



ASU-9000

ANTENNA SWITCHING UNIT



Installation Instructions

TiL Document No. 22RE630

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Issue 4
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Technisonic Industries Limited

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TECHNISONIC INDUSTRIES LIMITED

REVISION HISTORY [22RE630]				
For the most current revision of this document, please check the Technisonic website: www.til.ca				
REV	PAGES	DESCRIPTION	DATE	EDITED BY
A	7, 8	Added shielding to control lines as per certification testing.	Jul. 31, 2023	SM
B	10	Changed frequency range to 138 to 512 MHz.	Oct. 10, 2023	SM
B - 2	Cover Page	Changed picture on the front page to show the unit in silver.	Oct. 17, 2023	SM
B - 3	3, 4, 7, 8	Removed / relabeled unused inputs for bands 4, 5 and 6 from P1 and P2.	Jan. 31, 2024	SM
B - 4	11	Added DO-160G environmental test information	8 May 2025	SM

NOTES

CAUTION STATIC SENSITIVE !



This unit contains static sensitive devices. Wear a grounded wrist strap and/or conductive gloves when handling printed circuit boards.

FCC COMPLIANCE INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.



WARNING: For compliance with FCC RF Exposure Requirements the mobile transmitter antenna installation shall comply with the following two conditions:

1. The transmitter antenna gain shall not exceed 3 dBi.
2. The transmitter antennas shall be located outside of a vehicle and must not be co-located (kept at a separation distance of more than 20 cm from each other when installed). Also, they must be installed in such a way that they always maintain a separation distance of more than 113 cm from any person during operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

WARNING AND DISCLAIMER

Changes or modifications not expressly approved by Technisonic Industries could void the user's authority to operate the equipment.

This manual is designed to provide information about the ASU-9000 Antenna Switching Unit. Every effort has been made to make this manual as complete and accurate as possible.

WARRANTY INFORMATION

The Model ASU-9000 Antenna Switching Unit is under warranty for one year from the date of purchase. Failed units caused by defective parts or workmanship should be returned to:

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TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	GENERAL DESCRIPTION	
1.1	INTRODUCTION	1
1.2	DESCRIPTION	1
2	INSTALLATION INSTRUCTIONS	
2.1	GENERAL	2
2.2	OUTLINE DRAWING	2
2.3	PIN LOCATIONS AND DESCRIPTION	3
2.4	WIRING INSTRUCTIONS	6
2.5	WIRING DIAGRAMS	7
2.6	WIRING DETAILS	9
3	SPECIFICATIONS	
3.1	SPECIFICATIONS	10
4	DO-160G ENVIROMENTAL INFORMATION	
4.1	TEST CATEGORIES	11

SECTION 1: GENERAL DESCRIPTION

1.1 INTRODUCTION

This publication provides installation information for the ASU-9000 Antenna Switching Unit.

1.2 DESCRIPTION

The ASU-9000 Antenna Switching Unit is an interface which allows the TDFM-9000 or TDFM-9300 to be set up as 2 or 3 individual Forestry type radios (VHF main and guard receivers with a single transmit module that can be used for either main or guard). Each main and guard antenna ports are switched to a single antenna allowing only 3 antennas in an installation rather than 6. Mic, audio and PTT lines are also combined such that only 3 positions are required on the audio panel. The TDFM-9000 series radio software has been updated to provide the option to operate with the ASU-9000. Control signals are fed to the ASU-9000 via the RS-232 lines used by the RC-9000 (without affecting remote operation).

SECTION 2: INSTALLATION INSTRUCTIONS

2.1 GENERAL

The ASU-9000 is to be mounted using the holes provided in the flanges. The unit should be located as close to the TDFM-9000 as possible.

