ASTRO®
Digital XTL™ 5000
Mobile Radio Consolette
(Control Heads W7 and W9)

Instruction Manual

MOTOROLA

ASTRO® Digital XTL™ 5000 Consolette
(Control Heads W7 and W9)
Instruction Manual

Motorola, Inc.
8000 West Sunrise Boulevard
Fort Lauderdale, Florida 33322

6881098C21-P

Foreword

The information contained in this manual relates to all ASTRO® Digital XTL™ 5000 Consolettes, unless otherwise specified. This manual provides sufficient information to enable service shop personnel to troubleshoot and repair an ASTRO Digital XTL 5000 Consolette to the component level.

Product Safety and RF Exposure Compliance

Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your radio.

ATTENTION!

This radio is restricted to occupational use only to satisfy FCC RF energy exposure requirements. Before using this product, read the RF energy awareness information and operating instructions in the Product Safety and RF Exposure booklet enclosed with your radio (Motorola Publication part number 6881095C99) to ensure compliance with RF energy exposure limits.

For a list of Motorola-approved antennas, batteries, and other accessories, visit the following web site which lists approved accessories: http://www.motorola.com/cgiss/index.shtml.

Before operating an ASTRO Digital XTL 5000 Consolette, please read the “Consolette Installation Guidelines,” on page ix in the front of this manual.

Manual Revisions

Changes which occur after this manual is printed are described in FMRs (Florida Manual Revisions). These FMRs provide complete replacement pages for all added, changed, and deleted items. To obtain FMRs, contact the Customer Care and Services Division (see “Replacement Parts Ordering”).

Computer Software Copyrights

The Motorola products described in this manual may include copyrighted Motorola computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted computer programs, including, but not limited to, the exclusive right to copy or reproduce in any form the copyrighted computer program. Accordingly, any copyrighted Motorola computer programs contained in the Motorola products described in this manual may not be copied, reproduced, modified, reverse-engineered, or distributed in any manner without the express written permission of Motorola. Furthermore, the purchase of Motorola products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, except for the normal non-exclusive license to use that arises by operation of law in the sale of a product.

Document Copyrights

No duplication or distribution of this document or any portion thereof shall take place without the express written permission of Motorola. No part of this manual may be reproduced, distributed, or transmitted in any form or by any means, electronic or mechanical, for any purpose without the express written permission of Motorola.

Disclaimer

The information in this document is carefully examined, and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, Motorola reserves the right to make changes to any products herein to improve readability, function, or design. Motorola does not assume any liability arising out of the applications or use of any product or circuit described herein; nor does it cover any license under its patent rights nor the rights of others.

Trademarks

MOTOROLA, the Stylized M logo, ASTRO, and FLASHport are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners.

Table of Contents

Chapter 2 Installation 2-1

Chapter 3 Theory of Operation 3-1

List of Figures

List of Tables

Related Publications

ASTRO Digital XTL 5000 Mobile Radio with W3 Control Head User's Guide 6881096C67
ASTRO Digital XTL 5000 Mobile Radio with W4, W5, W7, and W9 Control Heads User's Guide 6881096C68
ASTRO Digital XTL 5000 Mobile Radio Installation Manual 6881096C72
ASTRO Digital XTL 5000 Mobile Radios Universal Crypto Module Field Installation Instructions 6881097C53
ASTRO Digital XTL 5000 VHF/UHF Range 1/700-800 MHz Mobile Radio Basic Service Manual 6881096C73
ASTRO Digital XTL 5000 VHF/UHF Range 1/700-800 MHz Mobile Radio Detailed Service Manual 6881096C74
ASTRO Digital Spectra and Digital Spectra Plus Mobile Radios W3/W4/W5/W7/W9 Control Head Models Service Manual 6881096C77
CPS Programming Installation Guide 6881095C44
KVL 3000 User's Manual 6881131E16
System 9000 Direct Entry Keyboard Instruction Manual 68P80101W22

Consolette Installation Guidelines

RF Operational Characteristics

Your ASTRO Digital XTL 5000 Consolette contains a digital mobile wireless two-way radio. When the Consolette is ON, it receives and transmits radio frequency (RF) energy.

Product Safety and RF Exposure Compliance

Caution Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your radio (Motorola Publication part number 6881095C99).

Operational Cautions

- Because of danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modifications of equipment.
- DO NOT operate the transmitter of any Consolette unless all RF connectors are secure and all connectors are properly terminated.
- All equipment must be properly grounded in accordance with *Motorola Standards and Guideline for Communications Sites "R56"* 68P81089E50 and specified installation instructions for safe operation.
- Slots and openings in the Consolette housing are provided for ventilation. To ensure reliable operation of the product and to protect if from overheating, these slots and openings must not be blocked or covered.
- Only an authorized technician familiar with the Consolette should service equipment.

Lightning and Surge Suppression

General

The installation of Transient Voltage Surge Suppression (TVSS) devices is a requirement for all communication sites and is essential for all facilities where communication-related electronics and electrical equipment are in use. Surges and transient power anomalies are potentially destructive electrical disturbances, the most damaging being over-voltage occurrences and short duration over-voltage events. Sometimes referred to as "spikes," high-energy transient power anomalies can arise from inductive load switching of other events within the power system or capacitive and inductive coupling from environmental events, such as nearby lightning activity. Environmental and inductive power anomalies are wideband occurrences with a frequency range from close to DC to well into the RF high frequency spectrum. It is critical that each point-of-entry (AC, telephone, LAN, signal/control, and RF) into the equipment area be protected against these anomalies. This protection is essential to reduce the risk of personal injury, physical equipment damage, and loss of operations (equipment downtime).

Recommendations

To protect your equipment from lightning and surge damage, do the following:

- Install these TVSS devices as described in Chapter 9, “Transient Voltage Surge Suppression,” of the *Motorola Standards and Guideline for Communications Sites “R56”* 68P81089E50 manual.
- Ground all RF transmission lines from the antenna structure to the shelter or building as described in Chapter 6, “External Grounding,” of the *Motorola Standards and Guideline for Communications Sites “R56”* 68P81089E50 manual. Upon entering the building, all RF transmission lines shall route through a coaxial RF-type TVSS (or Surge Protection Device).

Recommended Protectors

TVSS devices are available through Motorola's Accessories and Aftermarket Products Division. Installation instructions are generally included with each device. The following listing includes phone line suppressors, AC line surge protectors, coaxial cable in-line lightning arrestors, and coaxial cable ground clamp kits.

- Phone Line Suppressors
  - RRX4021 - Single Line Suppressor, 3-electrode gas tube protector
  - TRN4589 - Dual Line Suppressor, 3-electrode gas tube protector
  - RRX4021 - Single Line Suppressor, 3-electrode gas tube protector
- AC Line Surge Protectors
  - RRX4034 - AC Line Surge Protector, 117VAC line, 7/8" x 14 conduit hole mounting
- Coaxial Cable In-Line Lightning Arrestors
  - RLN4711 - UHF-Type Connector
  - RRX4025 - N-Type Connector
  - RRX4032 - Tower Mount Kit
- Coaxial Cable Ground Clamp Kits
  - RDN5826 - 1/4" or 3/8" Cable Ground Clamp Kit
  - RDN5514 - 1/2" Cable Ground Clamp Kit
  - RDN5517 - 5/8" to 7/8" Cable Ground Clamp Kit

Safe Handling of CMOS Integrated-Circuit Devices

Introduction

This section will aid you in troubleshooting a malfunctioning Consolette. It is intended to be detailed enough to localize the malfunctioning circuit and isolate the defective component.

Caution

Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your radio (Motorola Publication part number 6881095C99).

Handling Precautions

Complementary metal-oxide semiconductor (CMOS) devices and other high-technology devices are used in the Consolette. While the attributes of these devices are many, their characteristics make them susceptible to damage by electrostatic discharge (ESD) or high-voltage charges.

Damage can be latent, resulting in failures occurring weeks or months later. Therefore, special precautions must be taken to prevent device damage during disassembly, troubleshooting, and repair. Handling precautions are mandatory for this radio and are especially important in low humidity conditions. DO NOT attempt to disassemble the radio without observing the following handling precautions.

1. Eliminate static generators (plastics, Styrofoam, etc.) in the work area.
2. Remove nylon or double-knit polyester jackets, roll up long sleeves, and remove or tie back loose hanging neckties.
3. Store and transport all static-sensitive devices in ESD-protective containers.
4. Disconnect all power from the unit before ESD-sensitive components are removed or inserted unless otherwise noted.
5. Use a static-safeguarded workstation, which can be accomplished through the use of an antistatic kit (Motorola part number 01-80386A82). This kit includes a wrist strap, two ground cords, a static-control table mat and a static-control floor mat.
6. Always wear a conductive wrist strap when servicing this equipment. The Motorola part number for a replacement wrist strap that connects to the table mat is 42-80385A59.

Parts Replacement and Substitution

Special care should be taken to ensure that a suspected component is actually the one at fault. This special care will eliminate unnecessary unsoldering and removal of parts, which could damage or weaken other components or the printed circuit board (PCB) itself.

When damaged parts are replaced, identical parts should be used. If the identical replacement component is not locally available, check the parts list for the proper Motorola part number and order the component from the nearest Motorola Communications Parts facility.

For information on ordering parts replacement, refer to Appendix B, "Replacement Parts Ordering".

Notes

ASTRO Digital XTL 5000 Consolette Model Chart

MODEL NUMBER	DESCRIPTION
L20KSS9PW1_N	10–50 W 136–174 MHz
L20QSS9PW1_N	10–40 W 380–470 MHz
L20SSS9PW1_N	10–40 W 450–520 MHz
L20URS9PW1_N	10–35 W 762–870 MHz
L20WRS9PW1_N	10–30 W 896–941 MHz

OPTION NUMBER	DESCRIPTION
G80_	ADD: Local Control Configuration
G81_	ADD: Digital Remote Control Configuration
L791_	ADD: Audio Interface Board
L146_	ADD: Tone Rem Control Option (Must have G80 Option)
L114_	ADD: VU Meter/Clock (No longer available)
L113_	ADD: Desk Microphone
L32_	ADD: 12 Volt DC only Operation
L681	ADD: AC Power Supply

L20KSS9PW1_N	L20QSS9PW1_N	L20SSS9PW1_N	L20URS9PW1_N	L20WRS9PW1_N	G80_	G81_	L791_	L146_	L114_	L113_	L32_	L681	ITEM NUMBER	DESCRIPTION
X	X	X	X	X									HHN4045_	Transceiver Hardware
X													HUD4022_	VHF Main Board
	X												HUE4039_	UHF Range 1 Main Board
		X											HUE4041_	UHF Range 2 Main Board
			X										HUF4017_	700/800 Main Board
				X									PMLF 4035_	900 Main Board
					X	X							FRN5358_	Fan
					X	X							HLN6883_	Interface Board
					X	X							THN6676_	Housing Assembly
					X	X							TKN8676_	Cable Kit
					X	X							HLN6607_	Front Panel Assembly
					X	X							HLN6185_	Front Plate of Mobile Brick
					X	X							HLN6865_	Remote Interconnect Hardware
					X								HLN6396_	Control Head Board
					X								HLN6441_	Control Head Display
					X								TRN7392_	Control Head Bracket Hardware
					X								TRN7393_	Control Head Interface Board
					X								TRN7394_	Speaker Hardware
					X								HLN6105_	Spare Button Kit
					X								HLN6688_	Spare Button Kit
						X							TGN6150_	Blank Control Head Panel
							X						PLN1688_	Audio Interface Board
								X					PLN1687_	Tone Remote Control Board
									X				FRN5360_	VU Meter/Clock Assembly (No longer available)
									X				TKN8680_	VU Meter/Clock Cable Kit (No longer available)
										X			HMN1050_	Desk Microphone
											X		FPN5366_	DC PS Interface
												X	HPN4005_	Power Supply, 13.8V, 10-Amp
												X	HLN6282_	Power Cord, 100V

Key: X = Item Included

ASTRO Digital XTL 5000 Consolette Options – VHF, UHF, 7/800 MHz Bands

OPTION	DESCRIPTION
Software Options	
G48	ENH: Conventional Operation
G50	ENH: SmartNET Operation
G51	ENH: SmartZone Operation
G101	ENH: Repeater Access
G114	ENH: Digital ID Display
G173	ENH: SmartZone OmniLink Multizone Operation
G241	ADD: SW ASTRO Ready Analog Operation
G387	ADD: Multicast Voting Scan
G361	ENH: ASTRO Project 25 Trunking SW
G806	ENH: ASTRO Digital CAI Operation
W947	ADD: RS232 Packet Data Interface
Consolette Encryption Options	
G113	ADD: ADP Encryption
G159	ADD: Encryption UCM Hardware
G193	ADD: ADP Software DSP Based Encryption
G194	ADD: ADP with DES/DES-XL/DES-OFB Encryption
G298	ADD: Encryption P25 and MDC OTAR
G336	ADD: Key Retention 30 Seconds
G625	ENH: DES/DES-XL/DES-OFB Encryption
G843	ADD: AES Encryption
G851	ADD: AES with DES-XL/DES-OFB Encryption
W793	ADD: DVI-XL Encryption
W797	ADD: DVP-XL Encryption
W969	ADD: Multiple Key Encryption Operation
Consolette Configuration Options	
L32	12 Volts DC Only
L73	Omit Microphone–Only compatible with G80 Option
G80	Local Control Configuration
G81*	Digital Remote Control Configuration
L114	VU Meter/Clock–Only compatible with G80 Option (No longer available)
L146	Tone Remote Control (TRC)—Only compatible with G80 Option
L791	Audio Interface Board
G799	Printed Test Results

***** Option G81 configures the ASTRO Digital XTL 5000 Consolette for operation with a Digital Remote Control Deskset. The Consolette is compatible with DGT9000 models L1751 and L1752, RCH3000 models L3030 and CDN1337, and MC3000 model L3223.

ASTRO Digital XTL 5000 Consolette Options – 900 MHz Band

OPTION	DESCRIPTION
Software Options	
G51	ENH: SmartZone Operation
G114	ENH: Digital ID Display
G173	ENH: SmartZone OmniLink Multizone Operation
G241	ADD: SW ASTRO Ready Analog Operation
G806	ENH: ASTRO Digital CAI Operation (Future Option)
Consolette Configuration Options	
L32	12 Volts DC Only
L73	Omit Microphone–Only compatible with G80 Option
G80	Local Control Configuration
G81*	Digital Remote Control Configuration
L114	VU Meter/Clock–Only compatible with G80 Option (No longer available)
L146	Tone Remote Control (TRC)—Only compatible with G80 Option
L791	Audio Interface Board
G799	Printed Test Results

***** Option G81 configures the ASTRO Digital XTL 5000 Consolette for operation with a Digital Remote Control Deskset. The Consolette is compatible with DGT9000 models L1751 and L1752, RCH3000 models L3030 and CDN1337, and MC3000 model L3223.

ASTRO Digital XTL 5000 Consolette VHF Specifications

GENERAL		RECEIVER		TRANSMITTER	
FCC Designation:	AZ492FT3806	**Frequency Range:**		**Frequency Range:**	
Temperature Range:	–20°C to +50°C	Range 1:	136–174 MHz	Range 1:	136–174 MHz
Power Supply:	115 VAC/230 VAC 12 Vdc	**Channel Spacing:**	12.5/25 kHz	**Rated Output Power:**	
AC Current Drain: (Maximum)		**Input Impedance:**	50 Ohms	Mid Power:	25-50 Watt Variable
25-50 Watts Variable:		**Frequency Separation:**	Full Bandsplit	**Channel Spacing:**	12.5/25 kHz
Receive:	0.7 A/0.4 A	**Analog Sensitivity:+**		**Output Impedance:**	50 Ohms
Transmit:	2.30 A/1.16 A	(25 kHz Channel Spacing)		**Frequency Separation:**	30 MHz
DC Current Drain: (Maximum)		20 dB Quieting:	0.40 µV	**Frequency Stability:**	**±0.00020%**
25-50 Watts Variable:		12 dB Quieting:	0.30 µV	(–20 to +50°C; 25°C Ref.)	
Receive:	3 A	**Digital Sensitivity:***		**Modulation Limiting:+**	
Transmit:	13.5 A	(12.5 kHz Channel Spacing)		25 kHz Channel Spacing:	±5.0 kHz
Dimensions (H x W x D):	4.25" x 15.75"x 17" (108 mm x 400 mm x 432 mm)	1% BER:	0.40 µV	12.5 kHz Channel Spacing:	±2.5 kHz
		5% BER:	0.30 µV	**Modulation Fidelity (C4FM):***	
Weight:	16.1 lbs (7.31 kg)	**Selectivity:+**		12.5 kHz Channel Spacing:	±2.8 kHz
		25 kHz Channel Spacing:	–80 dB	**FM Hum and Noise:+**	
		12.5 kHz Channel Spacing:	–70 dB	25 kHz Channel Spacing:	–50 dB
		Intermodulation:+*	–85 dB	12.5 kHz Channel Spacing:	–40 dB
		(25/30 kHz Channel Spacing)		**Emissions:+***	
		Spurious Rejection:+*	–90 dB	(Conducted and Radiated)	–85 dBc
		Audio Output @<3% Distortion:		**Audio Response:+**	
		(Local Control Only)	5W	(6 dB/Octave Pre-Emphasis from 300 to 3000 Hz)	+1, –3 dB
				Audio Distortion:+	2%
				Emissions Designators: 8K10F1E/F1D, 11K0F3E, 16K0F3E, and 20K0F1E	

+ = Measured in Analog Mode per TIA/EIA-603

* = Measured in Digital Mode per TIA/EIA TSB102.CAAB

Specifications subject to change without notice.

ASTRO Digital XTL 5000 Consolette UHF Specifications

GENERAL		RECEIVER		TRANSMITTER	
FCC Designation:		**Frequency Range:**		**Frequency Range:**	
Range 1:	AZ492FT4862	Range 1:	380–470 MHz	Range 1:	380–470 MHz
Range 2:	AZ492FT4867	Range 2:	450–520 MHz	Range 2:	450–520 MHz
Temperature Range:	–20°C to +50°C	**Channel Spacing:**	12.5/25 kHz	**Rated Output Power:**	
Power Supply:	115 VAC/230 VAC 12 Vdc	**Input Impedance:**	50 Ohms	Range 1:	10-40 Watt Variable
AC Current Drain: (Maximum)		**Frequency Separation:**	Full Bandsplit	Range 2:	10-45 Watt Variable
25-40 Watts Variable:		**Analog Sensitivity:+**		**Channel Spacing:**	12.5/25 kHz
Receive:	0.7 A/0.4 A	(25 kHz Channel Spacing)		**Output Impedance:**	50 Ohms
Transmit:	2.30 A/1.16 A	20 dB Quieting:	0.40 µV	**Frequency Stability:**	
DC Current Drain: (Maximum)		12 dB Quieting:	0.30 µV	(–20 to +50°C; 25°C Ref.):	±0.00020%
25-40 Watts Variable:		**Digital Sensitivity:***		**Modulation Limiting:+**	
Receive:	3 A	(12.5 kHz Channel Spacing)		25 kHz Channel Spacing:	±5.0 kHz
Transmit:	13.5 A	1% BER:	0.40 µV	12.5 kHz Channel Spacing:	±2.5 kHz
Dimensions (H x W x D):		5% BER:	0.30 µV	**Modulation Fidelity (C4FM):***	
	4.25" x 15.75"x 17" (108 mm x 400 mm x 432 mm)	**Selectivity:+**		12.5 kHz Channel Spacing:	±2.8 kHz
Weight:	16.1 lbs (7.31 kg)	25 kHz Channel Spacing:	–82 dB	**FM Hum and Noise:+**	
		12.5 kHz Channel Spacing:	–75 dB	25 kHz Channel Spacing:	–45 dB
		Intermodulation:+*	–85 dB	12.5 kHz Channel Spacing:	–40 dB
		Spurious Rejection:+*	–90 dB	**Emissions:+***	
		Audio Output @<3% Distortion:		(Conducted and Radiated)	–85 dBc
		(Local Control Only)	5 W	**Audio Response:+**	
				(6 dB/Octave Pre-Emphasis from 300 to 3000 Hz)	+1, –3 dB
				Audio Distortion:+	2%
				Emissions Designators: 8K10F1E/F1D, 11K0F3E, 16K0F3E, and 20K0F1E	

+ = Measured in Analog Mode per TIA/EIA-603

* = Measured in Digital Mode per TIA/EIA TSB102.CAAB

Specifications subject to change without notice.

ASTRO Digital XTL 5000 Consolette 700–800 MHz Specifications

GENERAL		RECEIVER		TRANSMITTER	
FCC Designation:	AZ492FT5823	**Frequency Range:**		**Frequency Range:**	
Temperature Range:	–20°C to +50°C	700 MHz Band:	764–776 MHz	700 MHz Band:	
Power Supply:	115 VAC/230 VAC 12 Vdc	800 MHz Band:	851–870 MHz	Repeater Mode:	794–806 MHz
AC Current Drain: (Maximum)		**Channel Spacing:**	12.5/20/25 kHz	TalkAround Mode:	764–776 MHz
35 Watts Variable:		**Input Impedance:**	50 Ohms	800 MHz Band:	
Receive:	0.7 A/0.4 A	**Frequency Separation:**	Full Bandsplit	Repeater Mode:	806–825 MHz
Transmit:	2.30 A/1.16 A	**Analog Sensitivity:+**		TalkAround Mode:	851–870 MHz
DC Current Drain: (Maximum)		(25 kHz Channel Spacing)		**Rated Output Power:**	
35 Watts Variable:		20 dB Quieting:	0.30 µV	700 MHz Band:	2**/30 W
Receive:	3 A	12 dB Quieting:	0.25 µV	800 MHz Band:	35 W
Transmit:	13.5 A	**Digital Sensitivity:***		**Channel Spacing:**	12.5/20/25 kHz
Dimensions (H x W x D):	4.25" x 15.75"x 17" (108 mm x 400 mm x 432 mm)	(12.5 kHz Channel Spacing)		**Output Impedance:**	50 Ohms
Weight:	16.1 lbs (7.31 kg)	1% BER:	0.30 µV	**Frequency Stability:**	
		5% BER:	0.25 µV	(–20 to +50°C; 25°C Ref.):	±0.00015%
		Selectivity:+		**Modulation Limiting:+**	
		25 kHz Channel Spacing:	–80 dB	25 kHz Channel Spacing:	±5.0 kHz
		12.5 kHz Channel Spacing:	–65 dB	20 kHz Channel Spacing:	±2.5 kHz (NPSPCA)
		Intermodulation:+*	–80 dB	**Modulation Fidelity (C4FM):***	
		Spurious Rejection:+*	–90 dB	12.5 kHz Channel Spacing:	±2.8 kHz
		Audio Output @3% Distortion:		**FM Hum and Noise:+**	
		(Local Control Only)	5 W into 8 Ohms	25 kHz Channel Spacing:	–40 dB
				Emissions:+*	–70 dBc/–85 dBc (GNSS) (Conducted and Radiated)
				Audio Response:+ (6 dB/Octave Pre-Emphasis from 300 to 3000 Hz)	+1, –3 dB
				Audio Distortion:+	2%
				Emissions Designators:	8K10F1D/F1E, 11K0F3E, 16K0F3E, and 20K0F1E

+ = Measured in Analog Mode per TIA/EIA-603
* = Measured in Digital Mode per TIA/EIA TSB102.CAAB
** = 2W itinerant frequencies

Specifications subject to change without notice.

ASTRO Digital XTL 5000 Consolette 900 MHz Specifications

GENERAL		RECEIVER		TRANSMITTER	
FCC Designation:	AZ492FT5847	**Frequency Range:**		**Frequency Range:**	
Temperature Range:	–20°C to +50°C	900 MHz Band:	935–941 MHz	900 MHz Band:	
Power Supply:	115 VAC/230 VAC	**Channel Spacing:**	12.5 kHz	Repeater Mode:	896–902 MHz
	12 Vdc	**Input Impedance:**	50 Ohms	TalkAround Mode:	935–941 MHz
AC Current Drain: (Maximum)		**Frequency Separation:**	Full Bandsplit	**Rated Output Power:**	
30 Watts Variable:		**Analog Sensitivity:+**		900 MHz Band:	10–30 W
Receive:	0.7 A/0.4 A	20 dB Quieting:	0.30 µV	**Channel Spacing:**	12.5 kHz
Transmit:	2.30 A/1.16 A	12 dB Quieting:	0.25 µV	**Output Impedance:**	50 Ohms
DC Current Drain: (Maximum)				**Frequency Stability:**	
30 Watts Variable:				(–20 to +50°C; 25°C Ref.):	±1.5ppm
Receive:	3 A			**Modulation Limiting:+**	
Transmit:	13.5 A			12.5 kHz Channel Spacing:	±2.5 kHz
Dimensions (H x W x D):		**Selectivity:+**			
	4.25" x 15.75"x 17"	12.5 kHz Channel Spacing:	–65 dB		
	(108 mm x 400 mm x 432 mm)	**Intermodulation:+**	–70 dB	**FM Hum and Noise:+**	
Weight:	16.1 lbs (7.31 kg)	**Spurious Rejection:+**	–80 dB	12.5 kHz Channel Spacing:	–38 dB
		Audio Output @3% Distortion:		(Hear Clear Off)	
		(Local Control Only)	5 W into 8 Ohms	**Emissions:+**	–70 dBc
				(Conducted and Radiated)	
				Audio Response:+	
				(6 dB/Octave Pre-Emphasis from 300 to 3000 Hz)	+1, –3 dB
				(TIA 603)	
				Audio Distortion:+	3%
				Emissions Designators:	
				8K10F1D/F1E, 11K0F3E,	

+ = Measured in Analog Mode per TIA/EIA-603

Specifications subject to change without notice.

Notes

Chapter 1 Introduction

1.1 Notations Used in This Manual

Throughout the text in this publication, you will notice the use of note, caution, warning, and danger notations. These notations are used to emphasize that safety hazards exist, and due care must be taken and observed.

NOTE: An operational procedure, practice, or condition that is essential to emphasize.

CAUTION indicates a potentially hazardous situation which, if not avoided, might result in equipment damage.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or injury.

1.2 General

This manual describes the installation, operation, and maintenance of the ASTRO Digital XTL 5000 Consolette. Refer to page xiii of this manual for the model/option chart and the performance specifications beginning on page xvi. For additional information about the XTL 5000 radio, refer to the XTL 5000 radio user's guide (6881096C68) and service manual (6881096C74).

The XTL 5000 Consolette incorporates functional design in a modern, lightweight, plastic housing. This housing was designed using *design-for-assembly* principles to minimize fasteners, part count, and assembly time, while improving versatility, assembly ease, and quality.

The XTL 5000 Consolette consists of a base plate onto which the entire Consolette is assembled. Subassemblies, which *snap-fit* into this base, include the following:

- Fan
- Power supply
- Audio interface or optional tone remote control board
- XTL 5000 radio
- RF connector
- Front panel assembly

The XTL 5000 radio, fan, and power supply also have screws that are used to secure them.

The front panel assembly consists of the following:

- XTL 5000 control head assembly
- Speaker
- Power-on LED
- Optional VU meter/clock (No longer available)
- Optional keyloading connector

In addition, all internal cabling for the station is completely connectorized. To complete the assembly, the top cover snaps into the base plate. See Chapter 7, "Schematics, Board Layouts, and Parts Lists" for the Consolette exploded view and Chapter 5, "Cable Diagrams" for detailed cable connector information.

VHF, UHF, 7/800 MHz Bands

The XTL 5000 Consolette allows conventional or trunked operation, analog or digital operation, SECURENET™ operation, local control, tone remote control, Digital Remote Control, and a variety of other options. The Microsoft Windows-based Customer Programming Software (CPS) allows for field programming for such items as channel frequencies, PL/DPL, etc.

900 MHz Bands

The XTL 5000 Consolette allows conventional operation, analog operation, local control, tone remote control, Digital Remote Control, and a variety of other options. The Microsoft Windows-based Customer Programming Software (CPS) allows for field programming for such items as channel frequencies, PL/DPL, etc.

The XTL 5000 Consolette supports all XTL 5000 features except Siren, Vehicular Repeater System, and those requiring the addition of a direct-entry keyboard (DEK). Refer to the applicable XTL 5000 service manual for additional information about XTL 5000 features.

NOTE: While SCAN can be enabled on the XTL 5000 Consolette, it is advisable that this feature not be used in conjunction with the Tone Remote Control option. This feature does not indicate to the remote user which channel the XTL 5000 transceiver may have scanned to, and thus might cause confusion.

Two DB-25 connectors located on the back panel of the unit provide connections for external equipment. The bottom connector (Accessory 2) provides an interface for tone remote and digital remote desksets.

1.3 Options

Several software, encryption, and configuration options are available on the XTL 5000 Consolette. For a complete list of available options, please refer to the options list on page xv of this manual. Any unique options are described in this section.

1.3.1 Consolette Configuration Options

1.3.1.1 Local Control Configuration, G80

This option configures the consolette for operation from a local control head. It adds a W7 style control head and speaker to the front panel. This option is compatible with L791, L146, L114, and L73.

1.3.1.2 Digital Remote Control Configuration, G81

This option configures the consolette for operation from a remote control head such as the MC3000. This option is not compatible with L146, L114, and L73. This option requires option L791.

NOTE: Mode names, phone lists, call lists, and message names are programmed using Customer Programming Software (CPS) for Consolettes equipped with either configuration, G80 or G81.

1.3.1.3 Audio Interface Board, L791

This option provides a digital interface to the local control head (W7 style) or the remote control head (ex. MC3000). This option is compatible with G80 and G81.

1.3.1.4 Tone Remote Control, L146

This option provides tone remote control capability, as well as a digital interface to the Gold Series Elite and MCC 5500 Consoles. This option is not compatible with G81. See the note on page 1 concerning SCAN.

1.3.1.5 12 Vdc Only, L32

This optional module replaces the AC power supply in sites where AC power is not available and allows the Consolette to operate with a 12 Vdc battery or generator.

1.3.1.6 Omit Microphone, L73

This option omits the desk microphone, which is part of the standard product. This option is not compatible with G81.

1.3.1.7 VU Meter/Clock, L114 (No Longer Available)

This option provides a digital clock display with provisions for time setting and a VU meter, which provides an indication of the transmit audio level in the form of incremental bars. This option is not compatible with G81.

1.3.2 Software Options

For a complete description of the operation of the available software features, refer to the ASTRO Digital XTL 5000 radio user's guide (6881096C68).

1.3.2.1 Enhanced Digital ID Display, G114

This option provides display capability of Push-To-Talk, Private Call, Call Alert, and Emergency Call IDs. This information will either be displayed on the local control head (if equipped) or at the remote control head (if equipped). If the TRC option L146 is ordered in combination with the G114 option, then the ID will be made available to the console. The PTT-ID option is not automatically enabled in the Consolette. To enable the G114 option, the ID Display field in the Consolette codeplug will need to be enabled using CPS. The ID Display field can be found in the Radio Configuration –> Display & Menu section of the Consolette codeplug.

NOTE: The G114 option provides ID display capability for those IDs that are generated by a PTT of the transmitting radio. ASTRO IDs generated by a subscriber radio due to an emergency button press (typically the orange button on a portable radio) can be decoded when the codeplug field **Emergency Alarm Receive Indicator** is set to “Display” or “Alert and Display.” See Section 2.12, "Emergency Alarm Receive Indicator," on page 2-16 for more information.

Chapter 2 Installation

2.1 Planning the Installation

Since a good installation is important to obtain optimal performance of the Consolette, carefully plan the installation before the actual work is started. Location of the Consolette in relation to power, control lines, and antenna, as well as convenience and access for servicing, should be considered.

NOTE: The RF transmission line should be kept as short as possible to minimize line losses; however, the antenna should not be placed so close as to cause interference with the Consolette. See "Lightning and Surge Suppression," on page ix of this manual for additional antenna, RF transmission line, and control line installation considerations.

Read the entire procedure and the suggestions offered to help plan the installation. Make sure all necessary equipment and facilities are available during installation.

The ASTRO Digital XTL 5000 Consolette is not recommended for dense site applications (that is, dense metropolitan areas or *antenna farms*).

2.2 Ventilation

The Consolette is designed for wall mount or horizontal flat plane installation with forced convection cooling on both mountings. For proper cooling, the Consolette must be kept free of obstructions at its back and sides for at least 4 inches (100 mm), so as not to restrict airflow.

NOTE: Make certain that the air temperature around the unit does not exceed the recommended operating temperature range of –20°C to +50°C.

2.3 Station Mounting Procedures

Refer to the specifications section in the front of this manual for unit dimensions.

2.3.1 Desktop Installation

The Consolette may be placed on any solid, flat surface with easy access to the power source and RF transmission line. Keep in mind the ventilation requirements as previously described in section 2.2, "Ventilation," on page 2-1.

2.3.2 Wall Mounting

Ensure that the selected mounting surface is strong enough to support the Consolette weight of 16 lbs. Mark the location of the four mounting screws (Figure 2-1 on page 2-2). Use screws suitable for the wall material. The maximum diameter of the screw and screw head should be 0.25 inches (6.5 mm) and 0.43 inches (11 mm), respectively. Allow the bottom surface of the screw head to protrude 0.3 inches (7.5 mm) from the wall surface. Hold the station with the front panel facing up and guide the holes provided on the bottom of the cabinet over the mounting screws.

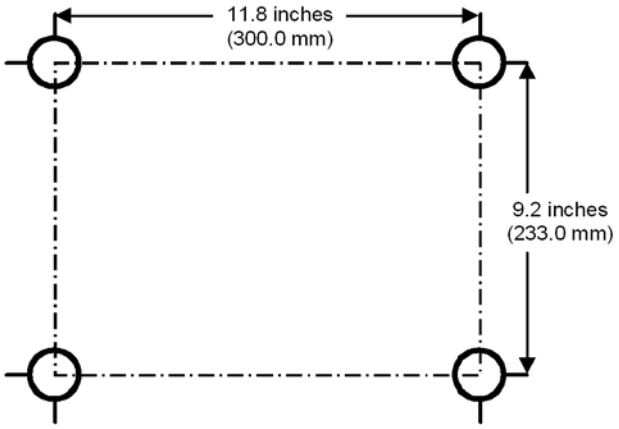


Figure 2-1. Wall Mounting

2.4 Antenna Connections

The antenna and transmission lines are not part of the Consolette; therefore, antenna installation instructions are not included in this section. Refer to the instructions shipped with the antenna for applicable information.

In its primary application, the Consolette is used for communication with mobile radios. Therefore, an omni-directional antenna is recommended. However, if the Consolette is located at the outer perimeter of a communications area, or if it is to be used for communication with a fixed station, an antenna with specific directional characteristics may be preferred. Local government agencies may also dictate the type of antenna to be used.

The coaxial antenna cable connects to an N-type coaxial connector located on the rear panel of the station. See Figure 2-2.

Figure 2-2. Rear Panel

2.5 Power and Ground Connection

2.5.1 General

All Consolettes should have a separate AC power circuit with proper current and voltage for Consolette operation. Refer to the specifications section in the front of this manual for AC requirements of each model. The power lines should be installed in accordance with local electrical codes. A substantial earth ground must be provided in a straight line close to the ground terminal provided on the Consolette. DO NOT consider an electrical output box as a substantial earth ground. See "Lightning and Surge Suppression," on page ix for additional grounding recommendations.

WARNING

Even if a three-wire grounding AC power source is available, the radio equipment must be grounded separately to prevent electrical shock hazards and provide lightning protection.

The AC power line leading to the selected site for the Consolette may be installed prior to installation of the Consolette itself.

2.5.2 AC Power Input

WARNING

The Consolette is shipped standard from the factory for operation from a 115 VAC power source. For 230 VAC operation, remove the Consolette top cover (see 4.4, "Disassembly and Reassembly," on page 4-2) and slide the AC power selector switch, located on the Consolette power supply, to the 230 VAC position. Install the appropriate AC power connector on the end of the 115 VAC power cord provided with the Consolette.

Figure 2-3. Power Supply VAC – Select Switch

NOTE: Replacement 115 VAC power cords may be ordered from Motorola as kit number HLN6282A.

1. Install the Consolette as described in section 2.3, "Station Mounting Procedures," on page 2-1.
2. Connect the female plug of the AC line cord to the AC input power connector on the rear panel of the station. See Figure 2-2. Rear Panel on page 2-2.
3. Connect the ground terminal on the Consolette in as straight a line as possible to a substantial earth ground located as close as possible to the Consolette ground terminal.

4. Make certain the AC power source is of the proper current and voltage rating for the Consolette. Refer to the specifications section in the front of this manual for the AC requirement of each model. Then connect the male plug of the AC line cord to the AC power source.

NOTE: The ON/OFF power button located on the ASTRO control head is disabled before shipment; therefore, the Consolette is immediately operational when its power cord is plugged into a live AC outlet. To enable the ON/OFF power button on the ASTRO control head, refer to the information in section 2.6, "DIP Switch and Jumper Settings," on page 2-4. Please note that the ON/OFF power button on the control head controls the power to the control head only. For Consolettes containing the Digital Remote Control feature, Option G81, no control head is present and the Consolette will always be immediately operational when its power cord is plugged into a live AC outlet.

2.5.3 DC Input Power (Optional)

Connection of DC input power to the Consolette is offered as an option. The battery should be connected to the DC connector (DC IN) on the rear panel of the Consolette. See Figure 2-2. Rear Panel on page 2-2. Note that the top and bottom pins of DC IN are the negative and positive terminals, respectively.

Caution

To prevent damage to the Consolette, be sure to use a battery that is connected only to the Consolette. Disconnect both battery terminals from the Consolette when connecting the battery to any other equipment, including a battery charger. Be sure to observe proper polarity when making the DC power connections.

2.6 DIP Switch and Jumper Settings

The DIP switches and jumpers are used to provide various operating configurations to the Consolette. The Audio Interface Board (AIB) has a DIP switch package and three jumpers. The optional Tone Remote Control (TRC) board has two DIP switch packages, two jumpers, and two plugs. Refer to the tables below for detailed descriptions of switch and jumper settings for each board.

NOTE: 0Ω chip resistors are used for some jumpers. A low-power soldering iron must be used to install and remove them.

Caution

Review "Safe Handling of CMOS Integrated-Circuit Devices," on page x before setting any DIP switches or jumpers.

2.6.1 Audio Interface Board (AIB) Settings

Table 2-1. Audio Interface Board DIP Switch Settings

Switch	State	Description
S101-1	**ON**	ASTRO control head power button disabled
	OFF	ASTRO control head power button enabled
S101-2		Not used
S101-3	**ON**	EMER active high
	OFF	EMER active low
S101-4	**ON**	600Ω Impedance
	OFF	900Ω Impedance
S101-5	ON	900Ω Impedance
	OFF	600Ω Impedance
S101-6	ON	Local desk microphone not present
	OFF	Local desk microphone present
S101-7	ON	Digital Remote Control option present
	OFF	Digital Remote Control option not present
S101-8		Not used
BOLD indicates factory default setting		

Table 2-2. Audio Interface Board Jumper Settings

Jumper	State	Description
JU101	**IN**	Always placed for ASTRO
J14	A-B	Transmitted and received audio is routed to TAPE_OUT (Accessory Connector 3, pin 11)
	B-C	Only received audio is routed to TAPE_OUT (Accessory Connector 3, pin 11)
J15	A-B	SPKR_UNMUTE active high (COR)
	B-C	SPKR_UNMUTE active low (COR)
BOLD indicates factory default setting		

2.6.2 Tone Remote Control (TRC) Board Settings

IMPORTANT: Be sure to remove power to the Consolette when making changes to the DIP switch settings for S100. This DIP switch resides under the RFI shield on the Tone Remote Control board. The XTL 5000 mobile unit and the shield cover must be removed in order to access the DIP switch. After changes have been made, replace the shield cover, XTL 5000 mobile unit, and Consolette lid before restoring power to the Consolette.

Table 2-3. Tone Remote Control Board DIP Switch Settings (S100)

Switch	State	Description
S100-1	**OFF**	Always off for ASTRO
S100-2	**ON**	Local mic audio not routed down wireline
	OFF	Local mic audio routed down wireline
S100-3	**ON**	Tone Remote Control
	OFF	SMP Control
S100-4	ON	AGC Disabled
	OFF	AGC Enabled
S100-5	ON	Tone Table Select 1*
	OFF	
S100-6	ON	Tone Table Select 2*
	OFF	
S100-7	ON	Tone Table Select 3*
	OFF	
S100-8	ON	Tone Table Select 4*
	OFF	
BOLD indicates factory default setting * Refer to Table 2-7 for setting information		

Table 2-4. Tone Remote Control Board DIP Switch Settings (S101)

Switch	State	Description
S101-1	**ON**	ASTRO control head power button disabled
	OFF	ASTRO control head power button enabled
S101-2		Not used
S101-3	**ON**	EMER active high
	OFF	EMER active low
S101-4	**ON**	600Ω impedance
	OFF	900Ω impedance
S101-5	ON	900Ω impedance
	OFF	600Ω impedance
S101-6	ON	Local desk microphone not present
	OFF	Local desk microphone present
S101-7	**ON**	Two-wire operation
	OFF	Four-wire operation
S101-8	ON	Four-wire operation
	OFF	Two-wire operation
BOLD indicates factory default setting		

Table 2-5. Tone Remote Control Board Jumper Settings

Jumper	State	Description
JU100	**IN**	Crystal frequency shift circuit enabled
	OUT	Crystal frequency shift circuit disabled
JU101	**IN**	Always placed for ASTRO
BOLD indicates factory default setting		

Table 2-6. Tone Remote Control Board Plug Settings

Plug	Jumper	Description
P101	A-B	Transmitted and received audio is routed to TAPE_OUT (Accessory Connector 3, pin 11)
	B-C	Only received audio is routed to TAPE_OUT (Accessory Connector 3, pin 11)
P102	A-B	SPKR_UNMUTE active high
	B-C	SPKR_UNMUTE active low
P103 (PLN1687B Only)	**A-B**	Enables AUX_TX_AUD as the transmit audio source associated with PTT*
	B-C	Enables wireline transmit audio as the transmit audio source associated with PTT*
BOLD indicates factory default setting		

Table 2-7. Tone Table Selection

SEL #4	SEL #3	SEL #2	SEL #1	Selected Tone Table
OFF	OFF	OFF	OFF	Standard
OFF	OFF	OFF	ON	CentraCom II
OFF	OFF	ON	OFF	No Mode Sel
OFF	OFF	ON	ON	Mode 1 only
OFF	ON	OFF	OFF	No Mode 1
OFF	ON	OFF	ON	Not supported
OFF	ON	ON	OFF	Not supported
OFF	ON	ON	ON	Not supported
ON	OFF	OFF	OFF	Not supported
ON	OFF	OFF	ON	Not supported
ON	OFF	ON	OFF	Not supported
ON	OFF	ON	ON	Not supported
ON	ON	OFF	OFF	Not supported
ON	ON	OFF	ON	Not supported
ON	ON	ON	OFF	Not supported
ON	ON	ON	ON	Not supported

2.7 Clock/VU Meter Setup (Optional) (No Longer Available)

The clock displays the time, day, month, and year.

2.7.1 Operation

Press the **mode** button to change the display cyclically between the time, month.day, and year.

2.7.2 Time Setting

After power up, the display blinks and the clock starts from the default time of: 00:00:00, month.day: 1.1, year: 1990. To set the time, do the following:

1. Press the **mode** button until the time is displayed (HH:MM).
2. Press the **set** button for 5 seconds.
3. Press the **mode** button to reset the seconds. The display shows the seconds.
4. Press the **set** button. The display shows the hours and minutes (blinking).
5. Press the **mode** button until the correct minutes are displayed.
6. Press the **set** button. The display shows the hours (blinking) and minutes.
7. Press the **mode** button until the desired hour is displayed.
8. Press the **set** button to complete the time setting.

2.7.3 Month and Day Setting

To set the month and day, do the following:

1. Press the **mode** button until the month.day (MM.DD) is in the display.
2. Press the **set** button for 5 seconds (the day blinks).
3. Press the **mode** button until the desired day appears in the display.
4. Press the **set** button (the month blinks).
5. Press the **mode** button until the desired month is displayed.
6. Press the **set** button to complete the month and day setting.

2.7.4 Year Setting

To set the year, do the following

1. Press the **mode** button until the year is in the display (1990 default).
2. Press the **set** button for 5 seconds (the right digit blinks).
3. Press the **mode** button until the correct digit blinks.
4. Press the **set** button (the next digit blinks).
5. Repeat the previous two steps to set all the digits.

The setting is complete. To display the time, press the **mode** button.

2.8 Accessory Connector 2

Table 2-8 on page 2-10 contains pin descriptions for Accessory Connector 2. See Figure 2-4. Accessory 2 and 3 Mating Connector on page 2-12 for pin locations on mating connector.

To avoid possible damage to external equipment and the Consolette, make sure equipment is connected to the proper accessory connector pins before applying power to the station.

