TM8000 mobiles

TM8100 Mobile Radio
Accessories Manual

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Contents

Preface

Scope of Manual

This manual contains information on installing, operating and servicing accessory products for TM8100 radios.

Enquiries and Comments

If you have any enquiries regarding this manual, or any comments, suggestions and notifications of errors, please contact Technical Support (refer to "Contact Information" on page 2).

Updates of Manual and Equipment

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Associated Documentation

MM8100-00-03-804 TM8100 Mobile Radio User's Guide

MM8100-02-00-812 TM8100 Mobile Radio Service Manual

All available TM8100 product documentation is provided on the TM8100 Product Support CD, product code TMAA20-01. Updates may also be published on the Tait support website.

Publication Record

Version	Publication Date	Description
1.00	September 2003	first release
2.00	December 2003	added information about the TMAA01-01 line-interface board, TMAA02-06 support kit for concealed and dynamic microphones, TMAA10-02 handset and TMAA10-03 high-power remote speaker
2.10	March 2004	added information about the TOPA-SV-024 test unit

Alert Notices

Within this manual, four types of alerts are given to the reader: warning, caution, important and note. The following paragraphs illustrate each type of alert and its associated symbol.

Warning!! **This alert is used when there is a potential risk of death or serious injury.**

Caution **This alert is used when there is the risk of minor or moderate injury to people.**

Important This alert is used to warn about the risk of equipment damage or malfunction.

Note This alert is used to highlight information that is required to ensure that procedures are performed correctly.

Abbreviations

Abbreviation	Description
AF	Audio Frequency
ALC	Automatic Level Control
CD	Compact Disk
CMOS	Complementary Metal Oxide Semiconductor
DTMF	Dual Tone Multiple Frequency
DIP	Dual In-Line Package
ESD	Electrostatic Discharge
IC	Integrated Circuit
IPN	Internal Part Number
LED	Light Emitting Diode
NB	Narrow Bandwidth (12.5kHz channel spacing)
PABX	Private Automatic Branch Exchange
PCB	Printed Circuit Board
PGA	Programmable-Gain Amplifier
PSTN	Public Switched Telephone Network
PTT	Press-To-Talk
PSTN	Public Switched Telephone Network
RF	Radio Frequency
SPI	Serial Peripheral Interface
WB	Wide Bandwidth (25kHz channel spacing)

1 Safety and Servicing Information

This chapter contains general information about safety and servicing procedures when working with TM8000 radios. While many TM8100 accessories plug into external radio interfaces, some accessories are fitted inside the radio. Refer to the TM8100 Service Manual for detailed disassembly and reassembly information

1.1 Personal Safety

Explosive Environments

Warning!! **Do not operate equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.**

Proximity to RF Transmissions

Do not operate the transmitter when someone is standing within 0.9m (35 inches) of the antenna. Do not operate the transmitter unless you have checked that all RF connectors are secure.

High Temperatures

The bottom surface of the radio and heatsink fins can become hot during prolonged operation. Do not touch these parts of the radio.

1.2 Equipment Safety

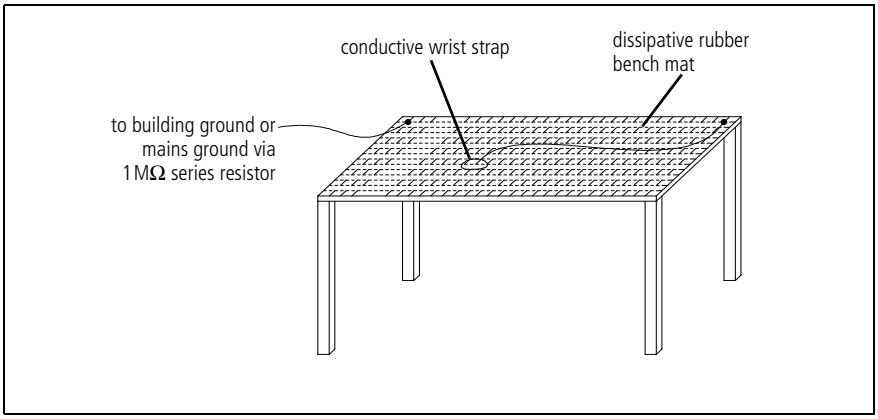
ESD Precautions

Important This equipment contains devices which are susceptible to damage from static discharges. You must handle these devices carefully and according to the procedures described in the manufacturers' data books.

Purchase an antistatic bench kit from a reputable manufacturer and install and test it according to the manufacturer's instructions. Figure 1.1 shows a typical antistatic bench set-up.

You can obtain further information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ESD S4.1-1997 (revised) or BS EN 100015-4 1994. The Electrostatic Discharge Association website is http://www.esda.org/.

Figure 1.1 Typical antistatic bench set-up



Antenna Load

The TM8100 radio has been designed to operate safely under a wide range of antenna loading conditions. However, the radio should always be operated with a suitable load to prevent damage to the transmitter output power stage.

1.3 Identifying Screw Types

Torx Recess Head Screws

Torx recess head screws are the standard type of screw used in TM8100 equipment, although Pozidriv head screws are also used in a few special applications.

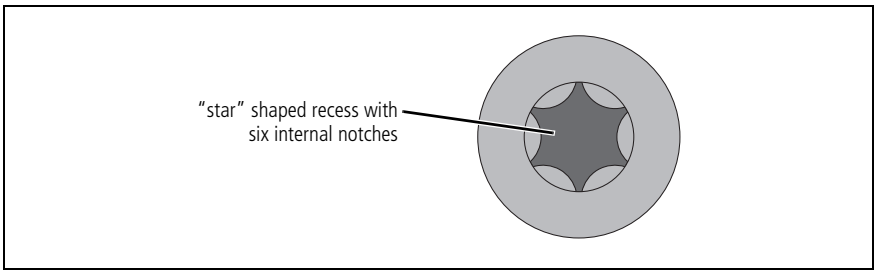
The Torx recess head has the advantage of improved screwdriver tip location, reducing the chances of screw head damage caused by the driver tip rotating within the recess. In addition, using a ball-tip Torx screwdriver allows you to drive a Torx head screw with the driver on a slight angle, which can be useful in situations where access is restricted.

It is important that you use the correct Torx screwdriver tip:

- M2.5 screws - T8
- M3 screws - T10
- M4 screws - T20.

Figure 1.2 below shows a typical Torx recess head screw (the actual hardware may differ slightly from this illustration due to variations in manufacturing techniques).

Figure 1.2 Identifying Torx screws



Allen UNC Screws

Allen 4-40 UNC thread screws are used in some locations in the TM8100 radio and cannot be interchanged with M3 screws.

Pozidriv and Philips Screws

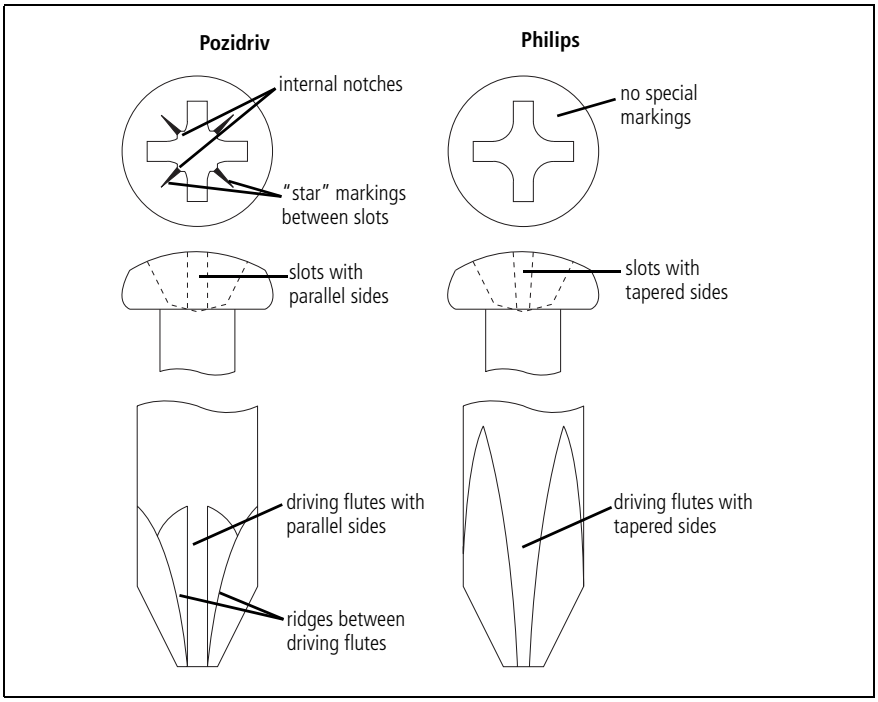
Both Pozidriv and Philips head screws are used on certain TM8100 accessories. It is important that you use the correct type and size screwdriver to avoid damaging screw heads.

It is particularly important that you do not use Philips screwdrivers on Pozidriv screw heads as the tapered driving flutes of the Philips screwdriver do not engage correctly with the parallel-sided slots in the Pozidriv screw head. This can result in considerable damage to the screw head if the screwdriver tip turns inside the recess.

Note If you find you need excessive downwards pressure to keep the screwdriver tip in the Pozidriv screw head, you are probably using the wrong type or size screwdriver.

Figure 1.3 on the following page shows the main differences between typical Pozidriv and Philips screw heads and screwdriver tips (actual hardware may differ slightly from these illustrations due to variations in manufacturing techniques).

Figure 1.3 Identifying Pozidriv and Philips screws and screwdrivers



1.4 Regulatory Information

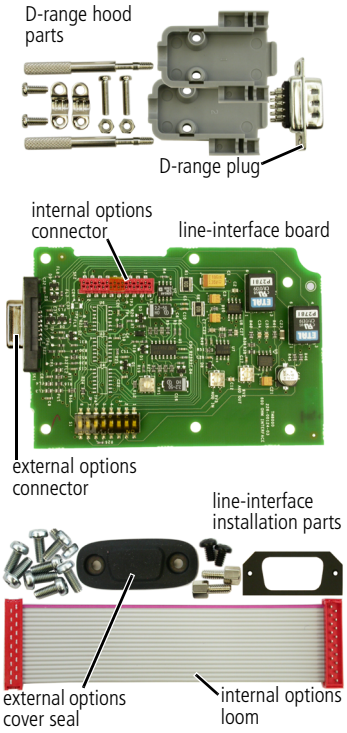
Any modifications you make to this equipment which are not authorised by Tait Electronics Ltd may invalidate your compliance authority's approval to operate the equipment.

1.5 PCB Information

All PCBs are identified by a unique 10 digit IPN (internal part number) which is printed onto the PCB (usually on the top side), as shown in the example below:

The last two digits of this number define the issue status, which starts at 01 and increments through 02,03, 04, etc. as the PCB is updated. If the PCB information contained in a section of this manual does not match the PCB number printed on your board, contact Technical Support (refer to "Contact Information" on page 2).

2 TMAA01-01 Line-Interface Board



The TMAA01-01 line-interface board provides both audio and digital interfaces for a variety of systems. The interfaces available are:

- an isolated 600Ω audio interface which is capable of both simplex operation on a two-wire system, or duplex operation on a four-wire system
- a keying interface which allows for two-wire keying or single line bi-directional keying
- a variable delay timer
- a logic sense control.

The line-interface board fits inside the radio in the options cavity and is connected to the main PCB by the internal options loom. The high-density 15-way D-range connector mounted on the line-interface board fits through the external options connector hole provided in the radio chassis.

Important The radio does not meet the IP54 protection standard once a line-interface board has been installed unless the external options cover seal is installed.

2.1 Operation

One of the control head function keys may be programmed to toggle the line-interface board on and off. When the function key LED is glowing, the line-interface board is on and when the LED is off, the line-interface board is off.

Refer to "Programming Information" on page 23 for information on the radio programming procedure.

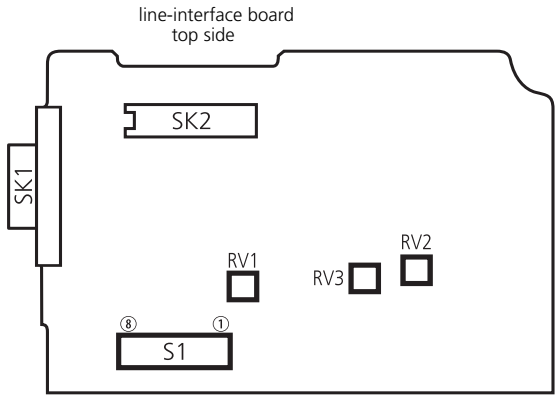
2.2 Configuring the Line-Interface Board

Important This equipment contains devices which are susceptible to damage from static charges. Refer to "ESD Precautions" on page 13 for more information.

2.2.1 Adjustment Points on the Line-Interface Board

The following table describes the line-interface adjustment points. Adjustments are made by setting the DIP switches on S1 to either "on" or "off" and by three variable resistors (RV1, RV2 and RV3).

Table 2.1 Line-interface board adjustment points

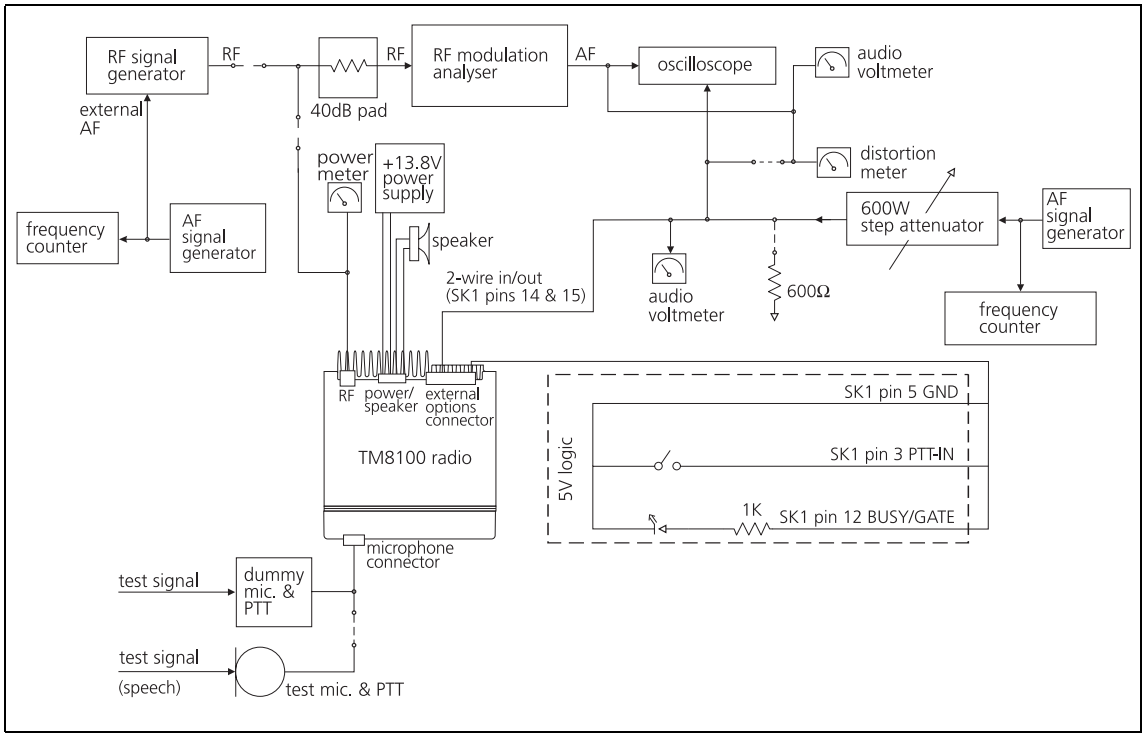


Function	Selection 1	Selection 2
two-wire audio interface	DIP1 on	DIP2 off
four-wire audio interface	DIP1 off	DIP2 on
busy/gate = busy	DIP3 on	DIP4 off
busy/gate = rx-gate	DIP3 off	DIP4 on
busy/gate logic inverted	DIP5 off	DIP6 on
busy/gate logic normal	DIP5 on	DIP6 off
bi-directional keying line	DIP7 on	
two-wire keying	DIP 7 off	
enable keying delay	DIP8 off	
keying delay	adjust RV1	
audio line out level	adjust RV2	
audio line in level	adjust RV3	

2.2.2 Test Equipment Setup

The following diagram shows the setup of the test equipment used when adjusting RV1, RV2 and RV3.

Figure 2.1 Line-interface test equipment setup



2.2.3 Configuration Procedure

The line-interface board configuration must be completed before the board is installed in the radio, as the top side of the line-interface board is not accessible once the board is screwed to the radio lid. To configure the line-interface board, carry out the following steps.

1. Program the radio in which the line-interface board is being installed with default line-interface test settings. The default test settings are explained in the following tables.

Note A general description of IOP_GPIO lines used with the line-interface board is given in Table 2.6 on page 23.

Table 2.2 Line-interface default test settings in the Programmable I/O form, Digital tab

Pin	Direction	Label	Action	Active	Debounce	Signal State	Mirrored
IOP_GPIO1	Input	None	External PTT 1	Low	60	None	None
IOP_GPIO2	Output	0	No Action	Low	None	None	None
IOP_GPIO3	Output	BUSY	Busy Status	High	None	None	None
IOP_GPIO4	Output	FKEY	F1 Key Status[a]	Low	None	Latching	None

a. One of the four control head function keys may be selected to control the line-interface AUX line, which turns the line-interface board on and off. For the associated LED to reflect the status of the line-interface board, the Function Key Action field on the Key Settings form must be set to Action Digital Output Line.

Table 2.3 Line-interface settings in the Programmable I/O form, Audio tab

Rx/PTT Type	Tap In	Tap In Type	Tap In Unmute	Tap Out	Tap Out Type	Tap Out Unmute
Rx	None	A-Bypass In	On PTT	R7	D - Split	Busy Detect
EPTT1	T5	A-Bypass In	On PTT	None	C-Bypass 0	On PTT

Table 2.4 Line-interface settings in the PTT form, External PTT (1) tab

Field		Setting
Advanced PTT	PTT Transmission Type	Voice
	Audio Source	Audio Tap In

2. Set the DIP switches on the line-interface board (S1) to the following default test settings:
   - DIP1 on (two-wire audio interface)
   - DIP2 off
   - DIP3 off
   - DIP4 on (busy/gate = rx-gate)
   - DIP5 on (busy/gate logic normal)
   - DIP6 off
   - DIP7 off (two-wire keying)
   - DIP8 off (time delay enabled).

3. Disassemble the radio in order to gain access to the options cavity. For detailed disassembly instructions, refer to the disassembly procedure in the TM8100 Service Manual.

   Connect the internal options loom between SK2 on the line-interface board and SK102 on the radio's main PCB.

4. Set up the test equipment shown in Figure 2.1, and follow the adjustment procedure for RV1, RV2 and RV3 described in the following section.

2.2.4 Adjusting RV1, RV2 and RV3

Setting the Keying Time Delay (RV1)

The keying time delay circuit is used to prevent the burst of noise occurring before a mobile is able to mute the audio when the carrier signal disappears. The keying time delay is used in conjuction with the keying signal (SK1 pin 1).

Set DIP8 off, and adjust RV1 for the required time delay. Rotate RV1 clockwise to increase the delay, and counterclockwise to reduce the delay.

Setting the Line Output Level (RV2)

Monitor the line output (SK1 pins 14 and 15) and apply an on-channel signal from the RF signal generator at an output level of -47 dBm, modulated to 60% of system deviation, at 1 kHz AF.

Adjust the RV2 for a line output level of -10 dBm.

Setting the Line Input Level (RV3)

Apply a line input signal of -10 dBm and key the transmitter.

- For a two-wire configuration, apply the line input signal to pins 14 and 15 on SK1.
- For a four-wire configuration, apply the line input signal to pins 4 and 10 on SK1.

Adjust RV3 until 60% of system deviation at 1 kHz is achieved.

2.3 Installing the Line-Interface Board

Note The line-interface board link options must be set before the board is installed in the radio, as the top side of the line-interface board is not accessible once the board is screwed to the radio lid.

2.3.1 Parts Required

The following table describes the parts required to install a line-interface board in a radio. The parts marked with an asterisk (★) are not shown in Figure 2.2 and are used to connect to the radio's external options connector.

Table 2.5 Line-interface installation parts required

Quantity	Internal Part Number	Description	Figure 2.2 Reference
1	362-01110-XX[a]	foam seal	③
1	362-01108-XX[a]	cover seal	⑪
2	347-00011-00	4-40x3/16 screws	⑫
2	354-01043-00	screw-lock fasteners	⑦
6	349-02062-00	M3x8 screws	⑨
★1	240-00010-80	D-range plug	—
★1	240-06010-29	D-range hood	—

a. Contact Technical Support for the exact IPN.

2.3.2 Installation Procedure

1. Disassemble the radio in order to gain access to the options cavity.

   For detailed disassembly instructions, refer to the disassembly procedure in the TM8100 Service Manual.

The circled numbers in the following instructions refer to items in the diagram on the previous page.

2. Remove the top cover and lid ① from the radio to access the options cavity.

3. Remove the external options connector bung ②, if it is fitted.

4. On the inside of the radio lid place the foam seal ③ over the external options connector cavity ④.

5. With the top side of the line-interface board ⑤ facing the radio lid, guide the external options connector ⑥ (the D-range connector on the line-interface board) into the external options connector cavity.

