APX™ TWO-WAY RADIOS

APX 7500 MULTI-BAND CONSOLETTE DETAILED SERVICE MANUAL

Foreword

The information contained in this manual relates to all APX™ 7500 Multi-Band Consolettes, unless otherwise specified. This manual provides sufficient information to instruct a user on how to use the product and to enable service shop personnel to troubleshoot and repair an APX 7500 Consolette to the component level.

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.**

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.

Before operating an APX 7500 Consolette, please read the “Consolette Installation Guidelines,” on page xiii in the front of this manual.

Declaration of Conformity

This declaration is applicable to your radio only if your radio is labeled with the FCC logo shown below.
Per FCC CFR 47 Part 2 Section 2.1077(a)

Responsible Party
Name: Motorola Solutions, Inc.

Address: Motorola Solutions, Inc. 1301 E. Algonquin Rd.Schaumburg, IL60196-1078, U.S.A.
Phone Number: 1-800-927-2744

Hereby declares that the product:
Model Name: **APX 7500 Consolette**
conforms to the following regulations:
FCC Part 15, subpart B, section 15.107(a), 15.107(d) and section 15.109(a)

Class B Digital Device
As a personal computer peripheral, this device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

Javascript spin control element courtesy of Switch on the Code, used under terms of license at http://www.switchonthecode.com/license.

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 reliability, 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, MOTO, MOTOROLA SOLUTIONS and the Stylized M logo are trademarks or registered trademarks of Motorola Trademark Holdings, LLC and are used under license. All other trademarks are the property of their respective owners.

Notes

Table of Contents

List of Figures

List of Tables

Related Publications

APX 7500 Mobile Radio with O5 Control Head User's Guide 6875947M01
APX 7500 Mobile Radio Installation Manual 6878215A01
APX 7500 Mobile Radio Basic Service Manual....6875964M01
APX 7500 Mobile Radio Detailed Service Manual 6875963M01
KVL 4000 User's Guide.... 6871018P37

Consolette Installation Guidelines

RF Operational Characteristics

Your APX™ 7500 Multi-Band Consolettes 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 it 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 7, “Surge Protective Devices” 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 4, “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).

Caution

All RF cables’ outer shields must be grounded per Motorola R56 requirements.

Caution

All RF cables shall be connected to a surge protection device according to Motorola R56 documents. Do not connect Tx and Rx RF cables directly to outside antenna.

General Electrostatic Discharge Recommendations

Electronic components, such as circuit boards and memory modules, can be extremely sensitive to electrostatic discharge (ESD). Motorola recommends that an antistatic wrist strap and a conductive foam pad be used when installing or upgrading the system.

If an ESD station is not available, wear an antistatic wrist strap. Wrap the strap around the wrist and attach the ground end (usually a piece of copper foil or an alligator clip) to an electrical ground. An electrical ground can be a piece of metal that literally runs into the ground (such as an unpainted metal pipe) or the metal part of a grounded electrical appliance. An appliance is grounded if it has a three-prong plug and is plugged into a three-prong grounded outlet.

NOTE: Do not use a computer as a ground, because it is not plugged in during installation.

APX™ 7500 Multi-Band Consolettes Model Chart

MODEL NUMBER	DESCRIPTION
	L30URS9PW1_N
	L30KSS9PW1_N
	L30SSS9PW1_N
	L30QSS9PW1_N
	L30TSS9PW1_N (7/800/VHF) with GA00244_ and GA00308_ or GA00225_ and GA00306_
	L30TSS9PW1_N (7/800/U1) with GA00244_ and GA00343_ or GA00341_ and GA00225_
	L30TSS9PW1_N (7/800/U2) with GA00244_ and GA00346_ or GA00345_ and GA00225_
	L30TSS9PW1_N (VHF/U1) with GA00306_ and GA00343_ or GA00341_ and GA00308_
	L30TSS9PW1_N (VHF/U2) with GA00306_ and GA00346_ or GA00345_ and GA00308_
	L30TSS9PW1_N (U1/U2) with GA00341_ and GA00346_ or GA00345_ and GA00343_
	L999_ (Full Featured Front Panel)
	L998_ (Limited Front Panel)
	CA01598_ AC Line Cord North America
	CA01600_ AC Line Cord BS1363 Plug UK
	W382_ Paddle Mic
	CA01942_ DC Cable with Fuse Option
	CA01602_ AC Line Cord AS3112 Plug Australia Selection

ITEM NUMBER	DESCRIPTION
MHUF1298	Transceiver (7/800MHz)
MHUD1800	Transceiver (VHF)
MHUE2217	Transceiver (UHF R2)
MHUE2207	Transceiver (UHF R1)
MHUR1004	Transceiver (7/800 and VHF)
MHUS1008	Transceiver (7/800 and U1)
MHUS1006	Transceiver (7/800 and U2)
MHUT1008	Transceiver (U1 and VHF)
MHUT1010	Transceiver (U2 and VHF)
MHUE1002	Transceiver (U1 and U2)
3085702C05	RF coax cable w/nuts - long
3085702C06	RF coax cable w/nuts - short
38009016001	RF port plug (for unused RF port if single band)
2771969H01	Chassis
5971984H01	Fan Bracket Assembly
PPLN1690_	High Speed board tanapa
PPLN1691_	Low Speed board tanapa
0310909A45	SCRMCH M3.5X0.6X8 STARPAN STLZNC
HKN6219_	Main to LS/HS flex cable assembly
0971989H01	Audio jack assembly
0275387H01	Audio jack nut, hex

X	X	X	X	X	X	X	X	X	X								0310907B08	Star screw, 5mm
X	X	X	X	X	X	X	X	X	X								HPN4010_	Power supply
X	X	X	X	X	X	X	X	X	X								0271853N01	Nut, M4
X	X	X	X	X	X	X	X	X	X								3075385H01	Mobile to power supply extension cable
X	X	X	X	X	X	X	X	X	X								0771973H01	Mobile bracket
X	X	X	X	X	X	X	X	X	X								0310909C93	Screw, M6 mobile
X	X	X	X	X	X	X	X	X	X								0300140472	Screw for DB25 connector on mobile
X	X	X	X	X	X	X	X	X	X								7575388H01	Thermal pad
X	X	X	X	X	X	X	X	X	X								PPLN1696_	Main board tanapa
X	X	X	X	X	X	X	X	X	X								6005449Y01	Coin battery
X	X	X	X	X	X	X	X	X	X								3071994H01	Main to Mobile CAN cable
X	X	X	X	X	X	X	X	X	X								3071993H01	Main to Mobile Ribbon cable
X	X	X	X	X	X	X	X	X	X								1571968H01	Top Cover
X	X	X	X	X	X	X	X	X	X								6881095C99	Safety Manual
X	X	X	X	X	X	X	X	X	X								NNTN8200_	Consolette Instruction Manual CDROM
X	X	X	X	X	X	X	X	X	X								HBN5097_	Packaging Kit
X	X	X	X	X	X	X	X	X	X								28009234001	14-pin terminal connector
X	X	X	X	X	X	X	X	X	X								PMUN1038_	APX7500 Consolette STANDARD TIB MP
X	X	X	X	X	X	X	X	X	X								HKN6205_	REMOTE FLEX KIT
X	X	X	X	X	X	X	X	X	X								0364332H02	SCREW ASSY, SEALING
X	X	X	X	X	X	X	X	X	X								3264059H01	SEAL, OVERMOLDED FRAME
										X							PHHN1010_	Front panel tanapa (Full feature)
										X							PHCN4000_	O5 control head front
										X							HKN6191_	O5 flex
										X							HLN1468_	O5 control head back
										X							0364332H02	O5 screws
										X							0310907B08	Star screw, 5mm
										X							3071998H01	O5 to Main power cable
										X							3071990H01	O5 to Mobile CAN cable
										X							HKN6221_	Keyboard flex cable assembly
										X							PMLN5336_	O5 User's Guide
										X	X						HKN6220_	Display flex cable assembly
										X	X						3075313H01	GCAI adaptor cable
											X						PHHN1009_	Front panel tanapa (Limited)
												X					3082933N08	North America power cord
													X				3082933N29	UK style cord
														X			RMN5070_	GCAI Paddlemic
															X		3085059D05	DC battery cable with fuse
																X	HKN6233	Mounting Tray Hardware Kit
																	HKN6184_	USB GCAI programming/data cable (optional)
																	HKN6183_	RS232 GCAI programming/data cable (optional)
															X		3082933N27	Australia style cord

Key: X = Item Included

APX™ 7500 Multi-Band Consolettes

Transmitter Specification

	700 MHz	800 MHz	VHF	UHF R1	UHF R2
Frequency Range/ Bandsplits	764-776 MHz 794-806 MHz	806-824 MHz 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing	25/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz	25/12.5 kHz	25/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj*	10-30 Watts	10-35 Watts	10-50 Watts	10-40 Watts	10-45 Watts (450-485 MHz) 10-40 Watts (485-512 MHz) 10-25 Watts (512-520 MHz)
Frequency Stability (–30°C to +60°C; +25°C Ref.)	±0.00015 %	±0.00015 %	±0.0002 %	±0.0002 %	±0.0002 %
Modultion Limiting	±5 kHz/±2.5 kHz	±5 kHz/±4 kHz (NPSPAC) /±2.5 kHz	±5 kHz/±2.5 kHz	±5 kHz/±2.5 kHz	±5 kHz/±2.5 kHz
Modulation Fidelity (C4FM) 12.5kHz Digital Channel	±2.8 kHz	±2.8 kHz	±2.8 kHz	±2.8 kHz	±2.8 kHz
Emissions	Conducted+|Radiated+ –70/–85 dBc | –20/–40 dBm	Conducted+|Radiated+ –70 dBc | –20 dBm	Conducted+|Radiated+ –85 dBc | –20 dBm	Conducted+|Radiated+ –85 dBc | –20 dBm	Conducted+|Radiated+ –85 dBc | –20 dBm
Audio Response	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)
FM Hum & Noise (25 & 20 KHz/12.5 KHz)	40/34 dB	40/34 dB	50/40 dB	45/40 dB	45/40 dB
Audio Distortion	2%	2%	2%	2%	2%

Receiver Specification

		700 MHz	800 MHz	VHF	UHF R1	UHF R2
Frequency Range/Bandsplits		700 MHz 764-776	800 MHz 851-870 MHz	VHF 136-174 MHz	UHF R1 380-470 MHz	UHF R2 450-520 MHz
Channel Spacing		25/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz	25/12.5 kHz	25/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at 3% distortion		2.5W++	2.5W++	2.5W++	2.5W++	2.5W++
Frequency Stability (–30°C to +60°C; +25°C Ref.)		±0.00015 %	±0.00015 %	±0.0002 %	±0.0002 %	±0.0002 %
				Pre-Amp|Standard	Pre-Amp|Standard	Pre-Amp|Standard
Analog Sensitivity	12 dB SINAD	0.25 µV	0.25 µV	0.2 µV | 0.3 µV	0.2 µV | 0.3 µV	0.2 µV | 0.3 µV
Digital Sensitivity	1% BER	0.3 µV	0.3 µV	0.25 µV | 0.25 µV	0.25 µV | 0.4 µV	0.25 µV | 0.4 µV
	5% BER	0.25 µV	0.25 µV	0.2 µV | 0.2 µV	0.2 µV | 0.3 µV	0.2 µV | 0.3 µV
Intermodulation		80 dB	80 dB	80 dB | 85 dB	80 dB | 85 dB	80 dB | 85 dB
Spurious Rejection		90 dB	90 dB	90 dB	90 dB	90 dB
Audio Distortion at rated		3.00%	3.00%	3.00%	3.00%	3.00%
Selectivity	25 kHz	80 dB	80 dB	-	82 dB	82 dB
	12.5 kHz	65 dB	65 dB	70 dB	70 dB	70 dB
	30 kHz	-	-	90 dB	-	-

Power and Battery Specification

Minimum RF Power Output	10-35 Watts (764-870 MHz), 10-50 Watts (136-174 MHz), 10-40 Watts (380-470 MHz), 10-45 Watts (450-485 MHz), 10-40 Watts (485-512 MHz), 10-25 Watts (512-520 MHz)
AC Operation	110 to 220VAC 50-60Hz
AC Surge Spec	EN6100-4-5 Level 5
DC Operation	13.8VDC ±20% Negative Ground
Standby at 13.8V	0.85A (764-870 MHz), 0.85A (136-174 MHz), 0.85A (380-470 MHz), 0.85A (450-520 MHz)
Receive Current at Rated Audio at 13.8V	1.5A (764-870 MHz), 1.5A (136-174 MHz), 1.5A (380-470 MHz), 1.5A (450-520 MHz)
Transmit Current (A) at Rated Power	136-174 MHz (10-50 Watts) 13A (50W) 8A (15W) 380-470 MHz (10-40 Watts) 11A (40W) 8A (15W) 450-520 MHz (10-45 Watts) 11A (45W) 8A (15W) 764-870 MHz (10-35 Watts) 12A (35W) 8A (15W)

Regulatory Certifications

FCC Part 90
FCC Part 15, Class B
FCC Part 68/TIA968 -A
UL and CSA approval (UL60950)

Environmental Specification

Operating Temperature	–30°C /+60°C
Storage Temperature	–40°C /+85°C
Humidity	95% relative humidity
ESD	IEC 61000-4-2
Duty Cycle	EIA/TIA Intermittent Duty Cycle

FCC Certification ID

FCC ID	Model/ IC Model Number	IC Designation	Band and Power Level	RF Band Combination
AZ492FT3824	L30KSS9PW1AN	109U-92FT3824	10-50 Watts (136-174 MHz)	VHF
AZ492FT4894	L30QSS9PW1AN	109U-92FT4894	10-40 Watts (380-470 MHz)	U1
AZ492FT4895	L30TSS9PW1AN L_MHUT1008A	109U-92FT4895	10-50 Watts (136-174 MHz) and 10-40 Watts (380-470 MHz)	VHF/U1
AZ492FT4896	L30SSS9PW1AN	109U-92FT4896	10-45 Watts (450-520 MHz)	U2
AZ492FT5858	L30URS9PW1AN	109U-92FT5858	10-35 Watt (764-870 MHz)	7/800 MHz
AZ492FT7037	L30TSS9PW1AN	109U-92FT7037	10-50 Watts (136-174 MHz) and 10-35 Watt (764-870 MHz)	7/800/VHF
AZ492FT7043	L30TSS9PW1AN L_MHUS1008A	109U-92FT7043	10-40 Watts (380-470 MHz) and 10-35 Watts (764-870 MHz)	7/800/U1
AZ492FT7044	L30TSS9PW1AN L_MHUS1006A	109U-92FT7044	10-45 Watts (450-520 MHz) and 10-35 Watts (764-870 MHz)	7/800/U2
AZ492FT7047	L30TSS9PW1AN L_MHUT1010A	109U-92FT7047	10-50 Watts (136-174 MHz) and 10-45 Watts (450-520 MHz)	VHF/U2

General

Limited Front Panel Configuration (Dimension)	16” x 18.1” x 4.2” (406 x 460 x 107mm)
Full Feature Front Panel Configuration (Dimension)	16" x 18.75" x 4.2" (406 x 476 x 107mm)
Limited Front Panel Configuration (Weight)	18.5 lbs (8.4 kg)
Full Feature Front Panel Configuration (Weight)	19.5 lbs (8.9 kg)

Others

Wireline Specification	
Wireline Configuration	2-wire or 4-wire capable; 600ohm or bridging impedances.
Guard Tones	2175Hz(Default), 2100Hz, 2300Hz and 2325Hz.
Function Tones	450Hz - 2050Hz in 100Hz increments.
Tone Tolerence	±10Hz
Range of detection	-30dBm to +13dBm
Wireline Connector	RJ45
Wireline Surge	TIA-968-A, Section 4.2.2 **Type A Surge Metallic:** A peak voltage of at least 800V and a peak short circuit current of at least 100A. **Type A Surge Longitudinal:** A peak voltage of at least 1500V and a peak short circuit current of at least 200A.

ACIM Specification	
ACIM Signal Levels	RS232; 2-wire operation only
ACIM Connector Type	RJ45

USB Specifications	
USB Connector Type	Type A (Host), Type B (Device)
Data Rate	USB 1.1 Full Speed Compliant
Allowable Accessories	See Target Peripheral List

E&M Specifications	
Input	Qty 1, for PTT, active LOW
Input Rating	5.5V, 12mA MAX
Relay Output	Qty 1, follows channel activity.
Relay Output Type	Form A, SPST, normally open solid state relay, 350V, 120 mA MAX.
E&M Connector	DB25

LAN Specifications	
Bandwidth	10/100-Base-T

VIP Specifications	
Input Rating	5.5V, 12mA MAX
Output Rating	Open Drain N-channel FET, 28V, 150mA MAX
VIP Connector Type	14-pin terminal connector, adapter connector shipped with unit.

Crosspatch Specifications	
Crosspatch Connector Type	RJ45

Recorder Specifications	
Recorder Connector Type	RJ45
Recorder Configurations	Off, Receive, Receive and Transmit
Recorder Activity Output	Open Drain N-channel FET, 28V, 150mA MAX

Chapter 1 Introduction and Ordering

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 Welcome to APX™ 7500 Multi-Band Consolette

The Motorola APX™ 7500 Multi-Band Consolette is the next generation Consolette design that incorporates the APX 7500 mobile transceiver and the O5 control head to complement Motorola's APCO PHASE II dual band product line. The Consolette will continue to be a key device in many Motorola voice systems offering a low cost RF control station solution to customers that are within a communication system and want a wireless dispatch solution. The Consolette is also used as an emergency backup station when the infrastructure is off-line, as a low cost dispatch center for federal, state and local agencies, and as a fire station alerting system.

The APX 7500 Consolette is available in the 7/800MHz, VHF, UHF R1, and UHF R2 bands (mid power models only). Configurations include both the limited front panel and the full featured front panel (contains the O5 control head). Rear panel interfaces include: Tone Remote Control (TRC), ACIM, and E&M (Ear and Mouth) for interfacing to remote consoles and desksets such as the MC2000, the MCC5500, Gold Series Elite Console, and the MCC7500.

All models are equipped with an internal AC-to-DC power supply and support Battery Revert operation. Additionally there is an auxiliary display with corresponding soft menus and status indications for support of a VU Meter and Clock.

In addition to the above mentioned functionality, the APX 7500 Consolette supports the following functionality via its rear panel: recorder interface, connection for up to 2 headsets, interface for connection of an external PA, connection for a second speaker, and a crosspatch interface.

This manual describes the installation, operation, and maintenance of the APX 7500 Consolette. Refer to page xv of this manual for the model/option chart and the performance specifications beginning on page xvii. For additional information about the APX 7500 radio, refer to the APX 7500 radio user's guide (6875947M01) and service manual (6881096C74).

1.3 Options

Refer to the price pages or the system planner for detailed ordering information.

The APX Consolette is offered in two configurations:

A. **L999_**: with a full featured front panel containing an O5 control head, a numeric keypad, an auxiliary display for Clock and VU Meter functionality.

B. **L998_**: with a limited front panel containing only the auxiliary display for Clock and VU Meter functionality.

Both of these configurations provide TRC, ACIM, and E&M remote control operation.

Additionally there are the following orderable options:

A. **GA00469_** – Extended Dispatch Functionality, a software option that enables advanced functionality via the ACIM interface on ASTRO P25 and MDC Conventional channels. Advanced functionality includes:

-Emergency Alarm ACK Encode

-Status Update Decode

-Message Update Decode

-Status Request Encode

-Radio Enable/Disable Encode

-Radio Check Encode

-Remote Monitor Encode

B. **CA01598_** – Adds an AC power cord with connector style for operation in North America (3082933N08).

C. **CA01600_** – AC Line Cord BS1363 Plug UK.

D. **CA01602_** – AC Line Cord AS3112 Plug Australia Selection.

E. **W382AM** – Adds the desktop style microphone (RMN5070).

F. **CA01942_** – Adds a DC Cable with 20 amp fuse for use with DC operation or battery backup operation (3085059D05).

Refer to section 4.12.3.3 for more information on the Extended Dispatch Functionality features.

1.4 Auxiliary Equipment

1.4.1 Accessories

The following is a list of accessories supported by the APX Consolette:

i. GCAI Paddlemic - RMN5070_

ii. External Speaker - HSN4018_

iii. Rack Mount Tray - HKN6233_

iv. Headset Jack Box - FHN7470_

NOTE: The FHN7470_ Headset Jack Box kit includes cable kit (FKN8694_) which is incompatible with the Consolette. This cable must be modified or replaced with a customer supplied 1-to-1 cable between the Jack Box and Consolette Rear Panel Heaset connector.

v. Headset Amplifier Module Base with PTT switch - CDN6281

vi. USB GCAI programming/data cable - HKN6184_

vii. RS232 GCAI programming/data cable - HKN6183_

1.4.2 Replacement Parts

The following is a list of parts that ship standard with each Consolette and are available for replacement if necessary:

i. Coin cell battery (6071032M01)

ii. 14 pin terminal mating connector (28009234001)

iii. Packing kit (HBN5097_)

In the event that the unit needs to be sent in for repair, it is recommended that the unit be shipped using its original custom packaging. If this packaging was disposed of by the customer, additional packaging kits can be purchased from Motorola Solutions. It is the responsibility of the customer to properly package the equipment prior to shipping. Prior to shipping in the unit, please purchase the HBN5097_ for use with the APX 7500 Consolette.

1.4.3 Recommended Cabling

The APX 7500 Consolette has several ports and supports many different style cables. The chart in this section describes the functionality required along with the corresponding Consolette port locations and the supported cable kits.

Table 1-1. Cabling Chart

Function(s)	Connector Location	Cable
CPS Programming (USB) the transceiver. Flash Programming (USB) both the transceiver and the Consolette controller card. Radio packet data applications (USB)	GCAI on O5 Control Head or AUX GCAI on front panel	HKN6184_
Radio packet data applications (RS232) Tactical OTAR (RS232)	GCAI on O5 Control Head or AUX GCAI on front panel	HKN6183_
Consolette Configuration (Ethernet)	Ethernet/LAN connector on rear of Consolette.	OTS CAT5 Ethernet Cabling.
Consolette Configuration (USB)	USB-B connector on rear of Consolette	OTS USB-A to USB-B cable
Keyloading (all keys)	AUX GCAI on front of Consolette	TKN8531_ HKN6182_

All other cabling must be built by the customer. Refer to Chapter 6 for detailed cabling diagrams.

1.5 Feature Comparison

1.5.1 Front Panel Functionality

Figure 1-1. Full Featured Front Panel

Figure 1-2. Limited Front Panel

Table 1-2. Front Panel Functionality

Features*	Full Feature Front Panel (L999_)	Limited Front Panel (L998_)
Local Control Head Supported	√	No
GCAI Paddle mic supported	√	No
Internal local speaker	√	No
Clock	√	√
VU Meter	√	√
Auxiliary Display	√	√
Numeric Keypad	√	No
Programmable Buttons	√	Limited to 3 prog. button

Table 1-2. Front Panel Functionality

Features*	Full Feature Front Panel (L999_)	Limited Front Panel (L998_)
External Keyload Port	√	√
External Programming Port(s)	√	√
External IV&D Port	√	√
Tactical OTAR Port	√	√
Control head on/off switch	√	No

***requires appropriate options ordered**

1.5.2 Rear Panel Functionality

Table 1-3. Rear panel Functionality

Features*	Full Feature Front Panel (L999_)	Limited Front Panel (L998_)
TRC with Wireline	√	√
E&M with Wireline	√	√
ACIM with Wireline	√	√
APCO Interface	√	√
Crosspatch Interface	√	√
Crossmute Interface	√	√
Recorder	√	√
Auxiliary Audio Jack	√	√
Auxiliary External Mobile speaker	√	√
Headset Interface (2)*	√	No
General Purpose Inputs/Outputs	√	√
Emergency Footswitch	√	√

***requires appropriate options ordered and** local control including Headset operation is not allowed on limited feature configuration.

1.5.3 General

Table 1-4. General

Features*	Full Feature Front Panel (L999_)	Limited Front Panel (L998AA)
Power supply with battery revert	√	√
AC Power on/off switch	√	√
Intermittent Duty Cycle (EIA/TIA)	√	√
Dual Band supported	√	√
IP Interface	√	√

***requires appropriate options ordered**

Chapter 2 Theory of Operation

2.1 System Overview

The APX Consolette consists of several key components: the Mainboard, the O5 control head, the APX mobile radio and a power supply. The O5 control head provides part of the user interface for the APX Consolette radio system. The control head provides this interface with a 320 x 83 pixel display, five programmable menu buttons, one programmable button that defaults to emergency operation, volume knob, mode knob, dim button, home button, power button, and navigation pad. The GCAI is also located on the control head and allows attachment of accessories such as the microphone and programming cables. Additional user interface is provided by the front panel keypad which consists of twelve alpha-numeric keys as well as three function keys and a speaker mute key, an additional LCD with three programmable buttons, a power indication LED and another mobile microphone port that allows for programming and keyloading of the radio transceiver inside the Consolette.

2.2 Power Distribution

The Consolette contains a power supply that converts either an AC input or a DC input into two DC outputs. The first DC output is the Main output which provides A+ (13.2VDC +/- 2%) to the mobile transceiver and supports up to 12A continuous current. The second DC output is the Auxiliary output, which provides A+ to both the Mainboard and O5 Control Head (via the Mainboard) and can support up to 5A continuous current. A+ is supplied to the Mainboard from connector P2 pin 1 through 2A fuse F100. A+ is also supplied to the O5 control head via the Mainboard from connector P2 pin 1 through inductor L101 and 4A fuse F101 before reaching connector P10 pin 4, where the O5 power cable is attached. The Auxiliary output also provides an AC power valid indicator to the Mainboard in the form of signal AC_POWER_GOOD through P2 pin 2 with logic High at 3.0VDC +/- 0.2, logic Low at -0.3VDC to +0.5VDC. This AC_POWER_GOOD signal is routed to two locations via the Mainboard. The first location being the GCAI board (PPLN7790) which contains the front panel power-on LED. AC_POWER_GOOD is routed to this board through connector P2000 pin 2 along with A+ through P2000 pin 1. When AC_POWER_GOOD is at a logic High (AC voltage present), the circuitry on this board will light the power-on LED green. When AC_POWER_GOOD is at a logic Low (DC voltage present), the circuitry on the GCAI board will light the power-on LED amber. The second routing location of AC_POWER_GOOD is OMAP input AC_PG_OMAP (U400 pin W10 through octal buffer U1500). This lets the Consolette detect the presence of an AC voltage source. A+ is also routed via the Mainboard to the front panel display board (PPLN7789A) through display connector P110 pins 8 &10 and to the Consolette fan through fan connector P20 pin 1.

On the Mainboard itself, A+ feeds five devices, the main 5 volt, 3A switching regulator (U1300), a 3.3 volt, 50 mA unswitched linear regulator (U1305) used to power the on/off circuitry, an adjustable 50 mA unswitched linear regulator (U1319) used to provide the necessary wireline voltages (provides 9.6V which is divided down to also supply 4.8V and 2.2V), a MOSFET switch used to provide SWB+, and a MOSFET switch used to provide ignition for the O5 control head and APX transceiver. The 5 volt regulator feeds the TI TPS65010 power management IC, which provides power to the rest of the board; furthermore, the 5 volt regulator also feeds the regulators used to generate 2.85V and 1.5V. SWB+ feeds regulators which supply the 4.8V biasing for the headset microphones and the 9.6V and 4.8V for the headset speakers' volume control. SWB+ is also made available on the rear panel 14-pin Terminal Connector J103 pins 4, 6, and 8 for intended use with a relay coil. Each of these three SWB+ paths have a maximum current rating of 150mA.

2.2.1 5 Volt Regulator

U1300 is a 5 volt (VCC_5V) switching regulator with a 3A maximum output current. It supplies all the power for the Mainboard with the exception of the ON/OFF circuits. In addition to being the voltage source for many of the Mainboard's pull-up resistors, VCC_5V also supplies power to the RS232 transceiver U1704 and is the USB Host interface's VBUS source. VCC_5V is also the voltage source for the backlight LEDs on the keypad board and display board. VCC_5V is made available on the rear panel DB25 Accessories Connector J104 pin 18 for intended use with a relay coil. This VCC_5V path has a maximum current rating of 150mA. The regulator output is controlled by the ATMEL AVR, U1311, using enable pin 7 on the regulator. When the enable pin is driven low, the regulator enters standby mode with a quiescent current of 50 µA.

2.2.2 3.3 Volt Unswitched Regulator

U1305 is a Texas Instruments TPS71533 low drop-out 3.3 volt (UNSW_3.3V) regulator with a 50mA maximum output current. This regulator draws a quiescent current of 3.2 µA and is used to power the ON/OFF circuitry, real time clock, OMAP McBSP2 muxes, and CAN termination circuitry. This regulator is active whenever A+ is applied to the Consolette.

2.2.3 Wireline Voltage Regulator

U1319 is a Texas Instruments TPS71501 low drop-out adjustable regulator with an output current of 50mA. The voltage is set to within 5% of 9.6V (9.6V_WL); furthermore, using a voltage divider circuit, the 9.6V is divided down to 4.8V (4.8V_WL) and 2.2V (2.2V_WL). These are the voltages used for the various op amp, comparator, and switches on the wireline. This regulator is self enabled with A+ as the input voltage.

2.2.4 TPS65010 Power Management IC

The Texas Instruments TPS65010 power management IC, U1301, provides several voltages used by the OMAP microcontroller and peripheral devices. It also provides the proper power-on sequence of these voltages. The TPS65010 is supplied by the 5 volt switching regulator. It contains two stepdown converters and two low drop-out regulators. VMAIN is a step-down converter with a 1A maximum output current. In addition to supplying 3.3 volts (VCC_3.3V) to some of the Mainboard peripherals (and the divided down 1.35 volts, labeled VCC_1.35V, used for audio biasing), VMAIN also supplies the internal VLDO1 and VLDO2 regulators. VCORE is a step-down converter with a 400mA maximum output current. VCORE is used to provide the 1.6 volt (VCC_1.6V) OMAP core voltage. Both VLDO1 and VLDO2 are low-dropout regulators with 200mA maximum output current. VLDO1 provides 2.8 volts (VCC_2.8V) to most of the OMAP I/O pins and external peripherals on the Mainboard, along with supplying 2.8 volts to the keypad board (PPLN7788A) and display board (PPLN7789A) for both boards' keypad matrix pull-up resistors. VLDO2 provides 1.8 volts (VCC_1.8V) that is used mainly by the Codec digital section, FLASH memory, and SDRAM memory.

2.2.5 2.85 Volt Regulator

U1304 is a Texas Instruments TPS73201 low drop-out adjustable regulator with an output current of 250mA. The voltage is set to within 2% of 2.85V. This voltage is used for the Codec analog and I/O section, Nautilus FPGA circuitry, and USB transceivers' circuitry. VCC_5V is the input voltage to U1304, as well as its enable input pin 5; therefore, the 2.85 volt regulator is on whenever VCC_5V is present.

2.2.6 1.5 Volt Regulator

U1307 is a National Semiconductor LM317A adjustable regulator with an output current of 1A. The voltage is set to within 2% of 1.5 volts (VCC_NAUT_1.5V). This regulator provides the core voltage to the Nautilus FPGA and is self enabled with VCC_5V as the input voltage.

2.2.7 Headset Microphones 4.8 Volt Regulator

U1306 is a Texas Instruments TPS71501 low drop-out adjustable regulator with an output current of 50mA. The voltage is set to within 5% of 4.8V (4.8V_BIAS). This voltage provides the bias for both headset microphones' internal circuitry. This regulator is self enabled with SWB+ as the input voltage.

2.2.8 Headset Volume Control (RX Audio Attenuator) Voltages

U1320 is a Texas Instruments TPS71501 low drop-out adjustable regulator with an output current of 50mA. The voltage is set to within 5% of 9.6V (9.6V_AA); furthermore, using a voltage divider circuit, the 9.6V is divided down to 4.8V (4.8V_AA). 9.6V_AA is used to power the RX Audio Attenuator U506 as well as the dual buffer op amp package U501 which follows the U506 output. 4.8V_AA provides the reference for the audio input signal to U506. This regulator is self enabled with SWB+ as the input voltage.

2.3 System Communications Overview

The O5 control head communicates with the radio transceiver and the Mainboard via the CAN (Controller Area Network) bus interface and is set up in remote mount configuration as noted in the O5 manual. Likewise, the radio transceiver is also in remote mount configuration and uses cabling internal to the Consolette to connect to the O5 control head and the Mainboard via CAN. The CAN interface is described below.

The front panel keypad and display are connected to the Mainboard via ribbon flex cables. The GCAI connector for programming and keyloading uses an internal cable to connect to the front of the radio transceiver directly while the power indication LED has two wires connected to the Mainboard.

The radio transceiver also connects to the Mainboard via a ribbon cable that attaches to the 25-pin front connector on the remote TIB interface.

Additionally, the Consolette has many communication ports on the rear panel. There are eight (8) RJ-45 connectors, a USB device (type B) port, a USB host (type A) port, a 3.5mm audio jack, a DB25 accessory connector, a 14-pin accessory connector, and one or more RF connectors. All of these ports are attached to backplane boards which are connected to the Mainboard via two ribbon flex cables, with the exception of the RF ports which are connected directly to the radio transceiver.

2.3.1 CAN Interface Communications

The Mainboard contains an FPGA that is used to convert SSI signals into a robust signaling protocol that can travel over several meters of cable. A Controller Area Network (CAN) is used for this purpose. The CAN bus is a differential bus operating at approximately 1MHz. The signals are sent to the radio transceiver and the O5 control head where identical FPGA's convert the CAN signals back to SSI and route the SSI signals to the microprocessor in each device. This is a bidirectional bus allowing each device to send messages to each other and also back to the Mainboard using the same CAN bus. Two CAN buses are used as separate differential pairs to transfer data and audio between all devices. These are labeled CAN1 and CAN2, where CAN1 carries audio and CAN2 carries data. A third CAN bus is used for system on/off/reset commands. All three CAN bus twisted wire pairs are contained in each single cable.

The CAN1 bus is used for all audio exchange between the Mainboard, O5 control head and transceiver. The O5 control head converts microphone signals received on the GCAI to SSI using a CODEC. In addition, received audio from the transceiver is sent to the control head on this CAN bus. The FPGA on the O5 control head converts the CAN data back to SSI and routes the signal to a CODEC. The CODEC converts the audio back to an analog signal and routes the signal to an audio PA in the control head. That audio stream is then sent to the speaker mounted in the front panel of the Consolette.

The Mainboard also converts transmit audio input signals from the Consolette back panel to SSI using a CODEC. Moreover, received audio from the transceiver is sent to the Mainboard on this CAN bus. The FPGA on the Mainboard converts the CAN data back to SSI and routes the signal to a CODEC. The CODEC converts the audio back to an analog signal and routes the signal to the various audio interface connectors on the rear panel of the Consolette.

2.3.2 CAN Bus and Auto-Termination

The CAN bus has many benefits for long-distance and robust communication of digital signals. However, in order to function correctly in a multi-node system, cable termination must exist only at the end nodes. Any termination in the middle can greatly distort the CAN signals, reducing the effectiveness of the CAN bus. When a cable is not present in a CAN connector, the termination circuit defaults to shorting a 120Ohm load across the CAN_HIGH and CAN_LOW signals for each CAN bus. When all CAN connectors on a device are used, meaning that the device is in the middle of the CAN bus, the auto-termination circuit removes the termination from that device. The Consolette contains internal cabling to properly connect the CAN bus to all devices necessary.

NOTE: The CAN cables must always be attached at both ends to a device. The cable detection architecture presumes all cables attached have a device at both ends. The signal integrity of the CAN data stream can be degraded if the system is not installed in this manner.

2.3.3 Nautilus FPGA

The Nautilus FPGA (U900) requires three voltages which are 1.5V core voltage, 3.3V and 2.85V I/O voltages. It also requires a 16 MHz clock, which is used to generate internal frequencies (done by using internal multipliers and dividers). If either voltage or clock is not present at power on then the FPGA will not work properly. The core voltage and I/O voltage banks can power on in any sequence and the core voltage draws up to 500 mA at power on.

The FPGA is programmed by the OMAP using the SPI bus each time the Mainboard powers on. Upon completion of programming, the signal NAUT_CONFIG_DONE goes high. A failure in programming the FPGA will display FL 1C-86 error code on the Consolette LCD display.

2.3.4 Microcontroller and Memory

The Consolette Mainboard contains a Texas Instruments OMAP microcontroller, reference designator U400. Two clocks are supplied to the microcontroller, a 32 kHz clock and 12 MHz clock. A buffered version of the 32 kHz clock is visible on the testpoint “32k_out” briefly on startup. This pin is later reconfigured by software as a reset pin used by the OMAP. The microcontroller contains an integrated synchronous serial interface (SSI), serial peripheral interface (SPI), I2C interface, LCD controller, keypad controller, UART, and USB controllers. SSI is used for the CAN bus communication. SPI is used to transfer data to and from devices such as the Nautilus FPGA and the RX Audio Attenuator IC. I2C is used to transfer data to and from devices such as the CODEC, the Power Control IC, and the Real-Time Clock IC.

Switches are used to disconnect the OMAP SSI bus from the rest of the system. These switches are U403, U404, U407, and U408. In addition, filters FL400 and FL401 are used to filter noise from the SSI clock and frame sync lines. Finally, U410 is a Schmitt trigger used to square up the clock and frame sync lines before these signals reach OMAP.

A NOR Flash memory device, U301, is used to store Mainboard host code and non-volatile system variables. A DDR SDRAM memory device, U300, is used for volatile code and variables. Neither of these memory devices is field-repairable. Both devices are located near the OMAP processor under shield SH400.

Pull-up and pull-down resistors are used to provide software with a board revision ID. These resistors are located below the microcontroller shield SH400.

2.3.5 Clocks and Oscillators

The controller clock distribution consists of several primary clock sources:

- 32.768kHz
  - Crystal oscillator (Y402) is used as a startup clock provided to the OMAP processor (U400). An additional 32.768kHz crystal (Y1601) is placed to provide a reference signal to the Real-Time Clock IC (U1601). These two oscillators must be separate due to differing circuit requirements for crystal load capacitance.
- 12MHz
  - Crystal oscillator (Y401) provides the base clock source to the OMAP processor (U400). The OMAP DPLL then multiplies this base frequency to generate the DSP clock, MPU clock, etc. This clock is also used as the reference for all internal OMAP clocks synthesized by its internal PLL, such as the FLASH and SDRAM clocks and serial bus timing.
- 16MHz
  - A 16MHz reference clock is provided to the Nautilus FPGA by crystal oscillator Y901.
- 25MHz
  - Provided by the dedicated oscillator, Y701, to the Ethernet LAN Controller IC (U704).

2.3.6 User Interface

The user interface consists of the O5 control head, 19 buttons, and a GCAI connector. In addition, user feedback is provided using a 131 x 53 pixel LCD and a bi-color LED. One of the buttons is used for the Speaker_Mute function. This input will disable and re-enable the local speaker audio. Three of the buttons are grouped together and used for the LCD softkeys, three others are used as programmable buttons. The remaining buttons are alphanumeric and provide inputs to the keypad controller inside the microprocessor.

2.3.7 CODEC SSI Bus

The CODEC SSI is a dedicated bus for the TLVAIC12K CODEC. It has a 512 kHz clock, 8 kHz frame sync, 16 bit word size, and four slots. The FPGA transfers data from the CAN1 bus to the dedicated SSI Bus. The CODEC then provides signal conversion from digital to analog (D/A) and from analog to digital (A/D). The FPGA is the clock master, generating the clock and frame sync.

CODEC SSI Signals:

- SCLK_CODEC
- STDA_CODEC
- SRDA_CODEC
- FS_CODEC
- MCLK_CODEC
- PWRDN_CODEC
- RESET*-CODEC

2.3.8 SPI Bus

OMAP programs the FPGA at power-on via the SPI interface. OMAP also uses the SPI bus to read and write FPGA registers. The audio attenuation IC is also programmed using the SPI bus.

SPI Signals:

- SPI_CS: SPI FPGA Chip select.

- SPI_MISO: SPI input serial data
- SPI_MOSI: SPI output serial data
- SPI_CLK: SPI Clock

2.3.9 Main SSI Bus

The main SSI bus is used by OMAP to transfer data to the FPGA. This SSI Bus uses a 1.536 MHz clock, 8 kHz Frame sync, 16 bit word size, and 12 slots. The FPGA is also the clock master for this SSI bus, generating clock and frame sync.

Main SSI Signals:

- SCLK: Main SSI Clock running at 1.536 MHz
- FS: Frame sync running at 8 KHz
- STDA: SSI Transmit data
- SRDA: SSI Receive data

2.3.10 Nautilus FPGA Control signals

FGPA control signals are mainly used to know FPGA status, programming status and reset.

FPGA Control signals:

- NAUT_RESET*
- NAUT_INT
- NAUT_STATUS
- NAUT_CONFIG
- NAUT_CONFIG_DONE

2.3.11 USB Connectivity

The Consolette Mainboard has two USB ports for communication. A USB full speed device port (USB 1.1 compliant) and a USB Host port (version 1.1 compliant) that supports low and full speed.

2.3.12 USB Device port

The USB device port uses the internal OMAP transceiver which is connected to Pin Group 0. The OMAP USB transceiver transmits and receives serial data at full speed 12 Mbit/sec.

The enumeration process starts when a USB device connection is made to a USB host such as a computer. The USB device port detects VBUS and then pulls up D+ with a 1.5kOhm resistor inside FL1500. The host detects the D+ pull up and starts the enumeration process; activity should be seen on differential signals D+ and D-. See Figure 2-1 for USB full speed screen capture. Filter ST202 is used to protect the USB device port from ESD and RFI. The USB device port uses a standard USB type B connector.

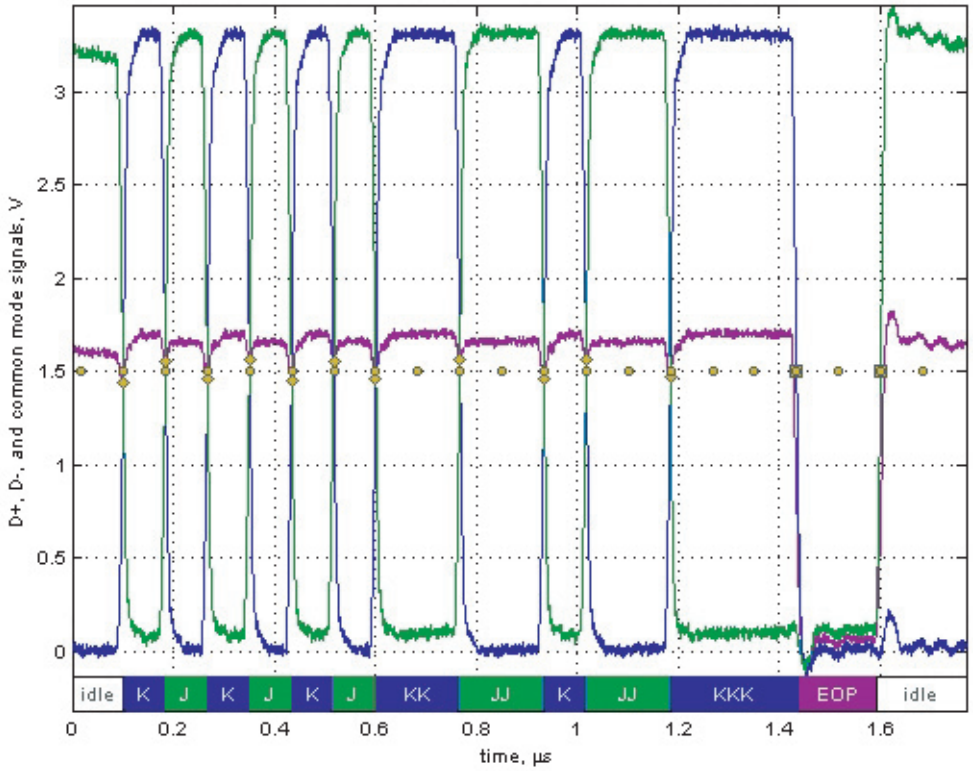


Figure 2-1. USB D+ and D- during full speed transaction

2.3.13 USB Host port

The USB host port uses a Philips ISP1105 transceiver (U303), which is connected to OMAP Pin Group 2. This transceiver is USB 1.1 compliant, low and full speed. Upon connection of an external USB device to the USB host port, the Consolette Mainboard provides VBUS to the device by enabling over-current IC TPS2041B (U1706), which provides over-current and short circuit protection for VBUS. If U1706 detects an over-current condition, then the USB2_OC line is pulled low. Over-current is detected when the current draw exceeds 500 mA. If a current higher than one Amp is detected, then the output is disabled. The Host port has 15kOhm pull down resistors for D+ and D- and also contains the same ST202 filter as the Device circuit to protect the USB Host data lines from ESD and RFI.

The enumeration process is started by detecting a pull-up on D+ or D- (Full or Low speed). The Consolette Mainboard then supplies VBUS to the attached device and performs the USB Host protocol. The USB Host port uses a standard USB type A connector.

NOTE: The USB Host port only supports allowable devices; please see the Target Peripheral List for the details of these approved accessories.

2.3.14 Ethernet Connectivity

The Consolette has an RJ-45 connector on the back panel for LAN communications. The Consolette is capable of both 10baseT and 100baseT data rates.

The LAN circuit contains a Micrel KSZ8841 Ethernet MAC Controller IC (U704) and supports Auto-Negotiation at 10/100Mbps Full and Half Duplex communications. The Ethernet Controller IC communicates to the OMAP microprocessor via the Flash memory bus and has its own dedicated 25 MHz clock. The LAN circuit also includes a Pulse HX1188 transformer (T700) with a 1:1 turns ratio and rated for 10/100baseT data rates. Termination components R738, R739, R745, R746, C742 and C743 are located close to the Ethernet Controller IC for impedance matching purposes on the differential LAN data pairs.

The Ethernet Controller IC and the transformer are located on the Mainboard while the RJ-45 connector is attached to the High Speed backplane board. A high-speed flexible ribbon cable is used to connect those two boards.

2.3.15 Receive Audio Paths

Audio from the receiver, as well as the various tones produced from the mobile (ex. keyfail tones, button-press beeps/bonks), are sent from the APX transceiver to the Consolette controller card (PPLN1689) in PCM audio format via the CAN_AUDIO bus. On the Consolette controller card, CAN audio is transferred to the SSI by the Nautilus FPGA and routed to the DSP. If “TRC” is selected as the “Wireline Function” audio parameter in the Consolette CPS, the DSP will filter the TRC guard tone from the received audio in order to prevent guard tone false detects on the wireline. PCM audio from the DSP is then converted to analog audio within the Codec (U505), and routed out to Codec outputs OUTP1 (U505 pin 10), OUTP2 (U505 pin 13), and OUTP3 (U505 pin 15). Receive analog audio coming from these Codec outputs is identical and they cannot have their gain adjusted separately within the Codec; however, there is various circuitry external to the Codec on these paths which allow separate receive audio gain adjustments. The Codec master receive gain adjustment for all three outputs is in the Consolette CPS labeled “RX Codec Adjustment”. This gain adjustment can vary from -42 dB to +20 dB in 0.5 dB steps. By default, the receive audio level from the Codec outputs should measure approximately 300 mVrms.

NOTE: The APX Consolette transceiver supports several over-the-air signaling types which can be enabled in its codeplug: Analog Conventional, Type II Trunking, APCO Conventional, and APCO P25 Trunking (including F2). Regardless of the signaling type chosen, the audio provided to the rear panel outputs on the Consolette is always in analog format.

2.3.15.1 Headset Receive Audio

Receive analog audio originating from Codec OUTP1 is the single-ended speaker audio source for both headset connectors. When a headset is connected to its respective RJ45 connector on the high speed connector rear panel of the Consolette (J11 for HDST1 and J12 for HDST2), HDST1_SENSE* (J11 pin 2) and HDST2_SENSE* (J12 pin 2) are grounded. These signals are passed through octal buffer U1809 before reaching OMAP inputs HDST1_SENSE_OMAP* (U400 pin M8) and HDST2_SENSE_OMAP* (U400 pin W8). This enables the Consolette to detect the headset connection(s) and mute the front panel speaker. Codec OUTP1 audio first passes through muting gate U502 which is controlled by PCIC output HDST_MUTE* (U1301 pin 26). It then passes through dual op amp package U500 pin 2, which has a gain of approximately 10 dB, before reaching RX Audio Attenuator U506. U506’s attenuation level is mapped to and controlled by the O5 control head’s volume knob via the OMAP’s SPI bus; therefore, any volume adjustment for the headset speakers is done with the O5 volume knob. To avoid needing to adjust the O5 volume knob when switching between the use of headsets and the front panel speaker, a volume adjustment from the Audio Parameters page in the Consolette Configuration may be selected. The “Headset Speaker Volume Ratio” can be chosen to have the headset volume reach maximum volume at 100% (1:1

Ratio) of front panel speaker maximum, 66%(1.5:1 Ratio) of front panel speaker maximum, or 50% (2:1 Ratio) of front panel speaker maximum. Also, the minimum and maximum volume levels of the headsets can be set using the Consolette Configuration. The “Headset Speaker Min (RX) Gain Setting” sets the minimum volume at the headset, even when the O5 volume knob is turned all the way down. This can be used to ensure audio is always heard at the headsets. The “Headset Speaker Max (RX) Gain Setting” sets the maximum volume at the headset, even when the O5 volume knob is turned all the way up. This can be used to ensure the headset volume is never too loud. The RX Audio Attenuator output is then split and sent through dual buffer op amp package U501 (U501 pin 1 for HDST1_AUDIO and U501 pin 7 for HDST2_AUDIO) before reaching the high speed connector board (PPLN7786) at HDST1_SPKR+ (J11 pin 7) and HDST2_SPKR+ (J12 pin 7). Since these are both single-ended audio paths, HDST1_SPKR- (J11 pin 3) and HDST2_SPKR- (J12 pin 3) are both tied to ground. Audio levels at HDST1_SPKR+ and HDST2_SPKR+ can range anywhere from 0 to approximately 800 mVrms based on the O5 volume knob’s position. When the headsets are disconnected, the Consolette will remove the mute override from the front panel speaker.

NOTE: Only APX Consolettes with the local control option consisting of an O5 control head and front panel speaker will support headsets. The limited front panel APX Consolettes will not provide headset speaker audio.

2.3.15.2 Recorder and External PA Receive Audio

Analog audio originating from Codec OUTP2 (CODEC_OUTP2) is the receive audio source for both single-ended recorder audio and single-ended external PA audio. Coming out of Codec OUTP2, this audio is split and passed through recorder audio muting gate U1813, which is controlled by OMAP output REC_ACT (U400 pin V19), and external PA muting gate U1815, which is controlled by OMAP output EXT_PA_ACT (U400 pin N21). These muting gates unmute when there is valid audio present; however, these muting gates can also be completely disabled via codeplug programming in the Consolette Configuration Audio Parameters page. By selecting “Record Off” for “Recorder Configuration” and “Output Off” for “Public Address Amplifier Audio”, the Consolette will mute the gates and not assert the associated activity outputs. The activity outputs are open drain MOSFET logic outputs controlled by the same OMAP outputs which control the muting gates. These activity outputs are active low logic which indicate when there is valid audio activity on the recorder and/or the external PA paths. REC_ACTIVITY* (driven low by MOSFET Q1806 when valid audio activity is present on the recorder path) is located on the high speed connector board’s RJ45 Recorder Connector J23 pin 3. EXT_PA_ACTIVITY* (driven low by MOSFET Q1807 when valid audio activity is present on the external PA path) is located on the low speed connector board’s (PPLN7787) DB25 Accessories Connector J104 pin 9. After passing through the recorder muting gate, recorder audio is then sent through quad buffer op amp package U1802 (output at U1802 pin 7) before reaching the high speed connector board at REC_AUDIO (J23 pin 1). Similarly, after passing through the external PA muting gate, external PA audio is then sent through quad buffer op amp package U1802 (output at U1802 pin 1) before reaching the low speed connector board at EXT_PA_AUD (J104 pin 8). Both audio paths are at a fixed level of approximately 300 mVrms relative to a 1.0 kHz tone at 60% FSD.

2.3.15.3 APCO, Crosspatch, and Audio Jack Receive Audio

Receive analog audio originating from Codec OUTP3 (RX_FILT_AUDIO) is the single-ended audio source for APCO receive audio, crosspatch receive audio, audio jack receive audio, and wireline receive audio. The audio coming from Codec OUTP3 splits off for APCO, crosspatch, and audio jack receive audio and first passes through muting gate U1810 which is controlled by OMAP output RX_TONES_CTRL (U400 pin Y15). It then splits again and passes through two of the op amps in quad buffer op amp package U1802. The output of U1802 pin 14 (RX_AUDIO_BUFF) is sent to the low speed connector board's Audio Jack Connector P100 pins 2 and 3 (the same receive audio is output at both the right and left speaker connections). This audio jack receive audio is at a fixed level of approximately 300 mVrms relative to a 1.0 kHz tone at 60% FSD. The output of U1802 pin 8 (RX_AUDIO) is sent to both the high speed connector board's Crosspatch Connector J24 pin 1 and the low speed connector board's Accessories DB25 connector J104 pin 4 (the A(rx) portion of the Consolette APCO Interface). Both of these audio paths are also at a fixed level of approximately 300 mVrms relative to a 1.0 kHz tone at 60% FSD. Additionally, for the crosspatch configuration, there is a channel active output which indicates when receive audio is present. CP_CHAN_ACTIVITY* (driven low by open drain MOSFET Q1813 when valid receive audio is present) is located on the high speed connector board's Crosspatch Connector J24 pin 2. When a Consolette is connected in a crosspatch configuration, this CP_CHAN_ACTIVITY* output will drive the active low PTT input and key up whatever communication device (most likely another Consolette) it is connected to. For the Consolette APCO interface, a channel active solid state relay (K1800) is provided. This is especially useful when the customer's setup has a signal with a high voltage or if the customer wants to switch in a ground signal. The relay circuitry has a maximum load voltage of 350V and a maximum load current of 120 mA. Access to the input and output of the relay are found on the low speed connector board's DB25 Accessories Connector J104. CHAN_ACT_RELAY_IN (J104 pin 21) is the input to the relay and CHAN_ACT_RELAY_OUT (J104 pin 25) is the relay's output. The relay is normally open and controlled by OMAP output CHAN_ACT (U400 pin P20). When valid receive audio is present, CHAN_ACT turns on transistor Q1803 which causes a contact closure of the relay.

2.3.15.4 Wireline Receive Audio

The audio coming from Codec OUTP3 (RX_FILT_AUDIO) is also split off for RX wireline audio (RX_FILT_AUDIO_WL). It first passes through the line adjust circuit made up of op amp U1818 and EEPOT U1803. This circuit allows the notched, filtered audio level to be adjusted via EEPOT U1803 which is controlled by the OMAP's I2C bus; moreover, this is done by varying the "Wireline Out (RX) Gain Setting" in the Consolette Configuration, thus adjusting the audio level to the wireline. This allows compensation for line losses to obtain the desired audio levels. The adjusted audio is then split into opposing phases in the line driver circuit (quad op amp package U1808, Q1801 and Q1802), where receiver audio is applied to the line transformer T1801 and the wireline. With two-wire selected, the line driver audio is also applied to the input of the transmit audio/tones detection path through T1801 pin 4. A portion of the line driver audio is also fed into the input amplifier of the transmit audio/tone detection path, via the output of U1808 pin 7 and switch U1805; this audio is approximately 180° out of phase with the received audio at T1801. 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 since switch U1805's connection to the two-wire interface is open, while U1805's connection to the four-wire interface is closed.

2.3.15.5 External Speaker Receive Audio

There is a secondary speaker (referred to as the external speaker) output on the low speed connector board's 14-pin Terminal Connector J103 pins 1 (EXT_SPKR+) and 2 (EXT_SPKR-). The audio source for these pins originates from the J600 connector on the APX mobile's TIB. J600 pin 24 is the APX mobile SPEAKER_LOW and J600 pin 25 is the APX mobile SPEAKER_HIGH. This audio is passed from the APX mobile TIB through a ribbon cable onto the APX Consolette main board through P600 connector pins 22 (EXT_SPKR-) and 24 (EXT_SPKR+). From here, the audio is passed unaltered directly through the main board to the low speed connector board. The external speaker audio is used to monitor receive audio and alert tones; however, this output cannot provide transmit audio. Its audio level may be set in the APX mobile CPS to either maintain a fixed volume, or to track the O5 volume knob. Additionally, there is an external speaker active output which indicates when the external speaker is unmuted. EXT_SPKR_ACTIVITY* (driven low by open drain MOSFET Q1804 when valid audio activity is present on the secondary speaker) is located on the low speed connector board's DB25 Accessories Connector J104 pin 23.

NOTE: EXT_SPKR- and EXT_SPKR+ should never be grounded. If they are grounded, this will damage the radio.

2.3.15.6 Front Panel Speaker Receive Audio

APX Consolettes with the local control option have an O5 control head and 20 Ohm speaker (referred to as the internal speaker) located in the front panel. Receive audio is routed over CAN from the APX transceiver to the O5 control head where it is converted to an analog signal and processed through a Class D audio PA circuit before being sent to the Consolette's local 20 Ohm speaker. The receive audio at this speaker is volume controlled via the O5 volume knob. Refer to section 4.4 for local front panel speaker operation. Additionally, there is an internal speaker active output which indicates when the internal speaker is unmuted. INT_SPKR_ACTIVITY* (driven low by open drain MOSFET Q1805 when valid audio activity is present on the local speaker) is located on the low speed connector board's DB25 Accessories Connector J104 pin 22.

2.3.16 Transmit Audio Path

The Consolette supplies several transmit audio paths on the rear panel of the Consolette as well as an O5 control head paddle microphone for APX Consolettes with the local control option. The three main input paths for rear panel transmit audio are headset microphone, crosspatch/APCO, and wireline; however, only one of these inputs can be active at a time. All three paths originate as analog audio at either the low speed or high speed board rear panel connectors and are sent to the Codec (U505). Associated with each path's audio, there are PTT sources also located on the low speed (PPLN7787) or high speed (PPLN7786) board rear panel connectors. Headset microphone audio is input at Codec MICIN (U505 pin 18), crosspatch/APCO audio is input at Codec INP1 (U505 pin 23), and wireline audio is input at Codec INP2 (U505 pin 19). From these inputs, the analog audio is converted to digitized SSI audio and routed to the DSP. The primary constraint on rear panel transmit audio is that only one Codec input can be visible to the DSP at any given time. Based on the Consolette Configuration "Rear Panel Priority" audio parameter, a priority is assigned to the inputs to determine which one is routed. If "None" is selected then audio is routed on a first-come first-served basis. All three paths have separate transmit gain controls within the Codec and DSP which can be adjusted using the Consolette Configuration. These gains can be adjusted from -42 dB to +20 dB in 0.5 dB steps to achieve the desired transmit deviation. If "TRC" is selected as the "Wireline Function" audio parameter in the Consolette Configuration, the DSP will filter the TRC guard tone from the transmit audio.

Local paddle microphone audio is digitized in the O5 control head and sent on the CAN_AUDIO bus from the control head to the Consolette controller card (PPLN1689). On the Consolette controller card, this digitized CAN audio is converted to SSI audio by the Nautilus FPGA (U900) and routed to the DSP where its gain can be adjusted via the “Controlhead Mic (TX) Gain Setting” in the Consolette Configuration. This gain can be adjusted from -5 dB to +5 dB in 0.5 dB steps to achieve the desired transmit deviation. Since local microphone audio is not being input to the DSP through the Codec, whenever there are simultaneous PTTs among the priority rear panel transmit path and the local microphone, the transmit audio on these active paths will be summed in the DSP. The only case where this is not true is when the local microphone PTTs first and then a tone remote control (TRC) attempts to PTT on a different channel. In this case, the Consolette will dekey and a bad tone will sound at the local speaker. From the DSP, the Nautilus FPGA converts the SSI audio to CAN audio which is sent over the CAN_AUDIO bus to the APX transceiver to be transmitted.

NOTE: The audio inputs to the APX Consolette are always in analog audio format. The APX Consolette then converts them for over-the-air transmit per the selected signaling type which can be enabled in its codeplug: Analog Conventional, Type II Trunking, APCO Conventional, and APCO P25 Trunking (including F2).

2.3.16.1 Headset Transmit Audio

Headset microphone audio can originate from both headset connectors. This audio is input on the high speed connector board's RJ45 Headset 1 Connector at HDST1_MIC+ (J11 pin 5) and RJ45 Headset 2 Connector at HDST2_MIC+ (J12 pin 5). Since these are single-ended microphone audio inputs, HDST1_MIC- (J11 pin 4) and HDST2_MIC- (J12 pin 4) are both tied to ground. Each headset path has its own PTT source associated with it, HDST1_PTT* (J11 pin 6) and HDST2_PTT* (J12 pin 6). These PTT signals are passed through octal buffer U1809 before reaching OMAP inputs HDST1_PTT_OMAP* (U400 pin R11) and HDST2_PTT_OMAP* (U400 pin Y1). After being routed from the high speed board to the controller card, the headsets’ microphone audio is biased and summed through quad op amp package U1801 pin 2 with an attenuation of 6 dB. Each headset microphone audio path has an impedance of 50Ω with a bias of 4.8V for the headset microphones’ internal circuitry. This summed audio from U1801 pin 1 is then input at Codec MICIN; furthermore, the gain of this audio is adjustable via the “Headset Mic (TX) Gain Setting” in the Consolette Configuration.

NOTE: Only APX Consolettes with the local control option consisting of an O5 control head and front panel speaker will support headsets.

2.3.16.2 APCO and Crosspatch Transmit Audio

The crosspatch and APCO transmit audio paths share the same Codec INP1; however, these paths are not summed. They are mutually exclusive, so only one of these paths is routed to Codec INP1 at any given time. The single-ended crosspatch transmit audio is input on the high speed connector board's RJ45 Crosspatch Connector at CP_AUX_TX (J24 pin 8) and its associated PTT source (CP_PTT*) is located on J24 pin 7. The single-ended APCO transmit audio is input on the low speed connector board's DB25 Accessories Connector at AUX_TX (J104 pin 17) and its associated PTT source (PTT*) is located on J104 pin 10. The PTT signals for both interfaces are passed through octal buffer U1809 before reaching OMAP inputs CP_PTT_OMAP* (U400 pin L18) and PTT_OMAP* (U400 pin V8). The crosspatch PTT and APCO PTT cannot be active simultaneously (only one PTT source is active at a time), but both can be deactivated. These parameters are set in the "Crosspatch-Hardware PTT Selection" audio parameter of the Consolette Configuration. Both the crosspatch and APCO transmit audio paths have an impedance of 600Ω and are attenuated 6 dB via quad op package U1801 (U1801 pin 6 for the crosspatch path and U1801 pin 9 for the APCO path) before being input into analog switch U1800. Based on the "Crosspatch-Hardware PTT Selection" setting, OMAP output CP_DISABLE (U400 pin M14) will select the appropriate U1800 input path to be switched into Codec INP1. The gain of this audio is adjustable via the "Crosspatch In (TX) Gain Setting" in the Consolette Configuration.

2.3.16.3 Wireline Transmit Audio

Wireline audio to be transmitted over the air is applied to the wireline interface network. This differential audio can be input in either of two locations depending on the "Wireline Configuration" setting in the Consolette Configuration Remote Interface Parameters page. Based on this setting, OMAP output NUM_WIRES (U400 pin W15) will select the appropriate wireline path (two-wire or four-wire) to be switched in via U1805. For two-wire operation, the differential audio is input on the high speed connector board's RJ45 Wireline Connector at LINE1+ (J21 pin 3) and LINE1- (J21 pin 6). For four-wire operation, the differential audio is input on the RJ45 Wireline Connector at LINE2+ (J21 pin 4) and LINE2- (J21 pin 5). The wireline interface network consists of line matching transformers T1801 (two-wire operation) and T1800 (four-wire operation), quad op amp package U1806, and other discrete components. The purpose of this circuitry is to match the impedance of the controller card to that of the wireline (T1801, T1800, K1801, K1802), block any DC components between the controller card and the wireline (C1862, C1863, C1860, C1861), and provide protection from surges on the line (surge arresters F1 and F2 on the high speed connector board). Solid state relays K1801 and K1802 set the impedance for the wireline. Based on the "Wireline Configuration" setting in the Consolette Configuration, OMAP output WL_IMPEDANCE (U400 pin P11) will select the appropriate wireline impedance (600Ω or High Impedance) to be switched in via K1801 and K1802. After passing through switch U1805, wireline transmit audio is attenuated 14 dB via quad op amp package U1801 (output pin 14) before entering Codec INP2. At this point, the transmit audio gain is either adjusted by the AGC (automatic gain compensation) algorithm in the DSP or linearly via the Codec and DSP. AGC is only used when the wireline interface is being used with tone remote control. Therefore, in order for the gain to be adjusted using AGC, "TRC" must be selected as the "Wireline Function" audio parameter in the Consolette Configuration and then "TRC AGC Configuration" must be enabled in the Consolette Configuration Remote Interface Parameters page. The AGC function, when enabled, sets the wireline transmit gain based on the level of the high level guard tone (HLGT) received. In addition, the "AGC Offset Adjustment" in the Consolette Configuration can be used to adjust the ratio applied between HLGT and audio to compensate for variation from the normal ratio. This may be required if there are nonlinearity in the wireline, if the console has a non-standard level for HLGT, or if the console lacks a microphone gain adjustment or

other means to set the HLGT to audio ratio. If “TRC AGC Configuration” is disabled, or “Hardware PTT” or “ACIM” are selected as the “Wireline Function” in the Consolette Configuration Audio Parameters page, then the gain of the wireline transmit audio is adjustable linearly via the “Wireline In (TX) Gain Setting”. This gain setting can be used to compensate for a line level other than 0 dBm. Note: This setting is disabled when wireline AGC is enabled. In addition to this digitized wireline transmit audio being sent to the APX transceiver to be transmitted, it is also sent on the CAN_AUDIO bus to the O5 control head (for APX Consolettes with the local control option). The O5 control head converts this digitized audio to an analog signal and processes it through a Class D audio PA circuit before sending it to the Consolette’s local 20 Ohm speaker. Refer to section 4.4 for local front panel speaker operation.

2.3.16.4 Transmit Audio Routing to Remote

In addition to the digitized rear panel transmit audio and local microphone audio being sent to the APX transceiver to be transmitted, some of these paths can also have this same transmit audio routed back through the Codec and output as analog audio out the wireline, out the Recorder interface, and/or out the External PA interface. Analog transmit audio from the headsets’ microphones, APCO AUX_TX (but not crosspatch transmit audio), and the local microphone can be sent back through the Codec and output as analog audio down the wireline to a remote device. This feature is enabled in the “Local Microphone Audio Routing to Remote Console” in the Consolette Configuration Audio Parameters page. All transmit audio sources (Consolette rear panel and O5 control head local microphone) can be routed to the Recorder and/or External PA interfaces. If transmit audio is needed on the Recorder interface, “Record RX+TX” can be enabled for “Recorder Configuration” from the Consolette Configuration Audio Parameters page. Alert tones such as talk-permit tones are always present in the recorder audio. Similarly, if transmit audio is desired on the External PA interface, “Output RX+TX” or “Output RX+TX (with tones)” can be enabled for “Public Address Amplifier Audio” in the Consolette Configuration Audio Parameters page. As indicated, alert tones can be filtered from the External PA interface if necessary.

2.3.16.5 Transmit Indication

Finally, there is an active low transmit activity output which indicates when the APX transceiver is active and transmitting. TX_ACTIVITY* (driven low by open drain MOSFET Q1810 when the APX transceiver is active and transmitting) is located on the low speed connector board’s DB25 Accessories Connector J104 pin 1.

Chapter 3 Installation

3.1 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 xiii 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 APX 7500 Consolette is not recommended for dense site applications (that is, dense metropolitan areas or *antenna farms*). The Consolette should be installed per the R56 Manual, Standards and Guidelines for Communication Sites. Additional surge protection is provided within the Consolette on its Wireline Interface and its AC power interface.

Caution

The Consolette is intended for indoor user only. It is not water resistant. As a result, it has no protection against splashing water. Do not expose the Consolette to dripping or splashing liquids. Do not place objects filled with liquids on or near the unit. Additionally do not place a naked flame, such as a lighted candle, on or near the Consolette.

3.2 Ventilation

The Consolette is designed for rack mount, wall mount or horizontal flat plane installation with forced convection cooling on all mountings. For proper cooling, the Consolette must be kept free of obstructions at its back 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 –30°C to +60°C.

3.3 Station Mounting Procedures

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

3.3.1 Rackmount Installation

Un-thread and retain the four feet from the bottom of the Consolette chassis. Place the Consolette on the rack mount tray (HKN6233_), aligning the four threaded studs with the slots in the bottom of the tray and sliding the unit forward fully so that the front panel protrudes through the front opening of the tray. Thread the four feet back onto the threaded studs protruding through the bottom of the tray and tighten to secure the Consolette. Mount the tray in the desired rack installation using the four #12-24 screws provided.

3.3.2 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 3.2, "Ventilation," on page 3-1.

3.3.3 Wall Mounting

Ensure that the selected mounting surface is strong enough to support the Consolette weight of 19.5 lbs. Mark the location of the four mounting screws (Figure 3-1 on page 3-2). 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.

The rack mount tray is used to wall mount the Consolette. Un-thread and retain the four feet from the bottom of the Consolette chassis. Place the Consolette on the rack mount tray (HKN6233_), aligning the four threaded studs with the slots in the bottom of the tray and sliding the unit forward fully so that the front panel protrudes through the front opening of the tray. Thread the four feet back onto the threaded studs protruding through the bottom of the tray and tighten to secure the Consolette. Hold the Consolette and tray assembly with the front panel facing up and guide the slotted holes on the bottom of the tray over the wall mounting screws.

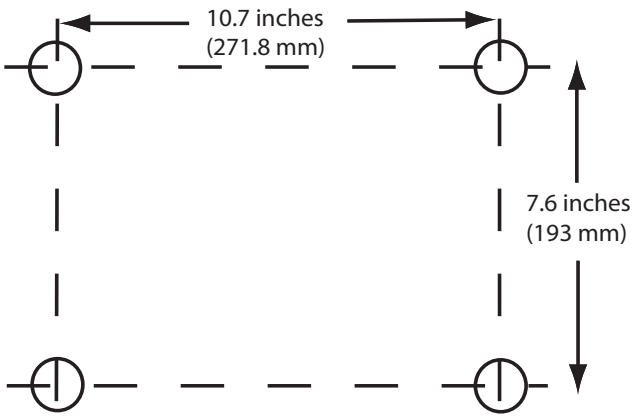


Figure 3-1. Wall Mounting

3.4 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 Consolette is intended for installation at a fixed location and operated as a control station or as a fixed unit; therefore, the antenna installation must comply with the following requirements in order to ensure optimal performance and compliance with the RF energy exposure limits in the standards and guidelines listed in the 6881095C99 manual:

a. The antenna should be mounted outside the building on the roof or a tower if at all possible.

b. As with all fixed site antenna installations, it is the responsibility of the licensee to manage the site in accordance with applicable regulatory requirements and may require additional compliance actions such as site survey measurements, signage, and site access restrictions in order to ensure that exposure limits are not exceeded.

c. Dual Band models must have two antennas attached. Check the requirements of the antenna supplier.

d. Ensure that the antenna cable can be easily routed to the Consolette. Route the antenna cable as far away as possible from any nearby electronics and associated wiring.

e. Check the antenna location for any electrical interference.

f. Ensure that any transmitting radio antennas are separated from each other by at least 3 feet (0.9 meter).

NOTE: The Antenna ports will be labeled appropriately for the ordered band combination.

Figure 3-2. Antenna Label

The coaxial antenna cable connects to an N-type coaxial connector located on the rear panel of the station. See Figure 3-3.

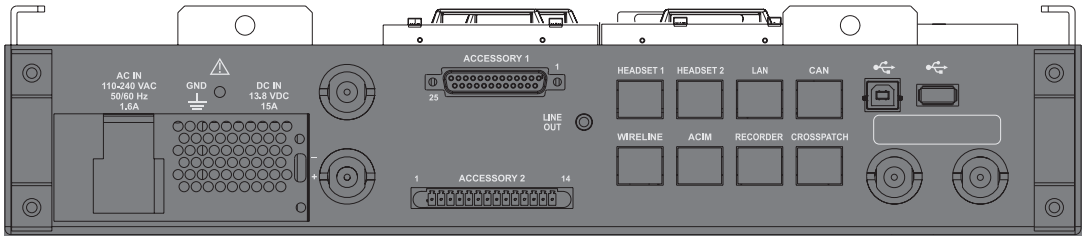


Figure 3-3. Rear Panel

3.5 Power and Ground Connection

3.5.1 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 xiii for additional grounding recommendations.

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.

This equipment is designed to permit the connection of the earthed conductor of the D.C. supply circuit to the earthing conductor at the equipment.

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

NOTE: Positive ground DC is not supported.

3.5.2 AC Power Input

The Consolette power supply is auto-switching and supports a nominal 110-220VAC input, 50-60Hz via a standard IEC 320 power inlet.

1. Install the Consolette as described in section 3.3, "Station Mounting Procedures," on page 3-1.
2. The Consolette power supply is auto-switching. Setting of a switch for 110VAC or 220VAC operation is not required.
3. Connect the female plug of the AC line cord supplied with the Consolette to the AC input power connector on the rear panel of the Consolette. See Figure 3-3., "Rear Panel," on page 3-3.
4. 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.
5. 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.
6. The power-on LED on the front of the Consolette will be lit green when the unit is powered from an AC source.

3.5.3 DC Input Power (Optional)

Connection of DC input power to the Consolette is offered as an option. The Consolette power supply supports a DC input of 13.8VDC +/- 10%.

1. First, install the Consolette as described in section 2.3, "Station Mounting Procedures," on page 2-1.
2. An external inline fuse is required when DC power is used. Connect the mobile power cable 3085059D05 with the inline 20 Amp fuse to the standard mobile radio connector on the rear of the Consolette marked “DC”. See Figure 3-3., "Rear Panel," on page 3-3.

NOTE: Top and bottom pins of “DC” are the negative and positive terminals, respectively, and are marked with a “-“and a “+”.

3. Connect the mobile power cable 3085059D05 leads to the battery.

NOTE: The ground pin of the battery connector on the Consolette is connected to earth (chassis) ground. As is the case with connecting any battery, care must be taken when connecting up the Consolette – red to red, black to black. Damage to all of the equipment could occur if the connections are incorrect.

4. The DC power does not pass through the ON/OFF rocker switch of the power supply, so the Consolette will be powered “on” as soon as DC input power is applied (or takes over upon loss of AC).
5. The power-on LED on the front of the Consolette will be lit amber when the unit is powered from a DC source. Refer to section 4.18 for information regarding an AC Power Fail alert when powered using DC.

