NOTE
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ±0.13 mm [±.005 in.] and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of the 24-Position Fiber-Optic Connector for Use with LuxCis termini. This connector system has been designed for use in commercial avionics systems. It provides a high-density, blind-mate optical interconnect in a backplane/card configuration having the general form factor of the TE Connectivity 2 mm HM Products. The fiber-optic cable interconnect is fed through the backplane to removable system modules using the LuxCis fiber-optic termini. The connector consists of the backplane connector and the mating module connector which interconnects up to twenty-four fibers. An optional protective cover and replacement sleeve-holder assembly for the module connector are available.

When corresponding with TE Personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

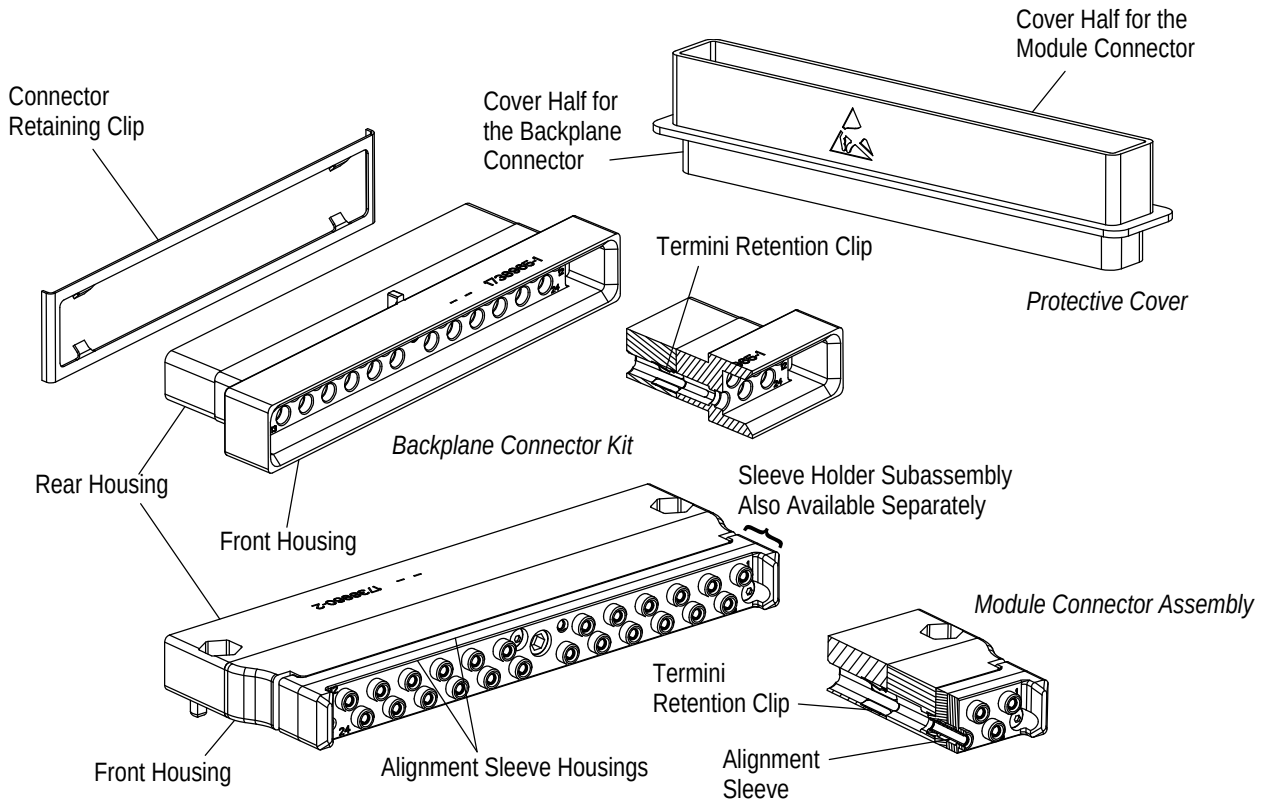

Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Updated document to corporate requirements
- Deleted older logos from artwork

LuxCis is a trademark.

2.2. Customer Assistance

Reference Product Base Part Number 1738965 and Product Code K585 are representative numbers of 24-Position Fiber-Optic Connector. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at www.te.com, or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers at the bottom of page 1.

2.3. Drawings

Customer Drawings for specific products are available from the service network. The information contained in Customer Drawings takes priority if there is a conflict with this specification or with any technical documentation supplied by TE.

2.4. Specifications

Product Specification 108-2247 provides product performance requirements and test results.

3. REQUIREMENTS

3.1. Safety Precautions

DANGER
Glass fiber can easily penetrate the skin and eyes. Always use extreme care and wear eye protection when stripping, cutting, and preparing the cable for use. Never look into the end of the fiber when the optical power is applied as infrared light cannot be seen, but it can severely damage the eyes. Also, never eat, drink, or smoke when working with the fibers. This could lead to injection of glass particles.

3.2. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light could cause deterioration of the connector housing material.

B. Shelf Life

The connectors and components should remain in the shipping containers until ready for use and should be used on a first in, first out basis.

C. Chemical Exposure

Do not store connector components near any chemicals listed, as they may cause discoloration and stress to the housing and termini.

Alkalies	Ammonia	Citrates	Phosphates Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites	Tartrates

D. Temperature Exposure

The storage temperature for these fiber-optic connectors is -55°C to 85°C [-67°F to 185°F]. The operating temperature for these connectors is -15°C to 70°C [5F to 158°F].

3.3. Special Characteristics

A. Backplane Connector Kit (Figure 2)

- The connector housing is sized to provide ±1 mm [.039 in.] floating alignment tolerance in the X and Y directions in the plane of the backplane board, when installed through the recommended panel cutout.
- Circuit identification numbers are molded-in on the rear and mating faces of the connector.
- The connector retaining clip is shipped unassembled with the connector. The clip contains four lance features which engage with the housing.
- Each circuit includes a keying slot that accepts the corresponding key of the LuxCis termini.
- Each circuit of the connector also contains a metallic retention clip which secures the installed termini in the proper position.
- The housing contains a key feature that orients the connector to the printed circuit (pc) board.

LuxCis is a trademark.

