Neutral	In Neutral
In gear, at Idle	In Neutral, or same gear position at Idle
In gear, above Idle	In Neutral, or same gear position at same or lower speed setting



ADJUST CONTROL HANDLES (see chart at left)

INACTIVE STATION
Press TAKE button a 2nd time while TAKE light is quick flashing to complete station transfer

2. At the station where you want to take control, move the control handles to an appropriate throttle position.

3. Press and release TAKE button a second time. The new control station is now the active station and has control of the engine and transmission.

LIGHT SEQUENCE AT STATION TAKING CONTROL

1) Prior to pressing button, light blinks 1 time every 2 seconds (Inactive station heartbeat).

Light flashes 1 time every 2 seconds.

2) After pressing button 1 time, TAKE light will blink—blink rate will depend on control handle setting at station taking control.

Slow blink—handles **not** in appropriate position.
Quick blink—handles in appropriate position.

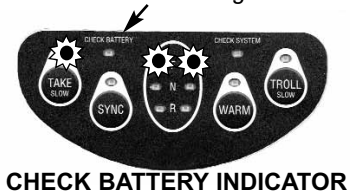
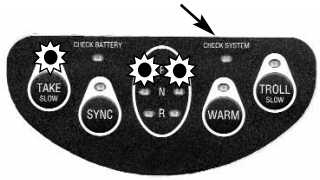
3) Control transfer is complete after pressing TAKE button second time, while TAKE light is quick flashing.

Solid TAKE light indicates transfer is complete. New station is now in control.

The EEC3 System may be configured to perform Station Transfer in one of two ways:
1) Underway Transfer - the "inactive" station taking control must have its control handles at Neutral or in the same gear at same or lower speed as the "active" station.
2) Transfer at Neutral - the "inactive" station taking control must be at Neutral position in order to transfer control from the "active" station. — See Section 5.9 for configuration instructions.

2.8 Warning Mode

During operation of the EEC3, the system will warn the operator when a problem is detected. System will continue to operate in unaffected functions.

CHECK BATTERY light blinks  **CHECK BATTERY INDICATOR** will blink when battery voltage conditions exist that are questionable.	**SYMPTOM** **1)** *SLOW BLINK*—One battery is either too high or too low. **2)** *QUICK BLINK*—Both batteries are either too high or too low.	**ACTION** **1)** Determine cause of input power problem. **2)** System will continue to operate normally, unless battery exceeds system parameters. If this occurs system will be switched into Alarm Mode (see page 10).
CHECK SYSTEM light blinks  **CHECK SYSTEM INDICATOR** will blink when a possible problem has been detected within the system.	**SYMPTOM** **1)** Diagnostics tests have detected that part of the control system is not functioning normally.	**ACTION** **1)** Restart control system (turn OFF/ON). Move handles to Neutral during system startup. **2)** Determine part of system not operating properly (ie. gear, throttle, troll, etc.). **3)** Utilize alarm code recovery procedure to discover source of problem (see Operations Guide).

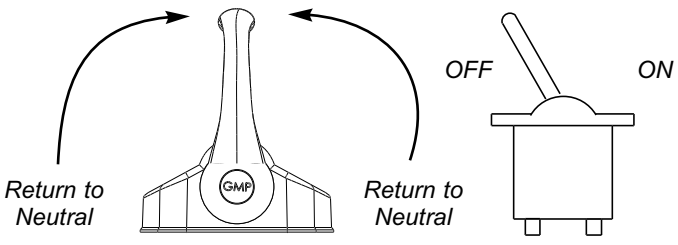
2.9 Alarm Mode

During operation, the EEC3 continuously monitors system functions and will alert operator if a system problem has been detected. When Alarm Mode is activated, control system will not continue to operate. In absence of control signal from EEC, transmission will normally go to NEUTRAL and engine throttle will normally go to IDLE.

All 4 lights blink in unison

ALARM IS INDICATED when all 4 lights are blinking in unison on the control keypad.

Return the main station control handles to NEUTRAL and turn EEC power switch OFF. Restart the EEC system.

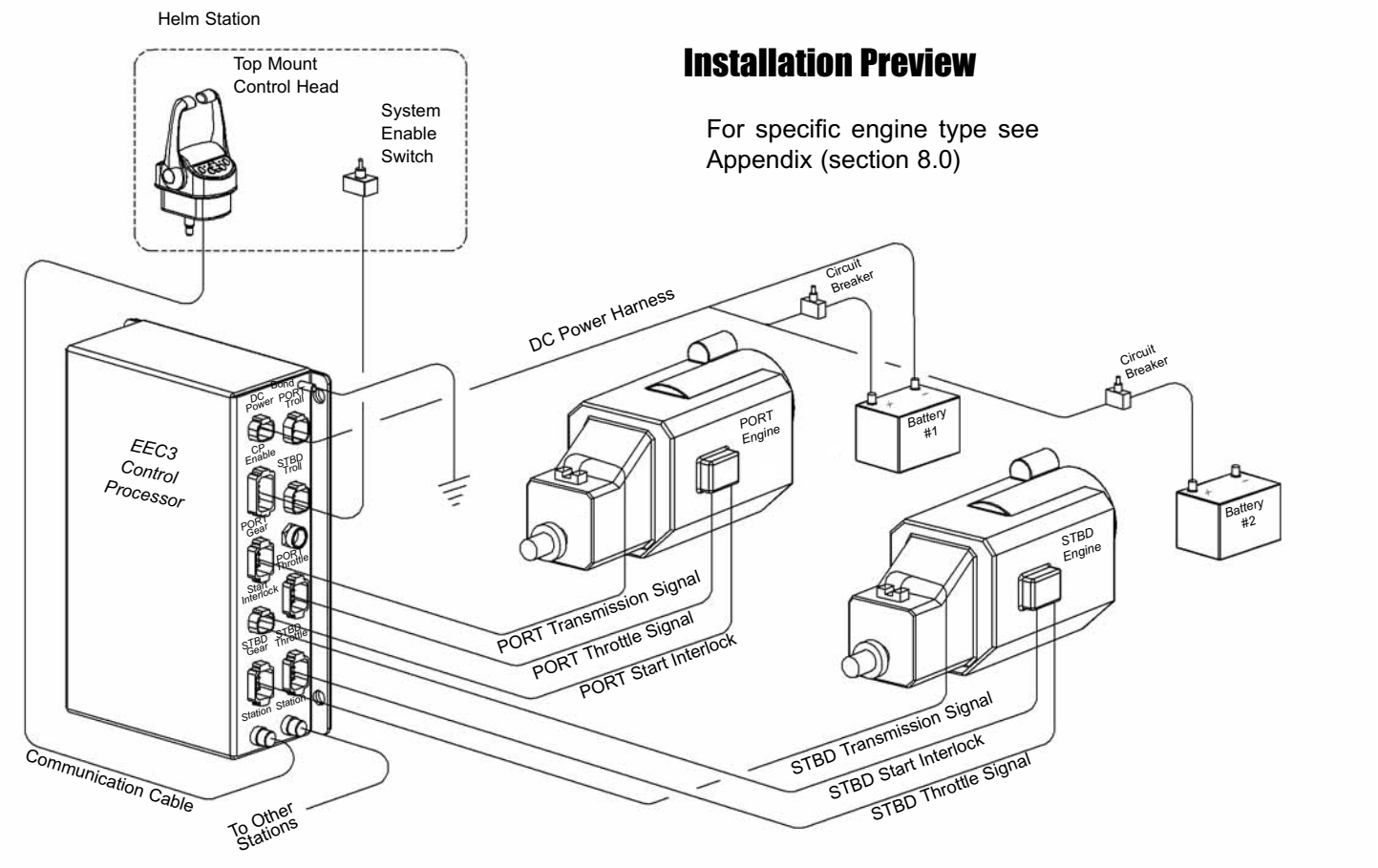


3.0 Installing the EEC3

Installing the EEC3 is simple and easy. It is always important that proper care be given when installing any equipment on board your vessel. It is always a wise practice before cutting into the ship's interior to follow the old adage "measure twice, cut (or drill) once!"

The installation process includes the following five steps:

STEP 1: Mount the Control Processor
STEP 2: Control Head(s) Installation
STEP 3: Station Communication Cable Routing
STEP 4: Engine Compartment Wiring
STEP 5: Operational Test



Pre-installation Planning

Before beginning the installation of the Glendinning EEC3 System, proper consideration and pre-planning should be given to several very important parts of the EEC3 system. Proper planning of the installation will help to insure that the EEC3 system will operate correctly and within specification. Failing to properly plan out the installation may decrease the reliability of the EEC3 system. The following are the most important things to consider in planning the EEC3 system. Close attention should be given to these issues:

• Control Processor Location

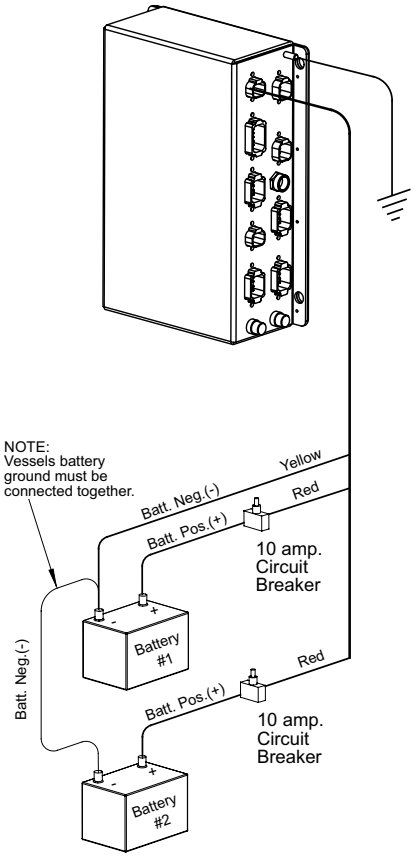
Environmental conditions—The Control Processor should be mounted in an area that is relatively dry and cool. Although

the electronic components are reasonably well-sealed from moisture, the product enclosure is not designed for constant, direct contact with water. Since the longevity of electronic components is reduced in high temperature environments it is best to find an area of the engine compartment that is not exposed to temperature extremes. The Control Processor has been designed for installation in the engine compartment, and should be mounted where there is some air movement or ventilation.

Accessibility—During system calibration or troubleshooting, it will be necessary for the installer or repair technician to have access to the connection points of the Control Processor. In view of this, the Control Processor should be mounted in a relatively accessible area.

• Power Supply / Enable Switch

In the installation of any electronic device, the source of power is one of the most important factors to consider during the installation. The EEC3 has a unique and very reliable power supply system which, if the system is properly installed, greatly improves the overall reliability of the engine control system.



Dual Battery Input—The EEC3 Control Processor provides for the connection of two independent sources of DC power. During normal operation, the Control Processor will draw power from both power sources. In a typical boat, the DC power distribution system is designed to take power from a single battery source and then distribute it to the various equipment that require power. Although the Control Processor can be powered off the DC distribution panel, this is NOT RECOMMENDED because it is not able to provide for the supply of power from 2 independent sources to any single device. In other boats, several batteries are arranged in parallel. Obviously, these batteries are not independent—that is, the voltage observed at one battery terminal will be the same at the other battery terminal. It is important that each battery source be completely independent of the other.

Power Source to EEC3 Must be Uninterrupted—It cannot be overemphasized that providing a secure, uninterrupted source of power to the EEC3 is vitally important to the reliable operation of the control system. For this reason, it is best that the EEC3 power be drawn as close as possible to the battery positive terminal, without having various components which may interrupt the flow of current to the control system.

Circuit Protection / Enable Switch—Per the ABYC guidelines, some type of current protection—circuit breaker or fuse—must be installed within 7 inches (17cm) of the connection to the source of power. It is very important to understand that circuit protection is installed for the protection of the wire, not the EEC3. The system has its own internal current protection and does not need any external fuse. However, the wire which connects the EEC3 to the boat power must be protected in case of chafing or other damage. Since the fuse or circuit breaker is physically located in the engine compartment, it would be extremely inconvenient to require the boat operator to have to go to the engine compartment to start-up the EEC3 system each time the boat operator wishes to use the boat. For this reason, Glendinning has allowed for the installation of an enable switch which allows the boat operator to remotely turn ON or OFF the EEC3 system from the helm station. When the enable switch is used, the EEC3 circuit protection is typically left in the ON position. The enable switch only requires a small (2 conductor, 18 gauge) wire to be run from the engine compartment to the helm station. DO NOT APPLY POWER TO THE ENABLE SWITCH—The purpose of the enable switch is only to open or close the circuit which allows power to be applied to the control system.

Battery Ground—The dual battery system requires that the battery positive terminals be at roughly the same voltage. In order for the battery positive terminals to be at the same voltage, it is necessary that the negative terminals of the battereies be connected at some common point. This is normal marine electrical practice and is specified in the ABYC guidelines. Prior to the final electrical hookup of the EEC system, the installer should verify that the battery ground terminals are connected at some common point.

• Cable Routing

Station Communication Cable Routing—When routing Station Cables it is adviseable to inspect the route and make sure surfaces are free of any sharp edges or burrs which could nick the cable and compromise the reliability of the system. Connectors are pre-terminated at the factory and should NEVER be forced into their proper recepticle. Make sure that the connector is properly aligned prior to insertion into the recepticle. If the connector is properly aligned, only a small amount of force will be necessary to insert the connector into the Control Processor or Control Head. Failure to properly align connector may damage the pins and cause the system to fail.

Connectors are one of the most important parts of the EEC3 system. Keep connectors covered and clean during installation. Most problems occur due to bad connections.

The EEC3 System utilizes CANbus technology to communicate between the Control Processor and the Control Station(s). Simply put, the CAN(Controller Area Network)bus network consists of a series of devices connected by a single wire routed throughout the boat. Station communication connects each system component sequentially which minimizes cable runs and lengths. At each end of the bus network a CANbus terminator (terminating resistor) must be connected in order for the system to perform correctly (see diagram below).

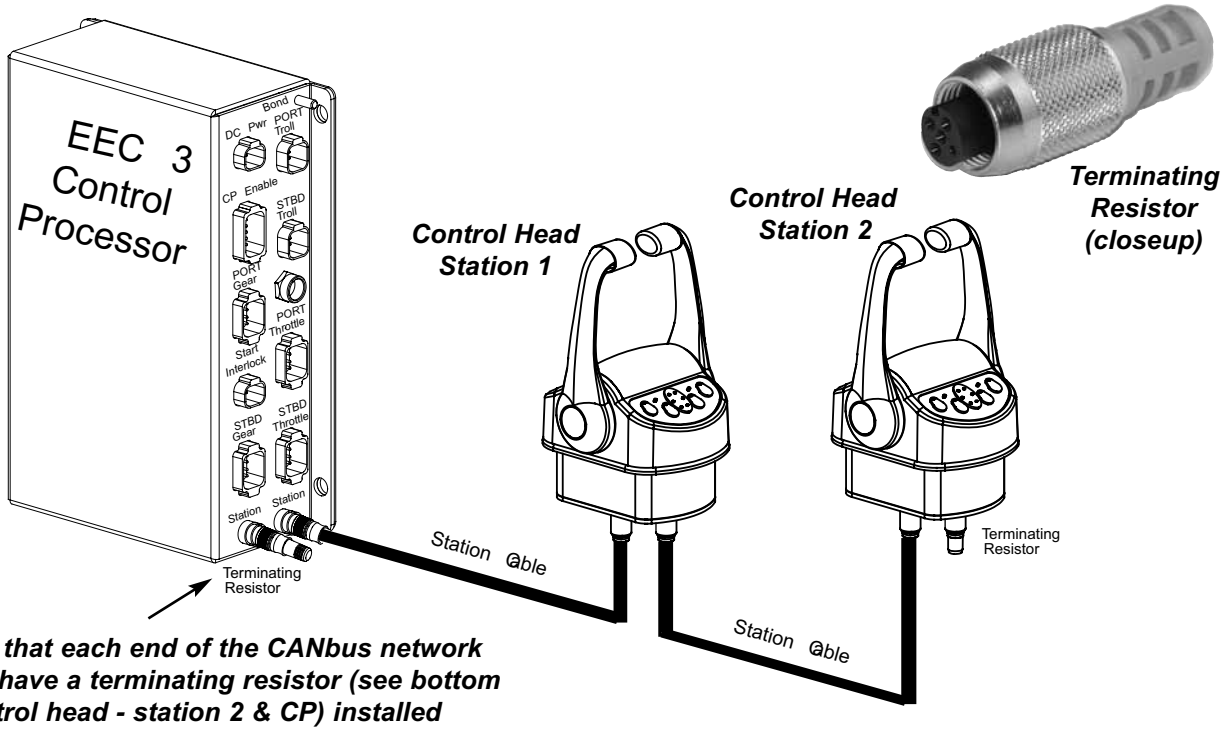
Station cables MUST NOT be spliced or shortened in the field. Cutting or nicking the cable will compromise the reliability of the system!

CANbus Network Layout

The CANbus network allows for devices to be connected in series by a single cable throughout the boat. The EEC3 system consists of:

(1) Control Processor, (up to 6) Control Heads, (optional) Handheld Remote Control Station, (optional) GTB Backup Processor.

You may connect each device in any configuration, however, a terminating resistor MUST be installed at each end of the network.

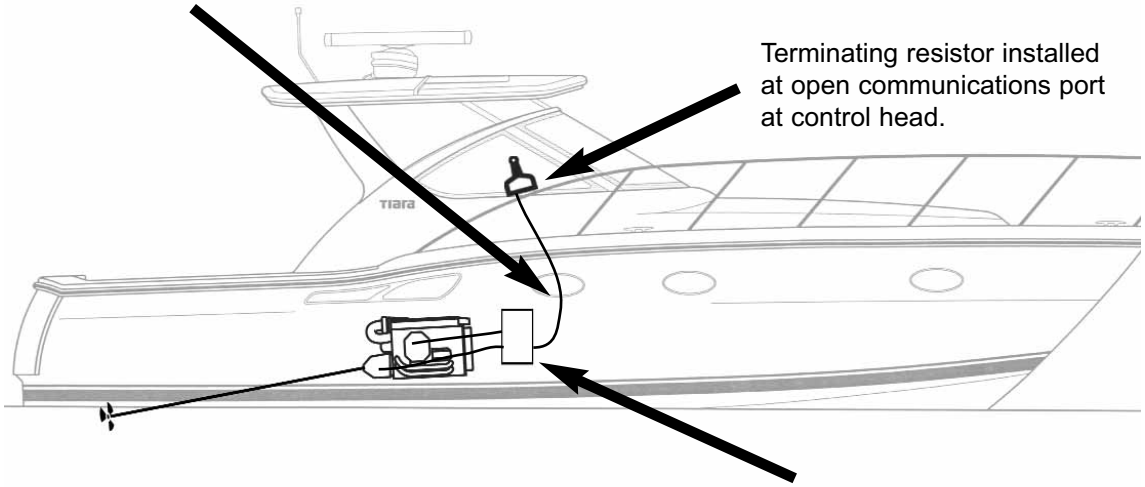


Notice that each end of the CANbus network MUST have a terminating resistor (see bottom of control head - station 2 & CP) installed

• EEC3 System Layouts

Single Station Layout

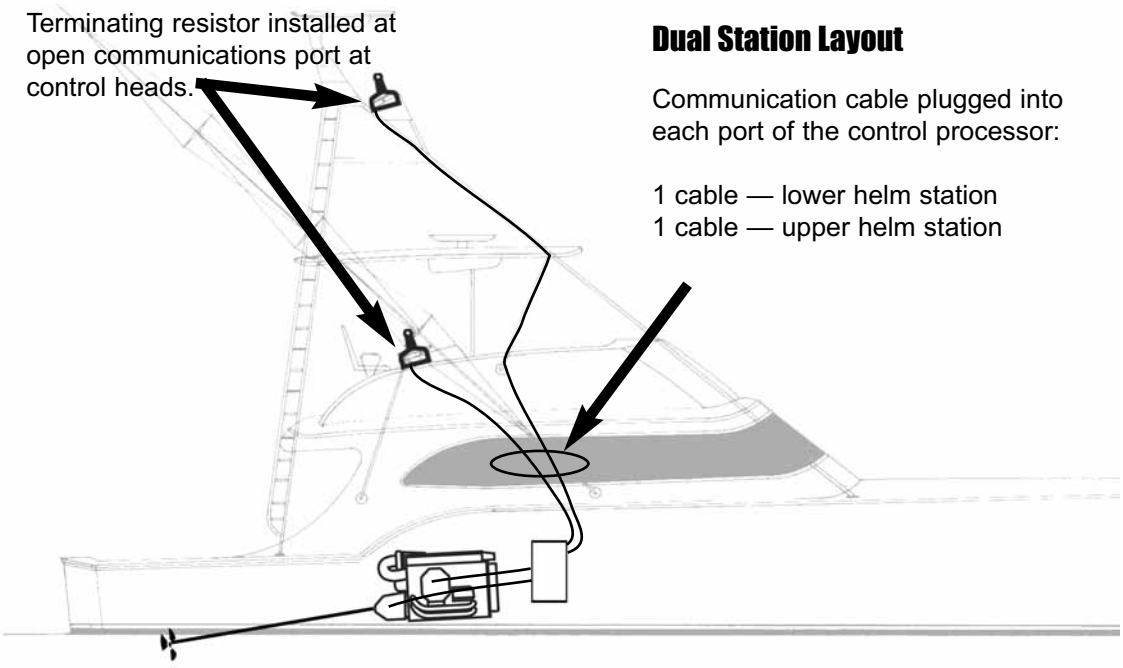
Single cable connects control head to control processor.

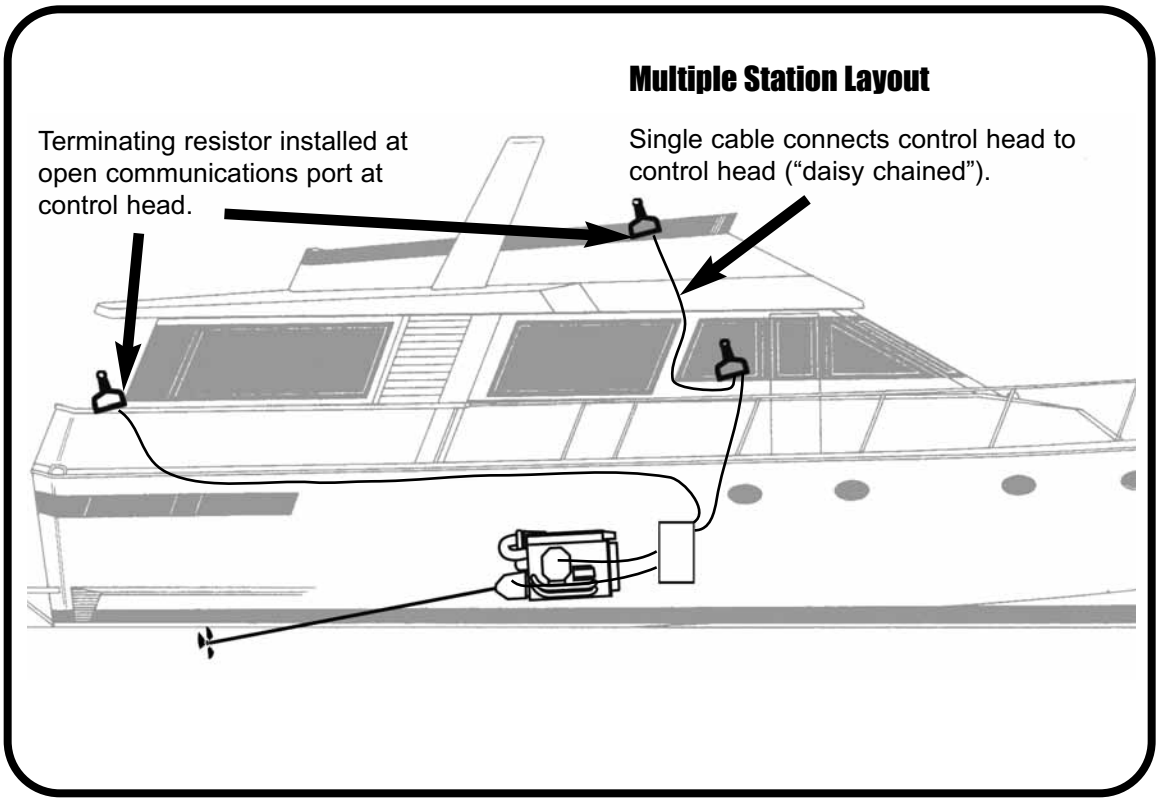


Dual Station Layout

Communication cable plugged into each port of the control processor:

1 cable — lower helm station
1 cable — upper helm station



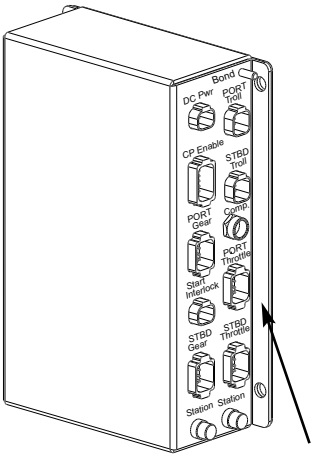


3.1 Mount the Control Processor

The Engine Processor is essentially a digital computer, similar to those used in offices or at home. Although the system has been carefully designed to operate in conditions that are common in recreational yachts, reliability of the system will be enhanced if the engine processor can be mounted in an area external to the engine room, where operating temperatures will be somewhat cooler.

Follow these steps to install the EEC3 Control Processor:

STEP 1: The Control Processor can be mounted anywhere in the engine room providing that the Processor is reasonably accessible so that inspection and/or repairs to the unit may be performed. The Control Processor should NOT be installed in adverse locations subject to salt-water exposure or excessive heat.



Allow 6” (15cm) on the connection side of the the Control Processor when determining mounting location for the Control Processor. This extra space allows for the connection of the harnesses to the Control Processor.

STEP 2: Mount the Control Processor using 1/4” (7mm) machine bolts or lag screws. If using lag screws, screw length should be no less than 1” (25mm). If using machine bolts, lockwashers or locknuts MUST be used *(figure 1)*.

3.2 Mounting the Control Head

One of the most important factors in selecting control head locations is the ability to control the vessel by allowing FULL movement of the control head handles. The area around the control head should have proper drainage to eliminate standing water. Although the control heads are sealed to withstand damage from exposure to mois-

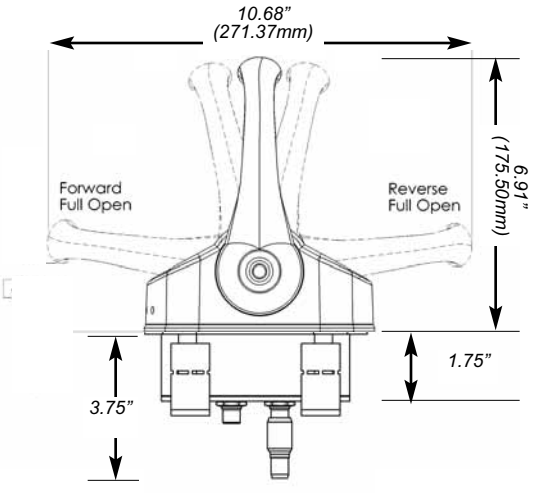
Top Mount Control Head

ture, they are not designed to be submerged.

STEP 1: Mark the location for the Control Head using the template provided (see section 8.0). Cut the 3-3/8” x 4-7/8” hole.

STEP 2: Place the Control Head assembly into the cutout. The Control Head clamps, which hold the control head against the console, have a break off point indicated by a perforation. For consoles 1/4” to 1” thickness, use bracket as supplied. For 3/4” to 1-5/8” thickness, break off clamp at 3/4” break off point.

STEP 3: Install Control Head clamps and tighten wing nuts provided. Make sure Control Head is firmly mounted to console.



3.3 Station Communication Cable Routing

Review comments made in Pre-Installation Planning, for determining proper routing of cables. Cables are manufactured in 5, 10, 20, 40, 60, 80, 100, and 120 foot lengths.

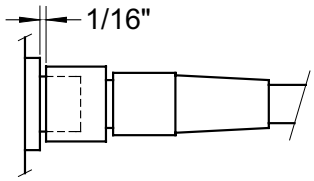
When routing and connecting station communication cables, BE SURE TO DO THE FOLLOWING:

- Use a terminating resistor at each end of the bus (see diagram — section 3.0, Cable Routing).
- Align the cables before connecting them to the proper connector on the Control Head and/or Control Processor.

REMEMBER:

—Connectors are pre-terminated at the factory and should NEVER be forced into their proper recepticle.
—Make sure that the connector is properly aligned prior to insertion into the recepticle.
—If the connector is properly aligned, only a small amount of force will be necessary to insert the connector into the Control Processor or Control Head.
—Failure to properly align connector may damage the pins and cause the system to fail.

It is VERY IMPORTANT that the Station Communication cable nut be connected tightly. The nut requires 6-7 turns to completely connect it, and there should be no more than a 2mm (1/16 inch) gap between the nut and the connector — see diagram below.

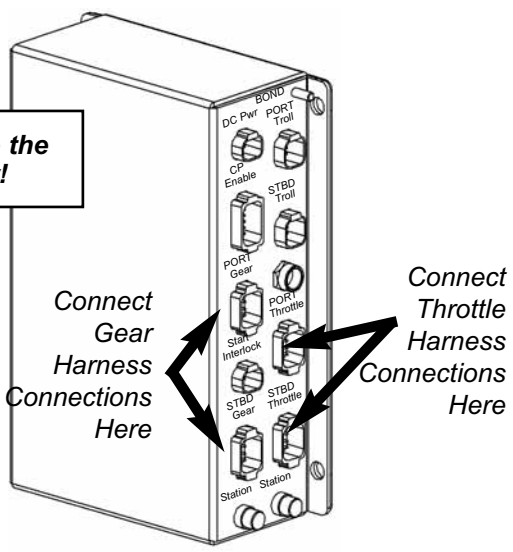


— when fully seated, connector is 1/16” away from nut (max)
— Connector requires 6 full turns to be fully engaged

WARNING: Failure to follow the instructions above will result in erratic system performance.

Station cables MUST NOT be spliced or shortened in the field. Cutting or nicking the cable will compromise the reliability of the system!

3.4 Connecting the Throttle and Transmission Harnesses



WARNING: Check voltage of gear solenoids — voltage must be the same as input voltage to the system. If NOT, damage will occur!

Port and Starboard throttle and transmission cables are attached to the EEC3 Control Processor at the appropriately labelled connector (see below).

To attach the throttle and transmission cables to the Control Processor:

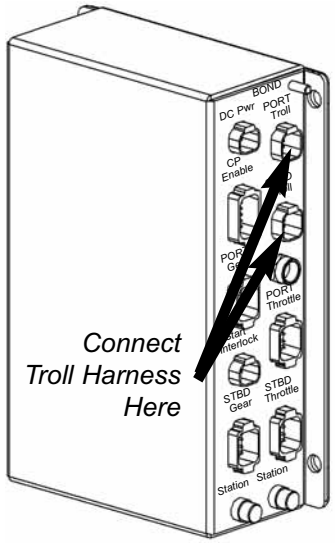
1. Find the appropriately labelled connector for the cable you wish to connect to the CP (ie. THROTTLE / PORT or STBD; GEAR / PORT or STBD).