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.

3.6 Power On/Off

3.6.1 Power On/Off using an AC source

To power on the Consolette using an AC source, first apply AC power to the rear of the unit per the installation instructions in 3.5.2, "AC Power Input," on page 3-4. Then move the rocker switch on the rear panel from the “O” to the “I” setting. The Consolette will now power up and is operational. If equipped with an O5 control head, the Consolette will display the factory default Zone and Channel on the O5 display after power up.

The factory default setting of the Ignition Switch is set to “Ignition Only Power-Up” in Consolette models. With this configuration, when there is a loss of AC power, the Consolette will automatically turn back on when AC power is restored. Move the rocker switch on the rear panel from “I” back to “O” to remove AC power from the unit. The unit will now power off as long as there is no DC input to the Consolette.

NOTE: Previous models of the Consolette required the AC cord to be removed in order to turn off the unit. This is no longer required with the new Consolette.

3.6.2 Power On/Off using a DC source

To power on the Consolette using a DC source, apply DC power to the rear of the unit per the installation instructions in 3.5.3, "DC Input Power (Optional)," on page 3-5.

NOTE: The ON/OFF power button located on the O5 control head is disabled before shipment; therefore, the Consolette is immediately operational when a DC source is provided to its rear panel input. To enable the ON/OFF power button on the O5 control head, refer to the information in 3.6.3, "Power On/Off using the O5 Control Head," on page 3-6

NOTE: The ON/OFF rocker switch on the rear of the Consolette has no effect on the unit when it is powered using a DC source.

The Consolette will now power up and is operational. If equipped with an O5 control head, the Consolette will display the factory default Zone and Channel on the O5 display after power up.

To power down, remove the DC source from the rear of the unit by disconnecting the 3085059D05 cable from the rear of the Consolette.

Refer to section 3.6.4 for information regarding using the DC source as a backup to the AC source and refer to Section section 3.7.1.1.7 for more information on configuring the radio codeplug for this setting.

3.6.3 Power On/Off using the O5 Control Head

The Power On/Off button integrated into the O5 control head on the front of the Consolette is disabled by factory default. This button can be enabled in the radio codeplug by setting the Ignition Switch setting to “Blank” using APX 7500 CPS. Note that while in this configuration, the user must press the Power On/Off button to turn on the unit. In the event there is a loss of AC power, the unit will remain OFF until the user presses the Power On/Off button to re-enable the Consolette.

Refer to Section section 3.7.1.1.7 for more information on configuring the radio codeplug for this setting.

3.6.4 Power Supply Battery Revert Operations

The Consolette power supply supports a battery revert operation. Battery revert operation is the ability for the power supply to automatically switch to the DC input in the event that AC input power is interrupted, without causing any interruption to Consolette operation.

First connect the AC source per the installation instructions in section 3.5.2. Next connect the DC source per the installation instructions in section 3.5.3.

When both an AC signal and a DC signal are present, the AC signal will be used by the power supply to provide the DC outputs needed by the Consolette. There is no charging capability on this connection.

If a battery is connected to the DC input of the Consolette, the Consolette will remain powered via the battery in the event that AC is interrupted or if the rocker switch on the rear panel is moved to the Off position (thus disconnecting the AC input).

3.7 Programming the Consolette

Programming and setup of the Consolette is required prior to use. Initial programming involves two programming methods:

i. Setup of the transceiver codeplug using the APX 7500 CPS

ii. Setup of the internal Consolette controller card using a web browser to access the built-in Configuration App.

NOTE: All programming can be accomplished without removal of the Consolette lid.

Prior to programming the Consolette, it is recommended that the Consolette be taken off-line. This could include temporarily refraining from using the unit or physically disconnecting the unit from any remote control source such as a Tone Remote Control deskset.

3.7.1 APX 7500 CPS Programming

The APX 7500 CPS application is used for set up of the transceiver features including transmit and receive frequencies, the zones and channels, the conventional and trunking personalities, and the O5 display. This requires the GCAI USB cable, HKN6184A, for connection between the PC and either the GCAI connector on the O5 control head or on the auxiliary GCAI connector on the front panel of the Consolette.

For details on the operation of the transceiver and its settings, refer to the APX 7500 Mobile Detailed Service Manual (6875963M01) and the APX 7500 O5 Control Head Mobile Radio User Guide (6875947M01). The transceiver codeplug supports additional features that are not applicable to Consolette users including Siren operation, DVRS operation, and Multi-Control Head operation. Default codeplugs have these features disabled and it is recommended that they remain disabled.

Additionally, the APX 7500 CPS application is used to Flash upgrade the O5 control head, the mobile radio, and the Consolette controller card firmware – See section 3.7.1.2.

3.7.1.1 Radio CPS settings specific to Consolette

3.7.1.1.1 Programming the APX Consolette for Consolette Enabled

Consolette codeplugs should be configured as Consolette Enabled to ensure proper error reporting.

In APX Mobile CPS:

Radio Ergonomics Configuration → Radio Ergonomics Wide → Advanced Tab:

- **Check** - Consolette Enable

3.7.1.1.2 Programming the APX Consolette to pass MDC Data

In some Consolette configurations it may be desirable to configure the Consolette to pass the MDC data burst to the external rear panel audio outputs (Wireline, Rx Audio, etc.) – For example, if MDC ID's are viewed at the Front Panel control head display or if they are passed to a console via the ACIM interface.

NOTE: With this configuration the MDC data burst will also be heard at the local speaker and headset.

In APX Mobile CPS:

Conventional Configuration → Conventional System → Features Tab:

- **Disable** - Data Operated Squelch (DOS)

Conventional Configuration → Conventional Personality → Rx Options Tab:

- **Rx Unmute Delay (ms)** – Set this value to 0 or some value less than or equal to the “MDC System Pretime” configured in the transmitting subscribers radios.

3.7.1.1.3 Programming the APX Consolette to MUTE the MDC data burst

In some Consolette configurations it may be desirable to configure the Consolette to MUTE the MDC data burst at the external rear panel audio outputs (Wireline, Rx Audio, etc.) and local speaker. For example, if MDC ID's are viewed at the Front Panel control head display or if they are passed to a console via the ACIM interface.

In APX Mobile CPS:

Conventional Configuration → Conventional System (MDC) → Features Tab:

- **Enable** – Data Operated Squelch (DOS)

Conventional Configuration → Conventional Personality → Rx Options Tab:

- **Rx Unmute Delay (ms**) – Set this to a value sufficiently greater than the “MDC System Pretime” configured in the transmitting subscribers radios.

When properly configured, the combination of these two fields will mute all the Consolette speakers and audio outputs for receive calls during pre-time and the MDC burst.

3.7.1.1.4 Programming the APX Consolette for PTT-ID Display

To enable PTT-ID display at the Front Panel control head and PTT-ID reporting on the ACIM link, PTT-ID display must be enabled.

In APX Mobile CPS:

Radio Ergonomics Configuration → Display → ID Display Tab:

- **PTT-ID Display** – Set to ”Dispatch”

3.7.1.1.5 Programming the APX Consolette for Emergency Alarm and Emergency Call Rx

The Consolette supports Emergency Alarm and Emergency Call decode on MDC, ASTRO Conventional, ASTRO 25 Trunking and Type II Trunking signalling types. A general purpose output can be enabled to activate when an Emergency Alarm is decoded.

NOTE: The Consolette’s transceiver can only detect trunking Emergency Alarms when on the control channel. If the Consolette is on a voice channel, it will not be able to decode the control channel and will miss the Emergency Alarm. This feature is not recommended for high usage systems where the Consolette is the only device decoding the alarms.

To enable received Emergency Alarm and Emergency Call PTT-ID indications at an ACIM connected Console several APX mobile codeplug fields must be configured.

In APX Mobile CPS:

Conventional Configuration → Conventional System (MDC or ASTRO) → Features Tab:

- **Check** – Emergency Alarm Rx Indicator

- Or for Trunking -

Trunking Configuration → Trunking System → Features Tab:

- **Check** – Emergency Alarm Rx Indicator

Emergency Configuration → Emergency Wide → General Tab:

- **Check** – Emergency Call Receive

Emergency Configuration → Emergency Wide → General Tab:

- **Emergency Alarm Rx Indicator Type** – Display Only**

NOTE: **Configuring this field for "**Alert & Display**" will also cause the Emergency Alarm to be sent to the console; however, the Consolette will also sound an Alert Tone when an Emergency Alarm is decoded which may be undesirable or distracting to the console dispatcher.

Additionally, the Consolette may be configured to activate a VIP Output when an Emergency Alarm is received.

In APX Mobile CPS:

Radio Ergonomics Configuration → Controls → Radio VIPs → General Tab:

- **Radio VIP Output Feature** - Set to "Emergency Alarm Rx"

In the Consolette Configuration:

Consolette Parameters → VIP Configuration → VIP # Output

- Set the corresponding VIP Output to "**Radio Function**"

3.7.1.1.6 Programming the APX Consolette for Extended Dispatch functionality

The Consolette supports a set of features typical of Console operation. These features are allowed on Conventional channels only. The Consolette does not act as a trunked station, and as a result, these features are not supported on Trunking channels. To enable this extended functionality, the Extended Dispatch Operation option (GA00469AA) must be ordered and then the field enabled in the radio APX 7500 CPS on a Conventional System-by-System basis.

Decode functionality includes:

- Emergency Alarm decode with corresponding outbound ACK, Status Update, and Message Update.

Encode functionality includes:

- Radio Enable/Disable, Radio Check, Remote Monitor, and Status Request.

To enable this functionality for a particular system, in APX Mobile CPS:

Conventional Configuration → Conventional System (MDC or ASTRO) → Features Tab:

- **Check** – Extended Dispatch Enable

3.7.1.1.7 Programming the APX Consolette Front Panel power button

The Consolette's Front Panel (control head) power button can be enabled or disabled based on the Ignition setting in the APX Mobile CPS.

To Enable the Front Panel power button – In APX Mobile CPS:

Radio Wide → Features Tab:

- **Ignition Switch** – Set to "Blank"

To Disable the Front Panel power button (Consolette turns on with the Rear Panel power switch) – In APX Mobile APX CPS:

Radio Wide → Features Tab:

- **Ignition Switch** – Set to "Ignition Only Power-Up"

3.7.1.1.8 Programming the APX Consolette Control Head Aux Control Feature

The Consolette's Front Panel (control head) soft menu buttons can be configured to activate VIP outputs on the rear panel (14 pin Terminal Block).

In APX Mobile CPS:

Radio Ergonomics Configuration → Radio Ergonomics Wide → Aux Control Tab:

- Configure Aux Controls 1, 2 and 3 as desired.

Radio Ergonomics Configuration → Controls → Radio VIPs → General Tab:

- **Radio VIP Output Feature** – Set to ”Aux Control 1, 2 or 3”

In the Consolette Configuration:

Consolette Parameters → VIP Configuration → VIP # Output

- Set the corresponding VIP Output(s) to ”Radio Function”

3.7.1.1.9 Programming the APX Consolette for Call Alert Decode

The Consolette can be programmed to decode Call Alerts (PAGE) directed to the Consolette’s PTT-ID for a particular system. The user will be alerted at the Consolette front panel control head display.

NOTE: If the ACIM feature is enabled, the Consolette will report all Call Alerts to any PTT-ID on the channel to the console via the ACIM link. The feature does not need to be enabled in the Mobile CPS.

In APX Mobile CPS:

(MDC) Conventional Configuration → Conventional Personality → Non-ASTRO Call Tab:

- **Call Alert Rx/Tx** – Set to ”Decode”(or optionally “Decode & Encode”)

(ASTRO) Conventional Configuration → Conventional Personality → ASTRO Call Tab:

- **Call Alert Rx/Tx** – Set to ”Decode”(or optionally “Decode & Encode”)

(TRUNKING) Trunking Configuration → Trunking Personality → Call/Page Tab:

- **Call Alert/Page Operation** – Set to ”Resp Only” or “List Only” or “Unlimited”

3.7.1.2 FLASHport Updating the Consolette

The APX 7500 CPS application is used to Flash upgrade the O5 control head, the mobile radio, and the Consolette controller card firmware if needed. For more information refer to the APX 7500 Mobile Detailed Service Manual (6875963M01) and the APX 7500 CPS application help screens. A GCAI USB cable (HKN6184A) is required for connection between the PC and either the GCAI connector on the O5 control head or the auxiliary GCAI connector (recommended) on the front panel of the Consolette.

Using the “FLASHport Upgrade” OR “Radio Software Refresh” options (also known as FLASHing), you may select the FLASHport upgrade file. This file is provided by Motorola – See Chapter 9 for Service options.

The “FLASHport Upgrade” process allows the CPS-user to upgrade the mobile radio's System Options, Firmware, Secure Encryption capabilities, and attached accessories (including the control head and Consolette controller card). The “Radio Software Refresh” process allows the CPS-user to refresh the radio's software, without upgrading or modifying the existing radio Features/System Options. Both of these options will include upgrading the Consolette controller card firmware if applicable.

Once the FLASHport Upgrade process begins, follow the prompts of the CPS FLASHport Upgrade Progress Window and the prompts on the Consolette’s Front Panel display(s).

NOTE: During a FLASHport Upgrade of the Mobile Radio, Control Head or Consolette Controller, the Consolette Auxiliary Display may be blank for several seconds and then show "Program Mode" for up to several minutes during the upgrade process. The user should not turn off or reset the unit unless prompted to do so. Full Featured Front Panel models (L999_ option) will show more detailed information on the progress of the Flash upgrade on the O5 Control Head display.

NOTE: In some cases the Consolette may prompt the user for a reset, in other cases the unit will automatically reset after the upgrade has completed. The amount of time to complete the process can vary depending on the number of components being upgraded. Multiple reset cycles may be required during the upgrade process.

3.7.2 Controller Card Configuration using a Web Browser

The Consolette controller card is configured using a standard web browser running on a computer. Additional programming software is not required as the application resides within the Consolette. Supported connection methods include USB and Ethernet.

NOTE: Recommended web browsers include Internet Explorer and Firefox.

3.7.2.1 Establishing a connection to the Consolette: Overview

3.7.2.1.1 Connection by Ethernet.

a. The Consolette may be configured remotely over a LAN. The consolette supports a standard 10/100 Ethernet network interface. Connect the Consolette to the network using a CAT-5 cable from the LAN port on the rear panel of the Consolette.

NOTE: The Consolette default address is the non-routable address 169.254.132.2. The address must be configured appropriately for use on a LAN. The Consolette LAN port supports automatic cable detection and crossover. For initial configuration a computer may be directly connected to the Consolette LAN port with a CAT-5 cable.

3.7.2.1.2 Connection by USB.

a. The Consolette may be locally configured by USB. The Consolette supports a USB/RNDIS networking interface. Connect the Consolette to the PC using the USB device port (the square port) on the back panel of the Consolette.

NOTE: The Consolette default address is 192.168.144.1. For the PC to recognize the Consolette, it is necessary to install the setup information file MotorolaRadioRNDIS.inf on the PC. This is the same file used by other Motorola radios for USB connectivity (e.g. for packet data applications) and may already be present on the PC as it is a file normally installed by the APX Family CPS; however, if Windows cannot locate a driver for the Consolette even though this file is already installed, a newer version of the file may be required.

3.7.2.2 Establishing a connection to the Consolette: Detailed

The APX Consolette is configured from a web-browser, which connects by one of two methods, either remotely over a LAN or locally by USB. Since the Consolette is not initially configured for the customer LAN, extra steps are necessary to make the first connection. The steps below describe how to configure the Consolette.

3.7.2.2.1 Connecting to the Consolette by Ethernet

1. The Consolette defaults to an IP address of 169.254.132.2. This is a "non-routable" address which will not pass through a router on a LAN. It is necessary to configure the Consolette with the correct addresses for the LAN. The Consolette does not support dynamic address assignment (DHCP), it has static addresses. To configure the Consolette, you will need to know the IP address the Consolette will use, the Netmask for the LAN subnet the Consolette will be on, and the Gateway address for the LAN subnet.

   NOTE: The IP address can also be viewed from the Setup menu on the auxiliary display of the Consolette.

2. It is recommended the initial configuration of the Consolette occur while the unit is disconnected from the LAN. Ideally a LAN switch will be available for this purpose. In this case, connect a CAT-5 cable from the switch to the Consolette LAN port on the rear panel, and a second CAT-5 cable from the switch to the LAN port on the PC. As an alternative, the Consolette supports automatic cable detection and crossover. A CAT-5 cable may be connected directly between the Consolette LAN port on the rear panel and the LAN port on the PC. If the PC is on the same physical subnet as the Consolette, it may also be possible to connect the Consolette LAN port to the network. The Consolette, prior to configuration, may cause a network disruption as a device with an improper address; therefore, this is not the recommended method

   NOTE: Some PCs may not support this mode of operation

3. The PC which will be used for initial configuration must temporarily have its IP address set to agree with the Consolette. Perform the following steps:

   I. On the PC, go to Settings/Network Connections/Local Area Connection

   II. Select Internet Protocol (TCP/IP) and click Properties

   III. If the "Use the following IP address" fields are filled in, make a note of the addresses.

   IV. Check "Use the following IP address", and enter 169.254.132.1 in the IP Address field. Enter 255.255.0.0 in the Subnet Mask field. Leave the other fields blank.

   V. Click "OK." Click "Close."

   NOTE: After completing initial configuration of the Consolette, perform the above steps again in order to update the PC by either 1. returning the address to that recorded in step c or 2. selecting "Obtain an IP Address automatically" to return the PC to its original state.

4. Start a browser on the PC. Navigate to http://169.254.132.2:8801. The Consolette welcome screen will appear.

   NOTE: Internet Explorer and Firefox are the recommended browsers for the APX Consolette; however, any browser supporting standard HTML will work.

3.7.2.2.2 Connecting to the Consolette by USB.

1. The Consolette defaults to an IP address of 192.168.144.1. On USB, the Consolette uses the RNDIS protocol. In RNDIS, the device (the Consolette in this case) assigns a network address to the host (the PC), which simplifies setup.

   NOTE: Windows XP operating system or newer required for RNDIS support. RNDIS operation on the Consolette has been validated with Microsoft Windows. RNDIS may be supported on other platforms but has not been verified to work with the Consolette.

2. RNDIS requires a suitable setup file to be installed on the PC for the attached device to be recognized. For the Consolette the required file is MotorolaRadioRNDIS.inf. Copy this file to your PC.
3. The Consolette provides both host and device USB ports. For connection to a PC, the Consolette must act as a device. Connect a standard USB cable from the PC to the square USB port on the Consolette rear panel. Windows should recognize that a device has been connected, and start the New Hardware Wizard. In the New Hardware Wizard, select "Install from a specific location" and click Next. Select "Search for the best driver" and check "Include this location". Navigate to the location you copied the MotorolaRadioRNDIS.inf file. Click Next.

   NOTE: Do not attempt to connect from the rectangular USB port to a PC.

   NOTE: A warning that Windows Logo testing has not been completed may appear. This warning may be ignored, click "Continue Anyway".

   NOTE: An error that Windows cannot find an install file for the hardware may appear. This may be caused if there is an older version of the MotorolaRadioRNDIS.inf file already present on the computer, and Windows attempted to install from that file.

   NOTE: An error that the .inf file is missing a required line may appear. This may be caused if the Windows install has not been updated, and the standard system file netrndis.inf is not present.
4. Start a browser on the PC. Navigate to http://192.168.144.1:8801. The Consolette welcome screen will appear.

   NOTE: Internet Explorer and Firefox are the recommended browsers for the APX Consolette; however, any browser supporting standard HTML will work.

3.7.2.3 Reading the controller card setting from the browser

Upon successful connection to the Consolette, the following notice will be presented to the user:

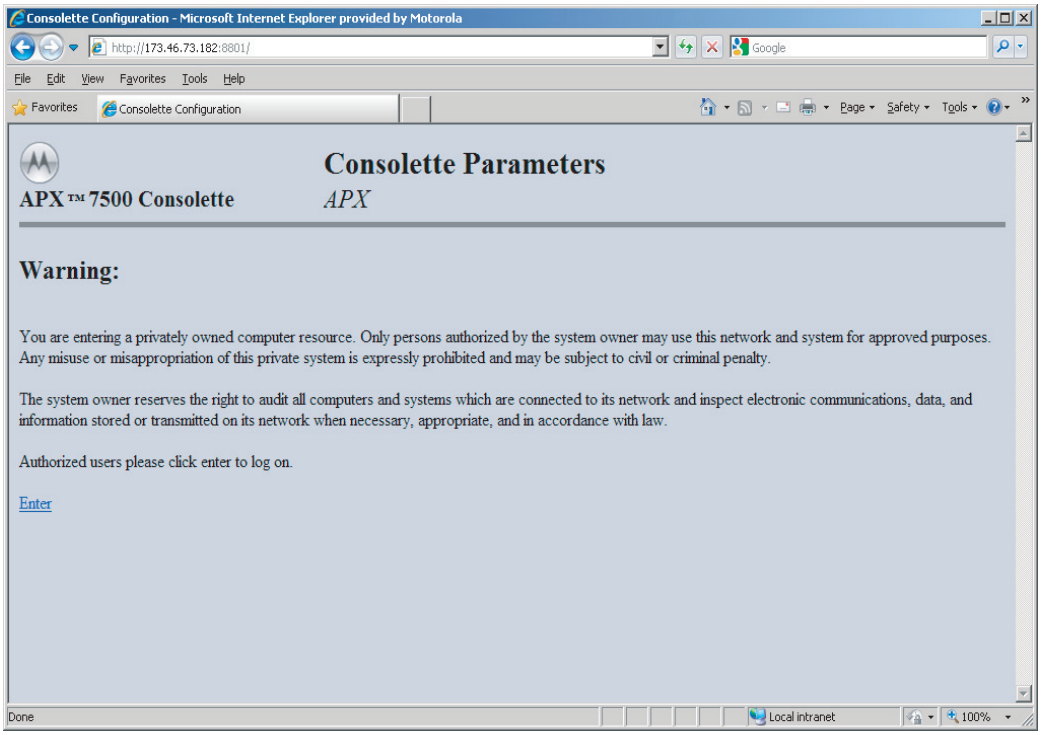


Figure 3-4. Initial Screen

Once the user accepts the terms, the following authentication popup will appear:

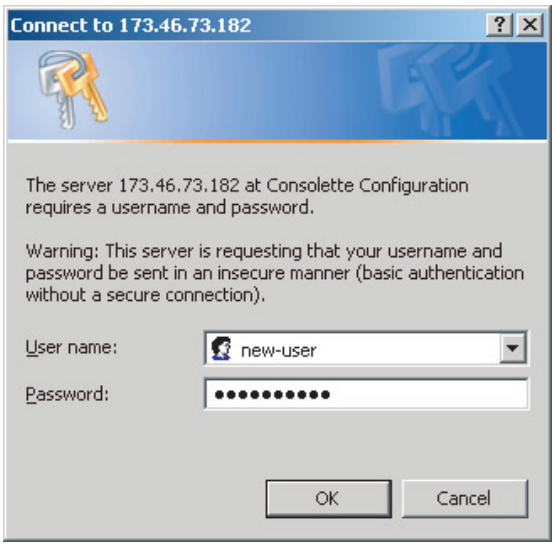


Figure 3-5. Authentication popup

Enter the factory default user name and password as follows:

- User Name: new-user
- Password: serial number of your Consolette with the alphanumeric characters in uppercase (ex. 123ABC4567)

Upon successful login, the Consolette Main Menu Page will appear.

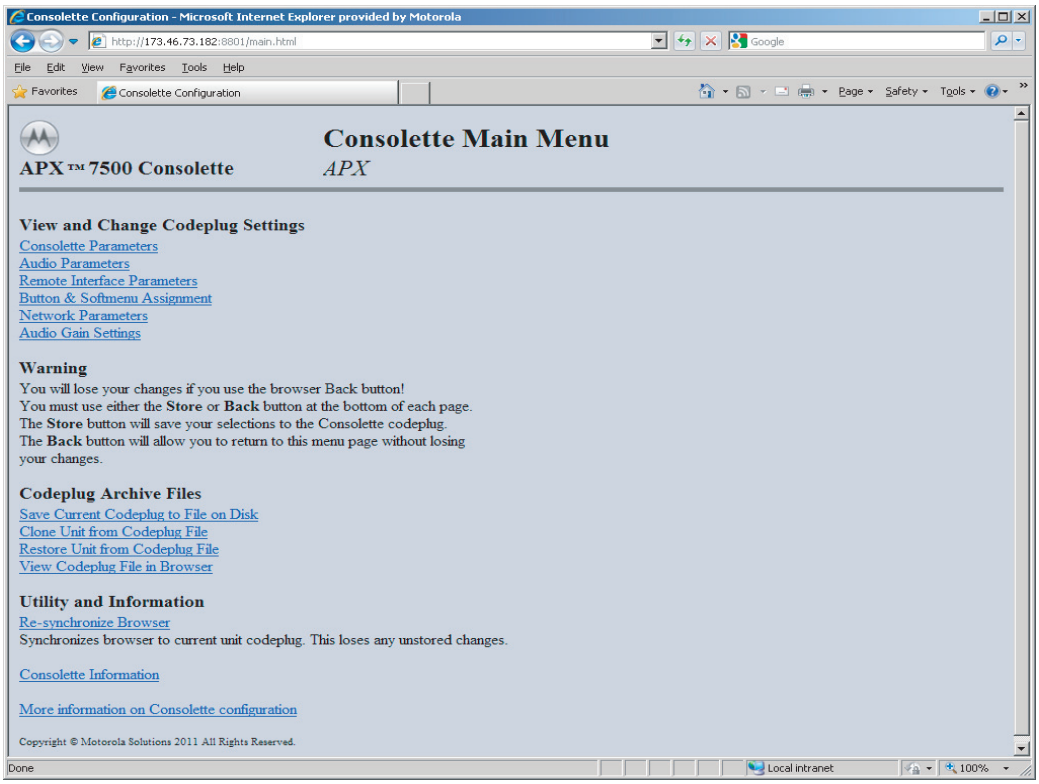


Figure 3-6. Main Menu page

3.7.2.4 Setting a new username and password

For security reasons, the Consolette's username and password should be updated to something other than the factory defaults. To change these parameters, first navigate to the Network Parameters Page (Figure 3-7) by following the link from the Main Configuration Page. Input the new username and password and then select "Store" at the bottom of the page to commit your changes.

At this time you may also wish to set other parameters, as required by the specific install. Click Back to return to the Main Menu, and then navigate to the other parameter pages as necessary. If the username and password were changed in the preceeding step, the authentication popup will appear. Enter the username and password (the newly set username and password) to re-authenticate.

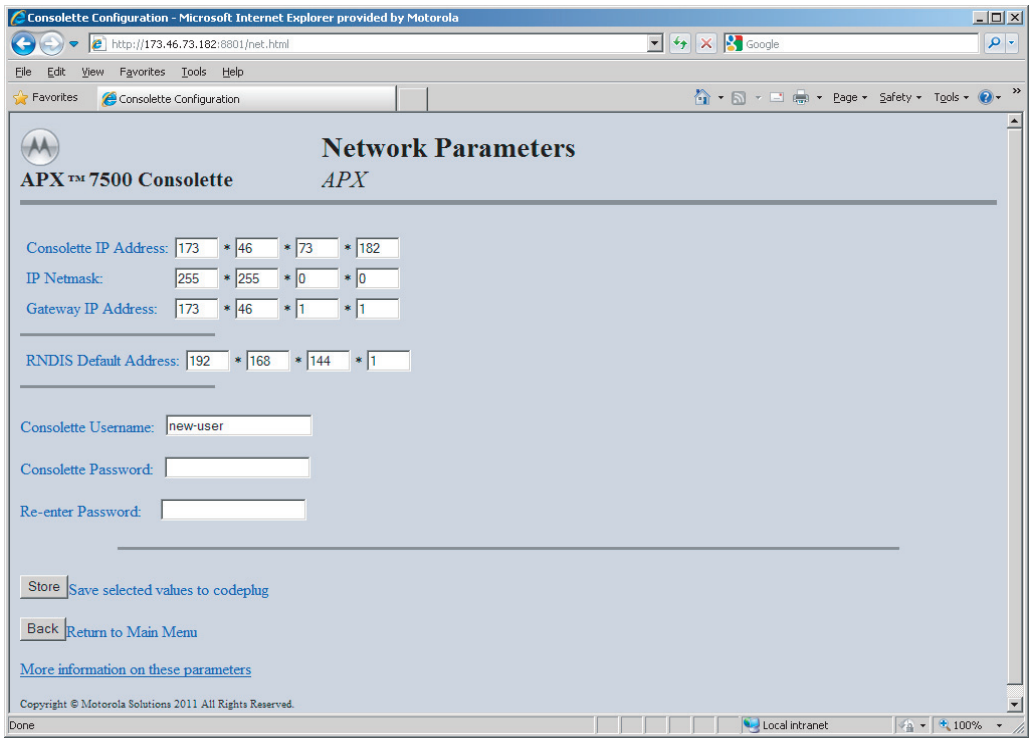


Figure 3-7. Networks Parameters page

3.7.2.5 Assigning a new IP Address:

Assigning a new IP address is not necessary as long as the Consolette is not used on a Local Area Network (LAN). However, if the Consolette is to be connected to a network, the Consolette's network addresses should be configured at this time.

From the Network Parameters Page (Figure 3-7), set the Consolette IP Address field to the address assigned for the Consolette. Set the IP Netmask and Gateway IP Address fields appropriately for the network.

It should not be necessary to change the RNDIS Default Address unless some other device must be connected to the PC which conflicts with the default address.

Click Store to transfer the new settings to the Consolette

NOTE: The IP address can also be viewed from the Setup menu on the auxiliary display of the Consolette.

3.7.2.6 Editing fields and applying the changes to the Consolette:

From the browser, the user can now change the selections of their Consolette controller board. First make the changes and then to transfer the changes to the Consolette select "Store" at the bottom of the web page.

If there are no invalid fields, the changes will be stored immediately. If there are invalid fields, the Consolette will popup a warning to the user. One the items are corrected, select "Store" again to commit the changes.

The "Back" button can be used to navigate between the links without committing the changes.

3.7.2.7 File maintenance on the PC

From the Main Menu page there are links to save the codeplug as a file on the PC; to clone a codeplug file from the PC into a Consolette; to restore a Consolette from a saved codeplug file; or to load a codeplug file into the browser for viewing.

NOTE: "Restoring" includes unit-specific fields such as the IP address. "Cloning" does not include the unit-specific fields. See the help screens for more detail.

NOTE: If the codeplug gets corrupted, or a firmware upgrade changes the codeplug format, the Consolette may automatically revert to a default codeplug. It is good practice to save a copy of the codeplug to file, so it can be reloaded if necessary.

3.7.3 Consolette Setup

This section refers to the user editable fields presented by the Consolette to the user's browser. Note that the exact appearance will depend on the selected parameters. The web pages are shown here with their default parameter settings selected for reference.

NOTE: Follow the "For more information on these parameters" link at the bottom of each page for the most detailed information regarding the fields.

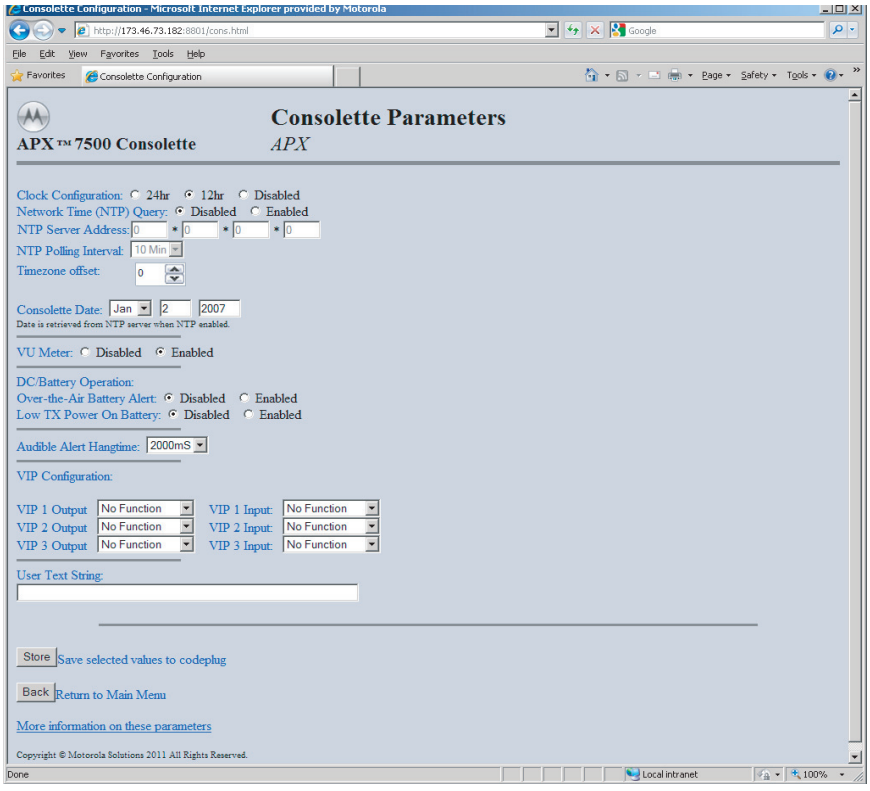


Figure 3-8. Parameter Default Page/Values

Figure 3-9. Audio Parameters Page

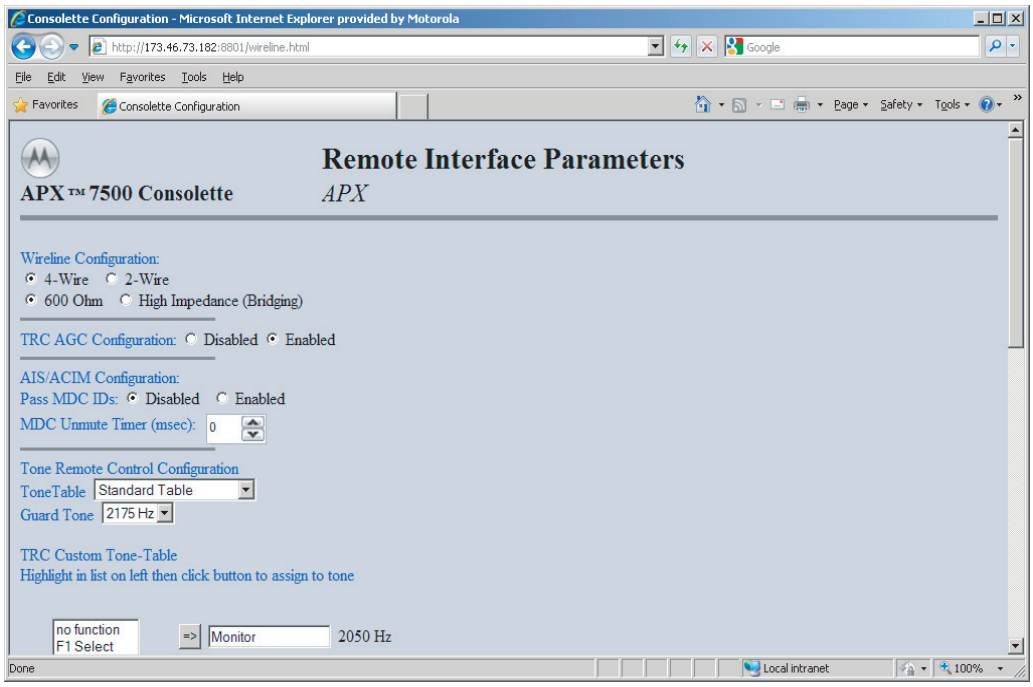


Figure 3-10. Top half of Remote Interface parameters page

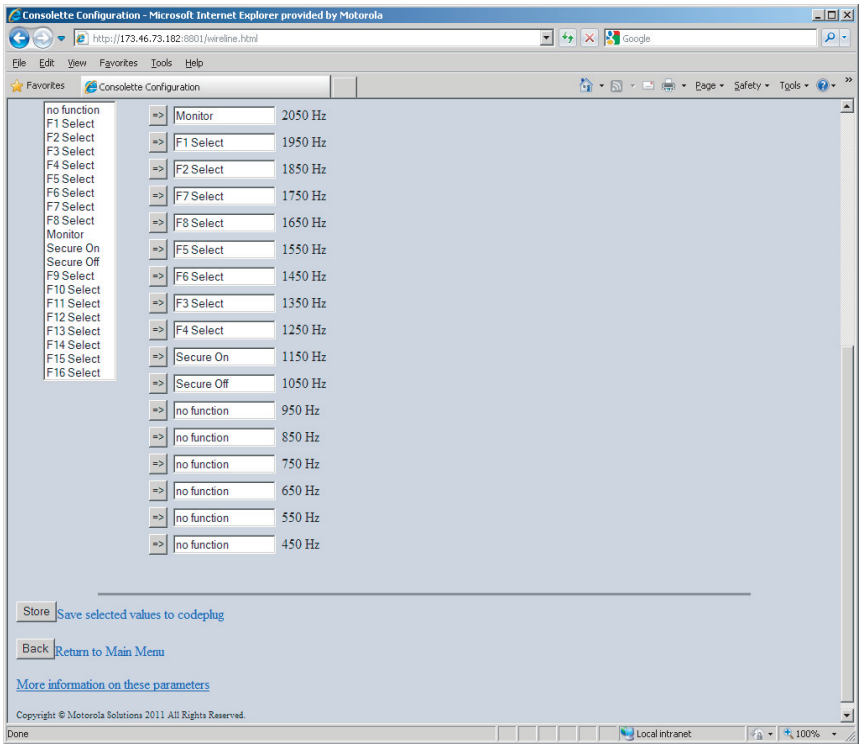


Figure 3-11. Lower half of Remote Interface parameters page

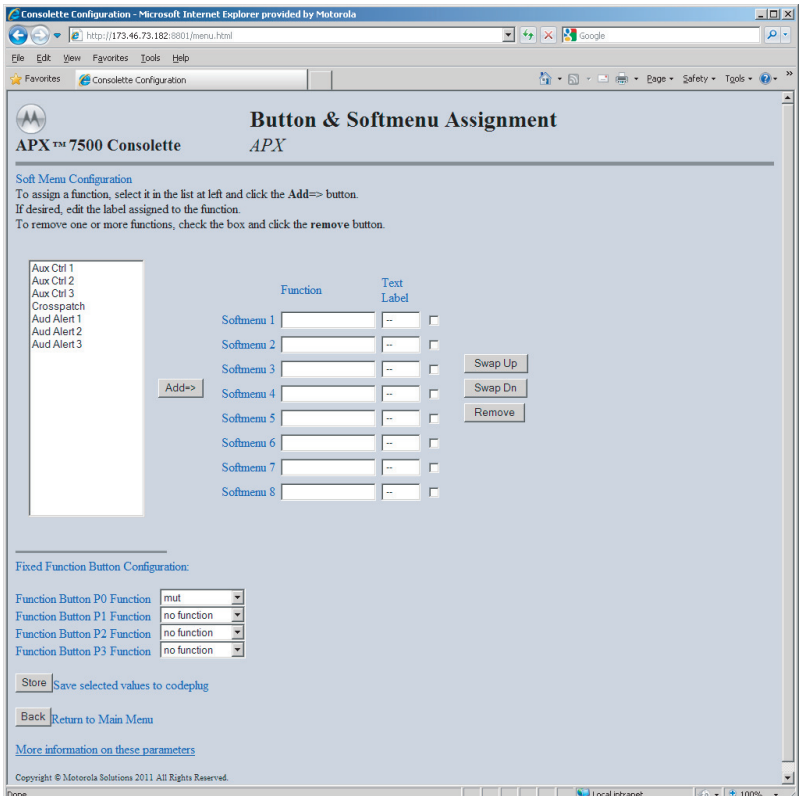


Figure 3-12. Softmenu Assignment Page

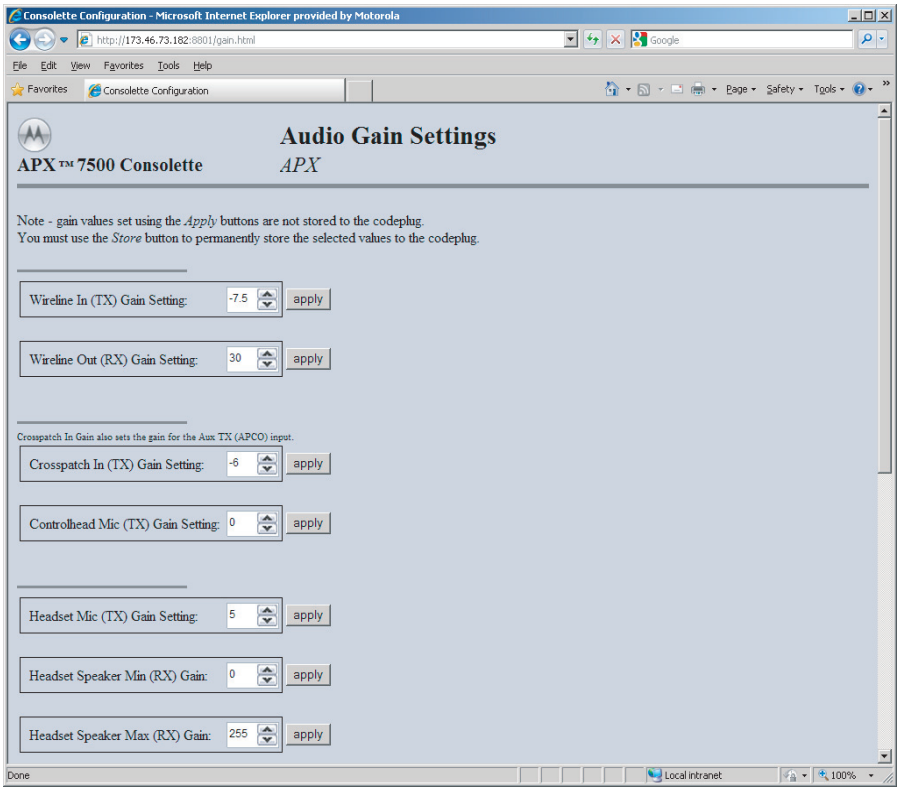


Figure 3-13. Audio Gain Settings Page (Top Page)

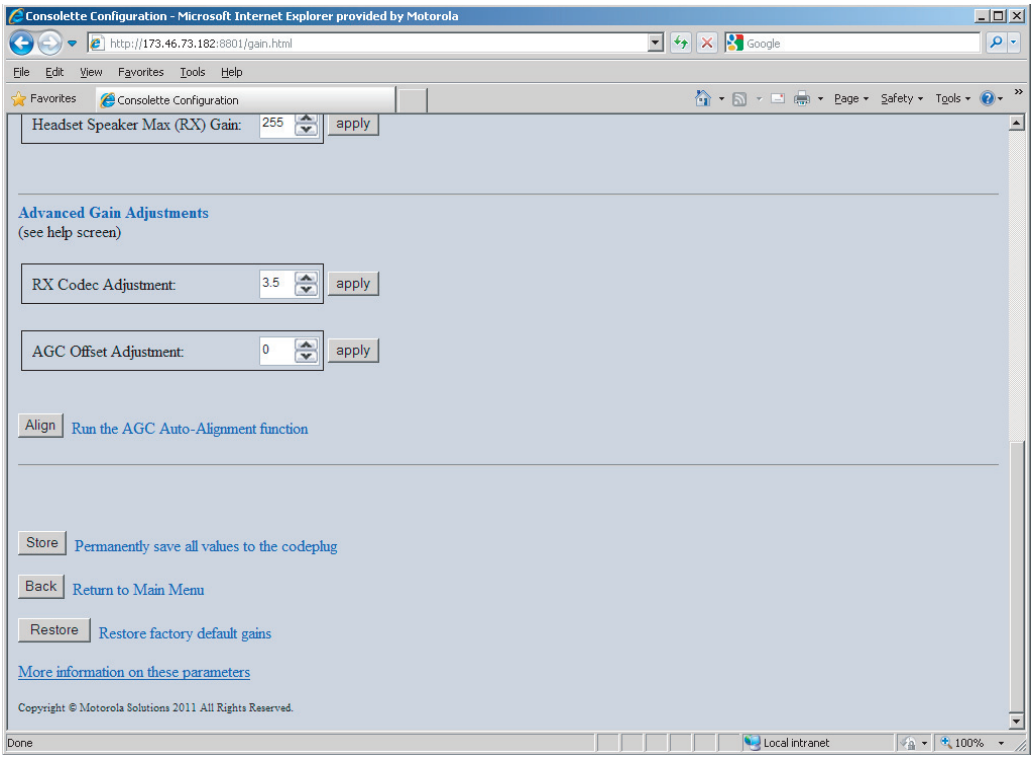


Figure 3-14. Audio Gain Settings Page (Bottom Page)

3.7.3.1 Remote Control via TRC Setup

The Consolette can be remotely controlled using Tone Remote Control (TRC). Refer to section 4.12.2 for more details on this operation.

To configure the Consolette for TRC operation, first enable TRC by selecting “TRC” under “Wireline Function” in the Audio Parameters Page (Figure 3-9). The user can also configure the unit for 2-wire or 4-wire operation, 600-ohm or High Impedance, and TRC AGC Configuration from the Remote Interface Parameters Page (Figure 3-10 and Figure 3-11). Additionally from this page, a predefined tone table can be selected or if necessary, a custom tone table can be created.

Also refer to section 3.7.3.4.13 (Transmit Priority Operation). It is recommend for Remote Control via TRC that Wireline is set as the priority input.

3.7.3.1.1 Audio Tuning - Wireline

The Consolette ships from the factory with the Wireline Out (RX) and Wireline In (TX) Gain Settings adjusted for operation with the specific mobile shipped inside the station. Typically, the Wireline Out (RX) Gain Setting has a nominal value of 29 and the Wireline In (TX) Gain Setting has a nominal value of -13.5 dB, although the values could vary slightly from unit to unit. These gains are user adjustable from the Audio Gain Settings Page (Figure 3-13). Refer to section 3.7.3.3.3 and section 3.7.3.3.4 for information regarding Wireline transmit and receive tuning using the hardware PTT signal.

With AGC Enabled (Applicable to TRC Operation Only), the Consolette ships from the factory with the “AGC Offset Adjustment” in the Audio Gain Settings Page adjusted for operation with the specific mobile with which it shipped. Adjustment in the field is generally not necessary, but may be required in the event that the mobile within the Consolette is repaired or replaced.

The Consolette supports a built-in Auto-Alignment feature for tuning of the AGC Offset Adjustment field. The alignment procedure consists of causing the Consolette to transmit a 1kHz tone at nominal deviation (3kHz deviation for a 25kHz channel), then activating the Auto-Alignment feature. When Auto-Alignment is activated, the Consolette will measure the level of the 1kHz tone, then calculate and save the appropriate AGC Offset Adjustment value.

The following procedure describes performing the Auto-Alignment using the Wireline TX input. However, any TX audio input may be used by injecting audio at a level appropriate for the desired input and activating the corresponding PTT signal.

1. Connect the Consolette’s RF output through an appropriate load to equipment capable of measuring RF deviation.
2. Select an analog channel on the Consolette.
3. On the Audio Parameters page of the Configuration Application, set Wireline Function to “Hardware PTT”, then click the “Store” button.
4. Generate a 1 kHz audio signal at 775mVrms from a 600 Ohm source to Wireline LINE2+ and LINE2- (if the Wireline is configured for 4-wire operation) or LINE1+ and LINE1- (for 2-wire operation). Note: 775mVrms is 0dBm across 600 Ohms.
5. In the Configuration Application, navigate to the Audio Gains page and then click the “Align” button under the AGC Offset Adjustment field. The AGC Auto Alignment page will be displayed.
6. Key up the Consolette by activating the APCO PTT signal on the Accessory 1 rear connector.
7. Measure the deviation of the transmitted signal, and adjust the amplitude of the injected 1kHz tone until nominal deviation is observed (3kHz for a 25kHz channel).
8. In the Configuration Application, on the AGC Auto Alignment page, click the “Start” button. A new page will be displayed indicating that the alignment has been completed, at which point the new AGC Adjustment Offset value has been stored to the codeplug.

9. Dekey the Consolette by deactivating the APCO PTT signal.
10. On the Audio Parameters page of the Configuration Application, restore Wireline Function to the previous or desired value, then click the “Store” button.

3.7.3.2 Remote Control via ACIM Setup

The Consolette can be remotely controlled from a Console supporting the RS232-based ACIM port. Refer to section 4.12.3 for more details on this operation. In the Audio Parameters Page (Figure 3-9), first enable the ACIM interface on the Consolette by selecting “ACIM” under the “Wireline Function” section. The user can also configure the unit for 2-wire or 4-wire operation and 600-ohm or High Impedance from the Remote Interface Parameters Page (Figure 3-10 and Figure 3-11).

Reporting of the MDC-1200 IDs can be enabled on this page as well.

NOTE: Some systems utilize external MDC-1200 decoders and prefer to have this field disabled.

Also refer to section 3.7.3.4.13 (Transmit Priority Operation). It is recommend for Remote Control via ACIM that Wireline is set as the priority input.

3.7.3.3 Remote Control via E&M Setup

The Consolette supports a PTT input (PTT*) on its rear panel. The associated audio path for this PTT input is defaulted to the single ended audio signal (AUX_TX) located on the DB25 connector on the Consolette rear panel. To instead use the balanced wireline audio path with this PTT input, select “Hardware PTT” for the “Wireline Function” in the Audio Parameters Page (Figure 3-9) and set the “TRC AGC Configuration” to “Disabled” in the Remote Interface Parameters Page (Figure 3-10 and Figure 3-11). The user can also set up the wireline for 2-wire or 4-wire operation, and 600-ohm or High Impedance operation from this page.

Also refer to section 3.7.3.4.13 (Transmit Priority Operation). It is recommend for Remote Control via E&M that Wireline is set as the priority input.

3.7.3.3.1 Transmit Audio Tuning - AUX_TX

The Consolette ships from the factory with the “Crosspatch In (TX) Gain Setting” at a nominal -6 dBm. This gain is user adjustable from the Gain Adjustments Page (Figure 3-13).

To adjust the transmit tuning of the AUX_TX path on the Consolette, first make sure that the “Crosspatch-Hardware PTT Selection” located in the Audio Parameters Page (Figure 3-9) is set to “Hardware PTT (Aux Tx)”. Next, generate a 1 kHz signal at 300mVrms from a 600 Ohm source into AUX_TX while asserting the PTT* signal. Measure the deviation of the received RF signal. Adjust the “Crosspatch In (TX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug.

3.7.3.3.2 Receive Audio Tuning - RX_AUDIO

The Consolette ships from the factory with the "RX Codec Adjustment" set at a nominal 4 dBm. This gain is user adjustable from the Gain Adjustments Page (Figure 3-13).

To adjust the receive tuning of the RX_AUDIO path on the Consolette, first generate an on-frequency signal modulated with a 1 kHz tone at 60% rated system deviation. See the table below for the deviation levels for each channel spacing:

Table 3-1. RX_Audio Deviation Levels

Channel Spacing	Rated System Deviation	60% Rated System Deviation
12.5 kHz	2.5kHz	1.5kHz
20 kHz	4.0 kHz	2.4 kHz
25 kHz	5.0 kHz	3.0 kHz

Connect to the RX_AUDIO path and measure the audio level. The output is nominally 300 mVrms. Adjust the “RX Codec Adjustment” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug.

3.7.3.3.3 Transmit Audio Tuning - Wireline

The Consolette ships from the factory with the “Wireline In (TX) Gain Setting” at a nominal -13.5 dBm. This gain, which is user adjustable from the Gain Adjustments Page (Figure 3-13), is used by the Consolette when the TRC AGC is disabled. To disable the TRC AGC, set the “TRC AGC Configuration” to “Disabled” in the Remote Interface Parameters Page (Figure and Figure 3-11).

To adjust the transmit tuning of the Wireline path on the Consolette when AGC is disabled, first make sure that the “Wireline Function” located in the Audio Parameters Page (Figure 3-9) is set to “Hardware PTT”. Next, generate a 1 kHz signal at 0dBm from a 600 Ohm source to LINE2+ and LINE2-. Note: 0dBm across 600 ohms is 775mVrms. Assert the PTT* signal and measure the deviation of the received RF signal. Adjust the “Wireline In (TX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug.

3.7.3.3.4 Receive Audio Tuning – Wireline

The Consolette ships from the factory with the “Wireline Out (RX) Gain Setting” at a nominal value of 29. This gain is user adjustable from the Gain Adjustments Page (Figure 3-13)

To adjust the receive tuning of the Wireline path on the Consolette, first generate an on-frequency signal modulated with a 1 kHz tone at 60% rated system deviation. See the table below for the deviation levels for each channel spacings:

Table 3-2. Wireline Deviation Levels

Channel Spacing	Rated System Deviation	60% Rated System Deviation
12.5 kHz	2.5kHz	1.5kHz
20 kHz	4.0 kHz	2.4 kHz
25 kHz	5.0 kHz	3.0 kHz

Connect to the LINE1+ and LINE1- path (J21 pins 3 and 6) and measure the audio level across a 600 ohm impedance load. The output is nominally 0 dBm (775 mVrms). Adjust the “Wireline Out (RX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug.

3.7.3.4 Rear Panel Setup

3.7.3.4.1 Headset Setup

On the Audio Parameters Page (Figure 3-9) there is the “Headset Speaker Volume Ratio” field. This field provides 3 different volume ratios to the front panel speaker volume. This provides a way to avoid needing to constantly adjust the Consolette volume knob when switching between the use of headsets and the front panel speaker. Selections are:

- 1:1 – the headset volume has the same range of the rotary knob as the front panel speaker
- 1.5:1 – the headset volume reaches maximum volume at 66% of front panel speaker maximum
- 2:1 – the headset volume reaches maximum volume at 50% of front panel speaker maximum

3.7.3.4.2 Receive Audio Settings - Headsets

The Consolette supports a minimum and maximum setting for the rear panel headset speaker volumes. The Consolette ships from the factory with the “Headset Speaker Min (RX) Gain” Setting at a value of 0 and the “Headset Speaker Max (RX) Gain” Setting at a value of 255. These values are user adjustable from the Gain Adjustments Page (Figure 3-13).

To adjust these settings for the headset path(s) on the Consolette, connect a headset to one of the headset paths on the rear panel and listen to normal voice audio. Adjust the rotary knob of the O5 control head volume level to a nominal level.

Adjust the “Headset Speaker Min (RX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug. Similarly, adjust the “Headset Speaker Max (RX) Gain Setting”.

3.7.3.4.3 Transmit Audio Tuning - Headsets

The Consolette ships from the factory with the “Headset Mic (TX) Gain Setting” at a nominal 5 dBm. This gain is user adjustable from the Gain Adjustments Page (Figure 3-13).

To adjust the transmit tuning of the Headset path on the Consolette, first generate a 1 kHz signal at 80mVrms from a 50 Ohm source into HDST1_MIC+ while asserting the HDST1_PTT* signal. Measure the deviation of the received RF signal. Adjust the “Headset Mic (TX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug. This Headset Mic (TX) Gain Setting applies to both Headset 1 and Headset 2.

3.7.3.4.4 Crosspatch or APCO PTT Setup

From the Audio Parameters Page (Figure 3-9), the field “Crosspatch-Hardware PTT Selection” can be used to configure either the Crosspatch interface or the rear panel Hardware PTT (APCO PTT) interface. These features cannot be enabled simultaneously.

None - This selection disables both Crosspatch and Hardware PTT (Aux Tx).

Crosspatch (Menu Selectable) – With this selection a button may be programmed to enable or disable Crosspatch from the front panel. If a Crosspatch button is not programmed, the feature will be disabled.

Crosspatch (Always Enabled) – With this selection the Crosspatch feature is always enabled.

Hardware PTT (Aux Tx) – This selection enables the rear panel Hardware PTT input where transmit audio is input at the rear panel Aux Tx pin. The Hardware PTT (Aux Tx) selection is incompatible with the Wireline Function "Hardware PTT" selection. If the Wireline Function "Hardware PTT" is enabled when Hardware PTT (Aux_Tx) is selected the Wireline Function will be forced to "None".

3.7.3.4.5 Transmit Audio Tuning – Crosspatch

The Consolette ships from the factory with the “Crosspatch In (TX) Gain Setting” at a nominal -6 dBm. This gain is user adjustable from the Gain Adjustments Page (Figure 3-13).

To adjust the transmit tuning of the Crosspatch path on the Consolette, first make sure that the “Crosspatch-Hardware PTT Selection” located in the Audio Parameters Page (Figure 3-9) is set to “Crosspatch (Always Enabled). Next, generate a 1 kHz signal at 300 mVrms from a 600 Ohm source into CP_AUX_TX and key the unit using the CP_PTT* signal. Measure the deviation of the received RF signal. Adjust the “Crosspatch In (TX) Gain Setting” field to increase or decrease the corresponding gain, then hit “apply” to see the result. Continue to adjust as necessary by selecting the up arrow or the down arrow and selecting the “apply” button. Once you have obtained the final setting, then hit “Store” at the bottom of the page to commit the new gains to the Consolette codeplug.

3.7.3.4.6 Over-the-Air Alert Tones Setup

From the “Button & Softmenu Assignment” Page, the user can assign an over-the-air alert tone to any buttons. The alert tone can be assigned to multiple buttons.

- To assign an alert tone to a softkey menu button, select the alert tone (e.g. Aud Alert 1) from the list on the left and click the “Add” button.
- To assign an alert tone to a dedicated programmable (side) button, select the alert tone from the pull-down menu of the corresponding side button.

Once all selections have been made, click the “Store” button to save the selections.

The user can change the “Audible Alert Hangtime” value. The default hangtime is 2 seconds (2000 milliseconds). From the “Consolette Parameters” Page, select the desired “Audible Alert Hangtime” value from the pull-down menu. Click the “Store” button to save the selection.

3.7.3.4.7 Battery (AC Power Fail) Alert Tone Setup

From the “Consolette Parameters” Page, the user can enable the over-the-air battery alert. Select the “Enabled” radio button for the “Over-the-Air Battery Alert” field. Click the “Store” button to save the selection.

3.7.3.4.8 Low TX Power on Battery Operation Setup

From the “Consolette Parameters” Page, the user can enable low TX power while operating on DC (battery) power. Select the “Enabled” radio button for the “Low TX Power On Battery” field. Click the “Store” button to save the selection.

3.7.3.4.9 Recorder Setup

From the Audio Parameters Page (Figure 3-9), the user can enable the output to an external recorder as well as select the audio content.

There are three configurations for the recorder:

- Record Off – when selected, the recorder output will remain muted.
- Record RX Only – when selected, the recorder output will contain receive audio and tones only.
- Record RX + TX – when selected, the recorder output will contain both receive audio and tones and transmit audio.

3.7.3.4.10 External PA Setup

From the Audio Parameters Page (Figure 3-9), the user can enable the output to an external public address system as well as select the audio content.

There are four configurations for the Public Address Amplifier Audio output:

- Output Off – when selected, the external public address audio output will remain muted.
- Output RX Only – when selected, the external public address output will contain receive audio only.
- Output RX + TX – when selected, the external public address output will contain both receive audio and transmit audio.
- Output RX + TX (with tones) – when selected, the external public address output will contain both receive audio and tones and transmit audio.

3.7.3.4.11 VIP Setup

From the Consolette Parameters Page (Figure 3-8), there is a VIP Configuration section where the user can configure up to 3 VIP Inputs and 3 VIP Outputs.

VIP Outputs: The function performed by each may be assigned here from the pull-down menu. Some VIP functions are performed by the radio internal to the Consolette. When these functions are to be used the function "Radio Function" should be selected and the VIP function should be programmed using APX 7500 CPS.

To enable VIP actuation from one of the Consolette programmable buttons to the left of the auxiliary display, select “Button Control” and the Button function should be programmed accordingly. (Refer to section 3.7.3.5.6 for more information on the available Button functions.)

If the VIP is not to be used, it is recommended that it remain assigned "No Function".

VIP Inputs: The VIP inputs are currently handled by the radio internal to the Consolette. Select “Radio Function” and the VIP function should be programmed using APX 7500 CPS.

If the VIP input is not to be used, it is recommended that it remain assigned “No Function”.

3.7.3.4.12 External Speaker Setup

From the Audio Parameters Page (Figure 3-9), the external/remote speaker can be configured to either mute when the front panel speaker is muted or not.

There are two configurations for the external/remote speaker:

- Tracks Internal Speaker – when selected, the external/remote speaker will mute/unmute when the front panel speaker mutes/unmutes.
- Does Not Mute – when selected, the external/remote speaker will operate normally and will not mute when the front panel speaker is muted by the user.

Also note that from the APX 7500 CPS, the external speaker can be set to have a fixed volume level or be controlled via the volume knob on the O5 control head.

3.7.3.4.13 Transmit Priority Operation

There are several transmit inputs to the rear panel of the Consolette. From the Audio Parameters Page (Figure 3-9) using the “Rear Panel Priority” field, a higher priority can be given to one of the inputs (Headset, Wireline, or Crosspatch/APCO). When “None” is selected, the priority remains “first come first served.”

3.7.3.5 Front Panel Setup

3.7.3.5.1 Front Panel Microphone Setup (Available with Option L999_)

The Consolette ships factory defaulted for use with a paddle mic connected to the O5 Control Head. If the Consolette is intended to be used without a microphone connected to the O5 Control Head, then the Default Control Head HUB State must be configured as On Hook in the APX mobile CPS.

In APX Mobile CPS:

Radio Ergonomics Configuration → Radio Ergonomics Wide → Advanced Tab:

- **Default Control Head HUB State** – Select "On Hook"

NOTE: This field is ignored if a microphone is connected to the control head CGAI connector. The Consolette will follow the HUB state of the microphone.

3.7.3.5.2 Speaker Mute Setup (Available with Option L999_)

There is a dedicated button on the front panel of the Consolette for muting the local speaker. From the Audio Parameters page (Figure 3-9), this button can be configured for momentary operation or latching operation. For momentary operation, select a duration in the pull-down menu for the “Timed Mute Duration” field. For latching operation, select “Infinite” in the pull-down menu for the “Timed Mute Duration” field.

The associating mute LED on the front panel can be enabled or disabled here too if necessary by selecting either “Enabled” or “Disabled” for the “Mute Button LED” setting.

3.7.3.5.3 Clock Setup

The Consolette will display the time on the auxiliary display. From the Consolette Parameters page (Figure 3-8), the Clock can be configured via the “Clock Configuration” field for 24 hour mode, 12 hour mode or disabled. When enabled, the Clock’s time can be set using the “Setup” soft menu on the auxiliary display.

Additionally, the Consolette can be set up to read the time from the Network Time (NTP) server by enabling the “Network Time (NTP) Query” field.

The Consolette ships from the factory with a coin cell battery installed for the purpose of maintaining the time in the event of a loss of AC power. Refer to section 4.7 for maintenance information regarding this coin cell battery.

3.7.3.5.4 VU Meter Setup

The Consolette supports a VU Meter bar graph on the auxiliary display. The VU Meter can be enabled or disabled by the “VU Meter” field from the Consolette Parameters page (Figure 3-8).

3.7.3.5.5 Soft Menu Setup

There are 3 buttons underneath the auxiliary display on the front panel. Up to 8 soft menus can be assigned and accessed using these 3 buttons. From the Softmenus Assignment page (Figure 3-12), features can be added to the soft menus as well as custom text for the labels. Up to 4 printable US-ASCII characters can be assigned.

For example, the user can add the “Crosspatch” function onto a soft menu with the text “XPAT”. The user will then see “XPAT” on the auxiliary display and be able to toggle the Crosspatch feature of the Consolette to either Enabled or Disabled from the front of the Consolette.

Once selections have been made, select “Store” at the bottom of the page to apply the changes to the Consolette.

3.7.3.5.6 Numeric Keypad and Programmable Buttons (Available with Option L999_)

The numeric keypad and 3 buttons to the right of the numeric keypad on the front panel represent buttons available on the Keypad Microphone. The numeric keypad is used for list entry fields in conjunction with the O5 display. The 3 buttons are essentially the 3 programmable side buttons on the Keypad Microphone.

The numeric keypad is always enabled; no additional setup is required.

From the Button & Softmenu Assignment page (Figure 3-12) and the “Fixed Function Button Configuration” fields, the function buttons labeled P1, P2, and P3 can be configured for “KPM purple”, “KPM one-spot”, and “KPM two-spot” consecutively. APX 7500 CPS can then be used to assign any available radio function to these 3 programmable buttons such as Monitor, Emergency, Secure, Scan, VIP Out control (ex. Aux Control).

Additionally, from the Button & Softmenu Assignment page (Figure 3-12), the buttons labeled P1, P2, and P3 can be configured for one-touch Consolette features that normally would be assigned to a soft menu underneath the auxiliary display such as “Crosspatch”. Note that there will be no virtual/soft function button and label on the auxiliary display to indicate the functionality of these buttons.

Once selections have been made, select “Store” at the bottom of the page to apply the changes to the Consolette.

Chapter 4 Feature Operation

4.1 O5 Control Head (L999_ required)

The Consolette can be ordered with the Full Featured Front Panel (L999_ option) which includes an O5 Control Head.

The Consolette can also be ordered with a limited front panel (L988_ option) where the O5 control head, the numeric keypad, and the speaker are not present. Functions such as the TRC interface and the ACIM interface continue to operate in this configuration. Microphone and Headset connections are intended to be made at the remote deskset/console position.

For details on the operation of the O5 control head, refer to the APX 7500 O5 Control Head Mobile Radio User Guide (6875947M01).

4.2 Keypad Operation (L999_ required)

On models with the full feature front panel, the Consolette contains a standard 3x4 numeric keypad for interaction with the O5 control head. The digits follow the keypad microphone layout and are marked with numeric (0-9, *, #) and alpha-numeric characters. The primary purpose of this keypad is for dialing, etc, through the radio.

4.3 Front panel Microphone (L999_ required)

A paddle mic (RMN5070) can be used with the Consolette. It connects to the GCAI connector on the O5 control head. The paddle mic supports a microphone and two functions: monitor enable/disable and transmit enable/disable.

4.3.1 Monitor

The Monitor button is used to disable PL (if applicable) in order for the user to listen for activity on that radio channel. Press the Monitor button to disable PL, release the Monitor button to re-enable PL.

4.3.2 Transmit

To transmit, press and hold the PTT button on the paddle mic while speaking into the microphone. The microphone is located in the upper portion of the paddle mic. Release the PTT button on the paddle mic to dekey. If the paddle mic transmit button is pressed at the same time as a transmit operation from the rear panel of the Consolette, the two transmit audios are combined and sent to the radio for transmit. The Consolette will dekey once all PTT sources are released. Transmit audio can be configured through the Consolette CPS to also be routed out the wireline interface to a remote user.

4.3.3 Auxiliary GCAI Connector

The APX Consolette is equipped with a GCAI connector on the front panel in addition to the one on the O5 Control Head. The primary purpose for this Auxiliary GCAI is keyloading and mobile programming. The Auxilliary GCAI connector does not support the connection of a microphone.

4.4 Front Panel Speaker (L999_ required)

Full Featured Front Panel models also contain an internally housed speaker. Receive audio, tones, and remote transmit audio are present at this speaker. The audio loudness can be controlled by the rotary volume knob on the O5 control head.

The normal operation of the front panel speaker can be overridden by:

- connection of a Headset to the Consolette
- activation of MUTE_IN to the Consolette
- activation of the Speaker Mute Button

Refer to section 4.9 for more details on the Speaker Mute Button, section 4.25 on the Mute In* (Crossmute) functionality, and section 4.13 for Headset operation.

4.5 Auxiliary Display Operation

The Consolette comes equipped with an auxiliary display to supplement the display provided by the O5 control head. It supports a Clock, a VU Meter, icons representing the state of Consolette features, soft menus with custom labels, and text updates indicating the state of Consolette features.

Figure 4-1. Auxiliary Display

4.6 Softmenu Buttons on the Auxiliary Display

The Consolette supports three buttons underneath its auxiliary display for accessing up to eight softmenus. These softmenus are used to activate or control certain Consolette features, and are programmed in the Consolette Codeplug. Each supports a label on the display that can be customized in the codeplug by the user. The label may consist of up to four printable US-ASCII characters. Consolette features currently supported via the soft menus are:

- Crosspatch Enable/Disable.
- Auxiliary Control Enable/Disable.
- Over-the-Air Alert Tones (L999_ Required).
- Setup functions including Clock Set and IP Address View.

There are two default key labels that are sometimes present on the softmenu keys. An "arrow" key is used to allow the user to scroll to more softmenu items. A "home" button will back up to the previous softmenu level.

4.7 Clock Operation

The Consolette supports a Clock on its auxiliary display for displaying the current time. The clock shows hours and minutes and can be configured for 12 hour format or 24 hour format. It can also be disabled completely. In 12 hour format an AM/PM indication is shown. The clock feature does not provide the date, or seconds resolution.

Setting the clock is accessed through the SETUP softmenu underneath the auxiliary display. Exiting clock set mode causes the time to be programmed and time display resumes counting from the newly entered time. A period of keypad inactivity while in clock set mode will also cause the Consolette to exit clock set mode, but the new time will not be programmed into the hardware.

Optionally, the time can be retrieved from the NTP server when connected to the network by enabling the “Network Time (NTP) Query” field using the onboard Consolette Configuration application.

Timekeeping is done by the RTC circuitry on the controller card within the Consolette. A battery backup circuit is used with the Clock. If power is completely interrupted to the Consolette, the internal coin cell battery will maintain the time. Once power is restored to the Consolette the display will show the correct time.

The Consolette ships from the factory with a coin cell installed. It is an Energizer CR2032 or equivalent battery and is rated for a nominal voltage of 3.0 Volts. Typical capacity is 240mA hours down to 2.0 Volts. For proper operation of the clock, it is recommended that the coin cell battery be changed every five years or sooner depending on the Consolette use case. It is also recommended to remove the coin cell battery when the Consolette is powered down and not in use for an extended period of time, such as storage or in the event that the Consolette is used outside of an office environment.

Caution

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

4.8 VU Meter Operation

The Consolette supports a VU Meter on its auxiliary display. The VU Meter is a bar-graph representation of the audio level on the currently selected transmit audio input. The VU meter provides a semi-instantaneous reading of the input level on the active source, thus it is not a true weighted VU function. The VU Meter can be enabled/disabled using the onboard Consolette Configuration application.

4.9 Speaker Mute Operation (L999_ required)

The Consolette supports a Speaker Mute button on units with a Control Head present. This button can be used to mute the front panel speaker for a programmable duration (10, 30, 60, or 120 seconds) or until the button is pressed again.

When the Speaker Mute button is activated, its backlight will change to red as an indicator to the operator. The red backlight may be disabled in the Consolette codeplug. Also, an icon on the auxiliary display is shown to indicate when the speaker is muted.

There are audio interactions between the Speaker Mute button and some rear panel inputs including the Headset and the Mute_In* input (Crossmute feature). The Speaker Mute button is operational as long as a Headset is not attached. Once the Headset is attached, the local speaker is automatically muted and the Speaker Mute button is disabled for as long as the Headset is attached. When the Headset is removed, the Speaker Mute button is again functional. Additionally, if the Mute_In* signal on the rear of the Consolette is activated, the local speaker is automatically muted. When the Mute_In* signal is deactivated, the local speaker will either stay muted or unmute depending on the last selection of the Speaker Mute button.

When either the Mute_In signal is asserted or the Speaker Mute button is active, the Speaker Mute icon will show on the auxiliary display. The backlight of the Speaker Mute button is either the standard backlight or a red backlight. A red backlight indicates to the user that the user last pressed the Speaker Mute button to mute the speaker. While lit, the front panel speaker will remain muted.

Refer to the following table for interactions between the Headset, Mute_In, Speaker Mute button, the icon, the backlight, and the front speaker.

Table 4-1. Speaker Mute Interaction

User Action	Icon Status	Speaker Mute Button Backlight Status	Front Speaker Status
Headset, Mute In and Speaker Mute are all inactive or not attached	No Icon	Standard Backlight	Normal Operation
Headset attached (overrides Mute In and Speaker Mute button)	Headset Icon	Standard Backlight	Muted
Mute In asserted	Speaker Mute Icon	Standard Backlight or Red Backlight* (if Speaker Mute also active)	Muted
Speaker Mute only is active	Speaker Mute Icon	Red Backlight*	Muted

*If enabled in the Consolette codeplug

Refer to section 4.25 on the Mute In* (Crossmute) functionality, and section 4.13 for Headset Operation.

4.10 Front Panel Programming Buttons

The Consolette supports three programmable buttons on units with a Control Head present. These are located underneath the Speaker Mute Button. These three buttons may be assigned to either Radio or Consolette functions. Refer to section 3.7.3.5.6 for how to program these buttons.

When configured for Radio Functions, the functionality that can be programmed onto these buttons is the same as that defined in the APX 7500 CPS for the Keypad Mic programmable sidebuttons. Use of these buttons can allow easier selection of radio features (ex. Scan, Auxiliary Control) with a single button press versus navigating the softmenus on the O5 control head.

The 3 programmable button on the Consolette can be mapped in the same order top-to-bottom as the 3 side buttons on the Keypad Mic as follows:

- P1 (Keypad Mic "Purple")
- P2 (Keypad Mic "One Dot")
- P3 (Keypad Mic "Two Dot")

Consolette functionality that may be assigned to the dedicated buttons currently includes:

- Crosspatch Enable/Disable
- Auxiliary Control Enable/Disable
- Over-the-Air Alert Tones

NOTE: There is no softmenu or label support on the auxiliary display to indicate the functionality of these buttons.

4.11 Emergency Alarm Decode

The APX Consolette supports Emergency Alarm decode on MDC Conventional, ASTRO Conventional, Type II Trunking and APCO P25 Trunking signaling types. Using APX 7500 CPS, the Consolette can be configured to display the ID on the attached O5 control head (if present), sound an alert tone, and activate a general purpose output when an Emergency Alarm is decoded.

NOTE: The Consolette's transceiver can only detect trunking Emergency Alarms when on the control channel. If the Consolette is on a voice channel, it will not be able to decode the control channel and will miss the Emergency Alarm. This feature is not recommended for high usage systems if the Consolette is the only device decoding the alarms.

IDs can also be provided to the ACIM interface. The APX Consolette has the ability to generate an Emergency ACK in response to receiving the Emergency Alarm via its ACIM interface. Refer to the ACIM section 4.12.3 for further details.

4.12 Wireline Interface

The Consolette supports a balanced Wireline Interface on a dedicated RJ45 on its rear panel. The Wireline supports:

- 2-wire or 4-wire operation
- 600-ohm loading or open bridge on both the receive and transmit paths

These settings are made using the Consolette Configuration Codeplug.

