ASES Antenna Test Box

US&S Part No.
N22514901

- Operation
- Troubleshooting

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Revision History

REV.	DATE	NATURE OF REVISION
0.0	April 2008	Initial Issue

Table of Contents

List of Figures

List of Tables

1. GENERAL INFORMATION

1.1. Purpose

This document provides instructions to use the ASES Antenna Test Box, US&S Part Number N22514901. This manual also provides a troubleshooting section and an illustrated parts catalog.

1.2. Scope

The ASES Antenna Test Box (ATB) is used to verify that the ASES Antenna is energized correctly. Indication that the antenna is properly energized is observed via a meter on the front of the ATB.

1.3. Goals and Objectives

The goals of the ASES Antenna Test Box assembly are:

- Verify the integrity of the vehicle wiring from the ASES Antenna to the carborne ASES enclosure.
- Verify the ASES Antenna operates correctly and transmits a 27 MHz signal.

1.4. Safety Summary

Throughout this manual there are notes, cautions, and warnings that should be followed by the user.

- Notes provide additional information for the subject being discussed in a particular section of the manual
- Cautions present considerations which, if ignored, could result in equipment damage
- Warnings present considerations which, if ignored, could result in personnel injury or death.

Electrical equipment can have high voltage and high temperature areas. Exercise caution when working around electrical equipment.

Follow all local and railroad safety requirements.

1.5. Abbreviations and Acronyms

The following abbreviations and acronyms are used in this manual:

ASES	Advanced Speed Enforcement System
ATB	Antenna Test Box
CPU	Central Processing Unit
mA	milliamp
MHz	megahertz
NJT	New Jersey Transit
SDU	Speed Display Unit
US&S	Union Switch & Signal
Vac	volts, alternating current
Vdc	volts, direct current

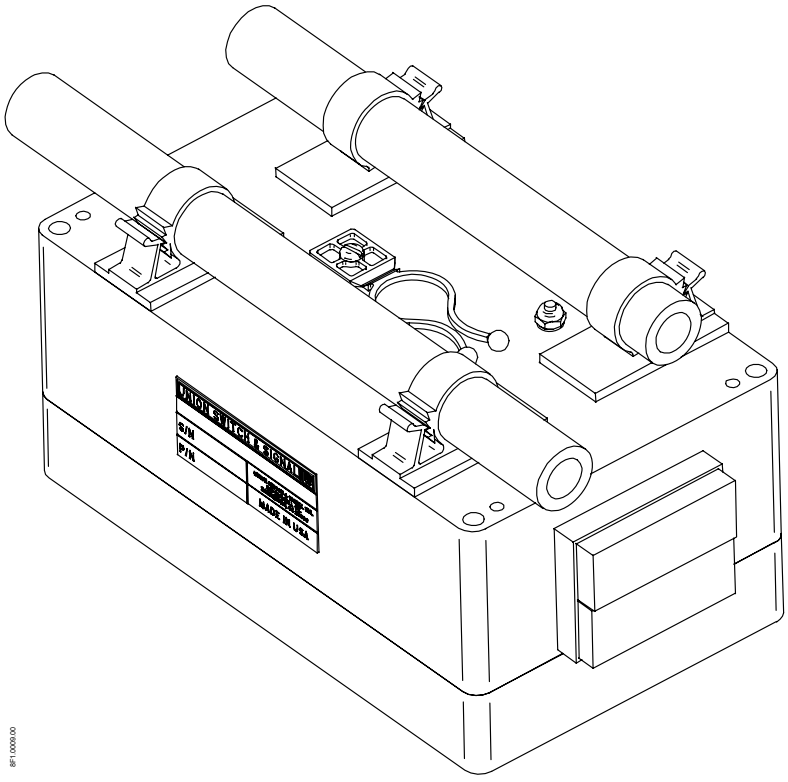

Figure 1-1. ASES Antenna Test Box

2. DESCRIPTION OF OPERATION

The ASES Antenna is mounted under the vehicle and receives information from active and passive wayside transponders located between the rails. The antenna transmits the information received over vehicle wiring to the electronic components in the ASES enclosure for information and processing. The ASES Antenna activates the transponders to send wayside information to the vehicle by transmitting a 27 MHz signal to the transponders when the vehicle passes over them.