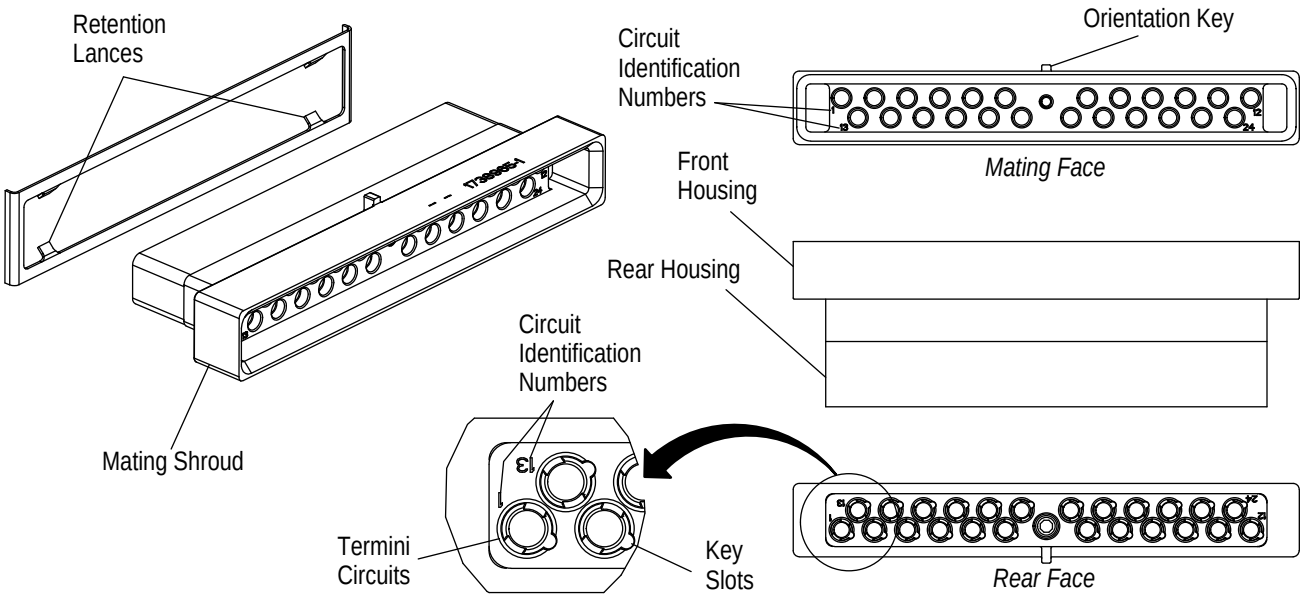

Figure 2

B. Module Connector (Figure 3)

- Contains two alignment posts to ensure connector positioning relative to the edge of the module circuit board.
- Contains two pockets to accept customer-supplied size 2 machine screw hex nuts, which are used to secure the connector to the board.
- As with the backplane connector, circuit identification numbers are molded-in on the rear face of the connector, and on the front face of the installed sleeve holder subassembly.
- Likewise, as with the backplane connector, the circuits include a keying slot and they contain retention clips.

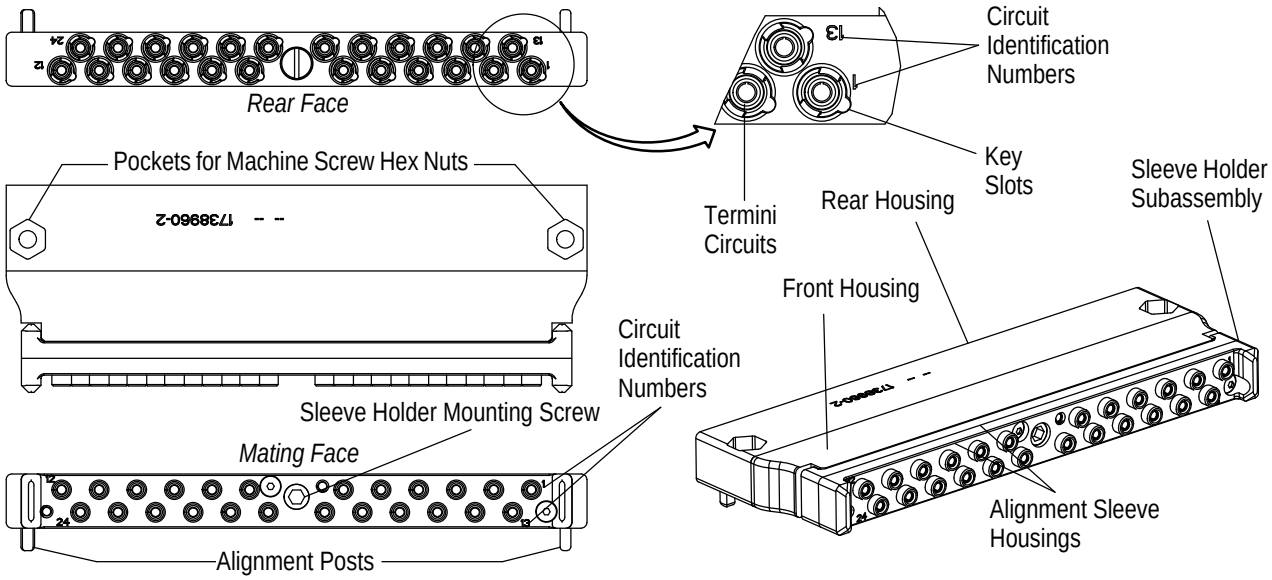

Figure 3

C. Sleeve Holder Subassembly (Figure 4)

- Circuit identification numbers are molded-in, which correspond to the circuit numbers of the module connector to which it is installed.
- Includes a center mounting screw to install the subassembly to the module connector.
- Contains the ceramic sleeves that align the mating termini for each circuit.
- End-block features provide the lead-in to accept up to ±1 mm [.039 in.] X and Y direction misalignment with the mating backplane connector.

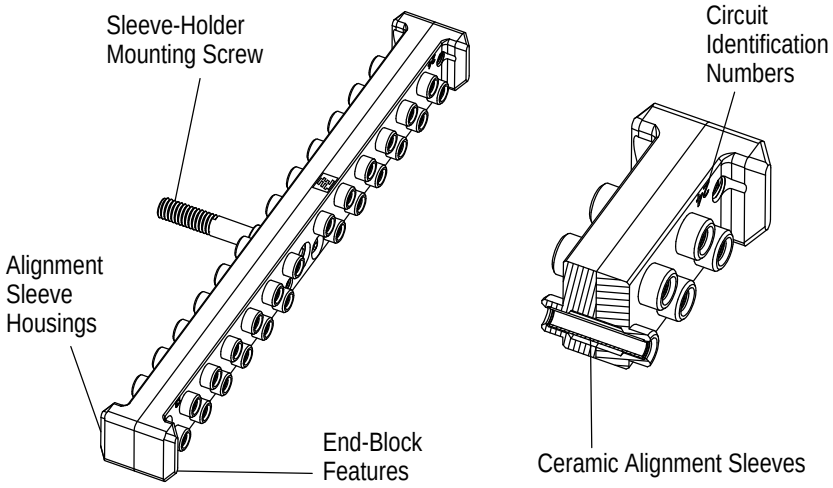

Figure 4

D. Protective Cover (Figure 5)

- The protective cover is made of anti-static material.
- The cover is common for both the module and backplane connectors, using the opposite sides.
- The cover serves to protect the end faces of the optical termini. As these are not sealed connectors, the cover is not expected to seal-out dust particles from the optical interfaces.