The receive path contains receive audio and tones (ex. Talk Permit Tones). It is muted when there is no valid audio. If "TRC Enabled" is selected in the Consolette Configuration, the DSP will filter the TRC guard tone from the received audio in order to prevent guard tone false detects on the wireline. A linear gain adjustment can be made on this path using the Consolette Configuration Codeplug. Note: In order for the trunking tones to be heard at the remote location, the remote device must be configured for full duplex operation. This is so that when the user presses the Push-to-Talk button at the remote, the remote will unmute its speaker to trunking tones on the wireline. (ex. the MIP5000 must have all channels configured for full duplex in order for it to unmute to the trunking tones).

The transmit path supports two types of gain adjustments: Linear and AGC (Automatic Gain Control). AGC is only if TRC is enabled. This can be enabled or disabled via the Consolette Configuration Codeplug. For more information regarding the tuning procedures of the wireline paths, refer to Section 2.7.3.1

This interface can be used in conjunction with an E&M interface, Tone Remote Control, or ACIM interface.

4.12.1 E&M with Wireline

E & M operation is provided by the Wireline Interface in conjunction with:

- Hardware PTT – an input to the rear panel DB25 that when asserted by an external device causes the Consolette to transmit the audio that is currently on the wireline path.
- Chan_Act_Relay_Out – a rear panel DB25 output of a normally open onboard relay which closes (and routes rear panel DB25 relay input Chan_Act_Relay_In) when the Consolette is receiving qualified audio.

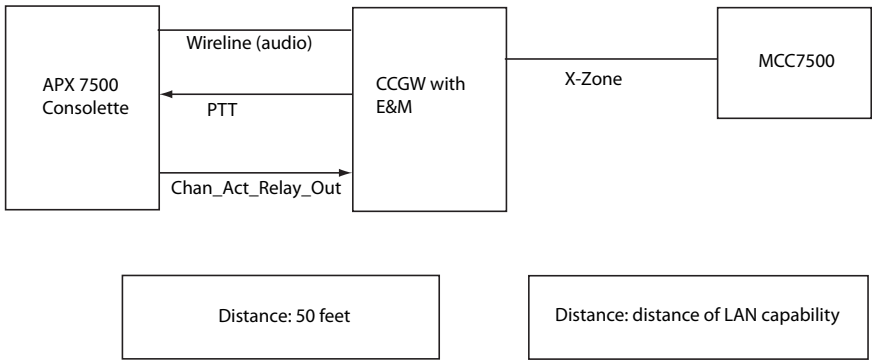


Figure 4-2. APX 7500 Consolette to MCC7500 topology

To configure this, the Consolette Configuration Codeplug should select Hardware PTT as the PTT input associated with the Wireline.

When the balanced Wireline Interface is unmuted to receive audio, the associated logic output (CHAN_ACT_RELAY_OUT) on the DB25 on the rear panel will be driven with the signal that is provided on CHAN_ACT_RELAY_IN. This signal passes through a relay on the Consolette. This is especially useful when the customer's setup has a signal with a high voltage or if the customer wants to switch in a ground signal. The relay circuitry has a maximum load voltage of 350V and a maximum load current of 120 mA.

4.12.2 Tone Remote Control Operation

4.12.2.1 Feature Description

The Wireline Interface can be used in conjunction with a Tone Remote Control (TRC) Deskset or Console. This interface consists of differential audio signals carrying transmit audio and control tones from the deskset/console and receive audio to the console. The Consolette analyzes incoming (transmit) wireline audio for the presence of particular guard and function tone frequencies and interprets them as commands.

The Consolette supports the following remote control functionality via Tone Remote Control:

- Channel Select
- Secure On/Off
- PTT Press/Release
- Monitor
- Receive Voice
- Transmit Voice

Based on the received commands, the Consolette in turn controls the internally-housed mobile radio appropriately.

NOTE: Enabling and disabling Scan operation is not supported from a Tone Remote Deskset. Scan operation enabled in the Consolette is not recommended when used with a Tone Remote Control Deskset. Scan operation in the radio can cause the radio to unmute to audio on an unselected channel. There is no indication at the Tone Remote Deskset user of the radio's scanned-to channel information. Any resulting dispatch communications could unintentionally get transmitted on an unselected channel.

NOTE: For instructions on configuring the Consolette for Tone Remote Control operation, see section 3.7.3.1.

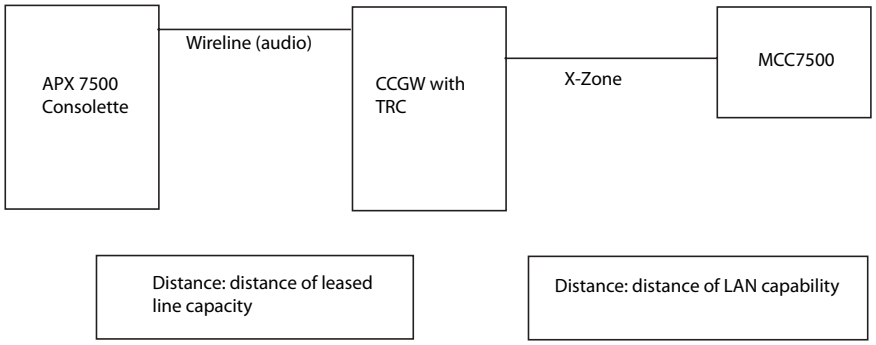


Figure 4-3. APX 7500 Consolette to MCC7500 topology

4.12.2.2 TRC Command Decoding

When TRC functionality is enabled in the Consolette codeplug, and when the TX wireline input of the codec is selected, the Consolette will monitor the incoming wireline audio for the presence of TRC tone sequences. The exact sequence of tones received from the console or deskset varies depending on the command being represented, however the sequence always follows the general pattern:

1. High-level guard tone (HLGT) for 120 ms @ 0 dB (nominal amplitude)
2. Function tone 1 for 40 ms @ -10 dB relative to HLGT
3. Function tone 2 (optional) for 40 ms, @ -10 dB relative to HLGT
4. Low-level guard tone (LLGT) for the duration of PTT @ -30 dB relative to HLGT, absent for all commands other than PTT

Figure 4-4 illustrates the sequence of tones involved in a line push-to-talk (LPTT) function.

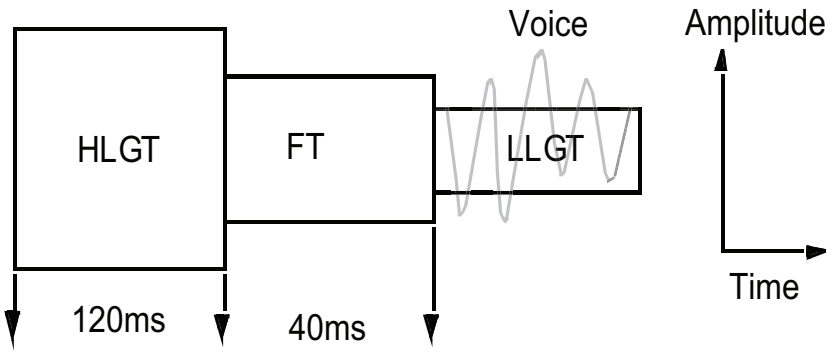


Figure 4-4. Remote Key-Up

A HLGT initiates all tone sequences and provides both a trigger for the Consolette to begin analyzing the sequence as well as a reference amplitude for detecting subsequent tones. LLGT is used to indicate that a PTT is occurring, where the PTT lasts for the duration of the LLGT.

Supported guard tone (both HLGT and LLGT) frequencies include: 2100Hz, 2175Hz, 2300Hz, and 2325Hz. The supported range of function tone frequencies include: 450Hz to 2050Hz in 100Hz increments. The frequencies can be mapped to functions in the Consolette codeplug. See section 3.7.3.1 for information on setting up the tone table. The Consolette supports pre-defined tone tables and also allows the user to customize a tone table with any desired assignment of functions to tones.

The pre-defined tables currently supported are:

Table 4-2. Pre-defined Tone Tables

Function Tone	Standard Table	CentraCom II	No Mode Select	Mode 1 Only	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

The functions represented by the function tones are any of the following:

Table 4-3. Tone Pattern

Function Tone	Meaning
CHAN x	Select channel x, where x is 1 through 16
CODED	Enable encryption
CLEAR	Disable encryption
MON	Enable receiver monitor

Based on the general tone pattern specified above, as well as the available function tones, the Consolette supports the following particular tone sequences:

Table 4-4. Tone Sequence

Operation	Tone Sequence
Channel	HLGT-CHAN
Coded	HLGT-CODED
Clear	HLGT-CLEAR

Operation	Tone Sequence
Monitor	HLGT-MON
PTT	HLGT-CHAN-LLGT
PTT Coded	HLGT-CODED-CHAN-LLGT
PTT Clear	HLGT-CLEAR-CHAN-LLGT

If any other sequence of tones is received, the Consolette will consider the sequence invalid and will ignore it in order to prevent unexpected behavior. Note that because the Consolette enforces positive mode control, each PTT sequence must include a Channel Select command even if the channel is not being changed.

The Consolette can detect Guard Tone in the range of -30dBm to +13dBm. The incoming HLGT is by definition at the reference amplitude for tones received from the remote console. Therefore, once the HLGT is detected, the Consolette will use its amplitude to calculate detection thresholds for subsequent FTs and LLGT. The FT amplitude is nominally at -10 dB from the HLGT, so the FT detection threshold will be set at -16 dB from the HLGT (one half of the nominal voltage) in order to provide sufficient margin for detection. Similarly, LLGT is nominally at -30 dB from HLGT, thus the LLGT threshold will be set at -36 dB from HLGT. If HLGT is at the rated wireline operating level of 775 mVrms, the resulting FT and LLGT thresholds will be calculated as 122.5 mVrms and 12.25 mVrms, respectively. Note that these thresholds are used for the detection of tones and are calculated regardless of whether AGC is enabled.

4.12.2.3 TRC Command Handling

After receiving and validating a complete tone sequence representing a TRC command, the Consolette acts on the command as appropriate. This involves sending one or more software commands to the internally-housed mobile radio to cause it to enact the necessary changes.

The following TRC commands may be interpreted by the Consolette, causing it to take the actions described:

4.12.2.3.1 Channel

The dispatch console user uses the Select Frequency command to change the Consolette's radio channel. This will select items such as a talk group and an air interface type. The number of channels that can be changed by the dispatcher is 14.

NOTE: Selection of 16 channels is possible if the tone table is set up to not use Coded/Clear operation.

When a Select Frequency command is received from the Console, the Consolette will send a message to the mobile radio to steer it to the channel requested. The channel number from the Console is mapped linearly to a zone and channel in the mobile radio. For example, if each zone has 5 channels, and the Console requests channel 8, the Consolette will steer the mobile to channel 3 in zone 2. If the mobile does not allow the indicated channel, the Consolette will generate a "bonk" tone and remain in the current channel.

NOTE: The Consolette is capable of 1250 channels and these can be accessed from the O5 control head.

4.12.2.3.2 Coded/Clear

When a coded or clear (encryption on or off) command is received, the Consolette will send a message to the mobile radio to set encryption to the indicated state. If the mobile does not allow the indicated encryption state on the current channel, the Consolette will generate a "bonk" tone and remain in the prior state.

NOTE: It is not possible to select the transmit Encryption Key (CKR) through the TRC interface. Refer to the APX 7500 CPS for more details on configuring the radio's secure settings. Encryption Key strapping is recommended for TRC operation.

4.12.2.3.3 PTT

To make a voice transmission, first select the desired channel using the Select Frequency feature. Then the console user also ensures that the correct secure mode (if configured) is chosen.

NOTE: For encrypted voice calls, the Console sends the request for secure mode to the Consolette so the Consolette can encrypt the audio. The Console does not encrypt the audio associated with coded mode calls.

Once all of the selections are made the console user invokes a PTT to start their transmission. The requested transmission is then performed by the Consolette which routes audio from the wireline TX interface to the radio for transmit. The transmission goes out on the currently selected air interface (and talk group if one is chosen) using the unit ID of the Consolette's radio (not the Console's unit ID). Once the LLGT is no longer detected by the Consolette or if the Console operator dekeys, the Consolette will dekey. AGC can be enabled on this interface. If the mobile configuration does not allow the PTT (RX Only Channel for example) or if any of the Channel/Coded/Clear commands included in the PTT sequence are disallowed, the Consolette will generate a "bonk" tone and not Key Up.

4.12.2.3.4 Monitor

When a monitor command is received, the Consolette will send a message to the mobile radio to cause it to enter the monitor state (ex. disables Receive PL on Conventional channels). Whenever a subsequent PTT command ends, a message is sent to exit the monitor state. The user may "quick-key" the Consolette (briefly key-up and de-key the Consolette) from the Console/Deskset in order to exit the monitor state.

4.12.2.3.5 Receiving a Voice Transmission

When the Consolette receives a voice transmission, the audio is provided on the wireline RX interface to the Console. There is no ID reporting available with the TRC interface. If ID reporting is needed, refer to section 4.16 for information regarding the use of an external MDC decoder or section 4.12.3 for information regarding the ACIM interface.

4.12.2.4 TRC Audio Processing

Receiver audio from the radio is passed through a guard tone notch filter within the DSP on the Consolette controller board (PPLN1689A). This filtered audio is then applied to a line driver circuit for transmission on the wireline to the remote Console/Deskset. The receive notch filter prevents false HLGT detection due to possible receiver audio components near the guard tone frequency (since with a two-wire configuration, receiver audio output and transmit audio/tone inputs are tied together at the wireline).

Transmit audio passes to the DSP on the Consolette controller board where gain (either linear or AGC) is applied. If AGC is enabled, the signal is automatically adjusted to a nominal -16dBm. If AGC is disabled, a linear gain/attenuation can be applied. This level can be selected in the Consolette Configuration Codeplug. The guard tone (LLGT) is removed from the audio prior to it being sent to the radio for transmit.

NOTE: On two-wire operation, receiver audio is muted when HLGT is detected, so that there will be no interfering audio signals on the wireline when the function tones are being received.

4.12.3 ACIM Interface

The Wireline Interface can be used in conjunction with the ACIM Interface. The Wireline is for audio, and the ACIM Interface is for digital control messages to the FNE (AIS/V.24 over RS232 interface). For more information on the Wireline configuration, see section 3.7.3. The ACIM interface has a dedicated RJ45 connection on the rear panel. It is an RS232 interface set up for 9600 baud, 8 data bits, no parity, 1 stop bit.

Typical Dispatch Console configurations with Consolette include:

1. Trunking Fall Back Operation - The Consolette provides communications in the event the main Trunking system is no longer accessible to the console.
2. Wireless Access to Different System Types – The Consolette provides access to different system types that the customer's main system does not have access to.

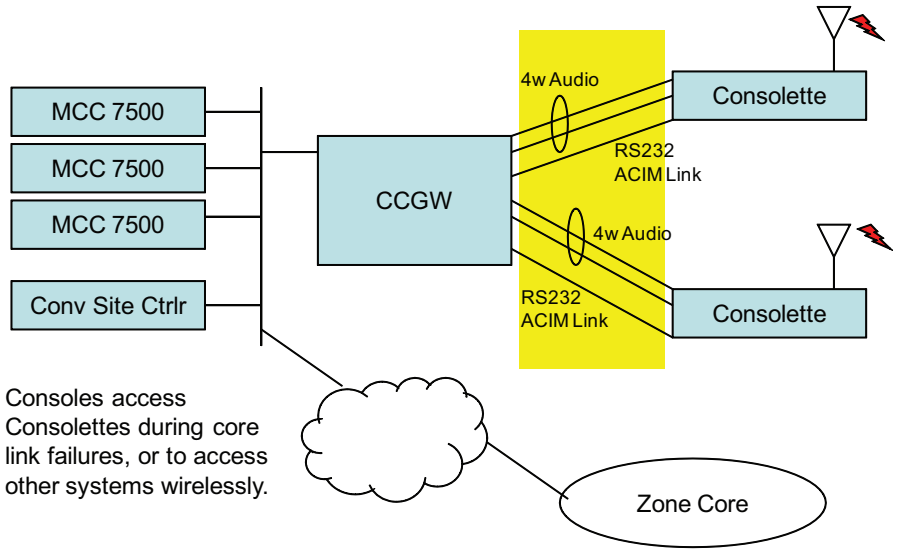


Figure 4-5. MCC7500 and CCGW with ACIM Typical System Architecture

The user may initiate the following commands to a Consolette from a Console via the ACIM interface (or CCGW):

- Channel Select (Console dependent; up to 255 with newer Consoles)
- Secure On/Off
- PTT Press/Release
- Monitor On
- Monitor Off (based on PTT release)
- Encryption Key (CKR) Select
- Outbound Call Alert
- Extended Dispatch Operation (GA00469 enabled)

Additionally the following information is made available to the Console from a Consolette via the ACIM interface (or CCGW):

- Encryption Key (CKR) Reporting
- ID Reporting

NOTE: Enabling and disabling Scan operation is not supported via the ACIM interface. Scan operation enabled in the Consolette is not recommended when used with a remote console using the ACIM interface. Scan operation in the radio can cause the radio to unmute to audio on an unselected channel. There is no indication to the Console user of the radio's scanned-to channel information. Any resulting dispatch communications including ACKs could unintentionally get transmitted on an unselected channel.

NOTE: For instructions on configuring the Consolette for ACIM operation, see section 3.7.3.2 in this manual.

4.12.3.1 ACIM Outbound Command Handling

After receiving an ACIM command, the Consolette acts on the command as appropriate. This involves sending one or more software commands to the internally-housed mobile radio to cause it to enact the necessary changes.

The following ACIM commands are interpreted by the Consolette:

4.12.3.1.1 Channel

The dispatch console user uses the Select Frequency command to change the Consolette's radio channel. This will select items such as a talk group and an air interface type. The number of channels that can be changed by the dispatcher is dependent on the Console. Gold Series Elite has the capability for up to 12 channels. The MCC7500 has the capability for up to 255 channels through the new T255R255 base type.

The Consolette is capable of 1250 channels and these can be accessed from the O5 control head. When a Select Frequency command is received from the Console, the Consolette will send a message to the mobile radio to steer it to the channel requested. Note that the channel number from the Console is mapped linearly to a zone and channel in the mobile radio. For example, if each zone has 5 channels, and the Console requests channel 8, the Consolette will steer the mobile to channel 3 in zone 2. If the mobile does not allow the indicated channel, the Consolette will generate a "bonk" tone and remain in the current channel.

4.12.3.1.2 Coded/Clear

When a coded or clear (encryption on or off) command is received, the Consolette will send a message to the mobile radio to set encryption to the indicated state. If the mobile does not allow the indicated encryption state on the current channel, the Consolette will generate a "bonk" tone and remain in the prior state. The coded or clear command from the Console is always associated with a subsequent command to transmit.

4.12.3.1.3 Transmitting Voice

A console user makes a voice transmission on an ACIM Link channel using the same procedures they use on an ASTRO conventional channel. First they ensure that the desired mode is set through the Select Frequency feature. Then the console user also ensures that the correct secure mode and CKR (if configured) are chosen.

NOTE: For encrypted voice calls, the Console sends the request for secure mode and the associated CKR to the Consolette so the Consolette can encrypt the audio. The Console does not encrypt the audio associated with coded mode calls.

Once all of the selections are made the console user invokes a PTT (through a mouse click or footswitch) to start their transmission. Note that the commands for Coded or Clear and CKR select are not sent until the PTT is initiated by the console user. The requested transmission is then performed by the Consolette routing audio from the wireline TX interface to the radio for transmit. The transmission goes out on the currently selected air interface (and talk group if one is chosen) using the unit ID of the Consolette's radio (not the Console's unit ID). Once the Console operator dekeys, the Consolette will dekey. If the mobile configuration does not allow the PTT (RX Only Channel for example) or if any of the Channel/Coded/Clear/CKR commands included in the PTT sequence are disallowed, the Consolette will generate a "bonk" tone and not Key Up.

NOTE: Outbound voice selective calls (ex. Private Calls) are not supported on the ACIM Link.

4.12.3.1.4 Encryption Key (CKR) Select

The Console user has the ability to select a specific CKR value to be used during transmit operation. When a CKR select command is received, the Consolette will send a message to the mobile radio to cause it to use the requested CKR on future transmissions.

NOTE: If the selected CKR is not programmed in the radio, the Consolette will generate a "bonk" tone and the prior CKR will remain selected.

NOTE: The Encryption Key (CKR) Select command is only sent when there is an associated command to transmit from the Console. This is especially important for Analog Conventional air interfaces (modes) where the Encryption Key must be properly selected in order to decrypt inbound secure calls. For this reason it is recommended to use CKR strapping for Analog modes. See the APX 7500 CPS for more details on programming the Consolette radio's secure settings.

4.12.3.1.5 Outbound Call Alerts

Allows the Console user the ability to transmit a Call Alert to a subscriber on the selected channel. The request is sent from the Console to the Consolette which will transmit the Call Alert over-the-air to a subscriber. The source ID of the Call Alert is the Console's ID. The corresponding ACK is received by the Consolette and provided to the Console.

NOTE: Operation on Conventional channels is supported at product launch. Operation on Trunking channels is not supported.

NOTE: MCC7500 consoles support outbound Individual Call Alerts and not Group outbound Call Alerts.

4.12.3.1.6 Monitor

When a monitor command is received, the Consolette will send a message to the mobile radio to cause it to enter the monitor state (ex. disables Receive PL on Conventional channels). Following any PTT On – PTT Off command sequence, a message is sent to the radio causing it to exit the monitor state.

4.12.3.2 ACIM Inbound Command Handling

The Consolette will forward received call information reported from the radio transceiver to the Console. This includes received call alerts, PTT-IDs as well as the CKR value used in conjunction with the received signal.

4.12.3.2.1 Receiving a Voice Transmission including IDs

When the Consolette receives a voice transmission it is reported to the Console via the ACIM Link. The console user will see it as an inbound call on the ACIM Link channel.

The Console GUI may show the alias (or Unit ID) of the source of the transmission if a Unit ID was received with the transmission. The Consolette supports inbound group calls, Voice Selective Calls, Trunking Private Calls and Emergency Calls. Not all air interface types support all inbound voice transmission types.

Note that Voice Selective Calls and Private Calls are only supported locally to the Consolette and are reported to the Console as Group Calls. Only Unit-to-Unit Call Alerts are reported to the MCC7500 Console, Group Call Alerts are not reported.

Table 4-5. Supported ID

	Call Alert	PTT-ID	Emergency Call PTT-ID	Emergency Alarm PTT-ID
Analog Conventional	Not Reported	Not Reported	Not Reported	Not Reported
Analog Conventional (with MDC)	Reported	Reported	Reported	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

4.12.3.2.2 Encryption Key (CKR) Reporting

The Consolette supports receiving encrypted calls in both ASTRO and analog modes. If the transmission is in encrypted mode, the Consolette will report the call to the console as encrypted via the ACIM link and the console GUI will show an Encrypted call. For all air interfaces the Consolette will also report the received CKR which can be displayed on the console GUI. Received encrypted calls are decrypted at the Consolette, not the Console.

4.12.3.2.3 Inbound Call Alert

A subscriber unit can direct a call alert over-the-air to the Consolette’s Unit ID at any time. The Consolette will receive it, decode it and provide it to the Console. The corresponding ACK will come from the Consolette and is transmitted over-the-air back to the specified subscriber. The Consolette will also decode a Group call alert; however, group call alerts are not reported to the Console.

4.12.3.2.4 Inbound Call Alert directed to Console

A subscriber unit can direct a call alert over-the-air to the Console via the Consolette on Conventional APCO and MDC channels. The Consolette will receive it and pass it to the Console. The corresponding ACK will come from the Console to the Consolette and is transmitted over-the-air back to the specified subscriber with the Console's ID.

4.12.3.3 Extended Dispatch Operation

The Consolette supports a set of features needed for typical Console operation. These features are allowed on Analog Conventional with MDC and ASTRO P25 Conventional channels only. The Consolette does not act as a trunked station, and as a result, these features are not supported on Trunking channels. To enable this extended functionality, the Extended Dispatch Operation option (GA00469) must be ordered and the field enabled in the radio CPS for each System. The Console user interface for these messages is the same as its user interface for ASTRO conventional channels.

NOTE: It is recommended that Scan operation not be used simultaneously with the Extended Dispatch functionality. This is to prevent inadvertent responses such as ACKs on a different channel than what the originating message was received on. Responses are transmitted on the selected channel, not the scanned-to channel.

4.12.3.3.1 Decode Functionality

When the Consolette receives a supplementary data transmission it is reported via the ACIM Link. The features supported are based on the current selected air interface. The supplementary data messages that can be received are:

- Emergency Alarm – a subscriber unit can send an emergency alarm over-the-air at any time. The Consolette will receive it, decode it and provide it to the Console. The corresponding ACK from the Console is then transmitted by the Consolette over-the-air back to the specified subscriber on Conventional channels only.
- Status Update – a subscriber unit can send a status update over-the-air at any time. The Consolette will receive it, decode it and provide it to the Console. The corresponding ACK from the Console is then transmitted by the Consolette over-the-air back to the specified subscriber.
- Message Update – a subscriber unit can send a message update over-the-air at any time. The Consolette will receive it, decode it and provide it to the Console. The corresponding ACK from the Console is then transmitted by the Consolette over-the-air back to the specified subscriber.

NOTE: Emergency Alarm decode is supported on both trunking and conventional air interfaces, but the corresponding ACK is only allowed on conventional air interfaces. Emergency Alarms on a Trunking air interface are always acknowledged by the Trunking System.

NOTE: The APX Consolette can be configured to decode the MDC-1200 signaling and report the received ID to the Console via the ACIM. The MDC audio is present on the wireline and may be audible to the Console user. To prevent this, it is recommended to enable DOS (Data Operated Squelch) in the MDC System and set the Rx Unmute Delay appropriately for the system in the MDC Personality using APX 7500 CPS. When using an external MDC decoder (ACIM MDC ID reporting disabled), the DOS must be disabled and the Rx Unmute Delay set to 0ms in order to pass the MDC data down the wireline. (Refer to section 3.7.1.1.2 and section 3.7.1.1.3).

4.12.3.3.2 Encode Functionality

When the Console users wish to transmit a supplementary data message to a subscriber in the field, they do it in the same manner as for ASTRO conventional channels. The request is sent from the Console to the Consolette which will then transmit the supplementary data over-the-air to a subscriber. The features supported by the Consolette are based on the currently selected air interface. The supplementary data messages that can be transmitted are:

- Status Request - allows the Console user the ability to remotely determine a specific subscriber’s status.

- Radio Enable/Disable - allows the Console user the ability to make unusable (Inhibit) a specific subscriber and correspondingly restore a unit to normal operation (Un-Inhibit).
- Radio Check - allows the Console user the ability to remotely ping a specific subscriber.
- Remote Monitor - allows the Console user the ability to remotely put a specific subscriber into transmit mode.

The corresponding response (e.g. ACK) transmitted by the specified subscriber and then received by the Consolette will be passed up to the Console. The Console retries supplementary data messages when the required acknowledgment is not received in time.

Table 4-6. Response Table

Inbound	Outbound	Analog Conv	MDC Conv	APCO Conv	9600 AP Trk	3600 Ast Trk	3600 Ana Trk
EMER Alarm		No	Yes	Yes	Yes	Yes	Yes
	EMER Alarm ACK	No	Yes	Yes	No*	No*	No*
Status Update	Status Update ACK	No	Yes	Yes	No	No	No
Msg Update	Msg Update ACK	No	Yes	Yes	No	No	No
Status Query Resp	Status Query	No	Yes	Yes	No	No	No
Radio Monitor ACK	Radio Monitor	No	Yes	Yes	No	No	No
Radio Check ACK	Radio Check	No	Yes	Yes	No	No	No
Subscriber Inhibit ACK	Subscriber Inhibit	No	Yes	Yes	No	No	No
Subscriber Un-Inhibit ACK	Subscriber Un-Inhibit	No	Yes	Yes	No	No	No

*For Trunking Channels the system will Ack the Emergency Alarm

4.12.4 Transmit Priority

There are several sources of PTT on the rear panel of the Consolette and the user can select one of these to have the highest priority in the event that more than one PTT is active at the same time. On the Audio Parameters Page (Figure 3-9), there is a field called “Rear Panel PTT Priority” with the following selections:

- Priority None – when selected, all PTTs (TRC, ACIM, Headset PTT, Crosspatch/HW PTT) on the rear panel are handled on a first come first served basis.
- Priority Headset – when selected, the Headset PTT is given the highest priority.
- Priority Crosspatch/APCO (Aux TX) - when selected, either the Crosspatch or the HW PTT is given the highest priority. The user can enable either the Crosspatch or the HW PTT inputs using the Crosspatch/APCO field. The APCO/HW PTT will operate as a typical logic PTT with a single ended audio path (Aux_TX) or the Crosspatch interface can be enabled with the corresponding Crosspatch PTT.
- Priority Wireline – when selected, the PTT source associated with the Wireline balanced audio path is given the highest priority. The user can set up the Wireline PTT source using the Wireline Function field. Selections are either TRC operation, ACIM operation, or APCO operation. Note that when TRC is selected as the Wireline Function all other rear panel PTTs are disabled- the Wireline must always be routed for tone decoding.

4.12.5 Control Point Monitor

The Consolette supports Control Point Monitor as defined by the FCC. The local Consolette speaker will unmute for remote (e.g. Wireline) 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 in the Consolette CPS see section 3.7.1).

When the Consolette is being used by both a local and a remote user (TRC or ACIM interface) 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 only if the remote user's channel encryption state and encryption key (CKR) align with that 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, change channels and a "bad" alert tone will be heard by both users until both PTTs are released. If the remote user requested a PTT with a different encryption state than what was selected by the local user, the Consolette will dekey, change encryption state and a "bad" alert tone will be heard by both users until both PTTs are released. If the remote user requested a PTT with a different encryption key (CKR) than what was selected by the local user a "bad bonk" tone will be heard for the duration of the remote PTT press.
- If the remote user attempts to change channels while the local user is keyed, the Consolette will dekey, change channels and a "bad" alert tone will be heard until the local user releases the PTT.
- If the remote user attempts to change the state of encryption while the local user is keyed, the Consolette will dekey, change encryption state and a "bad bonk" tone will be heard until the local user releases the PTT.
- If the remote user attempts to change the encryption key (CKR) while the local user is keyed, the Consolette will generate a momentary "bad bonk" tone to indicate that the encryption key was not changed.
- 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 and encryption key (CKR) 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.
- The local user is prohibited from changing the encryption key (CKR) while the remote user is keyed.

4.13 Headset Operation (L999_ required)

Connections for up to two headsets are provided at the rear panel of the Consolette. The two RJ45 connectors are designed specifically for the Headset Jack Box (FHN7470_) in conjunction with the Headset Amplifier Module Base with PTT switch (CDN6281). One Headset Interface Box is required for each RJ45 headset connector on the Consolette. Standard Plantronics Headsets with phono style plugs can then be plugged into the jack box.

NOTE: The FHN7470 Headset Jack Box kit includes cable kit (FKN8694A) which is incompatible with the Consolette. This cable must be modified or replaced with a customer supplied 1-to-1 cable between the Jack Box and Consolette Rear Panel Heaset connector.

NOTE: The MCC Series Headset Jack B1913A is not supported by the Consolette. Headset connections are only supported on Consolette models with a full featured front panel. They are not active on limited front panel units.

4.13.1 Connection

When a Headset Interface Box is connected to the rear panel, the Consolette will detect the connection and mute the front panel speaker. Additionally, the Headset icon will be shown on the front panel auxiliary display while the headset(s) is connected.

When the headsets are disconnected, the Consolette will remove the mute override from the front panel speaker. Front panel speaker audio will be set to the current level indicated by the rotary volume of the O5 control head.

4.13.2 Receive Operation

When receive audio is present from the radio, the Consolette routes the audio to both headsets. When audio is not present from the radio, the Consolette mutes this path. The user can control the level of audio to the headset speakers by adjusting the volume control on the O5 control head. An attenuator on the Consolette controller card is used to scale the audio from the Codec for the headset paths. For more information on the Headset configuration refer to section 3.7.3.4.

4.13.3 Transmit Operation

When the PTT signal from either headset is pressed, the microphone audio from the two headsets are combined and sent to the radio for transmit operation. While transmitting, the headset speakers will be muted. As a result, the user of one headset does not hear the mic audio from the other headset.

If the TRC, or ACIM inputs have priority over the headset, the headset PTT is ignored or interrupted. The headset, crosspatch, and APCO PTT inputs are accepted in a "first come first served" priority.

The O5 control head microphone continues to be enabled while the headset is attached. When both the headset and the local microphone are used at the same time, the audio is combined and sent to the radio for transmit operation.

For information regarding the tuning procedure of the Headset interface, refer to section 3.7.3.4 in this manual.

4.14 PTT Footswitch (L999_ required)

The Consolette provides two Headset connections one of which can be used with a PTT Footswitch for hands free operation. A headset is connected to one of the RJ45 Headset connectors to provide the microphone audio and speaker audio signals. The Footswitch is then connected to the other RJ45 Headset connector. The user would have to modify the footswitch connector to attach to the Consolette. Signals include:

- HDSTx_PTT* - This is a logic input to cause the radio to transmit. The radio will transmit when this input is pulled to less than 0.8VDC to ground.

NOTE: Enabling/Disabling Monitor is not supported on this interface.

4.15 Crosspatch Operation

The Consolette supports a Crosspatch Interface on a dedicated RJ45 connector on the rear panel. The Crosspatch allows connecting two Consolettes such that each will rebroadcast the audio received on the other, to allow cross-system communications. This is especially useful when a user has two systems in two different bands that need to communicate.

Signals include:

- RX_AUDIO – This is an unbalanced receive audio output relative to ground. The output is 300mVrms nominal for 60% rated receive system deviation. This output is always analog when receiving analog or digital transmission. PL tones are stripped off this audio. This output is muted while the radio is muted to invalid RF signals.
- CP_CHAN_ACTIVITY* – This is an open drain logic output indicating when audio is at the speaker. When active, it will be pulled to less than 0.8VDC.
- CP_PTT* – This is a logic input to cause the radio to transmit. The radio will transmit when this input is pulled to less than 0.8VDC to ground.
- CP_AUX_TX – This is an unbalanced low level transmit audio input relative to ground. The input sensitivity is 300mVrms nominal for 60% rated transmit system deviation.
- GND

When the Consolette receives a qualified over-the-air signal, the Consolette will assert its CP_CHAN_ACTIVITY* output pin, filter alert tones (ex. Talk Permit Tones) from the audio and then route receive audio to its crosspatch connector pin, RX_AUDIO.

When the CP_PTT* input pin becomes active, the Consolette will key up, and transmit audio from the crosspatch connector pin, CP_AUX_TX.

The Crosspatch hardware is designed such that the channel active output from one Consolette is the correct level to drive the PTT input on another, and the receive audio output level on one is correct to serve as transmit audio input to the other.

NOTE: The auxiliary (APCO) PTT input is mutually exclusive with the Crosspatch CP_PTT*. As a result, when Crosspatch is enabled, the APCO PTT is disabled and A(tx) is no longer routed.

4.15.1 Connection

The Consolette comes equipped with the Crosspatch functionality. To operate the feature, first connect a cable between two APX Consolettes via the dedicated RJ45 Crosspatch connector on the rear panel. Cables are not provided by Motorola, refer to Chapter 6 “Cabling Diagrams and Rear Panel”.

The Crosspatch feature can be enabled in the Consolette codeplug via the Configuration App. To disable the Crosspatch functionality, disconnect the cable or set the feature to disabled in the codeplug. Additionally, a softmenu on the auxiliary display or one of the 3 programmable buttons on the front panel can be assigned to the Crosspatch feature allowing a user to toggle the feature on or off without having to remove the cable or modify the codeplug.

4.16 APCO Interface

The Consolette supports the APCO Interface.

Table 4-7. Signals Table

Function	Pin Abbreviation	Definition
Transmit Audio	A(tx)	This is an unbalanced low level transmit audio input relative to ground. The input sensitivity is 300mVrms nominal for 60% rated transmit system deviation.
Receive Audio	A(rx)	This is an unbalanced receive audio output relative to ground. The output is 300mVrms nominal for 60% rated receive system deviation. This output is muted when there is not valid audio present.
Push-to-Talk	PTT	This is a logic input to cause the radio to transmit. The radio will transmit when this input is pulled to less than 0.8VDC to ground.
Qualified Audio Presence	A(p)	This signal is the output of an onboard relay(CHAN_ACT_RELAY_OUT). Its level is what is applied to the relay input(CHAN_ACT_RELAY_IN). The normally open relay is activated/closed when there is valid receive audio present. Note: This output is not a simple carrier detect output. It cannot be used as a “Channel Busy” indication.
Monitor	Monitor	This is a logic input to cause the Consolette to toggle the Monitor state of the radio. The radio will monitor the selected channel (override PL) when this input is pulled to less than 0.8VDC to ground. This input is combined with all other active sources of Monitor and HUB within the Consolette.

One application of using the APCO interface, is the support of external MDC encoders/decoders.

- MDC Encoders - Consolettes can be connected to an external MDC encoder. Encoders are typically used to generate tones that are provided to the Consolette via the audio connection for transmit over the air. An associated Push-to-Talk signal is also provided to key up the Consolette.
- MDC Decoders - Consolettes can be connected to an external MDC decoder. Tones are received over the air by the Consolette and provided on the receive audio path on its rear panel.

NOTE: The auxiliary (APCO) PTT input is mutually exclusive with the Crosspatch CP_PTT*. As a result, when Crosspatch is enabled, the APCO PTT is disabled and A(tx) is no longer routed.

4.17 Over-the-air Alert Tones Operation (L999_ required)

Over-the-air alert tones allow the Consolette operator to advise a fielded subscriber of a critical communication. The Consolette supports this functionality from its front panel. There are three predefined alert tones that can be assigned to either the softmenus underneath the auxiliary display or to the dedicated programmable buttons.

The predefined alert tones are:

- Alert 1 sends a 1 kilohertz tone

- Alert 2 sends a pulsed 1500 hertz tone alternating with an 800 hertz tone
- Alert 3 sends a pulsed 1500 hertz tone only

The alert tone is transmitted by the radio when the operator presses and holds the alert softkey (or programmed button). The alert tone will continue to transmit for as long as the button is pressed. After the button is released, the radio will remain keyed for a programmable period of time (hangtime). The alert tone will be audible on the local speaker. When the operator hears the alert tone stop, the operator will be able to resume normal Consolette operation (ex. key the radio from any supported PTT source).

4.18 Battery (AC Power Fail) Alert Tone Operation

The Consolette can detect when it is operating on a DC input via the logic signal (AC_POWER_GOOD) from the power supply and as a result can generate an alert tone to its local speaker, to a remote user via the wireline, and over-the-air if the Consolette is currently transmitting. This is useful for when remote notification of an AC power failure at the Consolette site is needed. This feature can be enabled in the Consolette codeplug.

This alert tone is predefined and is a 1200 Hz tone generated for a duration of 125mS, repeated every 10 seconds. The alert is automatically cleared when AC power is restored.

The power supply provides an AC_POWER_GOOD signal to the Consolette Mainboard. This signal is logic High when operating from an AC source and logic Low when operating from a DC source. If the Battery Alert feature is enabled, when a Low on the AC_POWER_GOOD signal is sensed, the Consolette will generate a battery alert tone to notify the operator of an AC power failure. The alert will be cleared when AC power is restored.

4.19 Revert to Low RF Power Operation

The Consolette can detect when it is operating on a DC input via the logic signal (AC_POWER_GOOD) from the power supply and as a result can automatically revert to using the low RF power setting as defined in the APX CPS on any future transmissions. This will help extend the life of the backup battery in the event of AC power failure. Note that when AC power is restored, the Consolette will automatically revert back to the power settings (High or Low) defined in the APX CPS for that selected channel. This will have the effect of canceling any high or low RF power selection that may have occurred by a local user at the front panel control head. This Revert to Low RF Power Operation can be enabled/disabled in the onboard Consolette Configuration application on the “Consolette Parameters” page.

4.20 Recorder Operation

The Consolette supports an RJ45 style connector on its rear panel for connection to an external recorder.

The recorder output from the Consolette can be configured as follows:

- Receive audio – including tones (ex. Keyfail and Trunking)
- Receive audio and Transmit audio – including tones
- Disabled

Receive audio, tones, and transmit audio is output from the Codec and routed through a mux for gating purposes such that audio is present at the recorder output at the appropriate times. The mux control signal (REC_ACTIVITY*) is also provided at the rear panel for use with enabling/disabling the external recorder.

The audio to the recorder (REC_AUDIO) is an unbalanced low impedance signal at a fixed level of 300mVrms. A logical output (REC_ACTIVITY*) is provided to indicate when activity is on the recorder output audio pin. When there is activity on the recorder output audio pin, it will be pulled to less than 0.8VDC. Refer to the below table for more information:

Table 4-8. Recorder Audio

	Disabled	RX Only	RX + TX	Mute in Active
Rx Audio	X	O	O	X
Tx Audio	X	X	O	X
Tones	X	O	O	X

NOTE: O - Audio present and activity pin active
X - Audio not present and activity pin not active

4.21 External PA Operation

The Consolette provides an audio output (EXT_PA_AUD) via the DB25 on the rear panel for use with an external Public Address Amplifier.

This audio output (EXT_PA_AUD) from the Consolette can be configured as follows:

- Receive audio - without tones
- Receive audio and Transmit audio - without tones
- Receive audio and Transmit audio - including tones (ex. Keyfail and Trunking)
- Disabled

The audio for use with the external Public Address amplifier (EXT_PA_AUDIO) is an unbalanced low impedance signal at a fixed level of 300mVrms. A logical output (EXT_PA_ACTIVITY*) is provided to indicate when activity is on this output audio pin. When there is activity on the output audio pin, it will be pulled to less than 0.8VDC. Refer to the below table for more information:

Table 4-9. Recorder Audio

	Disabled	RX Only	RX + TX	RX + TX + Tones	Mute in Active
Rx Audio	X	O	O	O	X
Tx Audio	X	X	O	O	X
Tones	X	X	X	O	X

NOTE: O - Audio present and activity pin active
X - Audio not present and activity pin not active

4.21.1 Firehouse Day/Night switch

The Consolette supports a feature called Auxiliary Control. This is where a button press on the front panel of the Consolette can control the activation of a general purpose output on the rear of the unit. The general purpose output can be connected to an external relay that could be used to mute/unmute an external PA system. A typical use case is in a firehouse where the PA system needs to be turned off in the evening and then re-enabled during the day.

Refer to the APX 7500 CPS Help Screens for VIP Outs for additional details on how to configure the transceiver for Auxiliary Control capability or section 3.7.1.1 of this manual.

4.22 VIP Operation

The Consolette supports 3 general purpose outputs and 3 general purpose inputs, also referred to as VIP Outs and VIP Ins. These I/O are available on the rear of the Consolette on a 14 pin terminal connector. An adaptor is provided with each Consolette. These I/O can function when a Control Head is present and also when the Control Head is not present on the new Consolette.

The general purpose inputs are active low. A signal of 0.8VDC or lower will activate the input. These signals are pulled high to 5VDC internal to the Consolette. When active, they are pulled to ground. VIP input functionality can be assigned to a radio function and configured using APX 7500 CPS.

Functionality is programmable by the user. Popular configurations for Consolette users include:

- **Emergency Alarm Receive Indicator -** The Consolette can be set up via APX 7500 CPS to activate a VIP output in the event that the Consolette receives an Emergency Alarm. Refer to section 3.7.1.1 for details on the radio CPS programming of the Emergency Alarm Receive Indicator.
- **Auxiliary Control Indication -** The Consolette can be configured such that a button press will activate a VIP output. The buttons that can be programmed to support the Auxiliary Control functionality are the O5 control head programmable buttons and the 3 function buttons on the front of the Consolette. Additionally, the Auxiliary Control functionality can be assigned to the softmenus on the auxiliary display. These softkeys can be programmed with text to help identify what the output is used for (ex. DOOR, ALRM).
- **Failsoft Indication -** The Consolette can be set up via APX 7500 CPS to activate a VIP output in the event that the Consolette enters these states: Out of Range, Wide Area, Failsoft. Each indication can be assigned a specific VIP Output. This can be used to provide real-time feedback to the radio dispatchers for when the trunked site exits Wide Area operation.

4.23 External Speaker

The Consolette supports connection on its rear panel to the 8-ohm mobile speaker. The mobile speaker cable must be modified in order to connect to the 14-pin terminal connector, J103 pins 1 (EXT_SPKR+) and 2 (EXT_SPKR-).

NOTE: EXT_SPKR- and EXT_SPKR+ should never be grounded. If they are grounded, this will damage the radio.

This speaker provides receive audio and alert tones but not transmit audio. The speaker may be set in the APX 7500 CPS to either maintain a fixed volume, or to track the O5 volume knob. Additionally, there is an external speaker active output which indicates when the external speaker is unmuted. EXT_SPKR_ACTIVITY* (driven low when valid audio activity is present on the secondary speaker) is located on the DB25 Accessories Connector J104 pin 23.

The normal operation of the external speaker can be configured to be overridden by:

- connection of a Headset to the Consolette when tracking local speaker.
- activation of the MUTE_IN signal to the rear of the Consolette.
- activation of the Speaker Mute Button from the front panel when tracking local speaker.

4.24 Audio Jack

The Consolette supports a dedicated connection for use with a powered speaker or a computer soundcard input. This output is a fixed level “line out” audio output at a nominal 300mVrms relative to a 1.0 kHz tone at 60% FSD. This audio includes receive audio and alert tones (no transmit audio). When there is no valid audio, this audio path is muted.

NOTE: Refer to the external equipment's manual to ensure its maximum input audio specification is not exceeded.

The connection is a dedicated 3.5 mm audio jack provided at the rear panel low speed connector board of the Consolette and labeled P100. A three-conductor 3.5 mm TRS (tip, ring, sleeve) connector or stereo plug should be used in conjunction with this jack. P100-1 accesses the sleeve (ground) of the plug, P100-2 accesses the tip (left speaker), and P100-3 accesses the ring (right speaker). The Consolette does not provide a true stereo output at this jack; however, the same receive audio and alert tones are supplied to both the right and left speaker connections.

NOTE: Connecting a two-conductor plug of the same size into this three-conductor jack will ground the ring (right speaker) and subsequently the tip (left speaker) since their audio is from the same source. This will result in no audio being heard.

4.25 Crossmute Operation (L999_ required)

The Consolette supports a Crossmute Interface on the DB25 connector on the rear panel. Crossmute allows an automated method of muting a Consolette while a second Consolette in close proximity is transmitting. This prevents noise due to RF desense from being heard on the speakers of the nearby, non-transmitting units.

Signals include:

- MUTE_IN* – This is a logic input to cause the Consolette to mute the Front and External speakers as well as all the other Rear Panel audio sources (PA, Recorder, etc). The Consolette will mute when this input is pulled to less than 0.8VDC to ground.
- TX_ACTIVITY* – This is an active low logic output that indicates when the Consolette is transmitting. When transmitting, this output is driven to ground.
- GND

The TX_ACTIVITY* output of one Consolette can be connected to the MUTE_IN* input of another Consolette and vice versa. The Crossmute hardware is designed such that the TX_ACTIVITY* output from one Consolette is the correct level to drive the MUTE_IN* input on another. When Crossmute is enabled on the Consolette and it is transmitting, the Consolette will assert its TX_ACTIVITY* output pin. This output will then activate the MUTE_IN* input of the connected Consolette causing the Consolette to mute the Front and External speakers as well as all the other Rear Panel audio sources (PA, Recorder, etc). When the MUTE_IN signal* is asserted, the Speaker Mute icon will show on the auxiliary display. Refer to section 4.9 for additional information regarding the interactions between MUTE_IN*, the Speaker Mute Button, and the Headset(s).

4.25.1 Connection

The Consolette comes equipped with the Crossmute functionality. To operate the feature, first connect a cable between two APX Consolettes via the DB25 connector on each rear panel. The MUTE_IN* input is accessible on the DB25 Accessories Connector (J104 pin 16). The TX_ACTIVITY* output is accessible on the DB25 Accessories Connector (J104 pin 1).

Cables are not provided by Motorola, refer to Chapter 6 "Cabling Diagrams and Rear Panel".

When the Crossmute cable is connected, the Crossmute feature will function automatically. To disable the Crossmute functionality, disconnect the cable.

4.26 Emergency

The Consolette supports a logic input that when asserted can trigger an over-the-air Emergency Alarm as if the user pressed the Emergency button on the front of the O5 control head. This interface can be used with an Emergency Footswitch. The user would have to modify the accessory to attach to the DB25 accessories connector on the rear of the Consolette. To activate this input, the EMERGENCY* signal must be pulled to a logic low (less than 0.8VDC).

NOTE: A "normally open" switch which grounds when activated is required for this interface.

Notes

Chapter 5 Maintenance

5.1 Introduction

This section details the procedures necessary to remove and replace the printed circuit boards in the APX 7500 Consolette radio. After troubleshooting and determining what needs to be replaced, disconnect the test equipment, the antenna cable, and the power cable.

Caution

Make sure to remove power to, and disconnect, all Accessories from the Consolette when performing any of the Following Disassembly and Reassembly instructions.

Locate the exploded view of the radio in "APX Consolette Exploded view" on page 8-2

The following tools are required for disassembling the radio:

- Small Flat Blade Screwdriver
- TORX™ T25 Driver Bit.
- TORX™ T15 Driver Bit.
- 7mm Magnetic Socket Driver (extension of >150mm)

If a unit requires more complete testing or service than is customarily performed at the basic level, please send radio to a Motorola Service Center listed in section 9.7

5.2 Assembly and Disassembly Procedures

The following is a list of detailed instructions on how to remove and replace the main components of the Consolette.

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 the wires; disconnect by connectors only.

5.2.1 Top Cover

5.2.1.1 Removing the Top Cover

1. Remove the four screws (A) that retain the cover to the housing as shown in Figure 5-1 using a T25 TORX™ driver.
2. Slide the top cover towards the rear and then lift the top cover straight up to remove.

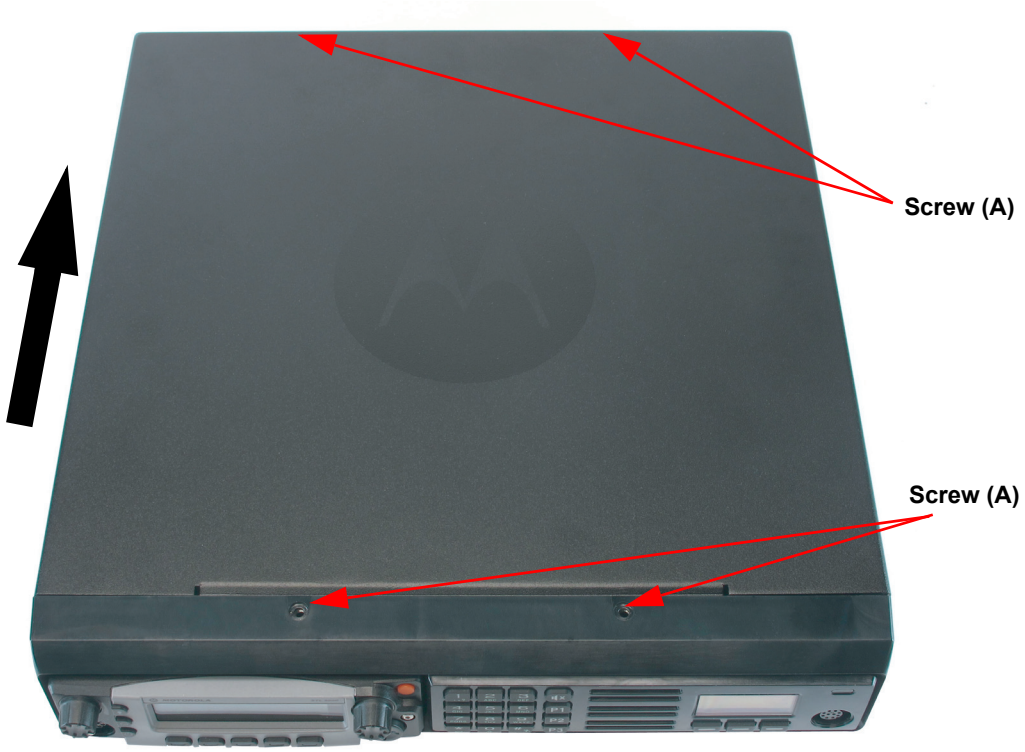


Figure 5-1. Removing and Replacing the Top Cover

5.2.1.2 Replacing the Top Cover

1. Lower the top cover straight down onto the base.
2. From the rear, slide the top cover forward making sure the front lip goes under the front plastic.
3. Install the four screws (A) on the top cover as shown in Figure 5-1 using a T25 TORX™ driver.
4. Tighten the screws to 1.5 N-m.

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.

5.2.2 Front Panel

5.2.2.1 Removing the Front Panel

1. Remove the two screws (A) on the bottom of the front panel assembly as shown in Figure 5-2 using a T25 TORX™ driver.
2. Unplug all cables connected to the front panel assembly and control head to the mobile radio and Consolette main board.

NOTE: The front panel Flex cables should be removed at the Consolette main board end.

NOTE: With the front panel assembly free from the rest of the Consolette chassis the Keypad board, Display board and Speaker can be easily removed and replaced using a T15 TORX™ driver.

5.2.2.2 Removing the Control Head (O5)

1. Use a T25 TORX™ driver bit to remove two screws (B) as shown in Figure 5-2.
2. Remove the Control Head from the Front of the Panel Assembly.

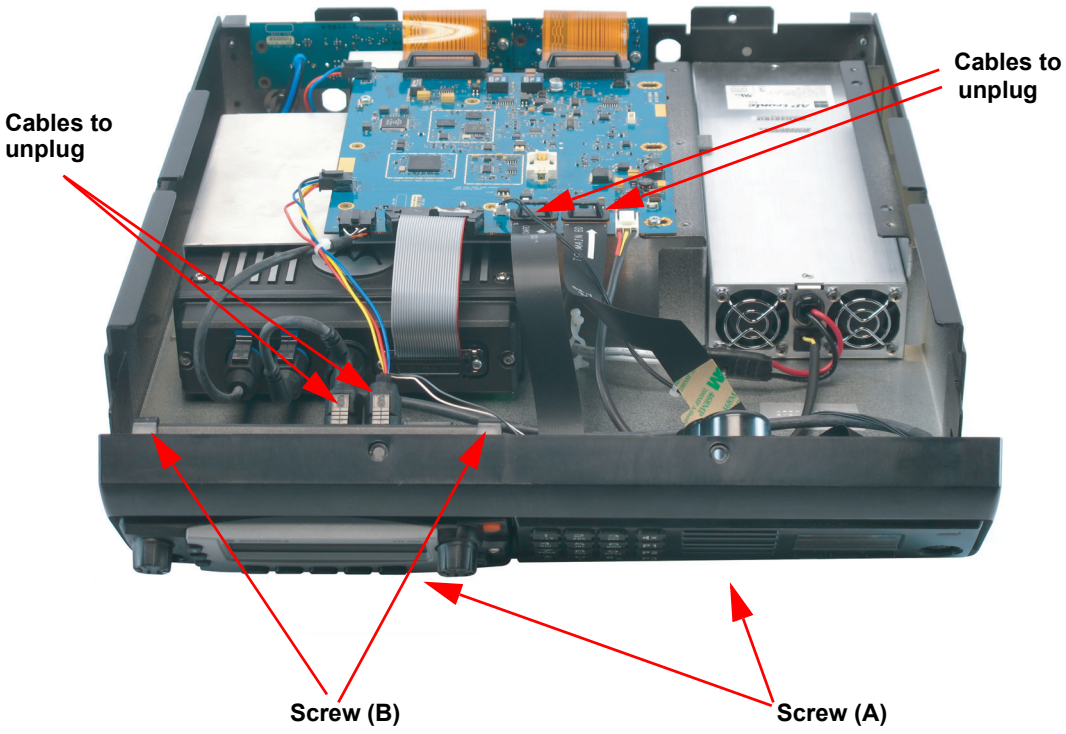


Figure 5-2. Removing and Replacing the Control Head

5.2.2.3 Replacing the Control Head (O5)

1. Insert the Control Head in the Front of the Panel Assembly.
2. Use a T25 TORX™ driver bit to insert two screws (B) as shown in Figure 5-2.

5.2.2.4 Replacing the Front Panel

1. With the Front Panel Assembly hanging forward plug in all cables that connect the front panel assembly and control head to the mobile radio and Consolette main board.
2. Reposition the front panel onto the chassis and install the two screws (A) on the bottom of the front panel assembly as shown in Figure 5-2 using a T25 TORX™ driver.
3. Tighten the screws to 1.5 N-m.

5.2.3 Main Board

5.2.3.1 Removing the Main Board

1. Unplug all cables and flex cables.
2. Remove the eight screws (A) on the main board assembly as shown in Figure 5-3 using a T15 TORX™ driver.
3. Store the main board assembly in anti-static bag when it is not being serviced.

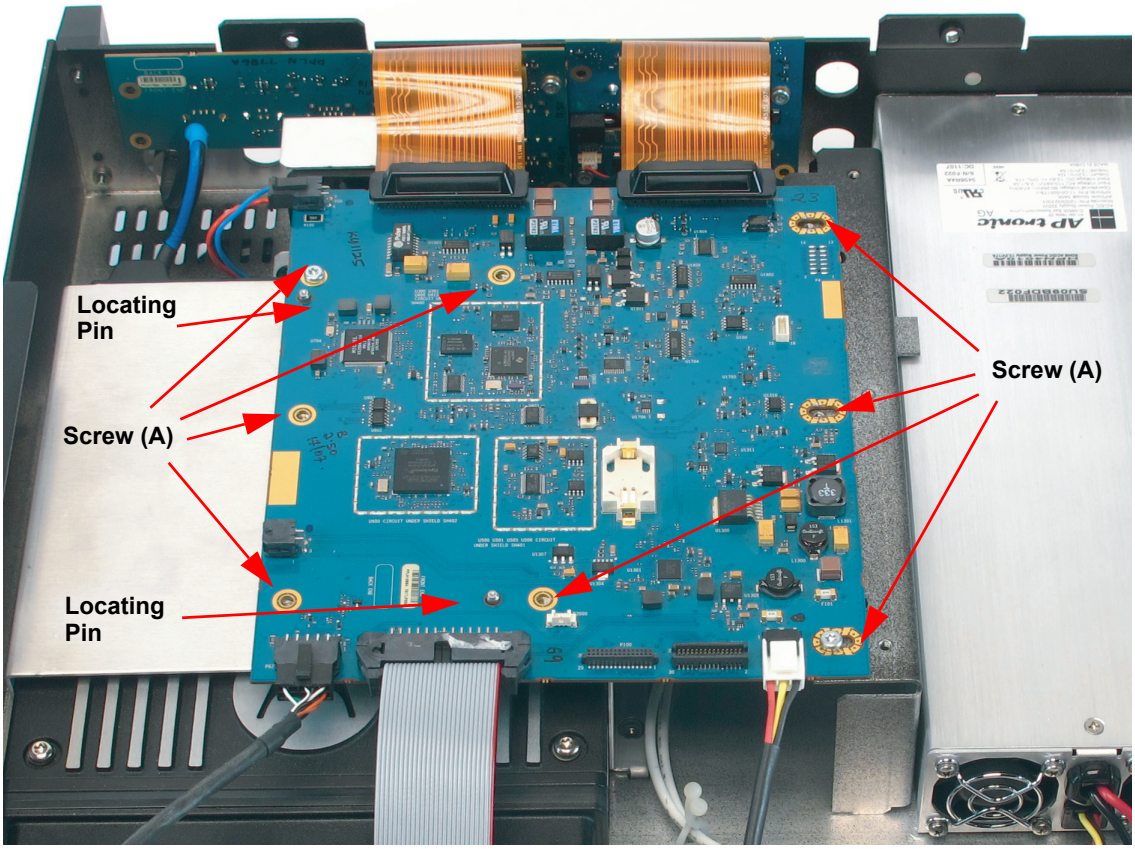


Figure 5-3. Removing and Replacing Main Board

5.2.3.2 Replacing the Main Board

1. Align the Main Board on the Radio Mounting Bracket which has two locating Pins.
2. Install the eight screws (A) on the main board assembly as shown in Figure 5-3 using a T15 TORX™ driver.
3. Tighten the screws to 1.0 N-m.
4. Reattach all cables and flex cables.

5.2.4 Mobile Radio

5.2.4.1 Removing the Mobile Radio

1. Remove the four screws (A) on the mobile radio assembly as shown in Figure 5-4 using a T25 TORX™ driver.
2. Unplug all cables from the Mobile Radio. Access to cables on rear of radio is easier after the four screws(A) are removed.
3. Lift mobile radio assembly straight up from chassis.
4. Remove the four screws holding the mobile radio to the radio bracket using a T25 TORX™ driver. Remove the mobile radio from the radio bracket. Remove and retain the thermal pad from the bottom of the mobile radio.

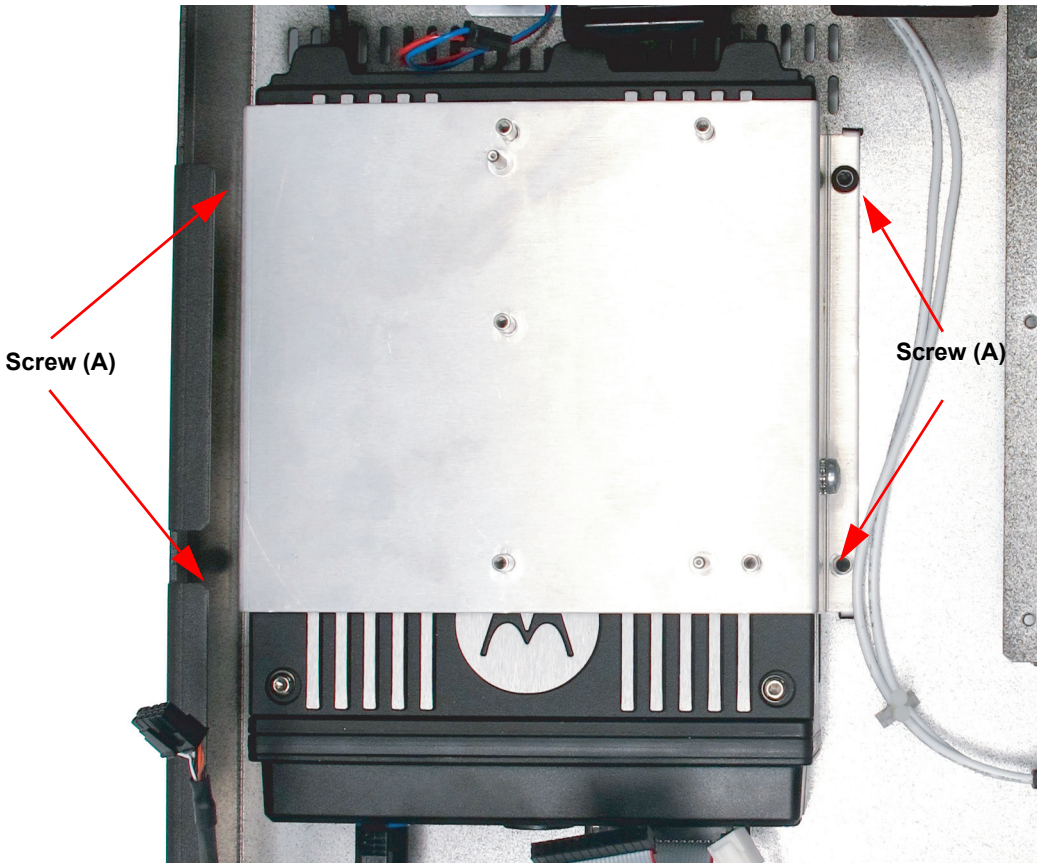


Figure 5-4. Removing and Replacing Mobile Radio

5.2.4.2 Replacing the Mobile Radio

1. Place radio bracket over replacement mobile radio oriented as shown in Figure 5-4 and install four screws using a T25 TORX™ driver. Place thermal pad on bottom of mobile radio.
2. Before attaching the Mobile Radio Assembly to the Chassis, reattach all cables to the Mobile Radio.
3. With the Mobile Radio Assembly in hand locate two slots on the Chassis and match up those slots with the tabs on the Assembly bracket.
4. Place the bracket tabs into the chassis slots which will then line up the mounting holes on the bracket with the holes on the chassis.
5. Install the four screws (A) on the main board assembly as shown in Figure 5-4 using a T25 TORX™ driver with an extension.
6. Tighten the four screws to 1.5 N-m.

5.2.5 Fan Assembly

5.2.5.1 Removing the Fan

1. Unplug the fan cable from the mating connector on the main board assembly.
2. Detach the Fan assembly by removing the two screws (A) as shown in Figure 5-5 using a T25 TORX™ driver.
3. Carefully lift the Fan Assembly straight up from the chassis.

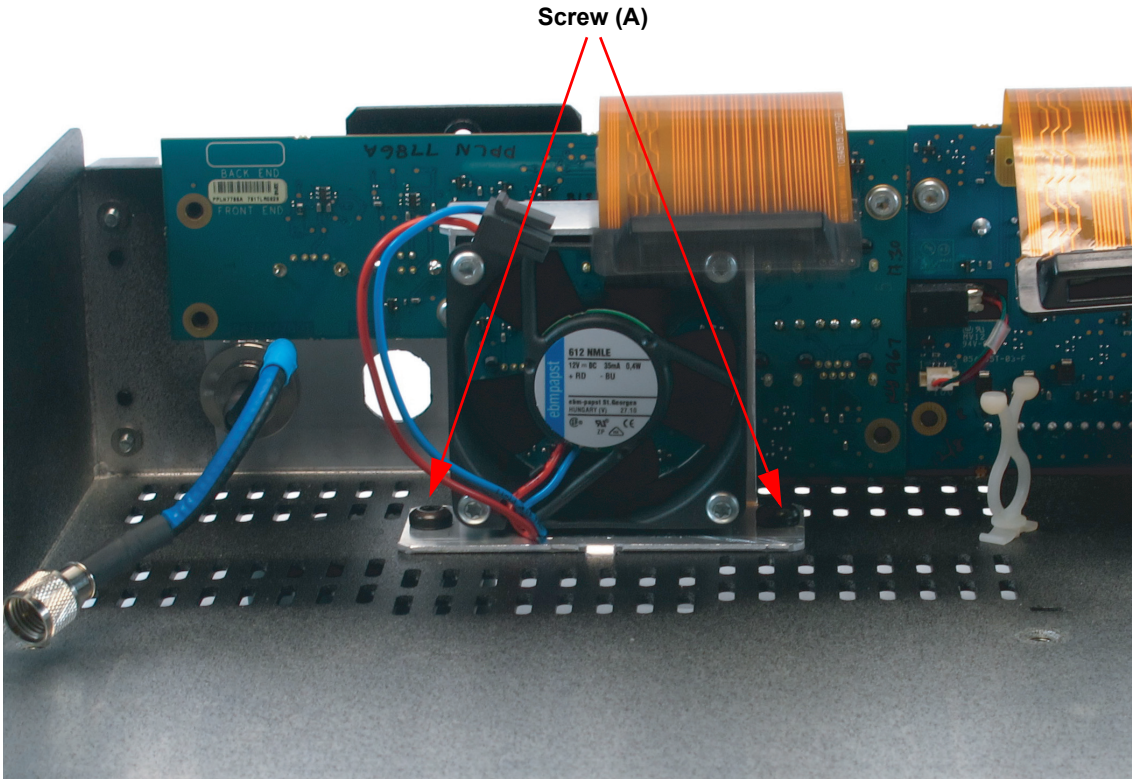


Figure 5-5. Removing and Replacing the Fan

5.2.5.2 Replacing the Fan

1. The chassis has a slot that will match up with to the tab on the Fan Assembly Bracket.
2. Place the Fan Assembly into the chassis with the tab inserted in the chassis slot.
3. Install the two screws (A) on the main board assembly as shown in Figure 5-5 using a T25 TORX™ driver.
4. Secure the fan and tighten the two screws to 1.5 N-m.

5.2.6 High Speed Board

5.2.6.1 Removing the High Speed Board

1. Remove the six screws (A) on the High Speed Board assembly as shown in Figure 5-6 using a T15 TORX™ driver.
2. Remove the High Speed Board with Flex attached.
3. Store the High Speed Board assembly in anti-static bag when it is not being serviced.

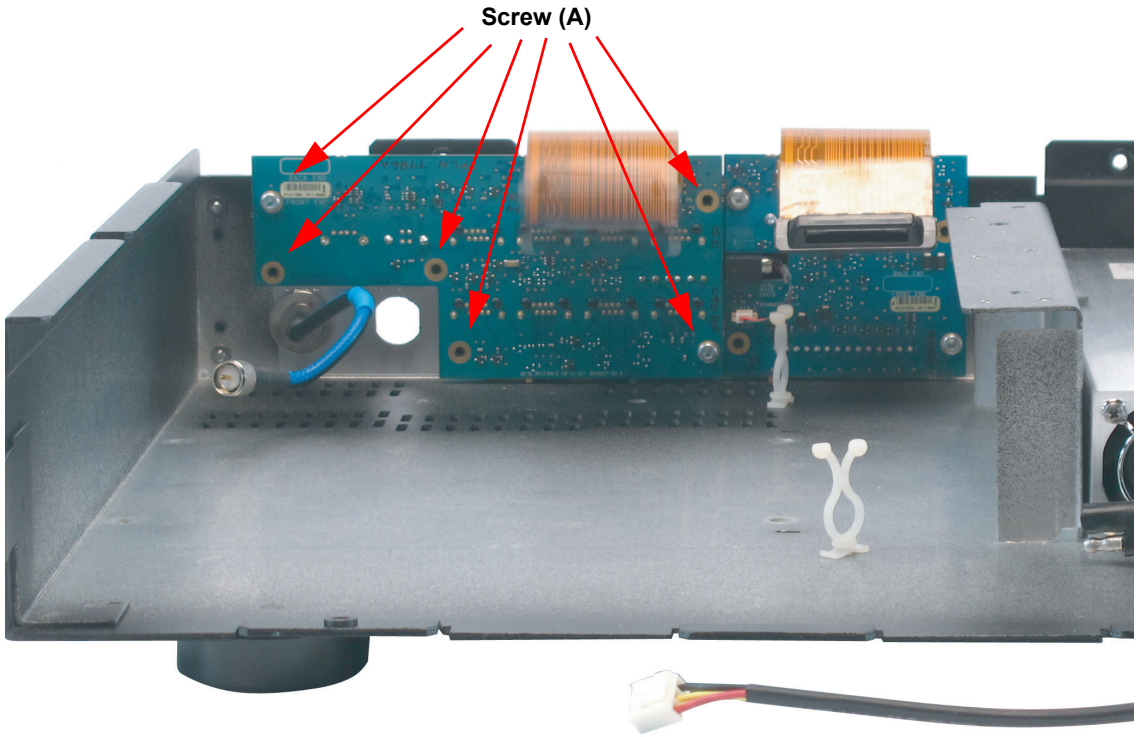


Figure 5-6. Removing and Replacing High Speed Board

5.2.6.2 Replacing the High Speed Board

1. Align the components on the High Speed Board with cutouts in the chassis.
2. Line up the holes on the High Speed Board with the standoffs on the chassis.
3. Install the six screws (A) on the High Speed Board assembly as shown in Figure 5-6 using a T15 TORX™ driver.
4. Tighten the screws to 1.0 N-m.

5.2.7 Low Speed Board

5.2.7.1 Removing the Low Speed Board

1. Unplug the Audio Jack Connector which is attached to the chassis.
2. Remove the four screws (A) on the Low Speed Board assembly as shown in Figure 5-7 using a T15 TORX™ driver.
3. Remove the Low Speed Board with Flex attached.
4. Store the Low Speed Board assembly in anti-static bag when it is not being serviced.

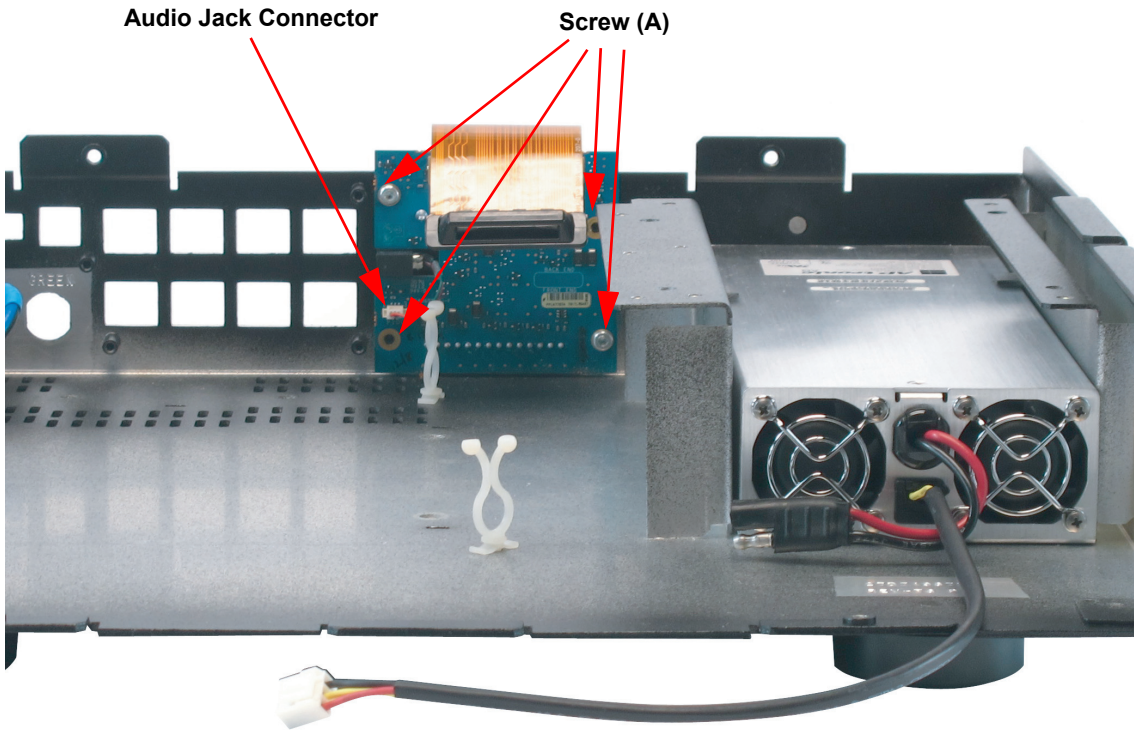


Figure 5-7. Removing and Replacing Low Speed Board

5.2.7.2 Replacing the Low Speed Board

1. Align the components on the Low Speed Board with the cutouts on the chassis.
2. Line up the holes on the Low Speed Board with the standoffs on the Chassis.
3. Install the four screws (A) on the Low Speed Board assembly as shown in Figure 5-7 using a T15 TORX™ driver.
4. Tighten to 1.0 N-m.
5. Plug the Audio Jack back in to the Low Speed Board connector.

