Interface Control Document
Cable Load Alleviator Device / Science Instrument Cable Interface
TA_SI_01

SOF-DA-ICD-SE03-036

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AFRC
Armstrong Flight Research Center
Edwards, CA 93523

ARC
Ames Research Center
Moffett Field, CA 94035

German Space Agency, DLR
Deutsches Zentrum für Luft
und Raumfahrt

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TA_SI_01

PREPARED BY:

Logyx / Jeffrey Huang / Systems Engineer — Date: 4/14/2017

CONCURRENCE:

MATTHEW ENGA
Digitally signed by MATTHEW ENGA
DN: c=US, o=U.S. Government, ou=NASA, ou=People, cn=MATTHEW ENGA, 0.9.2342.19200300.100.1.1=menga
Date: 2017.04.14 12:05:47 -07'00'

NASA / Matt Enga / Observatory Systems Integration Lead — Date

NASA / Jonathan Brown / SE&I Lead — Date: 4/14/2017

NASA / Michael Toberman / Operations Director — Date: 4/14/17

NASA / Edward Stanton / Observatory Systems Director — Date: 4/14/2017

DSI / Michael Hütwohl / Telescope Assembly Manager — Date: 4/14/2017

APPROVAL:

DLR / Clemens Plank / Project Engineer — Date

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

FINAL ICD REVISIONS

Revisions to this document from the previous issue are denoted by vertical bars in the margin of each page.

REV	DATE	DESCRIPTION	APPROVAL
0	12/17/2001	Initial NASA SPO Release of MAN Final ICD TA_SI_01, Issue 6, Dated 29 October 2001. (SOF-ICD-MG-062)	/s/ J. Logan
1	3/4/2003	Corrrected table of cable assignments and other associated entries, as described in SOF-DCR-0182. Revised high voltage coax cable model number, as described in SOF-DCR-0190.	/s/ J. Logan
2	4/26/2004	As described in SOF-DCR-0204: Deleted information for cables CD-102-G and CD-202-K, which were eliminated from the design of the TA Balancing System.	
3	2/21/2012	Updated to reflect incorporation of CCRs PRG-CCR-102 (and SOF CCR-365): Administrative / formatting changes related to the transformation of this ICD from former SOF-ICD-MG-062 into SOF-DA-ICD-SE03-036. Section 3: Added language to describe data and requirements presented within ICD and order of precedence between ICD and cited applicable and reference documents. Updated doc. number and names for RD 14. Added RD 16, RD 17, and RD 18. Clarify that U400 / U2 / U402 J128 ~ J131 are general purpose power feed-through lines capable of transmitting 115 VAC 60 Hz or 230 VAC 50 Hz power up to 2 KVA. Add J132 as new power feed-through line capable of transmitting 115 VAC 60 Hz or 230 VAC 50 Hz power up to 3.5 KVA. Replaced outdated Figure 13, Patch Panels Signal Lines, and Figure 14, Patch Panels Power Lines, with Figure 13-A, 13-B, 14-A and 14-B (figures and photographs reflecting the current U402 and U403 Patch Panel	PMB 2/21/2012

REV	DATE	DESCRIPTION	APPROVAL
		layouts). Added Sections 4.1.3.3, 4.1.3.4, 4.1.3.5, 4.1.3.6, 4.1.3.7, and 4.1.3.8, including Figures 13-A, 13-B, 14-A, 14-B, and Tables 1-A and 1-B, to describe TA Patch Panels U402 and U403, as well as the layout and spec. of the connectors on each panel. Add verbiage proposed by SOF CCR-365 to Section 4.1.4 to clarify the SI cooling line interface. Updates to Legend for Figure 3 and 4 and Table 1 to clarify the function of U402 J128 ~ J131 and add J132. Updates to Table 1 to clarify the function of U402 J128 ~ J131, add J132, and correct various errata. Multiple updates to Chapter 6 Annex 1 Datasheets of cables, lines and connectors for Science Instrument, to ensure that the correct data sheets are included, and that they are annotated and captioned accurately.	
3	4/10/2012	Per PRG-CCR-108: Updates to Legend for Figures 3 and 4, Table 1-B, Table 1, and Chapter 6 Annex 1 Figure A1 to reflect J60 ~ J69 microwave coax cable upgrades approved by Platform PCB via SOF CCR-651 on 3/29/2012 and to clarify SI mating connector P/N.	PMB 4/10/2012
3.1	4/12/2017	Incorporated OCCB-CCR-1075 (JIRA # SOF-4245): Added footnote to Table 1-A for SI Mating P/N for J132 to indicate that MS3456 plug may be substituted for (preferred) MS3459 plug with self-locking coupling nut.	OCCB 4/12/2017

TABLE OF CONTENTS

1 Acronyms

Acronyms used in this document are referenced in the SOFIA lexicon, PD-2009.

ID	Inner Diameter
OD	Outer Diameter
R_{min}	Minimum Bending Radius

2 Scope

This document describes the complete cables & lines arrangement of the Cable Load Alleviator (CLA) also the interface between the SI-cables & SI-lines and the TA Cable Load Alleviator device. Furthermore is in this document the interface to the aircraft defined.
In this document is defined the cable positions on the CLA running to the outer Cable Clamp on the Cable Tray (right side) and aircraft intercostal (left side). The cable routing from this locations to the Disconnect Panels are described in ICD TA_MCCS_P (responsibility USRA).
The Junction Box (analogue interface SMA to SI) is not part of this interface. This will be handled in ICD TA_SI_04.

This document is a reference document to ICD TA_AS_03.

It describes:

- The fixation and strain relief of the cables;
- The routing from aircraft system (AS) along the TA;
- The types and numbers of cables and lines
- The relevant features of these cables
- The location of mounting points and loads.

3 Documents

The data referenced in this ICD represents the latest version at the time of issuance of this ICD, unless otherwise stated, and forms a part of these requirements to the extent specified herein.

In the event of a conflict between the text of this ICD and the referenced cited herein, the text of this ICD takes precedence. Nothing in this ICD, however, supersedes contractual requirements unless a specific exemption has been obtained. As appropriate, reference is made to other project documentation for use as guidance in developing the content of this ICD and as such forms a basis for requirements to the extent specified herein.

3.1 Applicable Documents

AD 01	Statement of Work	DARA-WE2 Rev.3 - Dec.1999
AD 02	TA Requirements	NASA SOF 1011 Rev.6
AD 03	Interface Requirements	NASA SOF 1030 Rev.6
AD 04	EMC Design Specification	SOF-SPE-KT-6000.0.02, Issue 1

3.2 Reference Documents

RD 01	Interface Reference Document	PD-2003 (NASA)
RD 02	ICD TA_AS_03 Aircraft System / TA-Cable Load Alleviator Device Interface	SOF-DF_ICD-SE03-013
RD 03	TA Cables	SOF-DWG-MG-5262.0.01, Issue R03
RD 04	delete	
RD 05	Cable Load Alleviator	SOF-DWG-MG-4400.0.00, Issue R07
RD 06	TA Harness / Electrical Interface	SOF-ICD-MG-010, Issue 07
RD 07	Harness Master Diagram	SOF-DWG-KT-6200.0.01, Issue 09
RD 08	CLA Fine Drive Cables and Lines	SOF-DWG-MG-4410.0.00, Issue --
RD 09	Oil Supply Specification	SOF-SPE-MG-3130.0.01, Issue 03
RD 10	Thermal Subassembly Specification	SOF-SPE-MG-3400.0.01, Issue 02
RD 11	TA EMC Control Plan	SOF-PLA-KT-6000.0.01, Issue 02
RD 12	TA Cable List	SOF-LIS-KT-6200.0.01, Issue 03
RD 13	ICD TA_AS_10 Aircraft Cabin / Telescope Assembly Envelope	SOF_DF_ICD_SE03-017
RD 14	ICD TA-MCCS-P, Telescope to MCCS Physical Interface	SOF-DA-ICD-SE03-048
RD 15	Global 05 SOFIA Coordinate System	
RD 16	ICD MCCS_SI_05, Principal Investigator Patch Panel to Principal Investigator Equipment Rack(s)	SOF-AR-ICD-SE03-2029
RD 17	SOFIA Science Instrument System Specification	SOF-AR-SPE-SE01-2028
RD 18	ICD SI_CWR_01, Science Instrument Equipment to Counterweight Rack	SOF-AR-ICD-SE03-2027

4 Interface Requirements

All the cables including Science Instrument (SI) cables, hoses and vacuum lines from AS routings run over the Cable Load Alleviator. The cables are routed over the CLA Coarse Drive and along the CLA Fine Drive.

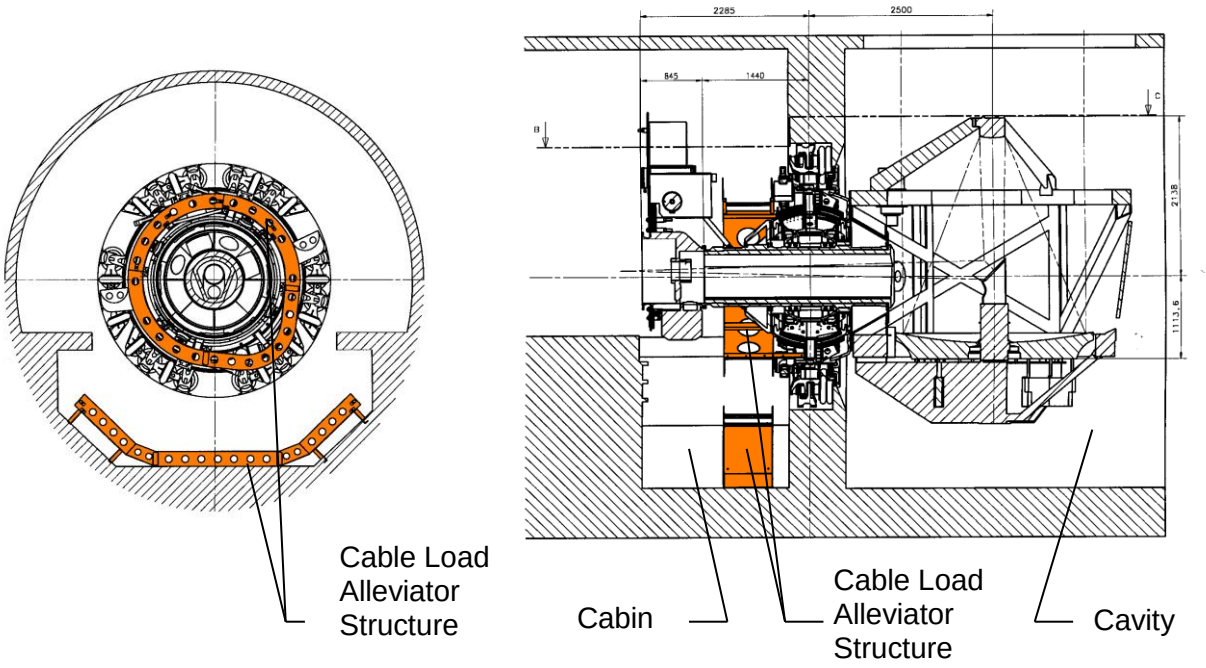


Figure 1: Cable Load Alleviator Location

4.1 Physical

4.1.1 Arrangement of the Cable Load Alleviator (CLA)

The arrangement of the Cable Load Alleviator device is shown in the documents RD 05 and RD 02.

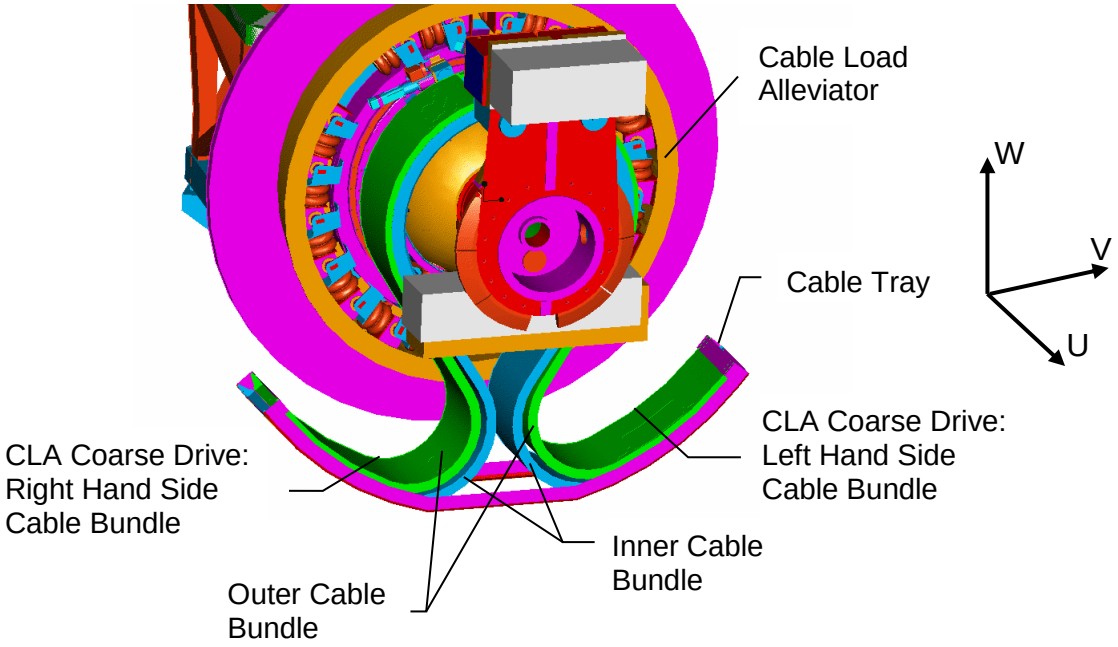


Figure 2: Cable Load Alleviator with Cable Bundles

A right hand and a left hand cable bundle runs free from the Cable Load Alleviator to the Cable Tray. The cable and line arrangement from the bundles are shown in the following Figure 3 and Figure 4.

The strain relievers on the Cable Tray have to be only disconnected on the left side completely to allow TA rotation to its 180°-maintenance position and <15° position (see RD 02 – Chapter 4.2.1 CLA Motion).

Loads on the strain relievers are presented in RD 02.
The dimensions of the alleviator are shown in the drawing SOF-DWG-MG-4400.0.00 (RD 05).

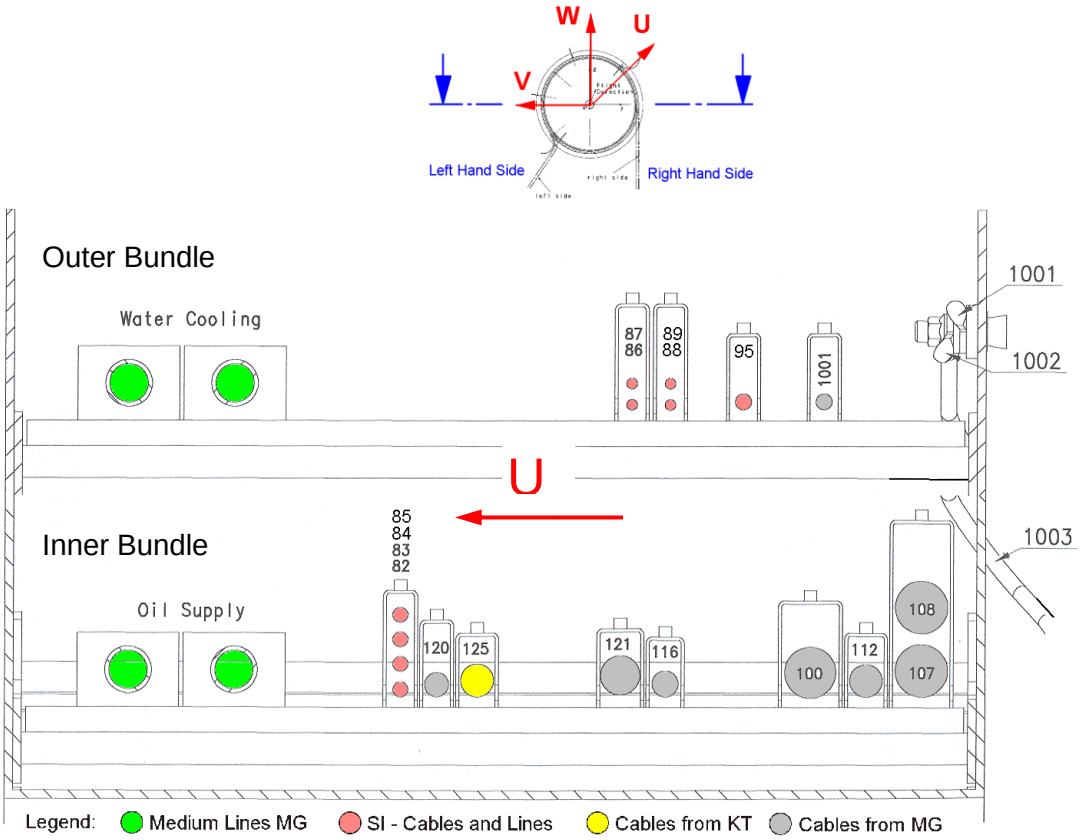


Figure 3: Right Hand Cable Bundle (Power and Medium Lines)

[To be refreshed once new cable for J132 is routed]

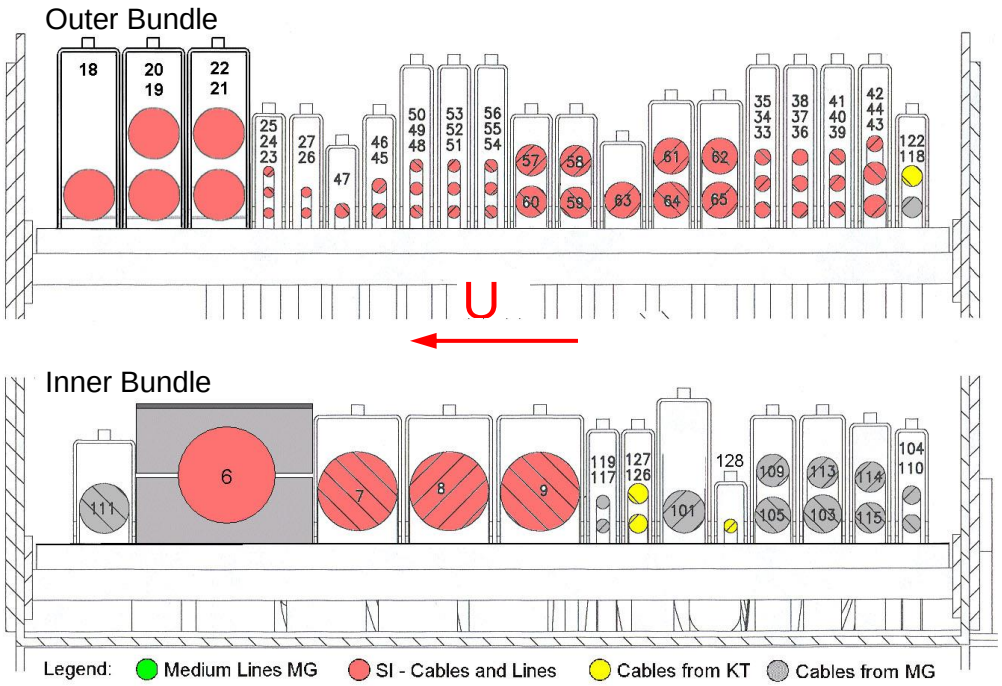


Figure 4: Left Hand Cable Bundle (Signal Lines)

Legend for Figure 3 and 4:

No	J No.	Cable ID
6		SI ∅47 Blower Line
7		SI ∅42 Vacuum Line
8		SI ∅42 Vacuum Line
9		SI ∅42 Vacuum Line
18	J80-J85	SI Fiber Optic
19	J86-J91	SI Fiber Optic
20	J92-J97	SI Fiber Optic
21	J98-J103	SI Fiber Optic
22	J104-J109	SI Fiber Optic
23	J70	SI Coax 50Ω
24	J71	SI Coax 50Ω
25	J72	SI Coax 50Ω
26	J73	SI Coax 50Ω
27	J74	SI Coax 50Ω
~~28-32~~		deleted, see Table 1 (1a)
33	J60	0UQ01Q01504.0-T/V
34	J61	0UQ01Q01504.0-T/V
35	J62	0UQ01Q01504.0-T/V
36	J63	0UQ01Q01504.0-T/V
37	J64	0UQ01Q01504.0-T/V
38	J65	0UQ01Q01504.0-T/V
39	J66	0UQ01Q01504.0-T/V
40	J67	0UQ01Q01504.0-T/V
41	J68	0UQ01Q01504.0-T/V
42	J69	0UQ01Q01504.0-T/V
43	J110	SI Vermillion 20SB4x22-25
44	J111	SI Vermillion 20SB4x22-25
45	J112	SI Video 75Ω
46	**J113**	SI Video 75Ω
47	**J114**	SI Video 75Ω

No	J No.	Cable ID
48	J115	SI Triax ECS
49	J116	SI Triax ECS
50	J117	SI Triax ECS
51	J118	SI Triax ECS
52	J119	SI Triax ECS
53	J120	SI Triax ECS
54	J121	SI Triax ECS
55	J122	SI Triax ECS
56	J123	SI Triax ECS
57		SI Cooling Line
58		SI Cooling Line
59		SI Cooling Line
60		SI Cooling Line
61	J75	SI Twisted Pair 20SB10x22-25
62	J76	SI Twisted Pair 20SB10x22-25
63	J77	SI Twisted Pair 20SB10x22-25
64	J78	SI Twisted Pair 20SB10x22-25
65	J79	SI Twisted Pair 20SB10x22-25
82	J128	SI Power Cable (AWG #12 TSP), 2 KVA max. power, 230 VAC max. voltage [Table 1 (10a)]
83	J129	
84	J130	
85	J131	
TBD	J132	SI Power Cable (AWG #8 TSP), 3.5 KVA max. power, 230 VAC max. voltage [Table 1 (10b)]
86	J124	SI 10 kV
87	J125	SI 10 kV
88	J126	SI 10 kV
89	J127	SI 10 kV
90		SI 10 kV/added s. Tab.1 (9) (Delete per telecon 7 March)
~~88-92~~		deleted, see Tab. 1 (8)
95		SI – Grounding / added
100	J400	CP-100-G
101	J401	CD-101-G

No	J No.	Cable ID
~~102~~		Deleted
103	J403	CP-103-G
104	J404	CP-104-G
105	J405	CPD-105-G
107	J407	CPD-107-G
108	J408	CP-108-G
109	J409	CPD-109-G
110	J410	CPD-110-G
111	J411	CPD-111-G
112	J412	CP-112-G
113	J413	CPD-113-G
114	J414	CPD-114-G
115	J415	CPD-115-G
116	J416	CP-116-G
117	J417	CD-117-G
118	J418	CD-118-G
119	J419	CP-119-G
120	J420	CP-120-G
121	J421	CP-121-G
122		CD-122-,123,-124,-129-G
125		CP-125-G
126		CP-126-G
127		CP-127-G
128		CP-128-G
1001	BPU1	Grounding CG-1001
1002		Grounding CG-1002
1003		Grounding CG-1003

The left hand bundle (see Figure 4) contains all the Signal Lines and the right hand bundle (see Figure 3) all the Power and Medium Lines. The Lines for Science Instrument (SI) are generally included in the outer cable bundles. The SI Blower Lines (stainless with braid) are contained in the left hand inner cable bundle. The SI-Grounding is separated from the TA-Grounding. All Panels have a Grounding Bolt (see **Figure 6**) for grounding and bonding the panel carrier. **Figure 5** shows a scheme for the CLA Grounding.

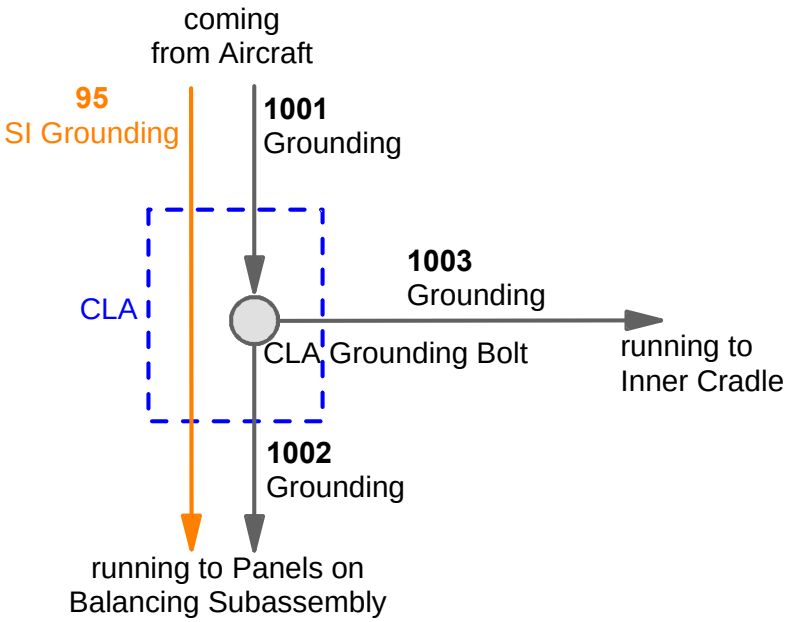


Figure 5: Grounding Scheme CLA

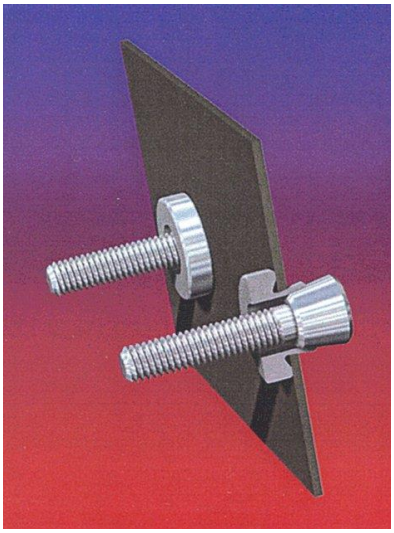


Figure 6: Grounding Bolt

Strain relievers (see Figure 7 and Figure 8) on the CLA, the Cable tray and the Aircraft System hold the cables and lines.

The arrangement of the SI cables and lines within the cable bundles is presented in Figure 3, Figure 4 and in RD 03.

The cable routing is shown in RD 03 and RD 08.

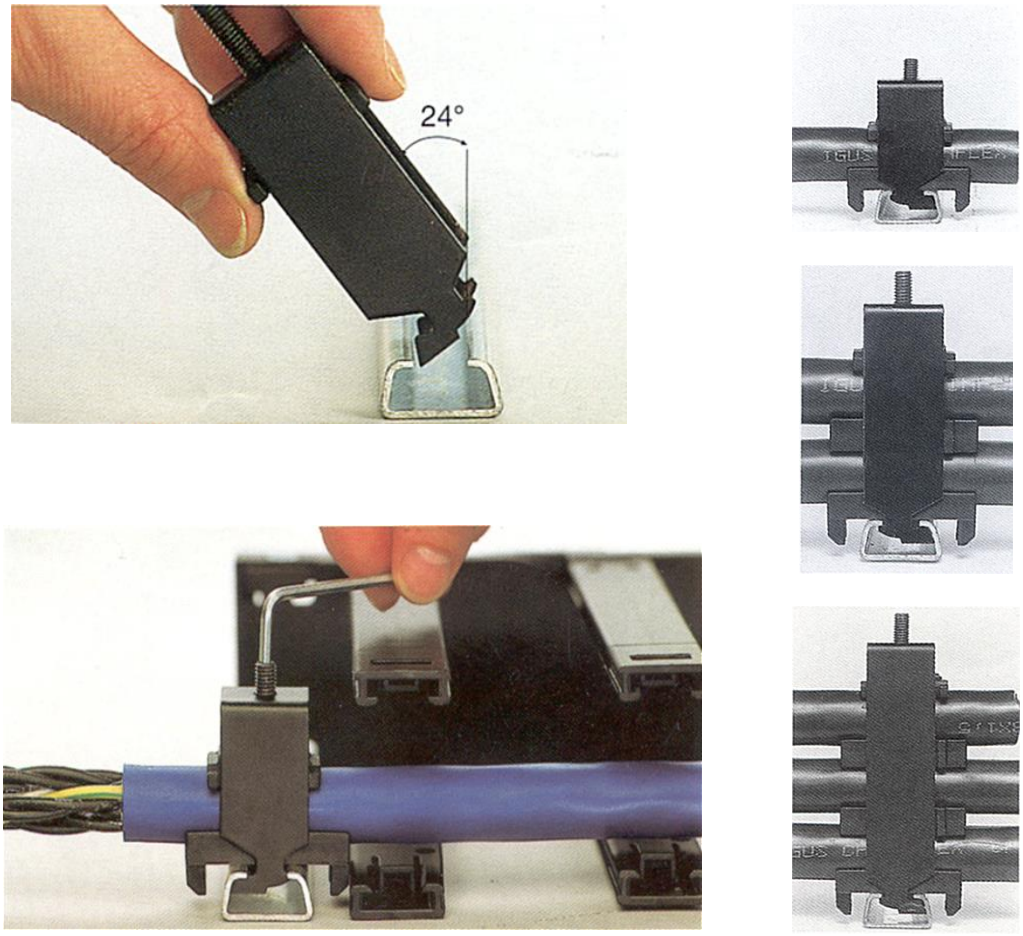


Figure 7: Cable Clamps for Power and Signal Lines

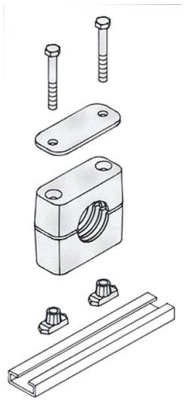


Figure 8: Cable Clamp for Medium Lines

The total cable length from the Aircraft Connector Panels to the Power and Signal Patch Panels on the Balancing Subassembly is for the

- Power Lines (right hand cable bundle) about 15 m (590.55 inch),
- Signal Lines (left hand cable bundles) about 15 m (590.55 inch).

The length from the Patch Panels on the Balancing Subassembly to the Science Instrument has to be added.

4.1.2 Cable Routing CLA / Flange Assembly

All the cables and lines from the Aircraft System to the moving part of the Telescope are routed via the CLA-Cable Tray and the CLA, over the Coarse Drive and the Fine Drive from the CLA to the separate systems.