Table 2-8. Accessory Connector 2—Pin Descriptions

Pin	Signal Name	Description
1	RX+ (LINE1+)†	Receive high used with TRC desksets (TX and RX high for two-wire operation; RX high for four-wire operation)†
2	AUD_SHLD	Ground: audio or analog
3	TX+ (LINE2+)†	Transmit high used with all desksets (TX high for four-wire operation)†
4	FILT_AUD (DET_AUD)†	RX filtered audio (RX detect or discriminator audio)†
5	A+	+13.8VDC or battery voltage
6	BUSY	Busy line of data bus; 5V logic
7	BUS+	High side of bus data: 180° out of phase with BUS–; 5V logic
8	NC	Currently not used
9	VIP OUTPUT 1	Vehicle interface output port 1
10	PTT*	Push-To-Talk initiates a transmission; 5V logic
11	TX– (LINE2–)†	Transmit low use with all desksets (TX low for four-wire operation)†
12	DIG_GND	Ground for 5V logic signals
13	VIP INPUT 1	Vehicle interface input port 1
14	REMOTE_RX+ (SPKR_HI)†	Remote deskset speaker high output (**CAUTION: grounding this pin will result in damage to the radio**) (Speaker high output)†
15	REMOTE_RX– (SPKR_LO)†	Remote deskset speaker low output (**CAUTION: grounding this pin will result in damage to the radio**) (Speaker low output)†
16	RX– (LINE1–)†	Receive low used with TRC desksets (TX and RX low for two-wire operation, RX low for four-wire operation)†
17	AUX_TX_AUD	Linear transmit audio path used with auxiliary PTT
18	VIP OUTPUT 3	Vehicle interface output port 3
19	BUS–	Low side of bus data: 180° out of phase with BUS–; 5V logic
20	RESET	Data bus reset line; 5V logic
21	5V	5V for logic circuits
22	VIP INPUT 3	Vehicle interface input port 3
23	VIP OUTPUT 2	Vehicle interface output port 2
24	MONITOR*	Allows activation of monitor (used with MRTI telephone interconnect)

Table 2-8. Accessory Connector 2—Pin Descriptions (Continued)

Pin	Signal Name	Description
25	SPKR_UNMUTE	Signal indicating if the Consolette is receiving valid audio
* indicates an active-low condition † indicates TRC information NC indicates Not Connected		

2.9 Accessory Connector 3

Table 2-9 contains pin descriptions for Accessory Connector 3. See Figure 2-4. Accessory 2 and 3 Mating Connector on page 2-12 for pin locations on mating connector.

To avoid possible damage to external equipment and the Consolette, make sure equipment is connected to the proper accessory connector pins before applying power to the station.

Table 2-9. Accessory Connector 3—Pin Descriptions

Pin	Signal Name	Description
1	RS232_RXD (NC)†	RS232 receive data (pin not used on TRC)†
2	ANA_GND	Ground: audio or analog
3	AUX_RX_AUD	External SECURENET not supported by the Consolette
4	FILT_AUD (DET_AUD)†	RX filtered audio (RX detect or discriminator audio)†
5	A+	+13.8 Vdc or battery voltage
6	BUSY	Busy line of data bus; 5V logic
7	BUS+	High side of bus data: 180° out of phase with BUS–; 5V logic
8	BUS_SHLD	Ground for data bus; logic ground
9	N/C (RS232_RXD)†	Pin not used on AIB (RS232 receive data)†
10	VSENSE1_SHLD	Analog ground
11	TAPE_OUT	Tape recorder audio output
12	DIG_GND	Ground for 5V logic signals
13	EMER	Activates emergency MDC1200 transmission
14	RS232_TXD (NC)†	RS232 transmit data (pin not used on TRC)†
15	RS232_RTS (NC)†	RS232 request to send (pin not used on TRC)†
16	RS232_CTS (PS_AUD_OUT)†	RS232 clear to send (external SECURENET not supported by the Consolette)†
17	AUX_TX_AUD	Linear transmit audio path used with auxiliary PTT

Table 2-9. Accessory Connector 3—Pin Descriptions (Continued)

Pin	Signal Name	Description
18	SWB+	Switched +13.8 Vdc or battery voltage
19	BUS–	Low side of bus data: 180° out of phase with BUS–; 5V logic
20	RESET	Data bus reset line; 5V logic
21	NC	Currently not used
22	NC (RS232_TXD)†	Pin not used on AIB (RS232 Transmit data)†
23	N/C (RS232_RTS)†	Pin not used on AIB (RS232 request to send)†
24	VSENSE2_SHLD	Analog ground
25	NC (RS232_CTS)†	Pin not used on AIB (RS232 clear to send)†
† indicates TRC information NC indicates Not Connected		

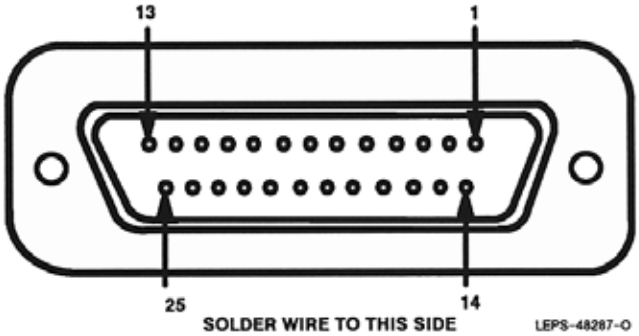


Figure 2-4. Accessory 2 and 3 Mating Connector

2.10 Remote Control Installation

2.10.1 Digital Remote Control Installation

Figure 2-5 shows a typical setup using multiple MC3000 desksets with the Consolette.

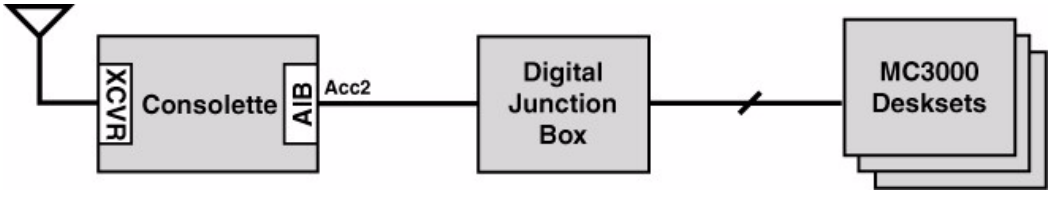


Figure 2-5. Consolette Setup with Multiple MC3000 Desksets

This procedure is to be used for installation of the RCH3000 or MC3000 digital remote deskset. Make sure switches 1 and 7 of S101 on the audio interface board are in the ON position. Refer to the Digital Remote Deskset Manual for information regarding deskset operation. Table 2-10 on page 2-13 lists the Accessory Connector 2 pins used for Digital Remote Control operation.

NOTE: All information, such as mode names, phone lists, call lists, and message names should be programmed in the Consolette using Customer Programming Software (CPS).

External Alarms (Horn and Lights): The Consolette routes the VIP lines from the local control head in Option G80 models to the rear accessory connector of the Consolette for the External Alarm feature. Access to the VIP lines in Option G81 models is at the remote deskset. Consult the MC3000 manual for detailed information concerning configuration and support.

Table 2-10. Accessory Connector 2 Pins: Digital Remote Control Operation

Pin Number	Signal Name
2	AUD_SHLD
3	TX+
6	BUSY
7	BUS+
11	TX–
12	DIG_GND
14	REMOTE_RX+
15	REMOTE_RX–
19	BUS–
20	RESET

2.10.2 Tone Remote Control Installation

NOTE: The Tone Remote Control Option (L146) must be ordered for this option to be available.

Tone remote desksets are to be connected to Accessory Connector 2 on the rear panel of the Consolette. See Figure 2-2. Rear Panel on page 2-2. Two-wire or four-wire operation is available. Two-wire operation uses Line1+ and Line1- for both receive and transmit audio. Four-wire operation uses Line 1+ and Line1- for receive audio and Line2+ and Line2- for transmit audio. The default setting for wireline operation is two-wire. Impedance flexibility of 600Ω or 900Ω between Line1+ and Line 1- is also provided. The default setting for impedance is 600Ω. For information regarding changing wireline operation or impedance, refer to Table 2-3 on page 2-6 for S100 and Table 2-4 on page 2-7 for S101. Refer to the applicable tone remote deskset manual for information regarding deskset operation. Table 2-11 on page 2-14 identifies the Accessory Connector 2 pins used for tone remote control operation.

Table 2-11. Accessory Connector 2 Pins: Tone Remote Control Operation

Pin Number	Signal Name
1	LINE1+
3	LINE2+
16	LINE1–
11	LINE2–

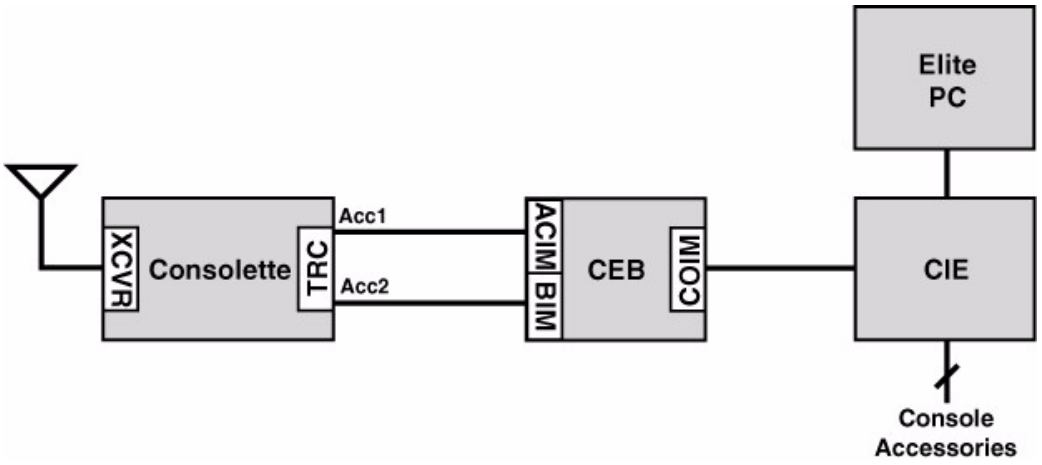


Figure 2-6. Consolette Setup with the Gold Elite Console

Figure 2-6 shows a typical setup using the Gold Elite Console with the Consolette.

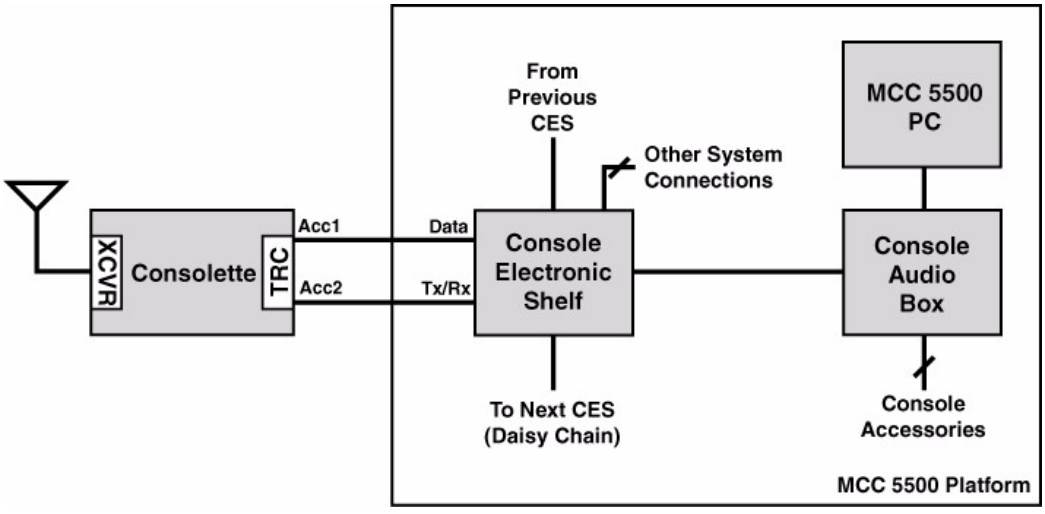


Figure 2-7. Consolette Setup with the MCC 5500

Figure 2-7 shows a typical setup using the MCC 5500 with the Consolette.

Follow the instructions at the beginning of this section to set up the wireline paths (used for audio routing as well as tone remote control tones) between the Console and the Consolette. Refer to 3.4.2.8, "Smart Modem Protocol (SMP) Control," on page 3-11 for details on the data connection (used for ID reporting as well as remote control) between the Console and the Consolette.

2.11 Controller Board Adjustment Procedures

The next two subsections explain the controller board adjustment procedures.

2.11.1 AIB Adjustment Procedure

This section explains the AIB adjustment procedure.

2.11.1.1 Transmit (Auxiliary Audio Input)

R244 is set fully clockwise, then turned counterclockwise aligning the slot between the two dots with the first triangle. This adjustment enables the Consolette to transmit and obtain 3 kHz deviation when a 2 Vrms, 1 kHz audio signal from a 600Ω source is applied to the AUX_TX_AUD input (Accessory Connector 2 pin 17). This adjustment and input level is based on a Cross Patch setup between two Consolettes (See Appendix A). R244 can be adjusted to accommodate various 1 kHz audio input levels (approximately 35 mVrms to 5 Vrms) into AUX_TX_AUD to enable the Consolette to transmit and obtain 3 kHz deviation.

NOTE: AUX_TX_AUD is used only with the external hardware PTT feature; therefore, if adjustment of R244 is needed, the Consolette must be keyed up using the external hardware PTT (grounding pin 10 on Accessory Connector 2).

2.11.1.2 Receive

While receiving a 1 kHz, 3 kHz deviation audio signal, R111 is adjusted for 1.0 Vrms across a 600Ω load at RX+ and RX- (Accessory Connector 2 pins 1 and 16, respectively).

2.11.2 TRC Adjustment Procedure

This section explains the TRC adjustment procedure.

2.11.2.1 Transmit (Wireline Input)

From the factory, AGC is enabled with S100-4 set to the OFF position. R529 is set fully clockwise, then turned counterclockwise one-half turn. This sets the AGC gain to somewhat less than maximum. Using 4-wire operation, the factory inputs a 120 mVrms, 1 kHz audio signal from a 600Ω source into Line 2+ and Line 2– (Accessory Connector 2 pins 3 and 11, respectively). The Consolette is placed in transmit and R569 is adjusted to obtain 3 kHz deviation. This allows for operation with signals between -20 dB to +13 dB without any additional field adjustments.

If AGC is disabled in the field with S100-4 set to the ON position, then R529 should be adjusted to obtain 0.7 VAC at TP1 when a 1 kHz audio signal is sent from the wireline.

2.11.2.2 Transmit (Auxiliary Audio Input)

For PLN 1687B boards, plug P103 needs to be in the A-B jumper position. R193 is set fully clockwise, then turned counterclockwise aligning the slot between the two dots with the first triangle. This adjustment enables the Consolette to transmit and obtain 3 kHz deviation when a 2 Vrms, 1 kHz audio signal from a 600Ω source is applied to the AUX_TX_AUD input (Accessory Connector 2 pin 17). This adjustment and input level is based on a Cross Patch setup between two Consolettes (See Appendix A). R193 can be adjusted to accommodate various input levels (approximately 35 mVrms to 5 Vrms) into AUX_TX_AUD to enable the Consolette to transmit and obtain 3 kHz deviation.

NOTE: AUX_TX_AUD is used only with the external hardware PTT feature; therefore, if adjustment of R193 is needed, the Consolette must be keyed up using the external hardware PTT (grounding pin 10 on Accessory Connector 2).

2.11.2.3 Receive

While receiving a 1 kHz, 3 kHz deviation audio signal, R545 is adjusted for 0 dBm (775 mVrms) across a 600Ω load at Line1+ and Line1– (Accessory Connector 2 pins 1 and 16, respectively).

2.12 Emergency Alarm Receive Indicator

NOTE: There are limitations with the Subscriber-to-Consolette/Console Emergency Alarm Receive Indication feature that should be taken into consideration when using the Consolette in a dispatch position. This is in contrast to a Subscriber-to-Quantar/DIU/Console Emergency Alarm Receive feature which does not have these limitations. See “Feature Limitations” paragraph in this section for a description of these limitations.

This feature selects the type of notification that the Consolette generates when an Emergency Alarm is received on either an MDC or an ASTRO channel (ASTRO Conventional, Type II Trunking, and ASTRO 25 Trunking) from another radio. The user can choose from four indication types:

- **No Indication**
- **Alert Only**: The Consolette will sound an audio alert tone. Repeated Emergency Alarms from the same initiating radio within a 30 second period will result in one indication at the Consolette.
- **Display Only**: The Consolette will display “EA RCVD” alternating with the ASTRO System ID, Trunking Personality Talkgroup ID or ID Alias of the subscriber radio that generated the Emergency Alarm. This continues for ten seconds. Pressing any button on the control head (except for the Dim or Volume) discontinues this information from appearing in the radio’s display. This information will either be displayed on the local control head (if equipped) or at the remote control head (if equipped). If the Consolette is equipped with the TRC option (L146), then the ID will be made available to the Console. Repeated Emergency Alarms from the same initiating radio within a 30 second period will result in one indication at the Consolette.
- **Alert and Display:** The Consolette will perform both the Alert tone generation and ID display as described for the Alert Only and Display Only types.

The Emergency Alarm Receive Indicator Type field can be found on the **Radio Configuration –> Radio Wide -> TPS** screen (Figure 2-8 on page 2-17) of the ASTRO 25 Mobile CPS (RVN4185_).

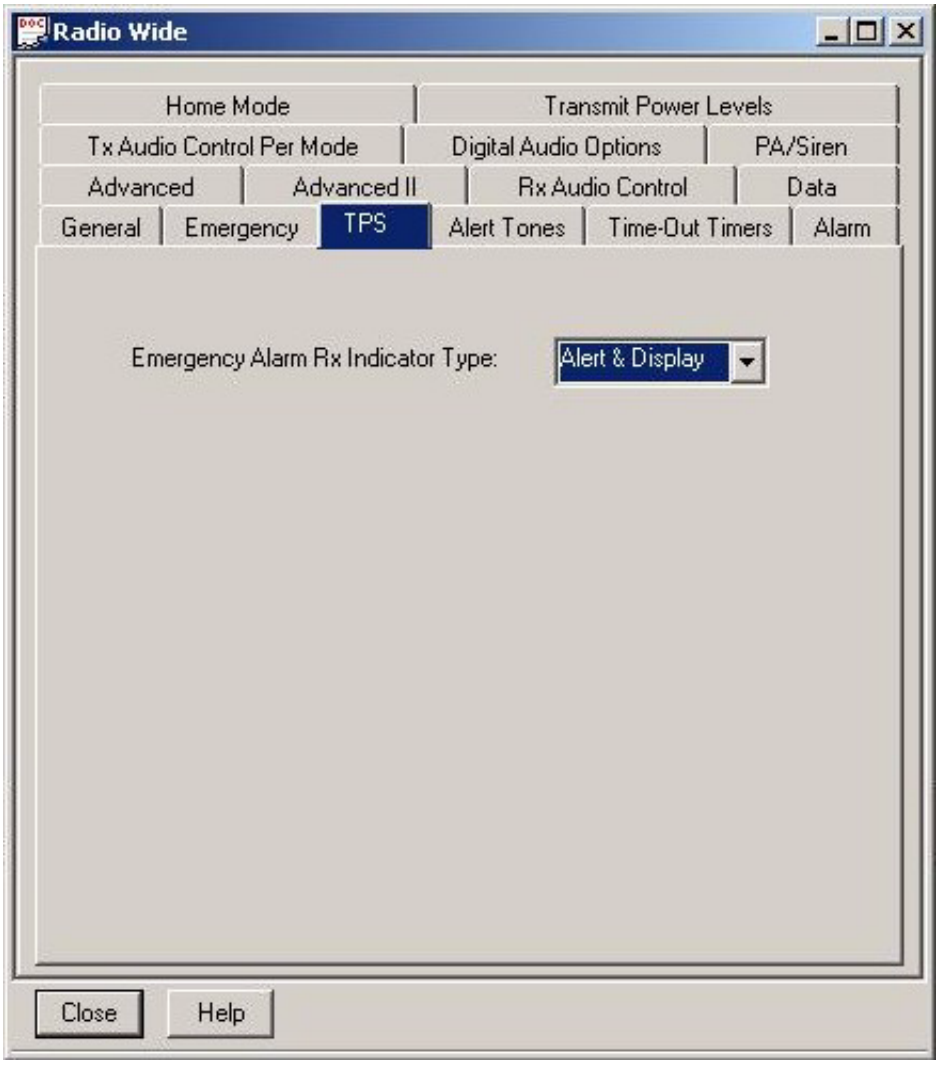


Figure 2-8. Radio Wide -> TPS Screen

In addition to the above indication types, the Emergency Alarm RX Indicator feature can be programmed to a single VIP Out. This VIP Out will be active for 10 seconds. The VIP Out fields can be found on the **Radio Configuration –> Controls -> Radio VIP** screen (Figure 2-9 on page 2-18) of the ASTRO 25 Mobile CPS (RVN4185_).

NOTE: The Consolette routes the VIP lines from the local control head in Option G80 models to the rear accessory connector. Access to the VIP lines in Option G81 models is at the remote deskset. Consult the MC3000 manual for detailed information concerning configuration and support.

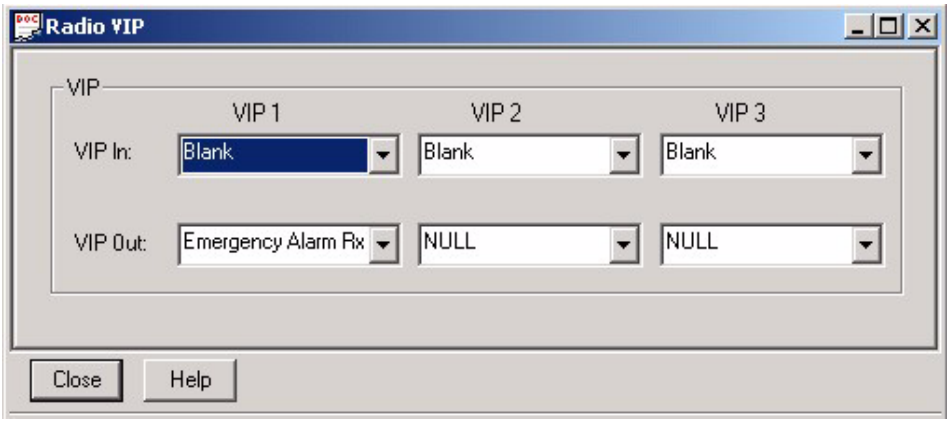


Figure 2-9. Radio Configuration –> Controls -> Radio VIP Screen

The decoding of the Emergency Alarm ID can be disabled in a specific ASTRO Conventional or Trunking system by unchecking the Emergency Alarm RX field. This field can be found in ASTRO 25 Mobile CPS (RVN4185_) on the **Conventional -> ASTRO Systems -> ASTRO System -> ASTRO System - # ->Advanced** screen (Figure 2-10) for ASTRO Conventional systems and **Trunking -> Trunking Systems -> Trunking System - # -> Advanced** screen (Figure 2-11 on page 2-19) for Trunking systems.

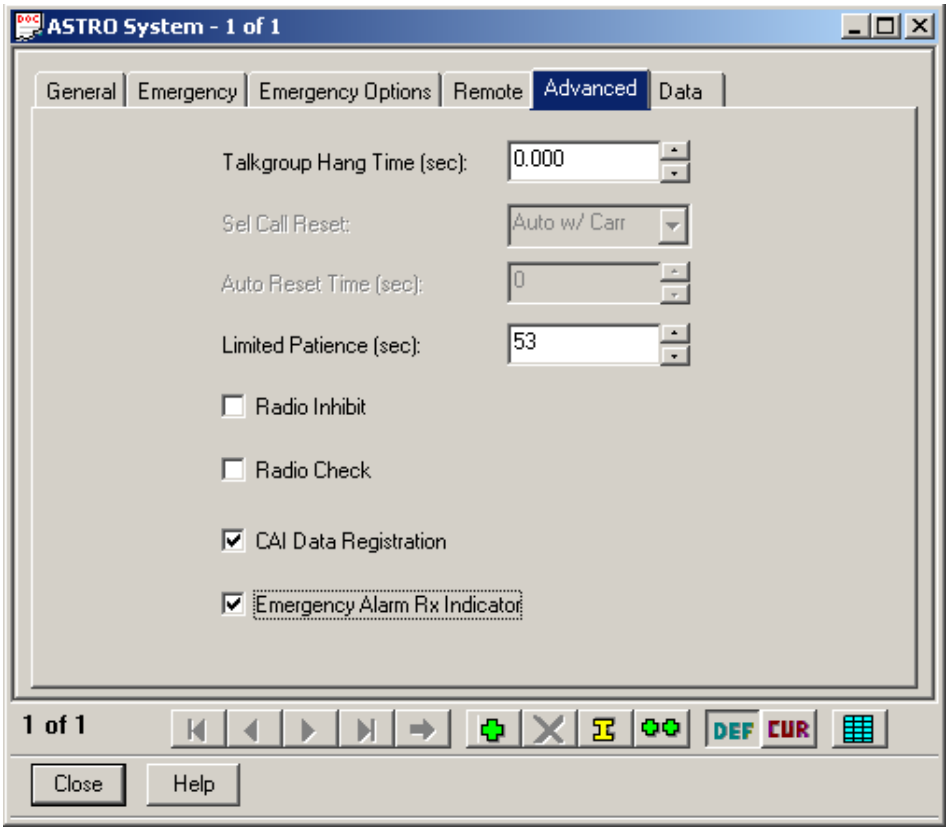


Figure 2-10. ASTRO System - # -> Advanced Screen

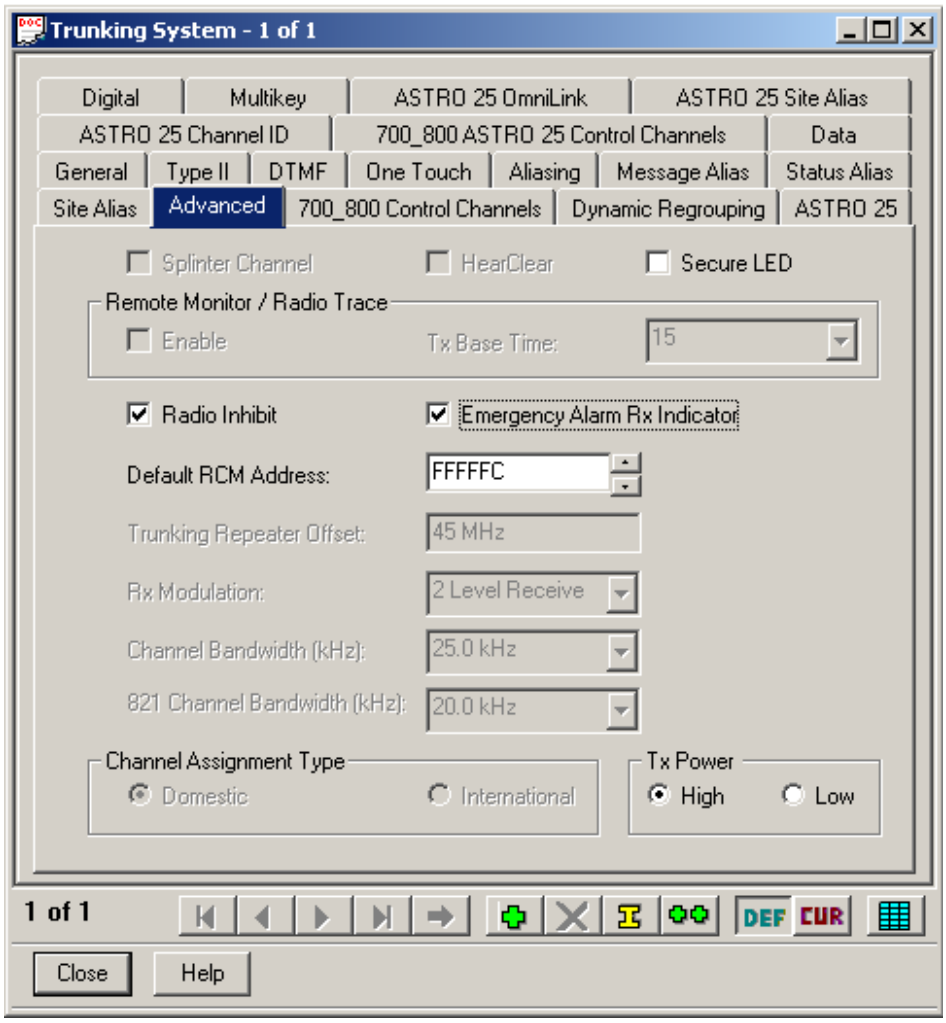


Figure 2-11. Trunking System - # -> Advanced Screen

2.12.1 Feature Limitations

There are situations where the Emergency Alarm ID may not be decoded by the Consolette. Two of the more common situations are:

- When on a Trunking channel, the Emergency Alarm will not be seen by the Consolette if it is currently transmitting or receiving a voice call. This is due to the normal operation of a Trunking System where the subscriber unit (e.g., Consolette) cannot receive control channel information while it is handling a voice call on a designated voice channel. The Trunking system will only broadcast the Emergency Alarm on the control channel and only those subscriber units listening to the control channel will receive the Emergency Alarm.
- If the Consolette is set to priority scan, it could miss the Emergency Alarm if it is currently busy on a Priority Channel and the Emergency Alarm is generated on a non-priority channel.

Other situations may exist. Due to the inherent nature of this feature, it is not recommended that this Consolette feature be used as the only Emergency Alarm Indicator in heavy use systems where Emergency Alarm is heavily relied upon. Consult your local Motorola Systems Engineer on the proper use of this feature.

2.13 Programming

This section describes codeplug and FLASHport programming.

2.13.1 Codeplug Programming

When the ASTRO Digital XTL 5000 Consolette arrives from the factory it will contain a default codeplug configuration based on the options ordered with the unit. For Example: If the Consolette is ordered with the L146 option, the “TRC Enable” field should be enabled in the codeplug.

Some options come enabled in the codeplug by default, but some options are disabled by default. For those options that are default-enabled from the factory, the following information should only be needed if the transceiver is replaced or repaired and the default configuration was not saved. For those options that are default-disabled, use this information to enable the option if desired.

To configure the codeplug of the ASTRO Digital XTL 5000 Consolette using ASTRO 25 Mobile CPS (RVN4185_), the XTL 5000 transceiver must be connected directly to the PC. The PC must be connected directly to the 26-pin accessory connector on the XTL 5000 transceiver using either a USB (HKN6163_) or RS232 (HKN6160_) mobile data cable, and not to the accessory connectors on the rear panel of the consolette. The HKN6155 cable can also be used. Connection is via the connector on the front of the XTL 5000 but not via the Control Head. Therefore, the first step in programming the codeplug of the Consolette is to remove the top cover. see ”4.4. Disassembly and Reassembly” on page 4-2 for cover removal and replacement instructions.

2.13.2 Tone Remote Control, L146

When the ASTRO Digital XTL 5000 Consolette is ordered with the L146 option, the “TRC Enable” field should be enabled in the codeplug for all of the features of the consolette to function properly. If this field is not already enabled when the Consolette is received from the factory, then it can be enabled on the **Radio Configuration->Radio Wide->Advanced II** screen (Figure 2-12 on page 2-21) in the ASTRO 25 Mobile CPS (RVN4185_).

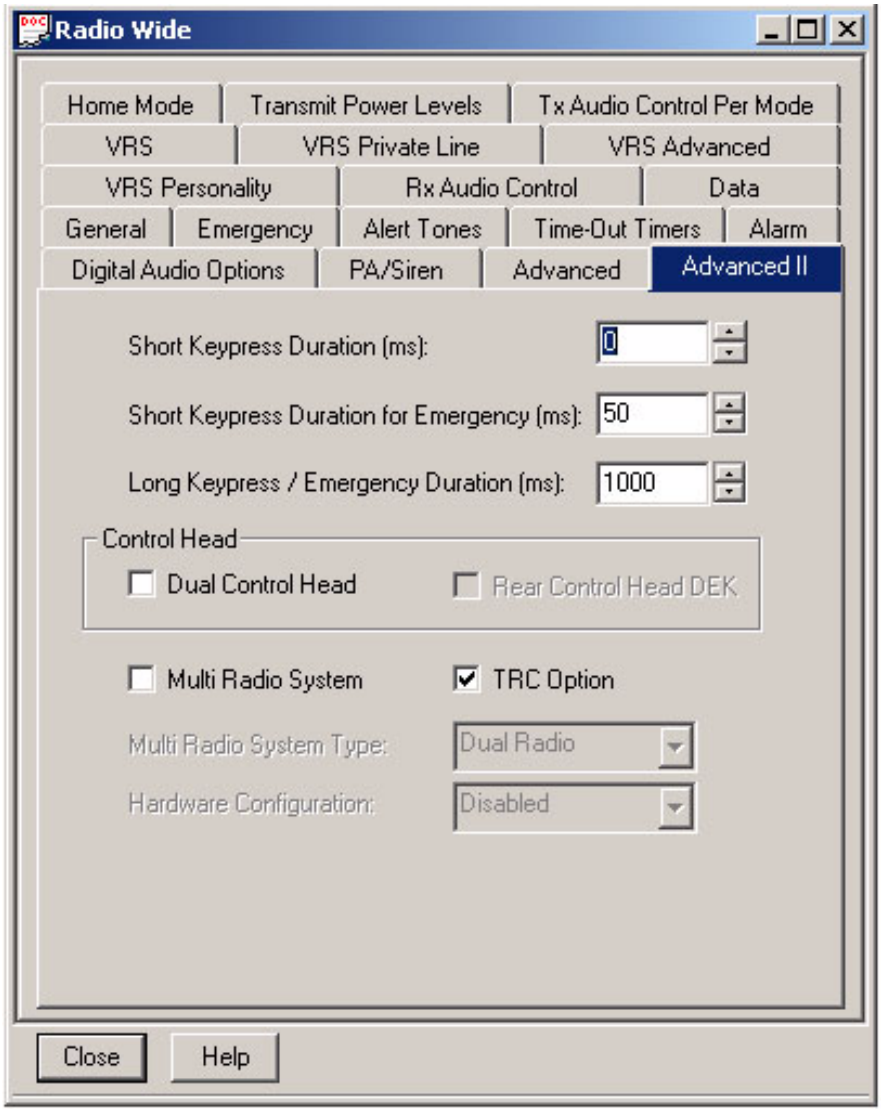


Figure 2-12. Radio Wide—Advanced II Tab Screen

2.13.3 Enhanced Digital ID Display, G114

This option provides display capability of Push-To-Talk, Private Call, Call Alert, and Emergency Call IDs. This information will either be displayed on the local control head (if equipped) or at the remote control head (if equipped). If the TRC option L146 is ordered in combination with the G114 option, then the ID will be made available to the console. The PTT-ID option is not automatically enabled in the Consolette. To enable the G114 option, the ID Display field in the Consolette codeplug will need to be enabled using ASTRO 25 Mobile CPS (RVN4185_). The ID Display field can be found in the **Radio Configuration – > Display & Menu->PTT ID** section of the Consolette codeplug (Figure 2-13 on page 2-22).

NOTE: The ASTRO Digital XTL 5000 Consolette uses an ASTRO Digital XTL 5000 mobile subscriber radio as its transceiver. Therefore, the Consolette will NOT decode an Emergency Alarm generated by field subscriber units, and it will NOT display the Emergency Alarm ID locally or at a console station. This signal is typically generated by the subscriber radio by pushing the orange alarm button.

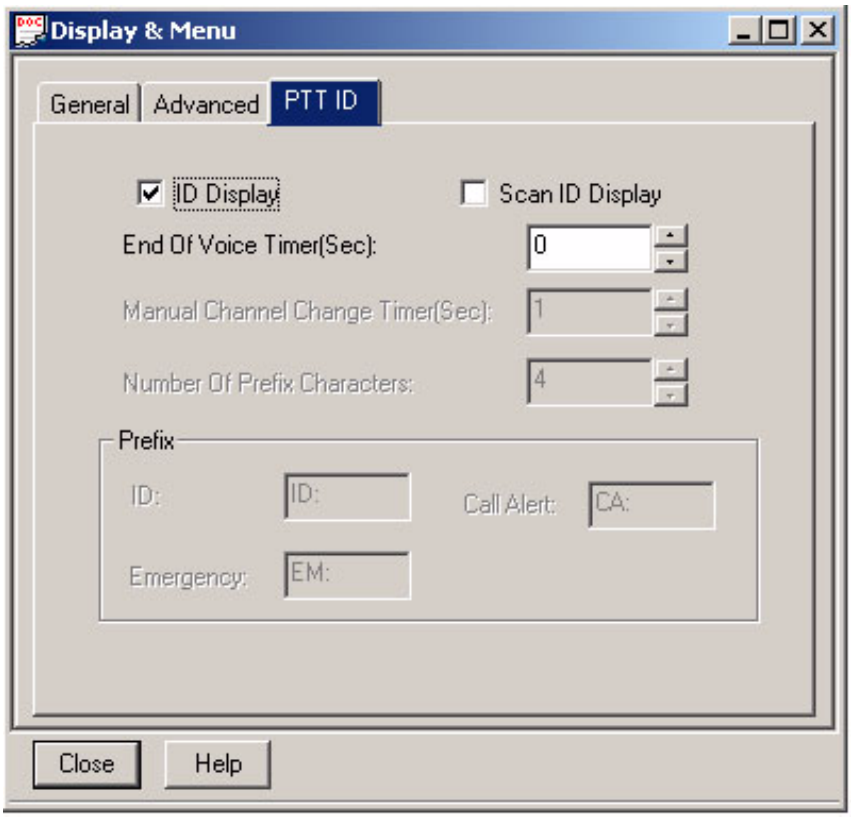


Figure 2-13. Display and Menu—PTT ID Tab Screen

2.13.4 HUB Defeats PL

The HUB Defeats PL feature enables the Consolette user to monitor all carrier squelch activity on a conventional dispatch channel when the monitor button is pressed. This is true even when the selected radio channel's Unmute/Mute rule requires PL (Private Line). The HUB Defeats PL field can be found on the **Conventional->Conventional Configuration->General** screen (Figure 2-14 on page 2-23) of the ASTRO 25 Mobile CPS (RVN4185_).

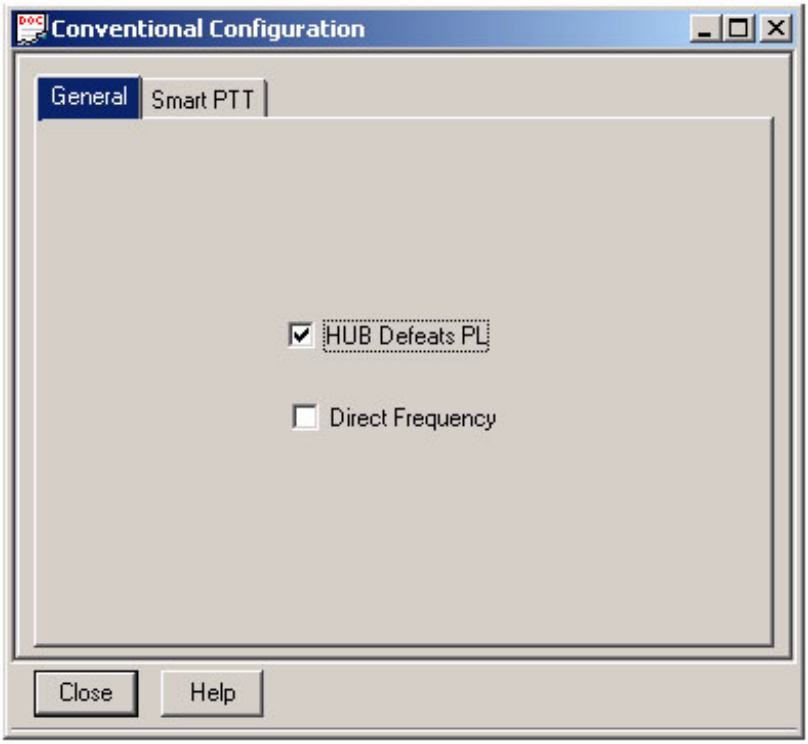


Figure 2-14. Conventional Configuration—HUB Defeats PL Feature

2.13.5 AUX TX/AUX MIC

In order to use the External Hardware PTT feature (Pin 10 of Accessory Connector 2) of the XTL 5000 Consolette, the "AUX TX" transmit audio path (Pin 17 of Accessory Connector 2) must be selected in the codeplug. The Consolette ships from the factory with the “Aux PTT Audio Source” codeplug field set to "AUX TX". If this field is not already selected when the Consolette is received from the factory, then it can be selected on the **Radio Configuration->Radio Wide->Advanced** screen (Figure 2-16 on page 2-25) in the ASTRO 25 Mobile CPS (RVN4185_).

NOTE: The "AUX TX" transmit audio path defaults to a 300mV input level. For more information on this feature, see ”3.3.1.2. Transmit Audio Paths” on page 3-4 in this manual.

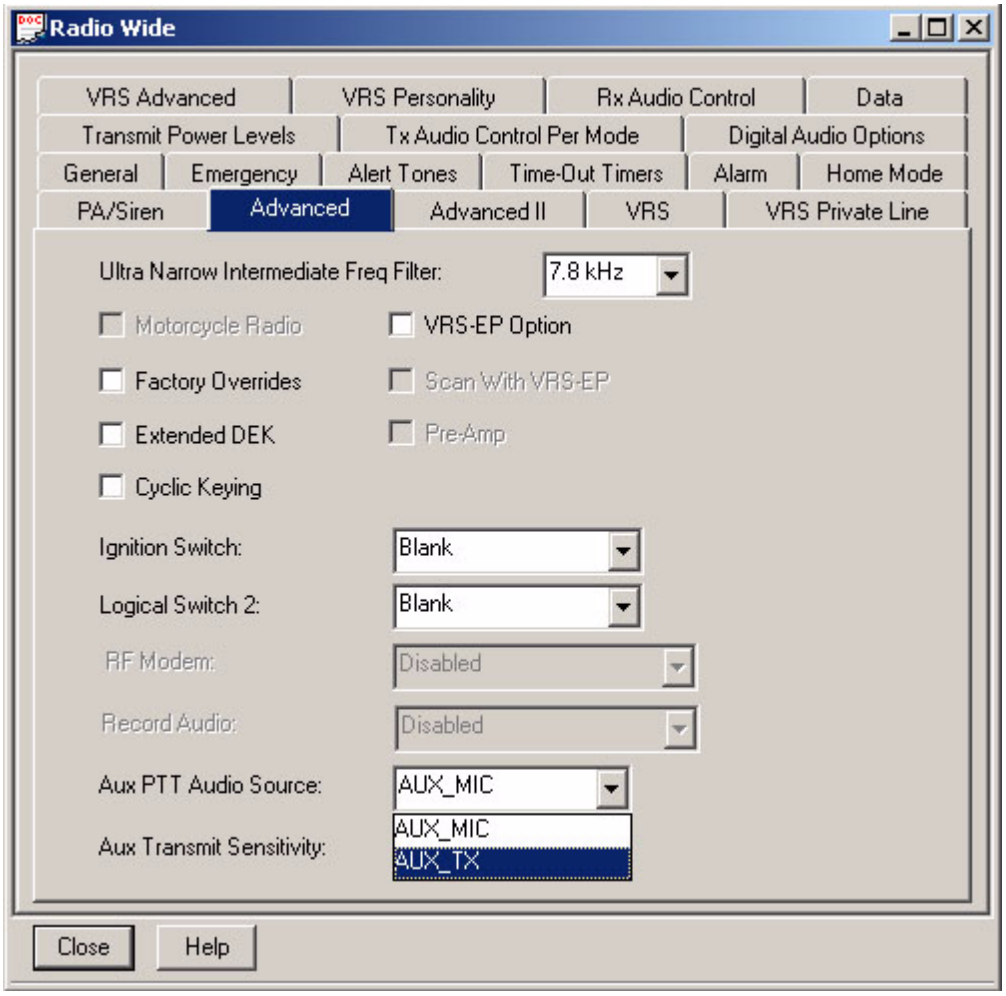


Figure 2-15. Radio Wide Screen — Advanced Tab Screen

2.13.6 AGC Gain Settings within the Radio

For the ASTRO Digital XTL 5000 Consolette to function properly, the AGC settings of the Internal Mic and External Mic fields should be disabled in the codeplug. If these fields are not already disabled when the Consolette is received from the factory, then they can be disabled on the **Radio Configuration->Radio Wide->Tx Audio Control Per Mode** screen (Figure 2-16 on page 2-25) in the ASTRO 25 Mobile CPS (RVN4185_).

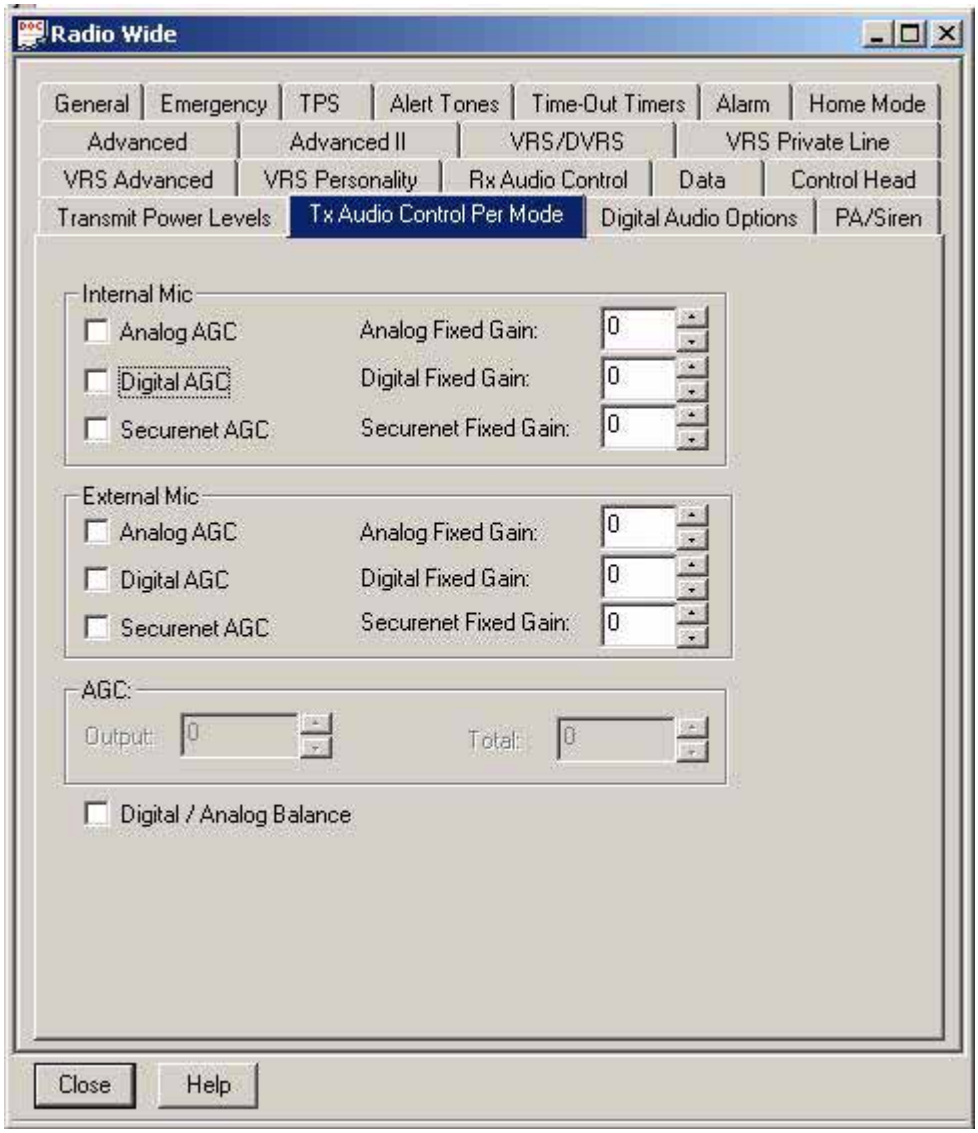


Figure 2-16. Transceiver AGC Gain Settings

2.13.7 FLASHport Programming

Always be sure you are ordering/using the latest version of the software package. If you are not sure, contact Motorola Product Services or United States and Canada Aftermarket Products Division at 1-800-422-4210.