2. Insert the cable connector fully until you hear a “click” from the locking tab. This assures that the connector is fully inserted.

When all connectors are properly connected to the Control Processor you may proceed to connect the other end of the cable to the engine’s appropriate recepticle (whether for Port or Stbd, or Throttle or Transmission).

Verify that you have the right harness for your engine type. If not, call GMP or your dealer promptly!

3.5 Connecting the Troll Harness



Port and Starboard TROLL cables are attached to the EEC-2001 Control Processor at the appropriately labelled connector of the Control Processor (see right).

To attach the TROLL cables to the Control Processor:

1. Find the appropriately labelled connector for the cable you wish to connect to the CP (ie. TROLL Stbd / TROLL Port).

2. Insert the cable connector maintaining correct pin alignment.

3.6 DC Power Input and Bonding Wire

In the installation of any electronic device, the source of power is one of the most important factors to consider during the installation. The Glendinning Electronic Engine Control has a unique and very reliable power supply system which, if the system is properly installed, greatly improves the overall reliability of the engine control system. *NOTE:The EEC can use 12 or 24V DC power, however, see the specific wiring diagram (see sec 7.1, or supplied by GMP technician) for the correct power to use. In some installations it is required to use 24V DC instead of 12V DC.*
The Glendinning EEC3 system is equipped with a sophisticated power management system that allows it to receive power from two (2) independent batteries (normally the port and starboard engine start batteries). In normal operation, the EEC3 will receive power from both battery sources, taking power from each battery proportionate to the voltage from level available. In the event of loss or reduction of voltage from one battery source, such as during engine start, the EEC3 system will continue to function normally by receiving power from the other battery with normal voltage.

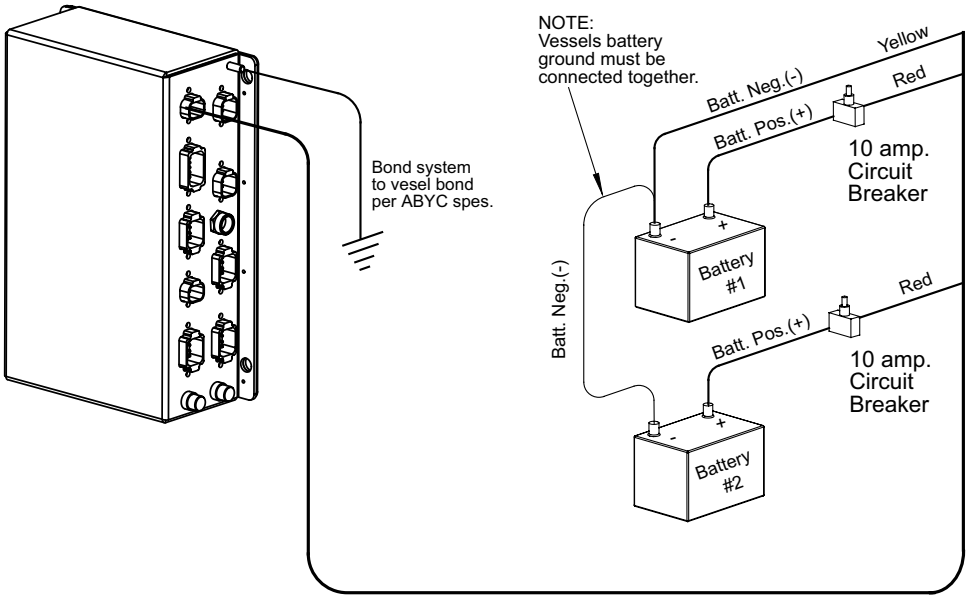
1) Connect the EEC3 DC Power Cable (supplied) to two (2) independent battery sources, (normally the port and starboard engine start batteries). On the positive side of these two runs, install a 10amp circuit breaker near each battery or power source (follow ABYC standards which require a circuit protection device within 7” of the wire connection to the power source

— NOTE: If the total wire run is longer than 15 feet from the battery to the Control Processor, install an approved junction box that the DC Power Cable may be connected to).

2) Make sure that the breakers are in the OFF position and then connect the “DC Power” to the Control Processor where indicated (see detail right).

3) Run a bonding wire (#12 AWG, green jacket) from the Control Processor bonding stud (1/4”) located top right on the connector side of the Control Processor.

3.7 Start Interlock

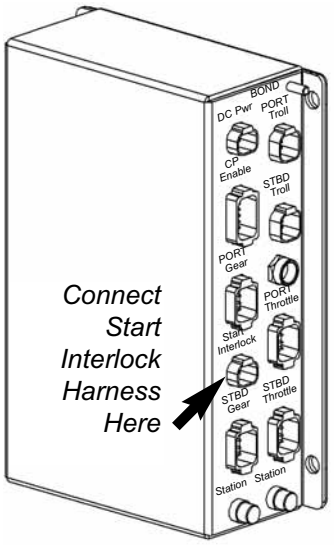


The EEC3 system includes a “start interlock” safety feature — this feature verifies that the transmission control lever is in Neutral prior to starting the engines. In order to utilize this product feature, the signal wire from the helm station start switch to the engine starter solenoid must be intercepted and run through the control switches within the Control Processor. The capacity of the Start Interlock relay is 15 amps DC.

To install the Start Interlock system:

1) Identify the Start Interlock wiring on the “Start Interlock harness”.

2) Route these wires to the engine distribution box and connect using appropriate connectors (see wiring diagram).

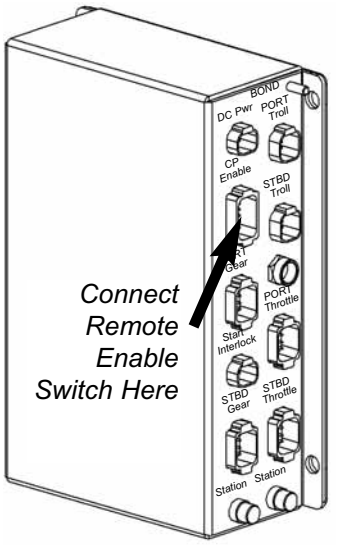


3.8 Remote Enable Switch

If you purchased the Smart Actuator for Mechanically controlled Transmissions, you WILL NOT need to connect Start Interlock at the EEC3 Control Processor. Start Interlock MUST be connected through the Smart Actuator — refer to Sec. 8.5.

While the boat is tied up at the dock and not in use, it is recommended that the EEC system be turned off. Since power is normally supplied directly to the Engine Processor from

power sources in the engine room, turning power ON and OFF in the engine room may be difficult to do each time the system is started up. For this reason, a remote enable switch is available for use with the EEC control system. This enable switch allows power to the system to be turned ON or OFF at the Main station.



The EEC System Enable Switch is installed as follows:

1. Make sure the circuit breakers that control the power to the Control Processor are turned off before starting this installation.

2. Install a Single Pole, Single Throw (SPST) switch in the instrument panel (NOTE: If using mechanically controlled transmissions with the Smart Actuator, use a Double Pole, Single Throw (DPST) switch as outlined in Section 8.5). A water resistant rocker switch or toggle switch is available from GMP.

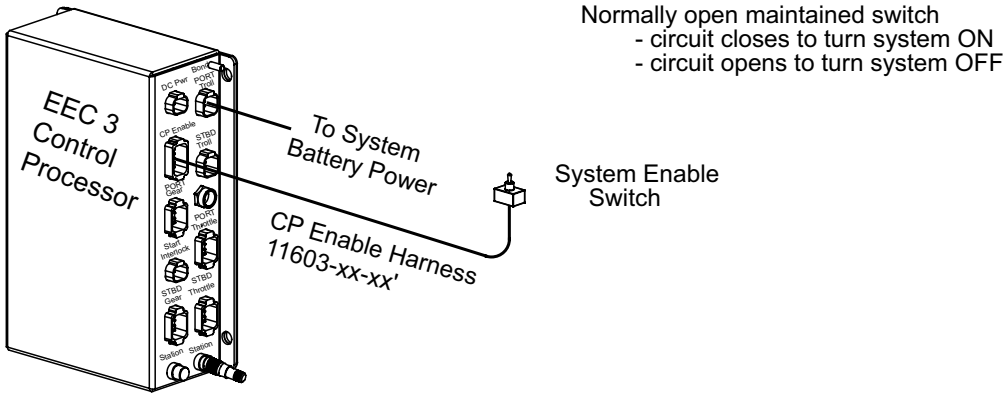
NOTE: Locate the switch in an area where it will not be inadvertantly turned OFF during operation.

3. Connect switch to harness provided.

NOTE: Do not connect an indicator light to the remote enable switch connections.
NOTE: A "jumper" can be installed in the place of wires on the connector at CP. Power may then be turned OFF and ON by using the 10amp breakers installed at battery

When using the Smart Actuator, a Double Pole / Single Throw (DPST) switch should be used instead of the Single Pole / Single Throw (SPST) switch mentioned in the instructions above. One pole of this switch is for the EEC3 and the other pole is for the Smart Actuator.

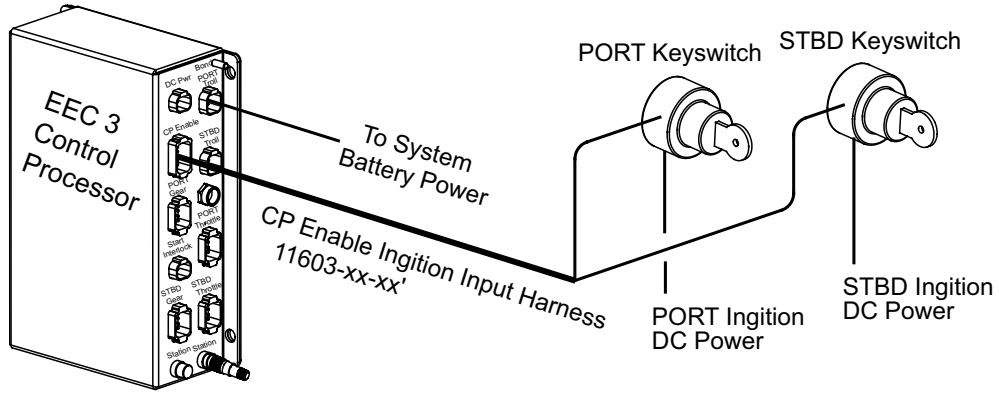
EEC 3 Control System Wiring Diagram - CP Enable Wiring Standard - "Dry Contact" ON/OFF



There are other enable circuitry options available, see next page.

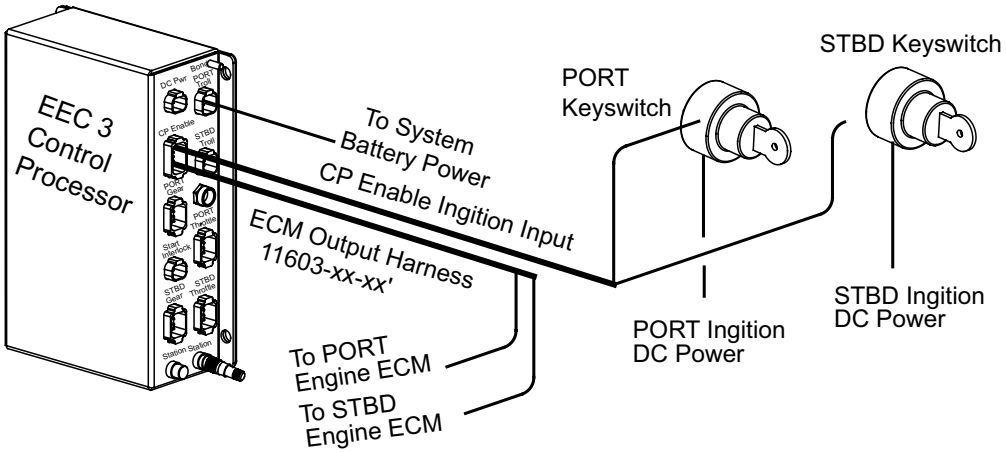
Ignition Activated - DC Power from both ingnition keys

- DC power from either ignition key turns system ON, both must be off for system to turn OFF.
- Jumper switches select 12 or 24v DC control



Ignition Activated w/Output - DC Power from ingnition key starts engine ECM

- DC power from either ignition key turns system ON , both must be off for system to turn OFF
- Ingnition power which enters EEC3 CP routes to engine ECM's once EEC3 system is up a running
- Port and Stbd engines are isolated from each other
- Jumper switches select 12 or 24v DC control, 8 amp capacity



4.0 Control Head Configuration

In order for each Control Head to communicate with the Control Processor, each Control Head must have a unique Handle Identifier. If you purchased a complete system, configuration and handle identification was performed by the factory.

If you purchased a control head **separately**, you will NEED to set the handle identifier for that control station. Follow the 8 steps below:

To Change Handle Identifier, Follow These 8 Steps:

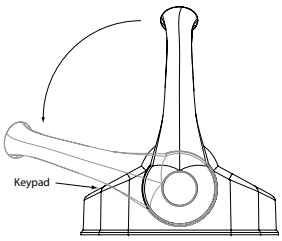
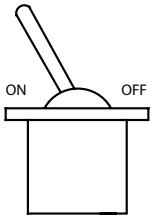
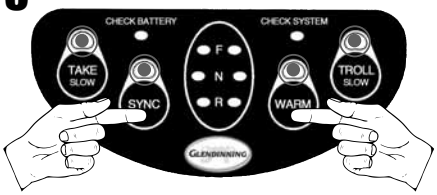
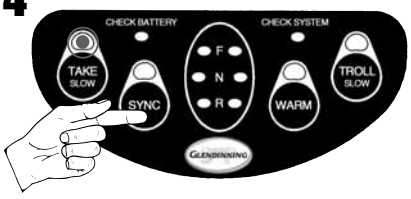
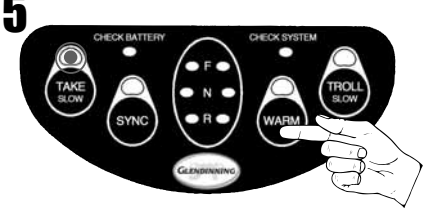
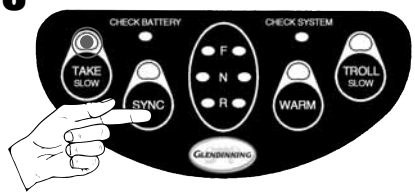
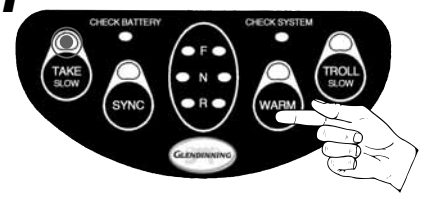
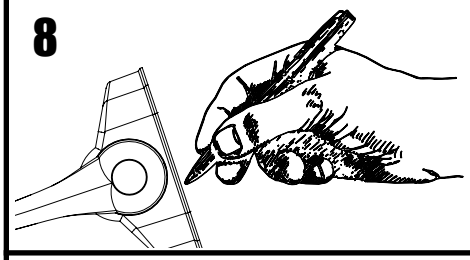
	ACTION	RESULT
1 	*Move control station handles to FULL ASTERN positions*	*No result*
2 	*Turn power ON to the system*	*TAKE LED will begin to flash*
3 	*Press & HOLD the 2 center buttons (SYNC & WARM) for approximately 2 seconds until all 4 LEDs begin to flash- RELEASE buttons*	*All 4 LEDs begin to flash*
4 	*Press & Release the SYNC button one time to select Handle Identifier Mode*	*TAKE LED will begin to flash*
5 	*Press & Release the WARM button one time to enter Handle ID Configuration*	*TAKE LED will be illuminated*

Chart is continued on next page . . .

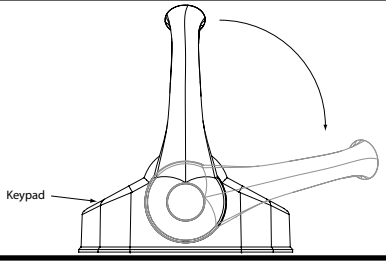
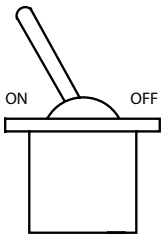
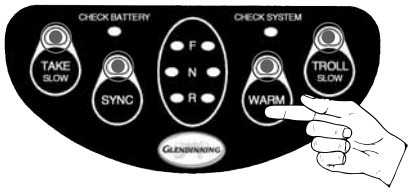
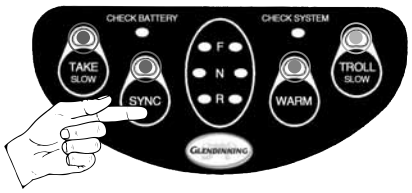
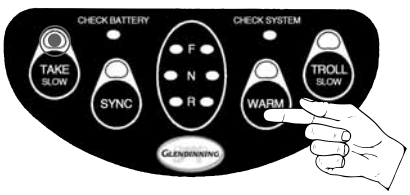
<table>
<tr><td>6
 
</td><td>ACTION

Press & Release SYNC button until desired handle ID is achieved — see chart at right for ID# and corresponding LED that is illuminated</td><td colspan="2">RESULT
<table><tr><th>ID#</th><th>LEDs ON</th></tr><tr><td>1</td><td>TAKE</td></tr><tr><td>2</td><td>SYNC</td></tr><tr><td>3</td><td>TAKE & SYNC</td></tr><tr><td>4</td><td>WARM</td></tr><tr><td>5</td><td>TAKE & WARM</td></tr><tr><td>6</td><td>SYNC & WARM</td></tr></table></td></tr>
<tr><td>7
 
</td><td>Press & Release the WARM button one time</td><td colspan="2">This action stores your handle ID in memory. All 4 LEDs begin to flash after ID is stored in memory</td></tr>
<tr><td>8
  </td><td>RECORD the Handle ID# on the tag located on the bottom of the Control Head</td><td colspan="2">N/A</td></tr>
<tr><td colspan="4">To Exit Control Handle Configuration Mode — turn system OFF and return control handles to NEUTRAL position.</td></tr>
</table>

5.0 Control Processor Configuration

Configuration of the EEC-3 system was performed at GMP from the information the ship operator gave at the time the order was placed. Changes to the Control Processor configuration, although not frequently done, can be made to suit operator preference and is entered from the **control head keypad.** Follow the instructions for each option when making changes.

To Enter System Configuration Mode, follow these steps:

	ACTION	RESULT
	*Move control station handles to FULL THROTTLE positions*	*No result*
	*Turn power ON to the system*	*TAKE LED will begine to flash*
	*Press & Release the WARM button 3 times*	*All 4 LEDs begin to flash*
	*Press & Release the SYNC button the number of times as outlined on pages 22-32 for particular SystemConfiguration Option you wish to change*	*Appropriate LED will be illuminated (see pages 22-32 for LED illumination for Configuration Option changed)* *Troll Type Options . . . . . .pg. 22* *Throttle on Top of Troll Options . . . . . .pg. 24* *Troll Delay Options . . . . . .pg. 25* *Throttle Delay Options . . . . . .pg. 26* *Gear Delay Options . . . . . .pg. 27* *High-Idle Step Size Options, PT 1 . . . . . .pg. 28* *High-Idle Step Size Options, PT 2 . . . . . .pg. 29* *SystemStartup Mode Options . . . . . .pg. 30* *Station Transfer Options . . . . . .pg. 31* *Set Configuration Settings to Default . . . . .pg. 32*
	*Press & Release the WARM button one time to save your configuration changes in memory*	*Appropriate LED will be illuminated depending on which System Configuration Option you selected in Step 4 above.*

5.1. Troll Type Options

The Troll Type Option allows you to configure the EEC3 system for the particular type of troll you have on your boat. Most systems are shipped with the correct Troll Type Option pre-configured by the factory.

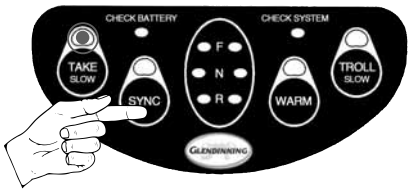
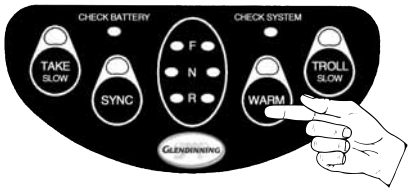
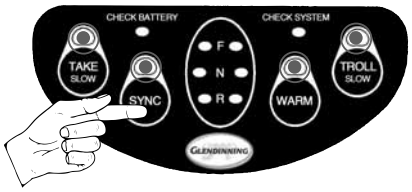
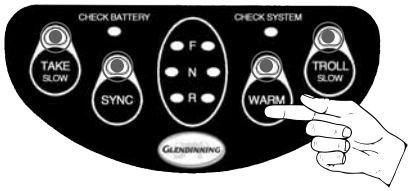
For engines equipped with ZF troll valves use Options 2 or 3 below

For engines equipped with TwinDisc troll valves use Options 4 or 5 below

For engines equipped with TwinDisc E-troll or ZF Auto-Troll valves use Option 6 below

Troll Type Option default is set for NO trolling valves .
Most systems are shipped with the correct Troll Type Option pre-configured by the factory.

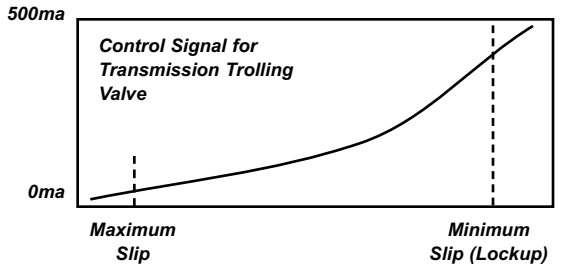
To Change Troll Type Option Setting Follow These Steps:

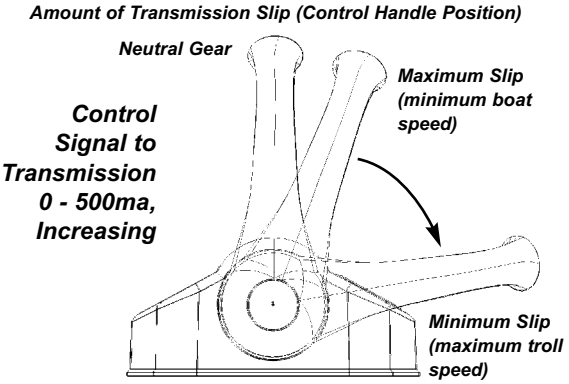
	Enter Configuration Mode as described in section 5.0 (pg. 21)			
	ACTION	**RESULT**		
	*Press & Release SYNC button 1 time for Troll Type Options*	*TAKE LED will begin to flash*		
	*Press & Release WARM button 1 time to activate selection*	*NO LEDs will be illuminated*		
	*Press & Release SYNC button repeatedly to cycle through Troll Type Options, LED will illuminate according to selection chosen (see chart at right)*		**LEDs ON**	**TROLL TYPE OPTION**
		1	**None**	**No Troll (default)**
		2	**TAKE**	**Increase 500ma**
		3	**SYNC**	**Decrease 500ma**
		4	**TAKE & SYNC**	**Increase 1000ma**
		5	**WARM**	**Decrease 1000ma**
		6	**TAKE & WARM**	**Increase towards 0-5v**
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may: 1) continue to change other configuration options on the following pages OR . . . 2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*		

NO Troll

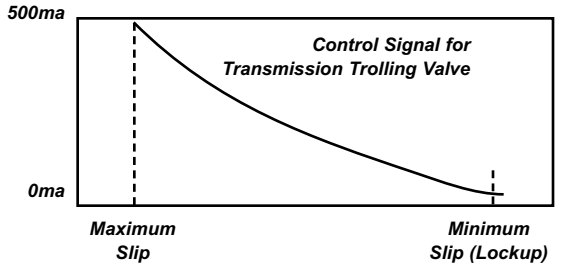
Choose this selection if your boat is NOT equipped with trolling valves.

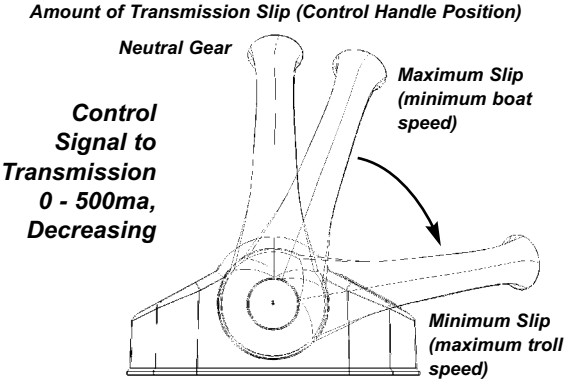
Increase 500ma





Decrease 500ma





Increase 1000ma

Same as *Increase 500ma* pictured above only measurements are 0ma - 1000ma.

Decrease 1000ma

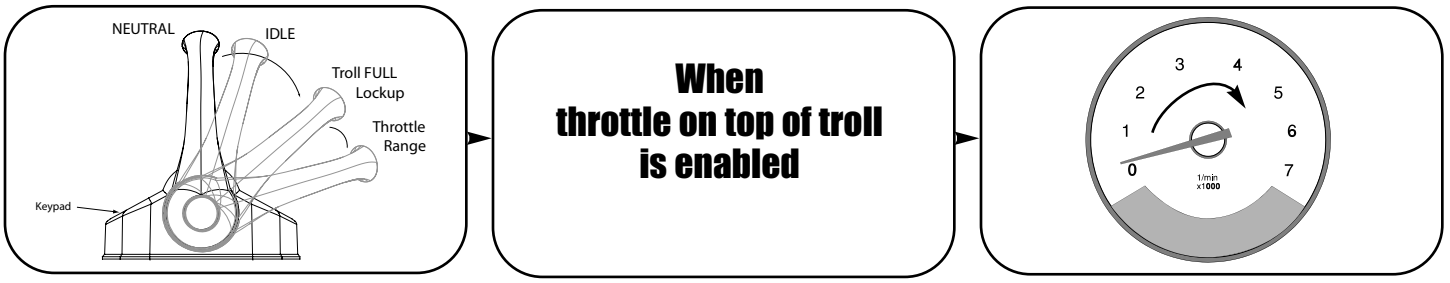
Same as *Decrease 500ma* pictured above only measurements are 0ma - 1000ma.

Increase 0 - 5 volts

Same as above only measurements are 0 - 5 volts instead of milliamps.

5.2 Throttle on Top of Troll Options

The Throttle on Top of Troll Option allows you to configure the EEC3 system to give approximately 1/3 of throttle range after reaching troll full lock-up.

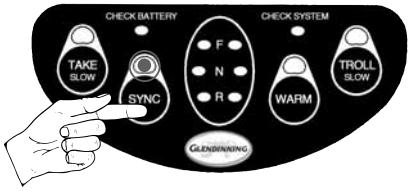
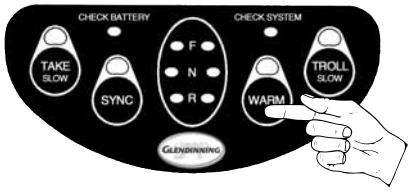
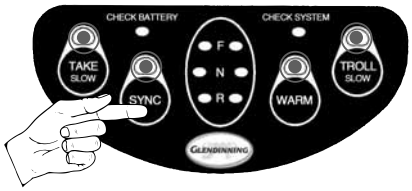
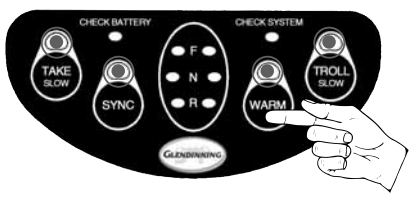


Moving handles past trolling valve full-lockup . . .

(Default = NO throttle on top of troll)

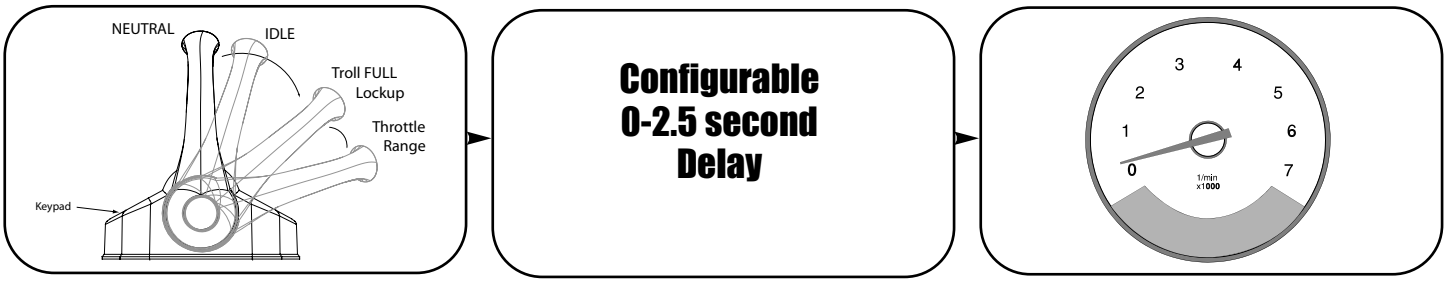
engine RPMs are increased up to 1/3 of normal throttle range

To Change Throttle on Top of Troll Option Setting Follow These Steps:

	Enter Configuration Mode as described in section 5.0 (pg. 21)			
	ACTION	**RESULT**		
	*Press & Release SYNC button 2 time for Throttle on Top of Troll*	*SYNC LED will begin to flash*		
	*Press & Release WARM button 1 time to activate selection*	*NO LEDs will be illuminated*		
	*Press & Release SYNC button repeatedly to cycle through Throttle on Top of Troll Options, LED will illuminate according to selection chosen (see chart at right)*		**LEDs ON**	**THROTTLE ON TOP OF TROLL OPTION**
		1	**None**	**No Throttle on Top of Troll (default)**
		2	**TAKE**	**Throttle on Top of FULL Lockup**
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may: 1) continue to change other configuration options on the following pages OR . . . 2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*		

5.3 Troll Delay Options

The Troll Delay option allows you to configure the EEC3 system to delay troll modulation as the system goes from gear shift fo troll modulation.

