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Rev.	Description	By	Date
1	Update label specifications – clarify visual inspection DCR#16458	M.A.	5/11/10
2	Torque table page 7 updated to correct torques value for 2-56 size screw from 1.4, it to 2.2 Pound-inch.	E. Stockinger	11/15/12
3	Revised per FCN-000300 – Update to include recommendations for label placement on cables	N. Wybenga	4/13/15
A	Revision per FCN-000XXX – General updates and addition of key indicators for Microscan manufacturing	N. Wybenga	5/13/15

**It is the user's responsibility to ensure that this document is the current revision.**

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# MICROSCAN<sup>®</sup>

## WORKMANSHIP MANUAL

ORIGINATOR: Craig Landon

DATE: 1/15/83

Size

Doc. #

Rev.

A

04-000010-01


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*Note: Sections 6,7 & 8 omitted intentionally.*

**PURPOSE:**

- This manual outlines the “preferred” and “minimum acceptable” standards of workmanship to be followed by sub-contractors and Microscan Systems Inc.
  - The requirements outlined in this manual are intended to establish, though not to limit the appearance and form, fit or function of the products manufactured for and by Microscan Systems, Inc.
  - When not otherwise stated on the drawings, specifications, or on contractual agreement, this manual is the basis for minimum acceptable standards.
  - This manual is intended to be used in conjunction with drawings, procedures and recommended specifications. In the event of conflict between this manual and the Engineering drawings, the criteria laid out in engineering drawings overrule the criteria in this manual.
- 
- Any ‘key’ symbols as shown to the left indicate key requirements identified for Microscan’s manufacturing team.

**REFERENCES:**

1. REGULATED SUBSTANCES SPECIFICATION (04-9000018-01)
2. IPC-A-610 (04-430039-XX)
3. MIL-013830A (04-100011-XX)
4. ELECTRICAL DISCHARGE PROCEDURE (04-000018-01)
5. ANSI STD. B46.1-1985
6. IPC-A-600 (04-430024-XX)
7. IPC-6012 (04-430038-XX)
8. IPC-1066
9. ASTM-D3359
10. IPC/WHMA-A-620

## SECTION 1.0: FINAL ASSEMBLY

### 1.1 COSMETIC SURFACE SPECIFICATION & INSPECTION

#### 1.1.1 General

Cosmetic inspection shall use the Time and Distance Inspection procedure described below and shall rely on the judgment of trained inspectors and suppliers. The Cosmetic Reference Standard (Table 2) defined in this specification is to be used for training inspection personnel and may also be used to assist in making an accept/reject decision.

Mirrors, polished surfaces, lenses, and optical surfaces are not covered by this standard; instead see Section 3.1.

#### 1.1.2 Viewing conditions

Parts and products shall be inspected under the following conditions.

- Uniform, non-directional illumination between 80 and 150 foot-candles. At levels greater than 150 foot-candles, caution should be used to not over inspect.
- Holding the product at the designated distance from you at chest level, scan the part in a sweeping motion (similar to reading) from left to right and top to bottom for the designated period of time.
- Parts shall not be manipulated to reflect a single light source in order to accentuate surface flaws, the viewing angle should be approximately 45-degrees to the light source.
- Magnification is not to be used when inspecting for cosmetic defects.

#### 1.1.3 Cosmetic class codes

Cosmetic class codes used for this standard are Class A, B, and C. Where possible, the cosmetic requirements should be clearly defined with Flag notes or similar conventions on the fabricated part drawings.

**Class A** (highly decorative surface) is any surface, on the exterior of the final product, which is immediately visible to the receiving customer.

**Class B** (moderately decorative surface) is surfaces that are external. However, they are primarily surfaces utilized to mount the product or for labels, and will be covered from view after customer installation.

**Class C** (non-decorative surface) surfaces are internal surfaces, not visible to the receiving customer.

#### 1.1.4 Time and distance inspection

"Viewing Time" indicates the duration of the observation. This time is based on a surface size of 36 sq-in or less. The more critical the cosmetic surface, the larger the surface, the longer the inspection period.

"Viewing Distance" indicates how far the inspector will be from the parts. The more critical the cosmetic surface, the closer the inspector will be to the parts.

**Table 1: Viewing Time and Distance**

Indicates the viewing time and distance to be used for various cosmetic standard codes.