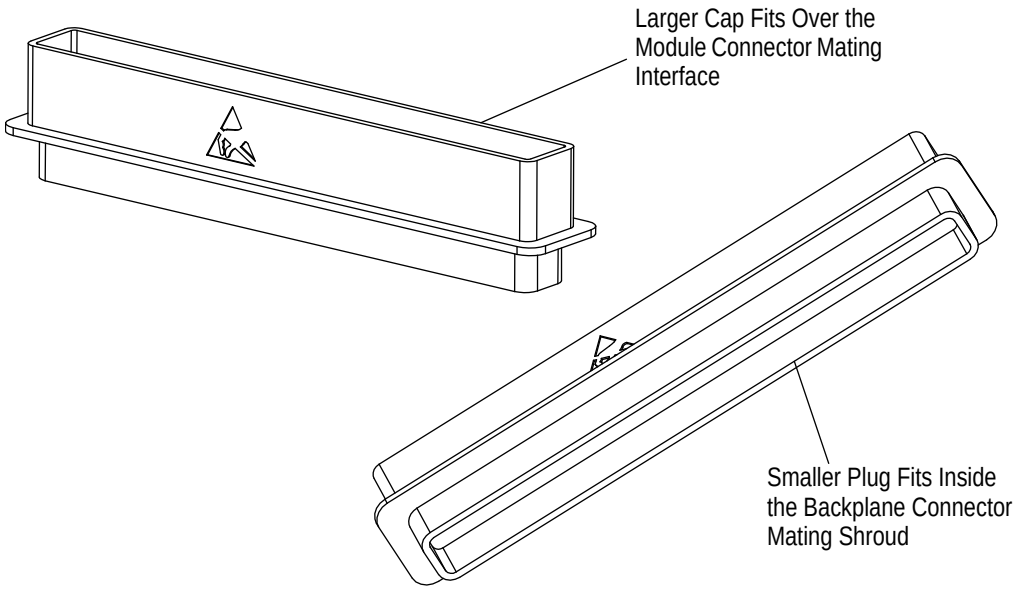

Figure 5

E. Termini and Fiber-Optic Cable Assemblies

These are available separately from TE under part number 1828200-1. Contact the Product Information number at the bottom of page 1 for more information.

3.4. PC Board Requirements

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4, G-10) or other TE Engineering approved substrates. The backplane connectors have been designed to accommodate a pc board thickness range of 2.03-4.19 mm [.080-.165 in.]. The module connectors accept a thickness range of 1.47-3.05 mm [.050-.120 in.].

B. Tolerance

The maximum allow bow of the pc board shall be 0.25 mm [.010 in.] over the length of the connector.

C. Mating Dimension

To ensure proper contact between the mating optical termini, the distance from the center of the post holes of the module board to the front face of the backplane must be within the limits specified in Figure 6.

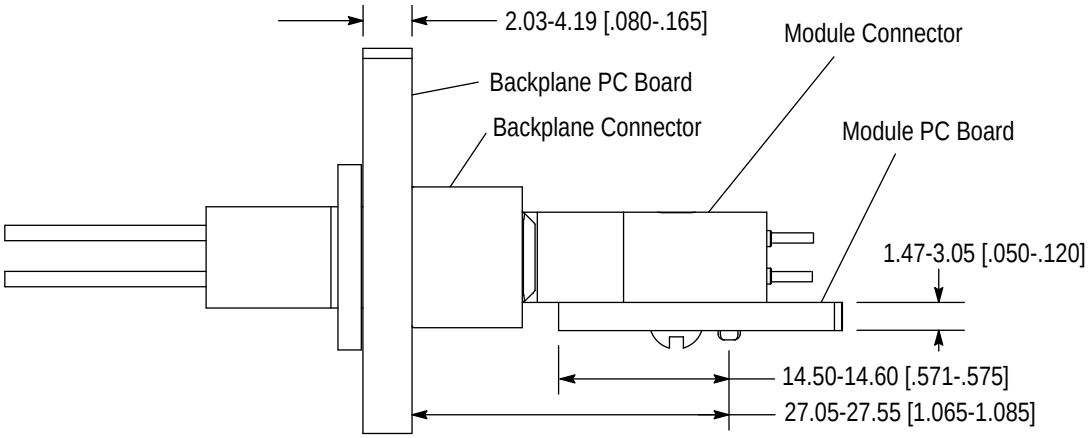

Figure 6

D. Layout (Figures 7 and 8)

There are precision mounting hole requirements.

•The backplane cutout provides clearance allowing the connector floating action that facilitates the connector mating. The cutout shape includes a notch that accepts the housing key feature.

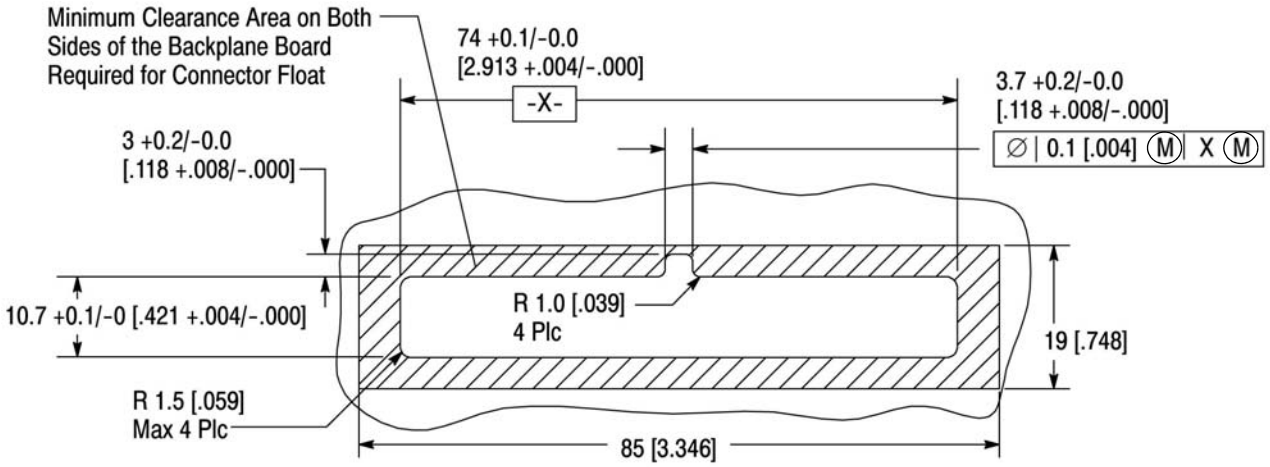

Figure 7

•The holes in the module pc board must be located as shown to ensure proper location and performance of the connector. These holes accept the connector alignment posts and the two customer-supplied size 2 machine screws required for mounting the connector to the pc board. These holes shall be unfinished.