2.2 OUTLINE DRAWING

Refer to the drawing below:

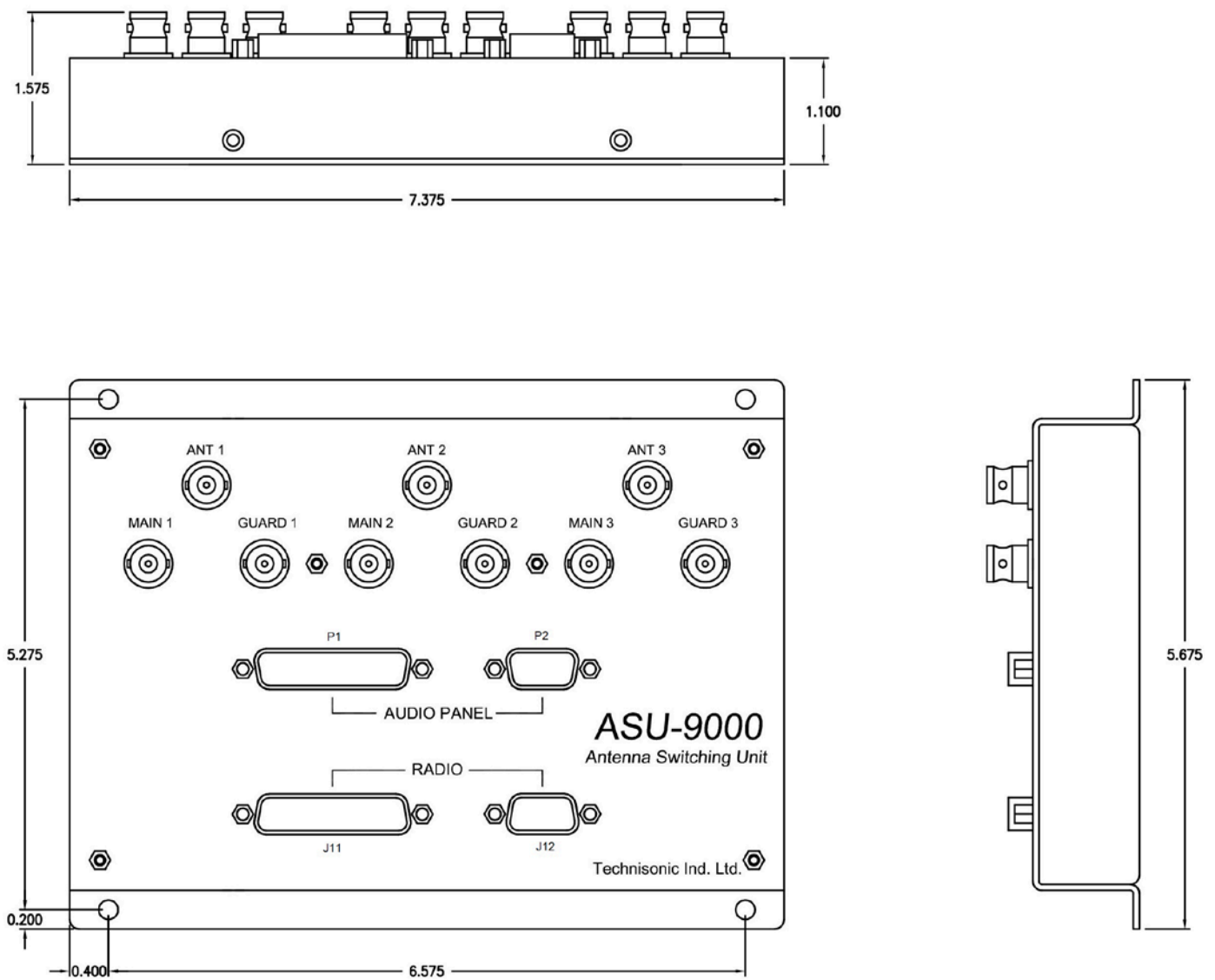


Figure 1: ASU-9000 Outline Drawing

2.3 PIN LOCATIONS AND DESCRIPTIONS

P1 (25 Pin D Connections) - Use FEMALE Connector	
Pin #	Description
1	Ground
2	Main Power +28 V _{DC}
3	Mic 1
4	Audio 1
5	PTT 1
6	Mic 2
7	Audio 2
8	PTT 2
9	Mic 3
10	Audio 3
11	PTT 3
12	TX Data
13	RX Data
14	Ground
15	Main Power +28 V _{DC}
16	Up
17	Down
18	Channel / Band
19	No Connection
20	No Connection
21	No Connection
22	No Connection
23	No Connection
24	No Connection
25	Panel Backlighting