5.2.8 Power Supply

5.2.8.1 Removing the Power Supply

1. Turn the chassis to the bottom side exposing the four screws that hold the Power Supply.
2. Remove the four screws that hold the Power Supply assembly to the chassis using a T25 TORX™ driver.
3. Turn the chassis to the top side, push aside the cable retainer and then slide the Power Supply out towards the front.

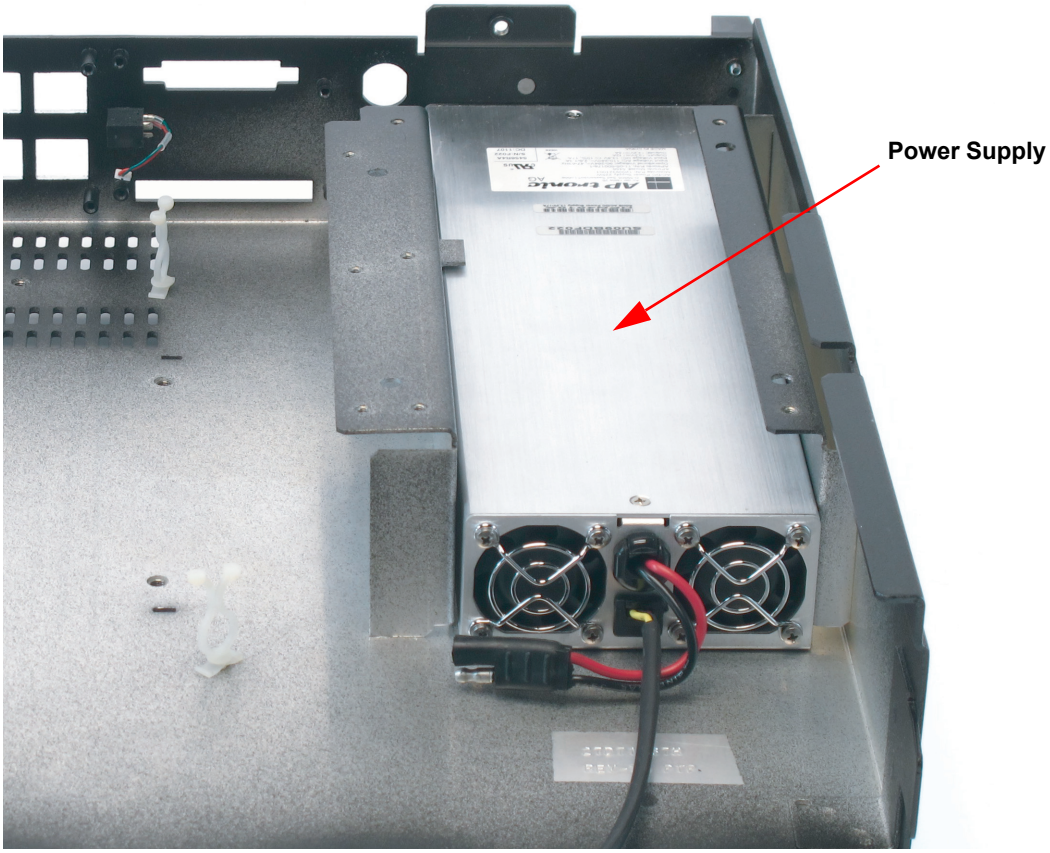


Figure 5-8. Removing and Replacing Power Supply

5.2.8.2 Replacing the Power Supply

1. Push aside the cable retainer before sliding the Power Supply between the two chassis brackets all the way to the back of the chassis.
2. Turn the chassis to the bottom side.
3. Replace the four screws that hold the Power Supply assembly to the chassis using a T25 TORX™ driver.
4. Tighten to 1.5 N-m.

Chapter 6 Cabling Diagrams and Rear Panel

6.1 Consolette to Centracom/ACIM Card - Data Cable

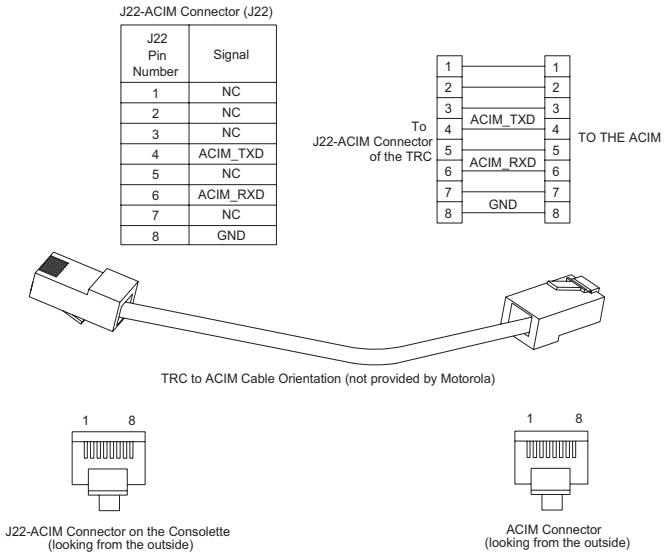


Figure 6-1. Consolette to Centracom/ACIM Card Cable

NOTE: An off-the-shelf 1-to1 cable may be used for the Consolette to Centracom/ACIM Card - Data Cable. Refer to the Centracom installation manual for the audio cabling between the CEB and the Consolette Wireline connector (J21).

6.2 Consolette to CCGW/ACIM V.24 Interface - Data Cable

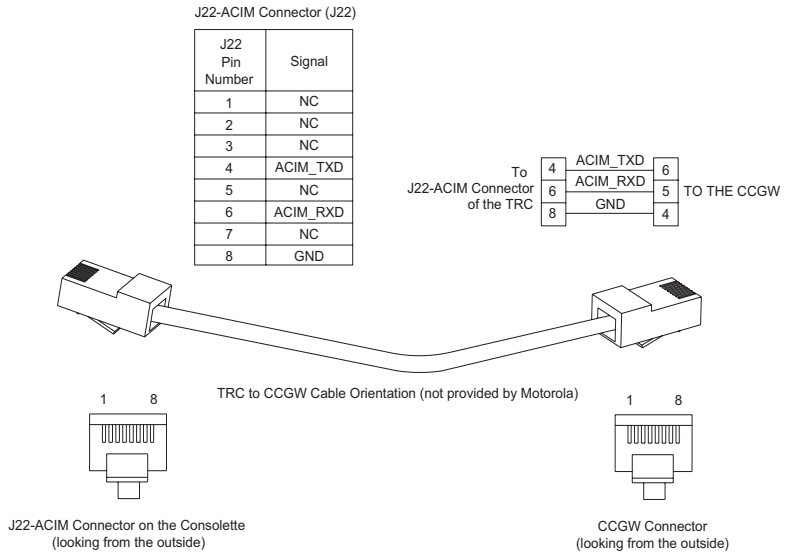


Figure 6-2. Consolette to CCGW/ACIM V.24 Interface Cable

6.3 Consolette to CCGW/Wireline Interface - Audio Cable

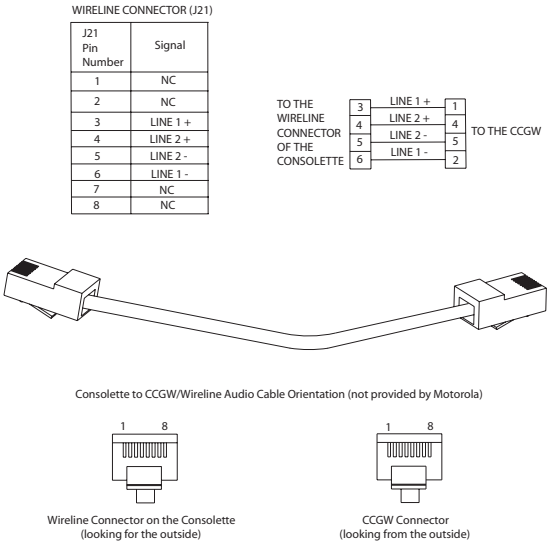


Figure 6-3. Consolette to CCGW/Wireline Interface - Audio Cable

6.4 Crosspatch Cable diagram

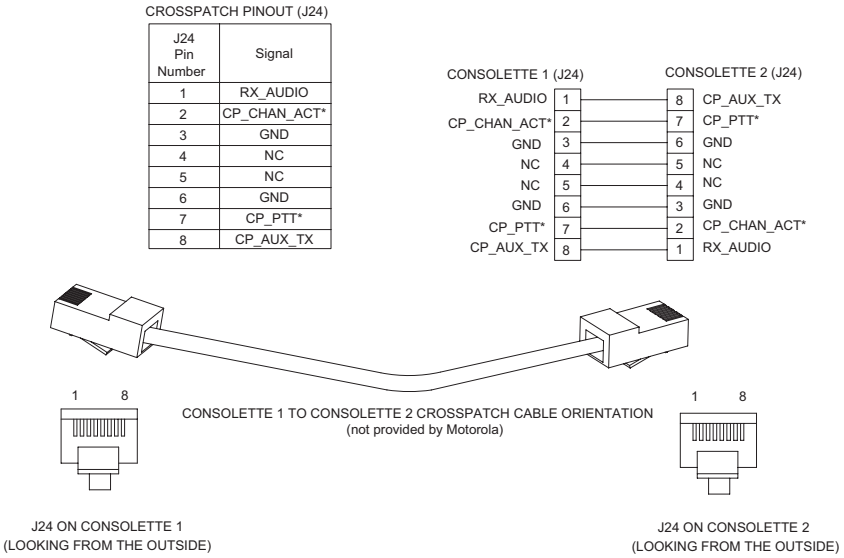


Figure 6-4. Crosspatch Cable

6.5 Crossmute Cable diagram

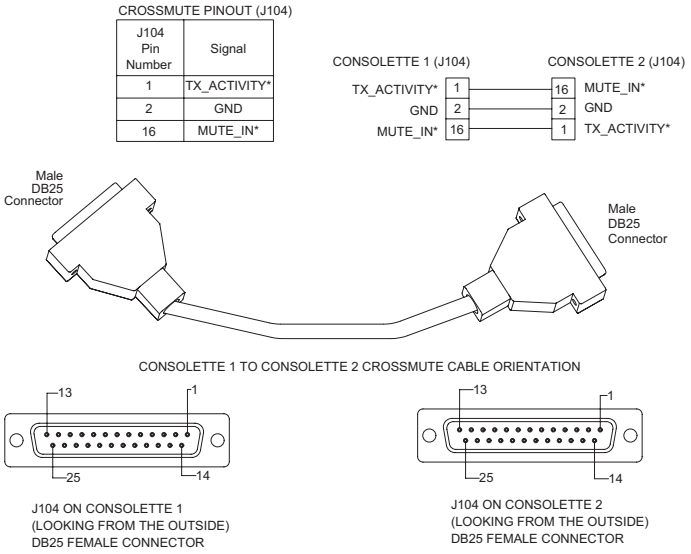


Figure 6-5. Crossmute Cable

6.6 Rear Panel Connector Pin Descriptions

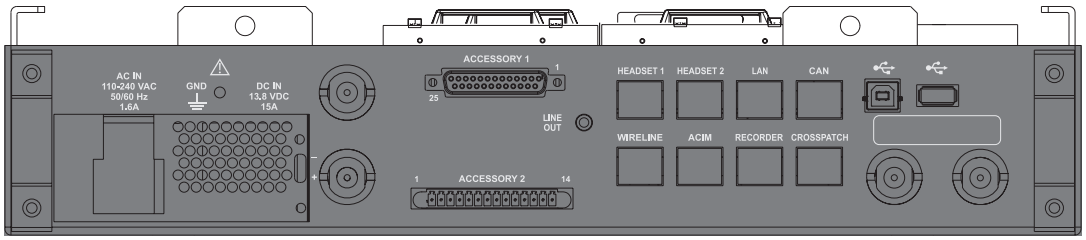


Figure 6-6. Rear Panel

6.6.1 CAN J14 (RJ45)

Table 6-1. CAN

Pin	Signal Name	Description
1	CAN_PWR_L	CAN Power Low Bus
2	CAN_PWR_H	CAN Power High Bus
3	CAN_DATA_L	CAN Data Low Bus
4	CAN_DATA_H	CAN Data High Bus
5	CAN_LOOP_REAR	CAN Termination Control
6	GND	Ground
7	CAN_AUDIO_L	CAN Audio Low Bus
8	CAN_AUDIO_H	CAN Audio High Bus

6.6.2 USB J16 (USB-A)

Table 6-2. USB HOST

Pin	Signal Name	Description
1	VBUS_HOST	USB Host Power Connection - Power supplied out to external USB device
2	D-_HOST	USB Host Data-
3	D+_HOST	USB Host Data+
4	GND	Ground

6.6.3 USB DEVICE J15 (USB-B)

Table 6-3. USB DEVICE

Pin	Signal Name	Description
1	USB_VBUS	USB Device Power Connection - Power sourced from external USB host
2	USB_DM	USB Device Data-
3	USB_DP	USB Device Data+
4	GND	Ground

6.6.4 ACCESSORY 2 CONNECTOR J103 (14PIN TERMINAL BLOCK)

Table 6-4. ACCESSORY 2

Pin	Signal Name	Description
1	EXT_SPKR+	Speaker high audio to the externally connected speaker.
2	EXT_SPKR-	Speaker low audio to the externally connected speaker.
3	VIPOUT1	Logic output VIP Output 1
4	SWB+	Switched +13.2Vdc or battery voltage
5	VIPOUT2	Logic output VIP Output 2
6	SWB+	Switched +13.2Vdc or battery voltage
7	VIPOUT3	Logic output VIP Output 3
8	SWB+	Switched +13.2Vdc or battery voltage
9	VIPIN1	Logic input VIP Input 1
10	GND	Ground
11	VIPIN2	Logic input VIP Input 2
12	GND	Ground
13	VIPIN3	Logic input VIP Input 3
14	GND	Ground

6.6.5 ACCESSORY 1 CONNECTOR J104 (DB-25)

Table 6-5. Accessory 1

Pin	Signal Name	Description
1	TX_ACTIVITY*	Active low logic output to indicate when the Consolette is transmitting.
2	GND	Ground
3	N/C	Not Used
4	RX_AUDIO[A(rx)]	Receive audio from Codec at a fixed level of approximately 300 mVrms. Part of the APCO interface.
5	FORCE_FAIL*	Active low logic input to bootstrap Consolette Controller.
6	N/C	Not Used
7	N/C	Not Used
8	EXT_PA_AUD	Receive audio and tones from Codec at a fixed level (300 mVrms) for use with an external PA.
9	EXT_PA_ACTIVITY*	Active low logic output to indicate when there is activity on the EXT_PA_AUD output pin.
10	PTT*	Active low logic input for brick transmit. Corresponds with AUX_TX [A(tx)] audio path. Part of the APCO interface.
11	N/C	Not Used
12	GND	Ground
13	EMERGENCY*	Active low logic input to activate an emergency transmission.
14	N/C	Not Used
15	N/C	Not Used
16	MUTE_IN*	Active low logic input to instruct all audio outputs to be muted.
17	AUX_TX[A(tx)]	Transmit audio w/o mic biasing. Goes with PTT*. Nominal level is 300mVrms. Part of the APCO interface.
18	VCC_5V	5Vdc output from consolette when system on.
19	N/C	Not Used
20	N/C	Not Used
21	CHAN_ACT_RELAY_IN	Input to solid state relay to indicate when the RX_AUDIO path is being driven. Relay is closed upon verification of a qualified signal being presented by the receiver. May still be active even if speakers mutes. (ex. Headset audio)

Pin	Signal Name	Description
22	INT_SPKR_ACTIVITY*	Active low logic output to indicate when there is valid audio on the internally housed Consolette speaker.
23	EXT_SPKR_ACTIVITY*	Active low logic output to indicate when there is valid audio on the external secondary speaker.
24	MONITOR*	Active low logic input to allow monitoring of channel traffic on conventional channels by defeating the coded squelch.
25	CHAN_ACT_RELAY_OUT	Output of solid state relay to indicate when the RX_AUDIO path is being driven. Relay is closed upon verification of a qualified signal being presented by the receiver. May still be active even if speakers mutes. (ex. Headset audio)

6.6.6 HEADSET 1 J11 (RJ45)

Table 6-6. Headset 1

Pin	Signal Name	Description
1	N/C	Not Used
2	HDST1_SENSE*	Active low logic input to indicate Headset 1 attached
3	HDST1_SPKR-	Speaker low output for use with Headset 1. Tied to ground.
4	HDST1_MIC-	Mic low connection for use with Headset 1. Tied to ground.
5	HDST1_MIC+	Mic high connection for use with Headset 1.
6	HDST1_PTT*	Active low logic input for Headset 1 PTT
7	HDST1_SPKR+	Speaker high output for use with Headset 1.
8	GND	Ground

6.6.7 HEADSET 2 J12 (RJ45)

Table 6-7. Headset 2

Pin	Signal Name	Description
1	N/C	Not Used
2	HDST2_SENSE*	Active low logic input to indicate Headset 2 attached
3	HDST2_SPKR-	Speaker low output for use with Headset 2. Tied to ground.
4	HDST2_MIC-	Mic low connection for use with Headset 2. Tied to ground.
5	HDST2_MIC+	Mic high connection for use with Headset 2.

Pin	Signal Name	Description
6	HDST2_PTT*	Active low logic input for Headset 2 PTT
7	HDST2_SPKR+	Speaker high output for use with Headset 2.
8	GND	Ground

6.6.8 WIRELINE J21 (RJ45)

Table 6-8. Wireline

Pin	Signal Name	Description
1	N/C	Not Used
2	N/C	Not Used
3	LINE1+	TX and RX high audio for 2-wire operation or RX high audio for 4-wire operation. 600 Ohms or Open Impedance.
4	LINE2+	TX high audio for 4-wire operation. 600 Ohms or Open Impedance.
5	LINE2-	TX low audio for 4-wire operation. 600 Ohms or Open Impedance.
6	LINE2+	TX and RX low audio for 2-wire operation or RX low audio for 4-wire operation. 600 Ohms or Open Impedance..
7	N/C	Not Used
8	N/C	Not Used

6.6.9 RECORDER J23 (RJ45)

Table 6-9. Recorder

Pin	Signal Name	Description
1	REC_AUDIO	Receive audio, tones, and/or transmit audio from the Codec at a fixed level of approximately 300mVrms.
2	GND	Ground
3	REC_ACTIVITY*	Active low logic output to indicate when there is activity on the REC_AUDIO output pin.
4	N/C	Not Used
5	N/C	Not Used
6	N/C	Not Used
7	N/C	Not Used
8	N/C	Not Used

6.6.10 CROSSPATCH J24 (RJ45)

Table 6-10. Crosspatch

Pin	Signal Name	Description
1	RX_AUDIO	Receive audio from the Codec at a fixed level of approximately 300mVrms.
2	CP_CHAN_ACTIVITY*	Active low logic output to indicate when the RX_AUDIO path is being driven with valid audio,tones.
3	GND	Ground
4	N/C	Not Used
5	N/C	Not Used
6	GND	Ground
7	CP_PTT*	Active low logic input for transmit. Corresponds with CP_AUX_TX audio path..
8	CP_AUX_TX	Transmit audio to Codec w/o mic biasing. Goes with CP_PTT* . Nominal level is 300mVrms.

6.6.11 ACIM J22 (RJ45)

Table 6-11. ACIM

Pin	Signal Name	Description
1	N/C	Not Used
2	N/C	Not Used
3	N/C	Not Used
4	ACIM_TX	Data from the ACIM.
5	N/C	Not Used
6	ACIM_RX	Data to the ACIM.
7	N/C	Not Used
8	GND	Ground

6.6.12 LAN J13 (RJ45)

Table 6-12. LAN

Pin	Signal Name	Description
1	LANTX+	Ethernet Transmit Data+
2	LANTX-	Ethernet Transmit Data-
3	LANRX+	Ethernet Receive Data+
4	GND	Ground
5	GND	Ground
6	LANRX-	Ethernet Receive Data-

Pin	Signal Name	Description
7	GND	Ground
8	GND	Ground

6.6.13 LINE OUT P100 (AUDIO JACK 3.5MM)

Table 6-13. Line Out

Pin	Signal Name	Description
1	GND	Ground
2	RX_AUDIO_BUFF	RX_AUDIO signal for use with a powered external speaker
3	RX_AUDIO_BUFF	RX_AUDIO signal for use with a powered external speaker

Notes

Chapter 7 Troubleshooting Charts and Error Codes

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.