In order to FLASH the internally housed XTL 5000 mobile, the lid must be removed from the Consolette. Connect the XTL 5000 mobile programming cable (HKN6160 or HKN6163) to the 26-pin accessory connector on the rear of the XTL 5000 radio and follow the FLASHport instructions. The HKN6155 cable can also be used. Connection is via the connector on the front of the XTL 5000 but not via the Control Head.

Notes

Chapter 3 Theory of Operation

3.1 Introduction

This section explains the general operation of the ASTRO Digital XTL 5000 Consolette. For more detailed information about the XTL 5000 transceiver, refer to the applicable XTL 5000 operator's manual or service manual.

3.2 General

The XTL 5000 Consolette consists of three major building blocks: the XTL 5000 transceiver, the Audio Interface board (AIB) or optional Tone Remote Control (TRC) board, and the power supply. The Audio Interface board is standard for the Consolette. The Tone Remote Control board replaces the Audio Interface board when the L146 option is added. All other blocks contained within the Consolette are served by the three major building blocks shown in bold (see Figure 3-1).

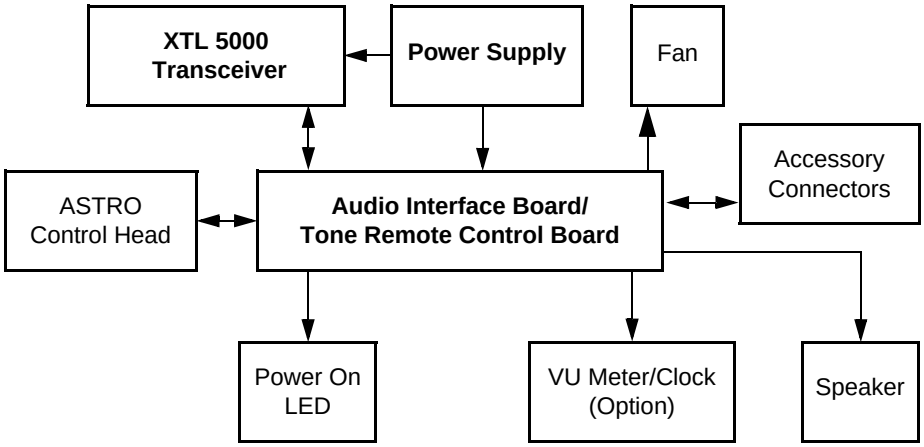


Figure 3-1. Consolette Block Diagram

Each major building block has its own unique function:

- Modulation, demodulation, and all other RF signal processing are performed by the XTL 5000 transceiver.
- All baseband signals being routed to and from the radio pass through the Audio Interface board or optional Tone Remote Control board. The board provides an interface for the control head, speaker, accessory connectors, and other options.
- Provisions have been made for the connection of voice recorders to the XTL 5000 Consolette.
- The power supply converts AC power into DC power for use by the radio's transceiver and the Audio Interface board or optional Tone Remote Control board.

The XTL 5000 control head and speaker are present in all Option G80 models. Option G81 Digital Remote Control models (see Figure 3-3 on page 3-2) do not have a control head or speaker. Refer to the appropriate XTL 5000 radio user's guide for information regarding the operation of the control head.

The accessory connectors (see Figure 2-4 on page 2-12) are used to connect external equipment to the Consolette. Accessory Connector 3 (top) is currently used for tape recorder audio out. Tone remote desksets or digital remote desksets should use Accessory Connector 2 (bottom). Accessory Connector 1 (RJ45) is used to connect to the digital interface (ex. ACIM) on a Gold Series Elite or MCC 5500 Console.

Caution

If any external equipment is inadvertently connected to the wrong accessory connector, damage to the equipment might occur.

The optional VU meter/clock provides a transmit audio level indicator and a digital clock display. Power is provided to the VU meter/clock as soon as the Consolette is plugged into a live AC outlet.

A fan is provided with every Consolette. It circulates the air inside the Consolette to keep the internal ambient temperature at an acceptable level. It is important for the fan to be operating at all times to maintain proper Consolette operation. In addition, it is important to leave the top cover in place to maintain proper thermal conditions inside the Consolette.

The location of the control head, Power On LED, VU meter/clock, and speaker are indicated on the front panel of the station shown in Figure 3-2.

Figure 3-2. Consolette Front Panel—G80 Option

Figure 3-3. Consolette Front Panel—G81 Option

3.3 Audio Interface Board (AIB)

The PLN1688A Audio Interface board (AIB) serves as the central interface for all internal and external components of the XTL 5000 Consolette. All signals are routed through the AIB where processing may occur. Most audio paths incorporate some processing, while most control and data signals are passed unaltered.

Multiple transmit and receive audio paths provide for numerous configurations of the XTL 5000 Consolette. All audio signals passing through the audio interface board are baseband signals in the range of 300-3000 Hz.

Most data and control signals are provided by 0-5V protected CMOS logic circuitry. PTT* and MONITOR* are provided for external control of transmit and receive functions. The XTL 5000 radio Vehicle Interface Ports (VIPS) are also available at Accessory Connector 2 (Option G80 models only).

3.3.1 Detailed Description

3.3.1.1 Receive Audio Paths

Two sources from the XTL 5000 radio are used for receive audio. Detect audio (DET_AUD) is located on J1 pin 17, and filtered audio (FILT_AUD) is located on J1 pins 11 and 36. Both DET_AUD and FILT_AUD are at a fixed level (approx. 300 mVrms). FILT_AUD is also present at Accessory Connector 2 pin 4 and Accessory Connector 3 pin 4.

Detect audio (DET_AUD) passes to the Audio Interface board via J1 pin 17 at a level of 300 mVrms, relative to a 1.0 kHz tone at 60% FSD. It is then amplified by U102 pins 8, 9, and 10 and the level set by potentiometer R111. The level should be set to attain 1.0 Vrms between RX+ and RX– (Accessory Connector 2 pins 1 and 16, respectively). The audio then passes through an audio shaping filter (U102 pins 12, 13, and 14), which has unity gain for frequencies below 3000 Hz. The output of the audio shaping filter (U102 pin 14) is split into opposing phases by U102 pins 1, 2, 3, 5, 6, and 7 to provide a balanced output. Q103 and Q104 provide a final amplification stage. The impedance between RX+ and RX– can be set to 600Ω or 900Ω using S101-4 and 5. See Table 2-1 on page 2-5.

When the radio is in an idle state, the DET_AUD line of the XTL 5000 transceiver is muted using the Channel Activity (CHAN_ACT*) signal provided by the transceiver, located on J1-6, in combination with multiplexor U106. The CHAN_ACT* signal is an active low signal. When the mobile radio routes received audio to the speaker, CHAN_ACT* switches from its idle state of 5 V to its active state of 0 V. Q109 inverts this CHAN_ACT* signal which activates transistor Q101 connected to control input A of the two-input multiplexor (U106 pin 11). When Q101 is active, U106 allows DET_AUD to be passed to the receive audio circuitry. When Q101 is inactive, the receive audio path is muted.

Receive audio is also routed from U106 gate 1 to buffer amplifier U101 op-amp 4 (MOB_RX). The output of this buffer drives the TAPE_OUT line at approximately 190 mVrms, which is used for external recording purposes.

Speaker audio is available at Accessory Connector 2, pins 14 and 15 (REMOTE_RX+ and REMOTE_RX–, respectively) for use with Digital Remote Control models. Speaker audio level is factory set but can be adjusted using Customer Programming Software. An array of resistors capable of dissipating 10 watts provides a 16Ω impedance for the desksets. To enable this audio output, S101-7 must be ON.

Caution

REMOTE_RX– (SPKR_LO) and REMOTE_RX+ (SPKR_HI) should never be grounded. If they are grounded, this will damage the radio.

3.3.1.2 Transmit Audio Paths

There are three main paths for transmit audio. The first path is a linear transmit audio path (AUX_TX_AUD) provided at both accessory connectors, Accessory Connector 2 pin 17 or Accessory Connector 3 pin 17. This path is dedicated for use solely with the external hardware PTT feature (keying up the Consolette by grounding pin 10 on Accessory Connector 2), and vice versa. This transmit path has an impedance of 600Ω and is amplified by U107 pins 5, 6, and 7 and the level set by potentiometer R244. The output of the amplifier (U107 pin 7) following AC-coupling capacitor C164 is fed into the XTL 5000 radio auxiliary transmit input at J1 pin 15 and J1 pin 40. The level of this signal should be 300 mVrms relative to a 1.0 kHz tone at 60% FSD. If data is to be transmitted via the AUX_TX_AUD path, U107 needs to be bypassed. This is done by removing 0 Ohm jumper R235 and placing it in the R234 location. This supplies a direct, unimpeded path for data to the XTL 5000 radio AUX_TX_AUD input; furthermore, the user must also use CPS to select the AUX_TX_AUD “Flat” path within the XTL 5000 mobile which is used for data transmission.

The other two transmit audio paths pass through transmit audio summing amplifier U101 pins 8, 9, and 10. The output of the summing amplifier (U101 pin 8) following AC-coupling capacitor C101 is fed into the XTL 5000 radio microphone input at J1 pin 23 and J1 pin 48. The level of this signal should be approximately 90 mVrms relative to a 1.0 kHz tone at 60% FSD.

Local microphone audio passes through the control head to J2 pin 30. The microphone audio is biased and passed through the summing amplifier with unity gain. This path has an impedance of 600Ω.

A differential transmit path is available at Accessory Connector 2 pins 3 and 11 (TX+ and TX–, respectively) with an impedance of 1.0kΩ. This signal is combined at U101 pins 2 and 3 into a linear signal at U101 pin 1 and then routed through the transmit audio summing amplifier with a gain of +6 dB.

Transmit audio taken from the MIC_HI and AUX_TX_AUD lines is routed to the tape recorder output based on the jumper position at header J14. TX audio is routed to the tape recorder output at approximately 90 mVrms when the jumper is in the A-B position. If the jumper is moved to the B-C position, TX audio is not routed to the tape recorder output. (The TX and RX audio measurements were made relative to a 1 kHz tone at 60% FSD.)

MIC_HI transmit audio is routed to the VU meter/clock (option L114) with a gain of +14dB. AUX_TX_AUD transmit audio is routed to the VU meter/clock with a gain of +4 dB.

3.3.1.3 Control and Data Paths

The Audio Interface board is transparent to all control and data lines except the data bus lines, MONITOR*, EMER (Emergency), and SPKR_UNMUTE. The amount of gain developed by U105 is determined by the current requirements of the remote desksets. Each op-amp on the BUS+, BUS-, and BUSY lines compares the voltage drop between the + and – inputs. The resulting amplified signal is further amplified by the transistor following each op-amp.

MONITOR* is presented to the radio with S101-6 OFF. See Table 2-1 on page 2-5. The monitor function is available at the control head and can also be enabled by grounding the MONITOR* input on Accessory Connector 2 pin 24.

EMER (Emergency) is available at Accessory Connector 3 pin 13. When triggered, the radio will broadcast an emergency signal (refer to the XTL 5000 radio user’s guide). S101-3 determines the method in which the emergency is triggered.

SPKR_UNMUTE is available at Accessory Connector 2 pin 25 as an output to provide an indication to accessories when the radio is receiving valid audio and the speaker is unmuted. This signal is configurable for either active-high or active-low operation using jumper J15. See Table 2-2 on page 2-5. When configured for active-high, the emitter of Q101 is used to determine the state of the speaker. (If the voltage of the emitter of Q101 is high, the speaker is unmuted; if the voltage here is low, the speaker is muted.) Similarly, if active-low is selected, the collector of Q102 is used to determine the state of the speaker. (If the voltage at the collector of Q102 is high, the speaker is muted; if the voltage here is low, the speaker is unmuted.) Typically, this signal is known as COR (Carrier-Operated Relay).

3.4 Tone Remote Control (TRC) Board

NOTE: For the XTL 5000 Consolette to work properly with the Tone Remote Control (TRC) option, several codeplug parameters must be properly set using the XTL 5000 mobile CPS. The TRC option must be enabled, and “HUB defeats PL” must be selected. For instructions on setting these parameters, see the Installation: Programming section of this manual.

3.4.1 General Description

Tone Remote Control allows control of a Consolette from a remote location using a pair of wires (wireline) which need not have DC continuity. Control is accomplished using a tone remote control console that sends a sequence of control tones that are interpreted by the Consolette. A Consolette function normally corresponds to a function tone (FT) of a predefined frequency. All function tones must be preceded by a high-level guard tone (HLGT—usually 2175 Hz), which alerts the Consolette for a sequence of one or more function tones. On two-wire operation, receiver audio is muted when HLGT is detected, so there will be no interfering audio signals on the wireline when the function tones are being received. Upon receipt of the function tone(s), the appropriate functions (are) executed by the Consolette. An example might be the monitor function, which disables receiver PL; the monitor function tone frequency is usually designated 2050 Hz. See Table 3-1 on page 3-6 for function tone descriptions.

Receiver audio is gated through the radio and passed through a guard tone notch filter on the TRC board. This processed audio is then filtered and applied to the phone line. Transmit audio passes through a sample-and-hold AGC circuit, a guard tone notch filter, and then to the radio to transmit. Audio coming from the wireline is also passed through a bandpass filter that is centered at the guard tone frequency. This audio is then routed to the microprocessor (U123) to be decoded.

Figure 3-4 illustrates the sequence of tones involved in a line push-to-talk (LPTT) function. In such a case, the function tone must be defined as a transmit function on a certain mode (that is, 1950 Hz is usually defined as the function tone for keying on mode 1). If an LPTT function tone is sent, the remote control console follows the function tone with a continuous low-level guard tone (LLGT), which is at the same frequency as the HLGT, but at an amplitude 30 dB lower. LLGT is a pilot tone that is present, along with the transmitted audio, for the duration of the transmission. At the end of the transmission, the Consolette dekeys after the LLGT is no longer detected.

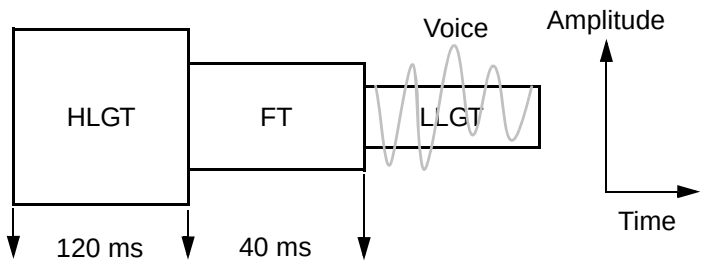


Figure 3-4. Remote Key-Up

Table 3-1. TRC Function Tone Descriptions

Function Tone	Tone Table Description				
	0000 - Standard Table	**0001 CentraCom II**	**0010 No Mode Select**	**0011 Mode 1 Only**	**0100 No Mode 1**
2175 Hz	Guard Tone/PTT	Guard Tone/PTT	Guard Tone/PTT	Guard Tone/PTT	Guard Tone/PTT
2050 Hz	Monitor	Monitor	Monitor	Monitor	Monitor
1950 Hz	Mode 1 Select	Mode 1 Select	No effect	Mode 1 Select	Mode 2 Select
1850 Hz	Mode 2 Select	Mode 2 Select	No effect	No effect	Mode 2 Select
1750 Hz	Mode 7 Select	Mode 7 Select	No effect	No effect	Mode 7 Select
1650 Hz	Mode 8 Select	Mode 8 Select	No effect	No effect	Mode 8 Select
1550 Hz	Mode 5 Select	Mode 5 Select	No effect	No effect	Mode 5 Select
1450 Hz	Mode 6 Select	Mode 6 Select	No effect	No effect	Mode 6 Select
1350 Hz	Mode 3 Select	Mode 3 Select	No effect	No effect	Mode 3 Select
1250 Hz	Mode 4 Select	Mode 4 Select	No effect	No effect	Mode 4 Select
1150 Hz	Secure Coded Select	Mode 5 Select	Secure Coded Select	Secure Coded Select	Secure Coded Select
1050 Hz	Secure Clear Select	Mode 6 Select	Secure Clear Select	Secure Clear Select	Secure Clear Select
0 indicates OFF state of S100 (8-5) 0101-1111 indicates same as Standard Table 1 indicates ON state of S100 (8-5)					

During an LPTT function, the LLGT is removed from the transmitted audio path by a notch filter on the TRC board. This notch filter is tuned to the guard tone frequency (2175 Hz).

When not in the LPTT mode, the TRC board accepts receiver audio from the XTL 5000 radio, passes it through a notch filter (tuned to guard tone), and then through a line driver for transmission down the wireline to the remote console. The receive notch filter prevents false HLGT detection due to possible receiver audio components near the guard tone frequency (since on a two-wire board, receiver audio output and transmit audio/tone inputs are tied together at the wireline).

3.4.2 Detailed Description

3.4.2.1 Control Point Monitor

The XTL 5000 Consolette with the TRC option (L146) supports Control Point Monitor as defined by the FCC. The local Consolette speaker will unmute for remote audio that is being passed from the remote device to the Consolette to be transmitted. When the local microphone is keyed, the local speaker will be muted to voice audio. In addition, audio from the local microphone that is to be transmitted by the Consolette is routed, via the wireline interface, to the remote device. (This is not needed for FCC Control Point Monitor and can be disabled by S100-2.)

When the XTL 5000 Consolette with the TRC option is being used by both a local and a remote user at the same time, situations arise in which one user has priority over the other.

The following cases describe the effect of dual interaction:

- If the remote user performs a push-to-talk (PTT) while the local user is already keyed, the remote user's audio will be transmitted with the encryption state that the local user has selected. This is only the case if the remote user requested a PTT on the same channel that was selected by the local user. If the remote user requested a PTT on a different channel than what was selected by the local user, the Consolette will dekey and a "bad" alert tone will be heard by both users until both PTTs are released.
- If the remote user attempts to change channels while the local user is keyed, the Consolette will dekey and a "bad" alert tone will be heard until the local user releases the PTT.
- All attempts by the remote user to change the state of encryption are ignored if the local user is already keyed.
- If the local user performs a PTT while the remote user is already keyed, the local user's audio will be transmitted on the channel that the remote user has selected with the encryption state that the remote user has selected.
- If the local user attempts to either change channels or the state of encryption while the remote user is keyed, the Consolette will dekey and a "bad" alert tone will be heard until the remote user releases the PTT.

3.4.2.2 Receive Audio Path

Audio from the receiver, as well as the various tones produced from the mobile (that is, keyfail tones and button-press "beeps"), are gated through the XTL 5000 transceiver and sent to the TRC board via a ribbon cable that plugs into J1 pin 42 (DET_AUD). Audio coming from the transceiver should measure approximately 300 mVrms.

DET_AUD from the XTL 5000 transceiver is always passed through U116 gate 2 (S100-1 is always OFF for the Consolette). Audio at U116 pin 14 should measure approximately 90 Vrms. Receive audio then passes through the muting gate (U116 gate 1), controlled by RX_MUTE. Receive audio muting is controlled by the microprocessor (U123 pin 36), which toggles the RX_MUTE output line. When HLGT is detected or an LPTT is in progress, the receiver audio will be muted. This gate is also muted for a local PTT in order to block ASTRO noise at the DET_AUD line from entering the wireline.

The audio is passed through buffer amplifier U105 op amp 3 and then notched at the guard tone frequency (2175 Hz) by hybrid HY2 filter 1. This hybrid contains an MF10 dual switched capacitor filter and a dual op-amp for summing purposes. The notch filter is formed by summing together the high-pass and low-pass outputs of the filter IC. The MF10s on both HY1 and HY2 require a high-frequency clock input that is derived from a divider circuit (U127 and U129) and the MPU "E" clock. The output of the clock divider circuit (FILTER CLK) is a 110.4 kHz square wave that is used by the MF10s to create the filters. The purpose of the notch filter is to notch out the guard tone frequency area of the voice spectrum prior to transmission across the wireline.

The receive notch filter has a gain of 0 dB at 1 kHz. At the 2175 Hz notch frequency the response is -35 dB, relative to 1 kHz. To allow the slight drifting of the guard tone frequency due to wireline translation, the filter must guarantee 30 dB of attenuation at ±5 Hz from the center frequency. The filter has a “Q” of 3.8 in order to remove all voice components in the guard tone frequency range before reaching the wireline. Without this protection, false guard tone detects by the TRC board would be inevitable, since the audio leaving the TRC board is up to 20 dB higher than that arriving to make up for wireline attenuation.

The output of the notch filter passes through another muting gate (U114 gate 2). This audio path is always closed when the Consolette is receiving. Local microphone audio and trunking tones also share this audio path to the console. During local PTT this gate can be used to mute local audio on the receive path (see section 3.4.2.3, "Transmit Audio Path," on page 3-8).

Receive audio is also routed from U116 gate 1 to buffer amplifier U106 op amp 4 (MOB_RX). The output of this buffer drives the TAPE OUT line, which is used for external recording purposes.

The line-adjust circuit (U111 op amp 3 and R545) allows the notched audio level to be adjusted via R545. By varying R545, you can adjust the audio level to the line. This allows you to compensate for line losses to obtain the desired audio levels. The adjusted audio is then sent through an audio-shaping filter (U111 op amp 4). This filter is a unity-gain, low-pass filter with a corner frequency of 3 kHz.

The output of the line audio-shaping filter is split into opposing phases in the line driver circuit (U111 op amps 1 and 2, Q114 and Q115), where the receiver audio is applied to the line transformer and the phone line. With two-wire selected, the line driver audio is also applied to the input of the transmit audio/tones detection path through T100-6. A portion of the line driver audio is also fed into the input amplifier of the transmit audio/tone detection path, via U111 op amp 2 and S101-7,8; this audio is approximately 180° out of phase with the received audio at T100. This is done in order to, at least partially, cancel the receive audio so that a tone from a control console may be more easily detected in the presence of receiver audio. With four-wire selected, this cancellation is not necessary and S101-7 should be open and S101-8 should be closed.

3.4.2.3 Transmit Audio Path

Wireline audio originating from a console to be transmitted over the air is applied to the wireline interface network. The wireline interface network consists of T100 (two-wire operation), T1610 (four-wire operation), U110, and other discrete components. The purpose of this circuitry is to match the impedance of the TRC board to that of the wireline (T100, T1610, S101), block any DC components between the TRC board and the wireline (C502, C501), and provide protection from surges on the line (E1, E2).

The input from the phone line is applied to U112 op amp 1 pin 2, along with the line driver audio-canceling voltage (described previously) via S101-7 and S101-8. The gain of U112 op amp 1 is controlled by FET transistor Q113. The lower the DC gate voltage on Q113, the higher the gain, since a more negative gate voltage tends to turn off the FET, creating maximum feedback resistance across pins 1 and 2 of U112 op amp 1. The AGC potentiometer (R529) sets the maximum gain point of the AGC. Normally, the potentiometer setting allows input signals as low as –35 dBm to achieve full deviation. After the AGC circuit, the audio is amplified by a factor of 20 (U112 op amp 4) and is sent to the transmit guard-tone notch filter (HY2 filter 2).

The transmit guard-tone notch filter is formed by summing the two outputs of the hybrid in the same manner as the receive notch filter previously discussed. This filter notches out the guard-tone frequency area of the voice spectrum before sending the audio to the radio to be transmitted. The notch filter's high “Q” of 5.8 ensures removal of the guard-tone frequency component without affecting the adjacent voice energy in the audio signal being transmitted.

The filtered audio level is adjusted by potentiometer R569 to set the transmitted deviation. The audio is routed through buffer amplifier U105 op amp 4 and then (via TX_AUDIO) into amplifier U110 op amp 1, after which it is sent to the XTL 5000 transceiver to be transmitted. The audio is also passed to buffer amplifier U106 op amp 2. The output of this buffer drives the TAPE OUT line, which is used for external recording purposes.

The filtered audio is also passed to amplifier U106 op amp 1, whose gain is set by digital potentiometer U107. The audio is passed to the AUX_RX_AUD input of the radio, where it is then output to the local speaker.

Audio tones associated with trunking operation are generated locally on the TRC board. They originate from the microprocessor (U132 pin 38) and are filtered by low-pass filter U106 op amp 3. The filtered tones are then sent to buffer amplifier U105 op amp 3 to be sent down the wireline to the remote speaker.

Local microphone audio (MIC_AUDIO) is passed to buffer amplifier U105 op amp 2. It is then sent down the wireline allowing local transmit audio to be monitored at the remote unit. If it is desired to prevent local audio (audio not received by the radio) from being routed to the remote speaker via the wireline, place S100-2 to the ON position. This will cause microprocessor U123 pin 35 (WL MUTE) to be asserted, opening the wireline path at U114 gate 2 for local microphone audio, local trunking tones, and locally generated beeps. Local microphone audio is also passed through buffer amplifier U105 op amp 1 to TX_AUDIO to the transmitter

A linear transmit audio path (AUX_TX_AUD) is provided at both accessory connectors: Accessory Connector 2 pin 17 or Accessory Connector 3 pin 17. This path is dedicated for use with the external hardware PTT feature (keying up the Consolette by grounding pin 10 on Accessory Connector 2),

NOTE: For PLN1687A boards, this path is always active. However, for PLN1687B boards, plug P103 needs to be placed in the A-B jumper position for this path from the Accessory connectors' AUX_TX_AUD pins to be active.

This transmit path has an impedance of 600Ω and is amplified by U101-3 pins 8, 9, and 10 and the level set by potentiometer R193. The output of the amplifier (U101-3 pin 8) following AC-coupling capacitor C174 is fed into the XTL 5000 radio auxiliary transmit input at J1 pin 15 and J1 pin 40. The level of this signal should be 300 mVrms relative to a 1.0 kHz tone at 60% FSD. If data is to be transmitted via the AUX_TX_AUD path, U101-3 needs to be bypassed. This is done by removing 0Ω jumper R197 and placing it in the R196 location. This supplies a direct, unimpeded path for data to the XTL 5000 radio AUX_TX_AUD input; furthermore, the user must also use CPS to select the AUX_TX_AUD "Flat" path within the XTL 5000 mobile which is used for data transmission.

The PLN1687B TRC board can also be configured to route wireline transmit audio to the AUX_TX_AUD linear transmit path to be used with the external hardware PTT feature. Placing plug P103 in the B-C jumper position routes the filtered wireline transmit audio from the output of amplifier U105 op amp 4 to amplifier U101-3 where its level is adjusted by potentiometer R193. This adjusted output following AC-coupling capacitor C174 is fed into the XTL 5000 radio auxiliary transmit input at J1 pin 15 and J1 pin 40. The level of this signal should be 300 mVrms relative to a 1.0 kHz tone at 60% FSD.

3.4.2.4 Tone Processing Section

Inputs to this section originate from TP1 (the output of U112 op amp 4) in the wireline transmit audio path. When looking for guard tone (standby operation), the audio is selected by U114 gate 1 to be routed through the guard tone bandpass filter and then sent to the filter/limiter. After high-level guard tone (HLGT) has been detected, U114 gate 1 is toggled to allow audio to bypass the bandpass filter. This permits unfiltered audio to be decoded and allows for proper identification of the function tones.

The limiter consists of a gain stage (U112 op amp 3), which also provides some broadband filtering, followed by a limiter stage that converts the signal to a square wave. The output of U112 op amp 2 drives transistor Q116. This transistor provides an input to the microprocessor's Input Capture (U123 pin 41). The input to this pin is a 0-5V peak-to-peak square wave. The frequency of the square wave depends on the particular guard/function tone being sent. The microprocessor determines which tone is being sent and then takes the corresponding actions.

3.4.2.5 AGC Circuit Operation

The output of U112 op amp 4 feeds reference comparators (U117 op amps 2, 3, and 4) of the AGC circuit. If the peak voltage at the input exceeds the threshold of U117 op amp 4 (+5.8V) in the positive direction, the output of U117 op amp 4 pulses high, causing current to pass through R510 and charge C506 via D1012. Similarly, if the peak minimum voltage at the input dips below the threshold of U117 op amp 3 (+3.6V), U117 op amp 3 will allow a pulse of current to pass through R509 to charge C506 via D1013. As C506 charges, the DC voltage on the gate of Q113 rises. This rise in gate voltage on Q113 will reduce the drain-source resistance and hence the gain of U112 op amp 1. This in turn will reduce the output of the AGC circuit. This output is again used to feed the comparators, and the process continues until the voltage is just equal to the threshold of U117 op amp 4 minus the threshold of U117 op amp 3, or 2.2V peak-to-peak.

The “sample-and-hold” action of the AGC occurs when a new HLGT is received. Upon detection of HLGT by the microprocessor (U123 pin 41), the AGC_RESET* line (which has been low when no LPTT was present) and the TONE detect line will go high (approximately 5V). This action will cause the gain of Q113 to rapidly increase (C503 is placed parallel with the smaller C506, reducing the gate voltage on Q113), and also turns Q110 off to allow a higher gain in the U112 op amp 1 stage. This action will momentarily cause a rise in the AC voltage level on TP1 above the usual compression point of 0 dBm. During the time that the peak voltage on TP1 is more than 0.7V higher than the 1.1V peak (0 dBm) threshold, comparator U112 op amp 2 and Q116 are actuated to provide faster than normal attack (gain reduction) time. In this manner, the gain is always reset to maximum at the beginning of a new line push-to-talk, and then is reduced as required until the HLGT is at 0 dBm (which is the AGC compression point) as measured on TP1. This ensures full deviation, regardless of the amplitude of any audio signal on the line just prior to the line push-to-talk.

During an LPTT function, the Auto Level Control (ALC) action of the AGC causes the gain to freeze for the duration of LLGT. This will preserve the natural characteristics of the speech without producing any pumping effects.

In extreme cases where the audio signal received at the Consolette is unusually low (due to very long lines or other attenuating factors), the AGC action of the TRC board may be inhibited, yielding slightly more gain. Switch S100-4, when set to the ON position, will disable the AGC circuitry. Absolute gain and transmit deviation is then adjustable by potentiometers R529 and R569, respectively. This option is NOT recommended because the Low-Level Guard Tone (LLGT) may already be too low to be detected and thus the Consolette will not transmit.

3.4.2.6 Power Distribution

A+ is routed to the TRC board from the power supply through J11. This connection provides ignition sense to the control head and the mobile. When S101-1 is in the ON position, A+ is immediately sourced from the power supply to the SWB+ connections of the mobile, control head, and TRC board. When S101-1 is in the OFF position, the user must enable power at the front of the control head. SWB+ is then sourced from the control head to the mobile and to the TRC board.

On the TRC board, A+ is converted to regulated 9.6V through U100. From this 9.6V source, several comparator voltages are produced. SWB+ is routed to a 5V regulator (U132) on the TRC board, which provides regulated 5V to all of the logic ICs.

On the PLN1687A TRC board, the one exception to the IC power distribution is the Serial I/O IC (U131). This IC needs to be powered at all times, regardless of the state of S101-1. A+ is routed to U131, as well as a continuous 5V source from the regulated 9.6V source. This IC is no longer used on the PLN1687A board. Therefore, 9.6V and 5V are the only voltages needed for this part of the circuit. A+ is no longer used here.

3.4.2.7 Input/Output Control Definitions

AGC_INHIBIT*—This signal is generated by the microprocessor (U123) through the latch (U124 pin 14). It is used to disable the AGC circuit of the TRC.

TONE_DETECT—This signal is generated by the microprocessor (U123) through the latch (U124 pin 12). It is toggled from low(0V) to high(5V) when a guard/function tone is successfully detected. This line provides a discharge path between C503 and C506, which varies the gain of the AGC circuit.

LPTT*—This signal is generated by the microprocessor (U123) through the latch (U124 pin 19). It is high during an LPTT to provide additional gain for LLGT. This additional gain improves the accuracy of the tone decoding process.

GT/FT*—This signal is generated by the microprocessor (U123) through the latch (U124 pin 17). During the detection of guard tone, the bandpass filter is switched into the path of the audio. This allows isolation of the 2175 Hz signal and provides more accurate decoding. Once the guard tone has been detected, the signal line goes low. This switches the bandpass filter out of the path to allow the function tone(s) to pass to the limiter/decoder undisturbed.

RX_MUTE—This signal is generated by the microprocessor (U123 pin 36). It is used to mute receiver audio (DET_AUD) when an HLGT has been detected or an LPTT is in progress. DET_AUD is also muted during a local PTT to block ASTRO noise from entering the wireline.

WL_MUTE—This signal is generated by the microprocessor (U123 pin 35). It is used to mute the wireline during a remote PTT, and when S100-2 is in the ON position (mute local audio and local trunking tones).

AGC_RESET*—This signal is generated by the microprocessor (U123) through the latch (U124 pin 16). It is used to provide an additional discharge path for C503 and C506 (changing the feedback path of U112A in the AGC circuit). Upon detection of HLGT by the microprocessor, the AGC_RESET line will go high. AGC_RESET will go low at the end of LPTT.

SPKR_UNMUTE—This signal is available at Accessory Connector 2 pin 25 as an output to provide an indication to accessories when the radio is receiving valid audio and the speaker is unmuted. This signal is configurable for either active high or active low operation using Plug P102. See Table 2-6 on page 2-8. When configured for active high, the emitter of Q117 is used to determine the state of the speaker. (If the voltage at Q117's emitter is low, the speaker is muted, and if the voltage here is high, the speaker is unmuted.) Similarly, if active low configuration is selected, the collector of Q118 is used to determine the state of the speaker. (If the voltage at Q118's collector is low, the speaker is unmuted, and if the voltage here is high, the speaker is muted.)

3.4.2.8 Smart Modem Protocol (SMP) Control

The XTL 5000 Tone Remote Control Board also provides an RS232 port through which the Consolette communicates digitally with a Gold Elite or MCC 5500 Console using the Smart Modem Protocol (SMP).

Depending on the setting of S100-3, the operation of the Tone Remote Control board can vary as follows:

3.4.2.8.1 S100 Pin 3 ON—Tone Remote Control

In this setup, the Consolette can only be controlled remotely by a tone remote deskset, via the wireline, as described in section 3.4.1, "General Description," on page 3-5 under “Tone Remote Control (TRC) Board.” The Consolette will report both PTT-IDs and Call Alert IDs, when applicable, to Accessory Connector 1 (J13) (see Table 3-2). For a list of supported IDs, see See Table 3-3 on page 3-13.

Table 3-2. Accessory Connector 1 (J13)

J13 Pin Number	Signal
1	N/C
2	N/C
3	N/C
4	ACIM_TXD
5	N/C
6	ACIM_RXD
7	N/C
8	GND

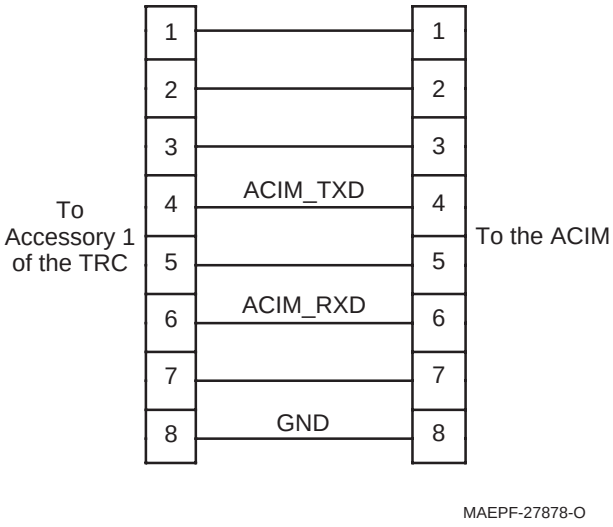


Figure 3-5. TRC to ACIM Cable Diagram

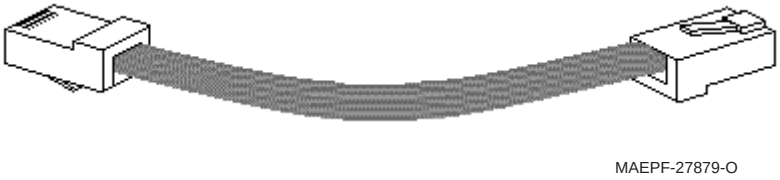


Figure 3-6. TRC to ACIM Cable Orientation (not provided by Motorola)

Table 3-3. Supported IDs

	Call Alert	PTT-ID	Emergency Call PTT-ID	Emergency Alarm PTT-ID
Analog Conventional (MDC)	Not Reported	Not Reported	Not Reported	Not Reported
APCO Conventional	Reported	Reported	Reported	Reported
Type II Trunking – Analog TG	Reported	Reported	Reported	Reported
Type II Trunking – Digital TG	Reported	Reported	Reported	Reported
ASTRO 25 Trunking	Reported	Reported	Reported	Reported

3.4.2.8.2 S100-3 OFF—SMP Control

In this setup, the Consolette can only be controlled remotely by the Gold Series Console or MCC 5500 via Accessory Connector 1 (J13). The Consolette reports both PTT-IDs and Call Alert IDs, when applicable, to Accessory Connector 1. For a list of supported IDs, see Table 3-3.

Caution

Do not connect anything to Accessory Connector 1 other than the supported SMP device (e.g., ACIM). Damage could occur to the Consolette and unsupported external devices.

As with Tone Remote Control, the Gold Series Console or MCC 5500 (using Smart Modem Protocol) can command the Consolette to do the following:

- Change modes (the number depends on console support)
- Enable/disable encryption
- Enable/disable monitor
- PTT with positive mode

Audio routing to and from the Consolette continues to pass down the wireline. See 3.4.2.2, "Receive Audio Path," on page 3-7 and 3.4.2.3, "Transmit Audio Path," on page 3-8 for audio routing details.

3.5 Power-Up

The ON/OFF power button located on the ASTRO control head is disabled before shipment. Therefore, the station is immediately operational when its power cord is plugged into a live AC outlet. To enable the ON/OFF power button on the control head, refer to the information in 2.6, "DIP Switch and Jumper Settings," on page 2-4 of this manual. Note that the ON/OFF power button on the control head controls the power to the control head only. For Option G81 model Consolettes (Digital Remote Control), no control head is present and the station will become immediately operational when its power cord is plugged into a live AC outlet.

Once the station is powered, the Power On LED should light up, and the station should be ready to receive or transmit.

3.6 Receive

Since there can be various configurations of the Consolette depending upon the user's requirements, no detailed receive operating instructions will be given in this section. However, detailed operating instructions can be found in the XTL 5000 radio user’s guide. For information regarding remote control deskset operation, refer to the applicable instruction manual.

3.7 Transmit

Since there can be various configurations of the Consolette depending upon the user's requirements, no detailed transmit operating instructions will be given in this section. However, detailed operating instructions can be found in the XTL 5000 radio user’s guide. For information regarding the operation of the digital remote deskset, refer to the applicable instruction manual.

NOTE: Each Consolette is shipped with the Emergency (Emer) button disabled. Use the current version of the ASTRO 25 CPS to enable the Emergency button, if desired.

3.8 Power-Up Self-Check Errors

Each time the radio is turned on, the MCU and DSP perform some internal diagnostics. These diagnostics consist of checking the programmable devices such as the FLASH ROMs, internal and external EEPROMs, SRAM devices, and ADSIC configuration bus checksum. At the end of the power-up self-check routines, if an error exists, the appropriate error code is shown on the display. Self-test errors are classified as either “fatal” or “non-fatal.” Fatal errors will inhibit user operation; non-fatal errors will not. For non-display radios, the error codes can be read using the Customer Programming Software (CPS) from the universal connector at the rear of the XTL 5000 transceiver.

See Table 3-4 on page 3-15 lists the XTL 5000 Consolette power-up self-check error codes.

Table 3-4. XTL 5000 Consolette Power-Up Self-Check Error Codes

Error Code	Description	Error Type	Troubleshooting Chart
ERROR 01/02	FLASH ROM Codeplug Checksum	NON-FATAL	See Note 1
ERROR 01/12	Security Partition Checksum	NON-FATAL	See Note 1
ERROR 01/20	ABACUS Tune Failure	NON-FATAL	See Note 1
ERROR 01/22	Tuning Codeplug Checksum	NON-FATAL	See Note 1
FAIL 01/81	FLASH ROM Checksum	FATAL	See Note 1
FAIL 01/82	FLASH ROM Codeplug Checksum	FATAL	See Note 1
FAIL 01/88	External SRAM Failure	FATAL	See Note 1
FAIL 01/90	General Hardware Failure	FATAL	See Note 1
FAIL 01/92	Security Partition Checksum	FATAL	See Note 1
FAIL 01/93	FLASHport Authentication Code Failure	FATAL	See Note 1
FAIL 01/98	Internal RAM Failure	FATAL	See Note 1
FAIL 01/A0	ABACUS IC Failure/Wrong ABACUS IC Version	FATAL	See Note 1
FAIL 01/A2	Tuning Codeplug Checksum	FATAL	See Note 1
FAIL 02/81	DSP ROM Checksum	FATAL	See Note 1
FAIL 02/88	DSP RAM Fatal Error	FATAL	See Note 1
FAIL 02/90	General DSP Hardware Failure (DSP start-up message not received correctly)	FATAL	See Note 1
FAIL 02/C0	Wrong Microprocessor Version in XTL 5000 Transceiver	FATAL	See Note 1
ERROR 05/10	Control Head Hardware Error	NON-FATAL	See Note 1
FAIL 05/81	Control Head ROM Checksum Error	FATAL	See Note 1
ERROR 09/10	Secure Hardware Failure	NON-FATAL	See Note 1
FAIL 09/90	Secure Hardware Fatal Error	FATAL	See Note 1
ERROR 1C/10	TRC Option Hardware Failure	NON-FATAL	See Note 2
FAIL 1C/81	TRC ROM Checksum Error	FATAL	See Note 3
FAIL 1C/82	TRC Configuration Register Corrupted	FATAL	See Note 3
FAIL 1C/88	TRC RAM Failure	FATAL	See Note 3

In the case of multiple errors, the codes are logically OR'd and the results displayed. As an example, in the case of an ADSIC checksum failure and a DSP ROM checksum failure, the resultant code would be 02/A1.

NOTES:

1. For troubleshooting charts and information, refer to the ASTRO Digital XTL 5000 Mobile Radio Detailed Service Manual, Motorola Publication 6881096C74.
2. Refer to the Figure 6-1., "Consolette Does Not Work Troubleshooting Chart," on page 6-2 in this manual.
3. For hardware failure with the TRC option, contact an authorized service shop for repair.

Chapter 4 Maintenance

4.1 Alignment

Advanced design and manufacturing techniques eliminate the need for traditional tuning tasks for the XTL 5000 transceiver. All circuits in the transceiver have been aligned at the factory with specialized equipment. Alignment in the field should not be necessary or attempted.

4.2 Maintenance and Troubleshooting Procedures

Depending upon the environment in which the XTL 5000 Consolette operates, a service schedule should be created to periodically clean out the inside of the Consolette. This will ensure proper air flow within the station at all times.

Table 6-1., "List of Troubleshooting Charts," on page 6-1 provides a listing of Troubleshooting Charts and Table 7-1., "List of Schematics, Board Layouts, and Parts Lists," on page 7-1 provides a listing of Schematics, Boards, and Parts Lists. These diagrams contain detailed cable connectorization information for each cable in the XTL 5000 Consolette. These diagrams should be used in conjunction with the applicable XTL 5000 service manual to efficiently service the Consolette.

The troubleshooting charts assist you in tracing a problem to its source. Start with the Figure 6-1., "Consolette Does Not Work Troubleshooting Chart," on page 6-2 and you will be directed to the source of the problem. Use other troubleshooting charts and the applicable XTL 5000 service manual to further identify the source of the problem.

4.3 Recommended Test Equipment and Service Aids

4.3.1 Electrical

- R2001 Communications System Analyzer or R2600 Service Monitor (or equivalent)
- R1037 or R1024 Digital Multimeter (or equivalent)
- HP8903 Audio Analyzer (or equivalent)
- HP3552 Transmission Test Set (or equivalent)
- 13.8Vdc, 15A Power Supply (for DC-only operation)
- Radio Service Cable (Motorola PN 3084565T01)
- ASTRO Digital XTL 5000 Basic Service Manual (Motorola PN 6881096C73)
- ASTRO Digital XTL 5000 Detailed Service Manual (Motorola PN 6881096C74)
- Current ASTRO 25 Mobile Customer Programming Software

4.3.2 Mechanical

- T10, T15, and T25 Torx™ Drivers
- Straight Blade and Phillips Screwdrivers
- Tuning Tool (Motorola PN 66-84974L01)
- 3/16-inch (4.7625 mm) and 11/32-inch (8.73125 mm) Hex Nut Drivers/Wrenches
- Needle-nose Pliers
- 3/32-inch (2.38125 mm) Allen Wrench

4.4 Disassembly and Reassembly

> **Caution** Make sure to remove power to, and disconnect, all accessories from the Consolette when performing any of the following Disassembly and Reassembly instructions.