The ASES Antenna Test Box contains a wire loop and a 0-1.0 milliamp (mA) meter movement that indicates when the ASES Antenna is operating and transmitting its 27 MHz signal. When the ATB is placed under an ASES Antenna and the antenna is energized, the meter on the front panel of the ATB deflects to indicate that the ASES Antenna is functioning properly.

The ATB does not calibrate the ASES antenna; it only verifies that the antenna is energized and producing a 27 MHz signal.


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3. ASES ANTENNA TEST PROCEDURE

The following procedure verifies the integrity of the vehicle wiring between the ASES enclosure and ASES Antenna, and tests the ASES Antenna for proper operation.

3.1. Required Equipment

- Functional ASES system with a fully-populated ASES rack
- Functional Speed Display Unit (SDU)
- NJT ASES Antenna Test Box

3.2. Procedure

Step	Procedure
1	DE-ENERGIZE the ASES equipment enclosure.
2	POSITION the ASES Antenna Test Box underneath the ASES Antenna with the ATB centered between the rails.
3	ENERGIZE the ASES equipment enclosure. ACKNOWLEDGE the alarm.
4	ENTER #1900# on the SDU keypad to access the SES Services Menu.
5	SELECT option '8' in the SES Services Menu on the SDU to energize the ASES Antenna
6	MONITOR the meter on the ASES Antenna Test Box. VERIFY the meter deflects from 0 towards 1.0 mA.
7	SELECT option '9' in the SES Services Menu on the SDU to exit this mode and end the test.

End of Procedure.


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4. ATB TEST AND TROUBLESHOOTING PROCEDURE

If the user encounters a problem with the ATB indication or operation, perform the following ATB troubleshooting and test procedures.

4.1. Test Description

In the field, the ATB is tested by placing the assembly under the ASES Antenna, energizing the ASES enclosure, and using the SES Services Menu option by entering #1900# on the SDU.

If the ATB fails or does not operate when the ASES Antenna is energized, the ATB requires repair. Refer to Figure 4-1 for a schematic diagram of the ATB electrical components. The ATB physical internal connections are illustrated in Figure 4-2, and are accessed by removing the ATB bottom cover.

4.2. Required Equipment

- ASES Antenna Test Box, US&S part number N22514901
- Fluke 8060A Digital Multimeter or equivalent
- Multimeter test leads and spare test lead.

4.3. Prerequisites

4.3.1. ATB Mechanical Inspection

1. Visually inspect the ATB assembly exterior to ensure components are installed in accordance with Figure 1-1.
2. Verify there is no damage to the ATB assembly box, tubes, or ammeter.

4.3.2. Test Setup

Remove the four screws from the bottom corners of the ATB and remove the cover.

Set the Digital Multimeter to measure resistance.

