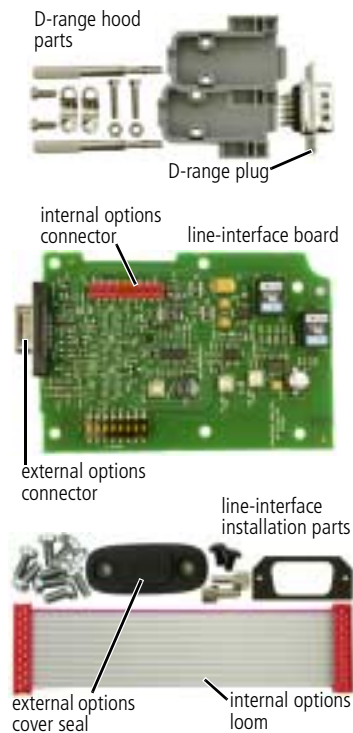


TM8100 mobiles
TM8200 mobiles

Accessories Manual



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 600 Ω 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 19](#) for information on the radio programming procedure.

2.2 Configuring the Line-Interface Board



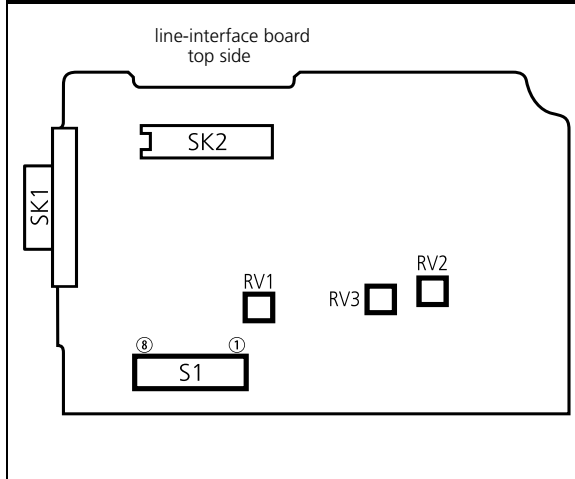
Important

This equipment contains devices which are susceptible to damage from static charges. Refer to [“ESD Precautions” on page 9](#) 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).

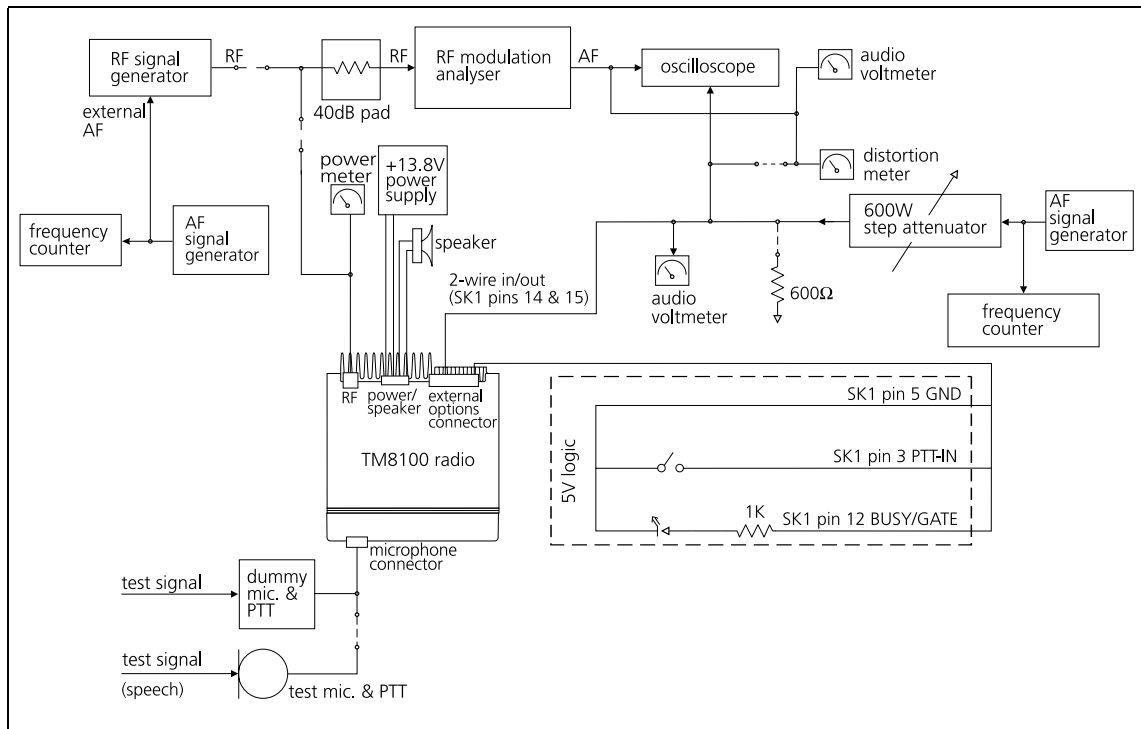
Table 2.1 Line-interface board adjustment points

| | 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 19](#).