Cosmetic class	A	B	C
<i>Application</i>	Primary external surface	Secondary external surface	Internal surface
<i>Viewing distance</i>	18 " (460mm)	18" (460mm)	24" (610mm)
<i>Viewing time</i>	8 seconds	5 seconds	3 seconds

### 1.1.5 Accept/reject

When flaws are observed within the specified time and distance and the accept/reject decision is difficult to make, refer to the Cosmetic Reference Standard (Table 2). Parts are often cosmetically acceptable even though flaws are noticeable.

Note: A flaw that occurs repeatedly in the same surface location becomes more easily noticed. If this same cosmetic flaw was judged acceptable at the beginning of the inspection of the run or lot, it shall also be acceptable at the end.

**Table 2: Cosmetic Reference Standard**

This table constitutes the reference standard of cosmetic acceptability. The total number of allowable mixed flaws shall not exceed the limit specified for the flaw with the largest allowable -quantity limit. Table 2 is primarily used to train personnel involved in inspection and may be used to assist in making an accept/reject decision.

Cosmetic class	A	B	C
<i>Specs &amp; discoloration</i>	TWO .02" (0.50mm) DIA	FOUR .03" (0.75mm) DIA	FOUR .06" (1.50mm) DIA
<i>Scratches &amp; lint</i>	TWO .01" (0.25mm) x .03" (0.75mm)	FOUR .02" (0.50mm) x .09" (2.25mm)	FOUR .03" (0.75mm) x .12" (3.00mm)
<i>Runs &amp; marks</i>	NONE	TWO .03" (0.75mm) DIA	TWO .06" (1.50mm) DIA
<i>Blister &amp; bare spots</i>	NONE	TWO .03" (0.75mm) DIA	TWO .06" (1.50mm) DIA

Reference dots:

• .02" (0.50mm)	◦ .02" (0.50mm)
• .03" (0.75mm)	◦ .03" (0.75mm)
• .06" (1.50mm)	◦ .06" (1.50mm)



## Terms and Definitions for Table 2

- Specks - Small Particles.
- Discoloration - Any change from original color/gloss or unintended inconsistent color.
- Scratches - Shallow grooves.
- Lint - Any unintended foreign substance in the coating or on the surface.
- Runs - Excessive coating that causes drips or non-uniform coverage.
- Marks - Pits, dents, sanding or other marks on the base material that remain visible after coating.
- Blisters – Non-adhesion. Lack of proper sticking of the coating to the surface.
- Bare spots - Areas that have insufficient or missing coating.

## SECTION 2.0: ASSEMBLY

### 2.1 MECHANICAL ASSEMBLY

#### 2.1.1 Torque Table

Use the following table as a reference for torque requirements when tightening fasteners in any assembly process unless otherwise stated.

(The torque drivers are calibrated to ensure the same torque application every time).

#### TORQUE SPECIFICATIONS FOR METAL FASTENERS ( $\pm 10\%$ )

Torque values are in Pounds-Inches (Newton-Meters)

Metal Screw Sizes – Torque values are in Pound – Inches (Newton Meters)																	
BASE MATERIAL <sup>1</sup>	#2 Self-Tapping	#4 Self-Tapping	0-80	1-72	2-56	4-40	6-32	8-32	10-32	¼ - 20	M1.6 x 0.35	M2 x 0.4	M2.5 x 0.45	M3 x 0.5	M4 x 0.7	M5 x 0.8	M6 x 1.0
Aluminum	-	-	1.0 (0.11)	2.0 (.226)	2.2 (.25)	2.9 (.33)	5.3 (.60)	10.8 (1.22)	19.2 (2.17)	45.6 (5.15)	1.0 (0.11)	2.2 (.25)	3.9 (.44)	6.5 (.73)	15.6 (1.76)	28.3 (3.20)	51.0 (5.76)
Brass	-	-	1.0 (0.11)	2.0 (.226)	2.0 (.226)	4.3 (.49)	7.9 (.89)	16.2 (1.83)	25.9 (2.93)	61.5 (6.95)	1.0 (0.11)	-	-	-	-	-	-
Low Carbon Steel	-	-	1.0 (0.11)	2.0 (.226)	2.2 (.25)	4.7 (.53)	8.7 (.98)	17.8 (2.01)	29.7 (3.36)	65.0 (7.34)	1.0 (0.11)	-	-	-	-	-	-
Poly Carbonate Plastic (Lexan™)	3.0(.34)	5.0 (.56)	0.53 (.060)	-	-	4.0 (.452)	5.0 (.56)	-	-	-	0.53 (.060)	0.53 (.060)	-	-	-	-	-
ABS Plastic	3.0(.34)	5.0 (.56)	-	-	-	4.0 (.452)	5.0 (.56)	-	-	-	-	-	-	-	-	-	-
Insert in PC Board	-	-	-	-	-	4.0 (.452)	4.0 (.452)	-	-	-	-	-	4.0 (.452)	4.0 (.452)	4.0 (.452)	-	-
Insert in Sheet Metal	-	-	-	-	-	5.0 (.56)	10.0 (1.13)	-	-	-	-	-	3.4 (.38)	4.2 (.47)	8.0 (.90)	-	-
Insert <sup>2</sup> in ABS Plastic	-	-	-	-	-	5.0 (.56)	10.0 (1.13)	-	-	-	-	-	-	4.2 (.47)	8.0 (.90)	-	-
Insert <sup>2</sup> in Poly Carbonate Plastic	-	-	-	-	-	5.0 (.56)	10.0 (1.13)	-	-	-	-	-	-	4.2 (.47)	8.0 (.90)	-	-

