

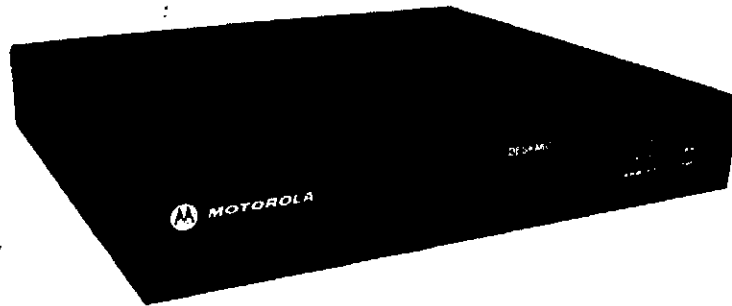


MOTOROLA

Tone Remote Adapter

L3276

Installation and Troubleshooting Manual



**6880802B90-O Release
15 September 2003**

COMMERCIAL WARRANTY
(STANDARD)

Motorola radio communications products are warranted to be free from defects in material and workmanship for a period of ONE (1) YEAR, [except for crystals and channel elements which are warranted for a period of ten (10) years] from the date of shipment. Parts, including crystals and channel elements, will be replaced free of charge for the full warranty period but the labor to replace defective parts will only be provided for ONE (1) Year from the date of shipment. Thereafter purchaser must pay for the labor involved in repairing the product or replacing the parts at the prevailing rates together with any transportation charges to or from the place where warranty service is provided. This express warranty is extended by Motorola Communications and Electronics, Inc., 1301 E. Algonquin Road, Schaumburg, Illinois 60196, to the original purchaser only, and only to those purchasing for purpose of leasing or solely for commercial, industrial, or governmental use.

WARNING

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

Version 6880802B90-O Release
15 September 2003

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6880802B90-O September 15, 2003

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In the event of a defect, malfunction or failure to conform to specifications established by seller, or if appropriate, to specifications accepted by Seller in writing, during the period shown, Motorola, at its option, will either repair or replace the product or refund the purchase price thereof, and such action on the part of Motorola shall be the full extent of Motorola's liability hereunder.

This warranty is void if:

- a. the product is used in other than its normal and customary manner;
- b. the product has been subject to misuse, accident neglect or damage;
- c. unauthorized alterations or repairs have been made, or unapproved parts used in the equipment.

This warranty extends only to individual products, batteries are excluded, but carry their own separate limited warranty. Because each radio system is unique, Motorola disclaims liability for range, coverage, or operation of the system as a whole under this warranty except by a separate written agreement signed by an officer of Motorola.

Non-Motorola manufactured products are excluded from this warranty but subject to the warranty provided by their manufacturers, a copy of which will be supplied to you on specific written request.

In order to obtain performance of this warranty, purchaser must contact its Motorola salesperson or Motorola at the address first above shown, attention Quality Assurance Department.

This warranty applies only within the United States.

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Chapter 1

Introduction to this Manual

About this Manual

The purpose of this manual is to help you install and troubleshoot the Tone Remote Adapter. It is written for technicians who are responsible for the installation and troubleshooting of a radio system. It provides reference information for technicians and Motorola field support engineers and technicians.

This manual details generic installation techniques to install a Tone Remote Adapter and troubleshoot it rapidly. This manual assumes that you are familiar with the tools, test equipment, the system architecture, and the configuration of your system. This manual may also simply use the term "Remote Adapter" to imply Tone Remote Adapter.

The term "default" refers to values set by the factory in the product at the time of manufacture, and also refers to values determined by "default" programming by the user (user-defined).

Remote Adapter Overview

When a dispatch console or deskset sends out signals to a remote base station or radio, it does so over a wireline. Two types of signals are sent: the first type is the audio signal, while the second type are command signals that are used to do the remote controls.

The type of console or deskset determines whether the command signals are sent as different frequency values (tones) or as different current values. This manual describes the tone remote adapter used with a tone generating type console or deskset. The purpose of the tone remote adapter is to control the functions of the connected radio over a leased line. The combined signalling and audio from a remote console or deskset is decoded by the Remote Adapter. This provides operation of the radio controls and transfers audio between the dispatcher and the radio.

Model Information and Accessories

Table 1-1 provides the model information for the Remote Adapter, including optional equipment, field installation kits and accessories.

Table 1-1: Remote Adapter Model Information and Accessories

Product	Part Number
Tone Remote Adapter	L3276
Accessories	
Radio Interface Cable for use with MaxTrac, GM300, M1225, SM50, SM120, CDM1550 (10 ft.)(3 m.)	DDN6338
Generic Radio Cable with unterminated, bare leads (10 ft.)(3 m.)	DDN6340
MCS2000 Cable (10 ft.)(3 m.)	DDN6699
120/240 VAC 50/60Hz In-Line Power Supply, 1A	DDN6334
19" Rackmount Shelf (mounts two boxes)	DDN6335
Deskmic	HMN3000
Power Cable (w/ DIN Connector)	DDN7067
Replacement Fuse	BUSS Fuse 1A Slow Blow, 5X20 P/N: GMD-1

Specifications

Table 1-2 provides the operating specifications for the Remote Adapter.

Table 1-2: Tone Remote Adapter Operating Specifications

Condition	Specification
Dimensions	Approx. 8.2W x 7.3L x 1.3H inches; 20.83W x 18.54L x 3.30H centimeters
Weight	Approx. 1.55 lbs.; 0.703 Kg.
Operating Temp Range	-30°C to +60°C; -22°F to +140°F
Humidity	95% at 50°C (122°F) (non-condensing)
Power Input	10.5 to 16 V _{DC} max.; 350mA typical, 600mA max.

Table 1-2: Tone Remote Adapter Operating Specifications (Continued)

Condition	Specification
Frequency Response	±3dB from 300 to 3000Hz @ 1KHz ref., except at 2175Hz notch filter
Hum and Noise	Less than -45dB below rated outputs
Audio Distortion	Less than 3% THD @ 1KHz
Line Connection	2-wire half-duplex (default), 4-wire full-duplex
Accessory Connection	4-wire full-duplex only
Radio Rx Input (from Radio)	32mV _{AC} to 500V _{AC} (nominal 300mV _{AC} - default) Jumper selectable between range: 32mV _{AC} to 500mV _{AC} or 500mV _{AC} to 4.5V _{AC} (default)
Radio Tx Output (to Radio)	32mV _{AC} to 800mV _{AC} (nominal 80mV _{AC}) Jumper selectable between range: 32mV _{AC} to 500mV _{AC} (default) or 500mV _{AC} to 800mV _{AC}
Line Rx Input (from consoles/desksets)	-24dBm to 0dBm, adjustable (nominal -10dBm into 600Ω) Factory Setting: -10dBm
Line Tx Output (to consoles/desksets)	-15dBm to +10dBm, adjustable (nominal -10dBm into 600Ω) Factory Setting: -10 dBm
Control Outputs	Form C relay - Contact Ratings: 1A/24V _{DC} or 60V _{DC} max. Max. switching power 30W, 500mA/125V _{AC}
Line Impedance	600Ω Nominal
Max. No. of Channels	10
Input Tone Tolerance	±2%
Guard Tone Configurable Frequency	2175Hz
Audio Filtering	Guard tone notch in both directions (DIP switch selectable)

Note: Specifications subject to change without notice

Safety Summary

The following general safety precautions must be observed during all phases of operation, service and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates the safety standards of design, manufacture and the intended use of the product. Motorola assumes no liability for the customer's failure to comply with these requirements.

Ground the Equipment

To minimize shock hazard, the Tone Remote Adapter must be connected to an electrical ground. The equipment is supplied with a three-conductor AC power cable. This power cable must be plugged into an approved three-contact electrical outlet with the grounding wire (green) firmly connected to an electrical ground at the power outlet. The power cables meet International Electrotechnical Commission (IEC) safety standards. The chassis ground lead must be connected to the site ground.

Keep Away from Live Circuits

Operating personnel must not open the Tone Remote Adapter. Component replacement and internal adjustments required must be made by qualified maintenance personnel. Do not replace components with the power cable connected. To avoid injuries, always disconnect the power and discharge circuits before removing equipment shelves or making major modifications.

Do Not Service or Adjust Alone

Do not attempt major component replacement or internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Electrostatic Discharge: Sensitive Parts

This product contains CMOS and other circuit components which may be damaged by electrostatic discharge. Proper precaution must be taken when handling circuit modules. As a minimum, grounded wrist straps should be used at all times when handling circuit modules.

See Section 11.9 of the *Motorola R56—Standards and Guidelines for Communications Sites* for more detailed information.

Do Not Substitute Parts or Modify the Product

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Contact an authorized Sales and Service Office for service and repairs to ensure that safety features are maintained.

Return/Repair Procedure

If trouble is experienced with this equipment (Remote Adapter), for repairs or warranty information, please contact:

Motorola Inc.
System Support Center
1311 East Algonquin Road
Schaumburg, Illinois
60196
(800) 221-7144
(847) 576-7300

Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING: THE VOLTAGES EMPLOYED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE. EVERY REASONABLE PRECAUTION HAS BEEN OBSERVED IN DESIGN TO SAFEGUARD THE OPERATING PERSONNEL. OPERATING PERSONNEL SHOULD BE PROHIBITED FROM TAMPERING WITH PROTECTIVE DEVICES SUCH AS DOOR SWITCHES. THE POWER SHOULD BE REMOVED COMPLETELY AND THE HIGH VOLTAGE CAPACITORS IN POWER SUPPLIES DISCHARGED MANUALLY WITH A SHORTING BAR BEFORE MAKING INTERNAL ADJUSTMENTS.

Electrical Safety Advisory

Because of the risk of electrical surges, typically lightning transients, which are very destructive to customer terminal equipment connected to AC power sources, we recommend that the customer should install an AC surge arrester in the AC outlet to which the Remote Adapter is connected.

FCC Interference Warning

RADIO AND TELEVISION INTERFERENCE

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

WARNING: In order to maintain compliance with the FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unsaddled cables is likely to result in interference to radio and television reception.

Related Information

- *Motorola R56—Standards and Guidelines for Communications Sites* (6881089E50); also available on CD-ROM (9882904Y01).

Regulatory Warnings

FCC Warning for Systems

This equipment complies with part 68 of the Federal Communications Commission (FCC) rules for the United States.

A label is located on the underside of the remote adapter containing the FCC certification number, Industry Canada number, and Ringer Equivalence Number (REN). You must, upon request provide the following information to your local telephone company:

FCC Registration Number: FCC: US:G6FNINANL3276

CS03 Registration Number: CS03: 1488A-L3276

USOC Jack Type: RJ11C/W

AC REN: N/A **DC REN:** N/A

Should you experience trouble with this telephone equipment, please contact:

Motorola Inc.
System Support Center
1311 East Algonquin Road
Schaumburg, Illinois 60196

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

If trouble is experienced with this remote adapter, for repair or warranty information, please contact the Motorola System Support Center at (800) 221-7144. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

This equipment cannot be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs.

Your telephone company may discontinue your service if your equipment causes harm to the telephone network. They will notify you in advance of disconnection, if possible. During notification, you will be informed of your right to file a complaint to the FCC.

Occasionally, your telephone company may make changes in its facilities, equipment, operation, or procedures that could affect the operation of your equipment. If so, you will be given advance notice of the change to give you an opportunity to maintain uninterrupted service.

This equipment has a line which is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. In some

cases, the company's inside wiring associated with a single line individual service may be extended by means of certified connector assembly (telephone extension cord).

Equipment Attachment Limitations (Industry Canada)

NOTICE: The Industry Canada number identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The **Ringer Equivalence Number (REN)** assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5. **REN:** N/A

Restrictions concernant le raccordement de matériel (Industrie Canada)

AVIS : Le numéro d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme à certaines normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêchent pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur, ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, soient raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement : L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

AVIS : L'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5. **IES:** N/A

Chapter 2 Remote Adapter Layout and Operation

Introduction

This chapter describes the function of the Remote Adapter's LEDs and connectors.

Remote Adapter Front Panel



Figure 2-1: Tone Remote Adapter Front Panel

DESKMIC Port

This port connects the deskmic (P/N HMN3000) to the Tone Remote Adapter.

PTT LED

This LED is on when PTT has been activated from a console or deskset that is connected to the LINE port of the Remote Adapter.