6. Screw the external options connector to the radio lid using the two screw-lock fasteners ⑦.

   Tighten the fasteners to a torque of 0.9N·m (8lbf·in).

Important The external options connector screw-lock fasteners must be tightened correctly before screwing the line-interface board onto the mounting posts ⑧.

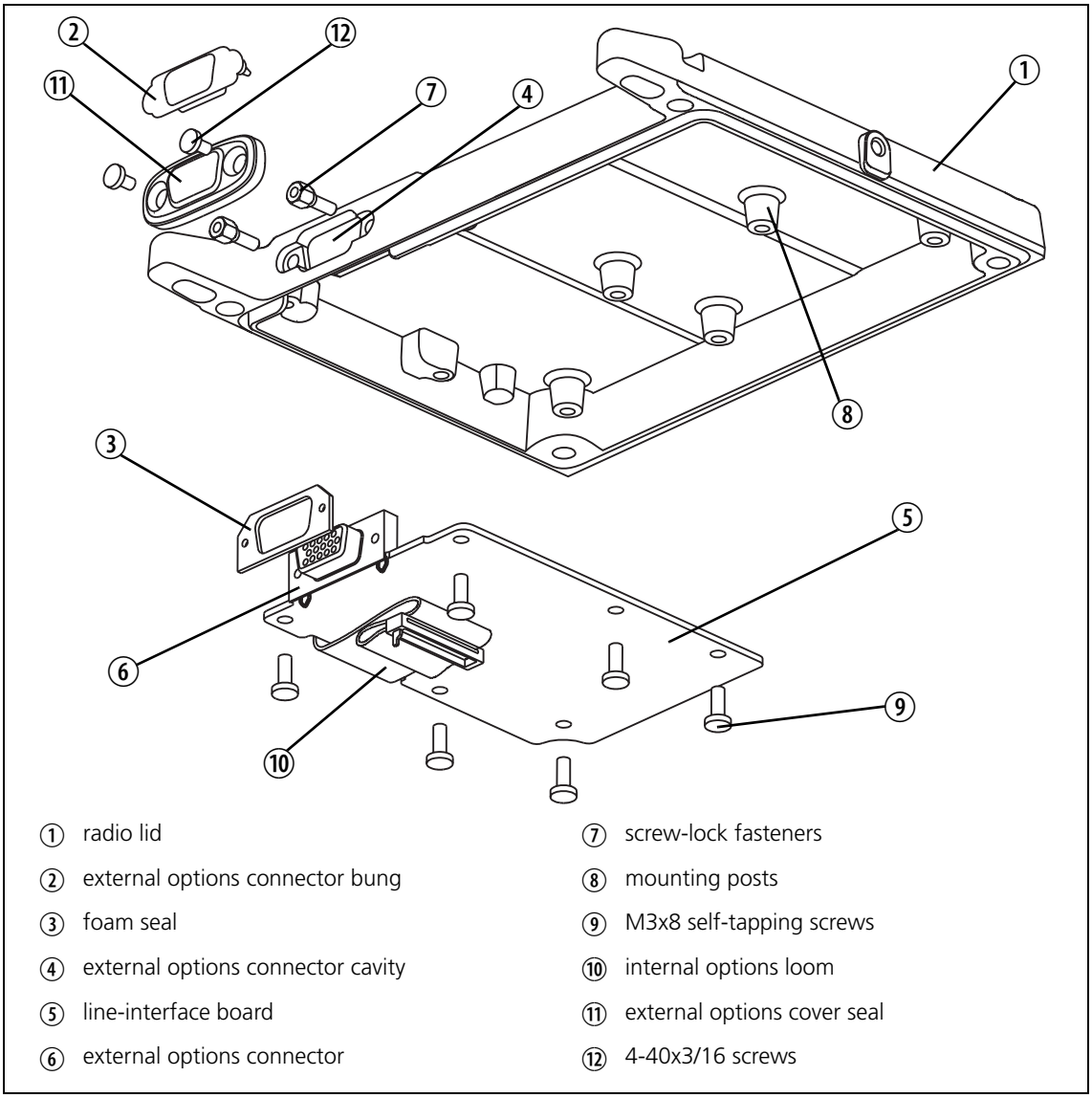
7. Screw the line-interface board to the mounting posts on the radio lid using six M3x8 self-tapping screws ⑨.

   Tighten the M3x8 screws to a torque of 1.9N·m (17lbf·in)

8. Plug the unattached end of internal options connector loom ⑩ into the internal options connector on the radio main PCB.

9. Refit the radio lid and top cover to the radio and screw the external options cover seal ⑪ over the external options connector, using the two 4-40x3/16 screws ⑫.

Figure 2.2 Installing the line-interface board



① radio lid
② external options connector bung
③ foam seal
④ external options connector cavity
⑤ line-interface board
⑥ external options connector
⑦ screw-lock fasteners
⑧ mounting posts
⑨ M3x8 self-tapping screws
⑩ internal options loom
⑪ external options cover seal
⑫ 4-40x3/16 screws

2.4 Programming Information

The lines from the radio's internal options connector that are used by the line-interface board are IOP_GPIO1 to IOP_GPIO4. The behaviour of these lines is configured in the Programmable I/O and PTT forms of the TM8000 Programming Application. Refer to the online help of the programming application for more information.

The Table 2.6 explains the required input and output line-interface connections.

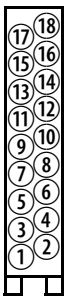
Table 2.6 Line-interface input and output connections

Radio Signal	Function	Comments
GPIO1	PTT FROM OPT	This signal causes the radio to transmit. This normally requires External PTT1 to be set up in the Digital tab of the Programmable I/O form and the External PTT (1) tab of the PTT form.
GPIO2	Busy/Gate	This active high signal allows connection to the Busy/Gate output signal. If this is not used, the Action field is set to No Action and the Active field is set to Low.
GPIO3	Busy/Gate (Keying Line)	This active high signal allows connection to the Busy/ Gate output signal. This signal also allows the single line keying functionality.
GPIO4	AUX	This allows the line-interface board to be disabled. One of the four control head function keys is selected to control this AUX line. For the associated LED to reflect the status of the line-interface board, the Function Key Action field on the Key Settings form must be set to Action Digital Output Line.

2.5 Interface Specification

The following tables summarize the signals used for the line-interface board on the internal options connector (SK2 on the line-interface board) and the external options connector (SK1 on the line-interface board).

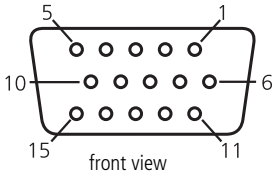
Table 2.7 Internal options connector (SK2) - pins and signals



top view

Pin	Radio Signal	Line-Interface Signal	Description
1	13V8_SW	13V8 FROM RADIO	switched 13V8 supply from the radio
2	AUD_TAP_OUT	AUDIO TAP OUT	Programmable tap point out of the receive or transmit audio chain.
3	AGND	AGND	analogue ground
4	AUX_MIC_AUD	—	not connected
5	RX_BEEP_IN	—	not connected
6	AUD_TAP_IN	AUD_TAP_IN	Programmable tap point into the receive or transmit audio chain.
7	RX_AUD	—	not connected
8	RSSI	—	not connected
9	IOP_GPIO1	PTT FROM OPT	IOP_GPIO1 from the radio 3V3 logic level, 5V tolerant
10	IOP_GPIO2	SECONDARY BUSY	IOP_GPIO2 from the radio 3V3 logic level, 5V tolerant
11	IOP_GPIO3	BUSY	IOP_GPIO3 from the radio 3V3 logic level, 5V tolerant
12	IOP_GPIO4	AUX	IOP_GPIO4 from the radio 3V3 logic level, 5V tolerant
13	IOP_GPIO5	GPIO5	IOP_GPIO5 from the radio 3V3 logic level, 5V tolerant
14	IOP_GPIO6	—	not connected
15	IOP_GPIO7	—	not connected
16	DGND	AGND	analogue ground
17	IOP_RXD	RXD	asynchronous serial port - receive data
18	IOP_TXD	TXD	asynchronous serial port - transmit data

Table 2.8 External options connector (SK1) - pins and signals

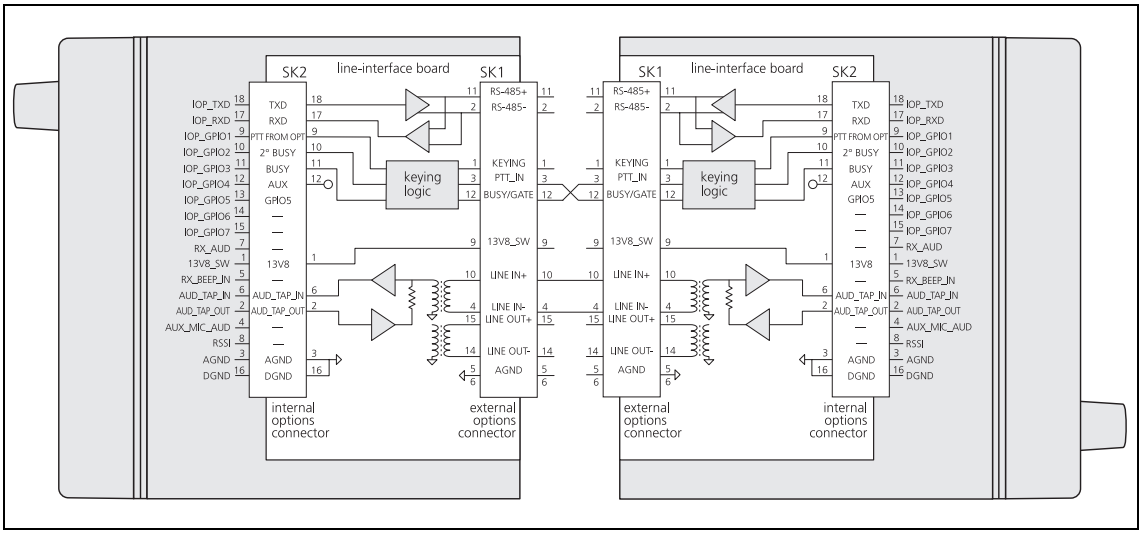


Pin	Signal	Description
1	KEYING	signal line keying
2	—	not connected
11	—	not connected
3	PTT-IN	bi-directional keying input
4	4W_LINE_IN -	4-wire line in negative
10	4W_LINE_IN +	4-wire line in positive
5	GND	ground
6	GND	ground
7	—	not connected
8	—	not connected
9	13V8 FROM RADIO	switched 13.8V supply from the radio
12	BUSY/GATE	Busy or receiver gate output. 5V CMOS logic level.
13	—	not connected
14	4W_LINE_OUT -	4-wire line out negative or 2-wire line in/out negative
15	4W_LINE_OUT +	4-wire line out positive or 2-wire line in/out positive

2.6 Line-Interface Board Application

The following diagram shows the control of two radios operated together, crossband or repeater linked.

Figure 2.3 Two radios connected as a repeater/crossband link



2.7 Line-Interface Board Specifications

Input Voltage	10.8V to 16VDC
Operating Temperature Range	-10°C to +60°C ambient
DC Input Current	<40mA total (+13.8V supply)
Line Input Sensitivity (60% deviation)	-20dBm to +6dBm (600Ω)
Line Output Level (60% deviation)	-20dBm to +6dBm (600Ω)
Line Impedance	600Ω
Return Loss (300Hz to 3kHz)	>20dB relative to 600Ω
Line Output Filter Response (stopband)	
2 pole	-12dB/octave, f >4kHz
6 pole	-36dB/octave, f >4kHz

2.7.1 Radio With Line-Interface Board: Receiver + Line Output

Receiver Frequency Response*	
Receiver Processed Bandwidth	300Hz to 3kHz (standard 400Hz to 3kHz (CTCSS)
Response	+1, -3dB relative to -6dB/octave
Receiver Unprocessed	+1, -3dB (300Hz to 3kHz)
*relative to 1kHz, 60% deviation	
Test Signal	-46dBm RF*, 0dBm line output, audio tap T4 *60% deviation at 1kHz
Signal-to-Noise Ratio	
Narrow Band	>40dB
Wide Band	>43dB
Mute Ratio	>60dB
Distortion*	
Narrow Band	<4%
Wide Band	<4%
*30kHz band width distortion meter	

2.7.2 Radio With Line-Interface Board: Receiver + Line Input

Transmitter Frequency Response*	
Bandwidth	300Hz to 3kHz
Response	+1, -3dB relative to -6dB/octave
*relative to 1kHz, 20% deviation, below limiting	
Test Signal	0dBm line input*, audio tap T1 *60% deviation at 1kHz
Signal-to-Noise Ratio*	
Narrow Band	>40dB
Wide Band	>43dB
*demodulated, filtered 300Hz to 3kHz and de-emphasised 750µs rms	
Mute Ratio	>60dB
Distortion*	<3%
*demodulated, filtered 15kHz low pass	

2.8 Circuit Description

2.8.1 Audio Interface

When the line-interface board is used for repeater applications, the audio passed between the two radios must be of such a level that the message is able to be repeated intelligibly. The audio interface is therefore capable of handling a wide range of input and output levels (-20 to +6dBm). The audio interface is also capable of using either a two- or four-wire isolated interface formats, which are selectable using S1.

The input to the line driver IC (U5) is the AUDIO TAP OUT line from the radio. This line is a software-programmabable tap point which can be chosen from various audio signals available within the radio and is coupled through a capacitor into the audio line out level control (RV2). This variable resister is AC coupled into the line driver (U5) which is used in a bridged-output format, with gain set to provide the necessary 21dB gain.

The resistors on the output of the line driver provides the necessary 600Ω terminating impedance, but also cause a 50% loss of signal. This is compensated for by the higher-than-necessary gain of the line driver. Line out protection is provided by two zener diodes, and the transformer (T1) provides isolation.

The audio interface is capable of using a two- or four-wire interface, so a tap is taken from one side of the balanced line out and is feed directly into the line input level control (RV3). When using a four-wire interface, the signal comes in through a second isolation transformer, T2. T2 is terminated with 600Ω and also acts as a voltage divider. This means that the signal level at RV3 will be identical to the level at RV3 when using a two-wire interface.

To achieve the required output level the non-inverting AC amplifier (U7) has a gain of 10, which provides the necessary 13dB of gain. The output of the amplifier is AC coupled into the AUDIO_TAP_IN line (pin 6 of SK2).

2.8.2 Logic Interface

The line-interface board is able to provide simple interface solutions with other radios. Logic is used to control keying of both radios as well as providing time delays to prevent squelch or cycling problems. The logic uses gates rather than discrete components.

The choice of which input controls BUSY/GATE can be selected using switches 3 and 4 of S1, while the sense of BUSY/GATE (pin 12 of SK1) can be selected using switches 5 and 6. Switch 7 accommodates either a two-line keying system or a single bi-directional keying line.

The comparators (in U1) operate off a single sided regulated 5V supply.

2.8.3 Power Supply

The power supply for the line-interface board comes from the radio via the internal options connector and is a 13.8V switched supply. Digital logic components are used in the line-interface board so there is a 5V regulator provided.

Initially the 13.8V from the radio is filtered and used for the audio line driver (U5) with reference to analogue ground. This 13.8V is also used to supply the 5V regulator, which is filtered separately for either 5V digital or analogue devices. A simple voltage divider is used to provide a 2.5V half-rail for the digital and a 2.2V rail for the analogue sections.

2.9 PCB Information

2.9.1 TMAA01-01 Parts List (PCB IPN 226-00124-04)

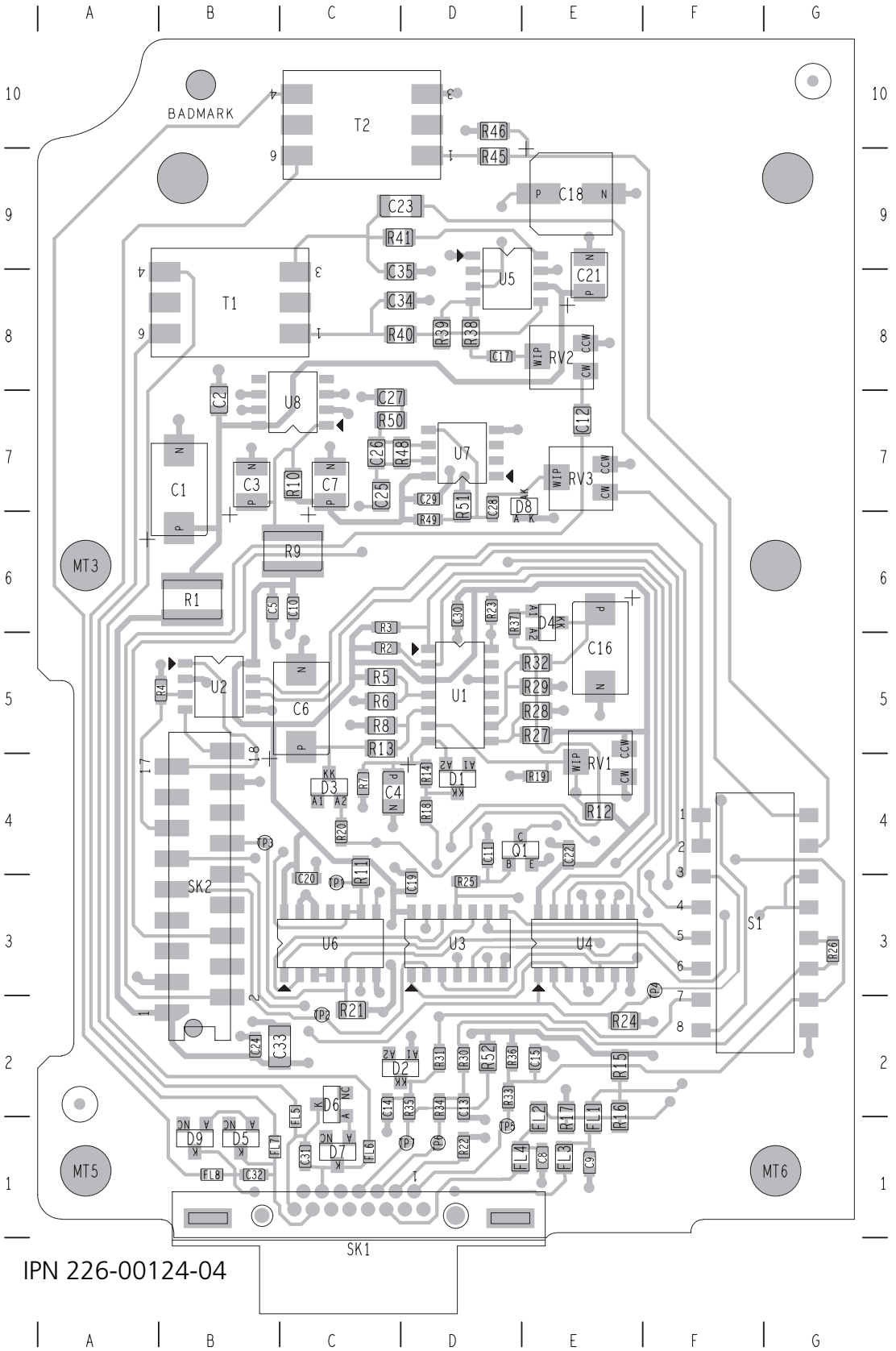
Ref.	IPN	Description
C1	014-08100-03	Cap Tant SMD 10u 35v 20% D
C2	015-26100-08	Cap Cer 0805 100n 10% X7r 50v
C3	014-07470-01	Cap Tant SMD 4u7 25v 10% B
C4	014-18100-05	Cap Tant SMD 10u 10v 10% A
C6	014-06220-00	Cap Tant SMD 2.2Mf 50v
C7	014-07470-01	Cap Tant SMD 4u7 25v 10% B
C10	018-16100-00	Cap 0603 100n 16vx7r+-10%
C11	018-15100-00	Cap 0603 10n 50v X7r +-10%
C12	015-26220-08	Cap 0805 220n 10% X7r 16v
C13	018-14100-00	Cap 0603 1n 50v X7r +-10%
C14	018-14100-00	Cap 0603 1n 50v X7r +-10%
C15	018-14100-00	Cap 0603 1n 50v X7r +-10%
C16	014-06220-00	Cap Tant SMD 2.2Mf 50v
C17	018-16100-00	Cap 0603 100n 16vx7r+-10%
C18	016-08470-01	Cap Elec SMD 47uf 6*4 16v
C19	018-15100-00	Cap 0603 10n 50v X7r +-10%
C20	018-15100-00	Cap 0603 10n 50v X7r +-10%
C21	014-07470-01	Cap Tant SMD 4u7 25v 10% B
C22	018-15100-00	Cap 0603 10n 50v X7r +-10%
C23	015-07220-08	Cap Cer 1206 2u2 16v X7r
C25	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C26	015-23150-01	Cap Cer 0805 150p 5% NPO 50v
C27	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C28	018-16100-00	Cap 0603 100n 16vx7r+-10%
C29	018-15100-00	Cap 0603 10n 50v X7r +-10%
C30	018-15100-00	Cap 0603 10n 50v X7r +-10%
C31	018-15100-00	Cap 0603 10n 50v X7r +-10%
C32	018-15100-00	Cap 0603 10n 50v X7r +-10%
C34	015-23470-08	Cap Cer 0805 470p 10% X7r 50v
C35	015-23470-08	Cap Cer 0805 470p 10% X7r 50v
D1	001-10000-70	Diode SMD BAV70 D-Sw SOT23
D2	001-10000-70	Diode SMD BAV70 D-Sw SOT23
D3	001-10000-70	Diode SMD BAV70 D-Sw SOT23
D4	001-10000-70	Diode SMD BAV70 D-Sw SOT23
D5	001-10084-51	Diode SMD BZX84C5V1 Zen SOT23
D6	001-10084-51	Diode SMD BZX84C5V1 Zen SOT23
D7	001-10084-51	Diode SMD BZX84C5V1 Zen SOT23
D8	001-10099-01	Diode BAV99w Dual Ss
D9	001-10084-51	Diode SMD BZX84C5V1 Zen SOT23
FL5	057-11220-02	Ind 0603 Blm11a221 Emi Supr
FL6	057-11220-02	Ind 0603 Blm11a221 Emi Supr
FL7	057-11220-02	Ind 0603 Blm11a221 Emi Supr
FL8	057-11220-02	Ind 0603 Blm11a221 Emi Supr
Q1	000-10084-82	Xstr BC848C NPN SS SOT23
R1	036-02100-03	Res 1218 10e 5% 1w PRC201
RV1	042-05100-05	Res Pre SMD 10k Cer 4mm Sq
R2	038-15100-10	Res 0603 10k 1/16w +-1%
RV2	042-05100-05	Res Pre SMD 10k Cer 4mm Sq
R3	038-15100-10	Res 0603 10k 1/16w +-1%
RV3	042-05100-05	Res Pre SMD 10k Cer 4mm Sq
R5	036-15820-00	Res M/F SMD 0805 82k 5%
R6	036-15470-10	Res M/F SMD 0805 47k 1%
R7	038-16220-00	Res 0603 220k 1/16w +-5%
R8	036-16120-00	Res M/F SMD 0805 120k 5%
R9	036-02100-03	Res 1218 10e 5% 1w PRC201
R10	036-13100-10	Res M/F SMD 0805 100e 1%
R11	036-14390-00	Res M/F SMD 0805 3k9 5%
R12	036-14330-10	Res M/F SMD 0805 3k3 1%
R13	036-16120-00	Res M/F SMD 0805 120k 5%
R14	038-16220-00	Res 0603 220k 1/16w +-5%
R18	038-14100-10	Res 0603 1k0 1/16w +-1%