<sup>1</sup> Base Material refers to all materials being joined by the hardware. If two or more dissimilar materials are being joined, use the torque specification for the softest material.

<sup>2</sup> Ultrasonically welded inserts only.

Also check **IPC-A-610** under Mechanical Assembly for further guidelines.

### Alternative Torque Method:

Hand tighten fastener until head of fastener is lightly seated against substrate. Tighten 1/2 to 3/8 turn further.

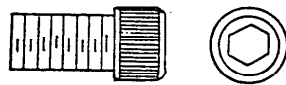
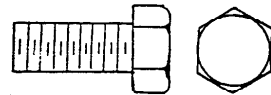
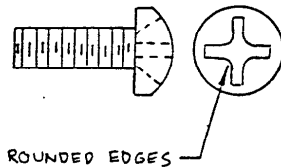
#### 2.1.1.1 Calibration

Calibrate all adjustable torque tools at the beginning of each shift, and whenever an adjustment to the torque driver is made. Calibrate tools per Microscan Procedure 04-110001-01.

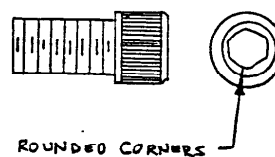
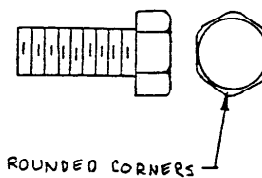
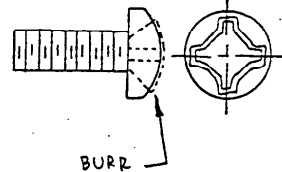
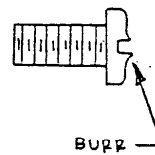
### 2.1.2 Fasteners and Fastener Installation

#### 2.1.2.1 Screws, Machine and Cap

##### ACCEPTABLE



##### REJECTABLE



#### 2.1.3 Loctite

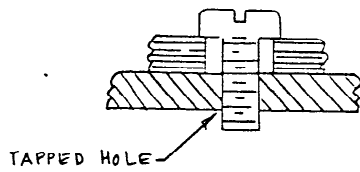
Loctite or other liquid locking devices shall not be used unless specified on drawing/BOM.

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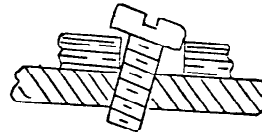
### 2.1.4 Oversize Holes

ACCEPTABLE



- A. Head of screw completely covers hole.
- B. If unable to provide adequate coverage a flat washer may be used under screw head.