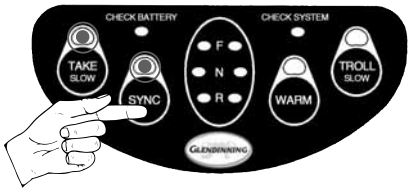
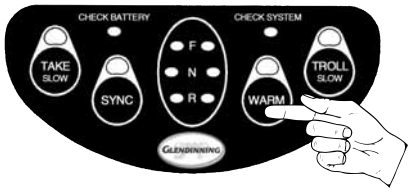
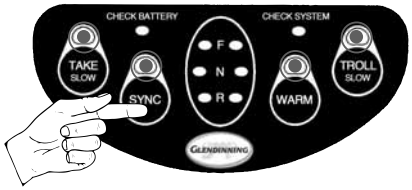
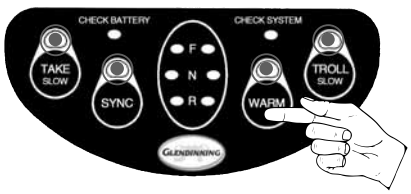


When in Troll Mode, moving handles in or out of the throttle on top of troll range . . .

system will pause . . . (Default = NO delay)

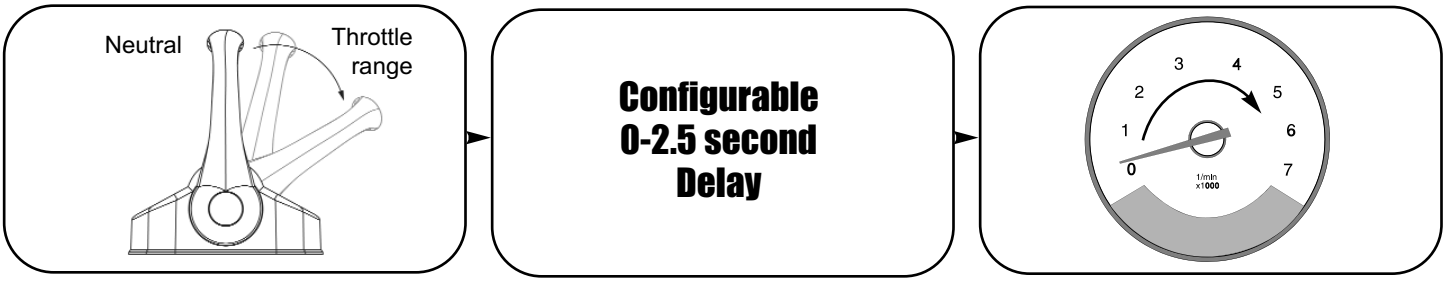
before engaging or disengaging trolling valves

To Change Troll Delay Option Settings Follow These Steps:

	Enter Configuration Mode as described in section 5.0 (pg. 21)			
	ACTION	**RESULT**		
	*Press & Release SYNC button 3 time for Troll Delay Options*	*TAKE & SYNC LEDs will begin to flash*		
	*Press & Release WARM button 1 time to activate selection*	*NO LEDs will be illuminated*		
	*Press & Release SYNC button repeatedly to cycle through Troll Delay Options, LED will illuminate according to selection chosen (see chart at right)*		**LEDs ON**	**TROLL DELAY OPTION**
		1	**None**	**No Troll Delay (default)**
		2	**TAKE**	**0.5 second delay**
		3	**SYNC**	**1.0 second delay**
		4	**TAKE & SYNC**	**1.5 second delay**
		5	**WARM**	**2.0 second delay**
		6	**TAKE & WARM**	**2.5 second delay**
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may: 1) continue to change other configuration options on the following pages OR . . . 2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*		

5.4 Throttle Delay Options

The Throttle Delay Option allows you to configure the EEC3 system to delay throttle output as you shift from Neutral, past in-gear idle, and into the throttle range.

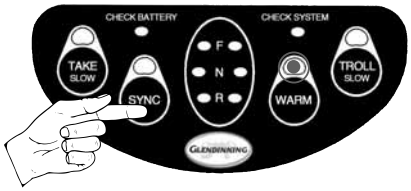
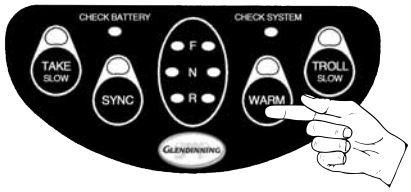
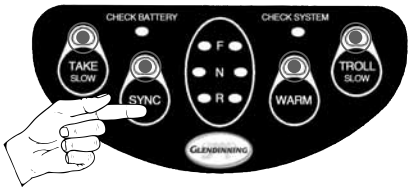
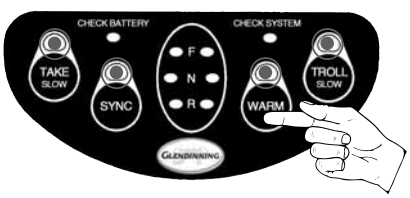


Moving handles from Neutral, past in-gear idle into throttle range . . .

system will shift transmission into gear and pause . . . (Default = 1 second)

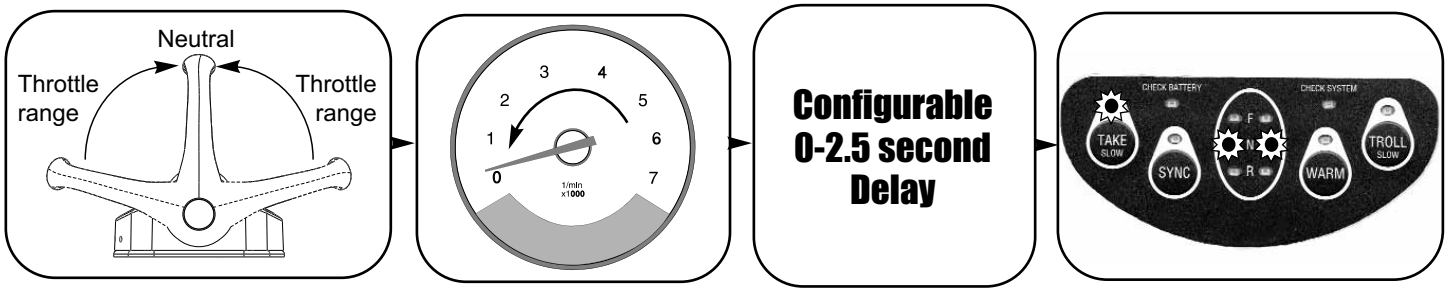
before RPMs are increased. above idle

To Change Throttle Delay Setting Follow These Steps:

	Enter Configuration Mode as described in section 5.0 (pg. 21)			
	ACTION	**RESULT**		
	*Press & Release SYNC button 4 times for Throttle Delay Option*	*WARM LED will begin to flash*		
	*Press & Release WARM button 1 time to activate selection*	*NO LEDs will be illuminated*		
	*Press & Release SYNC button repeatedly to cycle through Throttle Delay Options, LED will illuminate according to selection chosen (see chart at right)*		**LEDs ON**	**AMOUNT OF THROTTLEDELAY**
		1	**None**	**None**
		2	**TAKE**	**0.5 second**
		3	**SYNC**	**1.0 second (Default)**
		4	**TAKE & SYNC**	**1.5 second**
		5	**WARM**	**2.0 second**
		6	**TAKE & WARM**	**2.5 second**
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may: 1) continue to change other configuration options on the following pages OR . . . 2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*		

5.5 Gear Delay Options

The Gear Delay Option allows you to configure the ETS system to remain in gear when the system goes from the throttle range to neutral, to allow throttle to reach idle before shifting transmission.



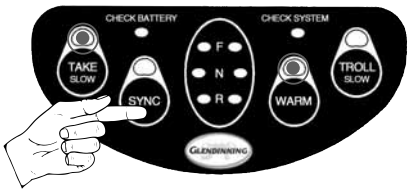
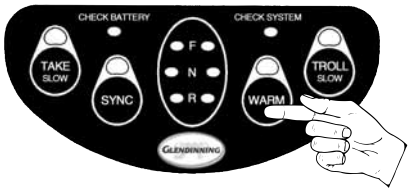
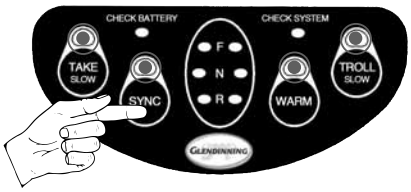
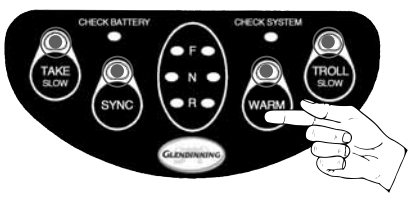
Moving handles from the throttle range (above idle) into neutral . . .

RPMs decrease to idle . . .

while transmission pauses . . . (Default = 0 seconds)

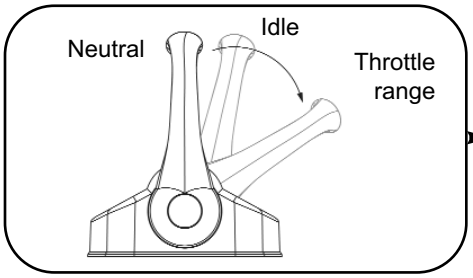
before shifting transmission into Neutral.

To Change Gear Delay Setting Follow These Steps:

<table>
<tr><td rowspan="2">  </td><td colspan="3">Enter Configuration Mode as described in section 5.0 (pg. 21)</td></tr>
<tr><td>ACTION</td><td colspan="2">RESULT</td></tr>
<tr><td></td><td>Press & Release SYNC button 5 times for Gear Delay Option</td><td colspan="2">TAKE & WARM LEDs will begin to flash</td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to activate selection</td><td colspan="2">NO LEDs will be illuminated</td></tr>
<tr><td>  </td><td>Press & Release SYNC button repeat-edly to cycle through Gear Delay Options, LED will illumi-nate according to selection chosen (see chart at right)</td><td>LEDs ON</td><td>AMOUNT OF DELAY</td></tr>
<tr><td></td><td></td><td>1 — None</td><td>None (Default)</td></tr>
<tr><td></td><td></td><td>2 — TAKE</td><td>0.5 second</td></tr>
<tr><td></td><td></td><td>3 — SYNC</td><td>1.0 second</td></tr>
<tr><td></td><td></td><td>4 — TAKE & SYNC</td><td>1.5 second</td></tr>
<tr><td></td><td></td><td>5 — WARM</td><td>2.0 second</td></tr>
<tr><td></td><td></td><td>6 — TAKE & WARM</td><td>2.5 second</td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to save option selection in memory</td><td colspan="2">Once selection has been saved by pressing & releasing the WARM button, you may:
1) continue to change other configuration options on the following pages OR . . .
2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.</td></tr>
</table>

5.6 High-Idle Step Size (Pt. 1) Options

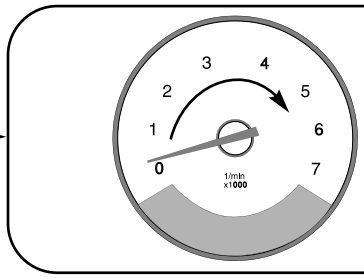
The High-Idle Step Size (Pt. 1) Option allows you to configure the EEC3 system to increase engine idle speed from .5% to 30% of total throttle output.



While in Neutral or Idle Detent Control Head handle positions . . .

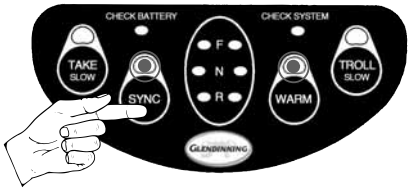
Configurable Engine Idle Setting (see chart below)

(Default = 4% of total throttle output)



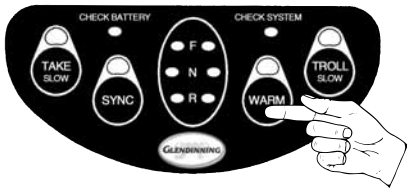
engine idle speed can be increased according to desired setting

To Change High-Idle Step Size Setting Follow These Steps:



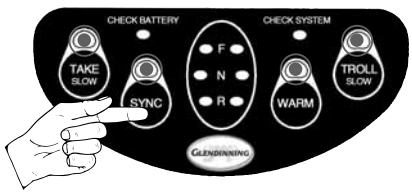
Enter Configuration Mode as described in section 5.0 (pg. 21)

ACTION	RESULT
Press & Release SYNC button 6 times for High-Idle Step Size, 1	*SYNC & WARM LEDs will begin to flash*



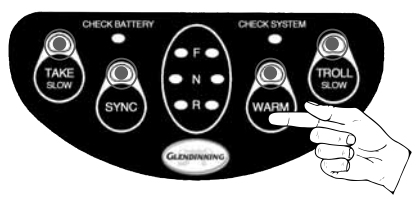
Press & Release WARM button 1 time to activate selection

NO LEDs will be illuminated



Press & Release SYNC button repeatedly to cycle through High Idle Options, LED will illuminate according to selection chosen (see chart at right)

	LEDs ON	AMOUNT OF HIGH-IDLE STEP
1	None	0.5% of Throttle Range
2	TAKE	1% of Throttle Range
3	SYNC	2% of Throttle Range
4	TAKE & SYNC	3% of Throttle Range
5	WARM	4% of Throttle Range (default)
6	TAKE & WARM	5% of Throttle Range
7	SYNC & WARM	10% of Throttle Range
8	TAKE, SYNC & WARM	20% of Throttle Range
9	TROLL	30% of Throttle Range

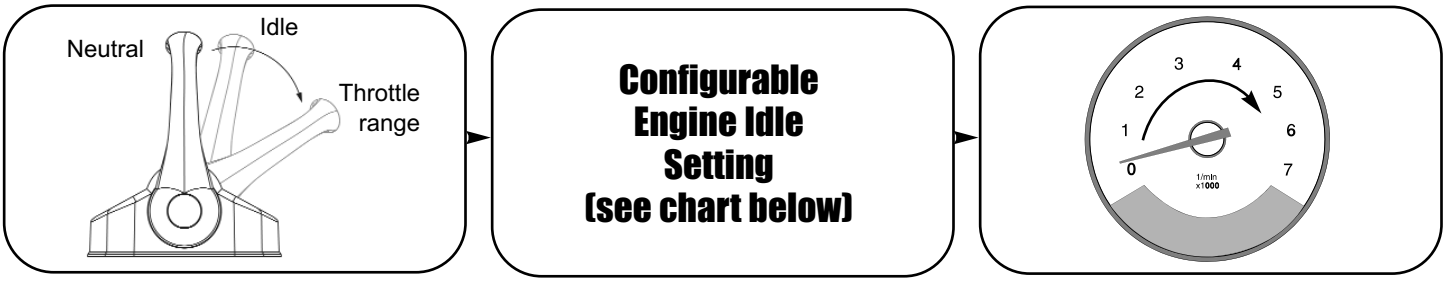


Press & Release WARM button 1 time to save option selection in memory

Once selection has been saved by pressing & releasing the WARM button, you may:
1) continue to change other configuration options on the following pages OR . . .
2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

5.7 High-Idle Step Size (Pt. 2) Options

The High-Idle Step Size (Pt. 2) Option allows you to configure the EEC3 system to change idle speed beyond the High-Idle Step (Pt. 1) Option range (from .5% to 5%).

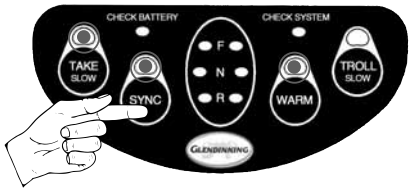
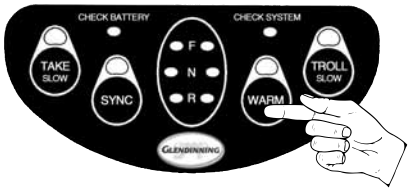
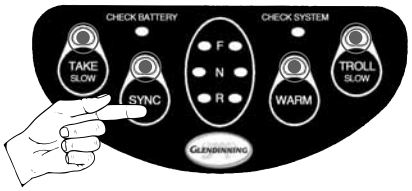
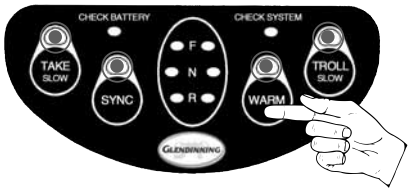


While in Neutral or Idle Detent Control Head handle positions . . .

(Default = 2% of total throttle output)

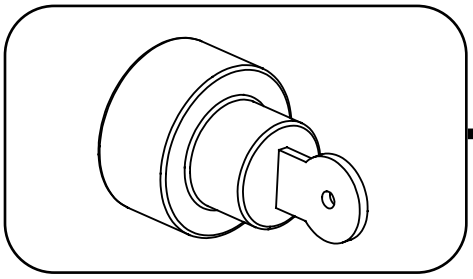
engine idle speed can be increased according to desired setting

To Change High-Idle Step Size Setting Follow These Steps:

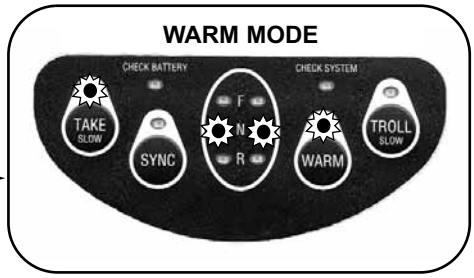
<table>
<tr><td></td><td colspan="3">Enter Configuration Mode as described in section 5.0 (pg. 21)</td></tr>
<tr><td></td><td>ACTION</td><td colspan="2">RESULT</td></tr>
<tr><td>  </td><td>Press & Release SYNC button 7 times for High-Idle Step Size, 2</td><td colspan="2">TAKE, SYNC & WARM LEDs will begin to flash</td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to activate selection</td><td colspan="2">NO LEDs will be illuminated</td></tr>
<tr><td>  </td><td>Press & Release SYNC button repeatedly to cycle through High Idle Options, LED will illuminate according to selection chosen (see chart at right)</td><td colspan="2"><table><tr><th></th><th>LEDs ON</th><th>AMOUNT OF HIGH-IDLE STEP</th></tr><tr><td>1</td><td>None</td><td>0.5% of Throttle Range</td></tr><tr><td>2</td><td>TAKE</td><td>1% of Throttle Range</td></tr><tr><td>3</td><td>SYNC</td><td>2% of Throttle Range (default)</td></tr><tr><td>4</td><td>TAKE & SYNC</td><td>3% of Throttle Range</td></tr><tr><td>5</td><td>WARM</td><td>4% of Throttle Range</td></tr><tr><td>6</td><td>TAKE & WARM</td><td>5% of Throttle Range</td></tr></table></td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to save option selection in memory</td><td colspan="2">Once selection has been saved by pressing & releasing the WARM button, you may:
1) continue to change other configuration options on the following pages OR . . .
2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.</td></tr>
</table>

5.8 System Startup Options

The System Startup Option allows you to configure the EEC3 system to enter WARM Mode or Normal RUN Mode at startup (power ON).

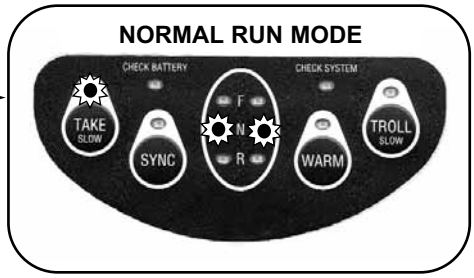


When turning system ON . . .



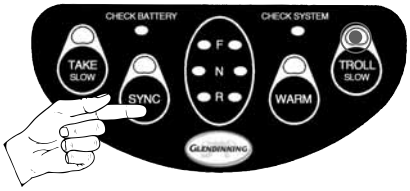
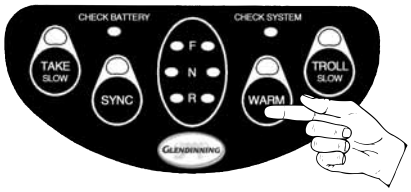
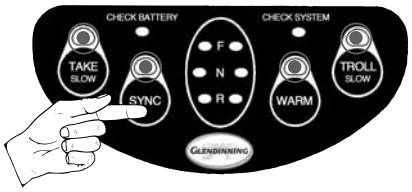
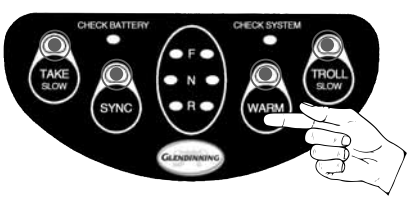
the transmission will be locked in WARM Mode (Neutral position) - RPMs will be increased only (Default)

OR



the transmission will immediately respond to the any movement of the control head handles - normal operation

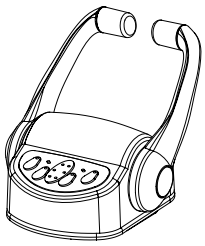
To Change System Startup Setting Follow These Steps:

<table>
<tr><td rowspan="2">  </td><td colspan="4">Enter Configuration Mode as described in section 5.0 (pg. 21)</td></tr>
<tr><td>ACTION</td><td colspan="3">RESULT</td></tr>
<tr><td></td><td>Press & Release SYNC button 8 times for System Startup Option</td><td colspan="3">TROLL LED will begin to flash</td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to activate selection</td><td colspan="3">NO LEDs will be illuminated</td></tr>
<tr><td rowspan="3">  </td><td rowspan="3">Press & Release SYNC button repeatedly to cycle through System Startup Options, LED will illuminate according to selection chosen (see chart at right)</td><td></td><td>LEDs ON</td><td>OPTION</td></tr>
<tr><td>1</td><td>None</td><td>WARM Mode (transmission is locked in Neutral) — (Default)</td></tr>
<tr><td>2</td><td>TAKE</td><td>Normal RUN Mode (transmission will go into gear when handles are moved)</td></tr>
<tr><td>  </td><td>Press & Release WARM button 1 time to save option selection in memory</td><td colspan="3">Once selection has been saved by pressing & releasing the WARM button, you may:
1) continue to change other configuration options on the following pages OR . . .
2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.</td></tr>
</table>

5.9 Station Transfer Options

The Station Transfer Option allows you to configure the EEC3 system to transfer station control underway above idle or with handles at the Neutral position only.

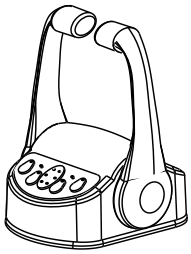
NOTE: Active Station can be at any handle position during station transfer



Inactive Station "taking control" must have control handles at Neutral or in the same gear at same or lower speed as Active Station

Choose "underway transfer" when you want to transfer control when handles are in appropriate position—not limited to Neutral gear only (Default)

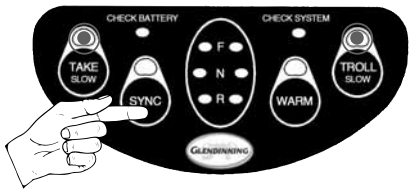
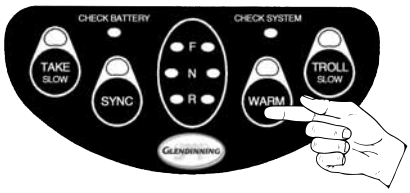
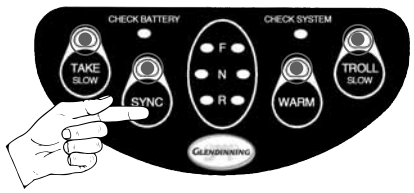
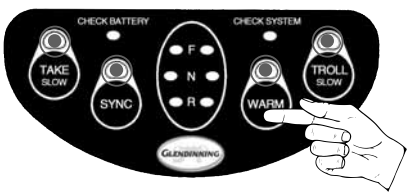
OR



Inactive Station "taking control" must be at Neutral position in order to transfer control from Active Station

Choose "Neutral transfer" when you want to transfer control when handles are in Neutral only

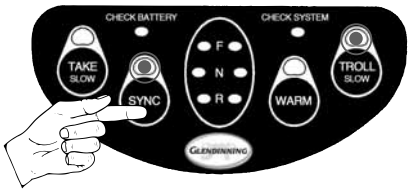
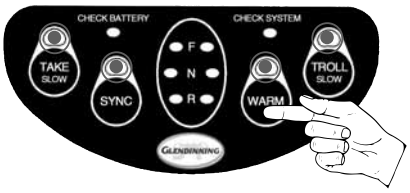
To Change Station Transfer Setting Follow These Steps:

	Enter Configuration Mode as described in section 5.0 (pg. 21)			
	ACTION	**RESULT**		
	*Press & Release SYNC button 9 times for Station Transfer Option*	*TAKE & TROLL LEDs will begin to flash*		
	*Press & Release WARM button 1 time to activate selection*	*NO LEDs will be illuminated*		
	*Press & Release SYNC button to cycle through Station Transfer Options, LEDs will illuminate (see chart at right)*		**LEDs ON**	**OPTION**
		1	**None**	**Underway Transfer (Default)**
		2	**TAKE**	**Transfer At Neutral Position only**
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may: 1) continue to change other configuration options on the following pages OR . . . 2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*		

5.10 Return System Settings to Default Option

The Return System Settings to Default Option allows you to return the system to it's factory default settings.

To Change System Settings to the Default values, Follow These Steps:

	Enter Configuration Mode as described in section 5.0 (pg. 21)	
	ACTION	**RESULT**
	*Press & Release SYNC button 10 times for Return to Default Option*	*SYNC & TROLL LEDs will begin to flash*
	*Press & Release WARM button 1 time to save option selection in memory*	*Once selection has been saved by pressing & releasing the WARM button, you may:* *1) continue to change other configuration options on the following pages OR . . .* *2) you may EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.*

Below is a list of the EEC3 Configuration options and their default settings:

SYSTEM OPTIONS	DEFAULT POSITION
Troll Type Option	**NO Troll**
Throttle on Top of Troll Option	**NO Throttle on Top of Troll**
Troll Delay Option	**NO Troll Delay**
Throttle Delay Option	**1.0 Second Delay**
Gear Delay Option	**NO Gear Delay**
High-Idle Step Size (PT 1) Option	**4% of Throttle Range**
High-Idle Step Size (PT 2) Option	**2% of Throttle Range**
System Startup Option	**WARM Mode**
Station Transfer Option	**Underway Transfer**

6.0 System Test & Checkout

System test and checkout consists of 2 steps:

1) ***Component installation checks*** — verify that the components appear to be correctly mounted and installed.
2) ***Operational tests*** — make sure the system is operating correctly.

6.1 Component Installation Checks

A. Control Processor

1.1	Verify Control Processor is securely fastened to boat structure.
1.2	Verify electrical power connections: *Battery Negatives*—Negatives from both batteries should be connected (not at Control Processor. It is vital that there be zero voltage potential between battery negative terminals. Battery negative terminals should be connected to Bonding system also. *Negative Lead*—Negative wire from EEC system is connected to single battery negative. *Positive Leads*—Power should be connected from Battery positive terminal or disconnect switch (battery side of switch) to CP via 10 amp fuse / circuit breaker. Check that all battery connections are tight. Verify that Bonding Wire is properly connected to Bonding stud (see sec. 3.6).
1.3	Verify that all connectors are properly inserted into their recepticles (Station Cables, Transmission Cables, Throttle Cables, and Troll Cables). DO NOT FORCE connectors into recepticles!. All wires should be secured with tie-wraps along route.
1.4	Verify that a terminating resistor is installed at each end of the CANbus network and that there is no open station connector (see sec. 3.0).

B. Control Head(s)

2.1	Verify Control Head(s) are securely fastened to boat structure.
2.2	Verify that Control Handles have an unobstructed freedom of movement (full ahead and full reverse).
2.3	Return all handles to NEUTRAL.
2.4	Verify that a terminating resistor is installed at each end of the CANbus networkand that there is no open station connector (see sec. 3.0).

System checks may be performed WITHOUT the engines running!

6.2 Operational Checks

A. General Functions

NOTE: While performing system checks, verify that the “Check System” LED stays OFF. If it comes ON, the system is in Alarm Mode (see pg. 35) and alarm condition must be checked and corrected before proceeding.

3.1	Turn System ON (see sec. 2.1).
3.2	Verify at the main station various functions: Warm up, Slow, Troll, Sync.
3.3	Transfer control to other stations (see sec. 2.7) and verify proper operation of functions at each station.

B. Start Interlock

4.1	Move Starboard Control Handle out of NEUTRAL position. Attempt to start engine. ***(NOTE: Be prepared to immediately shutdown engine if start interlock has been wired incorrectly!)***
4.2	Engine should NOT start; if it does, start interlock has not been wired correctly. Fix wiring and re-check.
4.3	Move Starbord Control Handle back to NEUTRAL position. After handle is moved to NEUTRAL position, then try to start engine. Engine should start.
4.4	Perform same check for Port engine.

C. Power Inputs

5.1	To verify separate power inputs, turn ON individual breakers one at a time and verify that DC power (12 or 24 VDC) is supplied to the Control Processor.

D. Engine Room Checks

6.1	Gear Operation — Verify that transmission solenoid valves are turning ON and OFF as you move Control Handles into and out of gear. Make sure that transmission shifts into appropriate direction — pushing handle forward causes forward boat motion, etc.

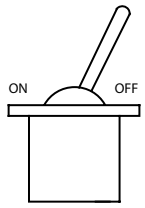
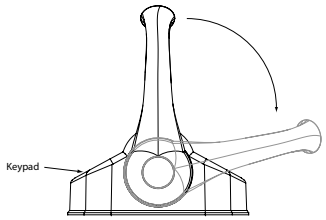
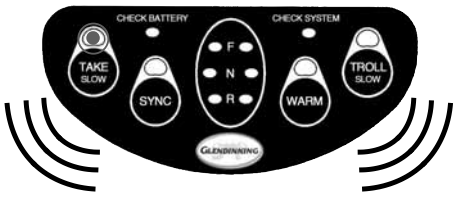
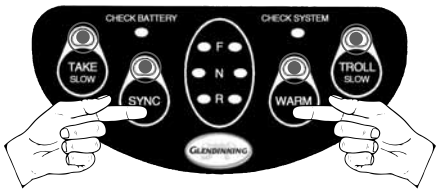
E. Trolling Valve (if equipped)

7.1	Enter Troll Mode and move handles to the forward detent — there should be little or NO propeller rotation. Rotation should increase as handle is pushed forward until Full-Lockup is achieved. Full-Lockup is verified by speed or transmission pressure.

7.0 Troubleshooting Mode

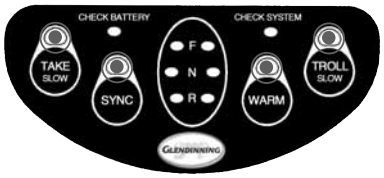
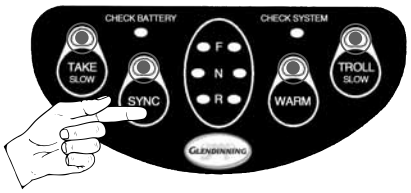
To review the stored EEC alarm codes you must first enter “Handle Troubleshoot Mode.” To do this you must use the main station control head and follow the 4 simple steps below:

To Enter Troubleshooting Mode, follow these steps:

	ACTION	RESULT
	*Turn system OFF*	*Check to see that the control head keypad LEDs are NOT illuminated. This is avisual indication that the system has been turned OFF.*
	*Move control station handles to FULL THROTTLE positions*	*The Main Station Control Head handles MUST be in the full throttle positions in order to enter Troubleshooting Mode.*
	*Turn system ON*	*When the system has been turned ON the TAKE LED will blink slowly and a beeping sound will be emitted from the keypad.*
	*Press & Release the SYNC & WARM buttons in unison 3 times*	*After pressing the two buttons, the keypad’s 4 LEDs will now begin to alternate between **slow binking** and **fast blinking** every 4 seconds.*

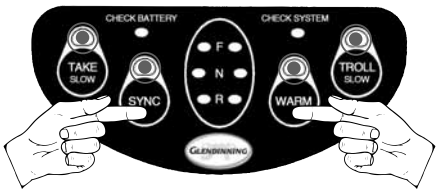
7.1 Retrieve alarm count & alarm codes

The control head keypad LEDs will alternate between **slow blinking** and **fast blinking**, every 4 seconds, to indicate the alarm count and the alarm codes. The system stores in memory the 16 most recent alarm codes beginning with the latest. See chart on following page. . .