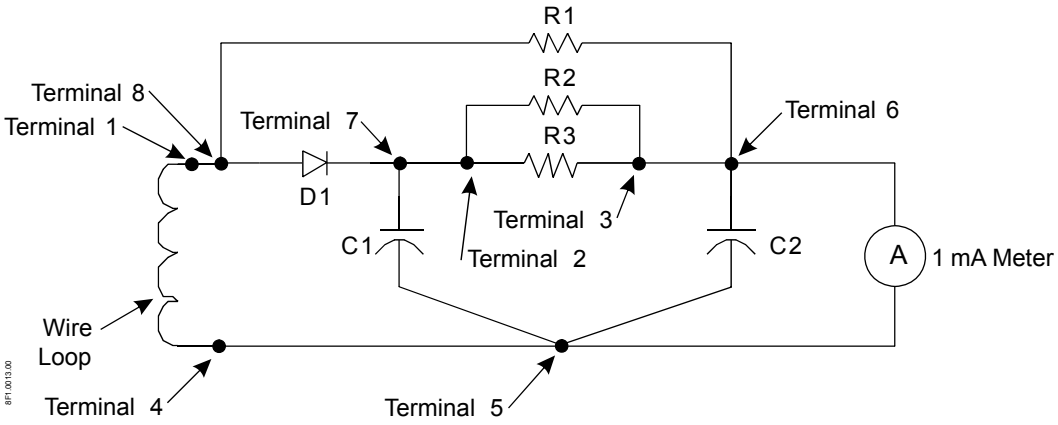

Figure 4-1. Antenna Test Box Schematic Diagram

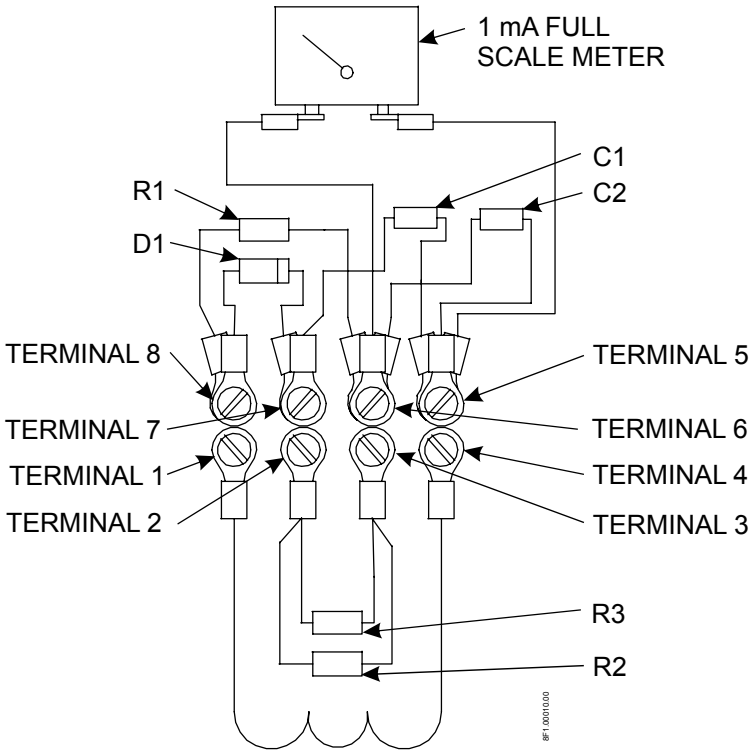

Figure 4-2. Antenna Test Box Connection Diagram

4.4. Test Procedure

Document test results on the **Data Sheet** that follows the procedure.

Refer to the following illustrations:

Figure 4-1. Antenna Test Box Schematic Diagram

Figure 4-2. Antenna Test Box Connection Diagram

Step	Procedure
1	MEASURE the resistance between Terminal 2 and Terminal 3 with the multimeter. VERIFY the resistance measured is 4337 ohms, ± 5% (4120 – 4554 ohms). RECORD the measured resistance value on the Data Sheet.
2	DISCONNECT one side of resistor R1and diode D1 from Terminal 8. MEASURE the resistance between Terminal 1 and Terminal 4 with the multimeter. VERIFY the resistance measured is less than 1.0 ohm. RECORD the measured resistance value on the Data Sheet.
3	CONNECT one test lead from the Digital Multimeter to the R1 lead removed from Terminal 8. MEASURE the resistance of R1 between the wire and Terminal 6 with the multimeter VERIFY the resistance measured is 22.1 Kohm ± 1 % (21879 – 22321 ohms). RECORD the measured resistance value on the Data Sheet
4	SET the multimeter to measure the forward voltage drop across diode D1. CONNECT the positive test lead (+) of the multimeter to the anode of D1. CONNECT the common test lead of the multimeter to the cathode (color band end) of D1 or to Terminal 7. MEASURE the voltage drop across diode D1. VERIFY the voltage drop is 0.7 volts ± 10 % (0.63 – 0.77 volts). RECORD the measured voltage value on the Data Sheet
5	RECONNECT diode D1 and resistor R1 to Terminal 8.
6	SET the multimeter to measure resistance. DISCONNECT the leads of capacitors C1 and C2 from Terminal 5. CONNECT the common test lead of the multimeter to the lead of capacitor C1 removed from Terminal 5. (Note: C1 is connected between Terminals 5 and Terminal 7.) CONNECT the other test lead of the multimeter to the lead of capacitor C1 connected to Terminal 7. CONNECT one end of an additional test lead to the multimeter common lead connected to capacitor C1. CONNECT the other end of the additional test lead to Terminal 7. VERIFY the resistance measured is less than 1.0 ohm. REMOVE the test lead from Terminal 7 while monitoring the multimeter. VERIFY the resistance measured increases as capacitor C1 begins to charge. REPLACE capacitor C1 if the resistance value does not increase. RECORD that the resistance reading increases on the Data Sheet.
7	REMOVE the additional test lead and the multimeter test leads from capacitor C1