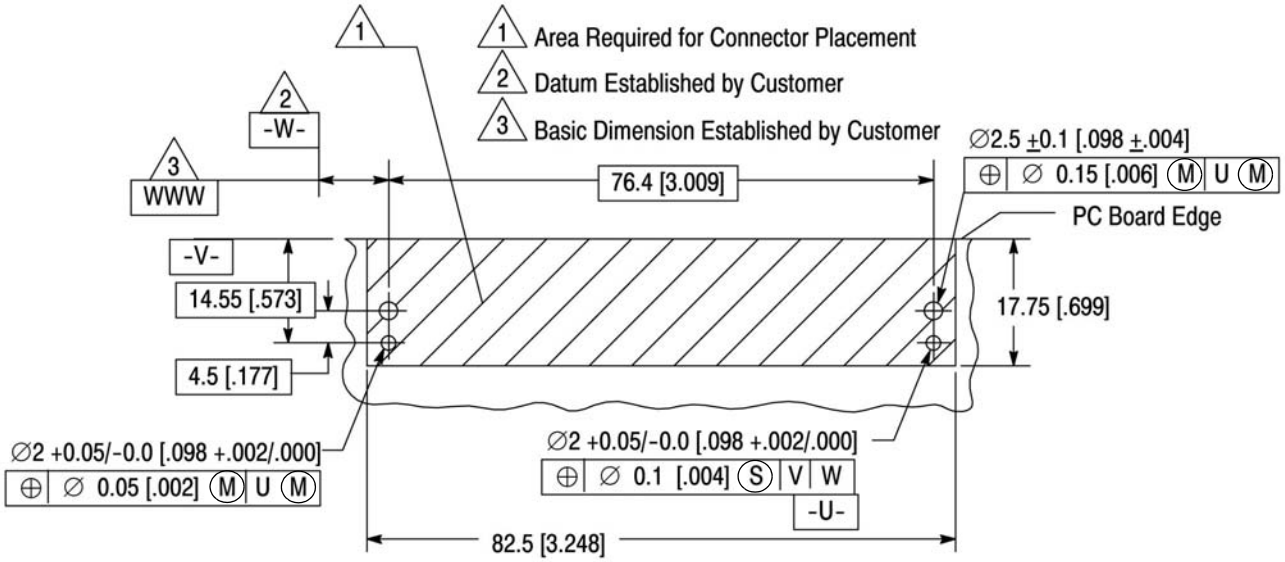

Figure 8

E. Connector Spacing (Figure 9)

CAUTION
Care must be taken to avoid interference between adjacent connectors and/or other components.

Due to the float of the backplane connector within the pc board cutout, spacing is required between adjacent connectors. Spacing for adjacent module connectors is dependent on that required for the mating backplane connectors. Additional spacing may be required for clearance to install the backplane retention clip.

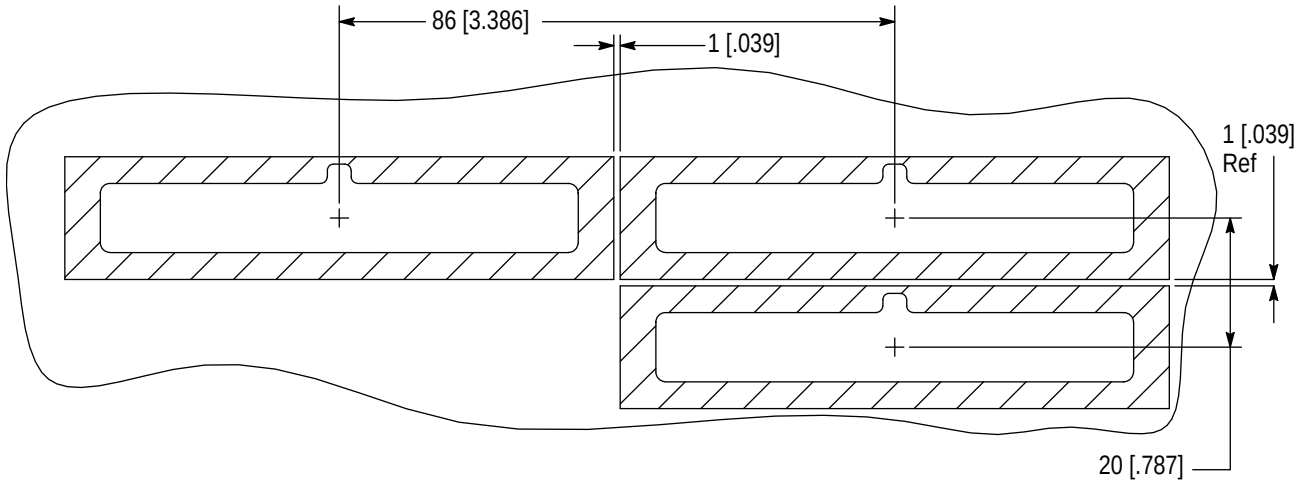

Figure 9 (Cont'd)

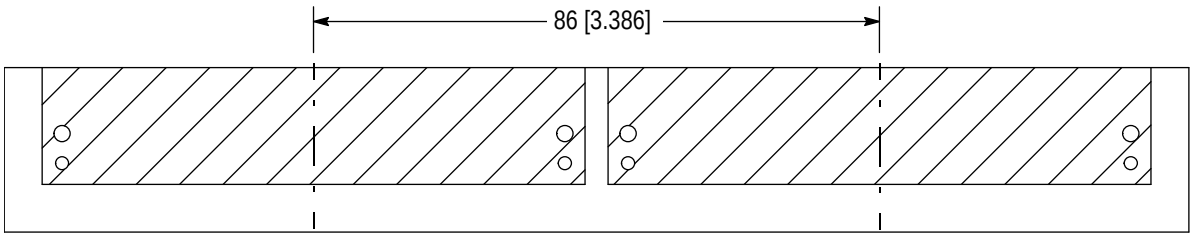

Figure 9 (End)

3.5. Installing Connectors on the PC Boards

TE recommends that the backplane and module connectors be installed on the pc boards after all the soldering, cleaning, and drying operations have been completed for the other components.

A. Module Connector (Figure 10)

NOTE
When placing the connector on the pc board, make sure the alignment posts are started into the corresponding holes before seating the connector on the board.

CAUTION
Connectors should be handled by the ends of the housing to avoid any deformation or damage to the alignment posts.

Once the connector is seated on the pc board, place size 2 machine screw hex nuts in both hex-pockets on the top surface of the connector. From the opposite sides of the board, thread size 2 machine screws through the matching board holes, through the connector housing, into the nuts. The screws shall be installed with 0.23-0.34 N•m [2-3 in-lb] torque. If desired, a thread-locking adhesive such as LOCTITE 268 may be applied to the screws prior to threading them into the connector.

The screws and nuts are customer-supplied, and TE recommends that stainless steel hardware be used in order to avoid potential corrosion.