	ACTION	RESULT
	*Record the sequence of alternating slow and fast blinking LEDs on the chart on page 38*	*This first series of alternating blinking LEDs shows the alarm count, that is how many times the system went into Alarm Mode*
	*Press & Release the SYNC button to cycle through the 16 most recent alarm codes*	*When the SYNC button is pressed and released the next series of alternating blinking LEDs will show the alarm code. Record the alarm codes on the chart on page39. Determine what the alarm codes are using the chart on page 40 and fill in the appropriate spaces on the chart on page 39.*

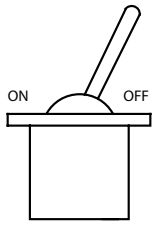
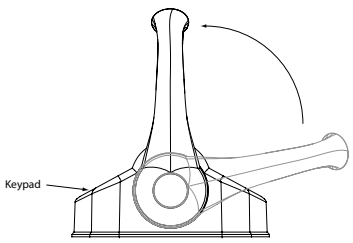
7.2 Deleting Alarm Codes and Resetting Alarm Count to Zero

While in Handle Troubleshoot Mode you can delete the 16 most recent alarm codes and reset the alarm count to zero at any time. Deleting alarm codes and resetting alarm count will minimize confusion for future troubleshooting. Follow the step below:

	ACTION	RESULT
	*Press & Release the SYNC & WARM buttons simultaneously*	*This action deletes the alarm codes and resets the alarm count to zero. All LEDs will begin to flash to indicate alarm codes have been deleted.* *You may delete alarm counts and alarm codes anytime after entering Troubleshooting mode.*

7.3 Exiting Handle Troubleshoot Mode

Once alarm codes have been reviewed and / or deleted, simply turn the system OFF and return the main station control handles to NEUTRAL before restarting system.

	ACTION	RESULT
	*Turn system power OFF*	*You have now exited Troubleshooting Mode.*
	*Move control head handles into their NEUTRAL positions*	*you may now restart the system in Normal Run Mode.*

EXAMPLE

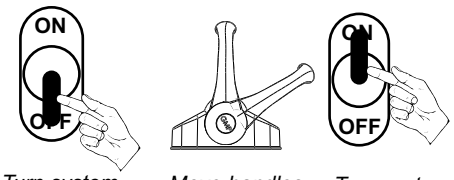
The following describes an actual problem that occurred on a boat which will illustrate the use of our troubleshooting mode.

When John turned his system on he noticed that all 4 LEDs on the keypad were flashing and the control head was beeping. He knew this was not normal and wanted to troubleshoot what was wrong.

All LEDs flashing

Beeping sound emitted

*John entered the system into "Handle Troubleshoot Mode" by **turning the system OFF**, moving the handles of the main station control **into the full throttle position**, and **turning the system back ON**. He then presses & releases the 2 center buttons on the keypad simultaneously 3 times. Now John can easily troubleshoot the problem.*



Turn system OFF *Move handles into FULL throttle position* *Turn system ON*

*John next noticed that the keypad LEDs began to alternate every 4 seconds between **slow blinking** and **fast blinking**. He recorded the LEDs that were blinking slow and the LEDs that were blinking fast on the chart (see pg. 38). The sequence below showed the system went into alarm a total of 3 times.*

Slow blinking

Fast blinking

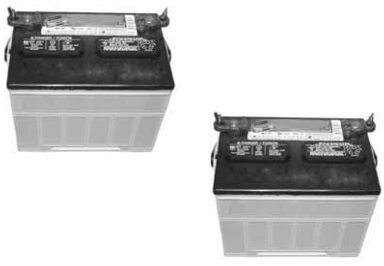
*John **pressed the SYNC button** to reveal the first alarm code. He recorded the sequence of blinking LEDs (pg. 39) and using the alarm code description chart (pg. 40), John determined that the battery voltage at startup was below 9.6 volts. By pressing the SYNC button a second time John was able to retrieve the next alarm code, and repeated this process for the last alarm code.*

Slow blinking

Fast blinking

Now that John discovered that the reason for the EEC system alarm code was low battery input voltage, he was able to focus on discovering the reason for this low battery voltage. After further investigation, he found two problems with his battery supply to the control system. The first problem is that only one battery power sources was connected to the EEC system, rather than two battery sources (see sec. 3.0 - Power Supply / Enable Switch for more information).

Secondly, the battery source that was connected (generator battery) was very low in voltage due to a failed battery charger. John fixed the problem with the generator battery charger, which charged the generator battery, and the EEC system immediately began to operate. Later, John had his marine electrician install a wire and circuit breaker to his house (domestic) battery source to provide a second battery source for the EEC system.



Alarm Count Chart

LEDs SLOW BLINKING				LEDs FAST BLINKING				= alarm count _____
TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL	

COUNT	LEDs SLOW BLINKING				LEDs FAST BLINKING			
	TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL
1	☼							
2		☼						
3	☼	☼						
4			☼					
5	☼		☼					
6		☼	☼					
7	☼	☼	☼					
8				☼				
9	☼			☼				
10		☼		☼				
11	☼	☼		☼				
12			☼	☼				
13	☼		☼	☼				
14		☼	☼	☼				
15	☼	☼	☼	☼				
16					☼			
17	☼				☼			
18		☼			☼			
19	☼	☼			☼			
20			☼		☼			
21	☼		☼		☼			
22		☼	☼		☼			
23	☼	☼	☼		☼			
24				☼	☼			
25	☼			☼	☼			
26		☼		☼	☼			
27	☼	☼		☼	☼			
28			☼	☼	☼			
29	☼		☼	☼	☼			
30		☼	☼	☼	☼			
31	☼	☼	☼	☼	☼			
32						☼		

COUNT	LEDs SLOW BLINKING				LEDs FAST BLINKING			
	TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL
33	☼					☼		
34		☼				☼		
35	☼	☼				☼		
36			☼			☼		
37	☼		☼			☼		
38		☼	☼			☼		
39	☼	☼	☼			☼		
40				☼		☼		
41	☼			☼		☼		
42		☼		☼		☼		
43	☼	☼		☼		☼		
44			☼	☼		☼		
45	☼		☼	☼		☼		
46		☼	☼	☼		☼		
47	☼	☼	☼	☼		☼		
48					☼	☼		
49	☼				☼	☼		
50		☼			☼	☼		
51	☼	☼			☼	☼		
52			☼		☼	☼		
53	☼		☼		☼	☼		
54		☼	☼		☼	☼		
55	☼	☼	☼		☼	☼		
56				☼	☼	☼		
57	☼			☼	☼	☼		
58		☼		☼	☼	☼		
59	☼	☼		☼	☼	☼		
60			☼	☼	☼	☼		
61	☼		☼	☼	☼	☼		
62		☼	☼	☼	☼	☼		
63	☼	☼	☼	☼	☼	☼		

Record alarm codes

Pressing the SYNC button will advance from the alarm count to alarm codes 1 - 16. Record each alarm code by placing an “X” in the appropriate space on the chart (below). After recording each alarm code press SYNC to cycle through each code.

#	LEDs SLOW BLINKING				LEDs FAST BLINKING				ALARM CODE DESCRIPTION
	TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

Once all alarm codes have been recorded, look up the alarm code in the table (following page) and record the alarm code description in the space provided next to each alarm code above.

Alarm Codes Description chart

Check alarm code values that you recorded on the opposite page with the list of alarm code descriptions below. Enter the description in the appropriate column on the chart.

LEDs SLOW BLINKING				LEDs FAST BLINKING				ALARM CODE DESCRIPTION
TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL	
☼								Detected multiple handles with the same handle ID at startup.
	☼							Combined battery input below 9V for 12V or 18V for 24V systems.
☼	☼							No handle connected at startup.
☼	☼		☼					Handle #1 PORT potentiometer reading below 0.25V or above 4.75V.
		☼	☼					Handle #2 PORT potentiometer reading below 0.25V or above 4.75V.
☼		☼	☼					Handle #3 PORT potentiometer reading below 0.25V or above 4.75V.
	☼	☼	☼					Handle #4 PORT potentiometer reading below 0.25V or above 4.75V.
☼	☼	☼	☼					Handle #5 PORT potentiometer reading below 0.25V or above 4.75V.
				☼				Handle #6 PORT potentiometer reading below 0.25V or above 4.75V.
☼		☼		☼				Handle #1 STBD potentiometer reading below 0.25V or above 4.75V.
	☼	☼		☼				Handle #2 STBD potentiometer reading below 0.25V or above 4.75V.
☼	☼	☼		☼				Handle #3 STBD potentiometer reading below 0.25V or above 4.75V.
			☼	☼				Handle #4 STBD potentiometer reading below 0.25V or above 4.75V.
☼			☼	☼				Handle #5 STBD potentiometer reading below 0.25V or above 4.75V.
	☼		☼	☼				Handle #6 STBD potentiometer reading below 0.25V or above 4.75V.
☼	☼	☼	☼	☼				**CP lost communication with Handle #1.
					☼			**CP lost communication with Handle #2.
☼					☼			**CP lost communication with Handle #3.
	☼				☼			**CP lost communication with Handle #4.
☼	☼				☼			**CP lost communication with Handle #5.
		☼			☼			**CP lost communication with Handle #6 (will not be stored).
** = Handle loosing communication will cause an alarm condition if handle is the active handle at time of fault								

If any alarm occurs, the cause of the alarm must be determined as soon as possible after returning to the dock. The alarm codes may be recovered to assist in troubleshooting. Contact Glendinning Marine Products for assistance.

Days (843) 399-6146

Evenings (843) 477-6630

The above number is a digital pager available during evening hours and/or weekends. Enter your phone # after you hear 3 beeps.
Service personnel will return your call.

8.0 Appendix / Reference

The Appendix / Reference section is divided as follows:

8.1 Wiring Diagrams (many other enigne layouts available, contact GMP)

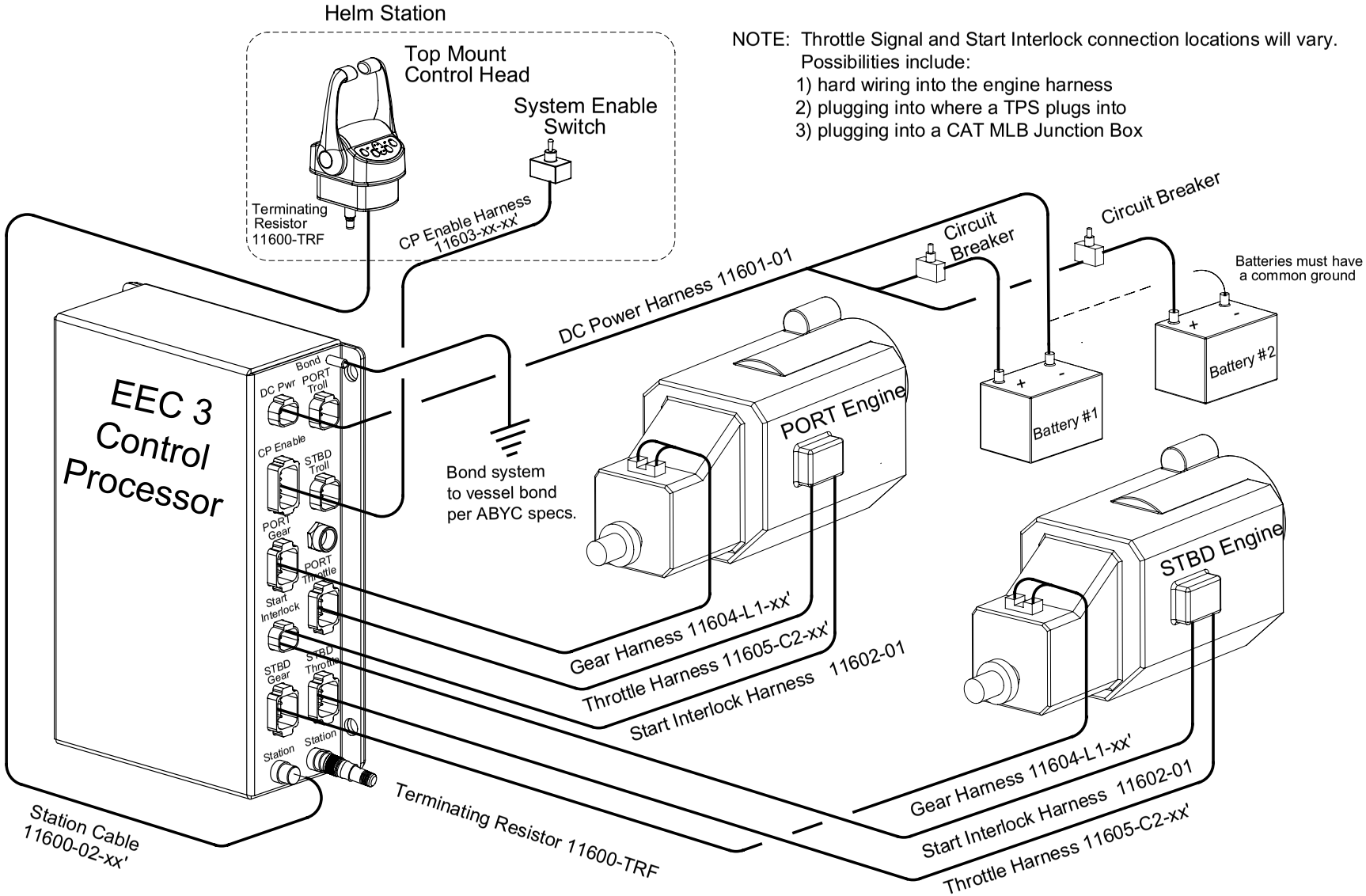
8.2 Dimensional Drawings / Cutout Templates

8.3 Gear / Throttle Backup (optional)

8.4 Sidemount Controls Installation (optional)

8.5 Smart Actuator Integration (optional)

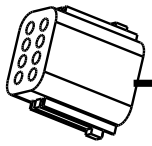
EEC 3 Control System Wiring Diagram - CAT Engine with ZF IRM Transmisions



EEC 3 Control System Harnesses - CAT Engine with ZF IRM Transmissions

Throttle Signal Harness

Part # 11605-C1-xx' has 3 pos. Deutsch Connector which plug into where a CAT TPS plugs into
Part # 11605-C2-xx' has a blunt cut end for wiring into harnesses
Part # 11605-C3-xx' had a 12pos. Deutsch for plugging into a CAT MLB Junction Box



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Processor End
Duetsch 8 pos. Black

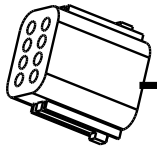
Cat Engine End

Red wire - Batt. Pos.
White wire - Throttle Output PWM Signal
Green wire - Batt. Neg.

Transmission Harness

Part # 11604-L1-xx' with LED indicators

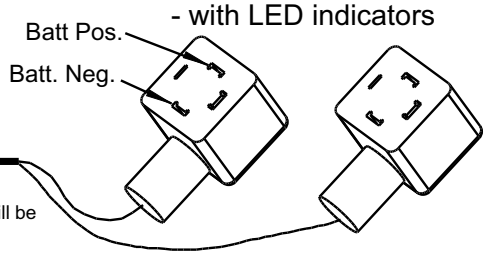
ZF Solenoid Valve Connectors - with LED indicators



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Processor End
Duetsch 8 pos. Grey

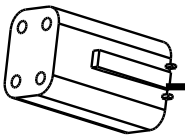
NOTE: Voltage output will be the same as input to CP



DC Power Harness

Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard (custom lengths available)



(Noise Supression devices)

Control Process End
Duetsch 4 pos. Black

Battery Positive #1 (Red wire)
Battery Positive #2 (Red wire)
Battery Negative (yellow wire)

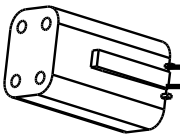
Start Interlock Harness

Part # 11602-01 (30' long std.)

NOTE: N.C. circuit between wires for PORT and STBD
Circuit OPENS when system is ON and is NOT in Neutral position
8 amp max current

NOTE: Each start interlock wire is 30' long standard (custom lengths available)

NOTE : All wires are yellow with red stripe



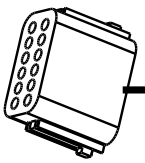
PORT
STBD

Control Process End Duetsch 4 pos. Black

CP Enable Harness

Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch with switch namepate



(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

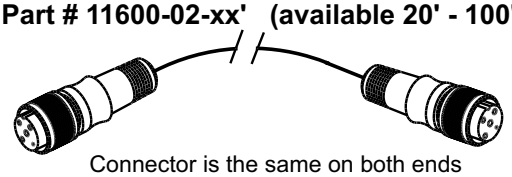
White
Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

Station Cable

Part # 11600-02-xx' (available 20' - 100' in 20' increments)

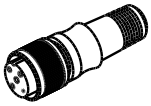


Connector is the same on both ends

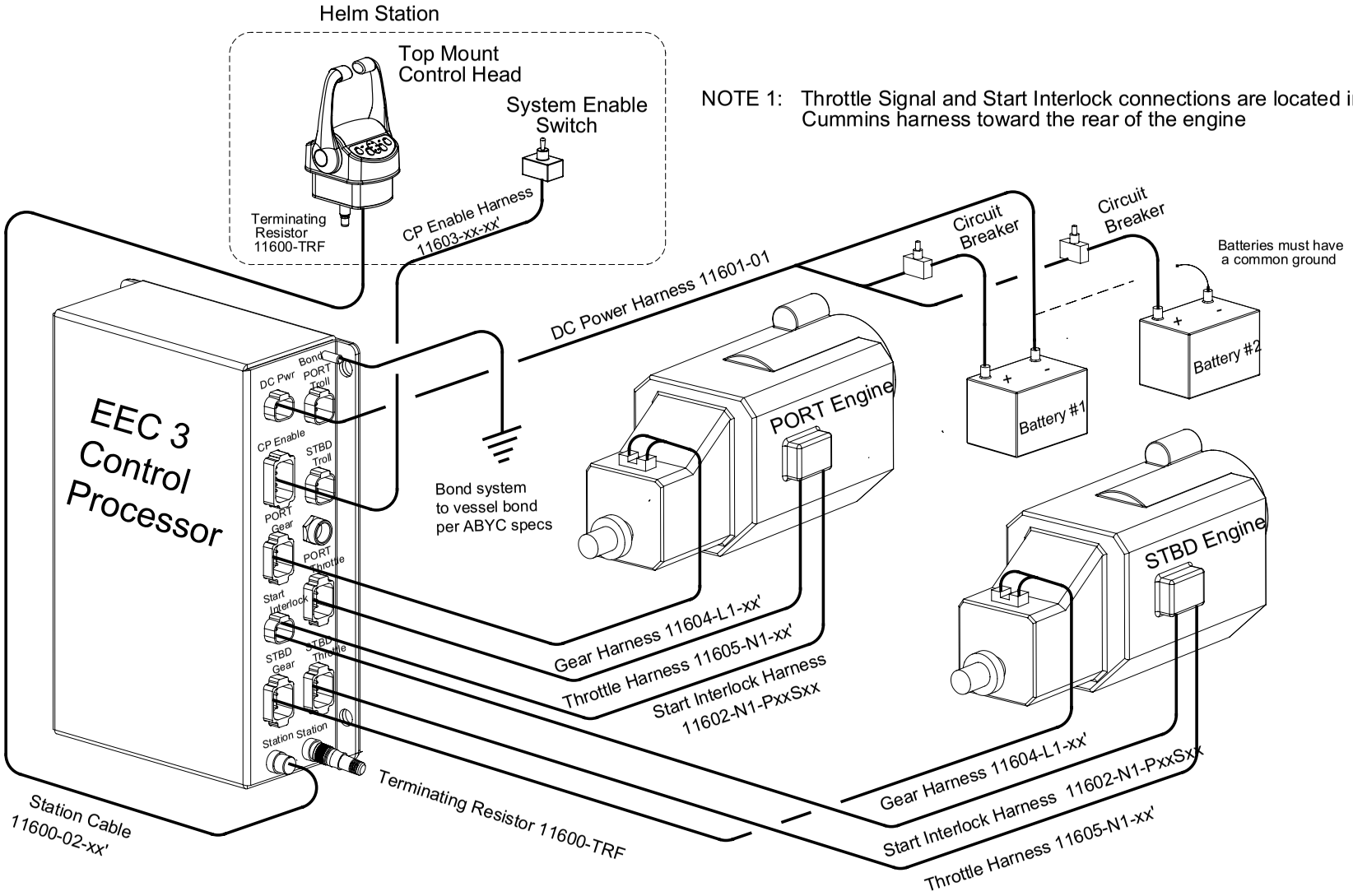
Terminating Resistor

Part # 11600-TRF

Two required per system



EEC 3 Control System Wiring Diagram - Cummins QSM11 with ZF IRM Transmisions

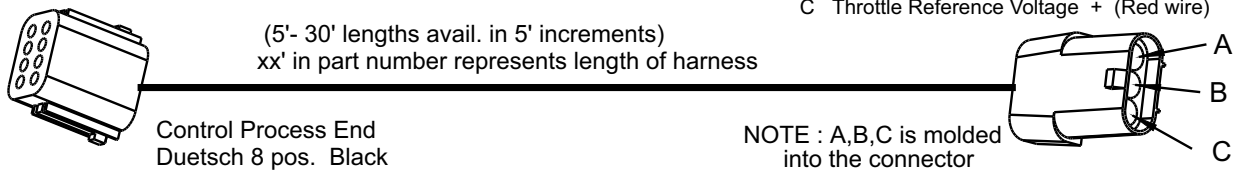


EEC 3 Control System Harnesses - Cummins QSM11 with ZF IRM Transmisions

Throttle Signal Harness
Part # 11605-N1-xx'

Packard Weatherpack
3 pos. Connector

Connections
A Throttle Reference Voltage - (Green wire)
B Throttle Voltage Signal (White Wire)
C Throttle Reference Voltage + (Red wire)

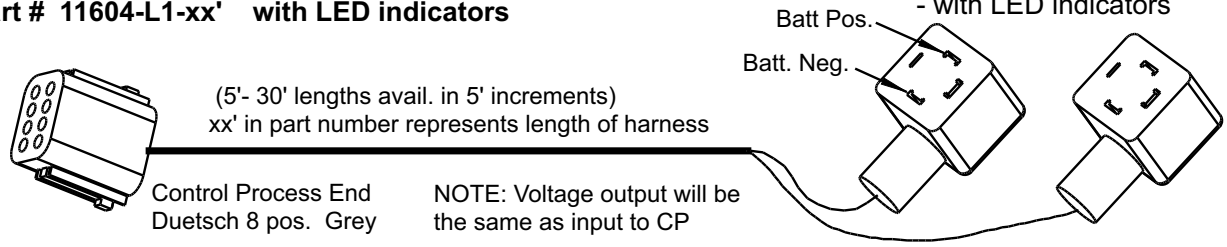


Control Process End
Duetsch 8 pos. Black

NOTE : A,B,C is molded into the connector

Transmission Harness
Part # 11604-L1-xx' with LED indicators

ZF Solenoid Valve Connectors
- with LED indicators

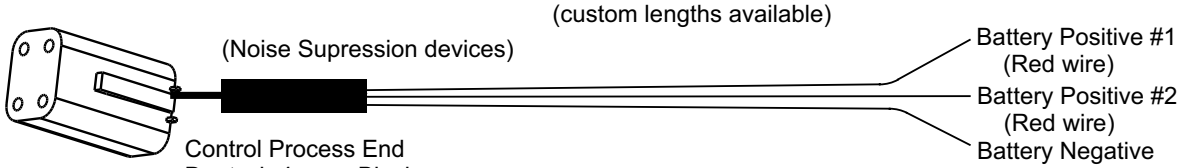


Control Process End
Duetsch 8 pos. Grey

NOTE: Voltage output will be the same as input to CP

DC Power Harness
Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard
(custom lengths available)

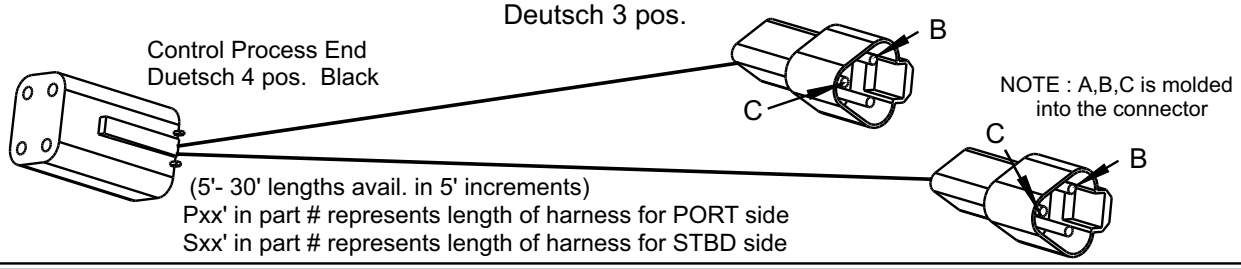


Control Process End
Duetsch 4 pos. Black

Start Interlock Harness
Part # 11602-N1-PxxSxx

Cummins Start
Interlock Connector
Deutsch 3 pos.

NOTE: N.C. Circuit between B & C positions.
Circuit OPENS when system is ON and
NOT in Neutral position - 8 amp max current

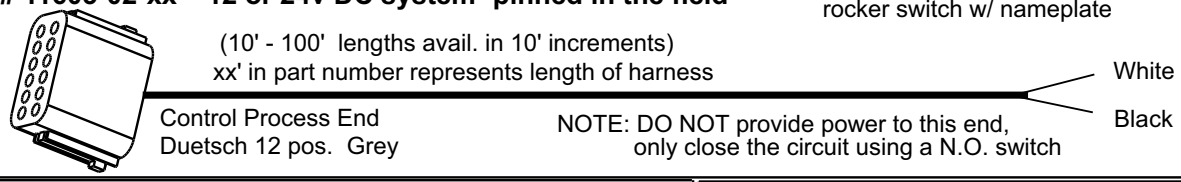


Control Process End
Duetsch 4 pos. Black

NOTE : A,B,C is molded into the connector

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

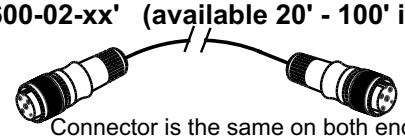
CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch w/ nameplate



Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

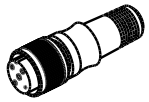
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



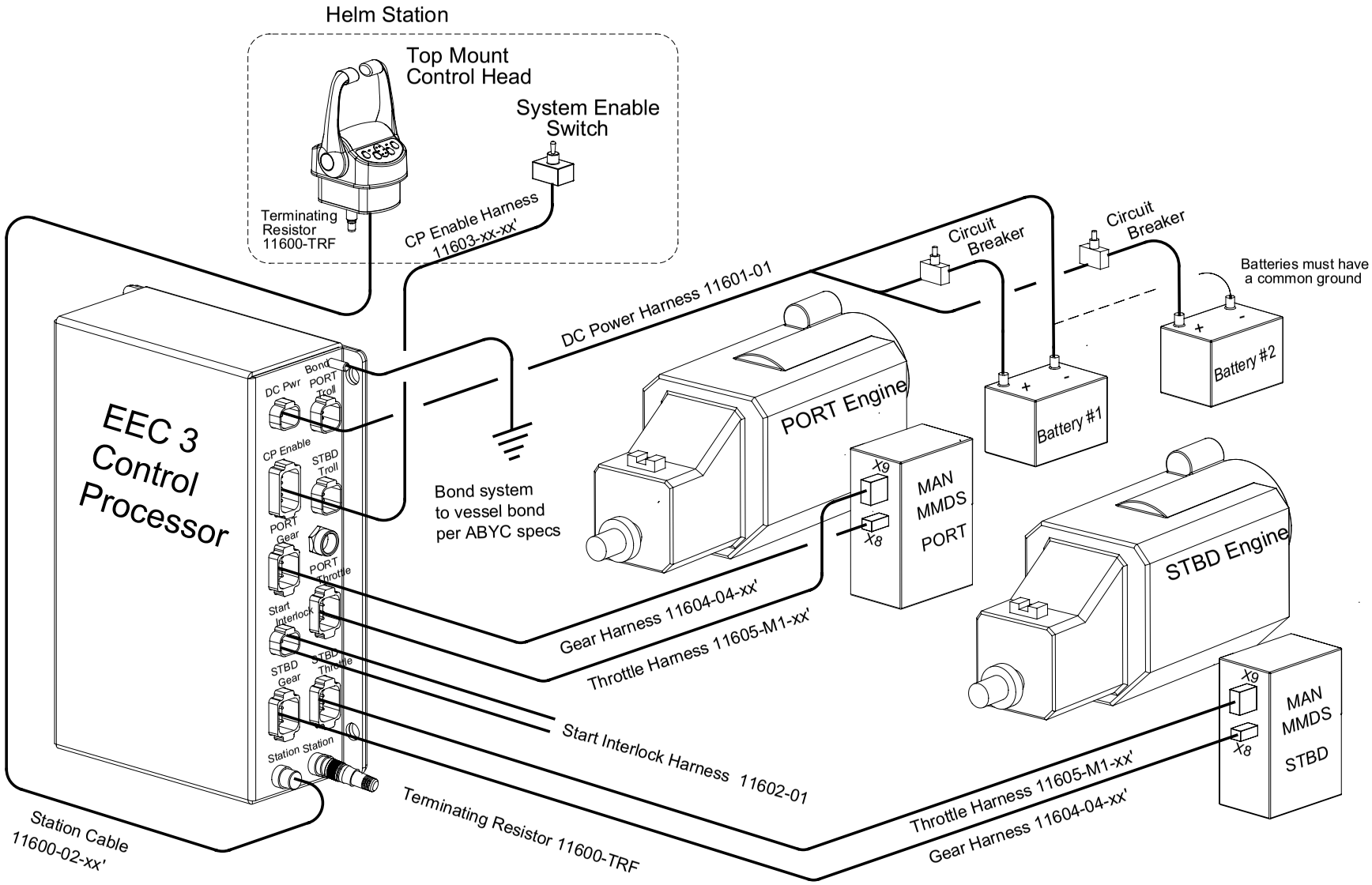
Connector is the same on both ends

Terminating Resistor
Part # 11600-TRF

Two required per system



EEC 3 Control System Wiring Diagram - MAN Engine with ZF IRM Transmisions



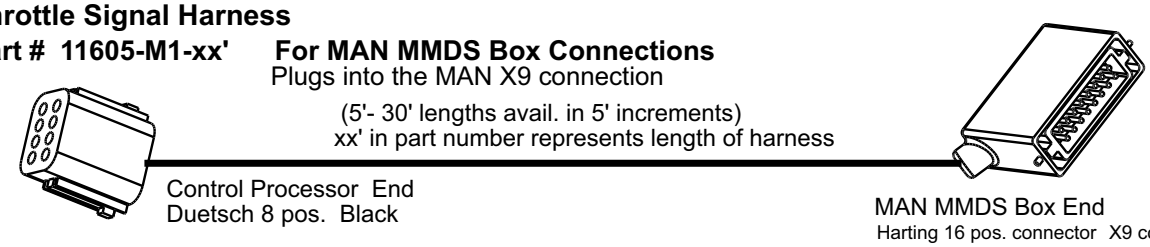
EEC 3 Control System Harnesses - MAN Engine MMDS with ZF IRM Transmisions (using gear connections at the X8 MAN MMDS Box)

Throttle Signal Harness

Part # 11605-M1-xx' For MAN MMDS Box Connections

Plugs into the MAN X9 connection

(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness



Control Processor End
Duetsch 8 pos. Black

MAN MMDS Box End
Harting 16 pos. connector X9 connection

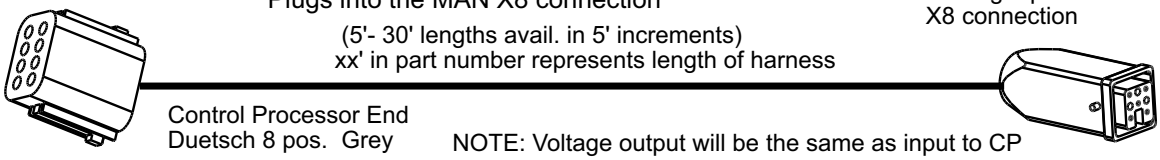
Transmission Harness

Part # 11604-04-xx' For MAN MMDS Box connection

Plugs into the MAN X8 connection

MAN MMDS Box End
Harting 8 pos. connector
X8 connection

(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness



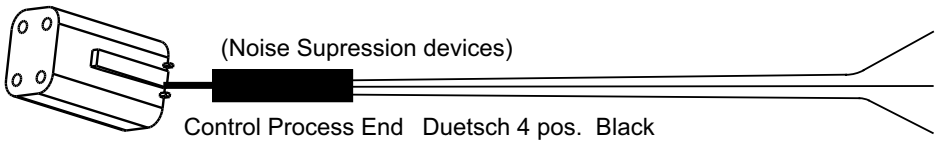
Control Processor End
Duetsch 8 pos. Grey

NOTE: Voltage output will be the same as input to CP

DC Power Harness

Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard
(custom lengths available)



(Noise Supression devices)

Battery Positive #1
(Red wire)

Battery Positive #2
(Red wire)

Battery Negative
(yellow wire)

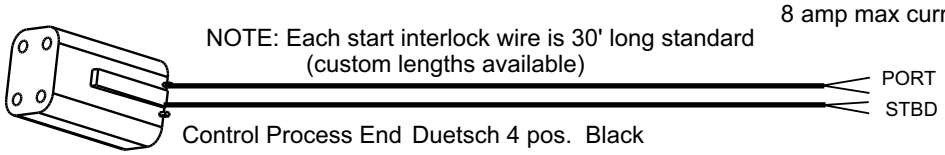
Control Process End Duetsch 4 pos. Black

Start Interlock Harness

Part # 11602-01 (30' long std.)