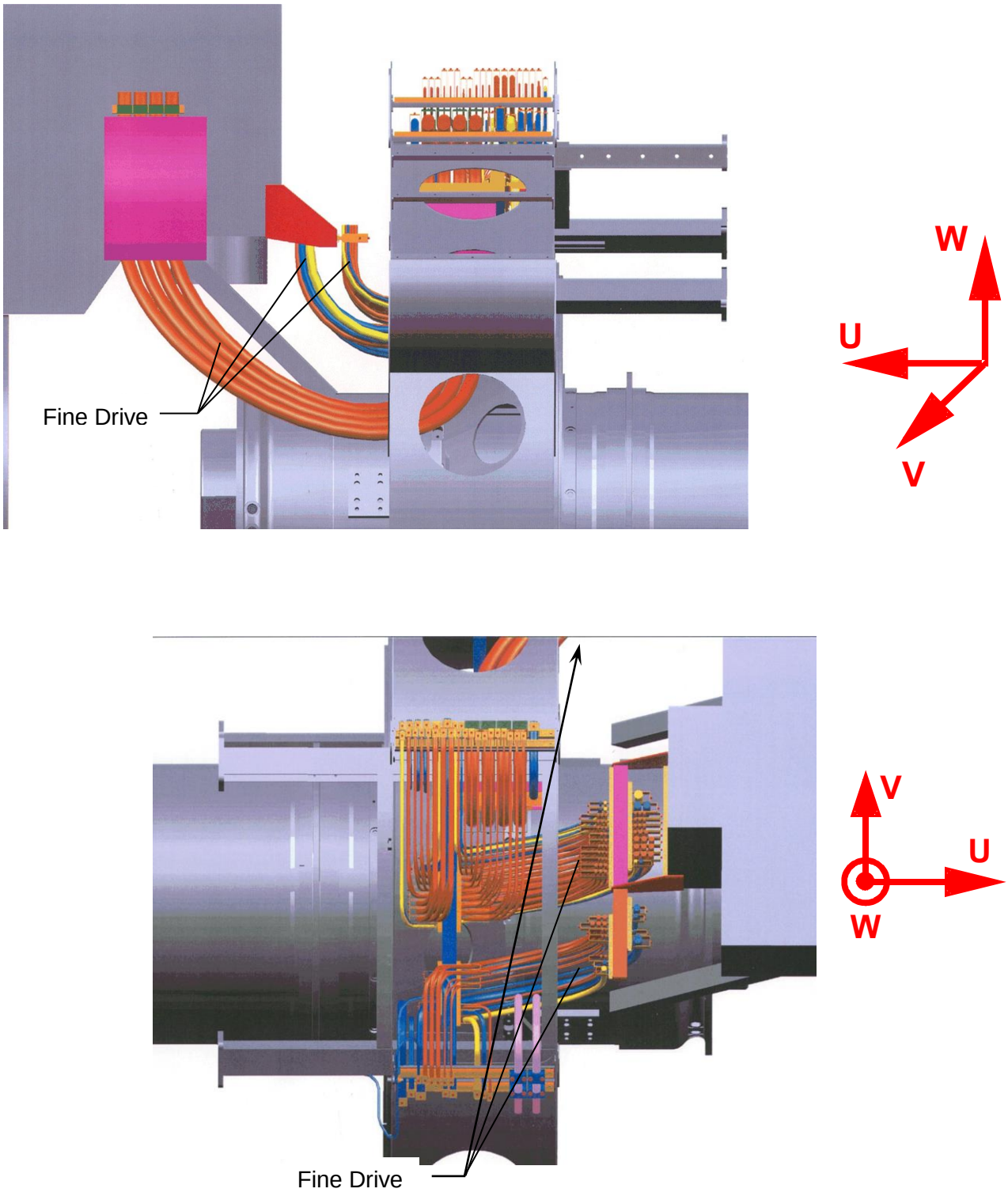


Figure 9: Fine Drive Cable Routing

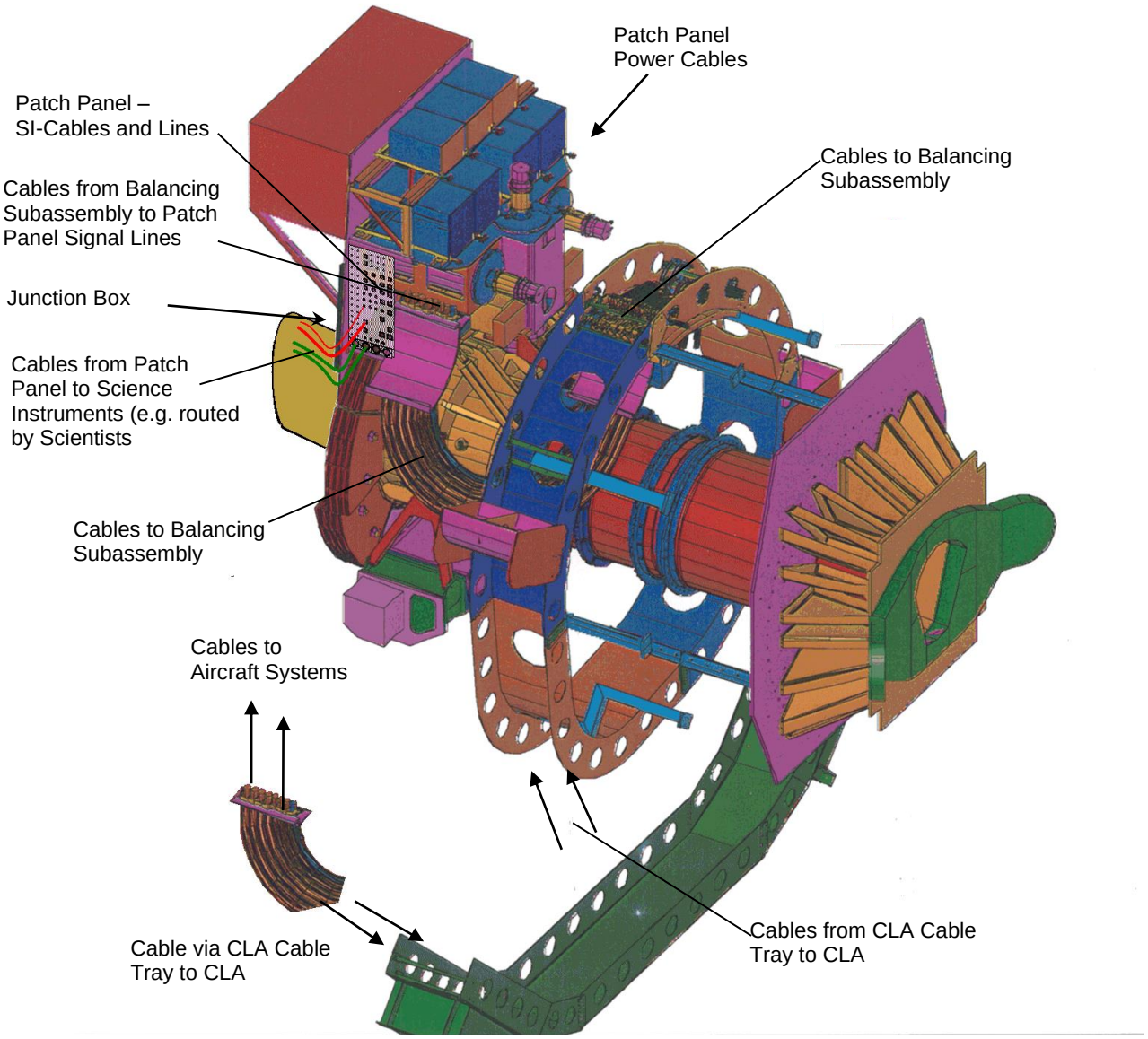


Figure 10: Cable Routing Aircraft System to Science Instrument with Signal Cables

The SI-Cables and Lines run from the Panel on the Aircraft System (designed by USRA – see RD 14) over the CLA-Coarse Drive and the CLA-Fine Drive (see Figure 9) to the Patch Panels (see Figure 13 and Figure 14 - number and size of connectors see Table 1: SI Cable and Connector Specification for TA_SI_01) located on the Balancing Subassembly. From there the SI-Cables and Lines are routed to the Science Instrument. The Power Cables run analogous to the Signal Lines from the Patch Panel on the Aircraft System to the Science Instrument.
All the cables and lines could be connected and disconnected on the Patch Panels by connectors (see Table 1: SI Cable and Connector Specification for TA_SI_01 and following pages).

4.1.3 SI-Patch Panels and Connector Fixations

All Patch Panels are made of a panel carrier, the connector plates and the connectors. The material for the panel carrier and for non isolated connector plates is aluminium. Each Power and Signal Panel from Science Instrument and Telescope Assembly are separated according EMC design specification AD 04.
The Blower and Vacuum Lines have a separated fixation with strain relievers (see Figure 8 and Figure 10). The material of these strain relievers is aluminium for the clamp part and steel for all other parts.
The vacuum and exhaust blower lines are electrically isolated from the SI Patch Panel, CLA cable clamps, and TA. USRA will provide the electrical insulating sleeve sections on the hoses where the hoses are to be clamped in the CLA. However, the TA-C, must provide the electrical isolation up at the SI Patch Panel and TA.

4.1.3.1 Panel fixation and Isolation

The SI Power- and Signal Panels will be isolated to the Balancing Structure. They will be isolated fixed on an beams and isolated screwed on the Balancer Main Plate (see Figure 11: Science Instrument Panel Isolation scheme).

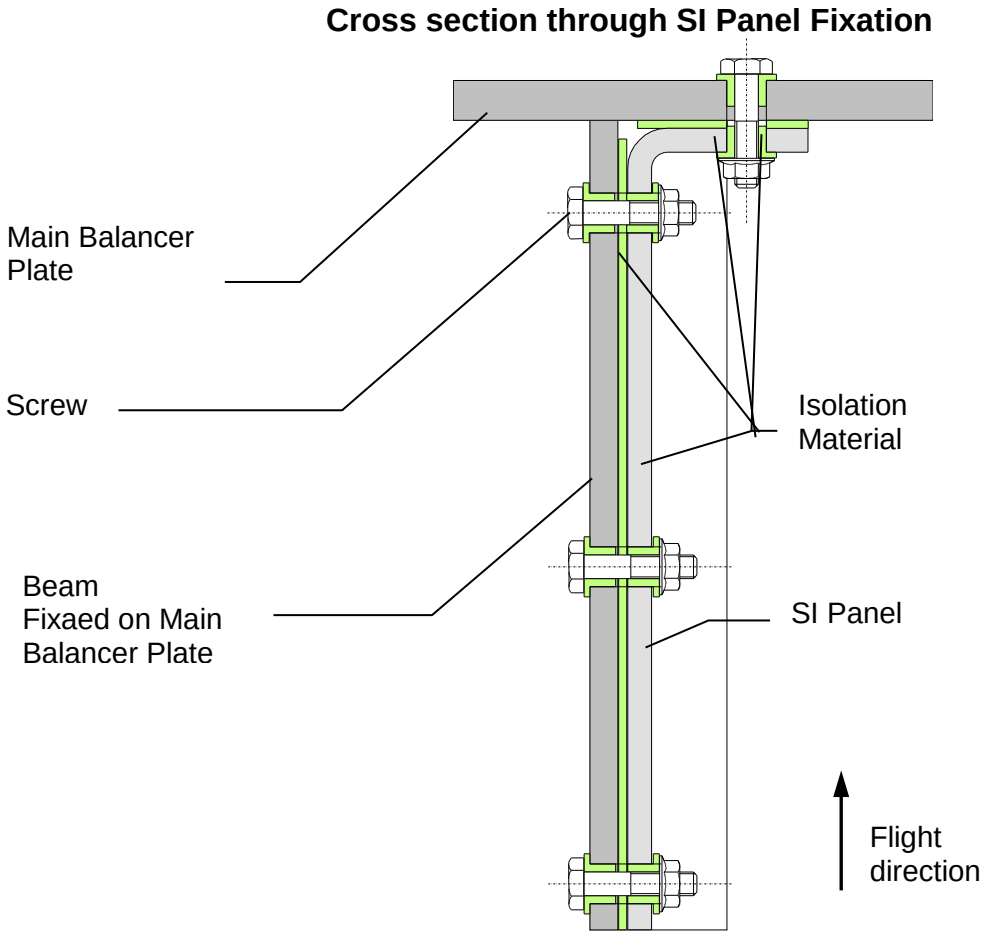


Figure 11: Science Instrument Panel Isolation scheme

On the SI-Signal Panel are the connectors for Signal Lines SF 104 PEM isolated with the Connector Plates against the Patch Panel Carrier. For this connectors are the connector plates from an isolated material (see Figure 12: Connector Fixation). The Reynolds 178-6053 (10kV) lines must be mounted in an electrically insulating panel, as are the SF 104 PEM lines.

4.1.3.2 Connector fixation

All connectors are fixed on the relevant Power- or Signal Patch Panel carrier. Each connector type has a different panel thickness for fixation. Therefore the Patch Panel is made of a carrier frame with a constant thickness. Connector plates that group connectors for specific cable types are attached to the carrier frame. The thickness specifications for these connector plates is itemized in Table 1. Connector plates that are made of conductive material are electrically connected to the carrier frame. For example: all Vermillion type connectors are screwed with four screws with nuts; these Vermillion type connector shells are electrically connected to the connector plate, and all Trompeter type connectors are screwed directly with nuts on a separate connector plate.

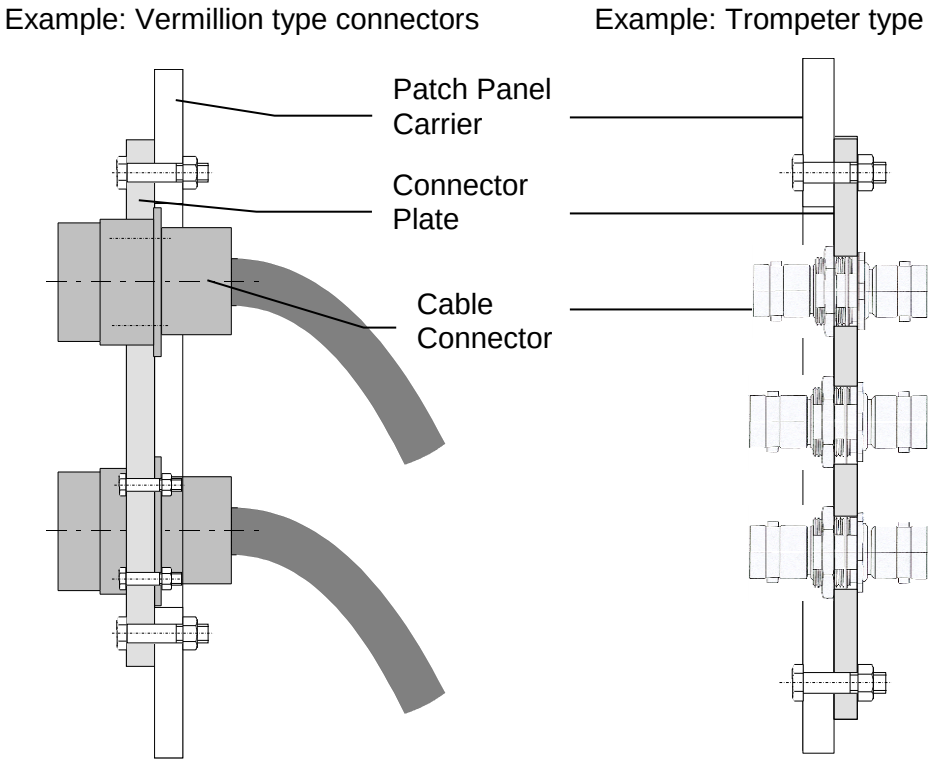


Figure 12: Connector Fixation

4.1.3.3 U402 and U403 Panel Function

Two panels located on the TA are available for PI use for routing power and signal between TA-mounted SI electronics and Panel U400 of the PI Patch Panel. The two patch panels are each connected to Panel U400 by cables routed underneath the aircraft main deck floor and through the Cable Load Alleviator. The Power SI Patch Panel (U402) provides connections to cables designated for power transmission.

The Signal SI Patch Panel (U403) provides connections to cables designated for signal and data transmission. The position of each panel in respect to the aircraft reference frame depends on the angle at which the TA is elevated. At 90-degree TA elevation, Panel U402 faces the right side of the aircraft and Panel U403 faces the left side of the aircraft.

The PI shall provide all jumper cable assemblies used to route power between Panel U402 and TA-mounted SI equipment. SI connectors that interface with U402 bulkhead connectors shall use the mating connector part numbers (or equivalents) as listed in Table 1-A. The contact assignments for SI connectors that interface with Panel U402 shall be as listed in RD 16, Tables 15-18.

The PI shall provide all jumper cable assemblies to route signals between Panel U403 and TA-mounted SI equipment. SI connectors that interface with U403 bulkhead connectors shall use the mating connector part numbers (or equivalents) as listed in Table 1-B. The contact assignments for SI connectors that interface with Panel U403 shall be as listed in RD 16, Tables 8-14.

4.1.3.4 Panel U402 Connector Layout

Figure 13-A shows the connector layout of Panel U402.

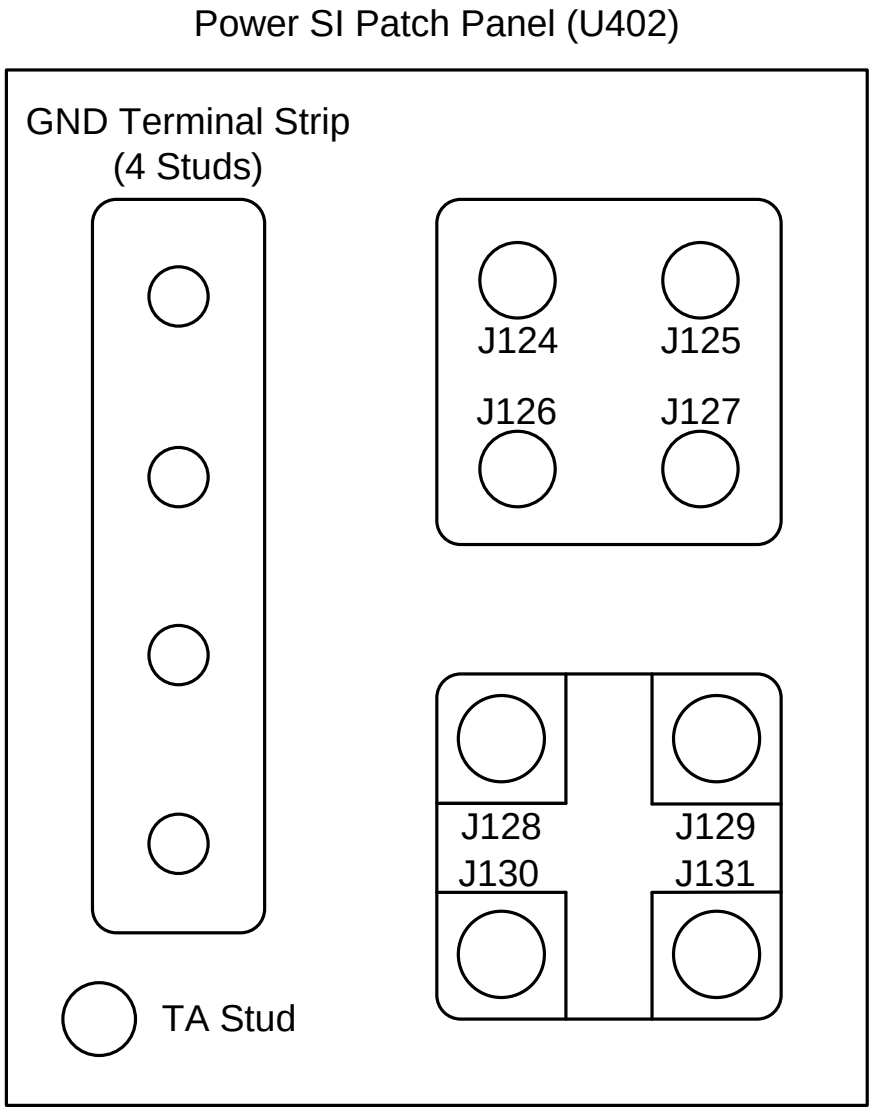


Figure 13-A: Panel U402 Connector Layout. (For reference only)

[To be refreshed once panel is updated to accommodate new J132 connector]

Figure 13-B shows a photograph of Panel U402.

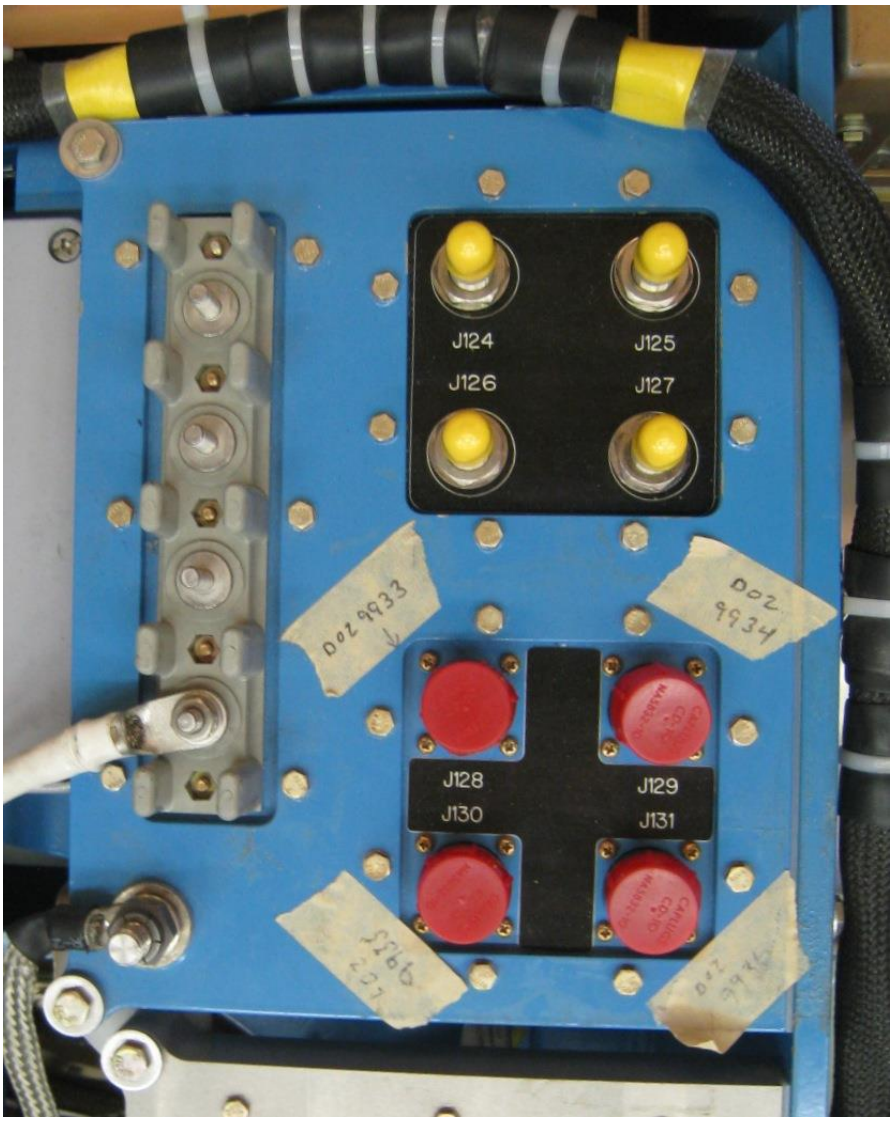


Figure 13-B: Panel U402 Photograph. (For reference only – April 2010)

[To be refreshed once panel is updated to accommodate new J132 connector]

4.1.3.5 Panel U402 Connector Details

Table 1-A lists the connector information for Panel U402. The table provides the following information: Cable reference designator number, Bulkhead Connector ID, Cable function, SI Patch Panel (bulkhead) connector part number, and Mating (SI cable) connector part number.

Connectors J128 through J131 are distinctly keyed to prevent misconnection.

Table 1-A: Panel U402 Connector Details

Panel Reference Designator	Cable Reference Designator	Bulkhead Connector ID	Function	Bulkhead Connector P/N	SI Mating P/N
U402	DOZ9929J	J124	High Voltage Cable (10 kV)	167-9096	167-4535
U402	DOZ9930J	J125	High Voltage Cable (10 kV)	167-9096	167-4535
U402	DOZ9931J	J126	High Voltage Cable (10 kV)	167-9096	167-4535
U402	DOZ9932J	J127	High Voltage Cable (10 kV)	167-9096	167-4535
U402	DOZ9933J	J128	SI Power Cable (AWG 12 TSP), 2 KVA max. power, 230 VAC max. voltage	M83723/71W1404N	M83723/76W1404N
U402	DOZ9934J	J129	SI Power Cable (AWG 12 TSP), 2 KVA max. power, 230 VAC max. voltage	M83723/71W14046	M83723/76W14046
U402	DOZ9935J	J130	SI Power Cable (AWG 12 TSP), 2 KVA max. power, 230 VAC max. voltage	M83723/71W14047	M83723/76W14047
U402	DOZ9936J	J131	SI Power Cable (AWG 12 TSP), 2 KVA max. power, 230 VAC max. voltage	M83723/71W14048	M83723/76W14048
U402	*[TBS by Platform Project]*	J132	SI Power Cable (AWG #8), 3.5 KVA max. power, 230 VAC max. voltage	MS3450W20-19S	MS3459W20-19P [1]
U402	DOZ9938B	N/A	Ground Terminal Strip (1/4"-28 UNF-2A stud)	MS27212-3-4	MS20659-109 (SAE-AS20659-109) ring lug terminal

Note:

[1] MS3456 plug may be substituted for specified (preferred) MS3459 plug for this application. The rationale and allowance for this connector-series substitution is for installed connectors that are easily accessible and operate in vibration and temperature environments which are considered benign.

4.1.3.6 SI Assembly Grounding

Panel U402 includes provisions for electrical safety grounding of TA-mounted SI equipment.

The resistance between the SI assembly and the U402 ground terminal strip shall be no greater than 10 mΩ (0.010 ohms). Per RD 17, para. 3.5.4.2 and Table 3.5-4, the SI assembly shall provide a designated test point (or grounding lug) with which this resistance measurement can be made. The Instrument Mounting Flange (IMF) is electrically grounded to aircraft ground, and it is anticipated that SI assemblies will

generally be grounded effectively via the structural / mechanical flange interface. Where necessary, a jumper cable assembly with a conductor no smaller than 6 AWG may be used to provide an electrical connection between the SI assembly and the U402 ground terminal strip (note that higher AWG numbers represent smaller conductors).

The PI shall provide any needed jumper cable assembly used between the SI assembly and the U402 ground terminal strip. The part number of the U402 ground terminal strip and the mating SI cable connector (ring terminal) are defined in Table 1-A. Refer to RD 17, paragraphs 3.5.4.2 and 3.5.4.3, for grounding requirements applicable to exposed, conductive surfaces of the SI assembly.

A ground cable assembly provided and installed by NASA, will be used ground the conductive CWR structure to the Panel U402 ground terminal strip. Refer to RD 18, section 3.3, for details of the CWR ground cable assembly.

4.1.3.7 Panel U403 Connector Layout

Figure 14-A shows the connector layout of Panel U402.

Signal SI Patch Panel (U403)

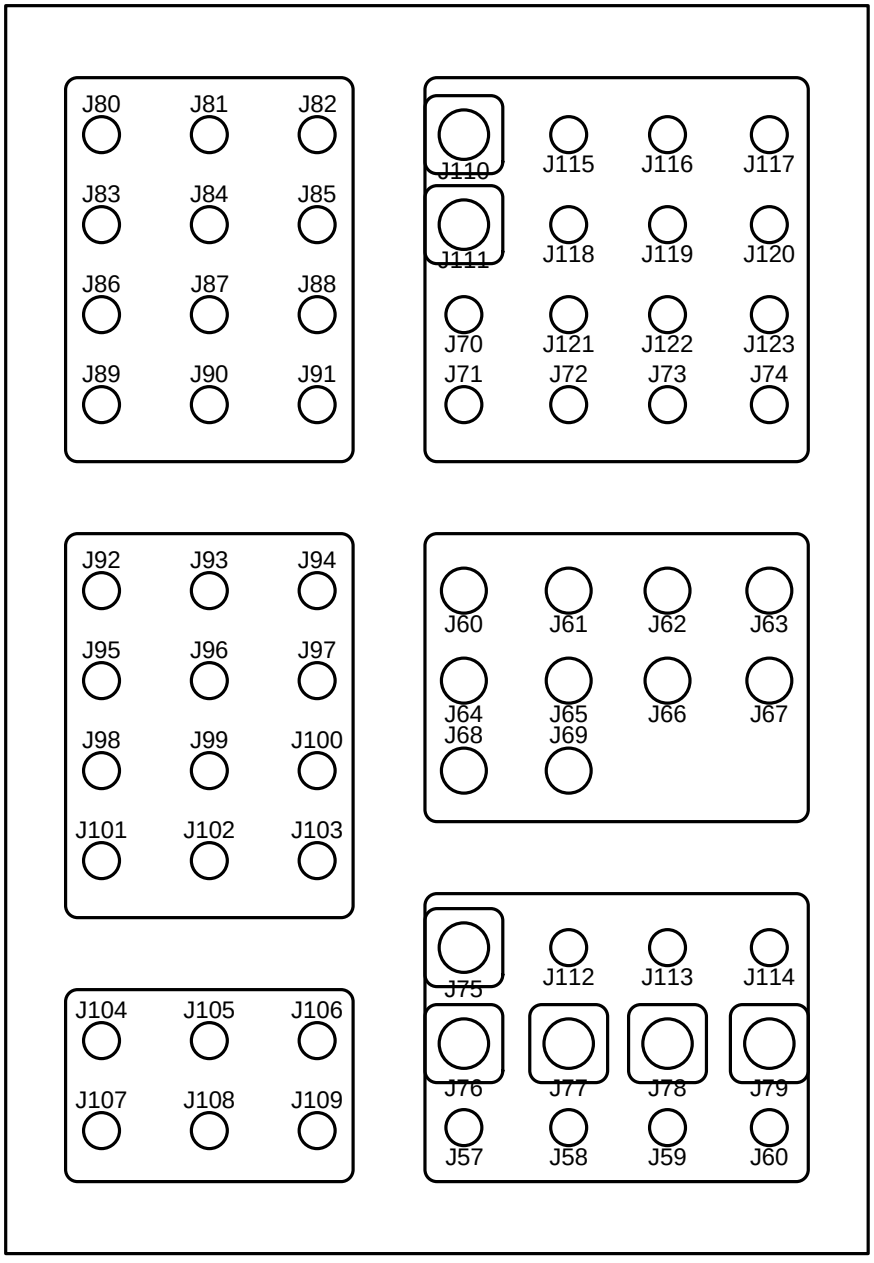


Figure 14-A: Panel U403 Connector Layout

(For reference only)

Panel U403 shows two connectors with the same bulkhead connector ID (J60). The J60 line is for 50Ω Coax. 4 SI Cooling Lines (Table 1 IDs 57 ~ 60) are mislabeled on Panel U403 as J57 ~ J60.

Figure 14-B shows a photograph of Panel U403.

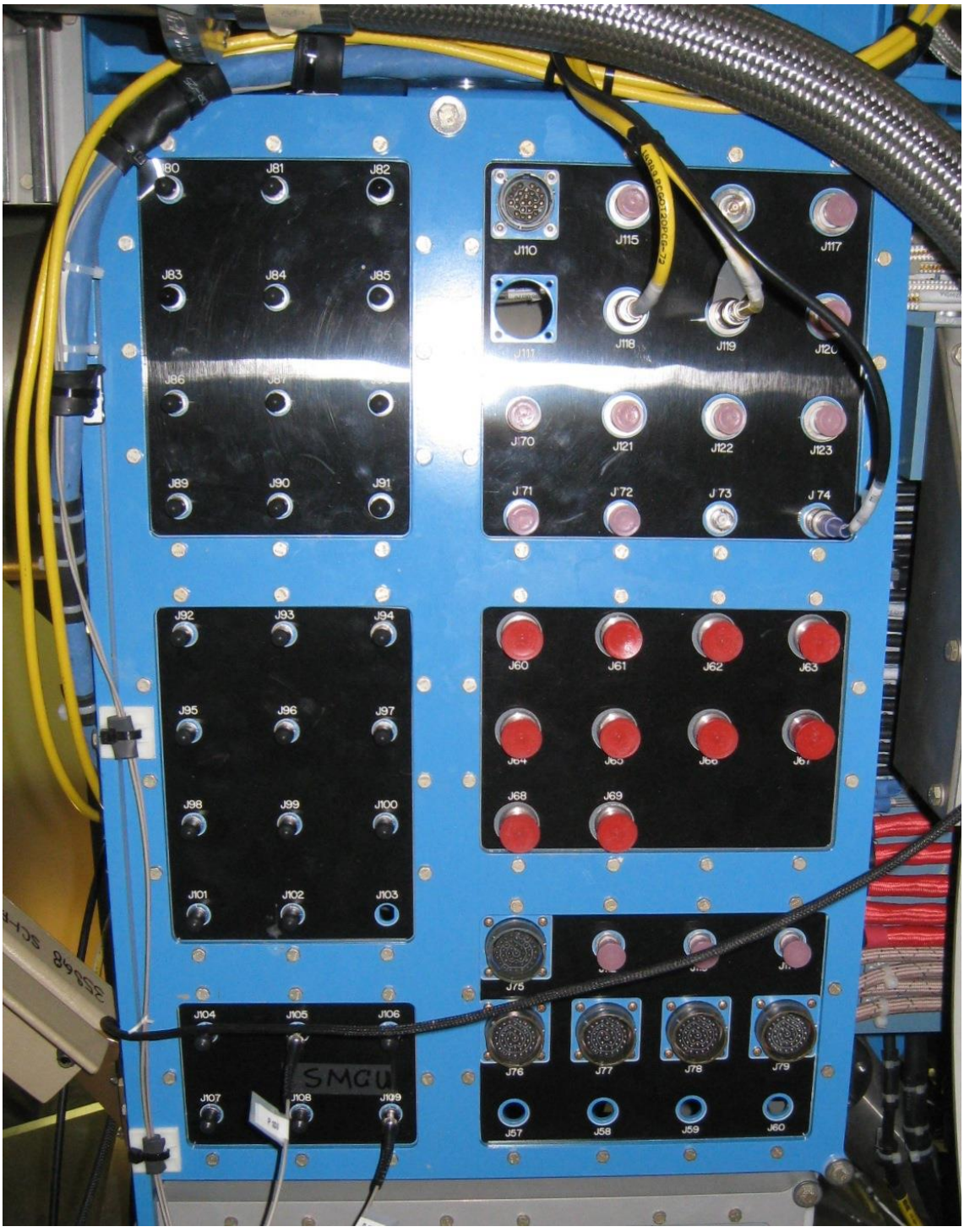


Figure 14-B: Panel U403 Photograph

(For reference only – April 2010, J103 and J111 not installed when picture was taken)
Panel U403 shows two connectors with the same bulkhead connector ID (J60). The J60 line is for 50Ω Coax. 4 SI Cooling Lines (Table 1 IDs 57 ~ 60) are mislabeled on Panel U403 as J57 ~ J60.

4.1.3.8 Panel U403 Connector Details

Table 1-B lists the connector information for the connectors of Panel U403. The table includes: Cable Reference Designator, SI Connector Reference Number, Cable Identification, SI Patch Panel (bulkhead) Connector Part Number, and Mating (SI cable) Connector Part Number.

Connectors J75-J79 and J110-J111 are keyed to prevent misconnection.

The PI shall use the designated emergency power shutdown pins on U403-J79 to shutdown any TA-mounted UPS whenever the Emergency Power Disconnect (EPD) signal is enabled. The pin assignment for U400/U403-J79 is listed in RD 16, Table 12. Refer to RD 16, section 3.2.1.1 and 3.2.2.3 for further details about the EPD-signal routing scheme.