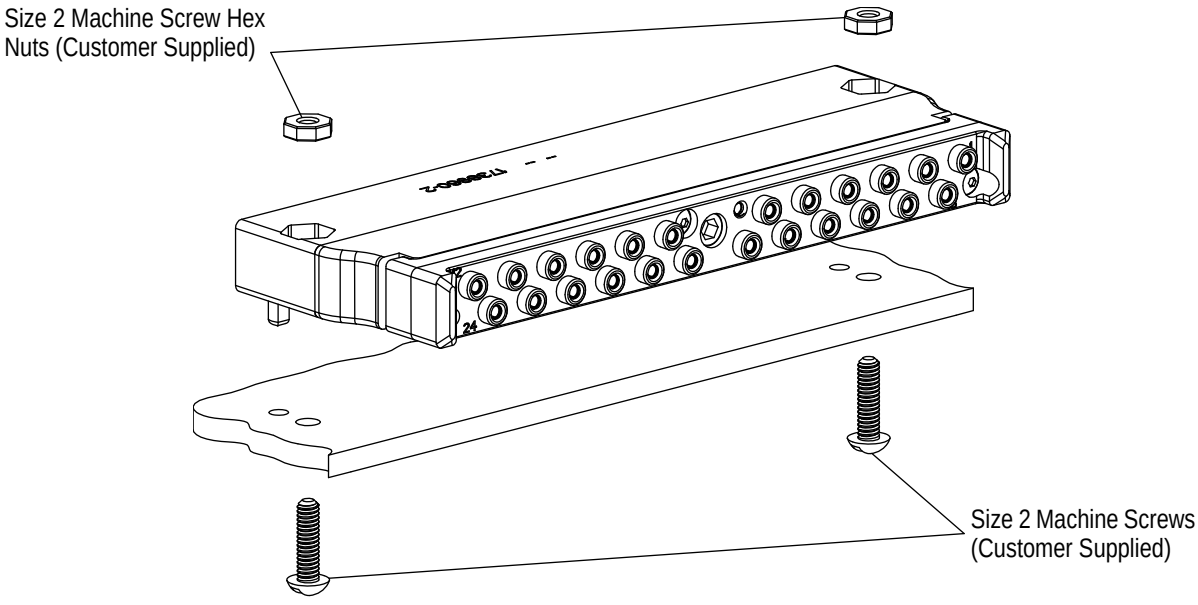

Figure 10

LOCTITE is a trademark.

B. Backplane Connector (Figure 11)

Place the rear (cable entry) face of the connector into the board cutout, with the housing key aligned with the corresponding cutout in the board. From the opposite side of the board, the connector retaining clip is placed over the protruding connector housing.

The lance features of the retention clip shall be oriented away from the pc board as the clip is installed. The clip can be placed on by hand. It is fully seated when there is a slight gap between corners of the clip and the backplane of approximately 0.13-0.64 mm [.005-.025 in.]. Visually check that there is no evidence of damage or distortion to the surface or lances of the clip.

NOTE
The gap can be checked using a plastic shim with a GO dimension of 0.13 mm [.005 in.] and a NO-GO dimension of 0.76 mm [.030 in.].

The backplane connector shall float easily within the panel cutout. If the installed clip does not conform to these requirements, remove the clip from the connector housing and discard the clip and connector. Then, install a new clip onto a new connector.

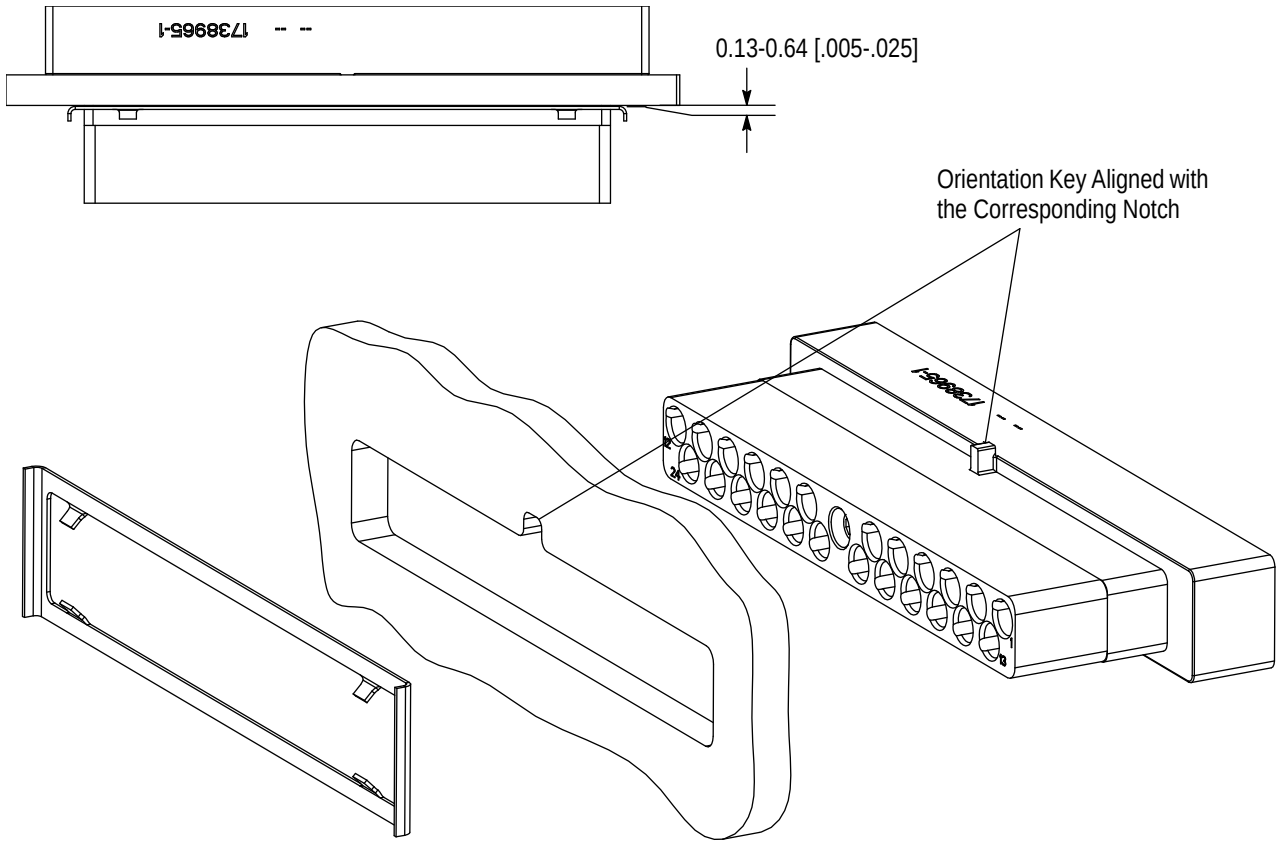

Figure 11

3.6. Installation and Removal of the LuxCis Termini (Figure 12)

The circuits of the 24-Position Fiber-Optic Connectors and the LuxCis termini are standard size 16. Commercially-available tools are required to install and remove the LuxCis termini:

Installing Tool: Daniels Mfg. Corp. Tool DAK83-16
Removal Tool: Daniels Mfg. Corp. Tool DRK83-16

LuxCis is a trademark.