Ref.	IPN	Description
R19	038-14270-00	Res 0603 2k7 1/16w +-5%
R20	038-15100-10	Res 0603 10k 1/16w +-1%
R21	036-14390-00	Res M/F SMD 0805 3k9 5%
R22	038-10000-00	Res 0603 Zero 0hm 1/16w +-5%
R23	038-15100-10	Res 0603 10k 1/16w +-1%
R24	036-14390-00	Res M/F SMD 0805 3k9 5%
R25	038-15100-10	Res 0603 10k 1/16w +-1%
R26	038-14100-10	Res 0603 1k0 1/16w +-1%
R27	036-15820-00	Res M/F SMD 0805 82k 5%
R28	036-15470-10	Res M/F SMD 0805 47k 1%
R29	036-16120-00	Res M/F SMD 0805 120k 5%
R30	038-13100-10	Res 0603 100e 1/16w +-1%
R31	038-14100-10	Res 0603 1k0 1/16w +-1%
R32	036-16120-00	Res M/F SMD 0805 120k 5%
R33	038-13100-10	Res 0603 100e 1/16w +-1%
R34	038-13100-10	Res 0603 100e 1/16w +-1%
R35	038-14100-10	Res 0603 1k0 1/16w +-1%
R36	038-15100-10	Res 0603 10k 1/16w +-1%
R37	038-15100-10	Res 0603 10k 1/16w +-1%
R38	036-15120-00	Res M/F SMD 0805 12k 5%
R39	036-16180-00	Res M/F SMD 0805 180k 5%
R40	036-13180-00	Res M/F SMD 0805 180e 5%
R41	036-13180-00	Res M/F SMD 0805 180e 5%
R45	036-13180-00	Res M/F SMD 0805 180e 5%
R46	036-13180-00	Res M/F SMD 0805 180e 5%
R48	036-16120-00	Res M/F SMD 0805 120k 5%
R49	038-16150-00	Res 0603 150k 1/16w +-5%
R50	036-15120-00	Res M/F SMD 0805 12k 5%
R51	036-16120-00	Res M/F SMD 0805 120k 5%
R52	036-16120-00	Res M/F SMD 0805 120k 5%
S1	230-10010-44	Sw SMD Spst 16dil X8
SK1	240-00011-67	Skt 15w Drng Ra Slim Dsub 7912
SK2	240-10000-11	Conn SMD 18w Skt M/Match
T1	054-00010-18	Xfmr Line SMD 600 Ohm P2781
T2	054-00010-18	Xfmr Line SMD 600 Ohm P2781
U1	002-10339-00	IC SMD LM339 4x CMplt S014
U3	002-10740-40	IC SMD 74AHCT04 S014 Hex Inv
U4	002-10740-80	IC SMD 74AHCT08 S014 4x2IP AND
U5	002-10854-10	IC TDA8541T 1w Audio Amp
U6	002-10740-80	IC SMD 74AHCT08 S014 4x2IP AND
U7	002-10003-58	IC SMD LM358 Dual 0-Amp
U8	002-10078-05	IC SMD 78l05 5v Reg
	226-00124-04	PCB TMA 600 Ohm Intfc
	365-00011-38	Lbl Static Warning Yel
	365-00011-54	Lbl White R1556/2 90*24mm
	399-00010-53	Bag Plstc 150*250mm
	399-00010-86	Bag Static Shlding 127x203mm
	410-01064-02	Pkg Hdr Card New Logo
600-00009-00 parts:		
	240-00010-80	Plg 15w Drng Hi-D
	240-06010-29	Conn 9w Hood/Cvr Lets
600-00010-00 parts:		
	219-00329-00	Loom TMA Int Opt
	354-01043-00	Fsnr Scrw Lok 1pr 4-40
	362-01108-01	Seal Drng Cvr 9way TMA
	362-01111-00	Seal Drng 9way TMA
	347-00011-00	Scrw 4-40*3/16 Unc P/P Blk
	349-02062-00	Scrw M3*8 T/T P/T ContiR

2.9.2 TMAA01-01 Grid Reference List (PCB IPN 226-00124-04)

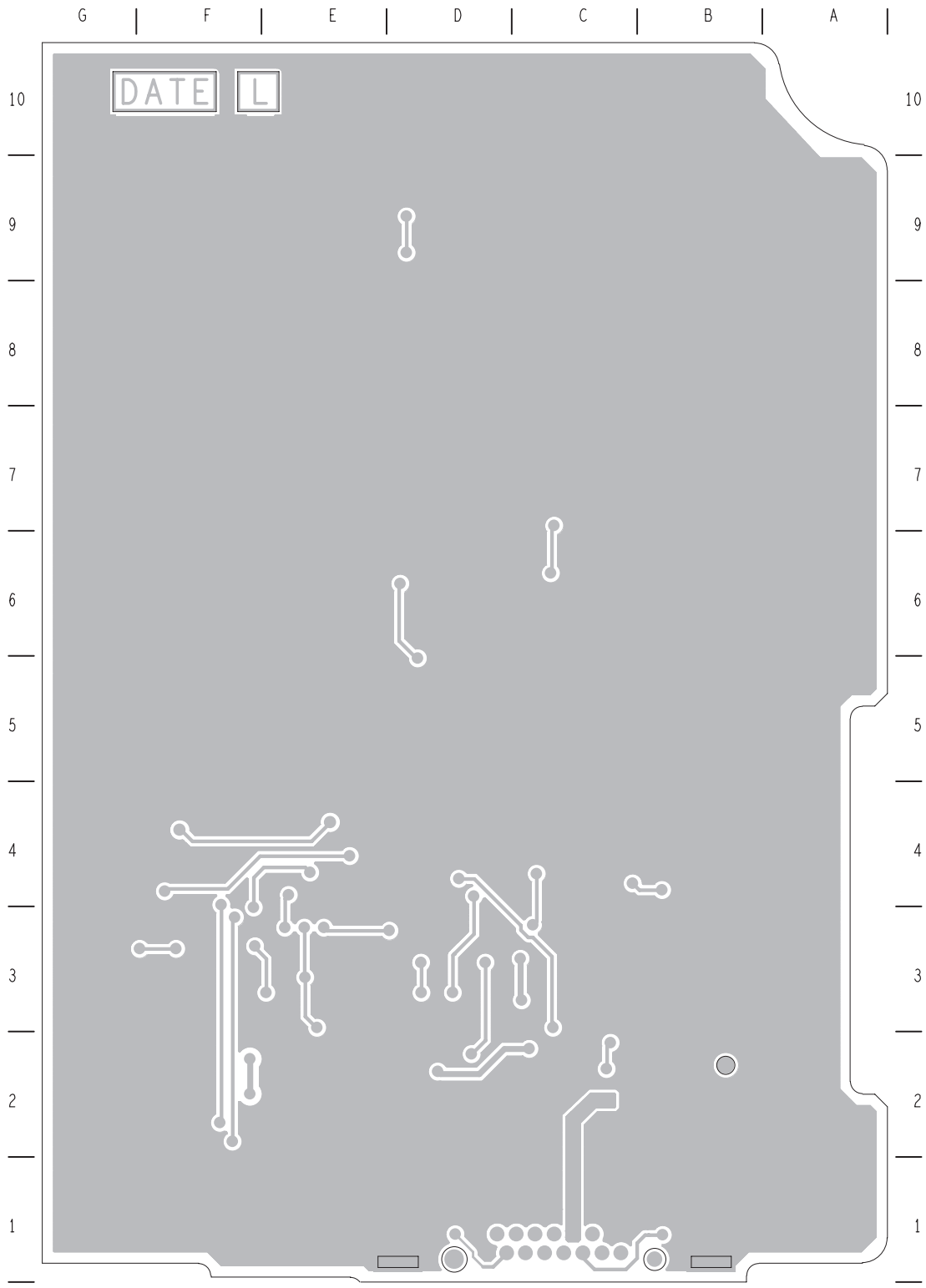
Ref.	PCB	Circuit
C1	B6	1J2
C2	B6	1J2
C3	B6	1J4
C4	C3	1B5
C6	C4	1D5
C7	C6	1J4
C10	C5	1K4
C11	D3	1E9
C12	E6	1J3
C13	D1	1F12
C14	C1	1D12
C15	E1	1E12
C16	E4	1C9
C17	D7	1J6
C18	E8	1H7
C19	D2	1A9
C20	C2	1A9
C21	E7	1K8
C22	E3	1A10
C23	D8	1J9
C24	B1	1C12
C25	C6	1F2
C26	C6	1F3
C27	C6	1F4
C28	D6	1G4
C29	D6	1A12
C30	D5	1A11
C31	C0	1J13
C32	B0	1G13
C33	C1	1C13
C34	D7	1J9
C35	D7	1J9
D1	D3	1C6
D2	D1	1D12
		1E12
D3	C3	1D4
D4	E5	1C9
D5	B0	1G12
D6	C1	1J12
D7	C0	1J12
D8	E6	1F5
		1F4
D9	B0	1G12
FL1	E0	1B4
FL2	E0	1B4
FL3	E0	1B5
FL4	E0	1B5
FL5	C1	1J11
FL6	C1	1J11
FL7	B1	1G11
FL8	B0	1G11
Q1	D3	1E10
RV1	E3	1B5
R1	B5	1K2
RV2	E7	1J6
R2	C4	1D7
RV3	E6	1G5
R3	C5	1C3
R5	C4	1D5
R6	C4	1D5
R7	C3	1B5
R8	C4	1D5
R9	C5	1K3
R10	C6	1K4
R11	C3	1E3
R12	E3	1C4
R13	C4	1D5
R14	D3	1C6
R18	D3	1C6
R19	E3	1B4
R20	C3	1D4
R21	C1	1E2
R22	D0	1H13
R23	D5	1C7
R24	E1	1H4
R25	D2	1E9
R26	G2	1F8
R27	E4	1C9
R28	E4	1C9
R29	E4	1C9
R30	D1	1F10
R31	D1	1E11
R32	E4	1C9
R33	D0	1F12
R34	D1	1F12
R35	D1	1E12
R36	D1	1F11
R37	D5	1C10
R38	D7	1J6
R39	D7	1J7
R40	D7	1J8
R41	C8	1J8
R45	D8	1G10
R46	D9	1G10
R48	D6	1F3
R49	D5	1G4
R50	C6	1F4
R51	D6	1F4
R52	D1	1E13
SK1	D0	1H13
		1B13
		1G13
		1E13
		1F13
		1C13
		1J13
S1	F2	1F8
SK2	B2	1F1
		1G1
		1B1
		1D1
		1J1
		1A1
		1K1
		1E1
TP1	C2	1D2
T1	B7	1J10
TP2	C1	1H2
T2	C9	1G11
TP3	B3	1F3
TP4	F2	1H4
TP5	D0	1F12
TP6	D0	1G12
TP7	D0	1E12
U1	D4	1C4
		1D6
		1C8
		1A11
U3	D2	1G3
		1D9
		1A9
		1C11
		1F8
		1C7
U4	E2	1D8
		1G3
		1G4
		1A10
U5	D7	1J7
U6	C2	1D3
		1A8
		1C10
U7	D6	1A12
		1F3
U8	C6	1K3

2.9.3 Line-Interface Board Layout (top side)



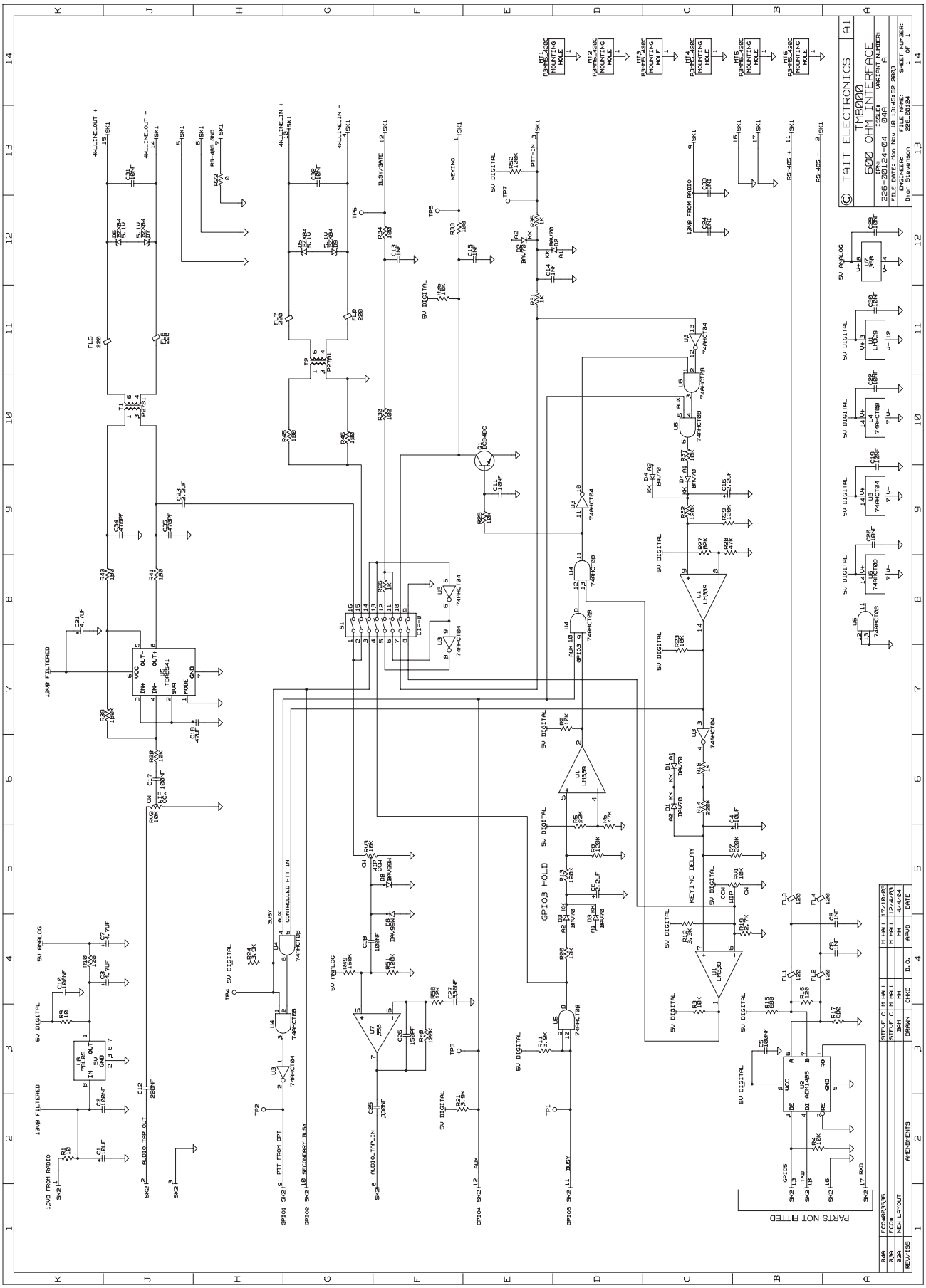
IPN 226-00124-04

2.9.4 Line-Interface Board Layout (bottom side)

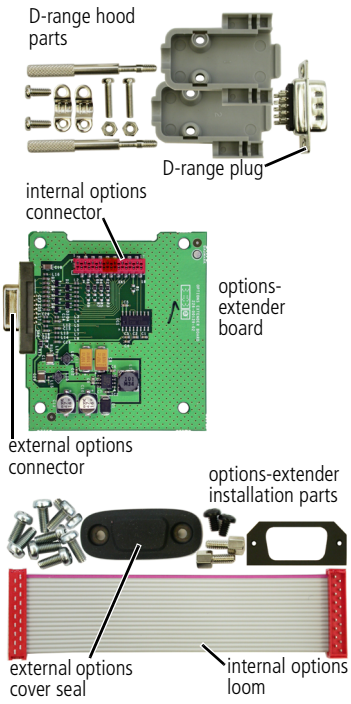


IPN 226-00124-04

2.9.5 Line-Interface Board Circuit Diagram



3 TMAA01-05 Options-Extender Board



The TMAA01-05 options-extender board provides external access to most of the signal lines provided by the radio's internal options connector.

The options-extender board fits inside the radio in the options cavity and is connected to the main PCB by the internal options connector and loom.

The internal options connector signals are then made available on the high-density 15-way D-range connector mounted on the options-extender board. This connector fits through the external options connector hole provided in the radio chassis.

Important The radio does not meet the IP54 protection standard once an options-extender board has been installed unless the external options cover seal is installed.

Important To comply with EN 301 489-5, all cables connected to the external options connector must be less than three metres (10 feet) in length.

3.1 Changing the Options-Extender Links

The options-extender board configuration must be completed before the board is installed in the radio, as the top side of the options-extender board is not accessible once the board is screwed to the radio lid.

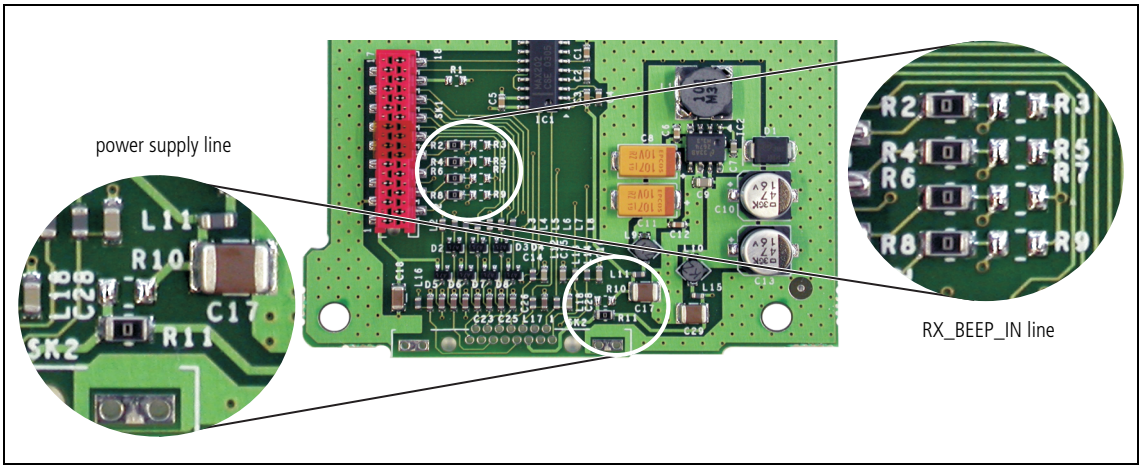
Important This equipment contains devices which are susceptible to damage from static discharges. Refer to "ESD Precautions" on page 13 for more information.