Acc PTT LED

This LED is on when PTT has been activated from the accessory device that is connected to the ACCESSORY port of the Remote Adapter.

DESKMIC PTT LED

This LED is on when PTT has been activated from the deskmic that is connected to the DESKMIC port of the Tone Remote Adapter.

CSQ LED

This LED is on when audio is received from the radio that is connected to the RADIO port of the Remote Adapter.

MON LED

This LED is on when the MONITOR has been activated either from the deskmic connected to the DESKMIC port, from the accessory connected to the ACCESSORY port, or from a console or deskset connected to the LINE port of the Tone Remote Adapter.

PWR LED

This LED is on when the power to the Tone Remote Adapter is ON.

Remote Adapter Rear Panel

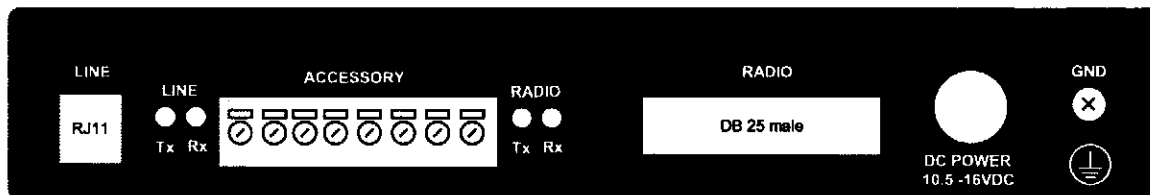


Figure 2-2: Remote Adapter Rear Panel

LINE Port

This port connects the wireline to the remote adapter (RJ-11).

LINE Tx Adjustment

Adjusts the line transmit level (signal leaves at the remote adapter LINE port).

LINE Rx Adjustment

Adjusts the line receive level (signal enters at the remote adapter LINE port).

ACCESSORY Terminals

These terminals connect to an MC1000 Basic Local or MC2000 Advanced Local deskset. They also connect to an MC2500 multi-channel deskset.

RADIO Tx Adjustment

Adjusts the radio transmit level (signal leaves at the remote adapter RADIO port).

RADIO Rx Adjustment

Adjusts the radio receive level (signal enters at the remote adapter RADIO port).

RADIO Port

This port connects the Remote Adapter to the radio.

DC POWER Port

This port connects the power supply to the remote adapter. The acceptable voltage range is $+10.5V_{DC}$ to $+16V_{DC}$.

GND Terminal

This terminal must be connected to ground.

Chapter 3 Installation

Introduction

This chapter provides an overview of a typical Remote Adapter installation configuration and explains the procedures to follow during an installation, including connecting it to an analog radio, operator desksets and consoles.

Overview

A remote adapter is located near a radio and allows the radio to be remotely controlled over a wireline from a dispatch console or deskset in a dispatch center. A combination of consoles or desksets may be used, provided that no more than ten (10) units are connected in parallel. Only one of the units may transmit at any given time. The console may be a CommandSTAR or CommandSTAR Lite model while the deskset may be an MC1000 Basic Tone, MC2000 Advanced Tone, MC2500 multi-channel model, or any compatible Tone Control console or deskset.

When the dispatcher wishes to use the radio to communicate, the communication frequency is determined by selecting one of several frequencies on the console or deskset. As a result, a tone sequence (command signal) is generated and received by the Tone Remote Adapter, which in turn interprets the tone sequence and selects the appropriate radio communication frequency for the audio signal. The dispatcher presses the Monitor button when PL is being used to listen if there is any other communication on the selected frequency, since transmitting would otherwise interfere with an on-going communication. If there is no other communication, the dispatcher presses the PTT (push-to-talk) button to activate the radio for audio transmission.

At the radio side, an MC1000 Basic Local or MC2000 Advanced Local deskset may be connected to the Tone Remote Adapter and can override any radio transmission or reception that may be occurring, thereby taking control of the radio. The audio from the MC1000 Basic Local or MC2000 Advanced Local deskset goes out over the radio and also to the consoles or desksets. A deskmic can also be connected to the Tone Remote Adapter and its audio also takes control of the radio and goes out over the radio, the consoles or desksets, and the accessory.

Example of a Typical Configuration

Installation Sequence

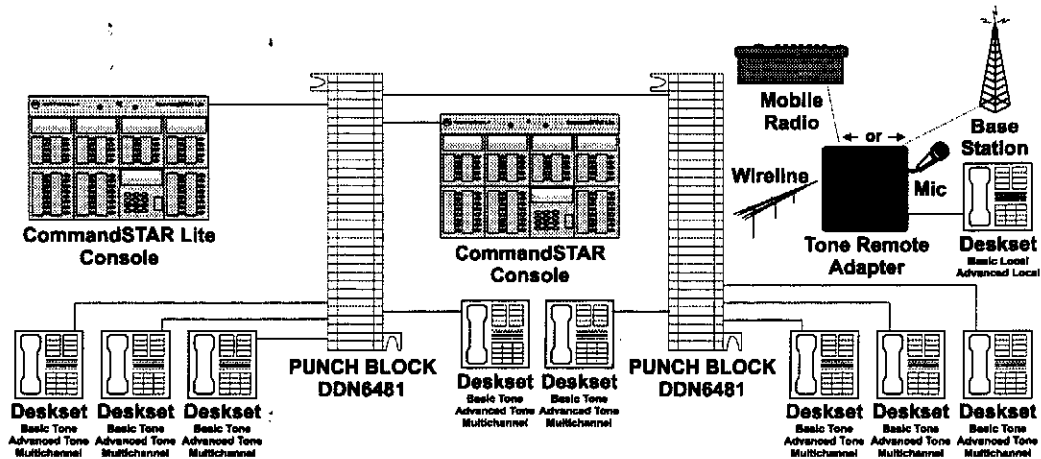


Figure 3-1: Typical Dispatch Center to Base Station Configuration

Installing one or more Remote Adapters involves these necessary procedures:

1. Locate an appropriate site for each Remote Adapter installation.
2. Set the DIP Switch and jumpers for each Remote Adapter.
3. Adjust the potentiometers, if required.
4. Install each Remote Adapter in an optional rackmount shelf, if desired.
5. Ground each Remote Adapter in a safe manner.
6. Connect each Remote Adapter to each radio, using the appropriate radio cables. See Table 1-1 on Page 1-2 for further information on the cable and radio types.
7. Connect each Remote Adapter to the operator consoles and desksets, as required.
8. Connect a power supply to each Remote Adapter.
9. Verify the installation.

These procedures should be completed in the order given above. Each procedure is described in detail in subsequent sections of this chapter.

Preparation for Installation

Before installing the Remote Adapter, make these site preparations:

- Determine a location for the Remote Adapter that ensures the operating conditions conform to the ranges found in the "Specifications" on page 1-2. If you are using the optional rackmount shelf, also determine where to install it.
- Verify that a DC power source is available to supply power to the Remote Adapter. If you are using the optional AC power supply (part number DDN6334), ensure that an AC power outlet is available.

Removing the Remote Adapter Cover

The Remote Adapter consists of two main pieces: the base and the cover. The cover fits over the base, and the two are held together by screws on either side and on the back of the Remote Adapter. Figure 3-2 shows the screws that you need to remove in order to open the Remote Adapter and Figure 3-3 shows the Remote Adapter with the cover removed.

Warning: Wear an ESD wrist strap and connect the free end to the adapter ground terminal before opening the Remote Adapter cover or working inside.

Note: Before removing the cover, the terminal strip on the ACCESSORY port must be removed. Remove it with care; hold the terminal strip firmly between your thumb and index fingers and pull it straight out toward you.

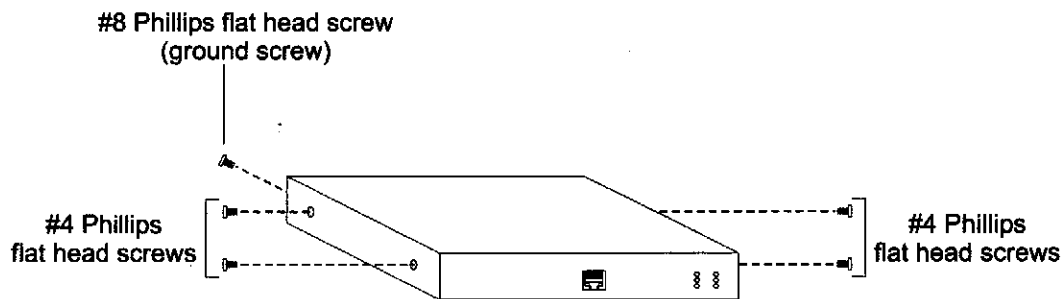


Figure 3-2: Tone Remote Adapter Screw Locations

During the installation procedure, you may need to remove the cover on the Remote Adapter in order to perform such tasks as changing DIP switch and jumper settings.

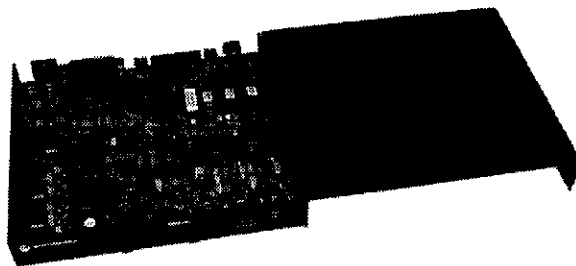


Figure 3-3: Tone Remote Adapter Base with Cover Removed

Note: This procedure requires Phillips #1 and Phillips #2 screwdrivers. Carefully remove the terminal strip from the ACCESSORY port before removing the cover.

To remove the Remote Adapter cover:

1. Use a Phillips #2 screwdriver to remove the ground screw from the back of the Remote Adapter.

The ground screw is a #8 Phillips flat head screw. For the location of the ground screw on the back of the Remote Adapter, see Figure 3-3 on page 3-4.

2. Use a Phillips #1 screwdriver to remove the four black screws on the sides of the Remote Adapter.

The screws are #4 Phillips flat head screws.

3. Slide the Remote Adapter cover back approximately one-quarter of an inch.
4. Carefully lift the Remote Adapter cover straight up to remove it.

Configuration Settings

DIP Switches

Note: Factory settings for DIP switches S2, S3 and S4 are all OFF (0).

Table 3-1: Tone Remote Adapter DIP Switch Settings

Switch	Function	Setting	Result
S2-1 to S2-4 (MSB) (LSB)	Sets the adapter's response to function tones.	0000 0001 0010 0011 0100 0101 1111	15 frequencies + monitor 16 frequencies (F16 = 2050 Hz) 16 frequencies + monitor (F16 = 450 Hz) 4 frequencies + monitor + 1 wildcard 2 frequencies + monitor + 2 wildcards Monitor + 4 private lines + PL strip No function tones (guard tone keying) Note: Settings not listed are not used.
S2-5 to S2-8 (MSB) (LSB)	Sets the revert frequency.	0000 0001 0010 0011 0100 0101 0110 0111 1000 1001 1010 1011 1100 1101 1110 1111	No revert (stays on last selected frequency) Revert to F1 Revert to F2 Revert to F3 Revert to F4 Revert to F5 Revert to F6 Revert to F7 Revert to F8 Revert to F9 Revert to F10 Revert to F11 Revert to F12 Revert to F13 Revert to F14 Revert to F15
S3-1 to S3-2 (MSB) (LSB)	Sets the adapter's receive mode.	00 01 10 11	Pass-through (CSQ LED and carrier relay voice-activated) Carrier Carrier OR PL/DPL Carrier AND PL/DPL
S3-3	Sets the adapter's wireline configuration.	0 1	2-wire 4-wire
S3-4	Sets the adapter's monitor mode.	0 1	Latching Momentary (4 seconds)
S3-5	Sets the carrier input logic.	0 1	Active low Active high

Table 3-1: Tone Remote Adapter DIP Switch Settings (Continued)

Switch	Function	Setting	Result
S3-6	Sets the PL/DPL input logic.	0 1	Active low Active high
S3-7	Sets the receive notch filter.	0 1	Filter enabled Filter disabled
S3-8	Sets the transmit notch filter.	0 1	Filter enabled Filter disabled
S4-1 to S4-2	Not used.		
S4-3	Sets the test tone mode.	0 1	Test tone disabled Test tone enabled
S4-4 to S4-8	Not used.		