Table 1: P1 Pin Connections (To Audio Panel)

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P2 (15 Pin High Density D Connections) – Use FEMALE Connector	
Pin #	Description
1	Ground
2	Audio Combined 1
3	No Connection
4	PTT Combined 1
5	No Connection
6	No Connection
7	Mic Combined 1
8	Speaker Lo
9	Speaker Hi
10	Audio Combined 2
11	Misc In
12	PTT Combined 2
13	Mic Combined 2
14	Misc In/Out
15	Audio Combined Ground 2

Table 2: P2 Pin Connections (To Audio Panel)

TECHNISONIC INDUSTRIES LIMITED

J11 (25 Pin D Connections) - Use FEMALE Connector	
Pin #	Description
1	Ground
2	Main Power +28 V _{DC}
3	Mic 1
4	Audio 1
5	PTT 1
6	Mic 2
7	Audio 2
8	PTT 2
9	Mic 3
10	Audio 3
11	PTT 3
12	TX Data
13	RX Data
14	Ground
15	Main Power +28 V _{DC}
16	Up
17	Down
18	Channel / Band
19	Mic 5
20	Audio 5
21	PTT 5
22	Mic 6
23	Audio 6
24	PTT 6
25	Panel Backlighting

Table 3: J11 Pin Connections (To Radio)

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J12 (15 Pin High Density D Connections) – Use FEMALE Connector	
Pin #	Description
1	Ground
2	Audio Combined 1
3	PTT4
4	PTT Combined 1
5	Audio 4
6	Mic 4
7	Mic Combined 1
8	Speaker Lo
9	Speaker Hi
10	Audio Combined 2
11	Misc In
12	PTT Combined 2
13	Mic Combined 2
14	Misc In/Out
15	Audio Combined Ground 2

Table 4: J12 Pin Connections (To Radio)

2.4 WIRING INSTRUCTIONS

The ASU-9000 shall be wired in accordance with the latest revision of the TDFM-9000 Installation Instructions – document 11RE442 or TDFM-9300 Installation Instructions – document 13RE471. The relevant details are shown below. The TDFM-9000 or TDFM-9300 must be set to 'Forestry Mode' for the ASU-9000 to work. The TDFM-9000/9300 must have software version 2.7.1 or higher.