Step	Procedure
8	CONNECT the common lead of the multimeter to the lead of capacitor C2 that was removed from Terminal 5. (Note: C2 is connected between Terminals 5 and Terminal 6.) CONNECT the other test lead of the multimeter to the lead of capacitor C2 connected to Terminal 6. CONNECT one end of an additional test lead to the multimeter common lead at6ached to capacitor C2. CONNECT the other end of the additional test lead to Terminal 6. VERIFY the resistance measured is less than 1.0 ohm. REMOVE the test lead from Terminal 6 while monitoring the multimeter. VERIFY the resistance measured increases as capacitor C2 begins to charge. REPLACE capacitor C2 if the resistance value does not increase. RECORD that the resistance reading increases on the Data Sheet.
9	REMOVE the additional test lead and the multimeter test leads from capacitor C2.
10	CONNECT the common lead of the multimeter to the ATB ammeter lead that was removed from Terminal 5. CONNECT the other multimeter test lead to the capacitor C2 lead connected to Terminal 6. VERIFY the ammeter needle indicates movement and the resistance measured is 48 ohms ± 10% (44 - 53 ohms). REPLACE the ammeter if the needle does not move or the resistance value is not correct. RECORD meter needle movement and the measured resistance value on the Data Sheet.
11	RECONNECT the leads for capacitors C1 and C2 to Terminal 5.
12	INSTALL the Antenna Test Box cover.
13	COMPLETE all Data Sheet entries.

End of Procedure.

Data Sheet

Serial Number of Antenna test Box _____

Date of Test _____

Step 1) Resistance Measured _____ ohms
(Allowable Tolerance = 4120 – 4554 ohms)

Step 2) Resistance Measured _____ ohms
(Allowable Tolerance = < 1.0 ohm)

Step 3) Resistance Measured _____ ohms
(Allowable Tolerance = 21879 – 22321 ohms)

Step 4) Voltage Measured _____ volts
(Allowable tolerance = 0.63 – 0.77 volts)

Step 6) Resistance measurement increases? Yes _____ No _____

Step 8) Resistance measurement increases? Yes _____ No _____

Step 10) Resistance Measured _____ ohms
(Allowable Tolerance = 44 – 53 ohms)

ATB ammeter Needle Movement? Yes _____ No _____

Antenna Test Box Test Result (check one):

☐ **PASSED** ☐ **FAILED**

Signature: _____ Date : _____


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5. PARTS CATALOG

The ASES Antenna Test Box is assembled by Union Switch and Signal Inc. from parts manufactured and purchased by US&S. The following table lists the parts used to assemble the ATB.

Refer to Figure 5-1 and Figure 5-2.