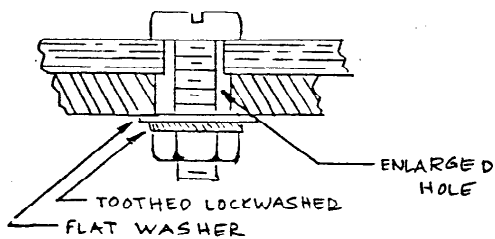
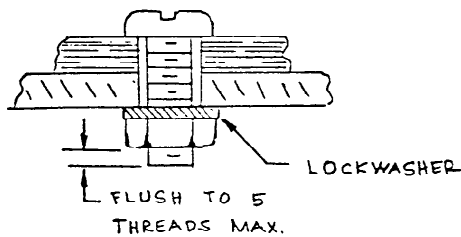
### REJECTABLE



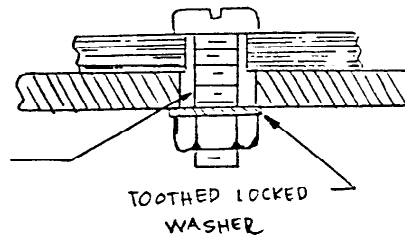
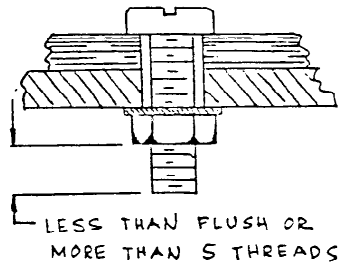
- A. Screw head pulled into mounting hole.
- B. Flat washer not used.

### 2.1.5 Nut Assembly

ACCEPTABLE

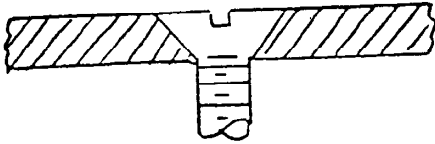


### REJECTABLE



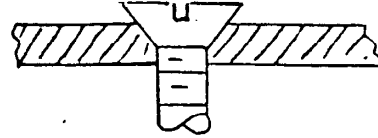
## 2.1.6 Flushness Requirements

### ACCEPTABLE

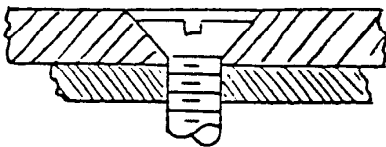


- A. No protrusion
- B. No shaving allowed.

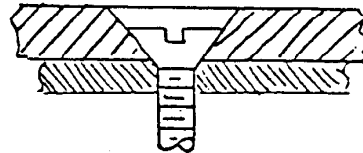
### REJECTABLE



- A. Head is above surface.



- A. Head is depressed, but counter sunk head does not protrude through at bottom of counter sink.
- B. 50% of screw head is in contact with counter sunk hole.



- A. Head protrudes through at bottom of counter sink.
- B. Less than 50% of screw head is in contact with counter sunk hole.
- C. Threaded material not counter sunk to accept protrusion. (Not preferred).

## 2.1.7 Threaded Type Fastener Installation.

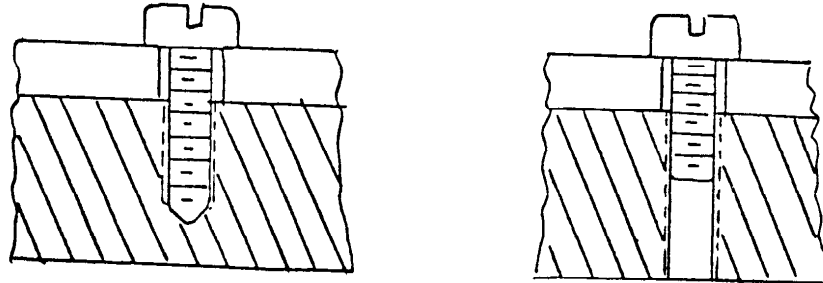
Interference with adjacent parts, or thread damage, and/or plating damaged shall be cause for rejection.

Unless otherwise specified, installations shall comply with the following.

- No evidence of loose hardware or movement between supporting hardware and attached parts.
- No evidence of forced installation of bolts or screws into holes, distortion or compression of supporting parts.

### 2.1.8 Thread Engagement

Threads of screws, bolts, or threaded material shall be free from visual evidence of stripping, cross-threading, or distortion. Evidence of the use of TAPS within self-locking devices, shall be cause for rejection. The minimum acceptable thread engagements are shown below:



## 2.2 PRINTED CIRCUIT BOARD ASSEMBLY (PCBA)

Soldering workmanship performed at Microscan will be to IPC standard IPC-A-610 “Acceptability of Electronic Assemblies”. The applicable section of the standard will be referenced to resolve any question as to the acceptability of solder workmanship in the assembly or rework of PCBA’s and electronic assemblies.