2.5 WIRING DIAGRAMS

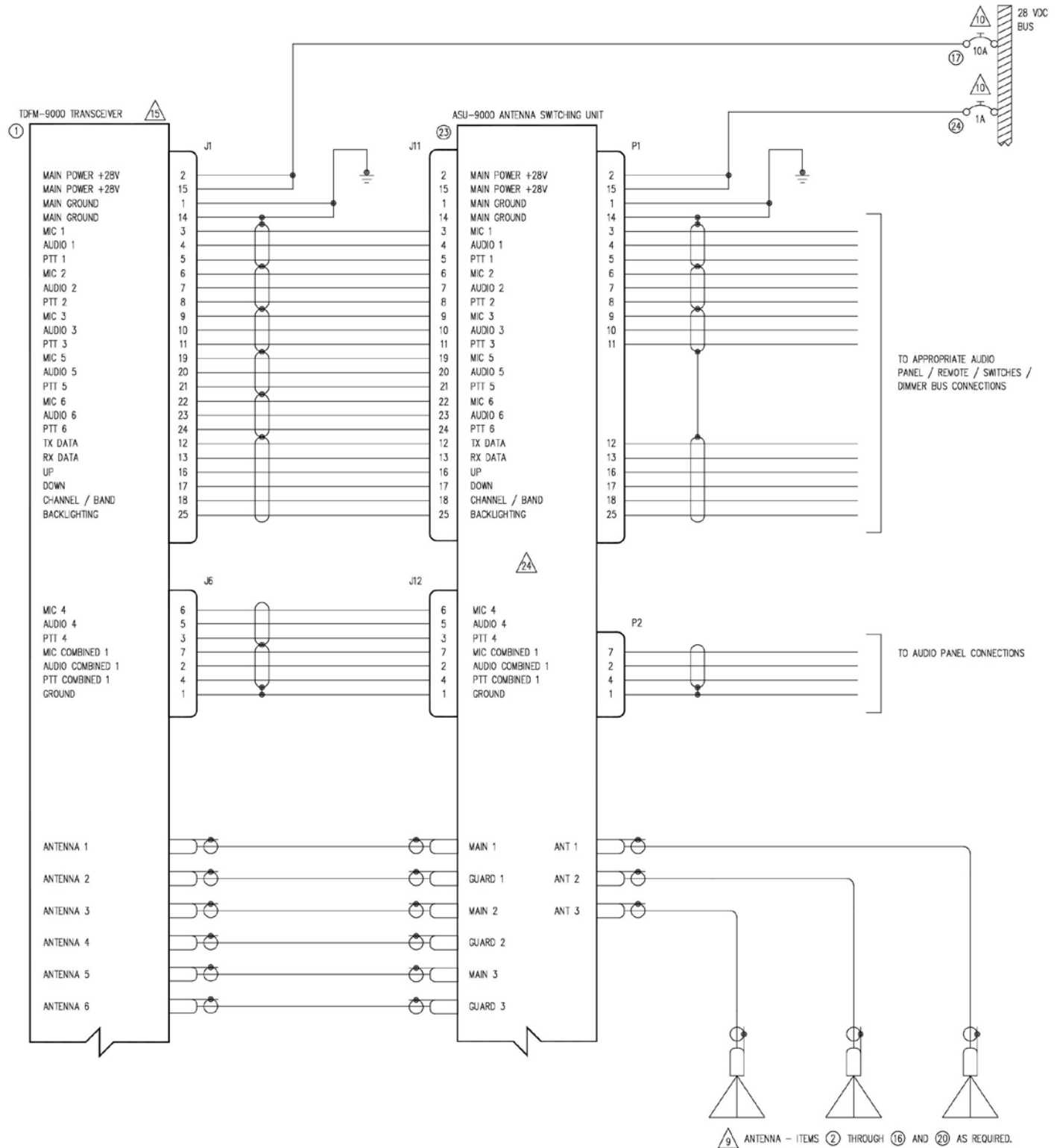


Figure 2: TDFM-9000 Wiring Diagram