Table 1-B: Panel U403 Connector Details

Panel Reference Designator	Cable Reference Designator	Bulkhead Connector ID	Function	Bulkhead Connector P/N	SI Mating P/N
U403	DOZ9865	J60	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9866	J61	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9867	J62	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9868	J63	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9869	J64	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9870	J65	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9871	J66	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9872	J67	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9873	J68	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9874	J69	50-ohm Coax	34N-50-0-51	Precision N-Type male, 18 GHz, 50Ω
U403	DOZ9875	J70	50-ohm Coax	BJ28	PL220-024 (50Ω BNC)
U403	DOZ9876	J71	50-ohm Coax	BJ28	PL220-024 (50Ω BNC)
U403	DOZ9877	J72	50-ohm Coax	BJ28	PL220-024 (50Ω BNC)
U403	DOZ9878	J73	50-ohm Coax	BJ28	PL220-024 (50Ω BNC)
U403	DOZ9879	J74	50-ohm Coax	BJ28	PL220-024 (50Ω BNC)

Panel Reference Designator	Cable Reference Designator	Bulkhead Connector ID	Function	Bulkhead Connector P/N	SI Mating P/N
U403	DOZ9880J	J75	AWG #20 Twisted-Shielded Pair	M83723/71W2041N	M83723/76W2041N
U403	DOZ9881J	J76	AWG #20 Twisted-Shielded Pair	M83723/71W20416	M83723/76W20416
U403	DOZ9882J	J77	AWG #20 Twisted-Shielded Pair	M83723/71W20417	M83723/76W20417
U403	DOZ9883J	J78	AWG #20 Twisted-Shielded Pair	M83723/71W20418	M83723/76W20418
U403	DOZ9884J	J79	AWG #20 Twisted-Shielded Pair	M83723/71W20419	M83723/76W20419
U403	DOZ9885	J80	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9886	J81	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9887	J82	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9888	J83	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9889	J84	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9890	J85	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9891	J86	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9892	J87	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9893	J88	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9894	J89	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9895	J90	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9896	J91	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX

Panel Reference Designator	Cable Reference Designator	Bulkhead Connector ID	Function	Bulkhead Connector P/N	SI Mating P/N
U403	DOZ9897	J92	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9898	J93	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9899	J94	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9900	J95	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9901	J96	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9902	J97	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9903	J98	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9904	J99	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9905	J100	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9906	J101	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9907	J102	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9908	J103	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9909	J104	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9910	J105	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9911	J106	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9912	J107	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9913	J108	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX

Panel Reference Designator	Cable Reference Designator	Bulkhead Connector ID	Function	Bulkhead Connector P/N	SI Mating P/N
U403	DOZ9914	J109	62.5 µm/multimode Fiber	M83522/17-NY	M83522/16-DNX
U403	DOZ9915J	J110	RS422 Twisted-Shielded Pairs	M83723/71W1624N	M83723/76W1624N
U403	DOZ9916J	J111	RS422 Twisted-Shielded Pairs	M83723/71W16246	M83723/76W16246
U403	DOZ9917	J112	75-ohm Coax	UBJ28	UPL220-024 (75Ω BNC)
U403	DOZ9918	J113	75-ohm Coax	UBJ28	UPL220-024 (75Ω BNC)
U403	DOZ9919	J114	75-ohm Coax	UBJ28	UPL220-024 (75Ω BNC)
U403	DOZ9920	J115	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9921	J116	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9922	J117	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9923	J118	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9924	J119	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9925	J120	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9926	J121	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9927	J122	50-ohm Triax	BJ73	PL75C-306
U403	DOZ9928	J123	50-ohm Triax	BJ73	PL75C-306

4.1.4 Types and Numbers of Cables and Lines

MT-I-cables and KT-cables are listed with all parameters in document RD 06. SI-cables and lines are listed in Table 1. MT-I-Media Lines are listed in Table 2.
Datasheets of cables, lines and connectors for Science Instrument see chapter 6 Annex 1.

Science Instruments using the cooling lines between the SI Patch Panel (U403) and the L/H aircraft CLA disconnect panel should provide a synthetic rubber hose type MIL 8794-4 in accordance with MIL-DTL-8794F with a 37° flare adapter type MS24587-4 end fitting (see Figure A 12).

Cable Type	OD (mm)	R_{min} (mm)	Weight (kg/m)	Connector Size (mm) *	Patch Panel Connector	Mates with	# needed	Thickness Connector Plate (mm)
Signal Lines 1. 0UQ01Q01504.0-T/V *** W. L. Gore & Associates	7.7	25.4	0.147	16 see Figure A 1	18 GHz 34N-50-0-51 Huber+Suhner	Precision N-Type male, 18 GHz, 50Ω	10	12
1a. Coax - AFC-240-UF Times μwave	6.1	20	0.067	12.7 see Figure A 2	BJ28 (50Ω) Trompeter	Std 50Ω BNC	5	4
2. Twisted Pair Vermillion 20SB 10x22-25 5x(20x20AWG)	17.2	170	0.335	36. 5 square see Figure A 3	Mil-C-83723 Series III Shell Size 20	Mil-C-83723	5	4 **
3. Fibre Optic Brand-Rex	9.2	82	0.1	8.03 x 3.16 see Figure A 4	Mil-C-83522/17-NY Lucent/FSI	Mil-C-83522/16-DNX Std ST Type	5 bundles (30fibres) 30 conn	2
Comm Lines 4. Vermillion 20SB4x22-25 2x (8x20AWG)	10.9	71.1	0.146	31.75 square see Figure A 5	Mil-C-83723 Series III Shell Size 16	Mil-C-83723 Series III	2	4 **
5. LAN (a) see 3	see 3	see 3	see 3	see 3	see Figure A 4	Std ST Type	see 3	see 3
6. Video 75Ω LMR-240-75 Times μwave	6.1	20	0.063	12.7 see Figure A 6	UBJ28 (75Ω) Trompeter	Std 75 Ohm	3	4
7. Triax ECS 322001 rev C	5.99	31	0.085	12.7 see Figure A 7	BJ73 Trompeter	PL75C-306 Trompeter	9	3,5
Power Lines 8. Twisted Pair	Del.	Del.	Del.	Deleted	Deleted	Deleted	Deleted	
9. 10 KV Lines Reynolds 167-2669	5.0	76	0.057	12.9 see Figure A 8	167-9096 Reynolds	167-4535 Reynolds	4	7
10a. SI Power, 2 KVA max. power, 230 VAC max. voltage M27500G12SD2T23 or M22759/34-12-9 (AWG #12 TSP)	5.87	58.7	0.083	34.1 (square) see Figure A 10	Mil-C-83723 Series III Shell Size 14 J128, J129, J130, J131	Mil-C-83723 Series III Plug	4 cables (4 conn)	4 **
10b. SI Power, 3.5 KVA max. power, 230 VAC max. voltage M22759/34-8-9 (AWG #8 TSP)				38.1 (square) see Figure A 10	MS3450W20-19S J132	MS3459W20-19P	1 cable (1 conn)	
11. Vacuum Line 1.25“ ID Chemfluor PTFE	41.28	140	1.042	KF Adaptor	KF-40 Flange	KF-40 Flange	3	
11a. Blower Line 1.5" ID TeleFlex	47	191	1.324	KF Adaptor	KF-40 Flange	KF-40 Flange	1	--
12. **SI Cooling Lines** Hydraflow HS89-04	10.6 (nom.)	13	0.07	17.5 see Figure A 12	MS21923-4 see Figure A 12	Synthetic rubber hose type MIL 8794-4 in accordance with MIL-DTL-8749F with a 37° flare adapter type MS24587-7 end fitting (see Figure A 12)	4	--

Cable Type	OD (mm)	R_{min} (mm)	Weight (kg/m)	Connector Size (mm) *	Patch Panel Connector	Mates with	# needed	Thickness Connector Plate (mm)
13 SI-Grounding Dearborn Standard Copper 8002RT30 (AWG #2) Bentley-Harris sleeving #5111001332S	13	100	0.31	See Figure A 13	1/4"-28 UNF-2A grounding stud on MS27212-3-4 / SAE AS27212-3-4 Terminal Strip	MS20659-109 (SAE-AS20659-109) ring lug terminal	1	
Total							57	

* The figures listed here are only valid for the data sheets in ANNEX 1

** Max. Panel thickness = complete thickness (from Data sheet) minus 2mm screw head height (for screw M3)

*** Cable assemblies must be custom ordered to specified length, where 504.0 represents cable length in inches to the nearest tenth inch, and -T/V specifies a thermal vacuum application

Table 1: SI Cable and Connector Specification for TA_SI_01

	SOURCE			CABLE		DESTINATION			Mechanical Data			Electrical Data										
	Device ID	Connector	Connector Type ♘	Cable ID ⊗	Cable Type ⊕	Device ID	Connector	Connector Type ♘	Cable ID ⊗	Approx. Weight	Approx. Diam.	Signal Description	A	B	D	P	S	E	Voltage	Current cont/pk	Freq.	Remarks
BD Motors Power	CLA_EndPan (+CLAXNDRI)	J400	MS27656T-25F29SB	CP-100-G ♈	8x(3x*16*TS)S	Patch Panel Power	J4101 J4201 J4301 J4401	MS27656T-17F8SN 17F8SA 19F11SN 19F11SA	CP-100-G ♈	976g/m	24.03 mm	BD Servo Motors Power +Brakes				X X			150V 24VDC	3/6A	16kHz✪	4x62W 4x10W
BD Motors Sync.	CLA_EndPan (+CLAXNDLO)	J401	MS27656T-19F35SN	CD-101-G ♈	4x(14x*24*TS)S	Patch Panel Signal	J4102 J4202 J4302 J4402	MS27656T-13F35SN 13F35SA 13F35SB 13F35SC	CD-101-G ♈	800 g/m	20.43 mm	BD Encoders/Commut.		X					<10V	<0.2A	-	
SCC_CAN-a	CLA_EndPan (+CLAXNDLO	J404	MS27656T-11F5SA	CPD-104-G ♈	((2x*26*TS)spec.+	NECS_1.1 (+P2A11)	J1191	MS27656T-11F5PN	CPD-104G ♈	96g/m	8.79mm	CAN-Bus + DC-Supply (NECS)			X	X			24VDC	2A		(120Ω 50pF 1MHz)
ATCU <> TASCU	CLA_EndPan (+CLAXNDLI)	J418 J458	ST Adapter 2523-11	CD-118-G ♈	2xFiberOptic	ATCU +F1A13	J4280 J4281	ST Adapter 2523-11	CD-118-G ♈	100g/m	<10	Ethernet(FiberOptic)			X				n/a	n/a	n/a	
PPms-Signal	CLA_EndPan (+CLAXNDLI)	J417	BNC ♀ (50Ω) ¥	CD-117-G ♈	Coaxial RG/U 316	ATCU +F1A13	J4241	BNC ♀ (50Ω)	CD-117-G ♈	150g/m	~6.5mm	Time Strobe		X				X	≤5V	<0.1A	1kHz	
FDTQ1	CLA_EndPan (+CLAXNDRI)	J407	MS27656T-25F29SN	CP-107-G ♈	3x(3x(3x*16TS*)S)S	FDTQ UO1.1 FDTQ VO1.1 FDTQ VO2.1	J1821 J1841 J1941	MS27656T-17F8PN 17F8PN 17F8PN	CP-107-G ♈	871g/m	24.65/ 8.82mm	FDTQ Servo Power 1 (U1/V1/V2)				X			150V	22,5/45 A	16kHz ✪	
FDTQ2	CLA_EndPan (+CLAXNDRI)	J408	MS27656T-25F29SA	CP-108-G ♈	3x(3x(3x*16TS*)S)S	FDTQ UO2.1 FDTQ WO1.1 FDTQ WO2.1	J1921 J1861 J1961	MS27656T-17F8PN 17F8PA 17F8PA	CP-108-G ♈	871g/m	24.65/ 8.82mm	FDTQ Servo Power 2 (U2/W1/W2)				X			150V	22,5/45 A	16kHz✪	
FD_Brakes	CLA_EndPan (+CLAXNDLO	J403	MS27656T-15F18SN	CP-103-G ♈	(8x(2x*20*TS)S	Brake Valves FD_YB1..8	J1121..28	8x Kostal M27 ♂	CP-103-G ♈	436g/m	18.31 mm	FD Brakes (Solenoid Valves)				X			24VDC	1.5/5A	n/a	
SPS1..3	CLA_EndPan (+CLAXNDLO	J410	MS27656T-11F5SN	CPD-110-G ♈	(2x*26TS*)spec.+ (2x20TS)S	SPS1 (+P8A01)	J1591	MS27656T-11F5PN	CPD-110-G ♈	96g/m	8.79mm	CAN-Bus + DC-Supply (Spherical Sensors)			X	X			24VDC	<2A		
NT Fans	CLA_EndPan (+CLAXNDRI)	J416	MS27656T-13F98SN	CP-116-G ♈	2x(4x*20*TS)S	Patch Panel Power	J290	MS27656T-13F98PN	CP-116-G ♈	229g/m	12.2mm	NT Fan Motors				X			200V3~	<2A	400Hz	

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

	SOURCE			CABLE		DESTINATION			Mechanical Data			Electrical Data										
	Device ID	Connector	Connector Type ⋊	Cable ID ⊗	Cable Type ⊕	Device ID	Connector	Connector Type ⋊	Cable ID ⊗	Approx. Weight	Approx. Diam.	Signal Description	A	B	D	P	S	E	Voltage	Current cont/pk	Freq.	Remarks
RIS_RP1/2 Ret.Pumps Mot.	CLA_EndPan (+CLAXNDRI)	J412	MS27656T-19F11SN	CP-112-G ♈	(2x(4x*16*)S)S	RP1 RP2	J1101 J1201	2XAEGA052MR04001250000	CP-112-G ♈	307g/m	15.22 mm	Pump Servo Drives Power			X X				280V	<10A	16kHz✪	
RIS_RP1/2 Ret.Pumps Aux.	CLA_EndPan (+CLAXNDRI)	J411	MS27656T-13F35SN	CD-111-G ♈	2x(4x(2x*24*TS))S	RP1 RP2	J1102 J1202	2XBEGA089MR130000002000	CD-111-G ♈	491g/m	24.07 mm	Pump Servo Drives Aux.	X X	X X					<24V	<0.2A		
RIS_Valves RIA_Val1.._Val4	CLA_EndPan (+CLAXNDLO)	J413	MS27656T-17F26SN	CPD-113-G ♈	(4x(6x*22*)S)S	Mot.Valves 1 Mot.Valves 2 Mot.Valves 3 Mot.Valves 4	J1211 J1212 J1213 J1214	HAN10E HAN10E HAN10E Bürkert 4	CPD-113-G ♈	432g/m	15.98 mm	Motor Valves (4x)		X X X X		X X X X			24VDC	1.5/3A		Incl. Limit Switches
Gap Sensors 1..4	CLA_EndPan (+CLAXNDLI)	J415	MS27656-T13F35SB	CPD-115-G ♈	4x(4x*22*TS)S	GS Panel (+P2XND1..4)	J176x (x=1..4)	4x MS27656T	CPD-115-G ♈	322g/m	14.6mm		X					X	<10V	<0.2		
Gap Sensors 5..8	CLA_EndPan (+CLAXNDLI)	J414	MS27656T-13F35SA	CPD-114-G ♈	4x(4x*22*TS)S	Bulkhead (+V2XND)	J1760	GLEN999Y13-35PN	CPD-114-G ♈	322g/m	14.6mm		X					X	<10V	<0.2		
Flange Rack POWER1	CLA_EndPan (+CLAXNDRI)	J421	MS27656T-21F16SN	CP-121-G ♈	(2x(5x*16*)S+(3x20)S)S	TCM F1A21 FCM F1A23 SMCU F1A22	J4411 J4511 J4311	MS27656T-17F8PN 17F8PN 11F98PN	CP-121-G ♈	450g/m	18.3mm	Power Supply to SMA Drive Units				X			200V	<10A	400Hz	
Flange Rack POWER2	CLA_EndPan (+CLAXNDR	J420	MS27656T-13F8SN	CP-120-G ♈	(3x20)S	ATCU F1A24	J4211	MS27656T-11F98PN	CP-120-G ♈	170g/m	11.3mm	Power Supply to Control Units				X			115V	<10A	60Hz	
GROUNDING	CLA_EndPan (+CLAXNDR	BPU1	LUG	CG-1001 ♈	150-405	CLA	G1XG01:1	LUG	CG-1001 ♈	100g/m	10mm²	Primary TA Grounding							0V	n/a	n/a	
IRIG-B	CLA_EndPan (+CLAXNDLI)	J419	BNC ♀ (50Ω)	CP-119-G ♈	Coax 50Ω RG/U 316 MIL-C-17	+F1A22 (SMCU)	J4371	BNC ♀ (50Ω)	CP-119-G ♈	150g/m	~6.5mm	Time code Signal			X				<10V	<0.1A	-	
SMCU <>TAMCP	CLA_EndPan (+CLAXNDLI)	J422 J423	ST Adapter 2523-11	CD-129-G ♈	2xFiberOptic	+F1A22 (SMCU)	J4380 J4381	ST Adapter 2523-11	CD-129-G ♈	100g/m	<10	Ethernet (FiberOptic)			X				N/a	n/a	n/a	

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

	SOURCE			CABLE		DESTINATION			Mechanical Data			Electrical Data										
	Device ID	Connector	Connector Type ⋉	Cable ID ⊗	Cable Type ⊕	Device ID	Connector	Connector Type ⋉	Cable ID ⊗	Approx. Weight	Approx. Diam.	Signal Description	A	B	D	P	S	E	Voltage	Current cont/pk	Freq.	Remarks
Sensor Supply + Safety - Cabin Cr.	CLA_EndPan (+CLAXNDLO)	J405	MS27656T-15F35SN	CPD-105-G ♈	(5x(6x22)S)S	P7XC31(B14) P6XC42(B15) P6XC52(B17) P3XC44(B16) P3XC51(B12)	J1341 J1351 J1371 J1361 J1323	MS27656T-9F35PN 9F35PN 9F35PN 9F35PN 9F35PN	CPD-105-G ♈	587g/m	17.3mm	FDTQ Temp. Sensors FD Hardstops/BrakeSens RIA Level Sensors RIA Pocket Pressure		X X		X X X X X	X X		24V DC	n/a	n/a	Sensor Supply and Hardwired Interlocks
Sensor Supply + Safety - Cav. Cr.	CLA_EndPan (+CLAXNDLO	J409	MS27656T-15F35SA	CPD-109-G ♈	(4x(6x22)S)S	Bulkhead (+V2XND)	J1300	GLEN999Y 15-35PN	CPD-109-G ♈	490g/m	15.7mm			X		X	X		24V DC	<0.5A	n/a	Sensor Supply and Hardwired Interlocks
Grounding (Flange Rack)	CLA	G1XG01:2	LUG	CG-1002	150-405	Flange Assembly	F1XG01:1	LUG	CG-1002	100g/m	10mm²								N/a	n/a	n/a	
Grounding (Cab. Inner Cradle)	CLA	G1XG01:3	LUG	CG-1003	150-405	Inner Cradle	V1XG01:1	LUG	CG-1003	100g/m	10mm²								N/a	n/a	n/a	
Grounding (Gyro Unit)	Flange Assembly	F1XG01:2	LUG	CG-1004	150-405	GYSU C1A01	C1A01:1	LUG	CG-1004	100g/m	10mm²								N/a	n/a	n/a	
Grounding (Cab. outerCr.Bulkhea	CLA_EndPan (+CLAXNDR	BPU1	LUG	CG-1005	150-405	Outer Cradle	V1XG02:1	LUG	CG-1005	100g/m	10mm²								n/a	n/a	n/a	

Remark: Grounding CG-1002 and CG-1003 runs not over the Coarse Drive Loop; CG-1003 runs not over the Fine Drive Loop
This table is a part from RD 06.

Table 2: MT Cable and Connector Specification

Cable ID	Source			Destination			Mecanical Data		Electrical Data			Remarks
	Device ID	Connector	Connector Typ	Device ID	Connector	Connector Typ	Mass [g/m]	Diameter [mm]	Voltage [V]	Current [A]	Frequency [Hz]	
CD-122-G 1)	FPI Controller	P129	2566-2 ST Ruggedized	CLA U4	P440	2566-2 ST Ruggedized	1.3	3	-		-	fiber imager data
CD-123-G 1)	FFI Controller	P132	2566-2 ST Ruggedized	CLA U4	P441	2566-2 ST Ruggedized	27.3	3	-		-	fiber imager data
CD-124-G 1)	WFI Controller	P135	2566-2 ST Ruggedized	CLA U4	P442	2566-2 ST Ruggedized	27.3	3	-		-	fiber imager data
CD-126-G	CLA U4	P444	MS 27467-T-11 F 35PN	IMCC	P141 (P444)	see other parts list		8				CAN bus
CD-126-G	CLA U4	P444	MS 27467-T-11 F 35PN	PPCC	P161	FU 25 P7	213.2	8				CAN bus
CP-125-G	CLA U1	P443	MS 27467-T-17 F 26PN	FPI Controller	P127	MS 27467-T-09 F 35SN		12	115		60	Power Controller
CP-125-G	CLA U1	P443	MS 27467-T-17 F 26PN	FW NT Panel	P103 (P443)	see other parts list		12	115		60	Power Controller
CP-125-G	CLA U1	P443	MS 27467-T-17 F 26PN	GRHA	P172	FU 09 S7	504.4	12	115		60	Power Controller
CP-125-G	CLA U1	P443	MS 27467-T-17 F 26PN	WFI Controller	P133	MS 27467-T-09 F 35SN		12	115		60	Power Controller
CP-125-G	CLA U1	P443	MS 27467-T-17 F 26PN	FFI Controller	P130	MS 27467-T-09 F 35SN		12	115		60	Power Controller
CP-127-G	CLA U4	P445	MS 27467-T-21 F 11PN	PPCC	P160	FU 09 S7		9	28		-	controller power
CP-127-G	CLA U4	P445	MS 27467-T-21 F 11PN	IMCC	P140	FU 09 S7	296.4	9	28		-	controller power
CP-127-G	CLA U4	P445	MS 27467-T-21 F 11PN	AMPM	P150 (P445)	see other parts list		9	28		-	controller power
CP-128-G							41.6	4				Dummy

Remark: 1) Cable CD122-G, CD123-G, CD124-G; CD129-G (Table 2) is bundled in one cable with diameter ~10mm
Cables and Connectors with dimensions and weight from Kayser-Threde are listed in RD 12

Table 3: KT Cables and Connectors

Medium Type	OD (mm)	R_{min} (mm)	Weight** (kg/m)	Connector Size (mm)	Comments *	# needed
Water Cooling Supply	36.1	187.4	1.8	see RD 10	hoses	1
Water Cooling Return	36.1	187.4	1.8	see RD 10	hoses	1
Oil Supply	36.1	187.4	1.8	see RD 09	hoses	1
Oil Return	36.1	187.4	1.8	see RD 09	hoses	1
TOTAL						4

* all TA Media Lines are fixed mounted with pipes on the CLA. For Coarse Drive Loop are hoses used
** all TA Media Lines are filled

Table 4: TA Media Lines

4.1.5 Location of Mounting Points

All the cables and Lines including Sciences Instrument cables and lines are hold by Strain Relievers or Connectors at the following positions (see Figure 15 and Figure 16)

- Connector Board
  (designed by Raytheon – refer to RD 02 and RD 14)
- Aircraft
  refer to RD 02
- CLA Cable Tray
  refer to RD 02
- CLA
  (see detailed figure “Balancing and CLA”)
- Balancing
- Patch Panels Balancing

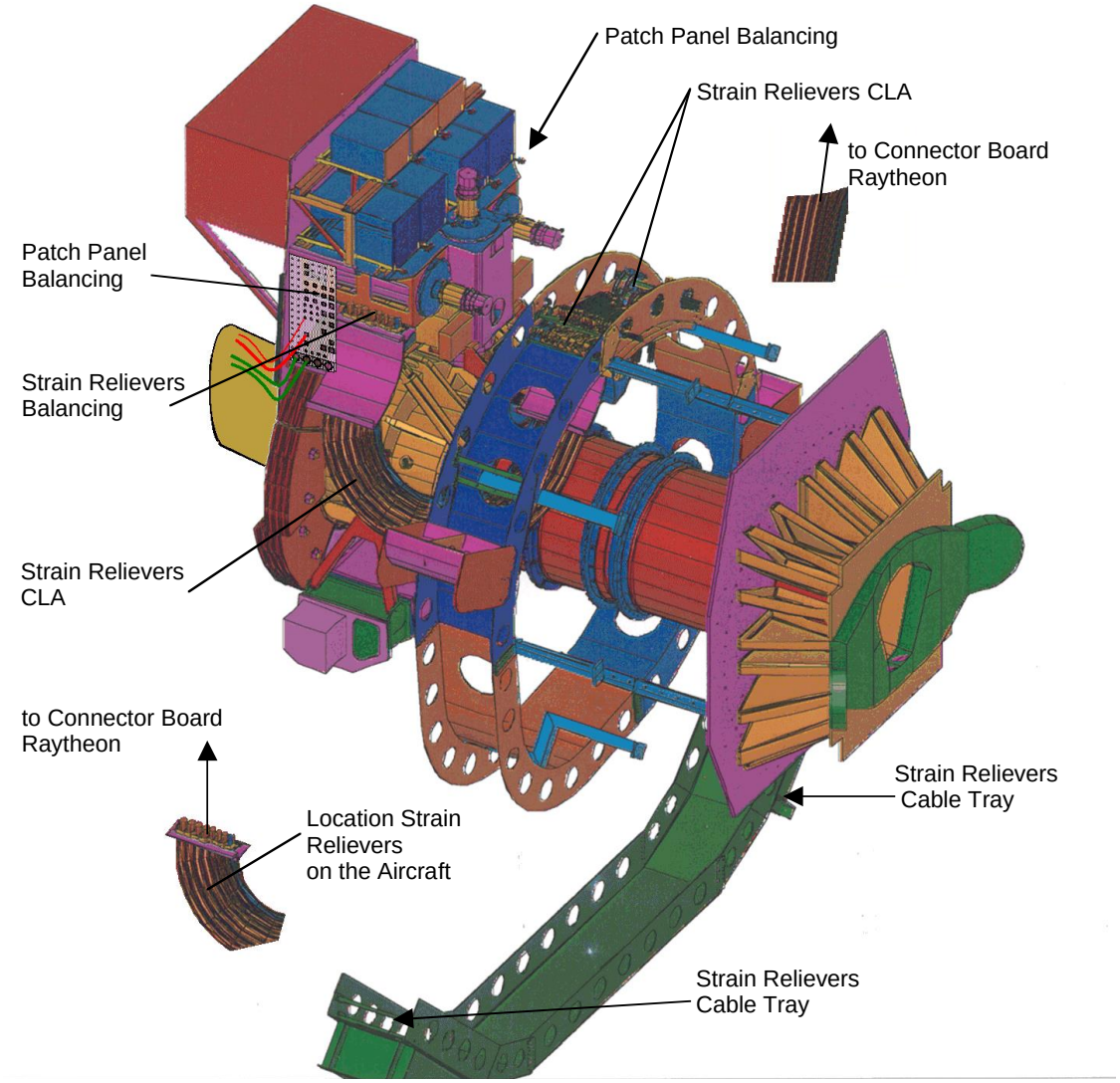


Figure 15: Location of Mounting Points

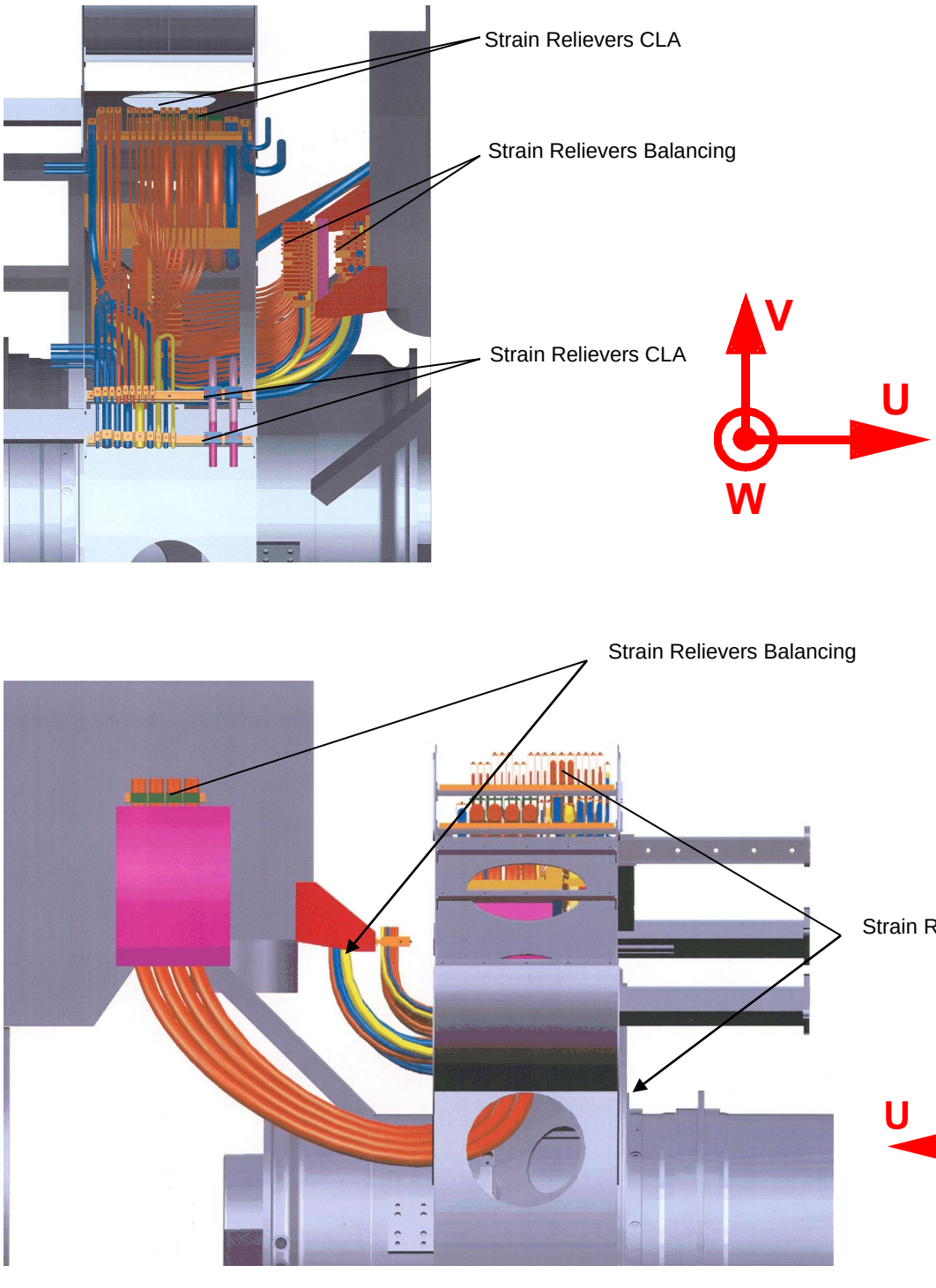


Figure 16: Mounting Points - Balancing and CLA

4.1.6 Dynamic Loads

The dynamic loads for the strain relievers on the aircraft and the Cable tray are shown in RD 02.

4.2 Responsibilities

A Table of Responsibilities for SI-Cables, -Lines and Connectors is also shown in RD 02

Supplying SI cables, -lines and -hoses and the connectors for these cables, including those mounted in the Patch Panels on the Balancing Subassembly, and those that connect with the Aircraft System Patch Panel.	USRA
USRA shall supply the TA-C with cables, -lines and -hoses of 15 m (590.55 inch) in length with connectors installed on the side connecting to the Patch Panel on the Balancing Subassembly. The connectors that connect with the Aircraft System Patch Panel will not be attached until JAITV.	USRA
TA-C is responsible for the Patch Panel on the Balancing Subassembly and the electrical isolation for the Patch Panel.	TA-C
TA-C is responsible for installing the SI cables in CLA and installing the panel mount connectors in the Patch Panel at the Balancing Subassembly if the connectors and couplers are attached on the cables and lines. This activity will be done during YAITV at Waco	TA-C (depending on contract change)
Delivery and Mounting of SI Cables Connectors and SI-Hoses Connectors on the Cables and Lines	USRA

4.3 Environmental

Temperature:	operating cabin exposure cabin	5°C.... 35°C -40°C... +70°C
Shockproof acc.:	MIL-Std 810E	
Humidity:		5 - 90 %

4.4 Safety

Cable plug connectors selected are standard bayonet or threaded style and are self-locking on installation. Selected panel mount connectors are secured via locking nut assemblies. Cutouts and assembly procedures for panel mount connectors are designed to positively prevent panel mount connector rotation during connection with external

cabling. Cable materials have been selected to be compliant with 14 CFR Part 25 (FAR Part 25). Pin/socket arrangement for each connecter has been selected according to general best engineering practices for aircraft wiring.

5 SRM & QA

5.1 Quality Assurance

Quality Assurance will verify each hardware interface to the drawing, and participate in testing by reviewing and verifying plans and procedures; witnessing tests; and approving reports in accordance with PD96100021-000 (PM21), for the USRA side of the ICD, and SOF-PLA-MG-0000.0.03, Safety, Reliability, Maintainability and Quality Assurance (SRM & QA) Plan, for the TA-C side of the ICD, respectively.

