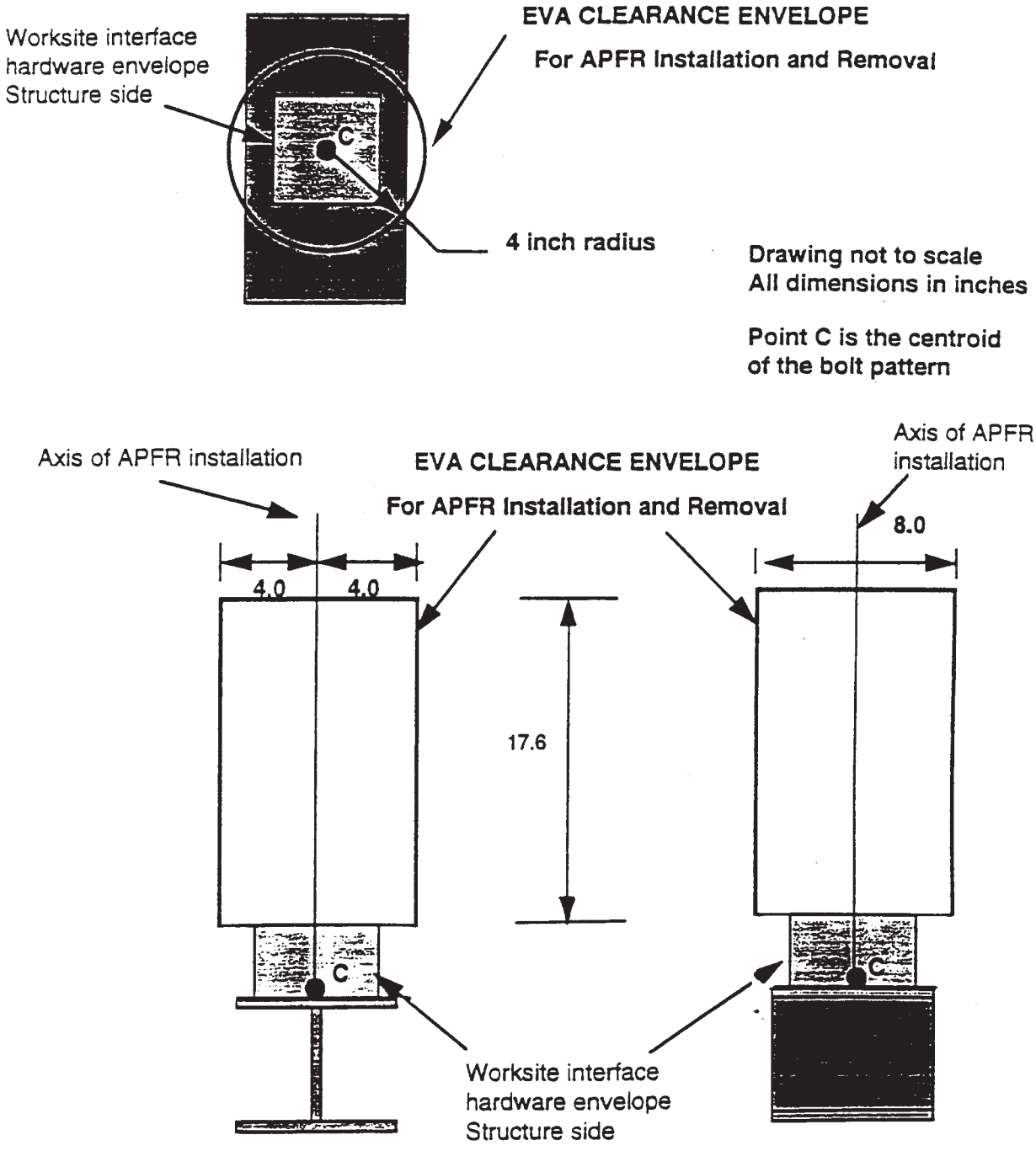


FIGURE 3.6.4.2.2–1 APFR INSTALLATION/REMOVAL EVA CLEARANCE ENVELOPE – TOP MOUNTED WORKSITE INTERFACE

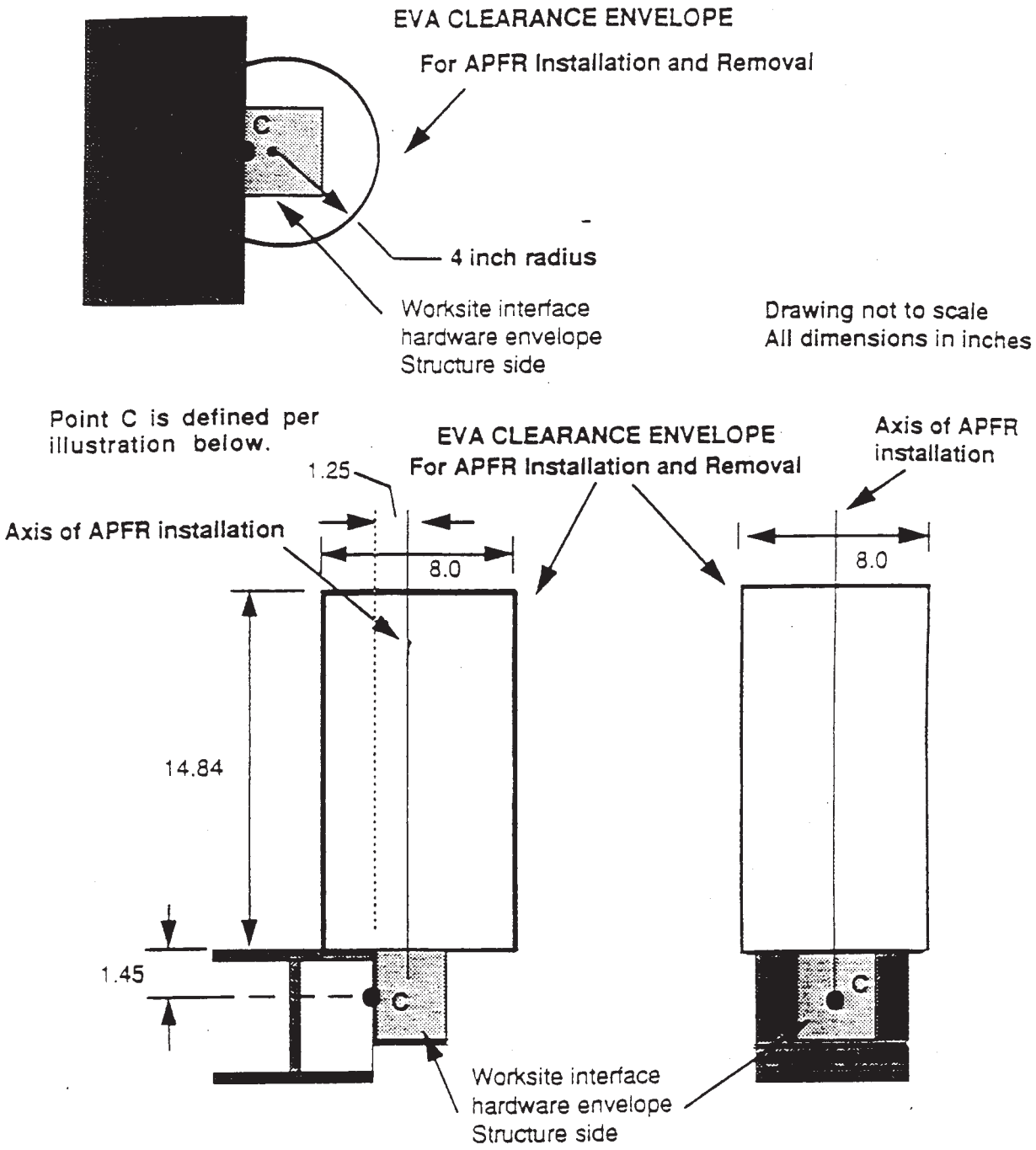


FIGURE 3.6.4.2.2–2 APFR INSTALLATION/REMOVAL EVA CLEARANCE ENVELOPE – SIDE MOUNTED WORKSITE INTERFACE

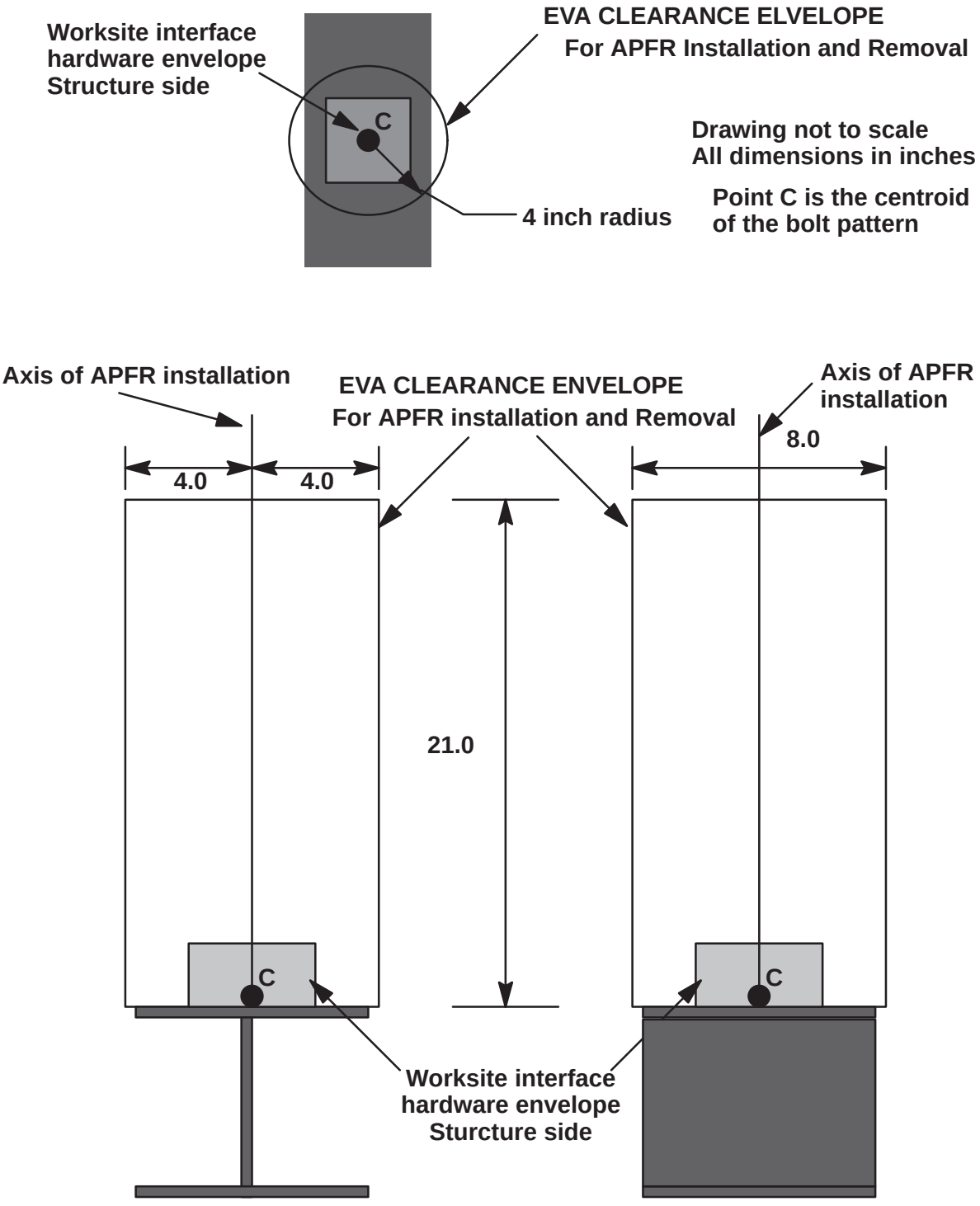


FIGURE 3.6.4.2.2–3 APFR INSTALLATION/REMOVAL EVA CLEARANCE ENVELOPE – ON–ORBIT INSTALLED WORKSITE INTERFACE

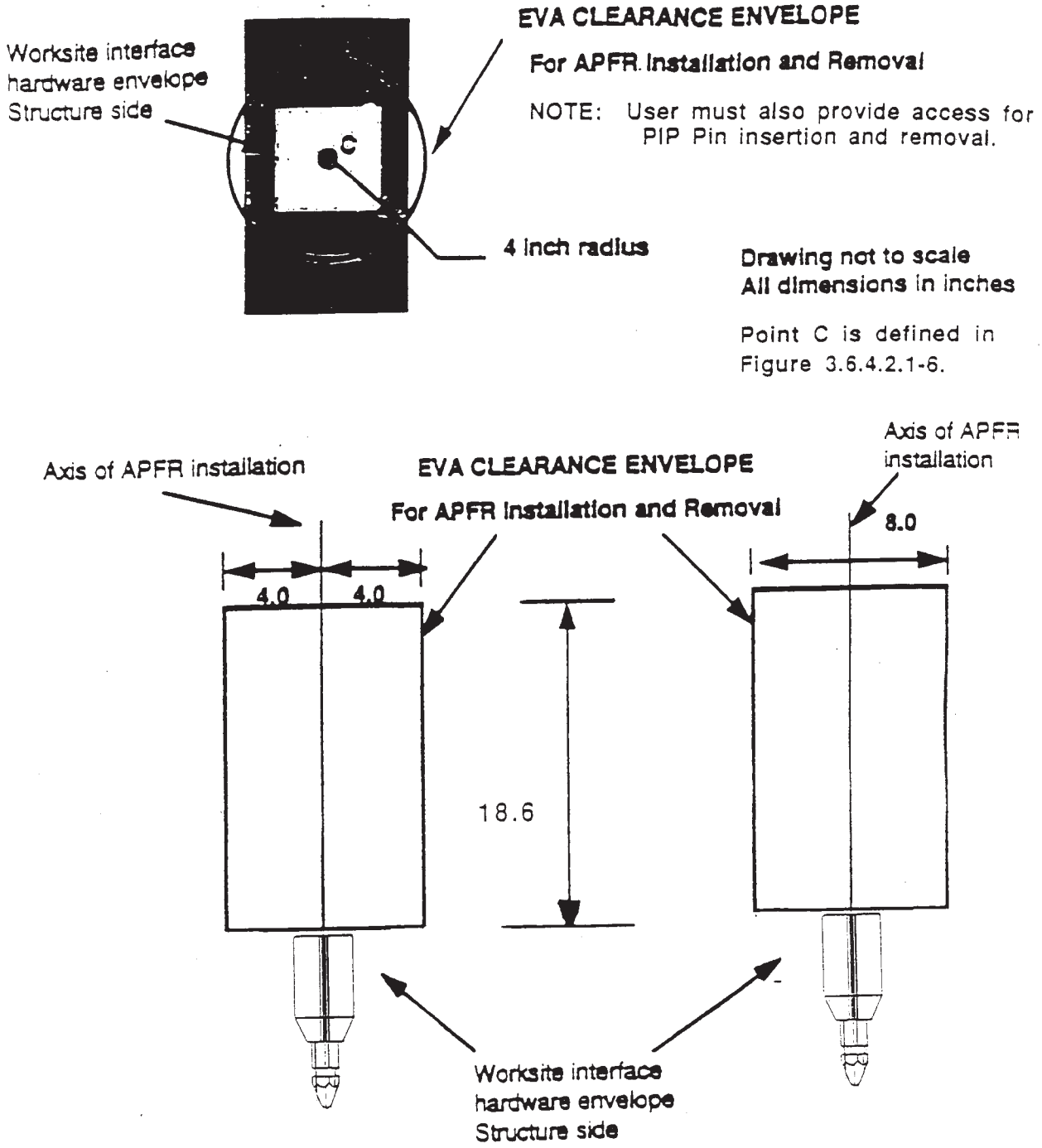


FIGURE 3.6.4.2.2–4 APFR INSTALLATION/REMOVAL EVA CLEARANCE ENVELOPE – WIF PASSIVE ADAPTER

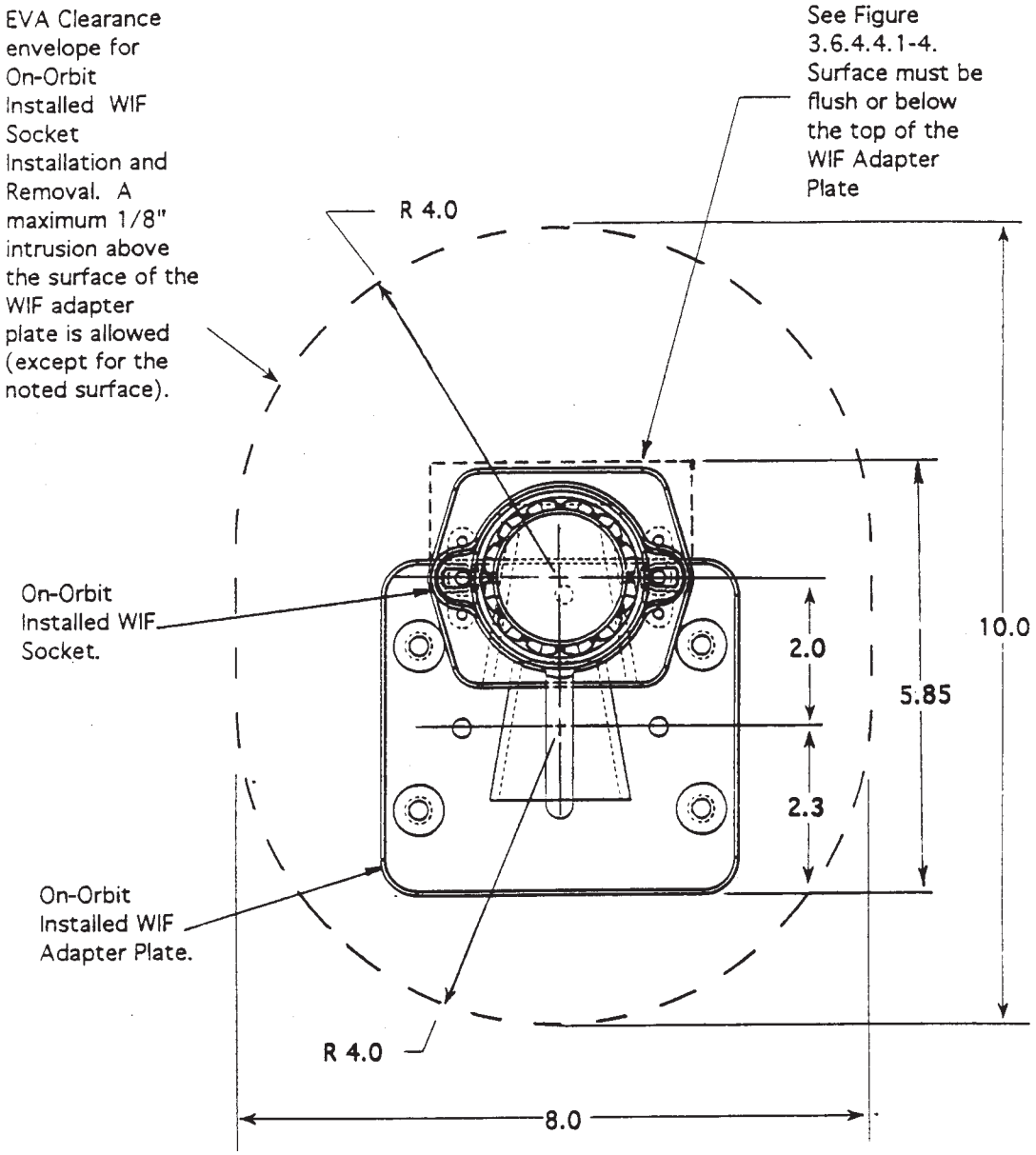
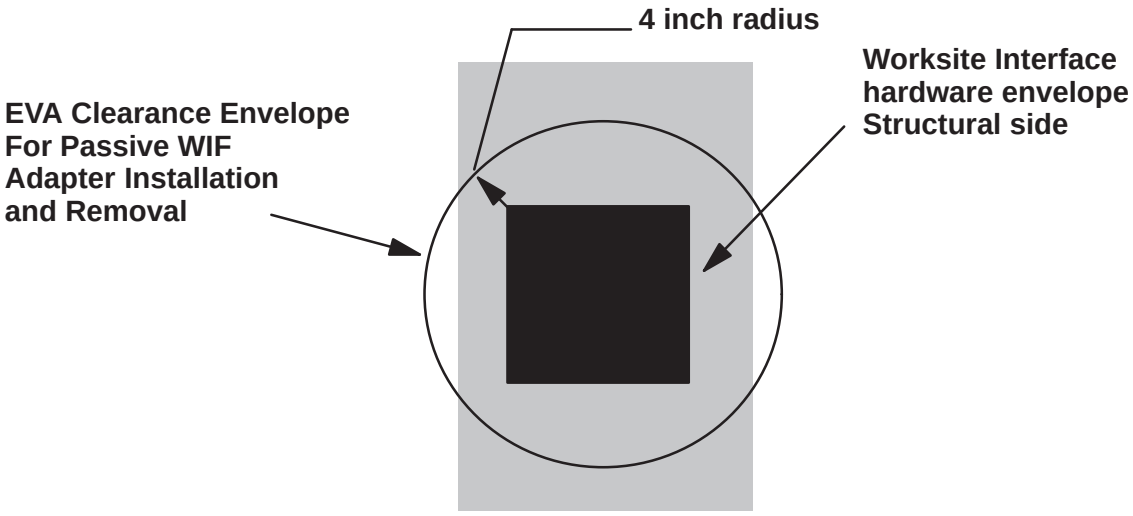


FIGURE 3.6.4.2.2–5 ON–ORBIT INSTALLED WIF SOCKET INSTALLATION EVA CLEARANCE ENVELOPE – ON–ORBIT INSTALLED WIF ADAPTER PLATE



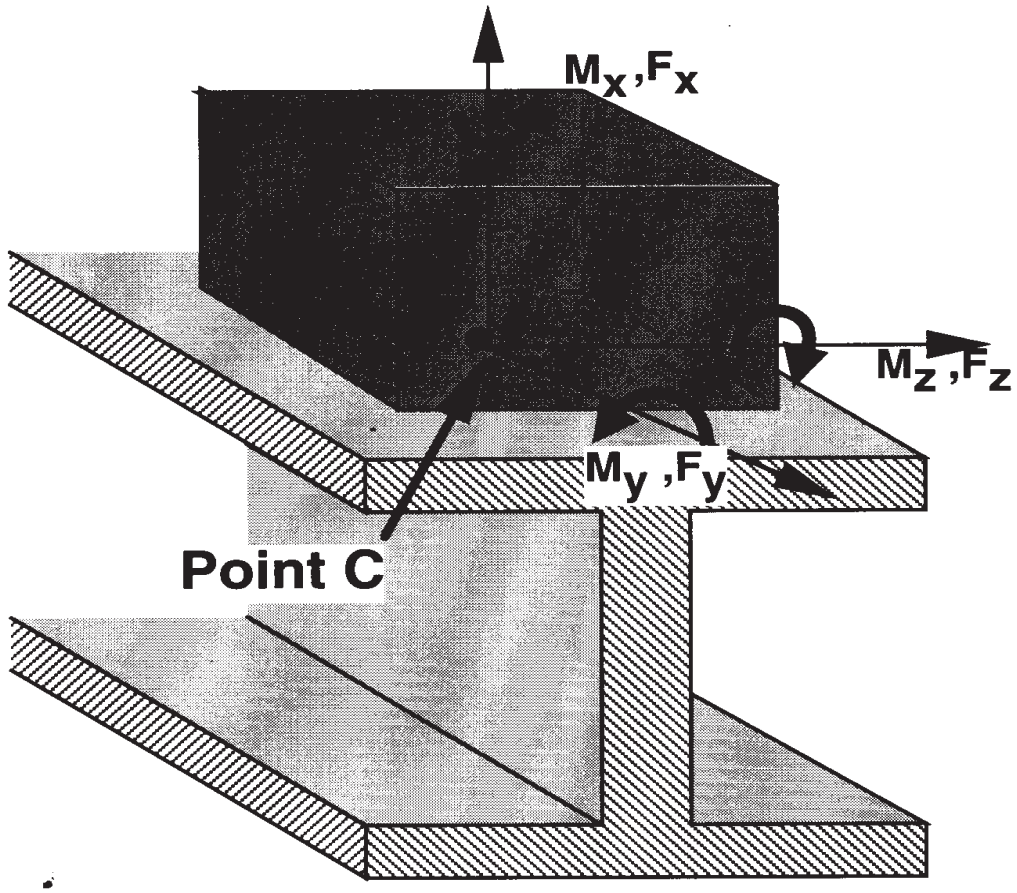
DRAWING NOT TO SCALE
ALL DIMENSIONS IN INCHES

FIGURE 3.6.4.2.2–6 WIF PASSIVE ADAPTER INSTALLATION/REMOVAL EVA CLEARANCE ENVELOPE – SHUTTLE–STYLE PFR SOCKET

Maximum Interface Loads

Moment	Force
Any direction 4200 in lbs	Any direction 274 lbs

Note: The above loads should be applied simultaneously.
All loads are to be applied at Point C.