The options-extender board has various link options which allow the user to re-configure the outputs available on the external options connector. The outputs that can be made available by changing linking resistors are:

- the 5V supply line, and
- the RX_BEEP_IN line.

In both cases, these lines replace other lines that are available when the linking resistors are in the factory-set configuration. Note that there is no external connection available for the RX_AUD line.

Figure 3.1 Options-extender board linking resistor locations



3.1.1 Power Supply Line

The power supply output available on pin 2 of the external options connector is factory-set to 13.8V. The output on this pin can be changed to 5V if R11 (a 0Ω surface mount resistor) is moved to position R10. Figure 3.1 at the top of the page shows the component locations.

Important The maximum current for the 5V supply line is 400mA.

3.1.2 RX_BEEP_IN Line

If the RX_BEEP_IN line is required on the external options connector, it must replace one of the following lines:

- IOP_RSSI
- AUD_TAP_IN
- AUX_MIC_AUD
- AUD_TAP_OUT.

The following table explains the resistor link changes required and Figure 3.1 at the top of the page shows the component locations.

Table 3.1 RX_BEEP_IN resistor changes

RX_BEEP_IN Line Replaces	Remove Resistor	Add Resistor
IOP_RSSI	R2	R3
AUD_TAP_IN	R4	R5
AUX_MIC_AUD	R6	R7
AUD_TAP_OUT	R8	R9

3.2 Installing the Options-Extender Board

3.2.1 Parts Required

The following table describes the parts required to install an options-extender board in a radio. The parts marked with an asterisk (★) are not shown in Figure 3.2 and are used to connect to the radio's external options connector.

Table 3.2 Options-extender installation parts required

Quantity	Internal Part Number	Description	Figure 3.2 Reference
1	362-01110-XX[a]	foam seal	③
1	362-01108-XX[a]	cover seal	⑪
2	347-00011-00	4-40x3/16 screws	⑫
2	354-01043-00	screw-lock fasteners	⑦
4	349-02062-00	M3x8 screws	⑨
★1	240-00010-80	D-range plug	—
★1	240-06010-29	D-range hood	—

a. Contact Technical Support for the exact IPN.

3.2.2 Installation Procedure

1. Disassemble the radio in order to gain access to the options cavity.

   For detailed disassembly instructions, refer to the disassembly procedure in the TM8100 Service Manual.

Refer to the diagram on the following page and the instructions below.

2. Remove the top cover and lid ① from the radio to access the options cavity.

3. Remove the external options connector bung ②, if it is fitted.

4. On the inside of the radio lid place the foam seal ③ over the external options connector cavity ④.

5. With the top side of the options-extender board ⑤ facing the radio lid, guide the external options connector ⑥ (the D-range connector on the options-extender board) into the external options connector cavity.

6. Screw the external options connector to the radio lid using the two screw-lock fasteners ⑦.

   Tighten the fasteners to a torque of 0.9N·m (8lbf·in).

Important The external options connector screw-lock fasteners must be tightened correctly before screwing the options-extender board onto the mounting posts ⑧.

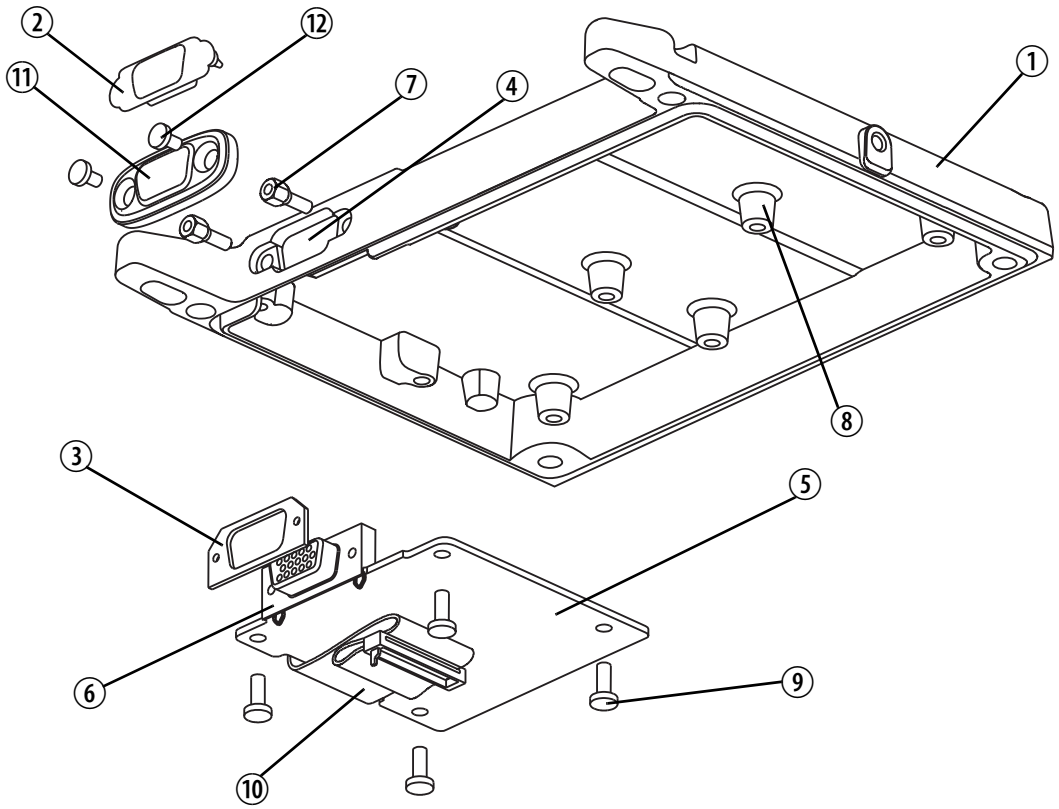
7. Screw the options-extender board to the mounting posts on the radio lid using four M3x8 self-tapping screws ⑨.

   Tighten the M3x8 screws to a torque of 1.9N·m (17lbf·in)

8. Plug the unattached end of internal options connector loom ⑩ into the internal options connector on the radio main PCB.

9. Refit the radio lid and top cover to the radio and screw the external options cover seal ⑪ over the external options connector, using the two 4-40x3/16 screws ⑫.

Figure 3.2 Options-extender board installation



① radio lid
② external options connector bung
③ foam seal
④ external options connector cavity
⑤ options-extender board
⑥ external options connector
⑦ screw-lock fasteners
⑧ mounting posts
⑨ M3x8 self-tapping screws
⑩ internal options loom
⑪ external options cover seal
⑫ 4-40x3/16 screws

3.3 Interface Specification

The following tables summarize the signals used for the options-extender board on the internal options connector (SK1 on the options-extender board) and the external options connector (SK2 on the options-extender board).

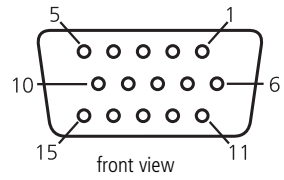
Note The TM8000 3DK Hardware Developer's Kit Application Manual (product code MMAA30-01-00-807) contains a detailed electrical specification for the signals available on the radio's internal options connector. This manual is part of the 3DK Resource CD, which can be purchased using product code TMAA30-01.

Table 3.3 Internal options connector - pins and signals

top view

Pin	Connector Signal	Description
1	13V8_SW	switched 13V8 supply from the radio
2	AUD_TAP_OUT	Programmable tap point out of the receive or transmit audio chain. DC-coupled
3	AGND	analogue ground
4	AUX_MIC_AUD	Auxiliary microphone input, with electret microphone biasing provided. Dynamic microphones are not supported.
5	RX_BEEP_IN	receive sidetone input, AC-coupled
6	AUD_TAP_IN	Programmable tap point into the receive or transmit audio chain. DC-coupled
7	RX_AUD	not connected
8	RSSI	analogue RSSI output
9-15	IOP_GPIO1 to IOP_GPIO7	programmable function and direction
16	DGND	digital ground
17	IOP_RXD	an RS-232 compliant asynchronous serial port - receive data
18	IOP_TXD	an RS-232 compliant asynchronous serial port - transmit data

Table 3.4 External options connector - pins and signals



Pin	Signal	Description
2	13V8_SW[a]	13V8 supply
6	AUD_TAP_OUT[b]	Programmable tap point out of the Rx or Tx audio chain. DC-coupled
7	AGND	analogue ground
11	AUX_MIC_AUD[b]	Auxiliary microphone input, with electret microphone biasing provided. Dynamic microphones are not supported.
1	AUD_TAP_IN[b]	Programmable tap point into the Rx or Tx audio chain. DC-coupled.
3	RSSI[b]	analogue RSSI output
15	IOP_GPIO1[c]	programmable function and direction
14	IOP_GPIO2[c]	programmable function and direction
13	IOP_GPIO3[c]	programmable function and direction
10	IOP_GPIO4[c]	programmable function and direction
9	IOP_GPIO5[c]	programmable function and direction
5	IOP_GPIO6[c]	programmable function and direction
4	IOP_GPIO7[c]	programmable function and direction
12	IOP_RXD	an RS-232 compliant asynchronous serial port - receive data
8	IOP_TXD	an RS-232 compliant asynchronous serial port - transmit data

a. This can be configured to be 5V. Refer to "Power Supply Line" on page 36.

b. This can be re-configured to be RX_BEEP_IN. Refer to "RX_BEEP_IN Line" on page 36.

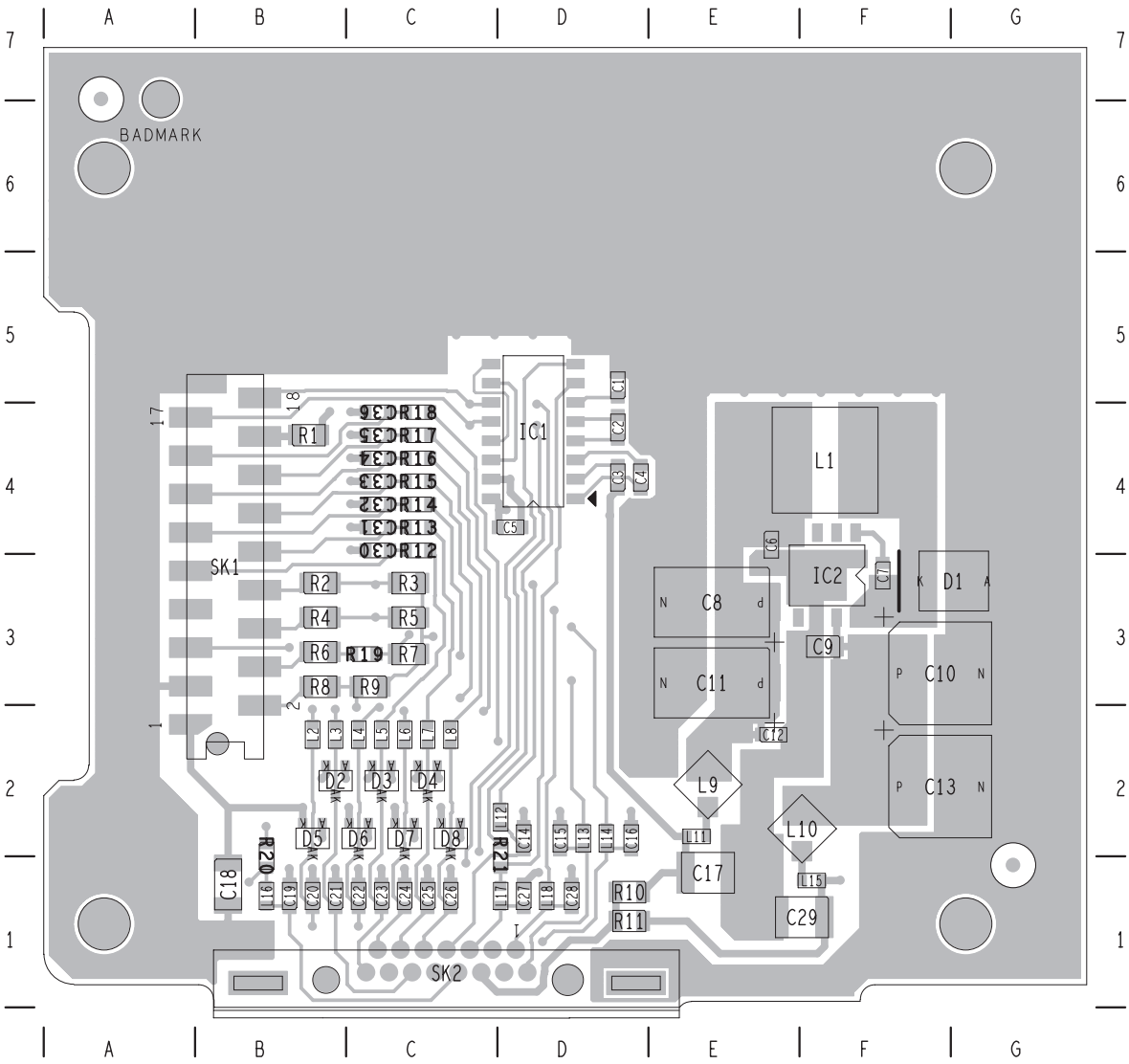
c. 3V3 CMOS output via 1kΩ series resistance. 5V tolerant input.

3.4 PCB Information

3.4.1 TMAA01-05 Parts List (PCB IPN 226-00129-03)

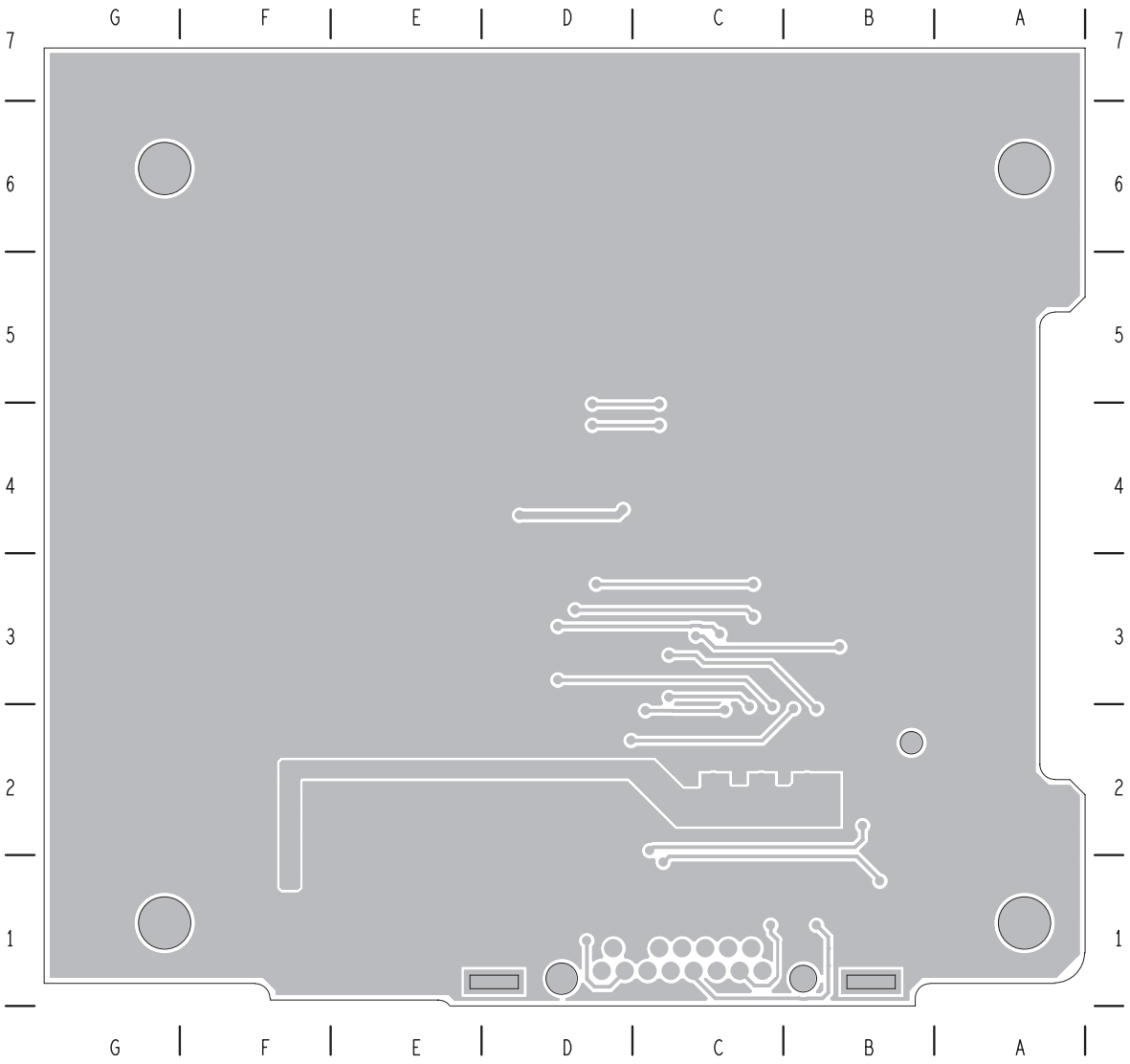
Ref.	IPN	Description
C1	018-16100-00	Cap 0603 100n 16vx7r+-10%
C2	018-16100-00	Cap 0603 100n 16vx7r+-10%
C3	018-16100-00	Cap 0603 100n 16vx7r+-10%
C4	018-16100-00	Cap 0603 100n 16vx7r+-10%
C5	018-16100-00	Cap 0603 100n 16vx7r+-10%
C6	018-16100-00	Cap 0603 100n 16vx7r+-10%
C7	018-15100-00	Cap 0603 10n 50v X7r +-10%
C8	014-08100-30	Cap Tant SMD 100u 10v Loesr D
C9	015-26100-08	Cap Cer 0805 100n 10% X7r 50v
C10	016-08470-01	Cap Elec SMD 47uf 6*4 16v
C11	014-08100-30	Cap Tant SMD 100u 10v Loesr D
C12	018-16100-00	Cap 0603 100n 16vx7r+-10%
C13	016-08470-01	Cap Elec SMD 47uf 6*4 16v
C14	018-15100-00	Cap 0603 10n 50v X7r +-10%
C15	018-15100-00	Cap 0603 10n 50v X7r +-10%
C16	018-15100-00	Cap 0603 10n 50v X7r +-10%
C17	015-07220-35	Cap Cer 1210 2u2 X5R 35v
C18	015-06470-01	Cap Cer 1206 470n X7r 20% 50v
C19	018-13470-00	Cap 0603 470p 50v X7r+-10%
C20	018-13470-00	Cap 0603 470p 50v X7r+-10%
C21	018-13470-00	Cap 0603 470p 50v X7r+-10%
C22	018-13470-00	Cap 0603 470p 50v X7r+-10%
C23	018-13470-00	Cap 0603 470p 50v X7r+-10%
C24	018-13470-00	Cap 0603 470p 50v X7r+-10%
C25	018-13470-00	Cap 0603 470p 50v X7r+-10%
C26	018-13470-00	Cap 0603 470p 50v X7r+-10%
C27	018-13470-00	Cap 0603 470p 50v X7r+-10%
C28	018-15100-00	Cap 0603 10n 50v X7r +-10%
C29	015-07220-35	Cap Cer 1210 2u2 X5R 35v
D1	001-10014-03	Diode SMD MBRS140T3 Sch
D2	001-10099-01	Diode BAV99w Dual Ss
D3	001-10099-01	Diode BAV99w Dual Ss
D4	001-10099-01	Diode BAV99w Dual Ss
D5	001-10099-01	Diode BAV99w Dual Ss
D6	001-10099-01	Diode BAV99w Dual Ss
D7	001-10099-01	Diode BAV99w Dual Ss
D8	001-10099-01	Diode BAV99w Dual Ss
IC1	002-10020-20	IC SMD ADM202 Rs-232 Con S0-16
IC2	002-10267-40	IC LM2674 S08 Swtch Volt Regul
L1	057-10100-65	Ind SMD Pwr Cdrh6D38 100UH .65
L2	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L3	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L4	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L5	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L6	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L7	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L8	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L9	057-10010-45	Ind SMD Pwr CDRH2D18 10UH .43A
L10	057-10010-45	Ind SMD Pwr CDRH2D18 10UH .43A
L11	057-10600-05	Ind 0603 Blm11p600s .5a F/Bead
L12	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L13	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L14	038-13220-00	Res 0603 220e 1/16w +-5%
L15	057-10600-05	Ind 0603 Blm11p600s .5a F/Bead
L16	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L17	057-10010-20	Ind 0603 Blm11-B102s 0.1a
L18	057-10010-20	Ind 0603 Blm11-B102s 0.1a
R2	036-10000-00	Res M/F SMD 0805 0e 0.125w
R4	036-10000-00	Res M/F SMD 0805 0e 0.125w
R6	036-10000-00	Res M/F SMD 0805 0e 0.125w
R8	036-10000-00	Res M/F SMD 0805 0e 0.125w
R11	036-10000-00	Res M/F SMD 0805 0e 0.125w
SK1	240-10000-11	Conn SMD 18w Skt M/Match
SK2	240-00011-67	Skt 15w Drng Ra Slim Dsub 7912
	226-00129-03	PCB TMAA01-05 Opts Brd
	365-00011-38	Lbl Static Warning Yel
	365-00011-54	Lbl White R1556/2 90*24mm
	399-00010-88	Bag Static Shlding 152*254mm
	410-01189-00	Pkg TMA Box 200x133x67mm
600-00009-00 parts:		
	240-00010-80	Plg 15w Drng Hi-D
	240-06010-29	Conn 9w Hood/Cvr Lets
600-00010-00 parts:		
	219-00329-00	Loom TMA Int Opt
	354-01043-00	Fsnr Scrw Lok 1pr 4-40
	362-01108-01	Seal Drng Cvr 9way TMA
	362-01111-00	Seal Drng 9way TMA
	347-00011-00	Scrw 4-40*3/16 Unc P/P Blk
	349-02062-00	Scrw M3*8 T/T P/T ContiR