Table 3-2: Relay Function Table

Mode \ Relay	K2	K7	K5	K3	K6	K1	K4
15 frequencies + monitor	N/A	Bit3	Bit2	Bit1	Bit0	PTT	MON
16 frequencies	Bit4	Bit3	Bit2	Bit1	Bit0	PTT	MON ¹
16 frequencies + monitor	Bit4	Bit3	Bit2	Bit1	Bit0	PTT	MON
4 frequencies + monitor + 1 wildcard	WC1	F4	F3	F2	F1	PTT	MON
2 frequencies + monitor + 2 wildcards	WC1	WC2	N/A	F2	F1	PTT	MON
monitor + 4 private lines + PL strip	PL strip	PL4	PL3	PL2	PL1	PTT	MON
No function tones	N/A	N/A	N/A	N/A	N/A	PTT	MON ¹

1. Monitor activated by accessory or desk microphone only.

Table 3-3: Mode to Frequency Assignment Table

Freq. + Mode	15 freq. + monitor	16 freq.	16 freq. + monitor	4 freq. + monitor + 1 wildcard	2 freq. + monitor + 2 wildcards	monitor + 4 private lines + PL strip	No function tones
2050Hz	Monitor	F16	Monitor	Monitor	Monitor	Monitor	N/A
1950Hz	F1	F1	F1	F1	F1	PTT	N/A
1850Hz	F2	F2	F2	F2	F2	PL strip	N/A
1750Hz	F3	F3	F3	F3	N/A	N/A	N/A
1650Hz	F4	F4	F4	F4	N/A	N/A	N/A
1550Hz	F5	F5	F5	N/A	N/A	N/A	N/A
1450Hz	F6	F6	F6	N/A	N/A	N/A	N/A
1350Hz	F7	F7	F7	WC1 on	WC1 on	PL1	N/A
1250Hz	F8	F8	F8	WC1 off	WC1 off	PL2	N/A
1150Hz	F9	F9	F9	N/A	WC2 on	PL3	N/A
1050Hz	F10	F10	F10	N/A	WC2 off	PL4	N/A
950Hz	F11	F11	F11	N/A	N/A	N/A	N/A
850Hz	F12	F12	F12	N/A	N/A	N/A	N/A
750Hz	F13	F13	F13	N/A	N/A	N/A	N/A
650Hz	F14	F14	F14	N/A	N/A	N/A	N/A
550Hz	F15	F15	F15	N/A	N/A	N/A	N/A
450Hz	N/A	N/A	F16	N/A	N/A	N/A	N/A

Table 3-4: Frequency to Bit Relationship for Mode 15 Freq. + Monitor

F#	Frequency	BIT3 (MSB)	BIT2	BIT1	BIT0 (LSB)
F1	1950 Hz	Inactive	Inactive	Inactive	Active
F2	1850 Hz	Inactive	Inactive	Active	Inactive
F3	1750 Hz	Inactive	Inactive	Active	Active
F4	1650 Hz	Inactive	Active	Inactive	Inactive
F5	1550 Hz	Inactive	Active	Inactive	Active
F6	1450 Hz	Inactive	Active	Active	Inactive

Table 3-4: Frequency to Bit Relationship for Mode 15 Freq. + Monitor (Continued)

F#	Frequency	Bit3 (MSB)	Bit2	Bit1	Bit0 (LSB)
F7	1350 Hz	Inactive	Active	Active	Active
F8	1250 Hz	Active	Inactive	Inactive	Inactive
F9	1150 Hz	Active	Inactive	Inactive	Active
F10	1050 Hz	Active	Inactive	Active	Inactive
F11	950 Hz	Active	Inactive	Active	Active
F12	850 Hz	Active	Active	Inactive	Inactive
F13	750 Hz	Active	Active	Inactive	Active
F14	650 Hz	Active	Active	Active	Inactive
F15	550 Hz	Active	Active	Active	Active

Table 3-5: Frequency to Bit Relationship for Mode 16 Freq.

F#	Frequency	Bit4 (MSB)	Bit3	Bit2	Bit1	Bit0 (LSB)
F1	1950 Hz	Inactive	Inactive	Inactive	Inactive	Active
F2	1850 Hz	Inactive	Inactive	Inactive	Active	Inactive
F3	1750 Hz	Inactive	Inactive	Inactive	Active	Active
F4	1650 Hz	Inactive	Inactive	Active	Inactive	Inactive
F5	1550 Hz	Inactive	Inactive	Active	Inactive	Active
F6	1450 Hz	Inactive	Inactive	Active	Active	Inactive
F7	1350 Hz	Inactive	Inactive	Active	Active	Active
F8	1250 Hz	Inactive	Active	Inactive	Inactive	Inactive
F9	1150 Hz	Inactive	Active	Inactive	Inactive	Active
F10	1050 Hz	Inactive	Active	Inactive	Active	Inactive
F11	950 Hz	Inactive	Active	Inactive	Active	Active
F12	850 Hz	Inactive	Active	Active	Inactive	Inactive
F13	750 Hz	Inactive	Active	Active	Inactive	Active
F14	650 Hz	Inactive	Active	Active	Active	Inactive
F15	550 Hz	Inactive	Active	Active	Active	Active
F16	2050 Hz	Active	Inactive	Inactive	Inactive	Inactive

Table 3-6: Frequency to Bit Relationship for Mode 16 Freq. + Monitor

F#	Frequency	Bit4 (MSB)	Bit3	Bit2	Bit1	Bit0 (LSB)
F1	1950 Hz	Inactive	Inactive	Inactive	Inactive	Active
F2	1850 Hz	Inactive	Inactive	Inactive	Active	Inactive
F3	1750 Hz	Inactive	Inactive	Inactive	Active	Active
F4	1650 Hz	Inactive	Inactive	Active	Inactive	Inactive
F5	1550 Hz	Inactive	Inactive	Active	Inactive	Active
F6	1450 Hz	Inactive	Inactive	Active	Active	Inactive
F7	1350 Hz	Inactive	Inactive	Active	Active	Active
F8	1250 Hz	Inactive	Active	Inactive	Inactive	Inactive
F9	1150 Hz	Inactive	Active	Inactive	Inactive	Active
F10	1050 Hz	Inactive	Active	Inactive	Active	Inactive
F11	950 Hz	Inactive	Active	Inactive	Active	Active
F12	850 Hz	Inactive	Active	Active	Inactive	Inactive
F13	750 Hz	Inactive	Active	Active	Inactive	Active
F14	650 Hz	Inactive	Active	Active	Active	Inactive
F15	550 Hz	Inactive	Active	Active	Active	Active
F16	450 Hz	Active	Inactive	Inactive	Inactive	Inactive

Jumpers

Table 3-7: Tone Remote Adapter Jumper Settings

Jumper	Description	In	Out	A	B
S1	Reset	N/A	Always out	N/A	N/A
S5	K1 Ground Reference	Ground (factory)	PTT Common	N/A	N/A
S6	K2 Ground Reference	N/A	N/A	Ground (factory)	K2 Common
S7	K7, K5, K3, K6 Gnd. Ref.	N/A	N/A	Relay Common	Ground (factory)
S8	K4 Ground Reference	Ground (factory)	Monitor Common	N/A	N/A
S9	TX Audio Level to radio	N/A	N/A	32mV _{AC} to 140mV _{AC} (factory)	140mV _{AC} to 800mV _{AC}
S10	RX Audio Level from radio	500mV _{AC} to 4.5V _{AC}	32mV _{AC} to 500mV _{AC} (factory)	N/A	N/A
S11	K8 Ground Reference	Ground (factory)	Carrier Common	N/A	N/A

Note: Use the Jumper Settings in conjunction with the procedures under Potentiometer Settings and Calibration in this chapter and Figure A-1, Tone Remote Adapter Circuit Board in Appendix A .

Potentiometer Settings and Calibration

Table 3-8: Potentiometer Settings

	LINE Tx R4	LINE Rx R3	RADIO Tx R2	RADIO Rx R1	ACCESSORY Tx R145	DESKMIC R70
Factory	-10dBm	-10dBm	80mV _{AC}	300mV _{AC}	350mV _{AC}	80mV _{AC} (9K Ω)
Potent.	R4	R3	R2	R1	R145	R70
Test Point	TP10	TP11	TP7	TP6	TP9	N/A
Calibration Reading	480mV _{AC}	180mV _{AC}	170mV _{AC}	180mV _{AC}	360mV _{AC}	N/A

Potentiometers in the Remote Adapter are provided for adjusting gain and signal levels to compensate for cable losses and for use with non-Motorola accessories and radios. In the event factory calibration has been altered or is insufficient for your application, the procedures that follow will assist you to achieve the intended factory values and performance.

Use the potentiometers shown in Table 3-8 to adjust the Transmit (Tx) and Receive (Rx) levels of the Tone Remote Adapter within a multi-station configuration. A factory level setting is suggested for each of the LINE, RADIO, ACCESSORY, and DESKMIC calibrations. These factory values are the factory settings. The variations in operator equipment, radio configurations, cable losses and other conditions may require calibration values different from those stated for satisfactory results.

Required Equipment and Tools

These tools and equipment are recommended to perform the calibration of the Tone Remote Adapter:

- Audio test set (600 ohm input impedance)
- AC-multimeter
- Assortment of jeweller's screwdrivers (for potentiometer adjustment)
- Assorted probes and cables

Before Starting Calibration

Prior to starting calibration, note the position of the DIP Switches on the component side of the main circuit board of the Tone Remote Adapter. Set all DIP Switches to the OFF position (Refer to the "Tone Remote Adapter Circuit Board" on page A-2 of Appendix A). The OFF position is the factory condition for a 2-wire configuration of the Tone Remote Adapter. Use a tone test set with a 600 ohm input impedance to perform all calibration procedures. It is strongly recommended that you calibrate the Remote Adapter within the radio system. This allows you to calibrate the Remote Adapter together with the system, rather than calibrate the theoretical values for the Remote Adapter alone.

Note: All DIP switches must be returned to their original settings after the calibration procedures are completed.

Performing the Calibration

You can perform a single calibration for any one potentiometer setting independent of the others, if necessary. During the calibration procedure, it is assumed that power to the Tone Remote Adapter is ON, except where noted.

Note: All ground connections should be made onto the GROUND screw at the back panel of the Tone Remote Adapter.

LINE Port Tx Level Adjustment

The Line Port Transmit (LINE Tx) factory output level into a 600 ohm load is -10dBm.

Perform these steps to re-calibrate the Line Port Tx output level to the factory setting:

1. Set DIP Switch S4-3 to ON to enable the internal test tone generator in the adapter. This generates a 1 KHz tone at all outputs of the Tone Remote Adapter.
2. Connect an AC-multimeter between GROUND and test point TP10.
3. Adjust Line Tx potentiometer R4 on the rear panel of the Tone Remote Adapter to obtain a reading of 480 millivolts AC on the AC-multimeter.
4. Reset the DIP Switch S4-3 to OFF when the calibration is complete.

You can adjust potentiometer R4 to generate an output level other than -10 dBm at Line Port J5. Measure the actual output value at the console or deskset end of the system with an audio test set. Then, adjust R4 to match the level expected at the console or deskset. This procedure is recommended to account for line loss and other signal attenuating factors. Refer to Table 1-2 on page 1-2 for the complete range of values.

LINE Port Rx Level Adjustment

The Line Port Receive (LINE Rx) factory input level is -10dBm. This input is terminated at 600 ohms within the Remote Adapter.

Perform these steps to re-calibrate the Line Port Rx input level to the factory setting:

1. Use a tone test set to apply a -10 dBm 1 KHz tone to the Line Port Rx input at connector J5-2 and J5-3.
2. Connect an AC-multimeter between GROUND and test point TP11.
3. Adjust Line Rx potentiometer R3 on the rear panel of the Tone Remote Adapter to obtain a reading of 180 millivolts AC on the AC-multimeter.

You can adjust potentiometer R3 to receive an input level other than -10 dBm at Line Port (J5). Generate the actual level at the console or deskset end of the system with an audio test set. Then, adjust R3 to obtain 180 millivolts AC at TP11. This procedure is recommended to account for line loss and other signal attenuating factors. Refer to Table 1-2 on page 1-2 for the complete range of values.