The following is a list of detailed instructions on how to remove and replace the main components of the Consolette. All of the retainer snaps surrounding the individual components must be released for removal.

> **Caution** Never attempt to lift the station by the front panel after the top cover is removed as damage may occur to the connected cables. Also, never attempt to disconnect any cable by pulling on the wires; disconnect by connectors only.

4.4.1 Top Cover

4.4.1.1 Removing the Top Cover

1. Raise the two latches on the rear of the Consolette upwards (see Figure 4-1).
2. Simultaneously lower both latches all the way down. When both latches are lowered, the top cover will automatically spring toward the rear of the Consolette.
3. Pull the top cover towards the rear of the Consolette to further separate it from the front panel.
4. Lift the top cover straight up to remove.

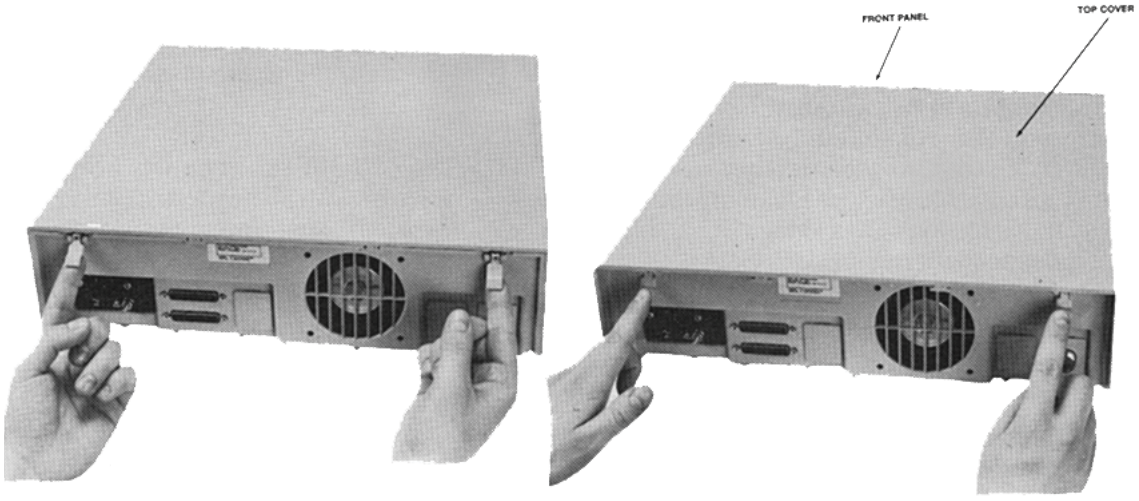


Figure 4-1. Removing the Top Cover

NOTE: The rear view of the Consolette shown in Figure 4-1 might be of an earlier model.

4.4.1.2 Replacing the Top Cover

1. Lower the top cover straight down onto the base, making certain that the four side tabs on the cover (two on each side) align with, and set into, the corresponding grooves in the base.
2. From the rear of the unit, push the top cover forward to close. It may be necessary to use a soft mallet to tap the top cover forward so that it locks into place securely.

NOTE: It is assumed from this point on that all disassembly and reassembly procedures begin with the top cover removed and end with the top cover being replaced.

4.4.2 XTL 5000 Transceiver

4.4.2.1 Removing the Transceiver

1. Begin removing the XTL 5000 transceiver by placing the Consolette on a solid surface with the front of the unit facing you. Refer to Figure 4-2.
2. Disconnect the DC power cable from the rear of the transceiver.
3. Disconnect the coaxial cable from the antenna port at the rear of the transceiver.
4. Remove the screw holding the transceiver in place. This screw is located on the left side of the transceiver in-between the two retainer snaps.
5. Pull out on the two retainer snaps on the left side of the transceiver to release it.
6. Tilt the transceiver to the right (lift from the left side) to release it from the retaining bosses on the right side of the transceiver.
7. Disconnect the interface cable from connectors J5 and J6 on the front of the transceiver. These connectors are held in place by four screws (two per connector).
8. Disconnect the Keyload Cable from the front panel of the transceiver, if present.

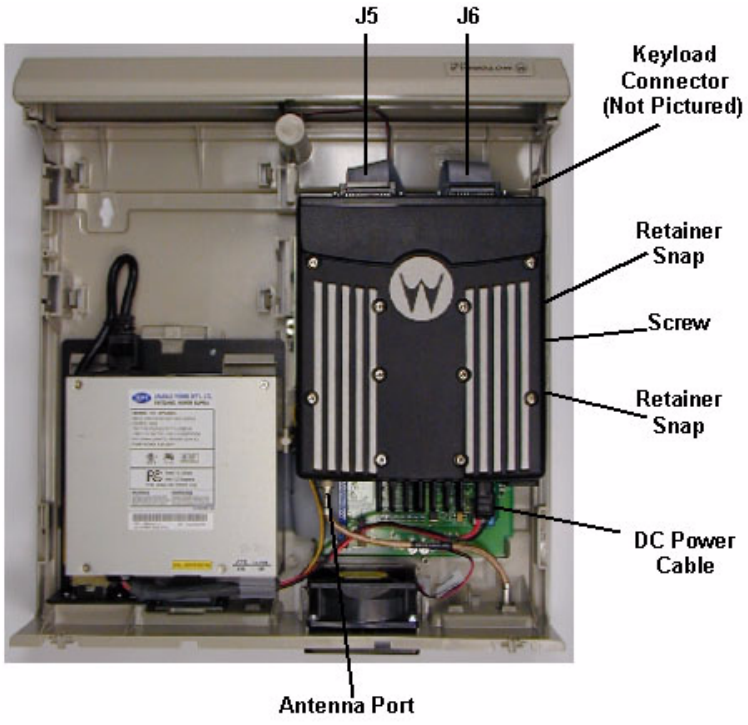


Figure 4-2. Removing the Transceiver

4.4.2.2 Replacing the Transceiver

1. Connect the interface cable to the connectors J5 and J6 on the front of the transceiver. Be sure to tighten the four screws (two per connector) so that the connectors do not inadvertently come loose.
2. Connect the Keyload cable to the microphone connector on the front panel of the transceiver, if the cable is present.
3. Insert the right side of the transceiver at a 45-degree angle so the bracket on the radio hooks under the retaining bosses in the center of the Consolette housing.
4. Lower the left side of the transceiver into the snap retainers on the left side of the Consolette housing, making sure that both retainers snap into place, locking the transceiver down.
5. Insert the screw between the two retainer snaps.
6. Connect the coaxial cable to the antenna port at the rear of the transceiver. (Make sure the connector is tightened down to where no threads are exposed. If threads are exposed, then the connector is not seated properly.)
7. Connect the DC power cable to the DC plug on the rear of the transceiver.

4.4.3 AIB/TRC Interface Board

NOTE: Follow the instructions for removing the XTL 5000 transceiver prior to attempting to remove or replace the AIB/TRC interface board.

4.4.3.1 Removing the AIB/TRC Board

The AIB/TRC board is located underneath the transceiver. Therefore, you must remove the transceiver before removing the interface board.

1. Disconnect the accessory cable from connector J3 of the AIB/TRC board. Refer to Figure 4-3 on page 4-5.
2. Disconnect the transceiver cable from connector J1 of the AIB/TRC board.
3. Disconnect the power cable from connector J11 of the AIB/TRC board.
4. Disconnect the power LED cable from connector J5 of the AIB/TRC board.
5. Disconnect the fan cable from connector J8 (AIB) or J13 (TRC).
6. Disconnect the control head cable TRN7393 from connector J2 of the AIB/TRC board. (This cable is present only on the Local Control (Option G80) Consolettes.)
7. Disconnect the speaker cable from connector J4 of the AIB/TRC board. (This cable is present only on the Local Control (Option G80) Consolettes.)
8. Disconnect the cable for the Clock/VU Meter from J6 of the AIB/TRC board, if this option is present.
9. With everything disconnected from the AIB/TRC board, the board can be removed by releasing the three retainer snaps on either side of the board (six total). It is easier if you start from the front of the unit and work to the back when releasing the retainers.
10. The AIB/TRC board should now be free from the Consolette housing.

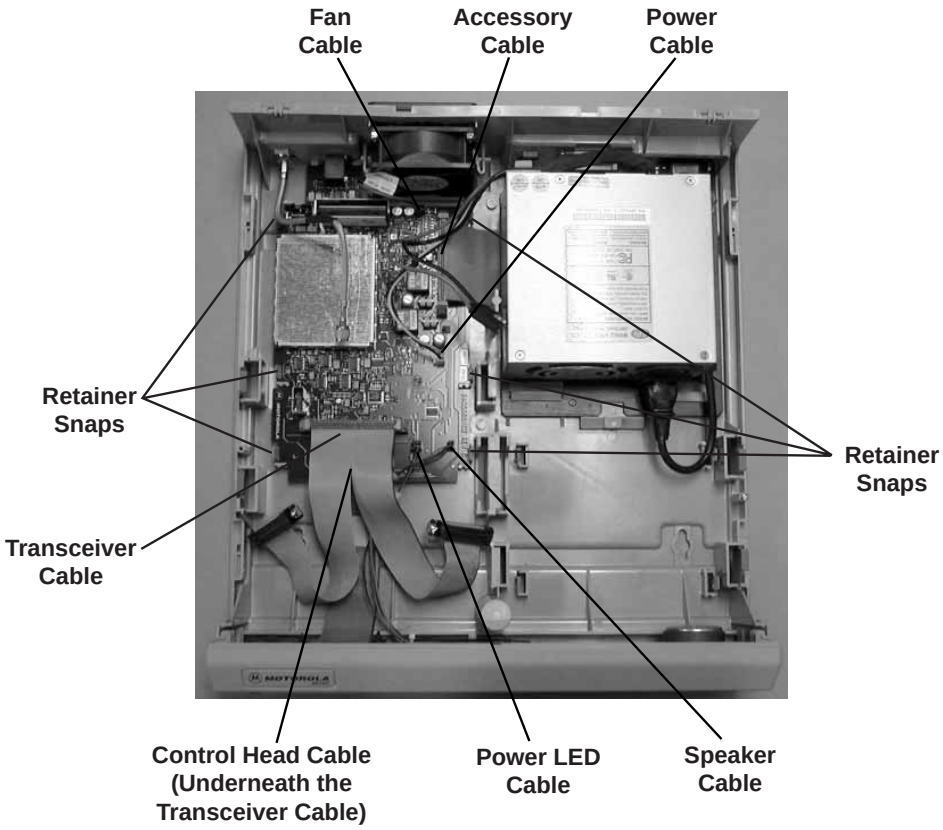


Figure 4-3. Removing the AIB/TRC Board

4.4.3.2 Replacing the AIB/TRC Board

1. Insert the AIB/TRC board into the Consolette housing and snap it into place. When inserting the TRC into the Consolette housing, make sure that the board is secured by the two retainers to the right and left of the opening for Accessory Connector 1.
2. Connect the accessory cable to connector J3 on the AIB/TRC board.
3. Connect the transceiver cable to connector J1 on the AIB/TRC board.
4. Connect the power cable to connector J11 on the AIB/TRC board.
5. Connect the power LED cable to connector J5 on the AIB/TRC board.
6. Connect the fan cable to connector J8 (AIB) or J13 (TRC).
7. Connect the control head cable TRN7393 to connector J2 on the AIB/TRC board. (This cable is only present on the Local Control (Option G80) Consolettes.)
8. Connect the speaker cable to connector J4 on the AIB/TRC board. (This cable is only present on the Local Control (Option G80) Consolettes.)
9. Connect the cable for the Clock/VU meter to J6 on the AIB/TRC board, if the option is present.
10. Perform the steps for replacing the transceiver (see 4.4.2.2, "Replacing the Transceiver," on page 4-4).

4.4.4 Power Supply

4.4.4.1 Removing the Power Supply

1. Make sure that the AC power cord is disconnected from the Consolette and that the ground connection has been removed.
2. Remove the screw located to the left of the power supply retainer snap. Refer to Figure 4-4.
3. Disconnect the DC power cable from the rear of the transceiver.
4. Disconnect the power cable from connector J11 on the AIB/TRC board. (It may be necessary to remove the transceiver in order to access connector J11.)
5. Push down on the power supply retainer snap to release the power supply.
6. Slide the power supply toward the front of the Consolette to free the power supply from the Consolette housing.
7. Lift the power supply out of the Consolette housing.

Figure 4-4. Removing the Power Supply

4.4.4.2 Replacing the Power Supply

1. Set the new power supply into the Consolette housing in the right rear corner.
2. Align the slits in the base of the power supply with the retainers on the Consolette housing so that the retainers come through the base of the power supply.
3. Slide the power supply to the rear of the Consolette. The retainer snap should engage and lock the power supply into place.
4. Connect the power cable to connector J11 on the AIB/TRC board.
5. Connect the DC power cable to the DC connector on the rear of the transceiver.
6. Insert the screw in the hole to the left of the retainer snap.
7. Make sure to reconnect the ground wire to the power supply before plugging the power supply back in to an AC outlet.

4.4.5 Fan

4.4.5.1 Removing the Fan

1. Make sure that the AC power cord is disconnected from the Consolette.
2. Disconnect the fan power leads from either connector J8 (AIB) or J13 (TRC). (If this is an older model Consolette, the fan may be plugged directly into the power supply.)
3. Remove the dust filter cover from its mounting bracket by releasing the four snap retainers holding it in place. This will expose the four Phillips screws holding the fan in place.
4. Remove the four Phillips screws and lock nuts that secure the fan to the rear of the Consolette housing. (There are openings in the bottom of the Consolette housing that will allow access to the two lock nuts on the bottom of the fan.) This will release the dust filter mounting bracket from the rear of the Consolette.
5. Release the two retainer snaps, one on each side, and tilt the top of the fan towards the front of the Consolette housing. This should release the fan from the retaining boss in the bottom of the Consolette housing.
6. Lift the fan out of the Consolette housing.

4.4.5.2 Replacing the Fan

1. Insert the fan at the rear of the Consolette housing at an angle.
2. Tilt the fan to the rear of the Consolette housing, making sure that the lower lip of the fan locks underneath the retaining boss in the bottom of the Consolette housing and the retainer snaps lock into place.
3. Insert the four phillips screws through the dust filter mounting bracket, the Consolette housing, and the fan assembly and secure them in place with the four lock nuts. (The bottom two screws can be accessed through two holes in the bottom of the Consolette housing to tighten down the lock nuts.)
4. Replace the dust filter cover onto the mounting bracket.

4.4.6 Control Head (G80 Option Only)

4.4.6.1 Removing the Control Head

1. Make sure the AC power cord is disconnected from the Consolette.
2. Remove the two control head mounting screws located on either side of the control head.
3. Push the control head from the rear to free it from the front panel.
4. Disconnect the TRN7393 control head interface kit from the rear of the control head.

4.4.6.2 Replacing the Control Head

Caution

When servicing control heads, it is recommended that all water seals (O-ring, keypads, etc.) that are disturbed in the procedure be replaced to ensure radio sealing integrity.

1. Connect the TRN7393 control head interface kit to the connector on the rear of the control head.
2. Push the control head into the front panel.
3. Insert the two control head mounting screws, one on either side of the control head.

NOTE: Care must be taken to shield the control head (front and back) from direct exposure to pressurized water. The pressurized water from a hose is, in most cases, more severe than the stated tests, conditions, and typical environments.

Chapter 5 Cable Diagrams

5.1 Standard Cables

Table 5-1. Power LED Cable Part #3084459T01 (P/O TKN8676)

Pin Number		Signal
Power LED	**J5**	
1	1	POWER_LED_A
2	2	POWER_LED_K
	3	N/C

Table 5-2. RF Coaxial Cable Part #0112004E09 (P/O TKN8676)

Pin Number		Signal
1 RX	**Radio**	
1	1	RF
2	2	ANA_GND

Table 5-3. Speaker Cable Part #3084457T01 (P/O TRN7394)

Pin Number		Signal
Speaker	**J4**	
1	1	SPKR_HI
2	2	SPKR_LO

Table 5-4. Control Head Cable

Pin Number		Signal
Control Head	**J2**	
1	1	N/C
2	2	N/C
3	3	N/C
4	4	N/C
5	5	ANA_GND(DIG_GND)†
6	6	N/C
7	7	N/C
8	8	ANA_GND(DIG_GND)†
9	9	BUS+
10	10	BUS-
11	11	A+
12	12	SWB+
13	13	BUSY
14	14	SWB+
15	15	IGN
16	16	RESET
17	17	VO3
18	18	VI3
19	19	N/C
20	20	VI1
21	21	VO1
22	22	VO2
23	23	N/C
24	24	N/C
25	25	N/C
26	26	MIC_LO
27	27	N/C
28	28	HUB
29	29	N/C
30	30	CTRL_HD_MIC
	31	N/C

Table 5-4. Control Head Cable (Continued)

Pin Number		Signal
Control Head	**J2**	
	32	N/C
	33	N/C
	34	N/C

* Denotes active low signal
† Denotes TRC signal name

Table 5-5. Radio Cable

Pin Number			Signal
Radio J6	**Radio J5**	**J1**	
1		1	PTT*
14		2	N/C
2		3	RS232-RXD
15		4	MONITOR*
3		5	RS232-TXD
16		6	CHAN_ACT* (N/C)†
4		7	RS232_RTS
17		8	N/C
5		9	RS232_CTS
18		10	DIG_GND
6		11	FILT_AUD (N/C)†
19		12	N/C
7		13	AUX_RX_AUD
20		14	N/C
8		15	AUX_TX_AUD
21		16	N/C
9		17	DET_AUD
22		18	SWB+
10		19	ANA_GND
23		20	N/C
11		21	MIC_LO (N/C)†
24		22	SPKR_LO
12		23	RAD_MIC (MIC_HI/ MOD_CTRL)†
25		24	SPKR_HI
13		25	N/C
	1	26	PTT*
	14	27	BUS-
	2	28	FLT_AUD_SHD
	15	29	MONITOR* (N/C)†
	3	30	IGN

Table 5-5. Radio Cable (Continued)

Pin Number			Signal
Radio J6	**Radio J5**	**J1**	
	16	31	N/C
	4	32	N/C
	17	33	N/C
	5	34	BUS+
	18	35	DIG_GND
	6	36	FILT_AUD
	19	37	RESET
	7	38	AUX_RX_AUD
	20	39	N/C
	8	40	AUX_TX_AUD
	21	41	BUS_SHLD
	9	42	N/C (DET_AUD)†
	22	43	SWB+
	10	44	ANA_GND†
	23	45	BUSY
	11	46	MIC_LO
	24	47	SPKR_LO (N/C)†
	12	48	RAD_MIC (N/C)†
	25	49	SPKR_HI (N/C)†
	13	50	EMER

* Denotes active low signal
† Denotes TRC signal name

Table 5-6. Accessory Cable

Pin Number			Signal
Accessory 2	**Accessory 3**	**J3**	
1		1	RX+ (LINE1+)†
14		2	REMOTE_RX+ (SPKR_HI)†
2		3	AUD_SHLD
15		4	REMOTE_RX- (SPKR_LO)†
3		5	TX+ (LINE2+)†
16		6	RX- (LINE1-)†
4		7	FILT_AUD (DET_AUD)†
17		8	AUX_TX_AUD
5		9	A+
18		10	VO3
6		11	BUSY
19		12	BUS-
7		13	BUS+
20		14	RESET
8		15	N/C

Table 5-6. Accessory Cable (Continued)

Pin Number			Signal
Accessory 2	**Accessory 3**	**J3**	
21		16	5V
9		17	VO1
22		18	VI3
10		19	PTT*
23		20	VO2
11		21	TX- (LINE2-)†
24		22	MONITOR*
12		23	DIG_GND
25		24	SPKR_UNMUTE
13		25	VI1
	1	26	RS232_RXD (N/C)†
	14	27	RS232_TXD (N/C)†
	2	28	ANA_GND
	15	29	RS232_RTS (N/C)†
	3	30	AUX_RX_AUD
	16	31	RS232_CTS (PS_AUD_OUT)†
	4	32	FILT_AUD (DET_AUD)†
	17	33	AUX_TX_AUD
	5	34	A+
	18	35	SWB+
	6	36	BUSY
	19	37	BUS-
	7	38	BUS+
	20	39	RESET
	8	40	BUS_SHLD
	21	41	N/C
	9	42	N/C (RS232_RXD)†
	22	43	N/C (RS232_TXD)†
	10	44	VSENSE1_SHLD
	23	45	N/C (RS232_RTS)†
	11	46	TAPE_OUT
	24	47	VSENSE2_SHLD
	12	48	DIG_GND
	25	49	N/C (RS232_CTS)†
	13	50	EMER

* Denotes active low signal

† Denotes TRC signal name

5.2 Optional Cables

Table 5-7. Clock/VU Cable (No Longer Available)

Pin Number		Signal
Clock/VU	**J6**	
1	1	VU_AUD
2	2	N/C
3	3	ANA_GND
4	4	A+

Chapter 6 Troubleshooting Charts

This chapter contains detailed troubleshooting flowcharts. These should be used as a guide in determining the problem areas. They are not a substitute for knowledge of circuit operation and astute troubleshooting techniques. It is advisable to refer to the related detailed circuit descriptions in the theory of operation chapter prior to troubleshooting a radio.