NOTE: N.C. circuit between wires for PORT and STBD
Circuit OPENS when system is ON and
is NOT in Neutral position
8 amp max current

NOTE: Each start interlock wire is 30' long standard
(custom lengths available)



PORT
STBD

NOTE : All wires are yellow
with red stripe

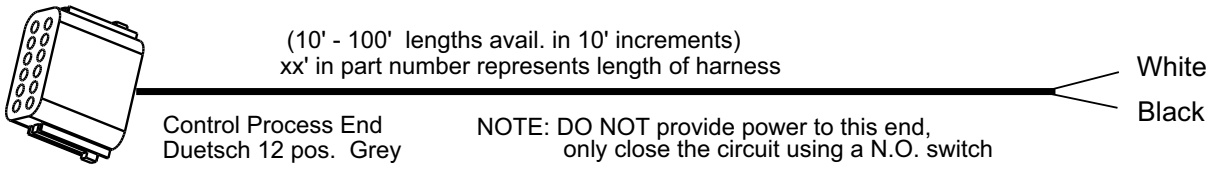
Control Process End Duetsch 4 pos. Black

CP Enable Harness

Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch
with switch namepate

(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness



White

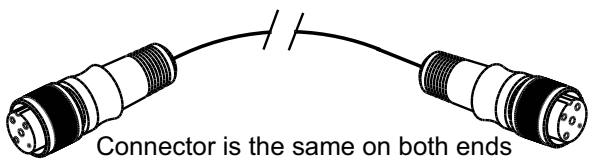
Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end,
only close the circuit using a N.O. switch

Station Cable

Part # 11600-02-xx' (available 20' - 100' in 20' increments)

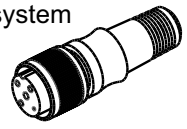


Connector is the same on both ends

Terminating Resistor

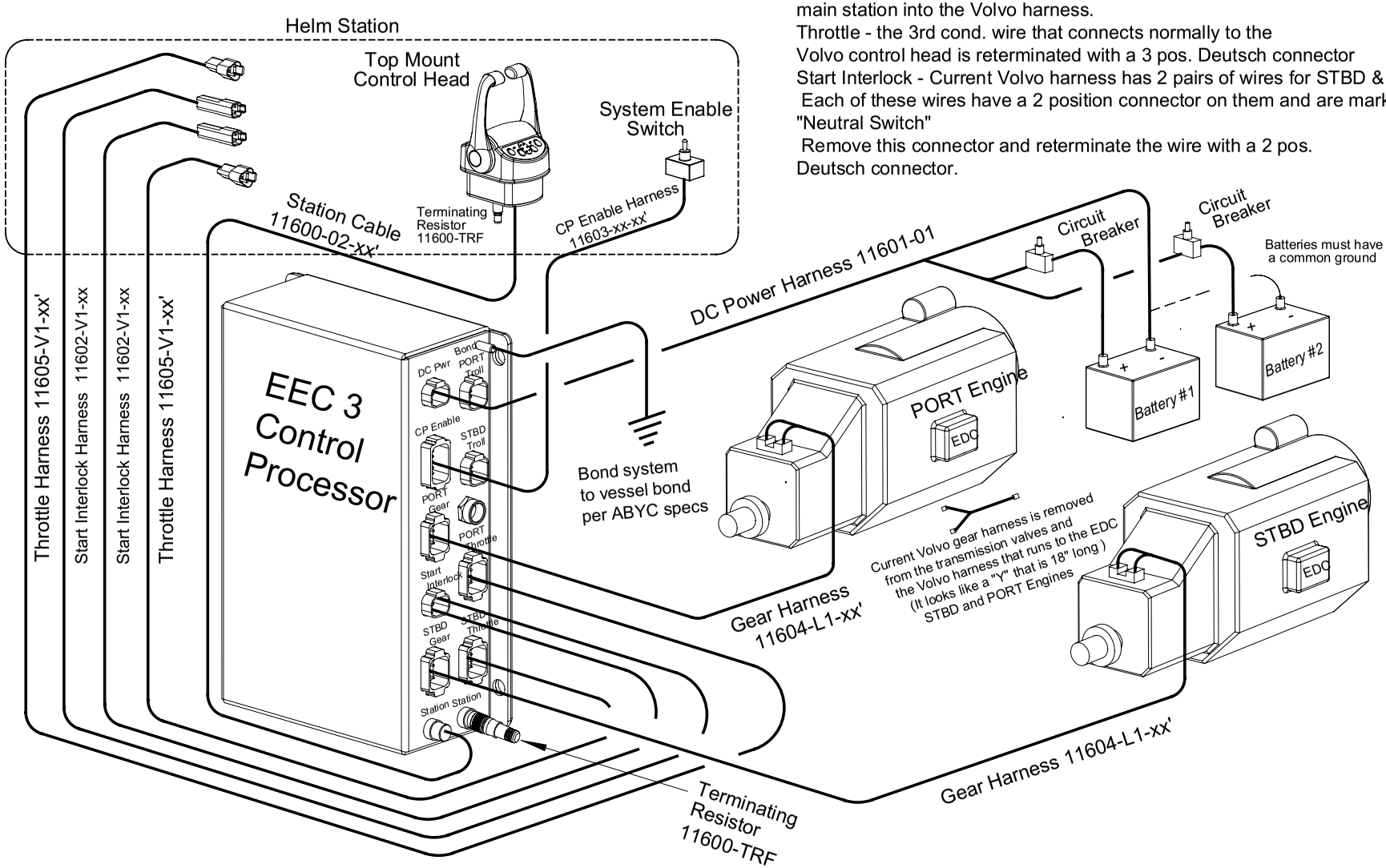
Part # 11600-TRF

Two required per system



EEC 3 Control System Wiring Diagram - Volvo EDC with ZF IRM Transmisions

NOTE 1:Throttle Signal and Start Interlock connections are made at the main station into the Volvo harness.
Throttle - the 3rd cond. wire that connects normally to the Volvo control head is reterminated with a 3 pos. Deutsch connector
Start Interlock - Current Volvo harness has 2 pairs of wires for STBD & PORT. Each of these wires have a 2 position connector on them and are marked "Neutral Switch"
Remove this connector and reterminate the wire with a 2 pos. Deutsch connector.

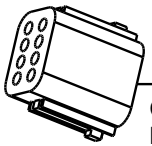


EEC 3 Control System Harnesses - Volvo EDC with ZF IRM Transmisions

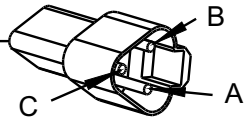
Throttle Signal Harness
Part # 11605-V1-xx'

Volvo Harness End Duetsch 3 pos. Connector
- note see next page for wiring harness connections

Connections
A Throttle Reference Voltage - (Green wire)
B Throttle Voltage Signal (White Wire)
C Throttle Reference Voltage + (Red wire)



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

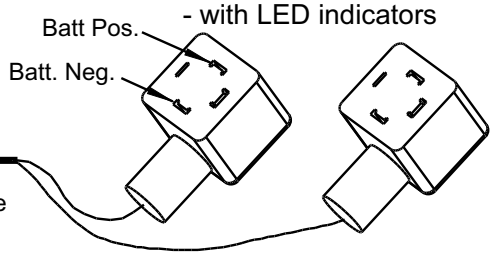


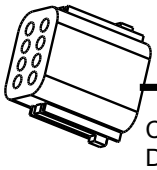
Control Process End
Duetsch 8 pos. Black

NOTE : A,B,C is molded into the connector
See next page for Volvo Harness connections

Transmission Harness
Part # 11604-L1-xx' with LED indicators

ZF Solenoid Valve Connectors
- with LED indicators





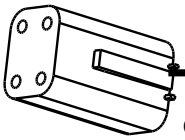
(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Process End
Duetsch 8 pos. Grey

NOTE: Voltage output will be
the same as input to CP

DC Power Harness
Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard
(custom lengths available)



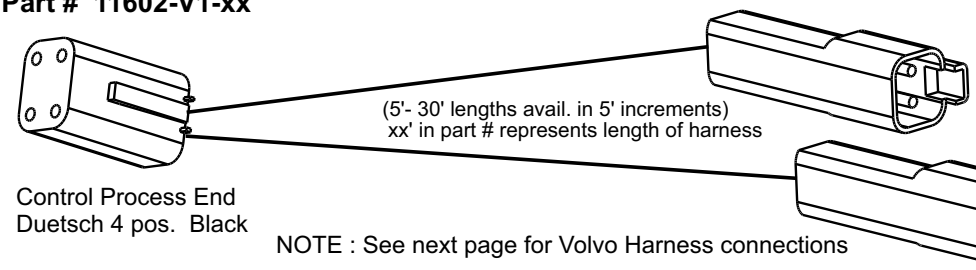
(Noise Supression devices)

Battery Positive #1
(Red wire)
Battery Positive #2
(Red wire)
Battery Negative
(yellow wire)

Control Process End
Duetsch 4 pos. Black

Start Interlock Harness
Part # 11602-V1-xx

Volvo Harness End
Deutsch 2 pos. Connector



NOTE: N.C. Circuit between
pins - Circuit OPENS when
system is ON and NOT in
Neutral position
8 amp max current

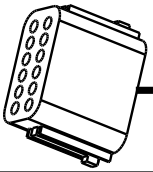
(5'- 30' lengths avail. in 5' increments)
xx' in part # represents length of harness

Control Process End
Duetsch 4 pos. Black

NOTE : See next page for Volvo Harness connections

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof
rocker switch w/ nameplate



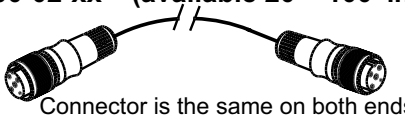
(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

White
Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end,
only close the circuit using a N.O. switch

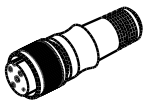
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



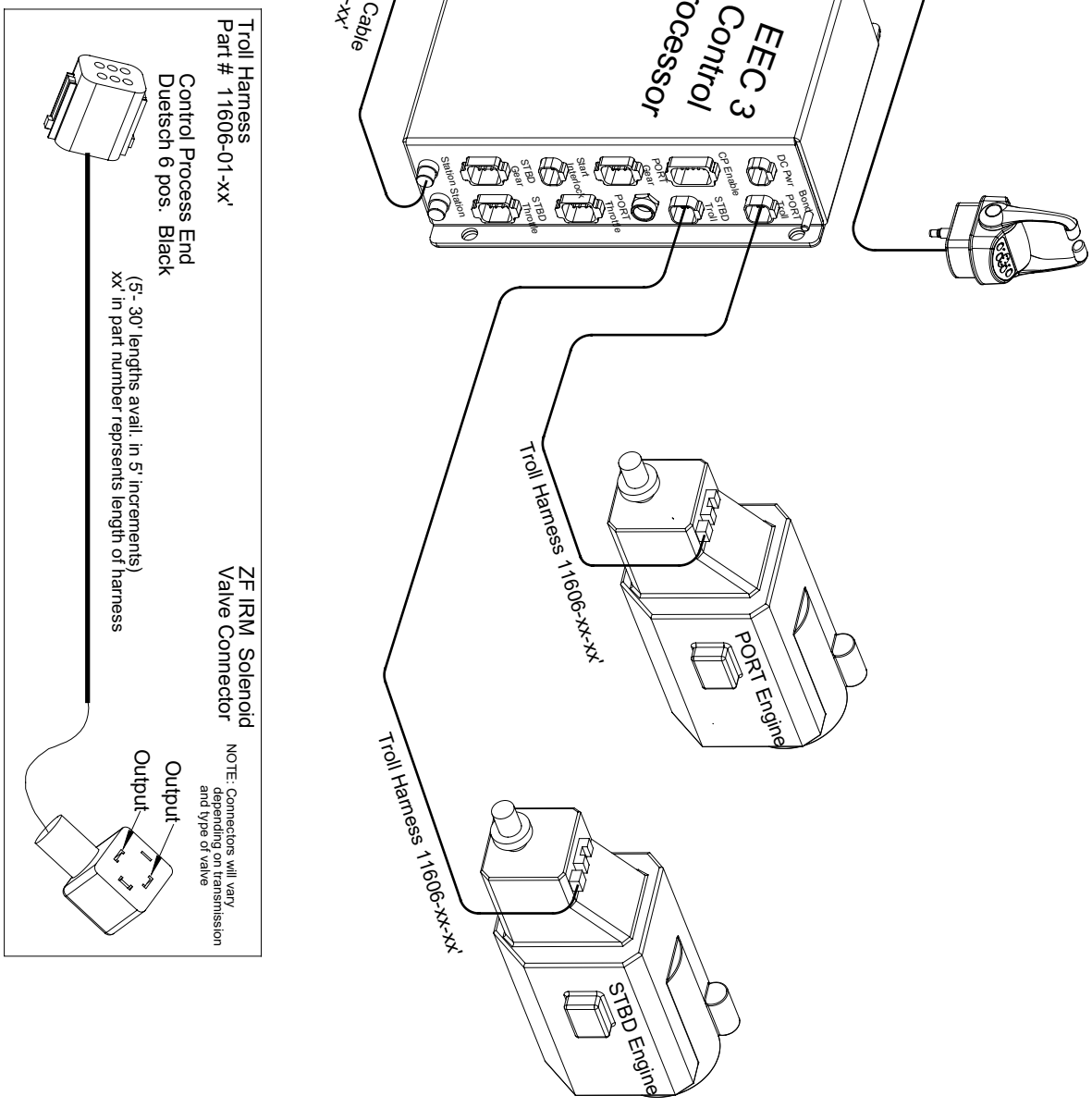
Connector is the same on both ends

Terminating Resistor
Part # 11600-TRF

Two required per system



EEC3 Troll Harness Connections (other harnesses available—contact GMP for details)



EEC3 Control Processor Pinout Connection

DC Power Connector (4 pin-Gray)

(1) Battery Positive 1 (3) Battery Ground 1
(2) Battery Positive 2 (4) Battery Ground 2 (optional, if required)

CP Enable/Spare Connector (12 pin-Gray)

(1) Ign. input 1/Spare output 1 (COM1)
(2) Ign. input 2/Spare output 1 (COM2)
(3) Spare output 2 (COM)
(4) Switch select - Ignition
(5) Voltage select -12V*
(6) Voltage select - (COM)*
(7) Voltage select - 24V*
(8) Switch select - dry switch*
(9) Switch select - (COM)*
(10) Spare output 2 (NO)
(11) Ign. output 2/Spare output 1 (NO2)
(12) Ign. output 1/Spare output 1 (NO1)

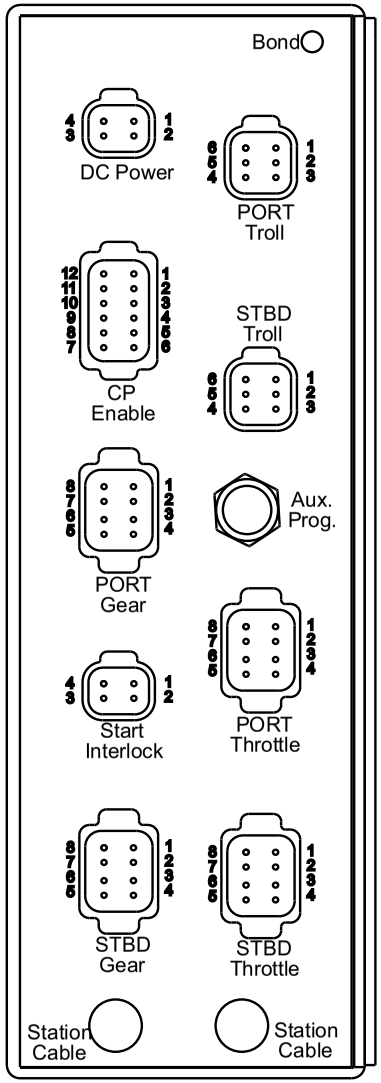
Note:
* references commonly used pins for this connector.
12V -(pins: 5,6) (8,9 - jumper),
24V -(pins: 6,7) (8,9 - jumper)

Start Interlock Connector (4 pin-Gray)

(1) PORT Start Interlock 1 (3) STBD Start Interlock 1
(2) PORT Start Interlock 2 (4) STBD Start Interlock 2

PORT/STBD Gear Connectors (8 pin-Gray)

(1) FWD Battery Positive + (5) REV Battery Negative -
(2) FWD Switch (COM) (6) REV Switch (NO)
(3) FWD Switch (NO) (7) REV Contact (COM)
(4) FWD Battery Negative - (8) REV Battery Positive +



PORT/STBD Troll Connectors (current based) 6 pin-Gray

(1) Adj. current Pos. + (4) Chassis Ground
(2) Sec. coil Pos. (+12/24VDC) (5) Sec. coil Neg. (GND)
(3) Not Used (6) Adj. current Neg. -

PORT/STBD Troll Connectors (voltage based) 6 pin-Gray

(1) 5v Reference (4) Enable Common
(2) Ground (5) Enable N.O.
(3) Output signal (6) Not used

Throttle Connections - 4 available Types

PORT/STBD Throttle Connectors- Voltage Type (8 pin-Black)

(1) Not used (5) Not Used
(2) Ref. voltage Pos.+ (6) Not Used
(3) Ref. voltage Neg.- (7) Not used
(4) Voltage signal (8) Chassis ground

PORT/STBD Throttle Connectors- PWM Type (8 pin-Black)

(1) Batt./PWM Pos. + (5) Not used
(2) PWM output signal (6) Not used
(3) Batt./PWM Neg. - (7) Not used
(4) Not used (8) Chassis ground

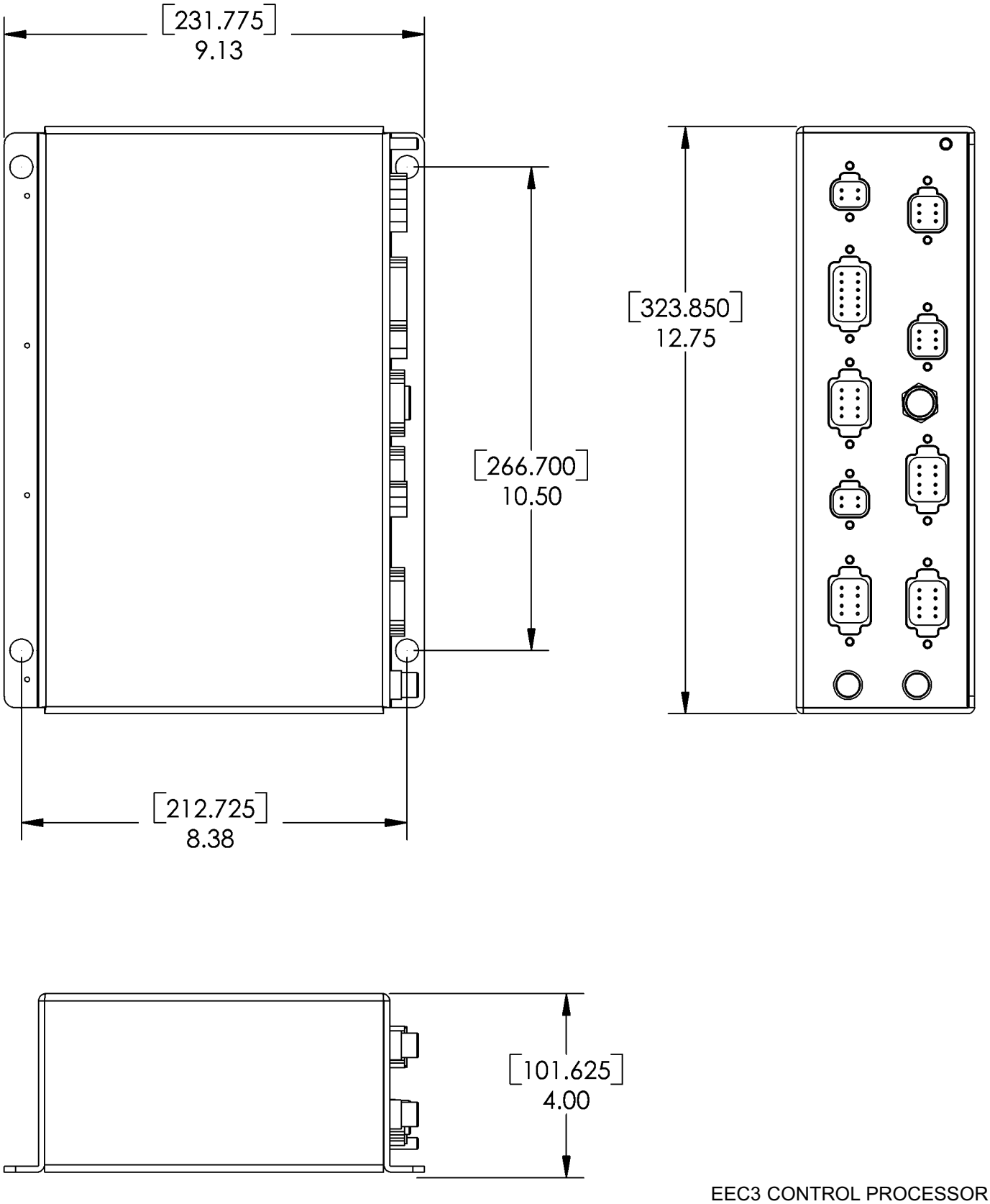
PORT/STBD Throttle Connectors- 4-20mA Type (8 pin-Black)

(1) Not used (5) 4-20mA output Pos. +
(2) Speed sig. input Pos. + (6) 4-20mA output Neg. -
(3) Not used (7) Speed sig. input Neg. -
(4) Not used (8) Chassis ground

PORT/STBD Throttle Connectors- MEFI Type (8 pin-Black)

(1) Ref. voltage 2 Pos. + (5) Output signal 2
(2) Ref. voltage 1 Pos. + (6) Ref. voltage 1 Neg. -
(3) Ref. voltage 1 Neg. - (7) Not used
(4) Output signal 1 (8) Chassis ground

Control Processor Dimensions



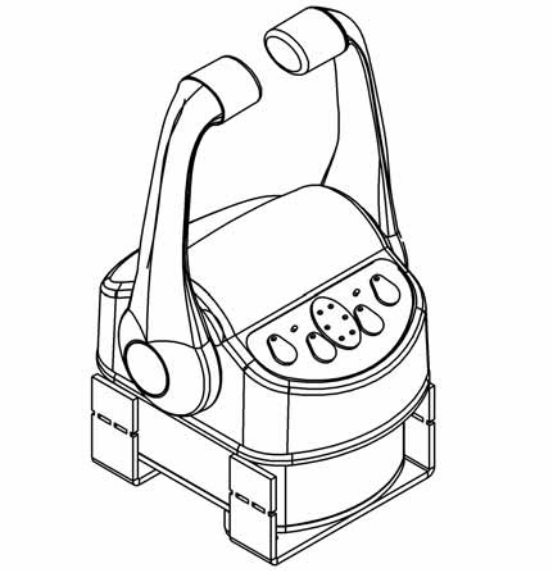
EEC3 CONTROL PROCESSOR

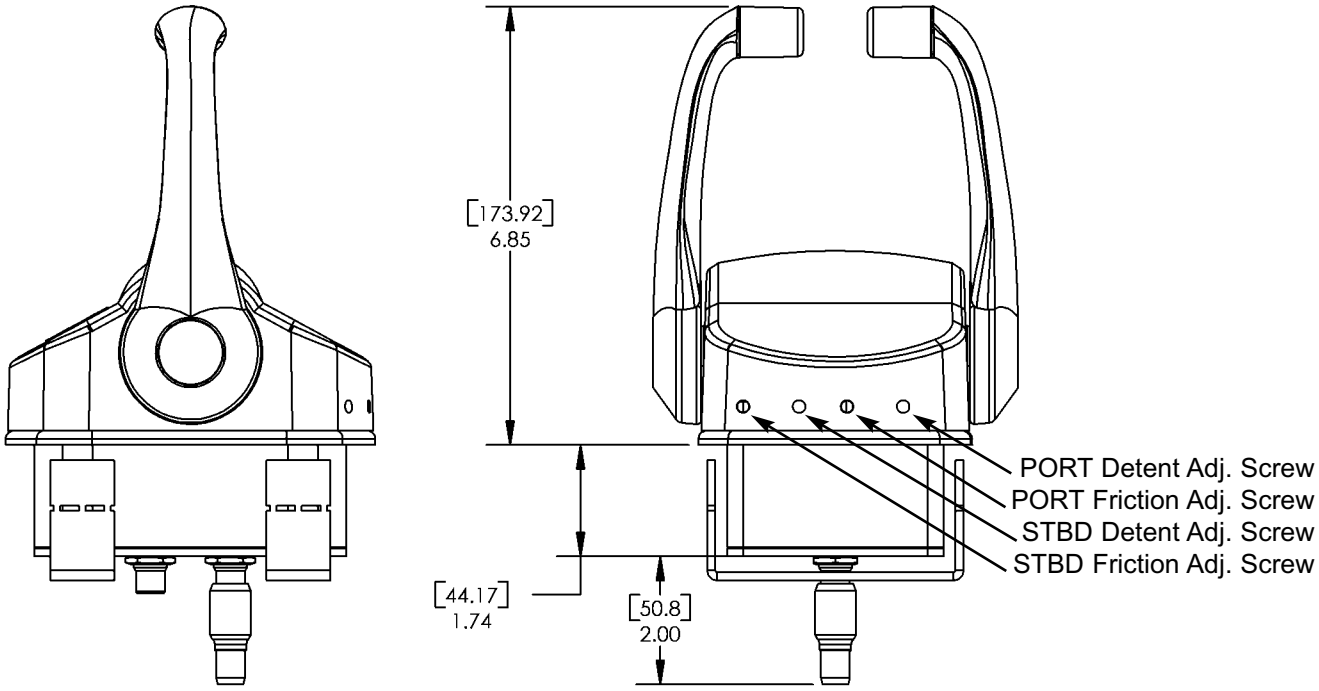
GMP PART# 11230

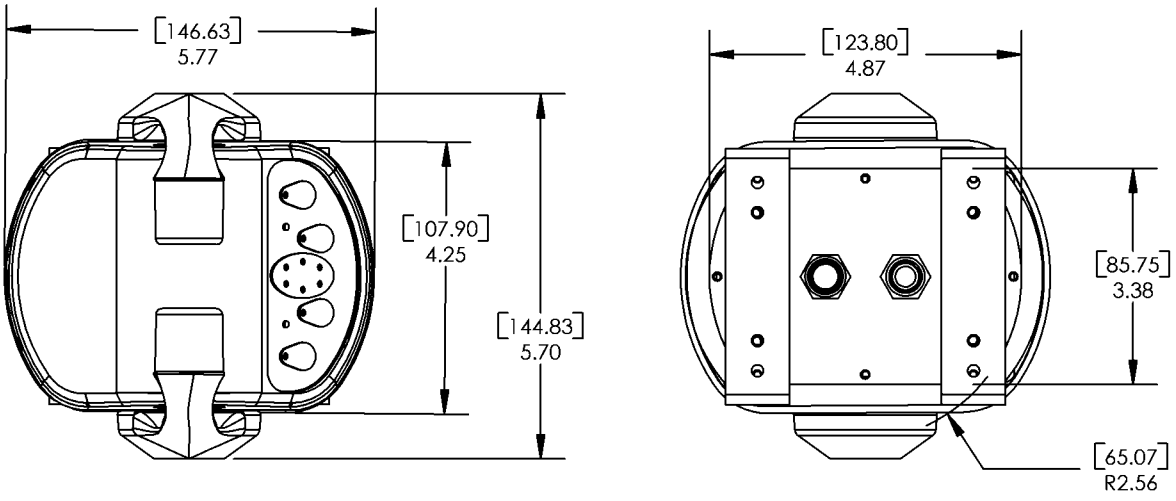
Control Head Dimensions (Top Mount)

EEC3 CONTROL HEAD (TOP MOUNT)

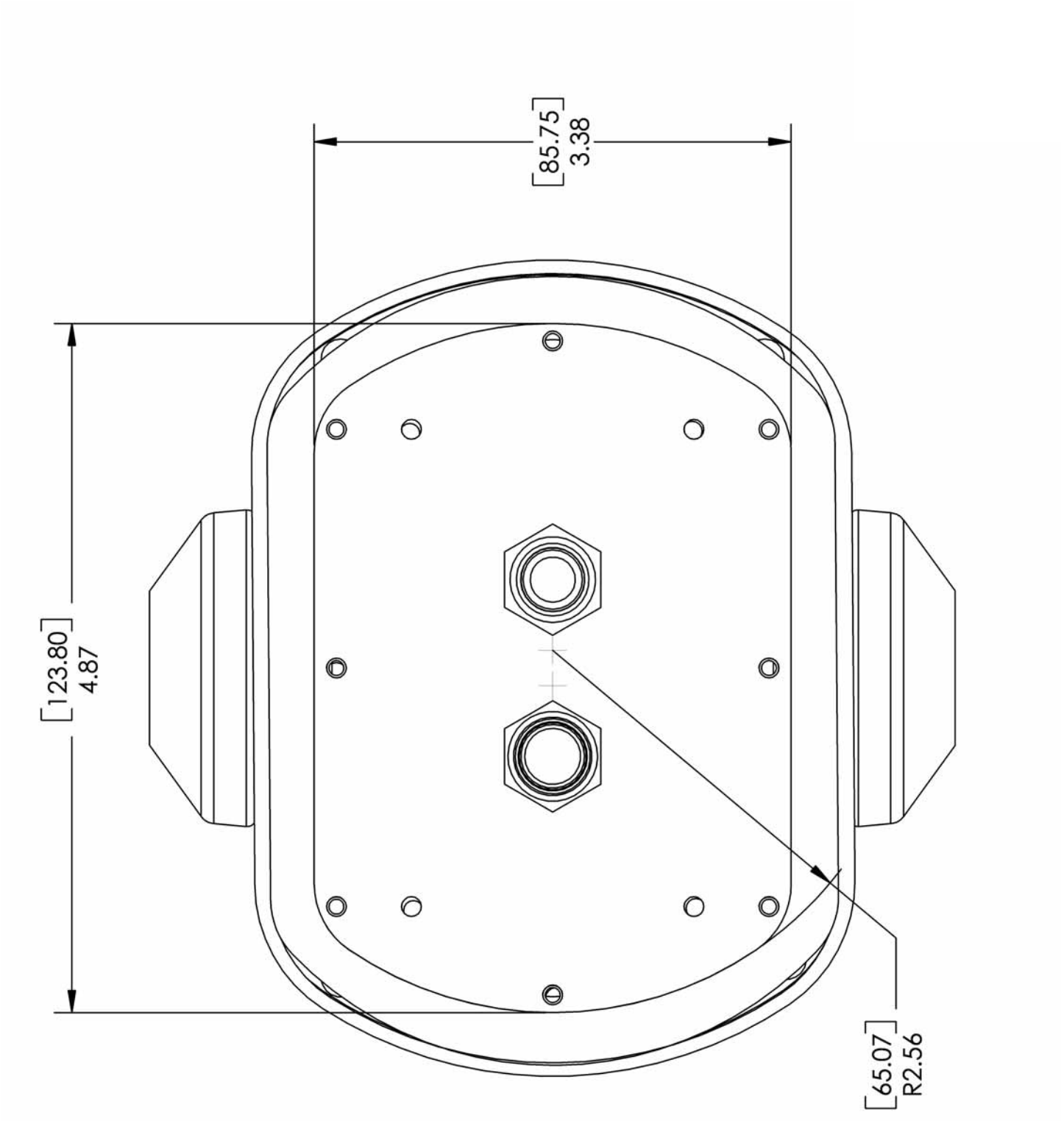
GMP PART# 11413-C15T







Cutout Template for Control Head (Top Mount)



8.3 Gear / Throttle Backup System (optional)

A. Description

The EEC Gear / Throttle Backup System allows the control of the transmission solenoid valves, as well as engine throttle through separate potentiometers other than the EEC Control System in the event of a failure. These separate potentiometers are mounted in one of the EEC Control Heads installed in the vessel. The switchover from the normal operation to backup operation is actuated by an Enable Switch mounted in the console. This Enable Switch turns on the Transfer Box which transfers control of the gear / throttle from the EEC Control System to the backup system. Presently this backup system is only for the gear / throttle and not for the trolling valves. In failure conditions the trolling valve will default to full lock-up when power is removed.