7.1 List of Troubleshooting Charts and Error Codes

Table 7-1. List of Troubleshooting Charts

Table 7-2. Error Table

7.2 Troubleshooting Charts

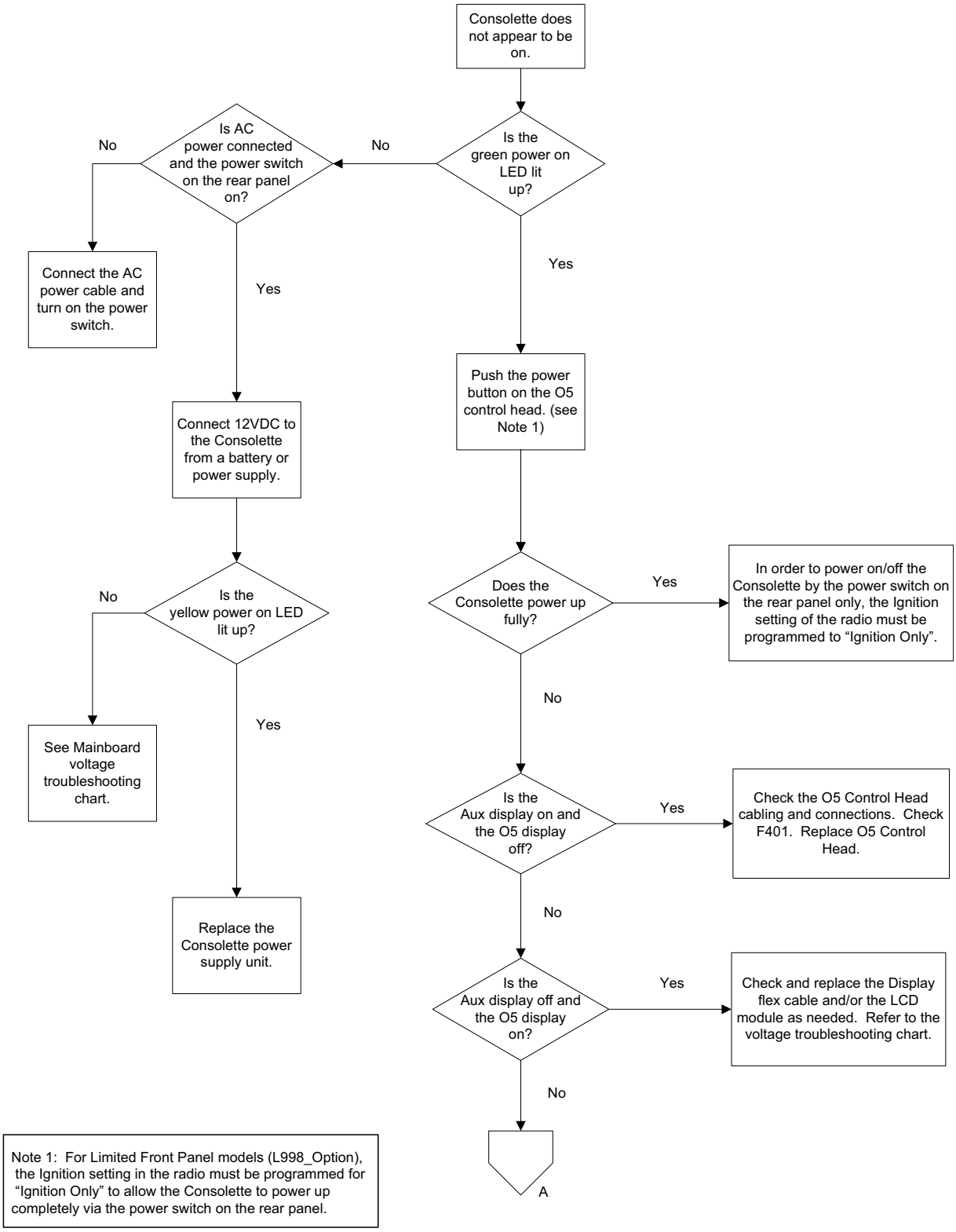


Figure 7-1. Consolette does not power On or Off - A

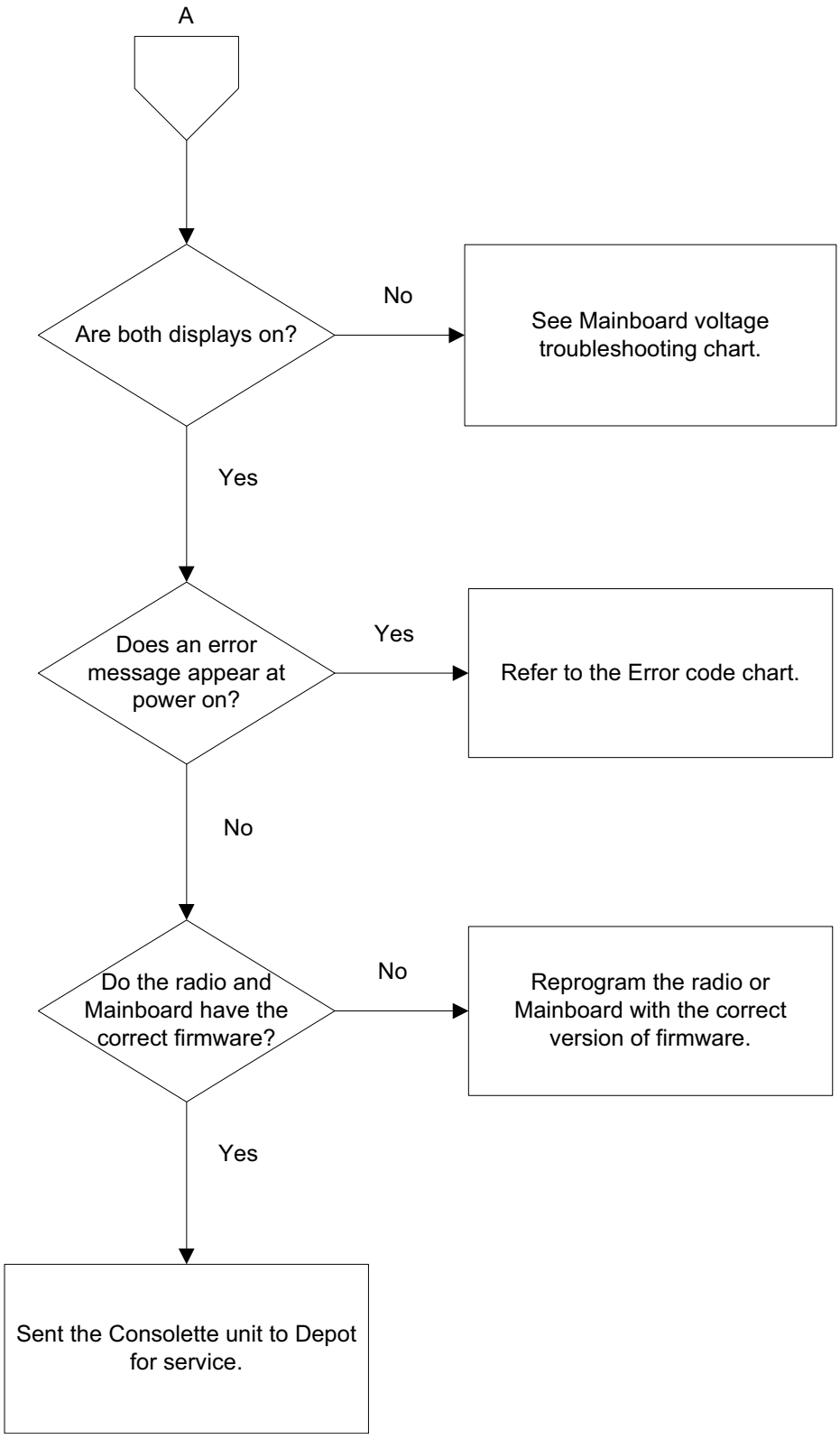


Figure 7-2. Consolette does not power On or Off - B

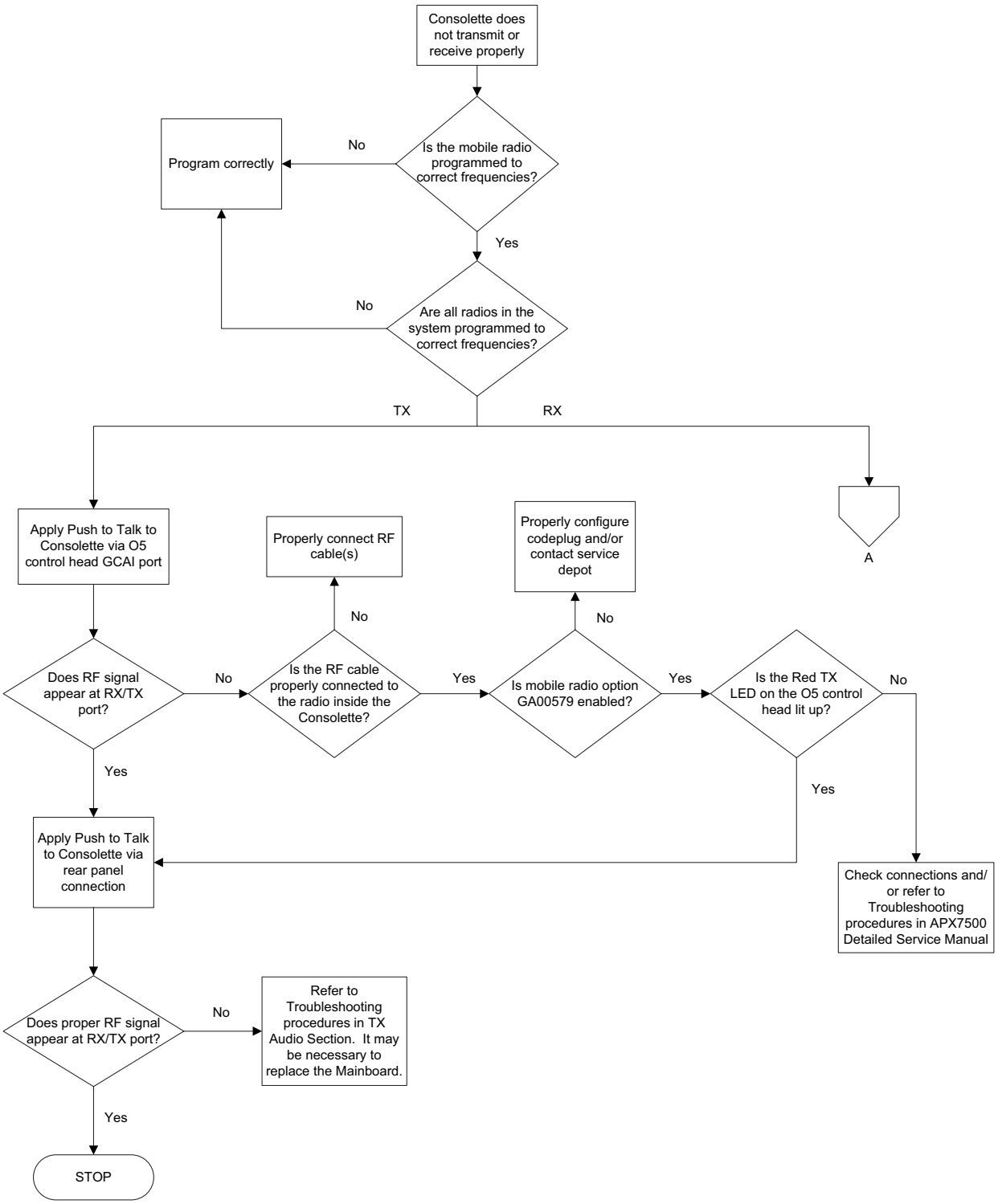


Figure 7-3. Consolette does not Transmit or Receive - A

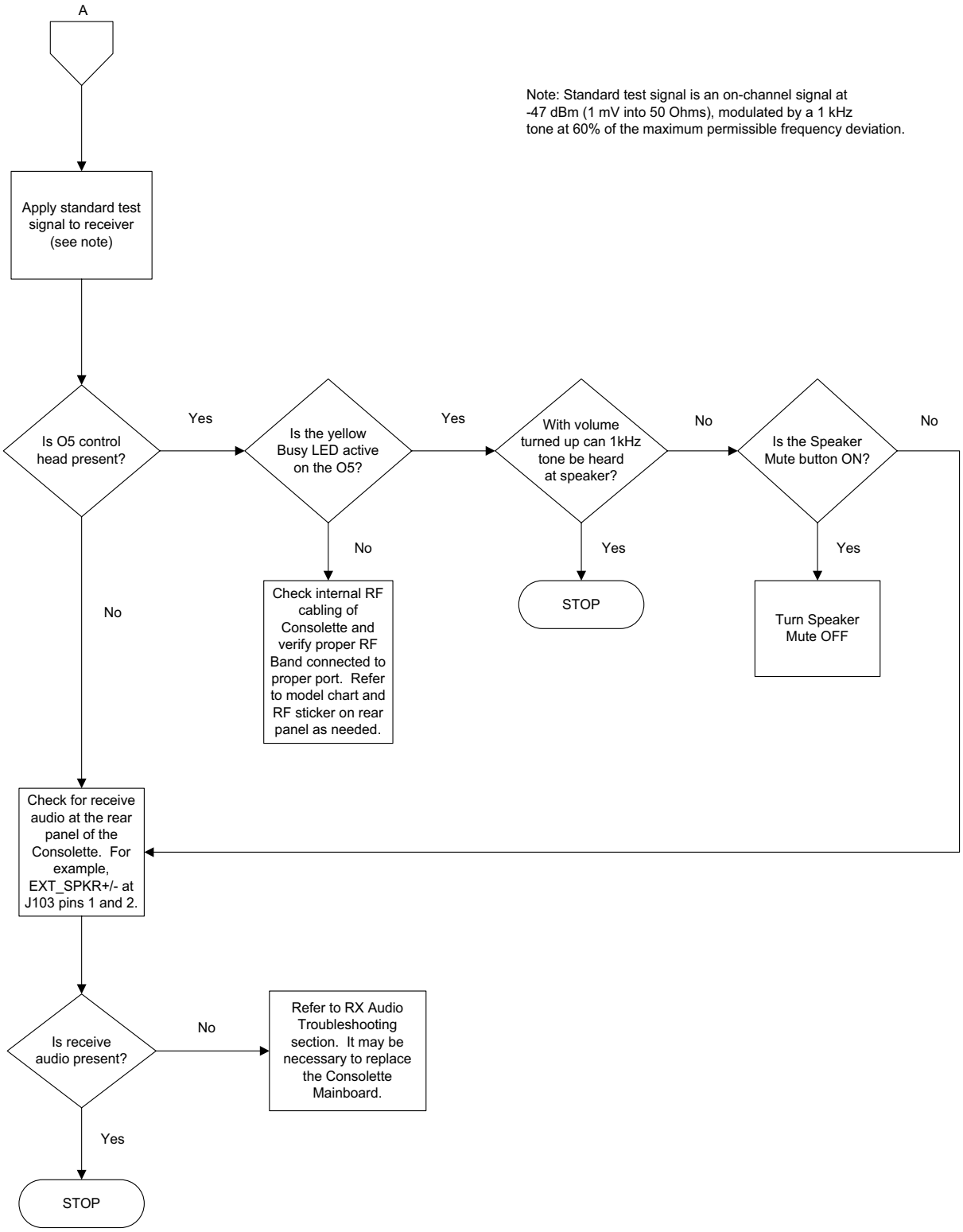


Figure 7-4. Consolette does not Transmit or Receive - B

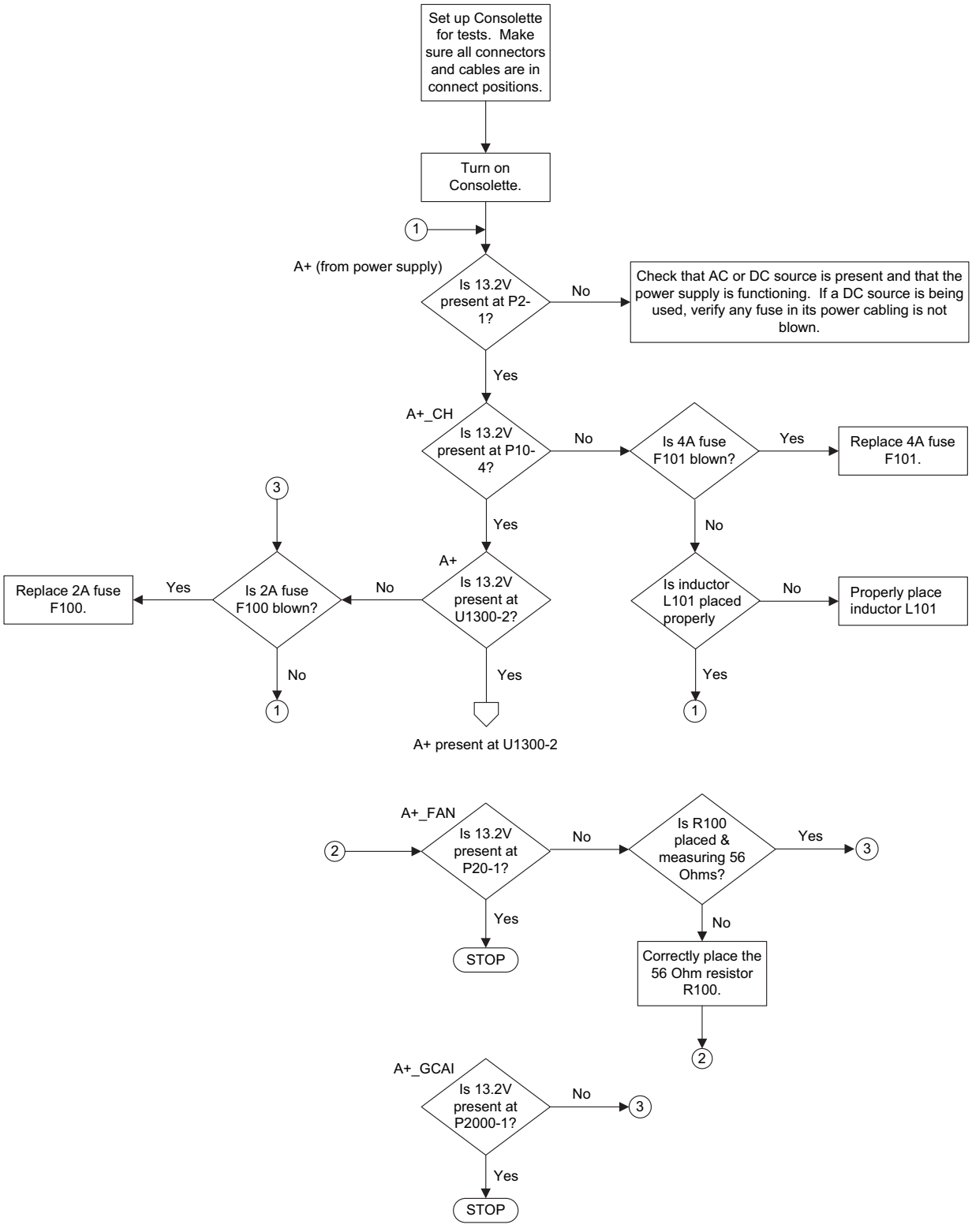


Figure 7-5. Controller Board DC Voltages - A

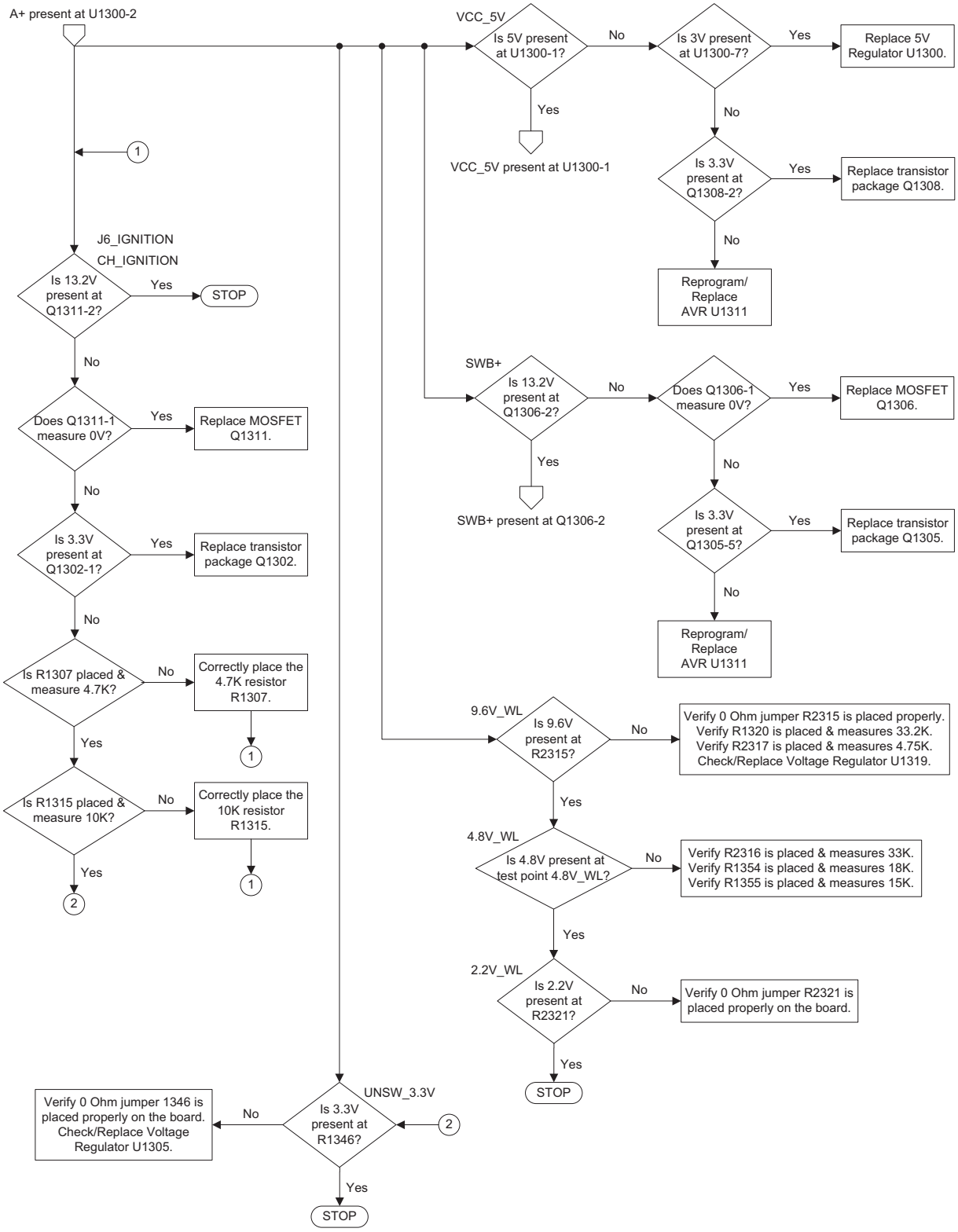


Figure 7-6. Controller Board DC Voltages - B

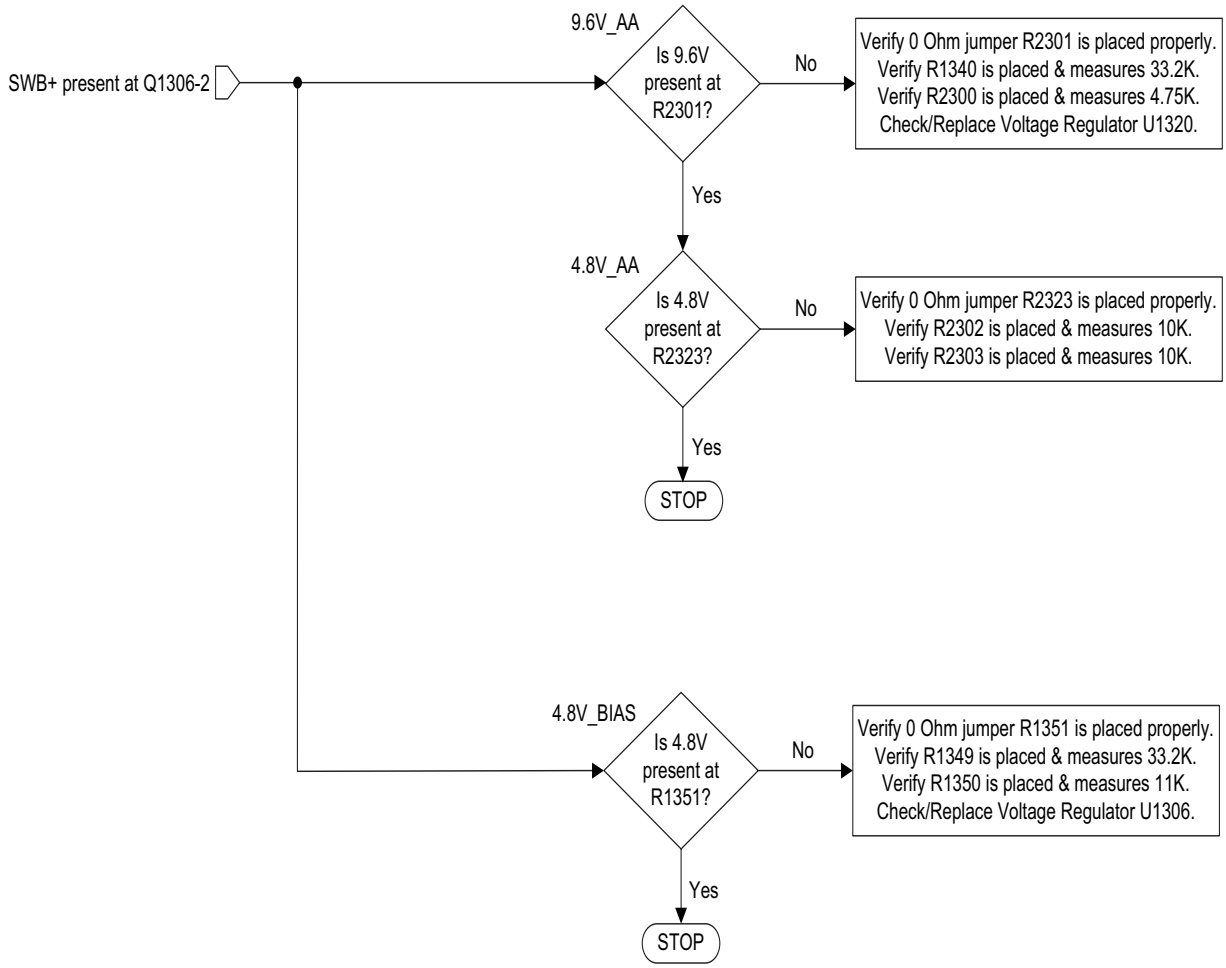


Figure 7-7. Controller Board DC Voltages - C

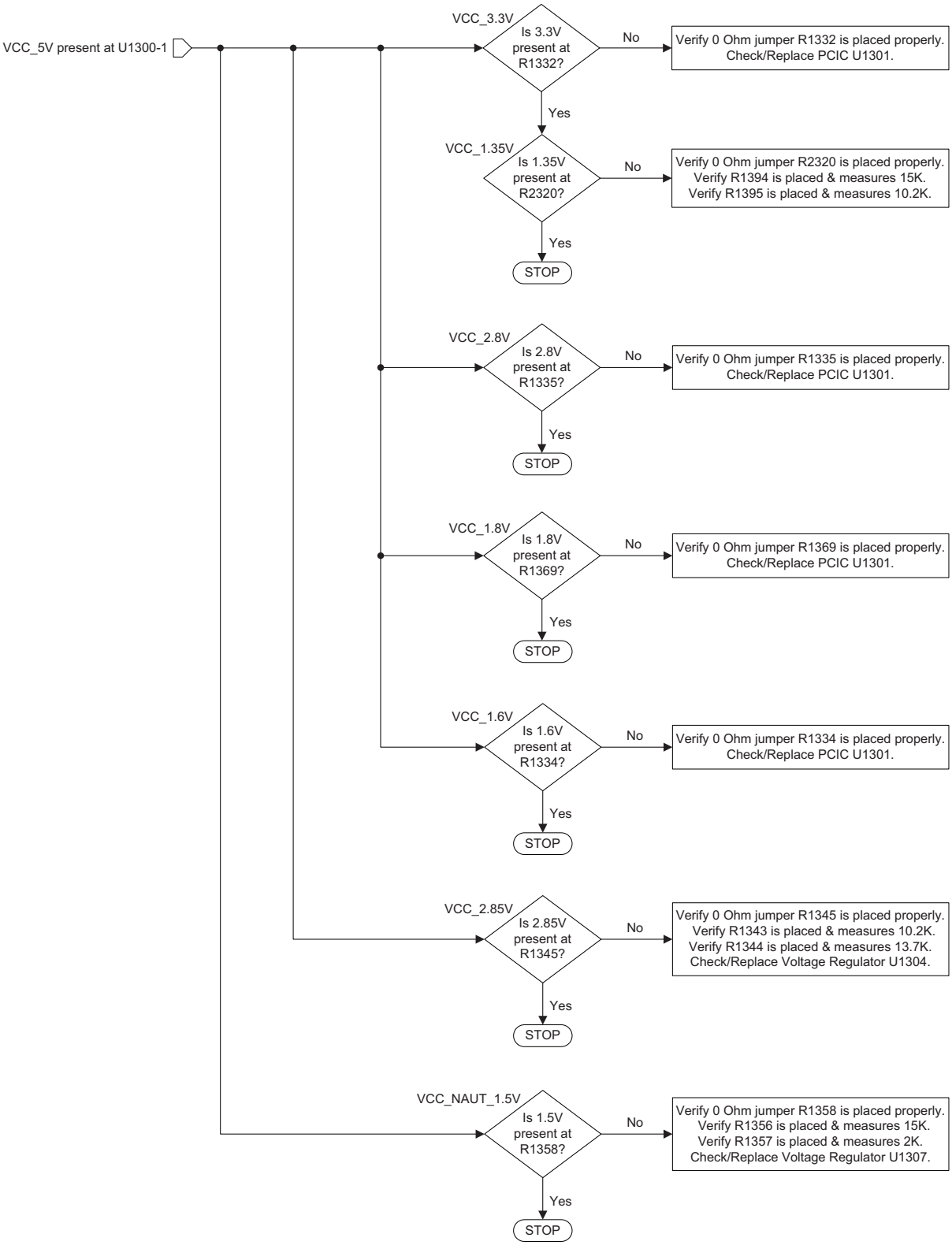


Figure 7-8. Controller Board DC Voltages - D

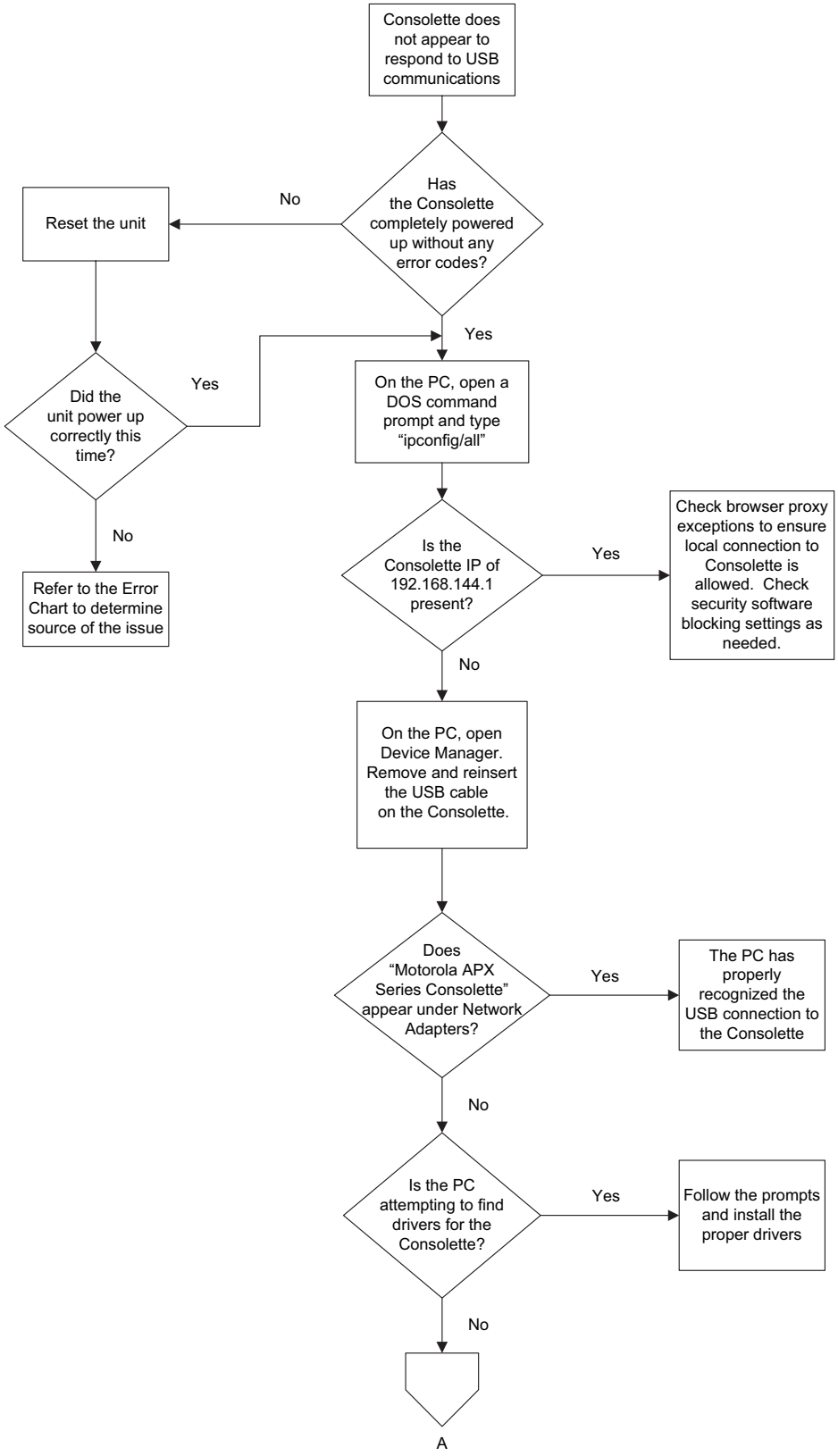


Figure 7-9. USB Connectivity - A

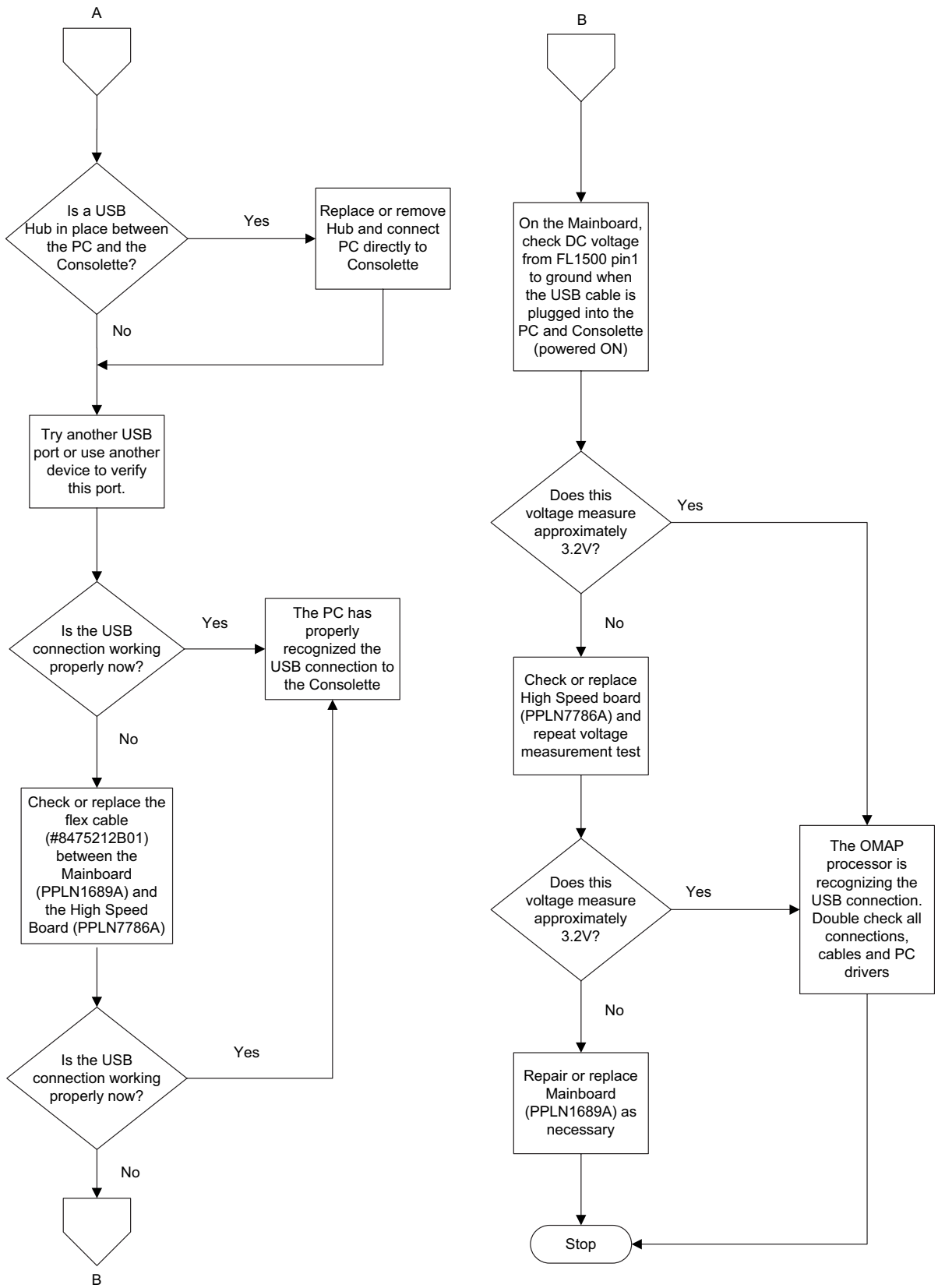


Figure 7-10. USB Connectivity - B

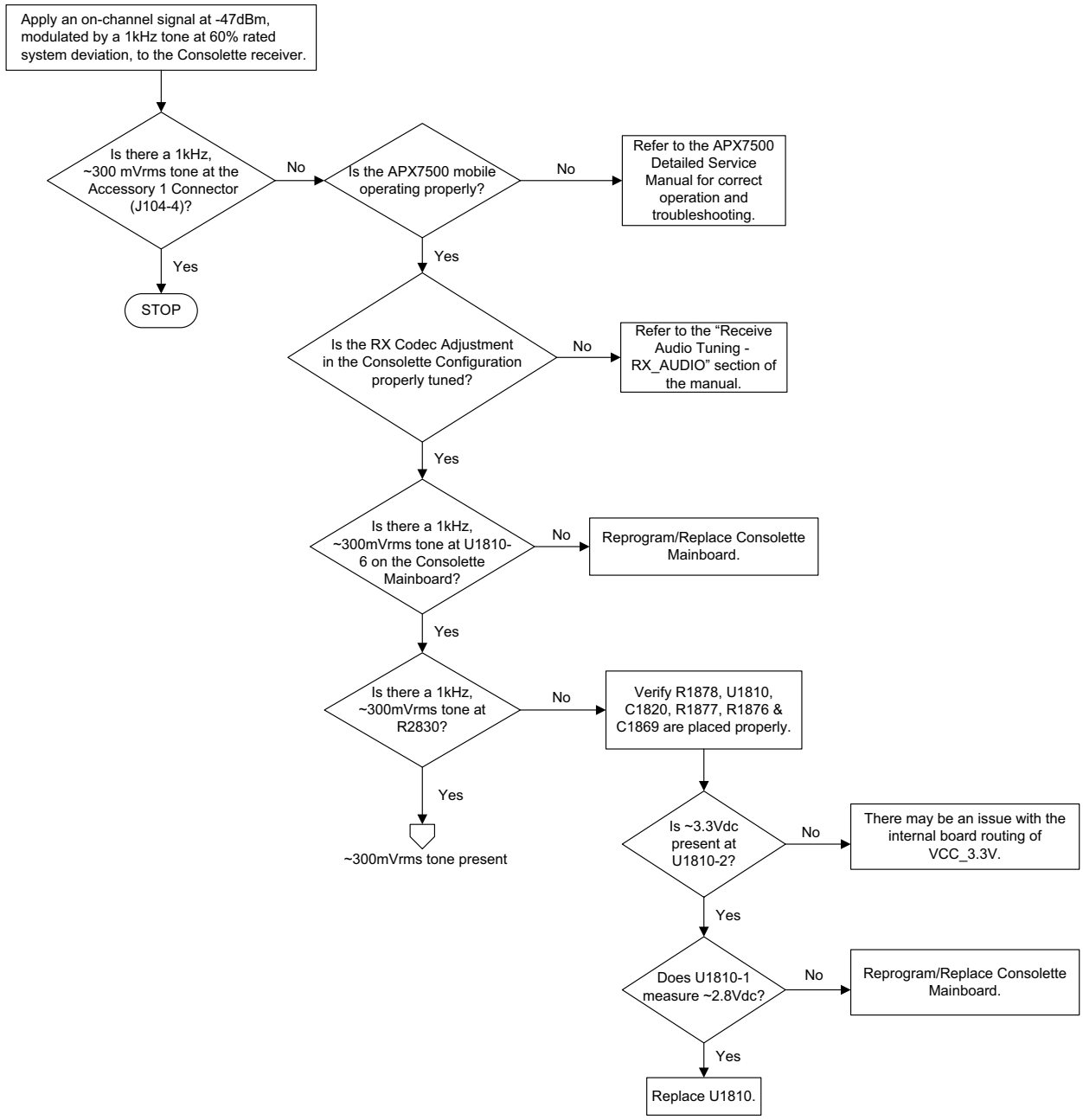


Figure 7-11. APCO RX Audio - A

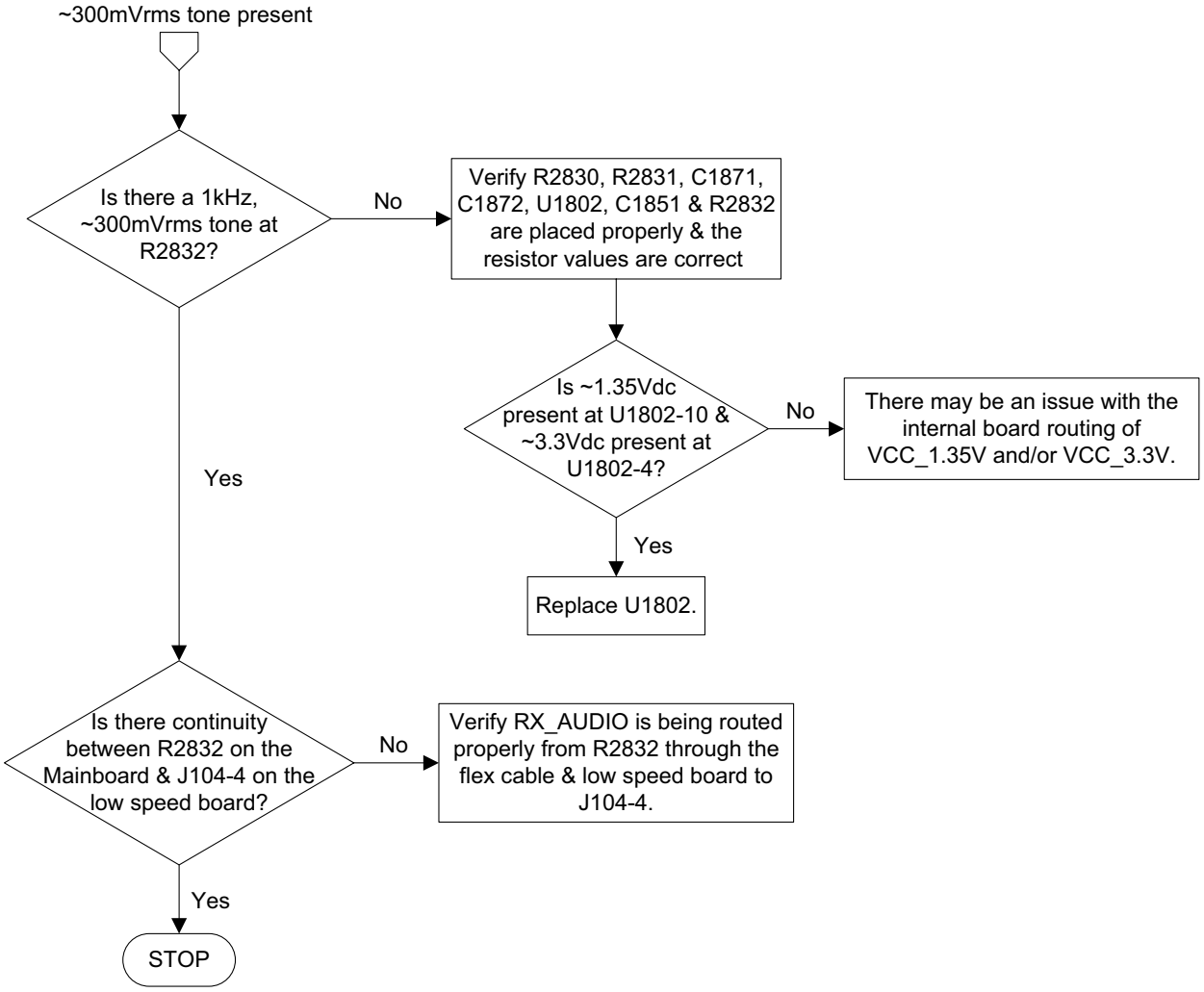


Figure 7-12. APCO RX Audio - B

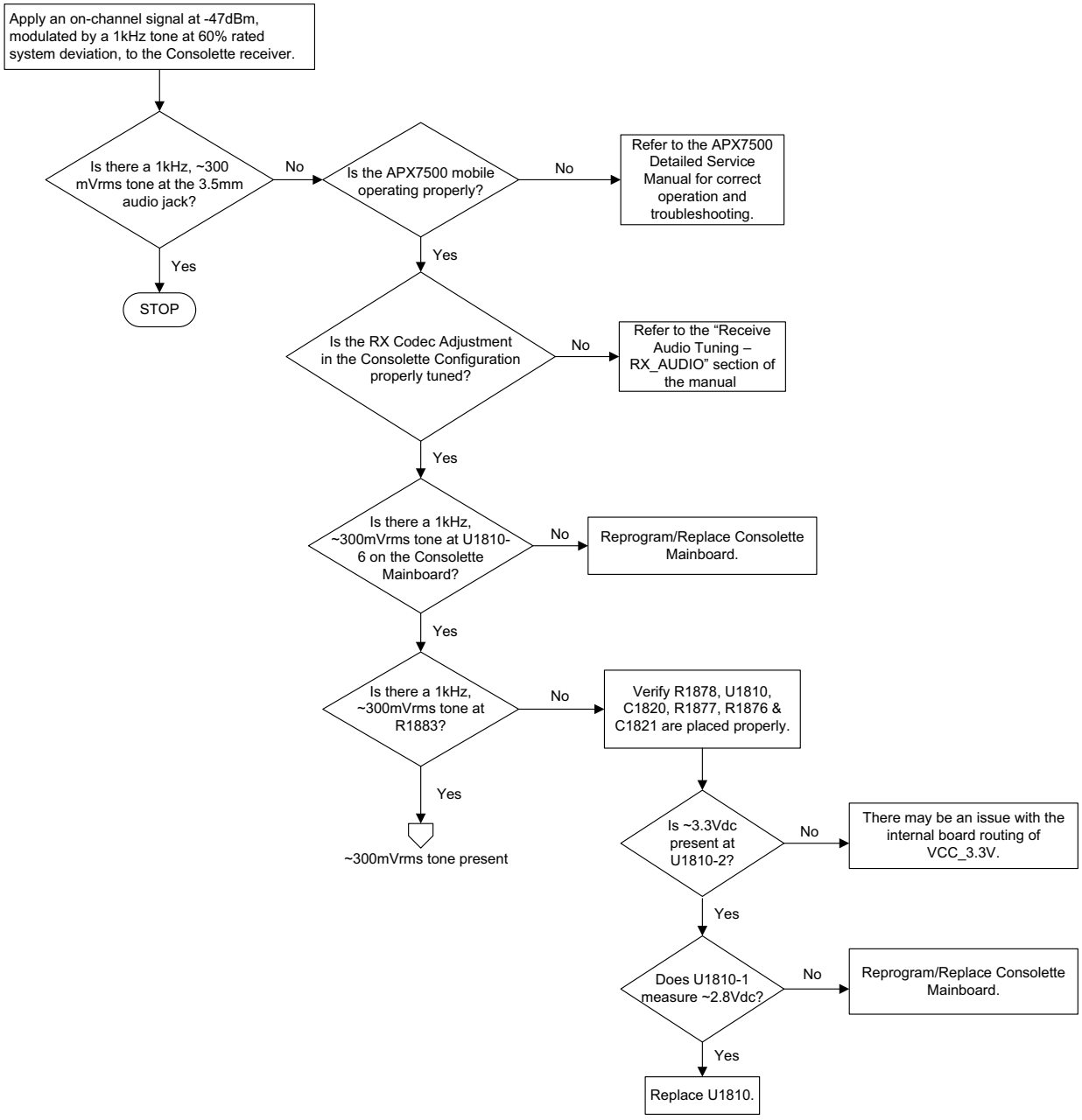


Figure 7-13. Audio Jack RX - A

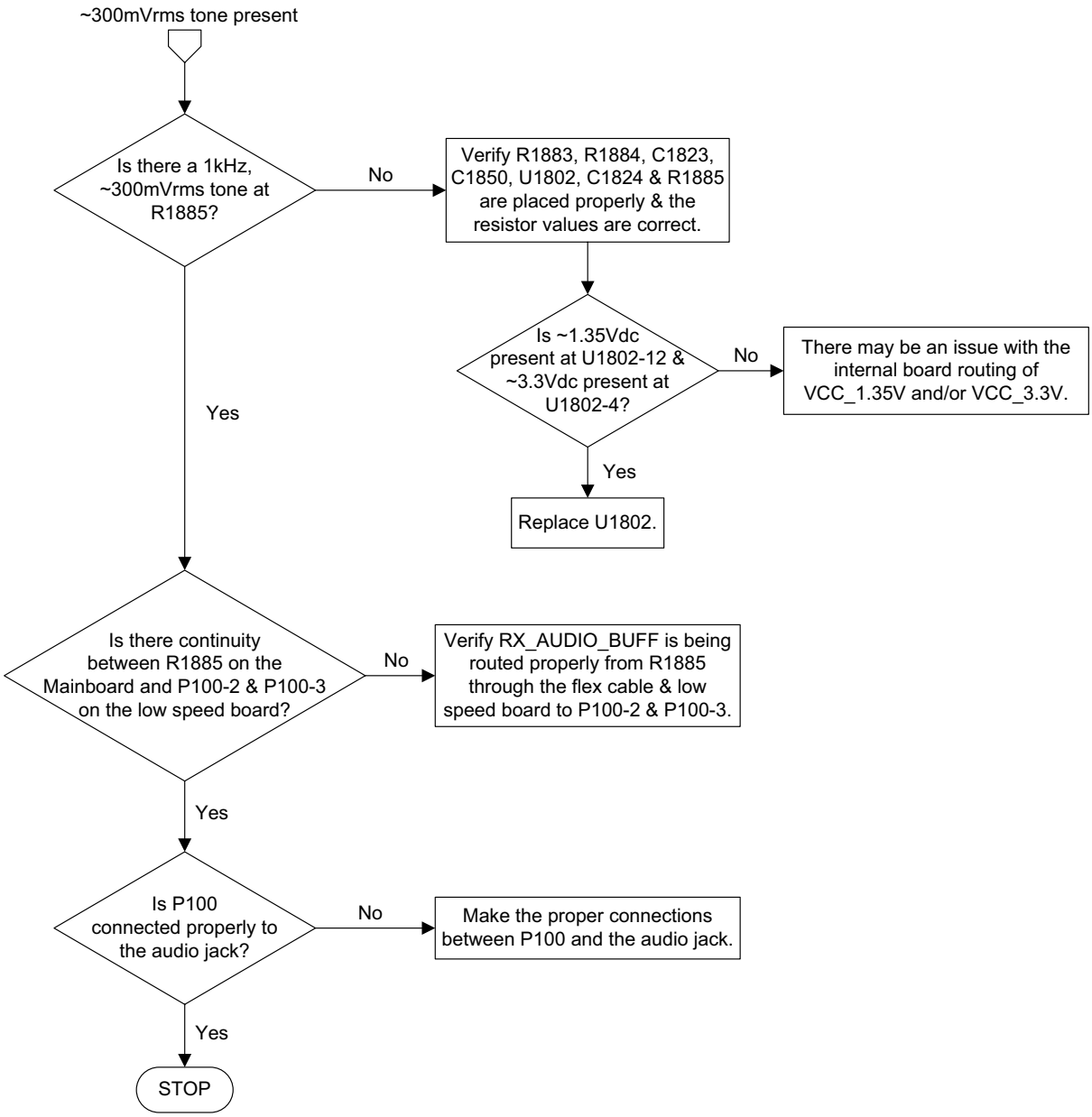


Figure 7-14. Audio Jack RX - B

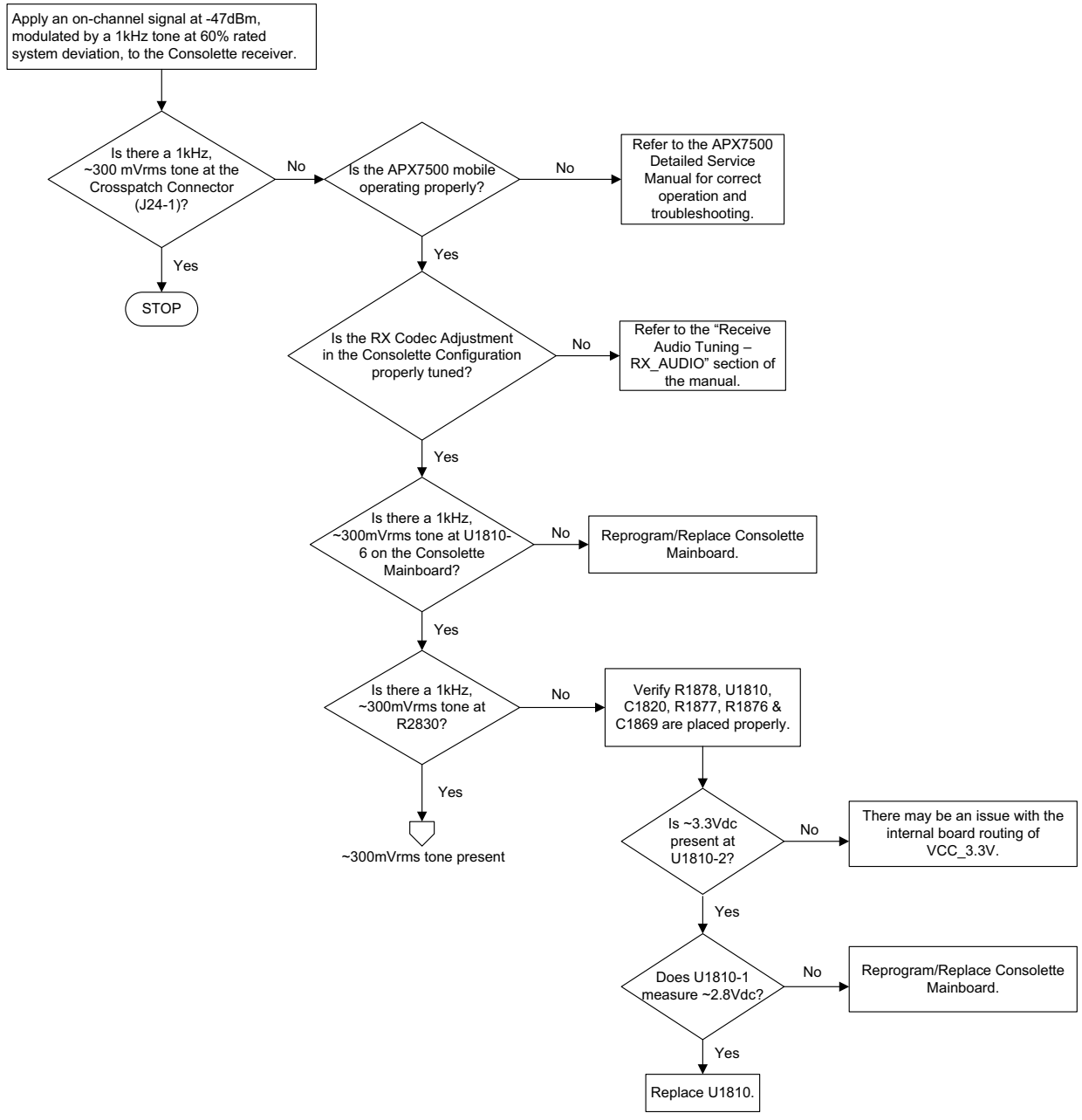


Figure 7-15. Crosspatch RX Audio - A

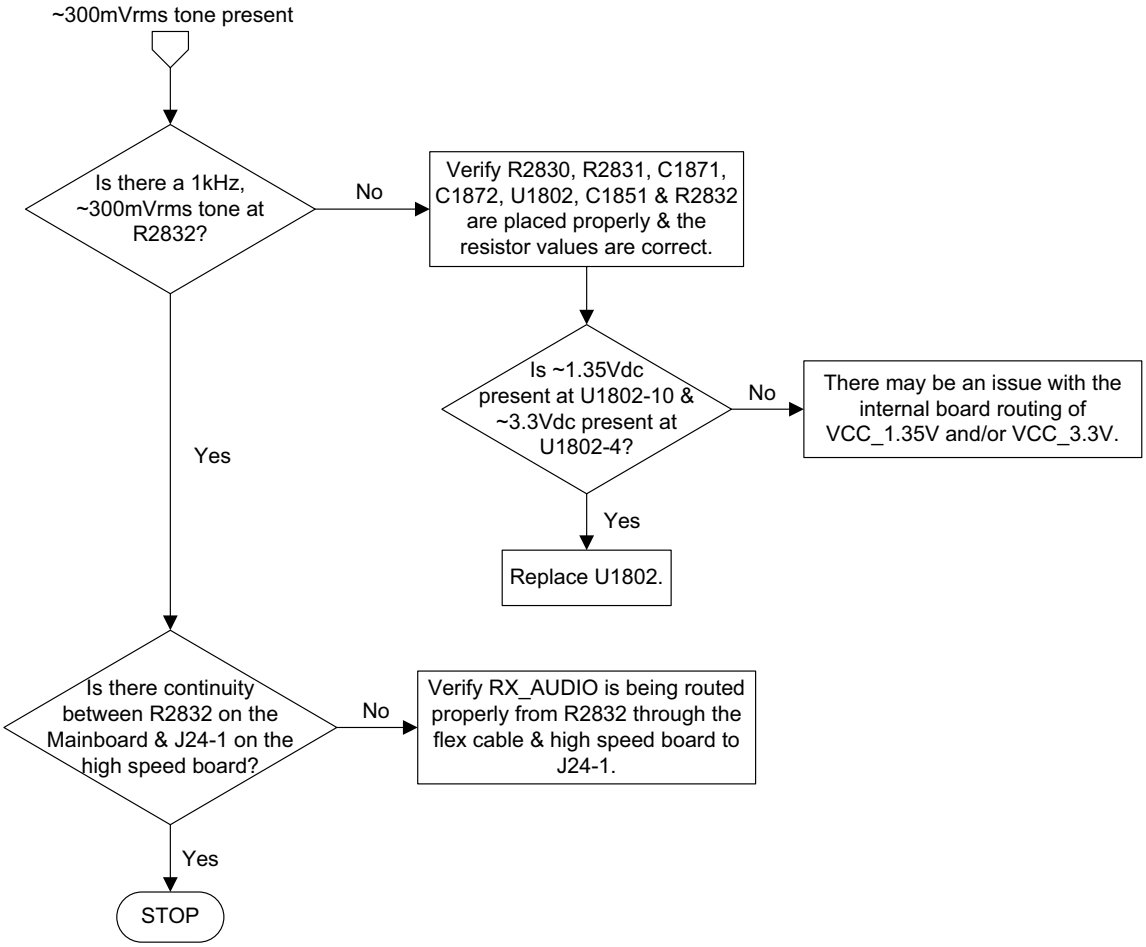


Figure 7-16. Crosspatch RX Audio - B

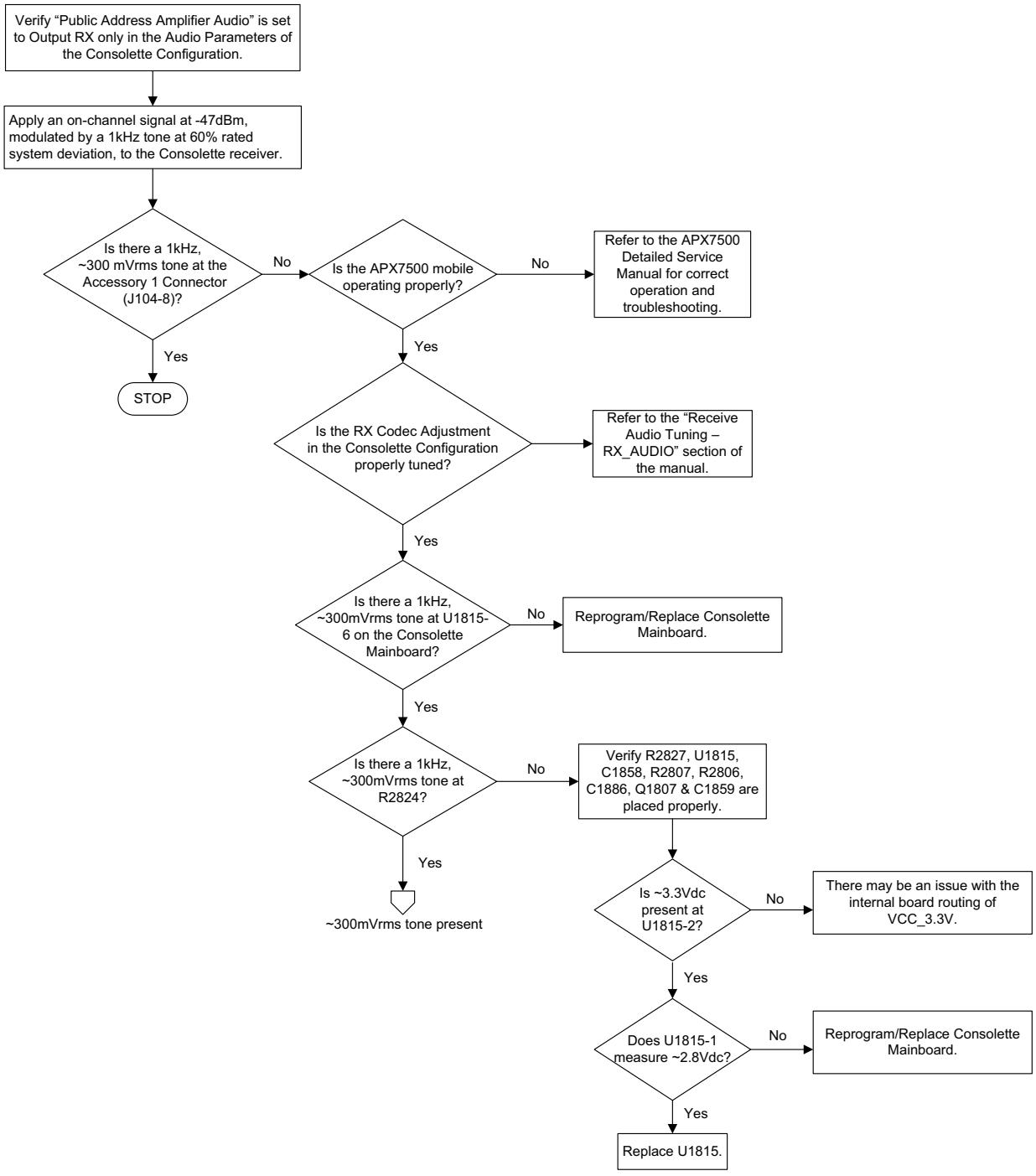


Figure 7-17. External PA RX Audio - A

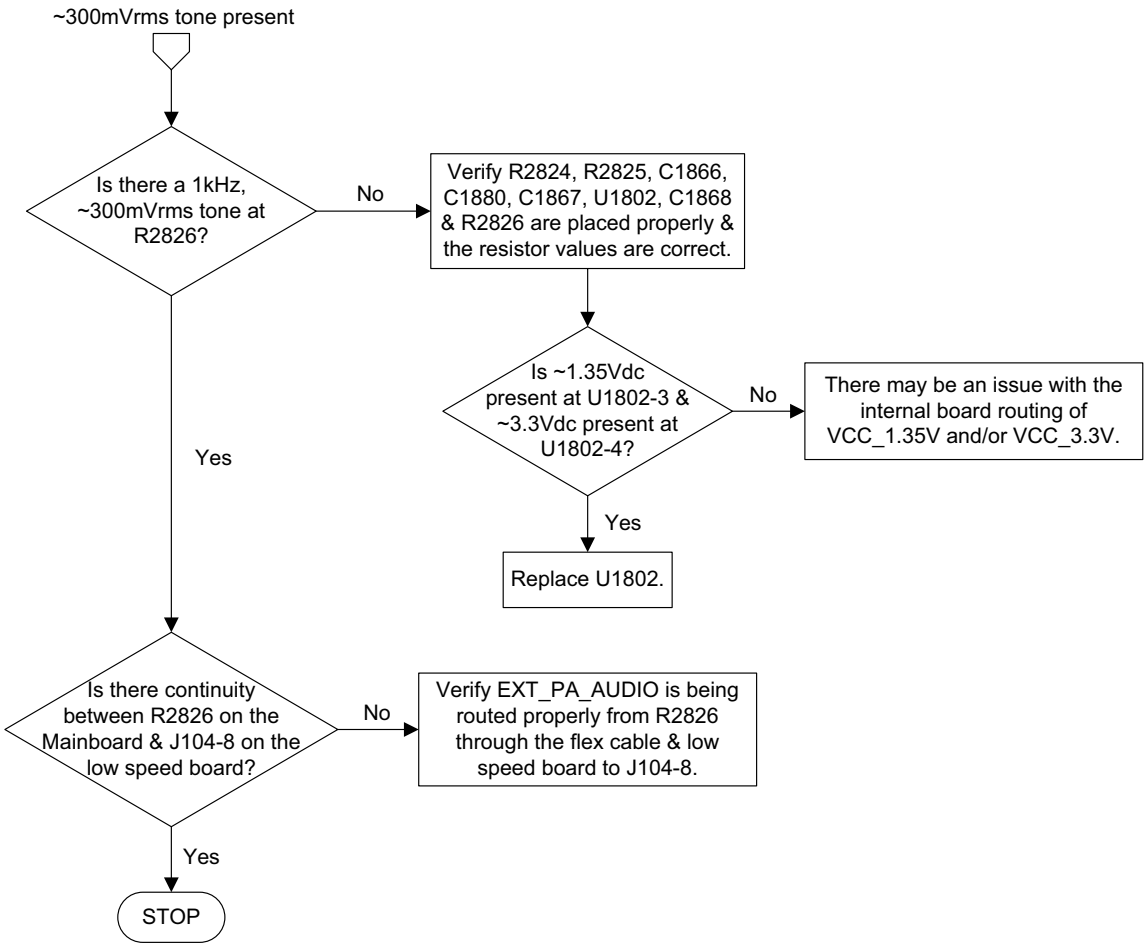


Figure 7-18. External PA RX Audio - B

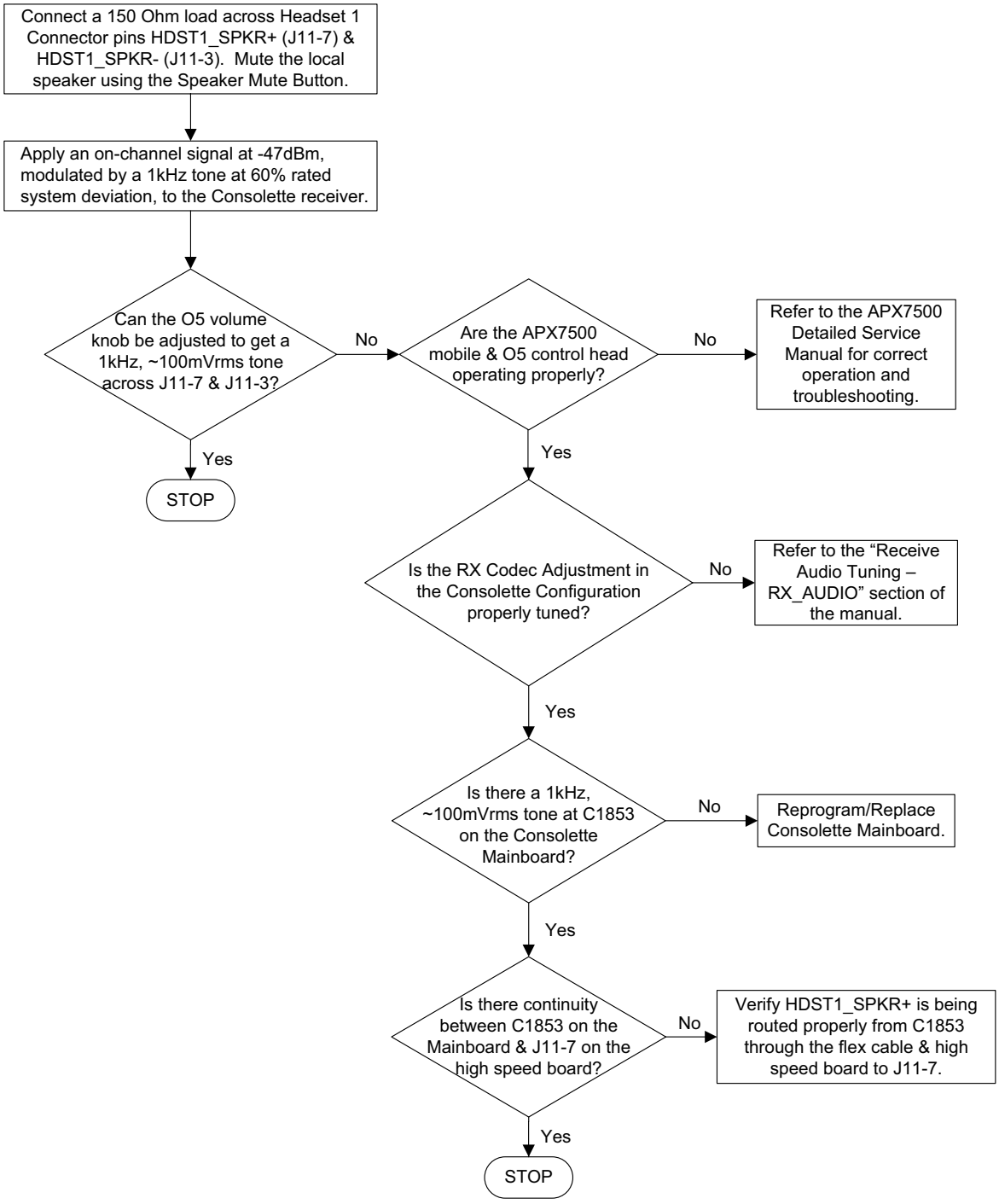


Figure 7-19. Headset 1 RX Audio

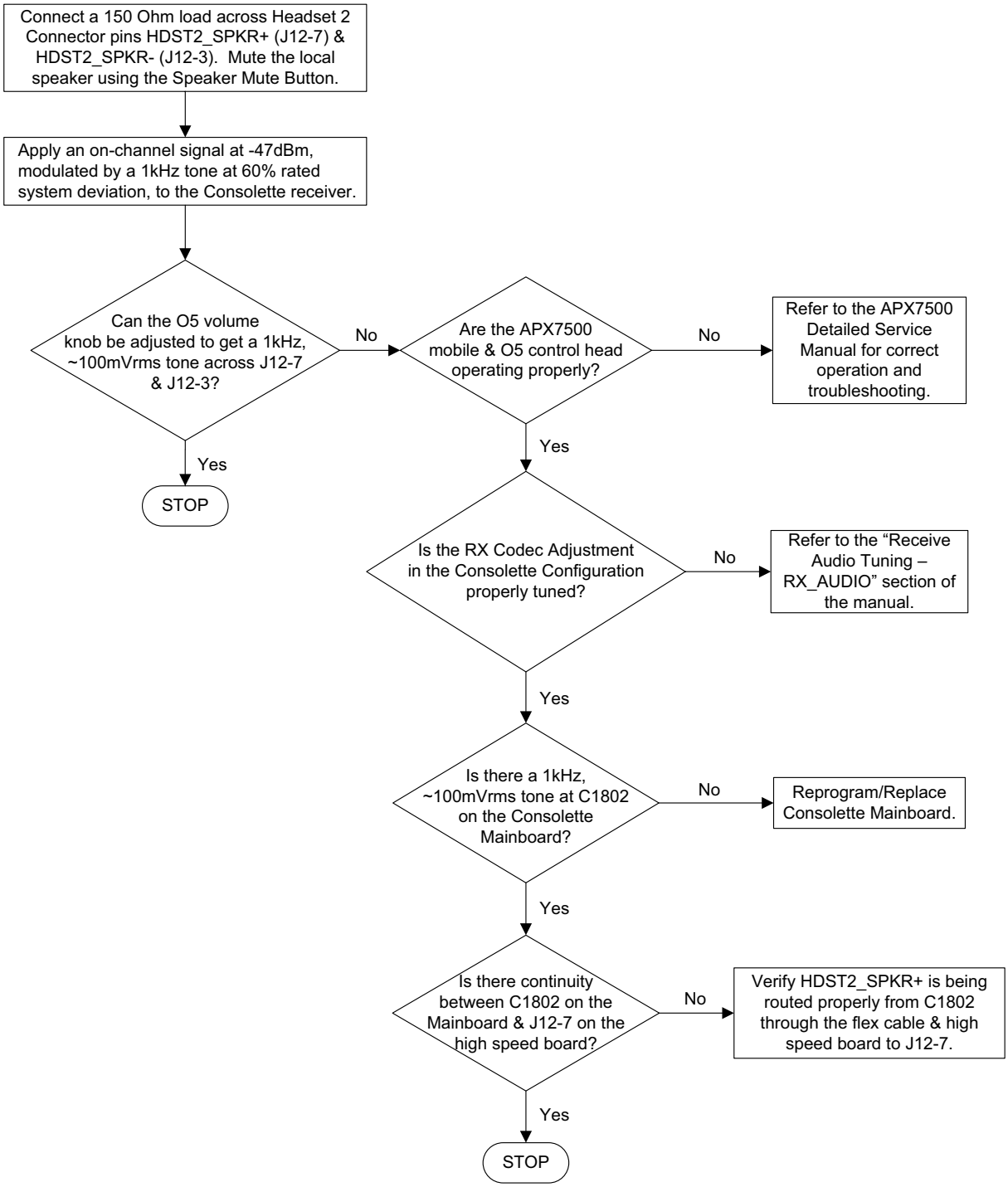


Figure 7-20. Headset 2 RX Audio

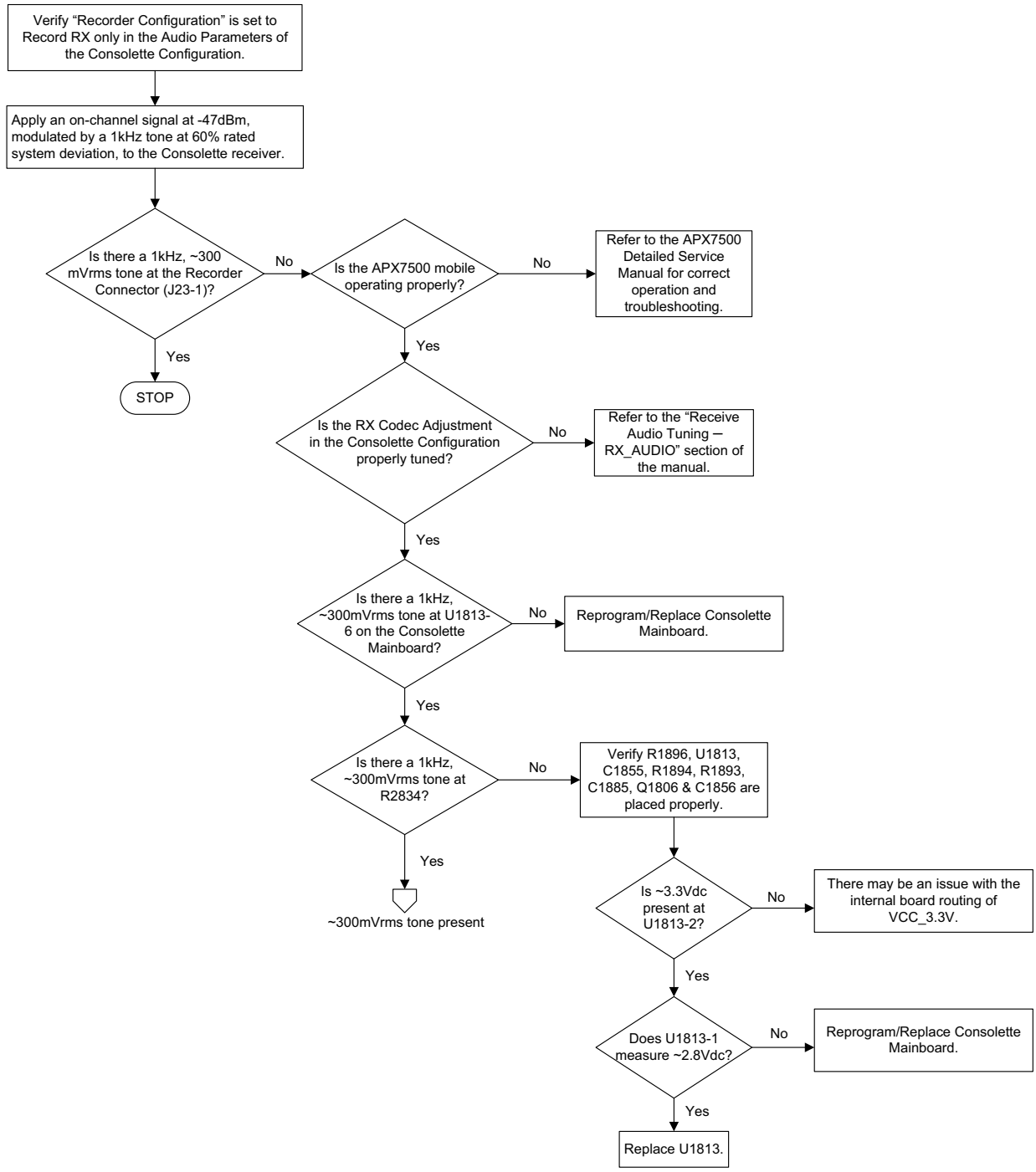


Figure 7-21. Recorder RX Audio - A

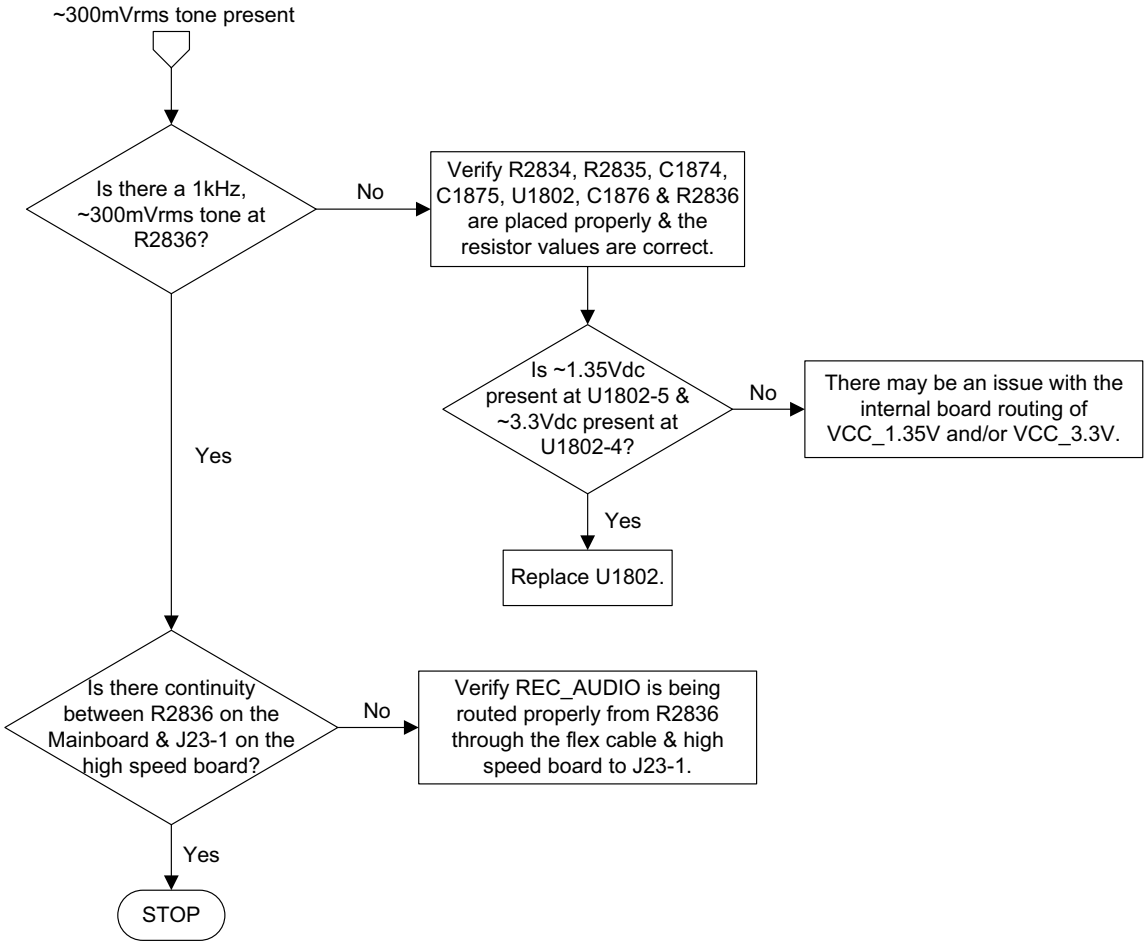


Figure 7-22. Recorder RX Audio - B

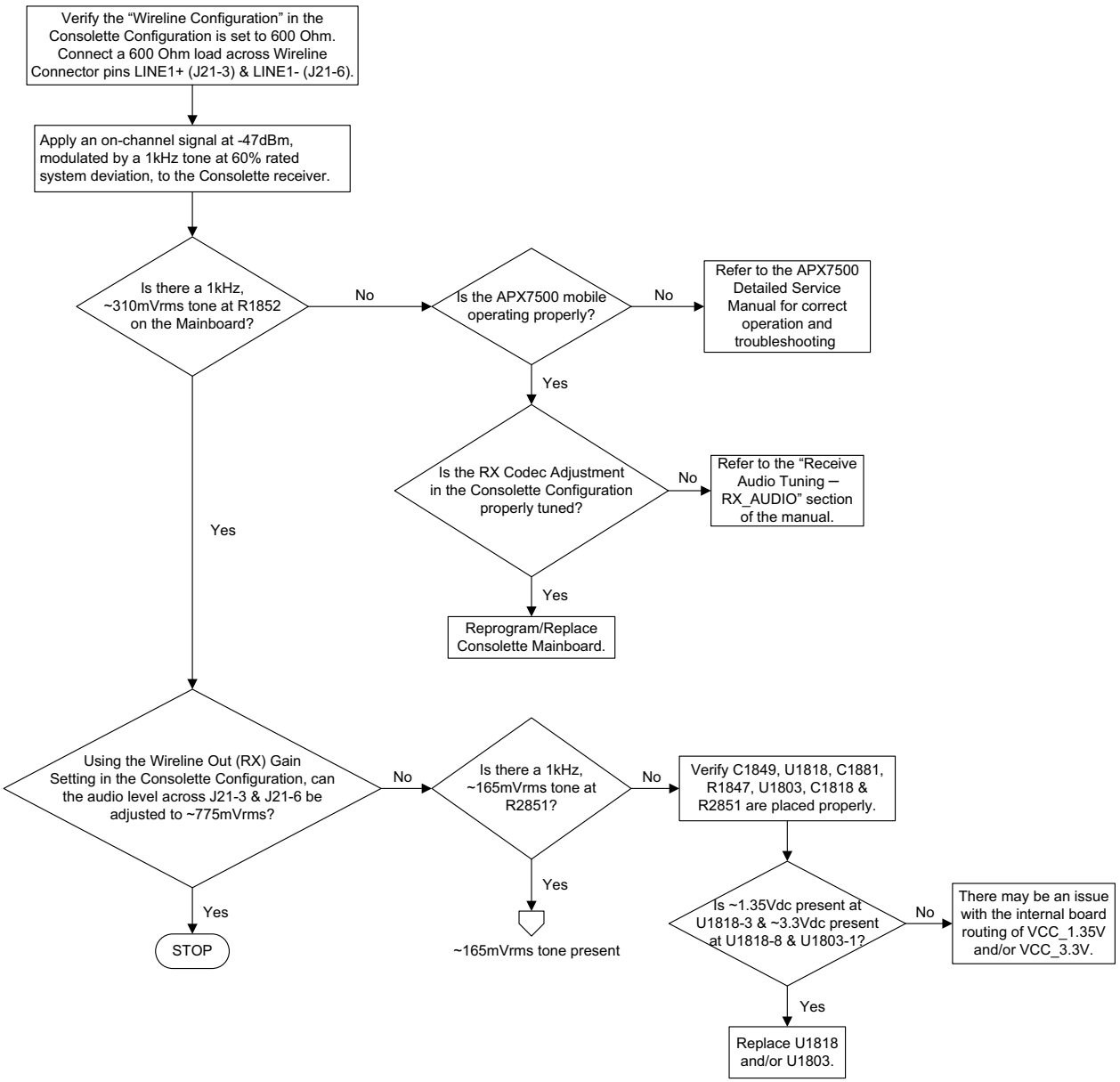
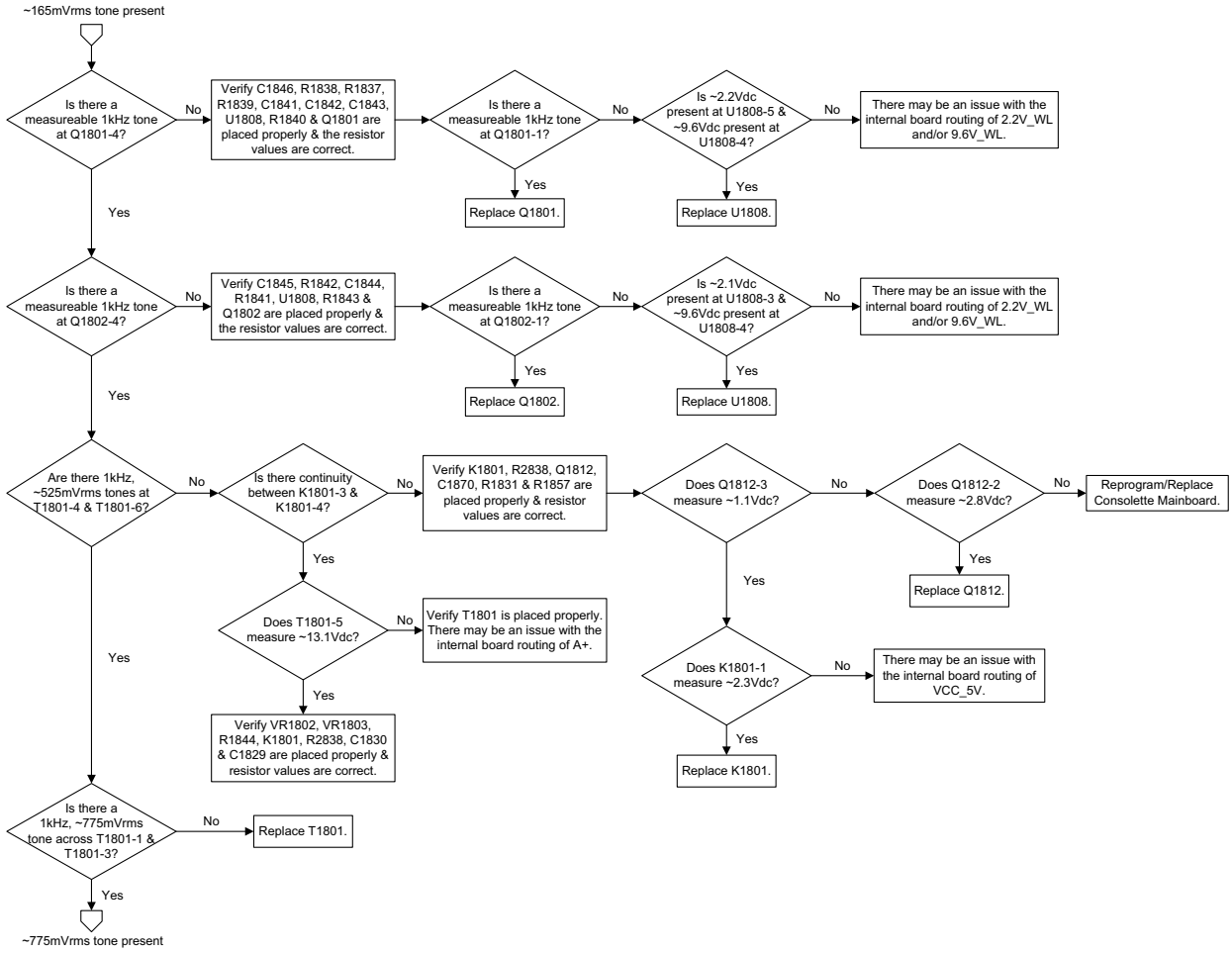


Figure 7-23. Wireline RX Audio - A



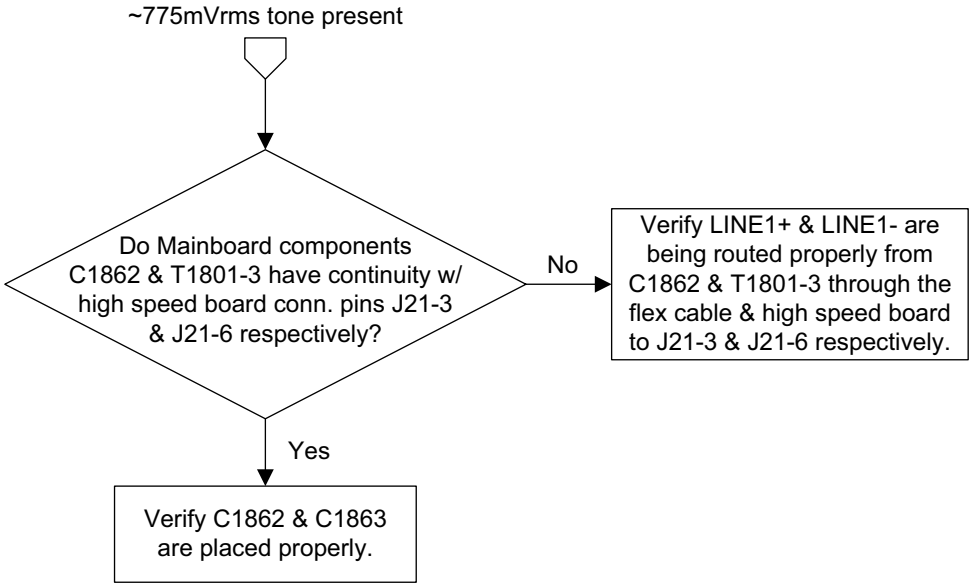


Figure 7-24. Wireline RX Audio - B

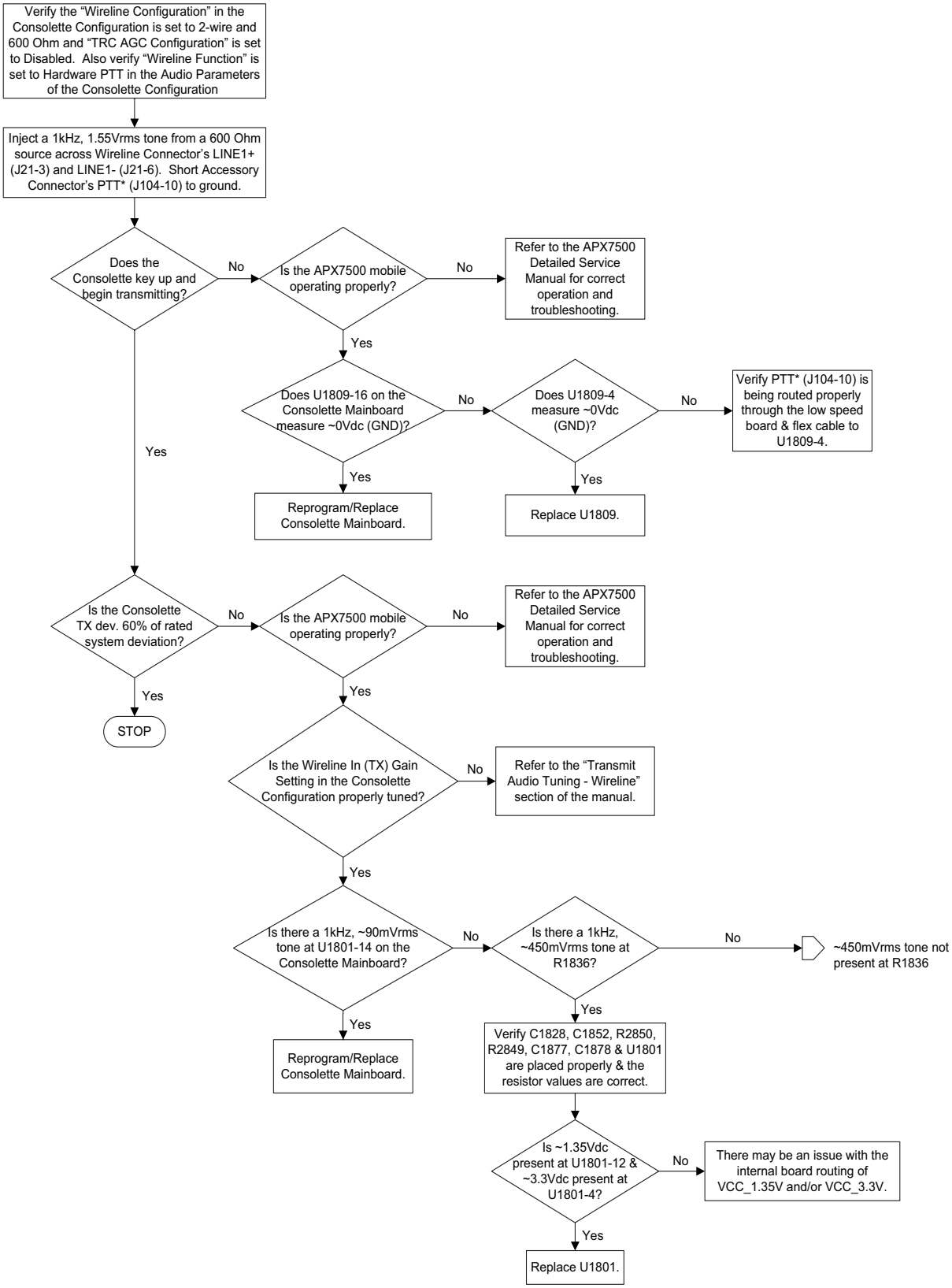


Figure 7-25. 2-Wire Wireline TX Audio - A

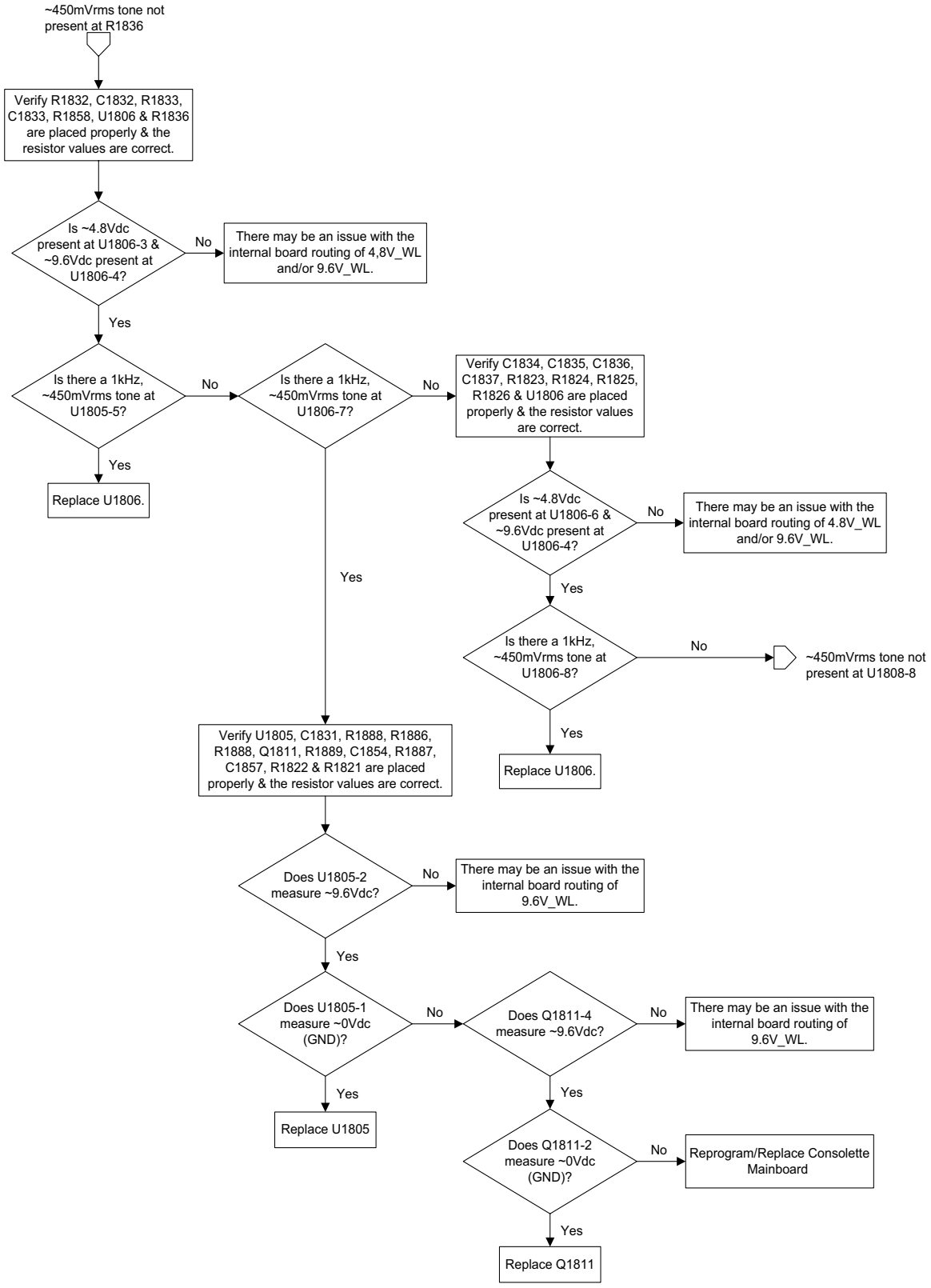


Figure 7-26. 2-Wire Wireline TX Audio - B

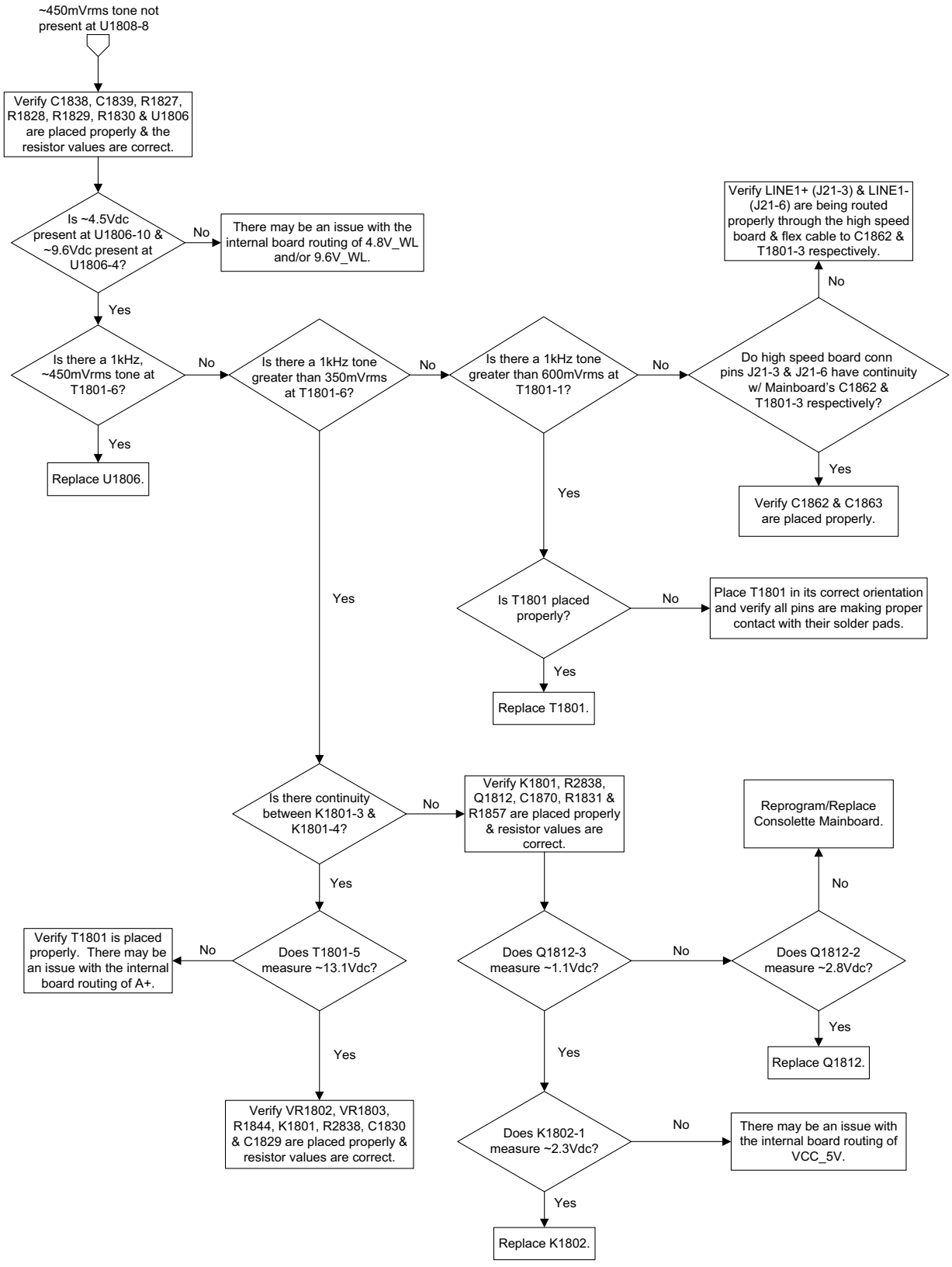


Figure 7-27. 2-Wire Wireline TX Audio - C

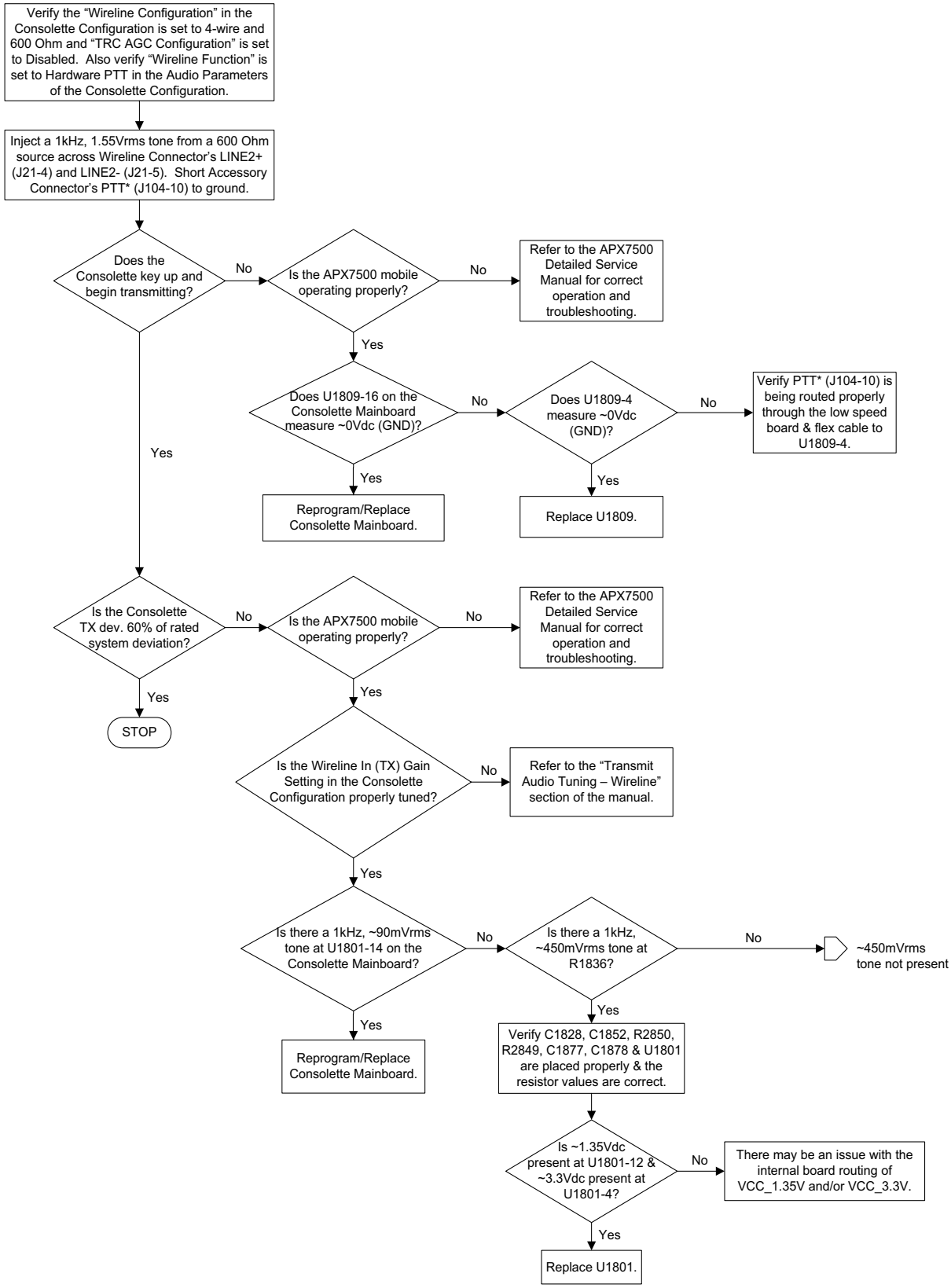


Figure 7-28. 4-Wire Wireline TX Audio - A

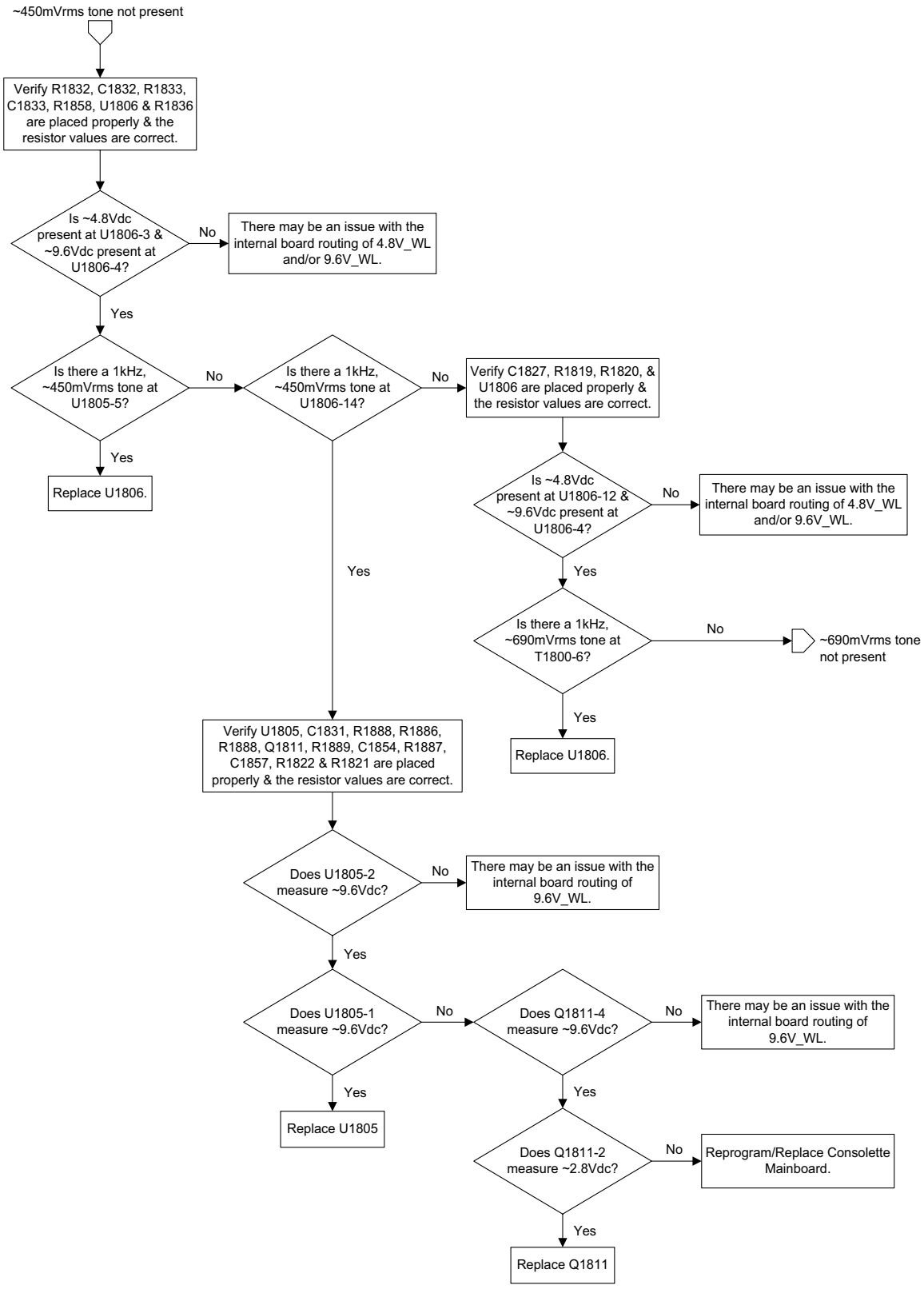


Figure 7-29. 4-Wire Wireline TX Audio - B

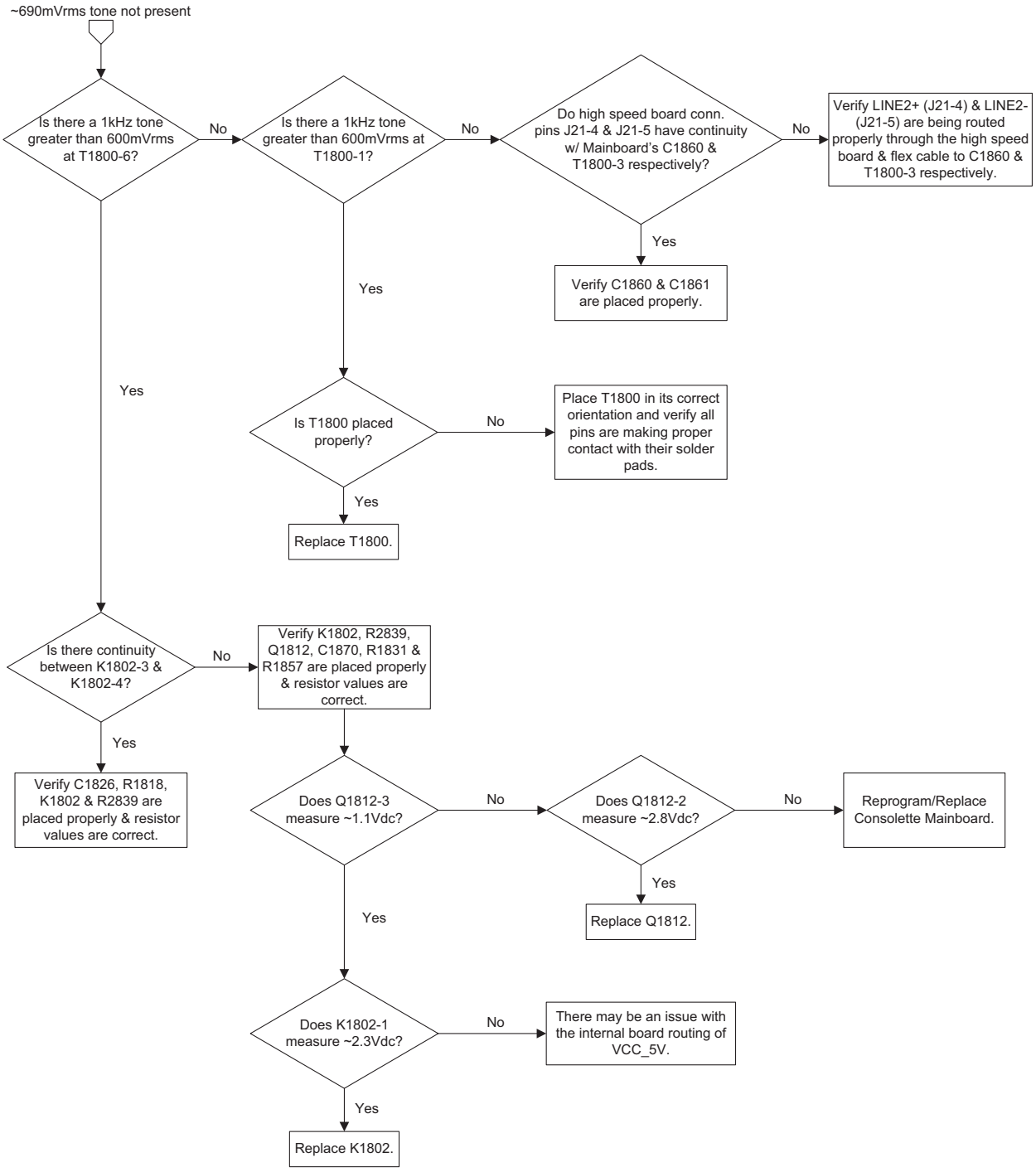


Figure 7-30. 4-Wire Wireline TX Audio - C

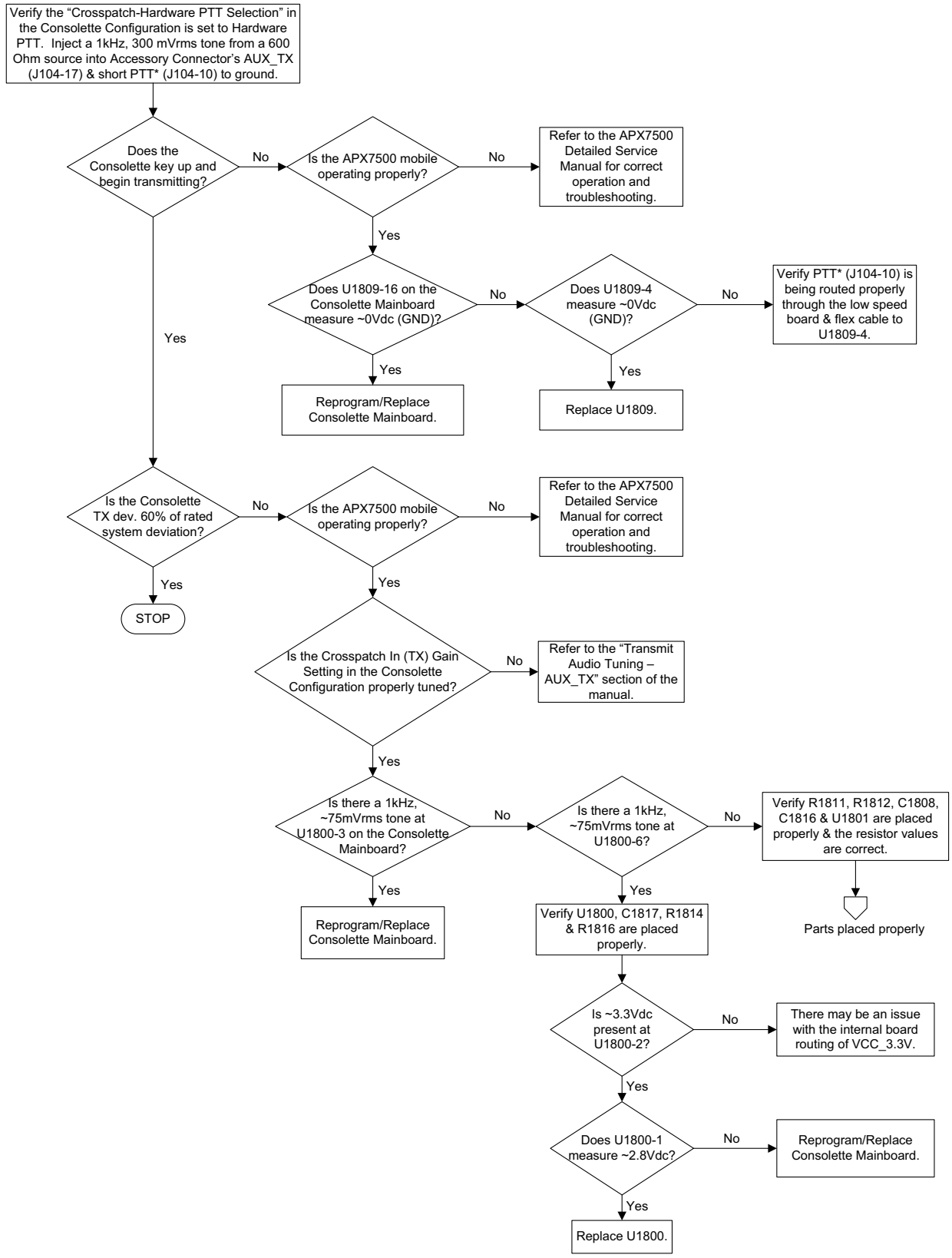


Figure 7-31. APCO TX Audio - A

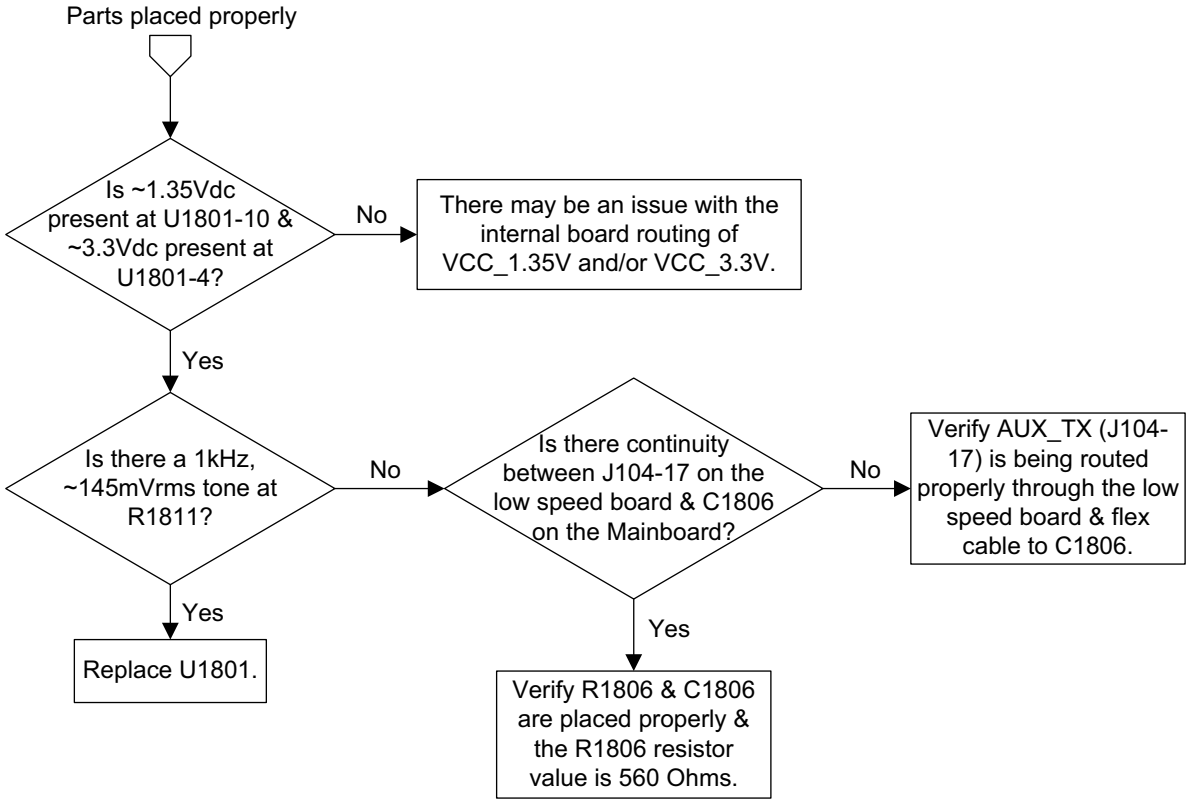


Figure 7-32. APCO TX Audio - B

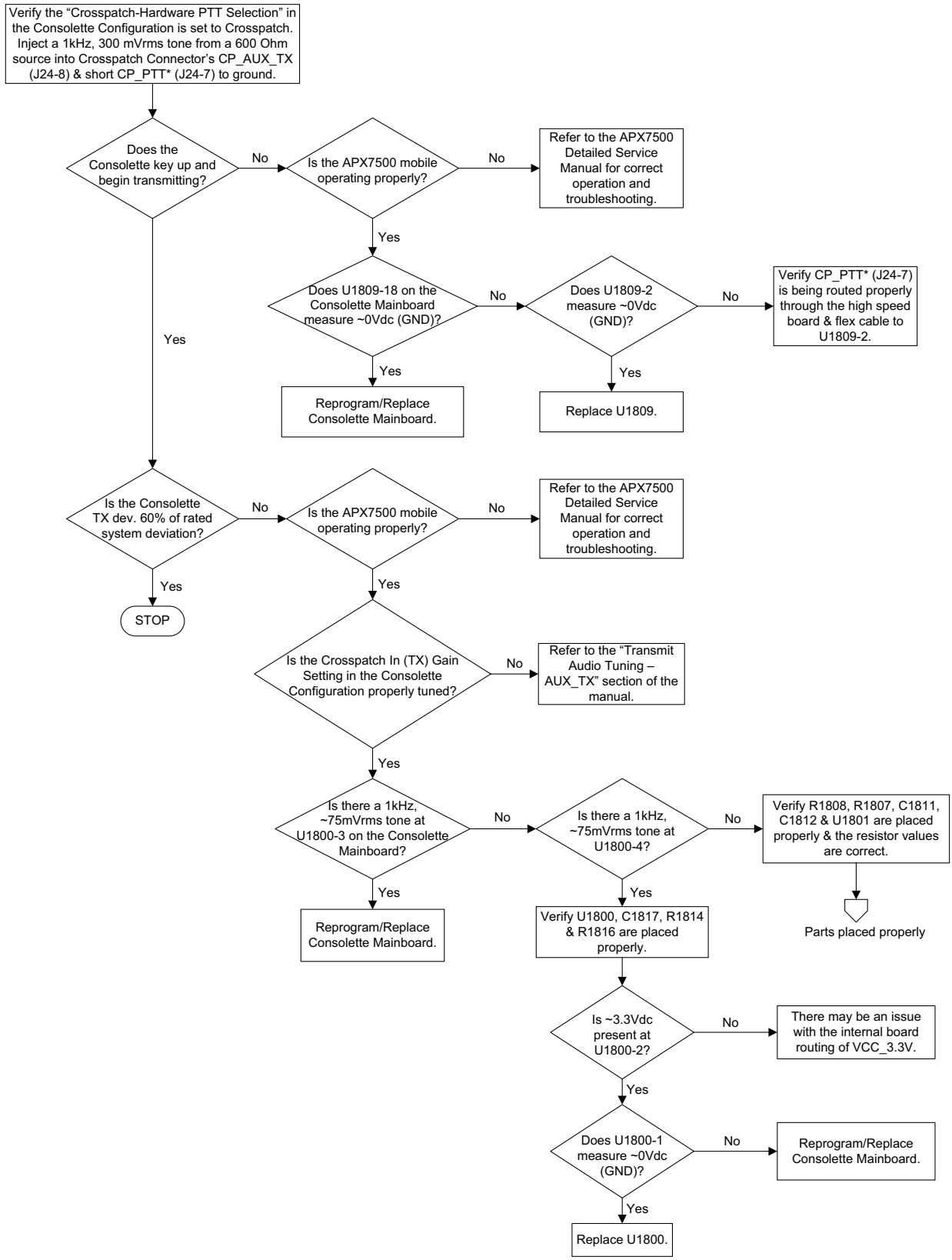


Figure 7-33. Crosspatch TX Audio - A

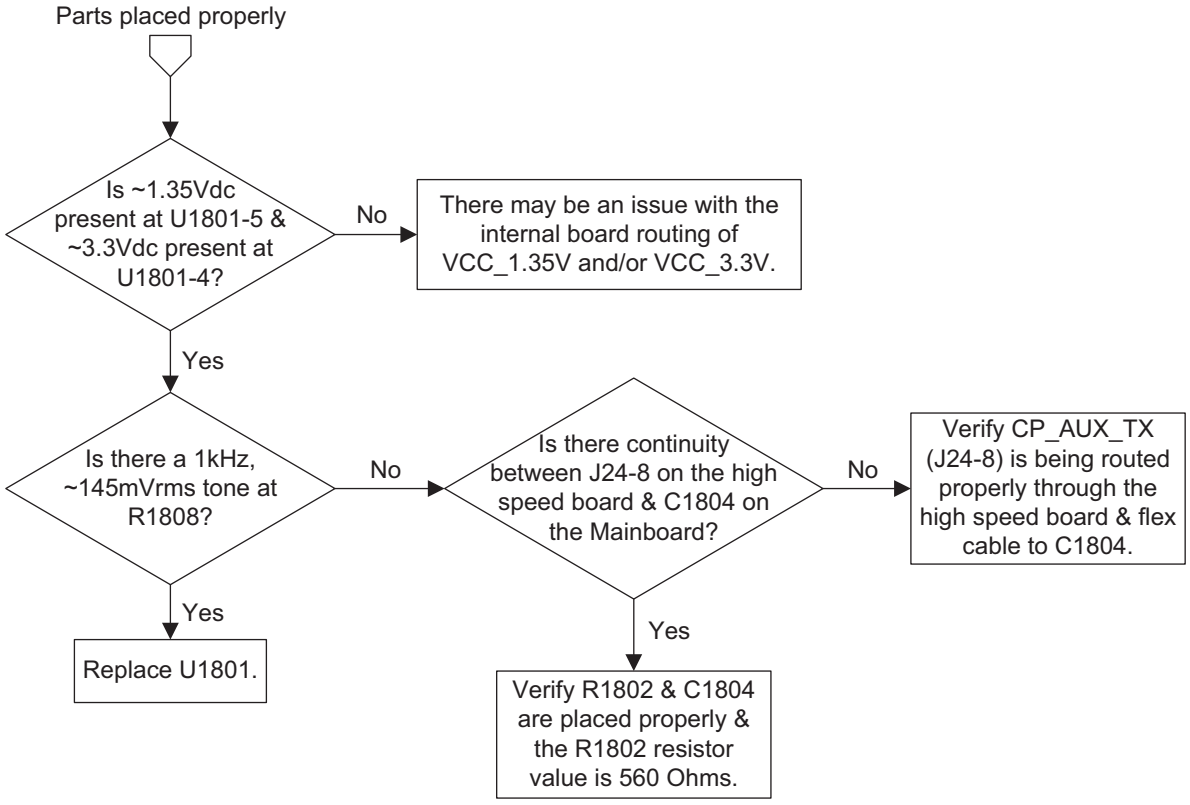


Figure 7-34. Crosspatch TX Audio - B

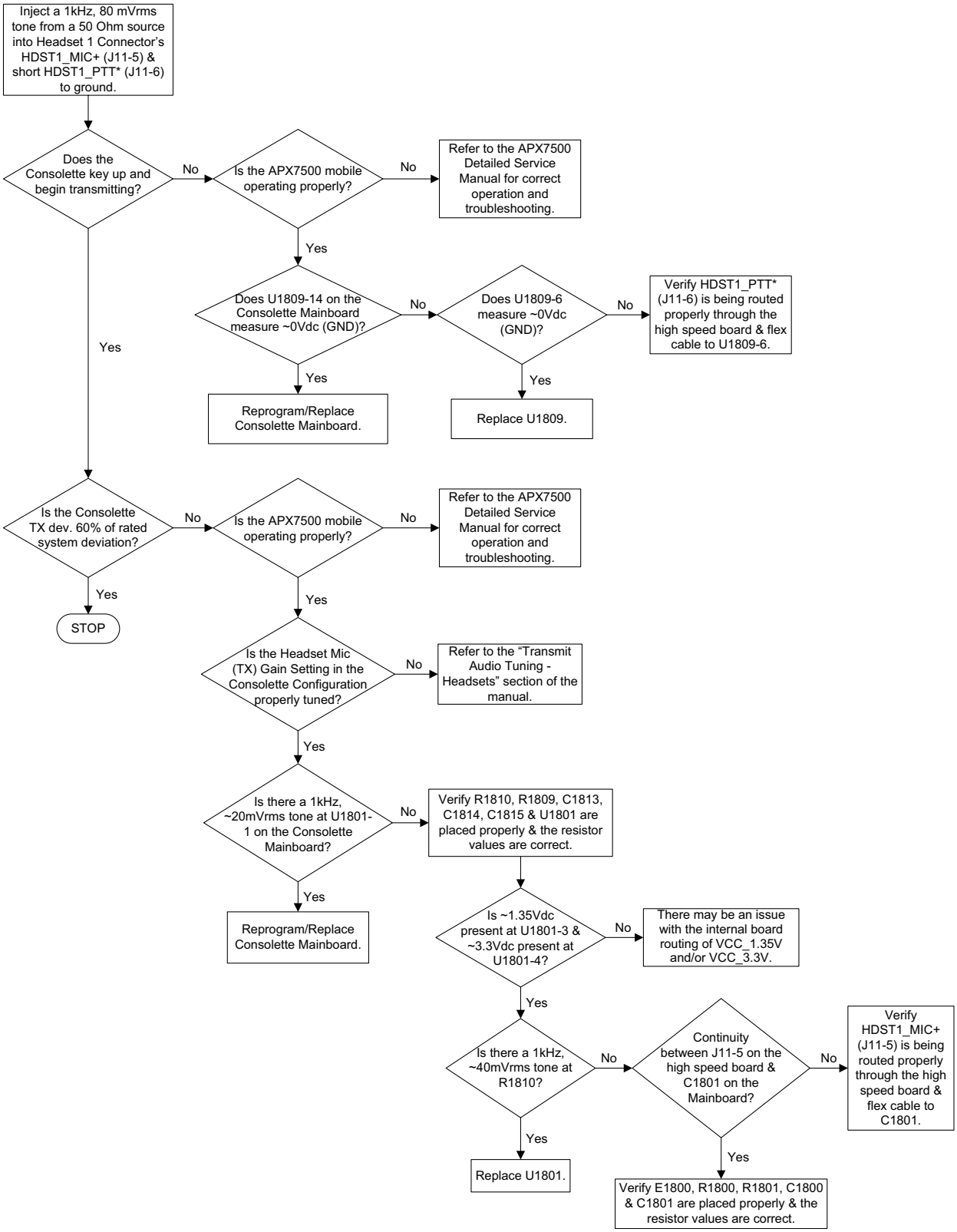


Figure 7-35. Headset 1 TX Audio

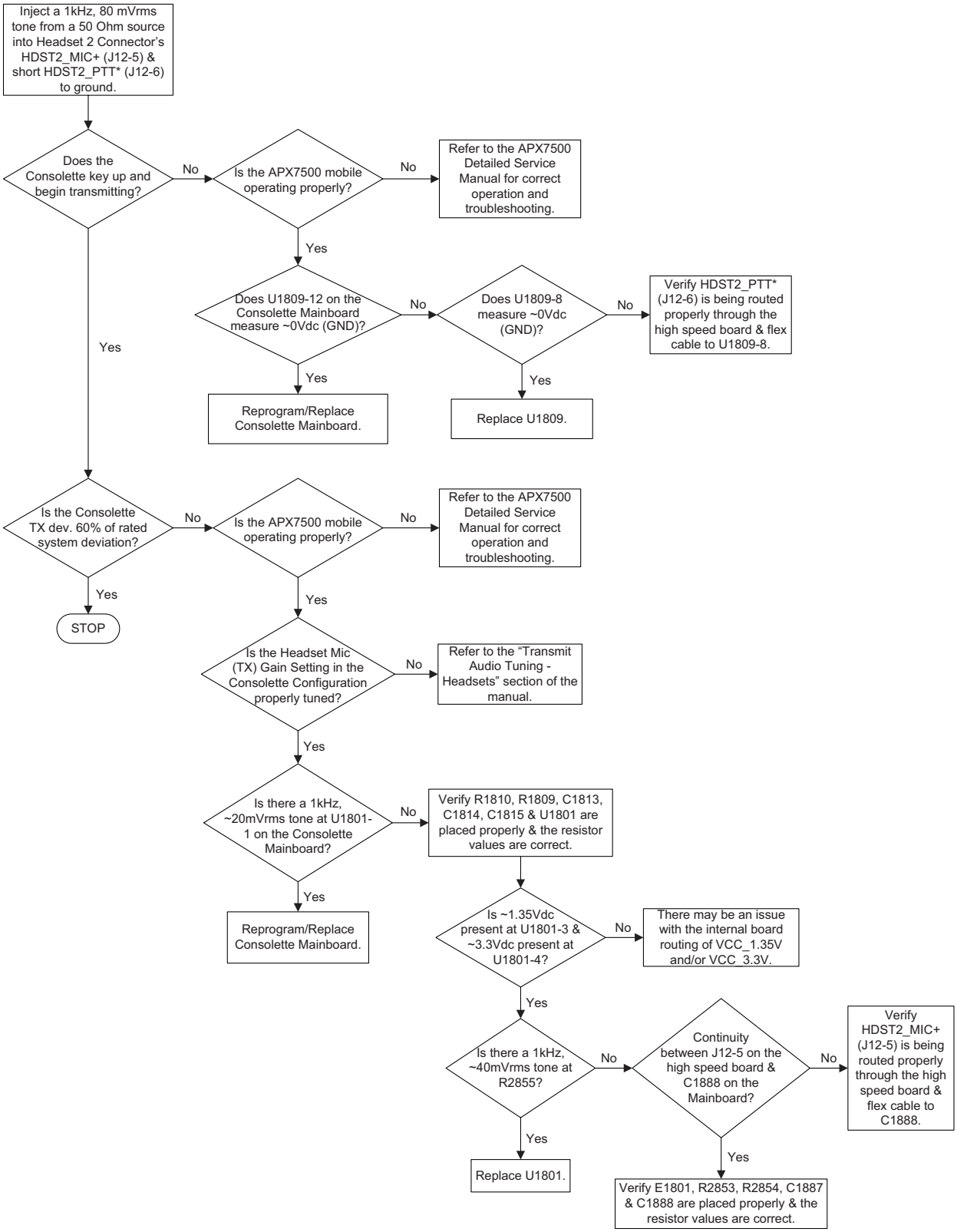


Figure 7-36. Headset 2 TX Audio

O5 Display Error Codes

O5 Display Text	Trigger Event	Troubleshooting Recommendation
ERROR 1C/02	Consolette operation is enabled in a non L30 model Codeplug	Replace transceiver with a L30 model transceiver for full support of Consolette functionality.
ERROR 1C/10	Consolette Controller board did not report at power up. This is a Consolette fatal error.	Check cable connections between Consolette controller board and the transceiver. Try reprogramming the Consolette Controller card.
Other errors	Various	Refer to the O5 user's guide for a list of radio errors and recommendations.