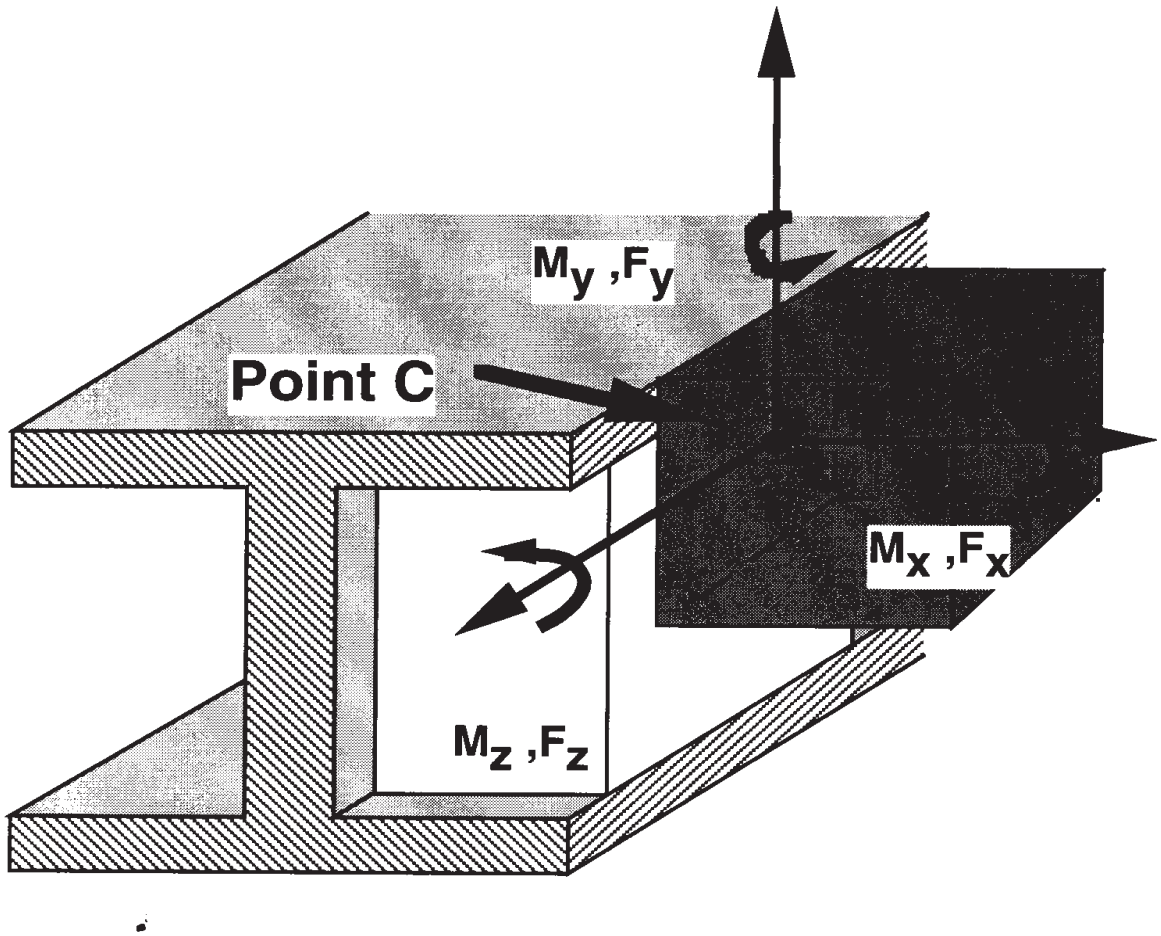
Point C, the force and moment origin, is located at the center of the bolt pattern at the mating interface

FIGURE 3.6.4.3.2–1 TOP MOUNTED AND ON–ORBIT INSTALLED WORKSITE INTERFACE WORKSITE PASSIVE HALF LOADING CRITERIA

Maximum Interface Loads

Moment	Force
Any direction 4200 in lbs	Any direction 274 lbs

Note: The above loads should be applied simultaneously.
All loads are to be applied at Point C.



Point C, the force and moment origin, is located at the center of the bolt pattern at the mating interface

FIGURE 3.6.4.3.2–2 SIDE MOUNTED WORKSITE INTERFACE PASSIVE HALF LOADING CRITERIA

3.6.4.3.3 MASS PROPERTIES

The maximum weight of the top mounted ground installed WIF is 1.75 lbs, the side mounted ground installed WIF is 2.25 lbs, the on–orbit installed WIF is 2.5 lbs and the on–orbit installed adapter plate is 2.0 lbs. The maximum weight of the passive WIF adapter is 2.0 lbs. The center of mass of all configurations is at the centroid.

3.6.4.4 MECHANICAL

3.6.4.4.1 MOUNTING AND INSTALLATIONS

The WIF hardware footprint and bolt pattern dimensions are shown in Figure 3.6.4.4.1–1 for ground installed top mounted, Figure 3.6.4.4.1–2 for ground installed side mounted, and Figure 3.6.4.4.1–3 for the on–orbit installed WIF Adapter Plate. The location of WIFs on the systems and elements are user defined. Users of the WIFs should apply these bolt patterns to their structure for the purpose of pre–drilling holes to install the passive half of the WIF. The passive WIF adapter to Shuttle style PFR socket interface requirements are shown in Figure 3.6.4.4.1–5.

The on–orbit installed WIF will require a unique clearance envelope to be installed onto the structure. Figure 3.6.4.4.1–4 provides the envelope necessary to allow for this installation.

The EVA clearance for installation/removal of the on–orbit installed WIF socket on the on–orbit installed WIF adapter plate, and the WIF adapter into the Shuttle–style PFR socket are shown in Figures 3.5.4.2.2–4, 3.6.4.4–5, and 3.6.4.2.2–6, respectively.

Clocking marks are provided on the WIFs as indicated in Figures 3.6.4.2.1–1, 3.6.4.2.1–2, 3.6.4.2.1–3 and 3.6.4.2.1–7 for user specified orientation of the WIF. The clocking marks allow for specific alignment of the APFR through the clocking indicator on the APFR load limiter.

3.6.4.4.2 SURFACE FINISH

The WIFs meet the finish requirements found in SSP 30233, Space Station Requirements for Materials and Processes. The faying surface is chemical conversion coated per MIL–C–5541, Class 3, for electrical bonding.

3.6.4.4.3 RESERVED

3.6.4.4.4 FASTENERS

The user will provide associated fastener hardware that is compatible with the material and protective finish for the WIFs, and will specify fastener engagement depth on the installation drawing. The fasteners for the on–orbit installed WIF adapter plate will not protrude above the counterbore provided.

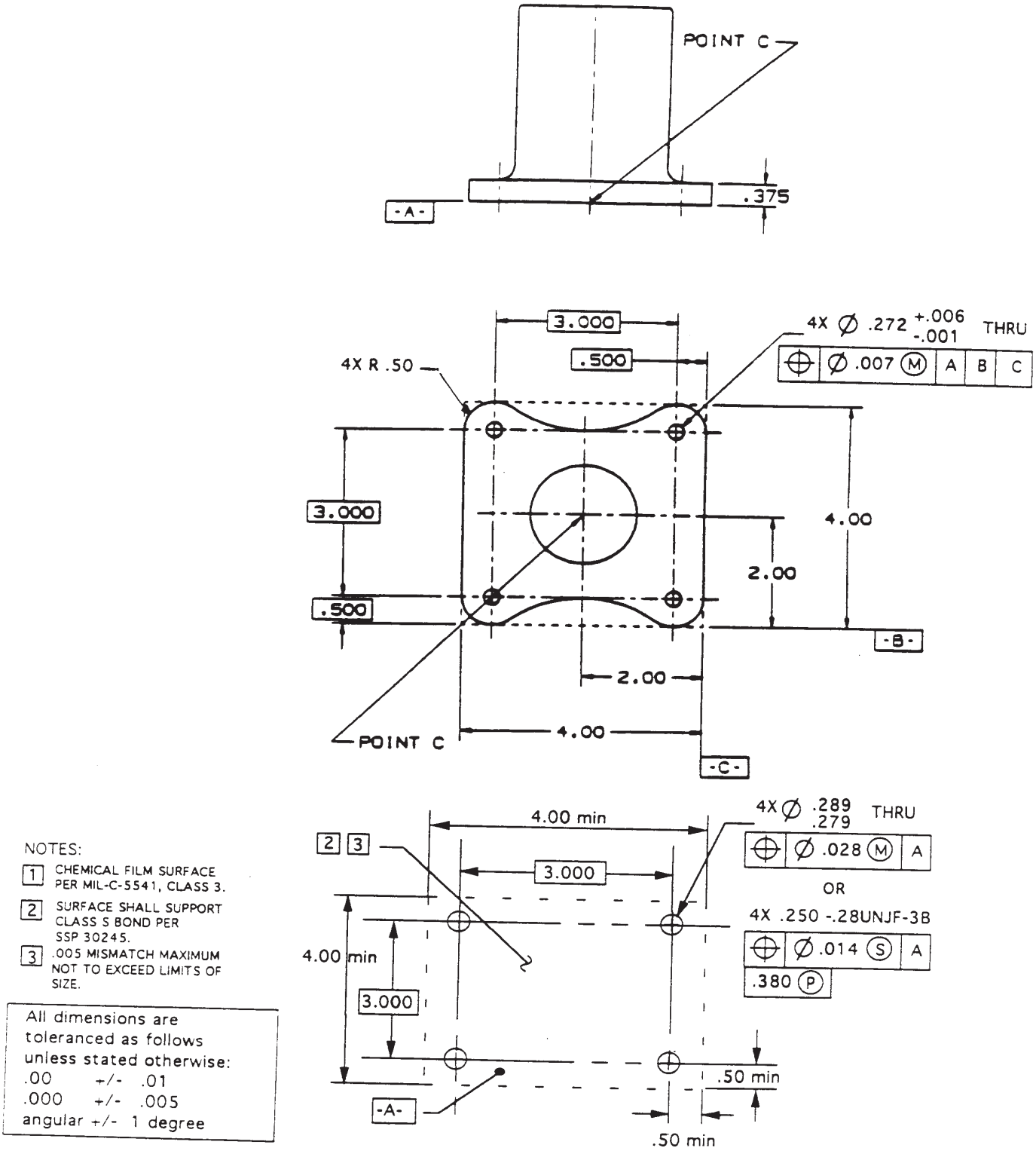


FIGURE 3.6.4.4.1–1 TOP MOUNTED WORKSITE INTERFACE PASSIVE HALF FOOTPRINT AND BOLT PATTERN (GROUND INSTALLED)