5.2 Safety

Cable plug connectors selected are standard bayonet or threaded style and are self-locking on installation. Selected panel mount connectors are secured via locking nut assemblies. Cutouts and assembly procedures for panel mount connectors are designed to positively prevent panel mount connector rotation during connection with external cabling. Cable materials have been selected to be compliant with 14 CFR Part 25 (FAR Part 25). Pin/socket arrangement for each connecter has been selected according to general best engineering practices for aircraft wiring.

This ICD does not contain interface design information attributed to the design control of hazards identified in PD96165004-000 (PA10-002, The Observatory Hazard Analysis).

5.3 Verification

Verification plan for this interface is documented in PM12, SOFIA Observatory Integration, Test and Verification Plan, for the USRA side of the ICD, and in SOFIA TA Verification Plan, SOF-PLA-MG-0000.0.13, for the TA-C side of the ICD, respectively.

6 Annex 1

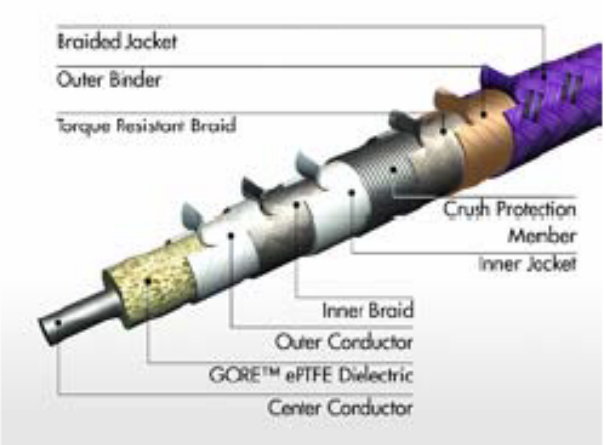
Datasheets of cables, lines and connectors for Science Instrument

Gore Cable Assembly Builder

Microwave Cable Part Number **0U**

W. L. Gore & Associates has developed and proven a wide range of products specifically tailored to the RF / microwave industry. Since 1976, when Gore first introduced our microwave assemblies, Gore has remained a worldwide leader in providing custom microwave assemblies for demanding applications. Typical applications using GORE & Microwave Assemblies include: test, aerospace, defense, telecommunications and general purpose. With an unmatched history in demanding environments, you may be assured that Gore will provide the reliable products necessary to meet your individual system requirements.

GORE™ Mini-CP Cable is internally ruggedized with excellent phase and amplitude stability. With the ruggedization designed into the cable, the assemblies have excellent durability while remaining exceptionally lightweight and flexible. The exceptional performance of mini-cp cable enables accurate and repeatable measurements while limiting the need to perform time consuming calibrations between measurements.



Specifications

Max Frequency GHz	18
Impedance Ohms	50
Center Conductor	Stranded
Dielectric Constant (nominal)	1.4
Velocity of Propagation	0.85
Temperature °C	-55 to 125
Nominal Outer Diameter in. (mm)	0.305 (7.7)
Minimum Bend Radius (multiple bends) in. (mm)	1 (25.4)
Nominal Weight g/ft (g/m)	45 (147.6)
Crush Resistance lb/linear in.	250
Bulk Cable Attentuation at 18 GHz dB/ft (dB/m)	0.40 (1.31)

Key Features

- Phase and amplitude stability
- Crush, torque and kink resistant
- Phase matching options
- Replaceable interface options/adapters

Key Benefits

- Longer calibration intervals
- Longer field-service life
- Suited for parallel or comparative measurements
- Reduced risk of assembly damage

Figure A 1

Ordering Information

To order a Special Purpose Test Assembly from Gore, select the part number needed (see Table 7 for part number details).

GORE® PHASEFLEX® Microwave RF/Test Assemblies are identified by a 12-character part number. This number designates the cable type, connector types, and assembly length:

1 2	3 4 5	6 7 8	9 10 11 .12
Cable Type	Connector A	Connector B	Assembly Length

Positions 1–2: See Tables 2 and 3 for the two-letter codes representing each cable type.

Positions 3–5 and 6–8: See Table 6 for the list of connectors available for each cable type. Connector codes A and B must be in alphanumeric order. Additionally, Gore offers an interface that can be used with replaceable connectors for 18 GHz cables (see Table 8).

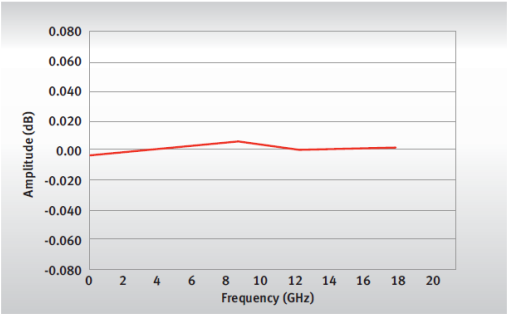
Positions 9–12: The length of the assembly is expressed in inches to the nearest tenth, including zeroes to fill positions if the length is less than three digits. For example, the length of a 24-inch test assembly is specified as 024.0 in the last four digits of the part number. Cables are available in standard lengths of 12 in (0.30 m), 24 in (0.61 m), 36 in (0.91 m), 48 in (1.22m), and 60 in (1.52 m).

The Gore Microwave/RF Assembly Builder is a step-by-step tool that allows you to configure and request a quote for a test assembly. For more information, visit **www.gore.com/rfcablebuilder**.

GORE® PHASEFLEX® Microwave/RF Test Assemblies are engineered to withstand the frequent torque, bending, and shaking common to test and manufacturing floor environments. These assemblies demonstrate excellent stability performance (see Figure 2).

GORE® PHASEFLEX® Microwave/RF Test Assemblies provide reliable electrical and mechanical performance for high throughput production test applications (see Table 4).

Figure 2: Typical Amplitude Stability with Flexure and Shake[1]



[1] Data is based on a 1 m (39.4 in) assembly.

Table 1: Test Assemblies with Guaranteed Phase and Amplitude Stability with Flexure[1]

Gore Cable Type	Phase Stability with Flexure (±°)		Amplitude Stability with Flexure (± dB)	
	Typical Value	Maximum Value	Typical Value	Maximum Value
0U	2.0	4.7	0.05	0.15

When cable is wrapped 360° around a 57 mm (2.25 in) radius mandrel.

Figure A 1

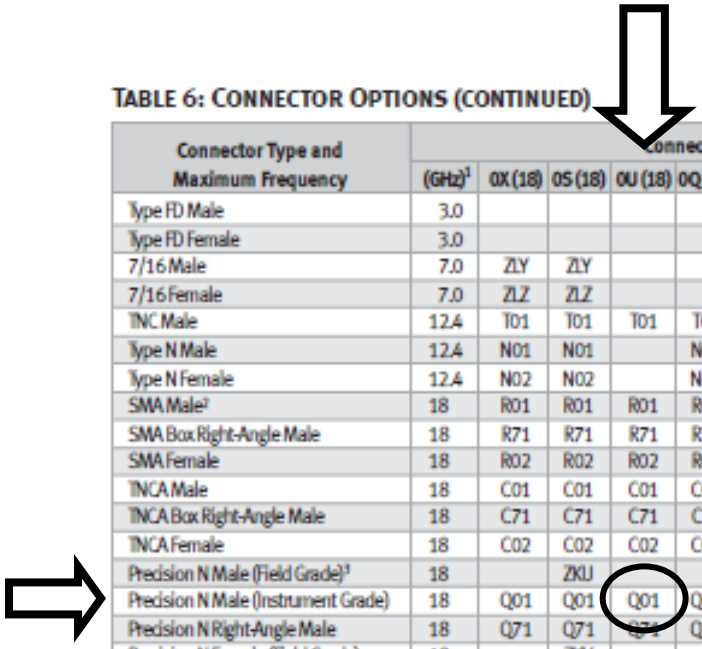


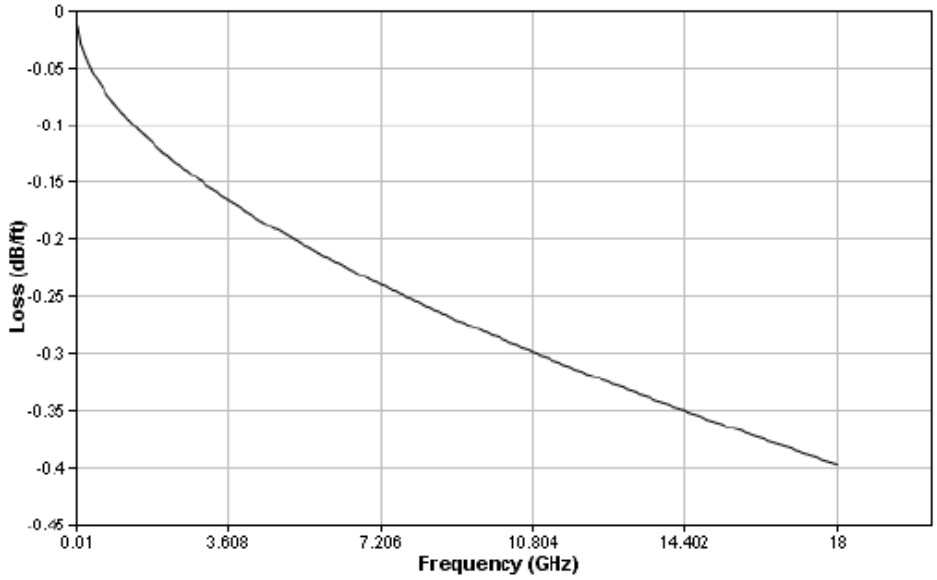
TABLE 6: CONNECTOR OPTIONS (CONTINUED)

Connector Type and Maximum Frequency	Connector Identification by Gore Cable Type (Maximum Frequency)														
	(GHz)[1]	0X (18)	0S (18)	0U (18)	0Q (18)	0P (18)	0M (18)	0W (26.5)	0R (26.5)	0T (26.5)	0K (40)	0D (40)	0Z (50)	0F (67)	CX (110)
Type FD Male	3.0														
Type FD Female	3.0														
7/16 Male	7.0	ZLY	ZLY												
7/16 Female	7.0	ZLZ	ZLZ												
TNC Male	12.4	T01	T01	T01	T01	T01									
Type N Male	12.4	N01	N01		N01	N01	N01								
Type N Female	12.4	N02	N02		N02	N02									
SMA Male[2]	18	R01	R01	R01	R01	R01	R01				R01				
SMA Box Right-Angle Male	18	R71	R71	R71	R71	R71	R71				R71				
SMA Female	18	R02	R02	R02	R02	R02	R02								
TNCA Male	18	C01	C01	C01	C01	C01	C01								
TNCA Box Right-Angle Male	18	C71	C71	C71	C71	C71	C71								
TNCA Female	18	C02	C02	C02	C02		C02								
Precision N Male (Field Grade)[3]	18		ZKU												
Precision N Male (Instrument Grade)	18	Q01	Q01	Q01	Q01	Q01	Q01								
Precision N Right-Angle Male	18	Q71	Q71	Q71	Q71	Q71	Q71								
Precision N Female (Field Grade)	18		ZKV												
Precision N Female (Instrument Grade)	18	Q02	Q02	Q02	Q02	Q02	Q02								
7 mm Hermaphroditic	18	K00	K00	K00		K00									
3.5 mm Male	26.5	D01	D01	D01				D01	D01	D01					
3.5 mm Female	26.5		D02	D02				D02	D02	D02					
3.5 mm Ruggedized Port Female	26.5			0HA						0HA					
3.5 mm Ruggedized DUT Male	26.5			0HB						0HB					
2.92 mm Male	40										0CQ	0CQ	0CQ		
2.92 mm Box Right-Angle Male	40										ZQA				
2.92 mm Female	40										0CP	0CP	0CP		
2.4 mm Male	50										0CJ		0CJ		
2.4 mm Female	50										0CK		0CK		
1.85 mm Male	67													0CB	
1.85 mm Female	67													0CA	
1.0 mm Male	110														0AB
1.0 mm Female	110														0AA
Interface for Replaceable Connectors[4]	18	601	601	601	601	601	601								

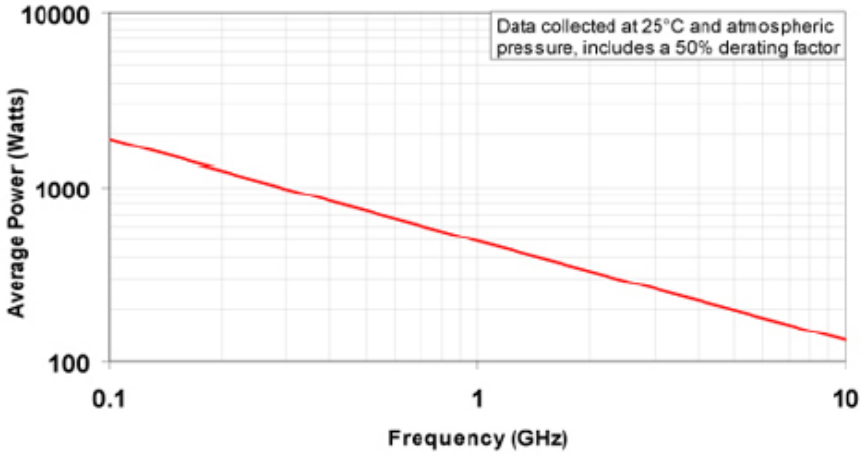
[1] The maximum operating frequency of a test assembly is determined by the lowest frequency of either the connectors or the cable.
[2] 0S1 connector code is an easy grip, quick-turn SMA connector.
[3] 0N1 connector code is an easy grip, quick-turn Precision N connector.
[4] See Table 8 for compatible connector options that are available separately.

Figure A 1

Attenuation



Power



Disclaimer - Envelope dimensions provided herein are for reference only and are subject to change without notice. Contact Gore with any questions.

Phone (In USA) : 1-800-445-GORE (800-445-4673) Phone (outside the US) : +1/302-292-5100

The data in this datasheet applies to standard GORE & Microwave / RF Cable Assemblies and performance may vary based on specific application conditions.

Figure A 1

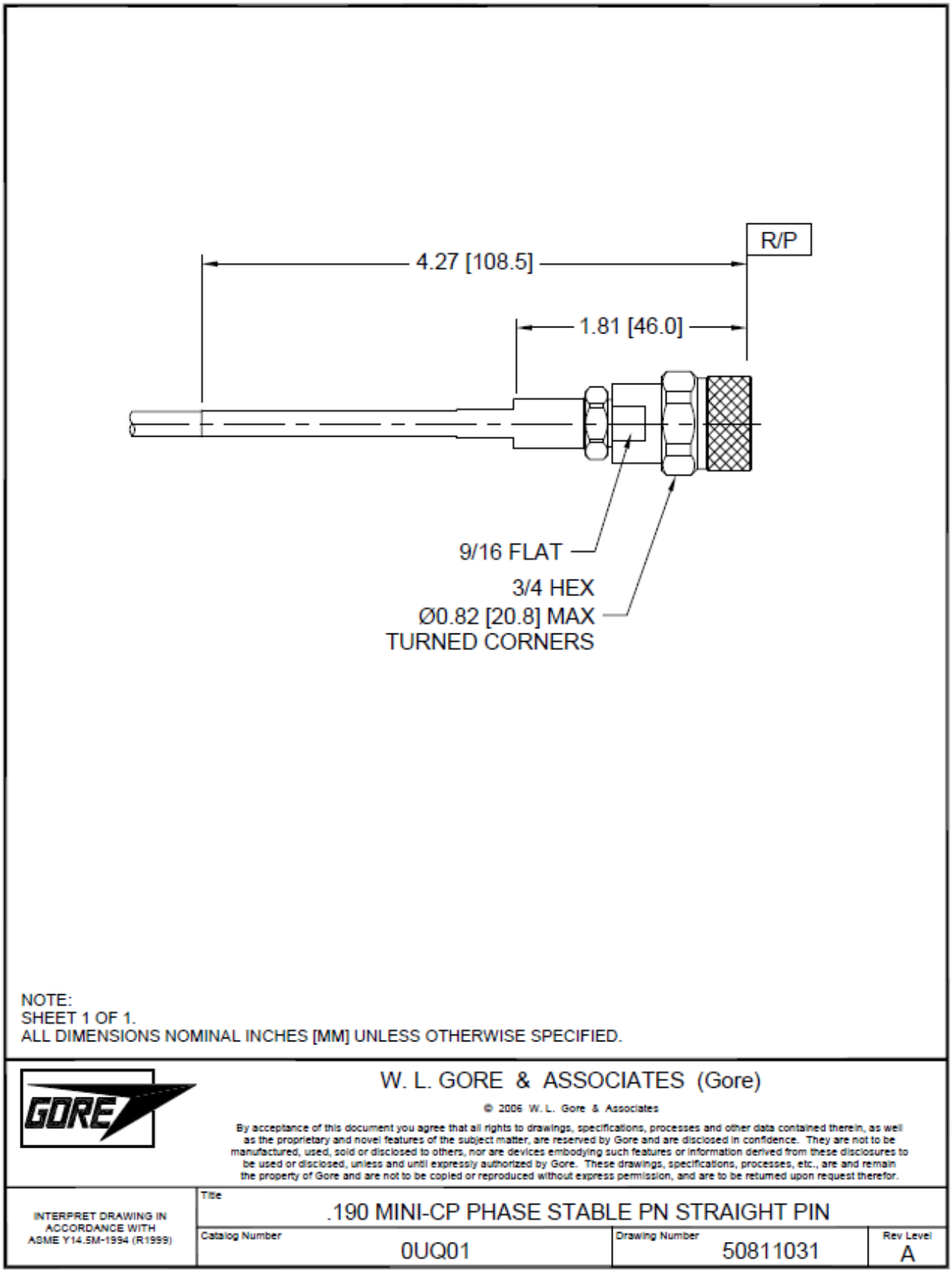


Figure A 1

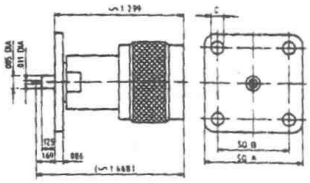
VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

817 867 4489

Flange Receptacles, male
for Micro-Strip

quare flange mounting

Protruding dielectric



SUHNER TYPE 50 Ω	SUHNER TYPE 75 Ω	Ident. No.	US-MIL	Weight oz.	Dimension in. A	B	C
13 N-50-0-59		642083		~1.76	1.00	0.720	0.126
13 N-50-0-60		642084		~1.52	0.689	0.50	0.100

Precision Adaptors

N-N 50Ω DC-18 GHz

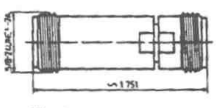


Fig. 1

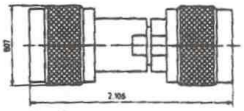


Fig. 2

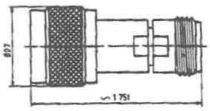


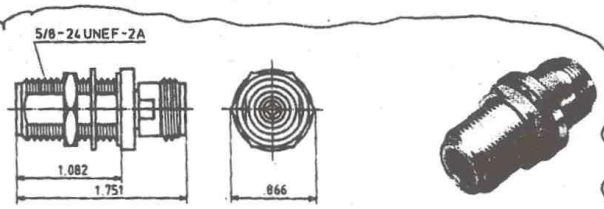
Fig. 3

SUHNER TYPE 50 Ω	SUHNER TYPE 75 Ω	Ident. No.	US-MIL	SWR	Fig.	Weight oz.	Notes
31 N-50-0-51		543383		1.03 + 0.01f/GHz	1	1.38	female - female
32 N-50-0-51		543917		1.03 + 0.01f/GHz	2	2.19	male - male
33 N-50-0-51		544001		1.03 + 0.01f/GHz	3	1.62	male - female

Panel Mounted Adaptor

Female - Female

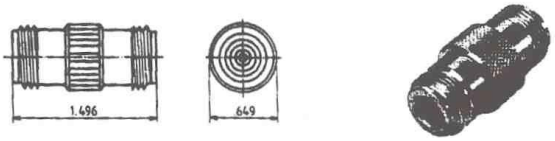
Single hole mounted



SUHNER TYPE 50 Ω	SUHNER TYPE 75 Ω	Ident. No.	US-MIL	SWR	Mounting hole	Weight oz.	Panel thickness max.
34 N-50-0-51		544593		1.03 + 0.01f/GHz	ML 12	1.48	0.492 in.

Within-Series-Adaptors 50Ω/75 Ω

Female - Female



SUHNER TYPE 50 Ω	SUHNER TYPE 75 Ω	Ident. No.	US-MIL M 55339/	Weight oz.	Notes
31 N-50-0-2		542382	07-00029	1.83	replaces UG-29C/U
	31 N-75-0-2	542612		1.73	

AI = Assembly instructions
Cable groups see page 9

Assembly tools see page 205
Mounting holes see page 219

64 SUHNER N

Figure A 1

REV. STATUS	REV.LTR.	B				REVISIONS		
SHEETS	SHEET NO	1				LTR	DESCRIPTION	DATE	BY
						-	Released	03/06/96	MTP
						A	Clarify FAR Requirement	09/13/96	MTP
						B	General Update	11/27/96	MTP

I. CONSTRUCTION

	DIAMETER
Center Conductor: 7 Strand Silver Plated Copper	.059"
Dielectric: Gas Injected Foam Polyethylene	.150"
Shield: Bonded Aluminum-Polyester-Aluminum Tape	.155"
36 GA Tinned Copper Braid(90%k)	.178"
Jacket: Modified Low Smoke Low Toxicity Zero Halogen Polyolefin	.242"

II. ENVIRONMENTAL AND MECHANICAL PROPERTIES

Cable 1a of Table 1

Weight: 45 lbs per 1000 feet
Operating Temperature: -40°C to +85°C
Minimum Bend Radius: 3/4"
Flammability: Meets IEC 332-1 and -3 requirements.
Meets FAR Part 25, Par. 25.853B and/or 25.1359(d)
Smoke Emission: Meets IEC 1034-1 requirements.
Conforms to NES 711 maximum smoke index test.
Toxic Fume Emission: Meets NES 713 maximum toxicity index value requirements.
Acid Gas Generation: Meets IEC 754-1 requirements.
Passes MIL-C-17G maximum acid gas requirements.

III. ELECTRICAL PROPERTIES

Impedance: 50 ohms
Capacitance: 24.8 pF per foot
Velocity: 82%

Attenuation @	
10 MHz:	0.95 dB per 100 feet
100 MHz:	3.03 dB per 100 feet
1000 MHz:	9.76 dB per 100 feet
DC Resistance - Center Conductor:	4.9 Ohms per 1000 feet

VSWR: 1.35:1 max. from 10 MHz to 1000 MHz

IV. CABLE MARKING: "AFC-240-ULTRAFLEX-FR TIMES MICROWAVE SYSTEMS 68999 AA-8489"

V. NOTES

1) All tests performed in accordance with MIL-C-17(current issue).

Unless otherwise specified dimensions in inches. Tolerances are applicable when specified.	Approvals			TIMES MICROWAVE SYSTEMS Wallingford, CT 06492		
	Drawn	MTP	04/15/96	AFC-240-Ultraflex-FR Flame Retardant, High Performance Air Frame Communications Coax		
	Check					
	PrjMg			Size A	Code Ident 68999	Dwg.No. AA - 8489
	PrdMg					
MI 54103	QAMgr			Scale: NA	Rev. (B)	Sheet: 1 of 1

Figure A 2

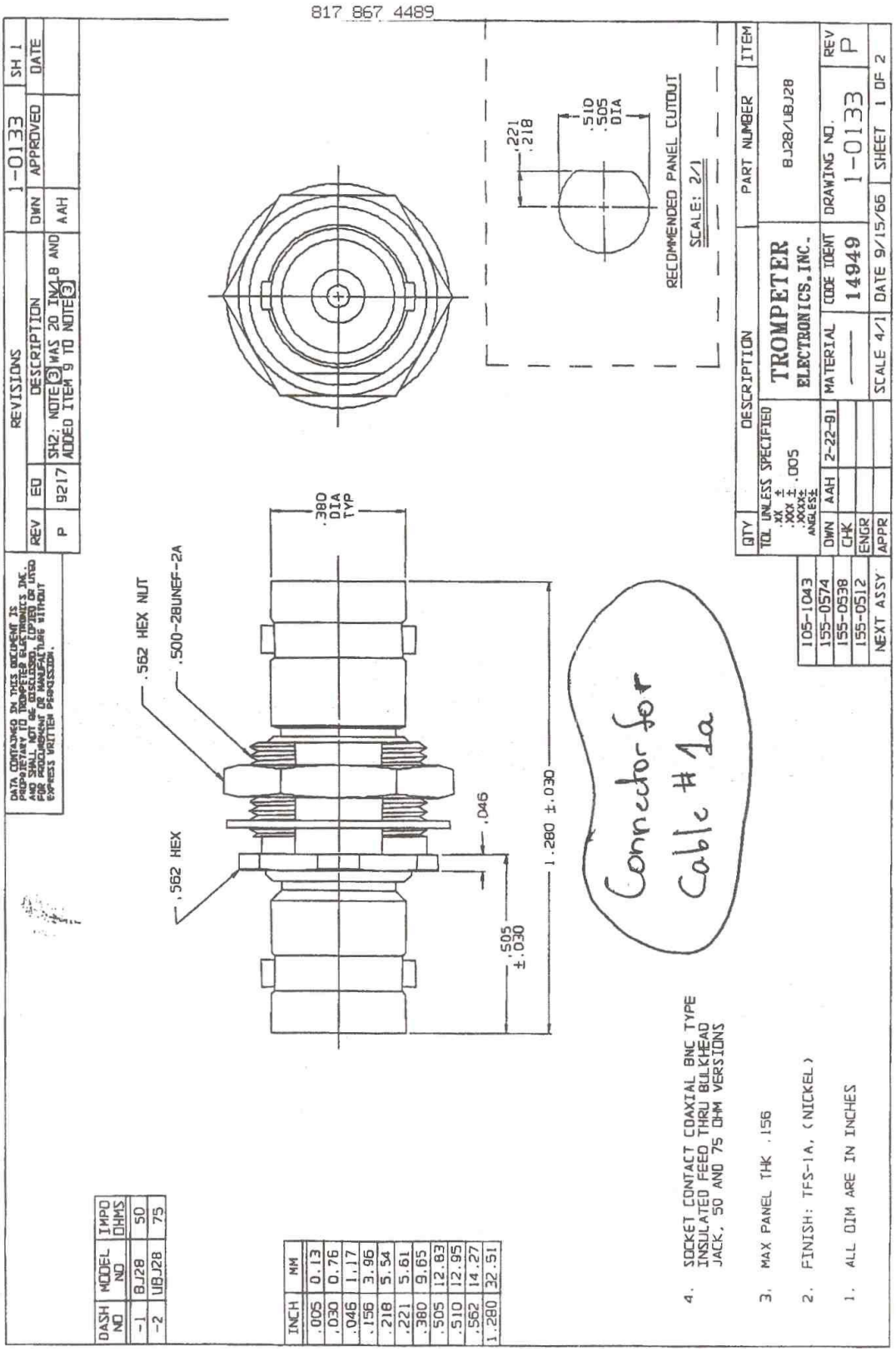

817 867 4489
REVISIONS
REV
ED
DESCRIPTION
DWN
APPROVED
DATE
P
9217
SH2: NOTE 3 WAS 20 INCH AND ADDED ITEM 9 TO NOTE 3
AAH
1-0133
SH 1
DATA CONTAINED IN THIS DOCUMENT IS PROPRIETARY TO TROMPETER ELECTRONICS INC. AND SHALL NOT BE DISCLOSED, USED OR LOANED FOR REPLACEMENT OR MANUFACTURE WITHOUT EXPRESS WRITTEN PERMISSION.
.562 HEX NUT
.500-28UNEF-2A
.380 DIA TYP
.562 HEX
.046
.505 ±.030
1.280 ±.030
.221 .218
.510 .505 DIA
RECOMMENDED PANEL CUTOUT
SCALE: 2/1
Connector for Cable #1a
QTY
DESCRIPTION
PART NUMBER
ITEM
TOL UNLESS SPECIFIED .XX ± .005 .XXX ± .XXX± ANGLES±
TROMPETER ELECTRONICS, INC.
BJ28/UBJ28
105-1043
155-0574
155-0538
155-0512
NEXT ASSY
DWN AAH 2-22-91
CHK
ENGR
APPR
MATERIAL
CODE IDENT
14949
DRAWING NO.
1-0133
REV
P
SCALE 4/1
DATE 9/15/66
SHEET 1 OF 2
DASH NO
MODEL NO
IMPD OHMS
-1 BJ28 50
-2 UBJ28 75
INCH MM
.005 0.13
.030 0.76
.046 1.17
.156 3.96
.218 5.54
.221 5.61
.380 9.65
.505 12.83
.510 12.95
.562 14.27
1.280 32.51
4. SOCKET CONTACT COAXIAL BNC TYPE INSULATED FEED THRU BULKHEAD JACK, 50 AND 75 OHM VERSIONS
3. MAX PANEL THK .156
2. FINISH: TFS-1A, (NICKEL)
1. ALL DIM ARE IN INCHES

Figure A 2

817 867 4489

WIRE SPECIFICATION: 22/39/32

Components: Tinned copper shielded twisted pair with ETFE jacket.

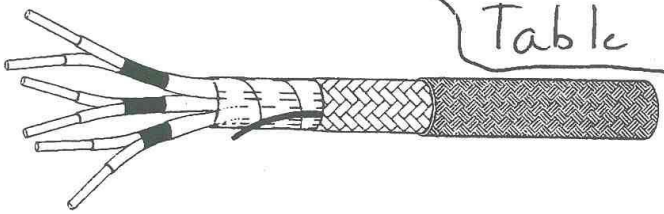
Overall Shielding: Aluminum mylar wrap drain wire, and braided Vermalloy® 3948 shield.

Jacket: Braided polyester.

AIRBORNE CABLES

Lightweight Electric and Magnetic Field Protection Shielded Twisted Pair Components

Cable #2 of Table 1



# twisted Pairs	P/N	Shield AWG	dia.	lbs/m	P/N	Shield AWG	dia.	lbs/m
2	20SB2X22-25	34	0.366	58.8	22SB2X22-25	34	0.334	49.8
3	20SB3X22-25	34	0.389	78.0	22SB3X22-25	34	0.355	65.5
4	20SB4X22-25	34	0.430	98.4	22SB4X22-25	34	0.391	82.3
5	20SB5X22-25	34	0.475	119.2	22SB5X22-25	34	0.431	99.5
6	20SB6X22-25	34	0.521	140.1	22SB6X22-25	34	0.473	116.7
7	20SB7X22-25	34	0.521	157.0	22SB7X22-25	34	0.473	130.4
8	20SB8X22-25	34	0.569	182.0	22SB8X22-25	34	0.516	151.0
9	20SB9X22-25	34	0.676	208.1	22SB9X22-25	34	0.612	172.9
10	20SB10X22-25	34	0.676	225.4	22SB10X22-25	34	0.612	186.9
11	20SB11X22-25	34	0.699	245.2	22SB11X22-25	34	0.633	203.1
12	20SB12X22-25	34	0.699	262.6	22SB12X22-25	34	0.633	217.2
13	20SB13X22-25	34	0.740	283.4	22SB13X22-25	34	0.669	234.3
14	20SB14X22-25	34	0.740	300.7	22SB14X22-25	34	0.669	248.3
15	20SB15X22-25	34	0.785	322.1	22SB15X22-25	34	0.709	266.0
16	20SB16X22-25	34	0.785	339.5	22SB16X22-25	34	0.709	280.1
17	20SB17X22-25	34	0.831	360.8	22SB17X22-25	34	0.751	297.7
18	20SB18X22-25	34	0.831	378.2	22SB18X22-25	34	0.751	311.8
19	20SB19X22-25	34	0.831	395.0	22SB19X22-25	34	0.751	325.4
20	20SB20X22-25	34	0.879	431.4	22SB20X22-25	34	0.794	355.0
25	20SB25X22-25	34	0.986	521.8	22SB25X22-25	34	0.890	428.9
30	20SB30X22-25	34	1.050	618.5	22SB30X22-25	34	0.947	508.1
35	20SB35X22-25	34	1.141	732.4	22SB35X22-25	34	1.029	601.0
40	20SB40X22-25	34	1.189	824.8	22SB40X22-25	34	1.072	676.2
45	20SB45X22-25	34	1.296	927.5	22SB45X22-25	34	1.168	760.2
50	20SB50X22-25	34	1.360	1,022.3	22SB50X22-25	34	1.225	837.5

NOTE: Wire specification and cable construction may be modified to meet any specific requirement.

VERMILLION INCORPORATED
CERTIFIED TO ISO 9001

4754 South Palisade, P.O. Box 12147 (67277), Wichita, Kansas 67217
Phone (316) 524-3100 Fax (316) 524-2011 www.vermillioninc.com

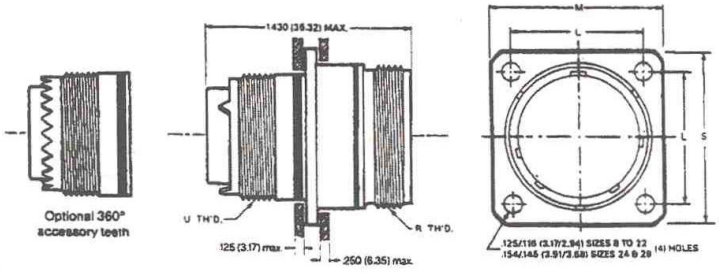
12-

Figure A 3

SPECIFICATIONS 817 867 4489

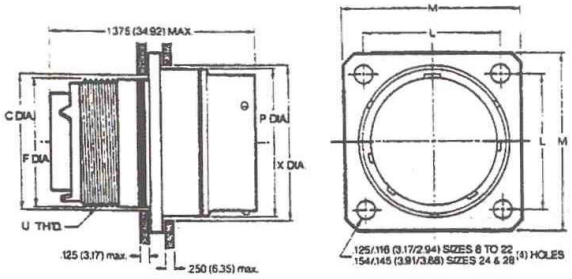
FLANGE MOUNT RECEPTACLES

MIL-C-83723/ 82 & 83 Threaded Type



MIL-C-83723/ 71 & 72 Bayonet Type

SHELL SIZE 28 NOT AVAILABLE.