Table 5-1. Antenna Test Box N22514901 Parts List

ITEM	PART NUMBER	QTY.	DESCRIPTION	DETAILS
1	M22515003	1 EA	BOX, ANTENNA TEST	
2	A043225	2 FT	WIRE-#16 AWG, BELDEN 8013 WIRE-#16 AWG, SOLID TINNED COPPER BELDEN #8013	8013 BELDEN
3	JR112670000001	1 EA	METER,PANEL,MILLIAMMETER,0-1 MADC,ROHS 0-1 MADC, MILLIAMMETER ANALOG PANEL METER, 1.5# SQUARE, LEFT ZERO, TAUT BAND, UV STABILIZED, UL94V-2 FLAMMABILITY, NEMA 4X, ROHS YOKOGAWA 260100FAFA	260100FAFA YOKOGAWA CORP OF AMERICA
4	J7091460818	1 EA	TERM-STRIP 4 TERM TERMINAL - STRIP, 4 TERMINALS, DOUBLE ROW, CLOSED BACK, .375 CENTERS, 6-32 BINDING HEAD SCREW BEAU TYPE 76004, MARATHON TYPE 600A-6P-4	76004 BEAU-VENITRON 600A-6P-4 MARATHON SPECIAL PROD
5	J4751200108	3 EA	WSHR-SST PLATE NO 6 WASHER - NO. 6, PLATE, STAINLESS STEEL.	
6	J048102	2 EA	NUT-6-32 SS ELASTIC NUT - 6-32 STAINLESS STEEL, ELASTIC STOP, 5/16 HEX X 3/16 HIGH. ESNA #79NM-62.	79NM-62 ESNA

ITEM	PART NUMBER	QTY.	DESCRIPTION	DETAILS
7	J5072980110	2 EA	SCR-SST 6-32X5/8 PAN SCREW - STAINLESS STEEL 6-32 X 5/8" PAN HD. MACH.	
8	J730590	2 EA	TERM-PRE-INSUL DMDGP TERMINAL - PRE-INSULATED, DIAMOND GRIP, #22 - #16 AWG WIRE SIZE, TERMINAL POST SIZE #10. AMP INC. #36154. DWG. 8064- SH. 975A. NOTE: AMP HAND CRIMP TOOL P/N 47386, OR 47387-2, OR 59824-1, OR 68345-1, OR 69151-1 NOTE: AMP HAND CRIMP TOOL P/N 47387-2	36154 TYCO (AMP)
9	J4751210109	2 EA	WSHR-SST LOCK NO 10 WASHER - STAINLESS STEEL M SPRING LOCK WASHER NO. 10	
10	J4802110105	2 EA	NUT,10-32 HEX SST NUT - #10-32, HEX, STAINLESS STEEL, CLASS 2 FIT, DOUBLE CHAMFERED. DWG. V480211-SH. 01.	
11	J4751200106	4 EA	WASHER-#4 FLAT SS WASHER - #4 FLAT, STAINLESS STEEL, OD 0.250 MS #15795-803	15795-803 MS
12	J4751210105	4 EA	WSHR-SST LOCK NO 4 WASHER - STAINLESS STEEL M SPRING LOCK WASHER NO.4 DWG. V475121-SH.01	
13	J4802110102	4 EA	NUT-NO4-40 SST HEX NUT - NO. 4-40 STAINLESS STEEL HEX MACHINE SCREW DWG. V480211-01	
14	J730299	14 EA	TERM-PRE INSUL DIA.GTERMINAL - PRE-INSULATED, DIAMOND GRIP, RING TONGUE, #6 STUDSIZE, #22-16 AWG WIRE SIZE. AMP INC. #36152.DWG. 8064-SH. 975A. (FOR USE WITH AMP MACHINE #69875.)NOTE: AMP HAND CRIMP TOOL P/N 47386, OR 47386-2, OR 59824-1	36152 |TYCO (AMP) 698745 TYCO (AMP) 47386 TYCO (AMP)