All work is to be performed within the guidelines of Electrical Discharge, Procedure (04-000018).

- Follow IPC-A-610 Class 2 for verification of Printed Circuit Board assembly.
- All work is to be performed within the guidelines of Electrical Discharge Procedure (04-000018).
- Mark Dash Number, Revision, and Lot Number on PCB at locations provided using indelible ink.

In general, Microscan does not allow for ‘Repair’ of bare PCB damage, even when the repair meets IPC guidelines. More specifically, the following items list what is and what is not acceptable.

### 2.2.1 Conductor/Land damage – lifted pads/lands

No pads or land repair allowed even if they are within the process indicator of class 1, 2, and 3.

### 2.2.2 Barrel damage – pulled

No barrel repair is allowed.

### 2.2.3 Solder Resist Coating: Voids and Blisters

This item needs to be reviewed to determine the nature and extent of the void(s) and blister(s). Depending on the defect and/or process indicator, some items can be re-masked to bring the assembly back to form, fit and function.

If the void is “small” in size, around 0.125 inch diameter and smaller, then this can be reworked. Use appropriate masking material and cure. The color may or may not exactly match.

If the void is “large”, greater than 0.250 inches, then rework is not allowed.

If the void is between 0.125 and 0.250 inches, this will need Microscan engineering evaluation and treated as a case by case basis.

#### 2.2.4 IPC-1066 Marking Requirements

RoHS compliant assemblies must be marked per IPC-1066 guidelines for RoHS/WEEE compliance. The marking sequence shall follow this order: PCB materials, reflow/wave solder finish, Microscan hand add solder material (always e1). The marking format shall be:

“Material”	“Reflow/Wave Solder”	e1
------------	----------------------	----

The PCB assembly house shall mark the finished PCBAs with either white silkscreen ink or a printed label. A barcode label containing the marking information may also be used. The label must meet requirements outlined in section 4.4. Marking shall be placed on the top (component) side of the PCA in the area provided on the assembly drawing. If the assembly drawing does not illustrate the location for marking, confirm location with Microscan engineering.

### SECTION 3.0: MATERIAL HANDLING & VERIFICATION

#### 3.1 OPTICAL COMPONENTS

##### 3.1.1 Cleaning of Glass/Optics/Mirrors

	Glass Cleaner	Alcohol	Paper Towel	Wood Q-Tip	Paper Q-Tip	Ultrasonic Cleaner	Compressed Air
Glass Window	X			X			
Ovalizing Lens						X	
Glass Filters	X		X	X			
Glass Lens	X		X	X			
Plastic Lens		X	X	X			
Polarizer		X		X			
Aluminum Mirrors		X		X			
Plastic Mirrors			X				X

\* In case of severe contamination where cleaning is ineffective, reject the parts to MRB.

### 3.1.2 Verification

- Parts must conform to MIL-O-13830A specification for scratch and dig.
- There will be no finger prints on the optical surfaces.
- The parts must be free of any air bubbles.
- Optical surfaces will be free of scratches. Scratches will be identified by holding the part at 10", reflecting overhead lighting off of the part so that the part appears white. Any scratches, if visible, will appear black.

### 3.1.3 Material Handling

- It is highly recommended to wear clean, lint proof gloves while handling optical components. This will provide the highest protection against surface damage.
- Remove the parts from the packaging very carefully.
- Do not place or drag the parts on any surface which can cause scratches.

## SECTION 4.0: FABRICATED COMPONENTS

### 4.1 MACHINED, CAST, OR MOLDED METAL PARTS

Following are the standards used for machined, cast, or molded metal parts.

- Scratch and Dig: MIL-O-13830A
- Surface Roughness and Waviness: ANSI Std. B46.1-1985
- Finished coatings: Per drawing specifications.
- Unless otherwise specified the Surface Roughness and Waviness is to be 32 micro inches or better as per ANSI std. B46.1-1985.
- Unless otherwise specified break all sharp edges to R.03.
- Unless otherwise specified inside corner radius machined to R.005.
- Paint Adherence must be Class 3 or better per ASTM-D3359.