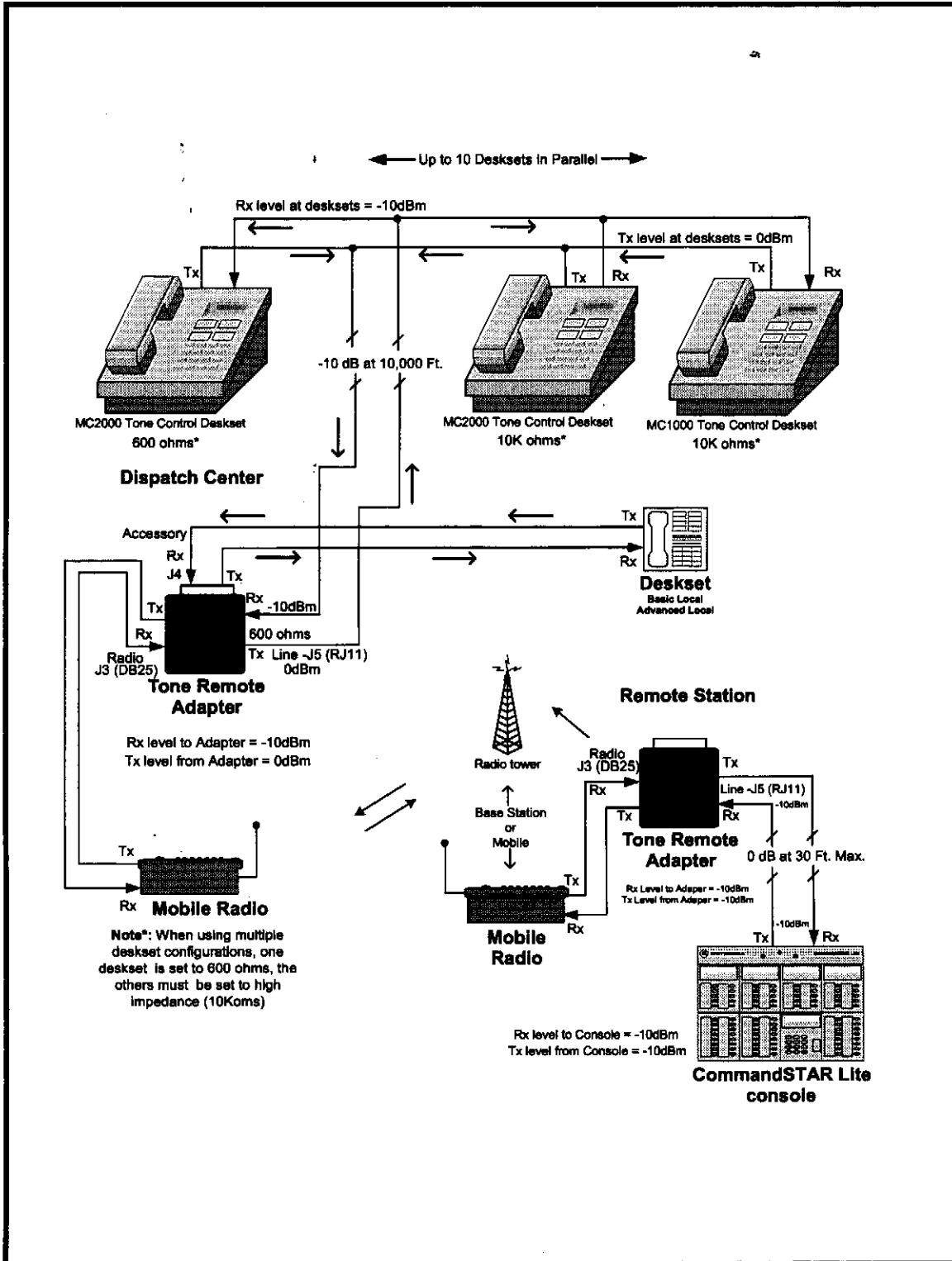


Figure 3-4: Tone Remote Adapter - System Configuration

RADIO Port Tx Level Adjustment

The Radio Port Transmit (Radio Tx) factory output level into a 600 ohm load is 80 millivolts AC when Jumper S9 is in the "A" position.

Perform these steps to re-calibrate the Radio Port Tx output level to the factory setting:

1. Set DIP Switch S4-3 to ON to enable the internal test tone generator in the adapter. This generates a 1 KHz tone at all outputs of the Tone Remote Adapter.
2. Connect an AC-multimeter between GROUND and test point TP7.
3. Adjust Radio Tx potentiometer R2 on the rear panel of the Tone Remote Adapter to obtain a reading of 170 millivolts AC on the AC-multimeter.
4. Reset the DIP Switch S4-3 to OFF when the calibration is complete.

It is recommended that you connect the radio to the Remote Adapter before calibrating the Radio Tx Port to ensure accurate calibration. The input impedance of the radio also must be considered for accurate calibration; for example, 600 ohms.

You can adjust potentiometer R2 to generate an output level other than 80 millivolts AC at Radio Port (J3). Measure the actual output value with an AC-multimeter at the J3 connector (J3-4 and J3-12). Then, adjust R2 to match the level expected at the radio. Refer to Table 1-2 on page 1-2 and Table 3-7 on page 3-11 for the complete range of values.

RADIO Port Rx Level Adjustment

The Radio Port Receive (Radio Rx) factory input level is 300 millivolts AC when Jumper S10 is removed. This input is terminated at 600 ohms within the Remote Adapter.

Perform these steps to re-calibrate the Radio Port Rx input level to the factory setting:

1. Use a tone test set to apply a 300 millivolt AC 1 KHz tone to the RADIO Port Rx input at connector J3-3 and J3-11.
2. Connect an AC-multimeter between GROUND and test point TP6.
3. Adjust Radio Rx potentiometer R1 on the rear panel of the Tone Remote Adapter to obtain a reading of 180 millivolts AC on the AC-multimeter.

You can adjust potentiometer R1 to accept input values other than 300 millivolts at RADIO Port (J3). Apply a 1 KHz tone of the actual input level at the (J3) connector at J3-3 and J3-11. Then, adjust R1 to obtain 180 millivolts AC at TP6. DO NOT connect a radio to the Remote Adapter if you are using a tone test set to generate the test tone at (J3); this can damage the radio. Refer to Table 1-2 on page 1-2 and Table 3-7 on page 3-11 for the complete range of values.

ACCESSORY Port Tx Level Adjustment

The Accessory Port Transmit (Accessory Tx) factory output level is 350 millivolts AC.

Perform these steps to re-calibrate the ACCESSORY Tx output level to factory settings:

1. Set DIP Switch S4-3 to ON to enable the internal test tone generator in the adapter. This generates a 1 KHz tone at all outputs of the Tone Remote Adapter.
2. Connect an AC-multimeter between GROUND and test point TP9.
3. Adjust the Accessory Tx potentiometer R145 on the main circuit board of the Tone Remote Adapter to obtain a reading of 350 millivolts AC on the AC-multimeter.

4. Reset the DIP Switch S4-3 to OFF when the calibration is complete.

Connect the known Accessory to the Remote Adapter before starting the following procedure to ensure the matching of impedances. You can adjust potentiometer R145 to generate values other than 350 millivolts at Accessory Port (J4). Measure the actual output level with an AC-multimeter at the (J4) connector (J4-1 and J4-2). Then, adjust R145 to match the level expected from the Accessory unit port. The Accessory port input is assumed to be high impedance and this factor must be considered for accurate calibration. Refer to Table 1-2 on page 1-2 for the complete range of values.

Note: In order to interface an MC1000 Local deskset (L3211) with the ACCESSORY port of the Tone Remote Adapter, the ACCESSORY Tx potentiometer R145 must be set to a value of 36.4K Ω .

ACCESSORY Rx Level

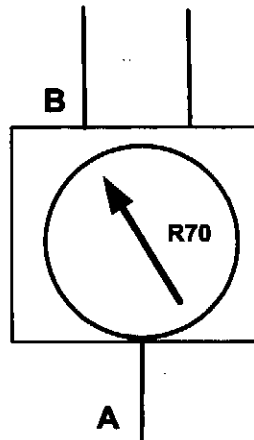
The Accessory Port Receive (Accessory Rx) input is factory preset for an 80 millivolt AC input and is not adjustable. This input is NOT terminated within the remote adapter.

DESKMIC

The Deskmic factory setting for this input level is 80 millivolts AC.

Perform these steps to calibrate the DESKMIC sensitivity level:

1. Before starting this procedure, power OFF the Tone Remote Adapter.
2. Use an AC-multimeter to measure the resistance between the single pin on the bottom of the Deskmic potentiometer R70 (Point A) and the leftmost pin (Point B) at the top of it as shown in the figure below.



3. Adjust R70 to increase or decrease the gain as determined by the changes in resistance measured by the AC-multimeter; the lower the resistance, the higher the gain. The factory setting for R70 is 9K ohms.

After Performing the Calibration

Reset all the DIP switches to their original configurations, or to other specified configurations, if required.

Mounting (Rackmount Shelf Installation)

The Remote Adapter may be installed in an optional 19 inch long rackmount shelf (part number DDN6335). You can mount two Remote Adapters side by side in a single shelf. The shelf itself can be mounted in any rackmount frame or cabinet that meets the 19-inch EIA (Electronic Industries Alliance) standard.

Note: This procedure requires a Phillips #1 screwdriver.

To install a Remote Adapter in a rackmount shelf:

1. Align the larger, circular ends of the two holes in the bottom of the Remote Adapter with a set of two grips on the rackmount shelf.

The grips are the small cylindrical objects that stick up from the base of the shelf. There are two sets of grips, one set on each side of the shelf. See Figure 3-5 below, for an illustration of how to position the Remote Adapter on the rackmount shelf.

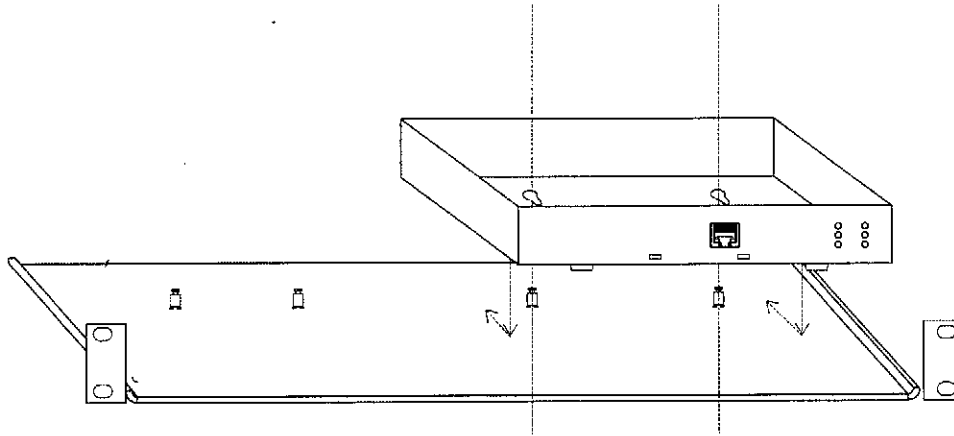


Figure 3-5: Positioning Tone Remote Adapter on Rackmount Shelf

2. Carefully lower the Remote Adapter until it is sitting on the shelf, with the grips inserted in the holes in the Remote Adapter base.
3. Push the Remote Adapter back slowly until you cannot move it further.

The grips should now be firmly secured in the narrower front sections of the holes on the Remote Adapter base.

4. Insert the two slats on the rackmount bracket into the two rectangular holes on the Remote Adapter front panel. See Figure 3-6 below, for an illustration of how to insert the bracket into the Remote Adapter.

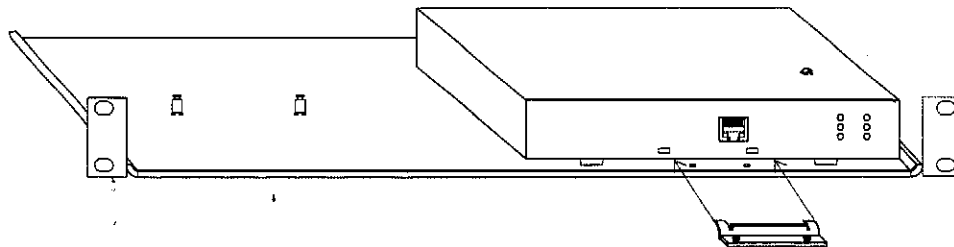


Figure 3-6: Inserting Rackmount Bracket Into Remote Adapter

5. Align the two holes on the bottom of the bracket with the two holes at the front of the rackmount shelf.
6. Using a Phillips #1 screwdriver and the two #4 Phillips flat head screws that came with the bracket, screw the bracket to the shelf. See Figure 3-7 below, for an illustration of how to screw the bracket into the rackmount shelf.