ITEM	PART NUMBER	QTY.	DESCRIPTION	DETAILS
15	JR112870000005	4 EA	CABLE CLAMP,ADJ,1" MAX DIA,ADHESIVE BASE CABLE CLAMP, ADJUSTABLE, RE-CLOSABLE, 0.875 INCH TO 1 INCH CABLE DIA, WITH ADHESIVE BACKING, NYLON, NATURAL COLOR OPERATING TEMPERATURE RANGE: 0C TO +85C RICHCO AKKL-8710A-RT SPC TECHNOLOGY 8408-0405	AKKL-8710A-RT RICHCO 8408-0405 SPC TECHNOLOGY
16	J5072980107	1 EA	SCR-6-32X7/16 PAN HD SCREW - 6-32 X 7/16", PAN HEAD, STAINLESS STEEL, MACHINE. DWG. V507298-SH. 1	
17	J4751210107	1 EA	WASHER,SST LOCK NO 6 WASHER - STAINLESS STEEL M SPRING LOCK WASHER NO.6 DWG. V475121-SH.01	
18	J4802110103	1 EA	NUT-NO6-32 SST HEX NUT - NO. 6-32 STAINLESS STEEL HEX MACHINE SCREW DWG. V480211-01	
19	M22515001	1 EA	PIPE, PVC	
20	M22515002	1 EA	PIPE, PVC	
21	J735338	1 EA	RESISTOR,22.1K OHM 1/8 WATT RESISTOR - METAL FILM, 22.1K OHMS, 1% TOL., 1/8 WATT, RN60C. IRC, DALE, CORNING OR MEPCO.	RN60C DALE ELECTRONICS RN60C IRC
22	J735168	1 EA	RES-49.9K OHMS,1/8 W RESISTOR - METAL FILM, 49.9K OHMS, 1% TOL., 1/8 WATT. RN60C, IRC, DALE, CORNING, OR MEPCO.	RN60C IRC RN60C DALE ELECTRONICS
23	J735124	1 EA	RES-4.75K OHMS 1/8 W RESISTOR - METAL FILM, 4.75K OHMS, 1% TOL., 1/8 WATT, RN60C. IRC, DALE, CORNING OR MEPCO.	RN60C IRC RN60C DALE ELECTRONICS

ITEM	PART NUMBER	QTY.	DESCRIPTION	DETAILS
24	J7261500060	1 EA	DIODE-ZENER, 24V, 1N4749A DIODE - ZENER, 24 V(REF), 5% OR 10% TOL., 1 WATT, DO-41 PKG. FAIRCHILD #1N4749A VISHAY #1N4749A EIC #1N4749A	IN4749A FAIRCHILD SEMICONDUCTOR IN4749A EIC SEMICONDUCTOR IN4749A VISHAY IN4749 MOTOROL IN4749 THOMS.CSF
25	J706995	2 EA	CAP,6800PF,200V,5%,MPE,AXIAL,THTCAPACITOR, 6800PF, 200V MIN, 5% MAX, POLYESTER FILM/FOIL,AXIAL WRAP FILL,THTOPERATING TEMPERATURE RANGE: -55C TO +85CBISHOP ELECTRONICS WA21C682JAMERICAN SHIZUKI CORP USS11-0.0068-5%-200VCORNELL DUBILIER WMF2D68JCORNELL DUBILIER WMF2D68J-F (ROHS)	WA21C682J BISHOP ELECTRONICS WMF2D68J CORNELL DUBILIERUSS 11-0.0068-5%-200V |AMERICAN SHIZUKI CORPWMF 2D68J-F CORNELL DUBILIER
26	A0458480084	1.125 FT	WIRE-#18 AWG ETFE WHITE WIRE - #18 AWG, 19/30 STRANDING, 0-600 VOLT RATING. COLOR-WHITE, INSULATION - TEFZEL, PER EJ-18109 CABLE USA	
27	M21911701	1 EA	NAMEPLATE	
28	JR112870000009	1 EA	CABLE CLAMP,TWIST LOCK,0.85",SCREW MOUNT CABLE CLAMP, TWIST LOCK, 0.74 INCH TO 0.85 INCH BUNDLE DIA, SCREW MOUNT, 0 TO 90 DEGREE FLEX BASE, NYLONG NATURAL COLOR RICHCO TLH-800-01	TLH-800-01 RICHCO
29	A774184 (Not illustrated)	1 EA	TBG SHRINK FIT 1/16 TUBING - SHRINK FIT, 1/16IN. BLACK ALPHLEX FIT 221-1/16, 50 PERCENT SHRINKAGE AT 275 DEG. F.	