To install, place the LuxCis terminus in the installation tool with the front tip of the tool seated against the retention collar of the terminus. Align the key feature of the terminus collar with the corresponding slot of the connector circuit, and push the termini straight into the connector housing until it is fully seated and locked into place. Pull back GENTLY on the optical cable (provided the particular grade of fiber being used can withstand a gentle pull) to ensure the termini is locked in place.

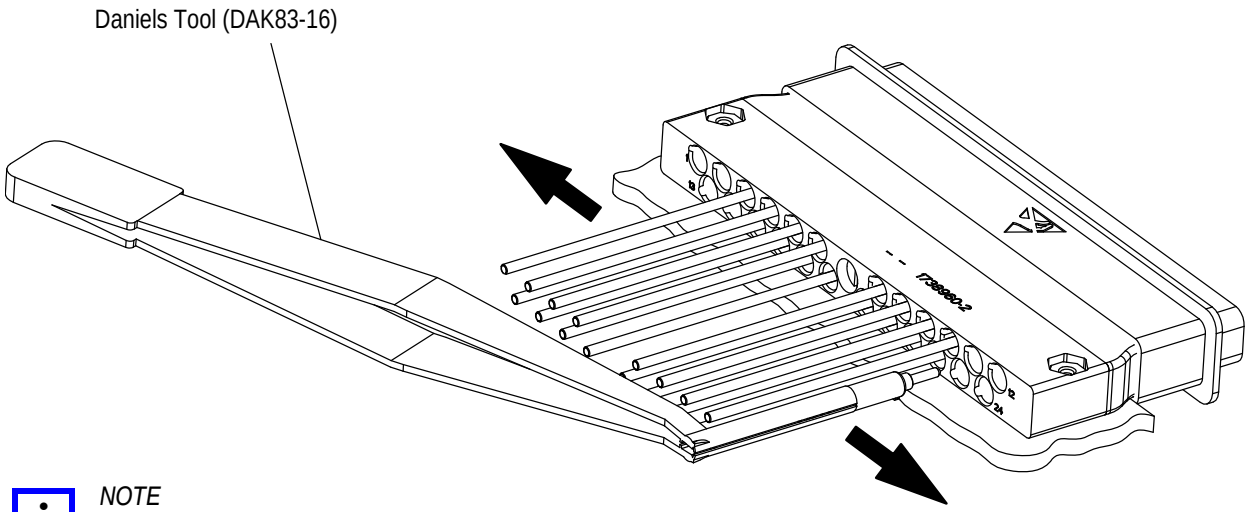

Figure 12

NOTE
When installing the termini in applications where all 24 circuits are not being used, TE recommends populating the connectors starting with the circuits located at the center of the connector and working outward. Also, keep the number of installed circuits balanced on either side of the center retaining screw. Installing the termini in this manner ensures even mating and unmating operations, minimizing any potential flexing of the sleeve holder subassembly during connector unmating. Also, this facilitates removal and re-installation of the sleeve holder subassembly. See Figure 12.

To remove a terminus, open the tool over the optical cable and slide the tip of the tool straight into the connector housing until it bottoms against the terminus collar. Then, pull straight backward GENTLY on both the tool and the optical fiber, removing the terminus from the housing.

CAUTION
Avoid rotating the tool during the tool insertion and terminus removal steps. Excessive tool rotation may rotate the retaining clip, preventing removal of the terminus.

CAUTION
Other tools exists that fit the standard size 16 circuits, for example, MIL Extraction Tool M81969/1-03. Using this or similar tools is not recommended, particularly to remove the LuxCis termini. The installing and removal tips of this tool contain a slot which can catch on the lances of the termini retention clips located inside the connector cavities. If such a tool is rotated within the circuit, it may likewise rotate the retaining clip, preventing removal of the terminus.

3.7. Installation and Removal of the Sleeve Holder Subassembly (Figure 13)

The sleeve holder subassembly is retained to the module connector with a center captive screw. This screw contains a hex-feature that accepts a 5/64-in. Allen key. To remove the subassembly, slowly turn the Allen key counter-clockwise, disengaging it from any LuxCis termini installed in the connector. If the subassembly starts to disengage unevenly, push on the tighter end of the sleeve holder accordingly to even it, and continue turning the Allen key until the subassembly is removed.

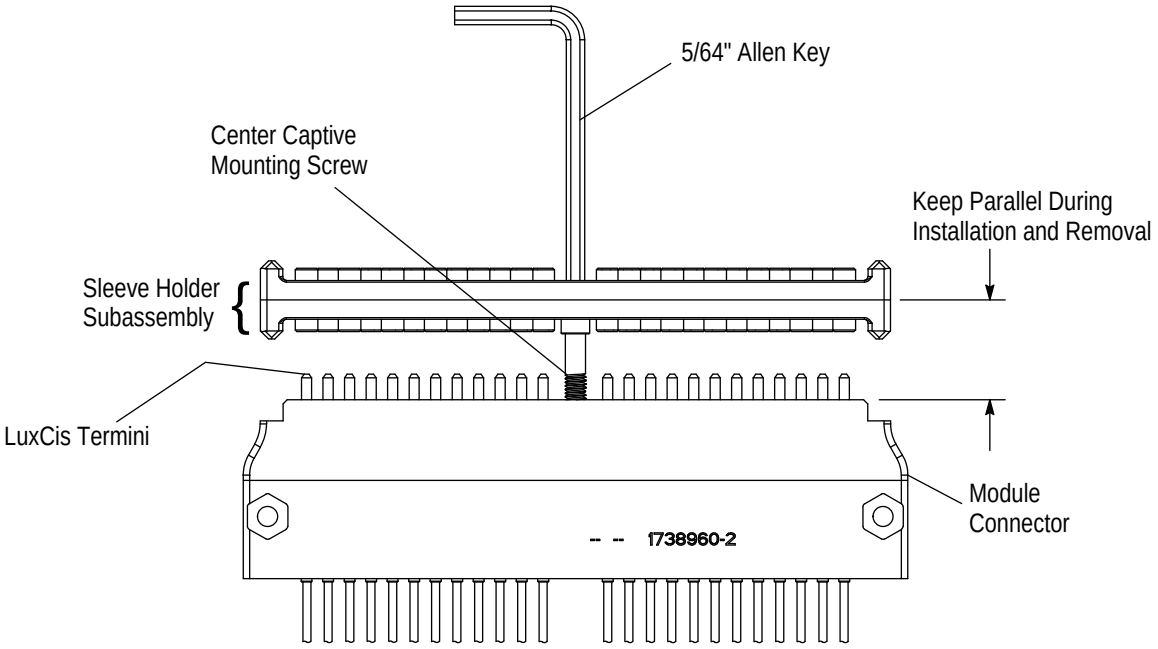

Figure 13

When installing the subassembly, align its circuits with those of the module connector housing, and start to engage the captive screw with the connector by turning the Allen key clock-wise. As the sleeve holder nears the tips of the installed termini, ensure they align into the respective circuits of the sleeve holder. Continue to engage the screw until the subassembly is bottomed against the connector housing. Then torque the screw to 0.34-0.45 N•m [3-4 in-lb]. Do NOT over-torque the screw.