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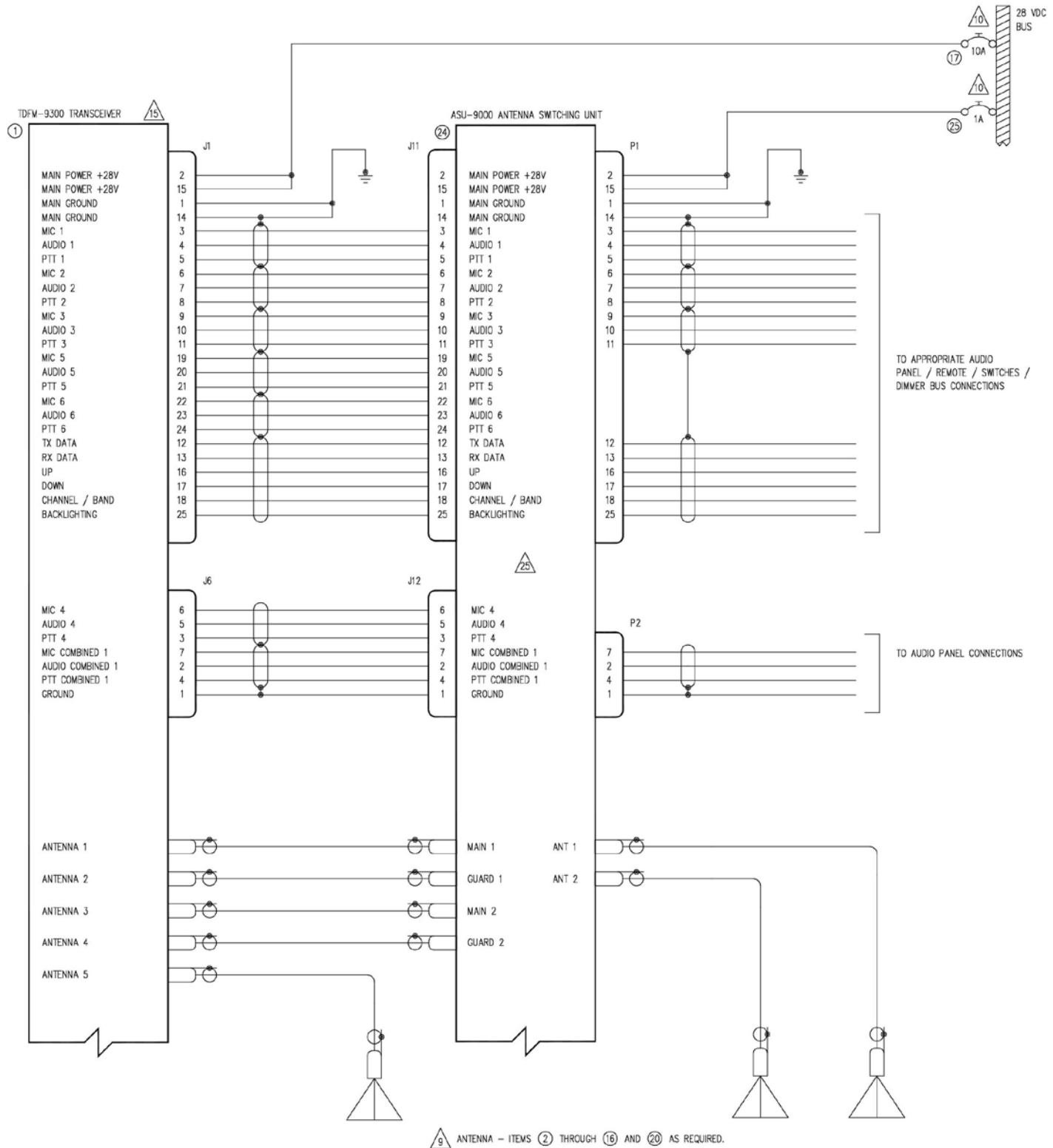