6.1 List of Troubleshooting Charts

Table 6-1. List of Troubleshooting Charts

6.2 Troubleshooting Charts

CONSOLETTE DOES NOT WORK

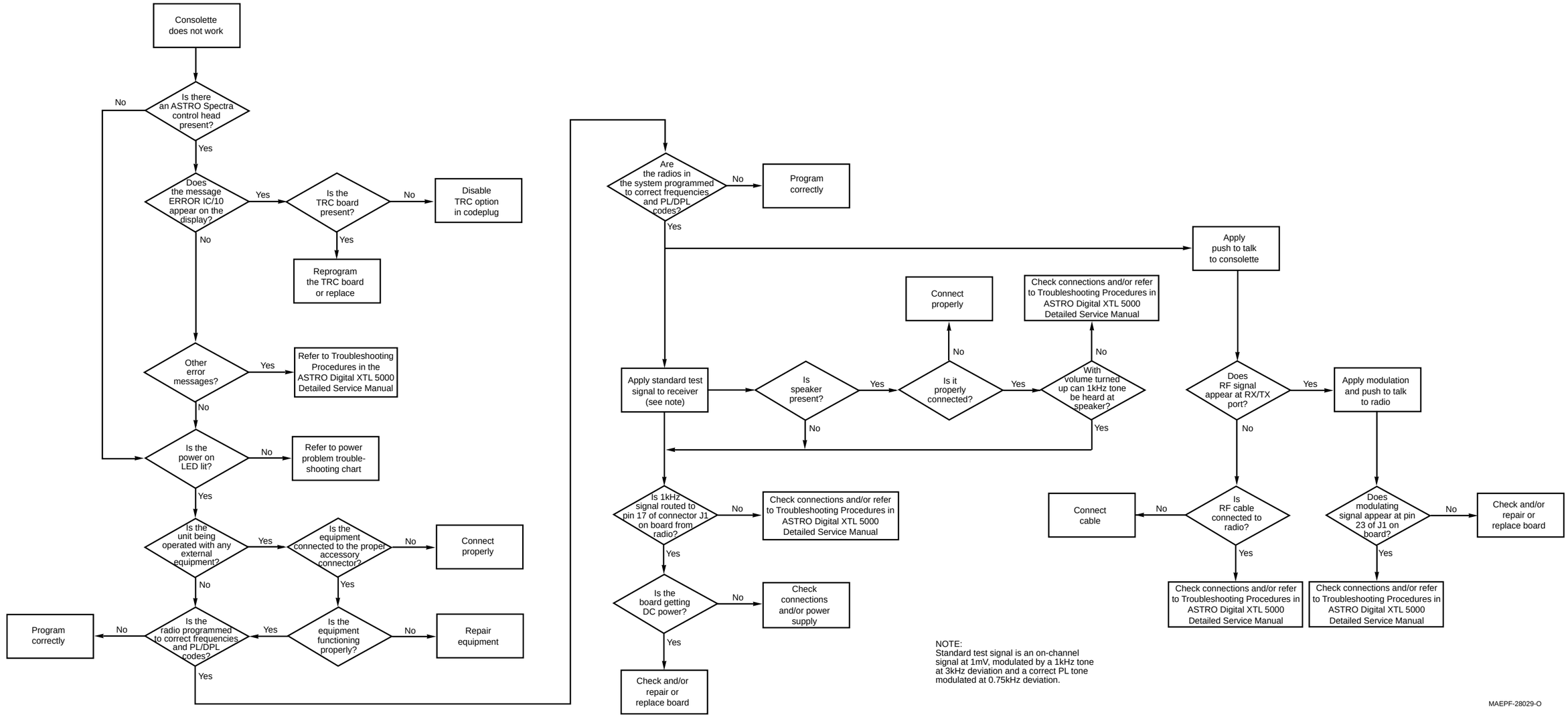


Figure 6-1. Consolette Does Not Work Troubleshooting Chart

POWER PROBLEM TROUBLESHOOTING

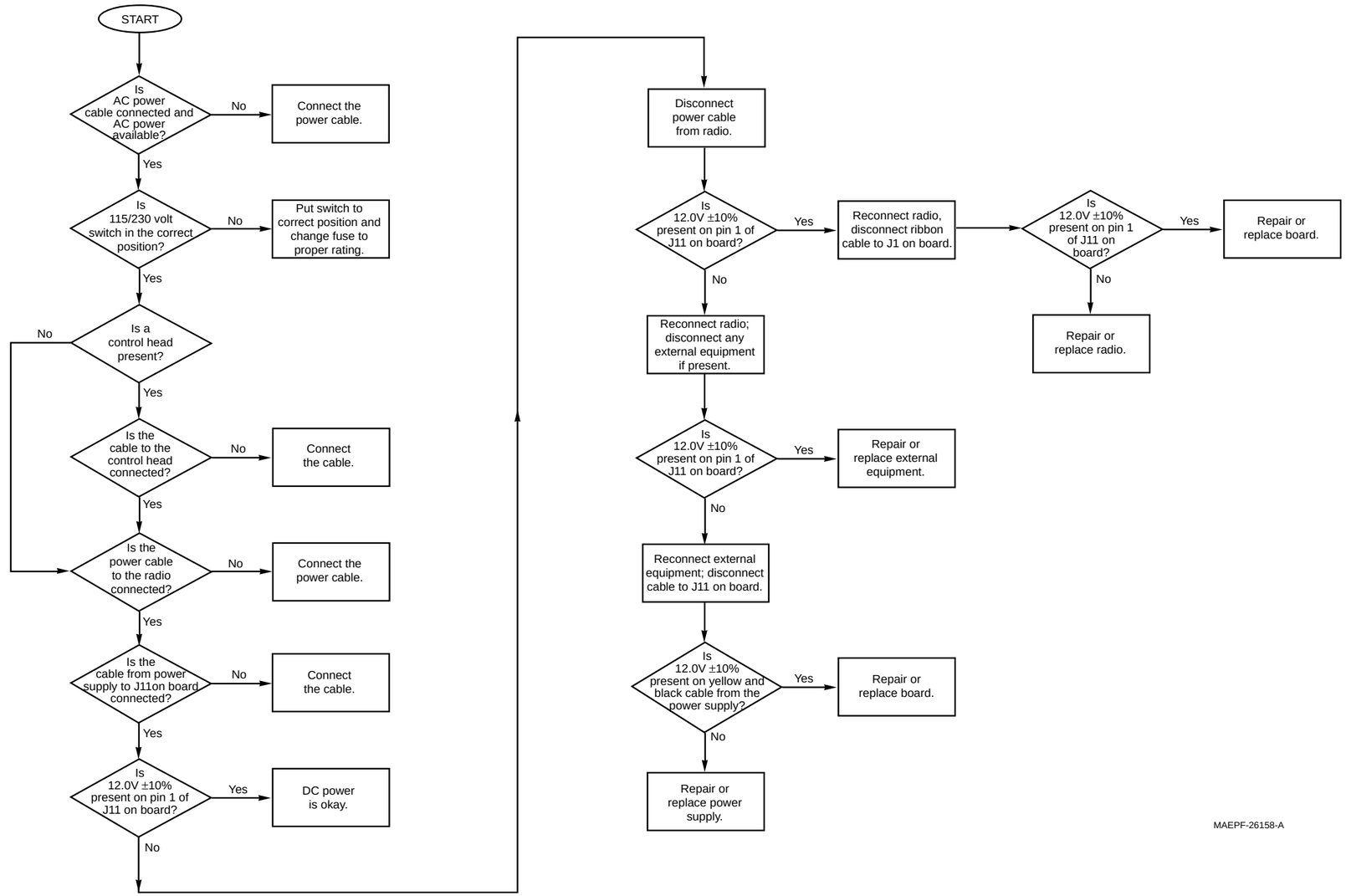


Figure 6-2. Power Problem Troubleshooting Chart

TRC LOCAL TX

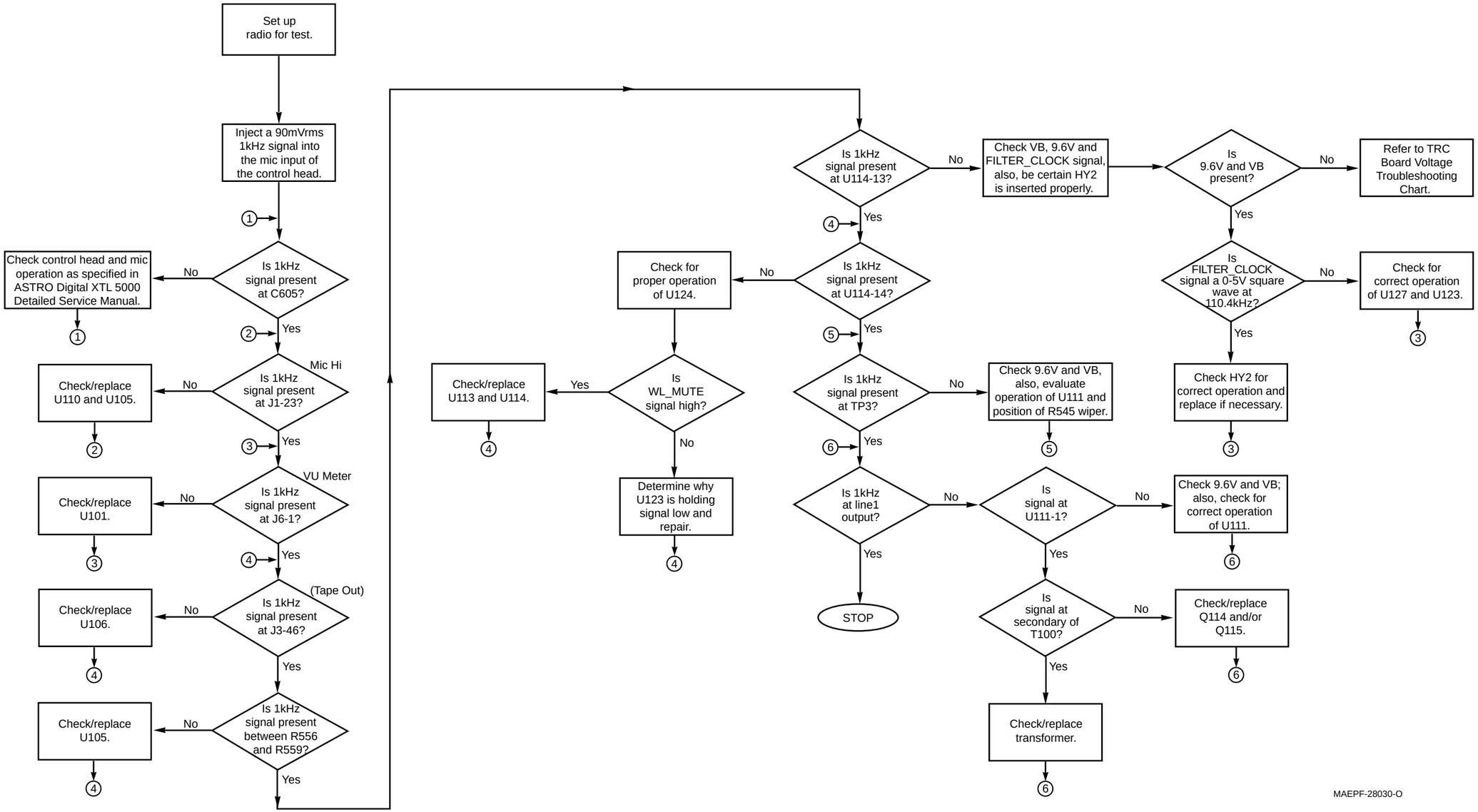


Figure 6-3. TRC Local TX Troubleshooting Chart

TRC RX AUDIO

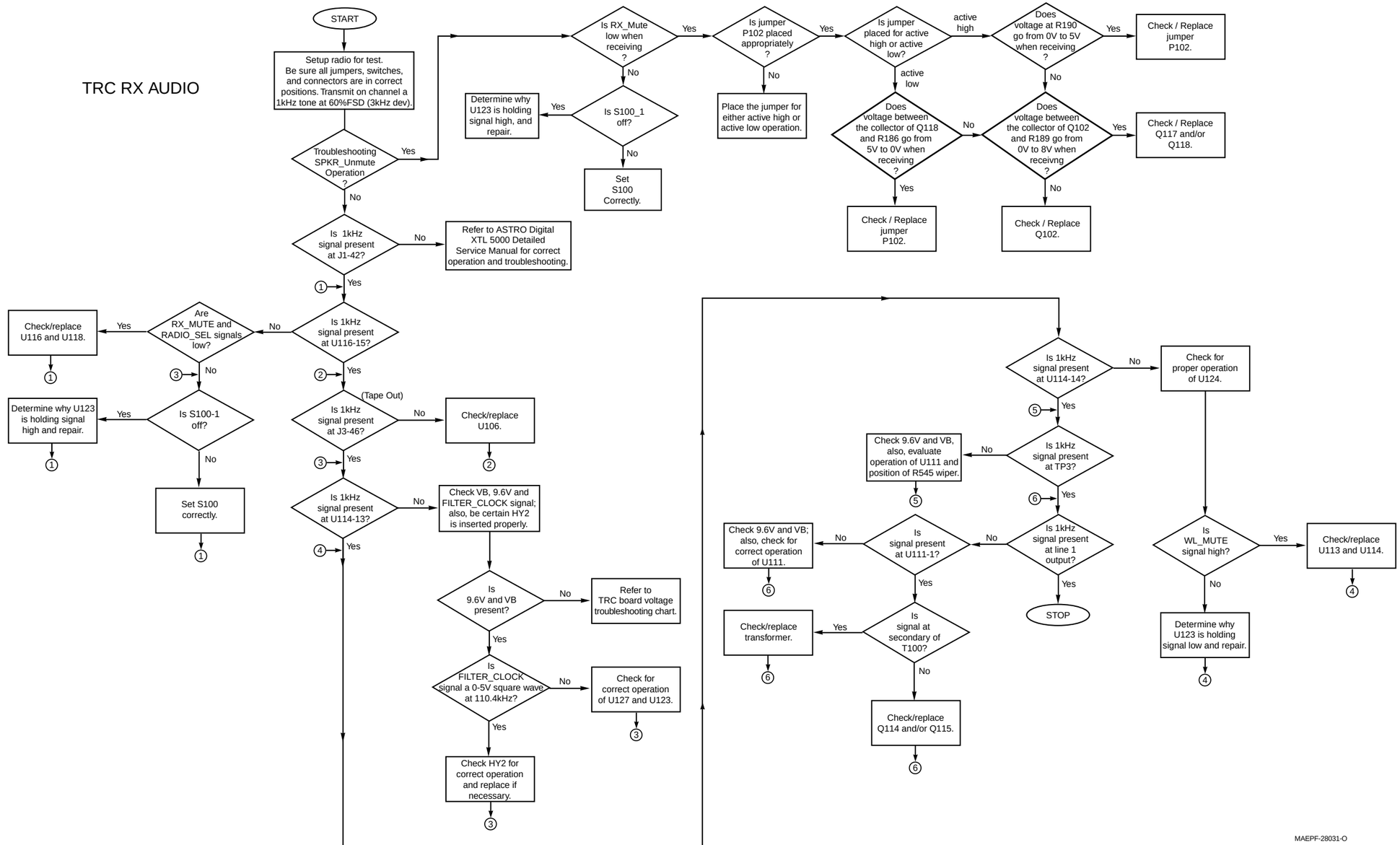


Figure 6-4. TRC RX Audio Troubleshooting Chart

TRUNKING/MDC TONES NOT HEARD
AT REMOTE CONSOLE

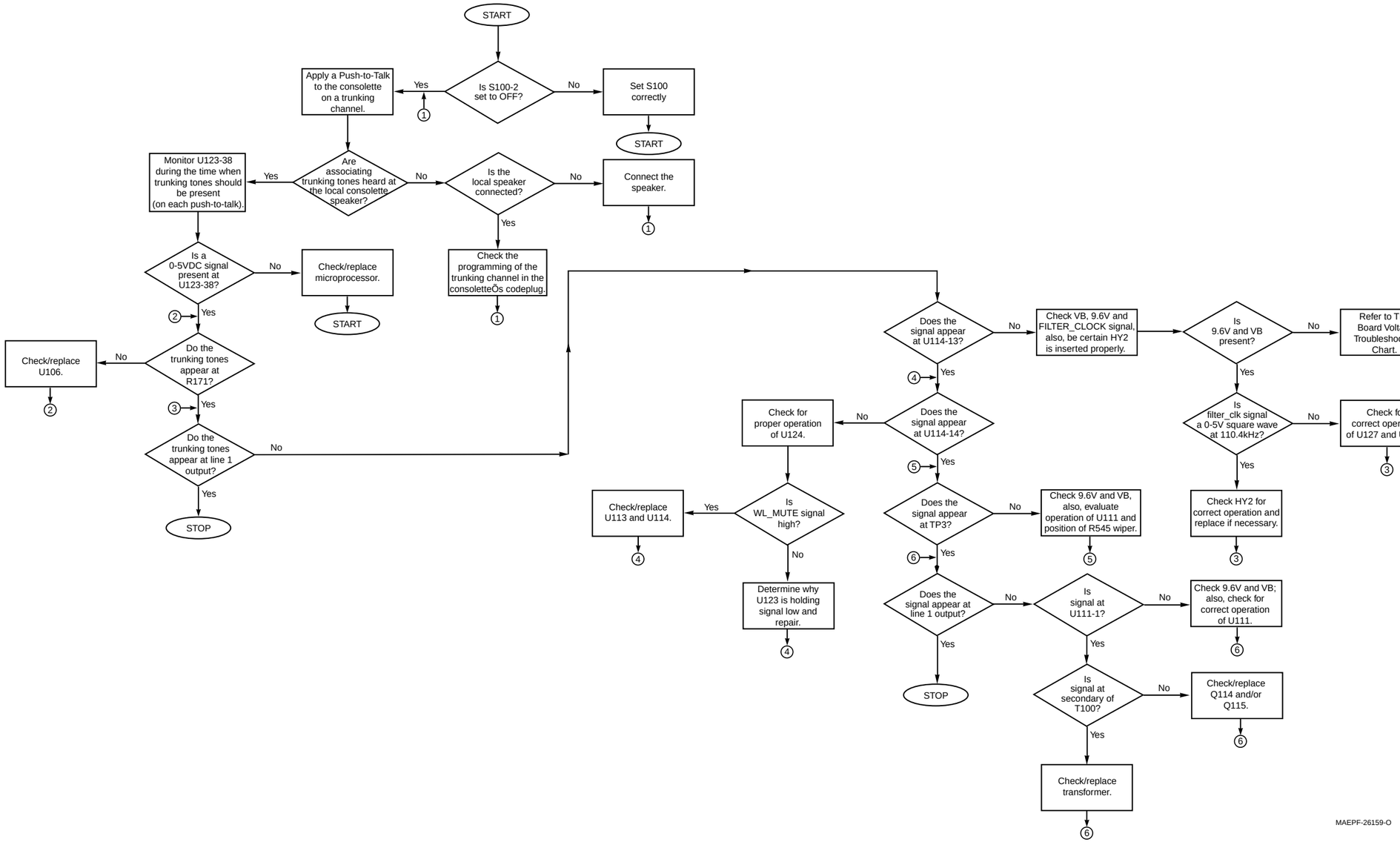


Figure 6-5. Trunking Tones Not Heard at Remote Console Troubleshooting Chart

TRC BOARD DC VOLTAGE

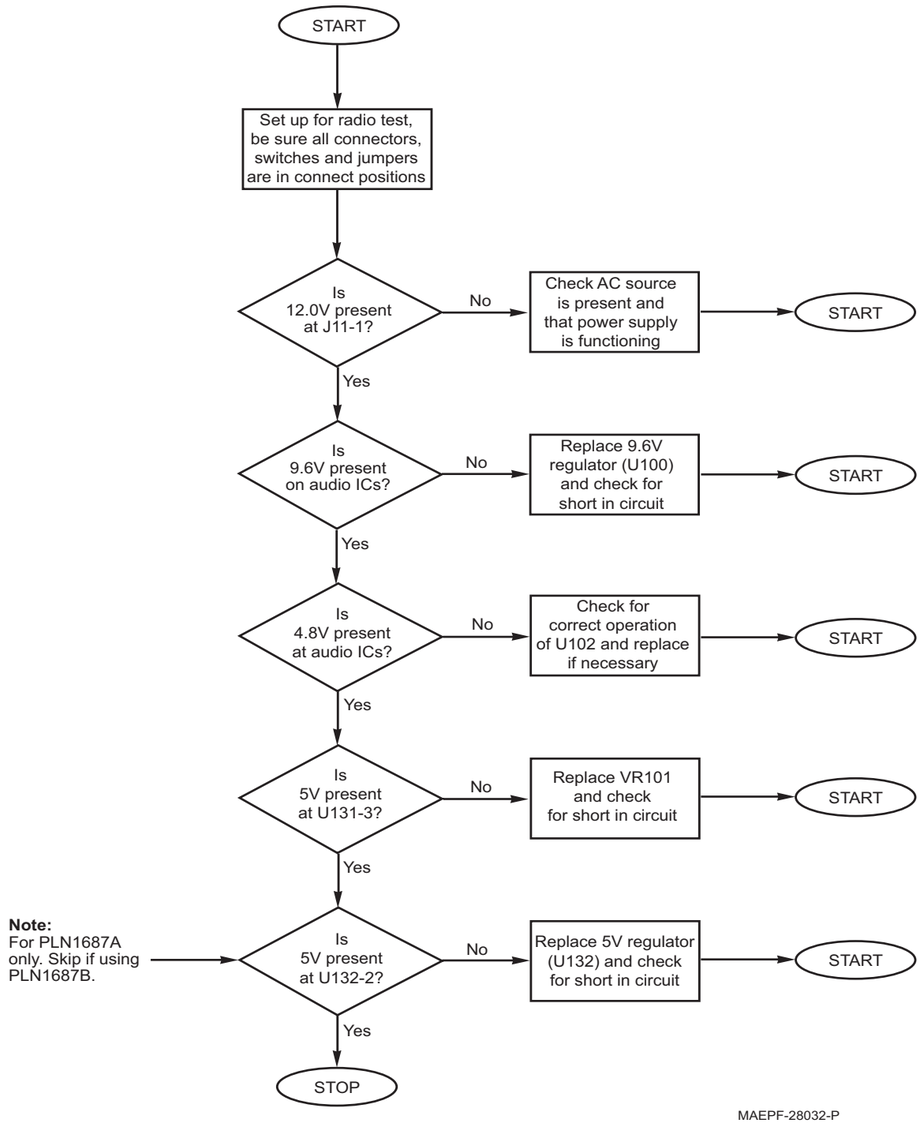


Figure 6-6. TRC Board DC Voltage Troubleshooting Chart

TRC TX AUDIO

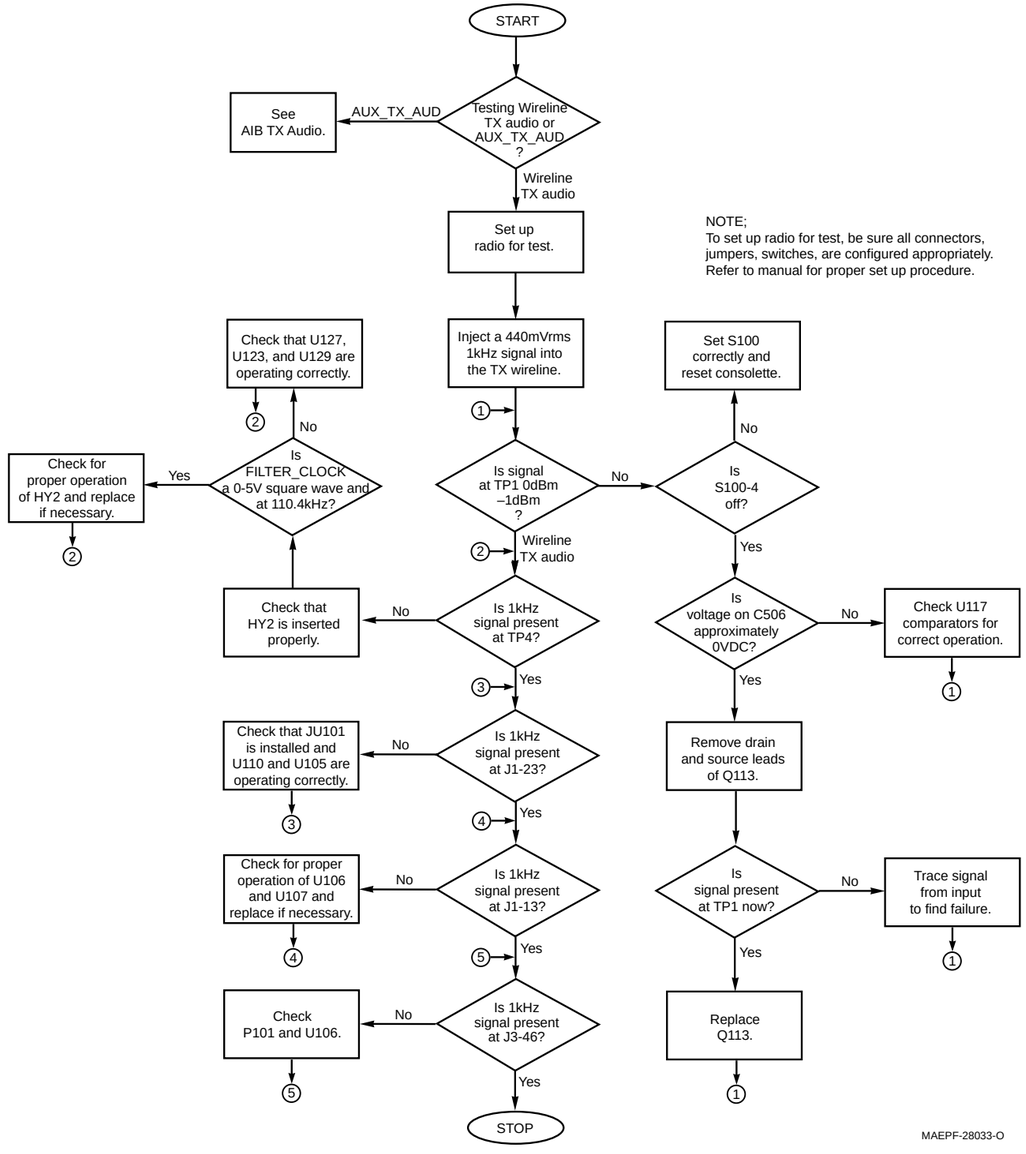


Figure 6-7. TRC TX Audio Troubleshooting Chart

AIB TX AUDIO

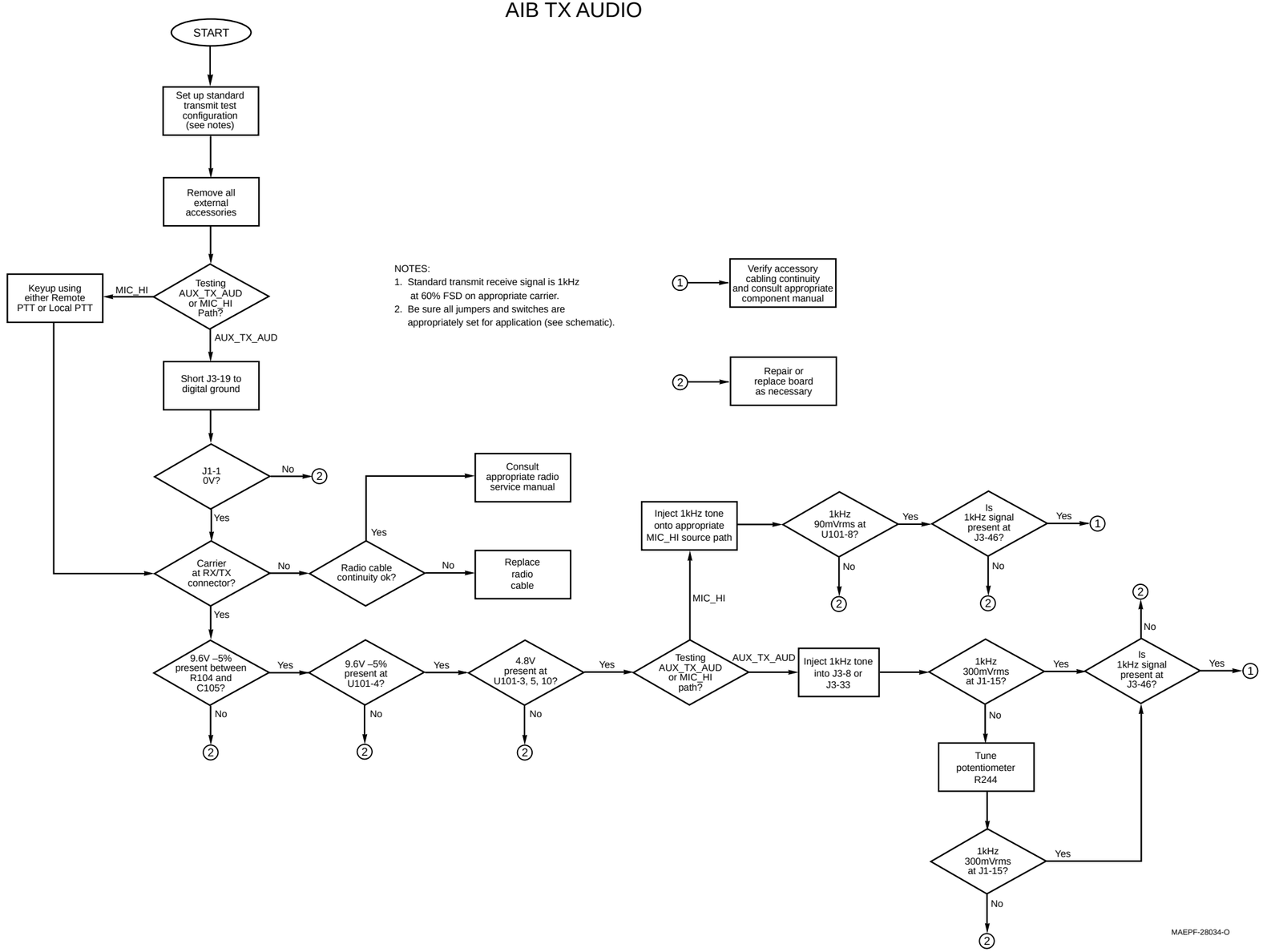


Figure 6-8. AIB TX Audio Troubleshooting Chart

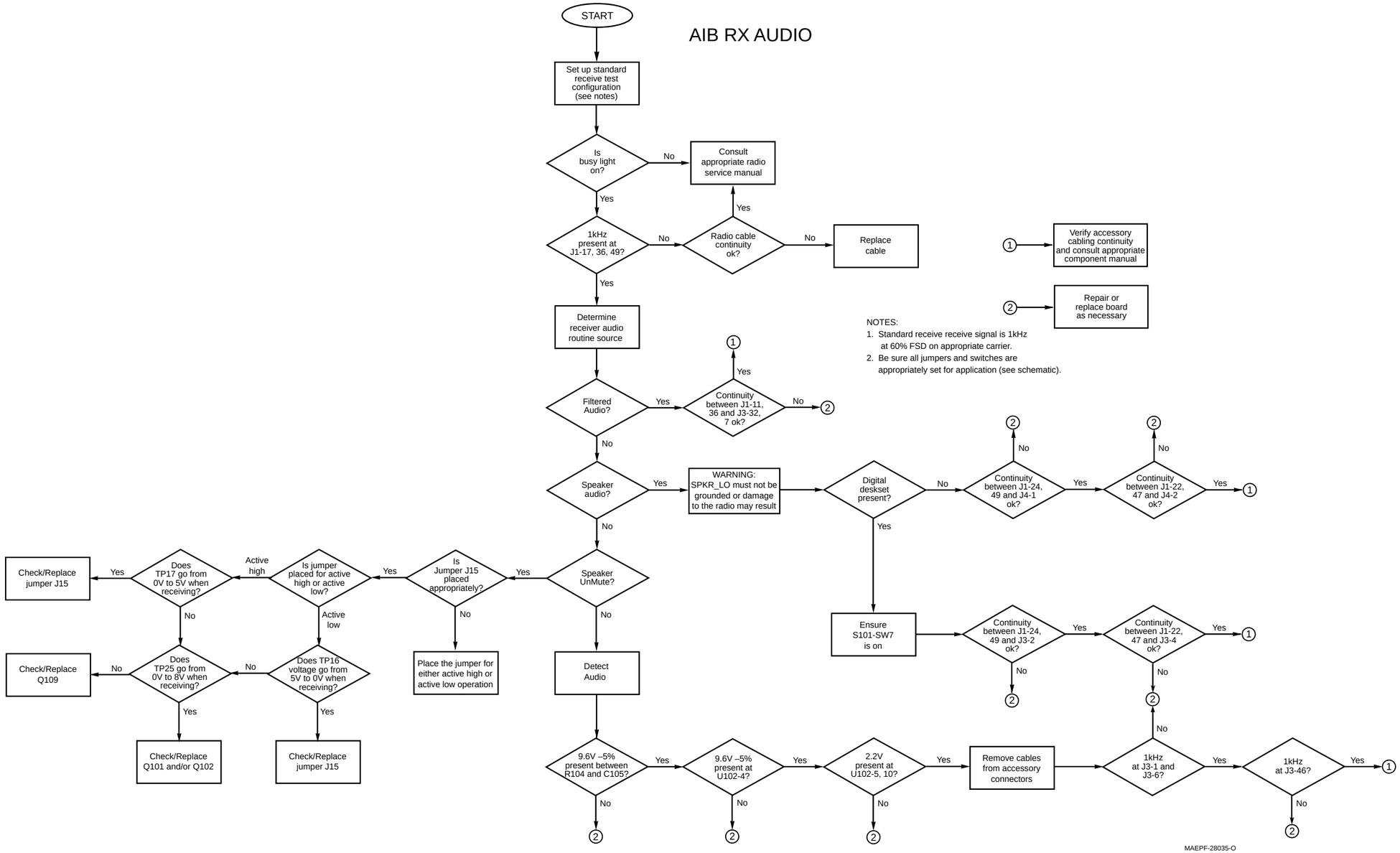


Figure 6-9. AIB RX Audio Troubleshooting Chart

AIB DC POWER

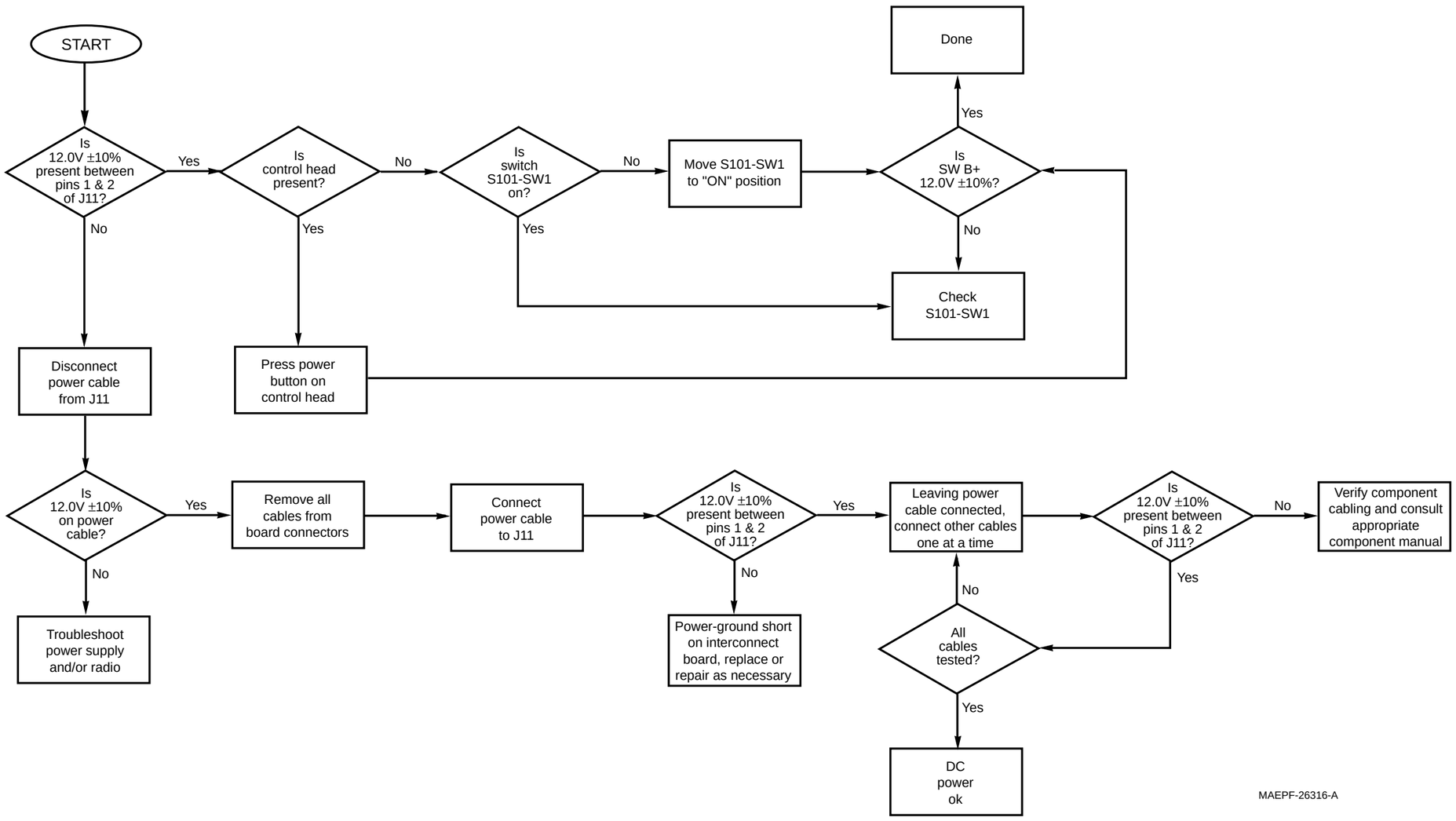


Figure 6-10. AIB DC Power Troubleshooting Chart

Chapter 7 Schematics, Board Layouts, and Parts Lists

This chapter contains schematics, board layouts, and parts lists. These should be used as a guide in determining the problem areas. They are not a substitute for knowledge of circuit operation and astute troubleshooting techniques. It is advisable to refer to the related detailed circuit descriptions in the theory of operation chapter prior to troubleshooting a radio.

7.1 List of Schematics, Board Layouts, and Parts Lists

Table 7-1. List of Schematics, Board Layouts, and Parts Lists

7.2 Schematics, Board Layouts, and Parts Lists

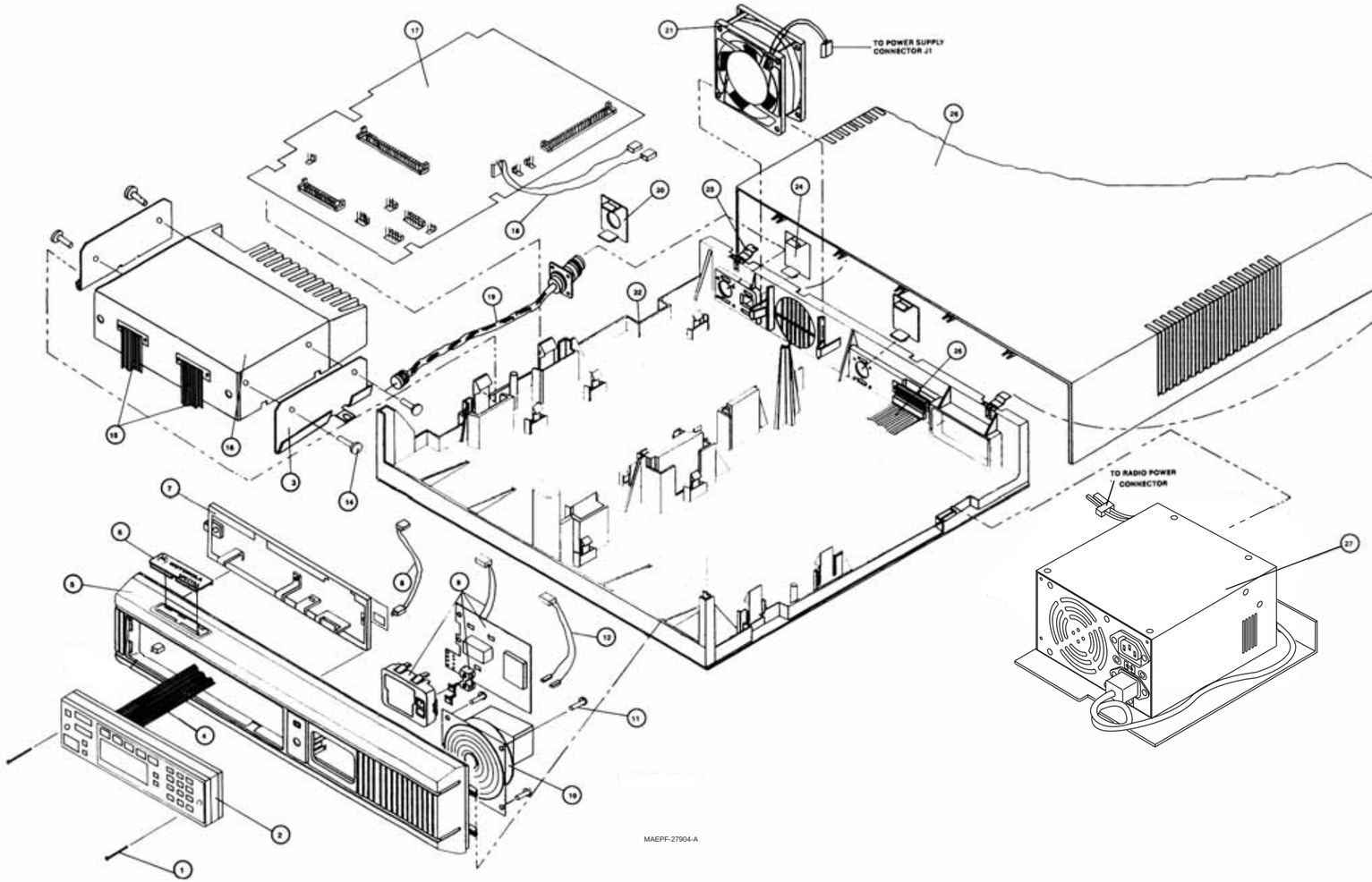
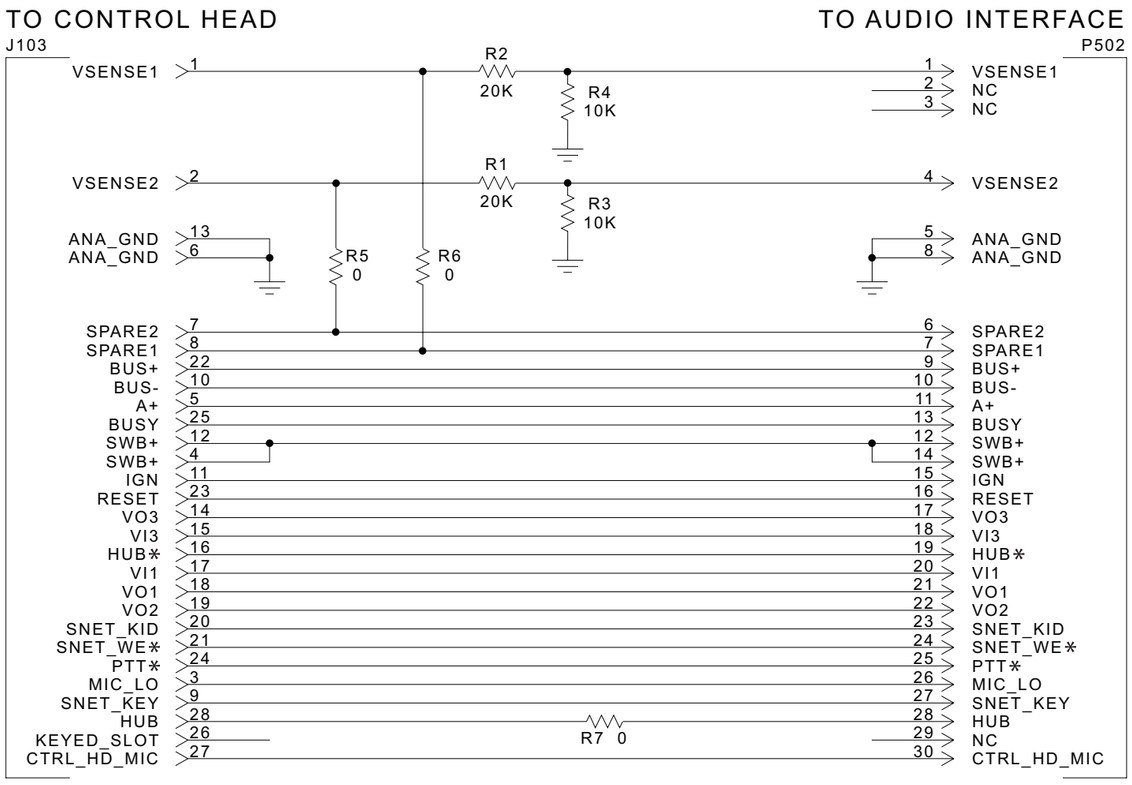


Figure 7-1. XTL 5000 Consolette Exploded View

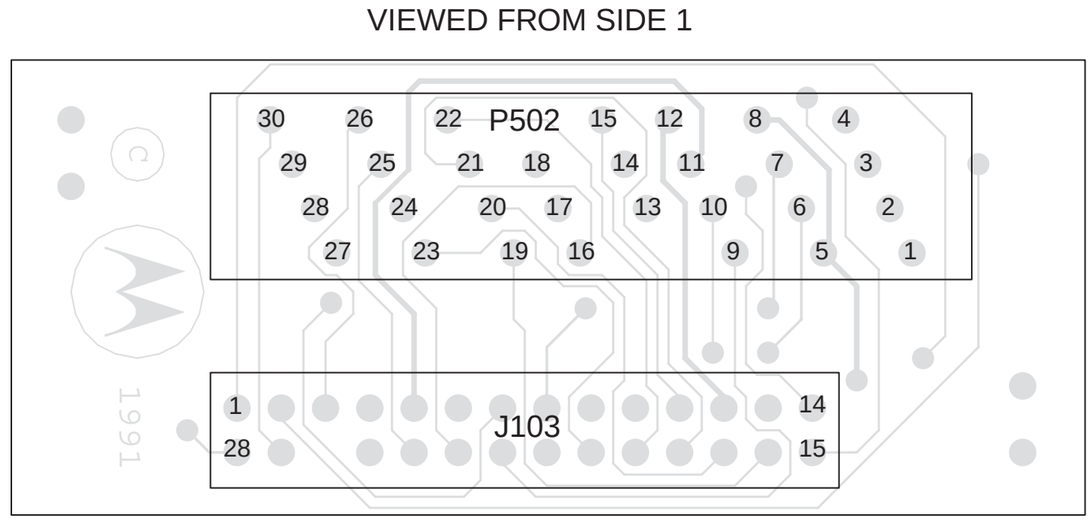


NOTES:
1. UNLESS SPECIFIED OTHERWISE, ALL RESISTOR VALUES ARE IN OHMS.
2. AN ASTERISK (*) FOLLOWING A SIGNAL NAME INDICATES AN ACTIVE LOW SIGNAL.

TEPS-48286-O

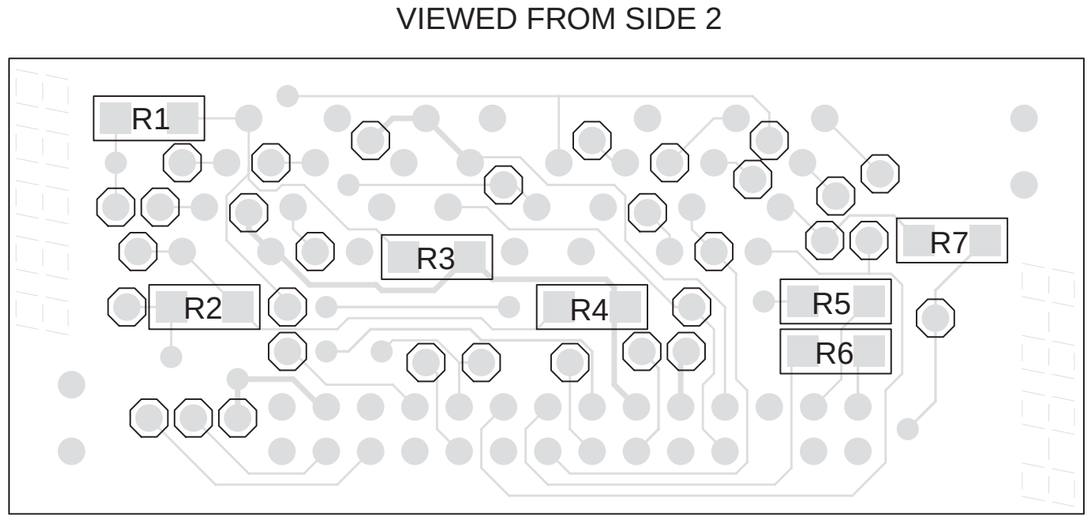
LEGEND	
⏚	ANALOG GROUND

Figure 7-2. TRN 7393B Control Head Interface Board Schematic



MAEPF-26343-O

Figure 7-3. TRN7393B Component Location Diagram–Side 1



MAEPF-26344-O

Figure 7-4. TRN7393B Component Location Diagram –Side 2

Table 7-2. XTL 5000 Consolette Exploded View Parts List

Ref. Des.	Part Number	Description
1	0385144C01	SCREW, Control Panel (2 req'd)
2	HLN1072A	CONTROL HEAD, ASTRO Spectra
4	3083139N40	CABLE, Control Head
5	6408270S01	PANEL, Front
6	3308509S05	NAMEPLATE
7	0784466T01	BRACKET, Control Head
8	3084459T01	CABLE, LED
9	L114	OPTION, Clock/VU Meter
10	5005913X02	SPEAKER
11	0310945A11	SCREW, Speaker (4 req'd)
12	3084457T01	CABLE, Speaker
13	0784465T02	BRACKET, Radio (2 req'd)
14	0380114M02	SCREW, Radio Bracket (4 req'd)
15	3084460T01	CABLE, Radio
16		RADIO, ASTRO Digital XTL 5000
17	PLN1688 and PLN1687	Audio Interface Board Tone Remote Control Board (Optional)
18	3084493T01	CABLE Power
19	0112004E09	CABLE, Antenna
20	3808649S01	SUPPORT, N-Type
21	FRN5358A	FAN
22	2708271S01 *or* 2708271S02	CHASSIS, Main CHASSIS, Main
23	5508626S01	LATCH (2 req'd)
24	3808649S02	COVER, N-Type (2 req'd)
25	3084462T01	CABLE, Accessory
26	1508346S01	COVER, Top
27	HPN4005	SUPPLY, Power

Table 7-3. TRN7393B Control Head Interface Board Parts List

Res. Des.	Part Number	Description
		CONNECTOR:
J103	0980113M03	Receptacle, 28-Contact
		CONNECTOR:
P502	3083139N40	Cable, Flat (with connectors)
		RESISTOR: W±5%; 1/8W unless stated
R1, 2	0611077B06	20k
R3, 4	0611077A98	10k
R5 thru R7	0611077A01	0Ω
		MISCELLANEOUS:
	5483865R01	Label, Bar Code; 1/4" Wide
	8484501T03	Board, Circuit

Notes:
For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
Part value notations:
$p=10^{-12}$ $n=10^{-9}$ $\mu=10^{-6}$
$m=10^{-3}$ $k=10^{3}$ $M=10^{6}$

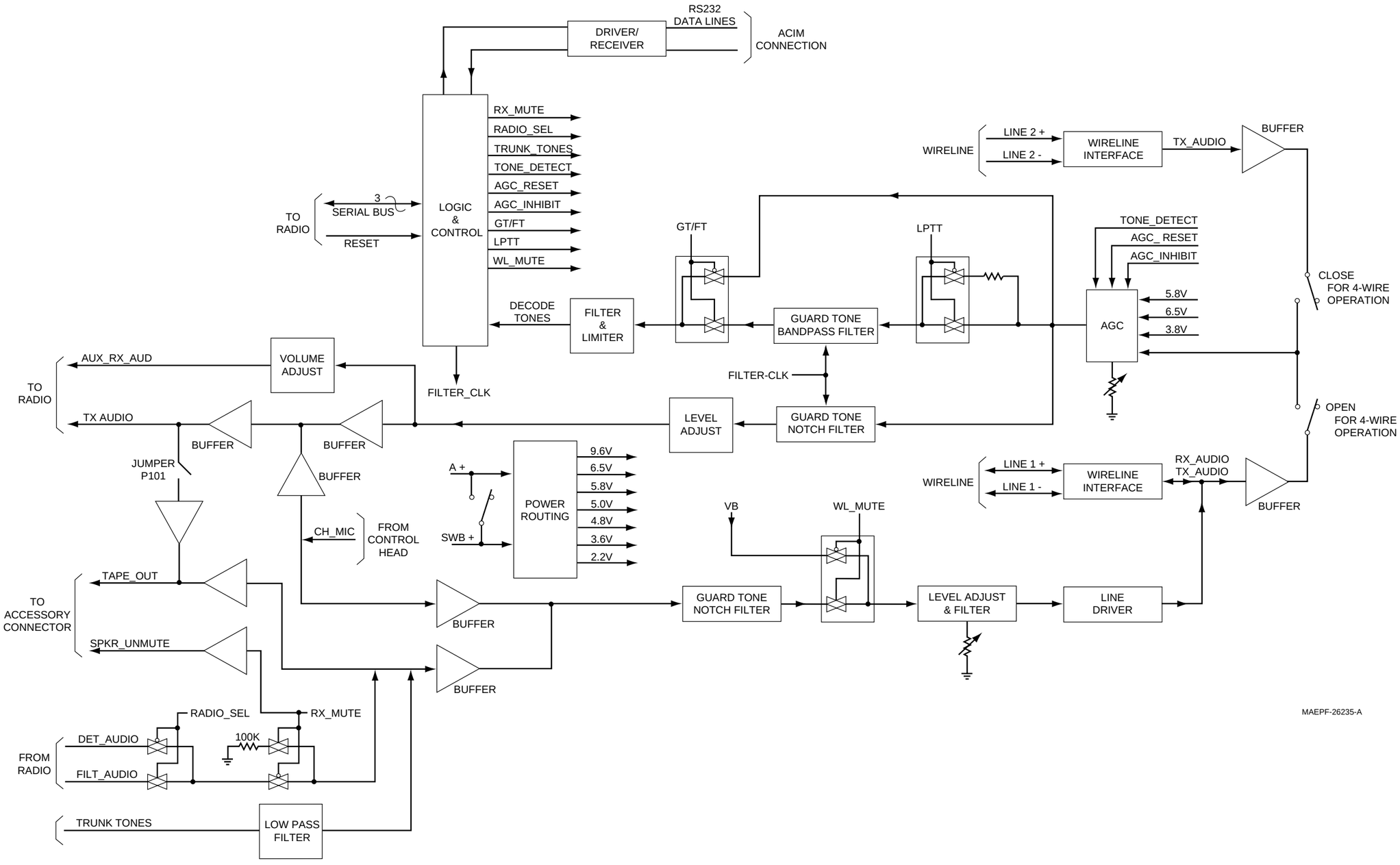


Figure 7-5. Tone Remote Control Board Block Diagram

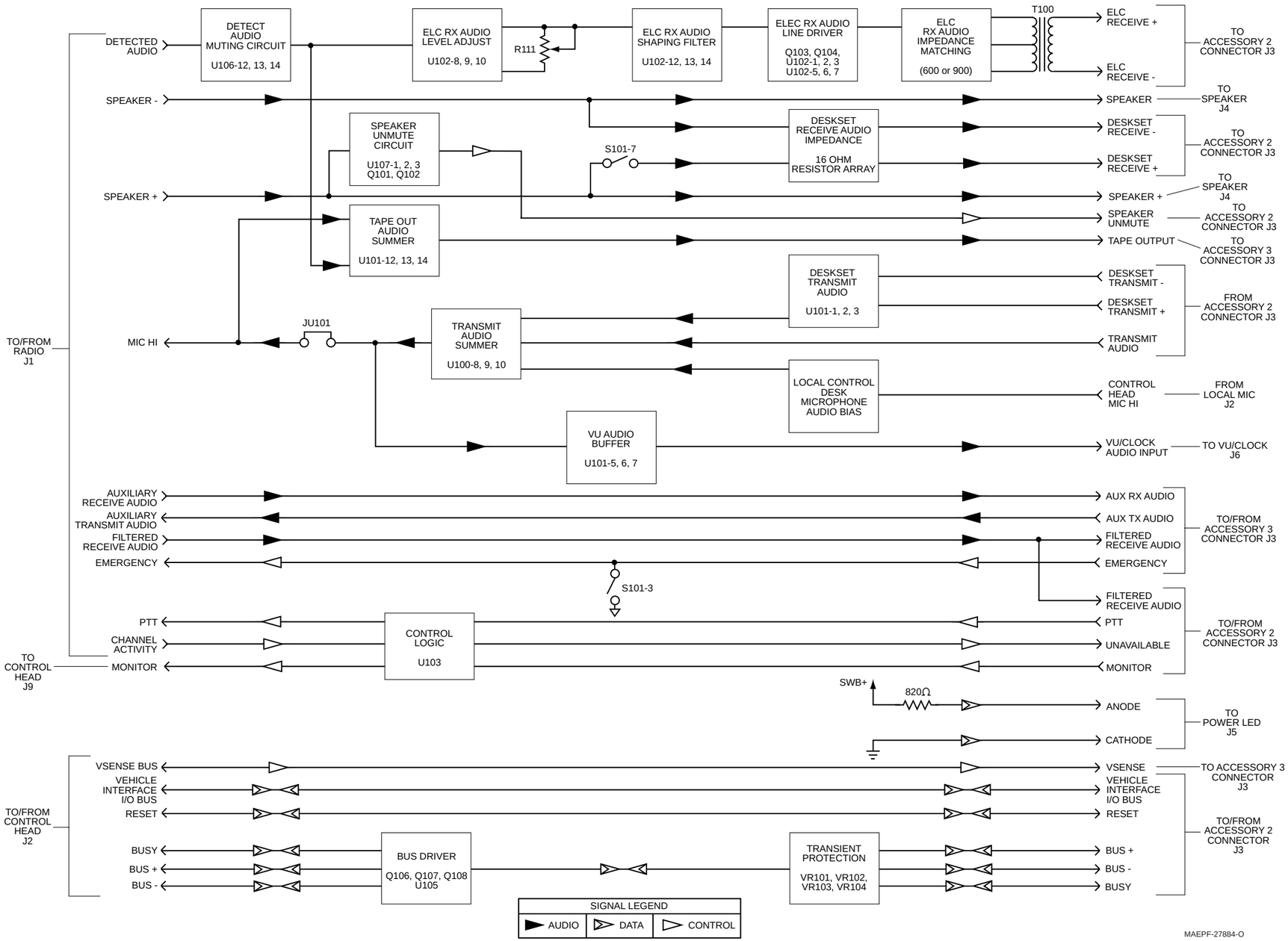


Figure 7-6. Audio Interface Board Block Diagram

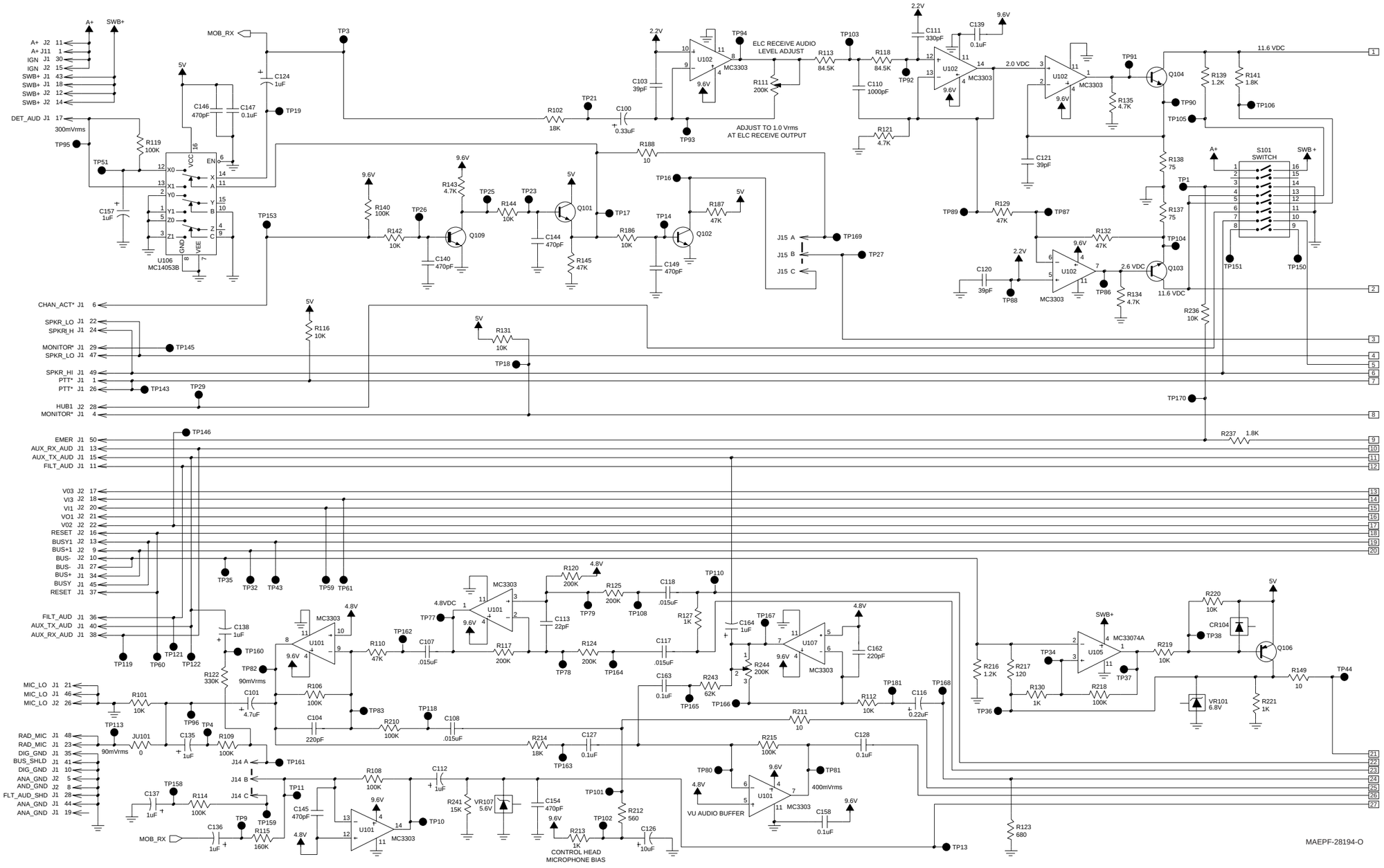


Figure 7-7. PLN1688A Audio Interface Board Schematic Diagram (Sheet 1 of 2)

JUMPER	STATE	DESCRIPTION
JU101	*IN	ALWAYS PLACED FOR ASTRO
J14	A-B	TRANSMITTED AND RECEIVED AUDIO IS ROUTED TO TAPE_OUT (ACCESSORY CONNECTOR 3, PIN 11)
	*B-C	ONLY RECEIVED AUDIO IS ROUTED TO TAPE_OUT (ACCESSORY CONNECTOR 3, PIN 11)
J15	A-B	SPKR_UNMUTE ACTIVE HIGH (COR)
	*B-C	*SPKR_UNMUTE ACTIVE LOW (COR)

JUMPER NOTES:
1. AN ASTERISK (*) INDICATES DEFAULT FACTORY SETTING

SWITCH	ON (CLOSED)	OFF (OPEN)
S101-1	*ASTRO CONTROL HEAD POWER BUTTON DISABLED	ASTRO CONTROL HEAD POWER BUTTON ENABLED
S101-3	*EMER ACTIVE HIGH	EMER ACTIVE LOW
S101-4	*600 OHM IMPEDANCE	900 OHM IMPEDANCE
S101-5	900 OHM IMPEDANCE	*600 OHM IMPEDANCE
S101-6	LOCAL DESK MICROPHONE NOT PRESENT	*LOCAL DESK MICROPHONE PRESENT
S101-7	DIGITAL REMOTE CONTROL OPTION PRESENT	*DIGITAL REMOTE CONTROL OPTION NOT PRESENT

SWITCH NOTES:
1. AN ASTERISK (*) INDICATES DEFAULT FACTORY SETTING
2. SWITCHES S101-2 AND S101-8 ARE UNUSED

SCHEMATIC NOTES
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. AN ASTERISK (*) FOLLOWING A SIGNAL NAME INDICATES AN ACTIVE LOW SIGNAL.
3. ALL VOLTAGE MEASUREMENTS TAKEN USING 1 KHZ AT 60% FSD.