3.8. Cleaning The LuxCis Termini

The LuxCis termini shall be cleaned using TE Cleaning Kit 1828335-2, which includes alcohol wipes and 1.2 mm [.047 in.] swabs. Wipe the mating face of the connector with the alcohol wipes and air dry. The swabs are used to clean the individual sleeves within the sleeve holder and the ferrule end-faces of the installed termini.

3.9. Connector mating and Unmating (Figure 14)

To mate the connectors, the circuits of the backplane connector must be properly oriented to accept the respective cavities of the mating module connector in order to successfully mate. For example, circuit “1” of the backplane connector shall be aligned to mate with circuit “1” of the module connector. The notch in the backplane cutout must be properly oriented to ensure the connector align in-phase.

NOTE
The LuxCis termini are spring-loaded, by design, in the axial direction of connector mating and unmating. As a result, the connectors do not secure themselves in the fully-mated state. The exterior system design shall engage the connectors to the proper mating depth.

The mechanism for engaging and disengaging the connectors shall be capable to overcome the mating and unmating forces specified in Design Objective 108-2247. The mechanism shall also control the rates of connector engagement and disengagement. The rates to axially engage and disengage the connectors shall not exceed 4 mm/sec [9.5 in/min].

The backplane connector is designed to float within the cutout of the backplane pc board. The backplane connector can float ±1 mm [±.039 in.] in the X and Y directions (in the plane of the pc board) from its normal position. As such, it can accept misalignment of 1 mm [.039 in.] with the mating module connector. The exterior system design shall ensure the connectors are located relative to each other within that range. Also, the system shall axially align the connectors within a 25 angle.

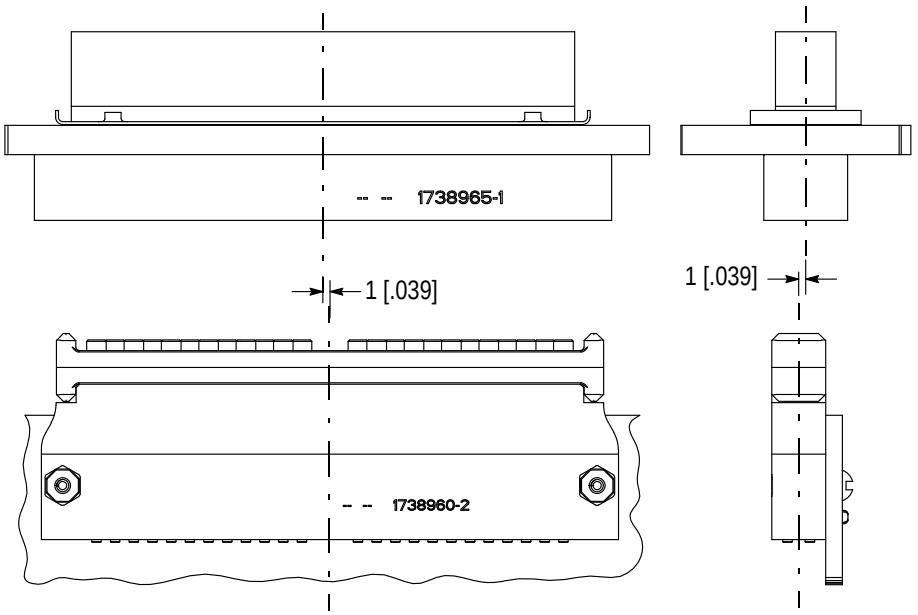

Figure 14

3.10. Ancillary Items

A. Protective Covers (Figure 15)

Optional protective covers for the 24-Position Fiber-Optic Connectors are available for purchase through your local TE Representative, or by calling the Product Information number at the bottom of page 1. The protective cover is used to protect the connector and LuxCis termini while they are not in use. The covers can easily be removed or placed on the connector by hand.

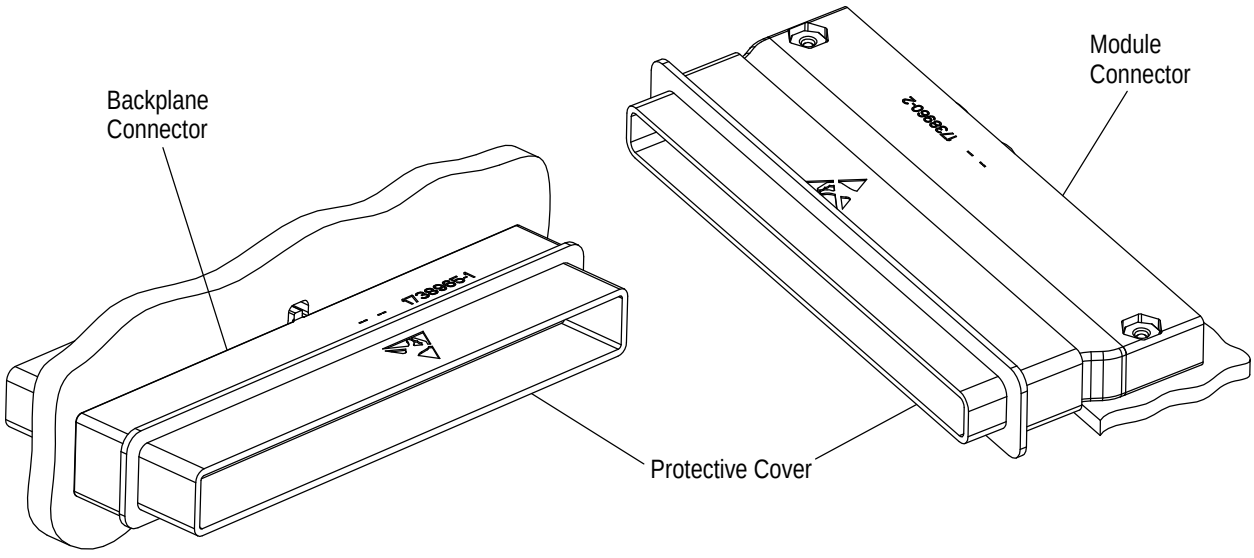

Figure 15

LuxCis is a trademark.

B. LuxCis Termini and Fiber-Optic Cable Assemblies

The LuxCis termini and Fiber-Optic Cable Assemblies are likewise available for purchase through your local TE Representative, or by calling Product Information at the number at the bottom of page 1.