INCHES

Shell Size	U Th'd. Access End	R Th'd. Mating End	C Dia. Panel (Min.)	F Dia. Rear (Max.)	P Dia. Front (Max.)	X Dia. Panel (Min.)	L	M
08	.500-20	.562-24	.510	.500	.562	.620	.594	.812
10	.625-24	.688-24	.635	.625	.696	.748	.719	.937
12	.750-20	.875-20	.760	.750	.875	.913	.812	1.031
14	.875-20	.938-20	.885	.875	.936	.980	.906	1.125
16	1.000-20	1.062-18	1.010	1.000	1.062	1.107	.969	1.250
18	1.062-18	1.188-18	1.072	1.062	1.187	1.209	1.062	1.343
20	1.188-18	1.312-18	1.192	1.187	1.312	1.337	1.156	1.437
22	1.312-18	1.438-18	1.322	1.312	1.437	1.452	1.250	1.562
24	1.438-18	1.562-18	1.447	1.437	1.562	1.577	1.375	1.703
28	1.750-18	1.812-16	1.760	1.750	1.812	1.827	1.562	1.953

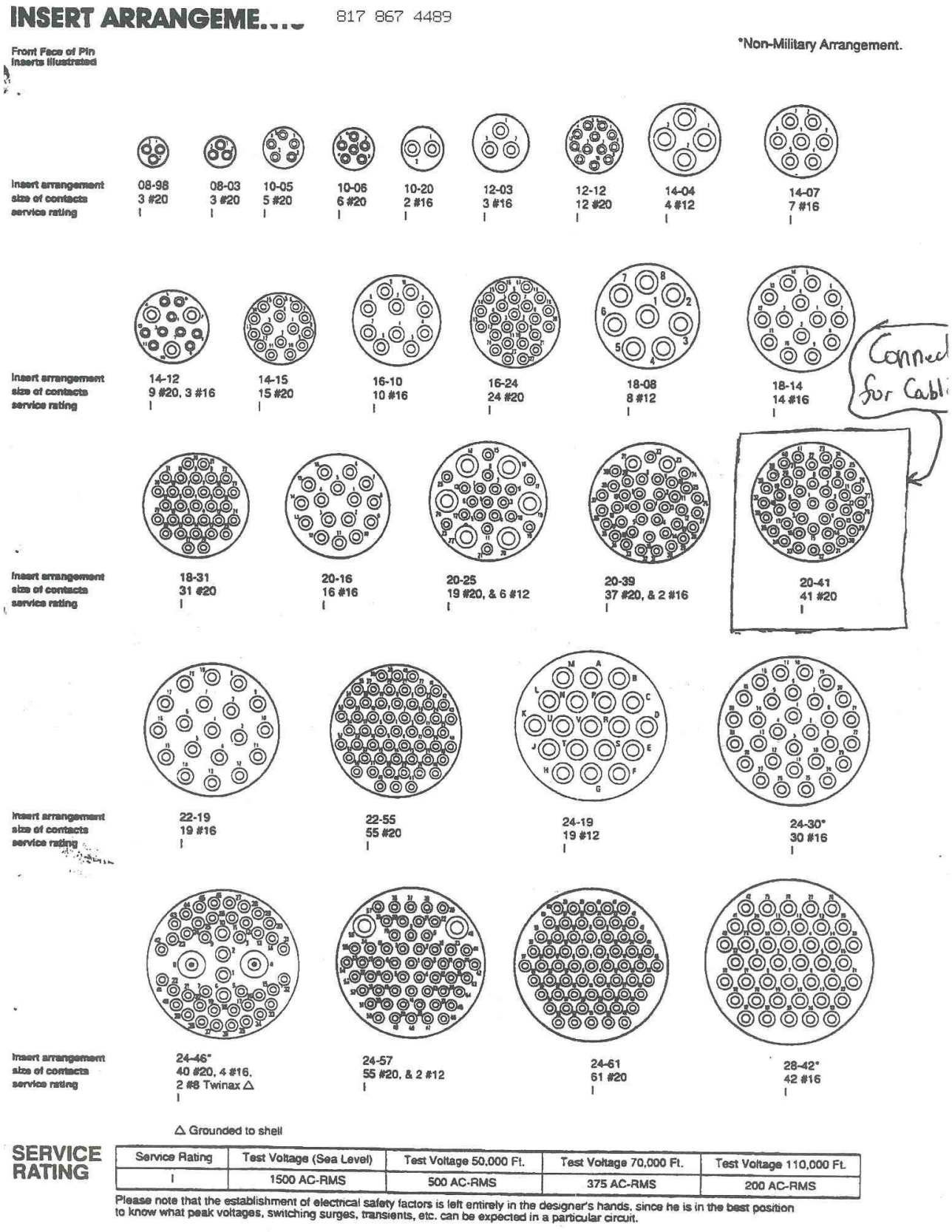
MILLIMETERS

Shell Size	C Dia. Panel (Min.)	F Dia. Rear (Max.)	P Dia. Front (Max.)	X Dia. Panel (Min.)	L	M
08	12.95	12.70	14.27	15.75	15.04	20.62
10	16.13	15.88	17.68	18.99	18.26	23.80
12	19.30	19.05	22.23	23.19	20.62	26.19
14	22.48	22.23	23.77	24.89	23.01	28.58
16	25.65	25.40	26.97	28.12	24.61	31.75
18	27.23	26.97	30.15	30.71	26.97	34.11
20	30.28	30.15	33.32	33.96	29.36	36.50
22	33.58	33.32	36.50	36.88	31.75	39.67
24	36.75	36.50	39.67	40.06	34.93	43.26
28	44.70	44.45	46.02	46.41	39.67	49.61

Connector for Cable #2

11

Figure A 3



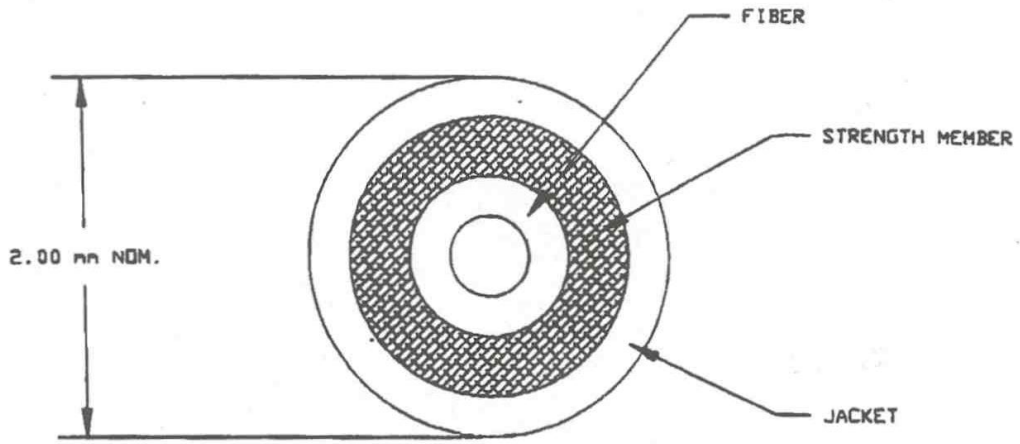
SERVICE RATING

Service Rating	Test Voltage (Sea Level)	Test Voltage 50,000 Ft.	Test Voltage 70,000 Ft.	Test Voltage 110,000 Ft.
I	1500 AC-RMS	500 AC-RMS	375 AC-RMS	200 AC-RMS

Please note that the establishment of electrical safety factors is left entirely in the designer's hands, since he is in the best position to know what peak voltages, switching surges, transients, etc. can be expected in a particular circuit.

Figure A 3

Cable #3 of Table 1



FIBER: COMPLIES WITH REQUIREMENTS AS SPECIFIED IN MIL-F-49291/6

CORE	62.5um ±3um
CLADDING	125um ±1um
PRIMARY BUFFER	250um ±15um (RAD HARD)
SECONDARY BUFFER	900um ±50um
ATTENUATION @ 0.85um	<4.5dB/km
ATTENUATION @ 1.3um	<2.0dB/km
BANDWIDTH @1.3um	>500 MHz-km
NUMERICAL APERTURE	0.275 ±0.015
PROOF TEST	100 kpsi
INDEX PROFILE	GRADED

STRENGTH MEMBER: ARAMID YARN LONGITUDINALLY APPLIED.

JACKET: ZERO HALOGEN, LOW SMOKE THERMOPLASTIC

O.D.: 2.0 mm ± 0.2 mm (0.078 in. ± 0.008 in.)

REQUIREMENTS: MFG. IN ACCORDANCE WITH MIL-C-85045E/16

BRAND-REX PART NUMBER: OC-1468

REVISIONS		
0	02/04/94	FIRST ISSUE
1	06/02/94	COMPLIES TO MIL-F-49291/6
2	06/13/94	PART NUMBER

REFERENCES: MIL-C-85045E/16

BRAND-REX COMPANY
Leadership Through Cable Technology
1600 West Main Street
Willimantic, CT 06226-1128

G493 62.5/125 RAD HARD SINGLE FIBER UNIT

DRAWN BY: WALT DRABEK | APPROVED BY: RB

APR-20-2000 13:40 8604507004

Figure A 4

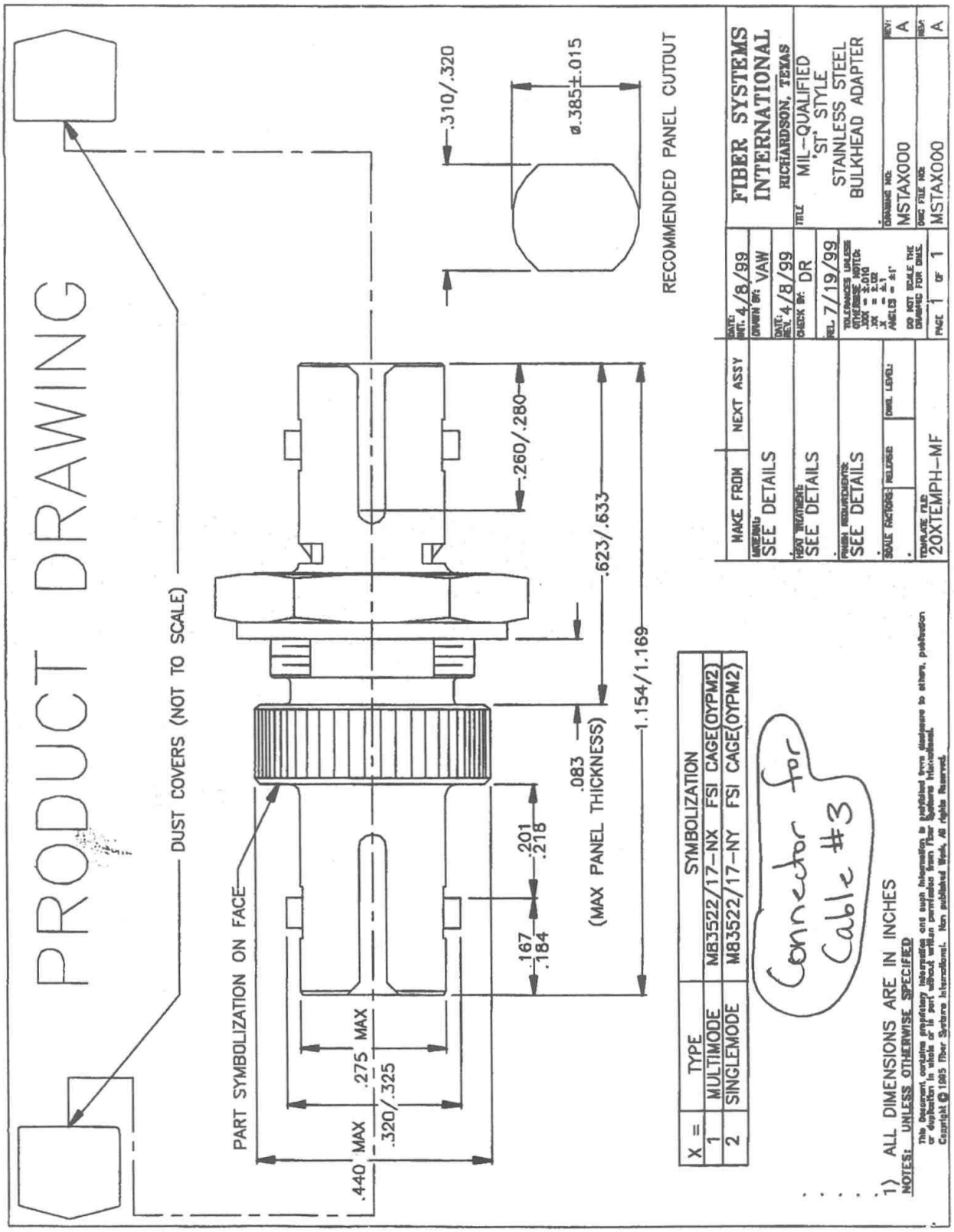

PRODUCT DRAWING
DUST COVERS (NOT TO SCALE)
PART SYMBOLIZATION ON FACE
RECOMMENDED PANEL CUTOUT
.310/.320
ø.385±.015
.260/.280
.623/.633
1.154/1.169
.083
(MAX PANEL THICKNESS)
.201
.218
.167
.184
.275 MAX
.320/.325
.440 MAX
X = TYPE
1 MULTIMODE
2 SINGLEMODE
SYMBOLIZATION
M83522/17-NX FSI CAGE(0YPM2)
M83522/17-NY FSI CAGE(0YPM2)
Connector for Cable #3
1) ALL DIMENSIONS ARE IN INCHES
NOTES: UNLESS OTHERWISE SPECIFIED
MAKE FROM
SEE DETAILS
NEXT ASSY
FIBER SYSTEMS INTERNATIONAL
RICHARDSON, TEXAS
MIL-QUALIFIED 'ST' STYLE STAINLESS STEEL BULKHEAD ADAPTER
MSTAX000
20XTEMPH-MF

Figure A 4

817 867 4489

WIRE SPECIFICATION: 22/20/32

Components: Tinned copper shielded twisted pair with ETFE jacket.

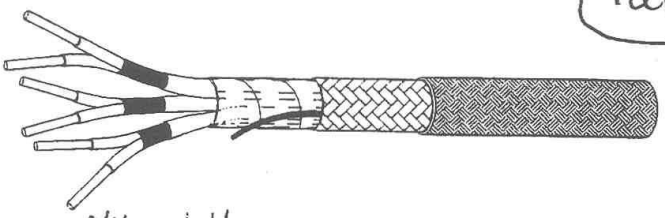
Overall Shielding: Aluminum mylar wrap drain wire, and braided Vermalloy® 3948 shield.

Jacket: Braided polyester.

AIRBORNE CABLES

Lightweight Electric and Magnetic Field Protection Shielded Twisted Pair Components

Cable #4 of Table 1



P/N ↓ | # twisted Pairs | shield AWG | dia. | lbs/m

# twisted Pairs	P/N	shield AWG	dia.	lbs/m	P/N	shield AWG	dia.	lbs/m
2	20SB2X22-25	34	0.366	58.8	22SB2X22-25	34	0.334	49.8
3	20SB3X22-25	34	0.389	78.0	22SB3X22-25	34	0.355	65.5
4	20SB4X22-25	34	0.430	98.4	22SB4X22-25	34	0.391	82.3
5	20SB5X22-25	34	0.475	119.2	22SB5X22-25	34	0.431	99.5
6	20SB6X22-25	34	0.521	140.1	22SB6X22-25	34	0.473	116.7
7	20SB7X22-25	34	0.521	157.0	22SB7X22-25	34	0.473	130.4
8	20SB8X22-25	34	0.569	182.0	22SB8X22-25	34	0.516	151.0
9	20SB9X22-25	34	0.676	208.1	22SB9X22-25	34	0.612	172.9
10	20SB10X22-25	34	0.676	225.4	22SB10X22-25	34	0.612	186.9
11	20SB11X22-25	34	0.699	245.2	22SB11X22-25	34	0.633	203.1
12	20SB12X22-25	34	0.699	262.6	22SB12X22-25	34	0.633	217.2
13	20SB13X22-25	34	0.740	283.4	22SB13X22-25	34	0.669	234.3
14	20SB14X22-25	34	0.740	300.7	22SB14X22-25	34	0.669	248.3
15	20SB15X22-25	34	0.785	322.1	22SB15X22-25	34	0.709	266.0
16	20SB16X22-25	34	0.785	339.5	22SB16X22-25	34	0.709	280.1
17	20SB17X22-25	34	0.831	360.8	22SB17X22-25	34	0.751	297.7
18	20SB18X22-25	34	0.831	378.2	22SB18X22-25	34	0.751	311.8
19	20SB19X22-25	34	0.831	395.0	22SB19X22-25	34	0.751	325.4
20	20SB20X22-25	34	0.879	431.4	22SB20X22-25	34	0.794	355.0
25	20SB25X22-25	34	0.986	521.8	22SB25X22-25	34	0.890	428.9
30	20SB30X22-25	34	1.050	618.5	22SB30X22-25	34	0.947	508.1
35	20SB35X22-25	34	1.141	732.4	22SB35X22-25	34	1.029	601.0
40	20SB40X22-25	34	1.189	824.8	22SB40X22-25	34	1.072	676.2
45	20SB45X22-25	34	1.296	927.5	22SB45X22-25	34	1.168	760.2
50	20SB50X22-25	34	1.360	1,022.3	22SB50X22-25	34	1.225	837.5

NOTE: Wire specification and cable construction may be modified to meet any specific requirement.

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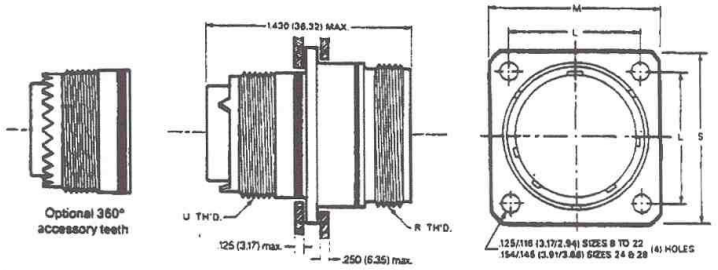
12-

Figure A 5

SPECIFICATIONS 817 867 4489

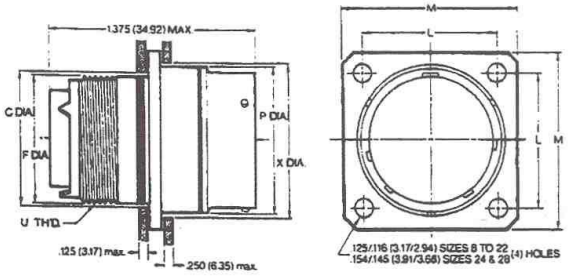
FLANGE MOUNT RECEPTACLES

MIL-C-83723/ 82 & 83 Threaded Type



MIL-C-83723/ 71 & 72 Bayonet Type

SHELL SIZE 28 NOT AVAILABLE.



INCHES

Shell Size	U Th'd. Access End	R Th'd. Mating End	C Dia. Panel (Min.)	F Dia. Rear (Max.)	P Dia. Front (Max.)	X Dia. Panel (Min.)	L	M
08	.500-20	.562-24	.510	.500	.562	.620	.594	.812
10	.625-24	.688-24	.635	.625	.696	.748	.719	.937
12	.750-20	.875-20	.760	.750	.875	.913	.812	1.031
14	.875-20	.938-20	.885	.875	.936	.980	.906	1.125
16	1.000-20	1.062-18	1.010	1.000	1.062	1.107	.969	1.250
18	1.062-18	1.188-18	1.072	1.062	1.187	1.209	1.062	1.343
20	1.188-18	1.312-18	1.192	1.187	1.312	1.337	1.156	1.437
22	1.312-18	1.438-18	1.322	1.312	1.437	1.452	1.250	1.562
24	1.438-18	1.562-18	1.447	1.437	1.562	1.577	1.375	1.703
28	1.750-18	1.812-16	1.760	1.750	1.812	1.827	1.562	1.953

MILLIMETERS

Shell Size	C Dia. Panel (Min.)	F Dia. Rear (Max.)	P Dia. Front (Max.)	X Dia. Panel (Min.)	L	M
08	12.95	12.70	14.27	15.75	15.04	20.62
10	16.13	15.88	17.68	18.99	18.26	23.80
12	19.30	19.05	22.23	23.19	20.62	26.19
14	22.48	22.23	23.77	24.89	23.01	28.58
16	25.65	25.40	26.97	28.12	24.61	31.75
18	27.23	26.97	30.15	30.71	26.97	34.11
20	30.28	30.15	33.32	33.96	29.36	36.50
22	33.58	33.32	36.50	36.88	31.75	39.67
24	36.75	36.50	39.67	40.06	34.93	43.26
28	44.70	44.45	46.02	46.41	39.67	49.61

Connector for Cable #4

11

Figure A 5

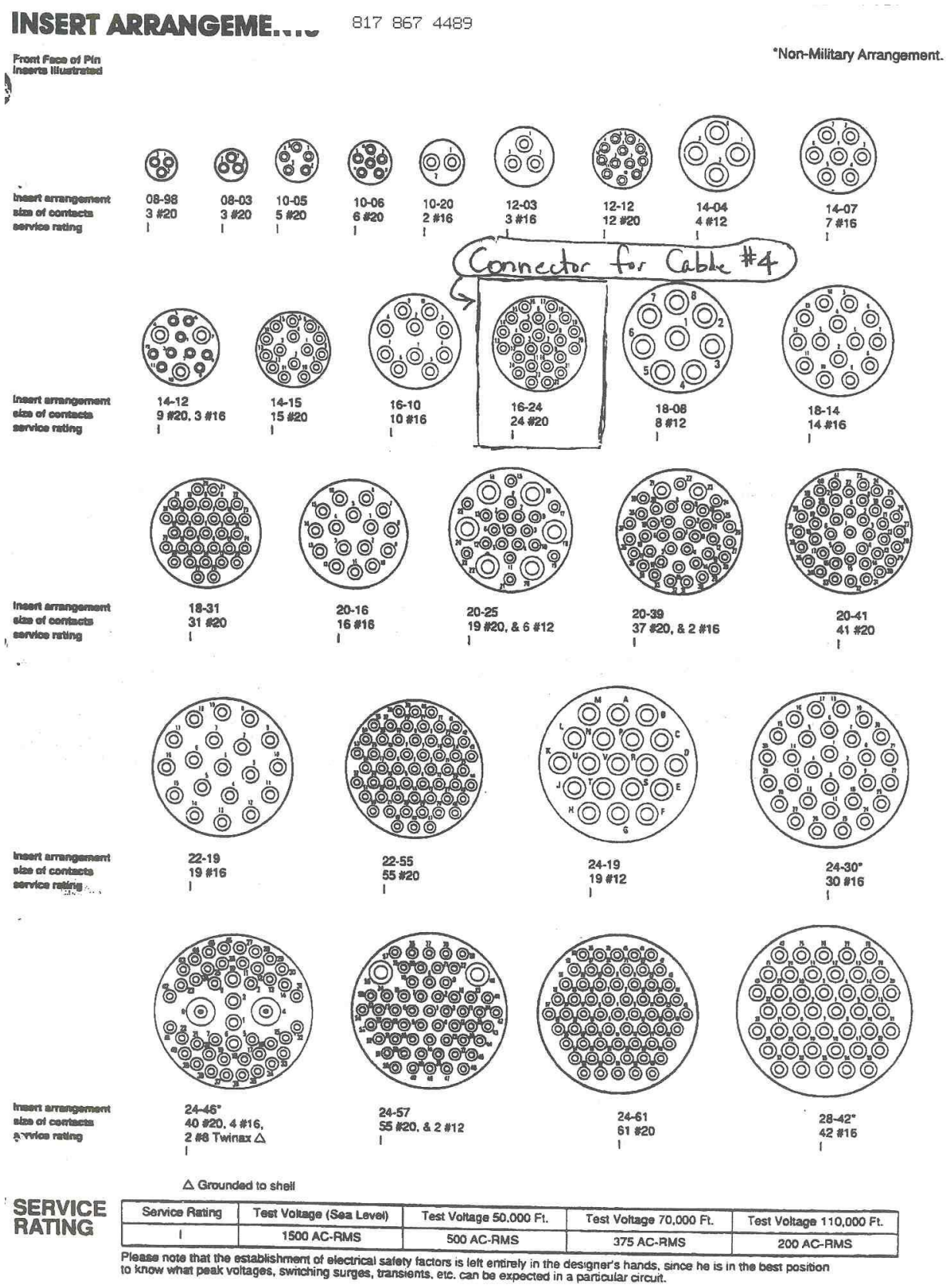

INSERT ARRANGEME....
817 867 4489
Front Face of Pin Inserts Illustrated
*Non-Military Arrangement.
Insert arrangement
size of contacts
service rating
08-98
3 #20
08-03
3 #20
10-05
5 #20
10-06
6 #20
10-20
2 #16
12-03
3 #16
12-12
12 #20
14-04
4 #12
14-07
7 #16
Connector for Cable #4
14-12
9 #20, 3 #16
14-15
15 #20
16-10
10 #16
16-24
24 #20
18-08
8 #12
18-14
14 #16
18-31
31 #20
20-16
16 #16
20-25
19 #20, & 6 #12
20-39
37 #20, & 2 #16
20-41
41 #20
22-19
19 #16
22-55
55 #20
24-19
19 #12
24-30*
30 #16
24-46*
40 #20, 4 #16,
2 #8 Twinax △
24-57
55 #20, & 2 #12
24-61
61 #20
28-42*
42 #16
△ Grounded to shell
SERVICE RATING
Service Rating
Test Voltage (Sea Level)
Test Voltage 50,000 Ft.
Test Voltage 70,000 Ft.
Test Voltage 110,000 Ft.
I
1500 AC-RMS
500 AC-RMS
375 AC-RMS
200 AC-RMS
Please note that the establishment of electrical safety factors is left entirely in the designer's hands, since he is in the best position to know what peak voltages, switching surges, transients, etc. can be expected in a particular circuit.

Figure A 5

REV. STATUS	REV.LTR.	-				REVISIONS			
SHEETS	SHEET NO	1				LTR	DESCRIPTION	DATE	BY
						-	Released	12/07/99	JCL

I. CONSTRUCTION — DIAMETER

Center Conductor: 7 Strand Bare Copper	.034"
Dielectric: Gas Injected Foam Polyethylene	.150"
Shield: Bonded Aluminum-Polyester-Aluminum Tape	.155"
36 GA Tinned Copper Braid(90%k)	.178"
Jacket: Black Low Smoke Low Toxicity Zero Halogen Polyolefin	.240"

Cable #6 of Table 1

II. ENVIRONMENTAL AND MECHANICAL PROPERTIES

Weight: 42 lbs per 1000 feet
Operating Temperature: -40°C to +85°C
Minimum Bend Radius: 3/4"
Flammability: Meets IEC 332-1 and -3 requirements.
Meets FAR Part 25, Par. 25.853B and/or 25.1359(d)
Smoke Emission: Meets IEC 1034-1 requirements.
Conforms to NES 711 maximum smoke index test.
Toxic Fume Emission: Meets NES 713 maximum toxicity index value requirements.
Acid Gas Generation: Meets IEC 754-1 requirements.
Passes MIL-C-17G maximum acid gas requirements.

III. ELECTRICAL PROPERTIES

Impedance: 75 ohms
Capacitance: 16.0 pF per foot
Velocity: 84%

Attenuation @ 10 MHz:	0.98 dB per 100 feet
100 MHz:	3.13 dB per 100 feet
1000 MHz:	10.06 dB per 100 feet
DC Resistance - Center Conductor:	12.2 Ohms per 1000 feet

VSWR: 1.35:1 max. from 10 MHz to 1000 MHz

IV. CABLE MARKING: "TIMES MICROWAVE LMR-240-75-ULTRAFLEX-FR - COMMUNICATIONS - CCTV - LSOH - LUL"

V. NOTES

1) All tests performed in accordance with MIL-C-17(current issue).

Unless otherwise specified dimensions in inches. Tolerances are applicable when specified.	Approvals			TIMES MICROWAVE SYSTEMS Wallingford, CT 06492		
	Drawn	JCL	12/07/99	LMR-240-75-Ultraflex-FR Flame Retardant - High Performance Air Frame Communications Coax		
	Check					
	PrjMg			Size A	Code Ident 68999	Dwg.No. AA - 8934
	PrdMg					
MI 54083	QAMgr			Scale: NA	Rev. (-)	Sheet: 1 of 1

Figure A 6

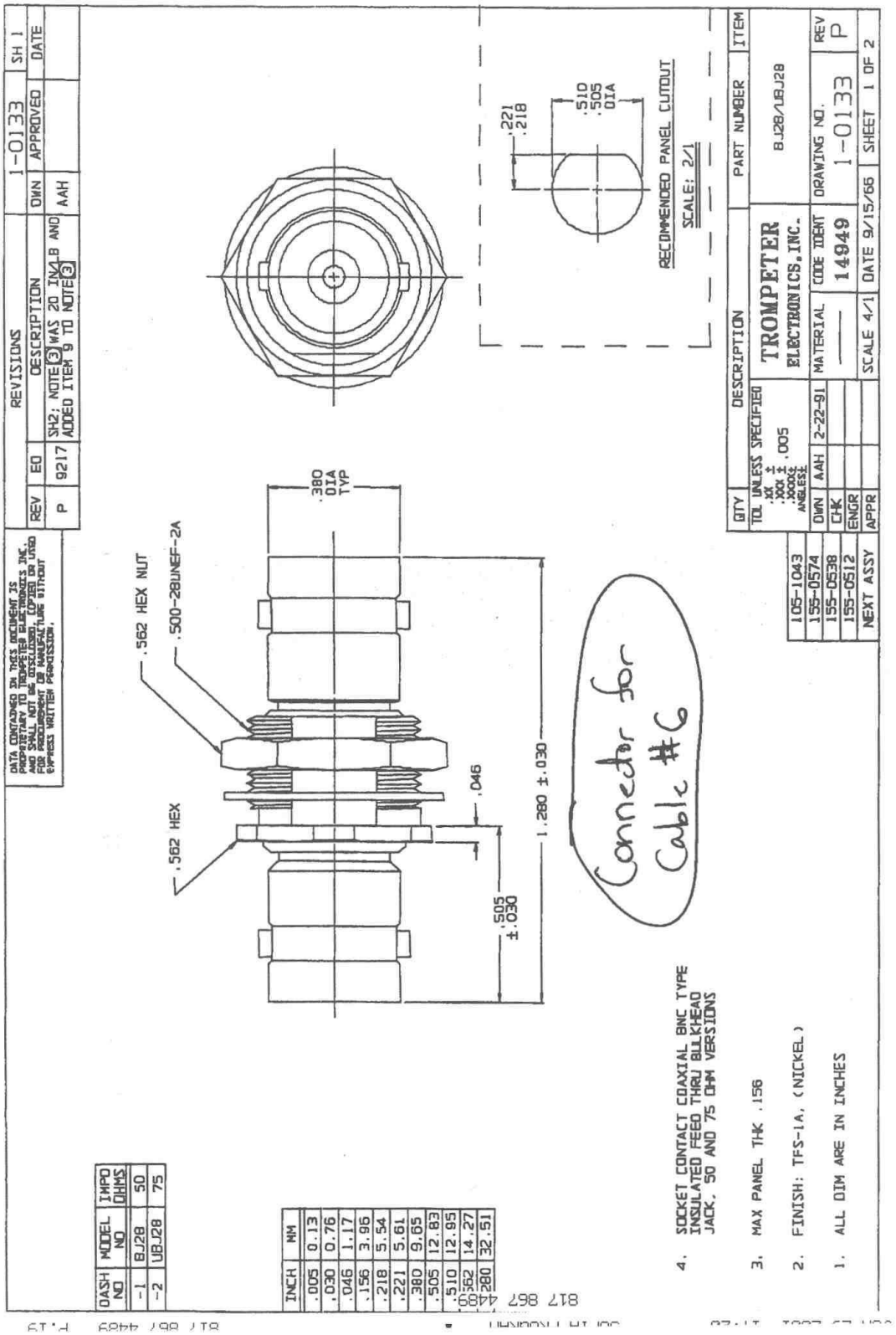

1-0133
SH 1
REVISIONS
REV
DESCRIPTION
DWN
APPROVED
DATE
P
9217
SH2; NOTE 3 WAS 20 IN 4.B AND ADDED ITEM 9 TO NOTE 3
AAH
DATA CONTAINED IN THIS DOCUMENT IS PROPRIETARY TO TROMPETER ELECTRONICS INC. AND SHALL NOT BE DISCLOSED, COPIED OR USED FOR PROCUREMENT OR MANUFACTURE WITHOUT EXPRESS WRITTEN PERMISSION.
.562 HEX NUT
.500-28UNEF-2A
.380 DIA TYP
.562 HEX
.046
1.280 ±.030
.505 ±.030
.221 .218
.510 .505 DIA
RECOMMENDED PANEL CUTOUT
SCALE: 2/1
QTY
DESCRIPTION
PART NUMBER
ITEM
TOL UNLESS SPECIFIED
.XX ±
.XXX ±.005
.XXXX ANGLES±
TROMPETER ELECTRONICS, INC.
BJ28/UBJ28
105-1043
155-0574
155-0538
155-0512
NEXT ASSY
DWN AAH 2-22-91
CHK
ENGR
APPR
MATERIAL
CODE IDENT
14949
DRAWING NO.
1-0133
REV
P
SCALE 4/1
DATE 9/15/66
SHEET 1 OF 2
Connector for Cable #6
DASH NO
MODEL NO
IMPD OHMS
-1 BJ28 50
-2 UBJ28 75
INCH MM
.005 0.13
.030 0.76
.046 1.17
.156 3.96
.218 5.54
.221 5.61
.380 9.65
.505 12.83
.510 12.95
.562 14.27
1.280 32.51
4. SOCKET CONTACT COAXIAL BNC TYPE INSULATED FEED THRU BULKHEAD JACK. 50 AND 75 OHM VERSIONS
3. MAX PANEL THK .156
2. FINISH: TFS-1A, (NICKEL)
1. ALL DIM ARE IN INCHES

Figure A 6

817 867 4489

REV	DESCRIPTION	DATE	APPROVED
A	SEE ECN 2190	12/12/94	TDM
B	SEE ECN 4105	4/26/96	JBH
C	ECN 12755, CORRECT CONDUCTOR STRANDING	11/15/00	

SHEET 1

DWG. NO. 322001-C

Trompeter: PL75C-306

CONSTRUCTION

Conductor: 20 AWG x 19/32 annealed silver plated copper: .037 O.D. nominal;
Dielectric: Solid PTFE; .116 O.D. nominal;
Inner Shield: 36 AWG silver plated copper braid; 90% coverage;
Inner Jacket: Tan FEP; .176 O.D. nominal;
Outer Shield: 36 AWG silver plated copper braid; 90% coverage;
Outer Jacket: Clear FEP; .236 O.D. nominal;

CHARACTERISTICS

Impedance: 50 Ohms nominal;
Capacitance: 29.5 pF/ft nominal;
Velocity of Propogation: 69.5% nominal;
Attenuation: 3.9 dB/100ft nominal @ 100 MHz;
8.0 dB/100ft nominal @ 400 MHz;
13.0 dB/100ft nominal @ 1000 MHz;
Bend radius: 1.2 in. nominal
Weight: 5.7 lbs./100 ft. nominal
Temperature range: −55° to +200° C.
Skydrol Resistant

ECS avionic cables meet or exceed burn/smoke requirements as set forth by Federal Aviation Regulations Part 25. In addition, they are designed and manufactured with materials which, when subjected to flames or high temperatures, will not outgas corrosive and toxic hydrogen chloride produced by conventional PVC cables.