B. Operation

Under normal operations, the gear and throttle are controlled by our EEC Control Processor (CP). This signal runs through the normally closed contacts of a relay in the Backup Transfer Box.

Once there is a failure of the control system, (noted by all four mode LED's blinking and a tone is heard from the Control Head) the vessel captain would switch the backup system switch on. (Note, we recommend that this on/off enable switch be protected so it cannot be accidentally energized.) This would energize all the relays in the Transfer Box and the gear / throttle would then be controlled by the backup potentiomenters that are mounted in one of the boat Control Heads. One other feature that is still operational in the backup mode is the start interlock function. This function will not allow the captain to start the engines when the transmissions are in forward or reverse gear. They must be in neutral in order to start the engines.

Backup System Items

There are three main components of the Backup System.

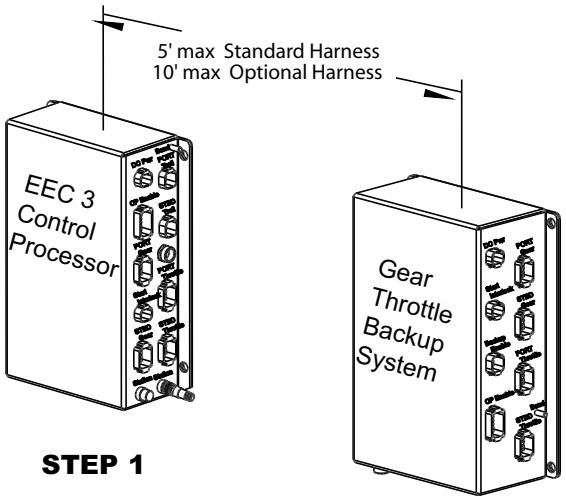
EEC Control Head with Backup potentiometers - Externally this looks like a normal control head but internally it has extra potentiometers mounted. These potentiometers control the port and starboard gear / throttle when the backup system is activated. Underneath this control head also has two wire exit holes on the bottom cover instead of one. One exit hole is for the normal station cable that runs to the CP and the other hole is for the cable that runs to the Backup System Transfer Box. Once the bottom cover is removed there is an instruction label inside that explains the connections and shows the model and part #.

EEC-GT Backup System Transfer Box - The Transfer Box is mounted near (within 10 feet) of the EEC Control processor. This transfer box is comprised of relays which control the gear / throttle when the system is in backup mode. Externally this box has watertight connectors that the harnesses plug into. The power for this Transfer Box is normally run from the same source that the Control Processor is connected to. The backup system can be powered by 10 - 40volts DC.

Backup System Harnesses - These are pre-terminated harnesses which redirect the start interlock, power switch, gear and throttle signals to run through the transfer box before running to the various connections on the boat.

C. Installation

1) Mount the Transfer Box within 10 feet of the EEC 2001 Control Processor which is normally mounted in the engine room.



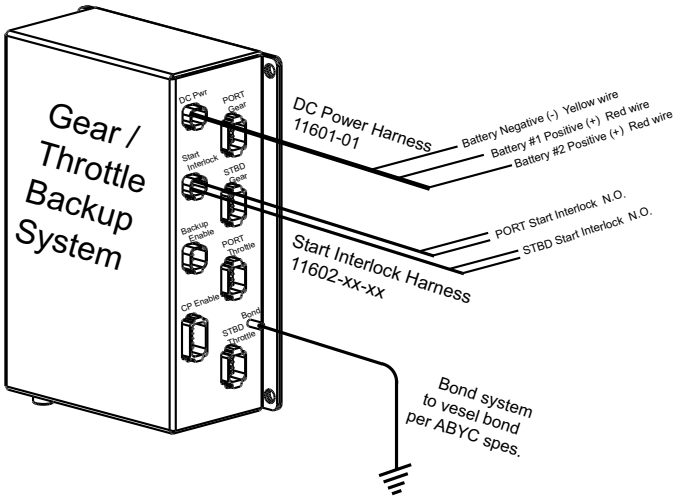
STEP 1

(Note: the harnesses which run from the CP to the Transfer Box come in 5' standard or 10' optional lengths.)

2) Install the various harnesses which run from the CP to the Transfer Box and to the engine.

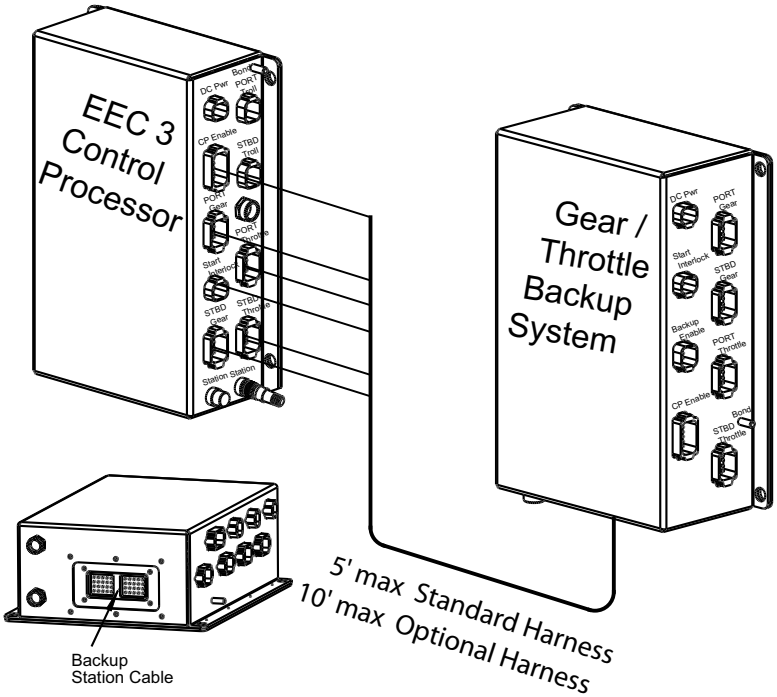
a. DC Power and Start Interlock and Bond Wire - This harness has brown connectors (8 position) on each end and a set of wires which run to the DC power and the start interlock connections. This harness feeds DC power to the Transfer Box. It also sends the Start Interlock signals to the Transfer Box so that in backup mode the start interlock function will still operate. The backup system operating voltage range is 10-36 volts and is low current so the breaker that supplies power to the EEC system is adequate for the Backup System.

STEP 2 (a)



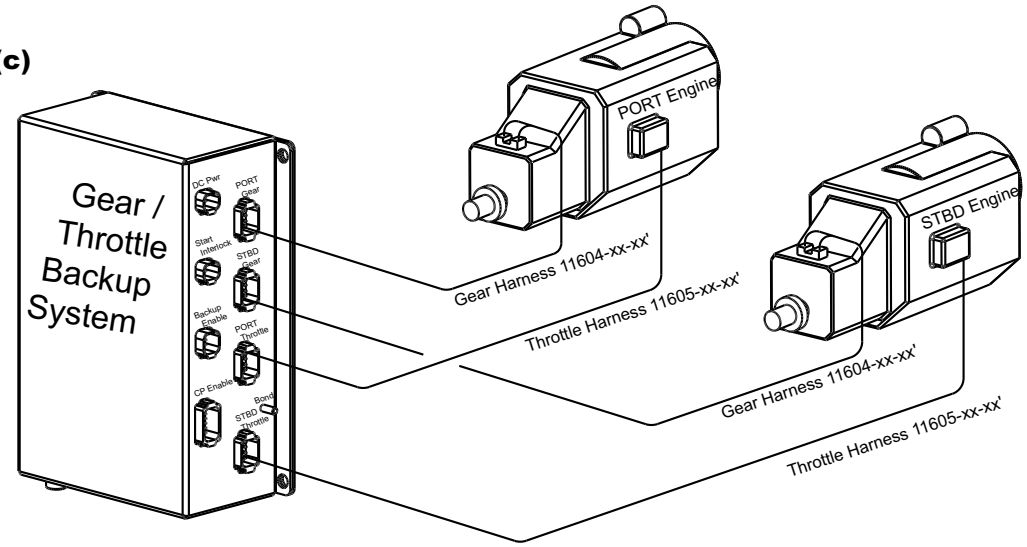
b. Interconnect Harness - This harness has six various connectors on one end and a large (40 pos.) connector on the other end. The harnesses' six various connector are plugged into the CP's CP enable, Port & Stbd Gear, Port & Stbd Throttle, and Start Interlock connectors. The large (40 pos) connector is plugged into the bottom of the GTB Box (NOTE: The socket head screw must be tightened which will seat the connector into it's receptacle). The connector that is currently plugged into the CP's CP enable connector is plugged into the Transfer Box's 12 pos. connector marked CP Enable.

STEP 2 (b)



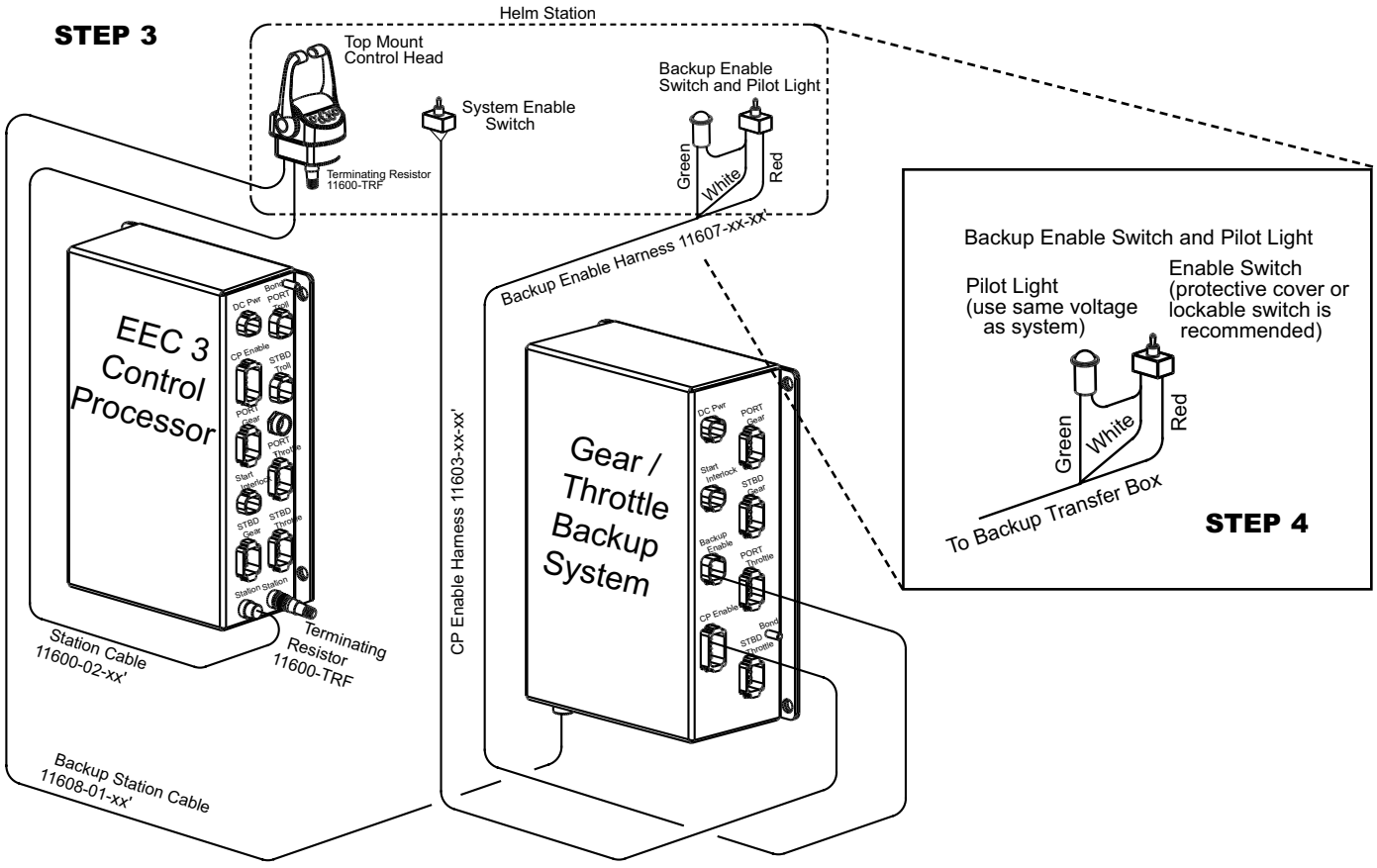
c. Gear & Throttle Harness - These harnesses have grey & black (8 pos.) connectors on one end. These route the gear & throttle to each engine and transmission. Unplug the 2 connectors that are plugged into the CP's connectors marked STBD and PORT Gear STBD and PORT THROTTLE and plug them into their respective connectors on the GTB Backup Box.

STEP 2 (c)



3) Backup Control / Enable Switch Harnesses - This harness has two wires strapped together. One wire has one large black connector (8 position) on one end and a small 6 pos. connector on the Control head end. The other wire in only stripped back so the installer can attach a switch and pilot light to it. This harness brings the signals from the backup control switches in the control head to the transfer box. It also, through the enable switch, turns on or off the Backup System and also controls the backup system pilot light. Install this harness from the Transfer Box to the control station that has the backup control head installed. Plug in this harness into the black connector on the transfer box marked Enable Switch.

STEP 3



4) **Install the Backup System Enable switch and pilot light** in the console and attach them to the Backup Control/Enable Switch harness. (This switch and light are normally provided by the installer.) This switch needs to be a normally open SPST switch. Because this switch turns on and off the backup system, it is must be highly reliable and also protected which would prevent accidental actuation from happening. Some switches have protection covers but this protection could be simply in where you mount the switch. It should be near the backup Control Head and yet mounted so the it would not be accidentally turned on (i.e. when another switch near it is being turned on.) The pilot light should be wired as per the diagram below. It should be a 12v or 24v DC low current light.

D. Installation Checkouts

Once the system has been installed the system must be checked for the proper operation. The basic checks are as follows:

1) **Backup System in General** - Once the normally EEC system is up and running and in neutral, turn the backup system enable switch on (NOTE: Do NOT have engines running!). At this point the Backup System light should come on, all the LED's on the Control head should go out. You are now in Backup Mode. Shift the Control Head levers to forward and reverse. You should hear the transmission solenoids "clicking" as you shift the transmission.

2) **Start Interlock Operation** - With the Control Head in neutral (or even put the system in Warm mode by pushing the WARM button) try to start the engine. NOTE: The checkout can be done at the dock, but care must be taken when shifting gears at the dock. Make sure that dock lines are tight and adequate. (NOTE: You do not have to start it, just try to turn over the engine with the starter.) The engine should start cranking while the Control head levers are in neutral.
Next push the Port engine control lever into forward gear. Try to start the PORT engine. You should not be able to start the engine. Put the PORT control lever back to Neutral and then try the STBD side. Make sure you do one side at a time. If you cannot start in gear but can start the engines in neutral then the Backup system start interlock function is working correctly.

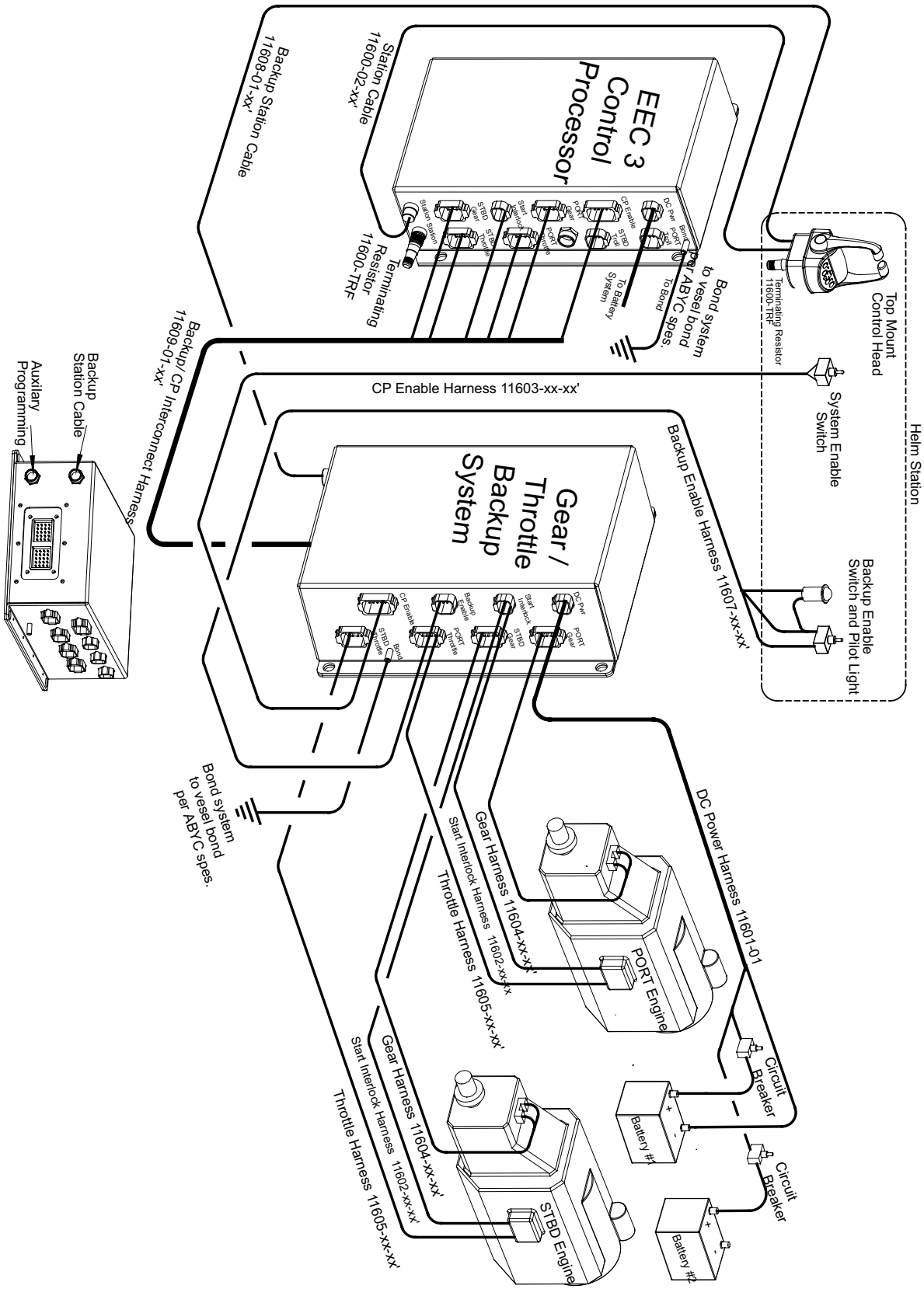
3) **Gear Operation** - NOTE: The checkout can be done at the dock, but care must be taken when shifting gears at the dock. Make sure that dock lines are tight and adequate. Once step 1 and 2 above have been checked, you can start the engines. Carefully move one Control Lever at a time in and out of gear. Check for proper direction and operation of the transmissions.

4) Now bring the Control levers to neutral and stop the engines. At this point turn off the Backup System enable switch and the lights on the Control Head should come on and the EEC system should be in normal operation.

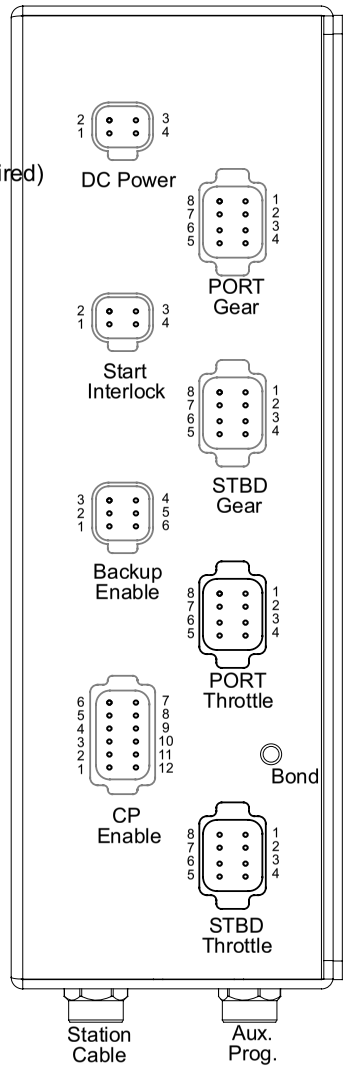
5) At this point make sure that in normal operation , with the EEC turned on, you have proper gear operation. Carefully move one Control Lever at a time in and out of gear. Check for proper direction and operation of the transmissions.

6) You are now fully tested . Make sure that all operators of the vessel know about the Backup System's operation and where the backup switch is located.

E. EEC3 Backup Gear / Throttle Backup System Wiring Diagram



F. EEC3 Backup Gear / Throttle Backup Pinout Connection



DC Power Connector (4 pin-Gray)

(1) Battery Positive 1
(2) Battery Positive 2
(3) Battery Ground 1
(4) Battery Ground 2 (optional if required)

Start Interlock Connector (4 pin-Gray)

(1) PORT Start Interlock 1
(2) PORT Start Interlock 2
(3) STBD Start Interlock 1
(4) STBD Start Interlock 2

Backup Enable Connector (6 pin-Gray)

(1) Switch COM (+12/24VDC)
(2) Switch (NO) 24V(enable light Pos.)
(3) Switch (NO) 12V(enable light Pos.)
(4) Batt. Neg.(enable light Neg.)
(5) Startup select jumper 1
(6) Startup select jumper 2

CP Enable/Spare Connector (12 pin-Gray)

(1) Ignition input 1
(2) Ignition input 2
(3) Backup spare output 1 (COM)
(4) Switch select - Ignition
(5) Voltage select -12V*
(6) Voltage select - (COM)*
(7) Voltage select - 24V*
(8) Switch select - dry switch*
(9) Switch select - (COM)*
(10) Backup spare output 1 (NO)
(11) Ignition output 2
(12) Ignition output 1

Note:
* references commonly used pins for this connector.
12V -(pins: 5,6) (8,9 - jumper), 24V -(pins: 6,7) (8,9 - jumper)

PORT/STBD Gear Connectors (8 pin-Gray)

(1) FWD Battery Positive +
(2) FWD Switch (COM)
(3) FWD Switch (NO)
(4) FWD Battery Negative -
(5) REV Battery Negative -
(6) REV Switch (NO)
(7) REV Contact (COM)
(8) REV Battery Positive +

Throttle Connections - 4 available Types

PORT/STBD Throttle Connectors- Voltage Type (8 pin-Black)

(1) Not used
(2) Ref. voltage Pos.+
(3) Ref. voltage Neg.-
(4) Voltage signal
(5) Not Used
(6) Not Used
(7) Not used
(8) Chassis ground

PORT/STBD Throttle Connectors- PWM Type (8 pin-Black)

(1) Batt./PWM Pos. +
(2) PWM output signal
(3) Batt./PWM Neg. -
(4) Not used
(5) Not used
(6) Not used
(7) Not used
(8) Chassis ground

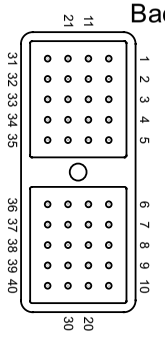
PORT/STBD Throttle Connectors- 4-20mA Type (8 pin-Black)

(1) Not used
(2) Not used
(3) Not used
(4) Not used
(5) 4-20mA output Pos. +
(6) 4-20mA output Neg. -
(7) Not used
(8) Chassis ground

PORT/STBD Throttle Connectors- MEFI Type (8 pin-Black)

(1) Ref. voltage 2 Pos. +
(2) Ref. voltage 1 Pos. +
(3) Ref. voltage 1 Neg. -
(4) Output signal 1
(5) Output signal 2
(6) Ref. voltage 2 Neg. -
(7) Not used
(8) Chassis ground

Backup to CP Connector (40 pin-Black)



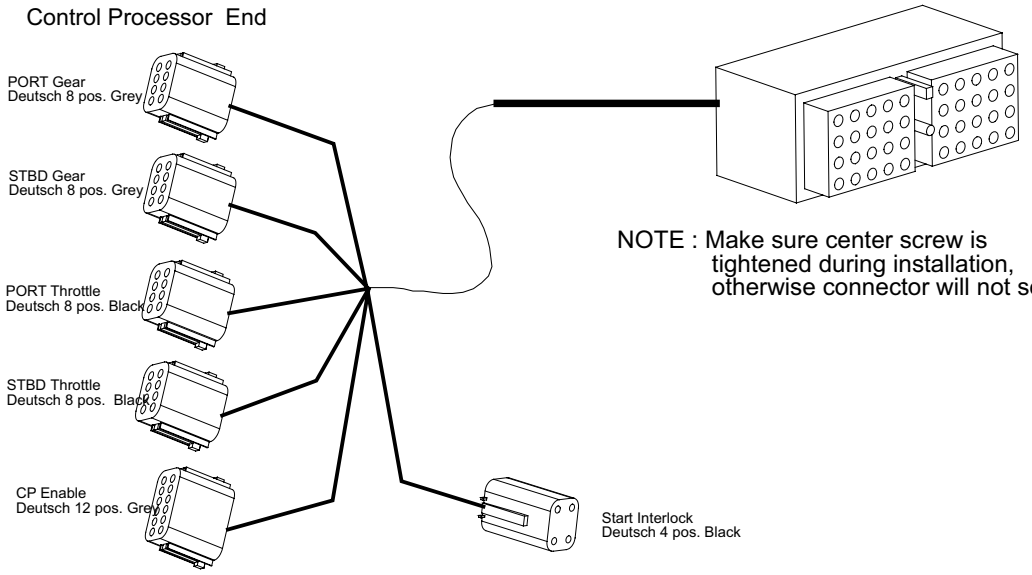
(1) CP port throttle 1
(2) CP port throttle 2
(3) CP port throttle 3
(4) Chassis Ground
(5) CP Enable volt. select - 12V
(6) CP Enable volt. select - (COM)
(7) CP Enable volt. select - 24V
(8) CP port Start Interlock 1
(9) CP port FWD Gear 1 (COM)
(10) CP stbd FWD Gear 1 (COM)
(11) CP port throttle 4
(12) CP port throttle 5
(13) CP port throttle 6
(14) Chassis ground
(15) CP Enable switch select - (COM)
(16) CP Enable switch select - dry switch
(17) CP Enable switch select - ign. switch
(18) CP port Start Interlock 2
(19) CP port FWD Gear 2 (NO)
(20) CP stbd FWD Gear 2 (NO)
(21) CP stbd throttle 1
(22) CP stbd throttle 2
(23) CP stbd throttle 3
(24) Chassis ground
(25) Not used
(26) Ignition input 1 to CP
(27) CP ignition output 1
(28) CP stbd Start Interlock 1
(29) CP port REV Gear 1 (COM)
(30) CP stbd REV Gear 1 (COM)
(31) CP stbd throttle 4
(32) CP stbd throttle 5
(33) CP stbd throttle 6
(34) Chassis ground
(35) Not used
(36) Ignition input 2 to CP
(37) CP ignition output 2
(38) CP stbd Start Interlock 2
(39) CP port REV gear 2 (NO)
(40) CP stbd REV gear 2 (NO)

G. EEC3 Backup Gear / Throttle Wiring Harness

Backup / CP Interconnect Harness
Part # 11609-01-05' 5' long harness
Part # 11609-01-05' 10' long Harness

Backup System End
Deutsch 40 pos.