Figure 3: TDFM-9300 Wiring Diagram

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2.6 WIRING DETAILS

QTY	ITEM	PART NUMBER	DESCRIPTION	MANUFACTURER	MATERIAL
1	1	TDFM-9000	MULTIBAND FM COMMUNICATIONS TRANSCEIVER	TECHNISONIC INDUSTRIES LIMITED	
A/R	2	CI-292-3	VHF ANTENNA, 136 TO 174 MHz	COMANT INDUSTRIES	
A/R	3	CI-292-4	VHF ANTENNA, 136 TO 174 MHz	COMANT INDUSTRIES	
A/R	4	CI-275	UHFLO ANTENNA, 403 TO 470 MHz	COMANT INDUSTRIES	
A/R	5	CI-275	UHFHI ANTENNA, 450 TO 512 MHz	COMANT INDUSTRIES	
A/R	6	CI-285	UHFHI (II) ANTENNA, 450 TO 520 MHz	COMANT INDUSTRIES	
A/R	7	CI-306	800 ANTENNA, 806 TO 870 MHz	COMANT INDUSTRIES	
A/R	8	CI-285	800/700 (II) ANTENNA, 700 TO 870 MHz	COMANT INDUSTRIES	
A/R	9	CI-295-200	VHF/UHF ANTENNA, 136 TO 174 / 380 TO 520 MHz	COMANT INDUSTRIES	
A/R	10	CI-295-250	VHF/700/800 ANTENNA, 136 TO 174 / 764 TO 870 MHz	COMANT INDUSTRIES	
A/R	11	21-50-45	VHF/UHF/700/800 ANTENNA, 136 TO 174 / 380 TO 870 MHz	COOPER ANTENNAS	
A/R	12	AV-825	VHF/UHF/700/800 ANTENNA, 136 TO 174 / 380 TO 520 / 760 TO 870 MHz	RAMI ANTENNAS	
A/R	13	AT-1108/ARC	VHF/UHF ANTENNA, 116 TO 152 / 225 TO 400 MHz	RAMI ANTENNAS	
A/R	14	S85-8282-34	VHF LO/VHF/UHF ANTENNA, 30 TO 88 / 108 TO 174 / 225 TO 400 MHz	SENSOR SYSTEMS INC	
A/R	15	S85-1227	UHF ANTENNA, 225 TO 400 MHz	SENSOR SYSTEMS INC	
A/R	16	AT-256A/ARC	UHF ANTENNA, 225 TO 400 MHz	RAMI ANTENNAS	
1	17	7274-11-10	CIRCUIT BREAKER, 10 AMPS	KLIXON	
A/R	18	RC-9000	REMOTE CONTROL HEAD	TECHNISONIC INDUSTRIES LIMITED	
A/R	19	SRA-6000	SWITCHED RECEIVE ATTENUATOR	TECHNISONIC INDUSTRIES LIMITED	
A/R	20	133956-1	VHF HIGH PASS FILTER	TECHNISONIC INDUSTRIES LIMITED	
A/R	21	S200-P12	SATELLITE COMMUNICATIONS SYSTEM	LATITUDE TECHNOLOGIES	
A/R	22	TDAP-650 OR 750	DIGITAL AUDIO PANEL	TECHNISONIC INDUSTRIES LIMITED	
A/R	23	ASU-9000	ANTENNA SWITCHING UNIT	TECHNISONIC INDUSTRIES LIMITED	
A/R	24	7274-11-1	CIRCUIT BEAKER, 1 AMP	KLIXON	

NOTES:

- 1) ALL WIRE IAW MIL-W-22759 UNLESS OTHERWISE SPECIFIED.
- 2) ALL CABLE IAW MIL-C-27500 UNLESS OTHERWISE SPECIFIED.
- 3) COAXIAL CABLE IAW MIL-C-17 UNLESS OTHERWISE SPECIFIED. DO NOT USE COAX WITH PVC INSULATION.
- 4) FABRICATION & INSTALLATION OF WIRING HARNESS IAW AC 43.13-1B CHAPTER 11.
- 5) GROUNDING AND BONDING IAW AC 43.13-1B CHAPTER 11, SECTION 15.
- 6) ALL SINGLE WIRE TO BE #22 AWG MINIMUM AND ALL SHIELDED WIRE TO BE #24 AWG MINIMUM, UNLESS OTHERWISE SPECIFIED.
- 7) POWER AND GROUND WIRES TO BE #20 AWG.
- 8) ANTENNA COAX TO BE RG-142/U OR EQUIVALENT.
- 9) INSTALLATION OF ANTENNA IAW AC 43.13-1B CHAPTER 4, SECTION 4, CHAPTERS 6 & 7, AND AC 43.13-2A CHAPTER 3.
IF POSSIBLE, THE ANTENNA SHOULD BE LOCATED A MINIMUM OF 12 FT FROM AIRCRAFT NAVIGATION RECEIVER ANTENNAS AND A MINIMUM OF 4 FEET FROM AIRCRAFT COMMUNICATIONS AND ELT ANTENNAS. BE CAREFUL NOT TO CHOSE SEPARATIONS THAT CLOSELY APPROXIMATE 1/4 OR 1/2 OR WHOLE NUMBER MULTIPLES OF THE NAVIGATION OR COMMUNICATIONS WAVELENGTH.
- 10) EQUIVALENT CIRCUIT BREAKERS OR FUSES MAY BE USED.
- 11) THE CHANNEL/BAND UP/DOWN PUSH BUTTONS ARE OPTIONAL. GROUND CHANNEL/BAND INPUT FOR BAND CONTROL, LEAVE UNCONNECTED FOR CHANNEL CONTROL.
- 12) THIS INPUT IS FOR BOTH 28 VDC AND 5 VAC PANEL LIGHTING. SELECT THE APPROPRIATE VOLTAGE IN THE CONFIGURATION MENU.
- 13) CONNECT TO THE APPROPRIATE AIRCRAFT DIMMING BUSS.
- 14) CONNECT TO THE AIRCRAFT AUDIO SYSTEM OR STAND-ALONE HEADSET JACKS.
- 15) INSTALLATION OF TRANSCEIVER IAW AC 43.13-1B CHAPTER 4, SECTION 4 AND AC 43.13-2A, CHAPTER 2. PR3 1/2 DZUS RAIL OR EQUIVALENT MAY BE USED.
- 16) TEST THE SYSTEM IN ACCORDANCE WITH THE POST-INSTALLATION TEST PROCEDURE IN THE INSTALLATION AND OPERATING INSTRUCTIONS MANUAL.
- 17) REFER TO THE AIRCRAFT STRUCTURAL REPAIR MANUAL AND THE MAINTENANCE MANUAL FOR INSTRUCTIONS AND INFORMATION PERTINENT TO THIS INSTALLATION.
- 18) THE USE OF RED DISPLAYS SHOULD BE MINIMIZED OR AVOIDED SO AS NOT TO DETRACT FROM THE ATTENTION GETTING CHARACTERISTICS NEEDED IN WARNING AND CAUTION ANNUNCIATORS. RED SHOULD BE USED TO ANNUNCIATE EMERGENCY CONDITIONS REQUIRING IMMEDIATE RESPONSE BY THE FLIGHT CREW. UNITS WITH RED DISPLAYS SHOULD NOT BE LOCATED IN CLOSE PROXIMITY TO WARNING AND CAUTION ANNUNCIATORS. THE INSTALLATION OF UNITS WITH RED DISPLAYS MUST BE EVALUATED ON A CASE BY CASE BASIS TO ENSURE THAT THE EFFECTIVENESS OF THE WARNING AND CAUTION ANNUNCIATORS IS NOT ADVERSELY AFFECTED.
- 19) CONNECTION TO AN OPTIONAL RC-9000 SLAVE CONTROL HEAD.
- 20) CONNECTION TO AN OPTIONAL SRA-6000 SWITCHED RECEIVE ATTENUATOR.
- 21) OPTIONAL SATELLITE PHONE / PTT SYSTEM. SEE MANUAL FOR INSTALLATION INSTRUCTIONS.
- 22) CONNECTION TO OPTIONAL VHF HIGH PASS FILTER.
- 23) CONNECTION TO OPTIONAL DIGITAL AUDIO PANEL.
- 24) CONNECTION TO OPTIONAL ANTENNA SWITCHING UNIT.

SECTION 3: SPECIFICATIONS

3.1 SPECIFICATIONS

<u>Specification</u>	<u>Characteristic</u>
Power Handling:	15 Watts
Frequency Range:	138 - 512 MHz (FM)
Maximum Loss	0.8 dB
Power Requirement:	28 Volts DC \pm 15% 300 mA max.
Communication:	RS232 – 115,200, N, 8, 1
Dimensions:	5.7" x 7.4" x 1.6" (14.48 x 18.8 x 4.1 cm)
Weight:	1.31 lbs. (595 g)

SECTION 4: DO-160G ENVIRONMENTAL INFORMATION

4.1 DO-160G TEST CATEGORIES

The ASU-9000 was tested to the RTCA/DO-160G paragraphs and categories as follows:

Conditions	Paragraph	Category
Temperature and Altitude	4.0	A2,B1,C4,D1
Temperature Variation	5.0	B
Humidity	6.0	A
Operational Shock and Crash Safety	7.0	A
Vibration: sinusoidal profile M random profile B sine-on-random profile G	8.0	S, U
Magnetic Effect	15.0	Z
Power Input	16.0	B
Voltage Spike	17.0	B
Audio Frequency Susceptibility	18.0	B
Induced Signal Susceptibility	19.0	AC
Radio Frequency Susceptibility	20.0	T
Emission of Radio Frequency Energy	21.0	M
Electrostatic Discharge	25.0	A