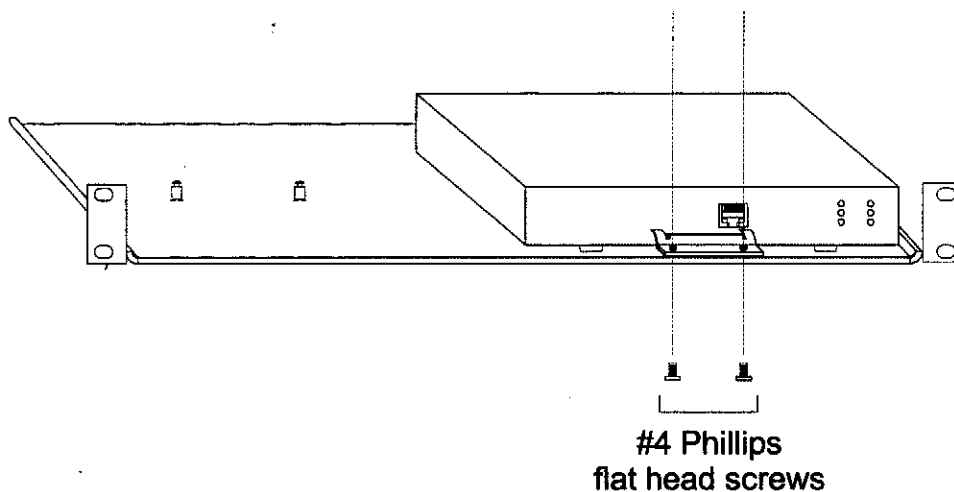


Figure 3-7: Fastening Rackmount Bracket to Rackmount Shelf

7. The Remote Adapter is installed in the rackmount shelf.

Grounding

A ground screw is located on the back panel of the Remote Adapter. Follow the guidelines given in Chapter 1 and ground the Remote Adapter by connecting this screw to the system main ground.

Radio Connection

To MCS2000 Radio

Table 3-9: Tone Remote Adapter RADIO Port to MCS2000 Radio Connection Chart

Remote Adapter Connector (J3)		Radio Connector	
Pin	Adapter Function	Pin	Radio Function
1	Channel Steer 3 (K7 Normally Open)	N/C	
2	CARRIER_PL/DPL_IN	8	Programmable
3	RADIO_RX+	11	RX audio
4	AGND	10	GND
5	Channel Steer 2 (K5 Normally Open)	N/C	
6	PTT (K1 Normally Open)	21	Mic PTT
7	Monitor (K4 Normally Open)	7	PL disable (monitor)
8	Channel Steer 1 (K3 Normally Open)	N/C	
9	Channel Steer 4 (K2 Normally Open)	N/C	
10	CARRIER_IN	8	Programmable
11	RADIO_RX-	** (10)	GND
12	RADIO_TX	23	Mic audio
13	No Connection	N/C	
14	Monitor Common (K4)* (S8 IN)	N/C	
15	Channel Steer 0 (K6 Normally Open)	N/C	
16	Channel Steer 3 (K7 Normally Closed)	N/C	
17	Channel Steer 2 (K5 Normally Closed)	N/C	
18	Channel Steer 1 (K3 Normally Closed)	N/C	
19	Channel Steer 0 (K6 Normally Closed)	N/C	
20	Channel Steer 4 (K2 Normally Closed)	N/C	
21	PTT (K1 Normally Closed)	N/C	
22	PTT Common (K1)* (S5 IN)	N/C	
23	Monitor (K4 Normally Closed)	N/C	
24	K2 Common* (S6A IN)	N/C	
25	Relay Common* (S7B IN)	N/C	

*Note: Connected internally within Remote Adapter.

**Note: Connected internally within MCS2000 Radio Interface Cable DDN6699.

WARNING: To prevent damage to the adapter or the radio when programmable or No Connection (N/C) pins are not used, clip off or secure in a manner so as to prevent leads from shorting together.

To RPG Radio

Table 3-10: Tone Remote Adapter RADIO Port to RPG Radio Connection Chart

Remote Adapter Connector (13)		Radio Connector	
Pin	Adapter Function	Pin	Radio Function
1	Channel Steer 3 (K7 Normally Open)	6, 8, 9, 12, or 14	Programmable
2	CARRIER_PL/DPL_IN	4, 8, 12, or 14	Programmable
3	RADIO_RX+	11	RX audio
4	AGND	7	GND
5	Channel Steer 2 (K5 Normally Open)	6, 8, 9, 12, or 14	Programmable
6	PTT (K1 Normally Open)	3	Mic PTT
7	Monitor (K4 Normally Open)	6, 8, 9, 12, or 14	Programmable
8	Channel Steer 1 (K3 Normally Open)	6, 8, 9, 12, or 14	Programmable
9	Channel Steer 4 (K2 Normally Open)	6, 8, 9, 12, or 14	Programmable
10	CARRIER_IN	4, 8, 12, or 14	Programmable
11	RADIO_RX-	** (7)	GND
12	RADIO_TX	2	Mic audio
13	No Connection	N/C	
14	Monitor Common (K4)* (S8 IN)	N/C	
15	Channel Steer 0 (K6 Normally Open)	6, 8, 9, 12, or 14	Programmable
16	Channel Steer 3 (K7 Normally Closed)	6, 8, 9, 12, or 14	Programmable
17	Channel Steer 2 (K5 Normally Closed)	6, 8, 9, 12, or 14	Programmable
18	Channel Steer 1 (K3 Normally Closed)	6, 8, 9, 12, or 14	Programmable
19	Channel Steer 0 (K6 Normally Closed)	6, 8, 9, 12, or 14	Programmable
20	Channel Steer 4 (K2 Normally Closed)	6, 8, 9, 12, or 14	Programmable
21	PTT (K1 Normally Closed)	N/C	
22	PTT Common (K1)* (S5 IN)	N/C	
23	Monitor (K4 Normally Closed)	N/C	
24	K2 Common* (S6A IN)	N/C	
25	Relay Common* (S7B IN)	N/C	

Note: Connected internally within Remote Adapter.

****Note:** Connected internally within Radio Interface Cable DDN6338.

WARNING: To prevent damage to the adapter or the radio when programmable or No Connection (N/C) pins are not used, clip off or secure in a manner so as to prevent leads from shorting together.

RPG includes MaxTrac, GM300, M1225, SM50, SM120, CDM1550.

Accessory Connection

Table 3-11: Accessory Port Pin-out (J4, from left to right)

ACCESSORY Port Pin	Signal Name
1	Accessory TX+
2	Accessory TX-
3	Accessory RX+
4	Accessory RX-
5	Accessory Monitor IN
6	Accessory PTT IN
7	Carrier (Normally Open)
8	Carrier Common

Line Connection

Table 3-12: Line Port Pin-out (J5)

LINE Port Pin	Signal Name
1	No Connection
2	LINE_TX-_4W
3	LINE_RX-_2W/4W
4	LINE_RX+_2W/4W
5	LINE_TX+_4W
6	No Connection

Deskmic Connection

Table 3-13: DESKMIC Port Pin-out (J1)

DESKMIC Port Pin.	Signal Name
1	No Connection
2	No Connection
3	DESKMIC_PTT
4	DESKMIC_P
5	Ground (GNDA)
6	DESKMIC_MON
7	No Connection
8	No Connection

Power Supply Connection

The Remote Adapter can be powered by a DC voltage source in the range of +10.5V_{DC} to +16V_{DC} (+12V_{DC} nominal). A cable to connect to an external DC supply is included or an optional +12V_{DC} converter power pack that plugs into a 120V_{AC} power outlet may be used.

For your reference, Table 3-14 provides the power outlet DIN port pin-out, and Figure 3-8 shows the DIN port.

Table 3-14: DC POWER Port Pin-out (DIN)

DC POWER Pin	Signal Name
1	Ground (GNDA)
2	No Connection
3	+12V
4	Ground (GNDA)
5	+12V

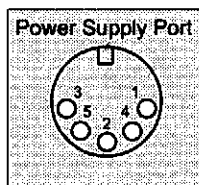


Figure 3-8: DC POWER Rear Panel DIN Port

Verification

To verify the installation, perform the following for every frequency between the dispatch center and the base station, between the Accessory deskset and the radio, and if applicable, between the deskmic and the radio:

1. Monitor.
2. TX audio.
3. RX audio (not applicable to deskmic).

Chapter 4 Troubleshooting

Introduction

This chapter describes the problems that you may encounter and their possible solutions.

Troubleshooting Chart

Use the chart below to locate your problem and possible solution.

Table 4-1: Troubleshooting Chart

Problem	Possible Solution
Cannot key the radio	Verify that a console or deskset function tone is generated for Tone Remote Adapter radio keying.
	Check the telephone line continuity from the remote adapter to the dispatch center.
	Check that the telephone line is balanced; neither side of the telephone line should be grounded.
	Verify the polarity of the line
	Verify that the radio receives the PTT signal from the Remote Adapter.
Radio is keyed constantly while the remote adapter is connected.	Relays may be configured for normally open or normally closed. Verify that the radio is programmed for the proper relay configuration or that the relays are configured properly for the way the radio is programmed.
	The problem may be a defective remote adapter relay. Return the unit for repair.

Table 4-1: Troubleshooting Chart (Continued)

Problem	Possible Solution
Rx audio is low or distorted.	Verify that the Remote Adapter RADIO_Rx is connected to the constant level squelched audio output of the radio. It must not be connected to the speaker output of the radio which varies with the radio volume control.
	Verify that the remote adapter receive level is set properly. See Potentiometer Settings and Calibration procedures in Chapter 3.
	Verify that the telephone line is balanced; neither side of the telephone line should be grounded.
	Verify that there is no more than 10dB of loss in the telephone line.
A squelch noise is present in the Rx audio or there is no Rx audio.	Check the remote adapter configuration settings.
	Check the radio jumpers or radio RSS (Radio Service Software) Programming.
	Verify that the Remote Adapter RADIO_Rx is connected to the constant level squelched audio output of the radio. It must not be connected to the speaker output of the radio which varies with the radio volume control.
	Verify that the telephone line is balanced; neither side of the telephone line should be grounded.
	Verify that there is no more than 10dB of loss in the telephone line.
	Verify that the volume potentiometer has not been turned down if the remote adapter Rx audio is connected to the volume potentiometer of the radio's speaker.
	Check the radio cable connections.
	Check the Remote Adapter jumpers.
Tx audio is distorted.	Adjust the remote adapter transmit audio output so that it does not exceed the expected radio input level.
	Check if Jumper S10 is in the correct position.

Table 4-1: Troubleshooting Chart (Continued)

Problem	Possible Solution
No Tx Audio	Verify that the radio is keyed when transmitting to the remote adapter from the dispatch center. Otherwise, see description for radio not keyed.
	Check the audio level adjustments and if required, adjust the Tx audio output or the deskset microphone level.
	Verify that there is no more than 10dB of loss in the telephone line.
	Check for blown fuse, F1, and replace if required.
Remote Adapter does not transmit or receive	Verify remote adapter is receiving power at the DC POWER INPUT.
	Check to see if the fuse has blown.
	Verify that there is an audio path from the telephone line to the tone remote adapter.
No Power; Power LED off	Verify that the unit is receiving power from a DC source.
	Check and replace fuse if blown.
Internal Sanity LED is always off.	If the unit is receiving power, a Sanity LED inside the box that is always OFF indicates a problem with the unit. Return the unit for repair.

Appendix A

Component Layouts and Schematic Diagrams

Introduction

This appendix contains component layout and schematic diagrams for the Tone Remote Adapter. Component parts of the Tone Remote Adapter, along with the manufacturer's part number and reference number for each component can be found on the schematic diagrams.