3.4.2 Options-Extender Board Layout (top side)



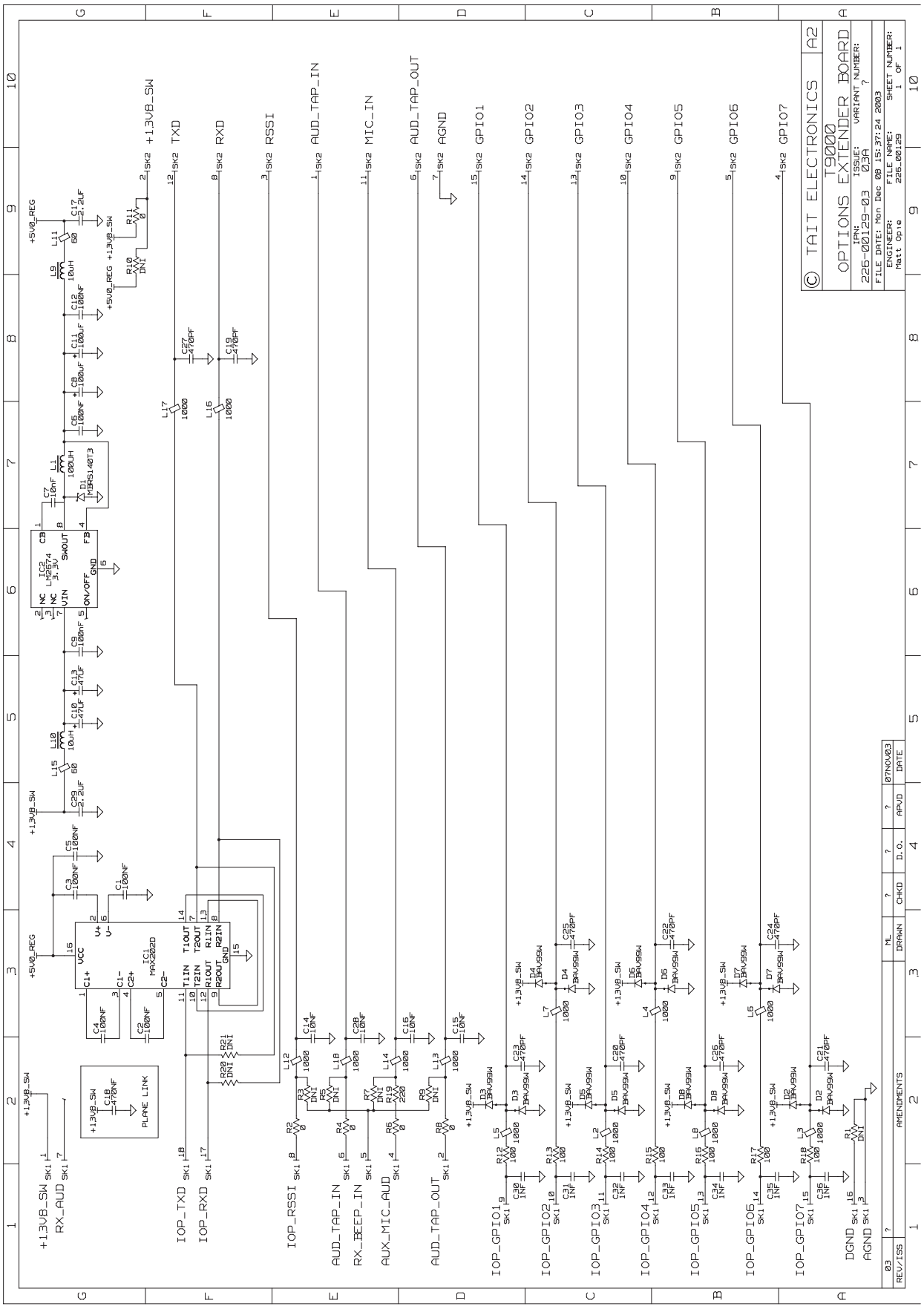
IPN 226-00129-03

3.4.3 Options-Extender Board Layout (bottom side)



IPN 226-00129-03

3.4.4 Options-Extender Board Circuit Diagram



4 TMAA02-02 DTMF Microphone

The TMAA02-02 DTMF microphone plugs into the microphone socket on the radio control head, and enables users to make calls to a PABX or PSTN.

To make a call, enter the required number using the DTMF keypad and the DTMF microphone generates audible DTMF tones as the microphone keys are pressed. Press the PTT key and speak clearly into the microphone then release the PTT key when you have finished speaking.

The microphone button operates a hookswitch, which is closed when the microphone is connected to the microphone clip and open when the microphone is removed from the microphone clip. The function of the hookswitch is determined by the radio programming.

4.1 Installation

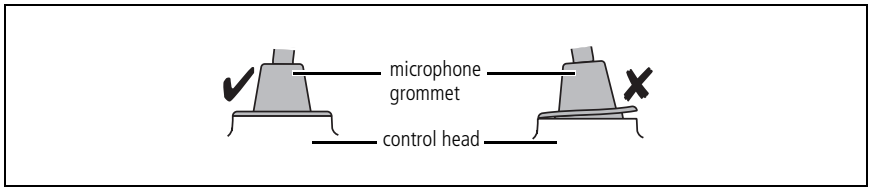
4.1.1 Installing the Microphone

Important The DTMF microphone grommet must be installed whenever the microphone is plugged into the microphone socket. When installed, the grommet has two functions:

- to prevent damage to the microphone socket when there is movement of the microphone cord, and
- to ensure that the control head is sealed against water, dust and other environmental hazards.

1. Plug the DTMF microphone cord into the microphone socket on the radio control head.
2. Slide the microphone grommet along the microphone cord and push two adjacent corners of the grommet into the microphone socket cavity.
3. Squeeze the grommet and push the remaining corners into position.
4. Check that the grommet is seated correctly in the cavity.

Figure 4.1 Correct DTMF microphone grommet seating



4.1.2 Installing the Microphone Clip

Install the microphone clip in the most convenient location for the radio user. It must be within easy reach of the user, but in such a position that the microphone PTT key cannot be inadvertently activated or jammed on.

Connect the microphone clip to the negative supply if hookswitch operation is required.

4.2 Adjustment

Remove the DTMF microphone back cover and set the DTMF tone level to approximately 80% deviation (±4kHz for wide bandwidth radios and ±2kHz for narrow bandwidth radios).

4.3 Radio Programming

The following table shows the settings required for CH_GPIO1 in the Programmable I/O form of the TM8000 Programming Application. This setting means that when a key is pressed on the microphone, the DTMF tones are fed into the radio's speaker at a reduced volume, giving the radio user confidence that the tones are being transmitted. Refer to the online help of the programming application for more information.

Table 4.1 DTMF microphone settings in the Programmable I/O form, Digital tab

Pin	Direction	Label	Action	Active	Debounce	Signal State	Mirrored To
CH_GPIO1	Input	None	Send Mic Audio To Spkr	High	None	None	None

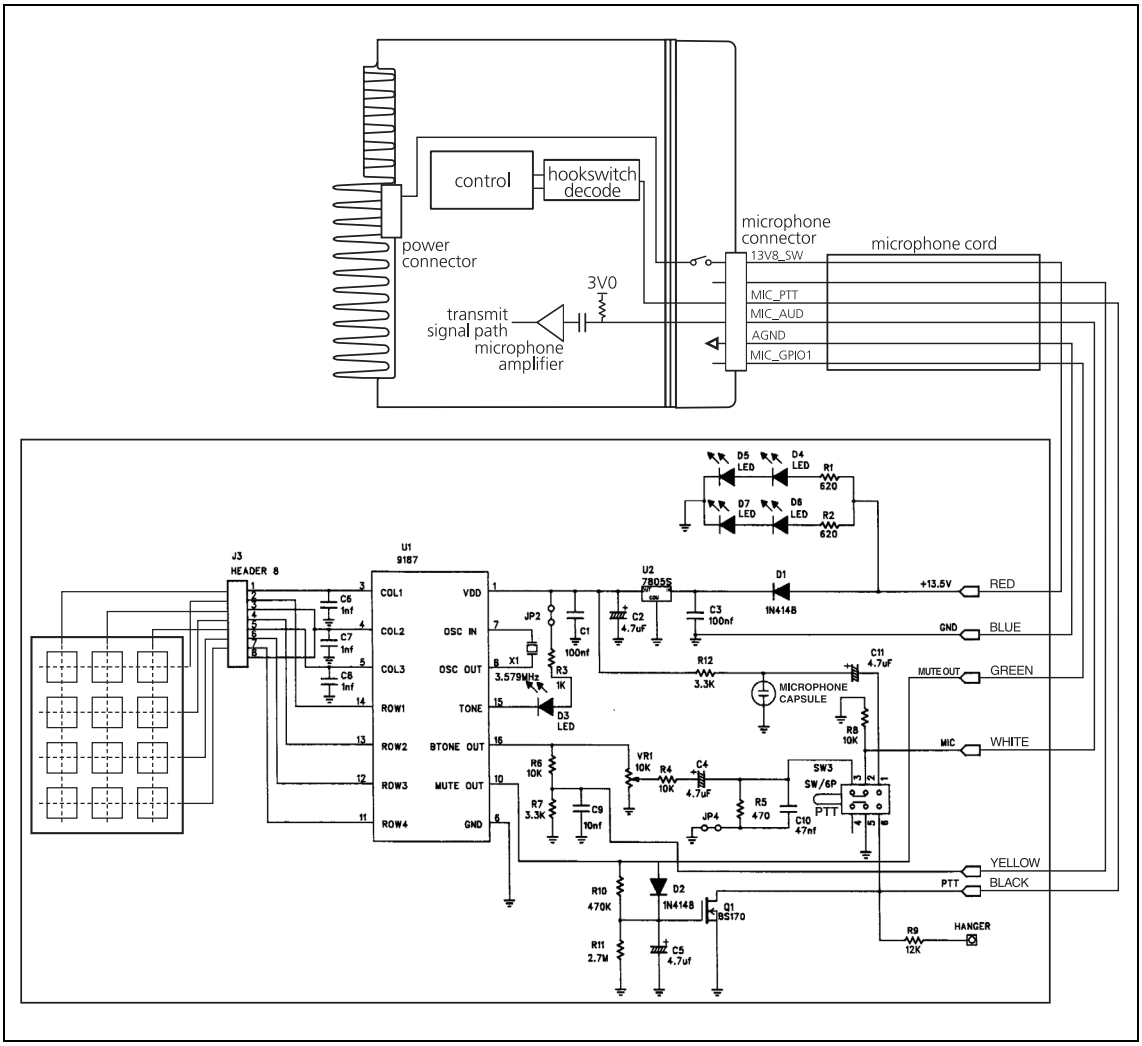
4.4 Interface Specification

The following table and diagram summarizes the signals used for the DTMF microphone on the radio's microphone connector and shows the interface between the DTMF microphone and the radio.

Table 4.2 DTMF microphone connector - pins and signals

Pin	Signal	Colour	Description
1	—	—	not connected
2	13V8_SW	red	power supply (switched)
3	—	yellow	not connected
4	MIC_PTT	black	PTT and hookswitch
5	MIC_AUD	white	audio from the microphone
6	AGND	blue	analogue ground
7	—	—	not connected
8	MIC_GPIO1	green	mute out

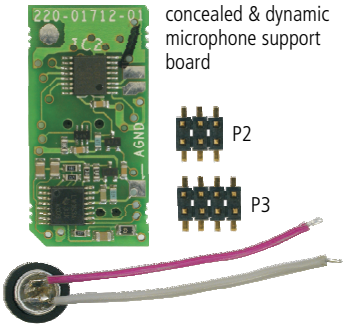
Figure 4.2 DTMF microphone to radio interface



4.5 Circuit Description

The microphone has a standard 12-key telephone keypad. When one of the keypad keys is pressed, a DTMF tone specific to that key is generated on the MIC_AUD line (pin 5). For the duration of the tone, the tone generator activates the PTT, so that the user is not required to press the PTT key to transmit each tone.

5 TMAA02-06 Support Kit for Concealed & Dynamic Microphones



The support kit for concealed and dynamic microphones can be used in two main applications:

- to monitor activity around the radio if the radio is placed in emergency mode, and
- to support the use of a dynamic microphone, such as that used in the TMAA10-02 handset.

The concealed and dynamic microphone support board plugs onto the radio's control head PCB and contains circuitry for a pre-amplifier and a microphone switch circuit. The concealed electret microphone is installed inside the speaker grille of the control head.

5.1 Installation

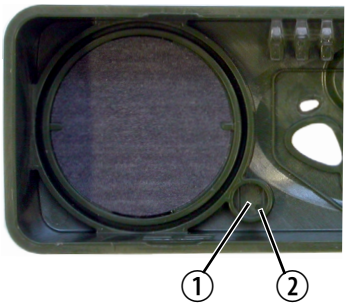
Important This equipment contains devices which are susceptible to damage from static discharges. Refer to "ESD Precautions" on page 13 for more information.

5.1.1 Disassembling the Radio Control Head

To install the concealed-microphone capsule and concealed and dynamic microphone support board, the control head must be removed from the radio and disassembled. For detailed disassembly instructions, refer to the disassembly procedure in the TM8100 Service Manual.

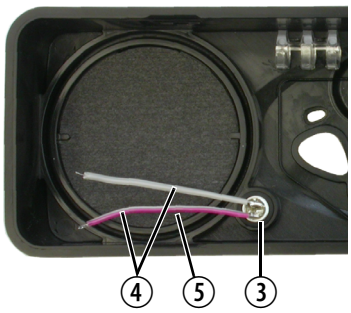
5.1.2 Installing the Microphone Capsule and Dynamic Microphone Board

1. Disassemble the control head in order to gain access to the speaker grille. This will mean removing the control head PCB, the space frame, and the speaker.
2. Drill a 1mm diameter hole in the concealed-microphone cavity ① in the position indicated by the small 'dimple' ②.



Important To maintain the IP54 protection class, great care must be taken when installing the microphone capsule and seal ③ into the concealed-microphone cavity.

3. Push the microphone capsule and seal into the concealed-microphone cavity, with the capsule wires ④ towards the speaker grille ⑤.

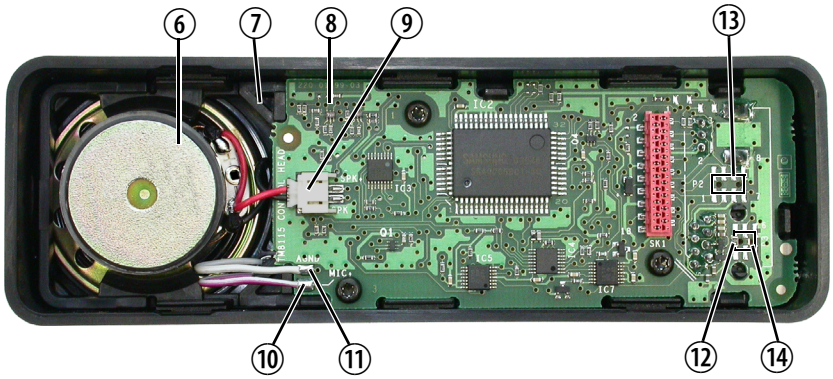


4. Reassemble the control head. This includes reinstalling the speaker ⑥, the space frame ⑦ and the control head PCB ⑧.

   Plug the speaker lead into the speaker connector ⑨.

5. On the control head PCB, solder the positive concealed-microphone wire to the MIC+ pad ⑩ and the negative wire to AGND ⑪.

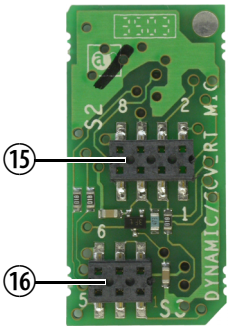
Note The positive wire on the microphone capsule is identified by a red stripe.



6. On the control head PCB, remove R11 ⑫ and solder P2 ⑬ and P3 ⑭ in the positions shown.

7. Plug S2 ⑮ and S3 ⑯ on the concealed and dynamic microphone support board onto P2 and P3 on the control head PCB.

8. Re-install the control head on the radio body.



5.2 Radio Programming

When the support kit for concealed and dynamic microphones is installed in a radio, two fields in the UI Preferences form of the TM8000 Programming Application may need to be selected.

- Dynamic Mic Support: select this field if a dynamic microphone is installed. An example of an accessory that uses a dynamic microphone is the TMAA10-02 handset.
- Covert Mic Fitted: select this field if a concealed microphone is installed.

Refer to the online help of the programming application for more information.

5.3 Interface Specification

The following table and diagram summarizes the signals used for the concealed and dynamic microphone support kit and shows the interface between the support kit and the radio control head.

Table 5.1 Concealed and dynamic microphone support board - pins and signals

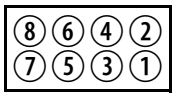
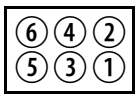
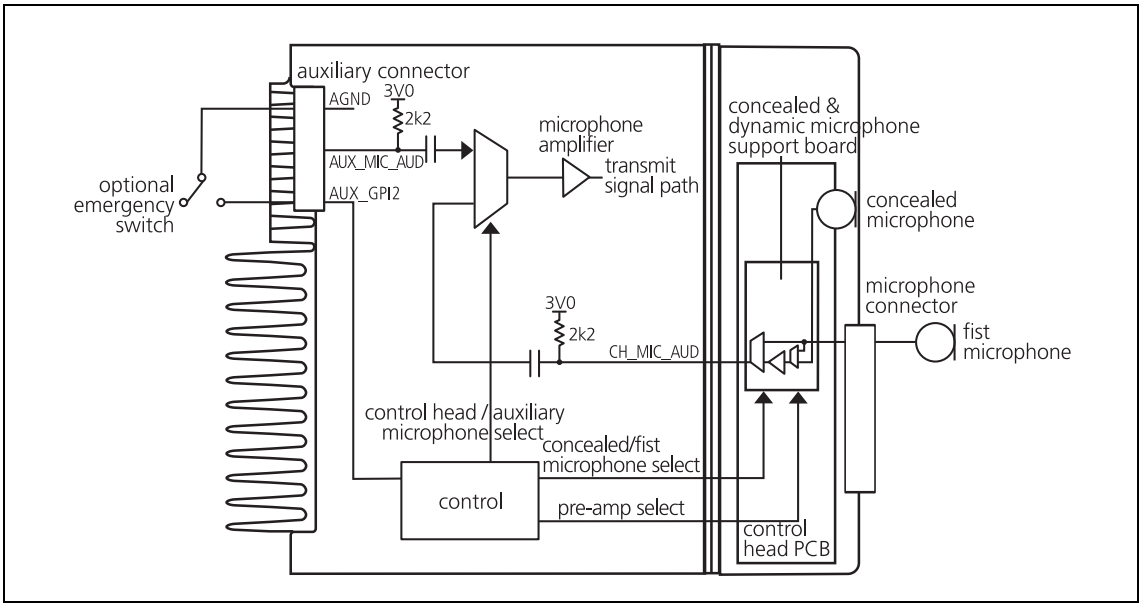
	Pin	Signal	Colour
 S2 top view	1	CH_LE	SPI latch signal to latch microphone select data into the concealed and dynamic microphone board
	2	D2-D3	data from the control head shift register
	3	OE	enables the output of the shift register of the audio switch
	4	CH_SPI_CLK	SPI clock signal to clock microphone select data into concealed and dynamic microphone board
	5	+13V8_SW	power for analogue parts
	6	+3V3	power for digital parts
	7	RST	initialise the concealed and dynamic microphone board shift register
	8	DGND	digital ground
 S3 top view	1	MIC_AUD_IN-P1	microphone audio from microphone interface
	2	MIC_AUD_OUT	processed microphone signal output to radio
	3	—	not connected
	4	MIC_AUD_OUT	processed microphone signal output to radio
	5	MIC+	audio from the concealed microphone
	6	AGND	analogue ground