Two styles of LuxCis termini are available:

Style ML: for loose and tight cable structure
Style MT: for ultra-tight cable structure

Both styles of termini are available for single-mode and multi-mode type optical fiber.

C. Strain Relief/Fiber Management

The 24-Position Fiber-Optic Connectors do not provide strain relief for the fiber-optic cable assemblies. It is the responsibility of the user to provide proper strain relief and management of the optical fibers. Consult your local TE Representative or contact Product Information at the number at the bottom of page 1 for fiber-management products specially-designed to the application.

3.11. Repair/Replacement

A. Replacement Sleeve Holder Assemblies

CAUTION
Damage may occasionally occur to the ceramic sleeves within the sleeve holder subassembly of the module connector. Connectors having damaged sleeves must not be used. Replacement sleeve holder subassemblies are available for purchase through your local TE Representative or contact Product Information at the number at the bottom of page 1. The installation and removal steps are provided in Section 3.7.

B. Damaged Components

CAUTION
Damaged components must not be used. If a damaged component is evident, it must be removed and replaced with a new one. In particular, damaged backplane connectors and retention clips must not be re-used.

4. QUALIFICATIONS

The 24-Position Fiber-Optic Connectors are being tested and evaluated. A test report will be issued upon completion. No commercial or agency qualifications are required.

5. TOOLING

LuxCis termini are installed and removed using the Daniels Mfg. Corp. tools listed in Section 3.6. See Figure 16 for the recommended tools.

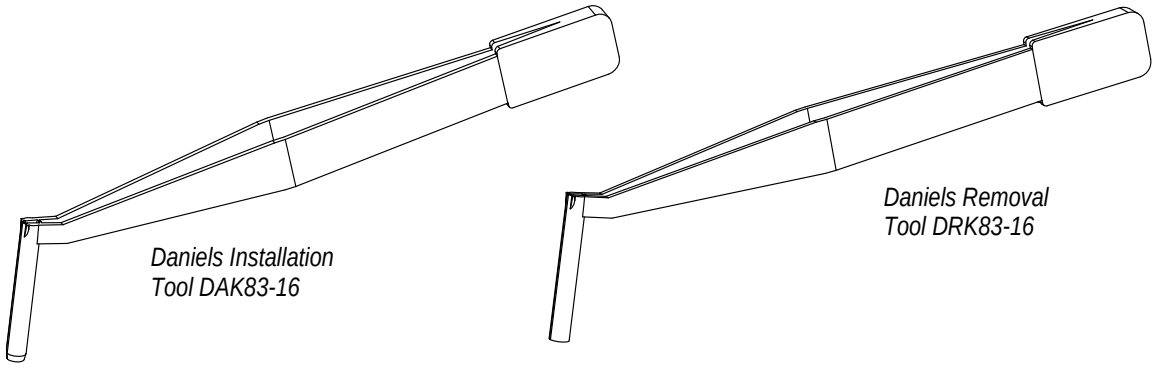

Figure 16

LuxCis is a trademark.

6. VISUAL AID

The illustration below shows a typical application of this product. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

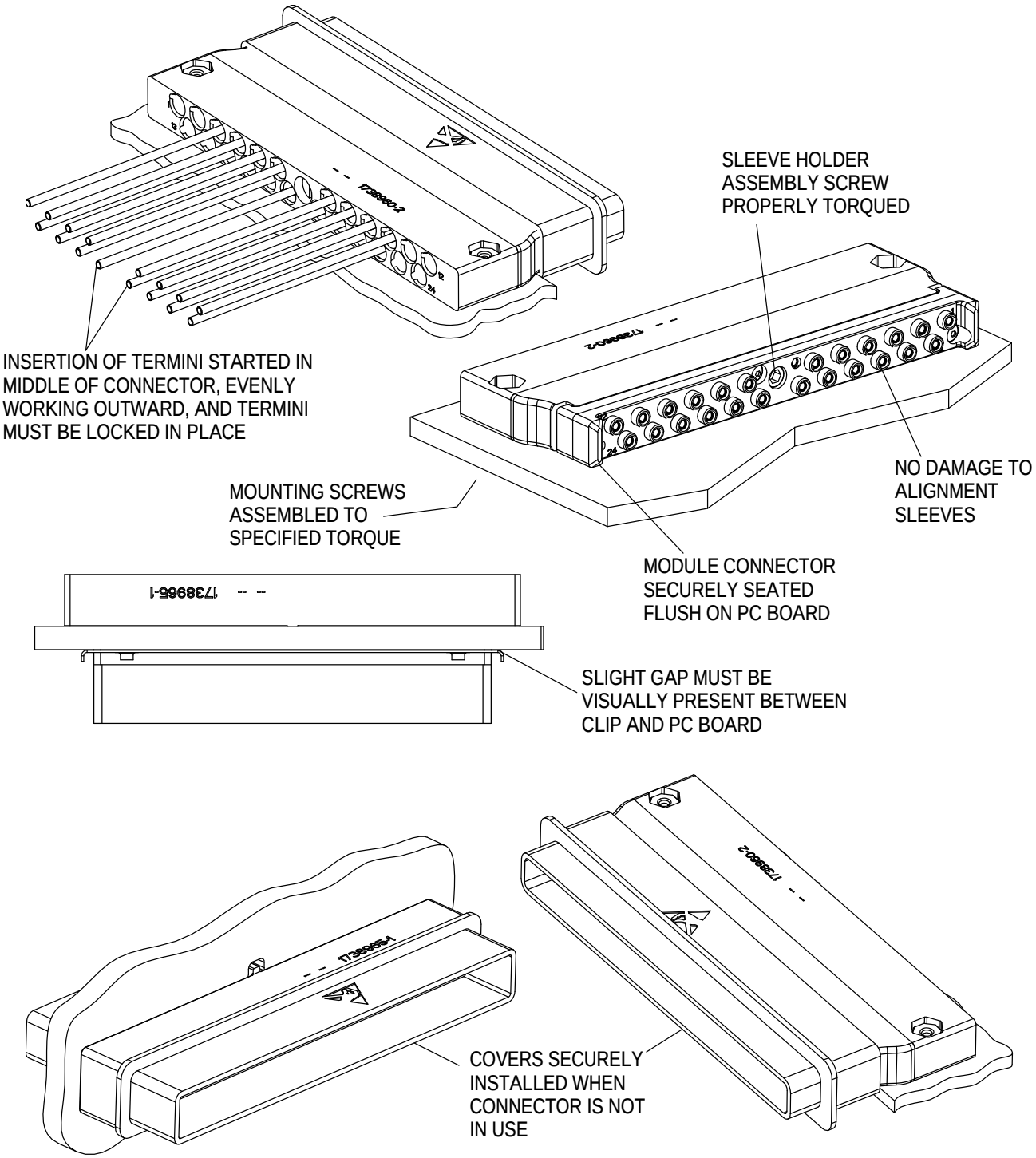

FIGURE 17. VISUAL AID