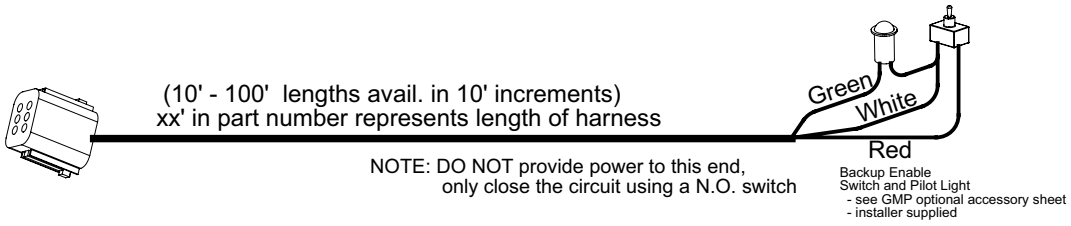
Control Processor End



NOTE : Make sure center screw is tightened during installation, otherwise connector will not seat properly

Backup Enable Harness
Part # 11607-12-xx' 12v DC system
Part # 11607-24-xx' 24v DC system
Part # 11607-02-xx' 12 or 24v DC system - pinned in the field
Control Process End
Duetsch 6 pos. Black

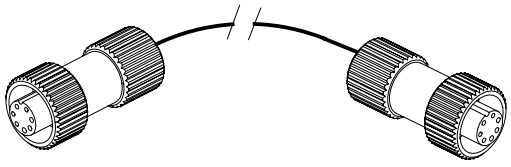
Backup Enable Switch End
- installer provided switch and pilot light
- GMP can provide a waterproof rocker switch with switch namepate
- use correct voltage pilot light



Backup Station Cable
Part # 11608-01-xx' (available 20' - 100' in 20' increments)

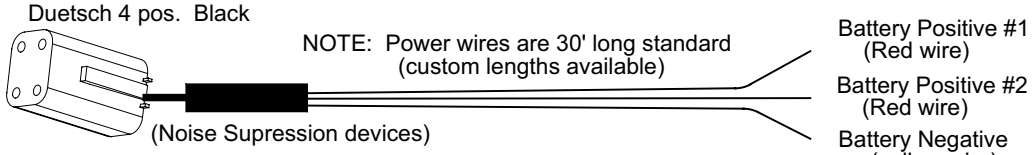
Routes from Backup System to Backup Control head

NOTE: Connector is the same on both ends

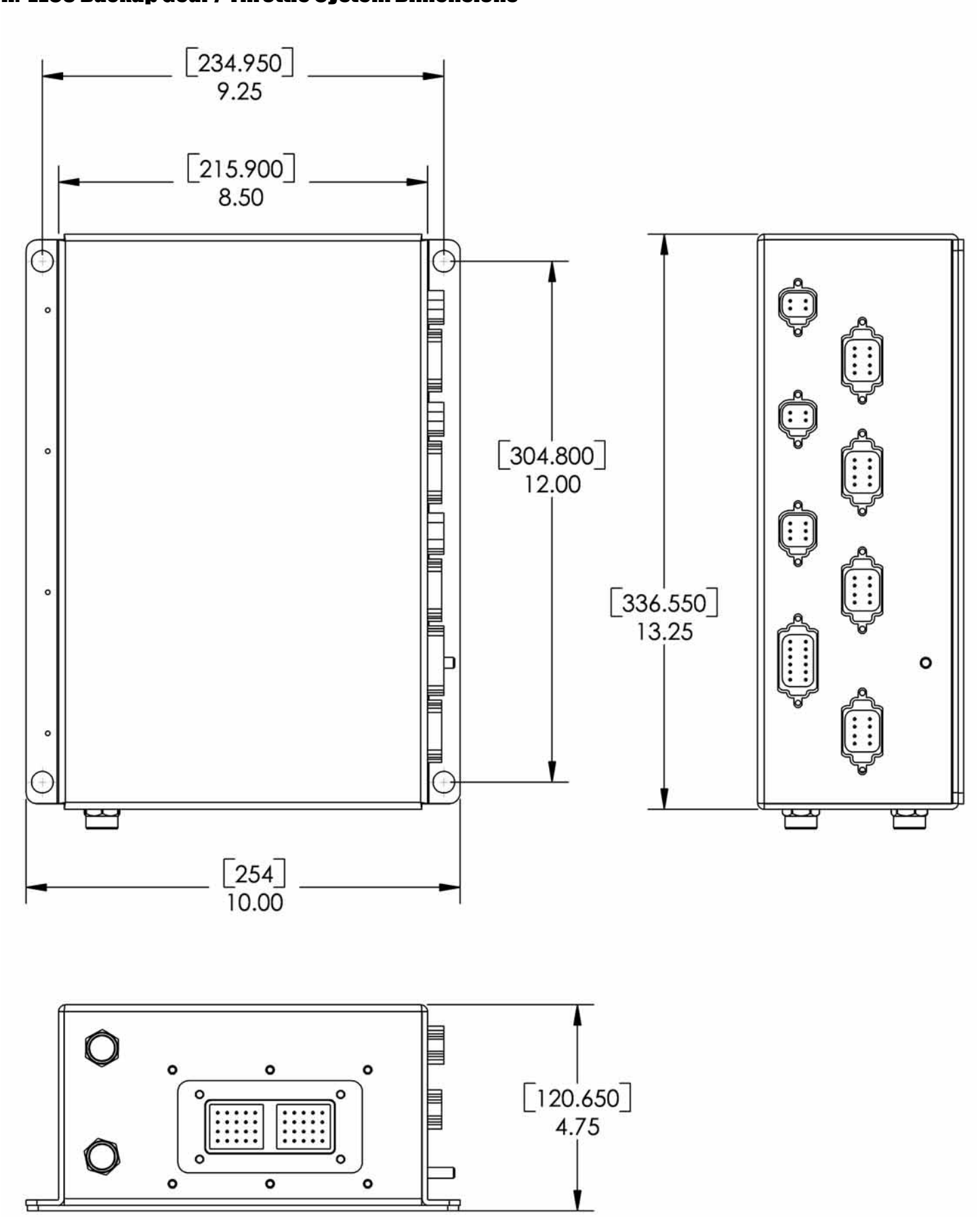


DC Power Harness
Part # 11601-01 (30' long std.)

Control Process End
Duetsch 4 pos. Black



H. EEC3 Backup Gear / Throttle System Dimensions



8.4 Sidemount Controls Installation (optional)

A. Sidemount Handle Control Assembly

Before installing the Sidemount Control Head Assembly consider:

There are 3 types of mounting options for the installation of Sidemount Controls.The major differences between these types of mounting options are the outside appearance of the console, and the difficulty of installation.

Mounting Option	Ease of Installation	Description
Bezel on the Outside of Console	Simple	A bezel and the sidemount control handle are visible on the exterior of the console
Bezel on the Inside of the Console	Hard	Bezel installed on the inside of the console, offers the most professional appearance with the control handle only being seen on the exterior of the console
No Bezel	Difficult	Control Head shaft and handle are visible on the exterior of the console

• Outside Console Bezel Mounting

Flange *Bezel*

STEP 1: Determine location of bezel hole in console by placing bezel on outside of console where desired and mark the 1-1/4" hole and the 1/4" clearance holes, (*see figure 8*) *(NOTE: Clearance for control head needs to be determined on inside of console before cutting holes; Make sure to use the correct control head mechanism PORT or STBD when planning the hole locator. Notice location of friction control adjustment screws in respect to console placement!)*.

STEP 2: Use 1-1/4" hole saw to cut center hole and drill 17/64" holes for outside flange mounting (*see figure 9*).

STEP 3: Place outside flange in 1-1/4" hole and place inside flange over small diameter of outside flange on inside of console. Tighten flanges together with 1/4" x 20 flat head screws (*see figure 10*) *(NOTE: Depending on console thickness, a small diameter of outside flange and 1/4" x 20 flat head screws may need to be shortened)*.

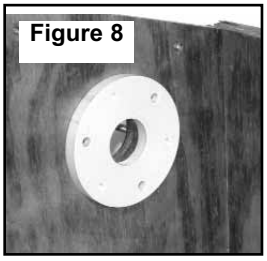


Figure 8

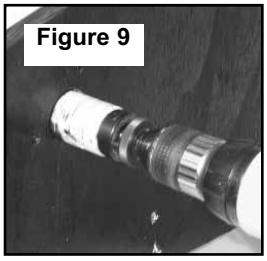


Figure 9

STEP 4: Once Outside Flange and Inside Flange are mounted, install (3) #10 flat head wood screws through Inside Flange. This will hold the Inside Flange in place in case of removal in the future (*see figure 11*) *(NOTE: Wood screws should not be longer than the thickness of the console)*.

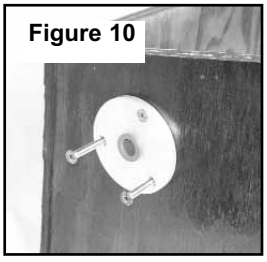


Figure 10

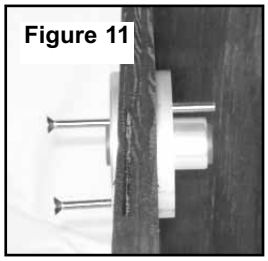


Figure 11

STEP 5: Install the Control Head mechanism in flange (*see figure 12*) *(NOTE: The control heads are marked Port and Stb.; Adjustment screws should face forward)*.

STEP 6: Establish the desired control head angle according to the clearance in the console (*see figure 13*).

STEP 7: Threaded rod with ball joints are to be attached to head and console at this point (*see figure 13*) *(NOTE: Angle of 90 degrees is best for most support)*.

STEP 8: Install control handle and key (where applicable) and tighten set screw down to mark shaft. Fine alignment of handles may be adjusted by shortening or lengthening threaded rod (*see figure 14*) *(NOTE: Shaft end play between handle and console should be less than 1/8" [see figure 15])*.

STEP 9: Remove set screw and handle and divot shaft using same size drill as the set screw.

STEP 10: Reinstall control handle and use two set screws, on top of each other.

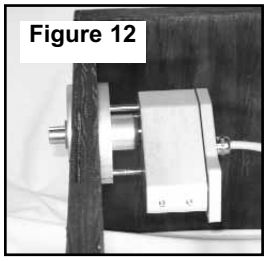


Figure 12

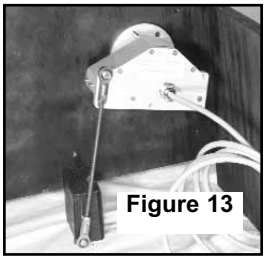


Figure 13

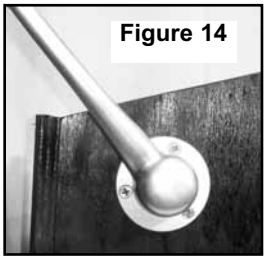


Figure 14

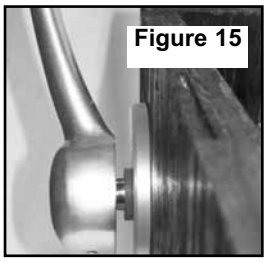


Figure 15

• Inside Console Bezel Mounting

STEP 1: To determine location of inside bezel mount, caution should be exercised to ensure proper placement of bezel prior to cutting hole in the console *(NOTE: This is determined by the clearance of the control head on the inside of the console)*.

STEP 2: Using the "inner bezel" as a template, trace the 1-1/4" center hole onto the inside wall of the console (*see figure 16*).

STEP 3: Cut out the 1-1/4" center hole and drill (3) #10 starter holes being careful NOT to drill through the wall of the console.

STEP 4: Place inner bezel onto the outer bezel shaft and insert assembly into the 1-1/4" cutout hole. Tighten (3) #10 wood screws into flange where indicated (*see figure 17*) *(NOTE: make sure to use screw lengths that DO NOT exceed the thickness of the console)*.

STEP 5: Bezel outside of console can now be marked flush so the excess can be removed. This allows no bezel to be seen on outside of console. Remove bezel from console. Remove red bushing from inside of bezel and trim bezel.

STEP 6: Reinstall red bushing in bezel and insert bezel into hole in console. Tighten (3) #10 wood screws into flange where indicated (*see figure 18*) *(NOTE: make sure to use screw lengths that DO NOT exceed the thickness of the console)*.

STEP 7: Install the control head shaft into the flange assembly.

STEP 8: Establish the desired control head angle according to the clearance in the console.

STEP 9: Threaded rod with ball joints are to be attached to head and console at this point *(NOTE: Angle of 90 degrees is best for most support)* (*see figure 19*).

STEP 10: Install control handle and key (where applicable) and tighten set screw down to mark shaft. Fine alignment of handles may be adjusted by shortening or lengthening threaded rod *(NOTE: Shaft end play between handle and console should be less than 1/8")* (*see figure 20*).

STEP 11: Remove set screw and handle and divot shaft using same size drill as the set screw.

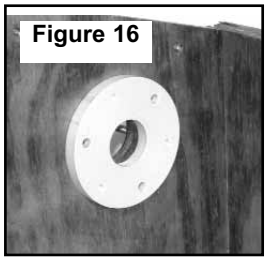


Figure 16

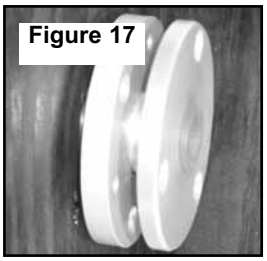


Figure 17

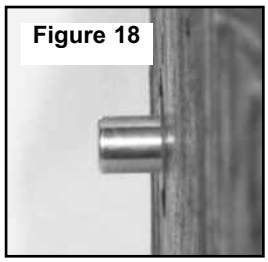


Figure 18

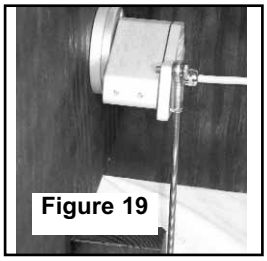


Figure 19

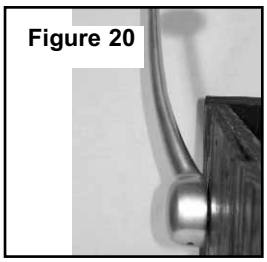


Figure 20

STEP 12: Reinstall control handle and use two set screws, on top of each other.

To mount control handles without Bezel mounting kit:

STEP 1: The control head has one face opposite handle shaft with 1/4 threaded holes to mount to inside face of console.

STEP 2: The 1/4 threaded holes can also be used to mount the control head to a bracket of your design, to attach head to some other locations in console.

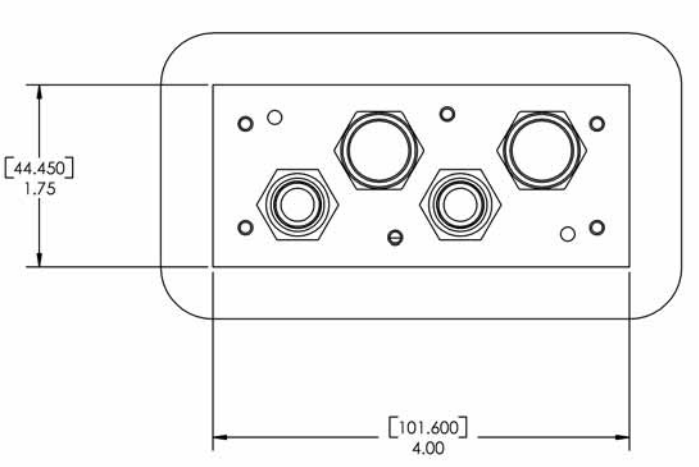
STEP 3: When method of mounting is determined, keep a these things in mind—The length of shaft outside of console and the free movement of the shaft.

B. Sidemount Keypad Assembly

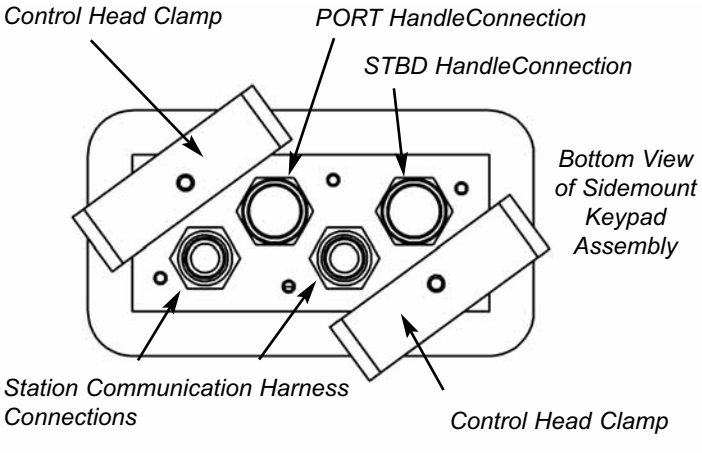
Before mounting the Sidemount Keypad Assembly, inspect the surface that the Keypad is to be mounted to. It should be flat and reasonably strong enough to support the Keypad securely.

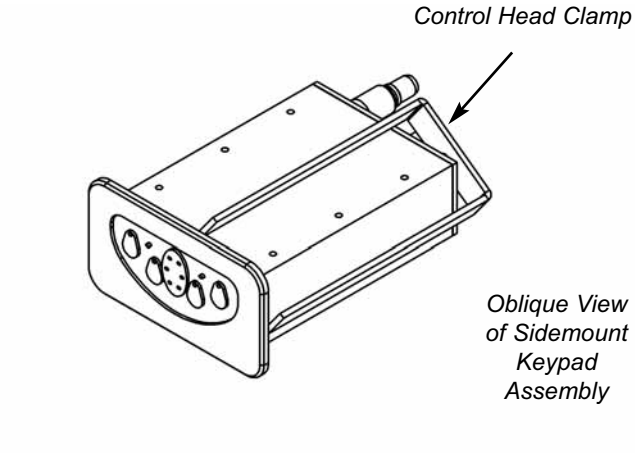
STEP 1: Mark the location for the Keypad Assembly using the full size template (see page 59). Cut the 1-3/4" x 4" keypad assembly cutout.

STEP 2: Insert the connection cable from the Sidemount Control Handle pod and the Station Cable (that leads to the Control Processor) through the console cutout and attach to the keypad assembly. The control head pods are marked PORT and STBD and must be installed in the proper connector.



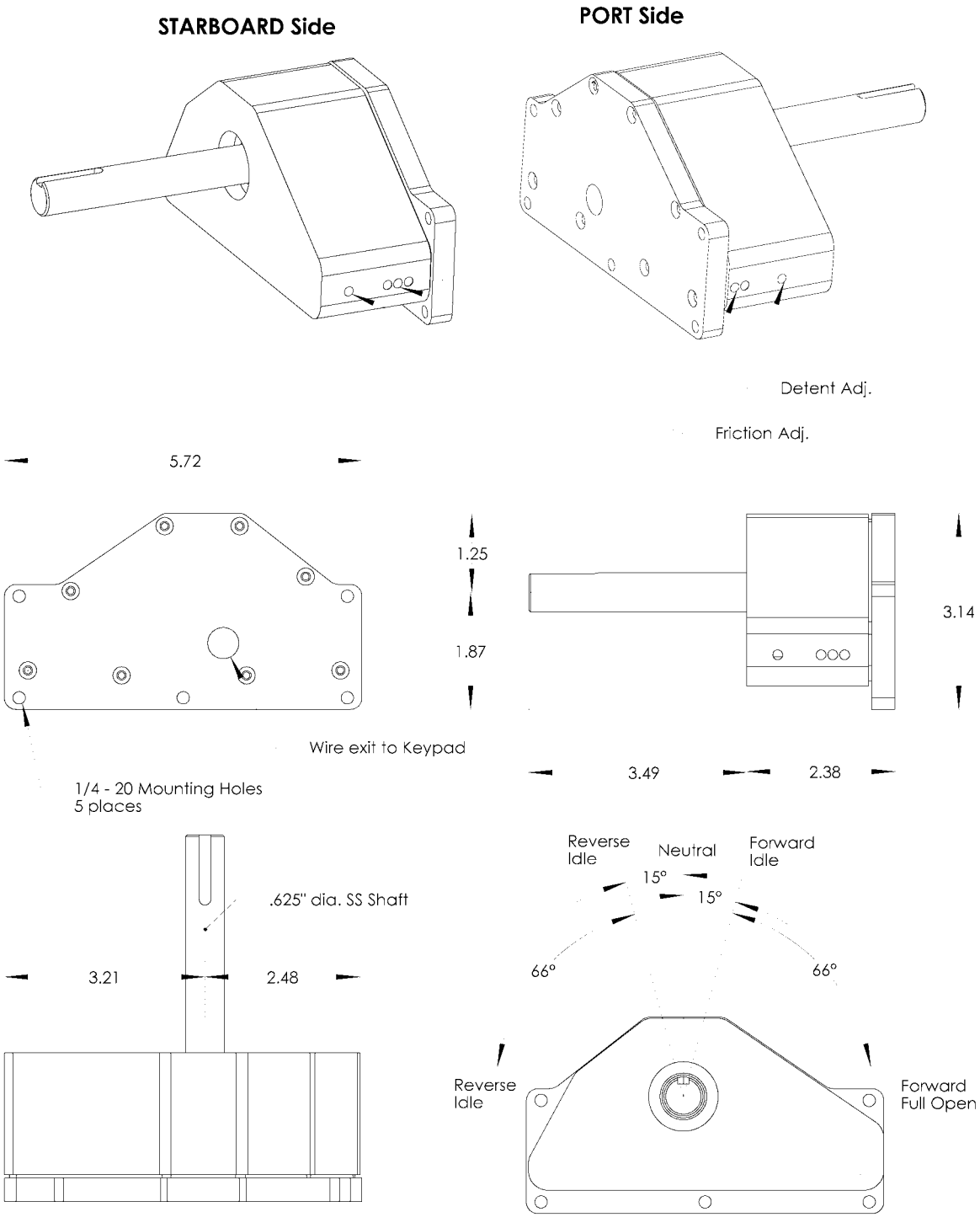
STEP 3: Install Control Head clamps and tighten wing nuts provided. Make sure Keypad Assembly is firmly mounted to console.





STEP 4: Connect the Sidemount Control Head Assembly (PORT and STBD) to the Sidemount Keypad Assembly at the PORT Handle and STBD Handle Connections (see diagram above). Connect the Station Communication Harness from the Control Processor to the Station Communication Connections on the Keypad Assembly (see diagram above). Depending on your network's configuration a Station Communication Harness or a Terminating Resistor must be installed at both Station Communication Connections on the Keypad Assembly.

Sidemount Handle Control Dimensions

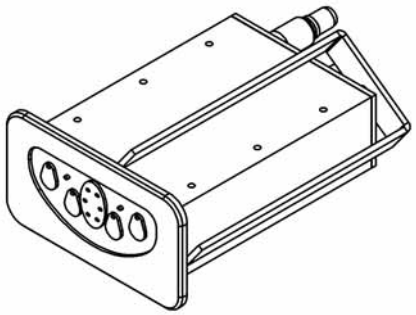


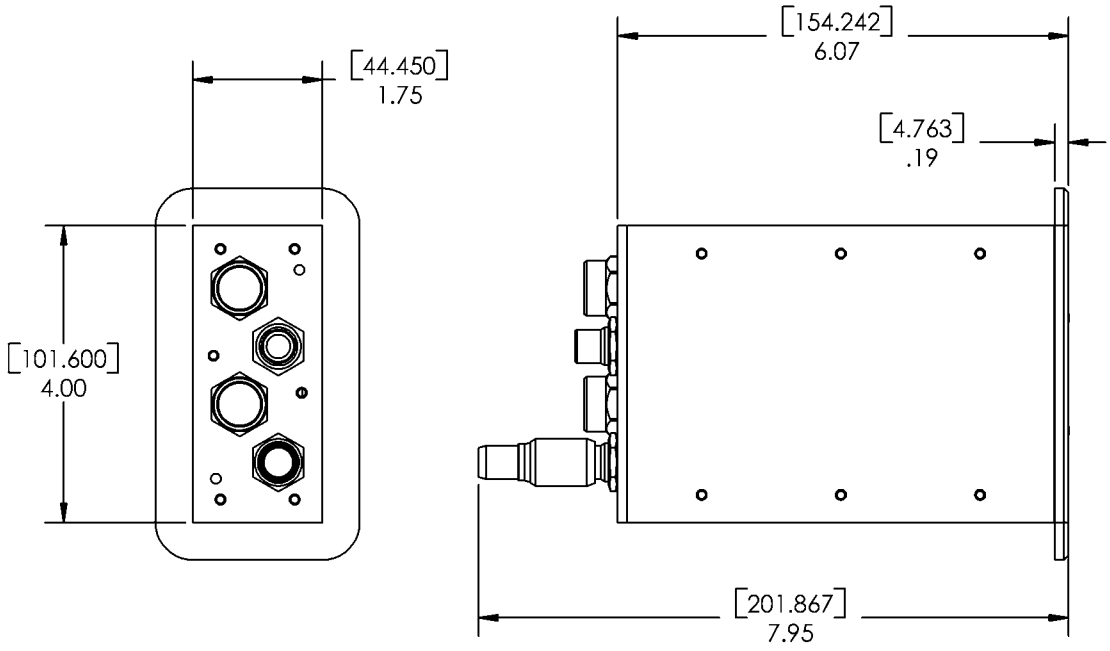
(STARBOARD Side Handle Shown)

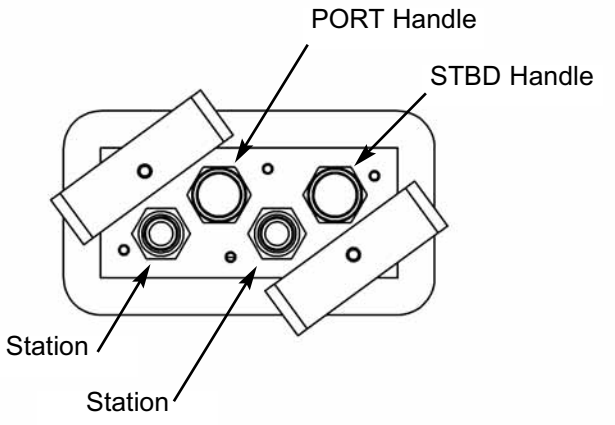
Sidemount Keypad Assembly Dimensions

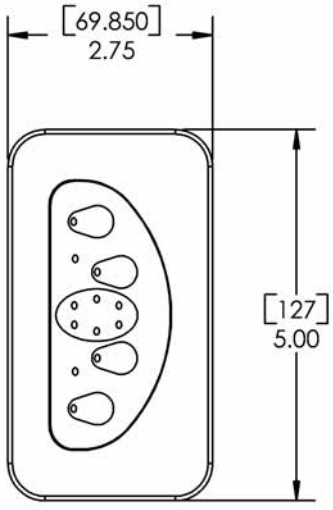
EEC3 SIDEMOUNT KEYPAD ASSEMBLY

GMP PART#

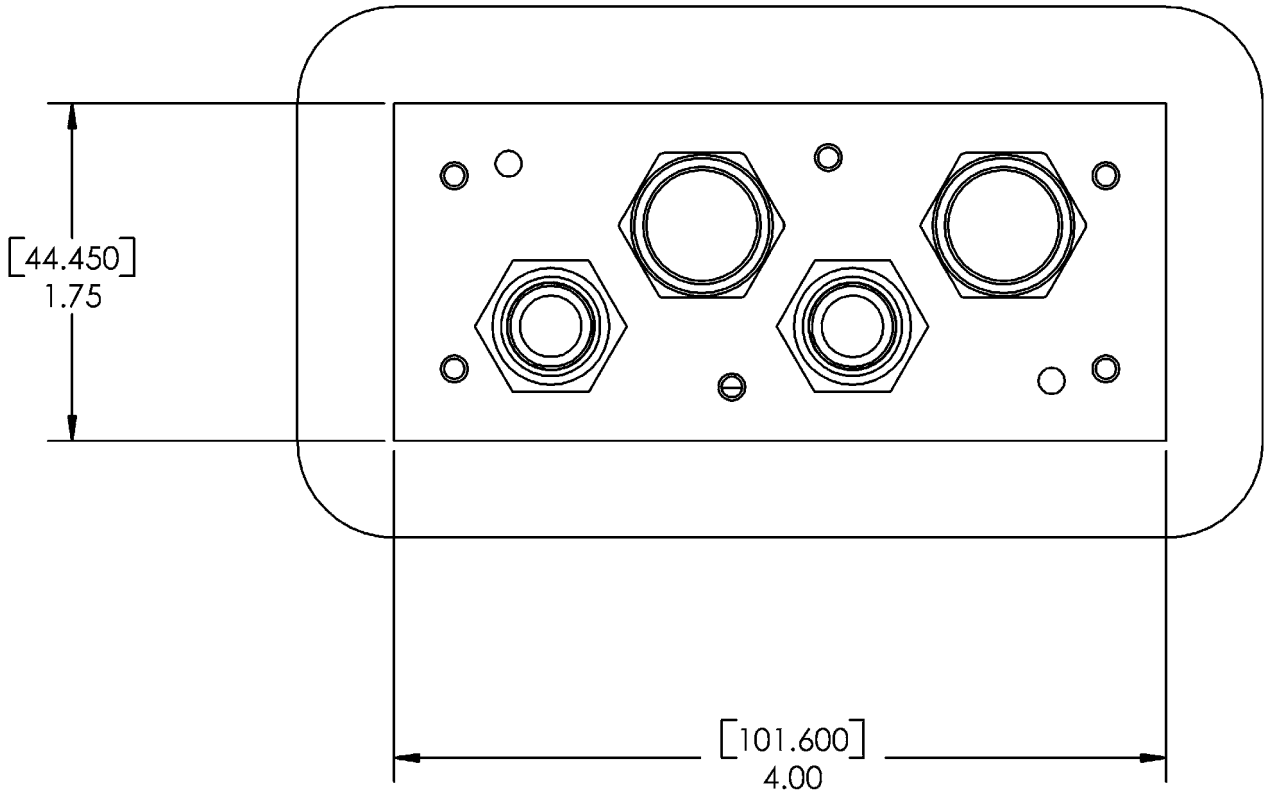








Cutout Template for Sidemount Keypad Assembly



8.5 Smart Actuator Integration (optional)

The Glendinning Smart Actuator has been designed to interface with your EEC-3 Control System when mechanical control of transmission, throttle, or trolling valves is necessary.