Figure 5.1 Concealed and dynamic microphone support kit to radio interface



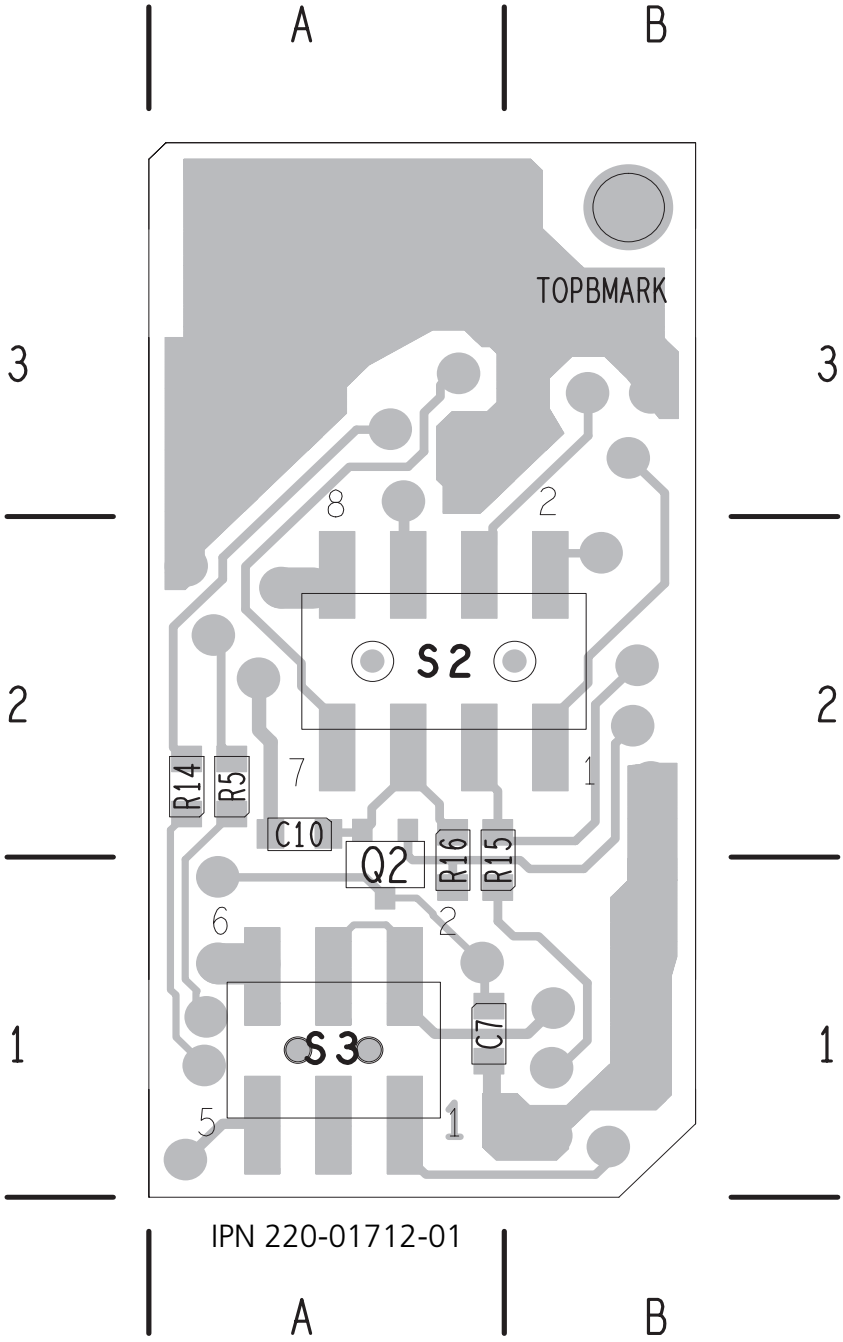
5.4 PCB Information

5.4.1 TMAA02-06 Parts List (PCB IPN 220-01712-01)

Ref.	IPN	Description
C1	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C2	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C3	018-15100-00	Cap 0603 10n 50v X7r +-10%
C4	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C5	018-16100-00	Cap 0603 100n 16vx7r+-10%
C6	018-16100-00	Cap 0603 100n 16vx7r+-10%
C7	018-16100-00	Cap 0603 100n 16vx7r+-10%
C8	018-16100-00	Cap 0603 100n 16vx7r+-10%
C10	018-16100-00	Cap 0603 100n 16vx7r+-10%
IC1	002-13740-53	IC 74LV4053 Mux/Demux Tssop16
IC2	002-13745-95	IC 74LV595 8BIT SHIFTREG TSSOP
Q1	000-10084-71	Xstr BC847BW NPN SOT323
Q2	000-10085-71	Xstr SMD BC857BW PNP SOT323
Q3	000-10084-62	Xstr BC846S Dual SOT363 NPN
Q4	001-10099-01	Diode BAV99w Dual Ss
R1	038-14220-00	Res 0603 2k2 1/16w +-5%
R2	038-14680-00	Res 0603 6k8 1/16w +-5%
R3	038-14470-00	Res 0603 4k7 1/16w +-5%
R4	038-15470-10	Res 0603 47k 1/16w+-1%
R5	038-14100-10	Res 0603 1k0 1/16w +-1%
R6	038-15330-10	Res 0603 33k 1%
R13	038-15100-10	Res 0603 10k 1/16w +-1%
R14	038-14100-10	Res 0603 1k0 1/16w +-1%
R15	038-14100-10	Res 0603 1k0 1/16w +-1%
R16	038-15470-10	Res 0603 47k 1/16w+-1%
R17	038-15150-10	Res 0603 15K 1% WDS
R18	038-15470-10	Res 0603 47k 1/16w+-1%
R20	036-10000-00	Res M/F SMD 0805 0e 0.125w
S2	240-10002-00	Skt SMD 8w 2x4 Lo-Prof 2mm
S3	240-10001-00	Skt SMD 6w 2x3 Lo-Prof 2mm
	220-01712-01	Pcb Dynamic/Covert Mic
P2	240-10004-00	Hdr SMD 8w 2x4 Lo-Prof 2mm
P3	240-10003-00	Hdr SMD 6w 2x3 Lo-Prof 2mm
	252-00010-41	Mic Capsule Electret 2.7*6mm
	369-01031-00	Rbbr Mic Upper A3M2751 T3K

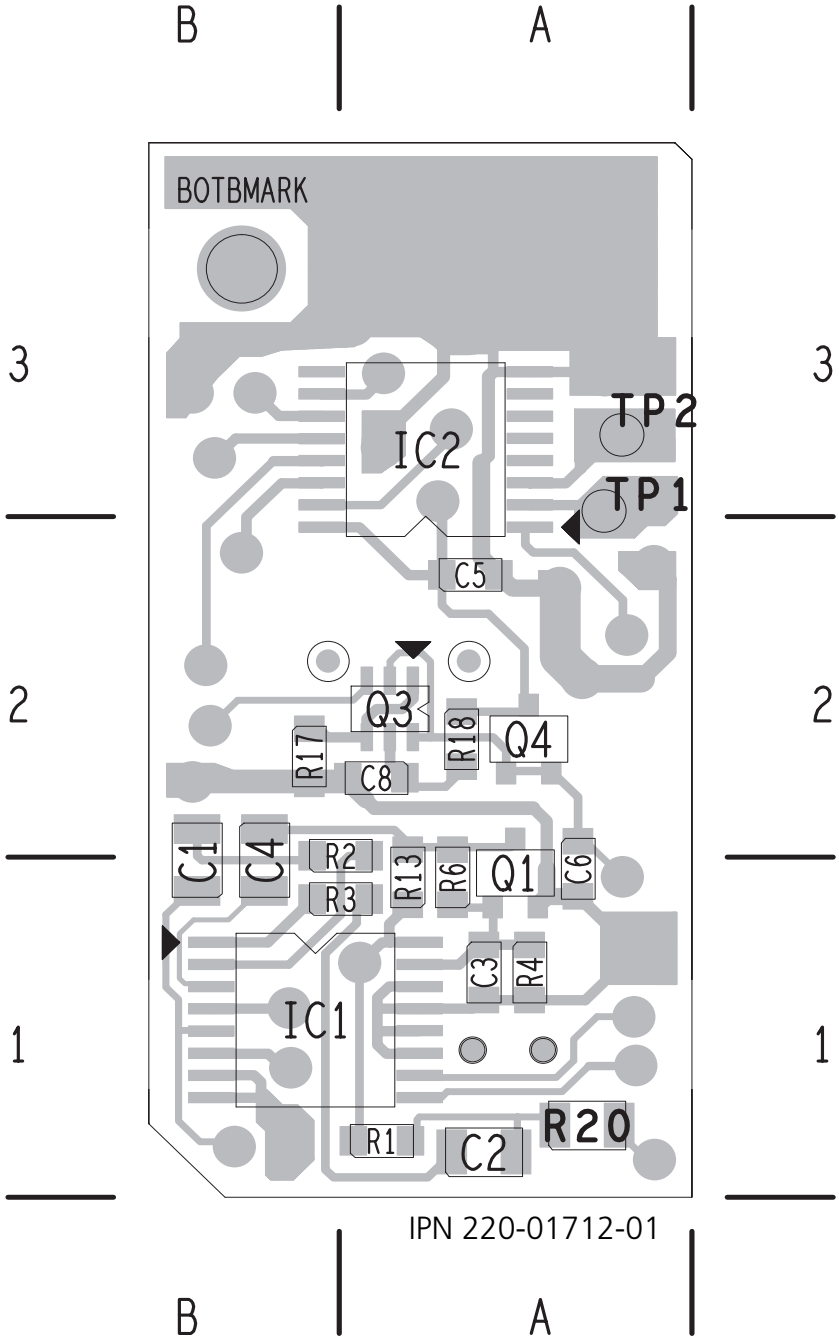
Ref.	IPN	Description

5.4.2 Concealed and Dynamic Microphone Support Board (top side)

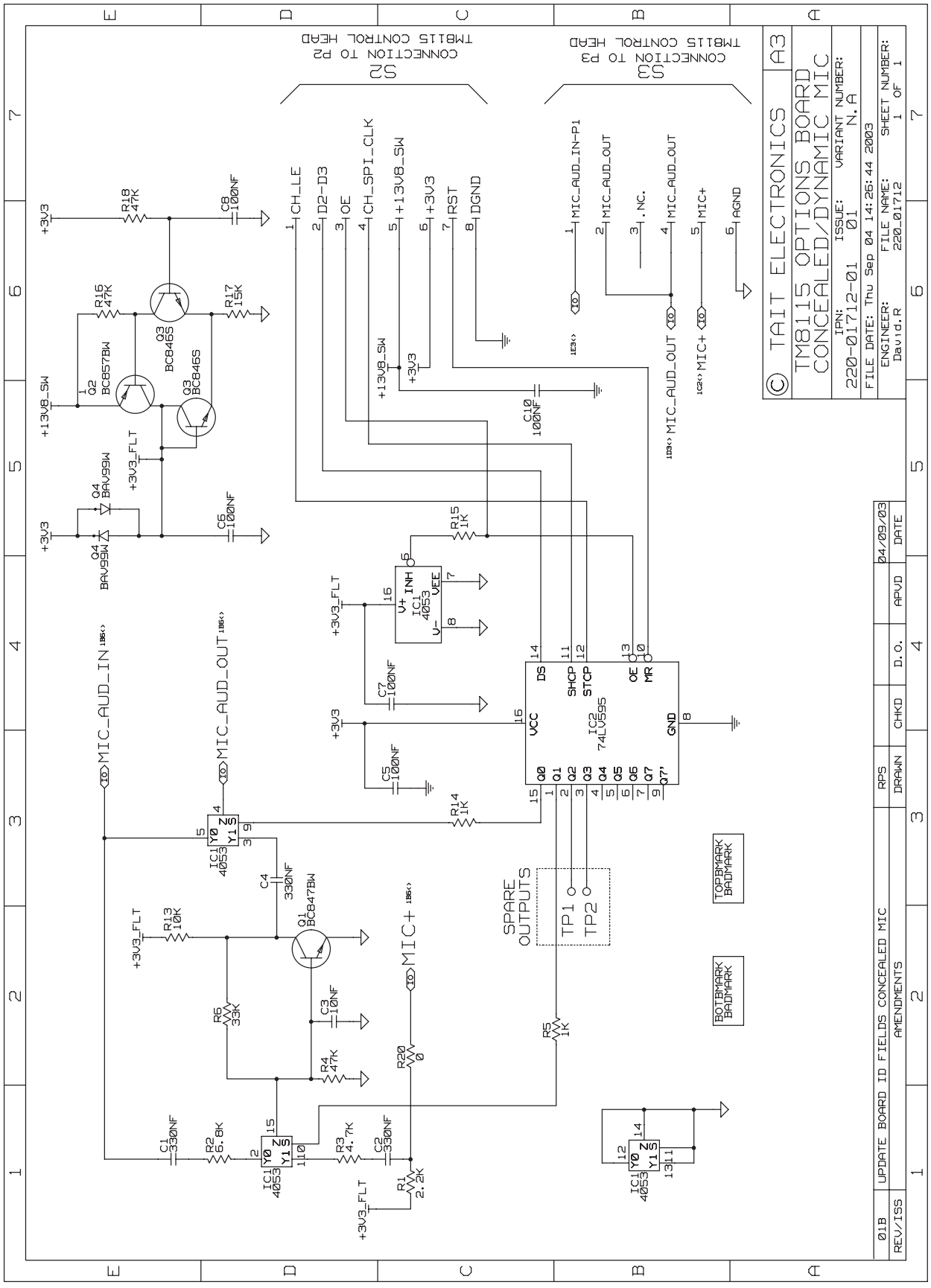


IPN 220-01712-01

5.4.3 Concealed and Dynamic Microphone Support Board (bottom side)



5.4.4 Concealed and Dynamic Microphone Board Circuit Diagram



6 TMAA10-01 Desktop Microphone

The TMAA10-01 desktop microphone is an omnidirectional dynamic microphone which can be used in dispatch situations, where the microphone is positioned on a flat surface. The desktop microphone plugs into the microphone socket on the radio control head.

The desktop microphone has an internal pre-amplifier and an adjustable sensitivity control on the underside of the desktop microphone base.

6.1 Operation

Hold down the monitor key and check whether the channel is clear.

If the channel is clear, press the PTT key to transmit. Speak clearly into the microphone and release the PTT key when you have finished talking.

Note The monitor key can be locked in the 'on' position. To do this, hold the monitor key down and slide the monitor key towards you. The monitor key should now be locked on.

6.2 Installation

Important The desktop microphone grommet must be installed whenever the desktop microphone is plugged into the microphone socket. When installed, the grommet has two functions:

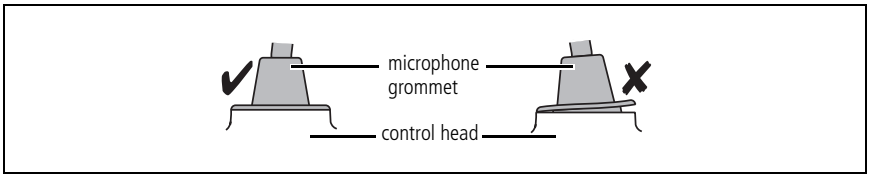
- to prevent damage to the microphone socket when there is movement of the microphone cord, and
- to ensure that the control head is sealed against water, dust and other environmental hazards.

1. Plug the microphone cord into the microphone socket on the radio control head.
2. Slide the grommet along the cord and push two adjacent corners of the grommet into the microphone socket cavity.

3. Squeeze the grommet and push the remaining corners into position.

4. Check that the grommet is seated correctly in the cavity.

Figure 6.1 Correct desktop microphone grommet seating



6.3 Adjustment

Adjust the output sensitivity of the desktop microphone using R5. R5 is accessible from the underside of the desktop microphone, as shown.

The microphone sensitivity is set to maximum by rotating R5 counterclockwise.

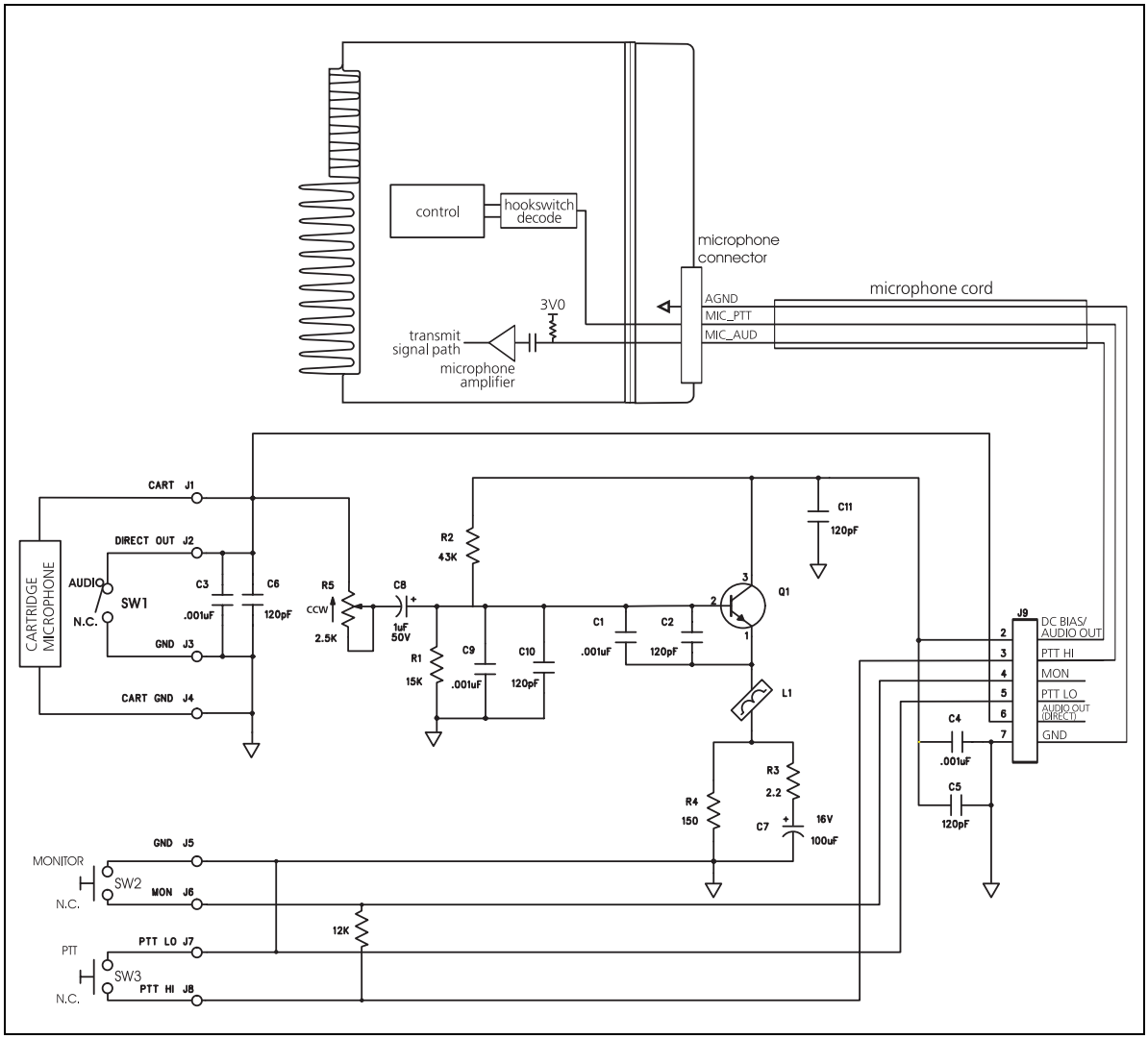
6.4 Interface Specification

The following table and diagram summarizes the signals used for the desktop microphone on the radio's microphone connector and shows the interface between the desktop microphone and the radio.

Table 6.1 Desktop microphone connector - pins and signals

Pin	Signal	Colour	Description
1	—	—	not connected
2	—	—	not connected
3	—	—	not connected
4	MIC_PTT	yellow	PTT
5	MIC_AUD	red	audio from the microphone
6	AGND	bare	analogue ground
7	—	—	not connected
8	—	—	not connected

Figure 6.2 Desktop microphone to radio interface



6.5 Circuit Description

The desktop microphone uses a dynamic microphone capsule and contains a pre-amplifier (Q1) to boost the microphone level to that required by the radio. Power for the pre-amplifier is provided by the electret microphone bias circuit within the radio. R5 is used to adjust the gain.

PTT and hookswitch signals are combined onto one line and fed to the control head PTT input of the radio.

7 TMAA10-02 Handset

The TMAA10-02 handset provides the user with privacy and also improves the audio quality in noisy environments. The handset uses a dynamic microphone capsule, so the TMAA02-06 support kit for dynamic microphones must also be installed and configured for dynamic microphone operation.

When your radio receives a call and the handset is mounted in its locking cradle, the radio unmutes and you can hear the call from your radio's internal speaker and from any connected remote speaker.

If you remove the handset from its cradle when you receive a call, the radio unmutes and you can hear the call from your radio's internal speaker, from any connected remote speaker and from the handset earpiece.

Using private handset mode, the radios internal and external speakers are muted and the call can only be heard from the handset earpiece.

7.1 Installation

7.1.1 Installing the TMAA02-06 Dynamic Microphone Support Kit

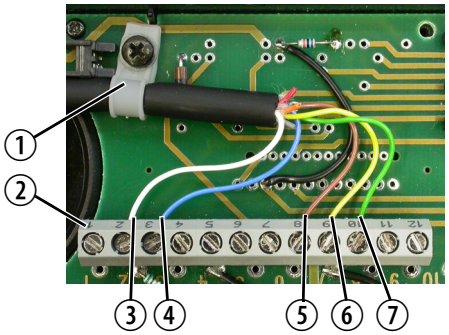
Refer to Section 5 "TMAA02-06 Support Kit for Concealed & Dynamic Microphones" for installation details.