Auxiliary Display Error Codes

Auxiliary Display Text	Trigger Event	Troubleshooting Recommendation
FL 1C/00 Unknown Error	Unknown error failure	Using Flashport, reprogram the Consolette controller board.
FL 01/90 Radio Comm Error	Consolette to Radio CAN Communication failure	Check cable connections between Consolette controller board and the transceiver.
CH ID # ERR	Duplicate Device ID Detected	Cycle power on the Consolette.
FL 1C/81 Host Checksum Error	Host Flash Checksum failure	Using Flashport, reprogram the Consolette controller board.
FL 1C/82 FLASH Driver Error	Flash Driver failure	Using Flashport, reprogram the Consolette controller board.
FL 1C/83 FLASH Table Error	PSDT Validate failure	Using Flashport, reprogram the Consolette controller board.
FL 1C/84 FLASH Mount Error	ISH Manager Initialization failure	Using Flashport, reprogram the Consolette controller board.
FL 1C/85 FPGA Image Error	PSDT Nautilus Image Record not found	Using Flashport, reprogram the Consolette controller board.
FL 1C/86 FPGA Init Error	Nautilus Image Programming failure	Using Flashport, reprogram the Consolette controller board.
FL 1C/91 DSP Image Error	DSP initialization fails (Flash Checksum failure, PSDT Record not found, or Record Size too big)	Using Flashport, reprogram the Consolette controller board.
FL 1C/92 DSP Failure	Host to DSP (IPC) Communication failure or DSP unresponsive	Using Flashport, reprogram the Consolette controller board.
FL 1C/A1 Codeplug Error	Code Plug Record not found or corrupted	Using Flashport, reprogram the Consolette controller board.
FL 1C/A2 Tune Data Error	Secure Tune checksum error	Using Flashport, reprogram the Consolette controller board.
Radio Error	Mobile radio errors	Refer to the O5 user's guide for a list of radio errors and recommendations.
Device Error	Non-radio errors	Refer to the O5 user's guide for a list of radio errors and recommendations.

NOTE: For Limited Front Panel models, customer may optionally connect a O5 CH to the unit in order to get the detailed error code..

NOTE: If error(s) continues, contact an approved service shop for further repair

Notes

Chapter 8 Exploded Views,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.

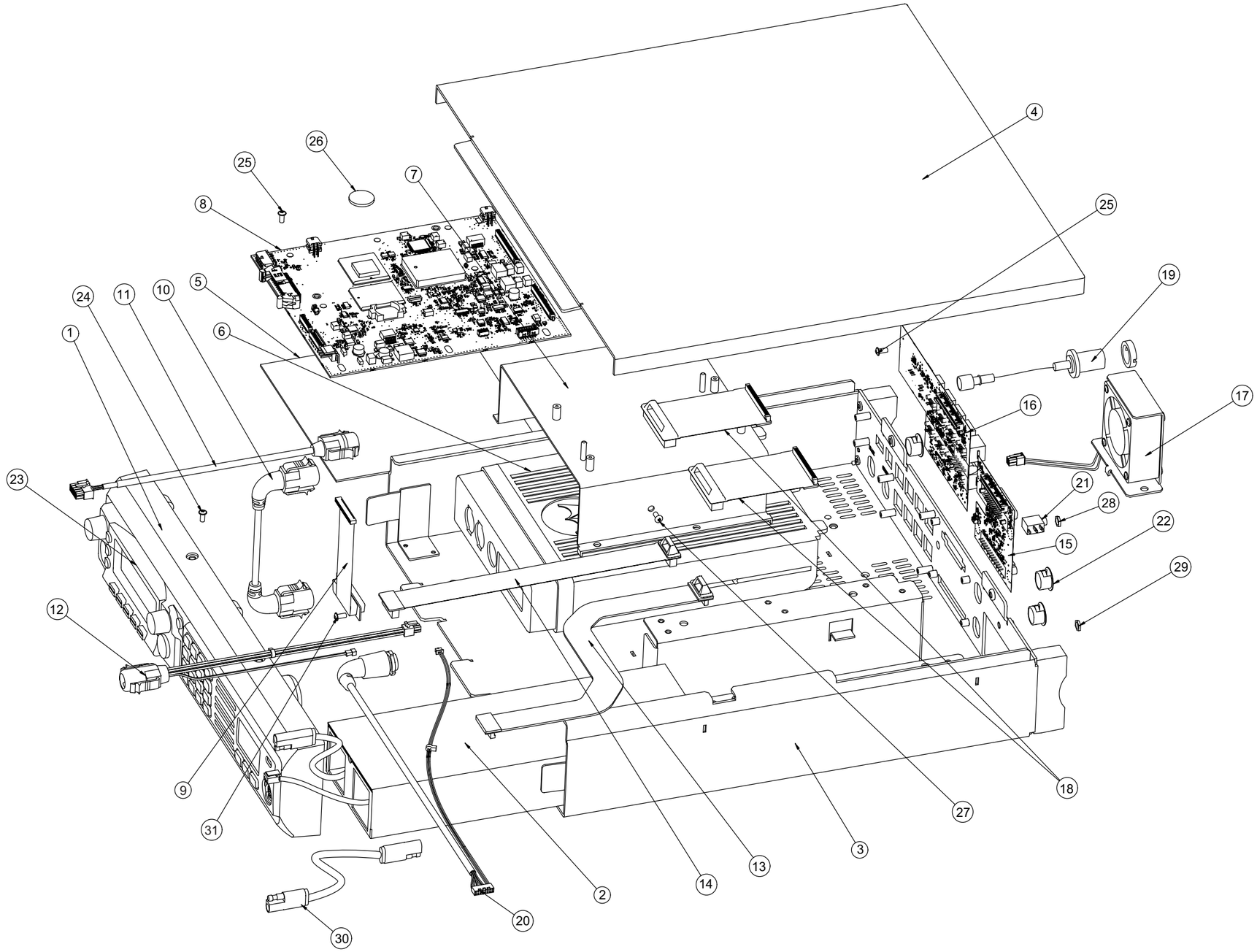
8.1 Exploded Views and Part Lists

Table 8-1. Table of Exploded Views

8.2 Schematics, Board Layouts, and Parts Lists

Table 8-2. List of Schematics, Board Layouts, and Parts Lists

Table 8-2. List of Schematics, Board Layouts, and Parts Lists



N0.	Motorola Part No.	Description
1	PHHN1010_ PHHN1009_	Front Panel Tanapa (Full Feature) Front Panel Tanapa (Limited)
2	HPN4010_	Power Supply
3	2771969H01*	Chassis tanapa (includes chassis, bumpers, feet, and plastic cable retainers)
4	1571968H01	Top Cover
5	7575388H01	Thermal pad
6	See Model Chart*	Transceiver kit(s)
7	0771973H01*	Mobile bracket
8	PPLN1696_	Main board tanapa
9	3071993H01	Main to Mobile Ribbon cable
10	3071990H01	O5 to Mobile CAN cable
11	3071994H01	Main to Mobile CAN cable
12	3071998H01	O5 to Main power cable
13	HKN6220_	Display flex cable assembly
14	HKN6221_	Keyboard flex cable assembly
15	PPLN1691_	Low Speed board tanapa
16	PPLN1690_	High Speed board tanapa
17	5971984H01	Fan Bracket Assembly
18	HKN6219_	Main to LS/HS flex cable assembly
19	3085702C05 3085702C06	RF coax cable w/nuts and washers: Long Short
20	3075313H01	GCAI adaptor cable
21	0971989H01	Audio jack assembly
22	38009016001	RF port plug (for unused RF port if single band)
23	See Model Chart	O5 control head kit(s)
24	0310907B08	Star screw, 5mm
25	0310909A45	SCRMCH M3.5X0.6X8 STARPAN STLZNC
26	6071032M01	Coin battery
27	0310909C93	Screw, M6 mobile
28	0275387H01	Audio jack nut, hex
29	0271853N01	Nut, M4
30	3075385H01	Mobile to power supply extension cable
31	0300140472	Screw for DB25 connector on mobile

* Parts not available through RPSD

Figure 8-1. APX Consolette Exploded view

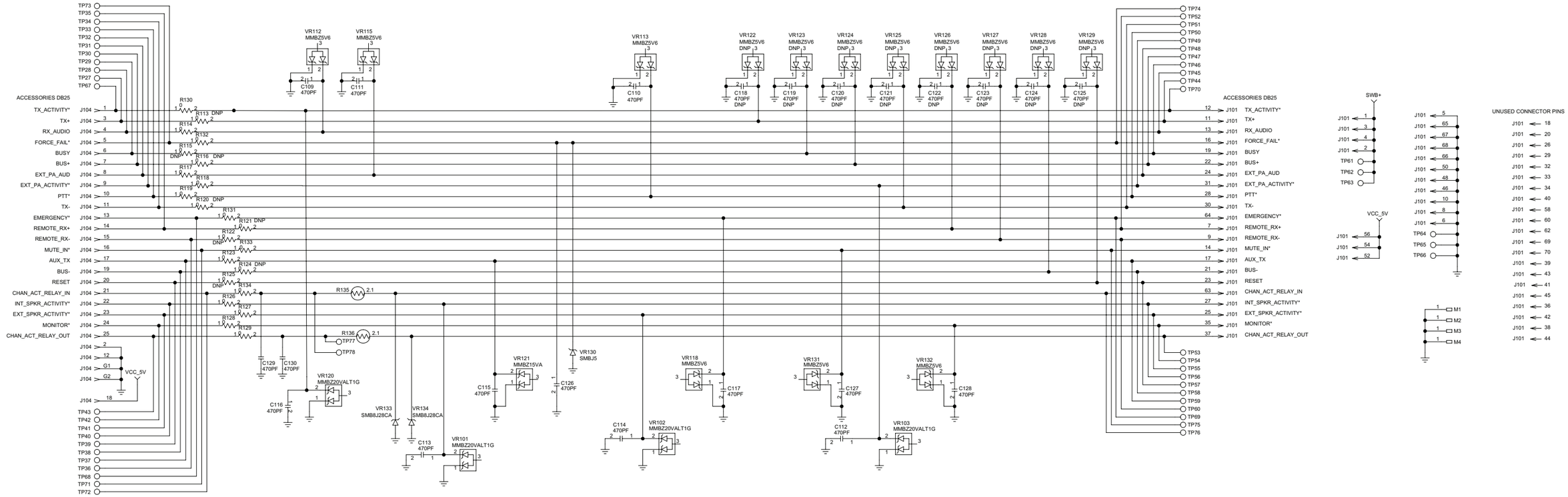


Figure 8-2. PPLN1691A Low Speed Circuit Schematic - A

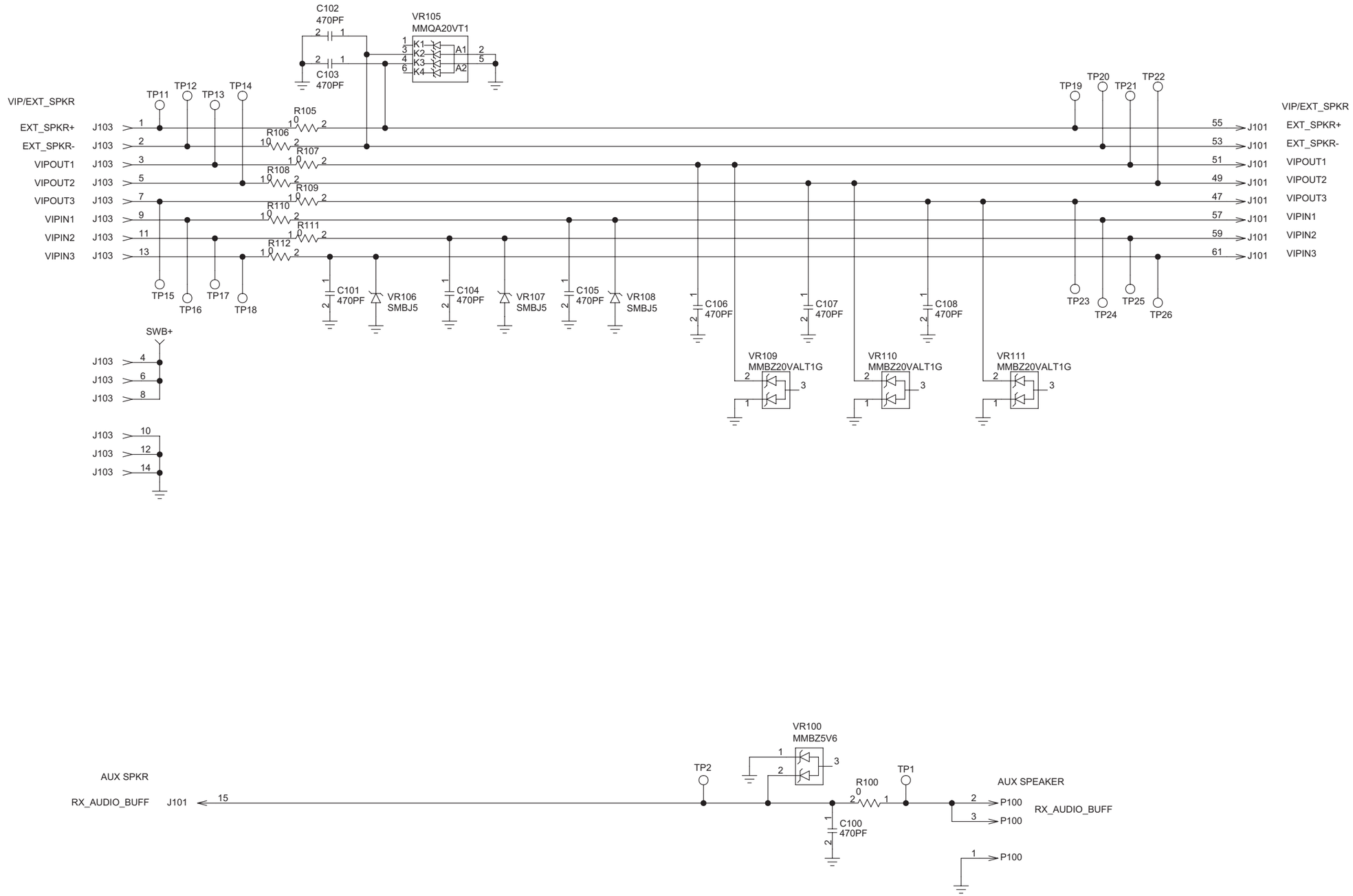


Figure 8-3. PPLN1691A Low Speed Circuit Schematic - B

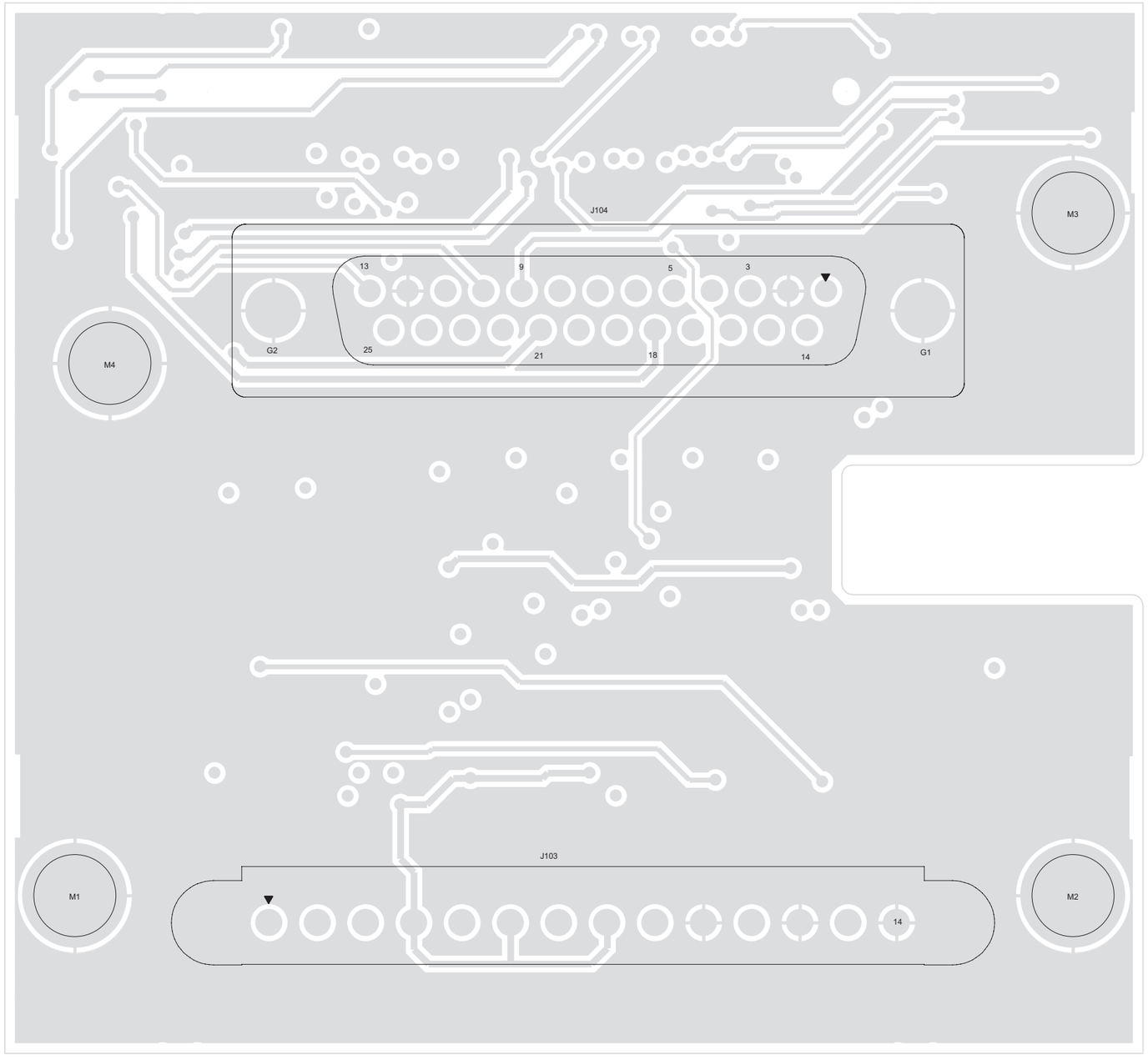


Figure 8-4. PPLN1691A Low Speed Circuit Board Layout - Side 1

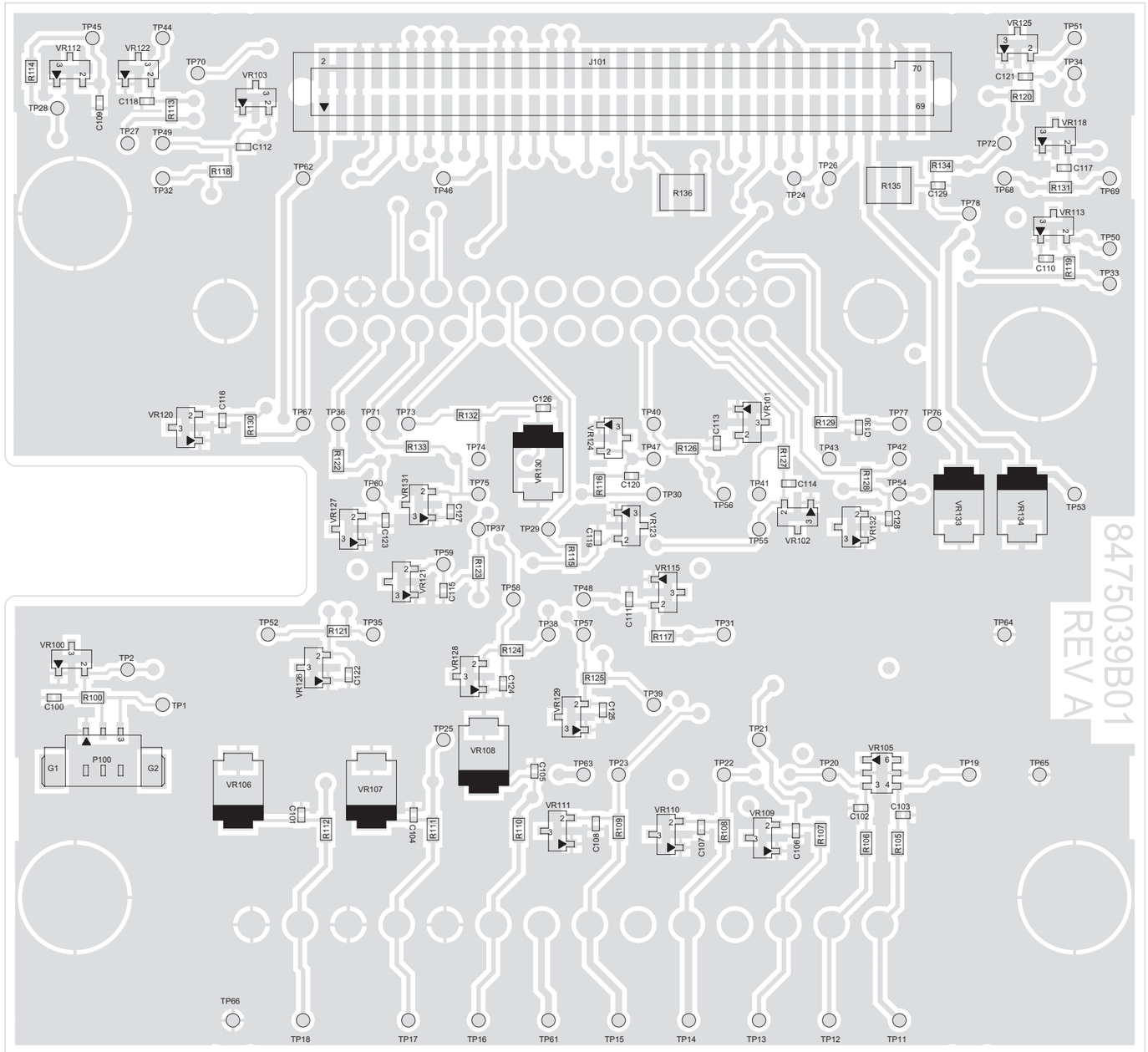
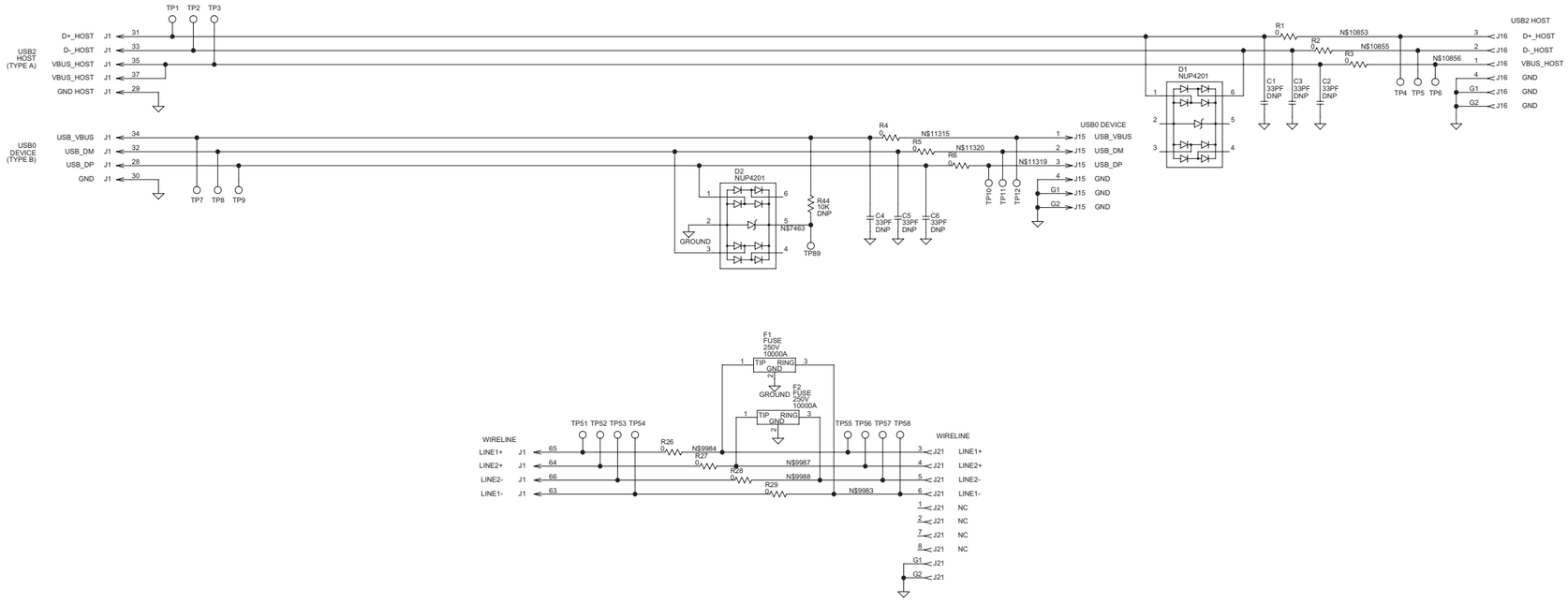


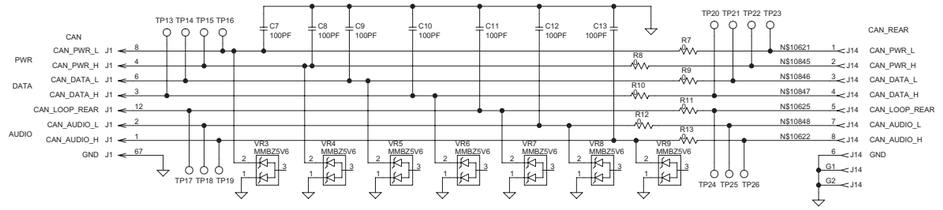
Figure 8-5. PPLN1691A Low Speed Circuit Board Layout - Side 2

PPLN1691A Low Speed Part List

Ref Des	Part Number	Description
C100	2113945A05	CAP CER CHP 470PF 50V 10%
C101	2113945A05	CAP CER CHP 470PF 50V 10%
C102	2113945A05	CAP CER CHP 470PF 50V 10%
C103	2113945A05	CAP CER CHP 470PF 50V 10%
C104	2113945A05	CAP CER CHP 470PF 50V 10%
C105	2113945A05	CAP CER CHP 470PF 50V 10%
C106	2113945A05	CAP CER CHP 470PF 50V 10%
C107	2113945A05	CAP CER CHP 470PF 50V 10%
C108	2113945A05	CAP CER CHP 470PF 50V 10%
C109	2113945A05	CAP CER CHP 470PF 50V 10%
C110	2113945A05	CAP CER CHP 470PF 50V 10%
C111	2113945A05	CAP CER CHP 470PF 50V 10%
C112	2113945A05	CAP CER CHP 470PF 50V 10%
C113	2113945A05	CAP CER CHP 470PF 50V 10%
C114	2113945A05	CAP CER CHP 470PF 50V 10%
C115	2113945A05	CAP CER CHP 470PF 50V 10%
C116	2113945A05	CAP CER CHP 470PF 50V 10%
C117	2113945A05	CAP CER CHP 470PF 50V 10%
C126	2113945A05	CAP CER CHP 470PF 50V 10%
C127	2113945A05	CAP CER CHP 470PF 50V 10%
C128	2113945A05	CAP CER CHP 470PF 50V 10%
C129	2113945A05	CAP CER CHP 470PF 50V 10%
C130	2113945A05	CAP CER CHP 470PF 50V 10%
J101	2871670H01	"HEADER, 70 PIN, .050 X .050"
J103	0975038B01	"HEADER, 3.5MM, VERTICAL PCB"
J104	0975037B02	"RECEPTACLE,25 PIN,D SUB,HITEMP,VERT"
P100	2871246H01	"PITCH PICOBLADE HEADER,"
PCB	8475039B01	"PWB, LOW SPEED CONNECTOR"
R100	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R105	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R106	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R107	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R108	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R109	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R110	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R111	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R112	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R114	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R117	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R118	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R119	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R123	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R126	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R127	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R128	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R129	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R130	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R131	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R132	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R133	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R134	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R135	0671736T01	"THMS,PTC,2.1OHM,SM,POLYSWITCH 100MA 1210 SM 30V"
R136	0671736T01	"THMS,PTC,2.1OHM,SM,POLYSWITCH 100MA 1210 SM 30V"
VR100	4813977A43	"PB-FREE, NOTCOMPLETELYENRICHED"
VR101	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR102	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR103	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR105	4813979C11	"DIODE,SUPR,QUAD 20 V ZEN, PB-FREE"
VR106	535316-001-00	"DIODE,SUPR,5V,SM,DO-214,UNIDIRECTIONAL / LEAD-FREE / ROHS CO"
VR107	535316-001-00	"DIODE,SUPR,5V,SM,DO-214,UNIDIRECTIONAL / LEAD-FREE / ROHS CO"
VR108	535316-001-00	"DIODE,SUPR,5V,SM,DO-214,UNIDIRECTIONAL / LEAD-FREE / ROHS CO"
VR109	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR110	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR111	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR112	4813977A43	"PB-FREE, NOTCOMPLETELYENRICHED"
VR113	4813977A43	"PB-FREE, NOTCOMPLETELYENRICHED"

Ref Des	Part Number	Description
VR115	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR118	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR120	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR121	4813977A44	"DIODE ARRAY,TRNSNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR130	535316-001-00	"DIODE,SUPR,5V,SM,DO-214,UNIDIRECTIONAL / LEAD-FREE / ROHS CO"
VR131	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR132	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR133	4885582Y01	"DIO,TVS,BIDIR,28V,800W,SMD DO-214AA"
VR134	4885582Y01	"DIO,TVS,BIDIR,28V,800W,SMD DO-214AA"





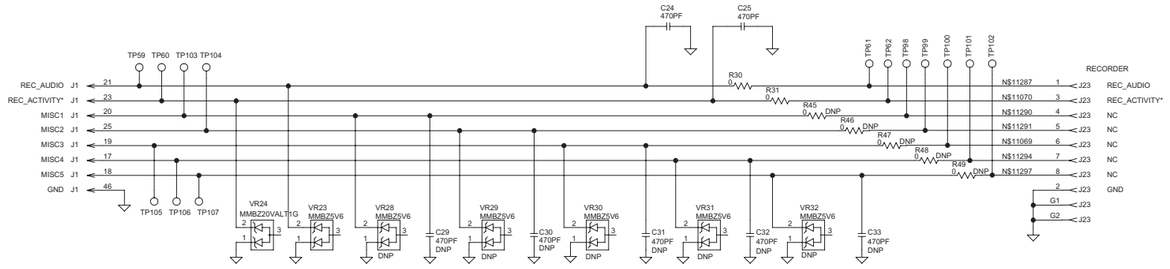


Figure 8-6. PPLN1690A High Speed Circuit Schematic - A

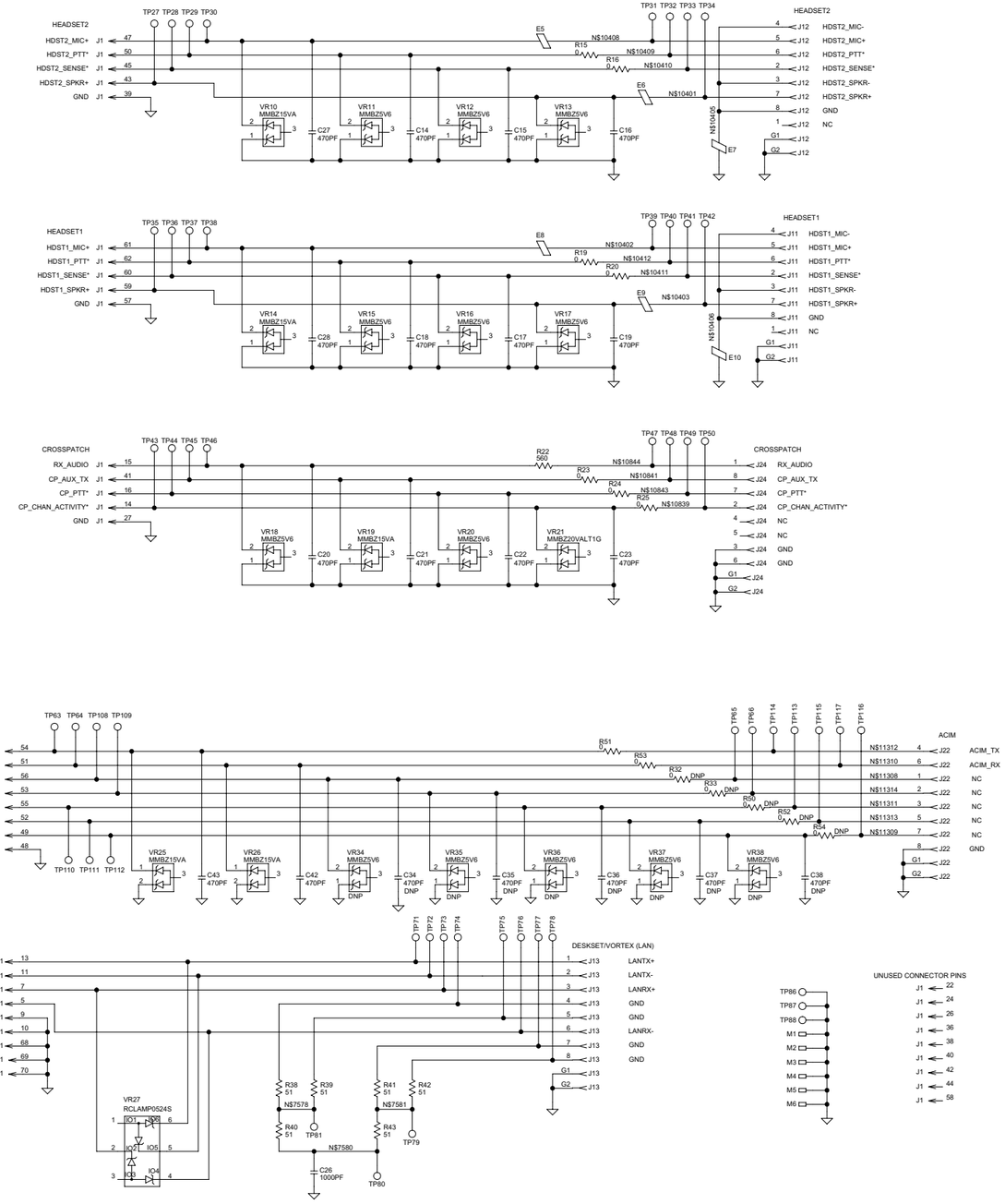


Figure 8-7. PPLN1690A High Speed Circuit Schematic - B

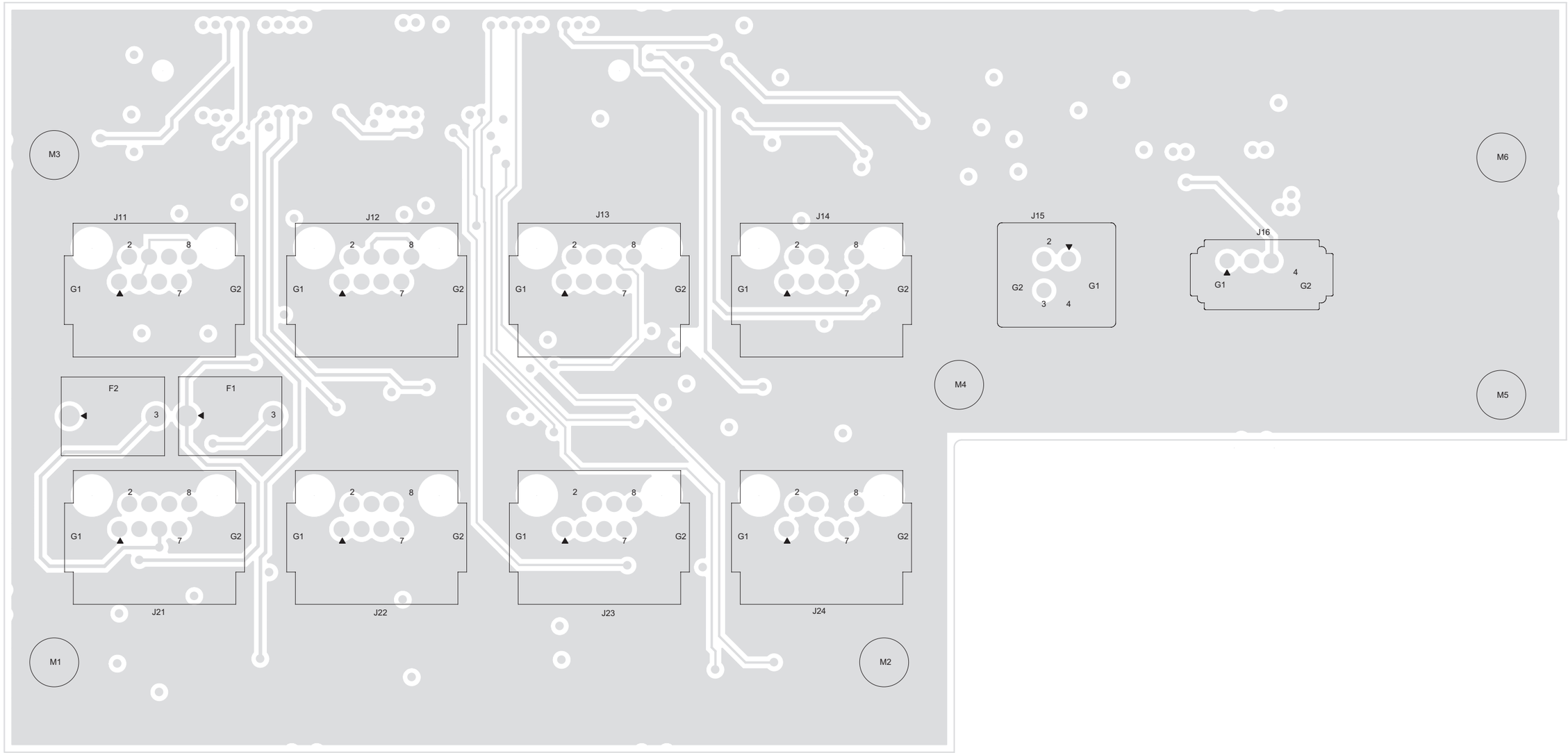


Figure 8-8. PPLN1690A High Speed Circuit Board Layout - Side 1

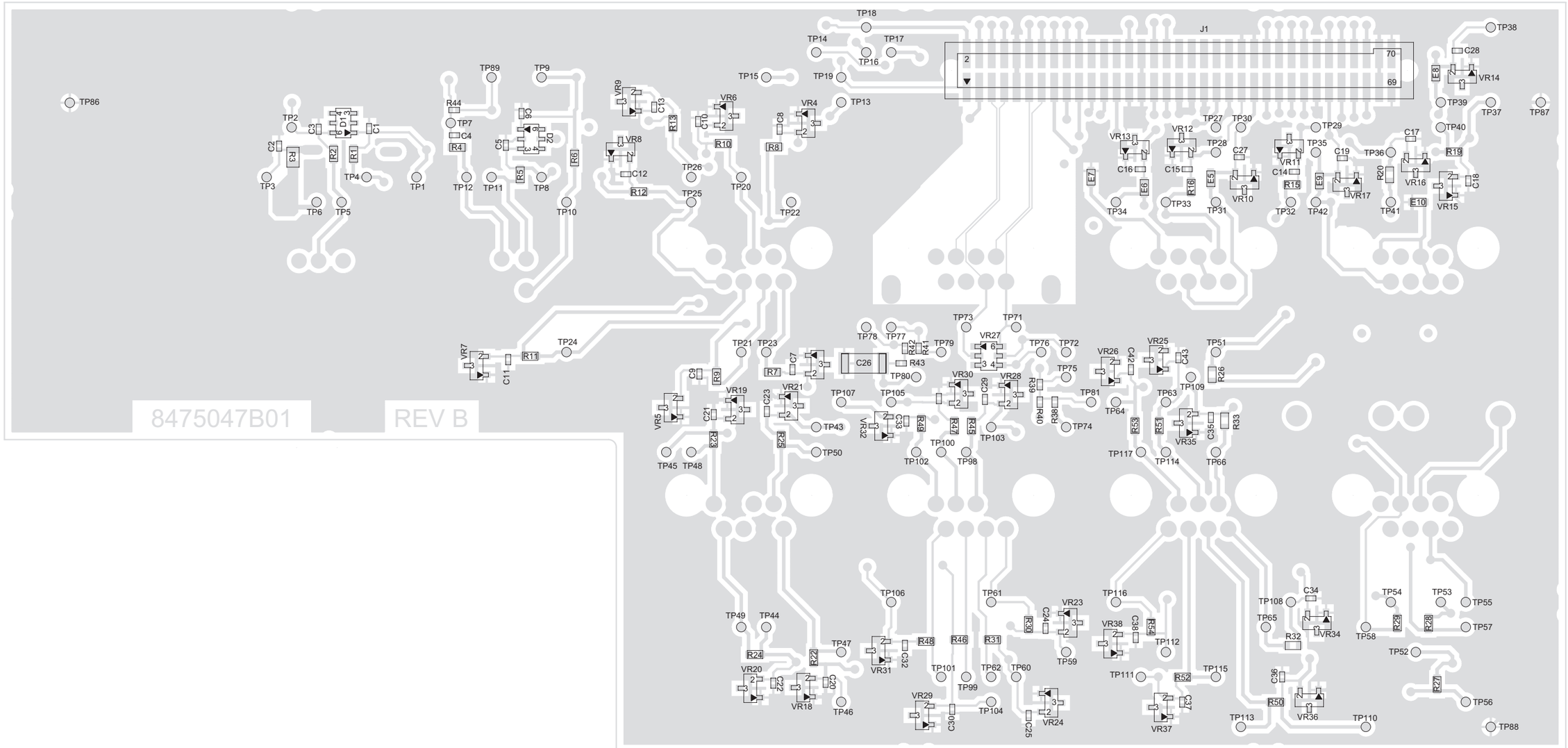
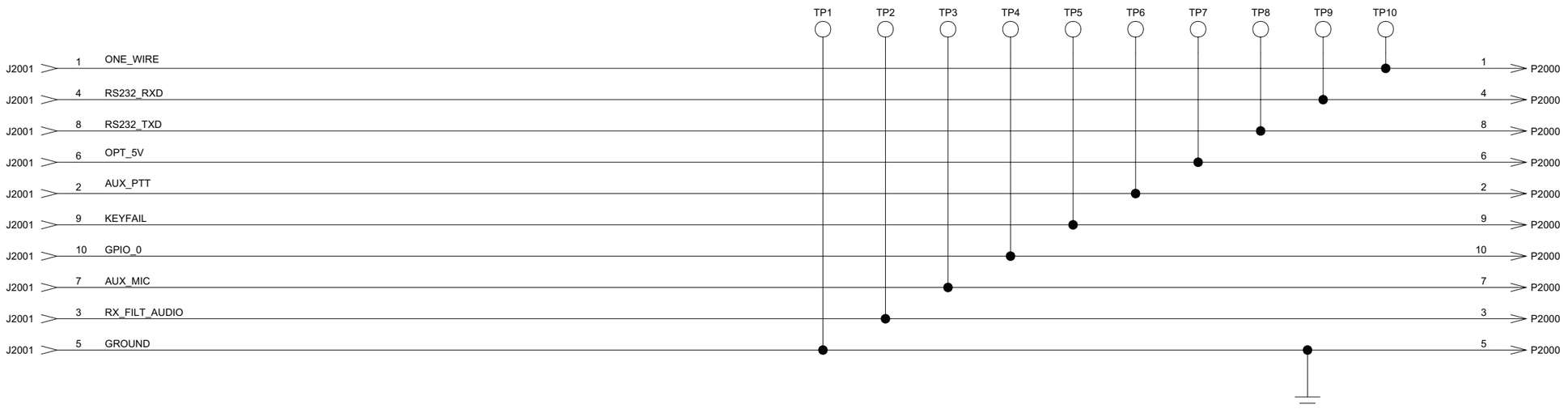


Figure 8-9. PPLN1690A High Speed Circuit Board Layout - Side 2

PPLN1690A High Speed Part List

Ref Des	Part Number	Description
C10	2113944A40	CAP CER CHP 100.0PF 50V 5%
C11	2113944A40	CAP CER CHP 100.0PF 50V 5%
C12	2113944A40	CAP CER CHP 100.0PF 50V 5%
C13	2113944A40	CAP CER CHP 100.0PF 50V 5%
C14	2113945A05	CAP CER CHP 470PF 50V 10%
C15	2113945A05	CAP CER CHP 470PF 50V 10%
C16	2113945A05	CAP CER CHP 470PF 50V 10%
C17	2113945A05	CAP CER CHP 470PF 50V 10%
C18	2113945A05	CAP CER CHP 470PF 50V 10%
C19	2113945A05	CAP CER CHP 470PF 50V 10%
C20	2113945A05	CAP CER CHP 470PF 50V 10%
C21	2113945A05	CAP CER CHP 470PF 50V 10%
C22	2113945A05	CAP CER CHP 470PF 50V 10%
C23	2113945A05	CAP CER CHP 470PF 50V 10%
C24	2113945A05	CAP CER CHP 470PF 50V 10%
C25	2113945A05	CAP CER CHP 470PF 50V 10%
C26	2188473T01	"CAP,CER CHIP,1000PF,10PF+/-,2000V-DC,-55DEG CMIN,125DEG CMAX"
C27	2113945A05	CAP CER CHP 470PF 50V 10%
C28	2113945A05	CAP CER CHP 470PF 50V 10%
C42	2113945A05	CAP CER CHP 470PF 50V 10%
C43	2113945A05	CAP CER CHP 470PF 50V 10%
C7	2113944A40	CAP CER CHP 100.0PF 50V 5%
C8	2113944A40	CAP CER CHP 100.0PF 50V 5%
C9	2113944A40	CAP CER CHP 100.0PF 50V 5%
D1	4813979A45	"DIODE ARRAY,SUPR,TSOP,5V,500W,9,PB-FREE"
D2	4813979A45	"DIODE ARRAY,SUPR,TSOP,5V,500W,9,PB-FREE"
E10	2462586G01	INDUCTOR CHIP FERRITE BEADS
E5	2462586G01	INDUCTOR CHIP FERRITE BEADS
E6	2462586G01	INDUCTOR CHIP FERRITE BEADS
E7	2462586G01	INDUCTOR CHIP FERRITE BEADS
E8	2462586G01	INDUCTOR CHIP FERRITE BEADS
E9	2462586G01	INDUCTOR CHIP FERRITE BEADS
F1	0180706J35	SURGE ARRESTER REWORKED
F2	0180706J35	SURGE ARRESTER REWORKED
J1	2871670H01	"HEADER, 70 PIN, .050 X .050"
J11	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J12	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J13	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J14	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J15	2875081B01	"RECEPTACLE,USB B,VERICAL,HIGH TEMP"
J16	0975080B01	"RECEPTACLE,USB A,VERICAL,HIGH TEMP"
J21	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J22	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J23	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
J24	0975079B01	"MODULAR JACK,VERTICAL, RJ45,W/LED'S"
PCB	8475047B02	"PWB, HIGH SPEED CONNECTOR"
R1	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R10	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R11	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R12	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R13	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R15	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R16	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R19	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R20	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R22	0613952H67	CER CHIP RES 560 OHM 5 0603
R23	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R24	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R25	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R26	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R27	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R28	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R29	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R3	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R30	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R31	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R38	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R39	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R4	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R40	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R41	0613952Q42	CER CHIP RES 51.0 OHM 5 0402

Ref Des	Part Number	Description
R42	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R43	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R5	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R51	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R53	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R6	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R7	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R8	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R9	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
VR10	4813977A44	"DIODE ARRAY,TRN-SNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR11	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR12	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR13	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR14	4813977A44	"DIODE ARRAY,TRN-SNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR15	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR16	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR17	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR18	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR19	4813977A44	"DIODE ARRAY,TRN-SNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR20	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR21	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR23	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR24	4813977A48	"DIODE ARRAY,SUPR,SM,SOT-23,17V,.225W,ZEN,2,PB-FREE"
VR25	4813977A44	"DIODE ARRAY,TRN-SNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR26	4813977A44	"DIODE ARRAY,TRN-SNT PROT,MMBZ15V,SM,SOT-23,15V,.225W,ZEN,2,PB-FR"
VR27	48009320001	"DIODE,SUPR,5V,RCLAMP0524S,SM,PBFREE"
VR3	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR4	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR5	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR6	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR7	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR8	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"
VR9	4813977A43	"PB-FREE, NOTCOM-PLETELYENRICHED"



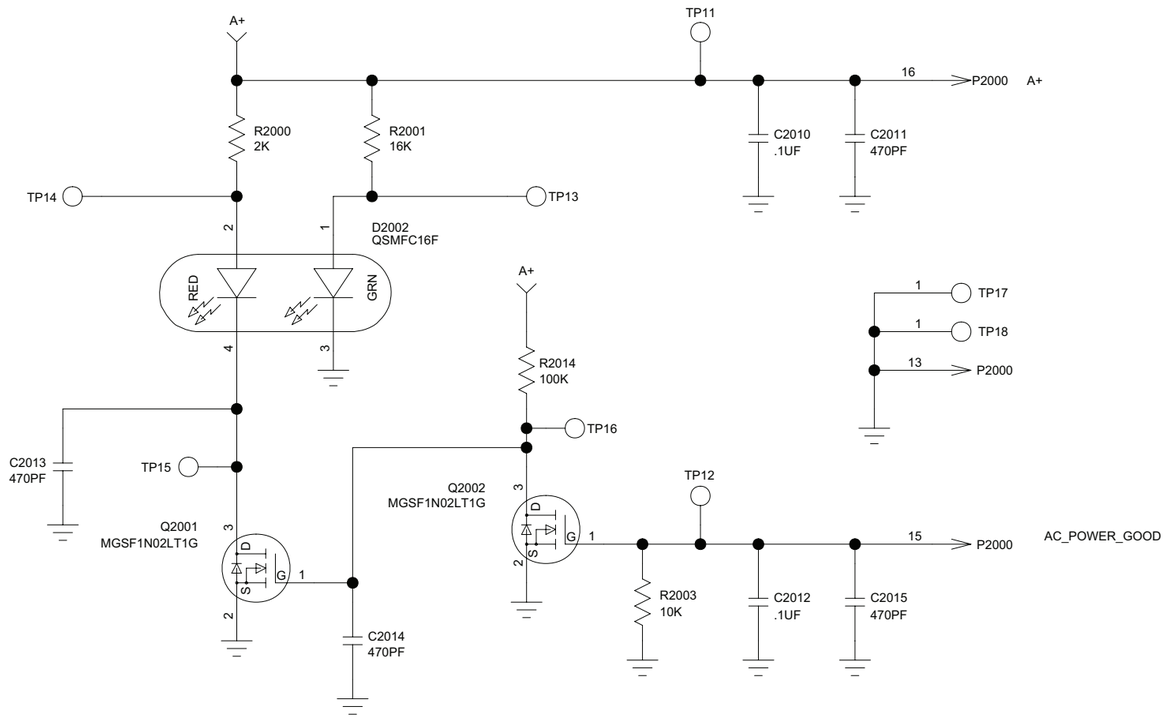


Figure 8-10. PPLN1694A GCAI Circuit Schematic

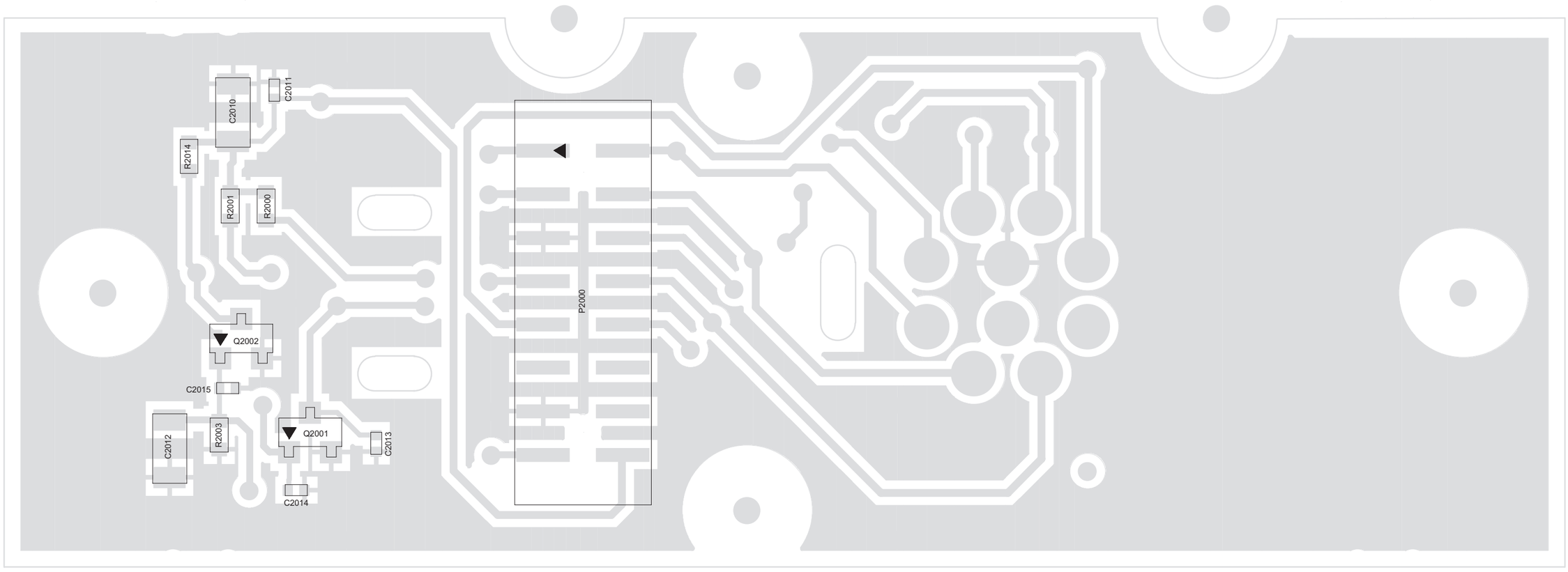


Figure 8-11. PPLN1694A GCAI Circuit Board Layout - Side 1

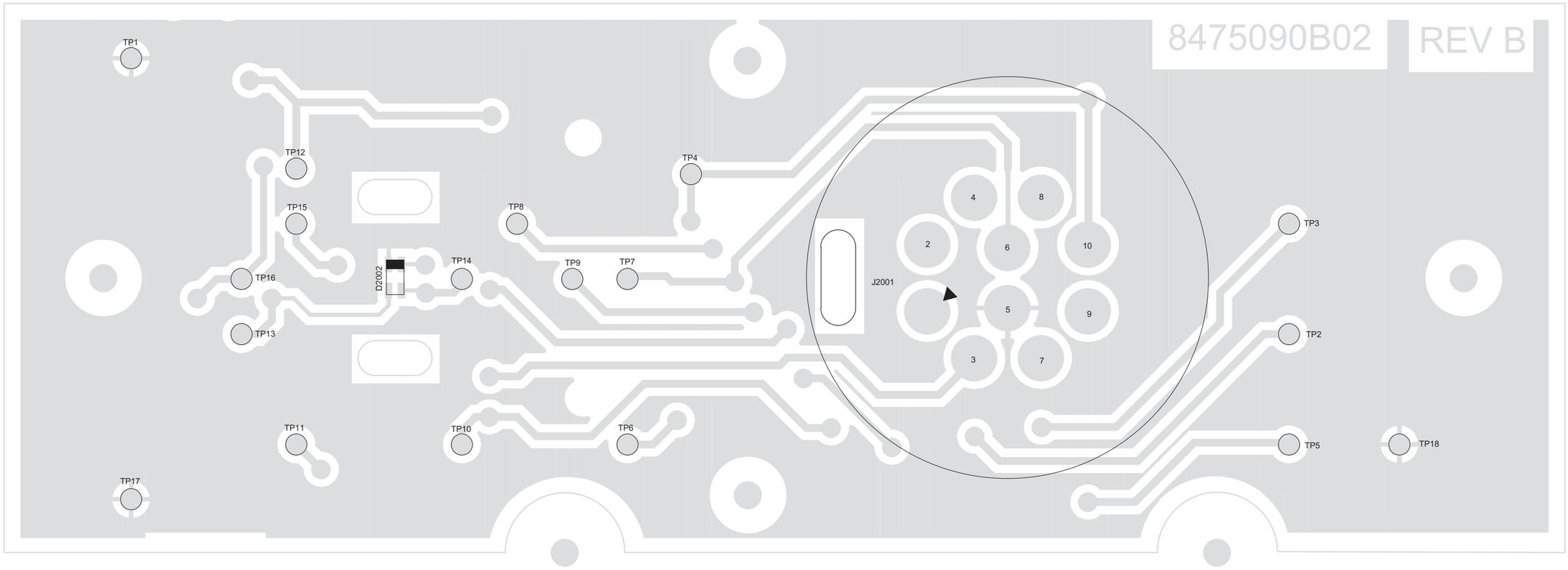


Figure 8-12. PPLN1694A GCAI Circuit Board Layout - Side 2

PPLN1694A GCAI Circuit Part List

Ref Des	Part Number	Description
C2010	2113945H89	CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX
C2011	2113945A05	CAP CER CHP 470PF 50V 10%
C2012	2113945H89	CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX
C2013	2113945A05	CAP CER CHP 470PF 50V 10%
C2014	2113945A05	CAP CER CHP 470PF 50V 10%
C2015	2113945A05	CAP CER CHP 470PF 50V 10%
D2002	4875690M01	LED,CHIP,BICLR,RED-PQ/GRN-QR
J2001	0964501H04	GCAI JACK ASSEMBLY
P2000	2875346C01	HEADER,16 PIN VETI-CAL, 2.0MM,SHROUD
PCB	8475090B02	PWB, GCAI CONNEC-TOR
Q2001	4813972A17	PB-FREE,NOT COM-PLETELY ENRICHED
Q2002	4813972A17	PB-FREE,NOT COM-PLETELY ENRICHED
R2000	0613952D30	CER CHIP RES 2000 OHM 1% 0603
R2001	0613952J06	CER CHIP RES 16K OHM 5 0603
R2003	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2014	0613952J25	CER CHIP RES 100K OHM 5% 0603

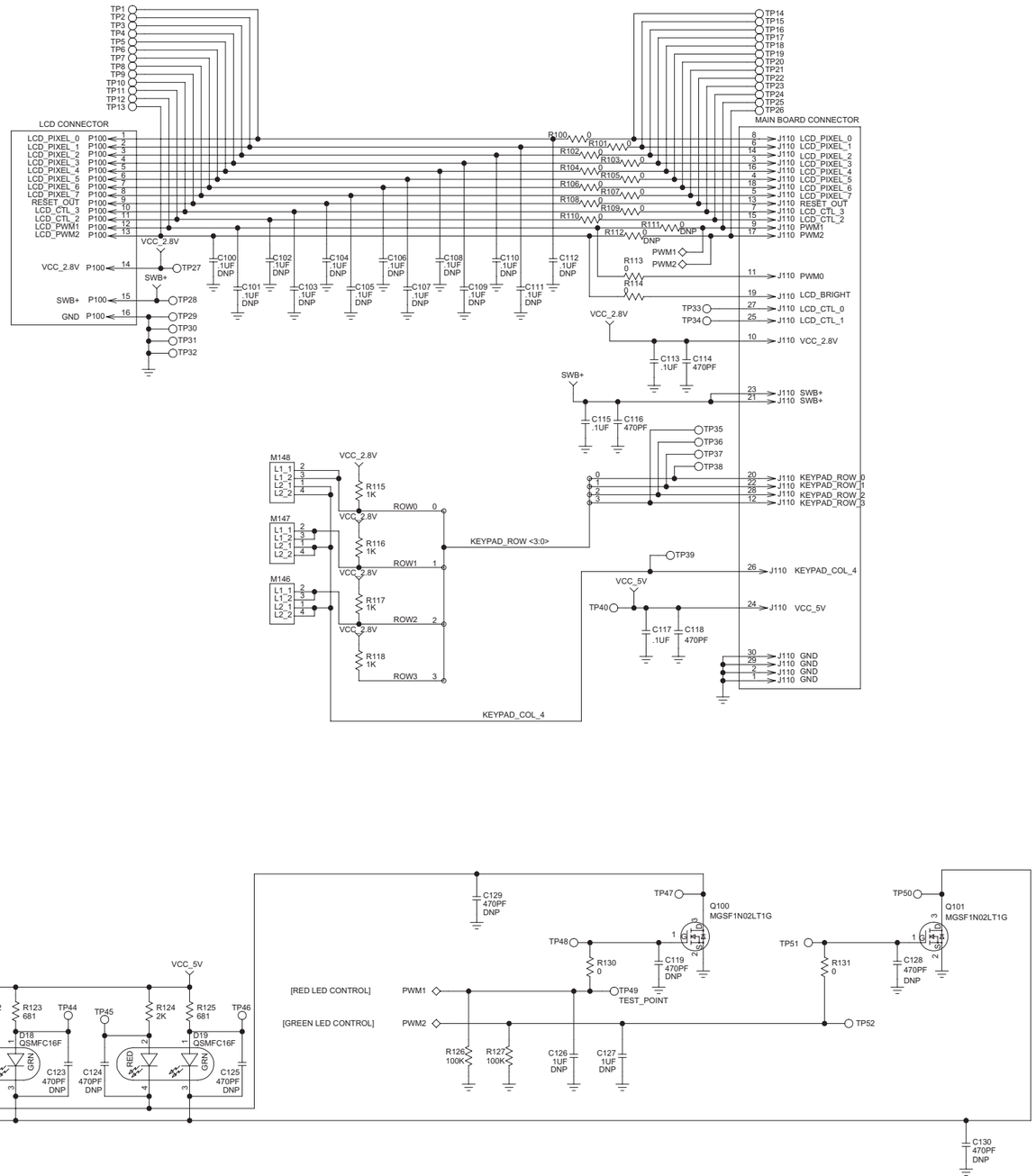


Figure 8-13. PPLN1692A Display Circuit Schematic

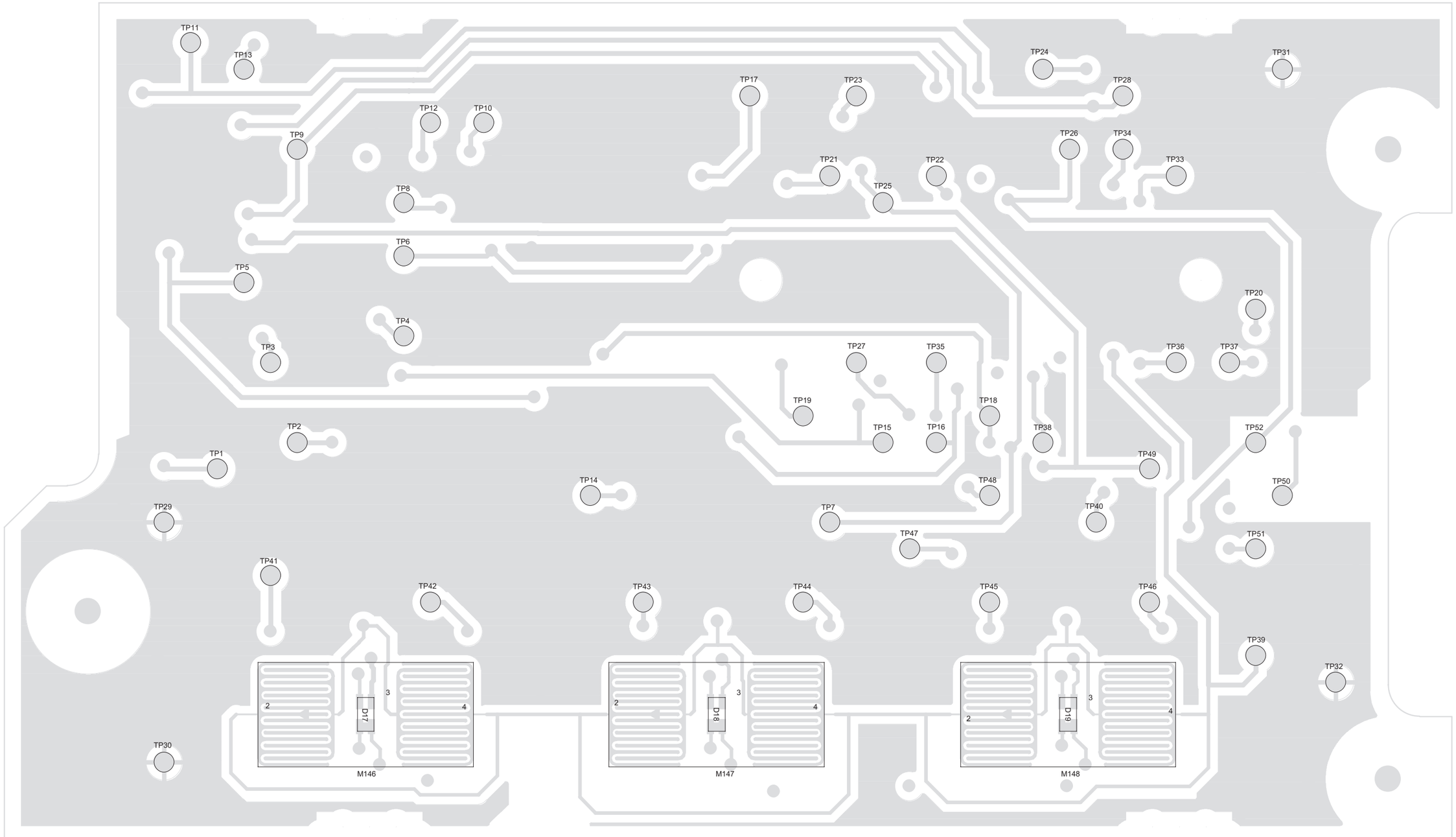


Figure 8-14. PPLN1692A Display Circuit Board Layout - Side 1

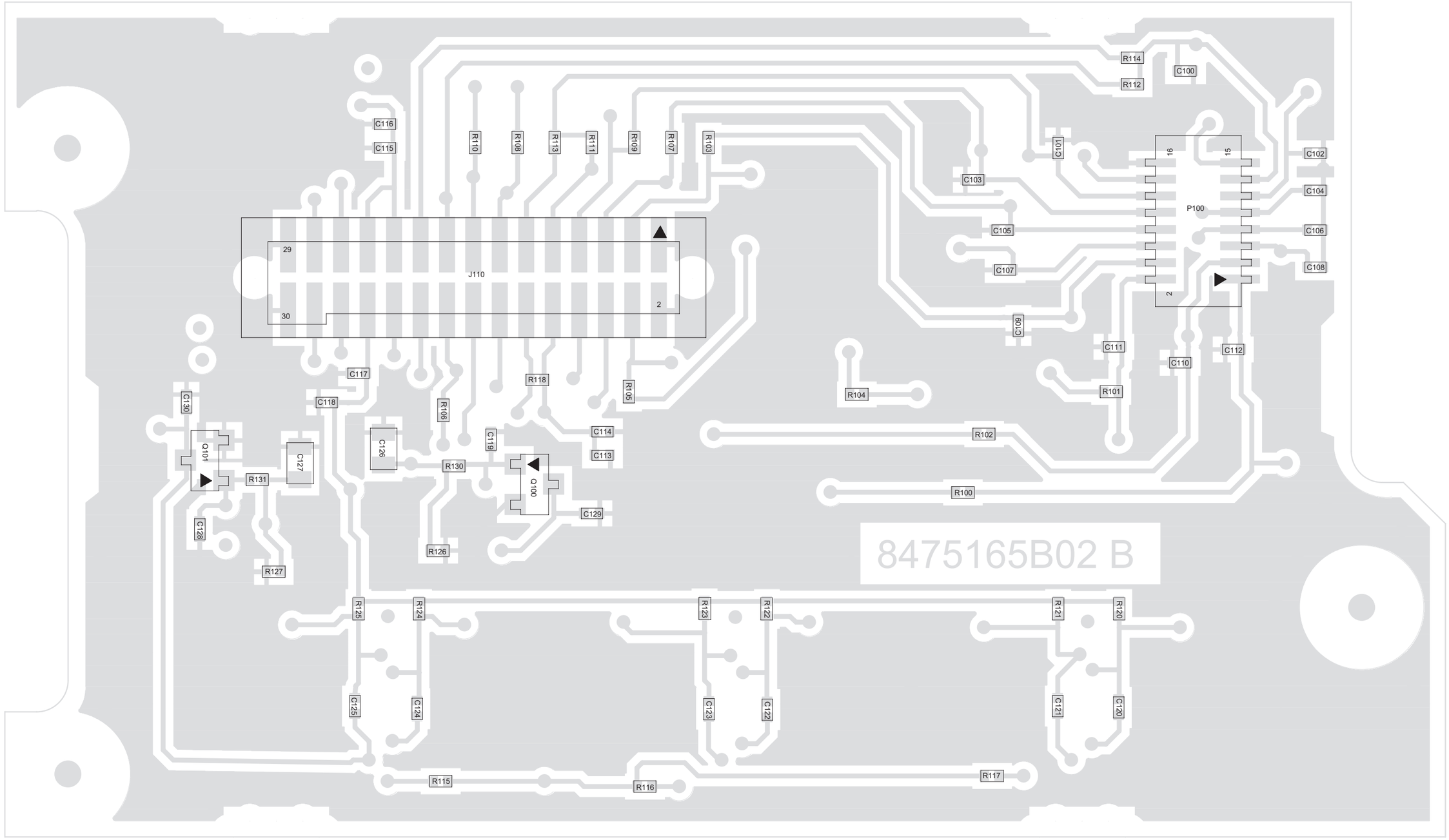


Figure 8-15. PPLN1692A Display Circuit Board Layout - Side 2

PPLN1692A Display Circuit Part List

Ref Des	Part Number	Description
C113	2113946K02	CAP CER CHP 0.10UF 16V
C114	2113945A05	CAP CER CHP 470PF 50V 10%
C115	2113946K02	CAP CER CHP 0.10UF 16V
C116	2113945A05	CAP CER CHP 470PF 50V 10%
C117	2113946K02	CAP CER CHP 0.10UF 16V
C118	2113945A05	CAP CER CHP 470PF 50V 10%
D17	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D18	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D19	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
J110	9009262001	"LOCKING HEADER, 30 PIN, .050 X .050"
P100	2815146H01	PLUG 0.8MM BTB CONNECTOR
PCB	8475165B02	"PWB, DISPLAY"
Q100	4813972A17	"PB-FREE,NOT COMPLETELY ENRICHED"
Q101	4813972A17	"PB-FREE,NOT COMPLETELY ENRICHED"
R100	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R101	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R102	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R103	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R104	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R105	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R106	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R107	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R108	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R109	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R110	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R113	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R114	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R115	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R116	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R117	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R118	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R120	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R121	0613952L81	CER CHIP RES 681 OHM 1% 0402
R122	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R123	0613952L81	CER CHIP RES 681 OHM 1% 0402
R124	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R125	0613952L81	CER CHIP RES 681 OHM 1% 0402
R126	0613952R25	CER CHIP RES 100K OHM 5% 0402
R127	0613952R25	CER CHIP RES 100K OHM 5% 0402
R130	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R131	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM