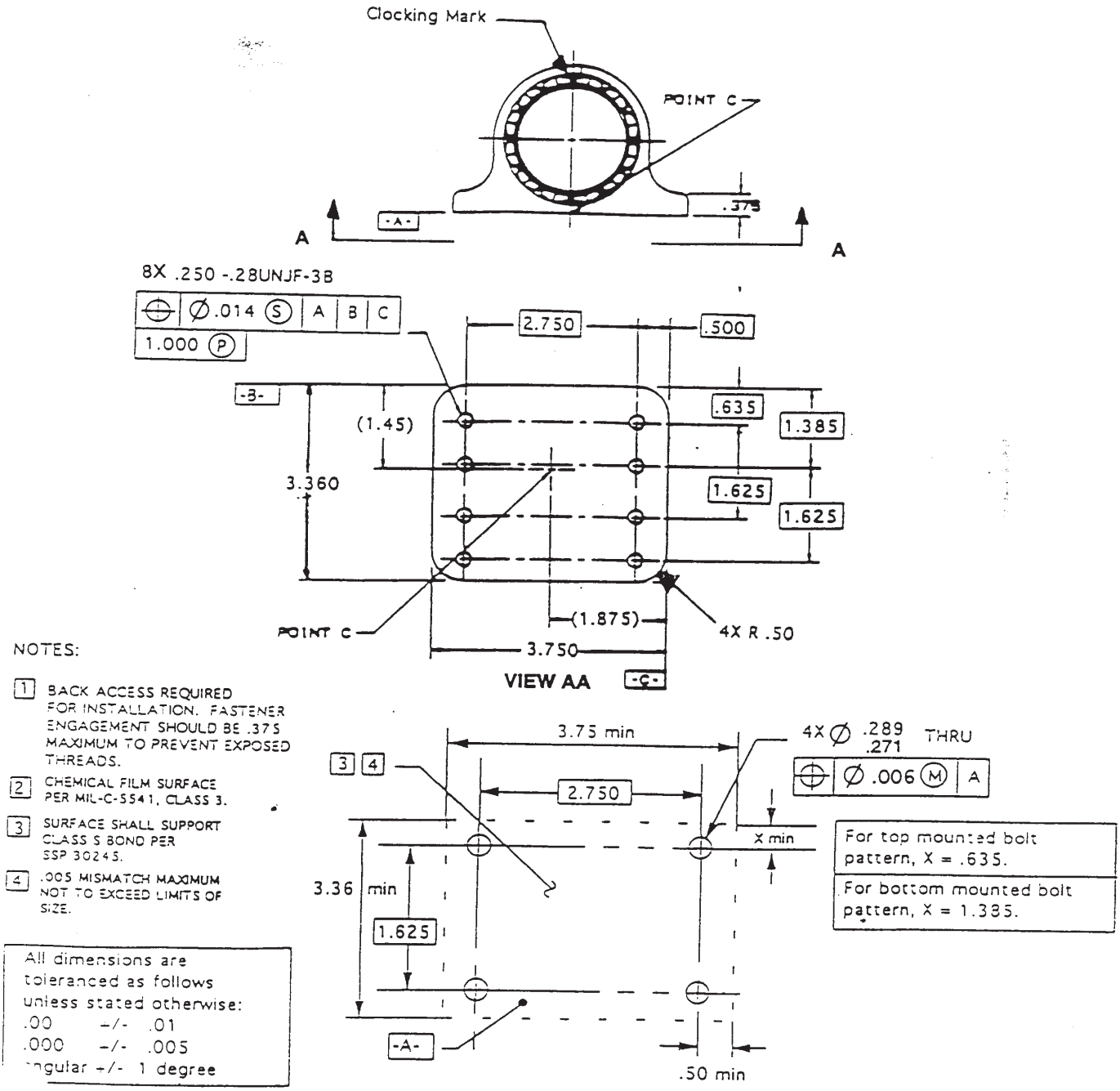


FIGURE 3.6.4.4.1–2 SIDE MOUNTED WORKSITE INTERFACE PASSIVE HALF FOOTPRINT AND BOLT PATTERN WITH CLOCKING MARK INDICATED

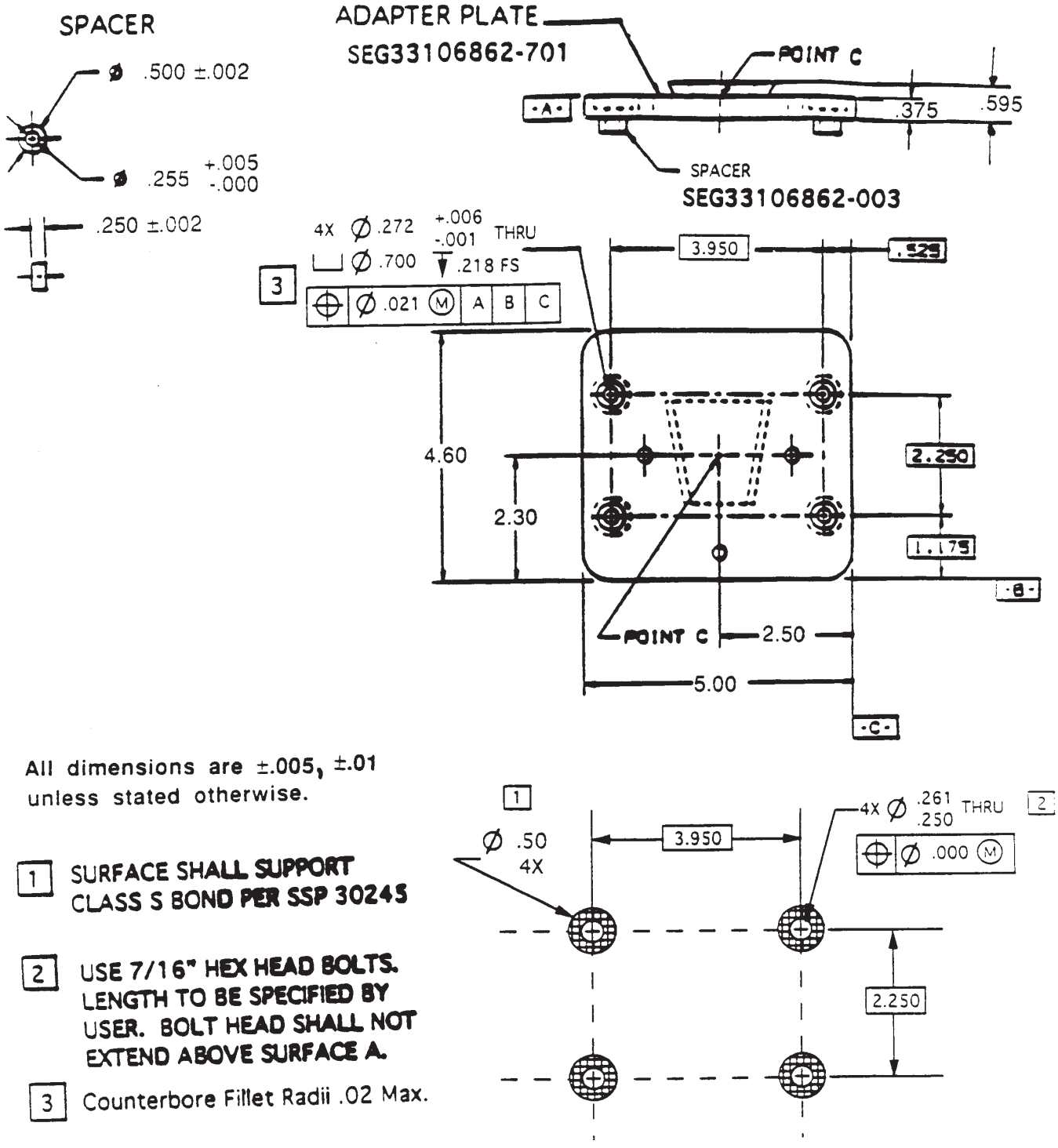


FIGURE 3.6.4.4.1–3 ON–ORBIT INSTALLED WORKSITE INTERFACE ADAPTER PLATE FOOTPRINT AND BOLT PATTERN

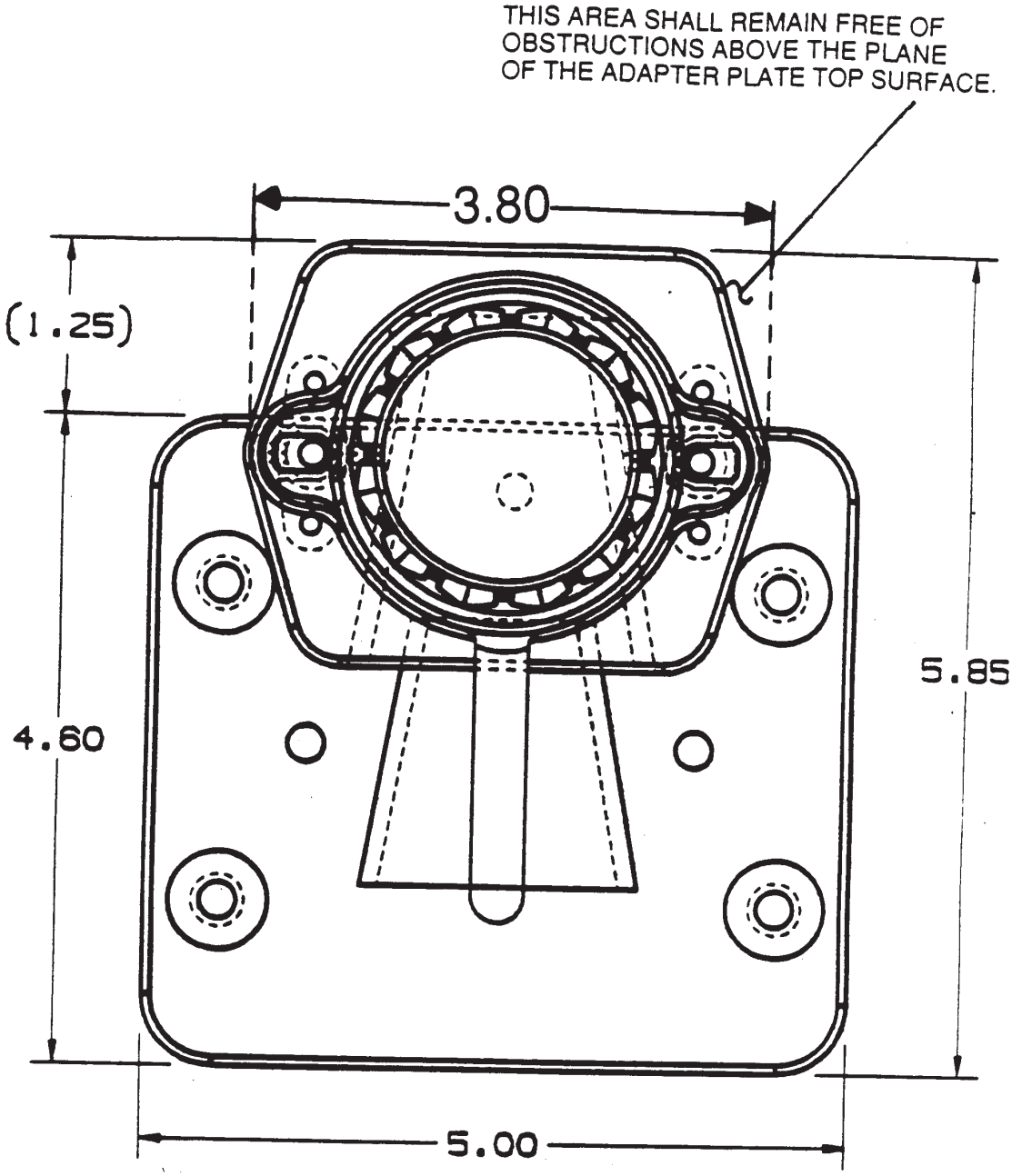


FIGURE 3.6.4.4.1–4 INSTALLATION ENVELOPE FOR ON–ORBIT INSTALLED WORKSITE INTERFACE

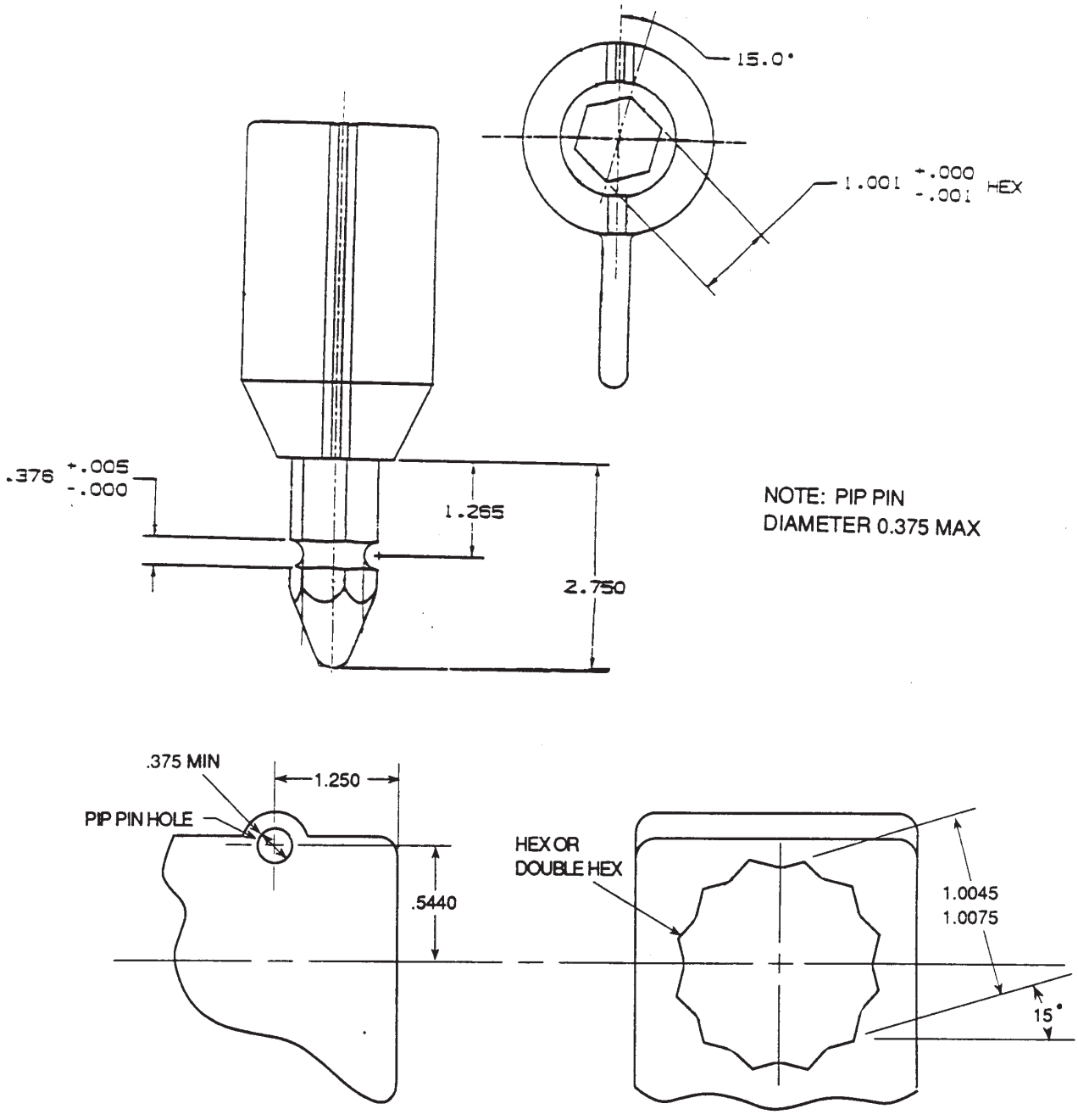


FIGURE 3.6.4.4.1–5 WIF PASSIVE ADAPTER TO SHUTTLE–STYLE PFR SOCKET INTERFACE

3.6.4.4.5 MATERIALS

The predominant material of the Passive WIFs and on–orbit installed WIF adapter plate is 7075–T7351 aluminum alloy. The adapter plate spacer material is titanium.

3.6.4.5 THERMAL

The WIFs are designated “incidental contact” EVA crew interfaces. Thermal control of the WIFs is achieved by passive techniques.

3.6.4.6 ELECTRICAL BONDING

The WIF to user interface will satisfy a class S bond per SSP 30245, Space Station Electrical Bonding Specification, in its entirety.

3.6.5 HANDRAIL (ON–ORBIT INSTALLED)

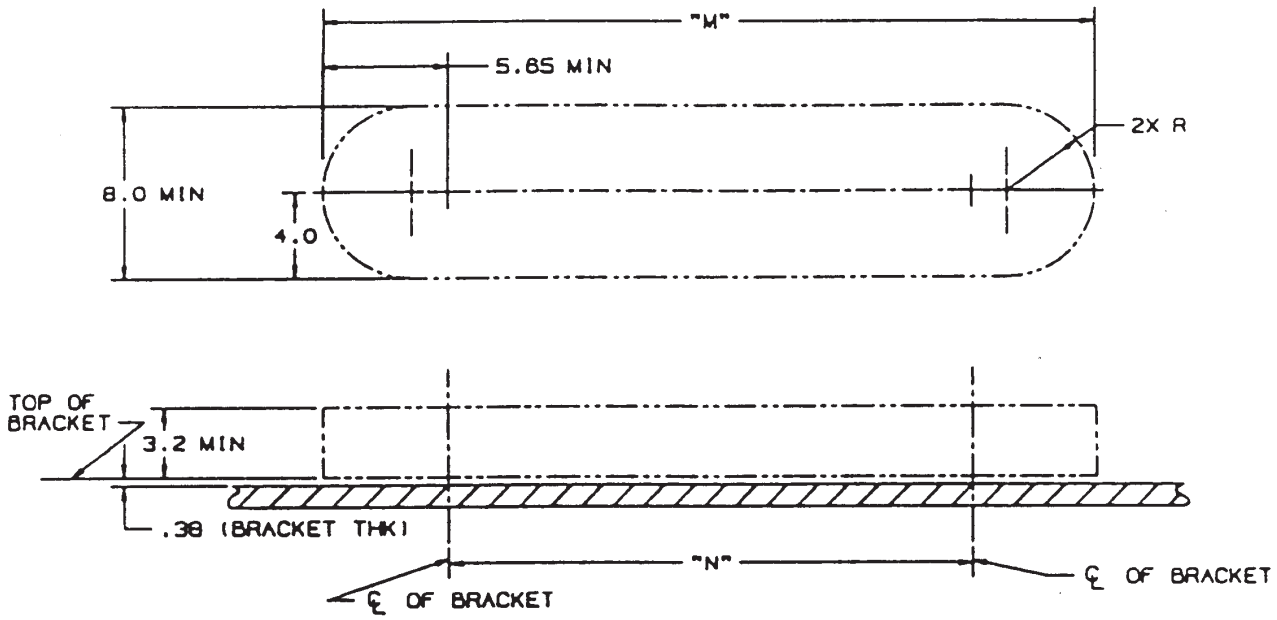
3.6.5.1 INTERFACE DESCRIPTION

EVA handrails will be supplied to facilitate translation and to provide restraint for a crewmember in a space suit on the exterior surface of Space Station elements. The handrails that are needed on the Space Station module longitudinal surfaces (e.g., Nodes, etc.) must be installed on–orbit due to the fact that the module diameter has been maximized to use the entire Shuttle payload bay. This section will describe the interface information for handrails that will be installed on–orbit. For ground installed handrails, see section 3.6.1.

3.6.5.2 ENVELOPE

3.6.5.2.1 HARDWARE

There are two on–orbit installed handrail configurations. The length of the standard on–orbit installed handrail is 24 in. between the stand–off seat track centers. The length of the dash 12 on–orbit installed handrail is 12 in. between the standoff seat track centers. Hardware envelope dimensions are shown in Figure 3.6.5.2.1–1.



Part Number	Description	N	M
SEG33106351–301	Handrail Assembly	24.00 ± .06	35.3
SEG33106351–305	Handrail Assembly	12.00 ± .06	23.3

FIGURE 3.6.5.2.1–1 ON–ORBIT INSTALLED HANDRAIL/HANDHOLD ENVELOPE (HARDWARE AND CLEARANCE)

3.6.5.2.2 EVA

A 4 in. radial EVA clearance envelope around the handrail is necessary for a crewmember to use it as a translation aid. Figure 3.6.5.2.2–1 defines the cross–section of the on–orbit installed handrail.

3.6.5.3 STRUCTURAL

3.6.5.3.1 LOADING

The loading criteria of the on–orbit installed handrail is that it must support a 220 lbs hand induced limit load or a 200 lbs EVA tether limit load in any direction. These loads will not occur simultaneously. The worst load case will produce a maximum limit load of 220 lbs shear/tension combined with a maximum bending moment at the stand–off interface of 800 in–lbs on the primary path. The worst load case will produce a maximum limit load of 187 lbs shear/tension combined with a maximum bending moment at the stand–off interface of 500 in–lbs on the secondary path.

3.6.5.3.2 MASS PROPERTIES

The maximum weight of the on–orbit installed handrails is 2.80 lbs.

3.6.5.4 MECHANICAL

3.6.5.4.1 MOUNTING AND INSTALLATIONS

The design of the handrail brackets for the on–orbit installed handrail interface is shown in Figures 3.6.5.4.1–1 and –2.

3.6.5.4.2 SURFACE FINISH

The on–orbit installed handrails meet the finish requirements found in SSP 30233, Space Station Requirements for Materials and Processes. The surface finish color will be yellow. The faying surface is chemical conversion coated per MIL–C–5542, Class 3, for electrical bonding.

3.6.5.4.3 FASTENERS

The design of the on–orbit installed handrail includes the attachment device needed for the interfaces and requires no additional fasteners.

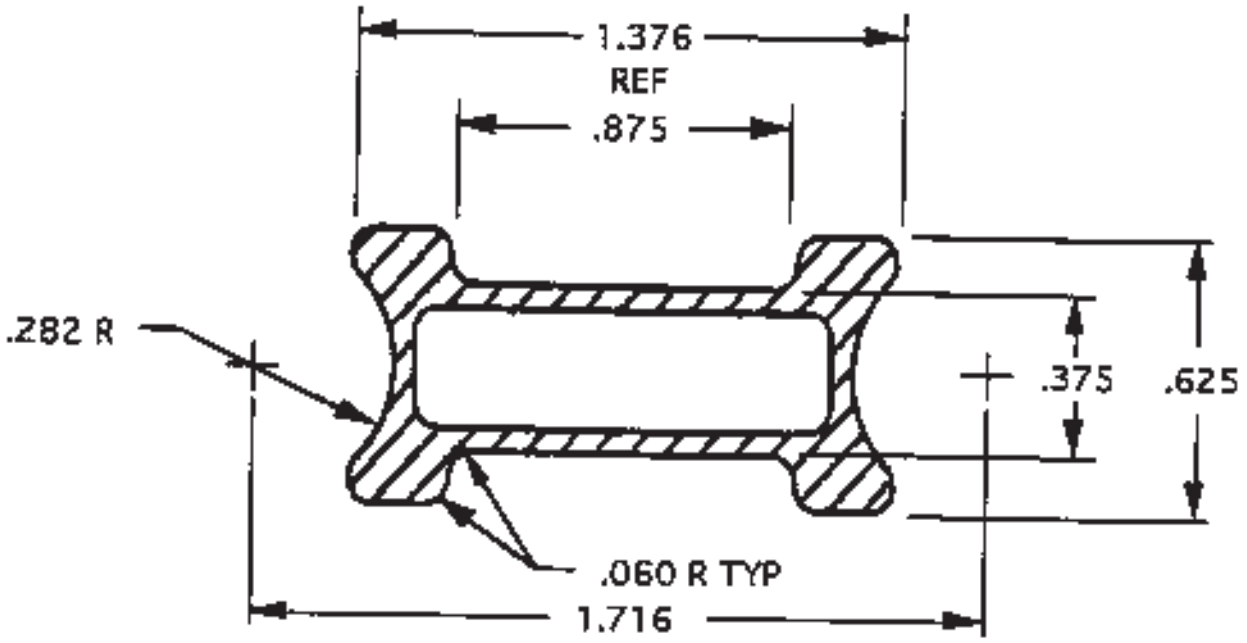
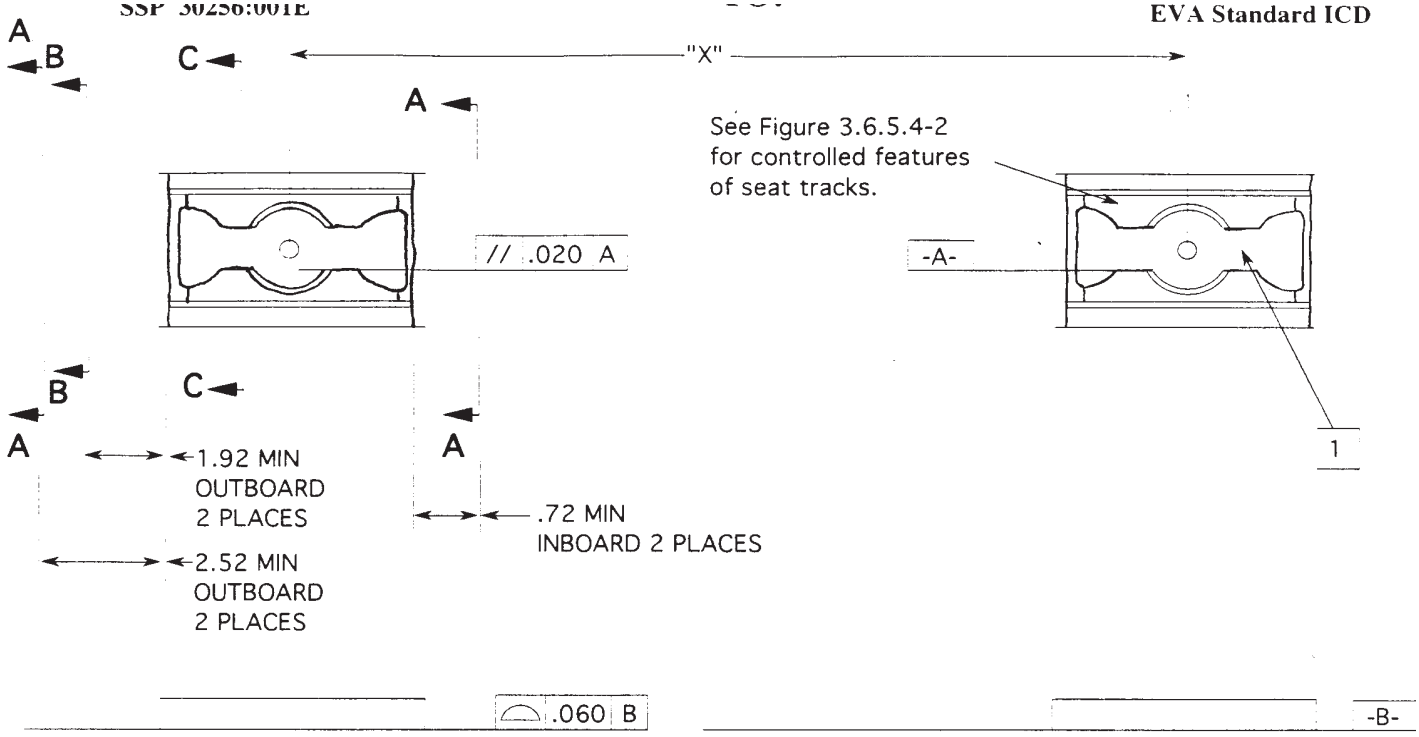
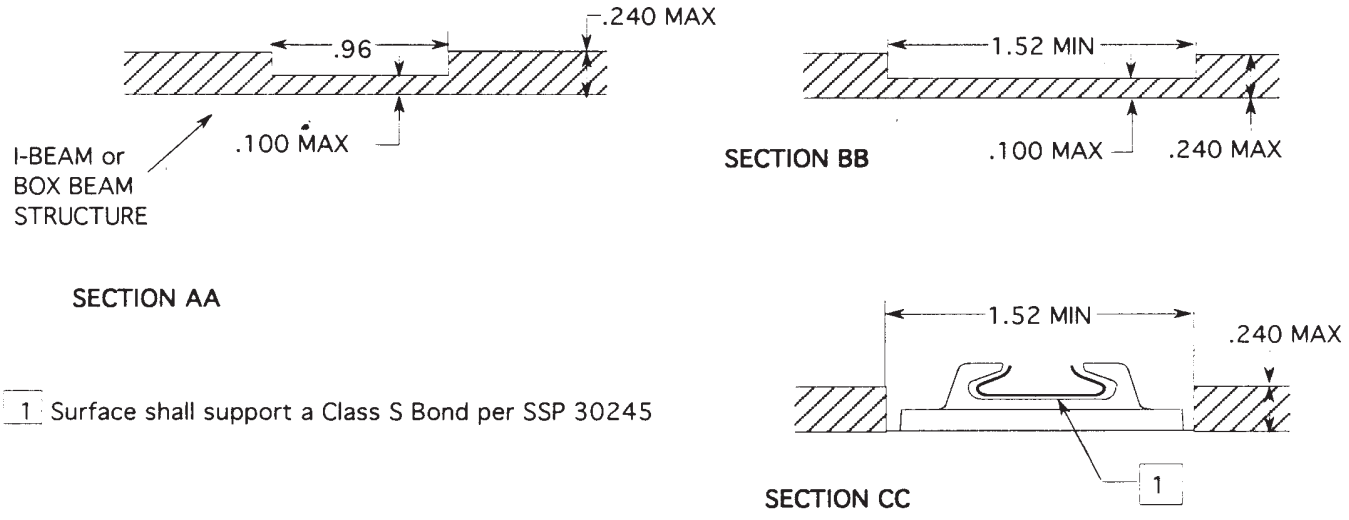


FIGURE 3.6.5.2.2–1 HANDRAIL CROSS SECTION (ON–ORBIT INSTALLED)



Part Number	Name	X ± 0.06
SEG 33106351-301	Handrail	24.00
SEG 33106351-305	Handrail-12	12.00

Structure Side Hardware Stay Out Envelopes through Sections AA, BB, and CC



1 Surface shall support a Class S Bond per SSP 30245

FIGURE 3.6.5.4.1–1 ON–ORBIT INSTALLED HANDRAIL TO HANDRAIL BRACKETS AND DEBRIS SHIELD INTERFACE

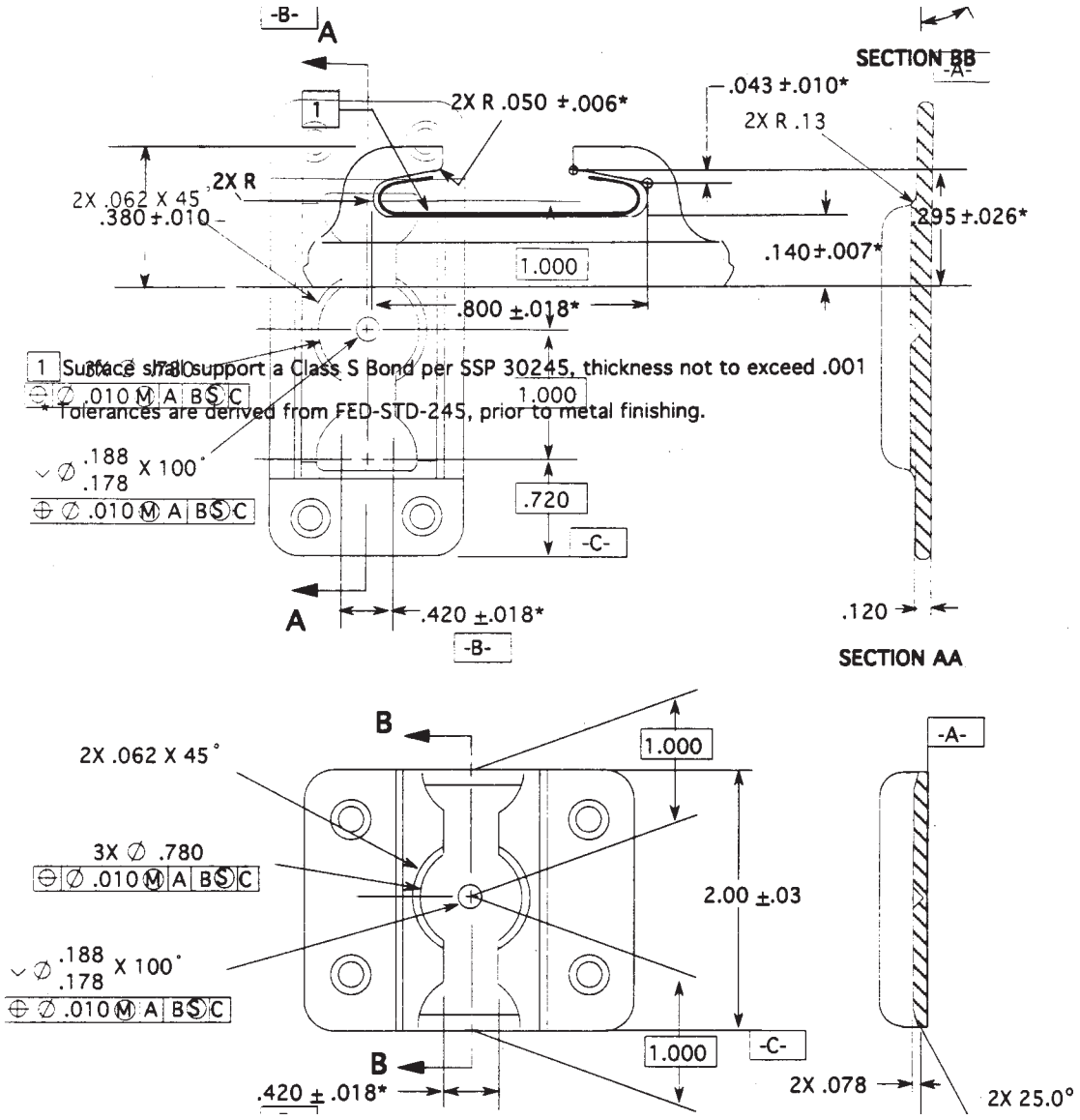


FIGURE 3.6.5.4.1–2 ON–ORBIT INSTALLED HANDRAIL BRACKET (SEAT TRACK) INTERFACE

3.6.5.4.4 MATERIALS

The handrail stand–off interface material is 7075–T7351 aluminum alloy.