The following component layout diagrams are included in this chapter:

- Tone Remote Adapter Component Layout (1 page)

The following schematic diagrams are included in this chapter:

- Tone Remote Adapter Main Board (7 pages)
- Tone Remote Adapter - Audio Path Block Diagram (1 page)

Component Layout Diagrams

Tone Remote Adapter

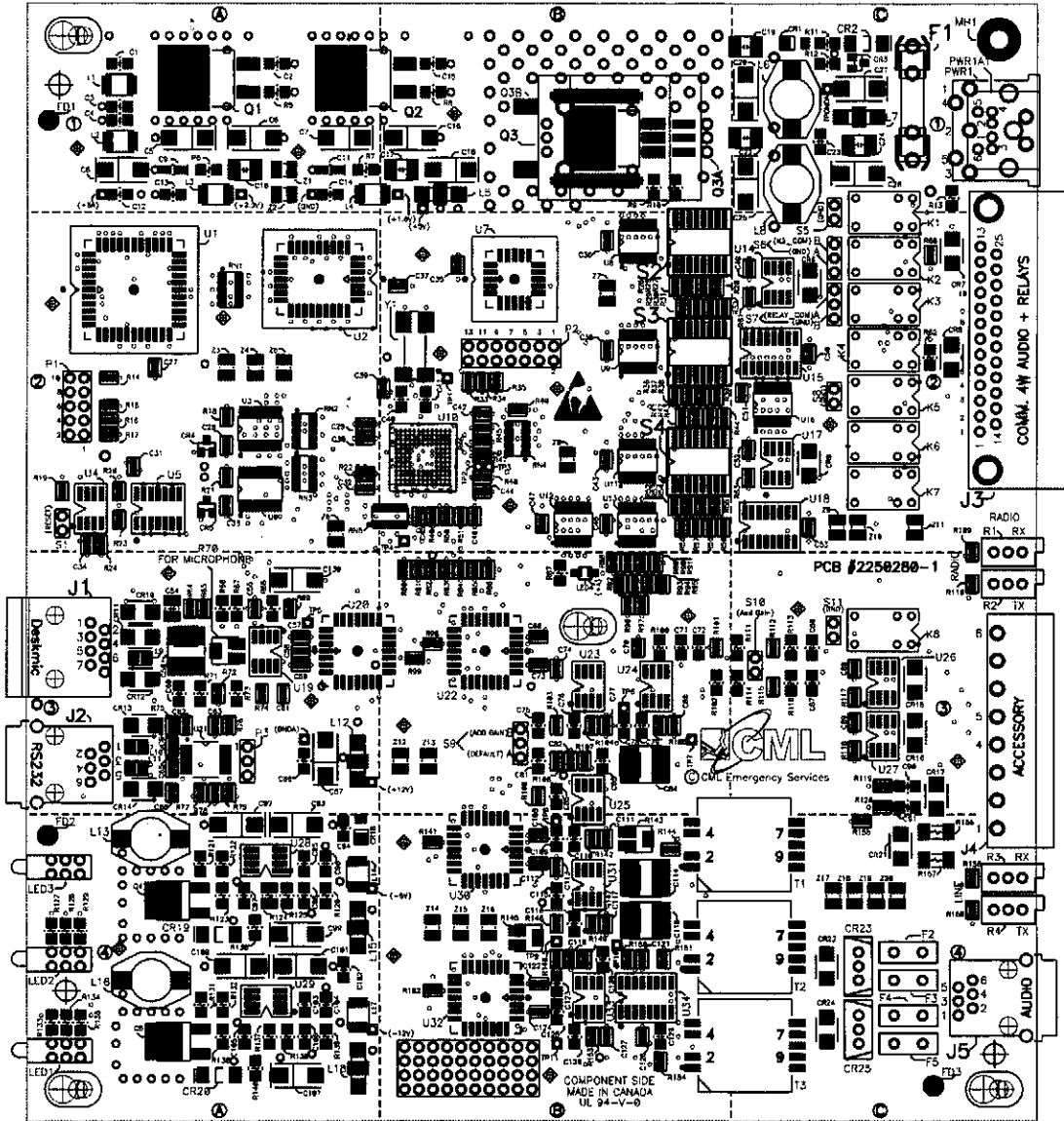
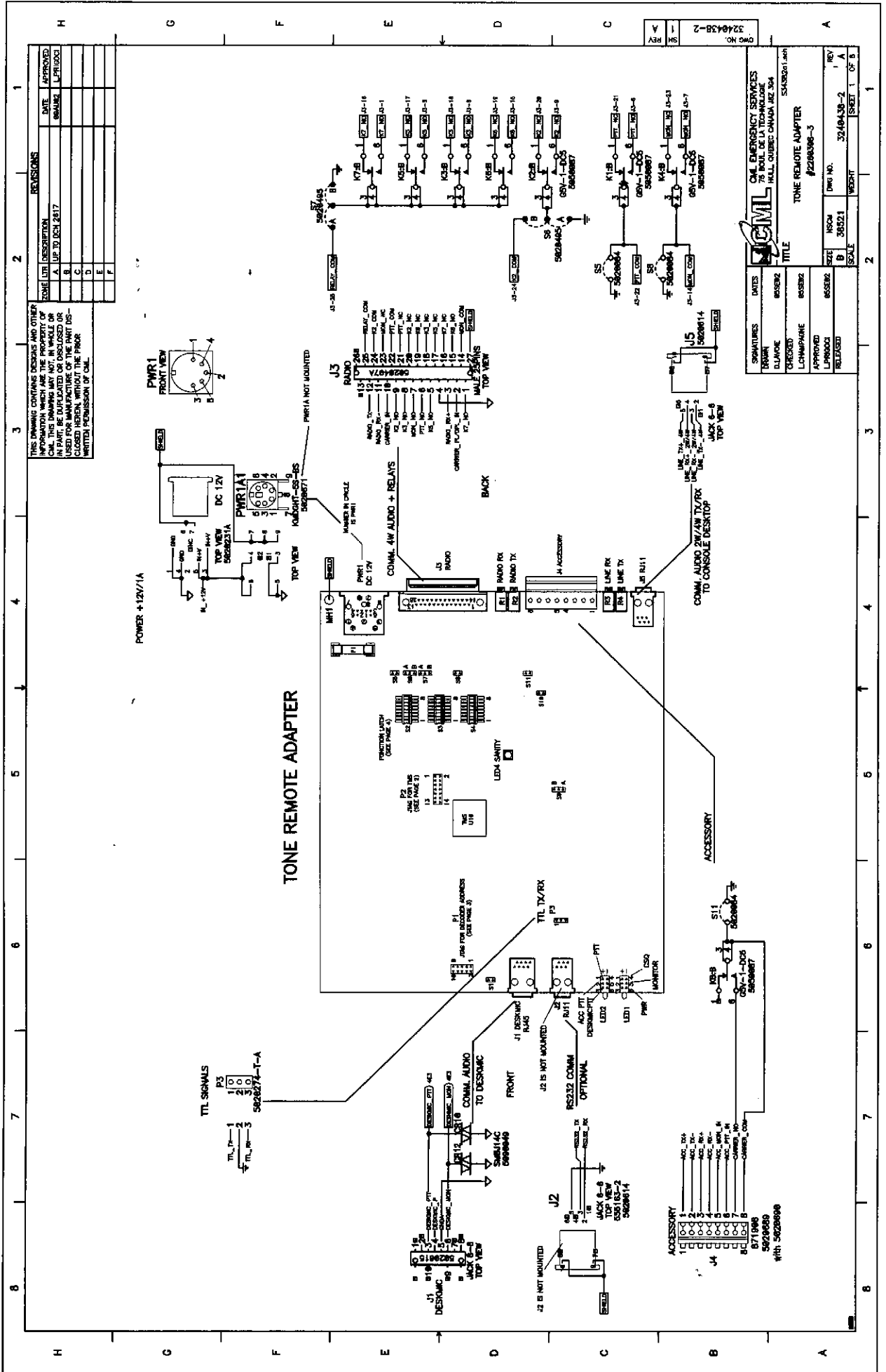


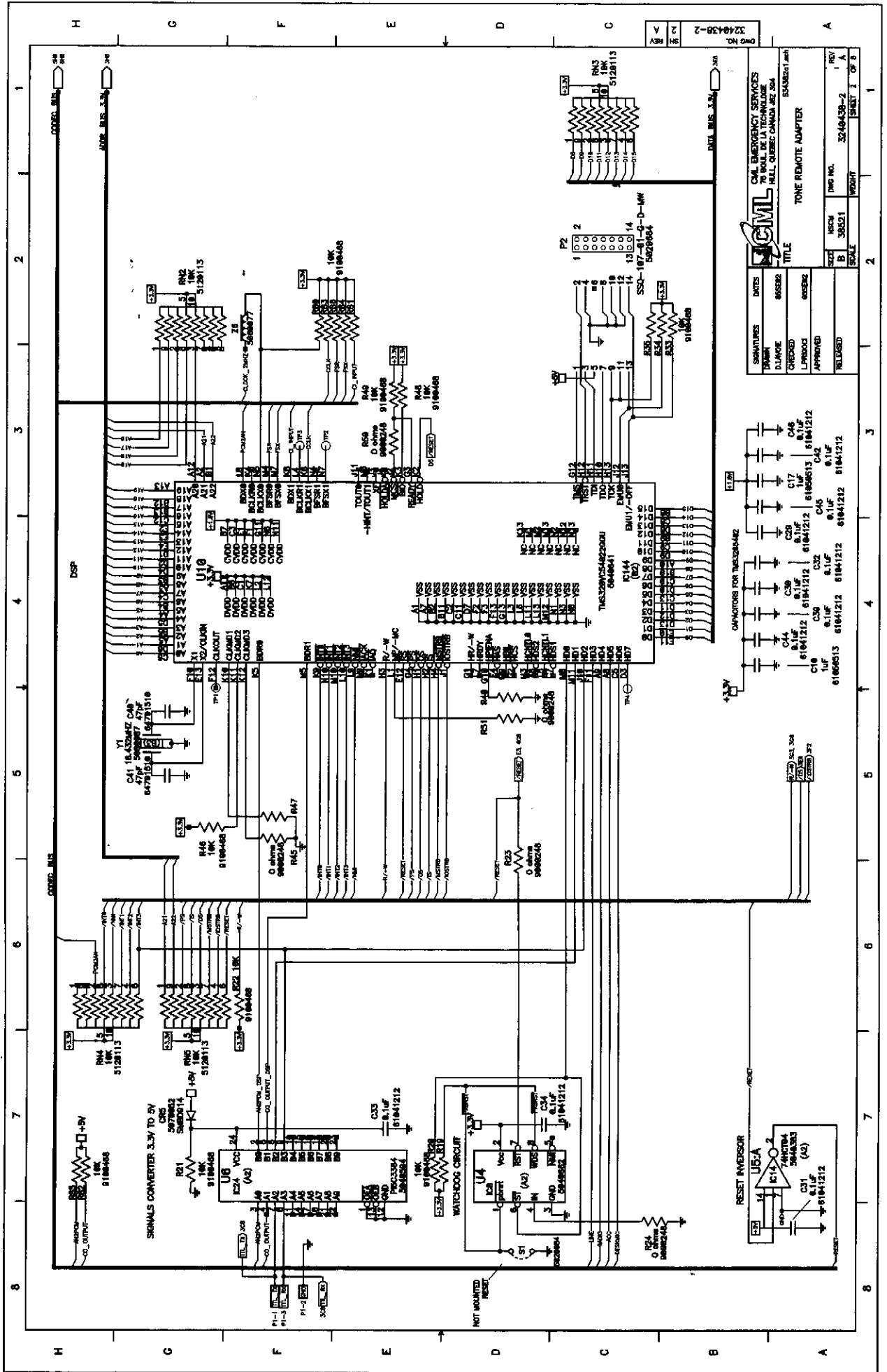
Figure A-1: Tone Remote Adapter Circuit Board

Schematics — (2260398-3) Tone Remote Adapter Main Board (1 of 7)