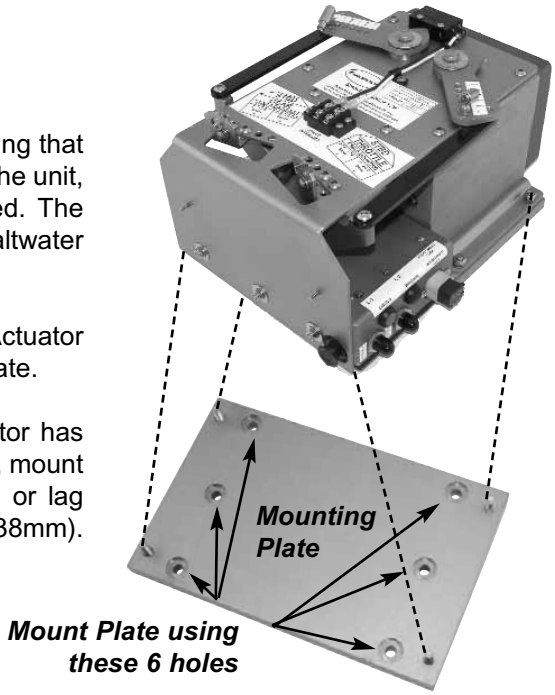
A. Installation

The Smart Actuator can be mounted anywhere in the engine room providing that the Actuator is reasonably accessible so that inspection and/or repairs to the unit, and connection of throttle and/or gear control cables may be performed. The Smart Actuator should NOT be installed in adverse locations subject to saltwater exposure or excessive heat.

The installation process consists of two steps: (1) installing the Smart Actuator Mounting Plate and (2) connecting the Smart Actuator to the mounting plate.

STEP 1: Once the proper location for the mounting of the Smart Actuator has been determined (see Pre-Installation Planning section 3.1 for guidelines), mount the Smart Actuator Mounting Plate using (6) 1/4" (7mm) machine bolts or lag screws. If using lag screws, screw length should be no less than 1-1/2" (38mm). If using machine bolts, lockwashers or locknuts MUST be used.

STEP 2: Attach the Smart Actuator to the mounting plate using (4) 1/4" - 20 nuts with lockwashers.



B. Control Cable Installation

A. Using the control cable swing clamp, mount the throttle / gear / troll lever control cables in their respective locations on the engine and transmission. Mount cables - do not connect the cable ends to the control levers at this time (NOTE: Although 43c cables can be installed with our system, we recommend premium grade, Type 33C control cables as the best cable choice).

B. Install swivel ball joints on the end of each control cable, ensuring that you have at least 1/2" (13 mm) of thread engagement. Do not tighten the cable jam nuts yet.

NOTE

In some cases, sufficient over-travel will not be able to be obtained even with adjustment of the cable clamp holder. This is caused by the connection point on the engine or transmission lever (normally called the pivot pin) being too far away from the shaft that the lever is connected to. In these cases, the pivot pin will have to be moved closer to the shaft (the "fulcrum point") in order to shorten the pivot pin travel. This will give you the correct over-travel required. The recommended length of travel of the control lever pivot pin should be approximately 2-1/2" to 2-3/4".

C. Compare the travel of each control cable to its associated lever at the transmission and engine. Ensure that each control cable has "over-travel" or that the cable is able to travel farther than the lever that it will be attached to. Check this for both ends of travel. If the control cable will not "over-travel" in both directions, adjustments will have to be made:

- If 1/4" or less adjustment is required, the terminal eye on the end of the cable may be screwed on or off the cable end. Ball joint thread engagement on the control cable end must never be less than 1/4".

- If more than 1/4" inch adjustment is necessary to achieve correct over-travel, the cable clamp position on the engine or transmission will have to be moved.

Once correct control cable over-travel is verified, connect the terminal eye of each control cable to the engine governor / throttle and transmission lever and install the pivot pin cotter pins or clips. Tighten the control cable terminal eye jam nuts.

D. After the control cable terminal eyes are attached to the control levers on the engine governor and transmission, measure the amount of travel for each control cable. Do this measurement at the actuator end of the control cable. (This is the distance that the cable will travel when the engine or transmission control lever is moved from one mechanical stop to the other. Record the information below - this information is needed in order to determine the correct cable connection on the Actuator coupler plates.

PORT ENGINE		STARBOARD ENGINE	
Control Cable	Length of Travel	Control Cable	Length of Travel
Throttle		Throttle	
Gear		Gear	
Troll Valve		Troll Valve	

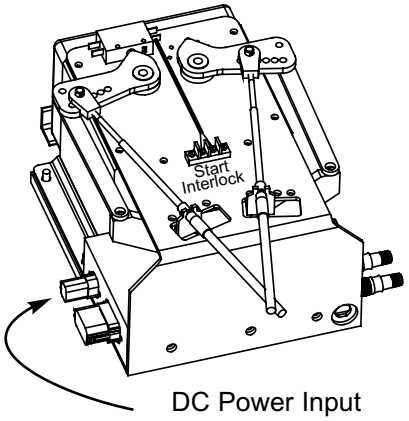
E. Once the control cables are properly attached to the engine governor / throttle and transmission control levers as described above in paragraphs A, B, and C, they may be connected to the Actuator levers as described below in paragraphs F, G, H and I. The following summarizes this process:

Paragraph F - Select the correct control cable mounting location on the Actuator, depending on the length of control lever / control cable travel.
Paragraph G - Move the ball joint ball pin on Actuator plate to the correct actuator travel.
Paragraph H - Select the correct coupler plate connection hole to be used, depending on length of control cable travel.
Paragraph I - Adjust control cable terminal prior to attaching to Actuator coupler plate

F. Mount the engine / transmission control cables to the proper control cable mounting location on the actuator. There are two possible mounting locations on the actuator for the control cables depending on the length of control cable travel - the distance measured in paragraph D. above. For control cable travel between 1-1/2” and 2-3/16”, mount the control cable in the SHORT Travel Mounting location. For control cable travel between 2-1/4” and 3-1/8”, mount the control cable in the LONG Travel Mounting location. (See the drawing on page 24 for clarification).

C. Wiring Connections

1. Battery Power Supply Connections to the Actuator



DC Power Input
Harness Connection

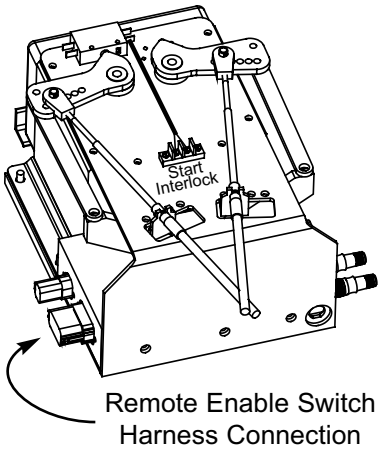
In the installation of any electronic device, the source of power is one of the most important factors to consider during the installation. The Glendinning Electronic Engine Control has a unique and very reliable power supply system which, if the system is properly installed, greatly improves the overall reliability of the engine control system. *NOTE:The EEC can use 12 or 24V DC power, however, see the specific wiring diagram (see sec 7.1, or supplied by GMP technician) for the correct power to use. In some installations it is required to use 24V DC instead of 12V DC.*
The Glendinning EEC system is equipped with a sophisticated power management system that allows it to receive power from two (2) independent batteries (normally the port and starboard engine start batteries). In normal operation, the EEC will receive power from both battery sources, taking power from each battery proportion-

ate to the voltage from level available. In the event of loss or reduction of voltage from one battery source, such as during engine start, the EEC system will continue to function normally by receiving power from the other battery with normal voltage.

1) Connect the Smart Actuator DC Power Harness (supplied) to two (2) independent battery sources, (normally the port and starboard engine start batteries). On the positive side of these two runs, install a 15amp circuit breaker near each battery or power source (follow ABYC standards which require a circuit protection device within 7" of the wire connection to the power source — NOTE: If the total wire run is longer than 15 feet from the battery to the Control Processor, install an approved junction box that the DC Power Cable may be connected to).

2) Make sure that the breakers are in the OFF position and then connect the "DC Power" to the Control Processor where indicated (see Wiring Diagram, page 81).

2. Remote Enable Switch



Remote Enable Switch
Harness Connection

While the boat is tied up at the dock and not in use, it is recommended that the EEC system be turned off. Since power is normally supplied directly to the Engine Processor from power sources in the engine room, turning power ON and OFF in the engine room may be difficult to do each time the system is started up. For this reason, a remote enable switch is available for use with the EEC control system. This enable switch allows power to the system to be turned ON or OFF at the Main station.

The EEC System Enable Switch is installed as follows:

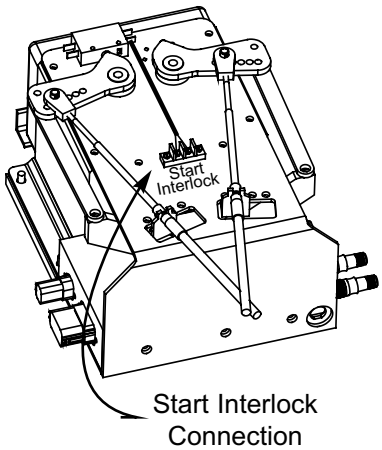
1. Make sure the circuit breakers that control the power to the Control Processor are turned off before starting this installation.

2. Install a Double Pole, Double Throw (DPDT) switch in the instrument panel. GMP has a switch/nameplate assembly designed for this purpose. The switch features a locking rocker that eliminates inadvertant activation of the switch. *NOTE: If installing a switch other than GMP's, locate the switch in an area where it will not be inadvertantly turned OFF during operation.*

3. Connect switch to the harness labelled SACT Enable Mech Gear (PN 11603-02-MG-xx) provided.

NOTE: Do not connect an indicator light to the remote enable switch connections.
NOTE: A "jumper" can be installed in the place of wires on the connector at Smart Actuator. Power may then be turned OFF and ON by using the 15amp breakers installed at battery input.

3. Start Interlock



Start Interlock
Connection

The Smart Actuator system includes a "start interlock" safety feature — this feature verifies that the transmission control lever is in Neutral prior to starting the engines. In order to utilize this product feature, the signal wire from the helm station start switch to the engine starter solenoid must be intercepted and run through the control switches within the Smart Actuator.

To install the Start Interlock system:

1) Run a wire to the terminal strip on the front of the actuator marked "Start Interlock".

2) Route these wires to the engine distribution box and connect using appropriate connectors.

4. Tachometer Sender Inputs (only used with Mechanical Throttle systems)

The purpose of the tachometer sender is to provide RPM information to the EEC system. This information is used by the System during engine synchronization. Installation of the tachometer senders is relatively straightforward. The following points should be considered:

1) Only tachometer senders that are supplied by GMP are to be used with the EEC system.

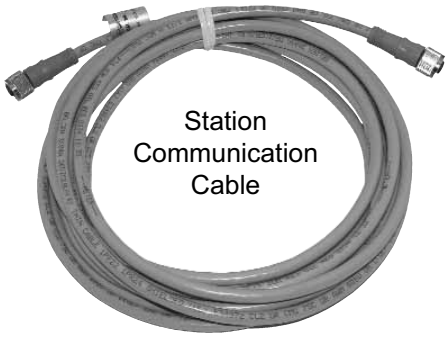
2) On engines equipped with mechanical tachometer outlets, such as Detroit Diesel, Caterpillar 3208, MAN, etc. the tach senders may be directly connected to the tachometer outlet on the engine. The tach senders that are supplied by GMP are “in-line” senders; that is, they may be installed between the engine tachometer connection and any other tachometer senders or tachometer drive cables that are attached to that tachometer connection.

3) On engines that are not equipped with a tach sender outlet, such as Volvo Diesel or any gasoline engine, a mechanical tachometer adapter will have to be used. See the back of the Installation Manual (Section 6.2) for a list of applicable drive adapters and drive adapter installation instructions.

4) The tach senders must be driven at a speed that corresponds to 1/2 engine speed. This is normal on most engines that have mechanical tachometer outlets or that use a mechanical drive adapter. On some engines, it may be possible to drive the tach sender at 1:1 or even twice engine speed. If this is done, the Engine Processor will be damaged due to excessive voltage output from the tach sender. To check for excessive tach sender speed, set your meter on frequency or hertz, verify that at full open the frequency is no larger than 5000 hz. (If you cannot check frequency , check the voltage from the tach sender while the engine is running at full speed. No more than 18 VAC should be present at the tachometer sender terminals.)

5. Station Communication Cable Connections

Review comments made in Pre-Installation Planning, paragraph 12, for determining proper routing of cables. Cables are manufactured in 20’ increments and are available from 20 - 120 feet.



Station Communication Cable

Align notch properly before inserting

When routing and connecting station communication cables, BE SURE TO DO THE FOLLOWING:

- Use a terminating resistor at each end of the bus (see diagram pg. 11).
- Align the cables before connecting them to the proper connector on the Control Head and/or Smart Actuator.

REMEMBER:

—Connector nut requires 6 turns of the nut to be fully seated, failure to do this will result in inconsistent operation of the system.

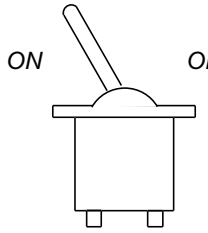
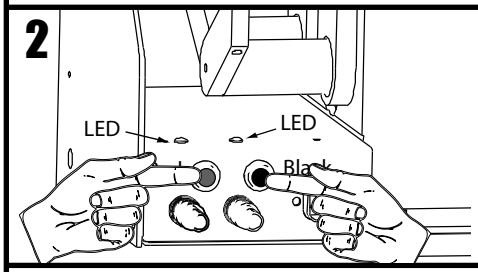
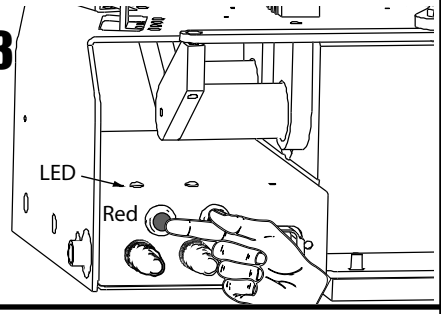
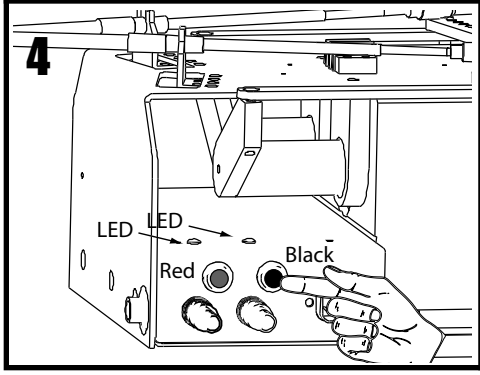
—If the connector is properly aligned, only a small amount of force will be necessary to insert the connector into the Control Processor or Control Head. Failure to properly align connector may damage the pins and cause the system to fail.

D. Calibrating Actuator Endpoints and Cable Direction

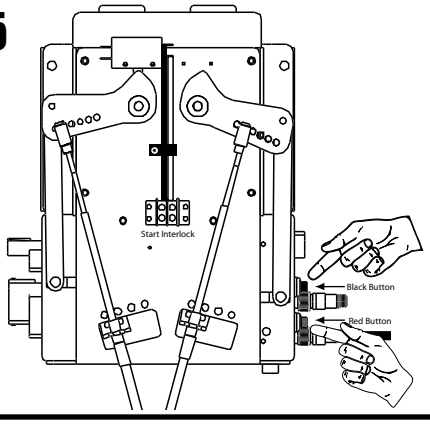
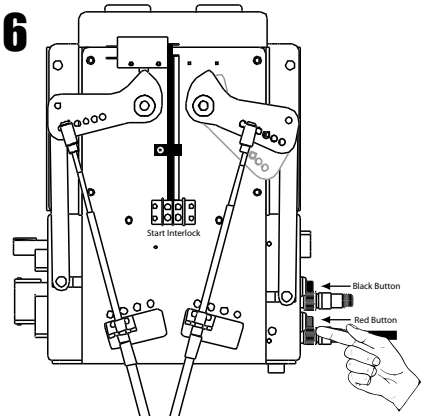
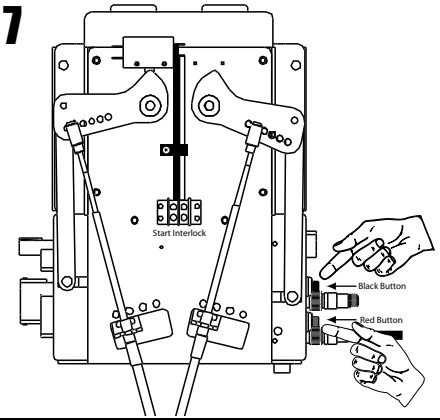
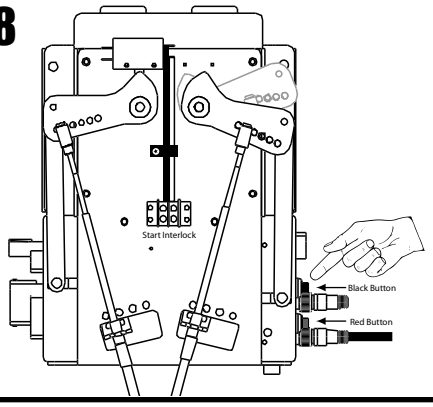
The Smart Actuator receives electronic impulses from the control head which moves the actuator plates into a posiiton where the associated engine's gear or throttle control lever has reached its mechanical stop position (endpoints). Calibration of the Smart Actuator endpoints is necessary to ensure that the engine achieves idle speed or full throttle when moved by the Smart Actuator. It is important to find the proper balance between the control cable position being "too loose" and not reaching its endpoint position (and therefore the engine not achieving idle speed or full throttle), and the cable being set up "too tight" and constantly operating in a compressed or stretched condition when moving to its endpoint of travel. Calibrating the Smart Actuator(s) with this proper balance will yield trouble-free operation of your engine's propulsion system.

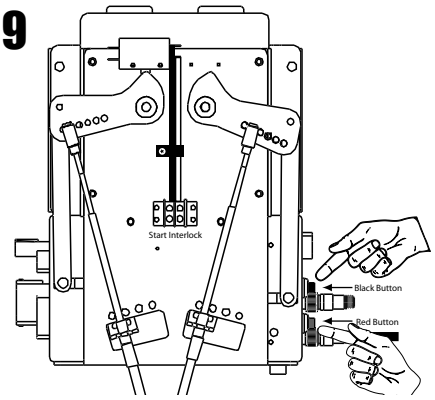
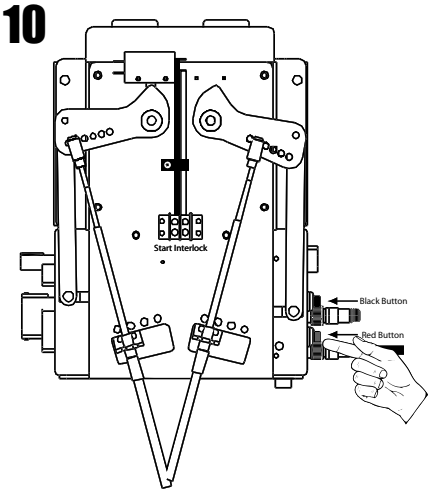
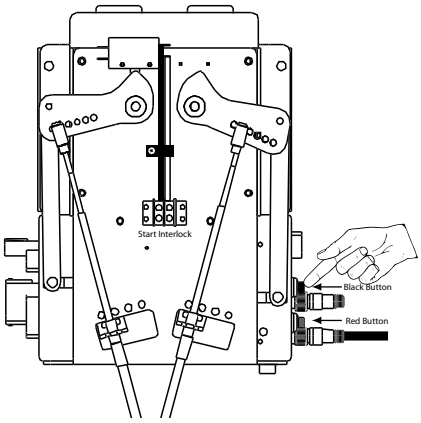
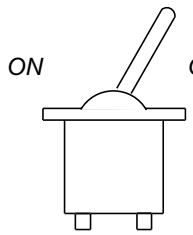
CAUTION: KEEP HANDS AWAY FROM MOVING COMPONENTS OF ACTUATORS WHEN CALIBRATING ENDPOINTS!

To Enter Smart Actuator Configuration Mode and Calibrate the Actuators, follow these steps:

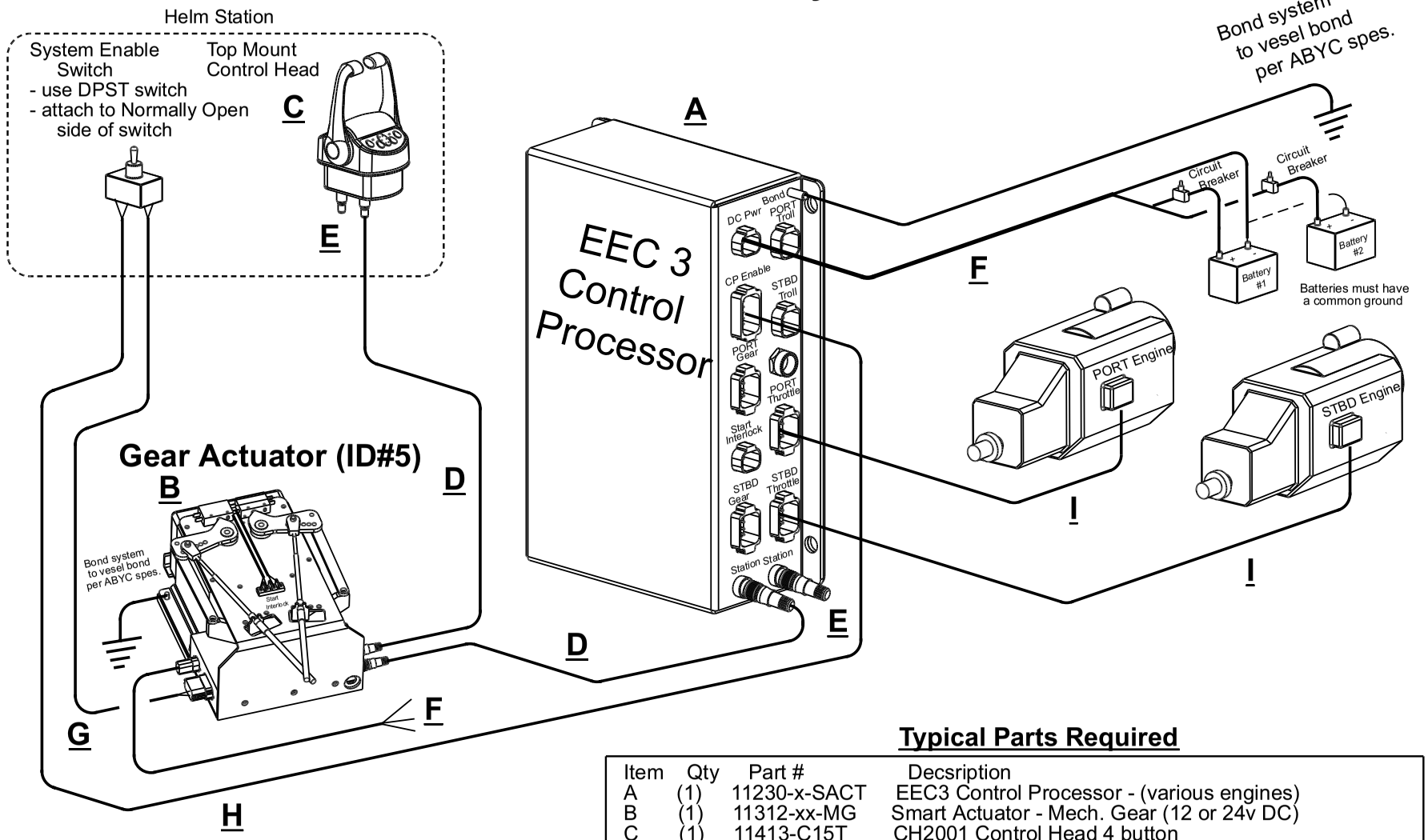
	ACTION	RESULT
1 	*Turn power to Smart Actuators ON.*	*N/A*
2 	*Press & Release both the RED & BLACK buttons on the Smart Actuator simultaneously 3 times.*	*Both LEDs above the RED and BLACK buttons will flash to indicate that you have entered Smart Actuator Configuration Mode.*
3 	*Press & Release the RED button on the Smart Actuator 2 times.*	*The LED above the BLACK button will flash to indicate that you have entered Endpoint Calibration Mode.*
4 	*Press & Release the BLACK button on the Smart Actuator 1 time.*	*Both LEDs above the RED and BLACK buttons will flash to confirm that you have entered Endpoint Calibration Mode and Throttle actuator will move to mid-travel position.* *Chart continues on following pages . . .*

If calibration of the Throttle Actuator is desired, continue with step 5. If calibration of ONLY the Gear Actuator is desired (but not Throttle Actuator), Press & Release the RED button 1 time and continue with step 5.

	ACTION	RESULT
5 	*Press & Release both the RED & BLACK buttons on the Smart Actuator simultaneously 1 time.*	*You are now ready to make calibration changes to the right side actuator (usually throttle or PORT troll).* *This is indicated by NO LEDs above the RED & BLACK buttons being ON.*
6 	*Press & Release the RED button repeatedly to EXTEND the actuator piston to the desired position.* *Control cable should firmly reach the mechanical endpoint on engine or transmission WITHOUT binding.*	*The "right" Actuator piston will begin to extend out with each press and release of the RED button.* *You may also Press & HOLD down the RED button to extend the actuator piston in larger increments until the desired position is achieved. Once position is achieved RELEASE the RED button.*
7 	*Press & Release both the RED & BLACK buttons on the Smart Actuator simultaneously 1 time.*	*This action will store the extended endpoint position in memory — LED above the RED button will illuminate to confirm memory stored.*
8 	*Press & Release the BLACK button repeatedly to RETRACT the actuator piston to the desired position.* *Control cable should firmly reach the mechanical endpoint on engine or transmission WITHOUT binding.*	*The "right" Actuator piston will begin to retract with each press and release of the BLACK button.* *You may also Press & HOLD down the BLACK button to retract the actuator piston in larger increments until the desired position is achieved. Once position is achieved RELEASE the BLACK button.* *Chart continues on following page . . .*

	ACTION	RESULT
9 	*Press & Release both the RED & BLACK buttons on the Smart Actuator simultaneously 1 time.*	*This action will store the extended endpoint position in memory — LED above the RED button will illuminate to confirm memory stored.*
10  	*Press & Release EITHER the RED or the BLACK button to confirmcorrect travel direction for the Actuator piston:* *Press & Release the RED button 1 time for:* *<u>Throttle Actuator</u> PUSH to OPEN <u>Gear Actuator</u> PUSH to Ahead Gear* *OR* *Press & Release the BLACK button 1 time for:* *<u>Throttle Actuator</u> PULL to OPEN <u>Gear Actuator</u> PULL to Ahead Gear*	*The LED above the RED button will illuminate to confirm that you have chosen PUSH to OPEN or PUSH to AHEAD for the cable direction for the Smart Actuator.* *The LED above the BLACK button will illuminate to confirm that you have chosen PULL to OPEN or PULL to AHEAD for the cable direction for the Smart Actuator.*
You have now completed calibration of the right side of the Smart Actuator. You must also complete the calibration process for the left side. To complete calibration for the left side — Repeat steps 5-10 for LEFT SIDE actuator calibration. If LEFT SIDE calibration is not required, proceed to step 11.		
11 	*To exit Smart Actuator Calibration Mode, turn power to the Smart Actuator OFF.*	*N/A*

EEC 3 Control System Wiring Diagram - for electronically controlled engines with mechanically controlled transmissions



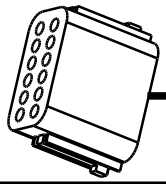
Typical Parts Required

Item	Qty	Part #	Decsription
A	(1)	11230-x-SACT	EEC3 Control Processor - (various engines)
B	(1)	11312-xx-MG	Smart Actuator - Mech. Gear (12 or 24v DC)
C	(1)	11413-C15T	CH2001 Control Head 4 button
D	(2)	11600-02-xx	Station Cable (20 - 100' long)
E	(2)	11600-TRF	Terminating Resistors
F	(2)	11601-01	Harness - DC Power Input (30' long std.)
G	(1)	11603-02-MG-xx	Harness - SACT Enable Mech Gear (20-100'long)
H	(1)	11603-xx-xx	Harness - CP Enable (12 or 24v DC) (20'-100' long)
I	(2)	11605-xx-xx	Harness - Various Engines (20 - 100' long)
Extra Control Station requires			
	(1)	11413-C15T	CH2001 Control Head 4 button
	(1)	11600-02-xx	Station Cable (20-100' long)

EEC 3 Control System Harnesses - Smart Actuator Option Harnesses

Smart Actuator - Mechanical Gear Enable Harness
Part # 11603-02-MG-xx'

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch w/ nameplate



(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

White

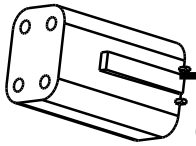
Black

Smart Actuator End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

DC Power Harness
Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard (custom lengths available)



(Noise Supression devices)

Battery Positive #1 (Red wire)

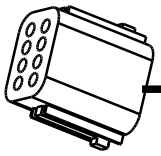
Battery Positive #2 (Red wire)

Battery Negative (yellow wire)

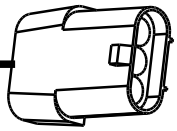
Control Process End
Duetsch 4 pos. Black

Throttle Signal Harness
Part # 11605-xx-xx'

Engine Connector



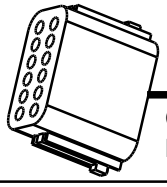
(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness



Control Process End
Duetsch 8 pos. Black

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch w/ nameplate



(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

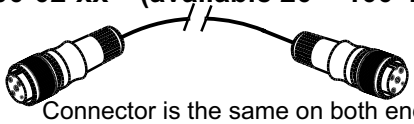
White

Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

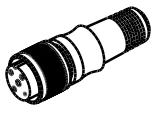
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



Connector is the same on both ends

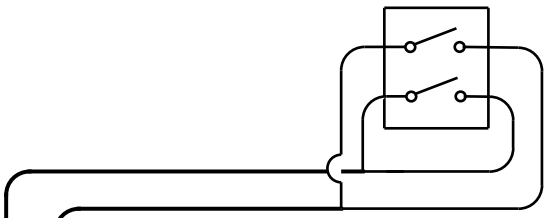
Terminating Resistor
Part # 11600-TRF

Two required per system

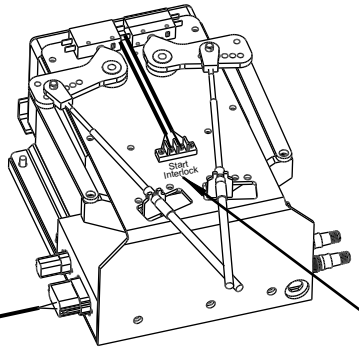


EEC-3 / Smart Actuator Remote Enable Wiring Diagram

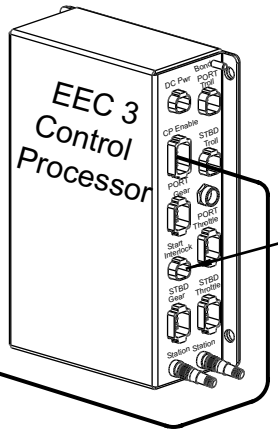
System Enable Switch
- use DPST switch
- attach to Normally Open side of switch



Gear Actuator (ID#5)



Use this terminal strip for Start Interlock connections.



Do not use Start Interlock connector on EEC3 CP. Use at Smart Actuator.

Smart Actuator Dimensions