3.6.5.5 THERMAL

The on–orbit installed handrails are designated “unlimited contact” EVA crew interfaces. Thermal control of this hardware is achieved by passive techniques. The installation design activity is responsible for maintaining the heat transfer rates within the specified limits.

3.6.5.6 ELECTRICAL BONDING

The on–orbit installed handrail to user interface will satisfy a class S bond per SSP 30245, Space Station Electrical Bonding Specification, in its entirety.

3.7 AIRLOCK EVA TOOL STOWAGE DEVICE

The Airlock EVA Tool Stowage Device (A/L ETSD) provides for the stowage of the EVA contingency tools listed in Table 3.2–2. Two A/L ETSDs will be mounted to and launched on the Joint Airlock.

3.7.1 INTERFACE DESCRIPTION

The Airlock to A/L ETSD interface definition is shown on Figure 3.7.1–1. The Airlock ETSD interface foot print definition is shown on Figure 3.7.1–2.

3.7.2 ENVELOPE

The Airlock ETSD maximum launch envelope is shown in Figure 3.7.2–1. The on–orbit working envelope is shown in Figure 3.7.2–2.

3.7.3 STRUCTURAL

3.7.3.1 MASS PROPERTIES

The maximum weight of each Airlock ETSD outfitted for launch is 270 pounds. The A/L ETSD center of gravity (CG) envelope is shown in Figure 3.7.2–1.

3.7.3.2 STIFFNESS

The Airlock ETSD will have a natural frequency of 35 Hz or greater.

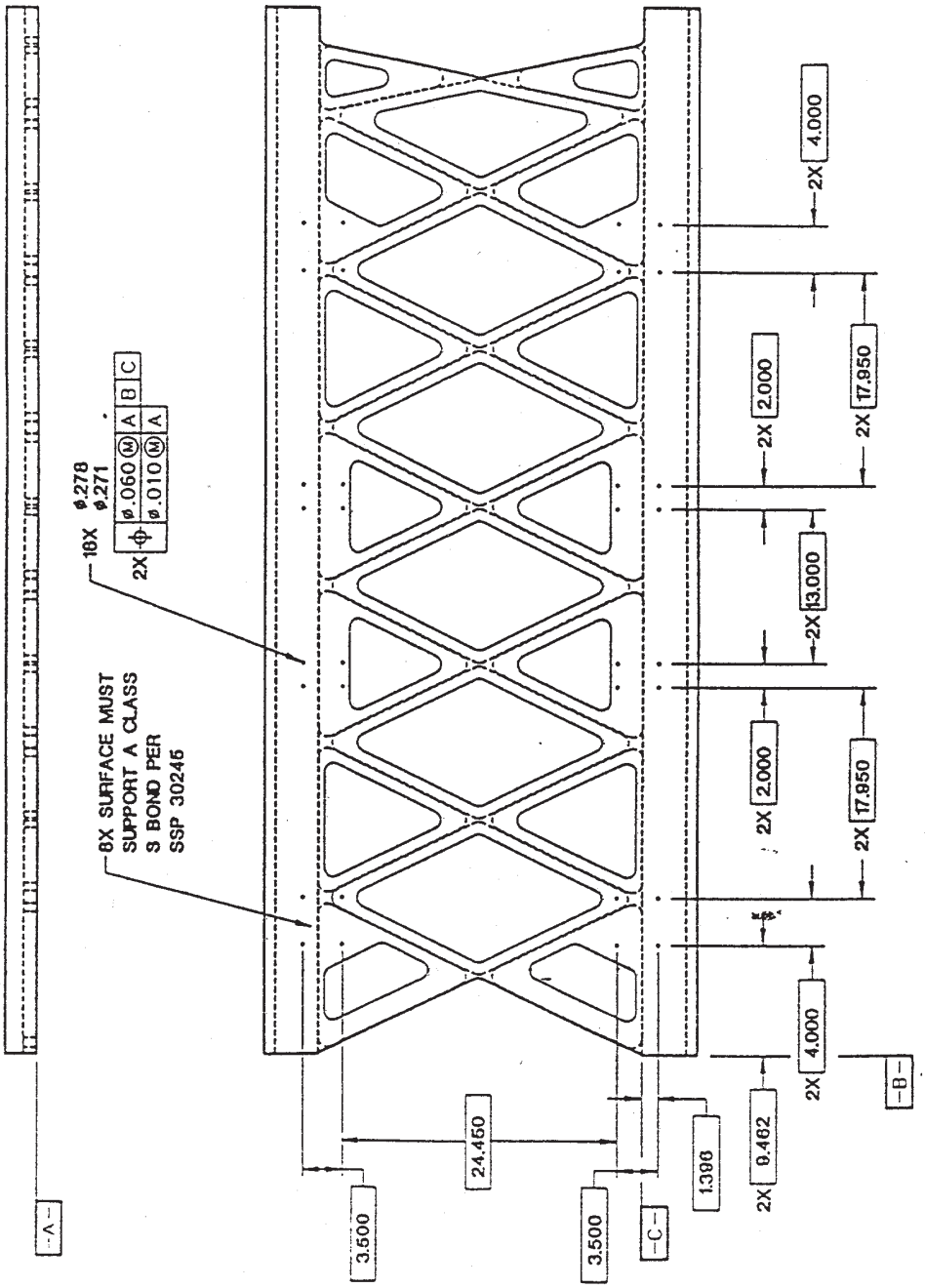
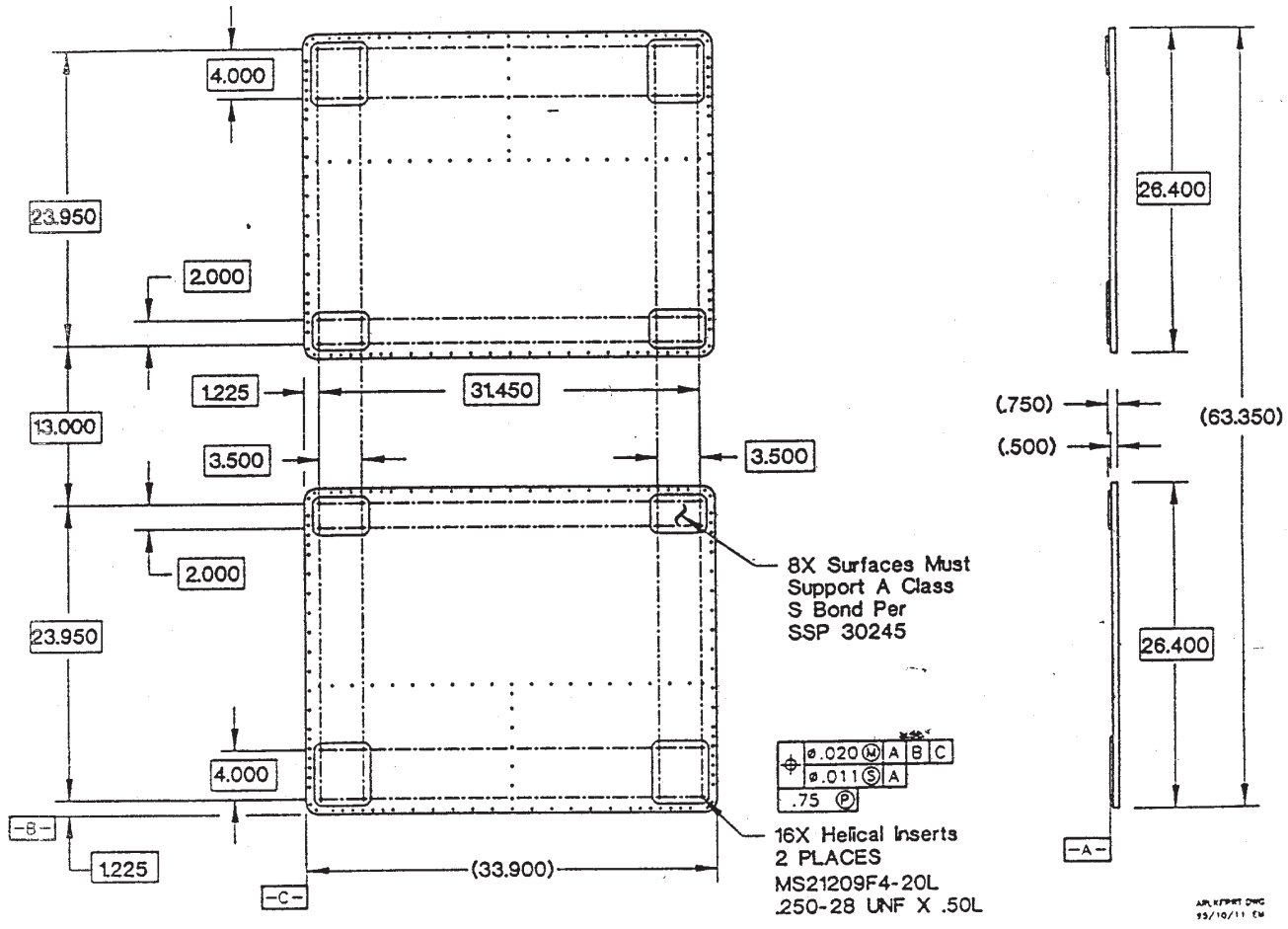


FIGURE 3.7.1–1 A/L STOWAGE TO AIRLOCK INTERFACE DEFINITION



Note: User organization to provide fasteners

FIGURE 3.7.1–2 A/L ETSD INTERFACE FOOTPRINT DEFINITION

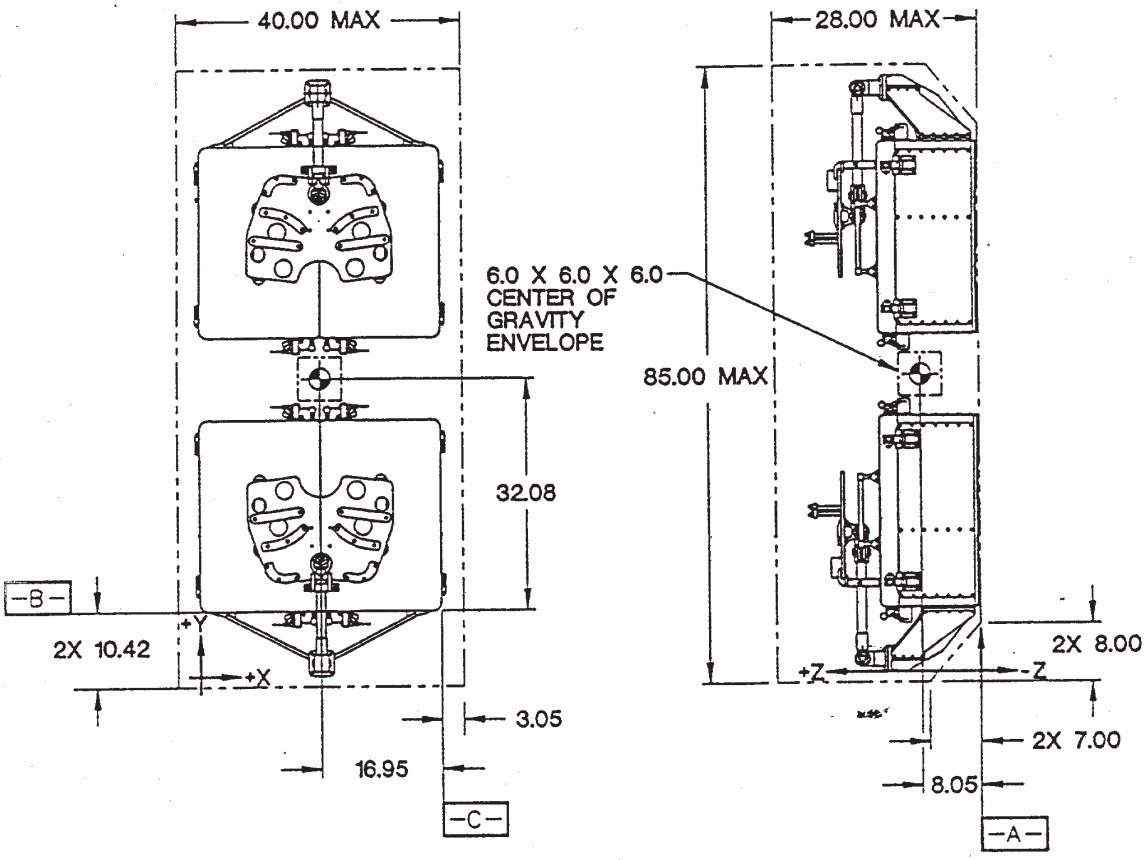


FIGURE 3.7.2–1 A/L ETSD LAUNCH ENVELOPE INTERFACE DEFINITION

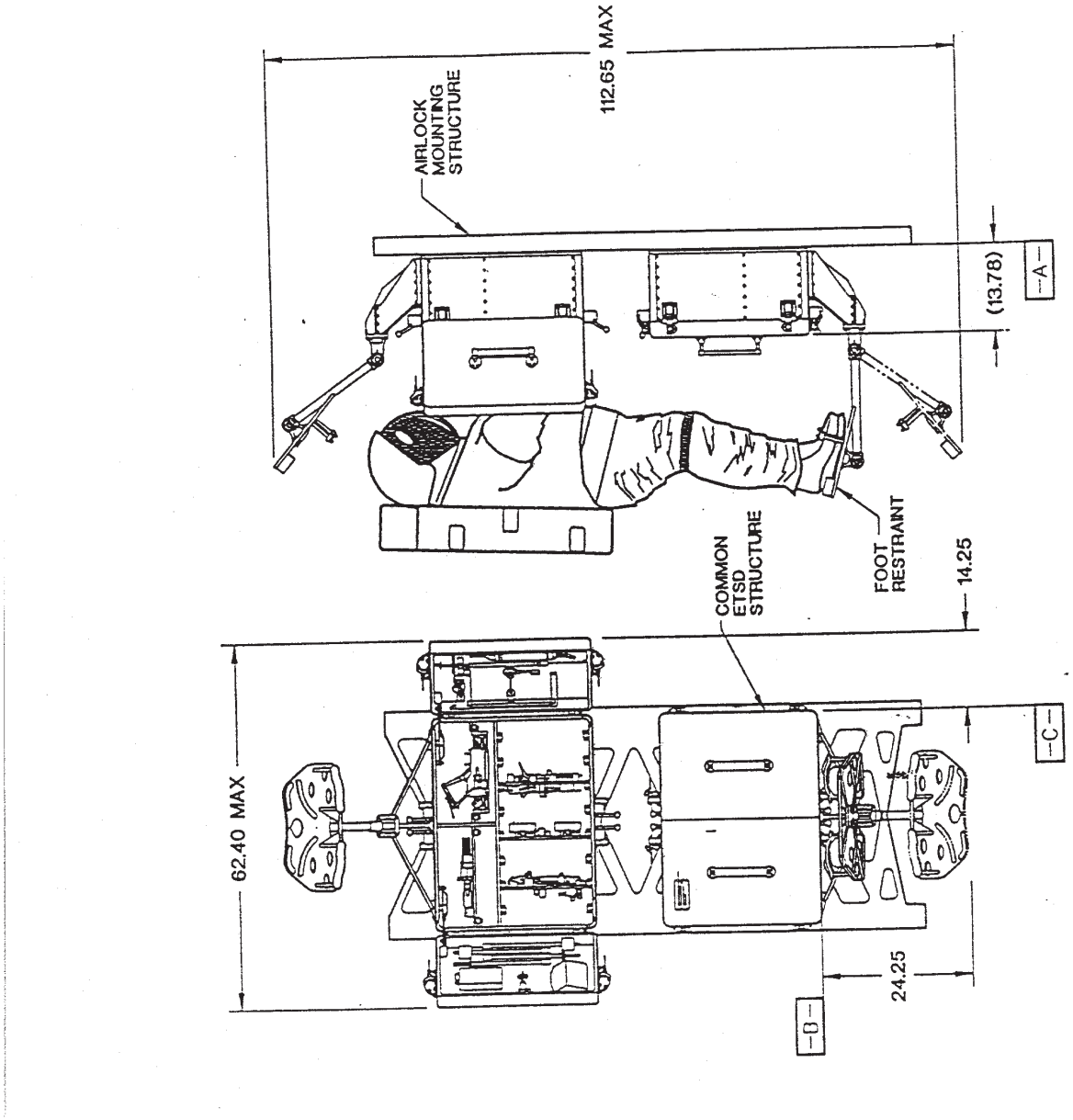


FIGURE 3.7.2–2 A/L ETSD ON–ORBIT WORKING ENVELOPE INTERFACE DEFINITION

3.6.1.2.2 EVA

A 4 in. radial EVA clearance envelope around each of the handrails/handholds is necessary for a crewmember to use them as translation aids. Figure 3.6.1.2.2–1 defines the profile of the ground installed handrail/handhold.

3.6.1.3 STRUCTURAL

3.6.1.3.1 LOADING

The loading criteria of the ground installed handrails/handholds is that they must support a 220 lbs hand induced limit load or a 200 lbs EVA tether limit load in any direction. These loads will not occur simultaneously. The worst load case on the primary translation path will produce a maximum limit load of 220 lbs shear/tension combined with a bending moment limit at the interface of each handrail/handhold stand–off of 572 in–lbs for the top mounted, 1037 in–lbs for the short side mounted and 1191 in–lbs for the tall side mounted handrail. The worst load case on the secondary translation path will produce a maximum limit load of 187 lbs shear/tension combined with a bending moment limit at the interface of each handrail/handhold stand–off of 486 in–lbs for the top mounted, 882 in–lbs for the short side mounted and 1013 in–lbs for the tall side mounted handrail.

3.6.1.3.2 MASS PROPERTIES

The maximum weight of the ground installed handrails/handholds varies with stand–off type and rail length. The unit weights of the ground installed handrails/handholds are listed in Table 3.6.1.3.2–1.

3.6.1.4 MECHANICAL

3.6.1.4.1 MOUNTING AND INSTALLATIONS

Bolt pattern dimensions for top mounted standard handrails and custom length handrails, without a center stand–off, are shown in Figure 3.6.1.4.1–1. The bolt pattern for the long custom length handrail with center stand–off and short custom length handrail are shown in Figure 3.6.1.4.1–3a and Figure 3.6.1.4.1–3b, respectively. Figure 3.6.1.4.1–4 shows the top mounted handhold bolt pattern. The tall and short side mounted handrail/handhold bolt patterns are shown by Figures 3.6.1.4.1–5 through 3.6.1.4.1–8. Users of handrails/handholds should apply these bolt patterns to their structure for the purpose of predrilling holes for hardware installation.