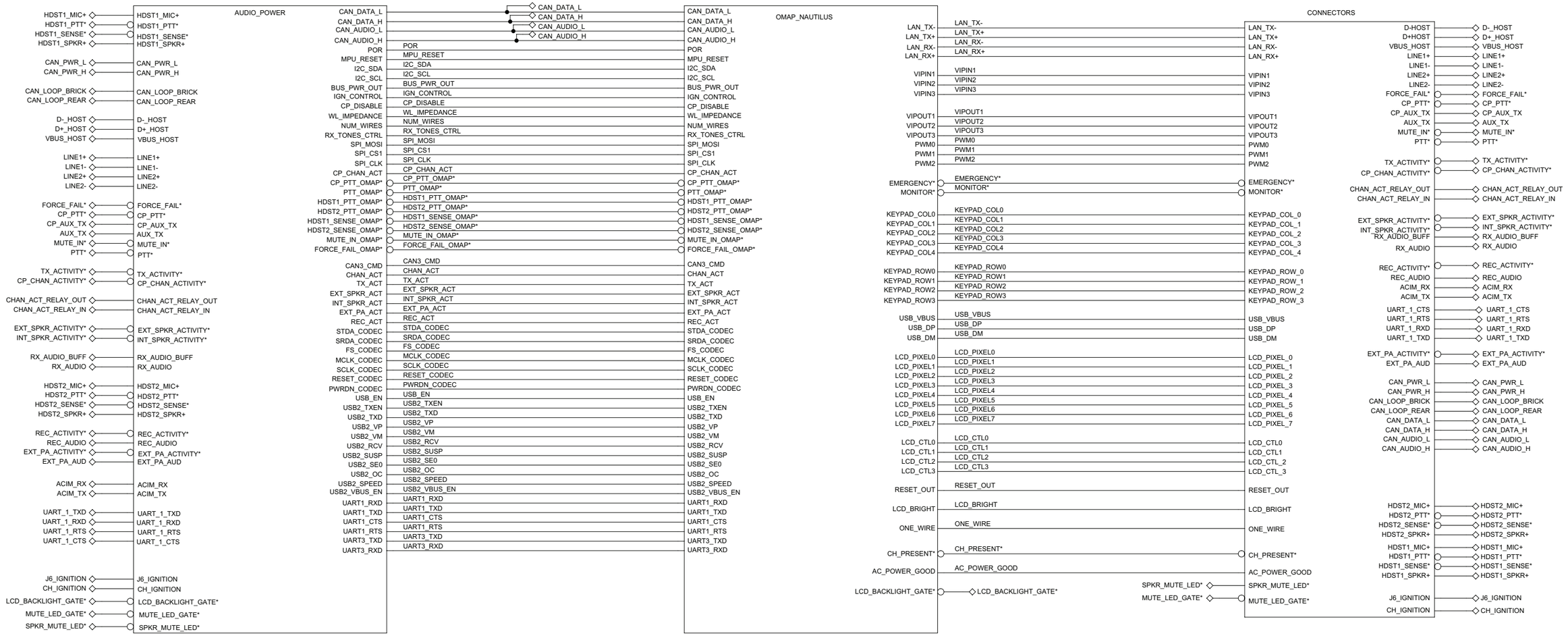


Figure 8-16. PPLN1696A Main Board Circuit Schematic - A

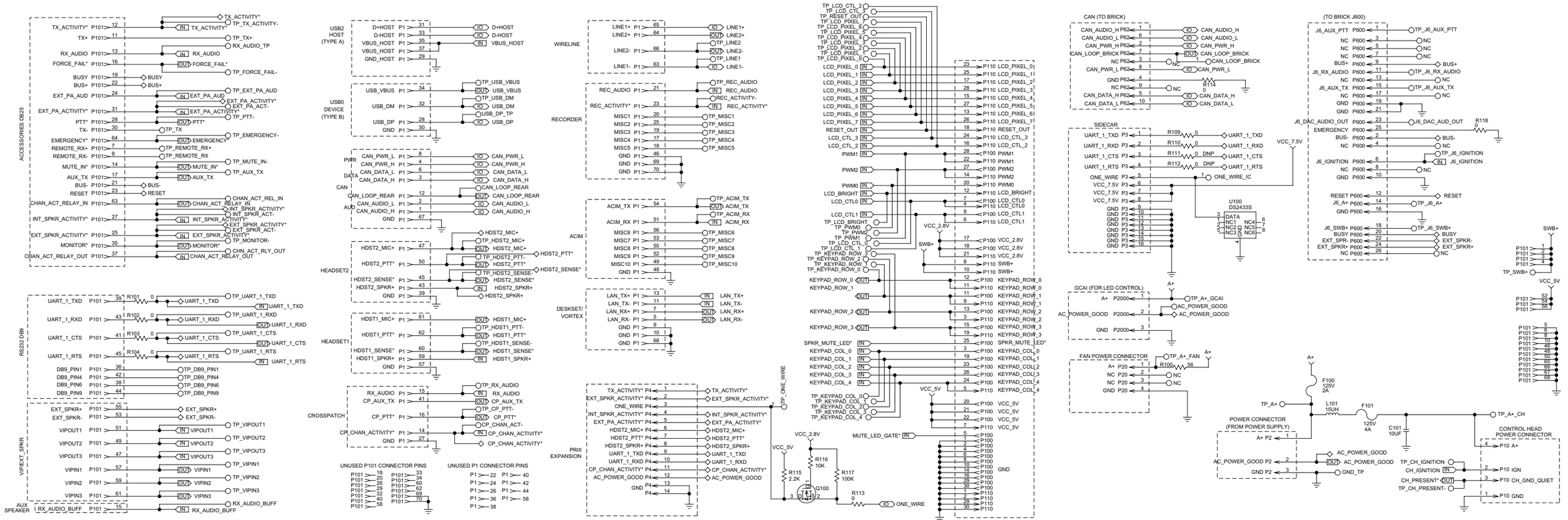
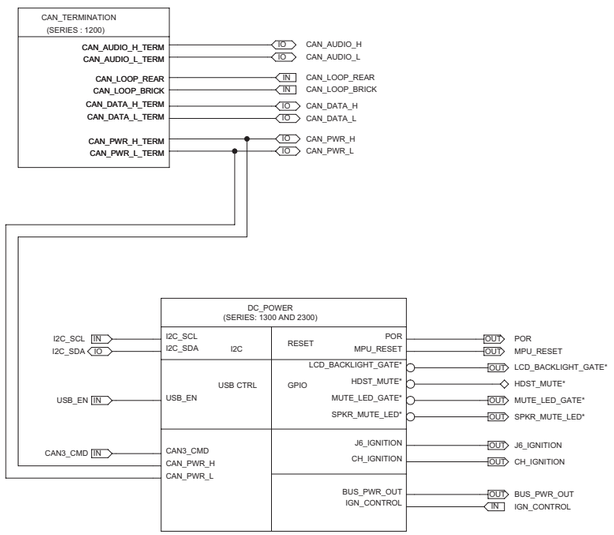
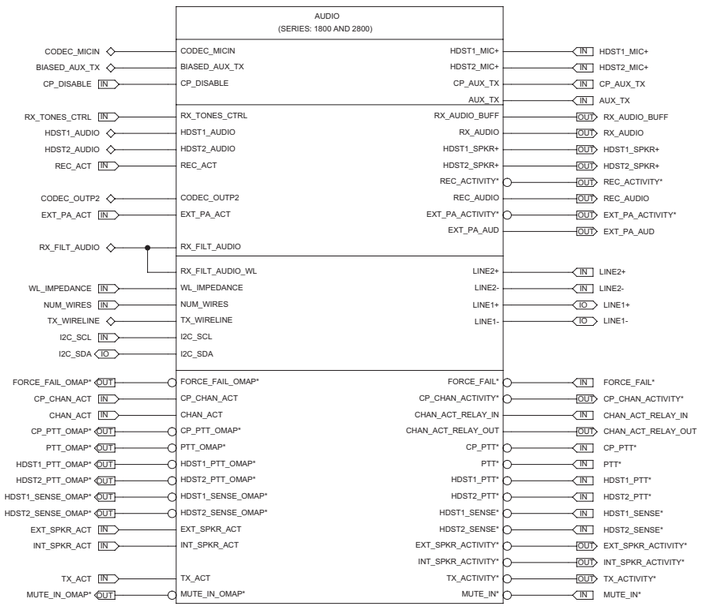
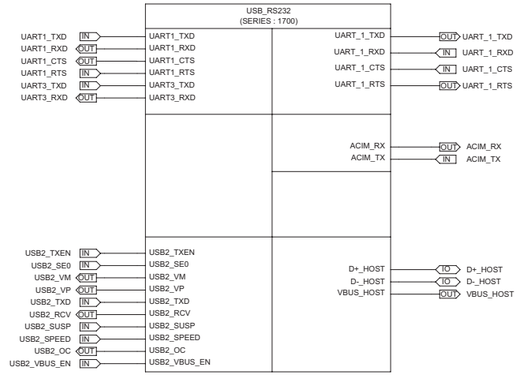
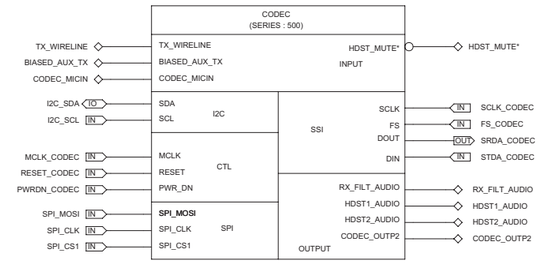


Figure 8-17. PPLN1696A Main Board Circuit Schematic - B









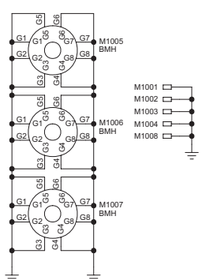


Figure 8-18. PPLN1696A Main Board Circuit Schematic - C

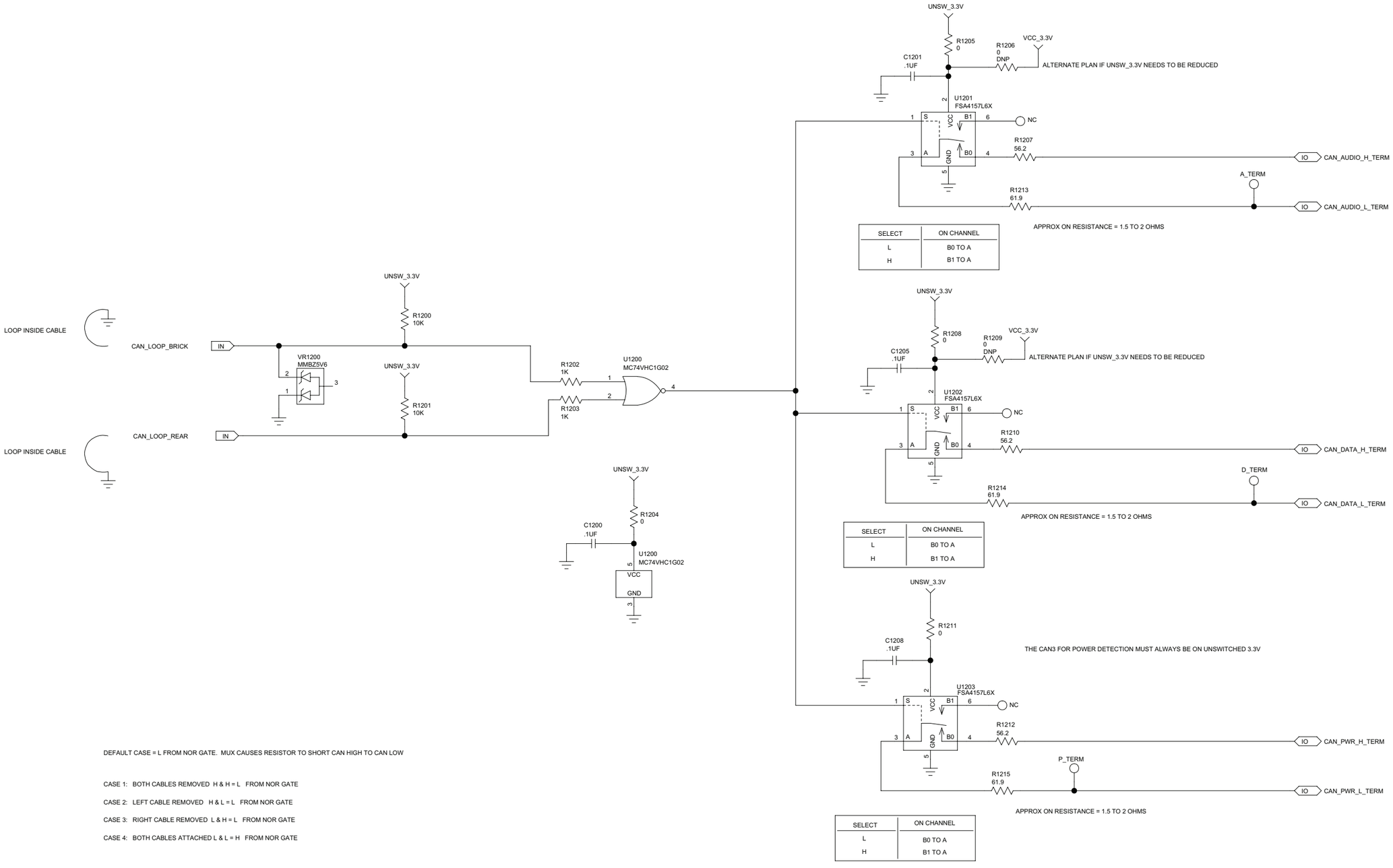


Figure 8-19. PPLN1696A Main Board Circuit Schematic - D

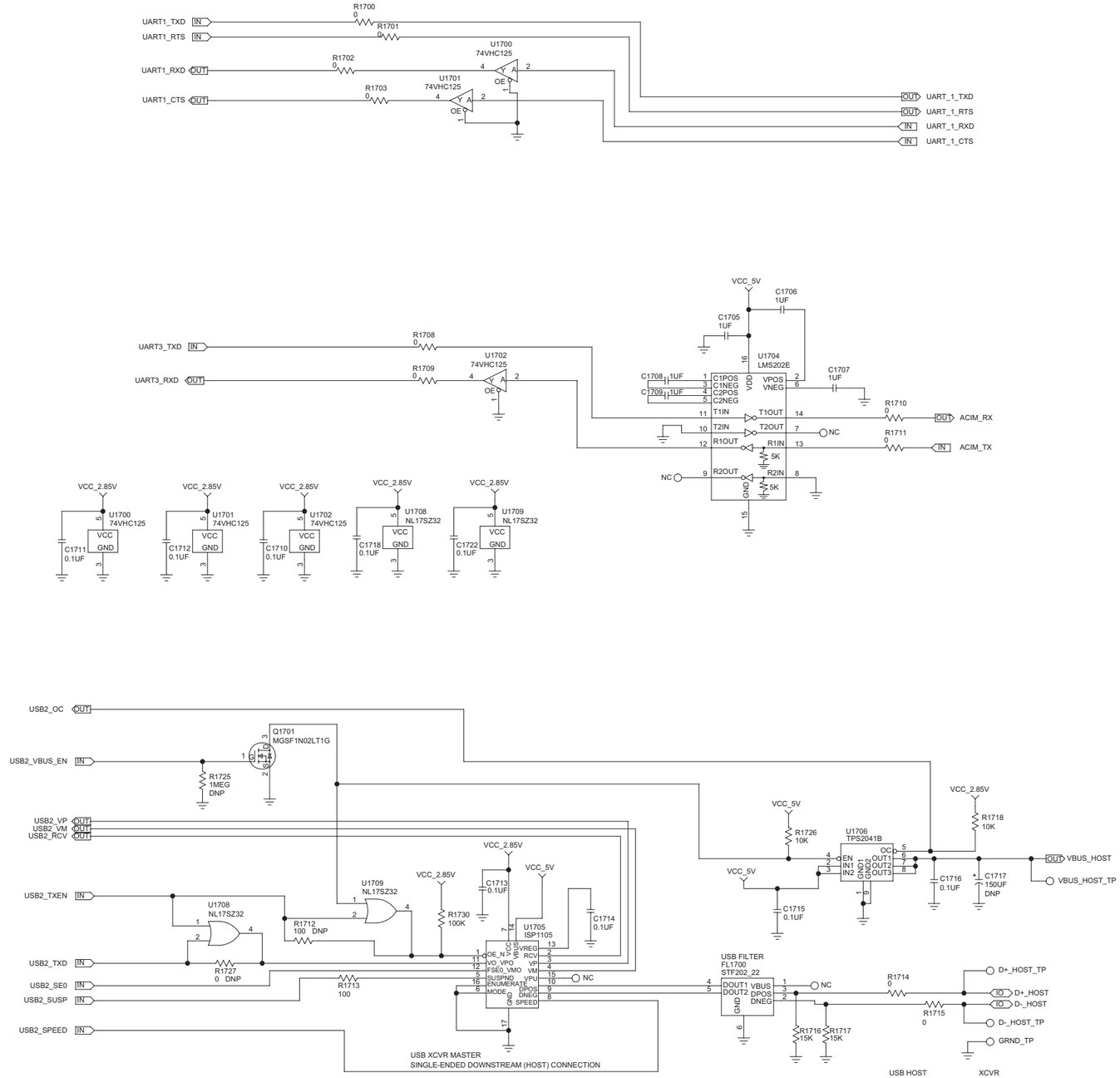


Figure 8-20. PPLN1696A Main Board Circuit Schematic - E

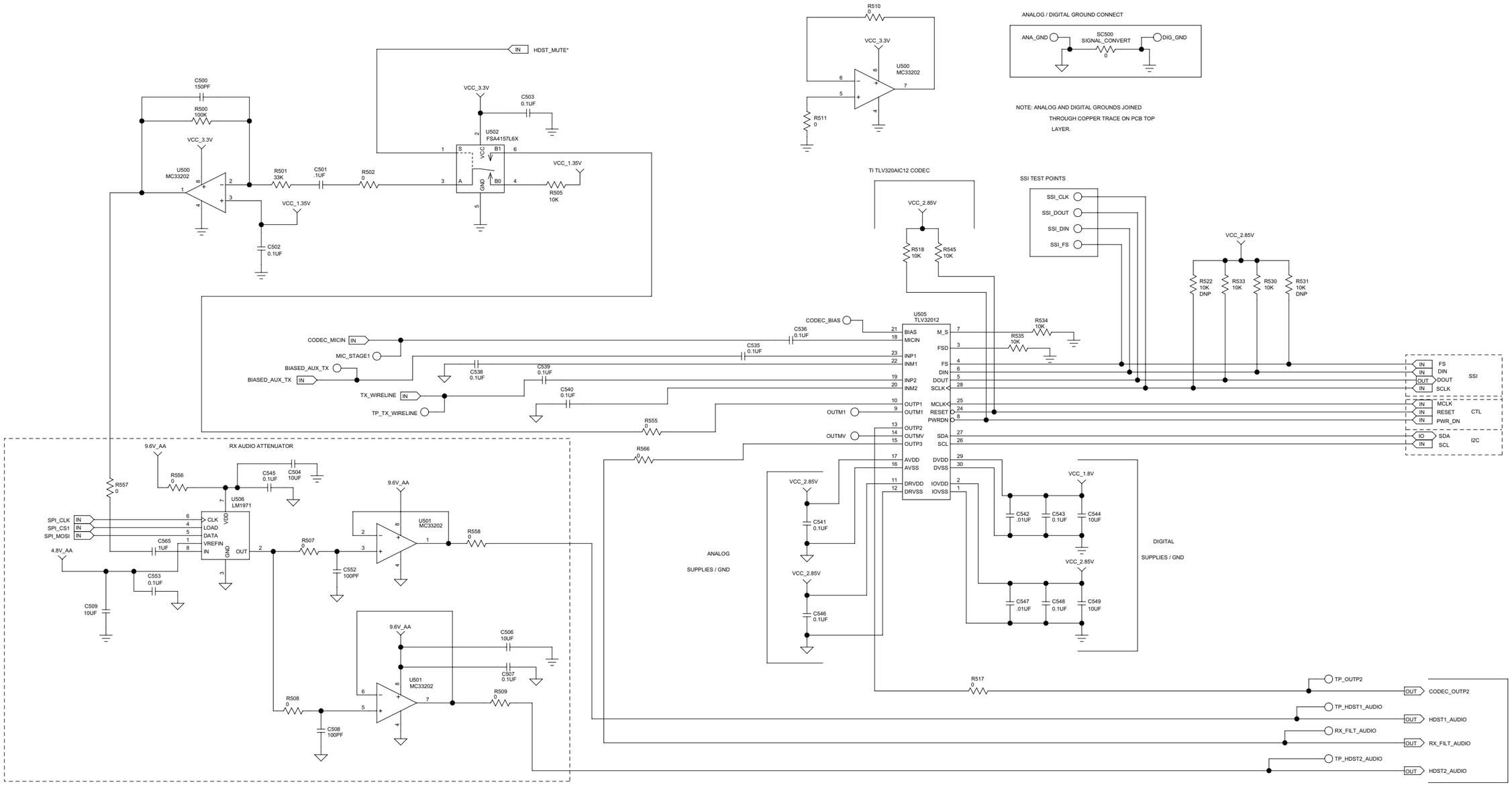


Figure 8-21. PPLN1696A Main Board Circuit Schematic - F

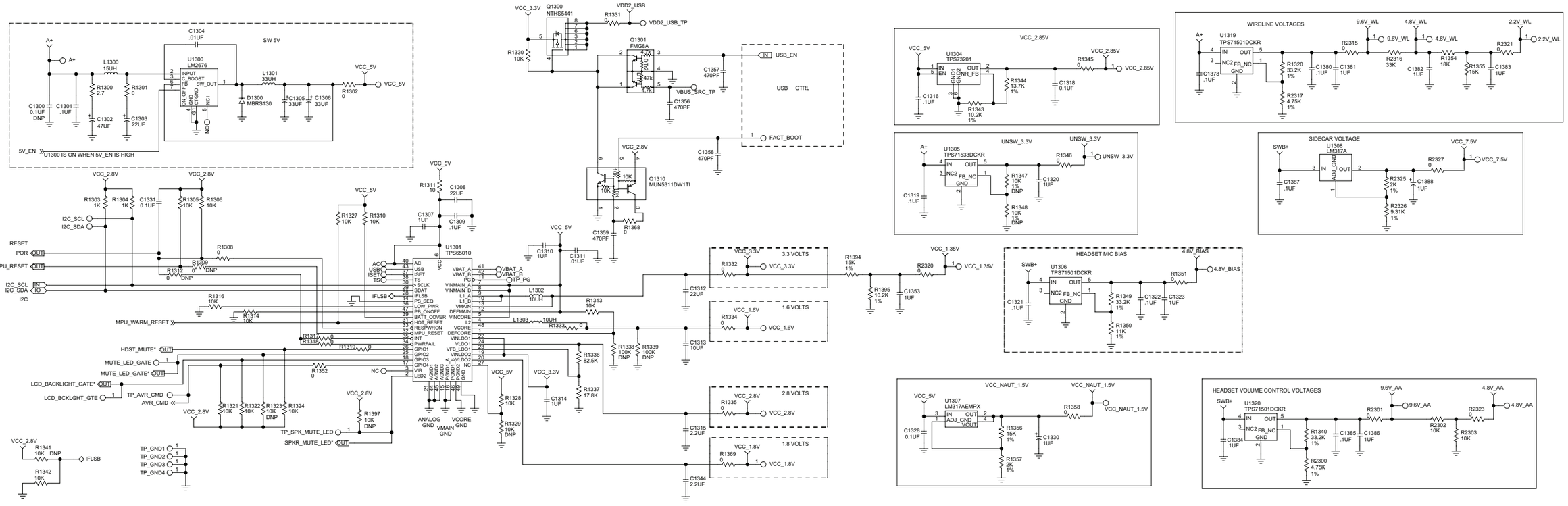
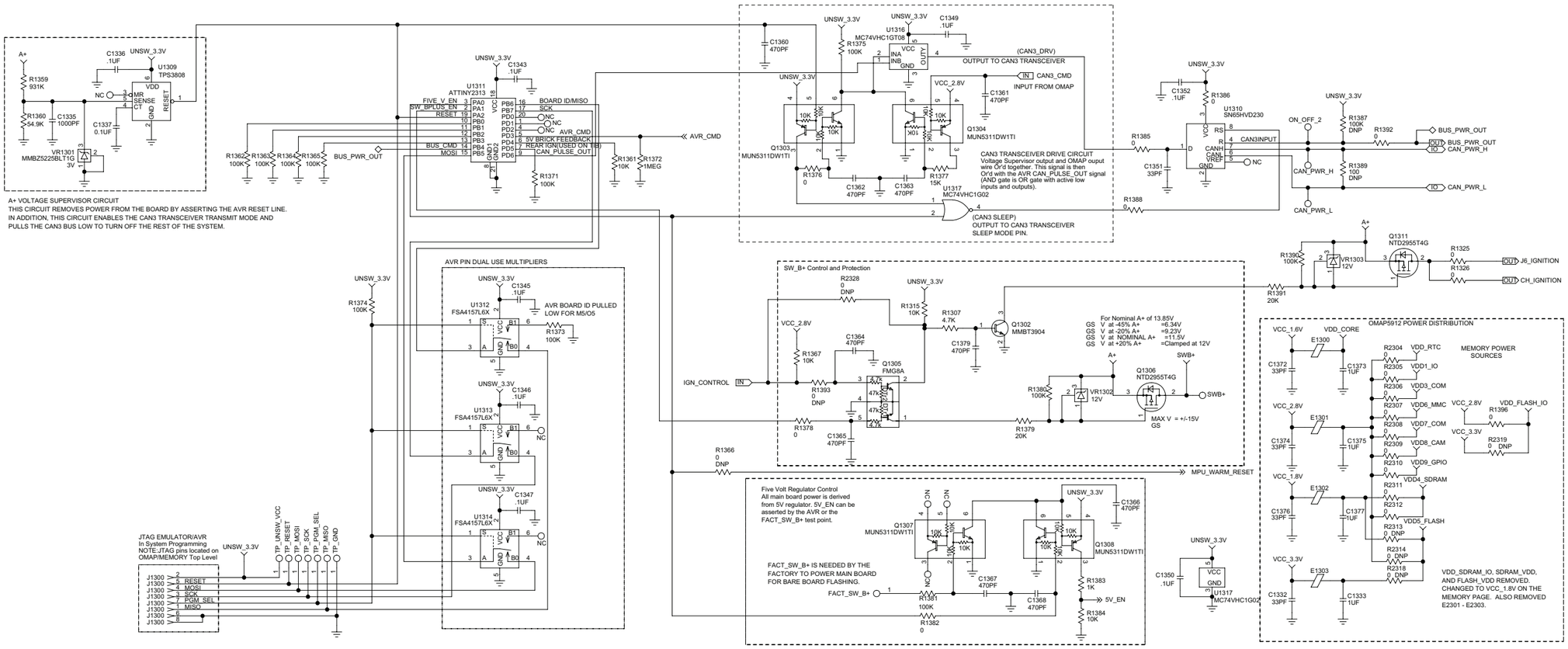


Figure 8-22. PPLN1696A Main Board Circuit Schematic - G



DC Voltage Table
Supply Type

Name	Value	Range	Part No.
VCC_1.6V	1.6V	1.55-1.65V	TPS65010
VCC_1.8V	1.8V	1.74-1.86V	TPS65010
VCC_2.8V	2.8V	2.68-2.96V	TPS65010
VCC_3.3	3.3V	3.20-3.40V	TPS65010
VCC_5	5.0V	4.90-5.10V	LM2676
UNSW_3.3V	3.3V	3.16-3.44V	TPS71533
A+	13.2V	12.94-13.46V	PSU
VCC_2.85V	2.82V	2.77-2.87V	TPS73201
VCC_1.35V	1.34V	1.25-1.40V	FROM VCC_3.3V
VCC_NAUT_1.5V	1.5V	1.46-1.53V	LM317
2.2V_WL	2.19V	1.96-2.44V	FROM 4.6V_WL
4.8V_BIAS	4.84V	4.57-5.12V	TPS71501
4.8V_WL	4.81V	4.31-5.35V	FROM 9.6V_WL
VCC_7.5V	7.46V	7.19-7.70V	LM317A
4.8V_AA	4.81V	4.31-5.35V	FROM 9.6V_AA
9.6V_WL	9.63V	9.08-10.19V	TPS71501
9.6V_AA	9.63V	9.08-10.19V	TPS71501

Supply Connections

Name	Value	Range	IC'S
VCC_FLASH_CORE	2.8V	2.7-3.6V	FLASH
VCC_FLASH_IO	1.8/2.8V	1.65-1.95/	FLASH
	2.7-3.6V		
VCC_SDRAM_CORE	2.8V	2.3-2.9V	SDRAM
VCC_SDRAM_IO	1.8/2.8V	1.65-2.9V	SDRAM
VDD_CORE	1.6V	1.35-1.65V	OMAP5912
VDD2_USB	3.3V	3-3.6V	OMAP5912
VDD1_PER	2.8V	2.5-3.6V	OMAP5912
VDD3_PER	2.8V	2.5-3.6V	OMAP5912
VDD6_PER	2.8V	2.5-3.6V	OMAP5912
VDD7_PER	2.8V	2.5-3.6V	OMAP5912
VDD8_PER	2.8V	2.5-3.6V	OMAP5912
VDD9_PER	2.8V	2.5-3.6V	OMAP5912
VDD4_SDRAM	1.8/2.8V	1.65-1.95/	OMAP5912
	2.5-3.6V		
VDD5_FLASH	1.8/2.8V	1.65-1.95/	OMAP5912
	2.5-3.6V		

Figure 8-23. PPLN1696A Main Board Circuit Schematic - H

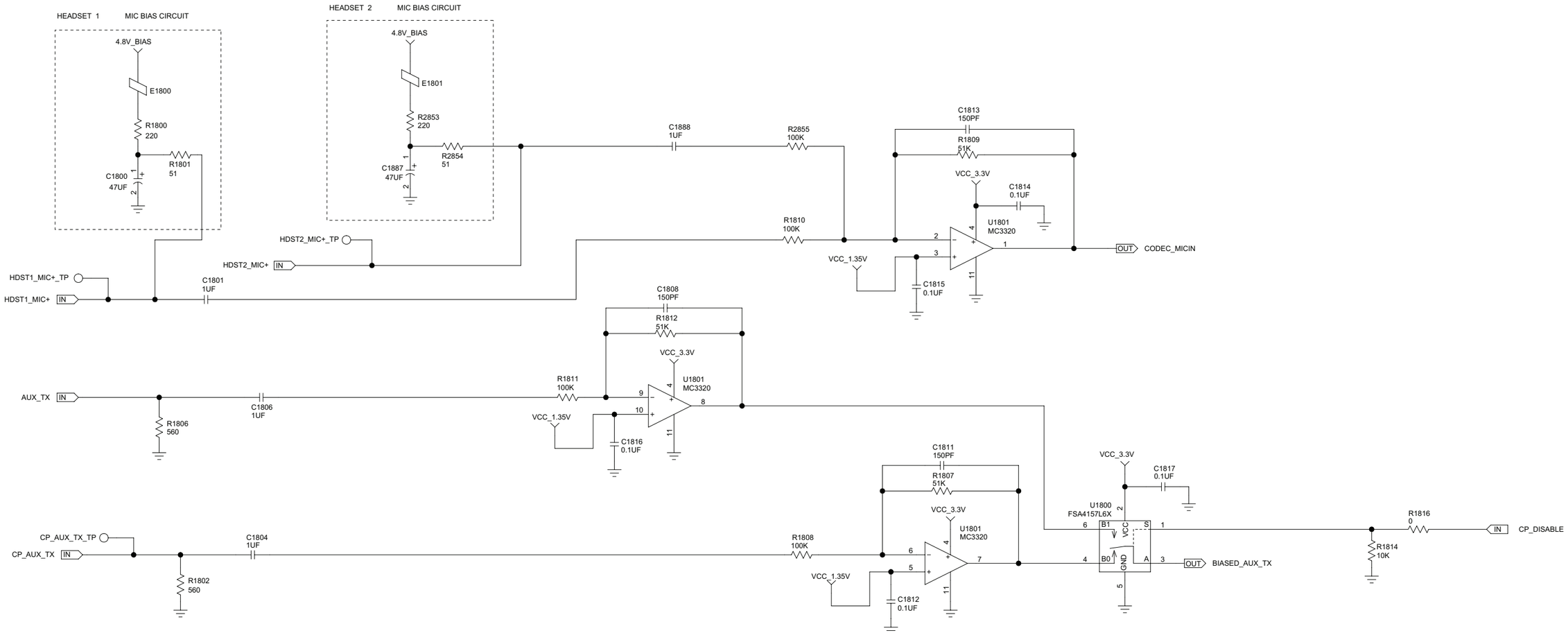


Figure 8-24. PPLN1696A Main Board Circuit Schematic - I

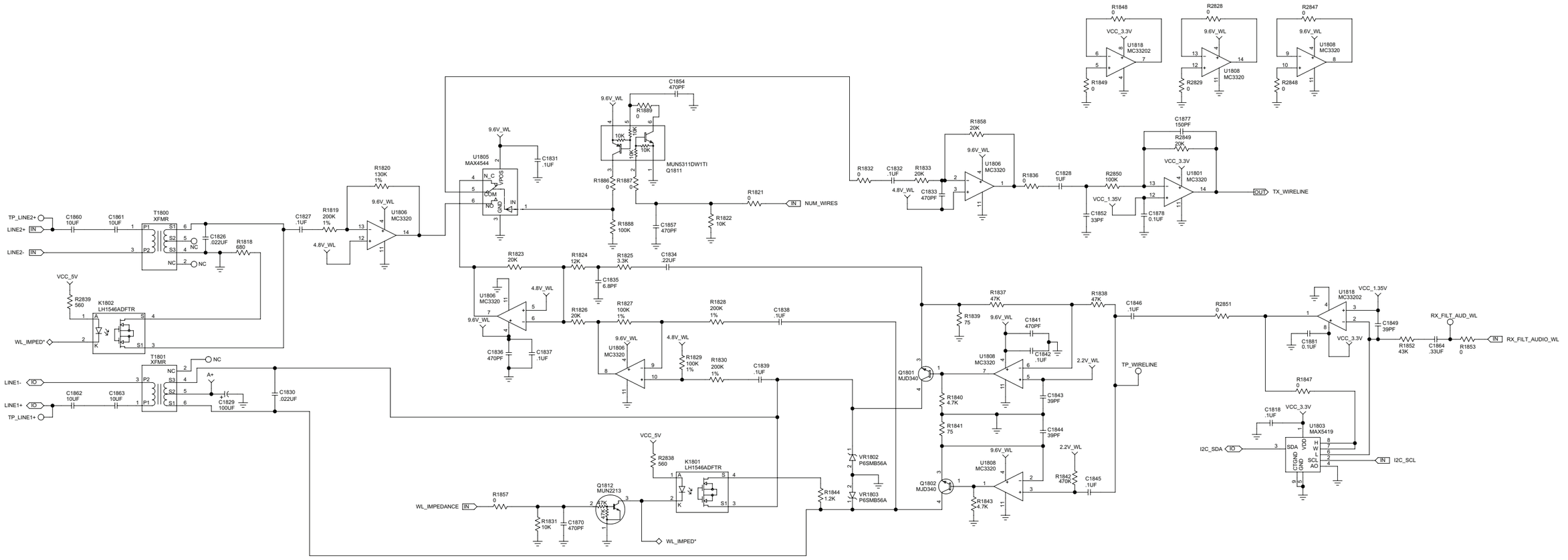


Figure 8-25. PPLN1696A Main Board Circuit Schematic - J

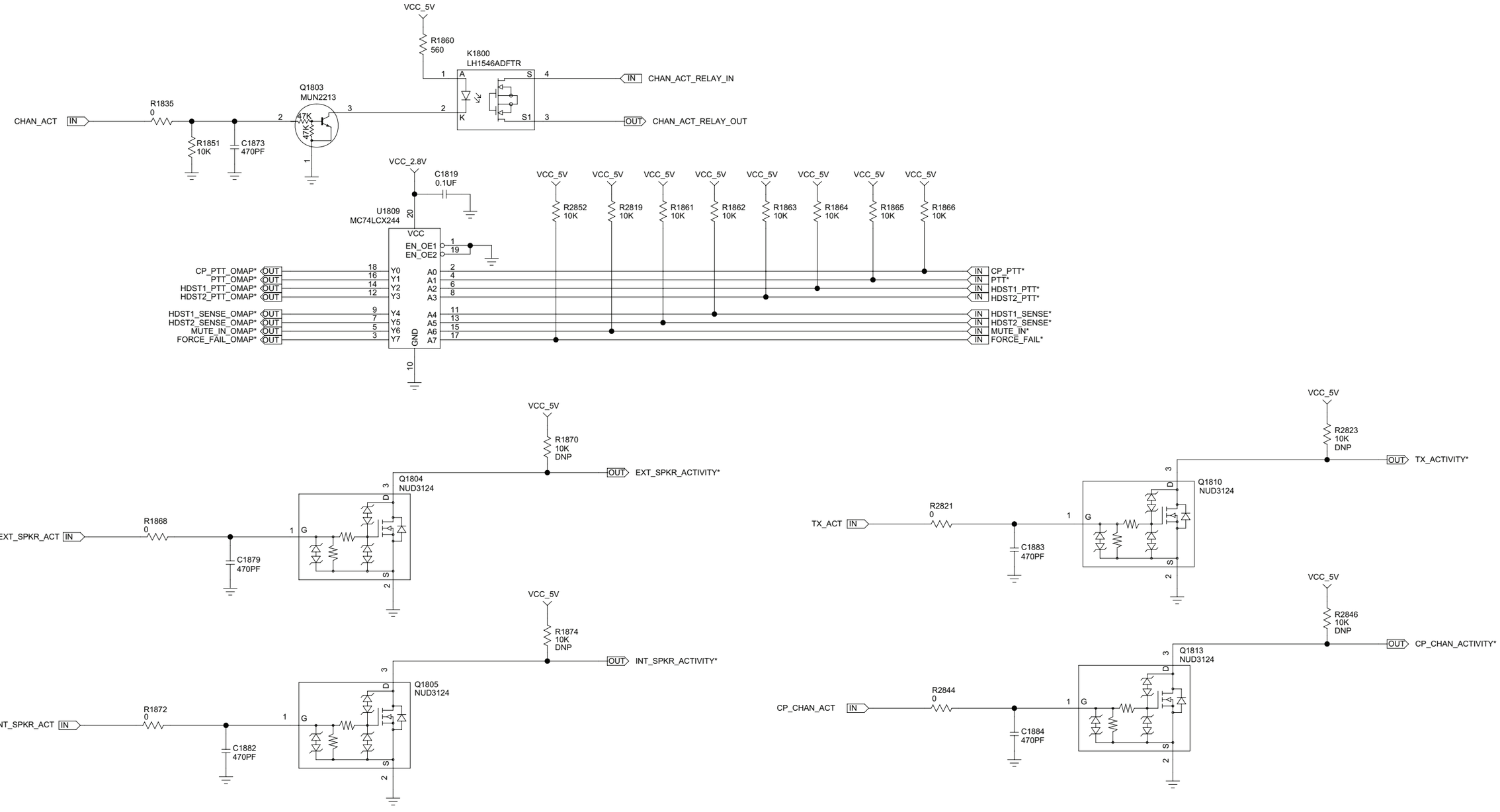
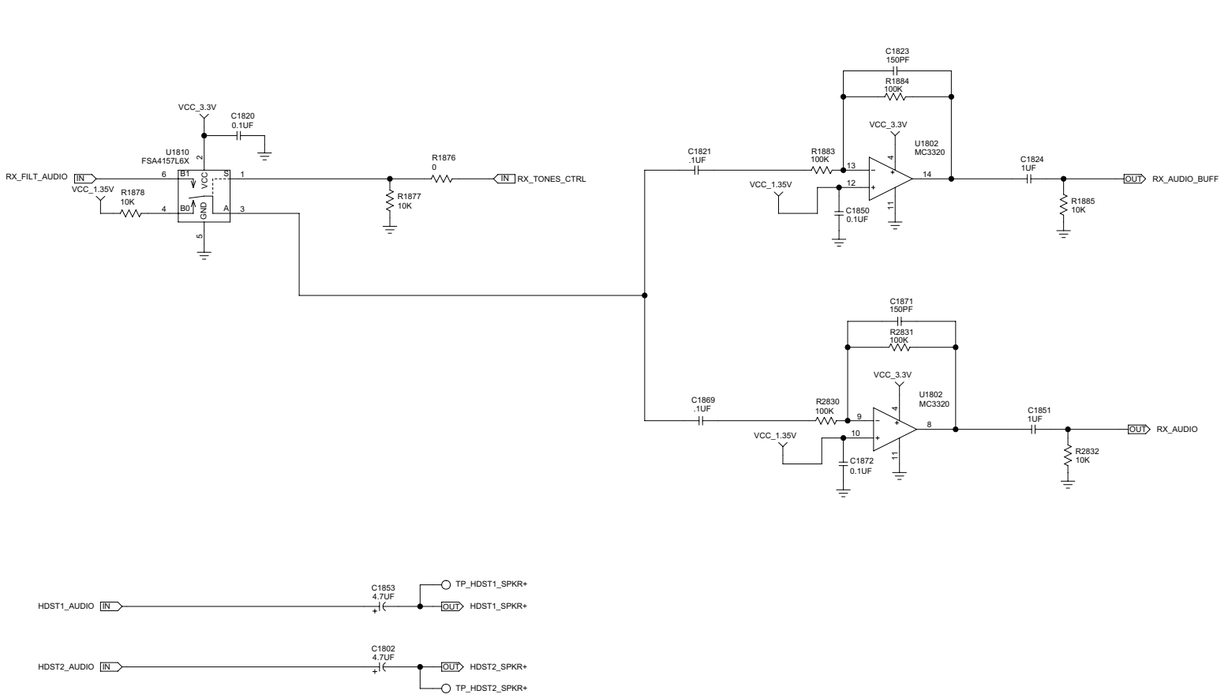


Figure 8-26. PPLN1696A Main Board Circuit Schematic - K



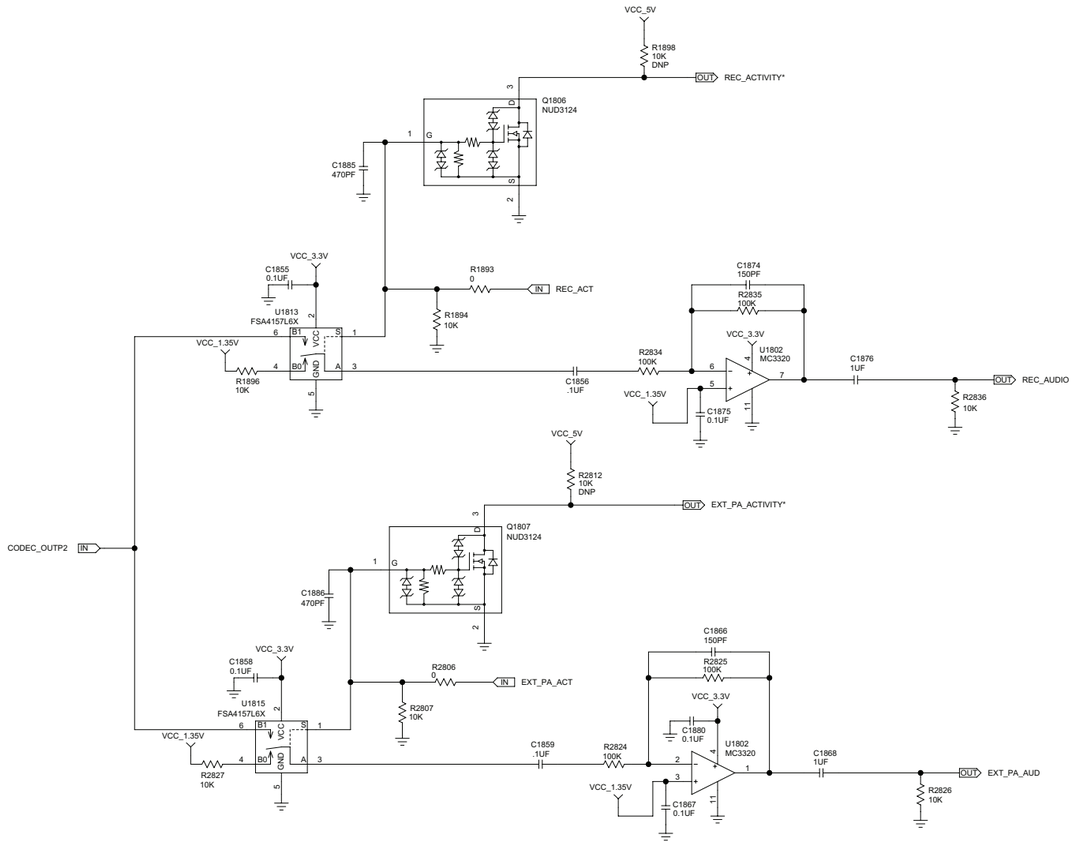


Figure 8-27. PPLN1696A Main Board Circuit Schematic - L

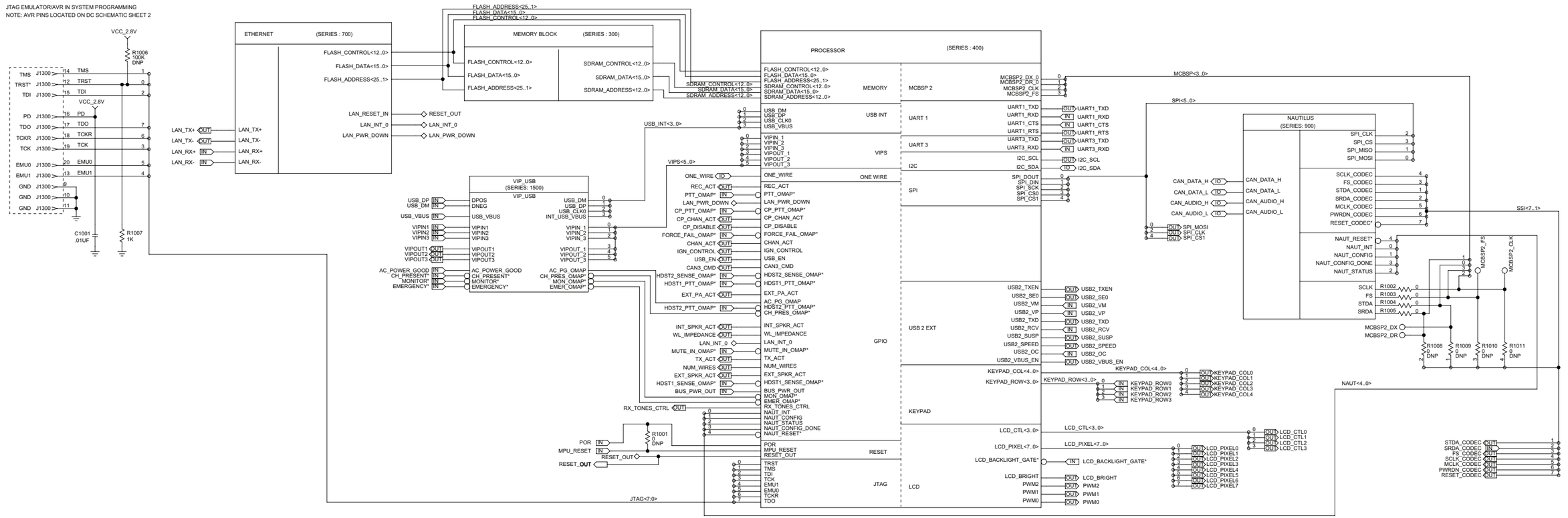


Figure 8-28. PPLN1696A Main Board Circuit Schematic - M

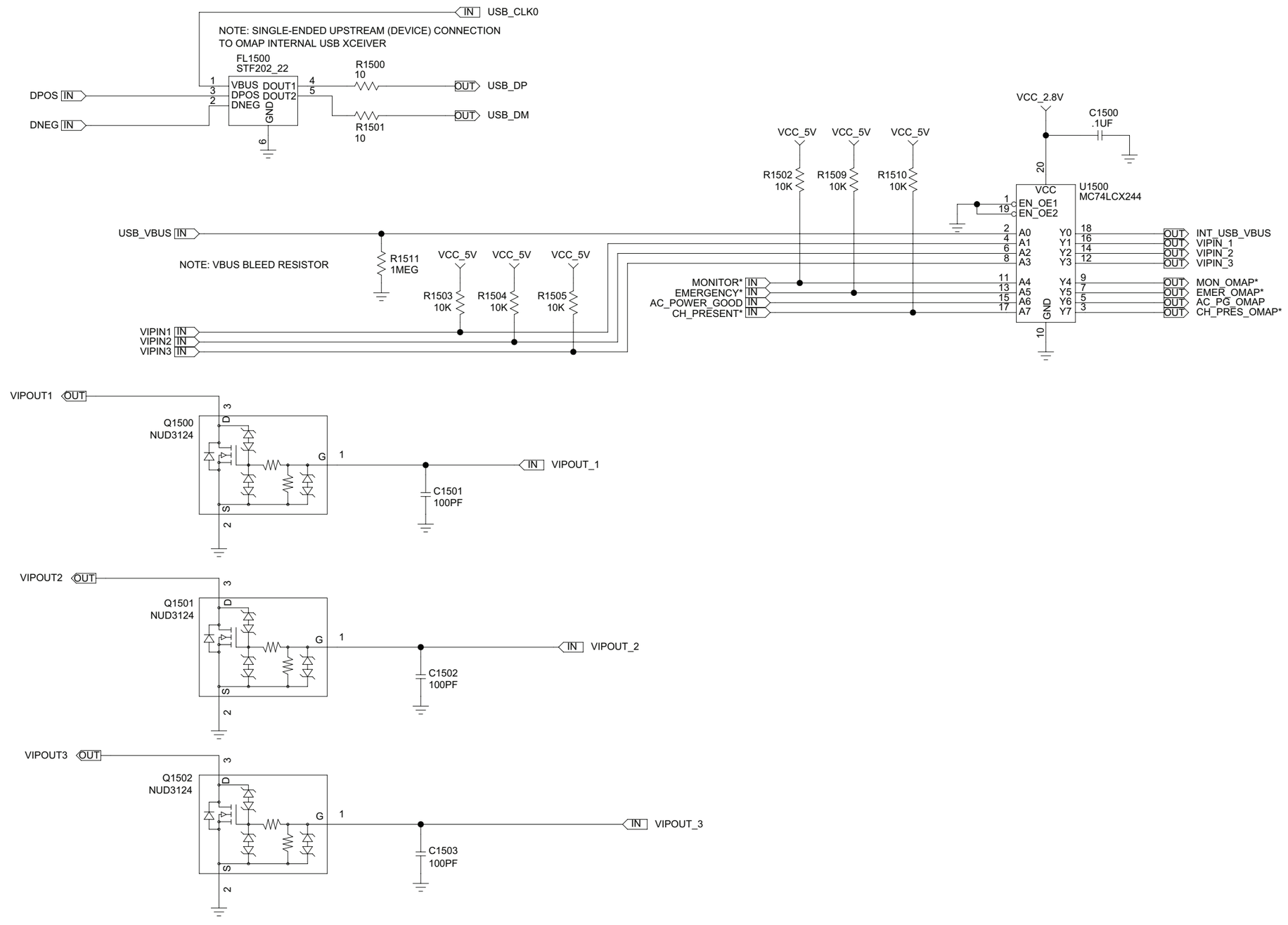


Figure 8-29. PPLN1696A Main Board Circuit Schematic - N

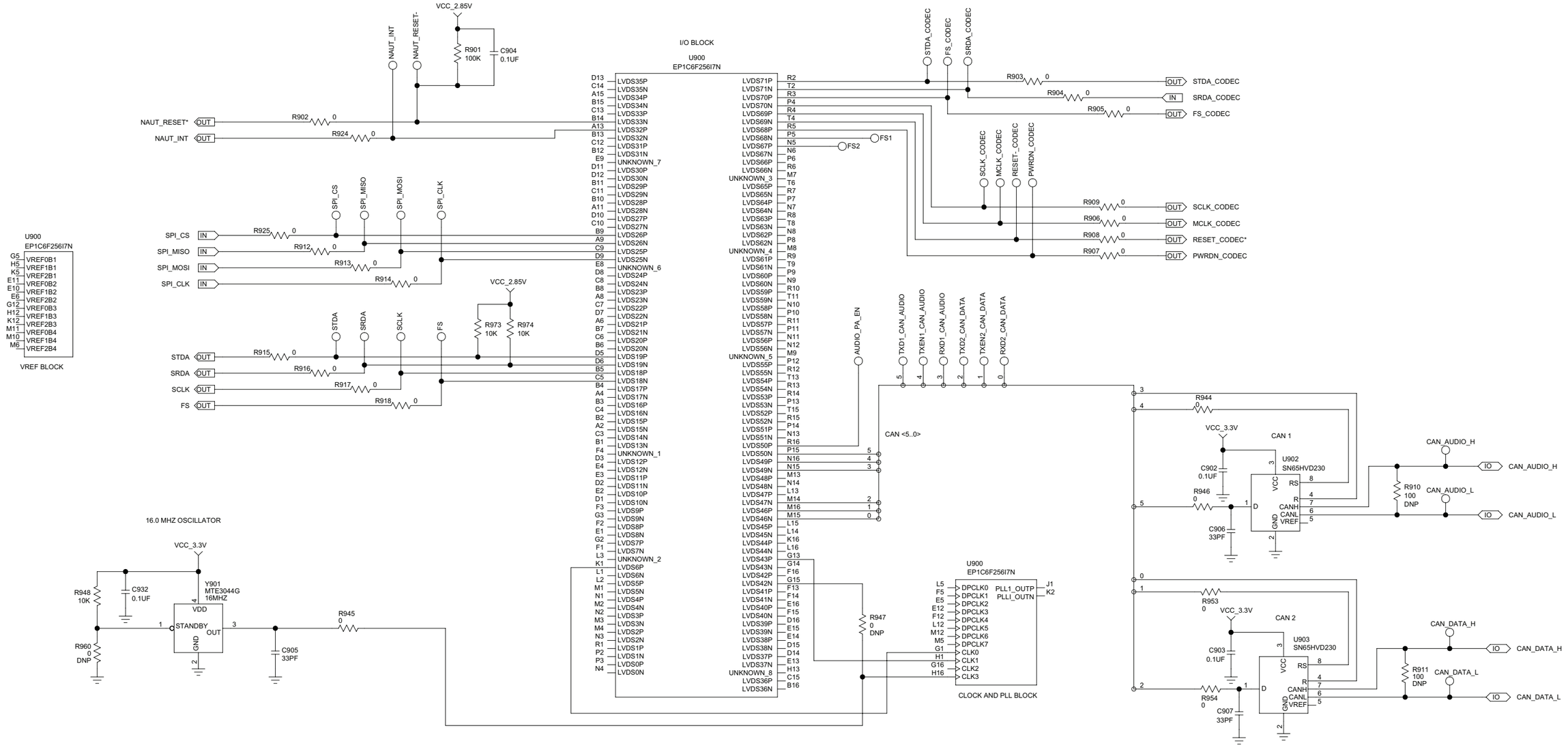


Figure 8-30. PPLN1696A Main Board Circuit Schematic - O

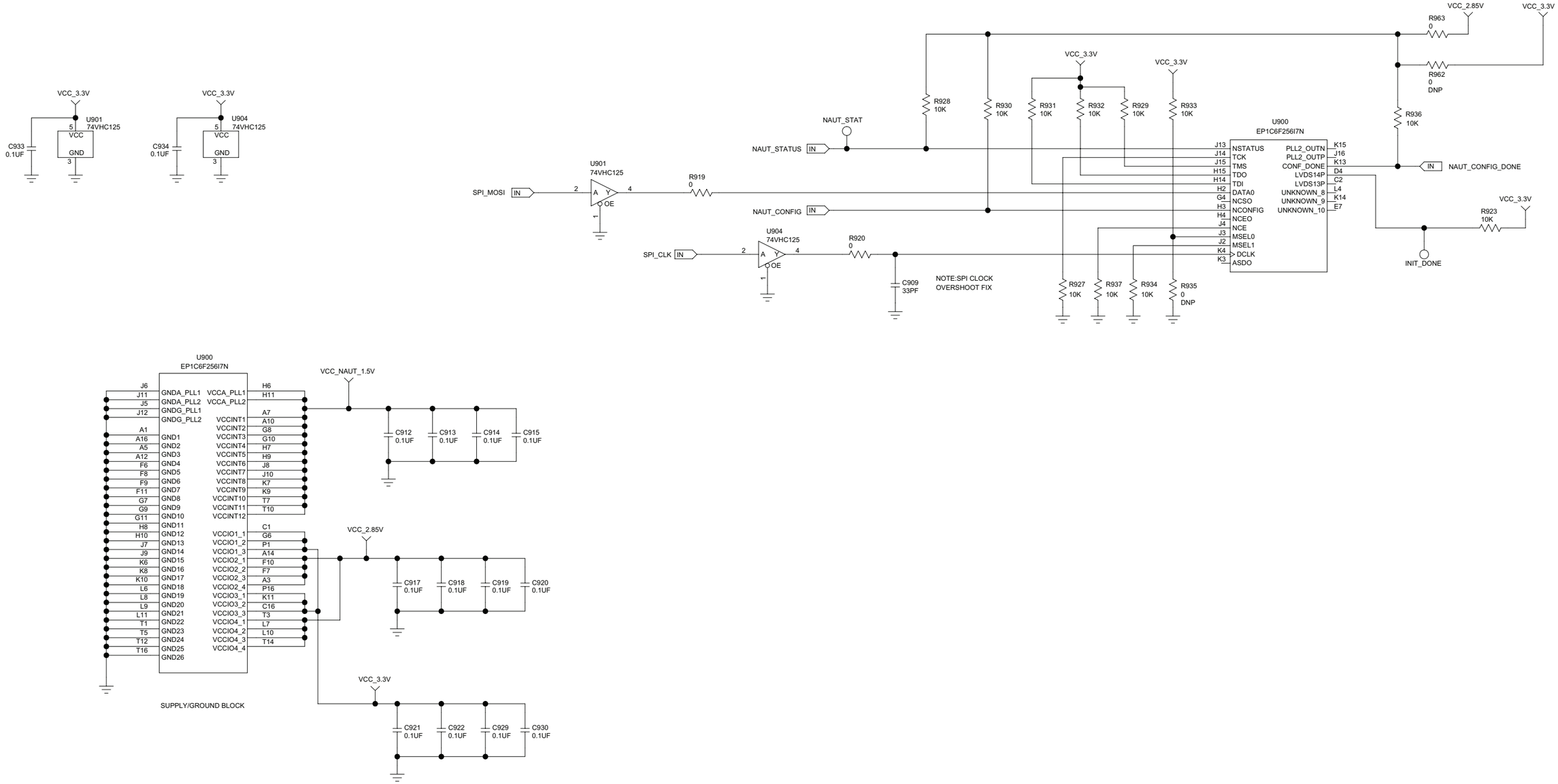


Figure 8-31. PPLN1696A Main Board Circuit Schematic - P

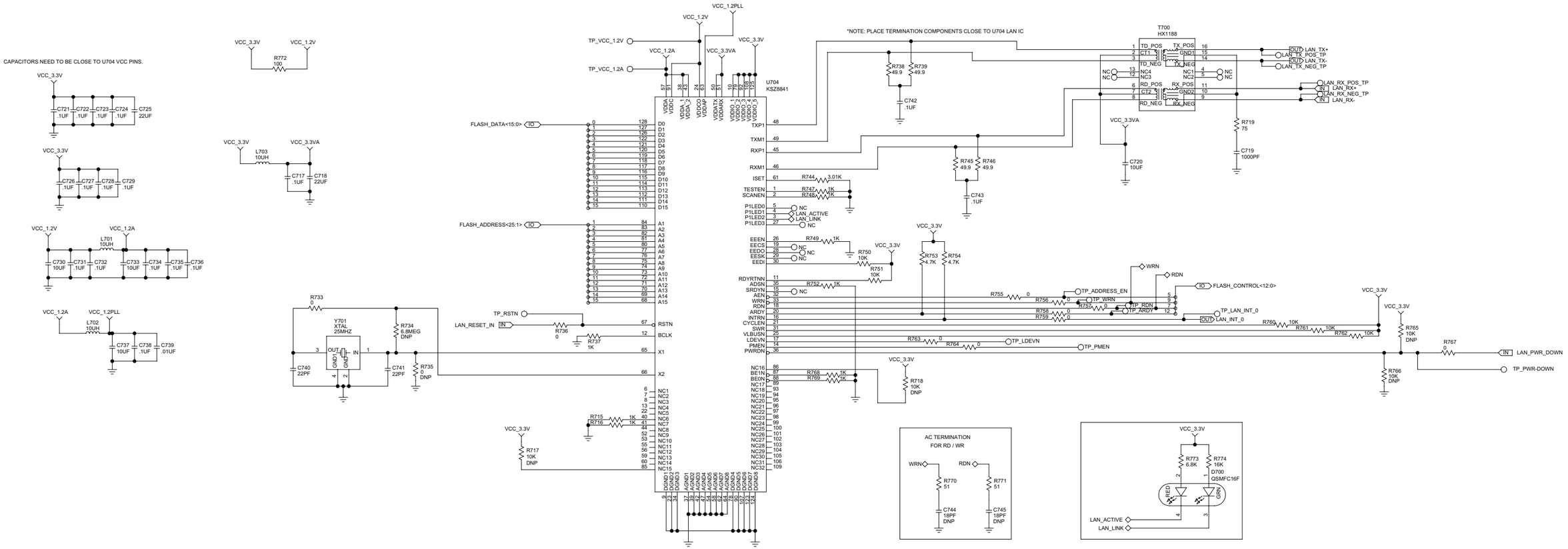


Figure 8-32. PPLN1696A Main Board Circuit Schematic - Q

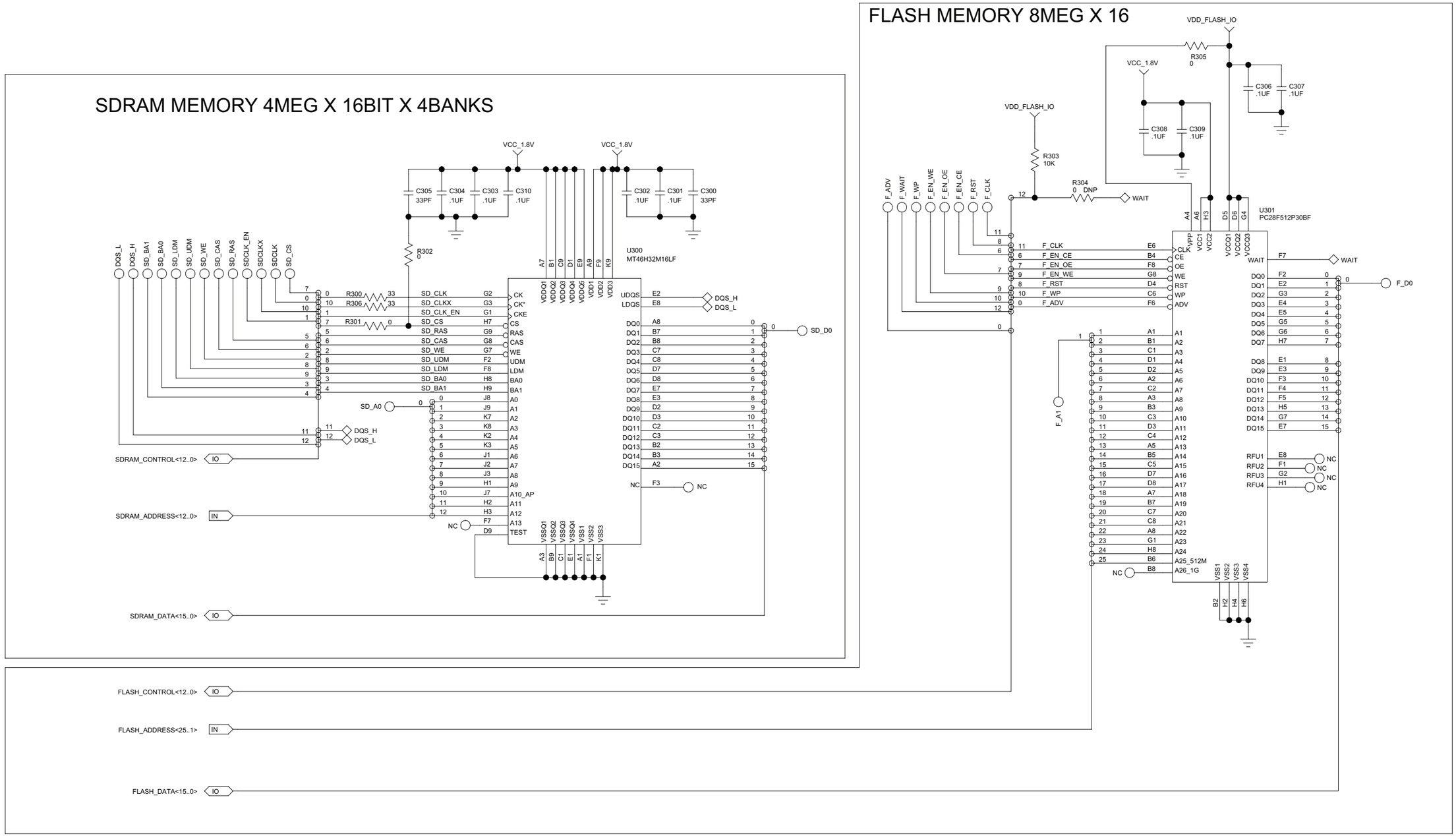


Figure 8-33. PPLN1696A Main Board Circuit Schematic - R

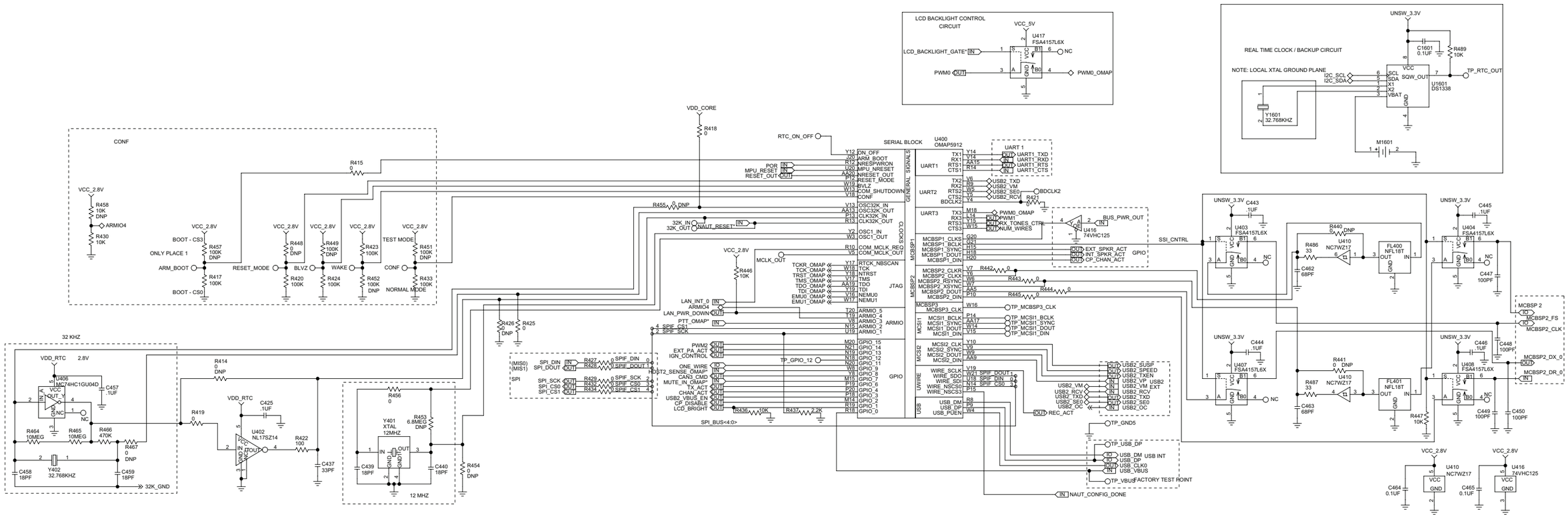
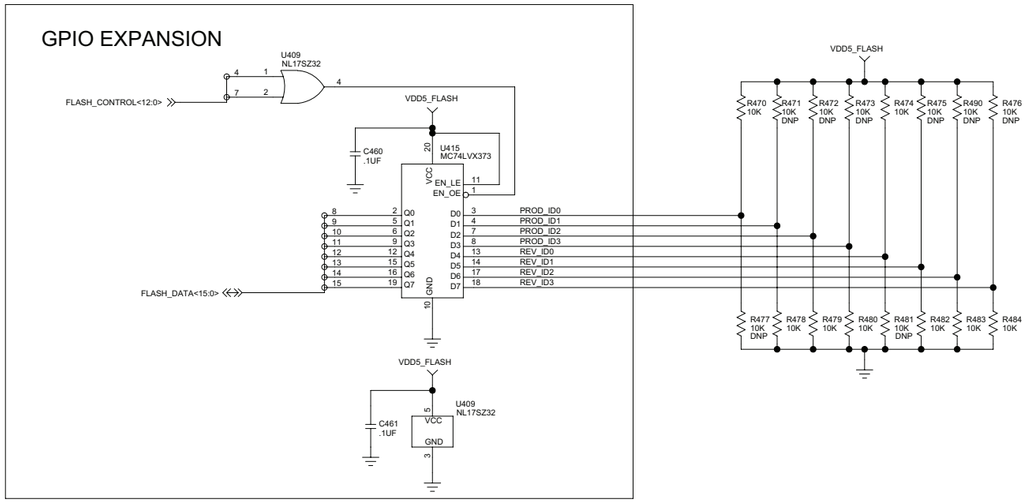
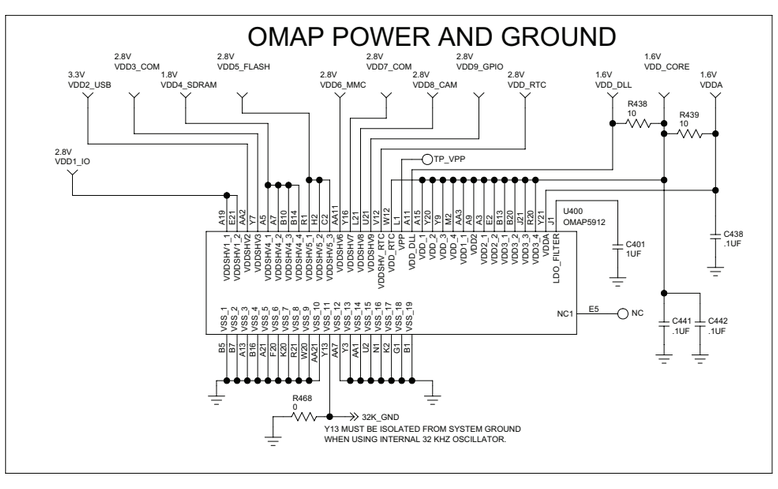
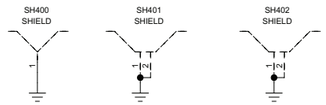