Cable #7 of Table 1

NOTES: All dimensions in inches.

APPROVALS	DATE
DRAWN BY JB HACKETT	11/10/92
CHECKED BY TD MEYERS	11/16/92
APPROVED BY TC KNUTSON	11/17/92

ELECTRONIC CABLE SPECIALISTS
FRANKLIN, WI 53132
PHONE: (414) 421-3500

TITLE
CUSTOMER SPECIFICATION
50 OHM TRIAXIAL CABLE

SIZE	CAGE CODE	LEVEL	PART NO.	REV.
A	66197		322001	C

SCALE 4/1 SHEET 1 OF 1

MARY WAHL

Figure A 7

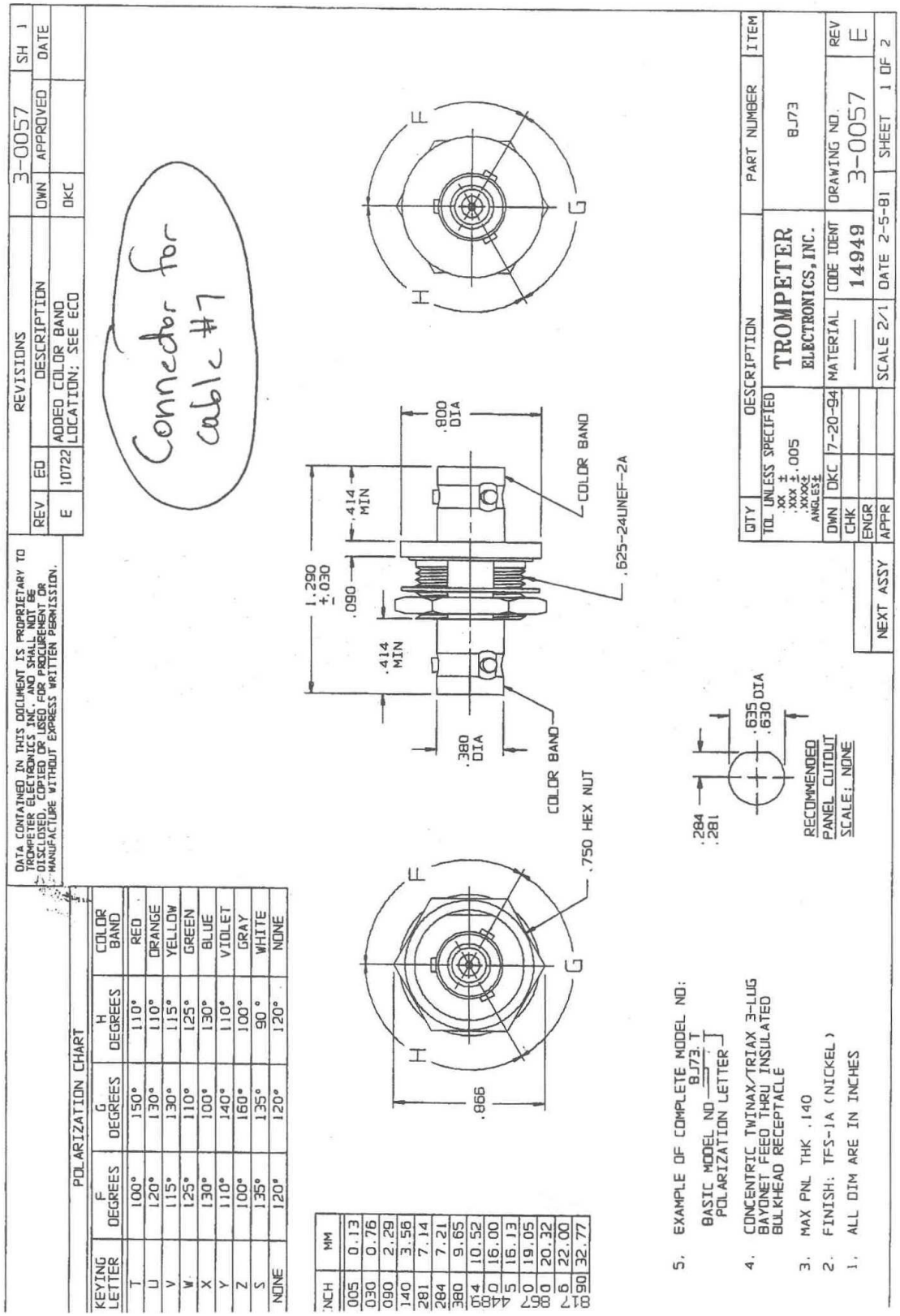
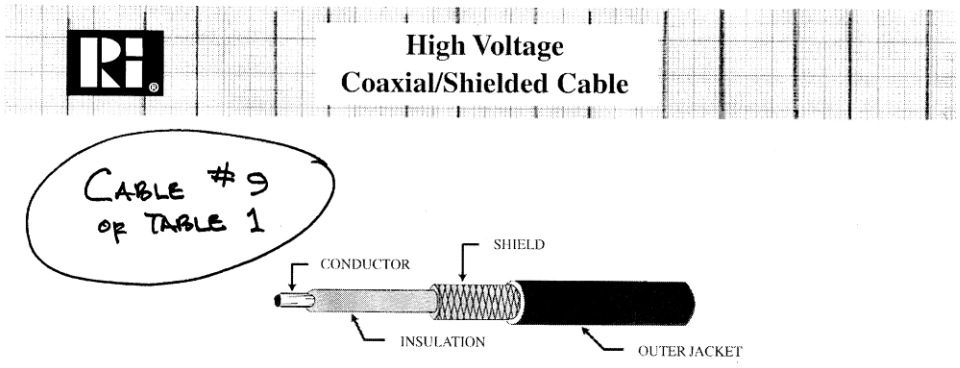

Connector for cable #7
REVISIONS
REV
ED
DESCRIPTION
DWN
APPROVED
DATE
E
10722
ADDED COLOR BAND
LOCATION; SEE ECO
DKC
3-0057
SH 1
DATA CONTAINED IN THIS DOCUMENT IS PROPRIETARY TO TROMPETER ELECTRONICS INC. AND SHALL NOT BE DISCLOSED, COPIED OR USED FOR PROCUREMENT OR MANUFACTURE WITHOUT EXPRESS WRITTEN PERMISSION.
POLARIZATION CHART
KEYING LETTER
E DEGREES
G DEGREES
H DEGREES
COLOR BAND
T 100° 150° 110° RED
U 120° 130° 110° ORANGE
V 115° 130° 115° YELLOW
W 125° 110° 125° GREEN
X 130° 100° 130° BLUE
Y 110° 140° 110° VIOLET
Z 100° 160° 100° GRAY
S 135° 135° 90° WHITE
NONE 120° 120° 120° NONE
INCH MM
005 0.13
030 0.76
090 2.29
140 3.56
281 7.14
284 7.21
380 9.65
664 10.52
680 16.00
685 16.13
750 19.05
800 20.32
875 22.00
901 32.77
1.290 ±.030
.090
.414 MIN
.800 DIA
.380 DIA
.625-24UNEF-2A
COLOR BAND
COLOR BAND
.750 HEX NUT
.866
.284
.281
.635
.630 DIA
RECOMMENDED PANEL CUTOUT
SCALE: NONE
5. EXAMPLE OF COMPLETE MODEL NO:
BJ73-T
BASIC MODEL NO
POLARIZATION LETTER
4. CONCENTRIC TWINAX/TRIAX 3-LUG BAYONET FEED THRU INSULATED BULKHEAD RECEPTACLE
3. MAX PNL THK .140
2. FINISH: TFS-1A (NICKEL)
1. ALL DIM ARE IN INCHES
QTY
DESCRIPTION
PART NUMBER
ITEM
TOL UNLESS SPECIFIED
.XX ±.01
.XXX ±.005
.XXXX ±
ANGLES ±
TROMPETER ELECTRONICS, INC.
BJ73
DWN DKC 7-20-94
CHK
ENGR
APPR
NEXT ASSY
MATERIAL
CODE IDENT
14949
DRAWING NO.
3-0057
REV
E
SCALE 2/1
DATE 2-5-81
SHEET 1 OF 2

Figure A 7



High Voltage Coaxial/ Shielded Cable

The coaxial and shielded cables shown below have been used in both military and industrial high voltage applications including Radar, ECM systems, power supplies and instrumentation. Many of the cables have controlled impedance. Figures for inductance and loop resistance (shield coupled to center conductor) are available upon request.

167-2669 and 178-8793 cables have controlled impedance, inductance and capacitance for fast response times and are used extensively to connect Exploding Bridgewire Detonators (EBW) to a Capacitor Discharge Unit (CDU).

Cable 178-5065 has foam insulation, giving lower capacitance and higher impedance. It has been used in cockpit displays.

Reynolds connectors are available for use with all cable types shown to complete your high voltage interconnection requirements.

High Voltage Coaxial/ Shielded Cable Attributes

OPERATING VOLTAGE (KVDC)	AWG	STRANDS	PLATING	CONDUCTOR Ø IN.	INSULATION MATERIAL & Ø IN.	SHIELDING AWG PLTG Ø IN.	JACKET MATERIAL Ø IN.	IMPED-ANCE OHMS	ATTEN. dB/100 FT @ 400 MHZ	CAP. pF/FT (Nom.) @ 1k HZ	PART NUMBER
600 v	30	7/38	SPC	.012	FEP .072	38 SPC .089	FEP .103	95	N/A	13.5	178-5065
18	26	19/38	SPC	.019	FEP .050	36 SPC .075	FEP .095	46	25	33.7	167-2896 [1]
20	16	19/29	TPC	.059	PE .118	36 TPC .150	PE .195	31	16	48	167-2669 [2]
22	22	19/34	SPC	.031	FEP .080	36 SPC .100	FEP .125	43	10.6	31	167-9346 [3]
25	22	19/34	SPC	.031	FEP .100	36 SPC .120	FEP .145	50	N/A	29.3	167-8726 [4]
40	20	19/32	TPC	.039	FEP .150	36 TPC .180	FEP .220	N/A	N/A	26	167-9785
40	20	19/32	SPC	.039	FEP .150	2 X 36 SPC .200	FEP .230	50	12.2	26	167-8556

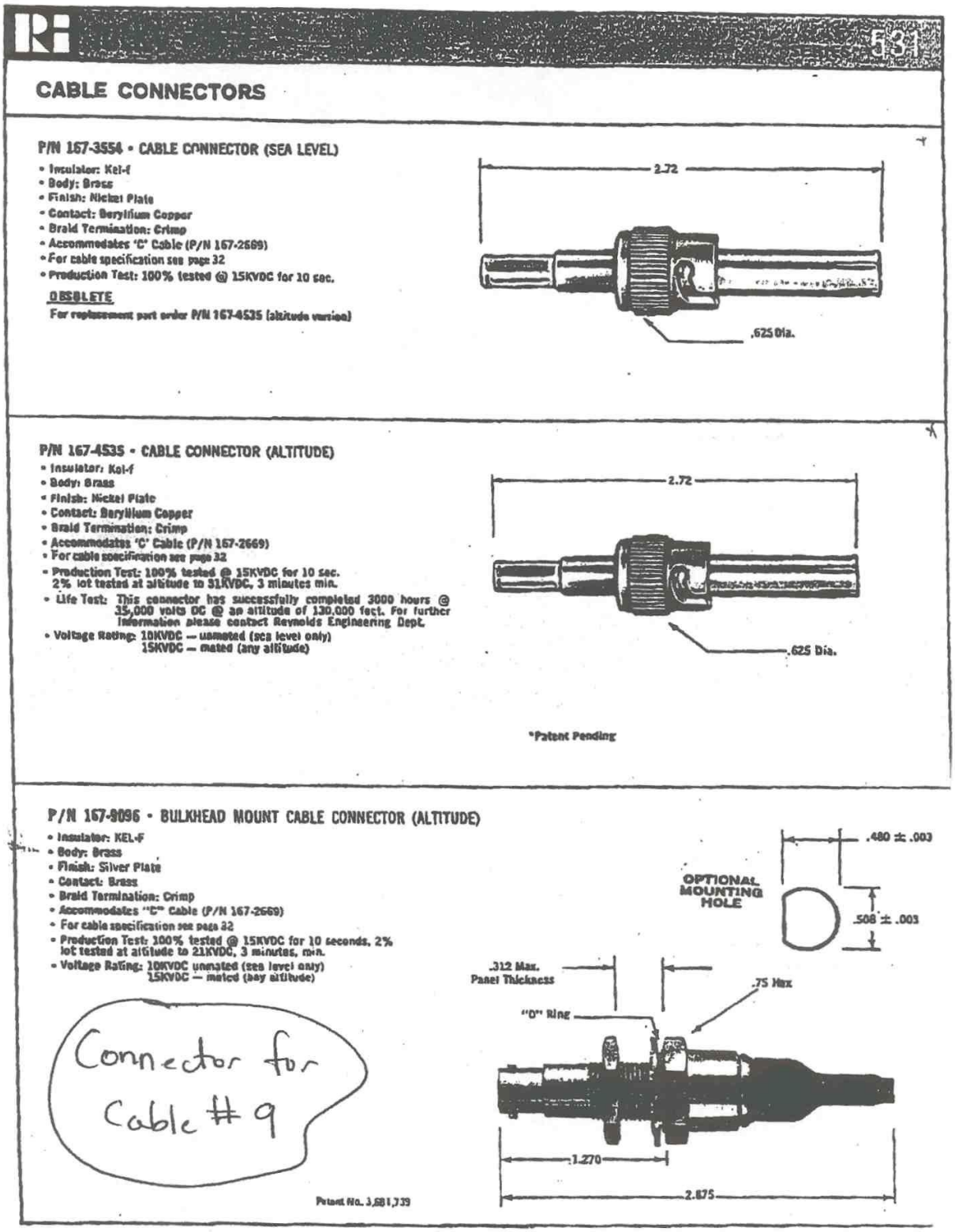
Color: Type "L" cable jacket is white. Type "C" cable jacket is red.
All other cable jackets are black.
Ordering: Use Part Number and specify length in feet.

Note: Pre-conditioning of FEP wire or cable is recommended because FEP insulation will shrink when exposed to temperature cycling. Pre-conditioning should be conducted in an air circulating oven at 204°C (400°F) for one hour. Pre-conditioning should only be performed on cut lengths prior to stripping and any termination procedure. *No attempt should be made to condition wire or cable in bulk form or while spooled.*

[1] Type "L" cable
[2] Type "C" cable. High temperature version (up to 260° C) available on request
[3] Type .080 "L" Cable
[4] Type .100 "L" Cable

9

Figure A 8



20

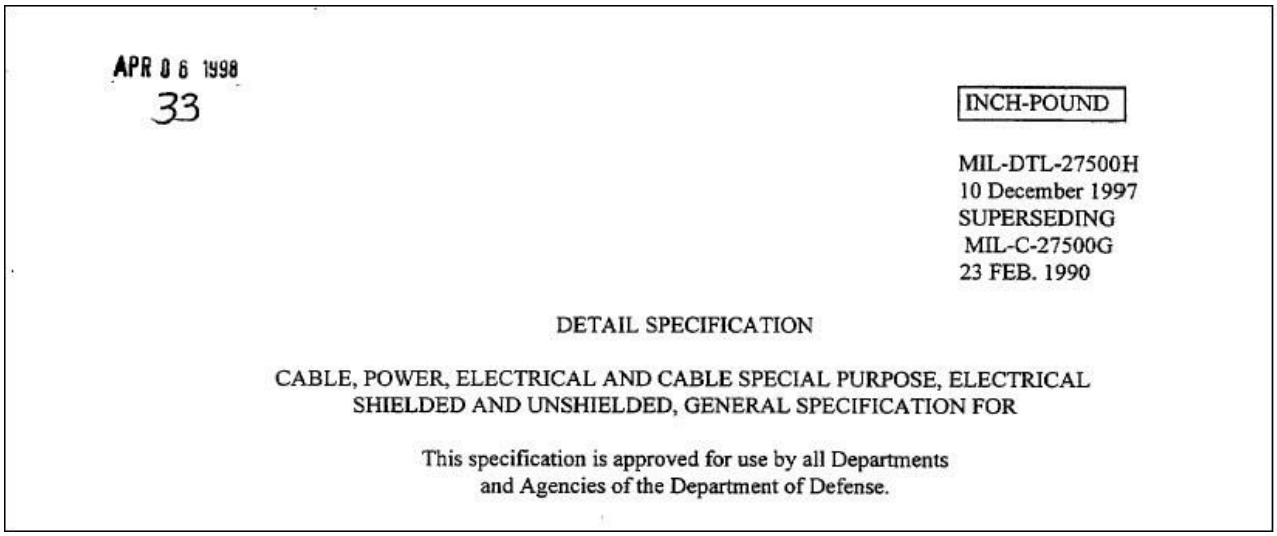
Figure A 9

Connector for Cable #9 Table 1 in TA_SI_01

Twisted Shielded Pair (#12 AWG TSP) 2 KVA max. power, 230 VAC max. voltage lines (Cable #10a Table 1): M27500G12SD2T23 or M22759/34-12-9

Twisted Shielded Pair (#8 AWG TSP) 3.5 KVA max. power, 230 VAC max. voltage lines (Cable #10b Table 1): M22759/34-8-9

This follows the MIL –spec document:



APR 0 6 1998
33

INCH-POUND

MIL-DTL-27500H
10 December 1997
SUPERSEDING
MIL-C-27500G
23 FEB. 1990

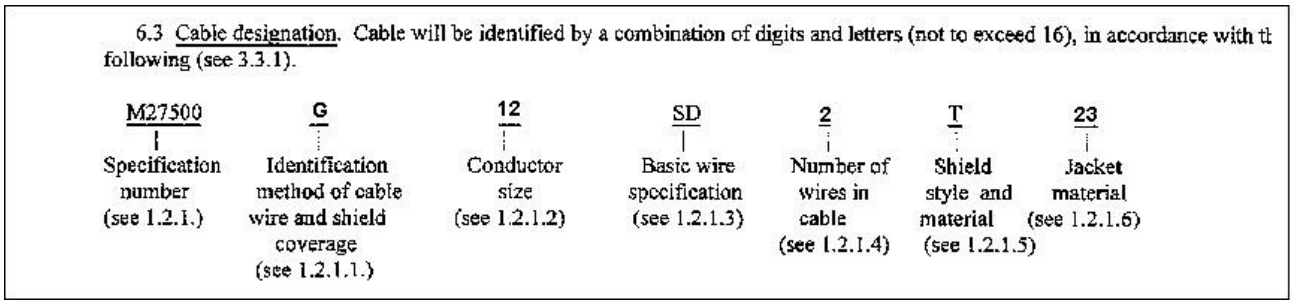
DETAIL SPECIFICATION

CABLE, POWER, ELECTRICAL AND CABLE SPECIAL PURPOSE, ELECTRICAL SHIELDED AND UNSHIELDED, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

MIL-DTL-27500H is a 33-page document.

Below is the explanation of the cable designation and references to subsections in MIL-DTL-27500H:



6.3 Cable designation. Cable will be identified by a combination of digits and letters (not to exceed 16), in accordance with th following (see 3.3.1).

M27500	G	12	SD	2	T	23
Specification number (see 1.2.1.)	Identification method of cable wire and shield coverage (see 1.2.1.1.)	Conductor size (see 1.2.1.2)	Basic wire specification (see 1.2.1.3)	Number of wires in cable (see 1.2.1.4)	Shield style and material (see 1.2.1.5)	Jacket material (see 1.2.1.6)

This means
M27500G12SD2T23 = 12 AWG; one twisted pair (red and blue); tin-coated copper, stranded conductors; round, single shield; white XLETFE jacket; with wire specification MIL-W-22759/34

Figure A 10

MIL-W-22759/34 | SAE AS22759/34

MIL-W-22759/34 Wire
SAE AS22759/34
Standard Wall
MIL Spec Wire

MIL-W-22759/34 Wire (M22759/34 Wire) Conductor:

Tinned Copper Conductor

MIL-W-22759/34 Wire (M22759/34 Wire) Insulation:

Fluoropolymer Cross-linked Modified ETFE Dual Insulation

MIL-W-22759/34 Wire (M22759/34 Wire) Jacket:

XL-ETFE

MIL-W-22759/34 Wire (M22759/34 Wire) Braid:

Treated aromatic polyamide for size 2

MIL-W-22759/34 Wire (M22759/34 Wire) Voltage Rating:

600 Volts

MIL-W-22759/34 Wire (M22759/34 Wire) Temperature Rating:

150°C

MIL-W-22759/34 Wire include:

Part Number	AWG Size	Conductor Stranding	Approx LBS/MFT	Max. Resistance @ 20°C OHMS/MFT	Min O.D. (in)	Max O.D. (in)
M22759/34-24	24	19/36	2.3	26.20	0.043	0.047
M22759/34-22	22	19/34	3.2	16.20	0.048	0.052
M22759/34-20	20	19/32	4.7	9.88	0.056	0.060
M22759/34-18	18	19/30	7.2	6.23	0.067	0.073
M22759/34-16	16	19/29	9.0	4.81	0.074	0.080
M22759/34-14	14	19/27	13.8	3.06	0.091	0.097
M22759/34-12	12	37/28	20.5	2.02	0.108	0.114
M22759/34-10	10	37/26	32.4	1.26	0.130	0.138
M22759/34-8	8	133/29	60.3	0.701	0.187	0.203
M22759/34-6	6	133/27	94.5	0.445	0.231	0.251
M22759/34-4	4	133/25	150.0	0.280	0.300	0.320
M22759/34-2	2	665/30	239.0	0.183	0.390	0.428
M22759/34-1	1	817/30	290.0		0.429	0.461
M22759/34-01	1/0	1045/30	377.0		0.469	0.501
M22759/34-02	2/0	1330/30	487.0		0.529	0.561

Figure A 10

Cable #10 Table 1 in TA_SI_01

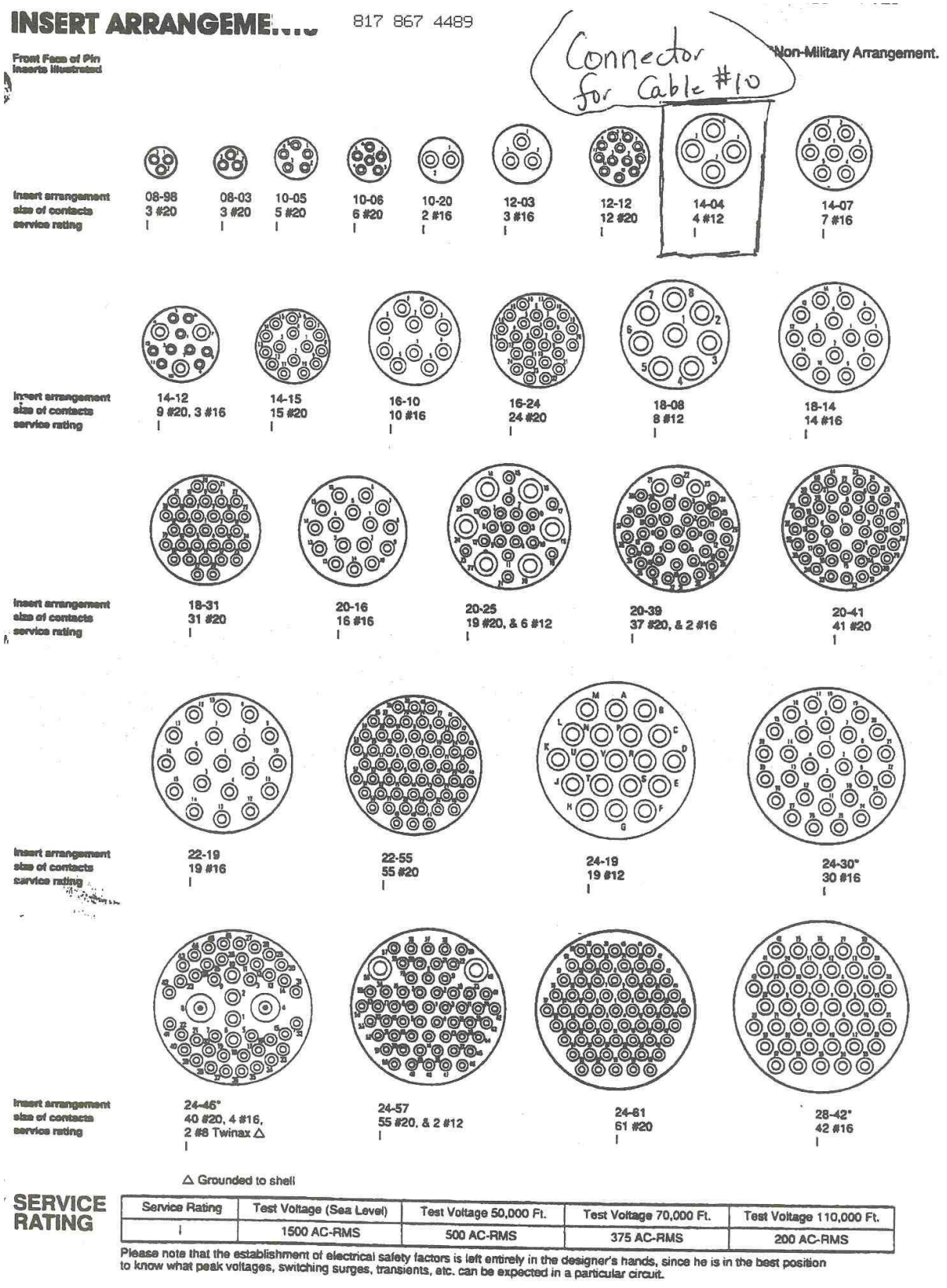


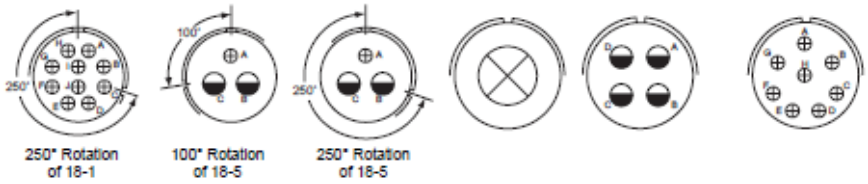
Figure A 10

Connector for Cable #10a Table 1 in TA_SI_01

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

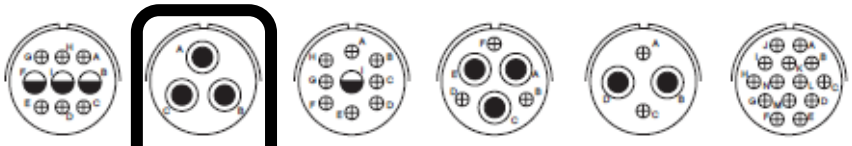
MS/Standard contact arrangements

front face of pin insert or rear face of socket insert illustrated



Insert Arrangement	18-24	18-27	18-28	20-2	20-4	20-7
Service Rating	B, C, F, G = A; Bal. = Inst.	D	D	D	D	A, B, G, H = D; C, D, E, F = A
Number of Contacts	10	2 1	2 1	1	4	8
Contact Size	16	12 16	12 16	0	12	16

Insert Arrangement	20-8*	20-9*	20-14	20-15	20-16	20-17
Service Rating	Inst.	H = D; Bal. = A	A	A	A	A
Number of Contacts	2 4	1 7	2 3	7	2 7	5 1
Contact Size	8 16	12 16	8 12	12	12 16	12 16



Insert Arrangement	20-18	20-19	20-21	20-22	20-24	20-27
Service Rating	A	A	A	A	A	A
Number of Contacts	3 6	3	1 8	3 3	2 2	14
Contact Size	12 16	8	12 16	8 16	8 16	16

* Consult Amphenol, Sidney, NY for availability.

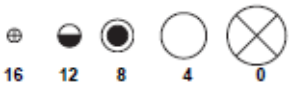


Figure A 10

Connector for Cable #10b Table 1 in TA_SI_01

SEP 25 2000 15:25 SOUTH PROGRAM 817 867 4489 P.02

817 867 4489

Teleflex INCORPORATED
fluid systems
A Division of Teleflex Incorporated (USA)

Full Vacuum Transfer Hose

CONVOLUTED

CONVOLUTED

**Full Vacuum Resistance.
Temperature Range -65°F to 400°F (-54°C to 204°C).
Noncontaminating. Chemically Inert. Flexible. Corrsion-Proof. Versatile. Long Life. Meets FDA requirements.**

Teleflex full vacuum convoluted Teflon* transfer hose effectively combines flexibility of application with corrosion resistance, long-term durability, full vacuum resistance and chemical inertness. This hose can also be found in hundreds of diverse chemical transfers, food handling, and various processing applications, from pure water to hazardous waste. It is eminently well suited for a wide variety of in-plant uses such as: loading and unloading, batch and bulk transfer, decanting vessels and drums, as well as meeting highly specialized, "one-of-a-kind" requirements.

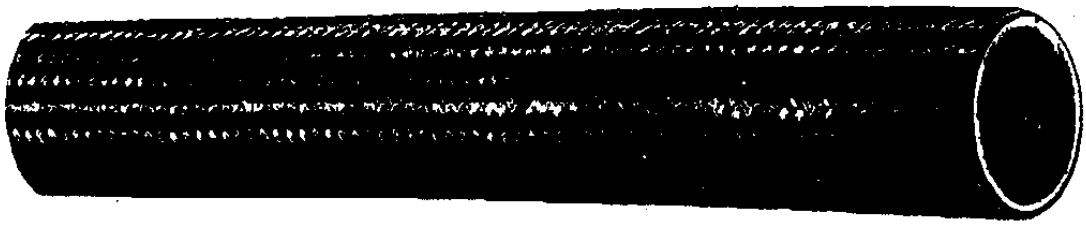
Teleflex full vacuum hose can be your "almost universal" answer for all your chemical loading and unloading of trucks, tank cars, barges and process vehicles.

Economically Attractive
The cost-effectiveness of this multi-purpose hose suggests substitution in a wide variety of applications presently utilizing nylon, rubber, metal hose or solid piping and tubing.

Exceptionally Versatile
This performance-proven combination blends a white, helical, convoluted Teflon inner tubing with a reinforced stainless steel braid and a spiral wire beneath the braid to add vacuum strength. Our T1569HV Series incorporates a conductive inner tube to dissipate electrostatic charges — an important factor during fuel handling and steam service. Both white and black innercore are resistant to almost all fluids.