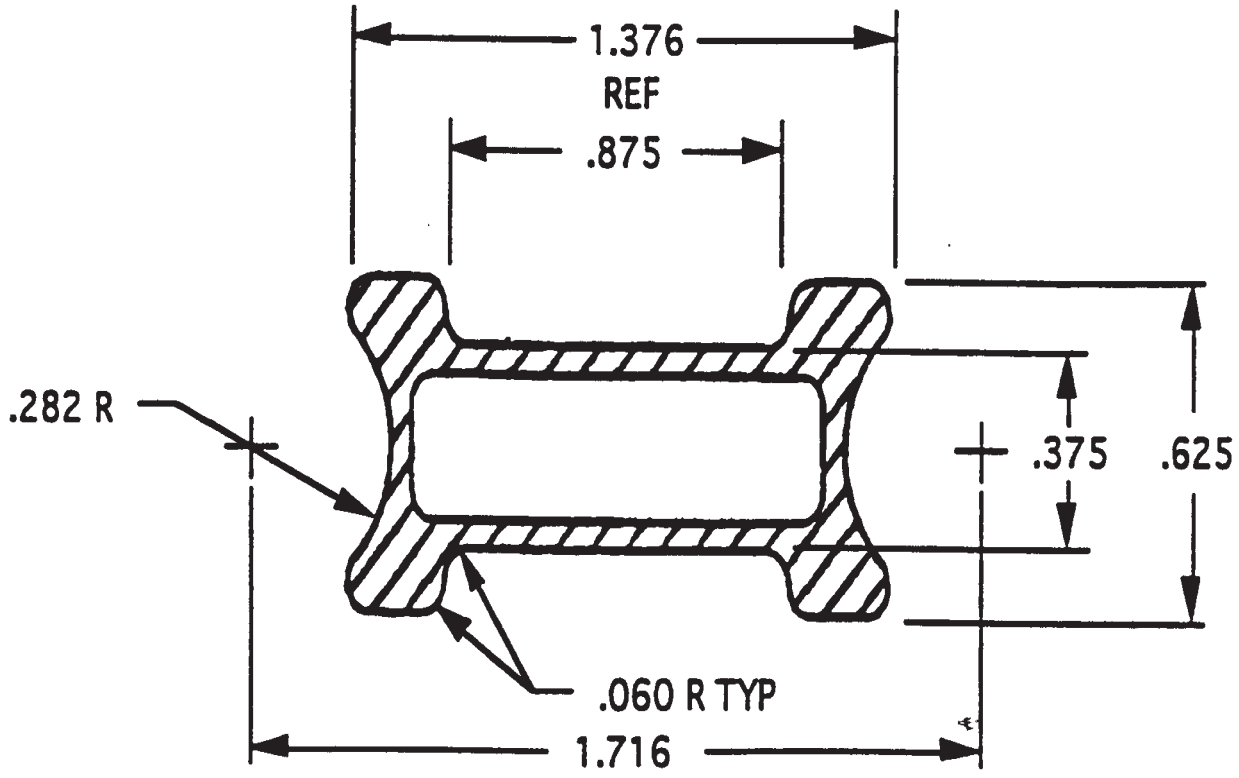
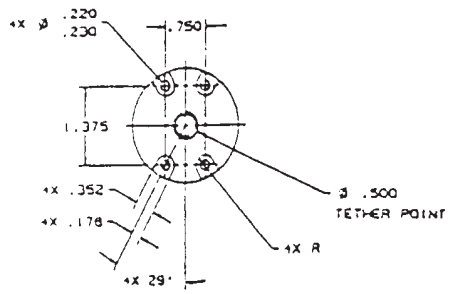


FIGURE 3.6.1.2.2–1 HANDRAIL/HANDHOLD CROSS SECTION (GROUND INSTALLED)

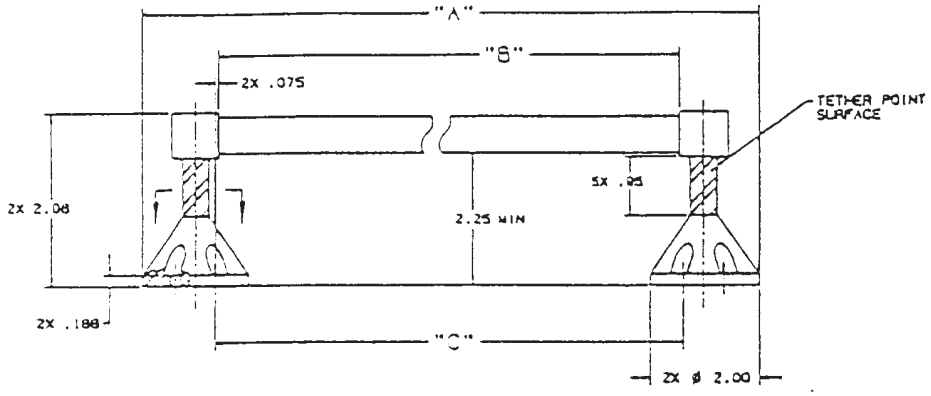
TABLE 3.6.1.3.2–1 GROUND INSTALLED HARDRAIL/HANDHOLD SPECIFICATION WEIGHTS

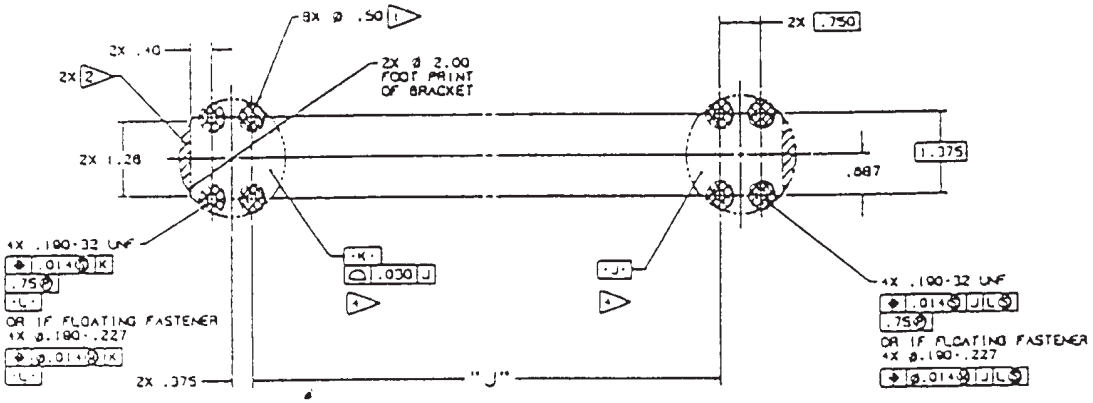
DESCRIPTION	PART NUMBER	UNIT WEIGHT, LBS
Handrail Assembly, Side Mounted, Tall – ISS (25.53”)	SEG33106348 – 301 (Ref. 5848232 – 501)	2.10
Handrail Assembly, Side Mounted, Short – ISS (25.53”)	SEG33106348 – 303 (Ref. 5848232 – 503)	1.90
Handhold Assembly, Side Mounted, Tall – ISS (8.53”)	SEG33106350 – 301 (Ref. 5848233 – 501)	1.70
Handhold Assembly, Side Mounted, Short – ISS (8.53”)	SEG33106350 – 303 (Ref. 5848233 – 503)	1.50
Handrail Assembly, Top Mounted – ISS (25.53”)	SEG33106347 – 801 (Ref. 5835754 – 501)	1.50
Handrail Assembly, Top Mounted – ISS (15.441”)	SEG33106347 – 811	1.29
Handrail Assembly, Top Mounted – ISS (21.941”)	SEG33106347 – 803	1.29
Handrail Assembly, Top Mounted – ISS (22.625”)	SEG33106347 – 805	1.31
Handrail Assembly, Top Mounted – ISS (25.606”)	SEG33106347 – 843	1.50
Handrail Assembly, Top Mounted Custom (47.635”)	SEG33106466 – 301	2.33
Handrail Assembly, Top Mounted Custom (15.441 + 6”)	SEG33106466 – 313	1.50
Handrail Assembly, Top Mounted – ISS (8.53”)	SEG33106347 – 807 (Ref. 5835755 – 501)	1.10
Handrail Assembly, Top Mounted – ISS (8.626”)	SEG33106347 – 809	0.94

PART NUMBER	DESCRIPTION	A ± .01	B ± .01	C (REF)	D ± .06
SEG33106347 - 801 (Ref. 5835754 - 501)	Handrail Assembly, Top Mounted -ISS (25.53")	28.28"	25.38"	25.530"	25.530"
SEG33106347 - 811	Handrail Assembly, Top Mounted - ISS (15.441")	18.19"	15.29"	15.441"	15.441"
SEG33106347 - 803	Handrail Assembly, Top Mounted - ISS (21.94")	24.69"	21.79"	21.941"	21.941"
SEG33106347 - 805	Handrail Assembly, Top Mounted - ISS (22.625")	25.38"	22.47"	22.625"	22.625"
SEG33106347 - 843	Handrail Assembly, Top Mounted - ISS (25.606")	28.36"	25.76"	25.606"	25.606"



SECTION
2 PLS



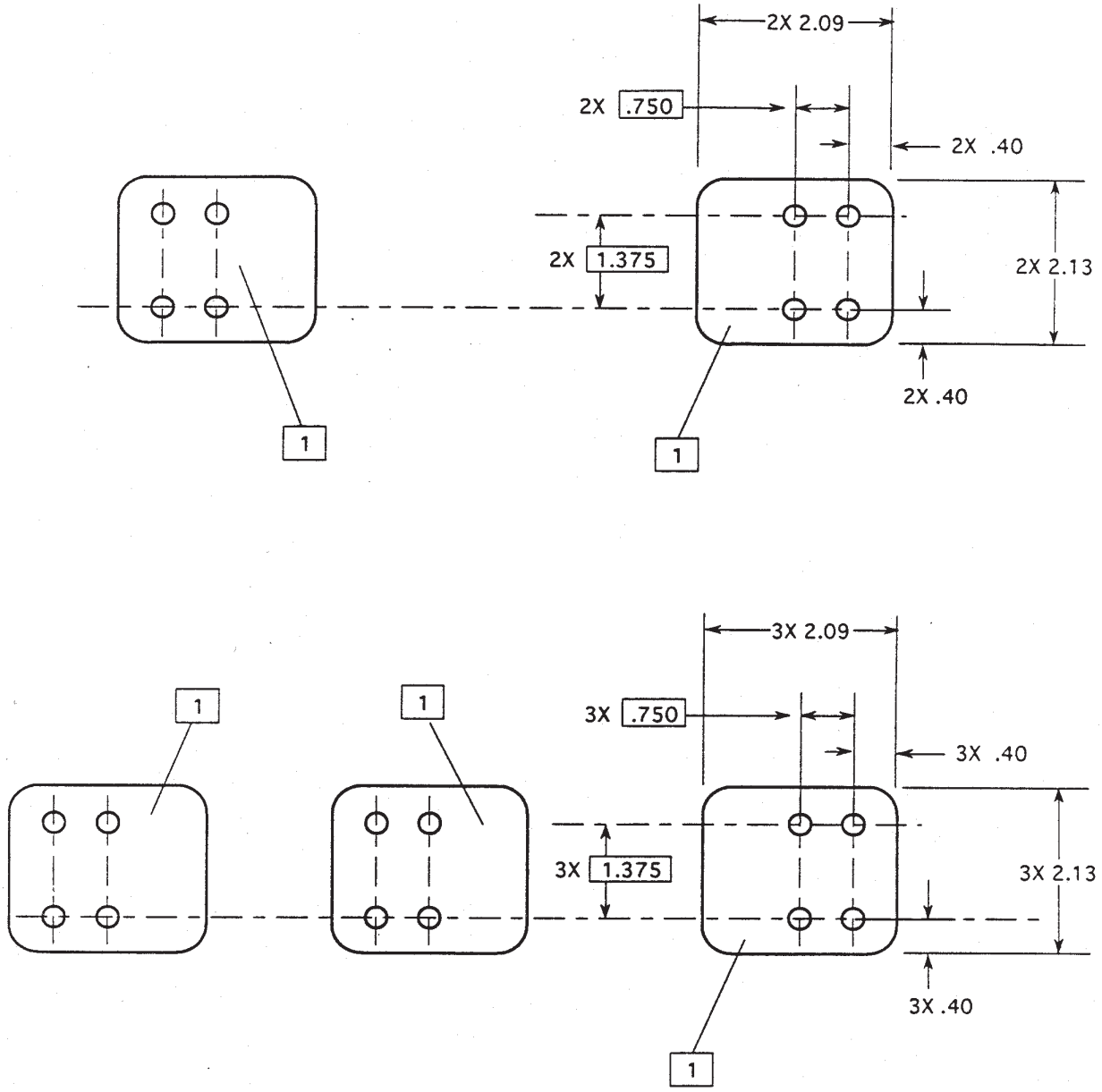


DIMENSIONAL TOLERANCES: (UNLESS OTHERWISE NOTED:)		
	.0	± .1
	.00	± .01
	.00	± .005

FLAG NOTES:

1. MINIMUM ELECTRICAL CONDUCTIVE SURFACE ON CROSS-HATCHED AREAS, TO SUPPORT A CLASS S BOND PER SSP30245.
2. STANDOFF BRACKET FOOT PRINT ALLOWED TO BE UNSUPPORTED IN THIS AREA.
3. USE MASTER-LOK, 10-32 UNF-2B SOCKET HEAD CAP SCREWS, LENGTH TO BE SPECIFIED BY USER.
4. .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE

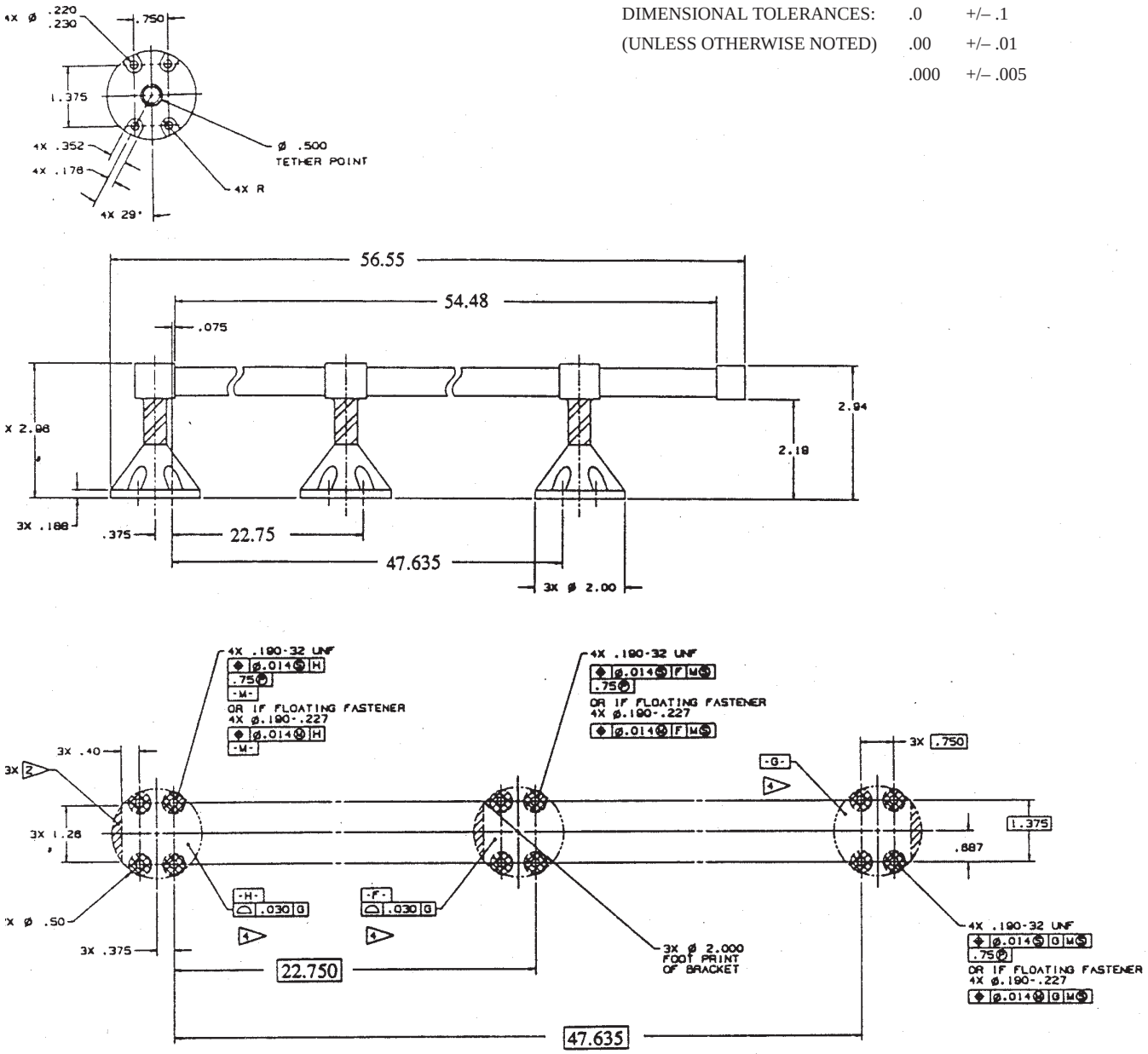
FIGURE 3.6.1.4.1–1 TOP MOUNTED HANDRAIL ENVELOPE AND BOLT INTERFACE (GROUND INSTALLED)



1 Electrical conductive surface to support a Class S Bond per SSP 30425

FIGURE 3.6.1.4.1–2 ALTERNATE BONDING SURFACE TOP MOUNTED HANDRAILS/HANDHOLDS (GROUND INSTALLED)

DIMENSIONAL TOLERANCES:	.0	+/– .1
(UNLESS OTHERWISE NOTED)	.00	+/– .01
	.000	+/– .005



FLAG NOTES:

1. MINIMUM ELECTRICAL CONDUCTIVE SURFACE ON CROSS-HATCHED AREAS, TO SUPPORT A CLASS S BOND PER SSP30245.
2. STANDOFF BRACKET FOOT PRINT ALLOWED TO BE UNSUPPORTED IN THIS AREA.
3. USE NAS1351N, 10-32 UNFR SOCKET HEAD CAP SCREWS, LENGTH TO BE SPECIFIED BY USER.
4. .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE

FIGURE 3.6.1.4.1–3a TOP MOUNTED CUSTOM LENGTH HANDRAIL ACCESS ENVELOPE (GROUND INSTALLED – LONG)

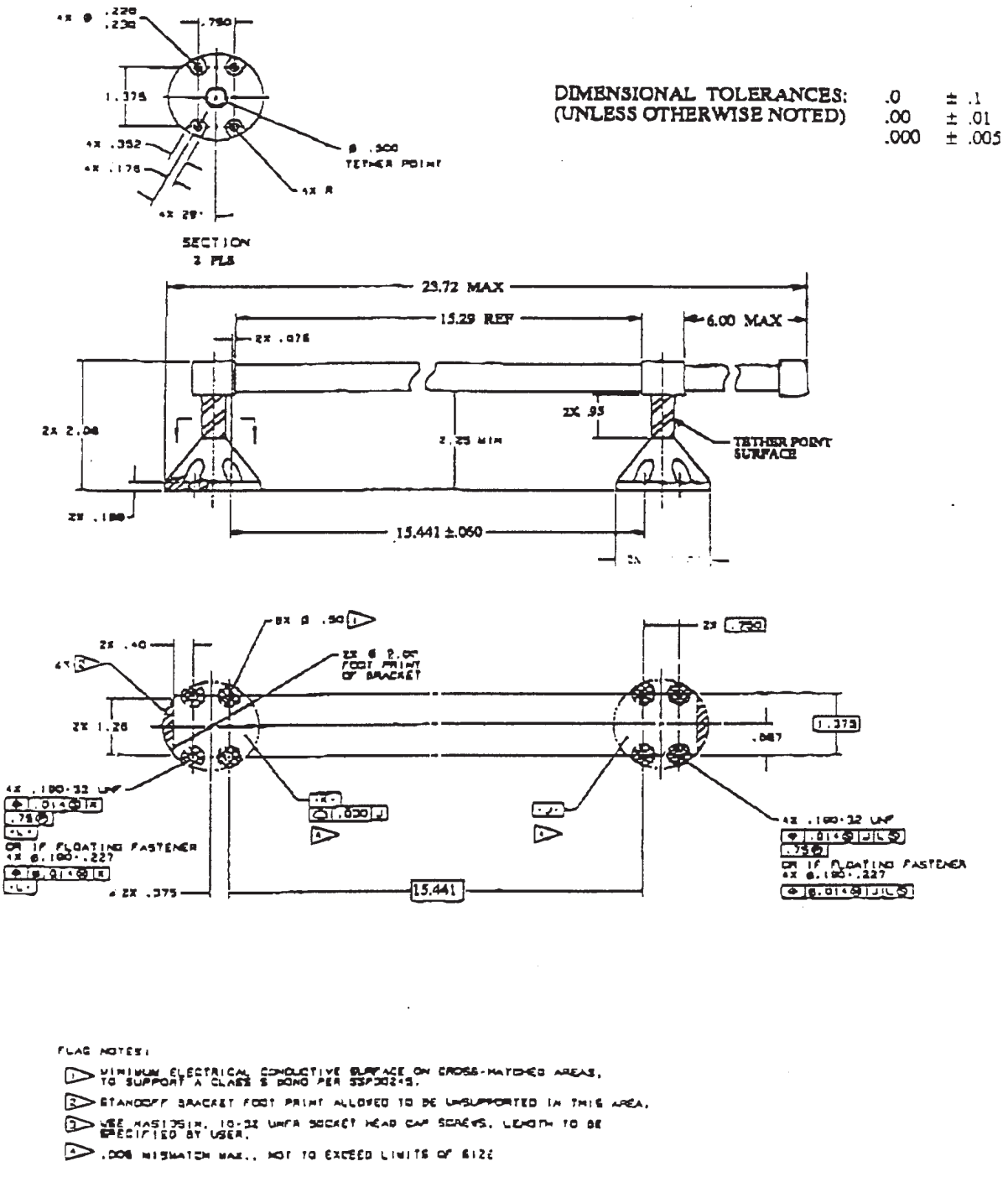
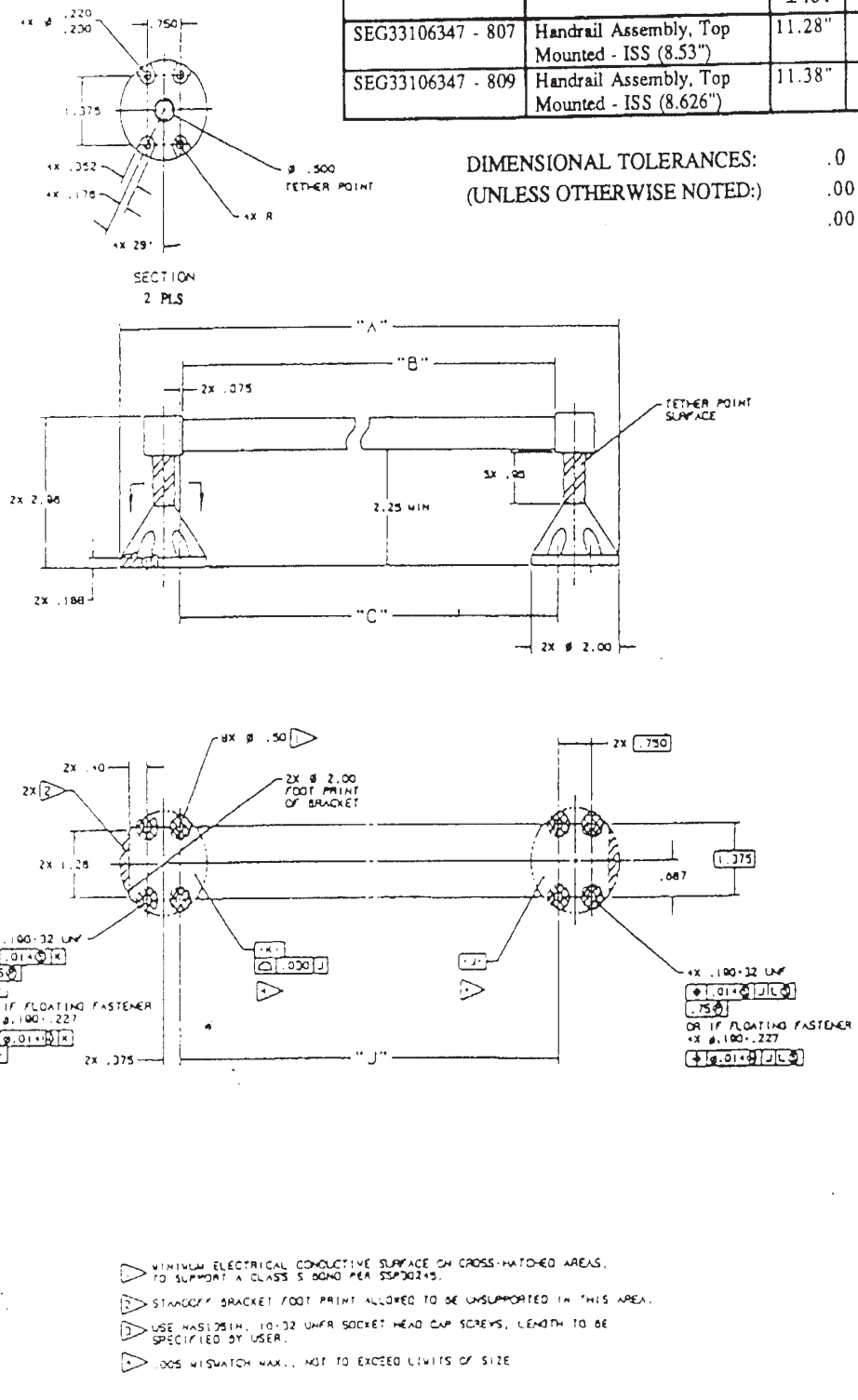