Figure 8-34. PPLN1696A Main Board Circuit Schematic - S





POWER GROUPS				
DC BLOCK PWR SYMBOL	PROC BLOCK PWR SYMBOL	OMAP PWR GROUP	OMAP FUNCTIONAL BLOCK	OMAP VOLTAGE RANGE
VCC_1.6	VDD_CORE	VDD,VDD1,VDD2 VDD3,VDDA	CORE VOLTAGE	1.555V - 1.65V (NORMAL) 0.99V - 1.65V (STANDBY)
VCC_1.8	VDD4_SDRAM	VDDSHV4	SDRAM I/O	2.5V - 3.0V (HIGH) 1.65V - 1.95V (LOW)
VCC_2.8	VDD5_FLASH	VDDSHV5	FLASH I/O	2.5V - 3.0V (HIGH) 1.65V - 1.95V (LOW)
	VDD1_PER		LCD I/O KEYBOARD I/O MCBSP1	2.5V - 3.0V
	VDD7_PER	VDDSHV7	UART1 (GPS I/F) MCSI1 (SSI/USB1 TO PATRIOT)	2.5V - 3.0V
	VDD9_PER	VDDSHV9	JTAG,GPIO,I2C	2.5V - 3.0V
	VDD3_PER	VDDSHV3	MCSI2 MCBSP2 (SSI TO PATRIOT) UART2	2.5V - 3.3V (HIGH) 1.65V - 1.95V (LOW)
	VDD8_PER	VDDSHV8	CAMERA I/O	2.5V - 3.6V
	VDD6_PER	VDDSHV6	MMC I/O	2.5V - 3.6V
VCC_3.3	VDD2_USB	VDDSHV2	USB TRANSCEIVER	3.0V - 3.6V



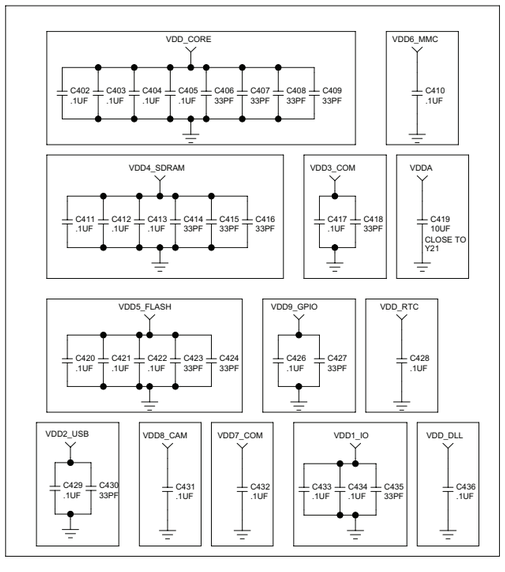


Figure 8-35. PPLN1696A Main Board Circuit Schematic - T

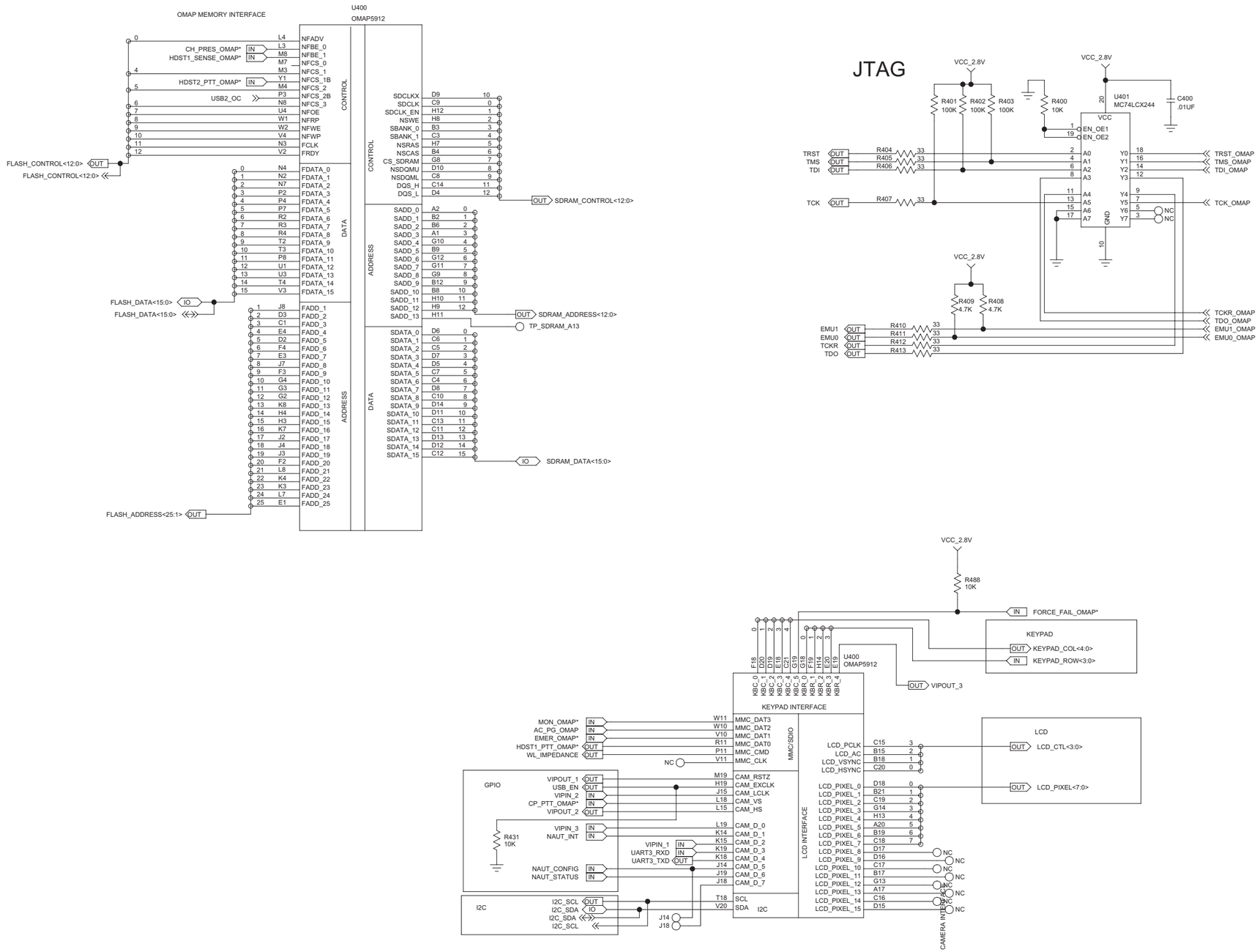


Figure 8-36. PPLN1696A Main Board Circuit Schematic - U

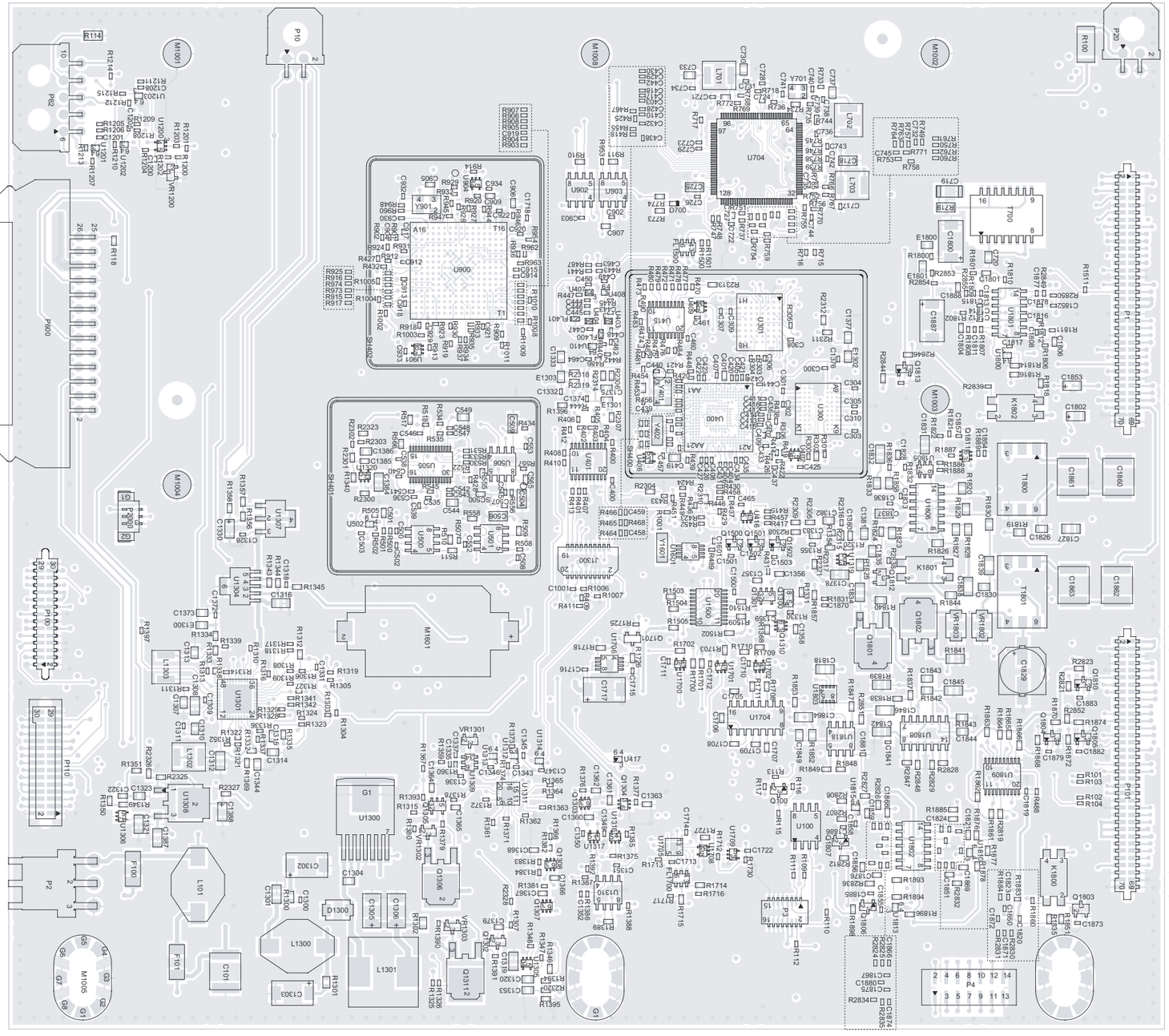


Figure 8-37. PPLN1696A Main Board Layout

PPLN1696A Main Board Part List

Ref Des	Part Number	Description
C1001	2113945B02	"CAP CER CHP 10,000PF 25V 10%"
C101	2171727H19	"CAP, CERAMIC, STACKED, 10UF, 100V"
C1200	2113946K02	CAP CER CHP 0.10UF 16V
C1201	2113946K02	CAP CER CHP 0.10UF 16V
C1205	2113946K02	CAP CER CHP 0.10UF 16V
C1208	2113946K02	CAP CER CHP 0.10UF 16V
C1301	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C1302	2314030J55	"CAP,FXD,47UF,+10%,-10%,25V-DC,SM,-55DEG CMIN,125DEG CMAX,1.049A"
C1303	2314030J28	"CAP,FXD,22UF,+10%,-10%,35V-DC,SM,-55DEG CMIN,125DEG CMAX,742MA"
C1304	2113945G45	"CAP,FXD,.01UF,+5%,-5%,50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX,P"
C1305	2314030F29	"CAP,FXD,33UF,+10%,-10%,10V-DC,SM,-55DEG CMIN,125DEG CMAX,542MA"
C1306	2314030F29	"CAP,FXD,33UF,+10%,-10%,10V-DC,SM,-55DEG CMIN,125DEG CMAX,542MA"
C1307	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1308	2113956D58	"CAP,FXD,22UF,+10%,-10%,6.3V-DC,1206,X5R,-55DEG CMIN,85DEG CMAX"
C1309	2113946K02	CAP CER CHP 0.10UF 16V
C1310	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1311	2113945B02	"CAP CER CHP 10,000PF 25V 10%"
C1312	2113956D58	"CAP,FXD,22UF,+10%,-10%,6.3V-DC,1206,X5R,-55DEG CMIN,85DEG CMAX"
C1313	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C1314	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1315	2113946N03	CAP CER CHP 2.2UF 16V
C1316	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1318	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1319	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1320	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1321	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1322	2113945D04	"CAP CER CHP 100,000PF 25V 10%"
C1323	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1328	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1330	2314030B01	"CAP,FXD,1UF,+10%,-10%,16V-DC,SM,-55DEG CMIN,125DEG CMAX,146MA,E"
C1331	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1332	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1333	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1335	2113945A09	CAP CER CHP 1000PF 50V 10%
C1336	2113946K02	CAP CER CHP 0.10UF 16V
C1337	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1343	2113946K02	CAP CER CHP 0.10UF 16V
C1344	2113946N03	CAP CER CHP 2.2UF 16V
C1345	2113946K02	CAP CER CHP 0.10UF 16V
C1346	2113946K02	CAP CER CHP 0.10UF 16V
C1347	2113946K02	CAP CER CHP 0.10UF 16V
C1349	2113946K02	CAP CER CHP 0.10UF 16V
C1350	2113946K02	CAP CER CHP 0.10UF 16V
C1351	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1352	2113946K02	CAP CER CHP 0.10UF 16V
C1353	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1356	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1357	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1358	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1359	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1360	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1361	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1362	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1363	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1364	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1365	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1366	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1367	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1368	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1372	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1373	2113946E02	CAP CER CHP 1.0UF 16V 10%

Ref Des	Part Number	Description
C1374	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1375	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1376	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1377	2113946E02	CAP CER CHP 1.0UF 16V 10%
C1378	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1379	2113944C06	CAP CER CHP 470.0PF 50V 5%
C1380	2113945D04	"CAP CER CHP 100,000PF 25V 10%"
C1381	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1382	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1383	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"
C1384	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1385	2113945D04	"CAP CER CHP 100,000PF 25V 10%"
C1386	2113955C31	"CAP,FXD,1UF,+10%,-10%,16V-DC,X7R,-55DEG CMIN,125DEG CMAX,PB-FR"

Ref Des	Part Number	Description
C1387	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1388	2314030B01	"CAP,FXD,1UF,+10%,-10%,16V-DC,SM,-55DEG CMIN,125DEG CMAX,146MA,E"
C1500	2113946K02	CAP CER CHP 0.10UF 16V
C1501	2113944A40	CAP CER CHP 100.0PF 50V 5%
C1502	2113944A40	CAP CER CHP 100.0PF 50V 5%
C1503	2113944A40	CAP CER CHP 100.0PF 50V 5%
C1601	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1705	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1706	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1707	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1708	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1709	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1710	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1711	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1712	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1713	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1714	2113946B04	CAP CER CHP 0.10UF 10V 10%

Ref Des	Part Number	Description
C1715	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1716	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1718	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1722	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1800	2314030J55	"CAP,FXD,47UF,+10%,-10%,25V-DC,SM,-55DEG CMIN,125DEG CMAX,1.049A"
C1801	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1802	2313960B05	"CAP,FXD,4.7UF,+10%,-10%,16V-DC,SM,-55DEG CMIN,125DEG CMAX,137MA"
C1804	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1806	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1808	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1811	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1812	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1813	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1814	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1815	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1816	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1817	2113946B04	CAP CER CHP 0.10UF 10V 10%

Ref Des	Part Number	Description
C1818	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1819	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1820	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1821	2113946C06	CAP CER CHP 0.10UF 10V 10%
C1823	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1824	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1826	2113945G53	"CAP,FXD,.022UF,+5%,-5%,50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX"
C1827	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1828	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1829	2385899Y19	"CAP,AL,100UF,20%,25 V,SM"
C1830	2113945G53	"CAP,FXD,.022UF,+5%,-5%,50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX"
C1831	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1832	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1833	2113945A05	CAP CER CHP 470PF 50V 10%

Ref Des	Part Number	Description
C1834	21009326001	"CAPACITOR, CERAMIC, 0.22 UF, +/-10% TOL, 50V, X7R, 1206"
C1835	2113944F38	"CAP,FXD,6.8PF,.25PF+/-,50V-DC,0805,C0G,-55DEG CMIN,125DEG CMAX"
C1836	2113945A05	CAP CER CHP 470PF 50V 10%
C1837	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1838	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1839	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1841	2113945A05	CAP CER CHP 470PF 50V 10%
C1842	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1843	2113944F56	"CAP,FXD,39PF,+5%,-5%,50V-DC,0805,C0G,-55DEG CMIN,125DEG CMAX,PB"
C1844	2113944F56	"CAP,FXD,39PF,+5%,-5%,50V-DC,0805,C0G,-55DEG CMIN,125DEG CMAX,PB"
C1845	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"

Ref Des	Part Number	Description
C1846	2113945H69	"CAP,FXD,.1UF,+5%,-5%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX,PB"
C1849	2113944F56	"CAP,FXD,39PF,+5%,-5%,50V-DC,0805,C0G,-55DEG CMIN,125DEG CMAX,PB"
C1850	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1851	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1852	2113944A31	CAP CER CHP 33.0PF 50V 5%
C1853	2313960B05	"CAP,FXD,4.7UF,+10%,-10%,16V-DC,SM,-55DEG CMIN,125DEG CMAX,137MA"
C1854	2113945A05	CAP CER CHP 470PF 50V 10%
C1855	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1856	2113946C06	CAP CER CHP 0.10UF 10V 10%
C1857	2113945A05	CAP CER CHP 470PF 50V 10%
C1858	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1859	2113946C06	CAP CER CHP 0.10UF 10V 10%
C1860	2171727H19	"CAP, CERAMIC, STACKED, 10UF, 100V"
C1861	2171727H19	"CAP, CERAMIC, STACKED, 10UF, 100V"
C1862	2171727H19	"CAP, CERAMIC, STACKED, 10UF, 100V"
C1863	2171727H19	"CAP, CERAMIC, STACKED, 10UF, 100V"

Ref Des	Part Number	Description
C1864	21009326002	"CAPACITOR, CERAMIC, 0.33 UF, +/-10% TOL, 50V, X7R, 1206"
C1866	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1867	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1868	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1869	2113946C06	CAP CER CHP 0.10UF 10V 10%
C1870	2113945A05	CAP CER CHP 470PF 50V 10%
C1871	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1872	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1873	2113945A05	CAP CER CHP 470PF 50V 10%
C1874	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1875	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1876	2113946S35	CAP CER CHP 1.0UF 16V 10%
C1877	2113944A42	CAP CER CHP 150.0PF 50V 5%
C1878	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1879	2113945A05	CAP CER CHP 470PF 50V 10%
C1880	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1881	2113946B04	CAP CER CHP 0.10UF 10V 10%
C1882	2113945A05	CAP CER CHP 470PF 50V 10%

Ref Des	Part Number	Description
C1883	2113945A05	CAP CER CHP 470PF 50V 10%
C1884	2113945A05	CAP CER CHP 470PF 50V 10%
C1885	2113945A05	CAP CER CHP 470PF 50V 10%
C1886	2113945A05	CAP CER CHP 470PF 50V 10%
C1887	2314030J55	"CAP,FXD,47UF,+10%,-10%,25V-DC,SM,-55DEG CMIN,125DEG CMAX,1.049A"
C1888	2113946S35	CAP CER CHP 1.0UF 16V 10%
C300	2113944A31	CAP CER CHP 33.0PF 50V 5%
C301	2113946K02	CAP CER CHP 0.10UF 16V
C302	2113946K02	CAP CER CHP 0.10UF 16V
C303	2113946K02	CAP CER CHP 0.10UF 16V
C304	2113946K02	CAP CER CHP 0.10UF 16V
C305	2113944A31	CAP CER CHP 33.0PF 50V 5%
C306	2113946K02	CAP CER CHP 0.10UF 16V
C307	2113946K02	CAP CER CHP 0.10UF 16V
C308	2113946K02	CAP CER CHP 0.10UF 16V
C309	2113946K02	CAP CER CHP 0.10UF 16V
C310	2113946K02	CAP CER CHP 0.10UF 16V
C400	2113945B02	"CAP CER CHP 10,000PF 25V 10%"

Ref Des	Part Number	Description
C401	2113946S35	CAP CER CHP 1.0UF 16V 10%
C402	2113946K02	CAP CER CHP 0.10UF 16V
C403	2113946K02	CAP CER CHP 0.10UF 16V
C404	2113946K02	CAP CER CHP 0.10UF 16V
C405	2113946K02	CAP CER CHP 0.10UF 16V
C406	2113944A31	CAP CER CHP 33.0PF 50V 5%
C407	2113944A31	CAP CER CHP 33.0PF 50V 5%
C408	2113944A31	CAP CER CHP 33.0PF 50V 5%
C409	2113944A31	CAP CER CHP 33.0PF 50V 5%
C410	2113946K02	CAP CER CHP 0.10UF 16V
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113946K02	CAP CER CHP 0.10UF 16V
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113944A31	CAP CER CHP 33.0PF 50V 5%
C415	2113944A31	CAP CER CHP 33.0PF 50V 5%
C416	2113944A31	CAP CER CHP 33.0PF 50V 5%
C417	2113946K02	CAP CER CHP 0.10UF 16V
C418	2113944A31	CAP CER CHP 33.0PF 50V 5%

Ref Des	Part Number	Description
C419	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C420	2113946K02	CAP CER CHP 0.10UF 16V
C421	2113946K02	CAP CER CHP 0.10UF 16V
C422	2113946K02	CAP CER CHP 0.10UF 16V
C423	2113944A31	CAP CER CHP 33.0PF 50V 5%
C424	2113944A31	CAP CER CHP 33.0PF 50V 5%
C425	2113946K02	CAP CER CHP 0.10UF 16V
C426	2113946K02	CAP CER CHP 0.10UF 16V
C427	2113944A31	CAP CER CHP 33.0PF 50V 5%
C428	2113946K02	CAP CER CHP 0.10UF 16V
C429	2113946K02	CAP CER CHP 0.10UF 16V
C430	2113944A31	CAP CER CHP 33.0PF 50V 5%
C431	2113946K02	CAP CER CHP 0.10UF 16V
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113946K02	CAP CER CHP 0.10UF 16V
C434	2113946K02	CAP CER CHP 0.10UF 16V
C435	2113944A31	CAP CER CHP 33.0PF 50V 5%
C436	2113946K02	CAP CER CHP 0.10UF 16V

Ref Des	Part Number	Description
C437	2113944A31	CAP CER CHP 33.0PF 50V 5%
C438	2113946K02	CAP CER CHP 0.10UF 16V
C439	2113944A28	CAP CER CHP 18.0PF 50V 5%
C440	2113944A28	CAP CER CHP 18.0PF 50V 5%
C441	2113946K02	CAP CER CHP 0.10UF 16V
C442	2113946K02	CAP CER CHP 0.10UF 16V
C443	2113946K02	CAP CER CHP 0.10UF 16V
C444	2113946K02	CAP CER CHP 0.10UF 16V
C445	2113946K02	CAP CER CHP 0.10UF 16V
C446	2113946K02	CAP CER CHP 0.10UF 16V
C447	2113944A40	CAP CER CHP 100.0PF 50V 5%
C448	2113944A40	CAP CER CHP 100.0PF 50V 5%
C449	2113944A40	CAP CER CHP 100.0PF 50V 5%
C450	2113944A40	CAP CER CHP 100.0PF 50V 5%
C457	2113946K02	CAP CER CHP 0.10UF 16V
C458	2113944A28	CAP CER CHP 18.0PF 50V 5%
C459	2113944A28	CAP CER CHP 18.0PF 50V 5%
C460	2113946K02	CAP CER CHP 0.10UF 16V
C461	2113946K02	CAP CER CHP 0.10UF 16V

Ref Des	Part Number	Description
C462	2113944A36	CAP CER CHP 68.0PF 50V 5%
C463	2113944A36	CAP CER CHP 68.0PF 50V 5%
C464	2113946B04	CAP CER CHP 0.10UF 10V 10%
C465	2113946B04	CAP CER CHP 0.10UF 10V 10%
C500	2113944A42	CAP CER CHP 150.0PF 50V 5%
C501	2113946C06	CAP CER CHP 0.10UF 10V 10%
C502	2113946B04	CAP CER CHP 0.10UF 10V 10%
C503	2113946B04	CAP CER CHP 0.10UF 10V 10%
C504	21009326003	"CAPACITOR, CERAMIC, 10 UF, +/-10% TOL, 16V, X7R, 1206"
C506	21009326003	"CAPACITOR, CERAMIC, 10 UF, +/-10% TOL, 16V, X7R, 1206"
C507	2113946B04	CAP CER CHP 0.10UF 10V 10%
C508	2113944A40	CAP CER CHP 100.0PF 50V 5%
C509	21009326003	"CAPACITOR, CERAMIC, 10 UF, +/-10% TOL, 16V, X7R, 1206"
C535	2113946B04	CAP CER CHP 0.10UF 10V 10%
C536	2113946B04	CAP CER CHP 0.10UF 10V 10%
C538	2113946B04	CAP CER CHP 0.10UF 10V 10%

Ref Des	Part Number	Description
C539	2113946B04	CAP CER CHP 0.10UF 10V 10%
C540	2113946B04	CAP CER CHP 0.10UF 10V 10%
C541	2113946B04	CAP CER CHP 0.10UF 10V 10%
C542	2113945B02	"CAP CER CHP 10,000PF 25V 10%"
C543	2113946B04	CAP CER CHP 0.10UF 10V 10%
C544	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C545	2113946B04	CAP CER CHP 0.10UF 10V 10%
C546	2113946B04	CAP CER CHP 0.10UF 10V 10%
C547	2113945B02	"CAP CER CHP 10,000PF 25V 10%"
C548	2113946B04	CAP CER CHP 0.10UF 10V 10%
C549	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C552	2113944A40	CAP CER CHP 100.0PF 50V 5%
C553	2113946B04	CAP CER CHP 0.10UF 10V 10%
C565	2113946S35	CAP CER CHP 1.0UF 16V 10%
C717	2113946K02	CAP CER CHP 0.10UF 16V
C718	2113956D58	"CAP,FXD,22UF,+10%,-10%,6.3V-DC,1206,X5R,-55DEG CMIN,85DEG CMAX"

Ref Des	Part Number	Description
C719	2188473T01	"CAP,CER CHIP,1000PF,10PF+/-,2000V-DC,-55DEG CMIN,125DEG CMAX"
C720	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C721	2113946K02	CAP CER CHP 0.10UF 16V
C722	2113946K02	CAP CER CHP 0.10UF 16V
C723	2113946K02	CAP CER CHP 0.10UF 16V
C724	2113946K02	CAP CER CHP 0.10UF 16V
C725	2113956D58	"CAP,FXD,22UF,+10%,-10%,6.3V-DC,1206,X5R,-55DEG CMIN,85DEG CMAX"
C726	2113946K02	CAP CER CHP 0.10UF 16V
C727	2113946K02	CAP CER CHP 0.10UF 16V
C728	2113946K02	CAP CER CHP 0.10UF 16V
C729	2113946K02	CAP CER CHP 0.10UF 16V
C730	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C731	2113946K02	CAP CER CHP 0.10UF 16V
C732	2113946K02	CAP CER CHP 0.10UF 16V
C733	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"

Ref Des	Part Number	Description
C734	2113946K02	CAP CER CHP 0.10UF 16V
C735	2113946K02	CAP CER CHP 0.10UF 16V
C736	2113946K02	CAP CER CHP 0.10UF 16V
C737	2113946F05	"CAP,CHIP,10UF,+10%,-10%,6.3V-DC,0805,X5R,-55DEG CMIN,85DEG CMAX"
C738	2113946K02	CAP CER CHP 0.10UF 16V
C739	2113945B02	"CAP CER CHP 10,000PF 25V 10%"
C740	2113944A29	CAP CER CHP 22.0PF 50V 5%
C741	2113944A29	CAP CER CHP 22.0PF 50V 5%
C742	2113946K02	CAP CER CHP 0.10UF 16V
C743	2113946K02	CAP CER CHP 0.10UF 16V
C902	2113946B04	CAP CER CHP 0.10UF 10V 10%
C903	2113946B04	CAP CER CHP 0.10UF 10V 10%
C904	2113946B04	CAP CER CHP 0.10UF 10V 10%
C905	2113944C36	CAP CER CHP 33.0PF 50V 5%
C906	2113944C36	CAP CER CHP 33.0PF 50V 5%
C907	2113944C36	CAP CER CHP 33.0PF 50V 5%
C909	2113944C36	CAP CER CHP 33.0PF 50V 5%
C912	2113946B04	CAP CER CHP 0.10UF 10V 10%

Ref Des	Part Number	Description
C913	2113946B04	CAP CER CHP 0.10UF 10V 10%
C914	2113946B04	CAP CER CHP 0.10UF 10V 10%
C915	2113946B04	CAP CER CHP 0.10UF 10V 10%
C917	2113946B04	CAP CER CHP 0.10UF 10V 10%
C918	2113946B04	CAP CER CHP 0.10UF 10V 10%
C919	2113946B04	CAP CER CHP 0.10UF 10V 10%
C920	2113946B04	CAP CER CHP 0.10UF 10V 10%
C921	2113946B04	CAP CER CHP 0.10UF 10V 10%
C922	2113946B04	CAP CER CHP 0.10UF 10V 10%
C929	2113946B04	CAP CER CHP 0.10UF 10V 10%
C930	2113946B04	CAP CER CHP 0.10UF 10V 10%
C932	2113946B04	CAP CER CHP 0.10UF 10V 10%
C933	2113946B04	CAP CER CHP 0.10UF 10V 10%
C934	2113946B04	CAP CER CHP 0.10UF 10V 10%
D1300	4813978N08	"DIODE,RECT,MBRS130,SM,SMB,1A,30V,SHTK,PB-FREE"
D700	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
E1300	2480067M02	CHK RF CHIP BEAD INDUCTOR
E1301	2480067M02	CHK RF CHIP BEAD INDUCTOR

Ref Des	Part Number	Description
E1302	2480067M02	CHK RF CHIP BEAD INDUCTOR
E1303	2480067M02	CHK RF CHIP BEAD INDUCTOR
E1800	2480067M02	CHK RF CHIP BEAD INDUCTOR
E1801	2480067M02	CHK RF CHIP BEAD INDUCTOR
F100	6583049X13	FUSE 2A FAST ACT
F101	6583049X15	FUSE 4A FAST ACT
FL1500	4813979A43	"FLTR,EMI/RFI,5.25V-DC,TSOP,PB-FREE"
FL1700	4813979A43	"FLTR,EMI/RFI,5.25V-DC,TSOP,PB-FREE"
FL400	9175030B01	FILTER
FL401	9175030B01	FILTER
J1300	0980423L10	"CONNECTOR, 20 PIN, RECEPTACLE"
K1800	8075926A01	RELAY SPST SOLID STATE
K1801	8075926A01	RELAY SPST SOLID STATE
K1802	8075926A01	RELAY SPST SOLID STATE
L101	2413980A05	"INDUCTOR, SURFACE MOUNT POWER"
L1300	2413980A05	"INDUCTOR, SURFACE MOUNT POWER"
L1301	2413980A04	"INDUCTOR , MSS1260 POWER NOPB"
L1302	2413980A03	CHIP INDUCTOR 1812PS-103KLC NOPB
L1303	2413980A03	CHIP INDUCTOR 1812PS-103KLC NOPB
L701	2413980A03	CHIP INDUCTOR 1812PS-103KLC NOPB
L702	2413980A03	CHIP INDUCTOR 1812PS-103KLC NOPB
L703	2413980A03	CHIP INDUCTOR 1812PS-103KLC NOPB
M1601	6075261B01	"BATT HOLDER,COIN CELL BATTERY,20MM"
P1	0971669H01	"SOCKET, 70 PIN, .050 X .050"
P10	0975379H01	"HEADER, 4 PIN, RA, LEADED,DUAL ROW, 3.0MM"
P100	0975247H01	"SOCKET, 30 PIN, .050 X .050"
P101	0971669H01	"SOCKET, 70 PIN, .050 X .050"
P110	9009262001	"LOCKING HEADER, 30 PIN, .050 X .050"
P2	0975380H01	"HEADER, 3 PIN RIGHT ANGLE, 3.96MM"
P20	0975379H01	"HEADER, 4 PIN, RA, LEADED,DUAL ROW, 3.0MM"
P2000	2871246H01	"PITCH PICOBLADE HEADER,"
P3	2815146H01	PLUG 0.8MM BTB CONNECTOR
P600	2875089B01	"HEADER, EJECTOR, 26 PIN, RA"
P62	2875086B01	"CONNECTOR, HEADER,10 PIN, RA"
PCB	8475207B01	"PWB, MAIN"
Q100	524753-001-00	"XSTR,FET GP PWR,N-CHANNEL,BSS138,SM,SOT-23,50V,200MA,LEAD"
Q1300	4813970A62	"XSTR,FET GP PWR,MOSFET,P-CH,ENHN,CF,-20V,1.3W,PB-FREE"
Q1301	4805921T28	"XSTR, DUAL NOPB"
Q1302	4813973M07	"XSTR,BIP GP SS,NPN,T3904,SM,SOT-23,SMT,40V,.225W,200MA,300MHZ"
Q1303	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"
Q1304	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"
Q1305	4805921T28	"XSTR, DUAL NOPB"
Q1306	4813970A66	"XSTR,FET GP PWR,MOSFET,P-CH,ENHN,DPAK,60V,55W,PB-FREE"
Q1307	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"
Q1308	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"
Q1310	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"
Q1311	4813970A66	"XSTR,FET GP PWR,MOSFET,P-CH,ENHN,DPAK,60V,55W,PB-FREE"
Q1500	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1501	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1502	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1701	4813972A17	"PB-FREE,NOT COMPLETELY ENRICHED"
Q1801	4813971A07	"XSTR,BIP GP POWER,BIPLR,NPN,MJD340,DPAK,SM,300V,15W,500MA,PB-"
Q1802	4813971A07	"XSTR,BIP GP POWER,BIPLR,NPN,MJD340,DPAK,SM,300V,15W,500MA,PB-"
Q1803	4813973A42	"XSTR,BIP GP SS,NPN,SM,SC-59,SMT,50V,.23W,100MA,PB-FREE"
Q1804	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1805	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1806	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1807	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1810	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
Q1811	4813973A81	"XSTR,BIP GP SS,DIG,NPN AND PNP,SOT-363,50V,.25W,100MA,PB-FR"

Ref Des	Part Number	Description
Q1812	4813973A42	"XSTR,BIP GP SS,NPN,SM,SC-59,SMT,50V,.23W,100MA,PB-FREE"
Q1813	51009328001	"IC,PWR DRIVER,24V,150MA,SM,PB-FREE"
R100	0613959Y43	CER CHIP RES OHM 5% 2512
R1002	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1003	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1004	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1005	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1007	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R101	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R102	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R103	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R104	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R109	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R110	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R113	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R114	0613958T74	CER CHIP RES 0.0 OHM JMP 1206
R115	0613952Q81	CER CHIP RES 2200 OHM 5 0402
R116	0613952R01	CER CHIP RES 10K OHM 5% 0402
R117	0613952R25	CER CHIP RES 100K OHM 5% 0402
R118	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1200	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1201	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1202	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R1203	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R1204	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1205	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1207	0613952K73	CER CHIP RES 56.2 OHM 1% 0402
R1208	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1210	0613952K73	CER CHIP RES 56.2 OHM 1% 0402
R1211	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1212	0613952K73	CER CHIP RES 56.2 OHM 1% 0402
R1213	0613952K77	CER CHIP RES 61.9 OHM 1 0402
R1214	0613952K77	CER CHIP RES 61.9 OHM 1 0402
R1215	0613952K77	CER CHIP RES 61.9 OHM 1 0402
R1300	0613958H11	CER CHIP RES 2.7 OHM 5% 0805
R1301	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R1302	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R1303	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R1304	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R1305	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1306	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1307	0613952Q89	CER CHIP RES 4700 OHM 5 0402
R1308	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1310	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1311	0613952Q25	CER CHIP RES 10.0 OHM 5 0402
R1313	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1314	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1315	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1316	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1317	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1318	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1319	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1320	0613952E51	CER CHIP RES 33.2K OHM 1 0603
R1321	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1322	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1324	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1325	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1326	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1327	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1328	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1330	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1331	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1332	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1333	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1334	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1335	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1336	0613952N89	CER CHIP RES 82.5K OHM 1 0402
R1337	0613952N25	CER CHIP RES 17.8K OHM 1 0402
R1340	0613952E51	CER CHIP RES 33.2K OHM 1 0603
R1342	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1343	0613952E02	CER CHIP RES 10.2K OHM 1 0603
R1344	0613952E14	CER CHIP RES 13.7K OHM 1 0603
R1345	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1346	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1349	0613952E51	CER CHIP RES 33.2K OHM 1 0603

Ref Des	Part Number	Description
R1350	0613952E05	CER CHIP RES 11.0K OHM 1 0603
R1351	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1352	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1354	0613952R07	CER CHIP RES 18K OHM 5% 0402
R1355	0613952R05	CER CHIP RES 15K OHM 5% 0402
R1356	0613952E18	CER CHIP RES 15.0K OHM 1 0603
R1357	0613952D30	CER CHIP RES 2000 OHM 1% 0603
R1358	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1359	0613952P94	CER CHIP RES 931K OHM 1 0402
R1360	0613952N72	CER CHIP RES 54.9K OHM 1 0402
R1361	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1362	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1363	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1364	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1365	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1367	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1368	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1369	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1371	0613952R25	CER CHIP RES 100K OHM 5% 0402

Ref Des	Part Number	Description
R1372	0613952R49	CER CHIP RES 1.0M OHM 5% 0402
R1373	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1374	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1375	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1376	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1377	0613952R05	CER CHIP RES 15K OHM 5% 0402
R1378	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1379	0613952R08	CER CHIP RES 20K OHM 5 0402
R1380	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1381	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1382	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1383	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R1384	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1385	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1386	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1388	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1390	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1391	0613952R08	CER CHIP RES 20K OHM 5 0402
R1392	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R1394	0613952E18	CER CHIP RES 15.0K OHM 1 0603
R1395	0613952E02	CER CHIP RES 10.2K OHM 1 0603
R1396	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1500	0613952Q25	CER CHIP RES 10.0 OHM 5 0402
R1501	0613952Q25	CER CHIP RES 10.0 OHM 5 0402
R1502	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1503	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1504	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1505	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1509	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1510	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1511	0613952R49	CER CHIP RES 1.0M OHM 5% 0402
R1700	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1701	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1702	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1703	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1708	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1709	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1710	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R1711	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1713	0613952Q49	CER CHIP RES 100 OHM 5 0402
R1714	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1715	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1716	0613952R05	CER CHIP RES 15K OHM 5% 0402
R1717	0613952R05	CER CHIP RES 15K OHM 5% 0402
R1718	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1726	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1730	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1800	0613952Q57	CER CHIP RES 220 OHM 5 0402
R1801	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R1802	0613952Q67	CER CHIP RES 560 OHM 5 0402
R1806	0613952Q67	CER CHIP RES 560 OHM 5 0402
R1807	0613952R18	CER CHIP RES 51K OHM 5 0402
R1808	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1809	0613952R18	CER CHIP RES 51K OHM 5 0402
R1810	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1811	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1812	0613952R18	CER CHIP RES 51K OHM 5 0402

Ref Des	Part Number	Description
R1814	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1816	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1818	0613952H69	CER CHIP RES 680 OHM 5 0603
R1819	0613958F30	CER CHIP RES 200K OHM 1% 0805
R1820	0613958F12	CER CHIP RES 130K OHM 1% 0805
R1821	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1822	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1823	0613958J08	CER CHIP RES 20.0K OHM 5% 0805
R1824	0613952J03	CER CHIP RES 12K OHM 5% 0603
R1825	0613958H85	CER CHIP RES 3300 OHM 5% 0805
R1826	0613958J08	CER CHIP RES 20.0K OHM 5% 0805
R1827	0613958F01	CER CHIP RES 100K OHM 1% 0805
R1828	0613958F30	CER CHIP RES 200K OHM 1% 0805
R1829	0613958F01	CER CHIP RES 100K OHM 1% 0805
R1830	0613958F30	CER CHIP RES 200K OHM 1% 0805
R1831	0613952R01	CER CHIP RES 10K OHM 5% 0402
R1832	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1833	0613958J08	CER CHIP RES 20.0K OHM 5% 0805
R1835	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R1836	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1837	0613952J17	CER CHIP RES 47K OHM 5% 0603
R1838	0613952J17	CER CHIP RES 47K OHM 5% 0603
R1839	0613958S46	CER CHIP RES 75.0 OHM 5
R1840	0613958H89	CER CHIP RES 4700 OHM 5% 0805
R1841	0613958S46	CER CHIP RES 75.0 OHM 5
R1842	0613958J41	CER CHIP RES 470K OHM 5% 0805
R1843	0613958H89	CER CHIP RES 4700 OHM 5% 0805
R1844	0613958H75	CER CHIP RES 1200 OHM 5% 0805
R1847	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1848	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1849	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1851	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1852	0613958J16	CER CHIP RES 43.0K OHM 5% 0805
R1853	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1857	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1858	0613958J08	CER CHIP RES 20.0K OHM 5% 0805
R1860	0613952Q67	CER CHIP RES 560 OHM 5 0402
R1861	0613952J01	CER CHIP RES 10K OHM 5% 0603

Ref Des	Part Number	Description
R1862	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1863	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1864	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1865	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1866	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1868	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1872	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1876	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1877	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1878	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1883	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1884	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1885	0613952J01	CER CHIP RES 10K OHM 5% 0603
R1886	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1887	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1888	0613952R25	CER CHIP RES 100K OHM 5% 0402
R1889	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R1893	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R1894	0613952J01	CER CHIP RES 10K OHM 5% 0603

Ref Des	Part Number	Description
R1896	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2300	0613952D66	CER CHIP RES 4750 OHM 1% 0603
R2301	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2302	0613952R01	CER CHIP RES 10K OHM 5% 0402
R2303	0613952R01	CER CHIP RES 10K OHM 5% 0402
R2304	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2305	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2306	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2307	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2308	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2309	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2310	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2311	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2314	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2315	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2316	0613952R13	CER CHIP RES 33K OHM 5% 0402
R2317	0613952D66	CER CHIP RES 4750 OHM 1% 0603
R2320	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2321	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R2323	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2325	0613952D30	CER CHIP RES 2000 OHM 1% 0603
R2326	0613952D94	CER CHIP RES 9310 OHM 1 0603
R2327	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2806	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2807	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2819	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2821	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2824	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2825	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2826	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2827	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2828	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2829	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2830	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2831	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2832	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2834	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2835	0613952R25	CER CHIP RES 100K OHM 5% 0402

Ref Des	Part Number	Description
R2836	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2838	0613952Q67	CER CHIP RES 560 OHM 5 0402
R2839	0613952Q67	CER CHIP RES 560 OHM 5 0402
R2844	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2847	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2848	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2849	0613952R08	CER CHIP RES 20K OHM 5 0402
R2850	0613952R25	CER CHIP RES 100K OHM 5% 0402
R2851	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R2852	0613952J01	CER CHIP RES 10K OHM 5% 0603
R2853	0613952Q57	CER CHIP RES 220 OHM 5 0402
R2854	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R2855	0613952R25	CER CHIP RES 100K OHM 5% 0402
R300	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R301	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R302	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R303	0613952R01	CER CHIP RES 10K OHM 5% 0402
R305	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R306	0613952Q37	CER CHIP RES 33.0 OHM 5 0402

Ref Des	Part Number	Description
R400	0613952R01	CER CHIP RES 10K OHM 5% 0402
R401	0613952R25	CER CHIP RES 100K OHM 5% 0402
R402	0613952R25	CER CHIP RES 100K OHM 5% 0402
R403	0613952R25	CER CHIP RES 100K OHM 5% 0402
R404	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R405	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R406	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R407	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R408	0613952Q89	CER CHIP RES 4700 OHM 5 0402
R409	0613952Q89	CER CHIP RES 4700 OHM 5 0402
R410	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R411	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R412	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R413	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R415	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R417	0613952R25	CER CHIP RES 100K OHM 5% 0402
R418	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R419	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R420	0613952R25	CER CHIP RES 100K OHM 5% 0402

Ref Des	Part Number	Description
R421	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R422	0613952Q49	CER CHIP RES 100 OHM 5 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952R25	CER CHIP RES 100K OHM 5% 0402
R425	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R427	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R428	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R429	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R430	0613952R01	CER CHIP RES 10K OHM 5% 0402
R431	0613952R01	CER CHIP RES 10K OHM 5% 0402
R432	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R436	0613952R01	CER CHIP RES 10K OHM 5% 0402
R437	0613952Q81	CER CHIP RES 2200 OHM 5 0402
R438	0613952Q25	CER CHIP RES 10.0 OHM 5 0402
R439	0613952Q25	CER CHIP RES 10.0 OHM 5 0402
R442	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R443	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R444	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R445	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R447	0613952R01	CER CHIP RES 10K OHM 5% 0402
R456	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R464	0613952R74	"RES,MF,10MOHM,5%,.0625W,SM,0402,400PPM/CEL,PB-FREE"
R465	0613952R74	"RES,MF,10MOHM,5%,.0625W,SM,0402,400PPM/CEL,PB-FREE"
R466	0613952R41	CER CHIP RES 470K OHM 5% 0402
R468	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R470	0613952R01	CER CHIP RES 10K OHM 5% 0402
R474	0613952R01	CER CHIP RES 10K OHM 5% 0402
R478	0613952R01	CER CHIP RES 10K OHM 5% 0402
R479	0613952R01	CER CHIP RES 10K OHM 5% 0402
R480	0613952R01	CER CHIP RES 10K OHM 5% 0402
R482	0613952R01	CER CHIP RES 10K OHM 5% 0402
R483	0613952R01	CER CHIP RES 10K OHM 5% 0402
R484	0613952R01	CER CHIP RES 10K OHM 5% 0402
R486	0613952Q37	CER CHIP RES 33.0 OHM 5 0402

Ref Des	Part Number	Description
R487	0613952Q37	CER CHIP RES 33.0 OHM 5 0402
R488	0613952R01	CER CHIP RES 10K OHM 5% 0402
R489	0613952R01	CER CHIP RES 10K OHM 5% 0402
R500	0613952R25	CER CHIP RES 100K OHM 5% 0402
R501	0613952R13	CER CHIP RES 33K OHM 5% 0402
R502	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R505	0613952R01	CER CHIP RES 10K OHM 5% 0402
R507	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R508	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R509	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R510	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R511	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R517	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R518	0613952R01	CER CHIP RES 10K OHM 5% 0402
R530	0613952R01	CER CHIP RES 10K OHM 5% 0402
R533	0613952R01	CER CHIP RES 10K OHM 5% 0402
R534	0613952R01	CER CHIP RES 10K OHM 5% 0402
R535	0613952R01	CER CHIP RES 10K OHM 5% 0402
R545	0613952R01	CER CHIP RES 10K OHM 5% 0402

Ref Des	Part Number	Description
R555	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R556	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R557	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R558	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R566	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
R715	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R716	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R719	0613958S46	CER CHIP RES 75.0 OHM 5
R733	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R736	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R737	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R738	0613952B68	CER CHIP RES 49.9 OHM 1% 0603
R739	0613952B68	CER CHIP RES 49.9 OHM 1% 0603
R744	0613952D47	CER CHIP RES 3010 OHM 1% 0603
R745	0613952B68	CER CHIP RES 49.9 OHM 1% 0603
R746	0613952B68	CER CHIP RES 49.9 OHM 1% 0603
R747	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R748	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R749	0613952Q73	CER CHIP RES 1000 OHM 5 0402

Ref Des	Part Number	Description
R750	0613952R01	CER CHIP RES 10K OHM 5% 0402
R751	0613952R01	CER CHIP RES 10K OHM 5% 0402
R752	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R753	0613952Q89	CER CHIP RES 4700 OHM 5 0402
R754	0613952Q89	CER CHIP RES 4700 OHM 5 0402
R755	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R756	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R757	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R758	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R759	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R760	0613952R01	CER CHIP RES 10K OHM 5% 0402
R761	0613952R01	CER CHIP RES 10K OHM 5% 0402
R762	0613952R01	CER CHIP RES 10K OHM 5% 0402
R763	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R764	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R767	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R768	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R769	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R770	0613952Q42	CER CHIP RES 51.0 OHM 5 0402

Ref Des	Part Number	Description
R771	0613952Q42	CER CHIP RES 51.0 OHM 5 0402
R772	0613952H49	CER CHIP RES 100 OHM 5% 0603
R773	0613952H93	CER CHIP RES 6800 OHM 5% 0603
R774	0613952J06	CER CHIP RES 16K OHM 5 0603
R901	0613952R25	CER CHIP RES 100K OHM 5% 0402
R902	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R903	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R904	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R905	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R906	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R907	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R908	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R909	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R912	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R913	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R914	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R915	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R916	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R917	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R918	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R919	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R920	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R923	0613952R01	CER CHIP RES 10K OHM 5% 0402
R924	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R925	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R927	0613952R01	CER CHIP RES 10K OHM 5% 0402
R928	0613952R01	CER CHIP RES 10K OHM 5% 0402
R929	0613952R01	CER CHIP RES 10K OHM 5% 0402
R930	0613952R01	CER CHIP RES 10K OHM 5% 0402
R931	0613952R01	CER CHIP RES 10K OHM 5% 0402
R932	0613952R01	CER CHIP RES 10K OHM 5% 0402
R933	0613952R01	CER CHIP RES 10K OHM 5% 0402
R934	0613952R01	CER CHIP RES 10K OHM 5% 0402
R936	0613952R01	CER CHIP RES 10K OHM 5% 0402
R937	0613952R01	CER CHIP RES 10K OHM 5% 0402
R944	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R945	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R946	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM

Ref Des	Part Number	Description
R948	0613952R01	CER CHIP RES 10K OHM 5% 0402
R953	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R954	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R963	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R973	0613952R01	CER CHIP RES 10K OHM 5% 0402
R974	0613952R01	CER CHIP RES 10K OHM 5% 0402
SC500	0613952G67	CER CHIP RES 0.0 +/- 0.050 OHM
SH400	2671986H01	MICROPROCESSOR SHIELD
SH401	2664060H01	"SHIELD, OMAP"
SH402	2664060H01	"SHIELD, OMAP"
T1800	2584422T02	XFMR LIME MATCHING
T1801	2584422T02	XFMR LIME MATCHING
T700	2489647C01	"XFMR,1:1,SM,10BASE-T_XFMR, ENET TRANSFORMER, HALO, TG110-SO"
U100	5185287Y01	4KB 1-WIRE EEPROM W18
U1200	5114000B65	"IC,NOR,MC74VHC1G02,1PER PKG,SOT-353,PB-FREE"
U1201	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SPDT,,PB FREE"
U1202	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SPDT,,PB FREE"
U1203	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SPDT,,PB FREE"

Ref Des	Part Number	Description
U1300	5185941F48	"IC, VREG 5V NOPB"
U1301	5185956E90	"IC,POWER MANAGEMENT,,SUPERVISORY/REG"
U1304	5185941F16	"IC,ADJ LOW DROP-OUT POS,V-REG,LM73201,SM,SOT-223/5,1 PER PKG,1.8 TO"
U1305	5185941F90	"IC,LINEAR VOLTAGE REG,,TPS71533"
U1306	5164852H54	"IC,LINEAR VOLTAGE REG,LOW DROPOU"
U1307	5164015H39	"IC,VREG,LM317S,SM,TO-263/3,,VOUT TO (40V + VOUT)INPUT RANGE,LM317SXNOPB"
U1308	532002-001-00	"IC,LNR V REGLTR,ADJUSTABLE,1.2V TO 37V,500MA,SM,DPAK,LEAD-FREE"
U1309	5187904J03	"IC,SOT-23,SOT-23,0PER PKG,,LOW QUIESCENT CURRENT, PROGRAMMABLE"
U1310	5185956E94	"IC,XCVR,1,,CAN TRANSCEIVER,,230,1PER PKG,SM,SO-8,,3.3V CAN X"
U1311	5116332H01	8-BIT AVR MICROCONTROLLER
U1312	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SPDT,,PB FREE"
U1313	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SPDT,,PB FREE"

Ref Des	Part Number	Description
U1314	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U1316	5114000B58	"IC,AND,LOGIC LEVEL SHIFTER,1PER PKG,SM,SOT-353,PB-FREE"
U1317	5114000B65	"IC,NOR,MC74VHC1G02,1PER PKG,SOT-353,PB-FREE"
U1319	5164852H54	"IC,LINEAR VOLTAGE REG,LOW DROPOU"
U1320	5164852H54	"IC,LINEAR VOLTAGE REG,LOW DROPOU"
U1500	5114007A07	"IC,BFR,8PER PKG,74LCX244,N-I,3ST,SM,TSSOP20,PB-FREE"
U1601	5189248C01	"IC,CLOCK GENERATOR,DS1338U-33+,SOIC16,32.768MHZ,0INVT OUT,1TR"
U1700	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"
U1701	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"
U1702	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"
U1704	5185941F54	"IC, RS232 TRANSCEIVER"
U1705	5187970L07	IC ADV USB TRANSCEIVER 3.1X3.1
U1706	5164015H50	"IC,SW,BIDIRECTIONAL,TPS2041B,SM,SOIC8,,SPST,OPEN DRAIN,CURRE"

Ref Des	Part Number	Description
U1708	5114007A47	"IC,OR,17SZ32,1PER PKG,SOT-353,PB FREE"
U1709	5114007A47	"IC,OR,17SZ32,1PER PKG,SOT-353,PB FREE"
U1800	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U1801	5114016A12	"IC,OP AMP,4PER PKG,LVOLT,SM,SO-14,PB-FREE"
U1802	5114016A12	"IC,OP AMP,4PER PKG,LVOLT,SM,SO-14,PB-FREE"
U1803	5175771A28	"IC, 256-TAP NONVOLATILE I2C DIG POT"
U1805	5175771A10	"IC, ANALOG SWITCH, SPDT, PB FREE"
U1806	5114016A12	"IC,OP AMP,4PER PKG,LVOLT,SM,SO-14,PB-FREE"
U1808	5114016A12	"IC,OP AMP,4PER PKG,LVOLT,SM,SO-14,PB-FREE"
U1809	5114007A07	"IC,BFR,8PER PKG,74LCX244,N-I,3ST,SM,TSSOP20,PB-FREE"
U1810	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U1813	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U1815	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U1818	5114005M13	IC DL OP AMP RAIL TO RAIL 8 PI

Ref Des	Part Number	Description
U300	51012058002	MOBILE LPDDR 512MBIT X16
U301	51012130001	NUMONYX P30 512MBIT NOR FLASH
U400	5175771A69	"IC, MICROPROCESSOR, OMAP 5912 ZZG"
U401	5114007A07	"IC,BFR,8PER PKG,74LCX244,N-I,3ST,SM,TSSOP20,PB-FREE"
U402	5114007A43	"IC,INVTR,1PER PKG,SOT-353,VCC RANGE 1.65 TO 5.5 V, PB-FREE"
U403	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U404	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U406	5114000A48	"IC,INVTR,1GU04,1PER PKG,SOT-353,PB-FREE"
U407	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U408	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U409	5114007A47	"IC,OR,17SZ32,1PER PKG,SOT-353,PB FREE"
U410	5109522E84	IC DUAL SCHMITT TRIG MICRO PAK
U415	5114019M15	"IC,LCH,8PER PKG,74LVX373,SM,TSSOP20,PB-FREE"
U416	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"

Ref Des	Part Number	Description
U417	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U500	5114005M13	IC DL OP AMP RAIL TO RAIL 8 PI
U501	5114005M13	IC DL OP AMP RAIL TO RAIL 8 PI
U502	5102836C11	"IC,ANLG SW,,FSA4157,SM,,,,SP DT,,PB FREE"
U505	5175771A31	"IC,AUDIO CODEC,SM,SO30,IC CODEC 16"
U506	5164015H85	"IC,LM1971-62,DB,LOG,POT,NOPB"
U704	5171131Y18	"IC,UCNTLR,SM,LQFP128,25MHZ,PB-FREE"
U900	5164015H36	"IC,FPGA,,EP1C6F256I7N,7SPEED,SM,BGA256,5980GATES,.13UM SR"
U901	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"
U902	5185956E94	"IC,XCVR,1,,CAN TRANSCEIVER,,230,1PER PKG,SM,SO-8,,3.3V CAN X"
U903	5185956E94	"IC,XCVR,1,,CAN TRANSCEIVER,,230,1PER PKG,SM,SO-8,,3.3V CAN X"
U904	5114000B39	"IC,BFR,1PER PKG,SM,SOT-353,PB-FREE"
VR1200	4813977A43	"PB-FREE, NOTCOMPLETELYENRICHED"

Ref Des	Part Number	Description
VR1301	4813977M04	"DIODE,ZEN,MMBZ5225,SM,SOT-23,3V,10MA,.225W,ZEN,PB-FREE"
VR1302	4813977M21	"DIODE,ZEN,MBZ5242,SM,SOT-23,12V,10MA,.225W,ZEN,PB-FREE"
VR1303	4813977M21	"DIODE,ZEN,MBZ5242,SM,SOT-23,12V,10MA,.225W,ZEN,PB-FREE"
VR1802	4813979A23	"DIODE,SUPR,.55W,P6SMB56,SM,SMB,ZEN,PB-FREE"
VR1803	4813979A23	"DIODE,SUPR,.55W,P6SMB56,SM,SMB,ZEN,PB-FREE"
Y1601	4809995L21	"RESON, QRTZ, .032768MHZ, SM, 12PF"
Y401	4802582S85	"RESON,QRTZ,12MHZ,TOLERANCE10PPM,STABILITY15PPM,,SM,,FUND,,LO"
Y402	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T1
Y701	4802582S78	"RESON,QRTZ,25MHZ,TOLERANCE10PPM,STA"
Y901	5102845C27	16.0MHZ OSCILLATOR

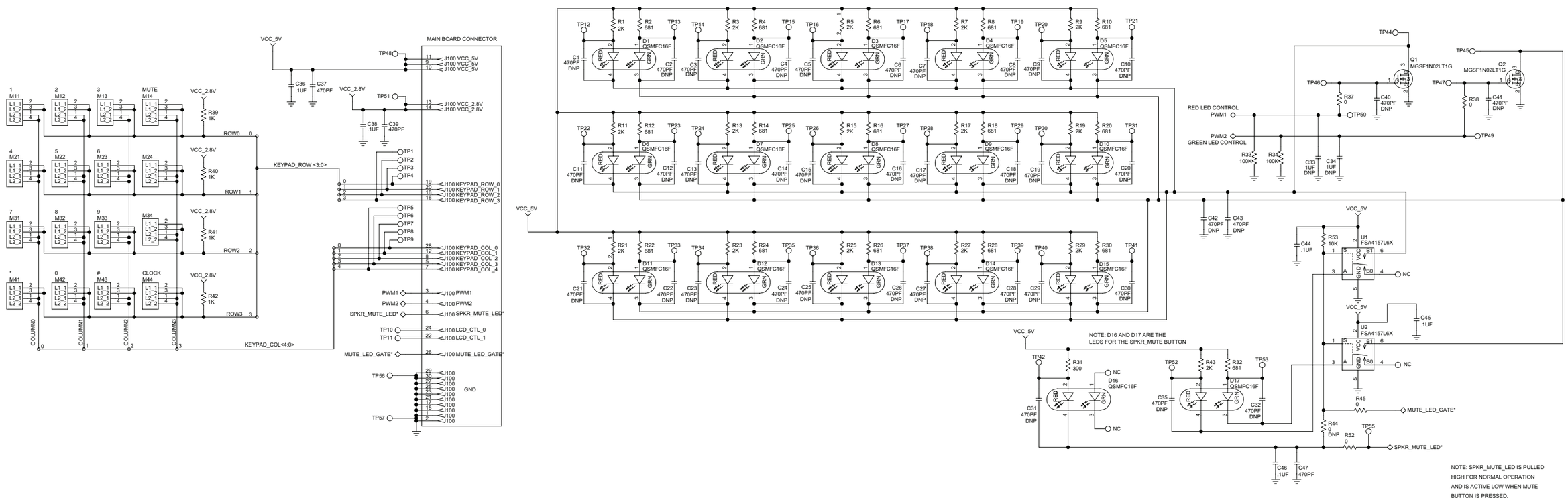


Figure 8-38. PPLN1693A Keypad Circuit Schematic

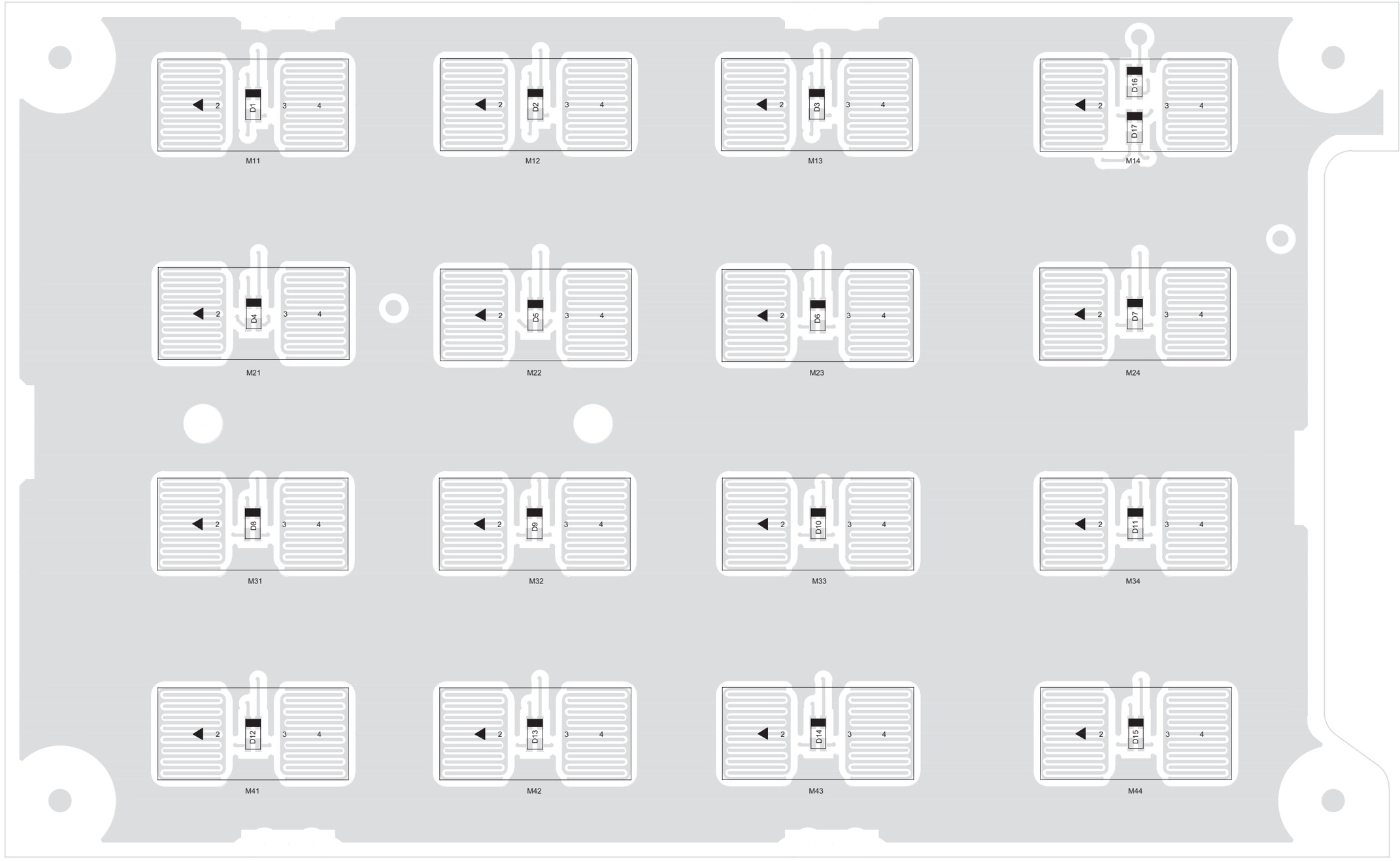


Figure 8-39. PPLN1693A Keypad Circuit Board Layout - Side 1

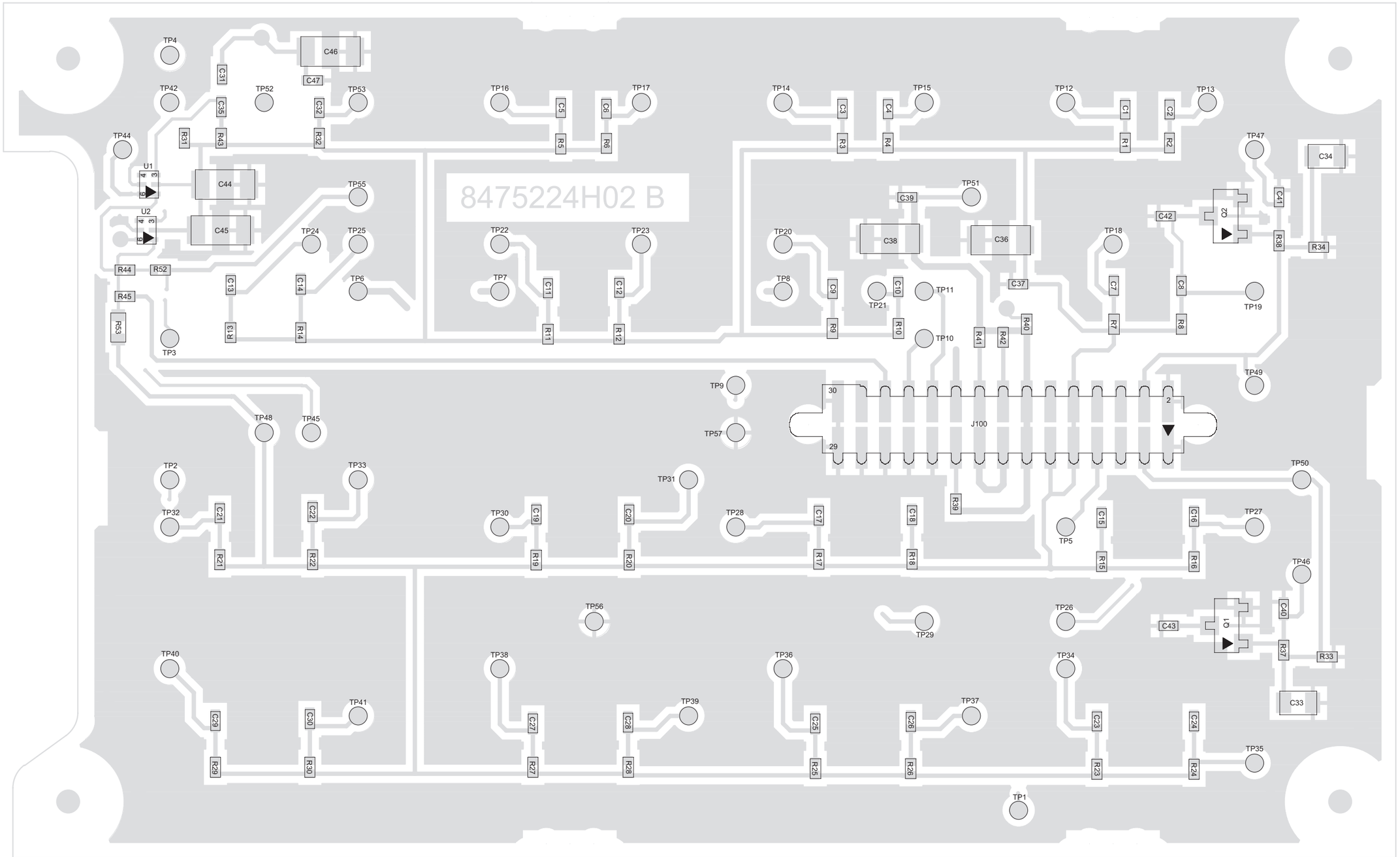


Figure 8-40. PPLN1693A Keypad Circuit Board Layout - Side 2

PPLN1693A Keypad Circuit Part List

Ref Des	Part Number	Description
C36	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C37	2113945A05	CAP CER CHP 470PF 50V 10%
C38	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C39	2113945A05	CAP CER CHP 470PF 50V 10%
C44	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C45	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C46	2113945H89	"CAP,FXD,.1UF,+10%,-10%,50V-DC,1206,X7R,-55DEG CMIN,125DEG CMAX"
C47	2113945A05	CAP CER CHP 470PF 50V 10%
D1	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D10	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D11	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D12	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D13	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D14	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D15	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D16	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D17	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D2	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D3	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D4	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D5	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D6	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D7	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D8	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
D9	4875690M01	"LED,CHIP,BICLR,RED-PQ/GRN-QR"
J100	0975247H01	"SOCKET, 30 PIN, .050 X .050"
PCB	8475224H02	"PWB, KEYBOARD"
Q1	4813972A17	"PB-FREE,NOT COMPLETELY ENRICHED"
Q2	4813972A17	"PB-FREE,NOT COMPLETELY ENRICHED"
R1	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R10	0613952L81	CER CHIP RES 681 OHM 1% 0402
R11	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R12	0613952L81	CER CHIP RES 681 OHM 1% 0402
R13	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R14	0613952L81	CER CHIP RES 681 OHM 1% 0402
R15	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R16	0613952L81	CER CHIP RES 681 OHM 1% 0402
R17	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R18	0613952L81	CER CHIP RES 681 OHM 1% 0402
R19	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R2	0613952L81	CER CHIP RES 681 OHM 1% 0402
R20	0613952L81	CER CHIP RES 681 OHM 1% 0402
R21	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R22	0613952L81	CER CHIP RES 681 OHM 1% 0402
R23	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R24	0613952L81	CER CHIP RES 681 OHM 1% 0402
R25	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R26	0613952L81	CER CHIP RES 681 OHM 1% 0402
R27	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R28	0613952L81	CER CHIP RES 681 OHM 1% 0402
R29	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R3	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R30	0613952L81	CER CHIP RES 681 OHM 1% 0402
R31	0613952Q60	CER CHIP RES 300 OHM 5 0402
R32	0613952L81	CER CHIP RES 681 OHM 1% 0402
R33	0613952R25	CER CHIP RES 100K OHM 5% 0402
R34	0613952R25	CER CHIP RES 100K OHM 5% 0402
R37	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R38	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R39	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R4	0613952L81	CER CHIP RES 681 OHM 1% 0402
R40	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R41	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R42	0613952Q73	CER CHIP RES 1000 OHM 5 0402
R43	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R45	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R5	0613952Q80	CER CHIP RES 2000 OHM 5 0402
R52	0613952R66	CER CHIP RES 0.0 +/- 0.050 OHM
R53	0613952J01	CER CHIP RES 10K OHM 5% 0603
R6	0613952L81	CER CHIP RES 681 OHM 1% 0402
R7	0613952Q80	CER CHIP RES 2000 OHM 5 0402

Ref Des	Part Number	Description
R8	0613952L81	CER CHIP RES 681 OHM 1% 0402
R9	0613952Q80	CER CHIP RES 2000 OHM 5 0402
U1	5102836C11	"IC,ANLG SW,FSA4157,SM,SPDT, PB FREE"
U2	5102836C11	"IC,ANLG SW,FSA4157,SM,SPDT, PB FREE"

Notes

Chapter 9 Replacement Parts Ordering

9.1 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.

9.2 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.

9.3 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).

9.4 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)

9.5 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)

9.6 Parts Identification

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

9.7 Where to Call for Service

The Motorola System Support Center (SSC) is the primary Motorola contact for service. After collecting the required information and writing a detailed problem report, contact the Motorola System Support Center for help with the problem.

9.7.1 Motorola System Support Center (SSC):

Call Motorola System Support Center (SSC):

- Prior to any software reload.
- To confirm troubleshooting results and analysis prior to removing and replacing a Field Replaceable Unit (FRU) or Field Replaceable Equipment (FRE) to repair the system.
- Phone: (800) 221-7144 for domestic calls
- Phone: (847) 576-7300 for international calls
- Fax: (847) 725-4073

Chapter 10 Acronyms and Definitions

10.1 Terms and Definitions

The following items listed below are the terms and definitions:

Term	Definition
10/100-BASE-T	10/100 Megabit Twisted Pair Ethernet Network
2W	Two-Wire Interface (Transmit and Receive on same copper pair)
4W	Four-Wire Interface (Transmit and Receive on different copper pairs)
ACIM	ASTRO Console Interface Module; a Motorola proprietary digital RS232 interface to the Console via the CCGW
AGC	Automatic Gain Control
ASTRO	Brand name for APCO 25 compliant product
CCGW	Conventional Channel Gateway
Channel	The multiple frequencies/talkgroups that a Consolette station can support
Channel Activity	Another name for the base station's E-Lead. An output from the station indicating it is receiving a qualified signal.
CPS	Customer Programming Software; a PC-based software tool that allows customizing radio functionality, including transmit and receive frequencies.
E&M Keying	Ear and Mouth Keying. See PTT and Channel Activity.
FCC	Federal Communications Commission
FT (Function Tone)	The short tone bursts that follow high level guard tone. These bursts are mapped to functions in the station. For instance, Setting the repeat mode, choosing a frequency, etc. Typically function tone is 40 ms in length. Dual function tone may be needed if encryption is supported.
GCAI	Global Core Accessory Interface; Motorola proprietary accessory port for use with Motorola approved cables; USB and RS232 styles supported
HLGT (High Level Guard Tone)	The initial tone of a TRC sequence begins with High Level Guard Tone. Typically a 120 ms burst of guard tone at an elevated level.
ID	Identification
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
LLGT (Low Level Guard Tone)	If the base station is to remain keyed the last function tone is followed by low level guard tone. As along as low level guard tone is present the station will remain keyed. When voice is routed to the station, it is summed with low-level guard tone in order to keep the station keyed.
MDC1200	Motorola signaling format used on radio transmissions
NIC	Network Interface Card
OS	Operating System

Term	Definition
OTS	Off-the-shelf
PC	Personal Computer
PTT	Push-to-talk; Another name for the base station's M-Lead. An input to the station to cause it to transmit over the air.
RoHS	Restriction of Hazardous Substances, European Union Regulation
RS232	A TIA/EIA standard for serial transmission between computers and peripheral devices, officially known since 1984 as TIA/EIA-232-E.
RTP	Real-time Transport Protocol
RTTE	Radio Equipment and Telecommunications Terminal Equipment
TCP/IP	Transmission Control Protocol / Internet Protocol
TRC	Tone Remote Control
UDP	User Datagram Protocol
USB	Universal Serial Bus
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
WEEE	Waste Electrical and Electronic Equipment

Index

V

W

Motorola Solutions, Inc.
1303 East Algonquin Road
Schaumburg, Illinois 60196 U.S.A.

September 2011.

68009482001-B