7.1.2 Handset Wiring

1. Drill a hole in the chosen mounting surface for the radio to handset cord and pass the cord through the hole.
2. Prepare the radio to handset cord, as follows.
   - Cut the radio to handset cord to the required length.
   - Strip away about 60mm (2 inches) of the cable outer sheath on the end without a connector.
   - Cut off the exposed orange, red and grey wires.
   - Strip about 6mm (0.2 inches) of the coating off each of the five remaining wires.
3. Secure the radio to handset cord in the handset PCB P-clip ①, as shown in the diagram on the following page.

4. Connect the five wires to the handset PCB connector ②.

Table 7.1 Handset PCB connector wiring

	Handset PCB Connector	Colour	Reference
	2	white	③
	3	blue	④
	8	brown	⑤
	9	yellow	⑥
	10	green	⑦

7.1.3 Handset Installation

1. Press the pushbutton and remove the handset from the locking cradle.
2. Disassemble the locking cradle by removing the four locking cradle screws.
3. Screw the handset mounting plate to the required mounting surface. Note that mounting screws are not provided in this kit.
4. Clamp the top part of the locking cradle onto the mounting plate, and secure it with the four locking cradle screws.

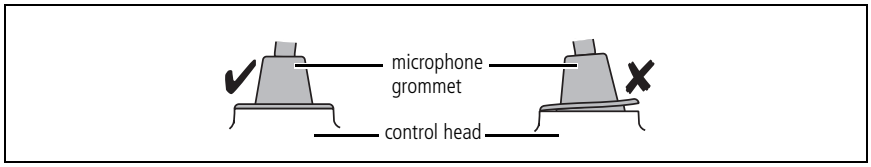
7.1.4 Connecting the Handset to the Radio

Important The handset microphone grommet must be installed whenever the handset to radio cord is plugged into the microphone socket. When installed, the grommet has two functions:

- to prevent damage to the microphone socket when there is movement of the microphone cord, and
- to ensure that the control head is sealed against water, dust and other environmental hazards.

1. Plug the radio to microphone cord into the microphone socket on the radio control head.
2. Slide the grommet along the cord and push two adjacent corners of the grommet into the microphone socket cavity.
3. Squeeze the grommet and push the remaining corners into position.
4. Check that the grommet is seated correctly in the cavity.

Figure 7.1 Correct handset microphone grommet seating



7.1.5 Radio Programming

Dynamic Microphone Support

The Dynamic Mic Support setting in the UI Preferences form of the TM8000 Programming Application must be selected. Refer to the online help of the programming application for more information.

Table 7.2 Handset settings in the UI Preferences form

Field	Setting	Selected/Cleared
Audio Setup	Dynamic Mic Support	selected

Private Handset Mode

If private handset mode is required, the radio needs to be programmed to mute the audio power amplifier when the handset is out of the cradle. The audio path is then only through the RX AUDIO line to the handset earpiece.

The following table shows the settings required in the Programmable I/O form of the TM8000 Programming Application. Refer to the online help of the programming application for more information.

Note If private handset mode is programmed, then no audio will be heard from the speakers if the handset is unplugged.

Table 7.3 Handset settings in the Programmable I/O form

Pin	Direction	Label	Action	Active	Debounce	Signal State	Mirrored To
CH_GPIO1	Input	None	Audio PA Off	High	25	None	None

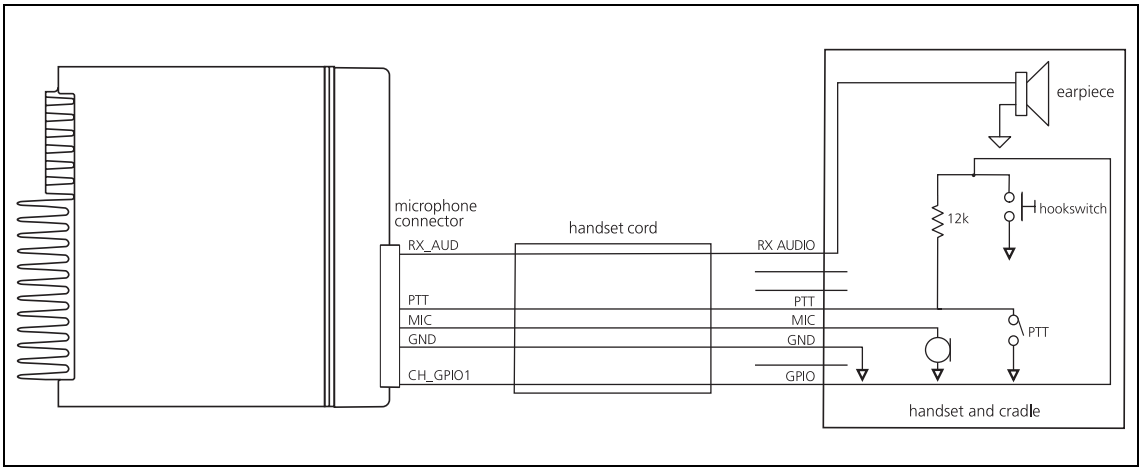
7.2 Interface Specification

The following table and diagram summarizes the signals used for the handset on the radio's microphone connector and shows the interface between the handset and the radio.

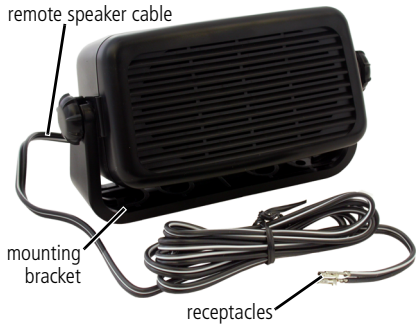
Table 7.4 Handset microphone connector - pins and signals

	Pin	Signal	Handset PCB Connector	Colour	Description
	1	RX_AUD	8	brown	receive audio to handset
	2	—	—	—	not connected
	3	—	—	—	not connected
	4	PTT	2	white	PTT and hookswitch
	5	MIC	9	yellow	audio from the handset to dynamic-mic support board
	6	GND	10	green	analogue ground
	7	—	—	—	not connected
	8	CH_GPIO1	3	blue	programmable line controlling private mode

Figure 7.2 Handset to radio interface



8 TMAA10-03 High-Power Remote Speaker



The TMAA10-03 high-power remote speaker is installed in parallel with the radio's existing internal speaker. The remote speaker can then be installed at some distance from the radio, or it can be used to increase the volume of the audio from the radio's existing internal speaker.

The remote speaker cable is terminated with two receptacles and two spare receptacles are included with the remote speaker, along with four mounting screws and washers.

8.1 Installation

8.1.1 Remote Speaker Mounting

1. Choose a mounting position for the remote speaker where it will not interfere with the operation of any of the vehicle controls.
2. Remove the remote speaker from the mounting bracket and use the screws and washers provided to fix the mounting bracket securely in the chosen location.

Important Check before drilling that the drill will not damage any components or wiring behind the mounting location.

- If mounting the bracket onto a metal surface, drill two 3.5mm (0.14 inch) holes in the appropriate locations and secure the bracket with the supplied self tapping screws.
- If mounting the bracket to any other material, such as plastic, drill two 4.5mm (0.18 inch) holes and attach the bracket with screws and captive nuts, or similar.

3. Attach the speaker to the mounting bracket using the thumbscrews.
4. Run the free end of the speaker cable to the radio power cable and install the two receptacles in the power connector, as described in the "Power Connector Wiring" procedure.

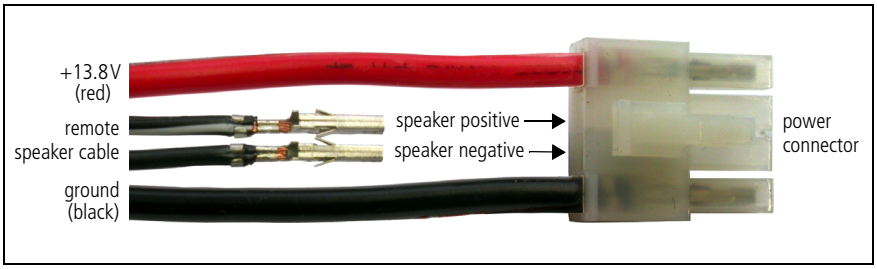
Important Check that the speaker cable is protected from engine heat, sharp edges and from being pinched or crushed.

8.1.2 Power Connector Wiring

Insert the remote speaker receptacles into the TM8100 power connector socket, as shown in the diagram below.

Note The positive remote speaker wire has a white stripe and must be inserted into the position on the power connector nearest the red wire.

Figure 8.1 Power connector wiring



9 TMAA10-04 Hands-Free Kit

The TMAA10-04 hands-free kit plugs into the radio's auxiliary connector and can be used in conjunction with the radio's rugged microphone. When hands-free operation is required, the user activates the PTT using the conveniently located remote PTT key, and the remote electret microphone replaces communication through the usual rugged microphone.

An extension lead is provided for the remote PTT and there are three mounting options for the remote microphone.

Note that the hands-free kit does not provide hookswitch operation. If this is required, the rugged microphone can provide this.

Important The radio does not meet the IP54 protection standard once a hands-free kit has been installed.

9.1 Installation

Important Care should be taken to avoid routing any cables near vehicle pedal controls, steering column and other moving parts.

9.1.1 Installing the Microphone

1. Choose one of the three mounting options provided for the remote microphone and determine the most appropriate location for the microphone.

   The mounting position of the microphone should be no more than 50cm (20 inches) from the user's mouth.

2. Route the remote microphone cable so as not to distract the driver.

3. Mount the remote microphone in the chosen location and check that the microphone and cable are clear of all the usual movements performed by the user.

9.1.2 Installing the Remote PTT

Important The remote PTT must be operable from a normal driving position.

1. Secure the remote PTT in position using the velcro strap and plug the remote PTT cord into the remote PTT extension lead.

   A common position for the remote PTT is on the gear lever of the vehicle.

2. Check that the cord and lead do not interfere with the safe operation of the vehicle.

9.2 Radio Programming

The following tables show the settings required in the PTT form and Programmable I/O form of the TM8000 Programming Application. Some of these settings are default settings and may not need to be changed. Refer to the online help of the programming application for more information.

9.2.1 Hands-Free PTT Form Settings

Note If hookswitch operation is programmed for the rugged microphone and the Inhibit PTT Transmission When Mic On Hook field is selected in the PTT tab of the PTT form, then the hands-free remote PTT cannot transmit when the rugged microphone hookswitch is closed (the microphone is on the microphone clip).

Table 9.1 Hands-free settings in the PTT form, External PTT (1) tab

Field		Setting
Advanced EPTT1	PTT Transmission Type	Voice
	Audio Source	AUX MIC

9.2.2 Hands-Free Programmable I/O Form Settings

Note The Programmable I/O form setting for AUX_GPIO4 must have the default programming settings and the AUX_GPIO4 pullup resistor on the radio main PCB must be set for the factory default of 3.3V (R769 fitted).

Table 9.2 Hands-free settings in the Programmable I/O form, Digital tab

Pin	Direction	Label	Action	Active	Debounce	Signal State	Mirrored To
AUX_GPI1	Input	None	External PTT 1	Low	25	None	None
AUX_GPIO4	None	None	No Action	None	None	None	None

9.3 Interface Specification

The following table and diagram summarizes the signals used for the hands-free kit on the radio's auxiliary connector and shows the interface between the hands-free kit and the radio.

Table 9.3 Auxiliary connector - pins and signals

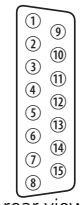
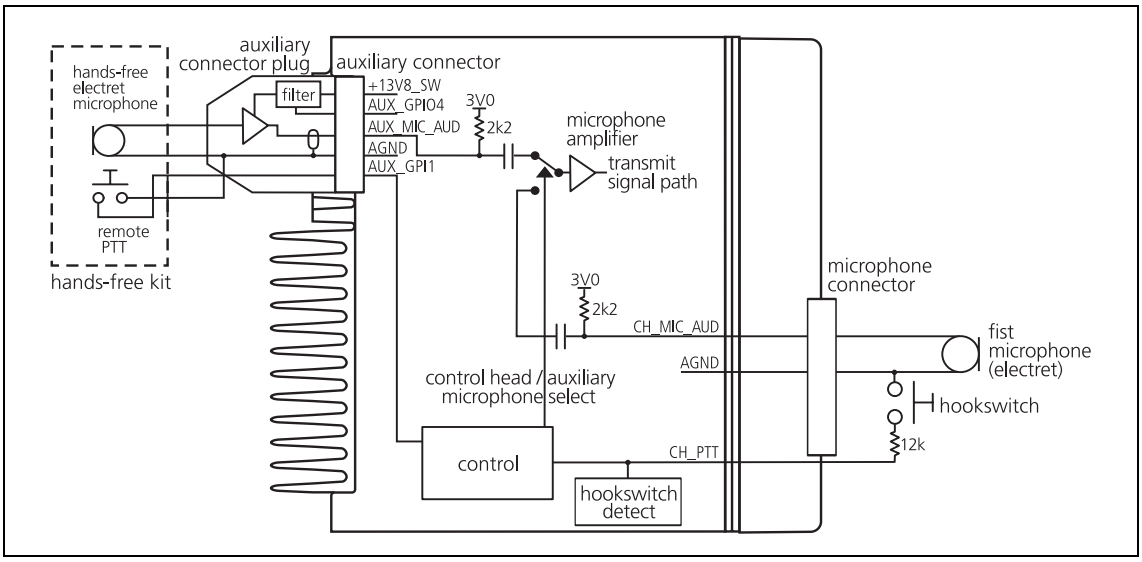
	Pin	Signal name	Description
 rear view	8	+13V8_SW	power to hands-free microphone pre-amplifier
	10	AUX_GPIO4	reference voltage to pre-amplifier regulator
	12	AUX_GPI1	PTT signal from hands-free kit
	14	AUX_MIC_AUD	microphone audio to the radio
	15	AGND	analogue ground

Figure 9.1 Hands-free to radio interface



9.4 Circuit Description

The hands-free microphone signal is amplified by a pre-amplifier in the auxiliary connector plug. The power supply to this amplifier is provided by the +13.8V supply on the auxiliary connector. This supply is filtered and regulated down to approximately 3.3V. The reference voltage for the regulator is provided by AUX_GPIO4 line.

The hands-free microphone signal is fed via AUX_MIC_AUD and an input selector to the radio's internal microphone amplifier. The microphone input selected depends on the PTT source used to make the call. If the remote PTT is used, then AUX_MIC_AUD is selected. If the control head microphone PTT is used, then CH_MIC_AUD is selected. Test points for all other auxiliary connections are provided on the auxiliary connector plug PCB to facilitate the connection of other devices or signals e.g ignition switch signal.

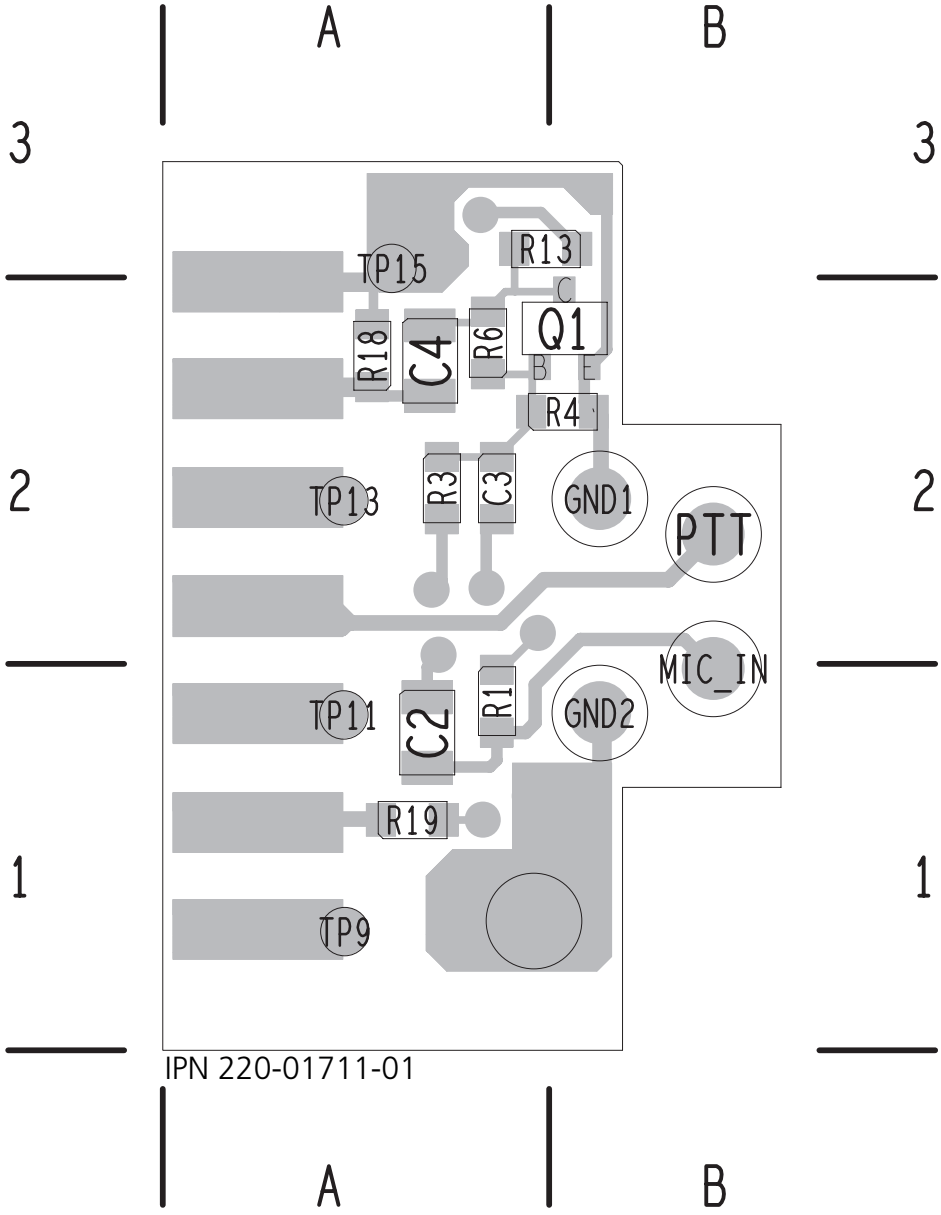
9.5 PCB Information

9.5.1 TMAA10-04 Parts List (PCB IPN 220-01711-01)

Ref.	IPN	Description
C2	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C3	018-15100-00	Cap 0603 10n 50v X7r +-10%
C4	015-26330-08	Cap Cer 0805 330n 5% 10v X7r
C6	015-26100-08	Cap Cer 0805 100n 10% X7r 50v
C7	015-26100-08	Cap Cer 0805 100n 10% X7r 50v
Q1	000-10084-71	Xstr BC847BW NPN SOT323
Q2	000-10085-71	Xstr SMD BC857BW PNP SOT323
Q3	000-10084-71	Xstr BC847BW NPN SOT323
Q4	000-10084-71	Xstr BC847BW NPN SOT323
R1	038-14220-00	Res 0603 2k2 1/16w +-5%
R3	038-14390-10	Res 0603 3k9 1%
R4	038-15470-10	Res 0603 47k 1/16w+-1%
R6	038-15330-10	Res 0603 33k 1%
R13	038-15100-10	Res 0603 10k 1/16w +-1%
R16	038-15470-10	Res 0603 47k 1/16w+-1%
R17	038-15150-00	Res 0603 15k 1/16w +-5%
R18	038-15100-10	Res 0603 10k 1/16w +-1%
R19	038-15100-10	Res 0603 10k 1/16w +-1%
	219-00305-00	cable
	220-01711-01	Pcb HFree
	236-00001-00	Sw Ptt W/Cbl & Strap
	240-00020-55	Plg 15w Drng 105 Deg Pnl Mtg
	240-06010-18	Conn 15w Hood/Cvr Drng MDJ15
	252-00010-72	Mic Electret Unidir 2.5mm Plg
	402-00006-00	F/Inst TMAA10-04 Kit HFree Eng