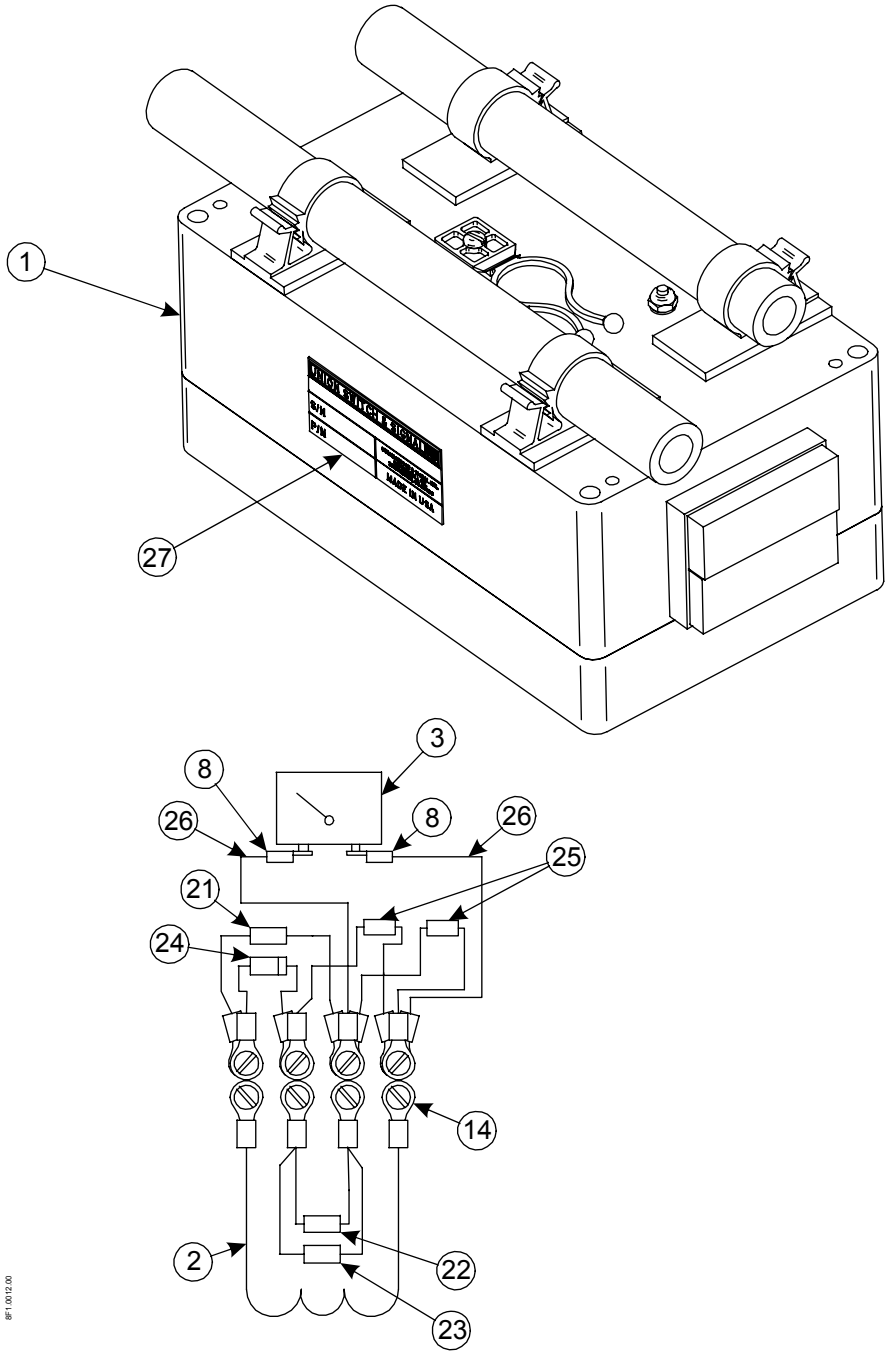

Figure 5-1. Antenna Test Box Parts (Sheet 1)