FIGURE 3.6.1.4.1–3b TOP MOUNTED CUSTOM LENGTH HANDRAIL ACCESS ENVELOPE (GROUND INSTALLED – SHORT)

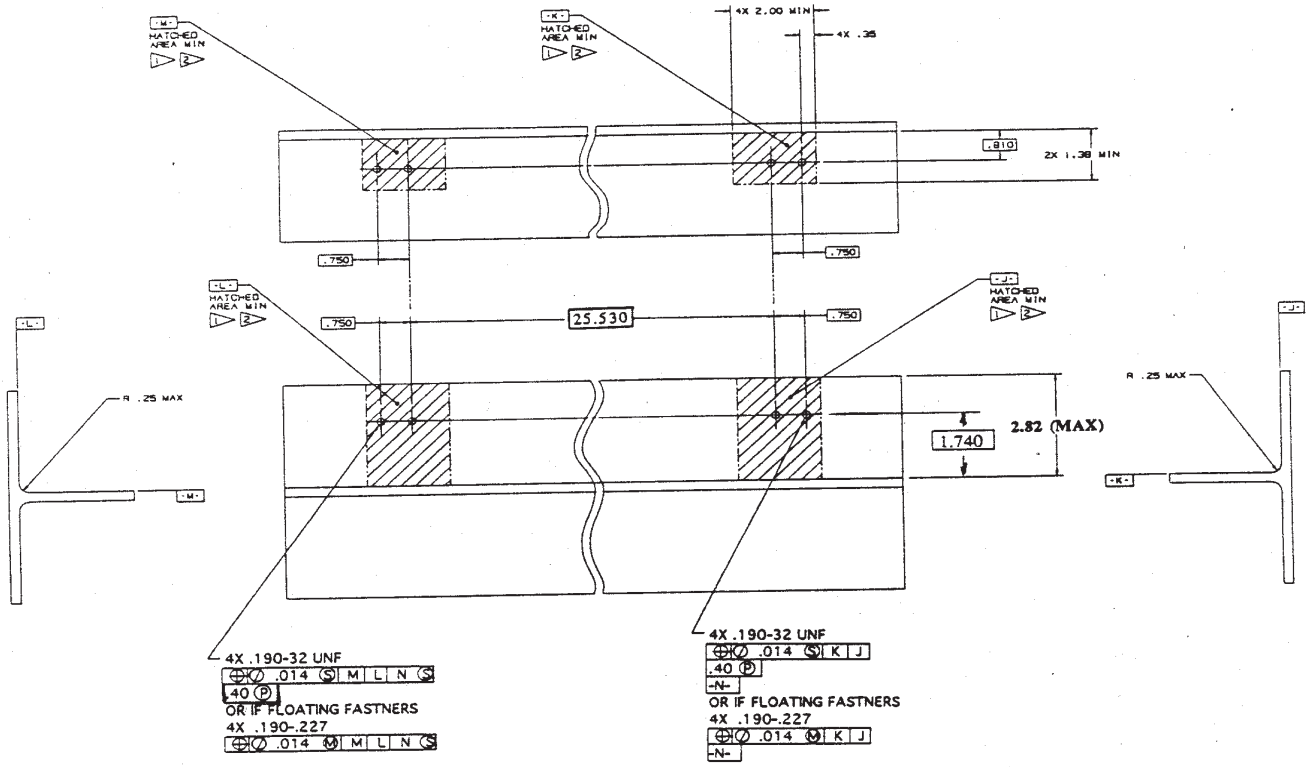
PART NUMBER	DESCRIPTION	A ± .01	B ± .01	C (REF)	J ± .06
SEG33106347 - 807	Handrail Assembly, Top Mounted - ISS (8.53")	11.28"	8.38"	8.530"	8.530"
SEG33106347 - 809	Handrail Assembly, Top Mounted - ISS (8.626")	11.38"	8.48"	8.626"	8.626"

DIMENSIONAL TOLERANCES: .0 ± .1
(UNLESS OTHERWISE NOTED:) .00 ± .01
.00 ± .005



1. MINIMUM ELECTRICAL CONDUCTIVE SURFACE ON CROSS-HATCHED AREAS, TO SUPPORT A CLASS S BOND PER SSP30245.
2. STANDOFF BRACKET FOOT PRINT ALLOWED TO BE UNSUPPORTED IN THIS AREA.
3. USE NAS1351H, 10-32 UNFR SOCKET HEAD CAP SCREWS, LENGTH TO BE SPECIFIED BY USER.
4. .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE

FIGURE 3.6.1.4.1–4 TOP MOUNTED HANDHOLD ENVELOPE AND BOLT INTERFACE (GROUND INSTALLED)

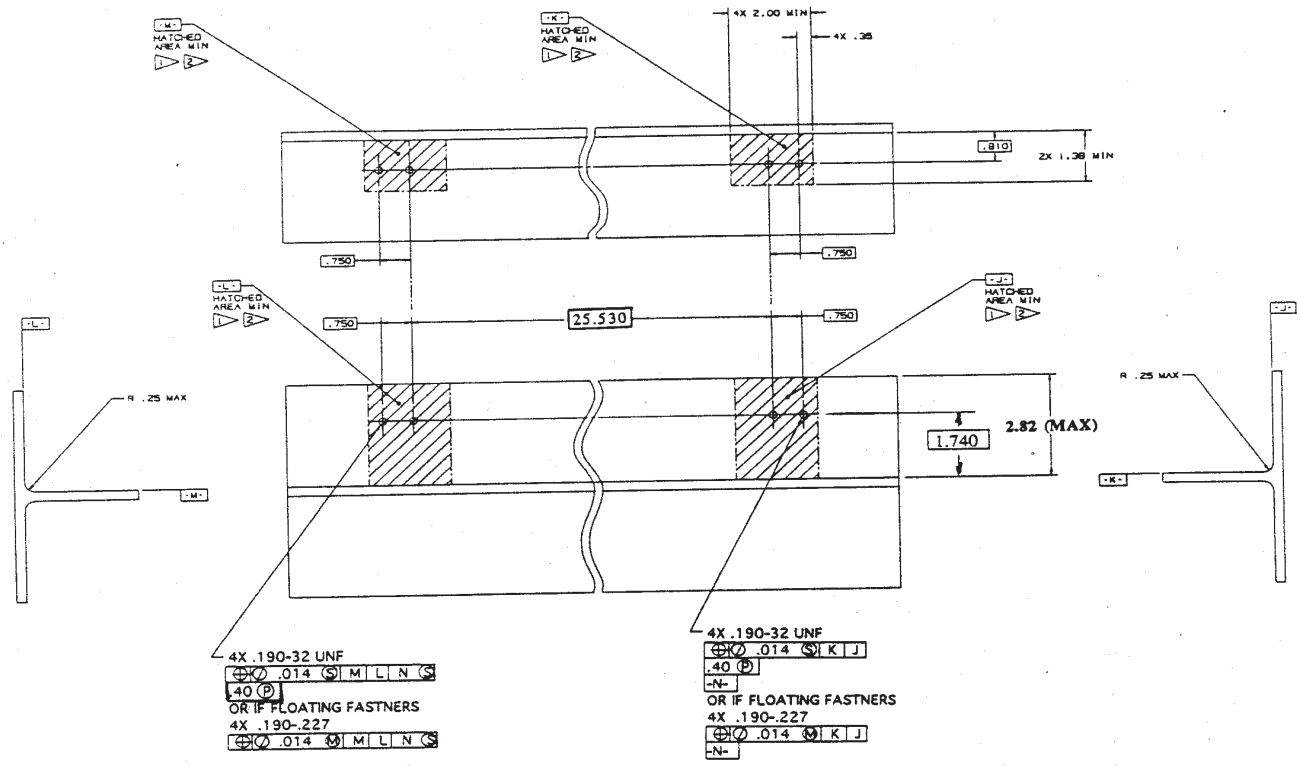


OTES:

> SURFACE MUST SUPPORT A CLASS "S" BOND PER SSP 30245.

> .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE.

FIGURE 3.6.1.4.1–5 TALL SIDE MOUNTED HANDRAIL BOLT INTERFACE (GROUND INSTALLED)

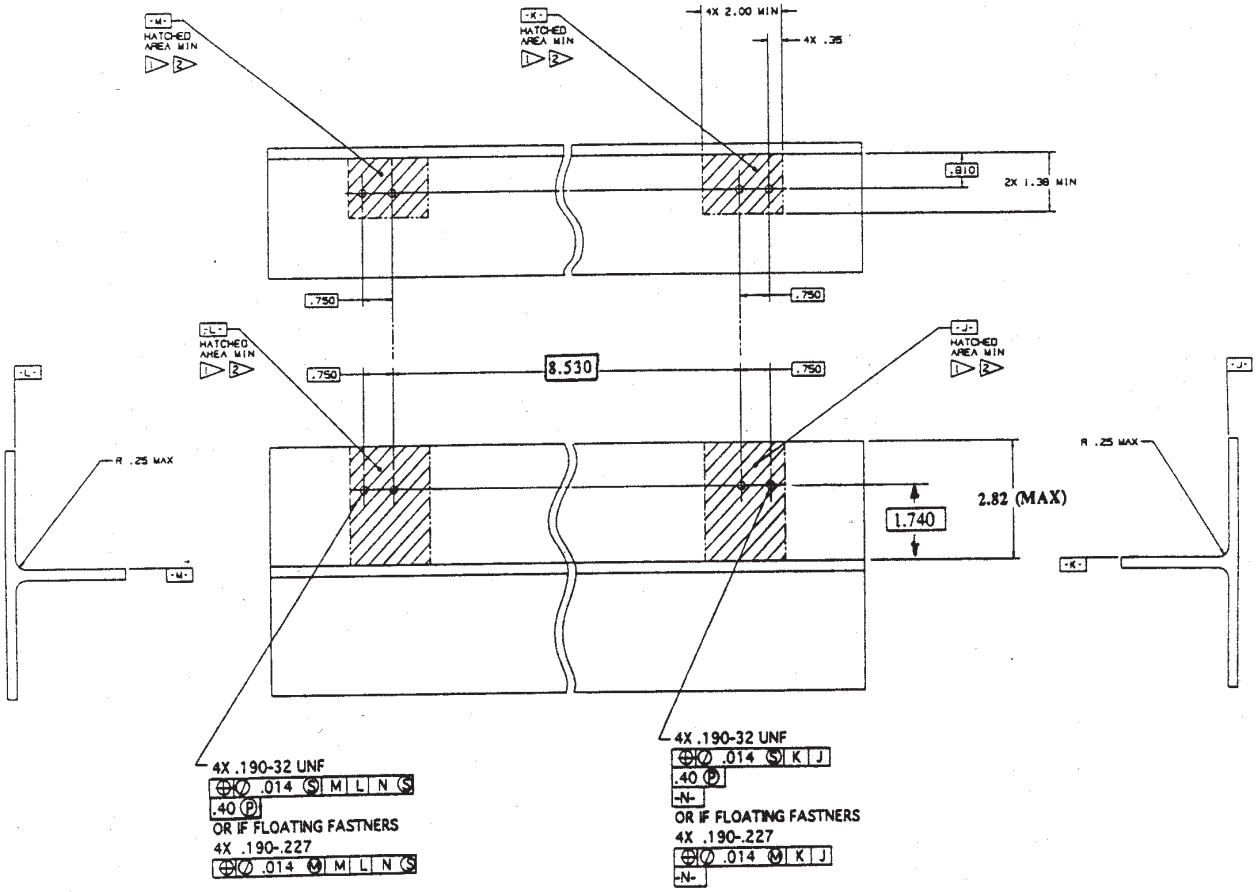


OTES:

> SURFACE MUST SUPPORT A CLASS "S" BOND PER SSP 30245.

> .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE.

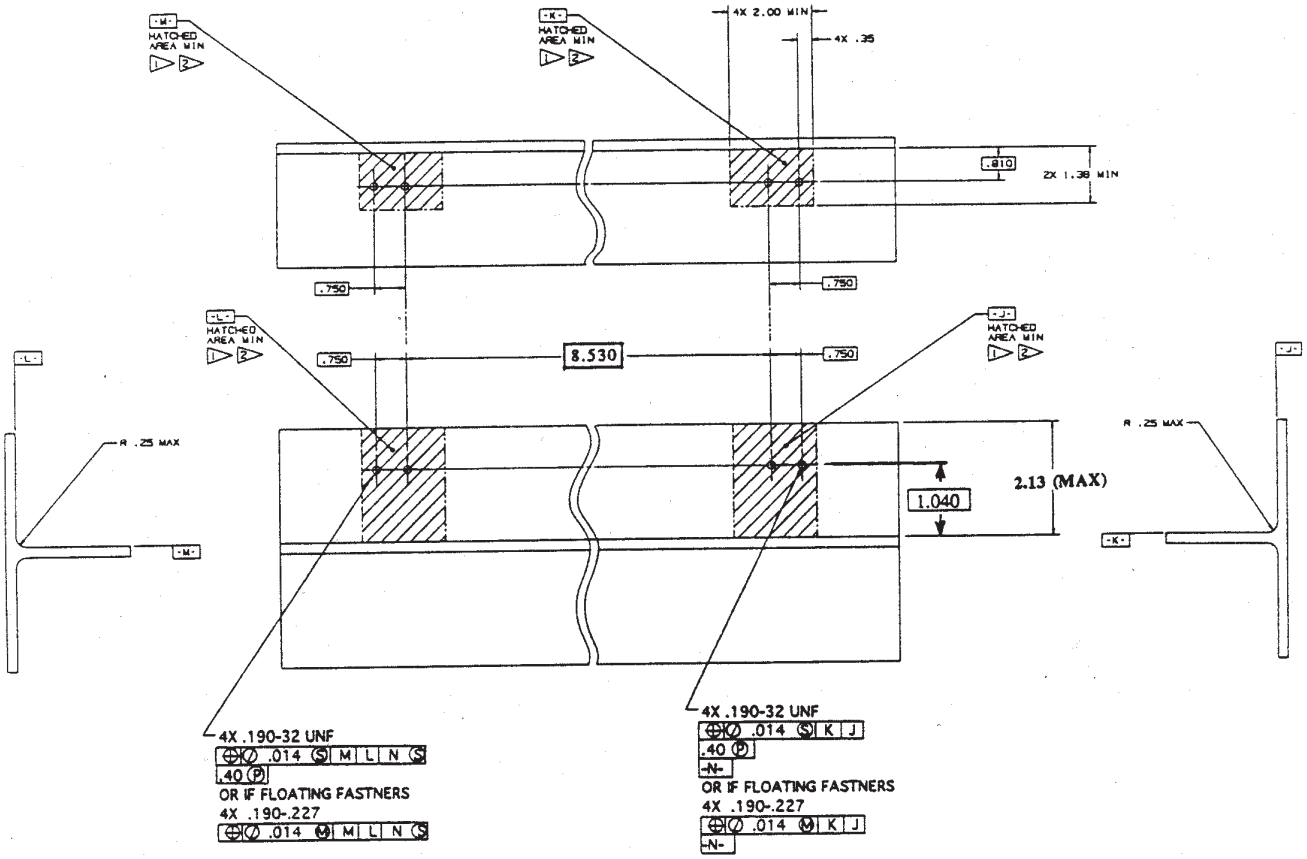
FIGURE 3.6.1.4.1–6 TALL SIDE MOUNTED HANDHOLD BOLT INTERFACE (GROUND INSTALLED)



NOTES:

1. SURFACE MUST SUPPORT A CLASS "S" BOND PER SSP 30245.
2. .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE.

FIGURE 3.6.1.4.1–7 SHORT SIDE MOUNTED HANDRAIL BOLT INTERFACE (GROUND INSTALLED)



NOTES:

1. SURFACE MUST SUPPORT A CLASS "S" BOND PER SSP 30245.
2. .005 MISMATCH MAX., NOT TO EXCEED LIMITS OF SIZE.

FIGURE 3.6.1.4.1–8 SHORT SIDE MOUNTED HANDHOLD BOLT INTERFACE (GROUND INSTALLED)

3.7.3.3 LOADS

3.7.3.3.1 LAUNCH LOADS

Launch load factors for the A/L ETSD are shown in the Table 3.7.3.3.1. These loads include the effects of mechanically transmitted and acoustically induced random vibration, as well as excitation from low frequency transients. The below listed load factors are to be applied in any axis, with a load factor of 25 % of the primary load applied to the remaining two orthogonal axes, simultaneously.

TABLE 3.7.3.3.1 DESIGN LIMIT LOAD FACTORS FOR SECONDARY STRUCTURE

Weight, lb	Load Factor, g
< 20	40
20 – 50	31
50 – 100	22
100 – 200	17
200 – 500	13

3.7.3.3.2 ON–ORBIT LOADS

The A/L ETSD complies with secondary translation path loads of 187 lbf for handholds and handrails.

3.7.3.4 MATERIAL COMPATIBILITY

The A/L ETSD and mounting structure are 7075–T7351 aluminum alloy and meet the requirements of SSP 30233, Space Station Requirements for Materials and Processes.

3.7.4 THERMAL

The A/L ETSD is designated an unlimited contact EVA interface. Thermal control of this hardware is achieved by passive techniques. The installation design activity and the EVAGFE provider share responsibility for maintaining the heat transfer rate within the specified limits.

3.7.5 ELECTRICAL BONDING

The A/L ETSD to Airlock interface must satisfy a Class S Electrical Bond per SSP 30245. The A/L ETSD electrical bonding interface is shown in Figure 3.7.1–1 and Figure 3.7.1–2.

3.8 EVA TOOL STOWAGE DEVICE

The EVA Tool Stowage Device (ETSD) provides stowage for the nominal EVA tools on the tool boards listed in Table 3.0–1 during launch and on–orbit. Two ETSDs will be mounted on the SpaceLab Pallet for launch. Once on–orbit, the ETSDs will be transferred to the Z–1 Truss Structure until the CETA Carts are available. At that time, one each ETSD will be permanently relocated to each CETA Cart.

3.8.1 INTERFACE DESCRIPTION

The ETSD to Z–1 Truss interface definition is shown in Figure 3.8.1–1.

3.8.2 ENVELOPE

The ETSD maximum launch envelope is shown in Figure 3.8.2–1. The ETSD maximum on–orbit envelope is shown in Figure 3.8.2–2 and the clearance envelope required to open the ETSD doors and access the tools is shown in Figure 3.8.2–3.

3.8.3 STRUCTURAL

3.8.3.1 MASS PROPERTIES

The maximum weight of each ETSD outfitted for launch is 208 lbs. The CG envelope for the ETSD is shown in Figure 3.8.2–1.