### 4.2 PLASTIC MOLDED PARTS

There are two types of defects not to be found in Plastic Injection molded parts:

**Structural:** Defects that affect the form, fit, or function of the part must be evaluated on case to case.

**Cosmetic:** The defects described may be acceptable if they appear on the interior or invisible surface after the product is assembled. Defects on the exterior or visible surface are not acceptable.

1.	<b>SINK</b>	A slight visible depression in the part surface caused by resin shrinkage during cooling.
2.	<b>BLUSH</b>	Slight discoloration generally appearing on the gates
3.	<b>WARP</b>	Dimensional change (flatness/roundness) during cooling.
4.	<b>KNIT LINE</b>	Slight visible marks indicating the direction of material flow around any obstructions.
5.	<b>FLASH</b>	A ring of plastic around the area of the mold parting line
6.	<b>EJECTOR MARKS</b>	Visible marks (marks on the exterior or visible surfaces) from the ejector pins.
7.	<b>DISCOLORATION</b>	Discoloration of the surface due to mold spray releases.

#### 4.2.1 General Specifications for Molded Plastic Parts (unless otherwise specified)

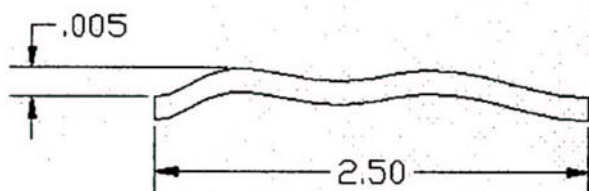
	Part Feature	Type	Specification
1.	Molding Dimensions/Tolerances	Exterior or Interior	Drawings are finished part dimensions.
2.	Gates/Sprues	Exterior or Interior	Flush to $-.010$ "
3.	Flash	Exterior Interior	Flush to $+.005$ " Flush to $+.015$ "
4.	Sink Marks	Exterior Interior	Not more than $.005$ " over a $1-1/2$ " Must not affect form, fit or function
5.	Cracks	Exterior Interior	Not Acceptable Must not affect form, fit or function

### 4.3 SHEET METAL

#### 4.3.1 Flatness

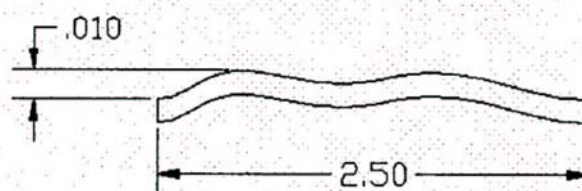
NOTE: Method of checking flatness - lay parts on surface plate with convex side up, measures the maximum rise. Weight or clamps may not be used.

#### Acceptable



A. Out of flat within limit shown on chart.

#### Rejectable



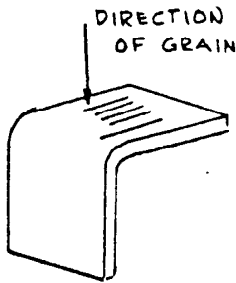
A. Out of flat beyond limit shown on chart.

### 4.3.2 Sheet Metal Part Flatness Specifications (unless otherwise specified on the drawings).

	Max. Dimension of Sheet Metal Part				
	< 3 in.	3 to < 10 in.	10 to < 24 in.	24 to < 48 in.	48 in. & over
Flatness Specification	.008	.015	.020	.030	.050

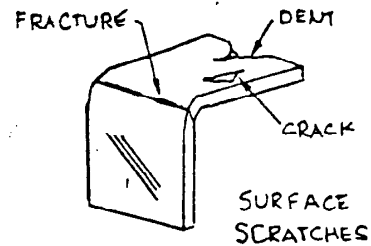
### 4.3.3 Bending

#### ACCEPTABLE



- A. No crack in bend area.
- B. No surface defects, i.e. cracks, dents, scratches, etc.
- C. Bend at right angle to grain direction where possible.

#### REJECTABLE



- A. Fractured in bend area.
- B. Material of finished part has scratches, dents, and/or cracks.

### 4.3.4 Burrs

All sheet metal parts shall be free from burrs and loose chip that may interfere with assembly or break free causing shorts or failure.

**Definition:** Burrs are excessive displacement of metal caused by the cutting tools and capable of snagging and/or breaking free from parent metal. Burrs shall be visible without magnification or capable of catching/snagging the fingernail when drawn across the suspected area.

Nicks, dents, pits or other forms of displaced metal as a result of normal handling, provided burrs are removed, will be acceptable, and provided surface is not cosmetic.