Anticorrosion Construction
The latest braiding technology and material processing techniques ensure the integrity of your entire transfer system. Manufactured in an exclusive Teleflex quality controlled process, the flanges and fittings are engineered to ensure contamination-free transfer. High pressure ratings and low elongation provide an exceptional measure of personal safety and process purity protection.

Teleflex full vacuum convoluted Teflon transfer hose is especially good for any application where a flexible connection or vibration elimination is required.



Full Vacuum Hose

Nominal ID In	Nominal ID MM	Nominal OD In	Nominal OD MM	Operating Pressure PSI	Operating Pressure Bar	Burst Pressure PSI	Burst Pressure Bar	Bend Radius In	Bend Radius MM	Weight Lbs/Ft	Weight Kg/M	Hose Number White	Hose Number Conductive
1½	38.10			750	52			7.5	190.5			T1568-24HV	
2	50.80			500	34			10	254.0			T1568-32HV	
3	76.20			250	17			15	381.0			T1568-48HV	
4	101.60			150	10			24	609.6			T1568-64HV	

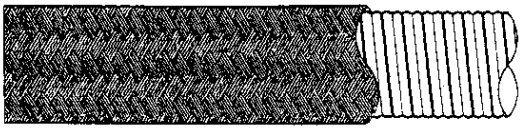
Figure A 11

SEP.25.2000 11:13AM TELEFLEX AERO HOSE NO.826 P.3

Medium Pressure Convoluted Hose of teflon*

Teleflex

FULL VACUUM CONVOLUTED TRANSFER HOSE



T1568 HV - non-conductive, PTFE lined, fiberglass reinforced innercore, spiral wire wrapped, overbraided with 300 series stainless steel.

T1569 HV - conductive (carbon impregnated), PTFE lined, fiberglass reinforced innercore, spiral wire wrapped, overbraided with 300 series stainless steel.

T1568 HV, T1569 HV

Hose Number White	Hose Number Conductive	Nominal I.D. in	Nominal O.D. in	Operating Pressure PSI	Burst Pressure PSI	Bend Radius in	Weight Lbs/Ft
T1568-24HV	T1569-24HV	1 1/2	1.85	750	3000	7.5	.89
T1568-32HV	T1569-32HV	2	2.42	500	2000	10	1.19
T1568-48HV	T1569-48HV						2.30
T1568-64HV	T1569-64HV						3.50

*A DuPont Registered Trademark

TA_SI_01 Cable list update
Vacuum & Blower hose
#11/11a
T1568-24HV
1.3 kg/m
MCS 12Jan01

Figure A 11

SEP-25-2000 15:26 SOFIA PROGRAM 817 867 4489 P.04

817 867 4489

Teleflex
fluid systems

VACUUM RATINGS

The vacuum ratings for convoluted and smooth bore hose are as follows. Full vacuum is considered to be 28.

T1568/T1569	INCHES OF Hg
-08	28
-12	28
-16	25
-20	20
-24	12
-32	5
T1568HV/T1569HV	
-24	28
-32	28
-48	28
-64	28
T1167	
-03	28
-04	28
-05	28
-06	28
-08	28
-10	28
-12	20
-16	14

Keep in mind that these factors may change if the minimum bend radius and maximum temperatures are reached.

Figure A 11

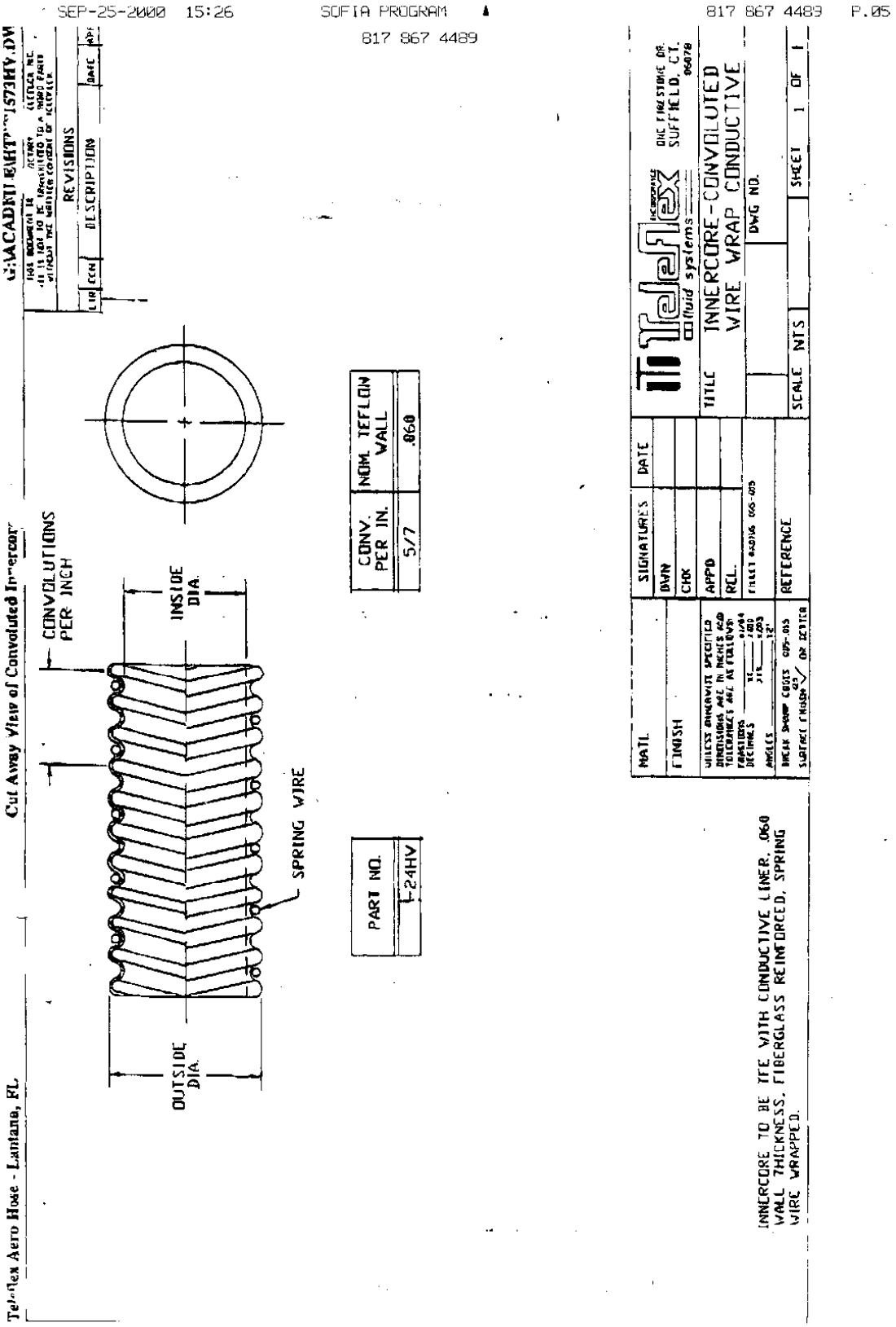

SEP-25-2000 15:26 SOFIA PROGRAM 817 867 4489 P.05
817 867 4489
C:\ACAD\TEWHT\573HV.DW
REVISIONS
DESCRIPTION
Cut Away View of Convoluted Innercore
CONVOLUTIONS PER INCH
INSIDE DIA.
OUTSIDE DIA.
SPRING WIRE
CONV. PER IN.
5/7
NOM. TEFLON WALL
.060
PART NO.
-24HV
INNERCORE TO BE TFE WITH CONDUCTIVE LINER, .060 WALL THICKNESS, FIBERGLASS REINFORCED, SPRING WIRE WRAPPED.
Teflex Aero Hose - Lantana, FL
MATL
FINISH
SIGNATURES
DRWN
CHK
APPD
REL.
DATE
TITLE
INNERCORE-CONVOLUTED
WIRE WRAP CONDUCTIVE
DWG NO.
SCALE NTS
SHEET 1 OF 1
REFERENCE
Teflex
fluid systems
DNC FINGERTIGHT DR.
SUFFIELD, CT.
06078

Figure A 11

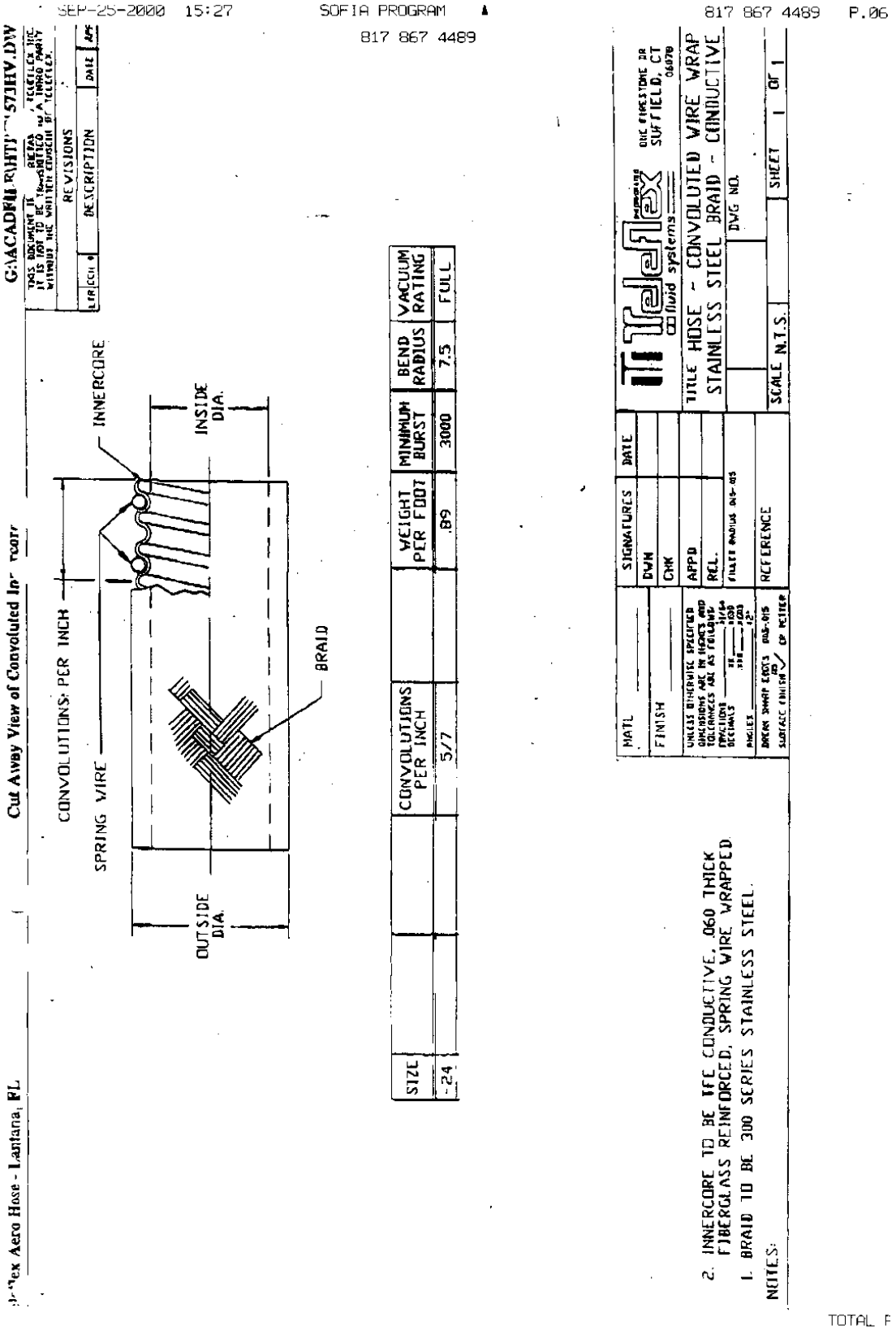
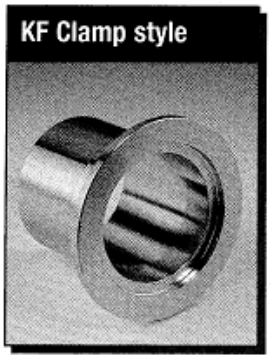
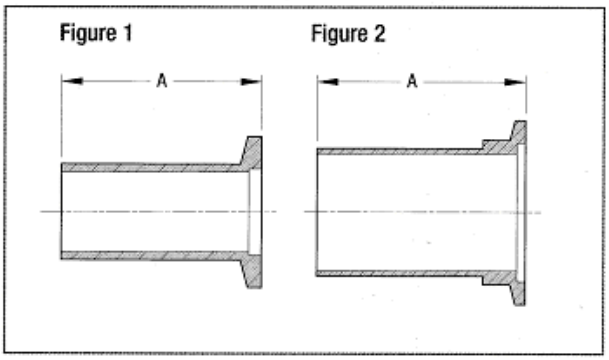

SEP-25-2000 15:27 SOFIA PROGRAM 817 867 4489 P.06
817 867 4489
G:\ACADFILE\RHTT~1\57JHEV.DWG
Cut Away View of Convoluted Inner Core
INNERCORE
INSIDE DIA.
CONVOLUTIONS PER INCH
SPRING WIRE
BRAID
OUTSIDE DIA.
SIZE
-24
CONVOLUTIONS PER INCH
5/7
WEIGHT PER FOOT
.89
MINIMUM BURST
3000
BEND RADIUS
7.5
VACUUM RATING
FULL
REVISIONS
DESCRIPTION
DATE
SIGNATURES
DATE
DWN
CHK
APPD
REL.
MATL
FINISH
REFERENCE
Tuflex
ONE FIRESTONE DR
SUFFIELD, CT
06078
TITLE HOSE - CONVOLUTED WIRE WRAP
STAINLESS STEEL BRAID - CONDUCTIVE
DWG NO.
SCALE N.T.S.
SHEET 1 OF 1
2. INNERCORE TO BE TFE CONDUCTIVE, .060 THICK
FIBERGLASS REINFORCED, SPRING WIRE WRAPPED
1. BRAID TO BE 300 SERIES STAINLESS STEEL.
NOTES:
Tuflex Aero Hose - Lantana, FL
TOTAL P

Figure A 11





- NW16 through NW50 sizes
- Requires hinged clamp or bulkhead clamp - see individual flange size
- One-piece construction, except where noted

NOMINAL REF ISO	FLANGE O.D.	NOMINAL TUBE SIZE	FIGURE	TUBE O.D.	WALL THICKNESS	A	WT LB	REFERENCE	PART NUMBER	PRICE $
STAINLESS STEEL										
NW16	1.18	1/2	1	.50	.065	.50	1/4	K050-SWS	715100	8
NW16	1.18	1/2	1	.50	.065	1.58	1/4	K050-LWS	715105	12
NW16	1.18	3/4	1	.75	.065	.50	1/4	K075-SWS	715101	8
NW16	1.18	3/4	1	.75	.065	1.50	1/4	K075-1	720000	13
NW16	1.18	3/4	1	.75	.065	1.58	1/4	K075-LWS	715106	12
NW25	1.57	1	1	1.00	.065	.50	1/4	K100-SWS	715102	9
NW25	1.57	1	2	1.00	.065	1.58	1/4	K100-LWS	715107	14
NW25	1.57	1	2	1.00	.065	2.04	1/4	K100-1	720001	15
NW40	2.16	1	2	1.00	.065	2.04	1/4	K101-1	720002	12
NW40	2.16	1-1/2	1	1.50	.065	.75	1/4	K150-SWS	715103	16
NW40	2.16	1-1/2	2	1.50	.065	1.58	1/4	K150-LWS	715108	20
NW40	2.16	1-1/2	2	1.50	.065	2.46	1/4	K150-1	720003	17
NW50	2.95	2	1	2.00	.065	.75	1/4	K200-SWS	715104	18
NW50	2.95	2	1	2.00 [1]	.065	1.58	1/4	K200-LWS	715109	25
NW50	2.95	2	2	2.00 [1]	.065	3.21	1/4	K200-1	720004	25
ALUMINUM 6061-T6										
NW16	1.18	3/4	1	.75	.065	1.58	1/4	K075-LWSA	715110	12
NW25	1.57	1	2	1.00	.065	1.58	1/4	K100-LWSA	715111	15
NW40	2.16	1-1/2	2	1.50	.065	1.58	1/4	K150-LWSA	715112	17
NW50	2.95	2	2	2.00	.065	1.58	1/4	K200-LWSA	715113	20

[1] Welded

Exhaust Blower Hose Connectors (Part Number K150-LWS 715108)

Figure A 11

316 Stainless Steel Braided Open Pitch Convoluted Hose Chemfluor PTFE

TWOB/TBOB Series Hose Specifications

'HV' Option for Vacuum Service* Fully Rated Vacuum Hose TWOBHV/TBOBHV

*HV versions are recommended for "full vacuum" applications and always for 2 1/2", 3" and 4" assemblies.

Description

TWOB (white inner core) and TBOB (anti-static black) innercore were designed to be the optimum in PTFE hose constructions. The tube is formed from a solid homogeneous PTFE extrusion, no tape lamination here! The internal convolutions are shaped to ensure pure flow, absolutely 100% totally cleanable. The Chemfluor PTFE is much thicker than most conventional hoses. This extra thickness gives TWOB and TBOB superior vacuum ratings and "hoop" strength, easy to flex yet won't flatten when bent and are extremely crush resistant. A primary advantage of a thick tube design is its ability to be extended through the fillings and flared over to form a sealing face. This eliminates any joint between fitting and hose. Flow is uninterrupted and the assembly is completely free of areas where corrosion or bacteria can start, pressure drop through the fitting is minimal, cleanliness is assured. Standard braid material is type 316 stainless steel. See page (p1) for Polypropylene and page (p2) for PVDF (Kynar) braid options.

Chemfluor PTFE Tube

- Unexcelled chemical resistance.
- Compatible with all materials.
- Rounded, open-pitch, helical convolution design.

- easy to clean: self cleaning.
- non-stick Chemfluor PTFE tube.
- can be cleaned with steam, caustics, solvents, or other cleaning agents.
- Assured sterility.

Temperature Rating

-73° C (-100° F) to +232° C (+450° F)

Vacuum Rating

See specification chart and vacuum rating note.

Fittings

"Flare-Thru"

- Integrally lined through the fittings in flanged, female cam and groove and sanitary clamp designs-1/2" mini-sanitary Flare-Thru also available. For availability consult us.

"Crimp Style"

■ Over 36 styles of 316L SS conventional fitting designs can be mechanically attached 360 degree Radial (crimp).

Performance Ratings

TWOB

White tube: type 316 stainless steel braid reinforcement.

TBOB

Anti-static black co-extruded tube; type 316 stainless steel braid reinforcement.

"Anti-Static" Inner tube

These hoses are designed to safely convey electrically resistive fluids such as solvents, certain hydrocarbon based fuels, freon and even steam. Particularly in high flow rate applications these materials can electrically accumulate. Anti-static (conductive) tubes safely dissipate any charges to the nearest earth ground.

Specifications

Measured resistance does not exceed 10 (to the power of 6) Ohms in accordance with hose specification DIN 2823 American National Standards Institute (ANSI) C59.3-1968 ASTM D257-72; British standard BS2050: 1978. Anti-static Chemfluor PTFE tube is a co-extrusion design. A minute amount of carbon is added to the inner portion of the thick-wall construction. Chemfluor PTFE properties are completely maintained. The anti-static Chemfluor PTFE is processed to prevent chemical "leaching" or friction contamination by this conductive tube.

TWOB/TBOB hose specifications

Hose Size ID (in.)	Part Number	OD Size (in.)	Recom.'d Working Pressure (PSI)	Min Burst Pressure @ 70°F (PSI)	Min Bend Radius	Vacuum Rating	Approx. Weight
1/2	08	3/4	500	2000	2	29.9	0.20
3/4	12	1 1/8	425	1700	2 3/4	29.9	0.30
1	16	1 1/4	350	1400	4	29.9	0.40
1 1/4	20	1 5/8	337	1350	5 1/2	29.9	0.70
1 1/2	24	2	275	1100	7	29.9	0.75
2	32	2 1/2	250	1000	8 1/2	29.9	1.05
2 1/2	40	3 1/4	212	850	13	29.9	1.35
3	48	3 7/8	175	700	14	29.9	1.75
4	64	5	150	600	16	29.9	2.1

Data given is for hose only. End fitting vs. hose pressure limitations must be considered and the lower of the two ratings must be used on assemblies.
Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 250°F.
Vacuum Rating is given @ 70°F @ 2x minimum bend radius; Decrease vacuum rating 1% for every 2°F above 250°F.
Vacuum rating factors: Vacuum rating decreases when installed less than 2 X min. bend radius.
1 1/4"=26" Hg; 1 1/2"=25" Hg; "2"-20" Hg; "21/2"-17" Hg; "3"=15" Hg; "4"-13" Hg
Extended Service Life Tip: Flexible Components suggests using full length "Anti-Kink" casing or at least 16" to 24" long "anti-kink cuffs (See "Options" Section, page 47) at each fitting end to help reduce the strain on the crimp collar & fitting in high load installations.
TWOBHV SERIES For Vacuum service conditions Flexible Components offers a "Heavy-duty Vacuum" option that allows full vacuum ratings for 1 1/2", 2" & 2 1/2" sizes up to 350°F Vacuum ratings are decreased 1% for every 2°F above 350°F.
Vacuum ratings @ less than 2 X minimum bend radius: 3"HV= 20"Hg; 4"HV= 17"Hg

Figure A 11

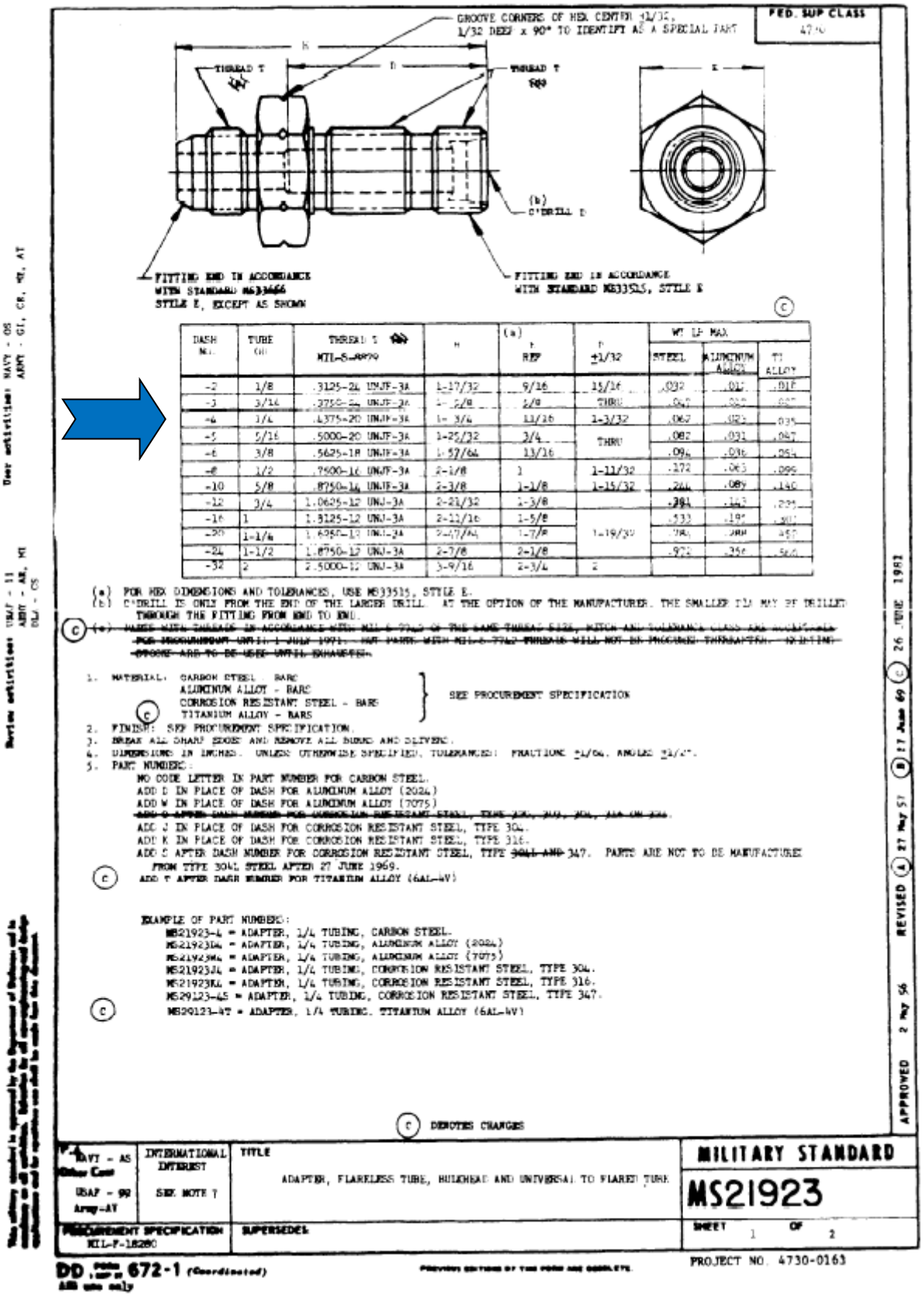
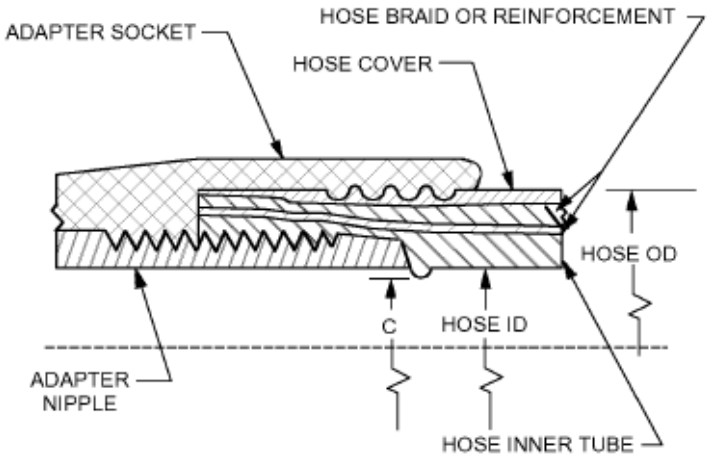

GROOVE CORNERS OF HEX CENTER 1/32, 1/32 DEEP x 90° TO IDENTIFY AS A SPECIAL PART
FED. SUP CLASS
THREAD T
THREAD T
FITTING END IN ACCORDANCE WITH STANDARD MS33656 STYLE E, EXCEPT AS SHOWN
FITTING END IN ACCORDANCE WITH STANDARD MS33515, STYLE E
(b) C'DRILL D
DASH NO.
TUBE OD
THREAD T MIL-S-8879
H
(a) F REF
F ±1/32
WT LB MAX
STEEL
ALUMINUM ALLOY
Ti ALLOY
-2 1/8 .3125-24 UNJF-3A 1-17/32 9/16 15/16 .032 .012 .019
-3 3/16 .3750-24 UNJF-3A 1-5/8 5/8 THRU .042 .022 .027
-4 1/4 .4375-20 UNJF-3A 1-3/4 11/16 1-3/32 .067 .025 .035
-5 5/16 .5000-20 UNJF-3A 1-25/32 3/4 THRU .082 .031 .047
-6 3/8 .5625-18 UNJF-3A 1-57/64 13/16 .094 .036 .054
-8 1/2 .7500-16 UNJF-3A 2-1/8 1 1-11/32 .172 .063 .096
-10 5/8 .8750-14 UNJF-3A 2-3/8 1-1/8 1-15/32 .264 .089 .140
-12 3/4 1.0625-12 UNJ-3A 2-21/32 1-3/8 .381 .143 .225
-16 1 1.3125-12 UNJ-3A 2-11/16 1-5/8 .533 .198 .307
-20 1-1/4 1.6250-12 UNJ-3A 2-7/8 1-7/8 1-19/32 .781 .288 .457
-24 1-1/2 1.8750-12 UNJ-3A 2-7/8 2-1/8 .972 .356 .568
-32 2 2.5000-12 UNJ-3A 3-9/16 2-3/4 2
(a) FOR HEX DIMENSIONS AND TOLERANCES, USE MS33515, STYLE E.
(b) C'DRILL IS ONLY FROM THE END OF THE LARGER DRILL. AT THE OPTION OF THE MANUFACTURER, THE SMALLER I.D. MAY BE DRILLED THROUGH THE FITTING FROM END TO END.
(c) (*) PARTS WITH THREADS IN ACCORDANCE WITH MIL-S-7742 OF THE SAME THREAD SIZE, PITCH AND TOLERANCE CLASS ARE ACCEPTABLE FOR PROCUREMENT UNTIL 1 JULY 1971. NOT PARTS WITH MIL-S-7742 THREADS WILL NOT BE PROCURED THEREAFTER. REVISED GROOVE ARE TO BE USED UNTIL EXHAUSTED.
1. MATERIAL: CARBON STEEL - BARS; ALUMINUM ALLOY - BARS; CORROSION RESISTANT STEEL - BARS; TITANIUM ALLOY - BARS } SEE PROCUREMENT SPECIFICATION
2. FINISH: SEE PROCUREMENT SPECIFICATION.
3. BREAK ALL SHARP EDGES AND REMOVE ALL BURRS AND SLIVERS.
4. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: FRACTIONS ±1/64, ANGLES ±1/2°.
5. PART NUMBERS:
NO CODE LETTER IN PART NUMBER FOR CARBON STEEL.
ADD D IN PLACE OF DASH FOR ALUMINUM ALLOY (2024)
ADD W IN PLACE OF DASH FOR ALUMINUM ALLOY (7075)
ADD J IN PLACE OF DASH FOR CORROSION RESISTANT STEEL, TYPE 304.
ADD K IN PLACE OF DASH FOR CORROSION RESISTANT STEEL, TYPE 316.
ADD C AFTER DASH NUMBER FOR CORROSION RESISTANT STEEL, TYPE 304L AND 347. PARTS ARE NOT TO BE MANUFACTURED FROM TYPE 304L STEEL AFTER 27 JUNE 1969.
(c) ADD T AFTER DASH NUMBER FOR TITANIUM ALLOY (6AL-4V)
EXAMPLE OF PART NUMBER:
MS21923-4 = ADAPTER, 1/4 TUBING, CARBON STEEL.
MS21923D4 = ADAPTER, 1/4 TUBING, ALUMINUM ALLOY (2024)
MS21923W4 = ADAPTER, 1/4 TUBING, ALUMINUM ALLOY (7075)
MS21923J4 = ADAPTER, 1/4 TUBING, CORROSION RESISTANT STEEL, TYPE 304.
MS21923K4 = ADAPTER, 1/4 TUBING, CORROSION RESISTANT STEEL, TYPE 316.
MS29123-4S = ADAPTER, 1/4 TUBING, CORROSION RESISTANT STEEL, TYPE 347.
(c) MS29123-4T = ADAPTER, 1/4 TUBING, TITANIUM ALLOY (6AL-4V)
(c) DENOTES CHANGES
APPROVED 2 May 56 REVISED (A) 27 May 57 (B) 17 Jun 69 (C) 26 JUNE 1982
User activities: NAVY - OS ARMY - GL, CR, MI, AT
Review activities: USAF - 11 ARMY - AR, MI DLA - CS
INTERNATIONAL INTEREST
SEE NOTE 7
TITLE
ADAPTER, FLARELESS TUBE, BULKHEAD AND UNIVERSAL TO FLARED TUBE
MILITARY STANDARD
MS21923
SHEET 1 OF 2
PROCUREMENT SPECIFICATION MIL-F-18280
SUPERSEDES
PROJECT NO. 4730-0163
DD FORM 672-1 (Coordinated)

Figure A 12

MIL-DTL-8794F



Hose size dash number	Adapter size dash number	ID of hose				OD of hose inch (mm)		C (see note 3) Minimum diameter inch (mm)
		fraction inch	decimal inch	mm	Tolerance inch (mm)			
-3	-3	1/8	.125	3.18	+.019 (0.48) -.000	.453 (11.51)	+.023 (0.58) -.016 (0.41)	.080 (2.03)
-4	-4	3/16	.188	4.78	+.026 (.66) -.000	.516 (13.11)		.132 (3.35)
-5	-5	1/4	.250	6.35	+.031 (0.79) -.000	.578 (14.68)		.200 (5.08)
-6	-6	5/16	.313	7.95		.672 (17.07)		.260 (6.60)
-8	-8	13/32	.406	10.31		.766 (19.46)	±.023 (0.58)	.350 (8.89)
-10	-10	1/2	.500	12.70	+.039 (0.99) -.000	.922 (23.42)		.450 (11.43)
-12	-12	5/8	.625	15.88	+.042 (1.07) -.000	1.078 (27.38)		.575 (14.61)
-16	-16	7/8	.875	22.23		1.234 (31.34)	±.031 (0.79)	.781 (19.84)
-20	-20	1 -1/8	1.125	28.58	+.047 (1.19) -.000	1.500 (38.10)		1.015 (25.78)
-24	-24	1 - 3/8	1.375	34.93		1.750 (44.45)		1.250 (31.75)
-32	-32	1 - 3/16	1.813	46.05		2.219 (56.36)	±.047 (1.19)	1.719 (43.66)
-40	-40	2 - 3/8	2.375	60.33	+.062 (1.57) -.000	2.875 (73.03)		2.178 (55.32)
-48	-48	3	3.000	76.20		3.563 (90.50)		2.803 (71.20)

FIGURE 1. Hose construction.