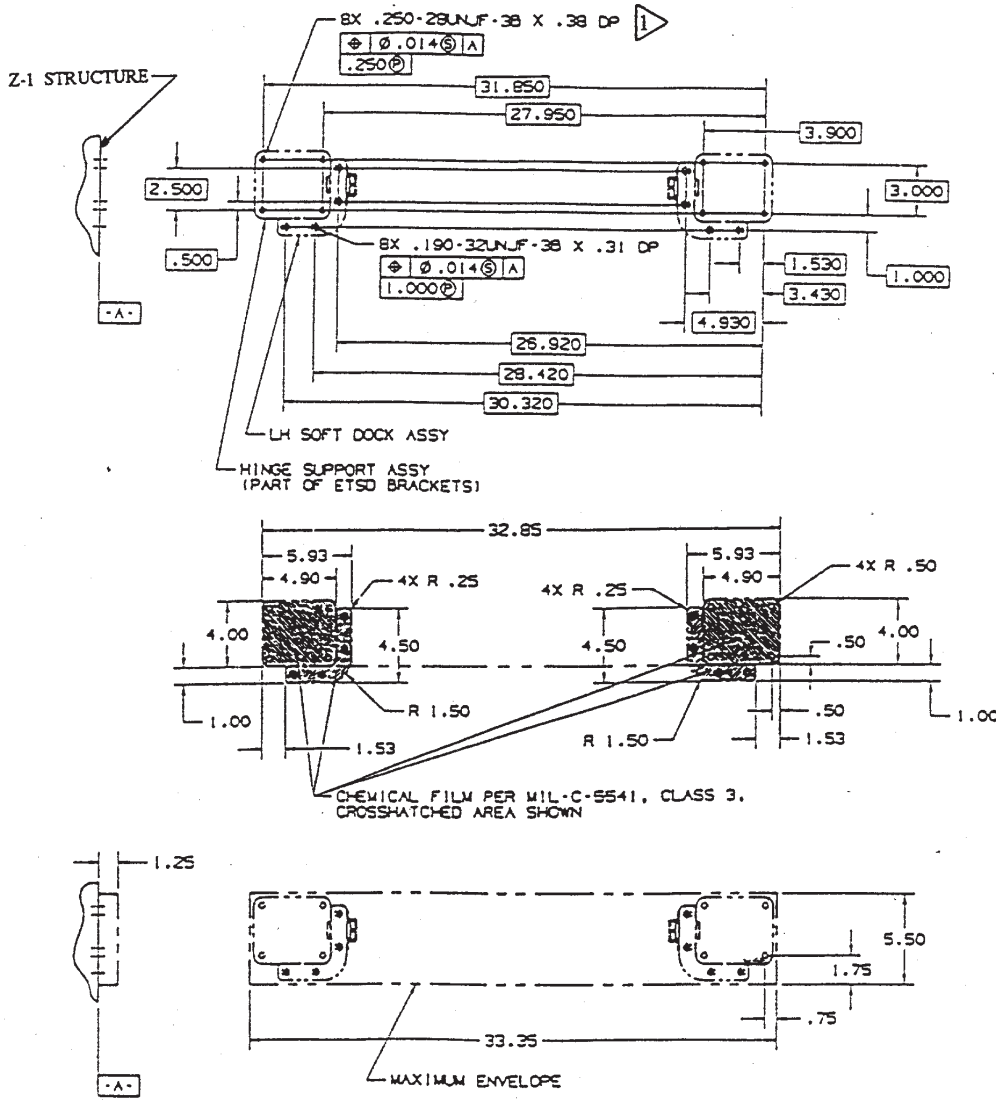
3.8.3.2 STIFFNESS

The CETA ETSD will have a natural frequency of 35 Hz or greater.

3.8.3.3 LOADS

3.8.3.3.1 LAUNCH LOADS

Launch load factors for the ETSD are shown in the Table 3.8.3.3.1. These loads include the effects of mechanically transmitted and acoustically induced random vibration, as well as excitation from low frequency transients. The below listed load factors are to be applied in any axis, with a load factor of 25 % of the primary load applied to the remaining two orthogonal axes, simultaneously.



1. CAPTIVE FASTENERS INCORPORATED IN ETSD BRACKETS

2. TOLERANCES: +/- .03

Note: The ETSD bracket provider shall construct a drill template which shall be used to dr true hold position for the softdock and the CETA-ETSD brackets located on the Z1 Truss segment.

FIGURE 3.8.1–1 EVA TOOL STOWAGE DEVICE TO Z1 INTERFACE DEFINITION

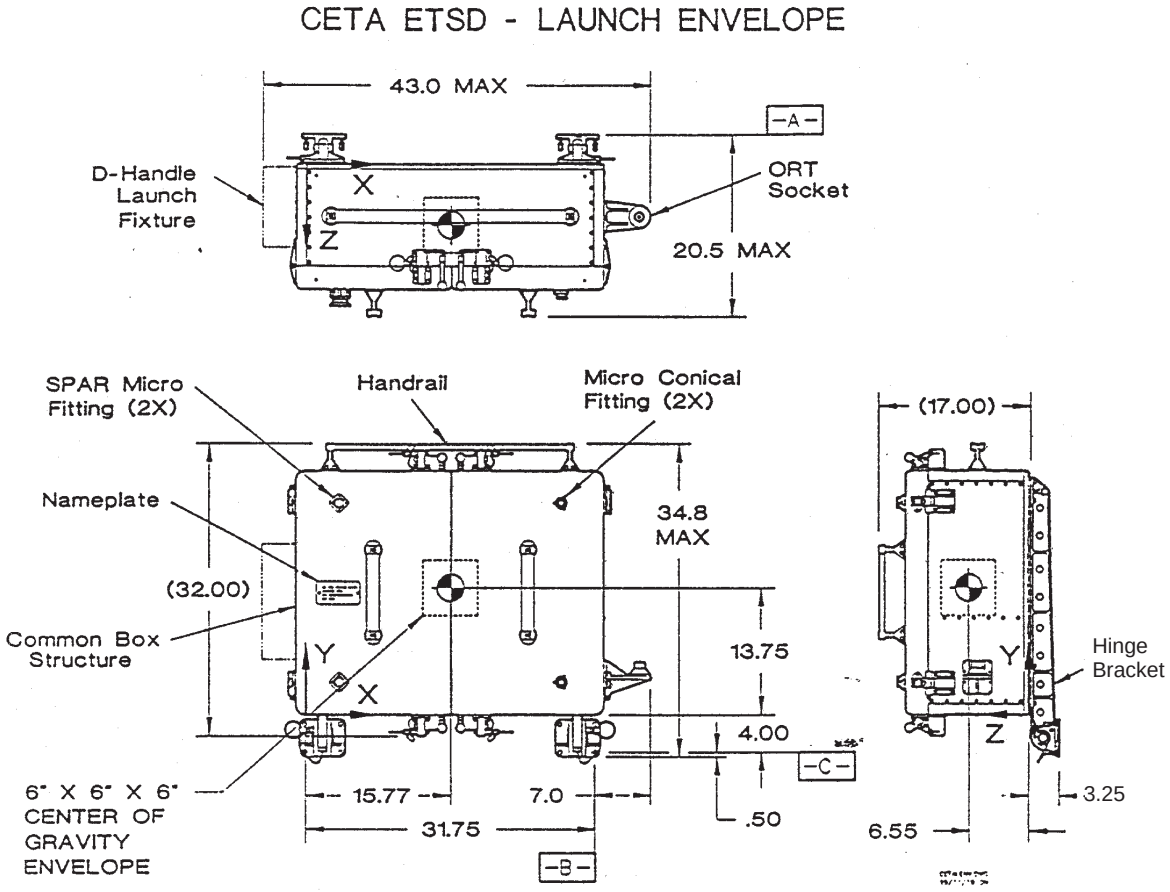


FIGURE 3.8.2–1 ETSD MAXIMUM LAUNCH ENVELOPE

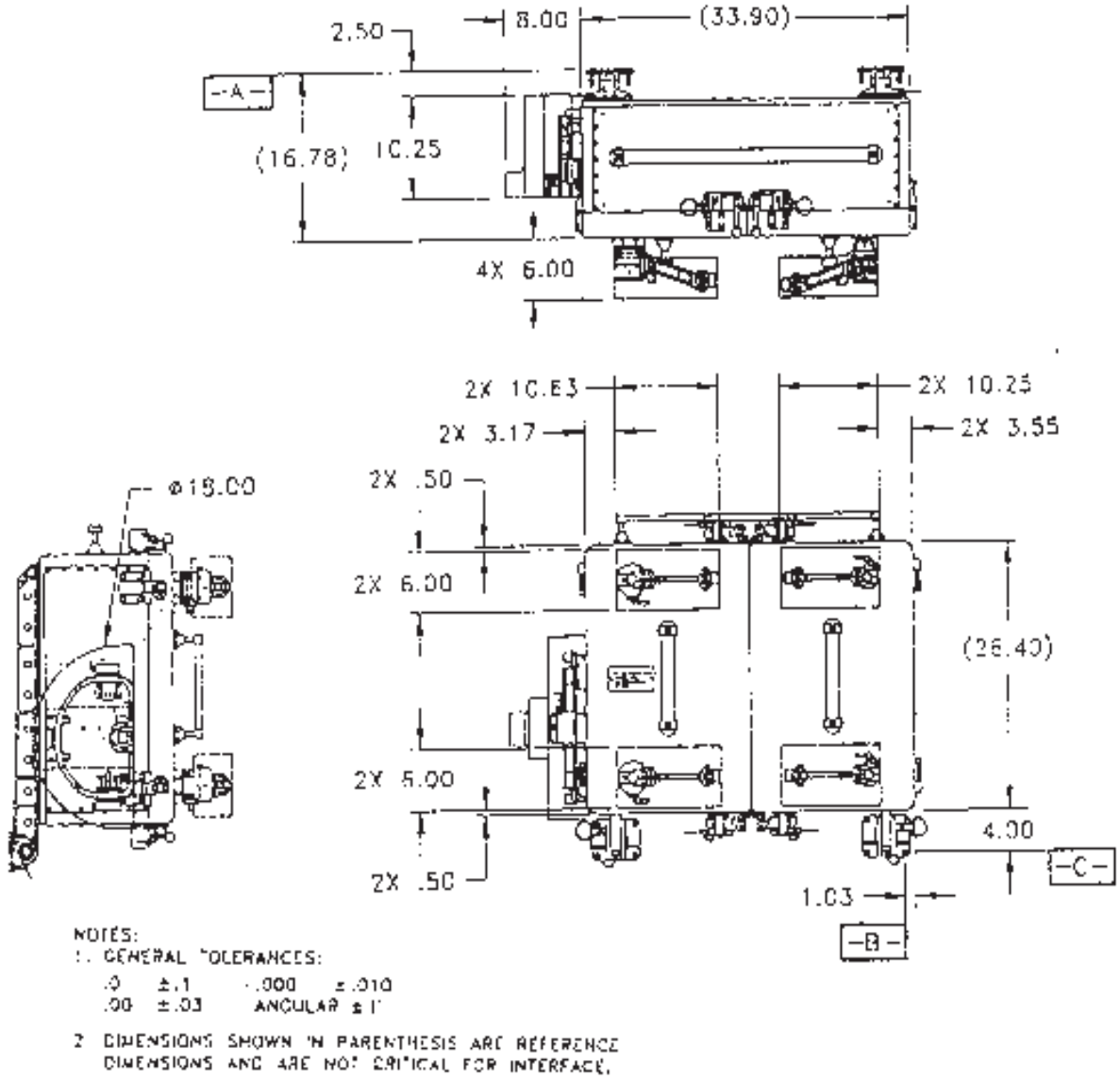


FIGURE 3.8.2–2 ETSD MAXIMUM ON–ORBIT ENVELOPE

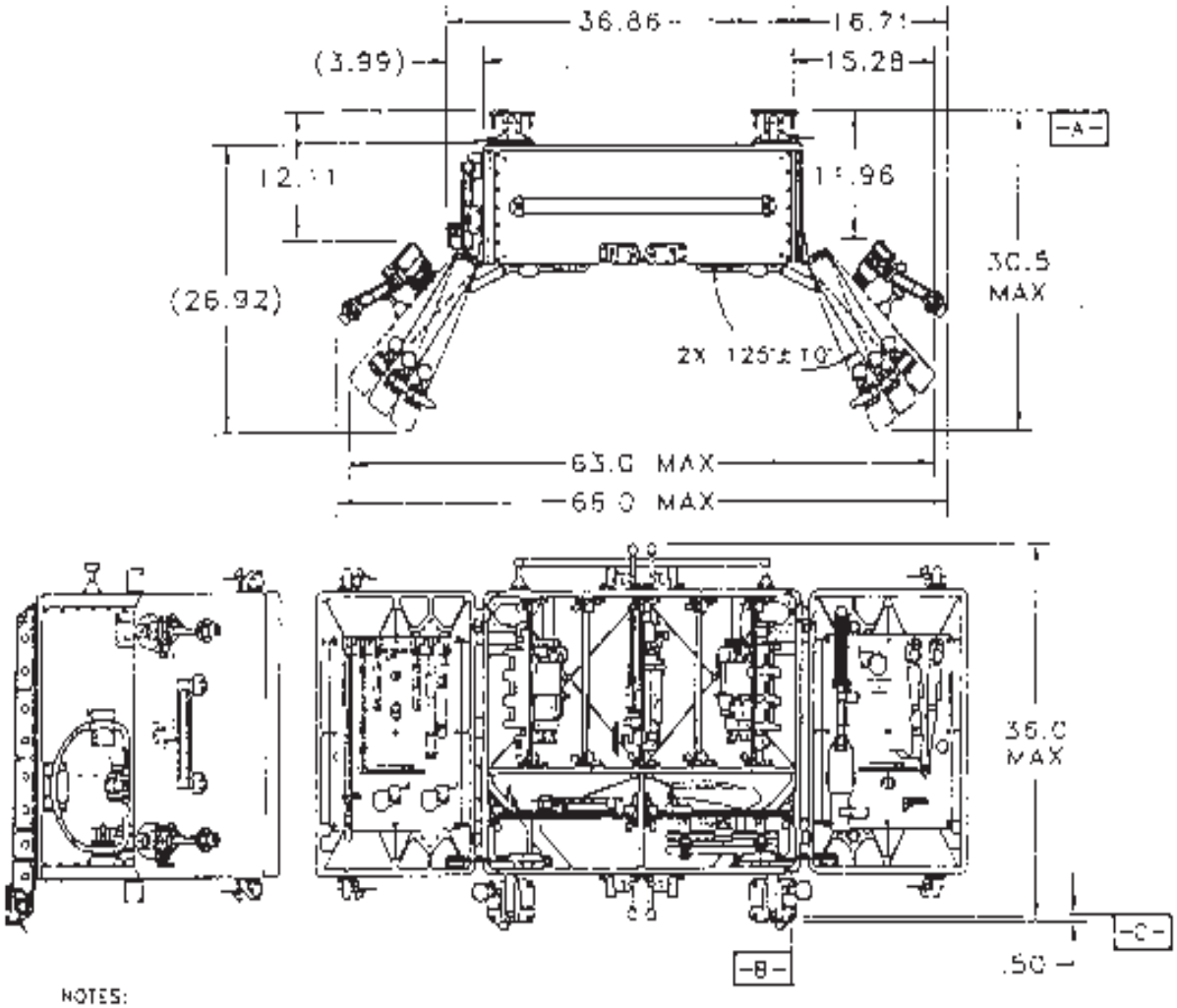


FIGURE 3.8.2–3 ETSD ACCESS AND CLEARANCE ENVELOPE

TABLE 3.8.3.3.1 DESIGN LIMIT LOAD FACTORS FOR SECONDARY STRUCTURE

Weight, lb	Load Factor, g
< 20	40
20 – 50	31
50 – 100	22
100 – 200	17
200 – 500	13

3.8.3.3.2 ON–ORBIT LOADS

The CETA ETSD complies with the secondary translation path loads of 187 lbf for handholds and handrails.

3.8.3.4 MATERIAL COMPATIBILITY

The ETSD and mounting structure are 7075–T7351 aluminum alloy and meet the requirements of SSP 30233, Space Station Requirements for Materials and Processes.

3.8.4 THERMAL

The ETSD is designated an unlimited contact EVA interface. Thermal control of this hardware is achieved by passive techniques. Responsibility for maintaining the heat transfer rates within specified limits is the responsibility of the ISS Prime with support from the installation design activity and the EVA GFE provider.

3.8.5 ELECTRICAL BONDING

The ETSD to SpaceLab Pallet and Z–1 Truss interfaces must satisfy a Class S Electrical Bond per SSP 30245 as shown in Figures 3.8.1–1 and 3.8.1–2. The ETSD electrical bonding interface is shown in Figure 3.8.1–1 and Figure 3.8.1–2.

3.9 EVA PRIMARY TRANSLATION PATH

The primary translation corridor requires a minimum diameter of 43 inches with no obstructions or intrusions into the path for hand–over–hand translation of an EVA crewmember. Figures 3.9–1 and 3.9–2 identify ISS elements. Figures 3.9–3 through 3.9–6 show the primary translation path for the US On–orbit Segment and for the International Partners at assembly complete. EVA primary translation paths on the Attached Pressurized Module (APM) and on the Centrifuge are not yet determined. However, the primary translation path interfaces between

Node 2 and these modules are defined. Translation path requirements for the Russian Segment are the responsibility of the NASA.

Data provided in the figures include the angular location of the primary translation handrail path on each module, and appropriate relative position of the slidewire with respect to the handrail path. EVA translation on the pressurized modules makes use of a safety tether connected to a slidewire that runs parallel to the handrail path. The envelope necessary for the primary translation path, the slidewire clearance, and the safety tether is shown in Figure 3.9–7. The primary translation corridor and the slidewire clearance envelope shall remain free of equipment protrusions. The gap between the slidewire and the handrail path shall remain free of equipment that can snag the safety tether.