## 4.4 LABELS

### 4.4.1 Verification

The legibility of the labels shall follow the following criteria unless otherwise specified on the drawing.

- The acceptance of the label marking is based on using an unaided eye unless magnification is required.
- Each label must be verified according to the drawing.
- Each letter and/or number must be complete and clearly legible on the label.
- No ink smears, spots or blurred characters allowed on the labels.
- No scratches or nicks allowed on the labels.
- No adhesive and/or glue is allowed on the visible surface.

### 4.4.2 Cleaning

Clean labels only if the contamination is not severe (reject otherwise).

When in doubt ask the supervisor for any special cleaning procedure.

### 4.4.3 Handling

Labels shall be handled very carefully in order to avoid any finger prints.

The labels must not be creased or twisted.

### 4.4.5 Reuse

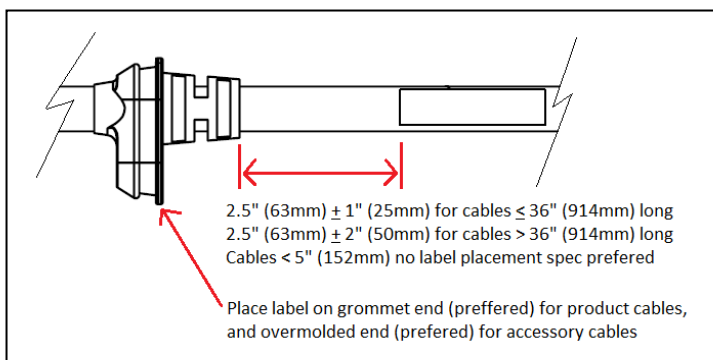
Once a label has been applied to a surface, it is considered used and cannot be removed and re-applied.

## 4.5 CABLE ASSEMBLIES

All cables will be built and inspected to IPC/WHMA-A-620 "Requirements and Acceptance for Cables and Wire Harness Assemblies", Class 2.

Any exceptions will be noted on the drawing, or in the following list.

- All cables are to be labeled with Microscan Part Number, Revision, & Date of Manufacture unless otherwise specified.
- Unless otherwise specified on the drawing, cable labels should be placed in accordance with the below spec:





- All cable assemblies are to be manufactured per the Approved Vendor List (AVL) and checked per the drawing.
- All cables have to be functionally tested using a cable tester (Cirris cable tester 1000M or equivalent).
- No nicks or cuts are allowed on the insulation of the wires and cable jacket.
- All cable assemblies are to be free from adhesives or glues from the labels.

#### 4.6 WIRE TIES & GROMMETS

- Follow the guidelines under IPC-A-610 and IPC/WHMA-A-620 regarding proper assembly and verification of the wire ties on the cables.
- Check the drawings for the location of the wire ties and grommets.

#### 4.7 PRINTED CIRCUIT BOARDS (PCB)

Printed circuit boards are to be manufactured to IPC 6012 “Qualification and Performance Specification for Rigid Printed Boards”, Class 2, with the following exceptions:

- Tooling holes shall be void of any plating.
- Annular ring on all supported holes shall meet IPC 6012 class 3 requirements (section 3.4.3).
- Component legend marking ink used on PCB shall comply with IPC 6012 section 3.2.11.
- Silkscreen component legends shall not overlap onto any portion of the exposed terminal area.
- Break all sharp edges and sand burrs flush with board edge.
- All other manufacturing requirements are noted on Microscan Systems PCB drill drawing for each given PCB. In the event manufacturing requirements are not specified refer to IPC-6012 class 2 default requirements.
- IPC-A-600 will be used for minimum acceptability requirements.

### SECTION 5.0: OEM COMPONENTS

#### 5.1 ELECTRICAL COMPONENTS

- Parts must conform to specification as specified on source control documents.
- The parts must always reside in a package with part number for easy and correct identification.
- The parts must be kept in anti-static bins and packaged in anti-static bags.
- ESD precautions must be observed when handling the parts.

## 5.2 MECHANICAL COMPONENTS

Parts must conform to specification as specified on source control documents.