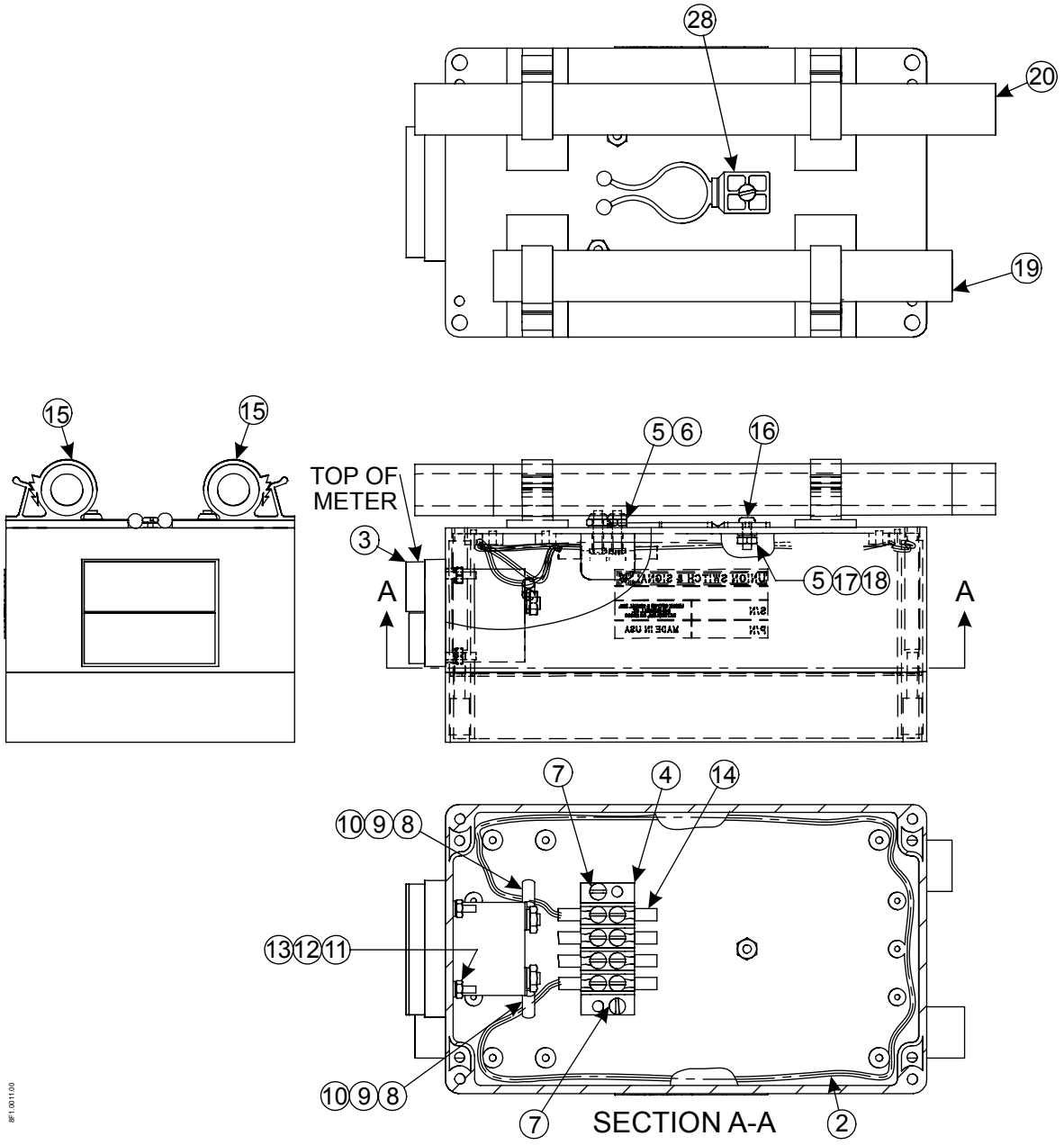

Figure 5-2. Antenna Test Box Parts (Sheet 2)

6. RAIL TEAM AND TECHNICAL SUPPORT

The Rapid Action Information Link Team (RAIL Team) is a group of experienced product and application engineers ready to assist you to resolve any technical issues concerning this product. Contact the RAIL Team in the United States at 1-800-652-7276 or by e-mail at railteam@switch.com.


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