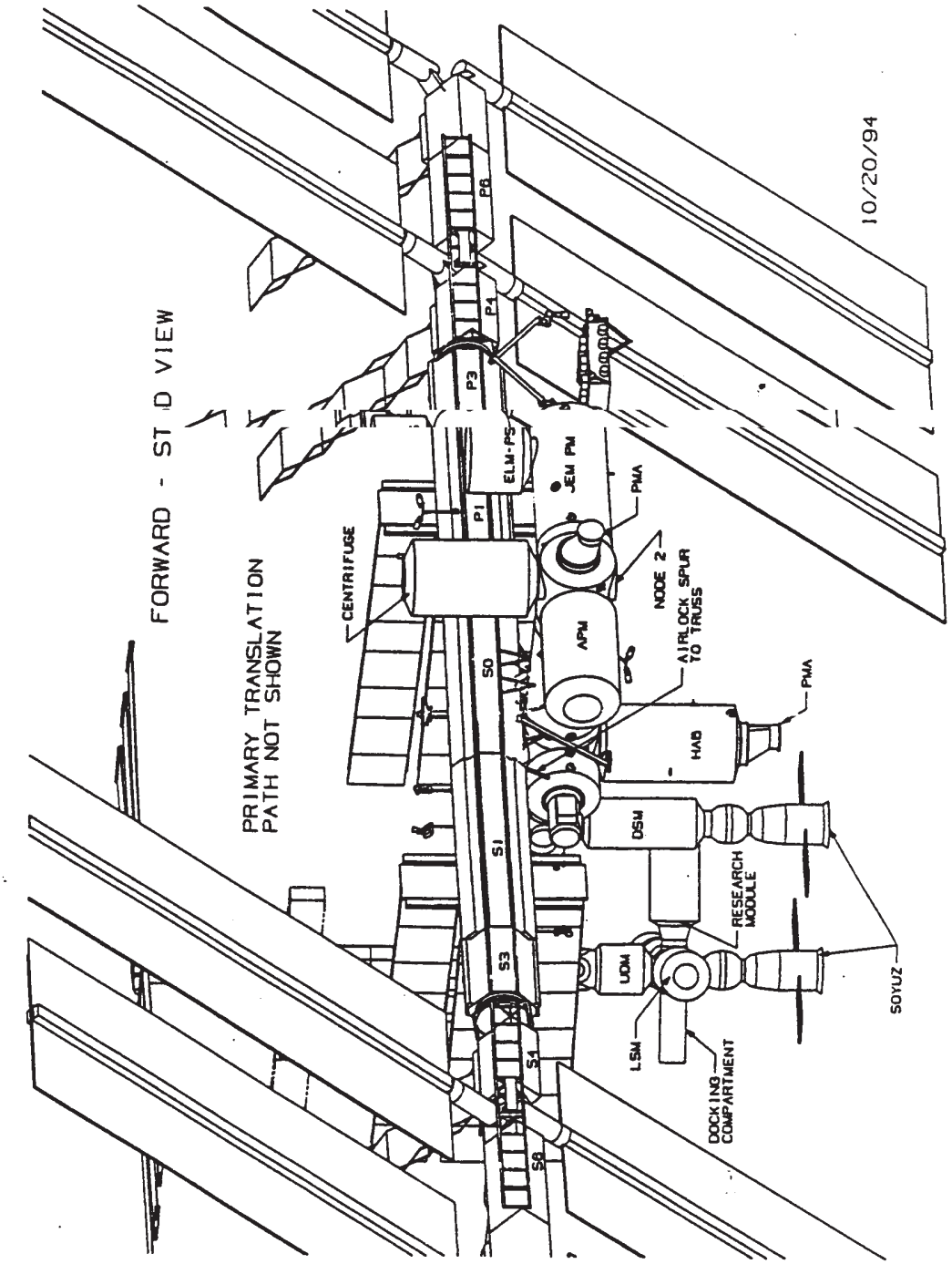


FIGURE 3.9–1 ISSA FORWARD – STARBOARD VIEW WITH MAJOR ELEMENTS IDENTIFIED

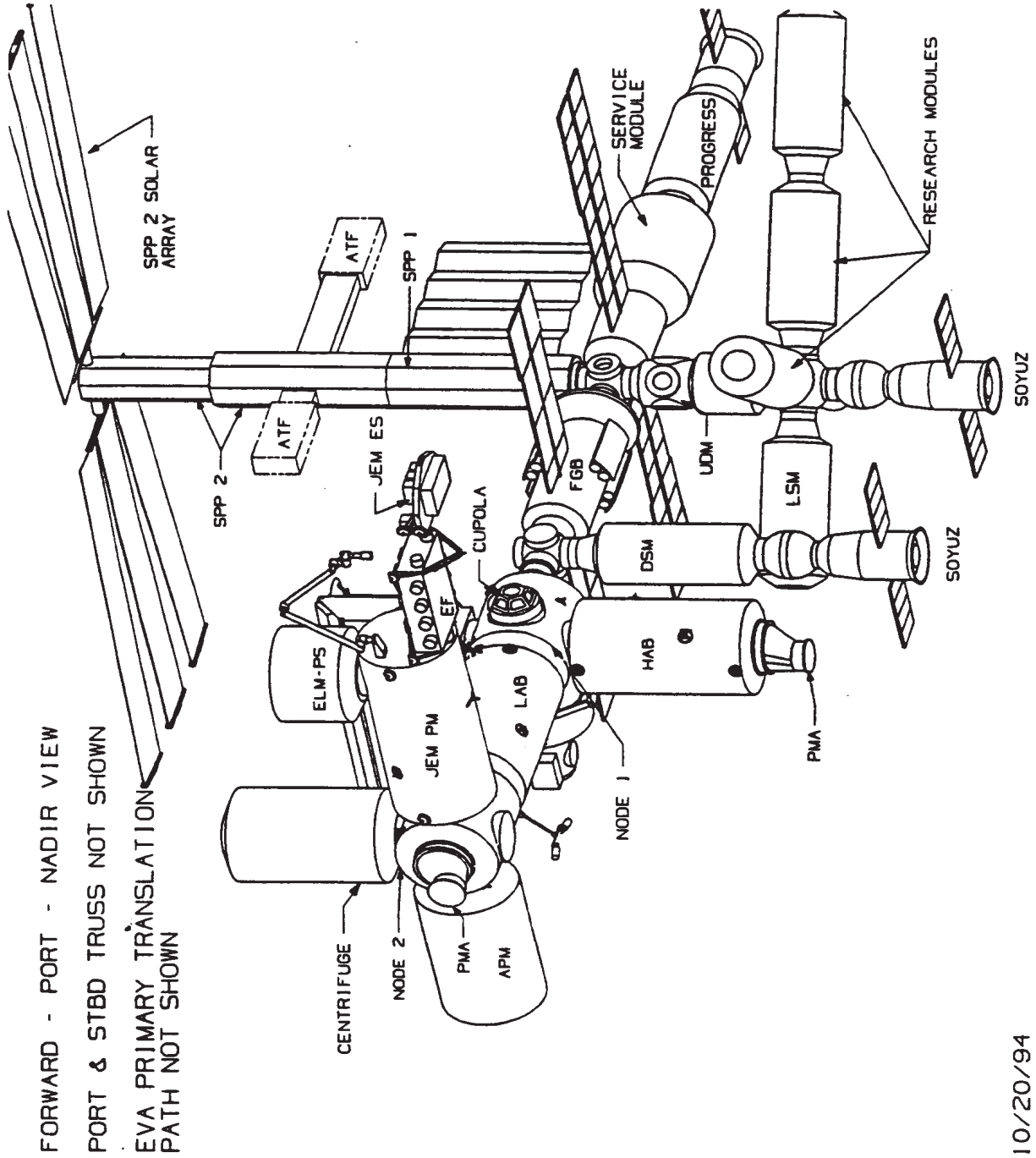


FIGURE 3.9–2 ISSA FORWARD – PORT – NADIR VIEW WITH MAJOR ELEMENTS IDENTIFIED

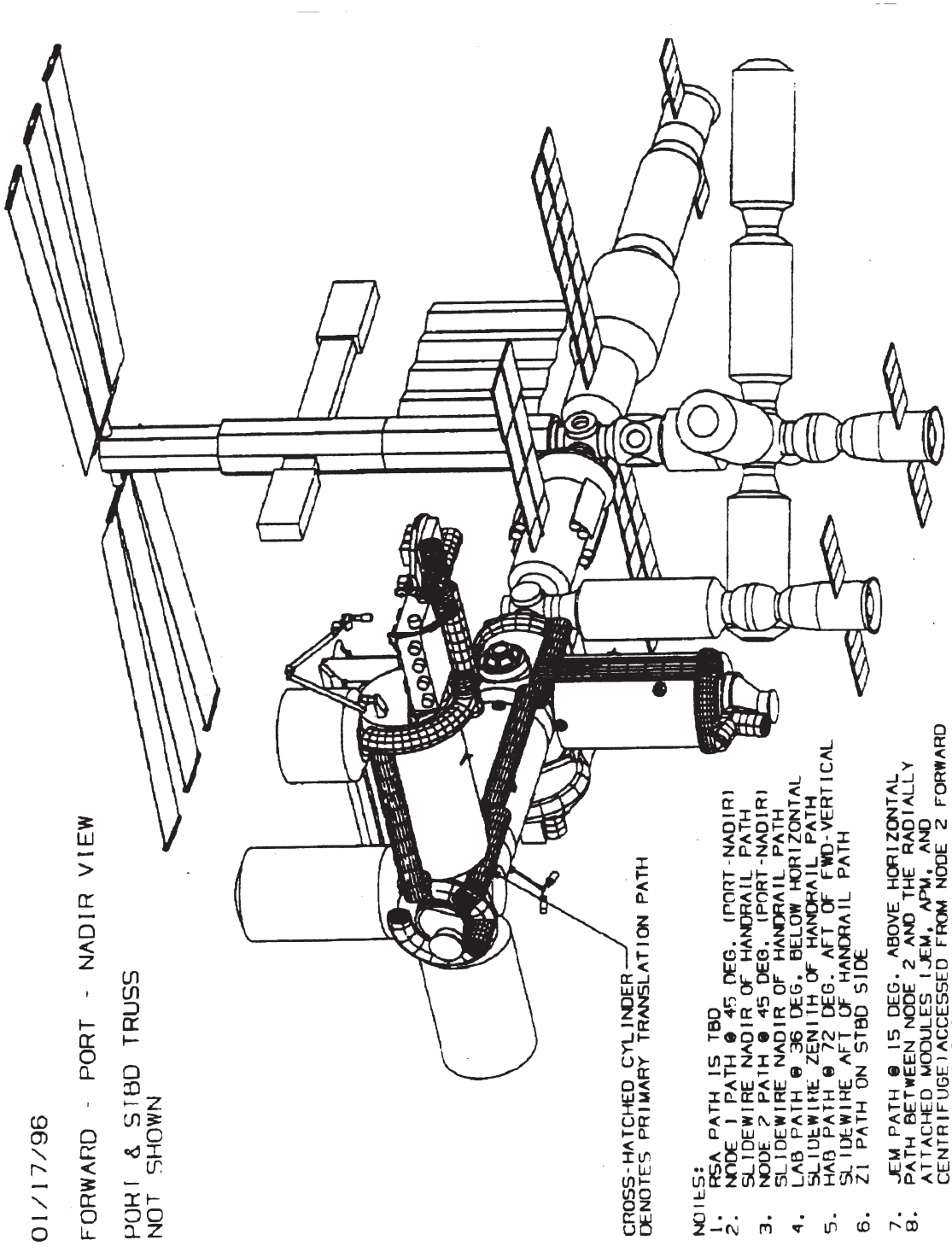


FIGURE 3.9–3 EVA PRIMARY TRANSLATION PATH FORWARD – PORT – NADIR VIEW

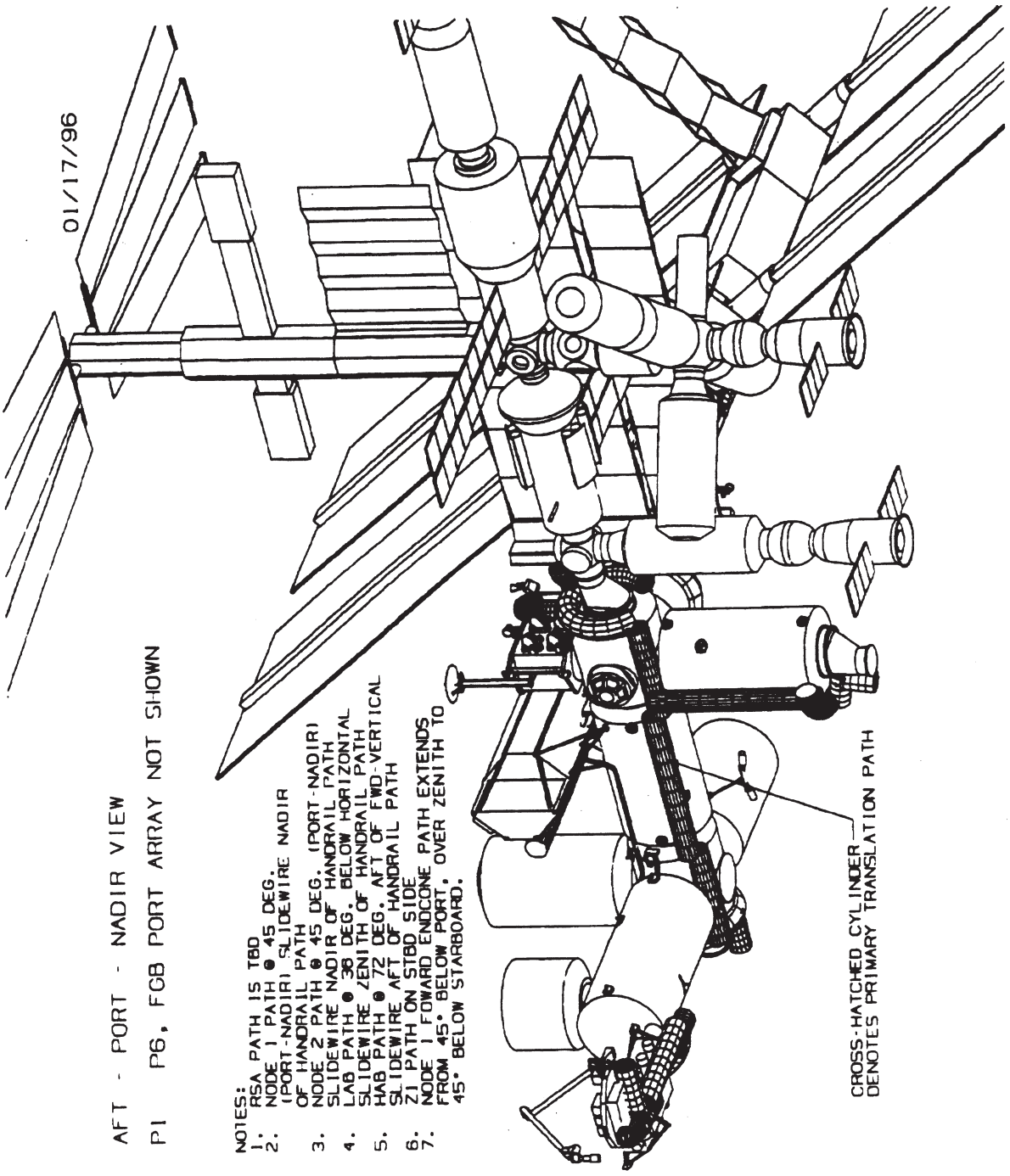


FIGURE 3.9–4 EVA PRIMARY TRANSLATION PATH AFT–PORT–NADIR VIEW

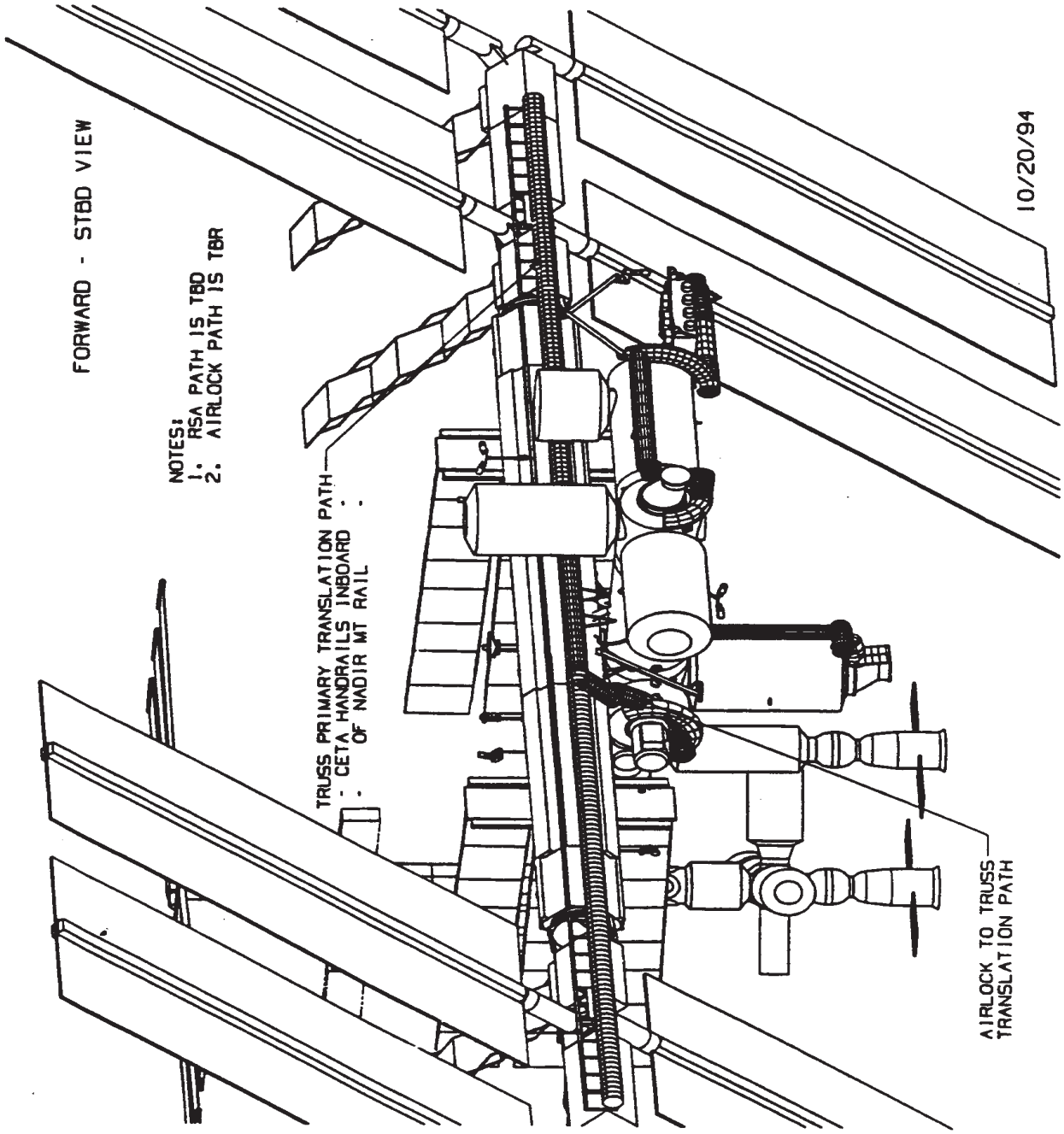


FIGURE 3.9–5 EVA PRIMARY TRANSLATION PATH FORWARD – STARBOARD VIEW

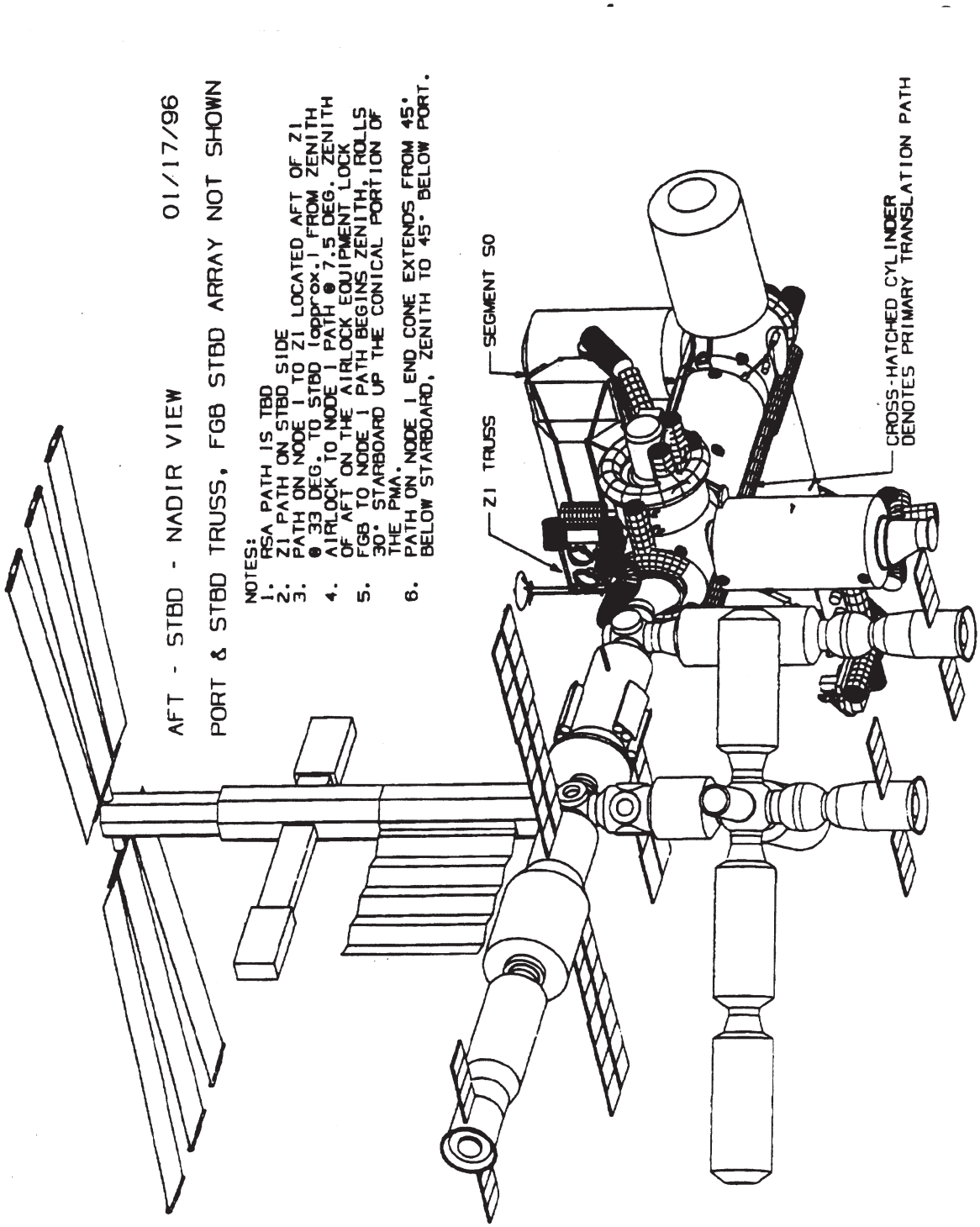


FIGURE 3.9–6 EVA PRIMARY TRANSLATION PATH AFT – STARBOARD – NADIR VIEW

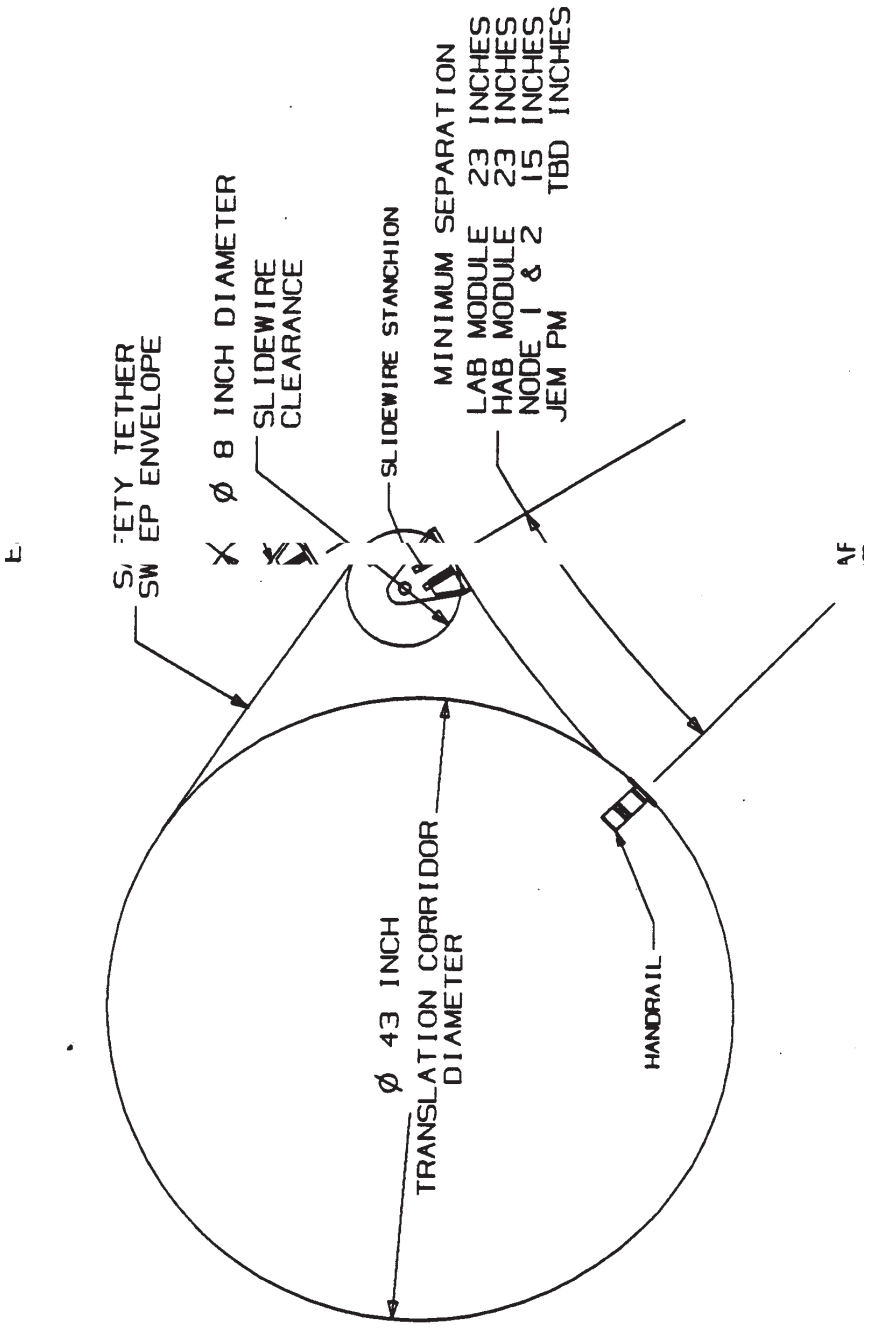


FIGURE 3.9–7 MODULE EVA PRIMARY TRANSLATION PATH, SLIDEWIRE, AND SAFETY TETHER ENVELOPE