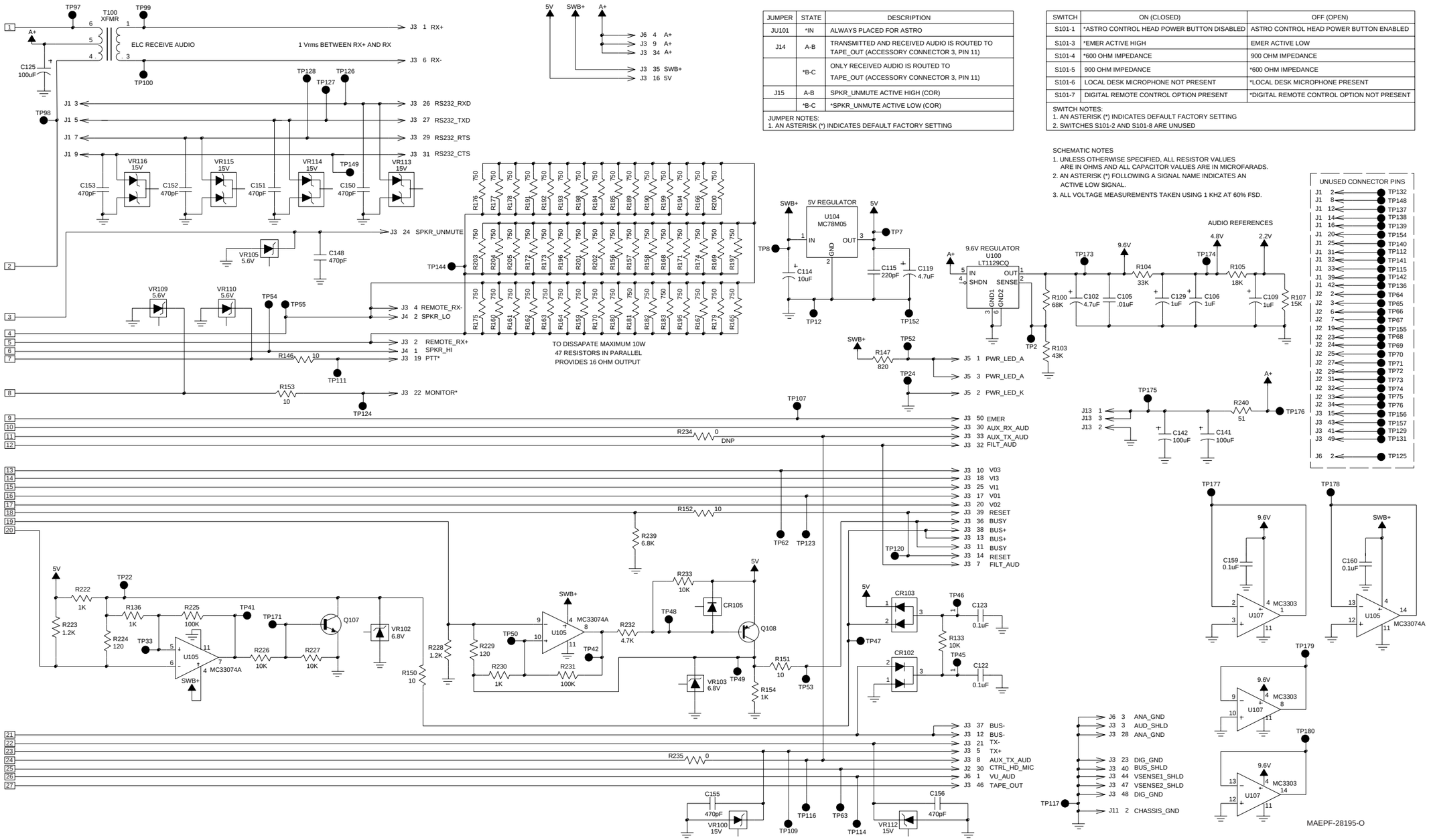


Figure 7-8. PLN1688A Audio Interface Board Schematic Diagram (Sheet 2 of 2)

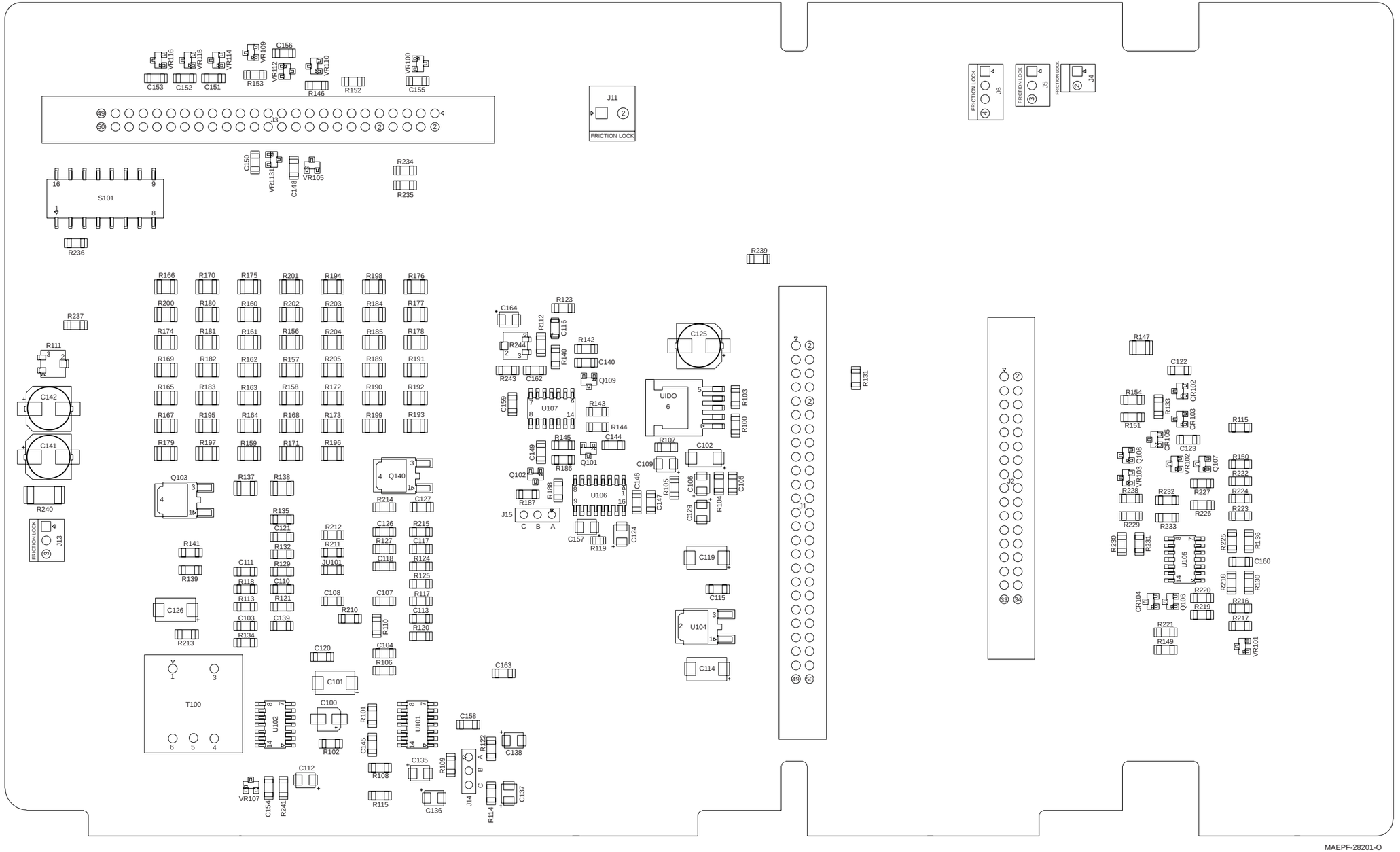


Figure 7-9. PLN1688A Audio Interface Board

Table 7-4. PLN1688A Audio Interface Board Parts List

Ref. Des.	Part Number	Description
–	0984728L01	Socket, Yellow Conn.
–	0984728L01	Socket, Yellow Conn.
C100	2380090M15	CAP,0.33uF
C101	2311049A15	CAP,4.7uF
C102	2311049A14	CAP,4.7uF
C103	2113740B39	CAP,39pF
C104	2113740B57	CAP,220pF
C105	2113741B45	CAP,.01uF
C106	2311049A08	CAP,1uF
C107	2113741B49	CAP,.015uF
C108	2113741B49	CAP,.015uF
C109	2311049A08	CAP,1uF
C110	2113740B73	CAP,1000pF
C111	2113740B61	CAP,330pF
C112	2311049A08	CAP,1uF
C113	2113740B33	CAP,22pF
C114	2311049A45	CAP,10uF
C115	2113740B57	CAP,220pF
C116	2311049A03	CAP,.22uF
C117	2113741B49	CAP,.015uF
C118	2113741B49	CAP,.015uF
C119	2311049A15	CAP,4.7uF
C120	2113740B39	CAP,39pF
C121	2113740B39	CAP,39pF
C122	2113741B69	CAP,0.1uF
C123	2113741B69	CAP,0.1uF
C124	2311049A08	CAP,1uF
C125	2380090M25	CAP,100uF
C126	2311049A45	CAP,10uF
C127	2113741B69	CAP,0.1uF
C128	2113741B69	CAP,0.1uF
C129	2311049A08	CAP,1uF
C135	2311049A08	CAP,1uF
C136	2311049A08	CAP,1uF
C137	2311049A08	CAP,1uF
C138	2311049A08	CAP,1uF
C139	2113741B69	CAP,0.1uF
C140	2113740B65	CAP,470pF
C141	2380090M25	CAP,100uF
C142	2380090M25	CAP,100uF
C144	2113740B65	CAP,470pF
C145	2113740B65	CAP,470pF
C146	2113740B65	CAP,470pF
C147	2113741B69	CAP,0.1uF
C148	2113740B65	CAP,470pF
C149	2113740B65	CAP,470pF
C150	2113740B65	CAP,470pF
C151	2113740B65	CAP,470pF
C152	2113740B65	CAP,470pF
C153	2113740B65	CAP,470pF
C154	2113740B65	CAP,470pF
C155	2113740B65	CAP,470pF
C156	2113740B65	CAP,470pF
C157	2311049A08	CAP,1uF
C158	2113741B69	CAP,0.1uF
C159	2113741B69	CAP,0.1uF
C160	2113741B69	CAP,0.1uF
C162	2113740B57	CAP,220pF
C163	2113741B69	CAP,0.1uF
C164	2311049A08	CAP,1uF
CR102	4813833C04	BAV70
CR103	4813833C03	BAW56
CR104	4813833C10	MMBD6050
CR105	4813833C10	MMBD6050
J1	2882505T15	CONN_P
J2	2882505T04	CONN_P
J3	2882505T15	CONN_P
J4	2884324M07	CONN_P
J5	2884324M08	CONN_P
J6	2884324M09	CONN_P
J11	2880004T02	CONN_P
J13	2884324M08	CONN_P
J14	2880001R03	CONN_P
J15	2880001R03	CONN_P
JU101	0611077A01	RES, 0
Q101	4813824A10	MMBT3904
Q102	4813824A10	MMBT3904
Q103	4813822A07	MJD340
Q104	4813822A07	MJD340
Q106	4813824A18	MMBT4403
Q107	4813824A11	MMBT2222A
Q108	4813824A18	MMBT4403
Q109	4813824A10	MMBT3904
R100	0611077B19	RES,68K
R101	0611077A98	RES,10K
R102	0611077B05	RES,18K
R103	0611077B14	RES,43K
R104	0611077B11	RES,33K
R105	0611077B05	RES,18K
R106	0611077B23	RES,100K
R107	0611077B03	RES,15K
R108	0611077B23	RES,100K
R109	0611077B23	RES,100K
R110	0611077B15	RES,47K
R111	1813905A14	RES,200K
R112	0611077A98	RES,10K
R113	0611077G81	RES,84.5K
R114	0611077B23	RES,100K
R115	0611077B28	RES,160K
R116	0611077A98	RES,10K
R117	0611077B30	RES,200K
R118	0611077G81	RES,84.5K
R119	0611079B23	RES,100K
R120	0611077B30	RES,200K
R121	0611077A90	RES,4.7K
R122	0611077B35	RES,330K
R123	0611077A70	RES,680
R124	0611077B30	RES,200K
R125	0611077B30	RES,200K
R127	0611077A74	RES,1K
R129	0611077B15	RES,47K
R130	0611077A74	RES,1K
R131	0611077A98	RES,10K
R132	0611077B15	RES,47K
R133	0611077A98	RES,10K
R134	0611077A90	RES,4.7K
R135	0611077A90	RES,4.7K
R136	0611077A74	RES,1K
R137	0611072A22	RES,75
R138	0611072A22	RES,75
R139	0611077A76	RES,1.2K
R140	0611077B23	RES,100K
R141	0611077A80	RES,1.8K
R142	0611077A98	RES,10K
R143	0611077A90	RES,4.7K
R144	0611077A98	RES,10K
R145	0611077B15	RES,47K
R146	0611077A26	RES,10

Ref. Des.	Part Number	Description
R147	0611072A47	RES,820
R149	0611077A26	RES,10
R150	0611077A26	RES,10
R151	0611077A26	RES,10
R152	0611077A26	RES,10
R153	0611077A26	RES,10
R154	0611077A74	RES,1K
R156	0611072A46	RES,750
R157	0611072A46	RES,750
R158	0611072A46	RES,750
R159	0611072A46	RES,750
R160	0611072A46	RES,750
R161	0611072A46	RES,750
R162	0611072A46	RES,750
R163	0611072A46	RES,750
R164	0611072A46	RES,750
R165	0611072A46	RES,750
R166	0611072A46	RES,750
R167	0611072A46	RES,750
R168	0611072A46	RES,750
R169	0611072A46	RES,750
R170	0611072A46	RES,750
R171	0611072A46	RES,750
R172	0611072A46	RES,750
R173	0611072A46	RES,750
R174	0611072A46	RES,750
R175	0611072A46	RES,750
R176	0611072A46	RES,750
R177	0611072A46	RES,750
R178	0611072A46	RES,750
R179	0611072A46	RES,750
R180	0611072A46	RES,750

Ref. Des.	Part Number	Description
R181	0611072A46	RES,750
R182	0611072A46	RES,750
R183	0611072A46	RES,750
R184	0611072A46	RES,750
R185	0611072A46	RES,750
R186	0611077A98	RES,10K
R187	0611077B15	RES,47K
R188	0611077A26	RES,10
R189	0611072A46	RES,750
R190	0611072A46	RES,750
R191	0611072A46	RES,750
R192	0611072A46	RES,750
R193	0611072A46	RES,750
R194	0611072A46	RES,750
R195	0611072A46	RES,750
R196	0611072A46	RES,750
R197	0611072A46	RES,750
R198	0611072A46	RES,750
R199	0611072A46	RES,750
R200	0611072A46	RES,750
R201	0611072A46	RES,750
R202	0611072A46	RES,750
R203	0611072A46	RES,750
R204	0611072A46	RES,750
R205	0611072A46	RES,750
R210	0611077B23	RES,100K
R211	0611077A26	RES,10
R212	0611077A68	RES,560
R213	0611077A74	RES,1K
R214	0611077B05	RES,18K
R215	0611077B23	RES,100K
R216	0611077A76	RES,1.2K

Ref. Des.	Part Number	Description
R217	0611077A52	RES,120
R218	0611077B23	RES,100K
R219	0611077A98	RES,10K
R220	0611077A98	RES,10K
R221	0611077A74	RES,1K
R222	0611077A74	RES,1K
R223	0611077A76	RES,1.2K
R224	0611077A52	RES,120
R225	0611077B23	RES,100K
R226	0611077A98	RES,10K
R227	0611077A98	RES,10K
R228	0611077A76	RES,1.2K
R229	0611077A52	RES,120
R230	0611077A74	RES,1K
R231	0611077B23	RES,100K
R232	0611077A90	RES,4.7K
R233	0611077A98	RES,10K
R234	0611077A01	RES,0
R235	0611077A01	RES,0
R236	0611077A98	RES,10K
R237	0611077A80	RES,1.8K
R239	0611077A94	RES,6.8K
R240	0680194M18	RES,51
R241	0611077B03	RES,15K
R243	0611077B18	RES,62K
R244	1813905A14	RES,200K
S101	4083706T01	SWITCH
T100	2584422T01	XFMR
U100	5105109Z13	LT1129CQ
U101	5113819A04	MC3303
U102	5113819A04	MC3303
U104	5113816A07	MC78M05

Ref. Des.	Part Number	Description
U105	5113819A05	MC33074A
U106	5113806A20	MC14053B
U107	5113819A04	MC3303
VR100	4813830A28	MMBZ5245B
VR101	4813830A18	MMBZ5235B
VR102	4813830A18	MMBZ5235B
VR103	4813830A18	MMBZ5235B
VR105	4813830A15	MMBZ5232B
VR107	4813830A15	MMBZ5232B
VR109	4813830A15	MMBZ5232B
VR110	4813830A15	MMBZ5232B
VR112	4813830A28	MMBZ5245B
VR113	4813832C28	MMBZ15
VR114	4813832C28	MMBZ15
VR115	4813832C28	MMBZ15
VR116	4813832C28	MMBZ15

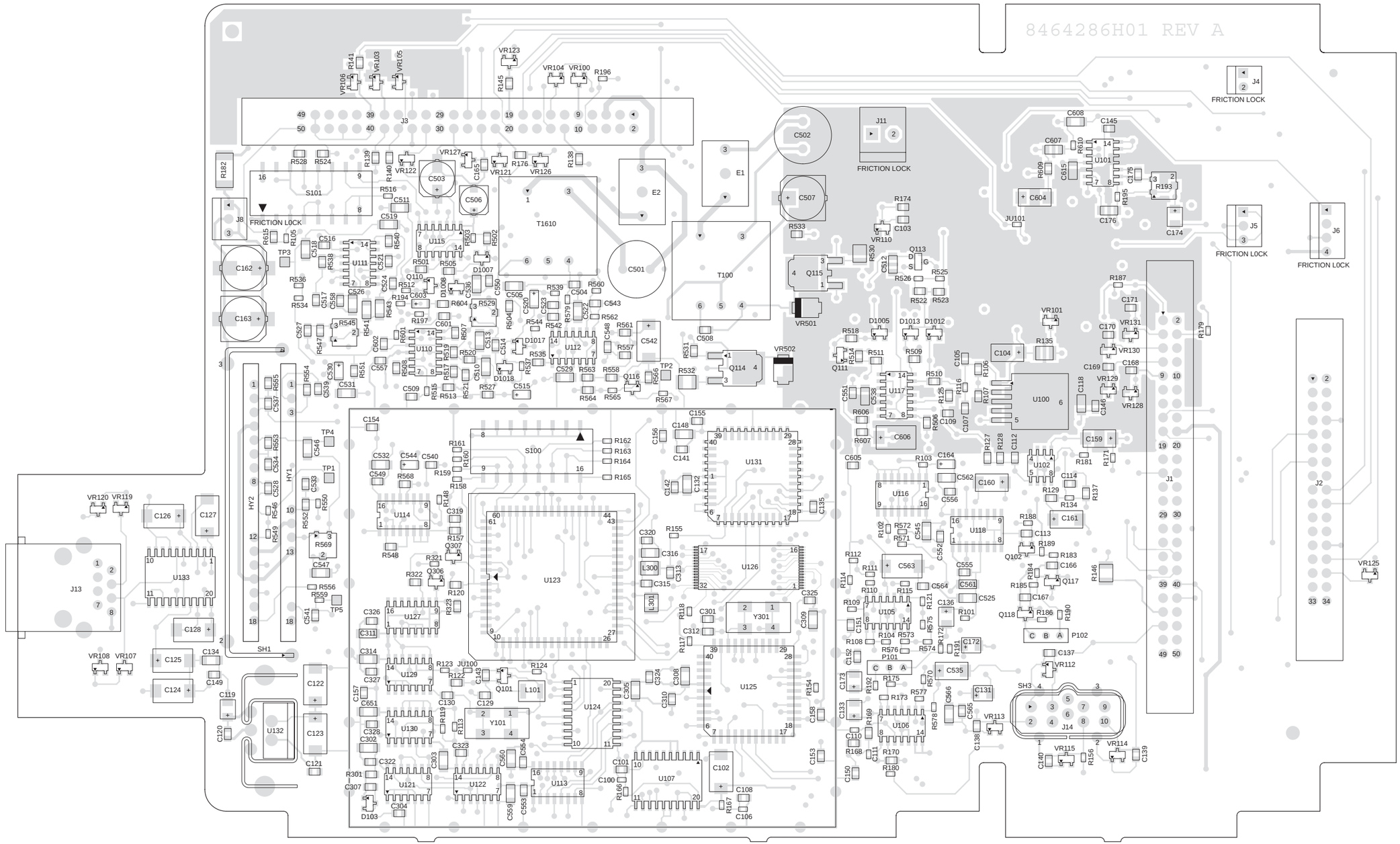


Figure 7-10. PLN1687A Tone Remote Control Board Component Location Diagram (Viewed from Side 1)

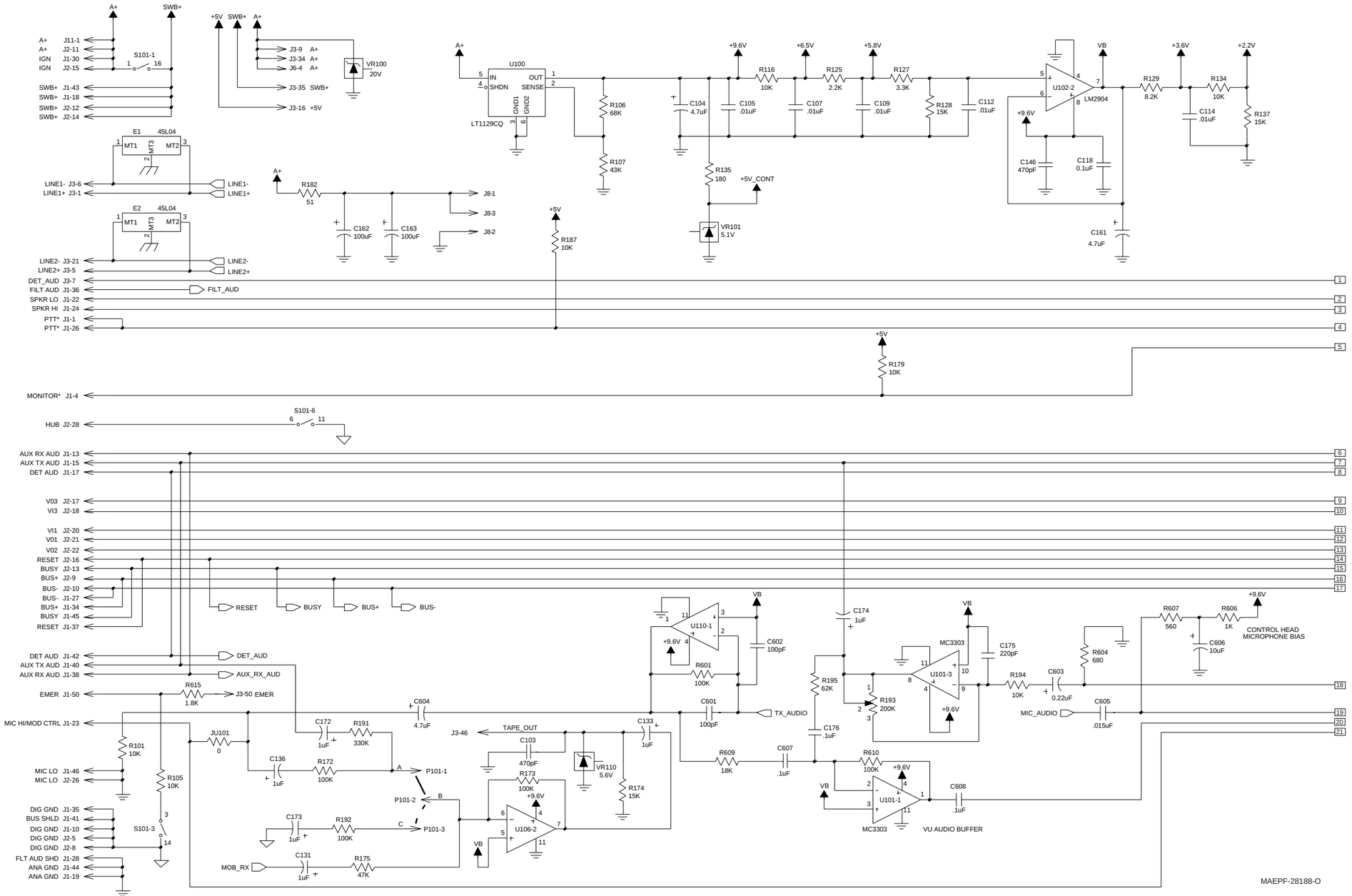


Figure 7-11. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 1 of 6)

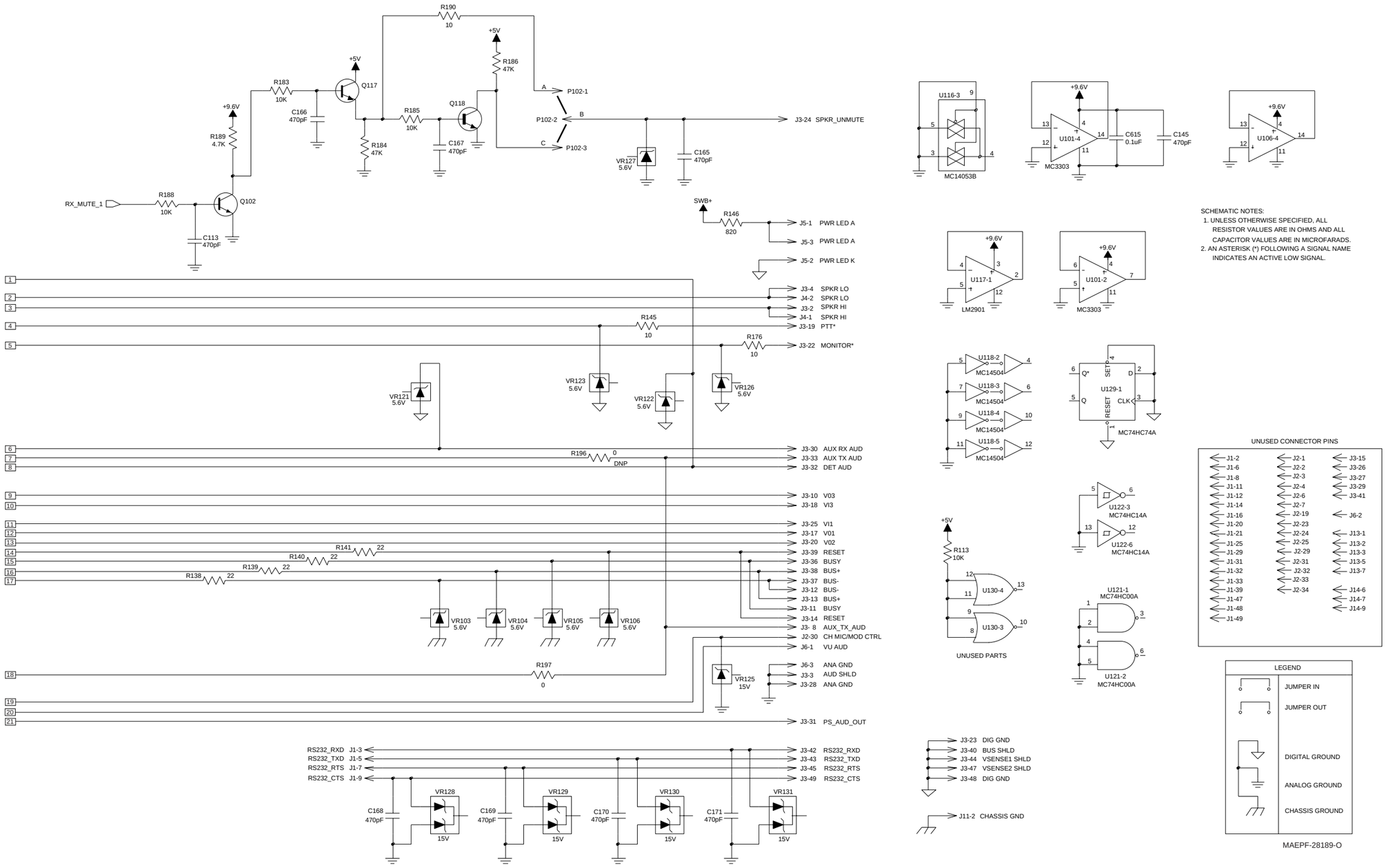


Figure 7-12. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 2 of 6)

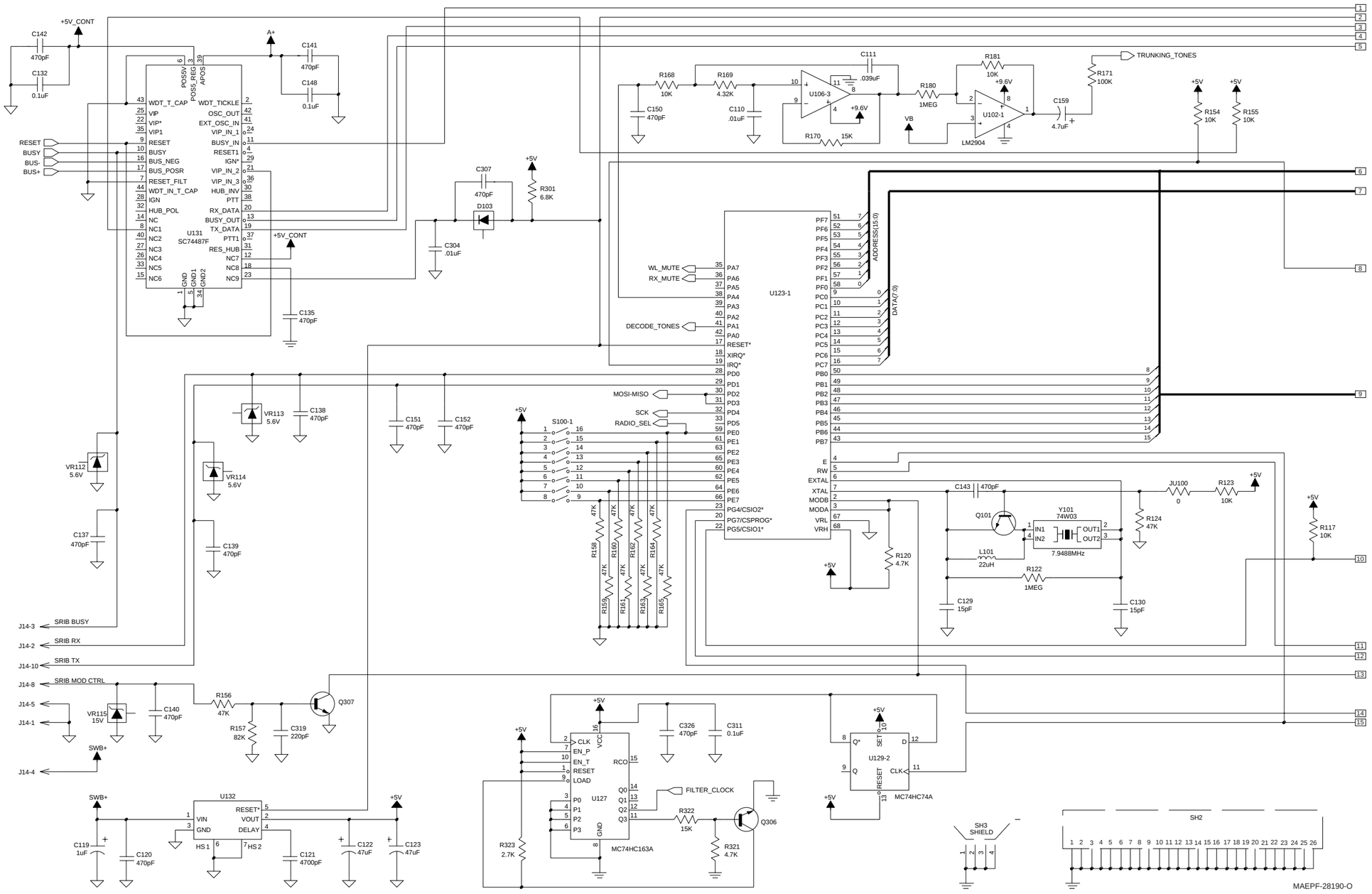


Figure 7-13. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 3 of 6)

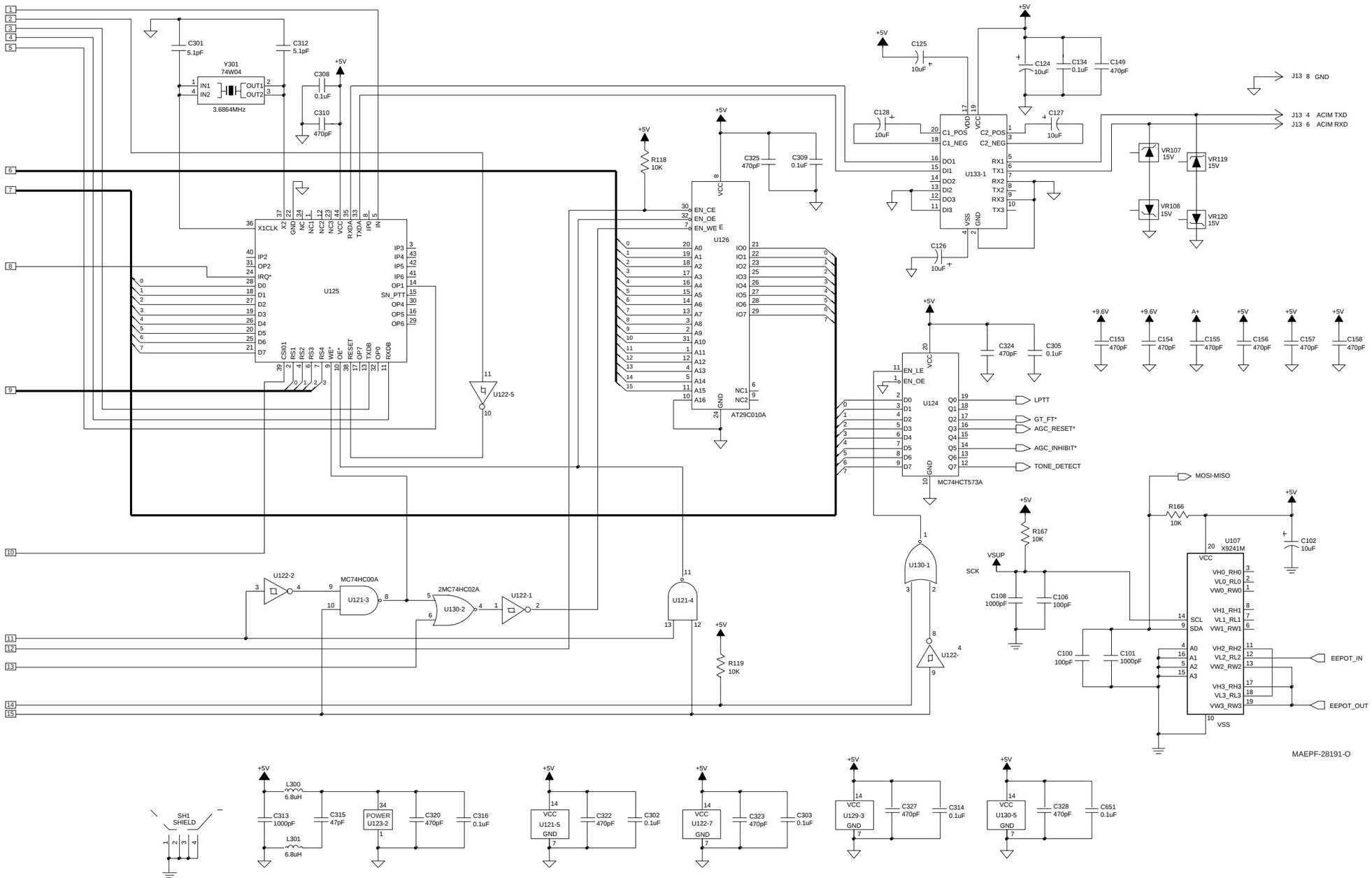


Figure 7-14. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 4 of 6)

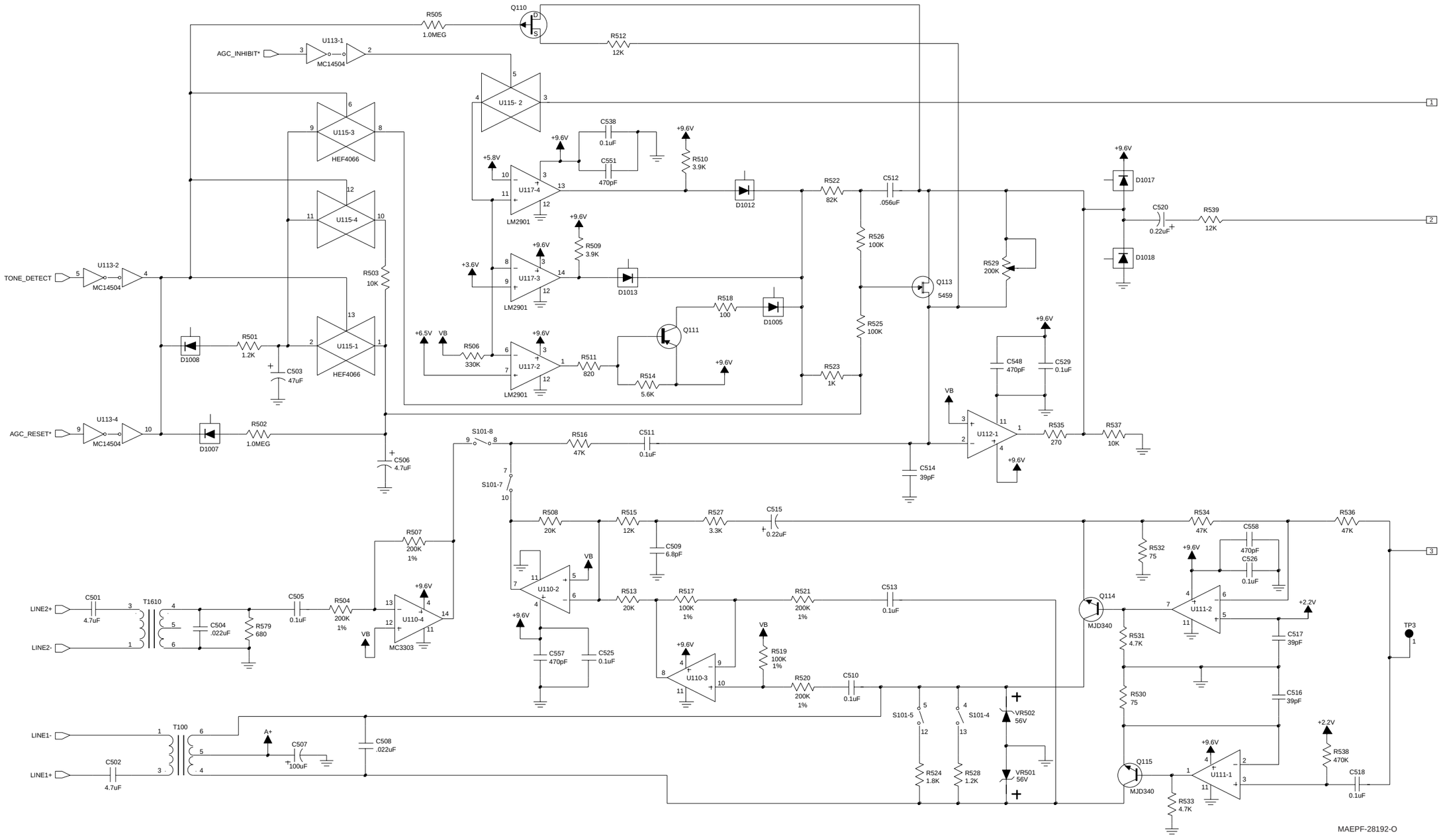


Figure 7-15. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 5 of 6)

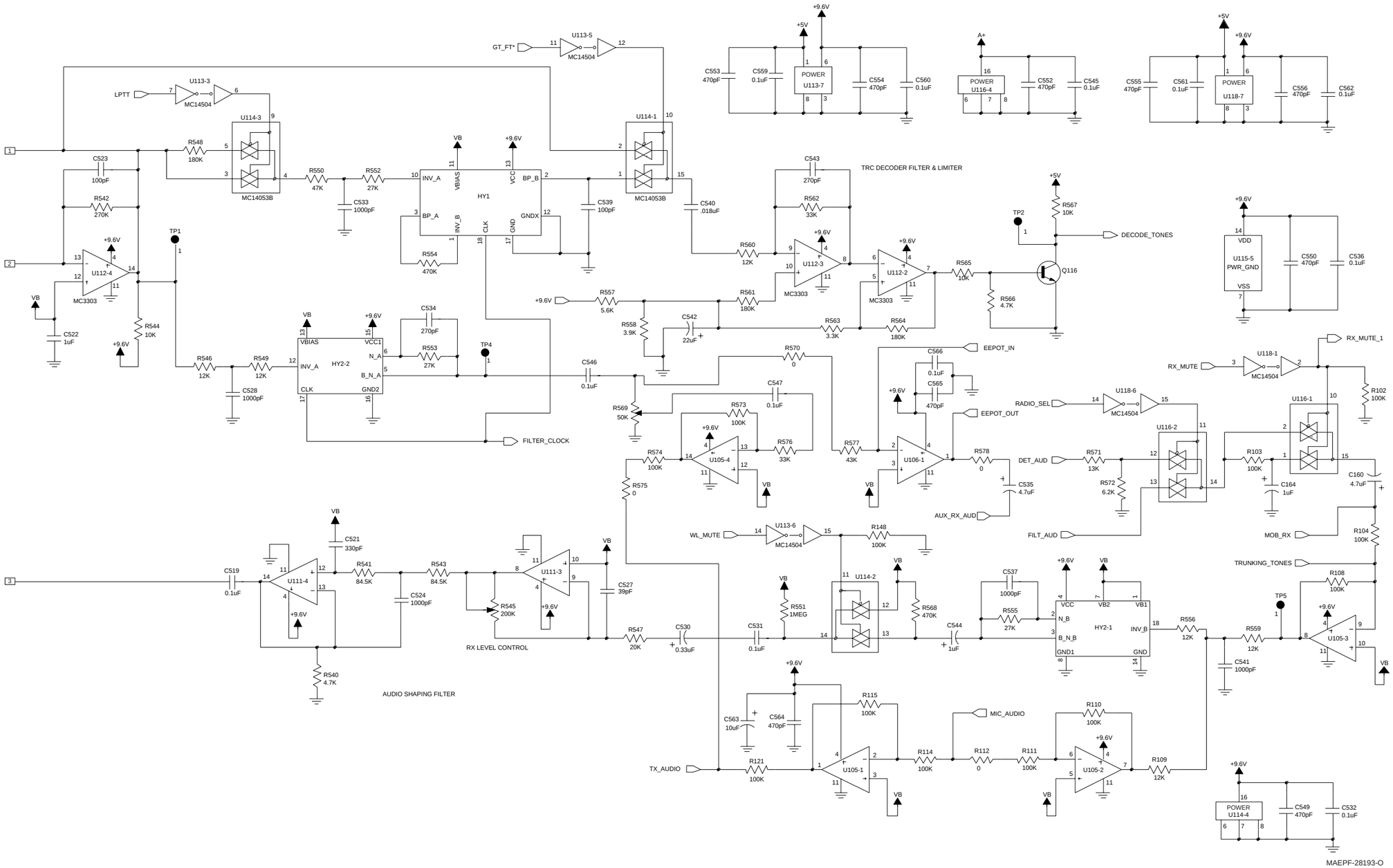


Figure 7-16. PLN1687A Tone Remote Control Board Schematic Diagram (Sheet 6 of 6)

Table 7-5. PLN1687A Tone Remote Control Board Electrical Parts List

Ref. Des.	Part Number	Description
–	2605255S01	HT SINK
–	2605455Z04	SHLD 3 X 3.5 COVER
C100	2113740F51	CAP CHIP REEL CL1 +/-30 100
C101	2113741A21	CAP CHIP CL2 X7R REEL 1000
C102	2311049A19	CAP TANT CHIP 10 10 25 A/P
C103	2113741A13	CAP CHIP CL2 X7R REEL 470
C104	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C105	2113741A45	CAP CHIP CL2 X7R REEL 10000
C106	2113740F51	CAP CHIP REEL CL1 +/-30 100
C107	2113741A45	CAP CHIP CL2 X7R REEL 10000
C108	2113741A21	CAP CHIP CL2 X7R REEL 1000
C109	2113741A45	CAP CHIP CL2 X7R REEL 10000
C110	2113741F49	CAP CHIP CL2 X7R REEL 10000
C111	2113743K05	CER CHIP CAP 0.039UF
C112	2113741A45	CAP CHIP CL2 X7R REEL 10000
C113	2113741A13	CAP CHIP CL2 X7R REEL 470
C114	2113741A45	CAP CHIP CL2 X7R REEL 10000
C118	2113741B69	CAP CHIP CL2 X7R REEL 100000
C119	2311049A08	CAP TANT CHIP 1 10 35 A/P
C120	2113741A13	CAP CHIP CL2 X7R REEL 470
C121	2113741A37	CAP CHIP CL2 X7R REEL 4700
C122	2311049A23	CAP TANT CHIP 47 10 10
C123	2311049A23	CAP TANT CHIP 47 10 10
C124	2311049A19	CAP TANT CHIP 10 10 25 A/P
C125	2311049A19	CAP TANT CHIP 10 10 25 A/P
C126	2311049A19	CAP TANT CHIP 10 10 25 A/P
C127	2311049A19	CAP TANT CHIP 10 10 25 A/P
C128	2311049A19	CAP TANT CHIP 10 10 25 A/P
C129	2113740A33	CAP CHIP REEL CL1 +/-30 15
C130	2113740A33	CAP CHIP REEL CL1 +/-30 15
C131	2311049A08	CAP TANT CHIP 1 10 35 A/P
C132	2113741B69	CAP CHIP CL2 X7R REEL 100000
C133	2311049A08	CAP TANT CHIP 1 10 35 A/P
C134	2113741B69	CAP CHIP CL2 X7R REEL 100000
C135	2113741A13	CAP CHIP CL2 X7R REEL 470
C136	2311049A08	CAP TANT CHIP 1 10 35 A/P
C137	2113741A13	CAP CHIP CL2 X7R REEL 470
C138	2113741A13	CAP CHIP CL2 X7R REEL 470
C139	2113741A13	CAP CHIP CL2 X7R REEL 470
C140	2113741A13	CAP CHIP CL2 X7R REEL 470
C141	2113741A13	CAP CHIP CL2 X7R REEL 470
C142	2113741A13	CAP CHIP CL2 X7R REEL 470
C143	2113741A13	CAP CHIP CL2 X7R REEL 470
C145	2113741A13	CAP CHIP CL2 X7R REEL 470
C146	2113741A13	CAP CHIP CL2 X7R REEL 470
C148	2113741B69	CAP CHIP CL2 X7R REEL 100000
C149	2113741A13	CAP CHIP CL2 X7R REEL 470
C150	2113741A13	CAP CHIP CL2 X7R REEL 470
C151	2113741A13	CAP CHIP CL2 X7R REEL 470
C152	2113741A13	CAP CHIP CL2 X7R REEL 470
C153	2113741A13	CAP CHIP CL2 X7R REEL 470
C154	2113741A13	CAP CHIP CL2 X7R REEL 470
C155	2113741A13	CAP CHIP CL2 X7R REEL 470
C156	2113741A13	CAP CHIP CL2 X7R REEL 470
C157	2113741A13	CAP CHIP CL2 X7R REEL 470
C158	2113741A13	CAP CHIP CL2 X7R REEL 470
C159	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C160	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C161	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C162	2380090M25	CAP ALU 100UF 25V
C163	2380090M25	CAP ALU 100UF 25V
C164	2311049A07	CAP TANT CHIP 1 10 16 A/P
C165	2113741A13	CAP CHIP CL2 X7R REEL 470
C166	2113741A13	CAP CHIP CL2 X7R REEL 470
C167	2113741A13	CAP CHIP CL2 X7R REEL 470
C168	2113741A13	CAP CHIP CL2 X7R REEL 470
C169	2113741A13	CAP CHIP CL2 X7R REEL 470
C170	2113741A13	CAP CHIP CL2 X7R REEL 470
C171	2113741A13	CAP CHIP CL2 X7R REEL 470
C172	2311049A08	CAP TANT CHIP 1 10 35 A/P
C173	2311049A08	CAP TANT CHIP 1 10 35 A/P
C174	2311049A08	CAP TANT CHIP 1 10 35 A/P
C175	2113740A63	CAP CHIP REEL CL1 +/-30 220
C176	2113741B69	CAP CHIP CL2 X7R REEL 100000
C301	2113740A20	CAP CHIP REEL CL1 +/-30 5.1
C302	2113741B69	CAP CHIP CL2 X7R REEL 100000
C303	2113741B69	CAP CHIP CL2 X7R REEL 100000
C304	2113741A45	CAP CHIP CL2 X7R REEL 10000
C305	2113741B69	CAP CHIP CL2 X7R REEL 100000
C307	2113741A13	CAP CHIP CL2 X7R REEL 470
C308	2113741B69	CAP CHIP CL2 X7R REEL 100000
C309	2113741B69	CAP CHIP CL2 X7R REEL 100000
C310	2113741A13	CAP CHIP CL2 X7R REEL 470
C311	2113741B69	CAP CHIP CL2 X7R REEL 100000
C312	2113740A20	CAP CHIP REEL CL1 +/-30 5.1
C313	2113740A79	CAP CHIP REEL CL1 +/-30 1000
C314	2113741B69	CAP CHIP CL2 X7R REEL 100000
C315	2113740A46	CAP CHIP REEL CL1 +/-30 47
C316	2113741B69	CAP CHIP CL2 X7R REEL 100000
C319	2113740A63	CAP CHIP REEL CL1 +/-30 220
C320	2113741A13	CAP CHIP CL2 X7R REEL 470
C322	2113741A13	CAP CHIP CL2 X7R REEL 470
C323	2113741A13	CAP CHIP CL2 X7R REEL 470
C324	2113741A13	CAP CHIP CL2 X7R REEL 470
C325	2113741A13	CAP CHIP CL2 X7R REEL 470
C326	2113741A13	CAP CHIP CL2 X7R REEL 470
C327	2113741A13	CAP CHIP CL2 X7R REEL 470
C328	2113741A13	CAP CHIP CL2 X7R REEL 470
C501	2382174V01	CAP LYTIC 4.7UF 200V 20% N/ PLR
C502	2382174V01	CAP LYTIC 4.7UF 200V 20% N/ PLR
C503	2380090M07	CAP ALU 47 20 16.0V SURF MT
C504	2113741A53	CAP CHIP CL2 X7R REEL 22000
C505	2113741B69	CAP CHIP CL2 X7R REEL 100000
C506	2380090M22	CAP ALU 4.7 20 50V SURF MT
C507	2380090M25	CAP ALU 100UF 25V
C508	2113741A53	CAP CHIP CL2 X7R REEL 22000
C509	2113740A24	CAP CHIP REEL CL1 +/-30 6.8
C510	2113741B69	CAP CHIP CL2 X7R REEL 100000
C511	2113741B69	CAP CHIP CL2 X7R REEL 100000
C512	2113741B63	CAP CHIP CL2 X7R REEL 56000