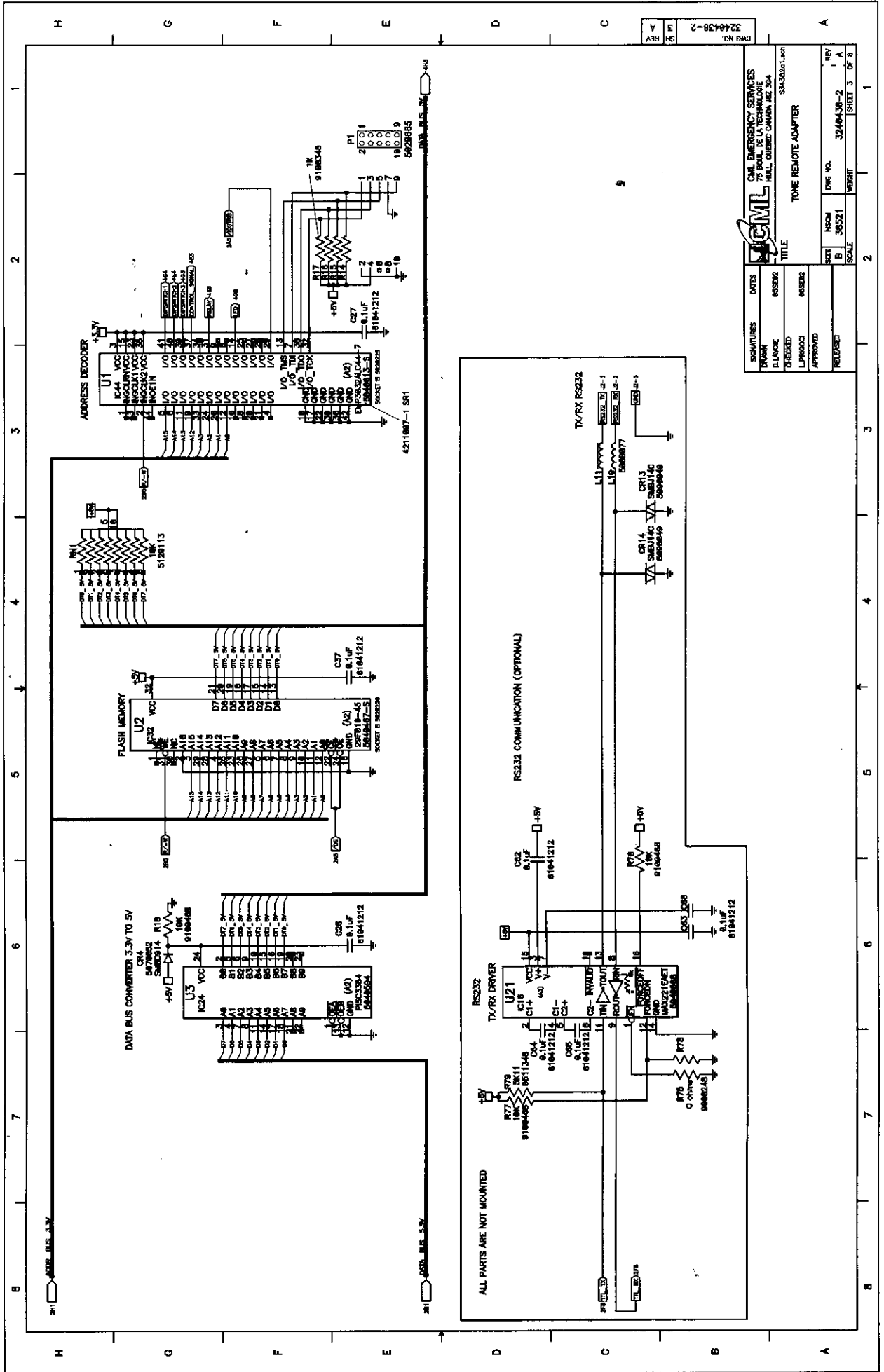


Schematics — (2260398-3) Tone Remote Adapter Main Board (2 of 7)

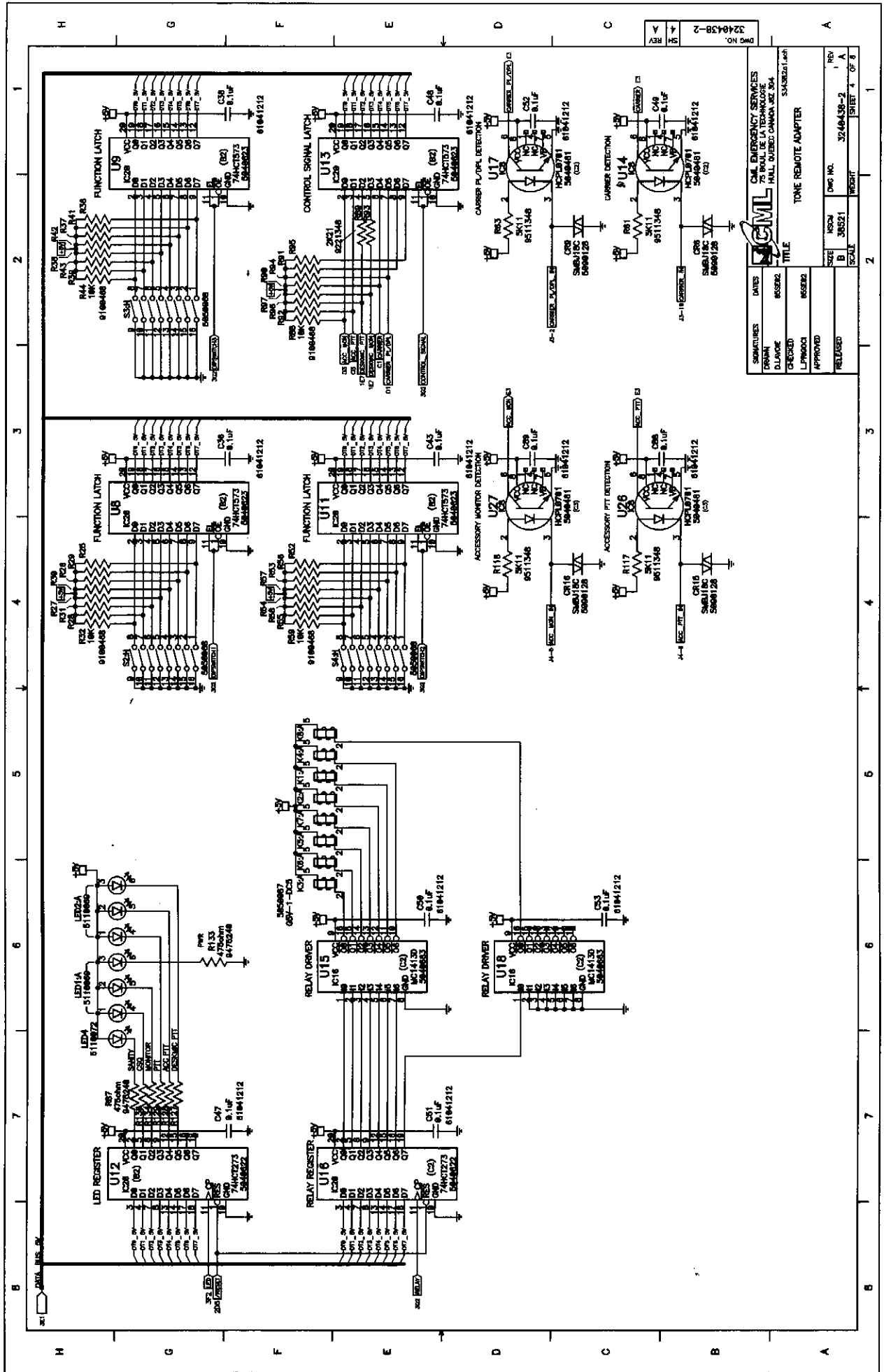
A-4



Schematics — (2260398-3) Tone Remote Adapter Main Board (3 of 7)



Schematics — (2260398-3) Tone Remote Adapter Main Board (4 of 7)

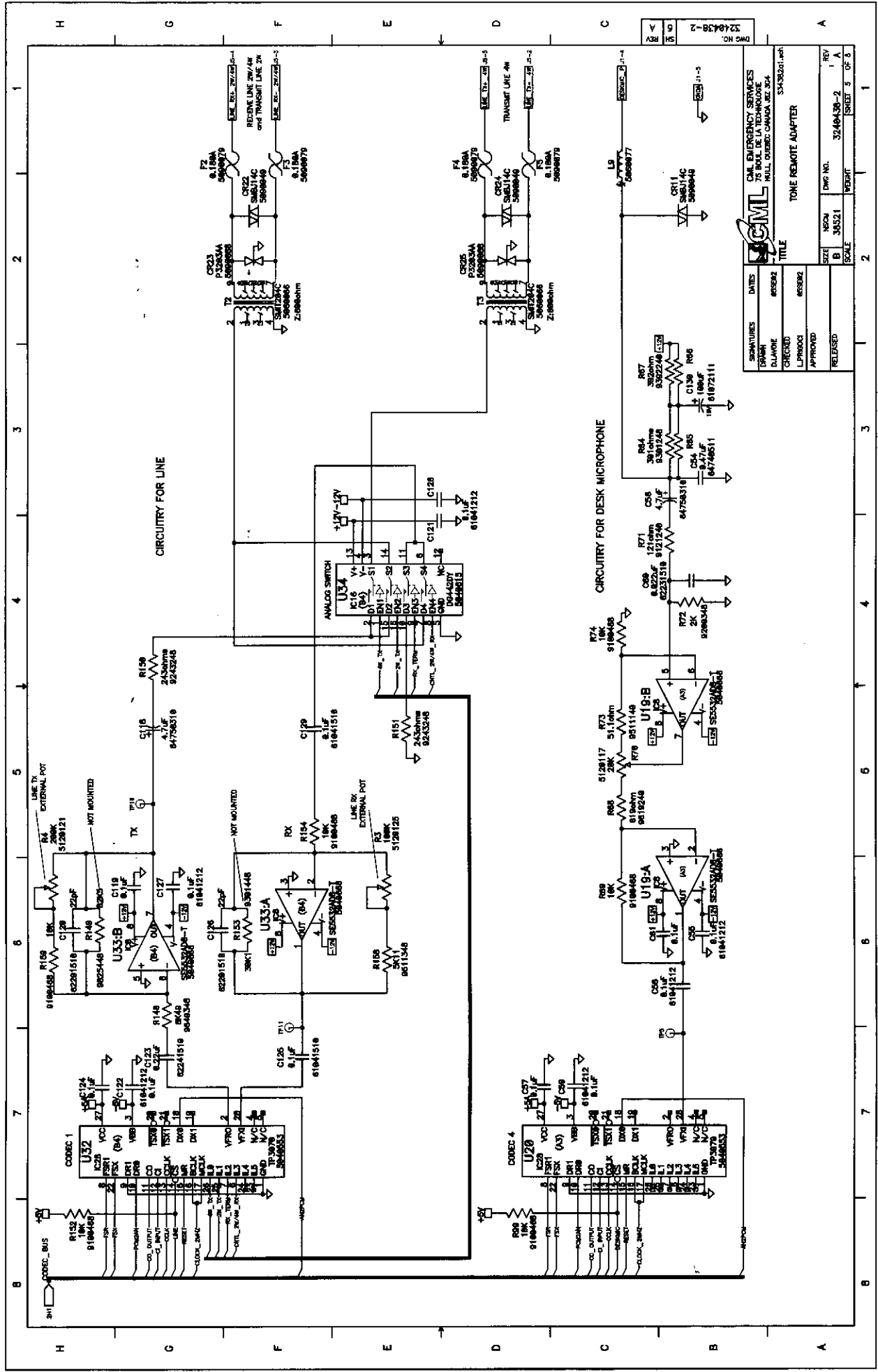


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DLAYNE	06/29/92				A
CHECKED					
APPROVED					
RELEASED					

CMIL EMERGENCY SERVICES	
HALL QUOTE: CANON 82.3A	
TITLE	
TONE REMOTE ADAPTER	
REV	DWG NO.
B	3246438-2
SCALE	SHEET
	4 OF 6