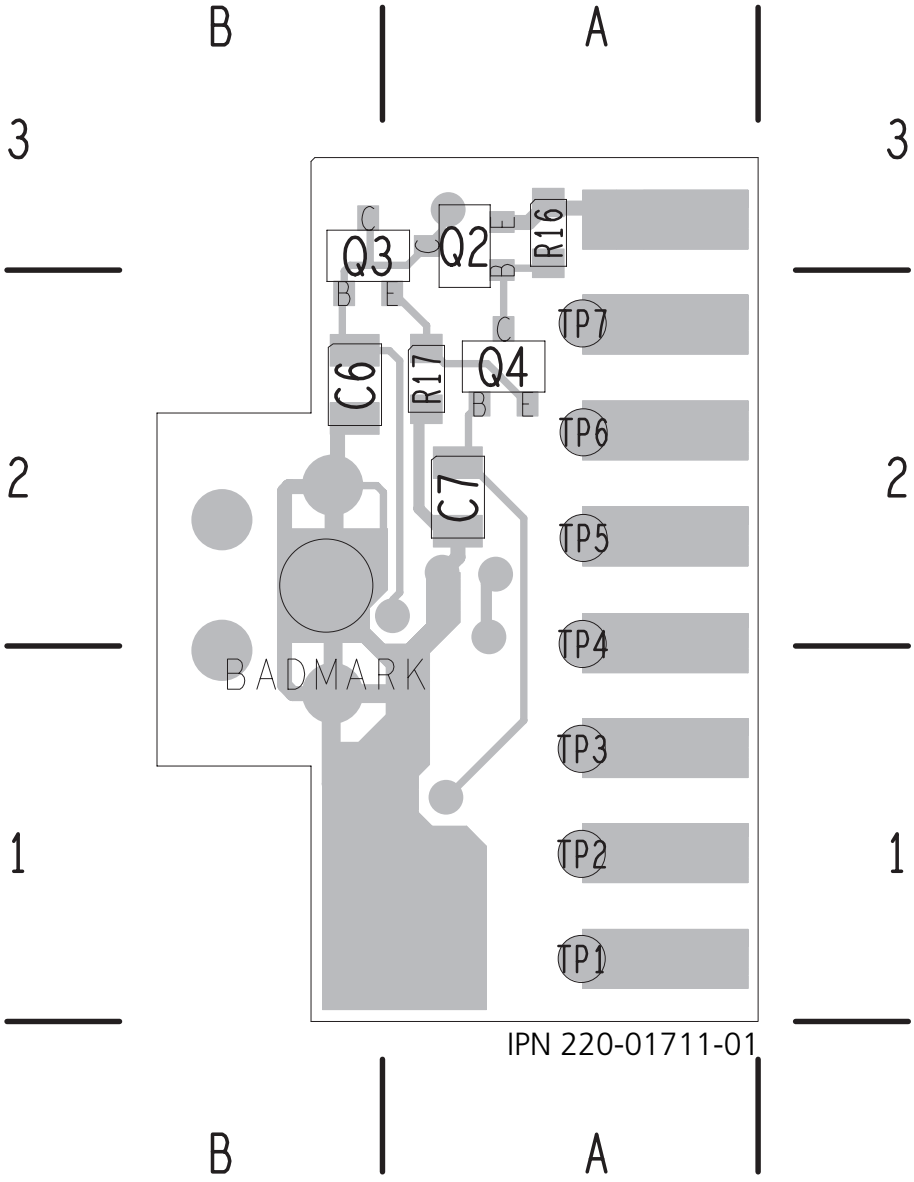
Ref.	IPN	Description

9.5.2 Hands-Free Pre-Amplifier Board Layout (top side)

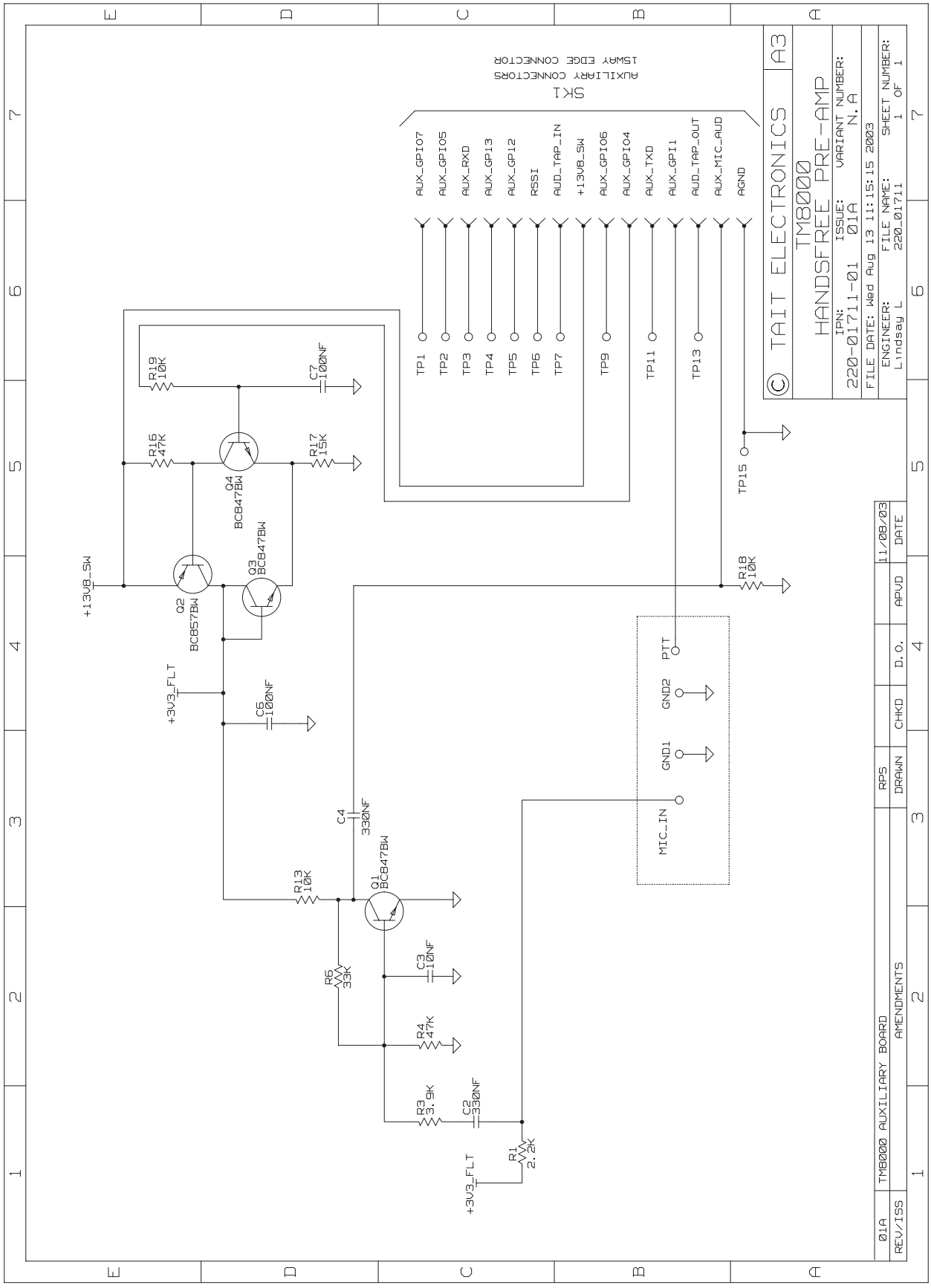


IPN 220-01711-01

9.5.3 Hands-Free Pre-Amplifier Board Layout (bottom side)



9.5.4 Hands-Free Pre-Amplifier Board Circuit Diagram

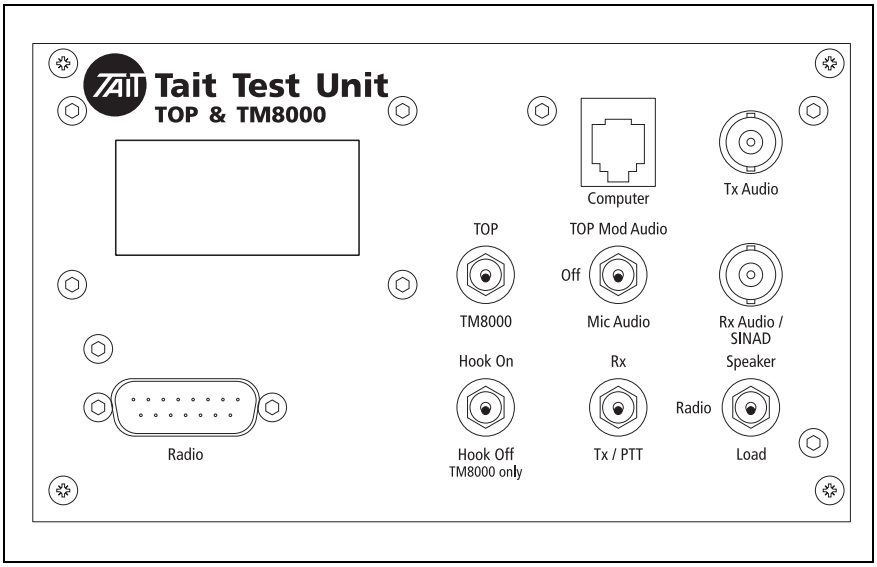


10 TOPA-SV-024 Test Unit

The TOPA-SV-024 test unit is used to test and maintain Tait Orca portables (TOP) and TM8100 radios by providing an interface between the radio, a test PC, and an RF communications test set.

The diagram below shows the front panel of the test unit.

Figure 10.1 TOPA-SV-024 test unit

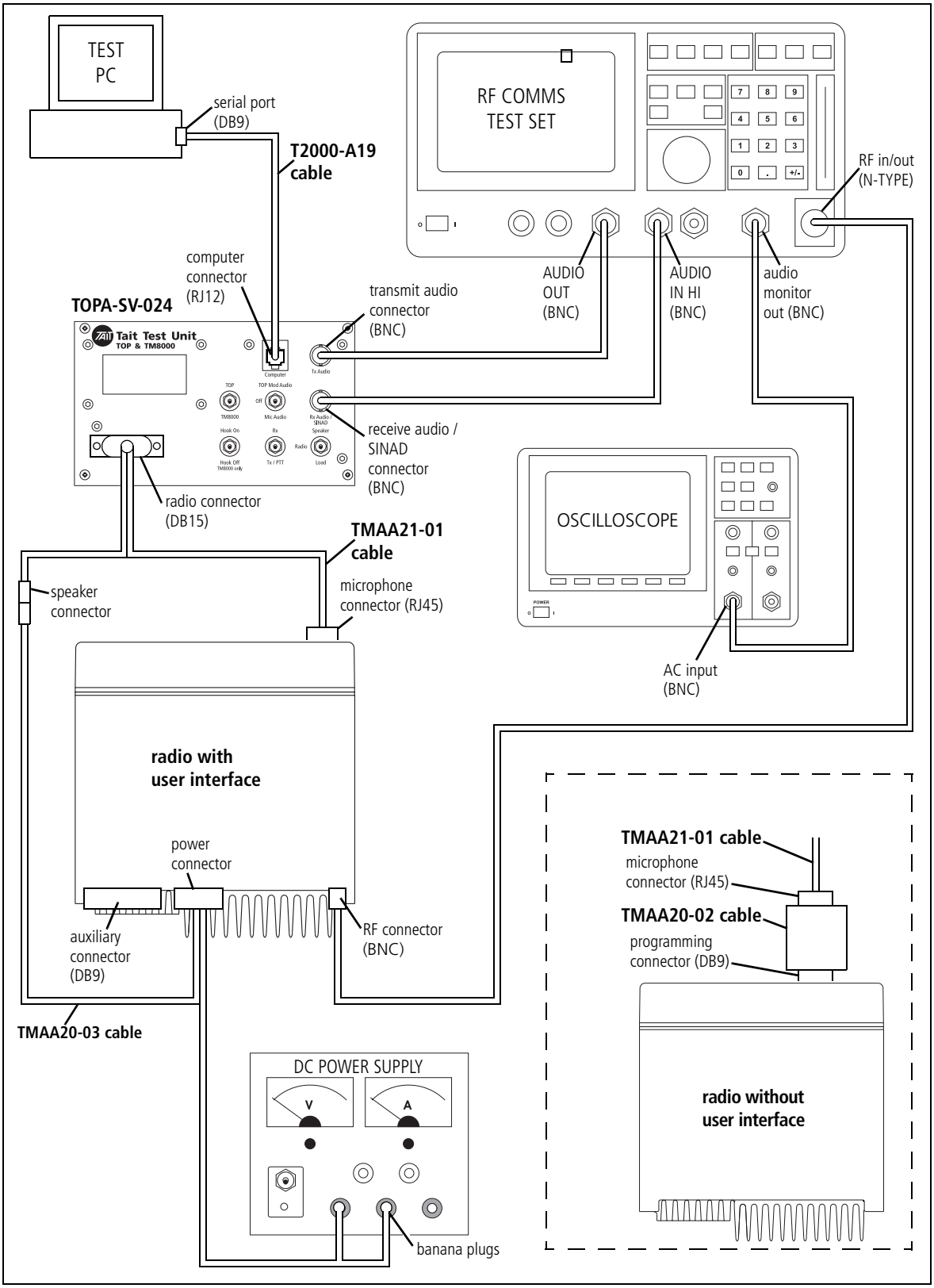


10.1 Test Equipment Setup

The diagram on the following page shows how the test unit is connected to the radio, the test PC, and the RF communications test set.

Note The test unit can also be connected to a T2000 radio using the T2000-11 cable. Use with T2000 radios is not described in this document.

Figure 10.2 Test setup



10.2 Operation

This section explains the function of the TOPA-SV-024 test unit controls. The procedure for using the test unit is described in the section of the TM8100 Service Manual covering test equipment.

10.2.1 TOP / TM8000 switch

This 2-way toggle switch is used to switch attenuation resistors (R4, R5, R6) in and out of the line from the radio's positive speaker output to the positive receive audio/SINAD output of the test unit (before the isolating transformer).

- When set to **TOP**, the attenuation resistors are switched out.
- When set to **TM8000**, the attenuation resistors are switched in (attenuation 10:1).

Important Selecting the wrong switch position can result in incorrect SINAD readings.

10.2.2 TOP Mod Audio / Off / Mic Audio switch

This 3-way toggle switch is used to switch between **Mod Audio** (Tait Orca portables only), **Mic Audio**, and **Off** (no audio signal).

- With the Tait Orca portables, this switch can be used for setting up dual point modulation by applying modulation to different parts of the radio.
- For normal transmit deviation tests (Tait Orca portables and TM8100), this switch is set to **Mic Audio**.

10.2.3 Hook On / Hook Off switch

Important When using the test unit with Tait Orca portables, the **Hook On** / **Hook Off** toggle switch **must** be set to **Hook Off**. Tait Orca portables do not have a hookswitch, and if the switch is set to **Hook On**, the Tait Orca portable F1 function is activated.

This 2-way toggle switch is used to simulate the microphone hookswitch opening ("hook off") and closing ("hook on"). This is done by switching a 12kΩ resistor (R3) in or out of the MIC_PTT line.

- When set to **Hook Off**, the 12kΩ resistor (R3) is switched out of the MIC_PTT line. This simulates the microphone being removed from the microphone clip.
- When set to **Hook On**, a 12kΩ resistor (R3) is switched into the MIC_PTT line. This simulates the microphone being placed on the microphone clip.

10.2.4 Rx / Tx/PTT switch

This 2-way toggle switch is used to switch between receive and transmit mode.

- When set to **Rx**, the PTT line is switched to high impedance.
- When set to **Tx/PTT**, the PTT line is pulled to ground.

10.2.5 Speaker / Radio / Load switch

This 3-way toggle switch is used during receive audio tests to switch the audio to the test unit speaker (**Speaker**), to the radio's internal speaker (**Radio**) or to a dummy load consisting of R1 and R2 (**Load**).

Note This switch does not disconnect the radio's internal speaker on M8100 radios with a user interface. If the switch is set to **Speaker** or **Load**, this simulates an external speaker being connected in parallel to the radio's internal speaker. TM8100 radios without a user interface do not have an internal speaker.

With all settings, a low level audio signal is available for testing through the SINAD port.

Tait Orca portables

- When set to **Speaker**, only the speaker of the test unit is active.
- When set to **Radio**, only the speaker of the Tait Orca portable is active.
- When set to **Load**, no speaker is active. The audio signal is terminated in the test unit dummy load.

TM8100 radios with user interface

- When set to **Speaker**, the speakers of the test unit and the TM8100 are both active. The speaker of the TM8100 cannot be disconnected.
- When set to **Radio**, only the speaker of the TM8100 is active.
- When set to **Load**, the TM8100 speaker remains active.

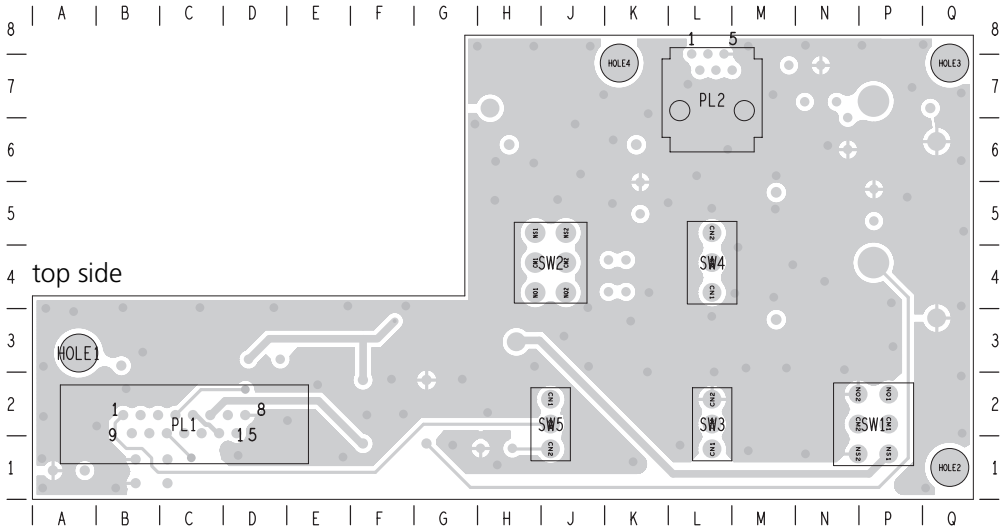
10.3 PCB Information (PCB IPN 220-01418-02A)

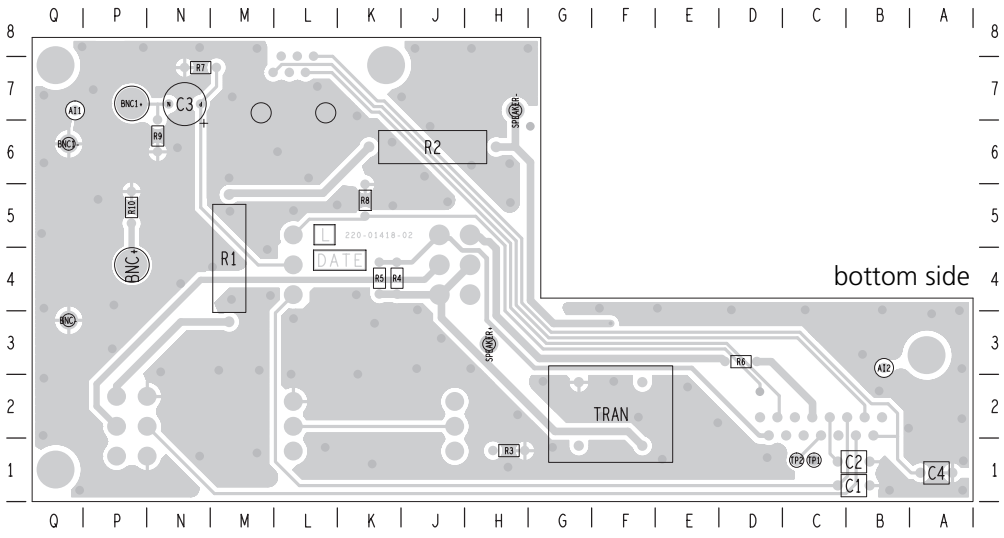
10.3.1 Parts List (Rev. 4)

Ref.	IPN	Description
BNC1	240-02100-11	Skt Coax BNC 3.5mm Pnl N/Tag
BNC2	240-02100-11	Skt Coax BNC 3.5mm Pnl N/Tag
C1	011-54100-01	Cap Cer Al 1n 10% T/C B 50v
C2	011-54100-01	Cap Cer Al 1n 10% T/C B 50v
C3	020-59100-06	Cap Elec Rdl 100m 16v 6.3x11
C4	011-54100-01	Cap Cer Al 1n 10% T/C B 50v
PL1	240-00010-55	Plg 15w Drng W-Wrap Pnl Mtg
PL2	240-04021-60	Skt 6w Modr Ph Vrt T-Ent
R1	032-31820-01	Res M/F Pwr 17x5 8e2 5% 2.5w
R2	032-31820-01	Res M/F Pwr 17x5 8e2 5% 2.5w
R3	030-55120-20	Res Flm 4x1.6 12k 5% 0.4w
R4	030-53560-20	Res Flm 4x1.6 560e 5% 0.4w
R5	030-54270-20	Res Flm 4x1.6 2k7 5% 0.4w
R6	030-52560-20	Res Flm 4x1.6 56e 5% 0.4w
R7	030-55100-20	Res Flm 4x1.6 10k 5% 0.4w

Ref.	IPN	Description
SW1	230-00010-42	Sw Tgl On Off On Dpdt Ms500hb
SW2	230-00010-57	Sw Tgl Dpdt On-On Pnl Mtg
SW3	230-00010-03	Sw Tgl Spst Mini Pnl Mtg
SW4	230-00010-16	Sw Tgr Spst 3-Pos Pnl Mtg
SW5	230-00010-03	Sw Tgl Spst Mini Pnl Mtg
TRAN	054-00010-17	Xfmr Line 600 Ohm 1:1
Not part of the PCB:		
SPKR	032-31820-01	Res M/F Pwr 17x5 8e2 5% 2.5w
	250-00010-19	Spkr C/W Rubber Sealing Ring

10.3.2 PCB Layout





10.3.3 Circuit Diagram