Ref. Des.	Part Number	Description
C513	2113741B69	CAP CHIP CL2 X7R REEL 100000
C514	2113740A43	CAP CHIP REEL CL1 +/-30 39
C515	2311049A03	CAP TANT CHIP A/P 0.22 10 35
C516	2113740A43	CAP CHIP REEL CL1 +/-30 39
C517	2113740A43	CAP CHIP REEL CL1 +/-30 39
C518	2113741B69	CAP CHIP CL2 X7R REEL 100000
C519	2113741B69	CAP CHIP CL2 X7R REEL 100000
C520	2311049A03	CAP TANT CHIP A/P 0.22 10 35
C521	2113740A67	CAP CHIP REEL CL1 +/-30 330
C522	2113743G21	CER CHIP CAP 1.0 UF
C523	2113740A55	CAP CHIP REEL CL1 +/-30 100
C524	2113740A79	CAP CHIP REEL CL1 +/-30 1000
C525	2113741B69	CAP CHIP CL2 X7R REEL 100000
C526	2113741B69	CAP CHIP CL2 X7R REEL 100000
C527	2113740A43	CAP CHIP REEL CL1 +/-30 39
C528	2113740A79	CAP CHIP REEL CL1 +/-30 1000
C529	2113741B69	CAP CHIP CL2 X7R REEL 100000
C530	2311049A04	CAP TANT CHIP A/P 0.33 10 35
C531	2113741B69	CAP CHIP CL2 X7R REEL 100000
C532	2113741B69	CAP CHIP CL2 X7R REEL 100000
C533	2113740A79	CAP CHIP REEL CL1 +/-30 1000
C534	2113740A65	CAP CHIP REEL CL1 +/-30 270
C535	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C536	2113741B69	CAP CHIP CL2 X7R REEL 100000
C537	2113740A79	CAP CHIP REEL CL1 +/-30 1000

Ref. Des.	Part Number	Description
C538	2113741B69	CAP CHIP CL2 X7R REEL 100000
C539	2113740A55	CAP CHIP REEL CL1 +/-30 100
C540	2113741A51	CAP CHIP CL2 X7R REEL 18000
C541	2113740A79	CAP CHIP REEL CL1 +/-30 1000
C542	2311049A21	CAP TANT CHIP 22 10 20 A/P
C543	2113740A65	CAP CHIP REEL CL1 +/-30 270
C544	2311049A07	CAP TANT CHIP 1 10 16 A/P
C545	2113741B69	CAP CHIP CL2 X7R REEL 100000
C546	2113741B69	CAP CHIP CL2 X7R REEL 100000
C547	2113741B69	CAP CHIP CL2 X7R REEL 100000
C548	2113741A13	CAP CHIP CL2 X7R REEL 470
C549	2113741A13	CAP CHIP CL2 X7R REEL 470
C550	2113741A13	CAP CHIP CL2 X7R REEL 470
C551	2113741A13	CAP CHIP CL2 X7R REEL 470
C552	2113741A13	CAP CHIP CL2 X7R REEL 470
C553	2113741A13	CAP CHIP CL2 X7R REEL 470
C554	2113741A13	CAP CHIP CL2 X7R REEL 470
C555	2113741A13	CAP CHIP CL2 X7R REEL 470
C556	2113741A13	CAP CHIP CL2 X7R REEL 470
C557	2113741A13	CAP CHIP CL2 X7R REEL 470
C558	2113741A13	CAP CHIP CL2 X7R REEL 470
C559	2113741B69	CAP CHIP CL2 X7R REEL 100000
C560	2113741B69	CAP CHIP CL2 X7R REEL 100000
C561	2113741B69	CAP CHIP CL2 X7R REEL 100000
C562	2113741B69	CAP CHIP CL2 X7R REEL 100000
C563	2311049A19	CAP TANT CHIP 10 10 25 A/P
C564	2113741A13	CAP CHIP CL2 X7R REEL 470

Ref. Des.	Part Number	Description
C565	2113741A13	CAP CHIP CL2 X7R REEL 470
C566	2113741B69	CAP CHIP CL2 X7R REEL 100000
C601	2113740A55	CAP CHIP REEL CL1 +/-30 100
C602	2113740A55	CAP CHIP REEL CL1 +/-30 100
C603	2311049A03	CAP TANT CHIP A/P 0.22 10 35
C604	2311049A14	CAP TANT CHIP 4.7 1020 A/P
C605	2113741A49	CAP CHIP CL2 X7R REEL 15000
C606	2311049A19	CAP TANT CHIP 10 10 25 A/P
C607	2113741B69	CAP CHIP CL2 X7R REEL 100000
C608	2113741B69	CAP CHIP CL2 X7R REEL 100000
C615	2113741B69	CAP CHIP CL2 X7R REEL 100000
C651	2113741B69	CAP CHIP CL2 X7R REEL 100000
D1005	4813833C10	DIODE GEN PUR 70V MMBD6050
D1007	4813833C10	DIODE GEN PUR 70V MMBD6050
D1008	4813833C10	DIODE GEN PUR 70V MMBD6050
D1012	4813833C10	DIODE GEN PUR 70V MMBD6050
D1013	4813833C10	DIODE GEN PUR 70V MMBD6050
D1017	4813833C10	DIODE GEN PUR 70V MMBD6050
D1018	4813833C10	DIODE GEN PUR 70V MMBD6050
D103	4813825A05	DIODE 30V HOT CARRIER MMBD301L
E1	8083545L04	SPKGAP 3P-4L1
E2	8083545L04	SPKGAP 3P-4L1
HY1	TFN6061A	HYBRID FLTR BANDPASS 2175
HY2	TFN6056A	HYBRID FLTR NOTCH 2175

Ref. Des.	Part Number	Description
J1	2882505T15	CONN HEADER 50 PIN
J11	2880004T02	HDR 0.156 FLK SNPB SR ST 2 POS
J13	0960113B01	JACK MOD. 8 PIN MT
J14	2880068M01	HEADER MIC
J2	2882505T04	PLUG HEADER 34 CKT
J3	2882505T15	CONN HEADER 50 PIN
J4	2884324M07	PLUG HDR 2.54MM GLD ST SR 2POS
J5	2884324M08	PLUG HDR 2.54MM GLD ST SR 3POS
J6	2884324M09	PLUG HDR 2.54MM GLD ST SR 4POS
J8	2884324M08	PLUG HDR 2.54MM GLD ST SR 3POS
JU100	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
JU101	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
L101	2480289M16	COIL IF 22UH 1611 CS 223
L300	2411087B36	COIL CHIP 6.8 UH 5 A/I
L301	2411087B36	COIL CHIP 6.8 UH 5 A/I
P101	2880001R03	CON PCB HDR 0.1 GLD SR ST 3 POS
P102	2880001R03	CON PCB HDR 0.1 GLD SR ST 3 POS
Q101	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q102	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q110	4813823A08	XSTR P-CH FET SW MMBFJ175LT1
Q111	4813824A18	XSTR PNP 40V 0.6A SW B=100
Q113	4885316E11	FET GENPUR N-CH _5459_ 6L SOT
Q114	4813822A07	TSTR NPN 300V 0.5A MJD340T4
Q115	4813822A07	TSTR NPN 300V 0.5A MJD340T4

Ref. Des.	Part Number	Description
Q116	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q117	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q118	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q306	4813824A10	TSTR NPN 40V 0.2A GEN PURP
Q307	4813824A10	TSTR NPN 40V 0.2A GEN PURP
R101	0662057A73	CHIP RES 10K OHMS 5%
R102	0662057A97	CHIP RES 100K OHMS 5%
R103	0662057A97	CHIP RES 100K OHMS 5%
R104	0662057A97	CHIP RES 100K OHMS 5%
R105	0662057A73	CHIP RES 10K OHMS 5%
R106	0660076A93	RES CHIP 68K 5 1/8
R107	0660076A88	RES CHIP 43K 5 1/8
R108	0662057A97	CHIP RES 100K OHMS 5%
R109	0662057A75	CHIP RES 12K OHMS 5%
R110	0662057A97	CHIP RES 100K OHMS 5%
R111	0662057A97	CHIP RES 100K OHMS 5%
R112	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R113	0662057A73	CHIP RES 10K OHMS 5%
R114	0662057A97	CHIP RES 100K OHMS 5%
R115	0662057A97	CHIP RES 100K OHMS 5%
R116	0662057A73	CHIP RES 10K OHMS 5%
R117	0662057A73	CHIP RES 10K OHMS 5%
R118	0662057A73	CHIP RES 10K OHMS 5%
R119	0662057A73	CHIP RES 10K OHMS 5%
R120	0660076A65	RES CHIP 4700 5 1/8
R121	0662057A97	CHIP RES 100K OHMS 5%
R122	0660079V49	RES CHIP 1.M OHM 5 1/8W 200PPM
R123	0662057A73	CHIP RES 10K OHMS 5%

Ref. Des.	Part Number	Description
R124	0662057A89	CHIP RES 47K OHMS 5%
R125	0660076A57	RES CHIP 2200 5 1/8
R127	0660076A61	RES CHIP 3300 5 1/8
R128	0660076A77	RES CHIP 15K 5 1/8
R129	0660076A71	RES CHIP 8200 5 1/8
R134	0662057A73	CHIP RES 10K OHMS 5%
R135	0611072A31	RES CHIP 180 5 1/4
R137	0660076A77	RES CHIP 15K 5 1/8
R138	0660076A09	RES CHIP 22 5 1/8
R139	0660076A09	RES CHIP 22 5 1/8
R140	0660076A09	RES CHIP 22 5 1/8
R141	0660076A09	RES CHIP 22 5 1/8
R145	0660076A01	RES CHIP 10 5 1/8
R146	0611072A47	RES CHIP 820 5 1/4
R148	0662057A97	CHIP RES 100K OHMS 5%
R154	0662057A73	CHIP RES 10K OHMS 5%
R155	0662057A73	CHIP RES 10K OHMS 5%
R156	0662057A89	CHIP RES 47K OHMS 5%
R157	0660076A95	RES CHIP 82K 5 1/8
R158	0662057A89	CHIP RES 47K OHMS 5%
R159	0662057A89	CHIP RES 47K OHMS 5%
R160	0662057A89	CHIP RES 47K OHMS 5%
R161	0662057A89	CHIP RES 47K OHMS 5%
R162	0662057A89	CHIP RES 47K OHMS 5%
R163	0662057A89	CHIP RES 47K OHMS 5%
R164	0662057A89	CHIP RES 47K OHMS 5%
R165	0662057A89	CHIP RES 47K OHMS 5%
R166	0662057A73	CHIP RES 10K OHMS 5%
R167	0662057A73	CHIP RES 10K OHMS 5%
R168	0660076E73	RES CHIP FILM 10K 1 1/8
R169	0662057R46	RES CHIP 4320.1W 1%
R170	0660076E77	RES CHIP FILM 15K 1 1/8

Ref. Des.	Part Number	Description
R171	0662057A97	CHIP RES 100K OHMS 5%
R172	0662057A97	CHIP RES 100K OHMS 5%
R173	0662057A97	CHIP RES 100K OHMS 5%
R174	0660076A77	RES CHIP 15K 5 1/8
R175	0662057A89	CHIP RES 47K OHMS 5%
R176	0660076A01	RES CHIP 10 5 1/8
R179	0662057A73	CHIP RES 10K OHMS 5%
R180	0662057B22	CHIP RES 1.0 MEG OHMS 5%
R181	0662057A73	CHIP RES 10K OHMS 5%
R182	0680194M18	RES 51 OHMS 5% 1W
R183	0662057A73	CHIP RES 10K OHMS 5%
R184	0662057A89	CHIP RES 47K OHMS 5%
R185	0662057A73	CHIP RES 10K OHMS 5%
R186	0662057A89	CHIP RES 47K OHMS 5%
R187	0662057A73	CHIP RES 10K OHMS 5%
R188	0662057A73	CHIP RES 10K OHMS 5%
R189	0662057A65	CHIP RES 4700 OHMS 5%
R190	0662057A01	CHIP RES 10 OHMS 5%
R191	0662057B10	CHIP RES 330K OHMS 5%
R192	0662057A97	CHIP RES 100K OHMS 5%
R193	1813905A14	POT 200K 20% SURF MT TOP ADJ
R194	0662057A73	CHIP RES 10K OHMS 5%
R195	0662057A92	CHIP RES 62K OHMS 5%
R196	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R197	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R301	0662057E50	RES CHIP 6800 OHMS 5%
R321	0662057A65	CHIP RES 4700 OHMS 5%
R322	0660076A77	RES CHIP 15K 5 1/8
R323	0660076A59	RES CHIP 2700 5 1/8
R501	0660076A51	RES CHIP 1200 5 1/8

Ref. Des.	Part Number	Description
R502	0660079V49	RES CHIP 1.M OHM 5 1/8W 200PPM
R503	0662057A73	CHIP RES 10K OHMS 5%
R504	0660079L33	RES CHIP 200. KOHM 11/8 200PPM
R505	0660079V49	RES CHIP 1.M OHM 5 1/8W 200PPM
R506	0660076B13	RES CHIP 330K 5 1/8
R507	0660079L33	RES CHIP 200. KOHM 11/8 200PPM
R508	0660076A80	RES CHIP 20K 5 1/8
R509	0660076A63	RES CHIP 3900 5 1/8
R510	0660076A63	RES CHIP 3900 5 1/8
R511	0660076A47	RES CHIP 820 5 1/8
R512	0662057A75	CHIP RES 12K OHMS 5%
R513	0660076A80	RES CHIP 20K 5 1/8
R514	0660076A67	RES CHIP 5600 5 1/8
R515	0662057A75	CHIP RES 12K OHMS 5%
R516	0662057A89	CHIP RES 47K OHMS 5%
R517	0660078L01	RES CHIP 100 KOHM 1 1/8 100PPM
R518	0660076A25	RES CHIP 100 5 1/8
R519	0660078L01	RES CHIP 100 KOHM 1 1/8 100PPM
R520	0660079L33	RES CHIP 200. KOHM 11/8 200PPM
R521	0660079L33	RES CHIP 200. KOHM 11/8 200PPM
R522	0660076A95	RES CHIP 82K 5 1/8
R523	0660076A49	RES CHIP 1000 5 1/8
R524	0660076A55	RES CHIP 1800 5 1/8
R525	0662057A97	CHIP RES 100K OHMS 5%
R526	0662057A97	CHIP RES 100K OHMS 5%
R527	0660076A61	RES CHIP 3300 5 1/8
R528	0660076A51	RES CHIP 1200 5 1/8

Ref. Des.	Part Number	Description
R529	1813905A14	POT 200K 20% SURF MT TOP ADJ
R530	0611072A22	RES CHIP 75 5 1/4
R531	0660076A65	RES CHIP 4700 5 1/8
R532	0611072A22	RES CHIP 75 5 1/4
R533	0660076A65	RES CHIP 4700 5 1/8
R534	0662057A89	CHIP RES 47K OHMS 5%
R535	0660076A35	RES CHIP 270 5 1/8
R536	0662057A89	CHIP RES 47K OHMS 5%
R537	0662057A73	CHIP RES 10K OHMS 5%
R538	0660076B17	RES CHIP 470K 5 1/8
R539	0662057A75	CHIP RES 12K OHMS 5%
R540	0660076A65	RES CHIP 4700 5 1/8
R541	0611077G81	RES CHIP 84.5K 1 1/8W
R542	0660076B11	RES CHIP 270K 5 1/8
R543	0611077G81	RES CHIP 84.5K 1 1/8W
R544	0662057A73	CHIP RES 10K OHMS 5%
R545	1813905A14	POT 200K 20% SURF MT TOP ADJ
R546	0662057A75	CHIP RES 12K OHMS 5%
R547	0660076A80	RES CHIP 20K 5 1/8
R548	0660076B07	RES CHIP 180K 5 1/8
R549	0662057A75	CHIP RES 12K OHMS 5%
R550	0662057A89	CHIP RES 47K OHMS 5%
R551	0660079V49	RES CHIP 1.M OHM 5 1/8W 200PPM
R552	0660076A83	RES CHIP 27K 5 1/8
R553	0660076A83	RES CHIP 27K 5 1/8
R554	0660076B17	RES CHIP 470K 5 1/8
R555	0660076A83	RES CHIP 27K 5 1/8
R556	0662057A75	CHIP RES 12K OHMS 5%
R557	0660076A67	RES CHIP 5600 5 1/8
R558	0660076A63	RES CHIP 3900 5 1/8
R559	0662057A75	CHIP RES 12K OHMS 5%

Ref. Des.	Part Number	Description
R560	0662057A75	CHIP RES 12K OHMS 5%
R561	0660076B07	RES CHIP 180K 5 1/8
R562	0662057A85	CHIP RES 33K OHMS 5%
R563	0660076A61	RES CHIP 3300 5 1/8
R564	0660076B07	RES CHIP 180K 5 1/8
R565	0662057A73	CHIP RES 10K OHMS 5%
R566	0660076A65	RES CHIP 4700 5 1/8
R567	0662057A73	CHIP RES 10K OHMS 5%
R568	0660076B17	RES CHIP 470K 5 1/8
R569	1885848F01	POT 50KOHM 20% SURF MT TOP ADJ
R570	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R571	0662057A76	CHIP RES 13K OHMS 5%
R572	0662057A68	CHIP RES 6200 OHMS 5%
R573	0662057A97	CHIP RES 100K OHMS 5%
R574	0662057A97	CHIP RES 100K OHMS 5%
R575	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R576	0662057A85	CHIP RES 33K OHMS 5%
R577	0662057A88	CHIP RES 43K OHMS 5%
R578	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R579	0662057A45	CHIP RES 680 OHMS 5%
R601	0662057A97	CHIP RES 100K OHMS 5%
R604	0660076A45	RES CHIP 680 5 1/8
R606	0660076A49	RES CHIP 1000 5 1/8
R607	0660076A43	RES CHIP 560 5 1/8
R609	0660076A79	RES CHIP 18K 5 1/8
R610	0662057A97	CHIP RES 100K OHMS 5%
R615	0660076A55	RES CHIP 1800 5 1/8
S100	4083706T01	SWITCH DIP SURFACE MOUNT
S101	4083706T01	SWITCH DIP SURFACE MOUNT

Ref. Des.	Part Number	Description
SH1	2605425Z01	SHIELD
SH2	2605455Z03	SHLD 3 X 3.5
SH3	2605887Z01	SHLD BD
SKT1	0984728L01	SKT CONN
SKT2	0984728L01	SKT CONN
T100	2584422T01	XFMR LINE ISOLATION TELEPHONE
T1610	2584422T01	XFMR LINE ISOLATION TELEPHONE
U100	5105109Z13	IC MICRO PWR LOW DROPUT REGLTR
U101	5113819A04	IC QD OP AMP GEN PURP MC3303D
U102	5113818A01	IC LOW COST SING SPLY LM2904DR
U105	5113819A04	IC QD OP AMP GEN PURP MC3303D
U106	5113819A04	IC QD OP AMP GEN PURP MC3303D
U107	5105109Z14	IC QUAD PROG POT
U110	5113819A04	IC QD OP AMP GEN PURP MC3303D
U111	5113819A04	IC QD OP AMP GEN PURP MC3303D
U112	5113819A04	IC QD OP AMP GEN PURP MC3303D
U113	5184704M90	IC CMOS 04M90 LEVEL SHIFTER
U114	5184704M60	IC CMOS 04M60 ANALOG
U115	5185956E80	IC CMOS 04M52 QUAD SW
U116	5184704M60	IC CMOS 04M60 ANALOG
U117	5113820A03	IC QUAD SING/DUAL SPLY LM2901
U118	5184704M90	IC CMOS 04M90 LEVEL SHIFTER
U121	5113805A01	IC QUAD 2INP NAND 74HC00AD
U122	5113805A09	IC INV HEX SCHMITT TRIG HC14

Ref. Des.	Part Number	Description
U123	5113802A27	IC 68HC11 W.SCI SPI A/D
U124	5113805A91	IC LATCH-TRANSP.OCT 3-ST N-INV
U125	5105625U57	DUART IC
U126	5105625U79	IC 128KX8 FLASH ROM
U127	5113805A41	IC CTR BINP SYNC RST 74HC163D
U129	5113805A18	IC DUAL D FF W/SET RST 74HC74
U130	5113805A02	IC QUAD 2INP NOR 74HC02AD
U131	5180057S04	“IC CUST SER I/O 13”” REEL”
U132	5185130C06	IC 5V REG W/RESET CS-8126-1T5
U133	5113811A11	IC RS-232-C DVR/RCVR SNGL SUP
VR100	4880140L25	DIODE SOT ZENER 20V TAPE&REEL
VR101	4880140L06	DIODE SOT ZENER 5.1V TAPE&REEL
VR103	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR104	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR105	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR106	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR107	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR108	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR110	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR112	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR113	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR114	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL

Ref. Des.	Part Number	Description
VR115	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR119	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR120	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR121	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR122	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR123	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR125	4880140L20	DIODE SOT ZENER 15V TAPE&REEL
VR126	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR127	4880140L07	DIODE SOT ZENER 5.6V TAPE&REEL
VR128	4813832C28	ZENER BPLR 15V FOR ESD SOT23
VR129	4813832C28	ZENER BPLR 15V FOR ESD SOT23
VR130	4813832C28	ZENER BPLR 15V FOR ESD SOT23
VR131	4813832C28	ZENER BPLR 15V FOR ESD SOT23
VR501	4813832A46	DIODE 56V TRANS SUP P6SMB
VR502	4813832A46	DIODE 56V TRANS SUP P6SMB
Y101	4805574W03	XTAL PRL RESONANCE 7.9488MHZ
Y301	4805574W04	XTAL SURFACE MOUNT

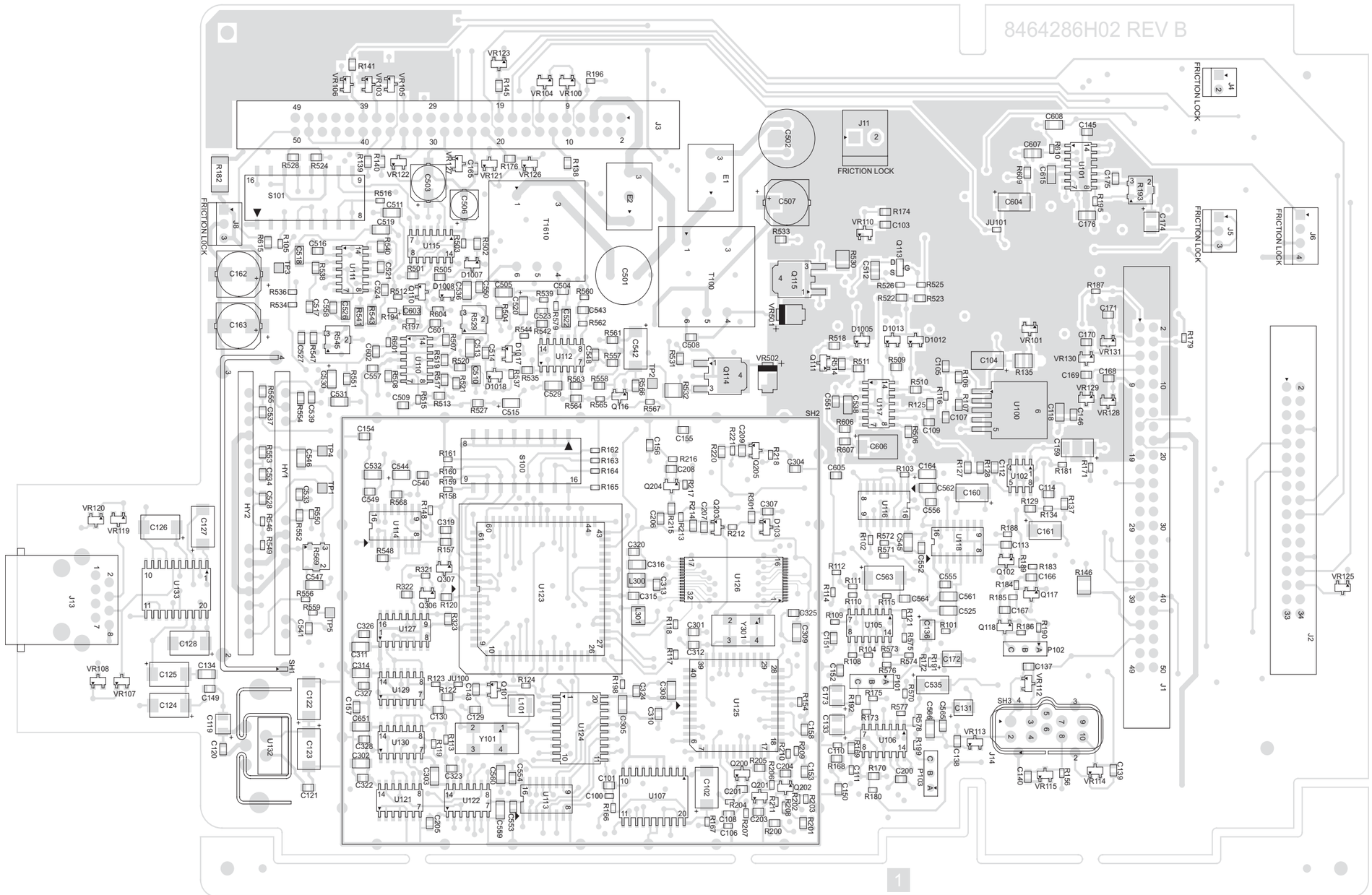


Figure 7-17. PLN1687B Tone Remote Control Board Component Location Diagram (Viewed from Side 1)

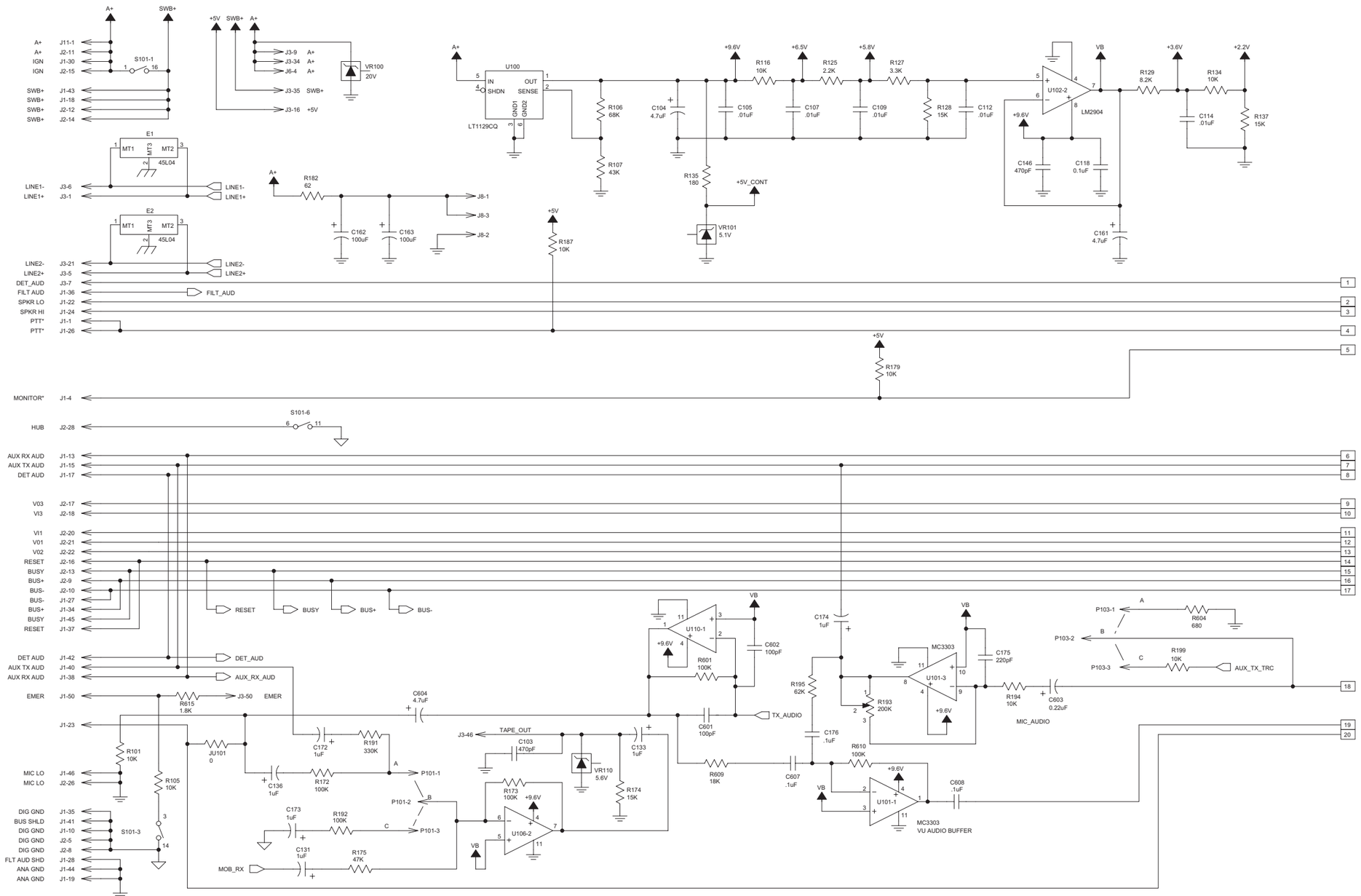
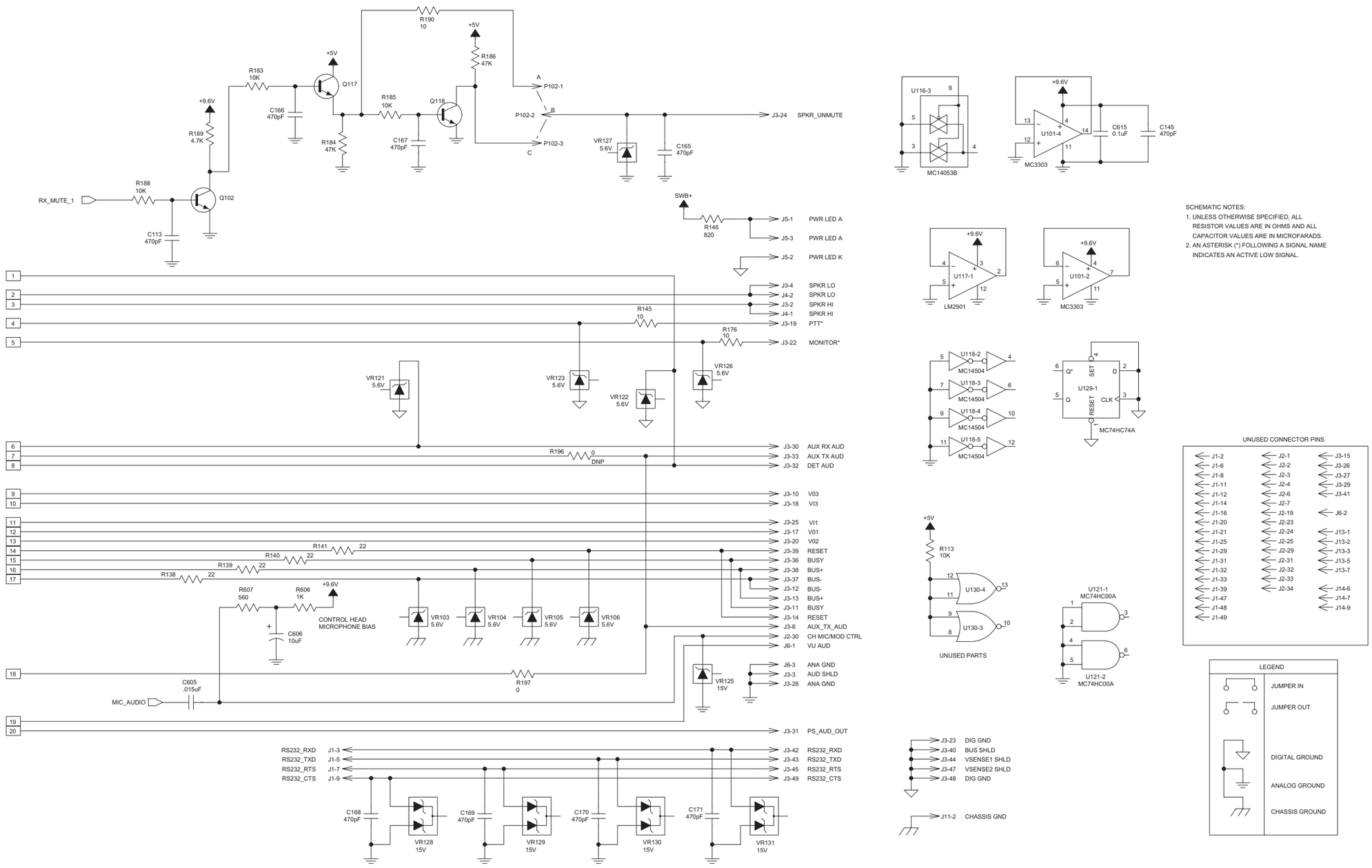


Figure 7-18. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 1 of 6)



SCHEMATIC NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTOR VALUES ARE IN OHMS AND ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. AN ASTERISK (*) FOLLOWING A SIGNAL NAME INDICATES AN ACTIVE LOW SIGNAL.

UNUSED CONNECTOR PINS

J1-2 J1-6 J1-8 J1-11 J1-12 J1-14 J1-16 J1-20 J1-21 J1-25 J1-29 J1-31 J1-32 J1-33 J1-39 J1-47 J1-48 J1-49

J2-1 J2-2 J2-3 J2-4 J2-6 J2-7 J2-19 J2-23 J2-24 J2-25 J2-29 J2-31 J2-32 J2-33 J2-34

J3-15 J3-26 J3-27 J3-29 J3-41

J6-2

J13-1 J13-2 J13-3 J13-5 J13-7

J14-6 J14-7 J14-9

J3-23 DIG GND
J3-40 BUS SHLD
J3-44 VSENSE1 SHLD
J3-47 VSENSE2 SHLD
J3-48 DIG GND

J11-2 CHASSIS GND

Figure 7-19. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 2 of 6)

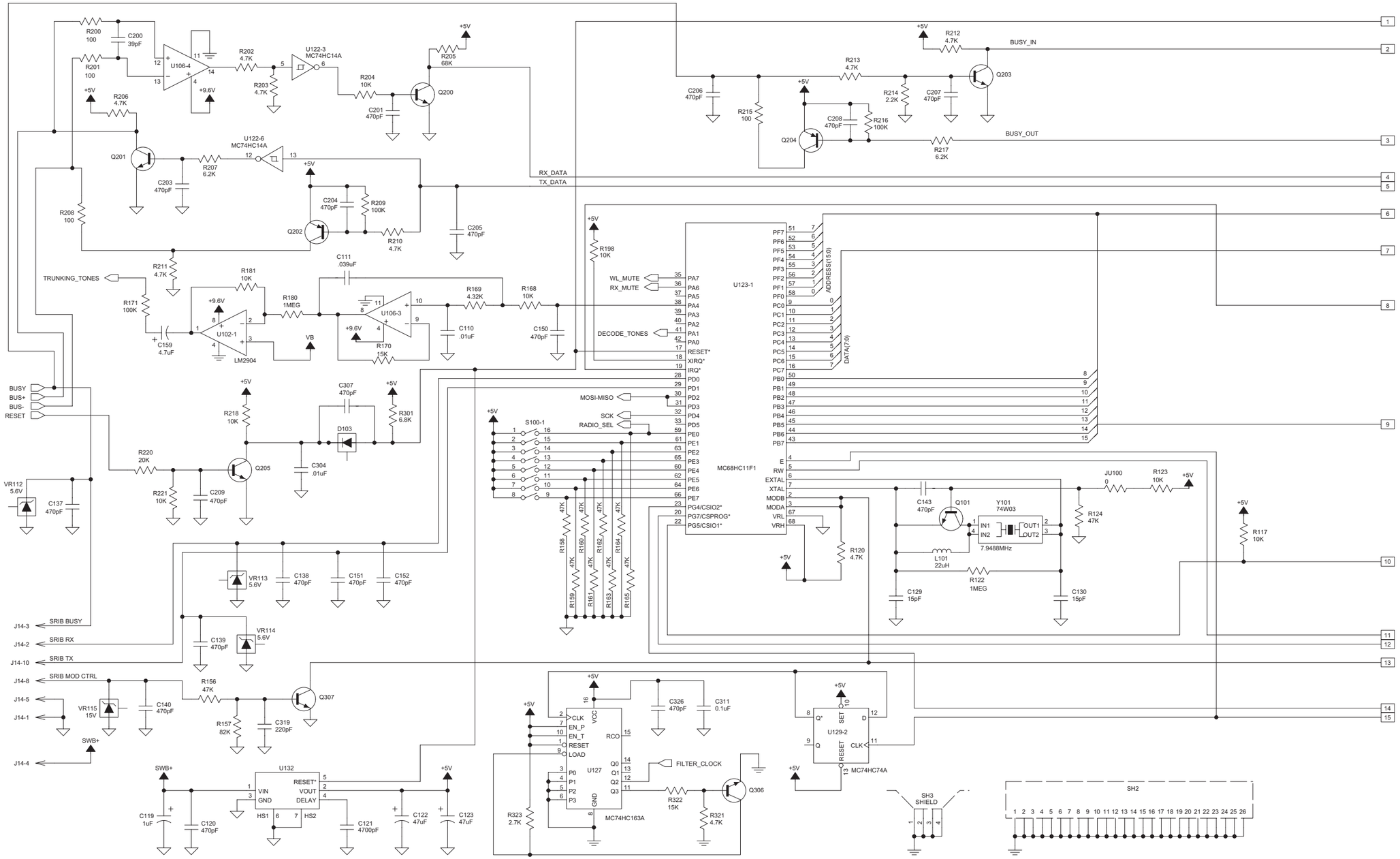


Figure 7-20. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 3 of 6)

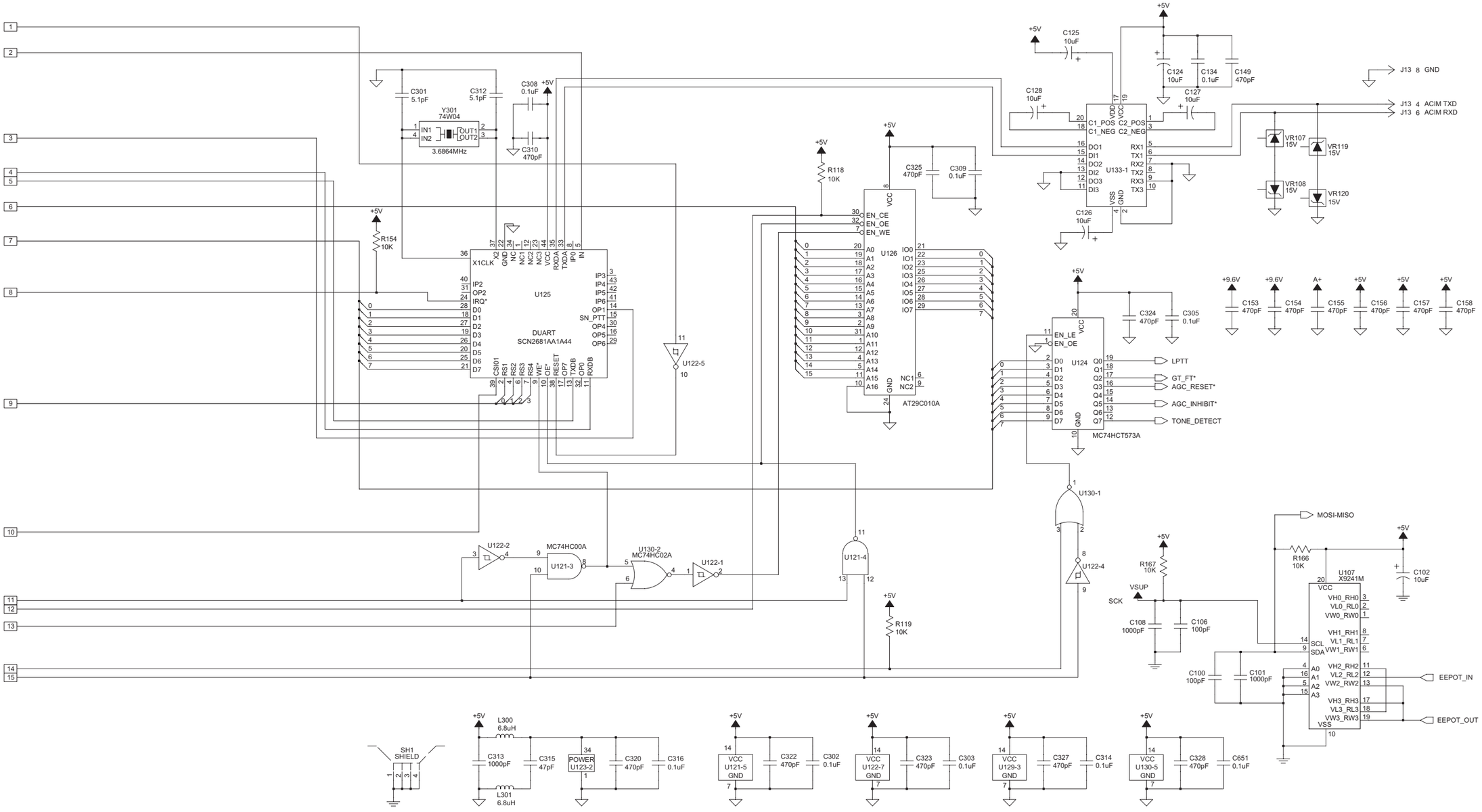


Figure 7-21. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 4 of 6)

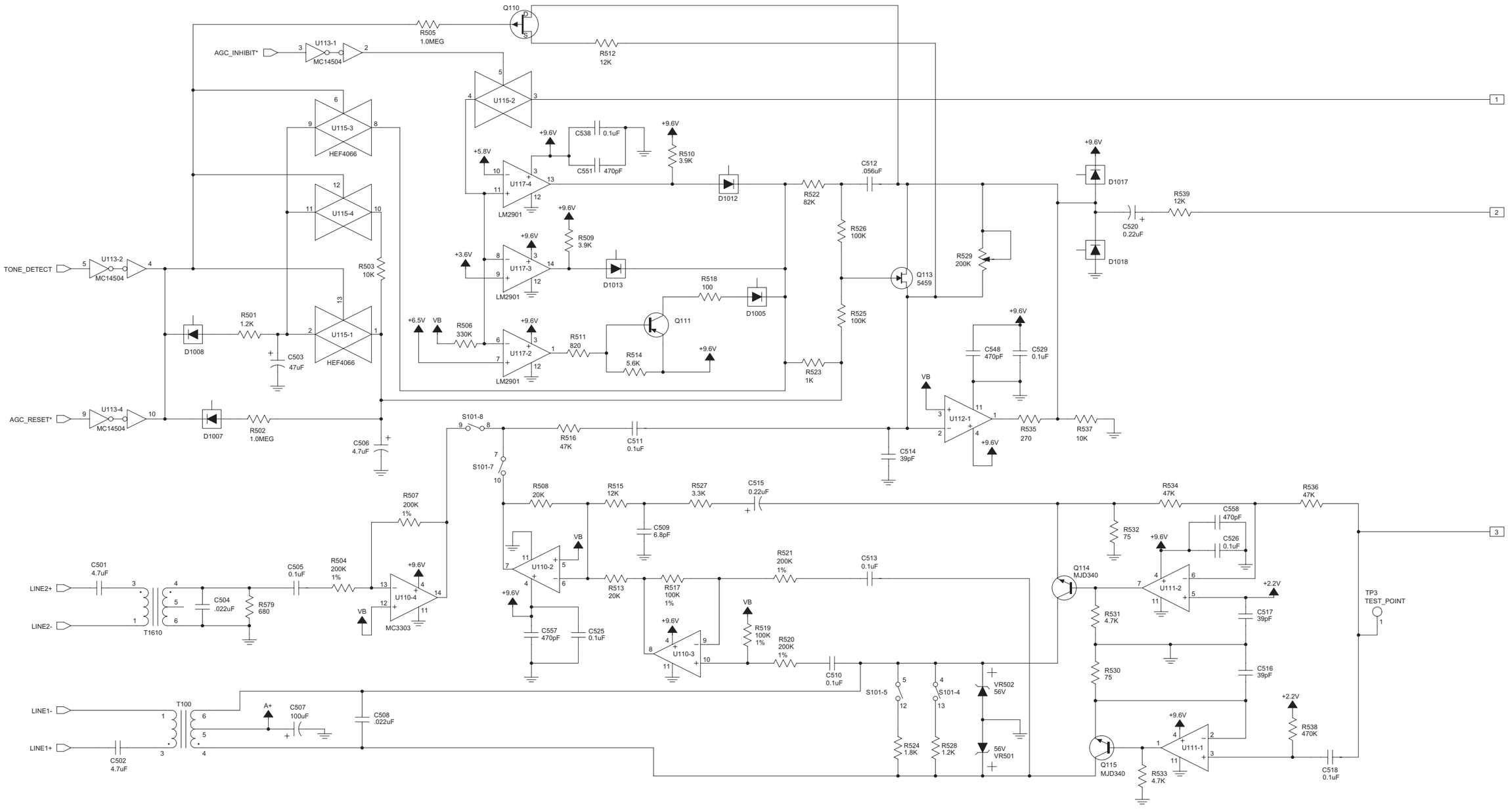


Figure 7-22. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 5 of 6)