DWG NO. 3246438-2
REV 2

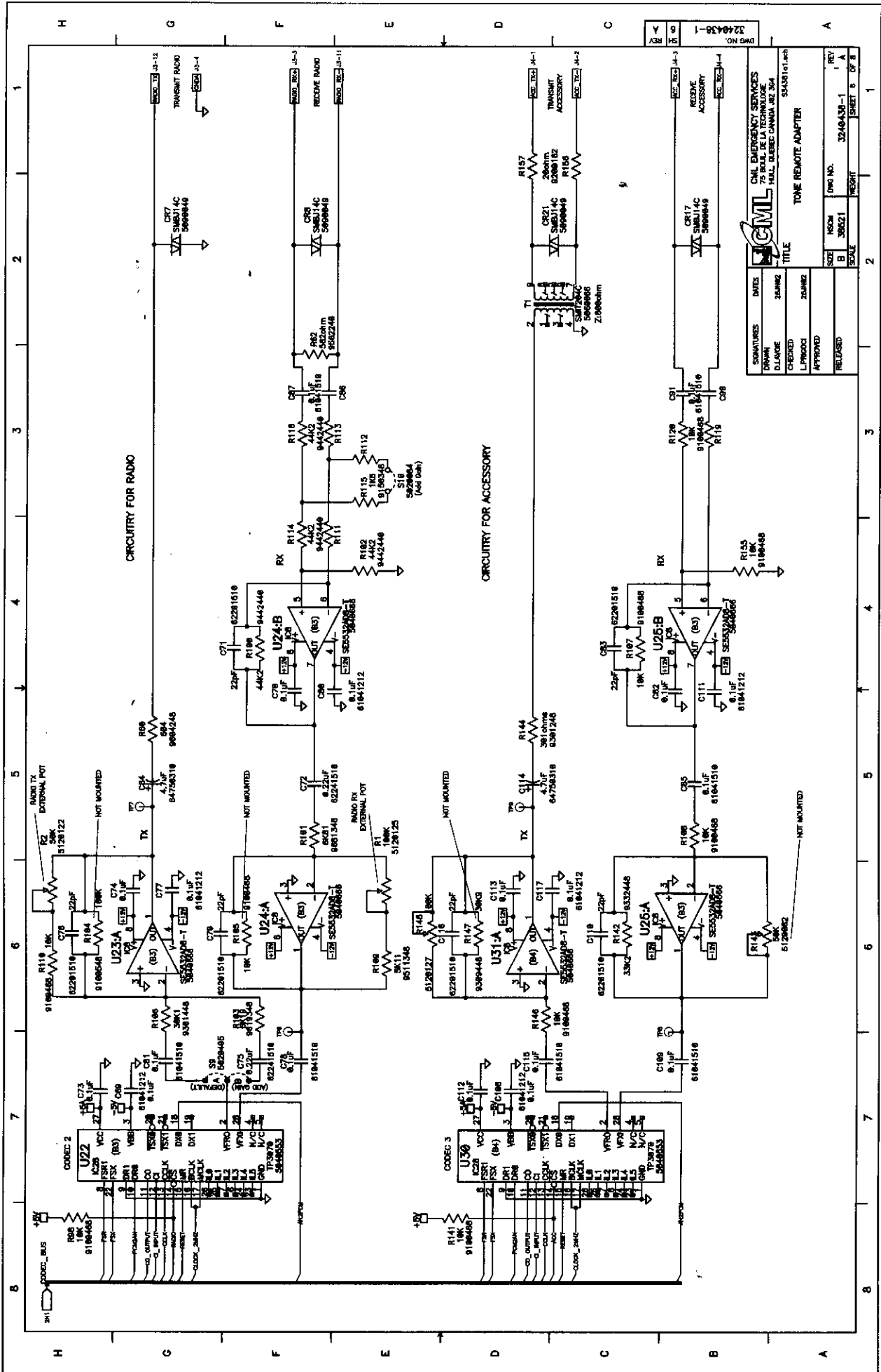
Schematics — (2260398-3) Tone Remote Adapter Main Board (5 of 7)



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CMML CAN EMERGENCY SERVICES 75 BOUL. DE LA TECHNOLOGIE MONTREAL, QUEBEC H3T 1K6 CANADA INC. 304					
TITLE					
TONE REMOTE ADAPTER					
SIZE	SCALE	WEIGHT	SHEET 5 OF 5		
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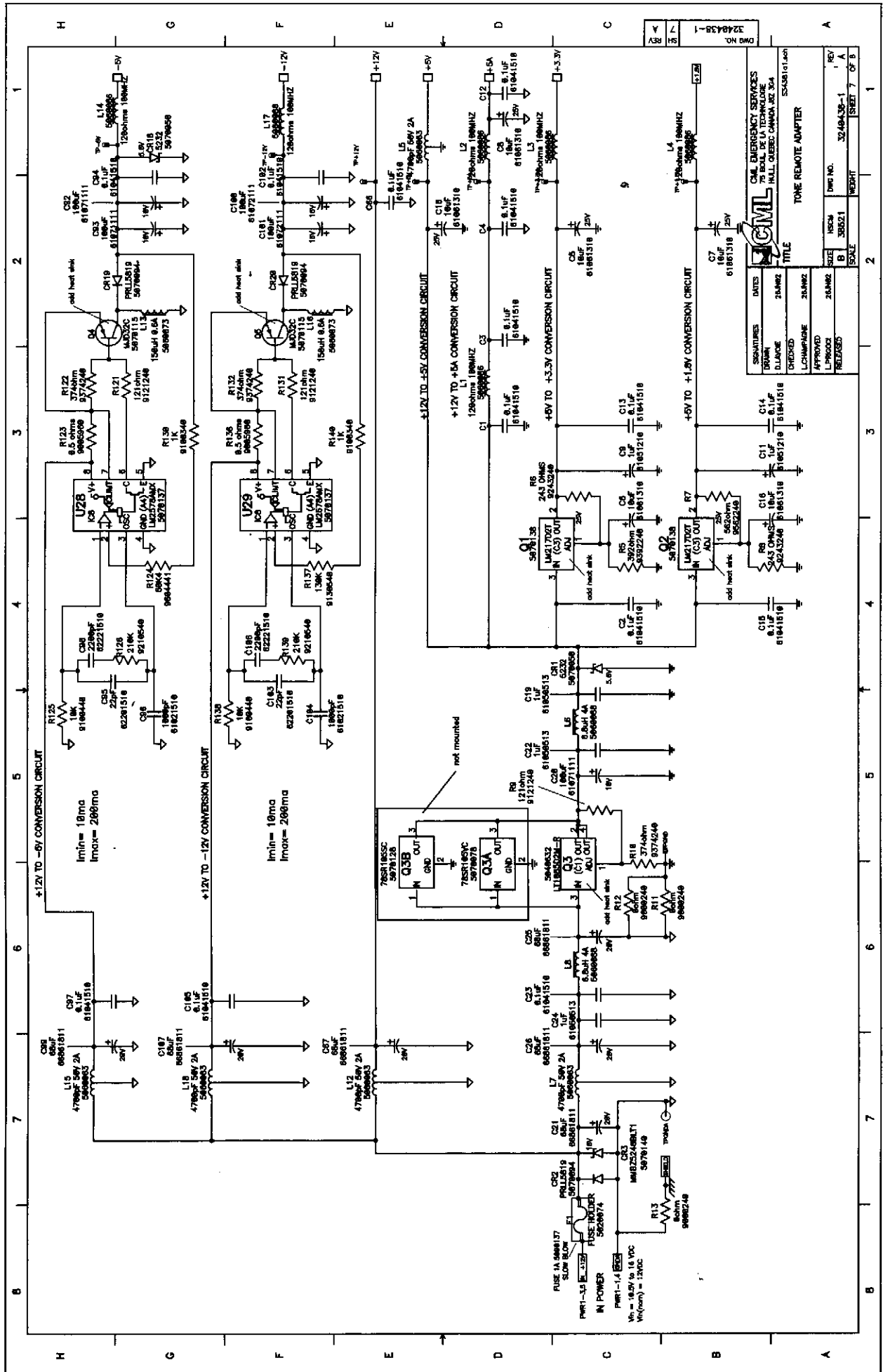
Schematics — (2260398-3) Tone Remote Adapter Main Board (6 of 7)

A-8



SIGNATURES		DIMS		DRAWN		CHECKED		APPROVED		RELEASED	
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LPRINCE	26JAN82										
<p>CML CORPORATION 75 BELL LA TECH RD HALL, QUEBEC CANADA J2R 5A4</p> <p>TONE REMOTE ADAPTER</p> <p>QWL NO. 3248438-1 REV. 1</p> <p>SCALE: 1:1 SHEET 6 OF 8</p>											

Schematics — (2260398-3) Tone Remote Adapter Main Board (7 of 7)

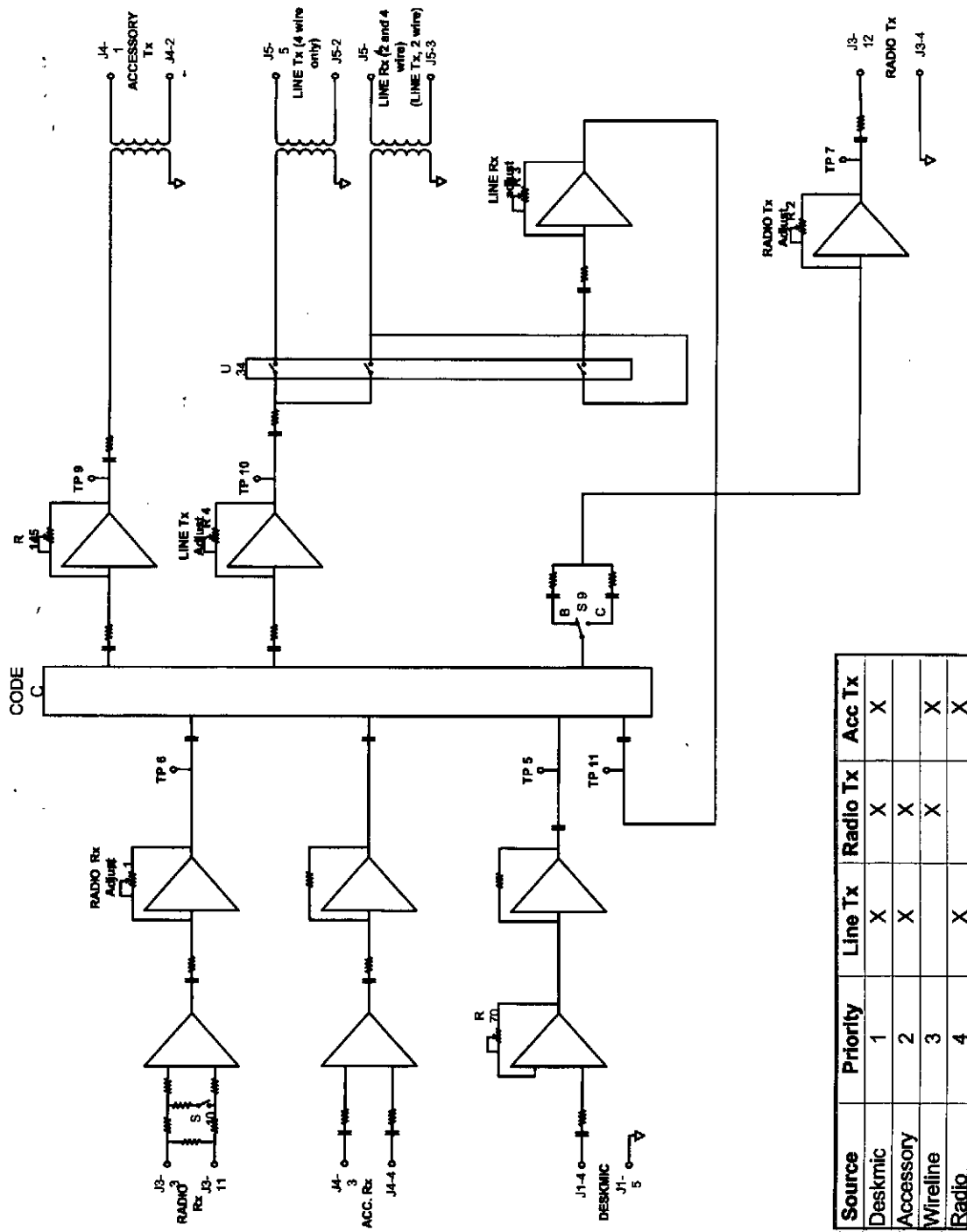


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Schematics — (2260398-3) Audio Path Block Diagram (1 of 1)

**TONE REMOTE
ADAPTER**
Audio Path Block Diagram



Source	Priority	Line Tx	Radio Tx	Acc Tx
Deskmic	1	X	X	X
Accessory	2	X	X	
Wireline	3		X	X
Radio	4	X		X

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