## SECTION 9.0: PACKAGING

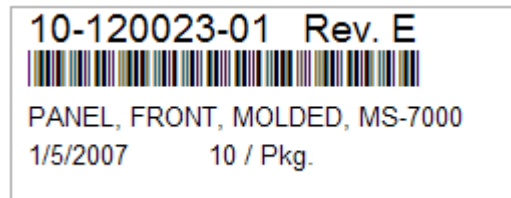
Unless otherwise specified, packaging is required which protects each part from damage in shipping and storage. Part specific packaging requirements may be specified in drawing notes or on Purchase Order including package type, quantity per package, and/or outer package. In case of a conflict, the Purchase Order takes precedence. All direct part marking must follow the drawing notes.

### 9.1 PART MARKING

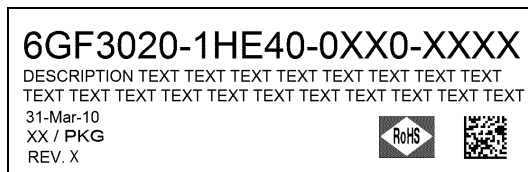
Unless otherwise specified, parts are to be identified in such a way to easily differentiate them from other similar parts. At minimum, packaged groups of parts are to be marked with a label including; part number, part number barcode, part description, revision, package date, and package quantity. Minimum barcode size is .20" tall, 0.010" code 39, with human readable part number located above barcode with text size as large as possible to fit on the label. The barcode can be replaced by a datamatrix symbol with a minimum element size of at least 0.0125". Part description, revision, manufacture date, and package quantity can be smaller font, but must be fully legible and match PO. The RoHS logo or other designation for compliant materials is optional. (Sample labels shown below) Additional part specific markings may be specified in drawing notes or on the PO.



RoHS compliant label example



Non-RoHS label example



Datamatrix Label Example

### 9.1.2 Marking Legibility

#### ACCEPTABLE

METAL STAMPING

- A. Sharp and clear, uniform in depth and thickness.

ENGRAVING

- A. Characters are sharply defined and of uniform depth.

SILK SCREENING  
OR STENCILING

- A. Characters are sharply defined and evenly spaced.

RUBBER STAMP

- A. Characters clean and clear.

#### REJECTABLE

METAL STAMPING

- A. Hard to read and not uniform in depth and thickness.

ENGRAVING

- A. Unclear outline or uneven.

SILK SCREENING  
OR STENCILING

- A. Characters blurred, not well cleaned. Smudged or smeared characters.

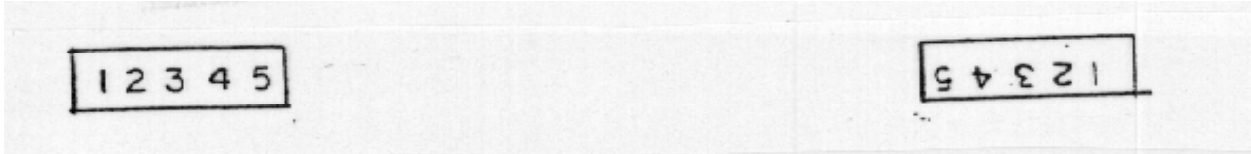
RUBBER STAMP

- A. Smeared or smudged.

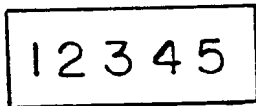
### 9.1.3 Marking Orientation

All marking shall be clear and legible. No fuzzy edges. Markings shall be oriented in a manner that they can be read from the bottom, front or right hand side, when the assembly is in its normal installed position.

ACCEPTABLE

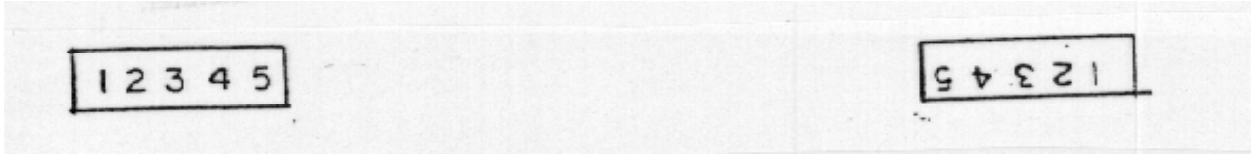


A. Reads left to right from bottom.

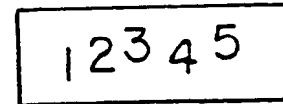


A. All characters evenly spaced.

REJECTABLE



A. Numerals inverted.



A. Out of line and not evenly spaced.