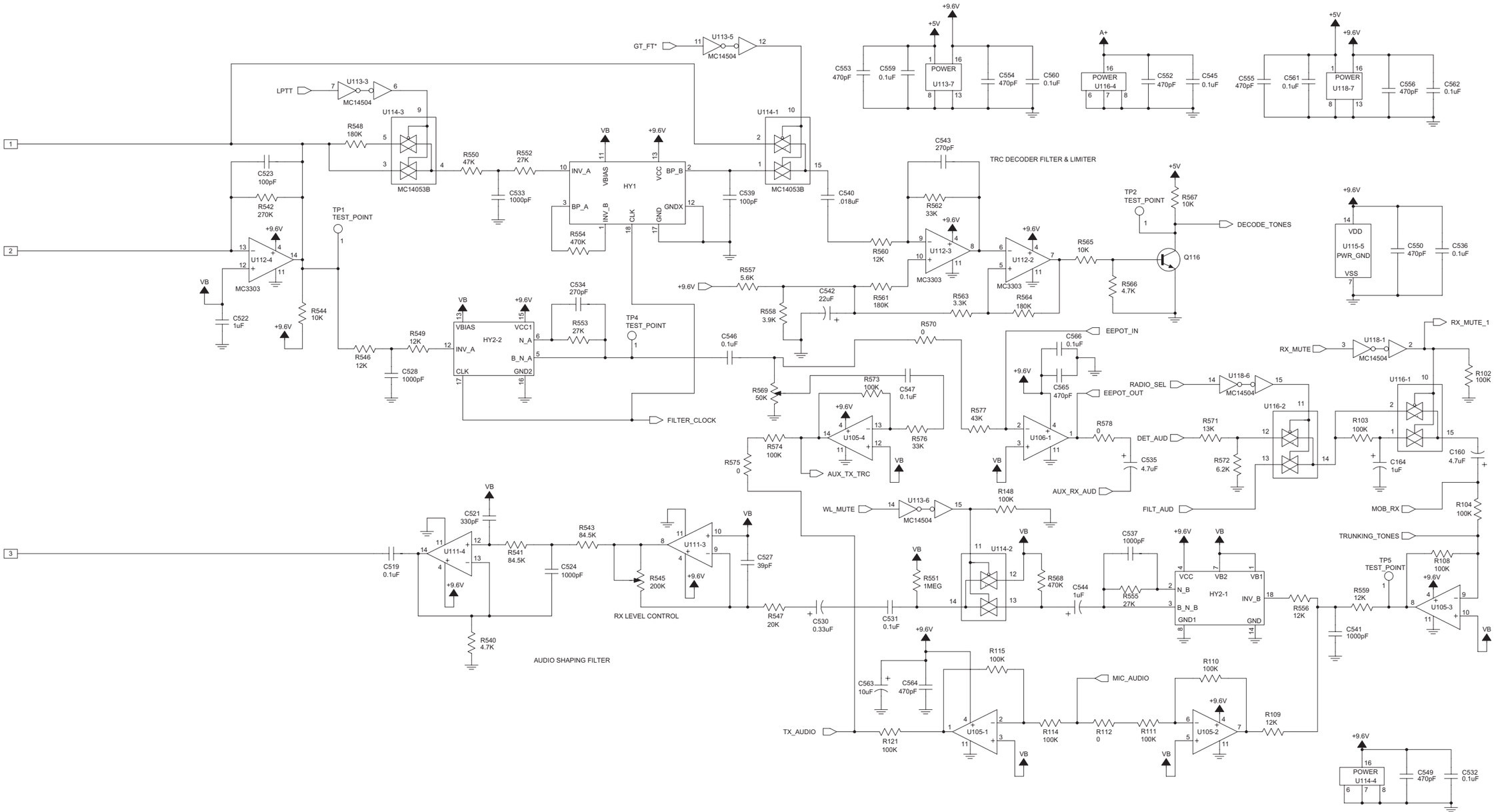


Figure 7-23. PLN1687B Tone Remote Control Board Schematic Diagram (Sheet 6 of 6)

Table 7-6. PLN1687B Tone Remote Control Board Electrical Parts List

Ref. Des.	Part Number	Description
–	2605255S01	HT SINK
–	2605455Z04	SHLD CVR
C100	2113740F51	CAP CHIP 100 PF +/-5%
C101	2113741A21	CAP CHIP 1000 PF +/-5%
C102	2311049A19	CAP FXD 10 UF +/-10%
C103	2113741A13	CAP CHIP 470 PF +/-5%
C104	2311049A14	CAP FXD 4.7 UF +/-10%
C105	2113741A45	CAP CHIP 0.01 UF +/-5%
C106	2113740F51	CAP CHIP 100 PF +/-5%
C107	2113741A45	CAP CHIP 0.01 UF +/-5%
C108	2113741A21	CAP CHIP 1000 PF +/-5%
C109	2113741A45	CAP CHIP 0.01 UF +/-5%
C110	2113741F49	CAP CHIP 0.01 UF +/-5%
C111	2113743K05	CAP CHIP 0.039 UF +80% -20%
C112	2113741A45	CAP CHIP 0.01 UF +/-5%
C113	2113741A13	CAP CHIP 470 PF +/-5%
C114	2113741A45	CAP CHIP 0.01 UF +/-5%
C118	2113741B69	CAP CHIP 0.1 UF +/-5%
C119	2311049A08	CAP FXD 1 UF +/-10%
C120	2113741A13	CAP CHIP 470 PF +/-5%
C121	2113741A37	CAP CHIP 4700 PF +/-5%
C122	2311049A23	CAP FXD 47 UF +/-10%
C123	2311049A23	CAP FXD 47 UF +/-10%
C124	2311049A19	CAP FXD 10 UF +/-10%
C125	2311049A19	CAP FXD 10 UF +/-10%
C126	2311049A19	CAP FXD 10 UF +/-10%
C127	2311049A19	CAP FXD 10 UF +/-10%
C128	2311049A19	CAP FXD 10 UF +/-10%
C129	2113740A33	CAP CHIP 15 PF +/-5%
C130	2113740A33	CAP CHIP 15 PF +/-5%
C131	2311049A08	CAP FXD 1 UF +/-10%
C133	2311049A08	CAP FXD 1 UF +/-10%
C134	2113741B69	CAP CHIP 0.1 UF +/-5%
C136	2311049A08	CAP FXD 1 UF +/-10%
C137	2113741A13	CAP CHIP 470 PF +/-5%
C138	2113741A13	CAP CHIP 470 PF +/-5%
C139	2113741A13	CAP CHIP 470 PF +/-5%
C140	2113741A13	CAP CHIP 470 PF +/-5%
C143	2113741A13	CAP CHIP 470 PF +/-5%
C145	2113741A13	CAP CHIP 470 PF +/-5%
C146	2113741A13	CAP CHIP 470 PF +/-5%
C149	2113741A13	CAP CHIP 470 PF +/-5%
C150	2113741A13	CAP CHIP 470 PF +/-5%
C151	2113741A13	CAP CHIP 470 PF +/-5%
C152	2113741A13	CAP CHIP 470 PF +/-5%
C153	2113741A13	CAP CHIP 470 PF +/-5%
C154	2113741A13	CAP CHIP 470 PF +/-5%
C155	2113741A13	CAP CHIP 470 PF +/-5%
C156	2113741A13	CAP CHIP 470 PF +/-5%
C157	2113741A13	CAP CHIP 470 PF +/-5%
C158	2113741A13	CAP CHIP 470 PF +/-5%
C159	2311049A14	CAP FXD 4.7 UF +/-10%
C160	2311049A14	CAP FXD 4.7 UF +/-10%
C161	2311049A14	CAP FXD 4.7 UF +/-10%
C162	2380090M25	CAP AL EL 100 UF+/-20%
C163	2380090M25	CAP AL EL 100 UF+/-20%
C164	2311049A07	CAP FXD 1 UF +/-10%
C165	2113741A13	CAP CHIP 470 PF +/-5%
C166	2113741A13	CAP CHIP 470 PF +/-5%
C167	2113741A13	CAP CHIP 470 PF +/-5%
C168	2113741A13	CAP CHIP 470 PF +/-5%
C169	2113741A13	CAP CHIP 470 PF +/-5%
C170	2113741A13	CAP CHIP 470 PF +/-5%
C171	2113741A13	CAP CHIP 470 PF +/-5%
C172	2311049A08	CAP FXD 1 UF +/-10%
C173	2311049A08	CAP FXD 1 UF +/-10%
C174	2311049A08	CAP FXD 1 UF +/-10%
C175	2113740A63	CAP CHIP 220 PF +/-5%
C176	2113741B69	CAP CHIP 0. 1UF +/-5%
C200	2113740A43	CAP CHIP 39 PF +/-5%
C201	2113741A13	CAP CHIP 470 PF +/-5%
C203	2113741A13	CAP CHIP 470 PF +/-5%
C204	2113741A13	CAP CHIP 470 PF +/-5%
C205	2113741A13	CAP CHIP 470 PF +/-5%
C206	2113741A13	CAP CHIP 470 PF +/-5%
C207	2113741A13	CAP CHIP 470 PF +/-5%
C208	2113741A13	CAP CHIP 470 PF +/-5%
C209	2113741A13	CAP CHIP 470 PF +/-5%
C301	2113740A20	CAP CHIP 5.1 PF 0.25 PF+/-
C302	2113741B69	CAP CHIP 0.1 UF +/-5%
C303	2113741B69	CAP CHIP 0.1 UF +/-5%
C304	2113741A45	CAP CHIP 0.01 UF +/-5%
C305	2113741B69	CAP CHIP 0.1 UF +/-5%
C307	2113741A13	CAP CHIP 470 PF +/-5%
C308	2113741B69	CAP CHIP 0.1 UF +/-5%
C309	2113741B69	CAP CHIP 0.1 UF +/-5%
C310	2113741A13	CAP CHIP 470 PF +/-5%
C311	2113741B69	CAP CHIP 0.1 UF +/-5%
C312	2113740A20	CAP CHIP 5.1 PF 0.25 PF+/-
C313	2113740A79	CAP CHIP 1000 PF +/-5%
C314	2113741B69	CAP CHIP 0.1 UF +/-5%
C315	2113740A46	CAP CHIP 47 PF +/-5%
C316	2113741B69	CAP CHIP 0.1 UF +/-5%
C319	2113740A63	CAP CHIP 220 PF +/-5%
C320	2113741A13	CAP CHIP 470 PF +/-5%
C322	2113741A13	CAP CHIP 470 PF +/-5%
C323	2113741A13	CAP CHIP 470 PF +/-5%
C324	2113741A13	CAP CHIP 470 PF +/-5%
C325	2113741A13	CAP CHIP 470 PF +/-5%
C326	2113741A13	CAP CHIP 470 PF +/-5%
C327	2113741A13	CAP CHIP 470 PF +/-5%
C328	2113741A13	CAP CHIP 470 PF +/-5%
C501	2382174V01	CAP AL EL 4.7 UF +/-20%
C502	2382174V01	CAP AL EL 4.7 UF +/-20%
C503	2380090M07	CAP AL EL 47 UF +/-20%
C504	2113741A53	CAP CHIP 0.022UF +/-5%
C505	2113741B69	CAP CHIP 0.1 UF +/-5%
C506	2380090M22	CAP AL EL 4.7 UF +/-20%
C507	2380090M25	CAP AL EL 100 UF+/-20%
C508	2113741A53	CAP CHIP 0.022UF +/-5%
C509	2113740A24	CAP CHIP 6.8PF 0.25 PF+/-
C510	2113741B69	CAP CHIP 0.1 UF +/-5%
C511	2113741B69	CAP CHIP 0.1 UF +/-5%
C512	2113741B63	CAP CHIP 0.056UF +/-5%
C513	2113741B69	CAP CHIP 0.1 UF +/-5%
C514	2113740A43	CAP CHIP 39 PF +/-5%
C515	2311049A03	CAP FXD 0.22 UF +/ -10%
C516	2113740A43	CAP CHIP 39 PF +/-5%
C517	2113740A43	CAP CHIP 39 PF +/-5%
C518	2113741B69	CAP CHIP 0.1 UF +/-5%
C519	2113741B69	CAP CHIP 0.1 UF +/-5%
C520	2311049A03	CAP FXD 0.22 UF +/ -10%
C521	2113740A67	CAP CHIP 330 PF +/-5%
C522	2113743G21	CAP CHIP 1 UF +80% -20%
C523	2113740A55	CAP CHIP 100 PF +/-5%
C524	2113740A79	CAP CHIP 1000 PF +/-5%
C525	2113741B69	CAP CHIP 0.1 UF +/-5%

Ref. Des.	Part Number	Description
C526	2113741B69	CAP CHIP 0.1 UF +/-5%
C527	2113740A43	CAP CHIP 39 PF +/-5%
C528	2113740A79	CAP CHIP 1000 PF +/-5%
C529	2113741B69	CAP CHIP 0. 1UF +/-5%
C530	2311049A04	CAP FXD 0.33 UF +/-10%
C531	2113741B69	CAP CHIP 0.1 UF +/-5%
C532	2113741B69	CAP CHIP 0.1 UF +/-5%
C533	2113740A79	CAP CHIP 1000 PF +/-5%
C534	2113740A65	CAP CHIP 270 PF +/-5%
C535	2311049A14	CAP FXD 4.7 UF +/-10%
C536	2113741B69	CAP CHIP 0.1 UF +/-5%
C537	2113740A79	CAP CHIP 1000 PF +/-5%
C538	2113741B69	CAP CHIP 0.1 UF +/-5%
C539	2113740A55	CAP CHIP 100 PF +/-5%
C540	2113741A51	CAP CHIP 0.018 UF +/-5%
C541	2113740A79	CAP CHIP 1000 PF +/-5%
C542	2311049A21	CAP FXD 22 UF +/-10%
C543	2113740A65	CAP CHIP 270 PF +/-5%
C544	2311049A07	CAP FXD 1 UF +/-10%
C545	2113741B69	CAP CHIP 0.1 UF +/-5%
C546	2113741B69	CAP CHIP 0.1 UF +/-5%
C547	2113741B69	CAP CHIP 0.1 UF +/-5%
C548	2113741A13	CAP CHIP 470 PF +/-5%
C549	2113741A13	CAP CHIP 470 PF +/-5%
C550	2113741A13	CAP CHIP 470 PF +/-5%
C551	2113741A13	CAP CHIP 470 PF +/-5%
C552	2113741A13	CAP CHIP 470 PF +/-5%
C553	2113741A13	CAP CHIP 470 PF +/-5%
C554	2113741A13	CAP CHIP 470 PF +/-5%
C555	2113741A13	CAP CHIP 470 PF +/-5%
C556	2113741A13	CAP CHIP 470 PF +/-5%
C557	2113741A13	CAP CHIP 470 PF +/-5%

Ref. Des.	Part Number	Description
C558	2113741A13	CAP CHIP 470 PF +/-5%
C559	2113741B69	CAP CHIP 0.1 UF +/-5%
C560	2113741B69	CAP CHIP 0.1 UF +/-5%
C561	2113741B69	CAP CHIP 0.1 UF +/-5%
C562	2113741B69	CAP CHIP 0.1 UF +/-5%
C563	2311049A19	CAP FXD 10 UF +/-10%
C564	2113741A13	CAP CHIP 470 PF +/-5%
C565	2113741A13	CAP CHIP 470 PF +/-5%
C566	2113741B69	CAP CHIP 0.1 UF +/-5%
C601	2113740A55	CAP CHIP 100 PF +/-5%
C602	2113740A55	CAP CHIP 100 PF +/-5%
C603	2311049A03	CAP FXD 0.22 UF +/10%
C604	2311049A14	CAP FXD 4.7 UF +/-10%
C605	2113741A49	CAP CHIP 0.015 UF +/-5%
C606	2311049A19	CAP FXD 10 UF +/-10%
C607	2113741B69	CAP CHIP 0.1 UF +/-5%
C608	2113741B69	CAP CHIP 0.1 UF +/-5%
C615	2113741B69	CAP CHIP 0.1 UF +/-5%
C651	2113741B69	CAP CHIP 0.1 UF +/-5%
D1005	4813833C10	DIODE RECT MMBD6050L
D1007	4813833C10	DIODE RECT MMBD6050L
D1008	4813833C10	DIODE RECT MMBD6050L
D1012	4813833C10	DIODE RECT MMBD6050L
D1013	4813833C10	DIODE RECT MMBD6050L
D1017	4813833C10	DIODE RECT MMBD6050L
D1018	4813833C10	DIODE RECT MMBD6050L
D103	4813825A05	DIODE MXR MMBD301L
E1	8083545L04	SPKGAP 3P-4L1
E2	8083545L04	SPKGAP 3P-4L1
HY1	TFN6061A	HYBRID FLTR BANDPASS 2175
HY2	TFN6056A	HYBRID FLTR NOTCH 2175
J1	2882505T15	CONN HEADER 50 PIN

Ref. Des.	Part Number	Description
J11	2880004T02	CONN RECT HDR 1 ROW M 2 CONT
J13	0960113B01	JACK MOD 8 PIN MOUNT
J14	2880068M01	HDR MIC
J2	2882505T04	PLUG HEADER 34 CKT
J3	2882505T15	CONN HEADER 50 PIN
J4	2884324M07	CONN RECT HDR 1 ROW M 2 CONT
J5	2884324M08	CONN RECT HDR 1 ROW M 3 CONT
J6	2884324M09	CONN RECT HDR 1 ROW M 4 CONT
J8	2884324M08	CONN RECT HDR 1 ROW M 3 CONT
JU100	0662057B47	RES 0 OHM 5% 0.1 W
JU101	0662057B47	RES 0 OHM 5% 0.1 W
L101	2480289M16	COIL 22 UH
L300	2411087B36	COIL CHIP 6.8 UH
L301	2411087B36	COIL CHIP 6.8 UH
P101	2880001R03	CONN RECT HDR 1 ROW M 3 CONT
P102	2880001R03	CONN RECT HDR 1 ROW M 3 CONT
P103	2880001R03	CONN RECT HDR 1 ROW M 3 CONT
Q101	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q102	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q110	4813823A08	XSTR FET GP SS P DEPL TO –236AB
Q111	4813824A18	XSTR GEN PURPOSE SMALL SIG PNP MMBT4403L
Q113	4885316E11	XSTR FET GEN PURPOSE SMALL SIG N
Q114	4813822A07	XSTR BIP GP POWER BIPLR NPN MJD3450T4
Q115	4813822A07	XSTR BIP GP POWER BIPLR NPN MJD3450T4

Ref. Des.	Part Number	Description
Q116	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q117	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q118	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q200	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q201	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q202	4813824A18	XSTR GEN PURPOSE SMALL SIG PNP MMBT4403L
Q203	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q204	4813824A18	XSTR GEN PURPOSE SMALL SIG PNP MMBT4403L
Q205	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q306	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
Q307	4813824A10	XSTR GEN PURPOSE SMALL SIG NPN MMBT3904L
R101	0662057A73	RES 10K OHM 5% 0.063 W
R102	0662057A97	RES 100K OHM 5% O.063 W
R103	0662057A97	RES 100K OHM 5% O.063 W
R104	0662057A97	RES 100K OHM 5% O.063 W
R105	0662057A73	RES 10K OHM 5% 0.063 W
R106	0660076A93	RES 68K OHM 5% 0.125 W
R107	0660076A88	RES 43K OHM 5% 0.125 W
R108	0662057A97	RES 100K OHM 5% O.063 W
R109	0662057A75	RES 12K OHM5% 0.0625 W
R110	0662057A97	RES 100K OHM 5% O.063 W
R111	0662057A97	RES 100K OHM 5% O.063 W
R112	0662057B47	RES 0 OHM 5% 0.1 W
R113	0662057A73	RES 10K OHM 5% 0.063 W
R114	0662057A97	RES 100K OHM 5% O.063 W
R115	0662057A97	RES 100K OHM 5% O.063 W

Ref. Des.	Part Number	Description
R116	0662057A73	RES 10K OHM 5% 0.063 W
R117	0662057A73	RES 10K OHM 5% 0.063 W
R118	0662057A73	RES 10K OHM 5% 0.063 W
R119	0662057A73	RES 10K OHM 5% 0.063 W
R120	0660076A65	RES 4.7K OHM 5% 0.125 W
R121	0662057A97	RES 100K OHM 5% O.063 W
R122	0660079V49	RES 1M OHM 5% 0.125 W
R123	0662057A73	RES 10K OHM 5% 0.063 W
R124	0662057A89	RES 47K OHM 5% 0.063 W
R125	0660076A57	RES 2.2K OHM 5% 0.125 W
R127	0660076A61	RES 3.3K OHM 5% 0.125 W
R128	0660076A77	RES 15K OHM 5% 0.125 W
R129	0660076A71	RES 8.2K OHM 5% 0.125 W
R134	0662057A73	RES 10K OHM 5% 0.063 W
R135	0611072A31	RES 180 OHM 5% 0.25 W
R137	0660076A77	RES 15K OHM 5% 0.125 W
R138	0660076A09	RES 22 OHM 5% 0.125 W
R139	0660076A09	RES 22 OHM 5% 0.125 W
R140	0660076A09	RES 22 OHM 5% 0.125 W
R141	0660076A09	RES 22 OHM 5% 0.125 W
R145	0660076A01	RES 10 OHM 5% 0.125 W
R146	0611072A47	RES 820 OHM 5% 0.25 W
R148	0662057A97	RES 100K OHM 5% O.063 W
R154	0662057A73	RES 10K OHM 5% 0.063 W
R156	0662057A89	RES 47K OHM 5% 0.063 W
R157	0660076A95	RES 82K OHM 5% 0.125 W
R158	0662057A89	RES 47K OHM 5% 0.063 W
R159	0662057A89	RES 47K OHM 5% 0.063 W
R160	0662057A89	RES 47K OHM 5% 0.063 W
R161	0662057A89	RES 47K OHM 5% 0.063 W
R162	0662057A89	RES 47K OHM 5% 0.063 W
R163	0662057A89	RES 47K OHM 5% 0.063 W

Ref. Des.	Part Number	Description
R164	0662057A89	RES 47K OHM 5% 0.063 W
R165	0662057A89	RES 47K OHM 5% 0.063 W
R166	0662057A73	RES 10K OHM 5% 0.063 W
R167	0662057A73	RES 10K OHM 5% 0.063 W
R168	0660076E73	RES 10K OHM 1% 0.125 W
R169	0662057R46	RES 4.32K OHM 1% 0.1 W
R170	0660076E77	RES 15K OHM 1% 0.125 W
R171	0662057A97	RES 100K OHM 5% O.063 W
R172	0662057A97	RES 100K OHM 5% O.063 W
R173	0662057A97	RES 100K OHM 5% O.063 W
R174	0660076A77	RES 15K OHM 5% 0.125 W
R175	0662057A89	RES 47K OHM 5% 0.063 W
R176	0660076A01	RES 10 OHM 5% 0.125 W
R179	0662057A73	RES 10K OHM 5% 0.063 W
R180	0662057B22	RES 1M OHM 5% 0.0625 W
R181	0662057A73	RES 10K OHM 5% 0.063 W
R182	0680194M20	RES 62 OHM 5% 0.1 W
R183	0662057A73	RES 10K OHM 5% 0.063 W
R184	0662057A89	RES 47K OHM 5% 0.063 W
R185	0662057A73	RES 10K OHM 5% 0.063 W
R186	0662057A89	RES 47K OHM 5% 0.063 W
R187	0662057A73	RES 10K OHM 5% 0.063 W
R188	0662057A73	RES 10K OHM 5% 0.063 W
R189	0662057A65	RES 4.7K OHM 5% 0.063 W
R190	0662057A01	RES CF 10 OHM 5% 1W SM 0.0603 W
R191	0662057B10	RES 330K OHM 5% 0.0625 W
R192	0662057A97	RES 100K OHM 5% O.063 W
R193	1813905A14	POT 200K 20%
R194	0662057A73	RES 10K OHM 5% 0.063 W
R195	0662057A92	RES 62K OHM5% 0.0625 W
R197	0662057B47	RES 0 OHM 5% 0.1 W
R198	0662057A73	RES 10K OHM 5% 0.063 W

Ref. Des.	Part Number	Description
R199	0662057A73	RES 10K OHM 5% 0.063 W
R200	0660076A25	RES 100 OHM 5% 0.125 W
R201	0660076A25	RES 100 OHM 5% 0.125 W
R202	0662057A65	RES 4.7K OHM 5% 0.063 W
R203	0662057A65	RES 4.7K OHM 5% 0.063 W
R204	0662057A73	RES 10K OHM 5% 0.063 W
R205	0660076A93	RES 68K OHM 5% 0.125 W
R206	0662057A65	RES 4.7K OHM 5% 0.063 W
R207	0662057A68	RES 6.2K OHM 5% 0.0625 W
R208	0660076A25	RES 100 OHM 5% 0.125 W
R209	0662057A97	RES 100K OHM 5% O.063 W
R210	0662057A65	RES 4.7K OHM 5% 0.063 W
R211	0662057A65	RES 4.7K OHM 5% 0.063 W
R212	0662057A65	RES 4.7K OHM 5% 0.063 W
R213	0662057A65	RES 4.7K OHM 5% 0.063 W
R214	0660076A57	RES 2.2K OHM 5% 0.125 W
R215	0660076A25	RES 100 OHM 5% 0.125 W
R216	0662057A97	RES 100K OHM 5% O.063 W
R217	0662057A68	RES 6.2K OHM 5% 0.0625 W
R218	0662057A73	RES 10K OHM 5% 0.063 W
R220	0660076A80	RES 20K OHM 5% 0.125 W
R221	0662057A73	RES 10K OHM 5% 0.063 W
R301	0662057E50	RES 6.8K OHM 5% 0.1 W
R321	0662057A65	RES 4.7K OHM 5% 0.063 W
R322	0660076A77	RES 15K OHM 5% 0.125 W
R323	0660076A59	RES 2.7K OHM 5% 0.125 W
R501	0660076A51	RES 1.2K OHM 5% 0.125 W
R502	0660079V49	RES 1M OHM 5% 0.125 W
R503	0662057A73	RES 10K OHM 5% 0.063 W
R504	0660079L33	RES 200K OHM 1% 0.125 W
R505	0660079V49	RES 1M OHM 5% 0.125 W
R506	0660076B13	RES 330K OHM 5% 0.125 W

Ref. Des.	Part Number	Description
R507	0660079L33	RES 200K OHM 1% 0.125 W
R508	0660076A80	RES 20K OHM 5% 0.125 W
R509	0660076A63	RES 3.9K OHM 5% 0.125 W
R510	0660076A63	RES 3.9K OHM 5% 0.125 W
R511	0660076A47	RES 820 OHM 5% 0.125 W
R512	0662057A75	RES 12K OHM5% 0.0625 W
R513	0660076A80	RES 20K OHM 5% 0.125 W
R514	0660076A67	RES 5.6K OHM 5% 0.125 W
R515	0662057A75	RES 12K OHM5% 0.0625 W
R516	0662057A89	RES 47K OHM 5% 0.063 W
R517	0660078L01	RES 100K OHM 1% 0.125 W
R518	0660076A25	RES 100 OHM 5% 0.125 W
R519	0660078L01	RES 100K OHM 1% 0.125 W
R520	0660079L33	RES 200K OHM 1% 0.125 W
R521	0660079L33	RES 200K OHM 1% 0.125 W
R522	0660076A95	RES 82K OHM 5% 0.125 W
R523	0660076A49	RES 1K OHM 5% 0.125 W
R524	0660076A55	RES 1.8K OHM 5% 0.125 W
R525	0662057A97	RES 100K OHM 5% O.063 W
R526	0662057A97	RES 100K OHM 5% O.063 W
R527	0660076A61	RES 3.3K OHM 5% 0.125 W
R528	0660076A51	RES 1.2K OHM 5% 0.125 W
R529	1813905A14	POT 200K 20%
R530	0611072A22	RES 75 OHM 5% 0.25 W
R531	0660076A65	RES 4.7K OHM 5% 0.125 W
R532	0611072A22	RES 75 OHM 5% 0.25 W
R533	0660076A65	RES 4.7K OHM 5% 0.125 W
R534	0662057A89	RES 47K OHM 5% 0.063 W
R535	0660076A35	RES 270 OHM 5% 0.125 W
R536	0662057A89	RES 47K OHM 5% 0.063 W
R537	0662057A73	RES 10K OHM 5% 0.063 W
R538	0660076B17	RES 470K OHM 5% 0.125 W

Ref. Des.	Part Number	Description
R539	0662057A75	RES 12K OHM5% 0.0625 W
R540	0660076A65	RES 4.7K OHM 5% 0.125 W
R541	0611077G81	RES 84 5K OHM 1% 0.125 W
R542	0660076B11	RES 270K OHM 5% 0.125 W
R543	0611077G81	RES 84 5K OHM 1% 0.125 W
R544	0662057A73	RES 10K OHM 5% 0.063 W
R545	1813905A14	POT 200K 20%
R546	0662057A75	RES 12K OHM5% 0.0625 W
R547	0660076A80	RES 20K OHM 5% 0.125 W
R548	0660076B07	RES 180K OHM 5% 0.125 W
R549	0662057A75	RES 12K OHM5% 0.0625 W
R550	0662057A89	RES 47K OHM 5% 0.063 W
R551	0660079V49	RES 1M OHM 5% 0.125 W
R552	0660076A83	RES 27K OHM 5% 0.125 W
R553	0660076A83	RES 27K OHM 5% 0.125 W
R554	0660076B17	RES 470K OHM 5% 0.125 W
R555	0660076A83	RES 27K OHM 5% 0.125 W
R556	0662057A75	RES 12K OHM5% 0.0625 W
R557	0660076A67	RES 5.6K OHM 5% 0.125 W
R558	0660076A63	RES 3.9K OHM 5% 0.125 W
R559	0662057A75	RES 12K OHM5% 0.0625 W
R560	0662057A75	RES 12K OHM5% 0.0625 W
R561	0660076B07	RES 180K OHM 5% 0.125 W
R562	0662057A85	RES 33K OHM 5% 0.1 W
R563	0660076A61	RES 3.3K OHM 5% 0.125 W
R564	0660076B07	RES 180K OHM 5% 0.125 W
R565	0662057A73	RES 10K OHM 5% 0.063 W
R566	0660076A65	RES 4.7K OHM 5% 0.125 W
R567	0662057A73	RES 10K OHM 5% 0.063 W
R568	0660076B17	RES 470K OHM 5% 0.125 W
R569	1885848F01	RES POT 40K OHM 20%
R570	0662057B47	RES 0 OHM 5% 0.1 W

Ref. Des.	Part Number	Description
R571	0662057A76	RES 13K OHM 5% 0.1 W
R572	0662057A68	RES 6.2K OHM 5% 0.0625 W
R573	0662057A97	RES 100K OHM 5% O.063 W
R574	0662057A97	RES 100K OHM 5% O.063 W
R575	0662057B47	RES 0 OHM 5% 0.1 W
R576	0662057A85	RES 33K OHM 5% 0.1 W
R577	0662057A88	RES 43K OHM 5% 0.1 W
R578	0662057B47	RES 0 OHM 5% 0.1 W
R579	0662057A45	RES 680 OHM 5% 0.063 W
R601	0662057A97	RES 100K OHM 5% O.063 W
R604	0660076A45	RES 680 OHM 5% 0.125 W
R606	0660076A49	RES 1K OHM 5% 0.125 W
R607	0660076A43	RES 560 OHM 5% 0.125 W
R609	0660076A79	RES 18K OHM 5% 0.125 W
R610	0662057A97	RES 100K OHM 5% O.063 W
R615	0660076A55	RES 1.8K OHM 5% 0.125 W
S100	4083706T01	SW MECH DIP AND SLIDE SWITCH SPST
S101	4083706T01	SW MECH DIP AND SLIDE SWITCH SPST
SH1	2605425Z01	SHLD
SH2	2605455Z03	SHLD
SH3	2605887Z01	SHLD
SKT1	0984728L01	CONN HSG SKT CONN
SKT2	0984728L01	CONN HSG SKT CONN
SKT3	0984728L01	CONN HSG SKT CONN
T100	2584422T01	XFMR LINE ISOLATION TELEPHONE
T1610	2584422T01	XFMR LINE ISOLATION TELEPHONE
U100	5105109Z13	IC LNR MICROPOWER LOW DROPUT REGLTR W SH
U101	5113819A04	IC OP AMP 4 PER PKG SO-14
U102	5113818A01	IC OP AMP 2 PER PKG SO-8
U105	5113819A04	IC OP AMP 4 PER PKG SO-14

Ref. Des.	Part Number	Description
U106	5113819A04	IC OP AMP 4 PER PKG SO-14
U107	5105109Z14	IC PROG POT 2K OHM 10K OHM 50
U110	5113819A04	IC OP AMP 4 PER PKG SO-14
U111	5113819A04	IC OP AMP 4 PER PKG SO-14
U112	5113819A04	IC OP AMP 4 PER PKG SO-14
U113	5184704M90	IC CMOS 04M90 LEV SHIFTER
U114	5184704M60	IC MUX/DEMUX
U115	5185956E80	IC SW SM 04M52 QUAD SW
U116	5184704M60	IC MUX/DEMUX
U117	5113820A03	IC COMPTR SO14 4 PER PKG
U118	5184704M90	IC CMOS 04M90 LEV SHIFTER
U121	5113805A01	IC NAND 4 PER PKG SOIC14
U122	5113805A09	IC INVTR 6 PER PKG SOIC14
U123	5171439H01	IC 68HC11
U124	5113805A91	IC BFR 8 PER PKG 3ST SOIC20
U125	5105625U57	IC CNTLR SCN2681 DUART
U126	5105625U79	IC 128 KX8 FLSH ROM
U127	5164852H75	IC CNTR BIN SYNC
U129	5113805A18	IC F-F/D 2 PER PKG SOIC14
U130	5113805A02	IC NOR 4 PER PKG SOIC14
U132	5185130C06	IC 5 V REG W/RESET CS-8126-1T5
U133	5113811A11	IC RS-232-C DVR/RCVR SNGL SUP
VR100	4880140L25	DIODE ZEN MMBZ 5250 20 V
VR101	4880140L06	DIODE ZEN MMBZ5231 SM SOT-23 5.1 V 20 A 5.1 V
VR103	4880140L07	DIODE SOT ZEN 5.6 V
VR104	4880140L07	DIODE SOT ZEN 5.6 V
VR105	4880140L07	DIODE SOT ZEN 5.6 V
VR106	4880140L07	DIODE SOT ZEN 5.6 V
VR107	4880140L20	DIODE ZEN SOT 15 V
VR108	4880140L20	DIODE ZEN SOT 15 V

Ref. Des.	Part Number	Description
VR110	4880140L07	DIODE SOT ZEN 5.6 V
VR112	4880140L07	DIODE SOT ZEN 5.6 V
VR113	4880140L07	DIODE SOT ZEN 5.6 V
VR114	4880140L07	DIODE SOT ZEN 5.6 V
VR115	4880140L20	DIODE ZEN SOT 15 V
VR119	4880140L20	DIODE ZEN SOT 15 V
VR120	4880140L20	DIODE ZEN SOT 15 V
VR121	4880140L07	DIODE SOT ZEN 5.6 V
VR122	4880140L07	DIODE SOT ZEN 5.6 V
VR123	4880140L07	DIODE SOT ZEN 5.6 V
VR125	4880140L20	DIODE ZEN SOT 15 V
VR126	4880140L07	DIODE SOT ZEN 5.6 V
VR127	4880140L07	DIODE SOT ZEN 5.6 V
VR128	4813832C28	DIODE TRANSIENT SUPPRESSER MMBZ15VDL
VR129	4813832C28	DIODE TRANSIENT SUPPRESSER MMBZ15VDL
VR130	4813832C28	DIODE TRANSIENT SUPPRESSER MMBZ15VDL
VR131	4813832C28	DIODE TRANSIENT SUPPRESSER MMBZ15VDL
VR501	4813832A46	DIODE TRANSIENT SUPPRESSER P6SMB56AT3 56 V
VR502	4813832A46	DIODE TRANSIENT SUPPRESSER P6SMB56AT3 56 V
Y101	4805574W03	OSC XTAL 7.95 MHz CLK OSC REF
Y301	4805574W04	OSC XTAL 3.69 MHz CLK OSC REF

Appendix A Cross Patch Configuration

A.1 General Description

The Cross Patch provides interoperability between two systems on different bands, analog or digital or trunking. An interface cable can be built to allow the interconnection of two Consolette stations to form a repeater system. The information received by Consolette 1 will be retransmitted or repeated by Consolette 2. Similarly, information received by Consolette 2 will be retransmitted on Consolette 1. The system is a first come, first served system in that one station does not have priority over the other. Moreover, the Consolettes must be located in different frequency bands to prevent RF interference from occurring from one Consolette to another.

A.2 Detailed Description

To enable Cross Patch operation between two Consolettes, build the cable shown in the Cross Patch Cable diagram below and connect each dB-25 connector to Accessory Connector 2 of the two Consolettes. If you wish to have the option of enabling/disabling Cross Patch operation, you must include an in-line switch (or switches) to open and close the connection between SPKR_UNMUTE and PTT, along with the connection between RX+(LINE1+)† and AUX_TX_AUD. To disable the Cross Patch, the connection between SPKR_UNMUTE and PTT must be open. This will prevent the Consolette that is receiving information from keying the Consolette it is connected to. In addition, the connection between RX+(LINE1+)† and AUX_TX_AUD must also be switched open to prevent received audio from one Consolette unintentionally mixing into the connected Consolette's Record, VU meter, and/or Microphone audio paths.

The PTT for Consolette 2 is derived from the SPKR_UNMUTE signal of Consolette 1 which is active when Consolette 1 is receiving information. RX audio from Consolette 1 is routed to the TX Audio of Consolette 2. Adjusting the potentiometer (R244 on AIB, R193 on TRC) on the TX Audio path of Consolette 2 will enable the user to match the receiver audio output sensitivity of Consolette 1. The behavior of the audio path from Consolette 2 to Consolette 1 is identical to the Consolette 1 to Consolette 2 path just described.

NOTE: In this configuration, the SPKR_UNMUTE jumper (J15 on AIB, P102 on TRC) should be placed for active low operation. (See Table 2-2 on page 2-5 for AIB and Table 2-5 on page 2-7 for TRC jumper location.)

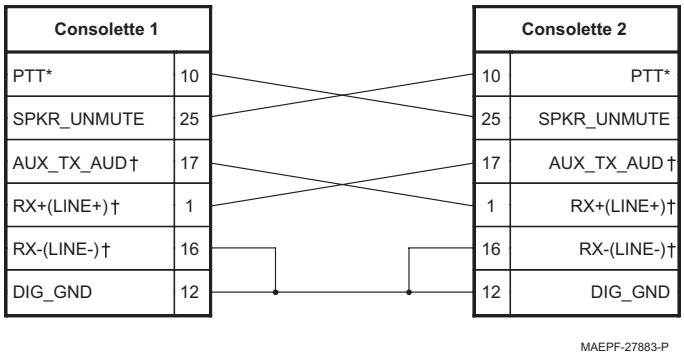


Figure A-1. Cross Patch Cable

NOTE: * Denotes active low signal
† Denotes TRC signal name

A.3 Level Settings

A.3.1 Consolette 1 to Consolette 2 Path

1. Adjust the receive audio path individually on both Consolette 1 and Consolette 2 prior to connecting together in a Cross Patch configuration. See sections “AIB Adjustment Procedure - Receive” and “TRC Adjustment Procedure - Receive” of this manual.
2. Connect Consolette 1 to Consolette 2 via the cable described above.
3. Connect a signal generator or communications analyzer to Consolette 1.
4. Connect Consolette 2 to a modulation analyzer or communications analyzer. Set the analyzer up to measure deviation level.
5. Apply a –47 dBm on channel RF signal modulated with a 1 kHz tone at 60% FSD into Consolette 1. Consolette 1 will now be receiving and Consolette 2 will be transmitting.
6. Adjust the TX Audio path potentiometer (R244 on AIB, R193 on TRC) on Consolette 2 until 60% FSD is obtained on the Consolette 2 modulation analyzer or communications analyzer.
7. Turn off the –47 dBm RF signal.

A.3.2 Consolette 2 to Consolette 1 Path

1. Adjust the receive audio path individually on both Consolette 1 and Consolette 2 prior to connecting together in a Cross Patch configuration. See sections “AIB Adjustment Procedure - Receive” and “TRC Adjustment Procedure - Receive” of this manual.
2. Connect Consolette 2 to Consolette 1 via the cable described above.
3. Connect a signal generator or communications analyzer to Consolette 2.
4. Connect Consolette 1 to a modulation analyzer or communications analyzer. Set the analyzer up to measure deviation level.
5. Apply a –47 dBm on channel RF signal modulated with a 1 kHz tone at 60% FSD into Consolette 2. Consolette 2 will now be receiving and Consolette 1 will be transmitting.
6. Adjust the TX Audio path potentiometer (R244 on AIB, R193 on TRC) on Consolette 1 until 60% FSD is obtained on the Consolette 1 modulation analyzer or communications analyzer.
7. Turn off the –47 dBm RF signal.

A.4 Radio-Wide Changes Using CPS

The Cross Patch uses the SPKR_UNMUTE signal from Consolette 1 as a PTT signal to PTT Consolette 2. Furthermore, the SPKR_UNMUTE signal is derived from voltage changes on the speaker leads. The speaker voltage changes if voice audio is present or if alert tones are present. Therefore, **all the Alert Tones should be turned OFF** using CPS. This will prevent unintended mobile PTTs. For example, if TX Clear Alert Tones are enabled, when Consolette 1 receives a signal, it PTTs Consolette 2. This sends an alert tone to Consolette 2's speaker, which then causes Consolette 1 to transmit, etc., causing cyclical keying and unkeying of both Consolettes.

To disable the Alert Tones, disable the following fields in CPS:

1. Radio Configuration Radio Wide → Alert Tones
   Alert Tones Disabled
   Power Up Self Test Alert Tone Disabled
2. Radio Configuration → Secure → Secure Configuration → Advanced

NOTE: These fields will be active only if the “Secure Hardware Equipped” field is enabled in the Radio Configuration → Secure → Secure Configuration → General section.
Tx Clear Alert Tones Disabled
Periodic Keyfail Alert Tone Disabled


Caution

When using the Cross Patch, you may exceed the duty cycle rating of the Consolette. If this condition is expected, the customer may want to reduce the RF power output of the Consolette.

A.5 Audio Degradation Issues

The Consolette Cross Patch Interface is a base band audio interface that can be used to interconnect the following:

- Analog to Analog systems
- Digital to Analog systems
- Analog to Digital systems
- Digital to Digital systems

Analog to analog patch systems should experience no audio degradation since there are no vocoders in the system. The audio will not be degraded in the digital to analog or analog to digital patches since the voice audio is only vocoded once. The digital to digital patches will experience degraded audio. The repeated voice will not be as intelligible as the original digital audio. The voice audio that passes through the patch is vocoded twice, and therefore isn't quite as sharp as the original. The small artifacts of the first vocoding are amplified and added to by the second vocoding. The net result is voice that isn't as intelligible as the high quality first vocoding. The voice has some audio aberrations, but mainly it's harder to understand what is being said. The degree of intelligibility loss varies with the type of vocoder. Field experience has shown that VSELP is affected more than IMBE, but both are degraded from the original message.

Notes

Appendix B Replacement Parts Ordering

B.1 Basic Ordering Information

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Crystal orders should specify the crystal type number, crystal and carrier frequency, and the model number in which the part is used.

B.2 Motorola Online

Motorola Online users can access our online catalog at

https://www.motorola.com/businessonline

To register for online access, please call 800-814-0601 (for U.S. and Canada Service Centers only). International customers can obtain assistance at https://businessonline.motorola.com.

B.3 Mail Orders

Send written orders to the following addresses:

Replacement Parts/ Test Equipment/Manuals/ Crystal Service Items

Motorola Inc.
Radio Products and Services Division*
Attention: Order Processing
2200 Galvin Drive
Elgin, IL 60123
U.S.A.

Federal Government Orders:

Motorola Inc.
U.S. Federal Government Markets Division
Attention: Order Processing
7230 Parkway Drive
Landover, MD 21076
U.S.A.

International Orders:

Motorola Inc.
Radio Products and Services Division*
Attention: Order Processing
2200 Galvin Drive
Elgin, IL 60123
U.S.A.

* The Radio Products and Services Division (RPSD) was formerly known as the Customer Care and Services Division (CCSD) and/or the Accessories and Aftermarket Division (AAD).

B.4 Telephone Orders

Radio Products and Services Division*
(United States and Canada)
7:00 AM to 7:00 PM (Central Standard Time)
Monday through Friday (Chicago, U.S.A.)
1-800-422-4210
1-847-538-8023 (International Orders)

U.S. Federal Government Markets Division (USFGMD)
1-800-826-1913 Federal Government Parts - Credit Cards Only
8:30 AM to 5:00 PM (Eastern Standard Time)

B.5 Fax Orders

Radio Products and Services Division*
(United States and Canada)
1-800-622-6210
1-847-576-3023 (International)

USFGMD
(Federal Government Orders)
1-800-526-8641 (For Parts and Equipment Purchase Orders)

B.6 Parts Identification

Radio Products and Services Division*
(United States and Canada)
1-800-422-4210, menu 3

B.7 Product Customer Service

Customer Response Center
(Non-technical Issues)
1-800-247-2346
FAX:1-800-247-2347

* The Radio Products and Services Division (RPSD) was formerly known as the Customer Care and Services Division (CCSD) and/or the Accessories and Aftermarket Division (AAD).

Index

Numerics

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W

Motorola, Inc.
8000 West Sunrise Boulevard
Ft. Lauderdale, FL 33322

6881098C21-P