6

Figure A 12

Mating hose for interface with Cooling Line Cable #12 Table 1 in TA_SI_01

INCH-POUND
MS24587E
14 May 2007
SUPERSEDING
MS24587D
22 September 2000

DETAIL SPECIFICATION SHEET

ADAPTER ASSEMBLY, STRAIGHT, HOSE TO TUBE,
REUSABLE, HYDRAULIC, FUEL AND OIL LINES

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-DTL-5070.

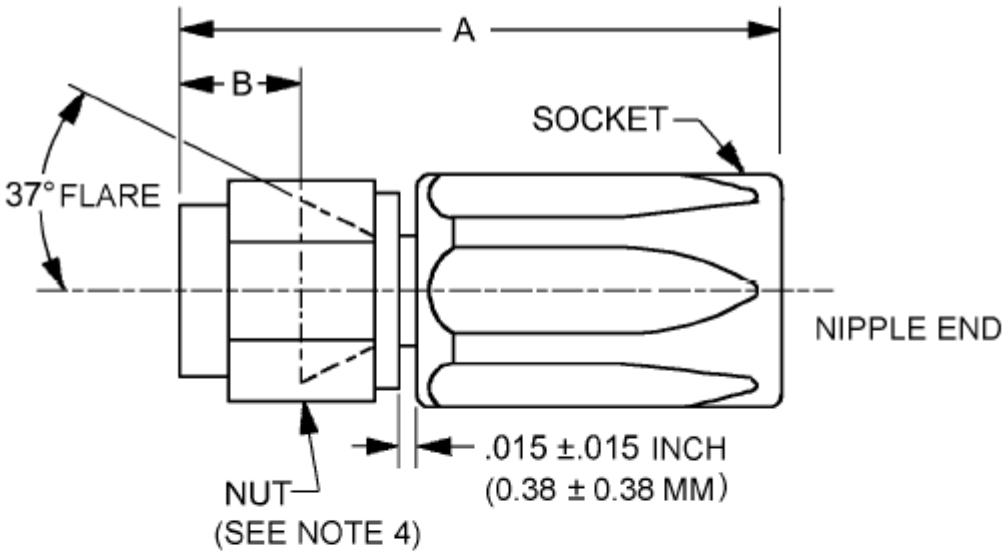


FIGURE 1. Straight adapter dimensions and configuration.

AMSC N/A FSC 4730

Figure A 12
Mating hose adapter for interface with Cooling Line Cable #12 Table 1 in TA_SI_01

MS24587E

Dash number	Hose ID (ref) inches (mm)	Tubing OD (ref) inches (mm)	Nipple PIN (see note 6) MS24588	Socket PIN MS24590	Nut PIN AN818	A (max) inches (mm)	B inches (mm)
-3 (see note 5)	.125 (3.18)	.188 (4.78)	-3	-3	-3	1.68 (42.67)	.320 (8.13) ±.016 (.41)
-4	.188 (4.78)	.250 (6.35)	-4	-4	-4	1.80 (45.72)	.375 (9.53) ±.030 (.76)
-5	.250 (6.35)	.313 (7.95)	-5	-5	-5	1.96 (49.78)	
-6	.313 (7.95)	.375 (9.53)	-6	-6	-6	2.10 (53.34)	
-8	.406 (10.31)	.500 (12.70)	-8	-8	-8D	2.58 (65.53)	.438 (11.13) ±.030 (.76)
-10	.500 (12.70)	.625 (15.88)	-10	-10	-10D	2.85 (72.39)	.515 (13.08) ±.030 (.76)
-12	.625 (15.88)	.750 (19.05)	-12	-12	-12D	3.20 (81.28)	.562 (14.27) ±.030 (.76)
			MS24589	MS24591			
-16	.875 (22.23)	1.000 (25.40)	-16	-16	-16D	2.87 (72.90)	.620 (15.75) ±.030 (.76)
-20	1.125 (28.58)	1.250 (31.75)	-20	-20	-20D	3.05 (77.47)	
-24	1.375 (34.93)	1.500 (38.10)	-24	-24	-24D	3.34 (84.84)	.765 (19.43) ±.030 (.76)
-32	1.813 (46.05)	2.000 (50.80)	-32	-32	-32D	4.08 (103.63)	.937 (23.80) ±.030 (.76)

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Unless otherwise specified, tolerances are as follows: Angles ±1°; decimals ±.005 inch (0.13 mm).
4. Nut must swivel freely after assembly.
5. Size -3 shall not be used in hydraulic applications.
6. Part or Identifying Number (PIN).

FIGURE 1. Straight adapter dimensions and configuration - Continued.

2

Figure A 12
Mating hose adapter for interface with Cooling Line Cable #12 Table 1 in TA_SI_01

MS24587E

REQUIREMENTS:

Dimensions and configurations: The design, construction, and physical dimensions shall be in accordance with MIL-DTL-5070 and figure 1 in case of conflict between this drawing and MIL-DTL-5070, this drawing shall govern.

Intended use: This assembly is designed for use only with hose in accordance with MIL-DTL-8794.

Materials: Materials shall be in accordance with MIL-DTL-5070.

Finish: Finish shall be in accordance with MIL-DTL-5070.

Color identification: Color identification shall be accordance with MIL-DTL-5070.

PIN example:

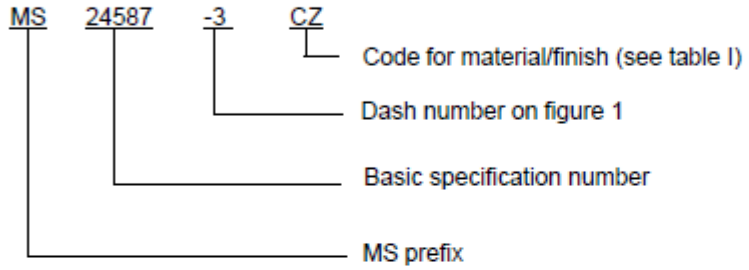


TABLE I. Code for material and finish.

Code	Dash size	Material/finish
CC	-3 thru -6	Carbon Steel – cadmium plating
CZ	-3 thru -6	Carbon steel – zinc plating
SS	-3 through -6	Corrosion resistant steel - N/A
AA	-8 through -32	Aluminum – anodic coating
TA	-3 through -32	Titanium - Anodized or fluoride phosphated.

To the users of this document, it is recommended that the use of carbon steel material with cadmium plating be used only when the other materials and finishes specified in this document cannot meet performance requirements.

Identification of product. The PIN and the manufacturer's Commercial and Government Entity (CAGE) Code or trademark shall be marked on a removable tag securely attached to the assembly.

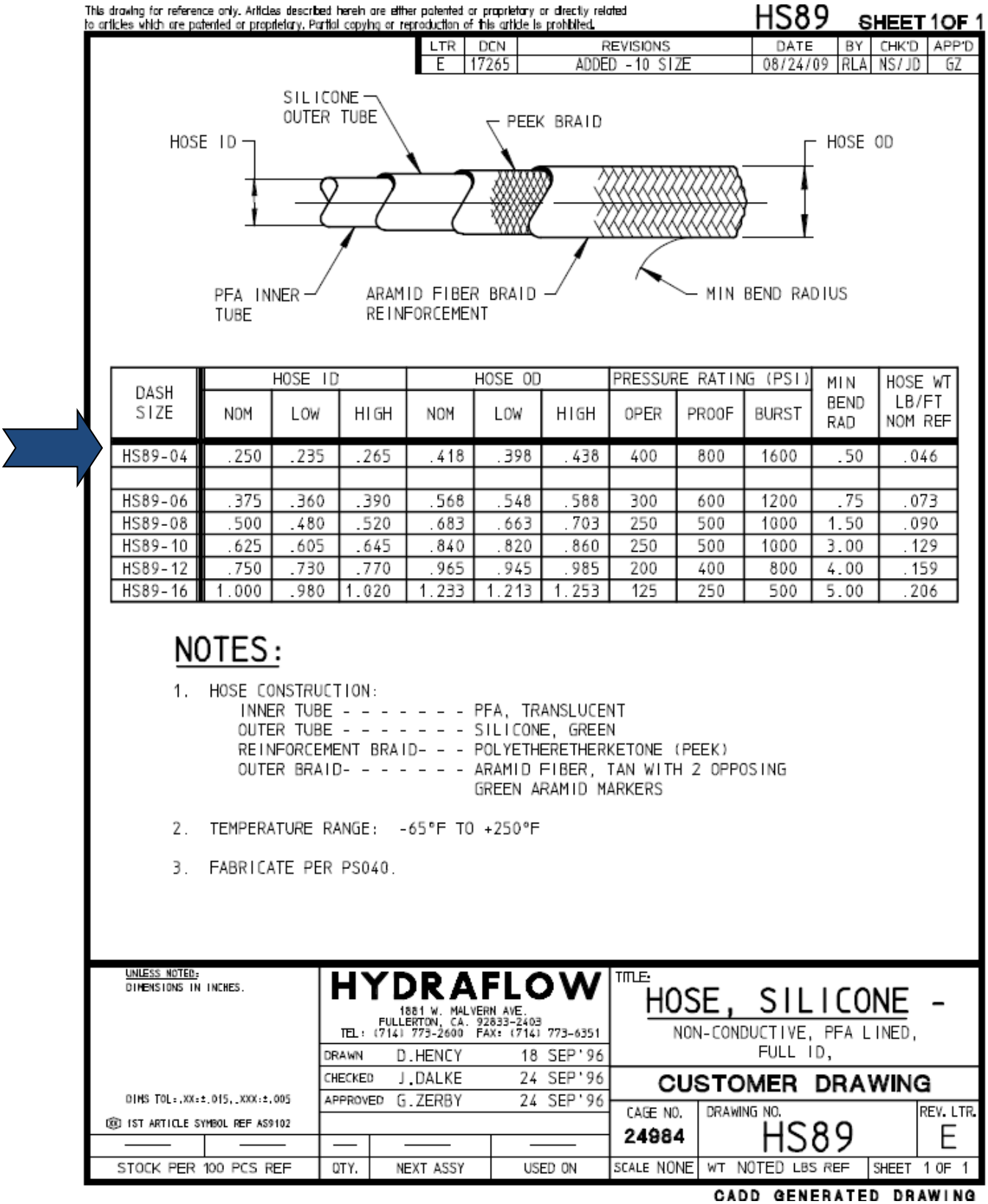
Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extent of the changes.

Referenced documents. In addition to MIL-DTL-5070, this document references the following:

AN818 MS24590
MS24588 MS24591
MS24589 MIL-DTL-8794

3

Figure A 12
Mating hose adapter for interface with Cooling Line Cable #12 Table 1 in TA_SI_01



This drawing for reference only. Articles described herein are either patented or proprietary or directly related to articles which are patented or proprietary. Partial copying or reproduction of this article is prohibited.

HS89 SHEET 1 OF 1

LTR	DCN	REVISIONS	DATE	BY	CHK'D	APP'D
E	17265	ADDED -10 SIZE	08/24/09	RLA	NS/JD	GZ

DASH SIZE	HOSE ID			HOSE OD			PRESSURE RATING (PSI)			MIN BEND RAD	HOSE WT LB/FT NOM REF
	NOM	LOW	HIGH	NOM	LOW	HIGH	OPER	PROOF	BURST		
HS89-04	.250	.235	.265	.418	.398	.438	400	800	1600	.50	.046
HS89-06	.375	.360	.390	.568	.548	.588	300	600	1200	.75	.073
HS89-08	.500	.480	.520	.683	.663	.703	250	500	1000	1.50	.090
HS89-10	.625	.605	.645	.840	.820	.860	250	500	1000	3.00	.129
HS89-12	.750	.730	.770	.965	.945	.985	200	400	800	4.00	.159
HS89-16	1.000	.980	1.020	1.233	1.213	1.253	125	250	500	5.00	.206

NOTES:

1. HOSE CONSTRUCTION:
   INNER TUBE - - - - - - - PFA, TRANSLUCENT
   OUTER TUBE - - - - - - - SILICONE, GREEN
   REINFORCEMENT BRAID- - - POLYETHERETHERKETONE (PEEK)
   OUTER BRAID- - - - - - - ARAMID FIBER, TAN WITH 2 OPPOSING GREEN ARAMID MARKERS
2. TEMPERATURE RANGE: -65°F TO +250°F
3. FABRICATE PER PS040.

UNLESS NOTED:
DIMENSIONS IN INCHES.

DIMS TOL=.XX=±.015,.XXX=±.005

(XX) 1ST ARTICLE SYMBOL REF AS9102

HYDRAFLOW
1881 W. MALVERN AVE.
FULLERTON, CA. 92833-2403
TEL: (714) 773-2600 FAX: (714) 773-6351

DRAWN	D.HENCY	18 SEP'96
CHECKED	J.DALKE	24 SEP'96
APPROVED	G.ZERBY	24 SEP'96

TITLE: HOSE, SILICONE - NON-CONDUCTIVE, PFA LINED, FULL ID,

CUSTOMER DRAWING

CAGE NO.	DRAWING NO.	REV. LTR.
24984	HS89	E

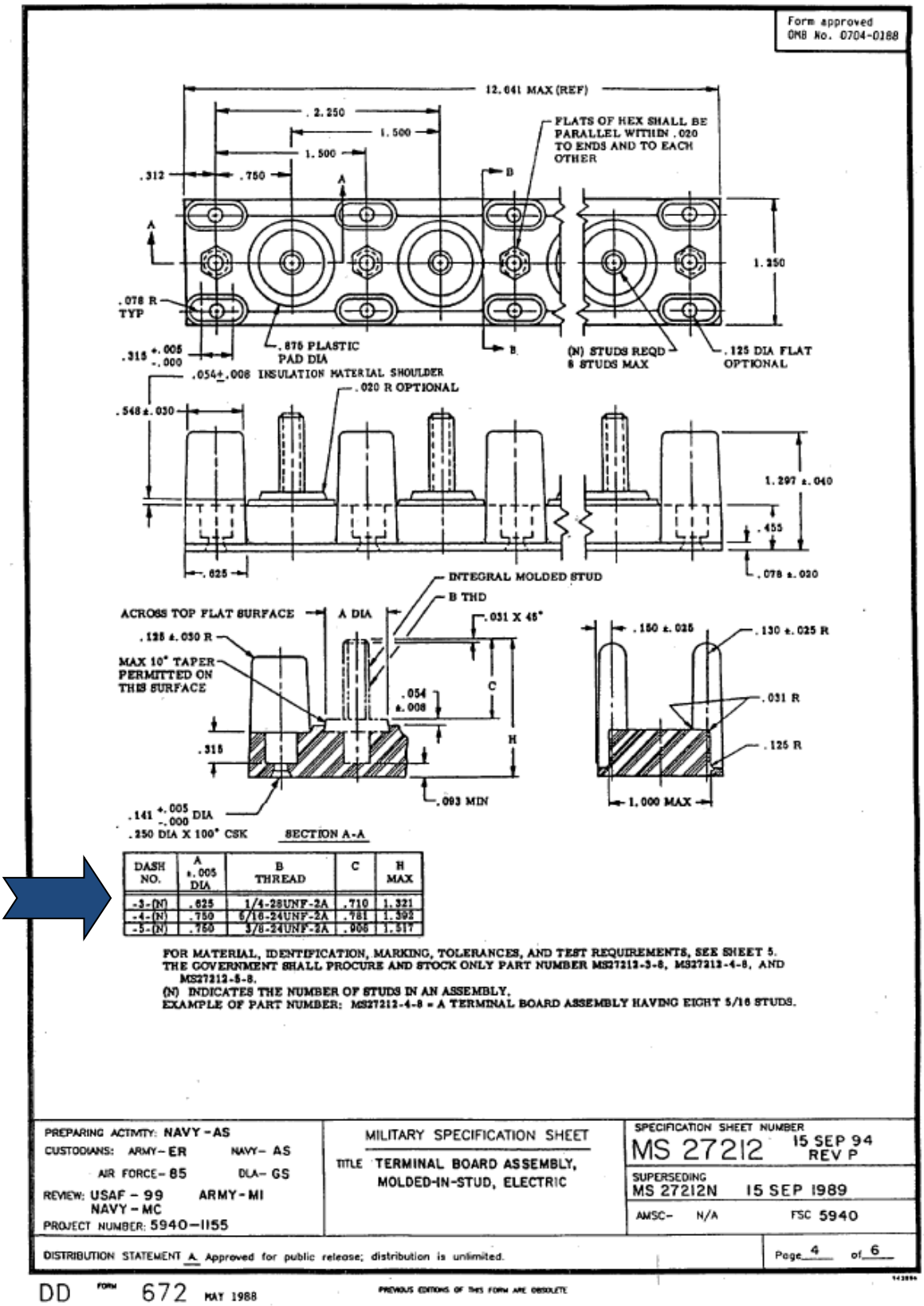
STOCK PER 100 PCS REF	QTY.	NEXT ASSY	USED ON	SCALE NONE	WT NOTED LBS REF	SHEET 1 OF 1

CADD GENERATED DRAWING

Figure A 12

Cooling Line Cable #12 Table 1 in TA_SI_01

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE



DASH NO.	A ±.005 DIA	B THREAD	C	H MAX
-3-(N)	.625	1/4-28UNF-2A	.710	1.321
-4-(N)	.750	5/16-24UNF-2A	.781	1.393
-5-(N)	.750	3/8-24UNF-2A	.906	1.517

FOR MATERIAL, IDENTIFICATION, MARKING, TOLERANCES, AND TEST REQUIREMENTS, SEE SHEET 5.
THE GOVERNMENT SHALL PROCURE AND STOCK ONLY PART NUMBER MS27212-3-8, MS27212-4-8, AND MS27212-5-8.
(N) INDICATES THE NUMBER OF STUDS IN AN ASSEMBLY.
EXAMPLE OF PART NUMBER: MS27212-4-8 = A TERMINAL BOARD ASSEMBLY HAVING EIGHT 5/16 STUDS.

PREPARING ACTIVITY: NAVY - AS
CUSTODIANS: ARMY - ER NAVY - AS
AIR FORCE - 85 DLA - GS
REVIEW: USAF - 99 ARMY - MI
NAVY - MC
PROJECT NUMBER: 5940-1155

MILITARY SPECIFICATION SHEET
TITLE TERMINAL BOARD ASSEMBLY, MOLDED-IN-STUD, ELECTRIC

SPECIFICATION SHEET NUMBER
MS 27212 15 SEP 94 REV P
SUPERSEDING
MS 27212N 15 SEP 1989
AMSC- N/A FSC 5940

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.
Page 4 of 6

DD FORM 672 MAY 1988
PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODISS SPECIFIED IN THE SOLICITATION: NONE

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE.

Figure A 13

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODISS SPECIFIED IN THE SOLICITATION: NONE

Form approved
OMB No. 0704-0188

ADDITIONAL REQUIREMENTS:

1. MATERIAL: INSULATION MATERIAL, DIALLYLISOPHTHALATE GDI-30F, MIL-M-14, 155°±3°C TOTAL CONTINUOUS RATING.
   STUDS: CORROSION-RESISTANT STAINLESS STEEL IN ACCORDANCE WITH ONE OF THE FOLLOWING TYPES:
   a) MIL-S-7720, COMPOSITION 302, CONDITION A, PASSIVATED IN ACCORDANCE WITH QQ-P-35;
   b) ASTM-A582, TYPE 303, CONDITION A, CLEANED IN ACCORDANCE WITH MIL-S-5002, WITHOUT PASSIVATION;
   c) ASTM-A493, TYPE XM-7 (UNS DESIGNATION S30430), PASSIVATED IN ACCORDANCE WITH QQ-P-35;
   d) SAE-AMS5686, TYPE 305, PASSIVATED IN ACCORDANCE WITH QQ-P-35; OR
   e) SAE-AMS7472, TYPE 305 (MODIFIED), PASSIVATED IN ACCORDANCE WITH QQ-P-35.
2. IDENTIFICATION MARKING: EACH TERMINAL BOARD SHALL BE PERMANENTLY MARKED WITH THE MS NO. AND THE DASH NO. WITHOUT M. MARKING MAY BE INKED, HOT STAMPED, OR MOLDED. RAISED MARKINGS SHALL BE .003 INCH OR LESS IN HEIGHT.
3. DIMENSIONS ARE IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ±.016, ANGLES ±2°.
4. THE CUMULATIVE TOLERANCE BETWEEN THE TWO END MOUNTING HOLES SHALL BE A MAXIMUM OF .003 INCH PER INCH OF LENGTH.
5. THREADS SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-S-7742. STUDS MAY HAVE A MAXIMUM OF TWO IMPERFECT THREADS AT THE WASHER FACE END.
6. (P) INTEGRALLY MOLDED PARTS; PRIOR TO MOLDING, METAL PARTS SHALL BE THOROUGHLY CLEANED TO REMOVE METAL CHIPS AND DUST AND STUDS SHALL BE ROUNDED. METAL PARTS (STUDS, THREADED INSERTS, TERMINAL PLATES EXCEPT FEED-THROUGH TYPE WHICH IS AN ASSEMBLED PART, AND TERMINAL STRIPS) SHALL BE MOLDED INTEGRALLY WITH THE TERMINAL-BOARD BASE. FOLLOWING MOLDING, ALL MOLDING MATERIALS SHALL BE REMOVED FROM CONTACT SURFACES AND THREADED PORTIONS. STUD SHOULDERS SHALL BE SPOT FACED TO ASSURE CLEAN, FLAT CONTACT SURFACES.

TEST REQUIREMENTS:

MINIMUM TORQUE VALUES: NO. 6 STUD, 22 POUND INCHES
NO. 8 STUD, 32 POUND INCHES
NO. 10 STUD, 40 POUND INCHES
1/4 STUD, 150 POUND INCHES
5/16 AND 3/8 STUDS, 170 POUND INCHES
THE MOLDED INTEGRAL STUD SHALL NOT BREAK, DISTORT OR PULL OUT OF THE TERMINAL BOARD BEFORE THE MINIMUM TORQUE VALUE IS REACHED.

POROSITY AND SURFACE DEFECTS: THE FINISHED TERMINAL BOARD SHALL COMPLY WITH THE GENERAL REQUIREMENTS OF MIL-M-14 PARAGRAPHS COVERING "SURFACE DEFECTS" AND "POROSITY".

DIELECTRIC STRENGTH TEST: THE TERMINAL BOARD SHALL BE CAPABLE OF WITHSTANDING 2500 VOLTS RMS FOR ONE MINUTE WHEN APPLIED BETWEEN ADJACENT STUDS AND BETWEEN STUD AND GROUND WITHOUT BREAKDOWN OR FLASHOVER.

THERMAL SHOCK: (P) THE TERMINAL BOARDS SHALL BE SUBJECTED TO THE TORQUE TEST BEFORE THERMAL SHOCK. THE TERMINAL BOARDS SHALL THEN BE MOUNTED BY NORMAL MOUNTING MEANS TO A STEEL GROUND PLATE AND TESTED ACCORDING TO METHOD 107 OF MIL-STD-202, TEST CONDITION A, EXCEPT STEP 3 SHALL BE 180±3±C. EXAMINATIONS AFTER CYCLING - TERMINAL BOARDS SHALL SHOW NO EVIDENCE OF CRACKING, CRAZING, CHIPPING, STRETCHING, SHRINKAGE, FLOWING, WARPING, OTHER DISTORTION OF THE PLASTIC MATERIAL, LOOSENING, MOVEMENT, OR DISTORTION OF PARTS. THE TERMINAL BOARD SHALL THEN BE RETESTED FOR ABILITY TO MEET THE TORQUE REQUIREMENT.

(P) NOTES:

1. FOR BUSSES TO CONNECT TERMINAL STUDS, USE MS25226.
2. FOR STRIPS TO INSULATE MOUNTING SCREWS, USE MS3373.
3. FOR COVER ASSEMBLIES, USE MS18029.
4. THE GOVERNMENT WILL ONLY PROCURE AND STOCK FULL LENGTH BOARDS. BOARDS REQUIRING A LESSER NUMBER OF STUDS THAN A MAXIMUM FULL LENGTH BOARD MAY BE MADE BY CUTTING THE FULL LENGTH BOARD INTO SMALLER LENGTHS. ALLOWANCE MUST BE MADE FOR THE LOSS OF ONE STUD FOR EACH CUT.
   EXAMPLE: ONLY 5 BOARDS OF 3 STUD LENGTH EACH CAN BE OBTAINED FROM A 20 STUD BOARD. CUTTING BOARDS TO THE DESIRED SIZE SHALL BE PERFORMED AT POINT OF INSTALLATION. THE INSTALLING ACTIVITY SHALL FURNISH FOR EACH TERMINAL STUD THE FOLLOWING RECOMMENDED HARDWARE:

PREPARING ACTIVITY: NAVY - AS CUSTODIANS: ARMY - ER NAVY - AS AIR FORCE - 85 DLA - GS REVIEW: USAF - 99 ARMY - MI NAVY - MC PROJECT NUMBER: 5940-1155	MILITARY SPECIFICATION SHEET TITLE TERMINAL BOARD ASSEMBLY, MOLDED-IN-STUD, ELECTRIC	SPECIFICATION SHEET NUMBER MS 27212 15 SEP 94 REV P SUPERSEDING MS 27212N 15 SEP 1989 AMSC- N/A FSC 5940
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.		Page 5 of 6

DD FORM 672 MAY 1988 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE.

Figure A 13

Form approved
OMB No. 0704-0188

(P) TABLE I. ATTACHING HARDWARE.

	ATTACHING HARDWARE			
			NUT	
DASH NO.	FLAT WASHER	LOCKWASHER 1/	PLAIN (HEXAGON)	OR SELF-LOCKING
-1-(N)	AN960-C6	MS35338-136 OR -155	MS35649-264	MS21042-06 OR MS21042L06
-2-(N)	AN960-C10	MS35338-138 OR -157	MS35650-304	MS21042-3 OR MS21042L3
-3-(N) 2/	AN960-C416	MS35338-139 OR -158	MS35650-3254	MS21042-4 OR MS21042L4
-4-(N) 2/	AN960-C516	MS35338-140 OR -159	MS35650-3314	MS21042-5 OR MS21042L5
-5-(N) 2/	AN960-C616	MS35338-141 OR -160	MS35650-3384	MS21042-6 OR MS21042L6
-6-(N)	AN960-C8	MS35338-137 OR -156	MS35649-284	MS21042-08 OR MS21042L08

1/ LOCKWASHER IS NOT REQUIRED WHEN SELF-LOCKING TYPE NUT IS USED.
2/ TERMINAL LUGS SPECIFIED ON MS25036 AS DASH NUMBERS 135 THROUGH 141 ARE NOT TO BE ATTACHED TO THESE ASSEMBLIES.

FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATIONS FOR BID.

(P) Table II. METRIC CONVERSION.

INCH	MM	INCH	MM	INCH	MM	INCH	MM
.004	.102	.141	3.581	.430	10.922	.891	22.631
.005	.127	.150	3.810	.437	11.099	.906	23.012
.008	.203	.156	3.962	.455	11.557	.938	23.825
.020	.508	.188	4.775	.522	13.259	.953	24.206
.025	.635	.210	5.334	.548	13.919	1.000	25.400
.030	.762	.218	5.537	.565	14.351	1.005	25.527
.031	.787	.222	5.639	.568	14.427	1.079	27.406
.040	1.016	.250	6.350	.580	14.732	1.125	28.575
.047	1.194	.257	6.528	.594	15.088	1.250	31.750
.050	1.270	.275	6.985	.595	15.113	1.297	32.944
.054	1.372	.281	7.137	.625	15.875	1.321	33.553
.071	1.803	.297	7.544	.688	17.475	1.392	35.357
.078	1.981	.312	7.925	.710	18.034	1.500	38.100
.093	2.362	.315	8.001	.750	19.050	1.517	38.532
.094	2.388	.328	8.331	.781	19.837	2.250	57.150
.115	2.921	.350	8.890	.789	20.041	12.334	313.284
.125	3.175	.375	9.525	.875	22.225	12.454	316.332
.130	3.302	.388	8.585	-	-	-	-

PREPARING ACTIVITY: NAVY-AS CUSTODIANS ARMY-ER NAVY-AS AIR FORCE-85 DLA-GS REVIEW: USAF-99 ARMY-MI USER: NAVY-MC PROJECT NUMBER: 5940-1155	MILITARY SPECIFICATION SHEET TITLE TERMINAL BOARD ASSEMBLY, MOLDED-IN-STUD, ELECTRIC	SPECIFICATION SHEET NUMBER MS 27212 15 SEP 94 REV P SUPERSEDING MS 27212N 15 SEP 1989 AMSC- N/A FSC 5940
DISTRIBUTION STATEMENT A Approved for public release; distribution is unlimited.		Page 6 of 6

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Figure A 13

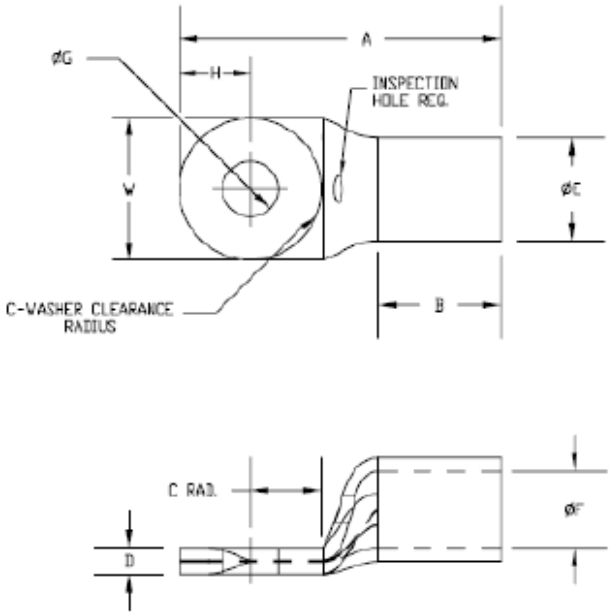

FIGURE 2 – TERMINALS FOR WIRE SIZE 12 THRU 0000

SAE Aerospace An SAE International Group	AEROSPACE STANDARD TERMINAL, LUG, CRIMP STYLE, COPPER, UNINSULATED, RING TONGUE, TYPE I, CLASS 1, FOR 175 °C TOTAL CONDUCTOR TEMPERATURE	SAE AS20659 SHEET 2 OF 7	REV. D

Figure A 13

SI Grounding Strap Lug mates w/ Terminal Strip Cable #13 Table 1 in TA_SI_01

TABLE 1 - DIMENSIONS

DASH NO.	WIRE SIZE	STUD SIZE	A MAX	B MIN	C MIN RADIUS	D MAX	D MIN	E DIA	F DIA	G DIA MAX	G DIA MIN	J DIA MIN	W MAX	W MIN
167		2 (.086)	.890		.115					.098	.090		.260	.178
138		4 (.112)	.890		.125					.122	.114		.260	.178
101		6 (.138)	.890		.125					.152	.142		.260	.210
102	22-18	10 (.190)	.968	.250	.172	.045	.023	.140 .115	.073 .052	.203	.193	.120	.320	.305
161		5/16 (.312)	1.187		.284					.338	.323		.540	.450
125		3/8 (.375)	1.308		.328					.400	.385		.540	.520
162		1/2 (.500)	1.530		.378					.525	.510		.733	.703
139		4 (.112)	.947		.125					.122	.114		.266	.234
103		6 (.138)	.955		.172					.152	.142		.327	.297
126		6 (.138)	.947		.125					.152	.142		.266	.234
104	16-14	10 (.190)	.955	.250	.172	.053	.029	.162 .145	.095 .081	.203	.193	.153	.327	.234
163		5/16 (.312)	1.249		.284					.338	.323		.540	.450
127		3/8 (.375)	1.290		.328					.400	.385		.540	.520
164		1/2 (.500)	1.593		.378					.525	.510		.733	.703
165		6 (.138)	.955		.202					.152	.142		.317	.290
105		10 (.190)	.969		.172					.203	.193		.391	.365
106	12-10	5/16 (.312)	1.156	.250	.296	.080	.037	.230 .210	.139 .129	.338	.323		.547	.485
128		3/8 (.375)	1.172		.328					.400	.385		.598	.536
166		1/2 (.500)	1.718		.378					.525	.510		.733	.703
140		8 (.164)	1.150		.234					.178	.168		.429	.386
107		10 (.190)	1.150		.234					.203	.193		.429	.386
141	8	1/4 (.250)	1.219	.315	.265	.084	.038	.272 .260	.186 .176	.275	.260		.478	.435
108		5/16 (.312)	1.297		.296					.338	.323		.590	.547
129		3/8 (.375)	1.297		.328					.400	.385		.590	.547
142		1/2 (.500)	1.545		.440					.525	.510		.833	.680
130		10 (.190)	1.312		.238					.203	.193		.503	.460
109		1/4 (.250)	1.312		.265					.275	.260		.503	.460
131	6	5/16 (.312)	1.437	.375	.305	.084	.043	.316 .295	.232 .222	.338	.323		.623	.580
110		3/8 (.375)	1.437		.328					.400	.385		.623	.580
143		1/2 (.500)	1.676		.440					.525	.510		.833	.700

Figure A 13
SI Grounding Strap Lug mates w/ Terminal Strip Cable #13 Table 1 in TA_SI_01