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 conjunction 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.

- 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).



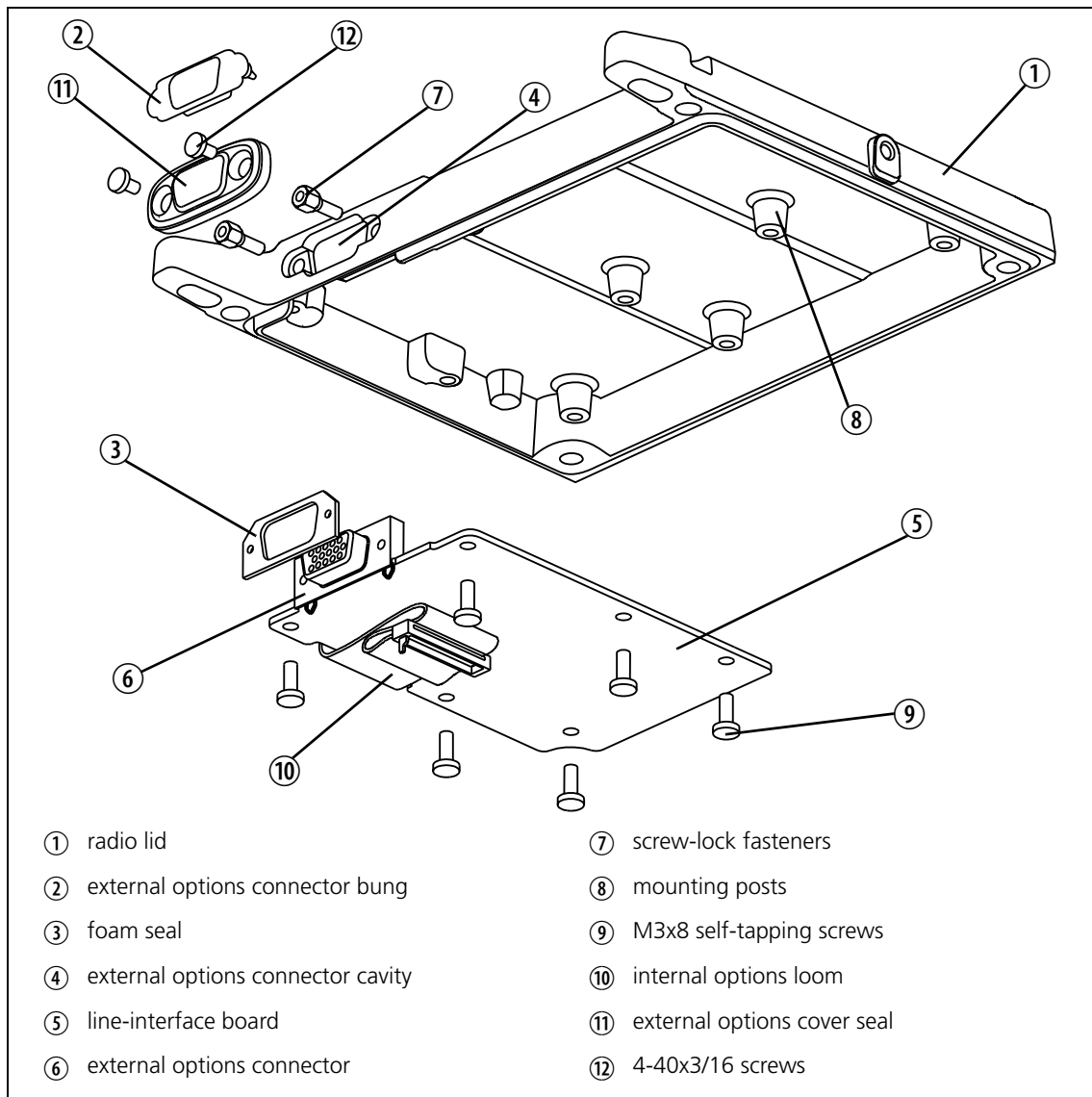
Important The external options connector screw-lock fasteners must be tightened correctly before screwing the line-interface board onto the mounting posts ⑧.

- 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)

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



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


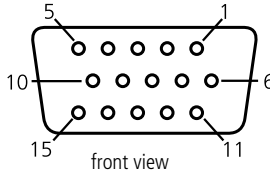
| | Pin | Radio Signal | Line-Interface Signal | Description |
|---|-----|--------------|-----------------------|--|
|  <p>top view</p> | 1 | 13V8_SW | 13V8 FROM RADIO | switched 13V8 supply from the radio |
| | 2 | AUD_TAP_OUT | AUDIO TAP OUT | Programmable tap point out of the receive or transmit audio 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

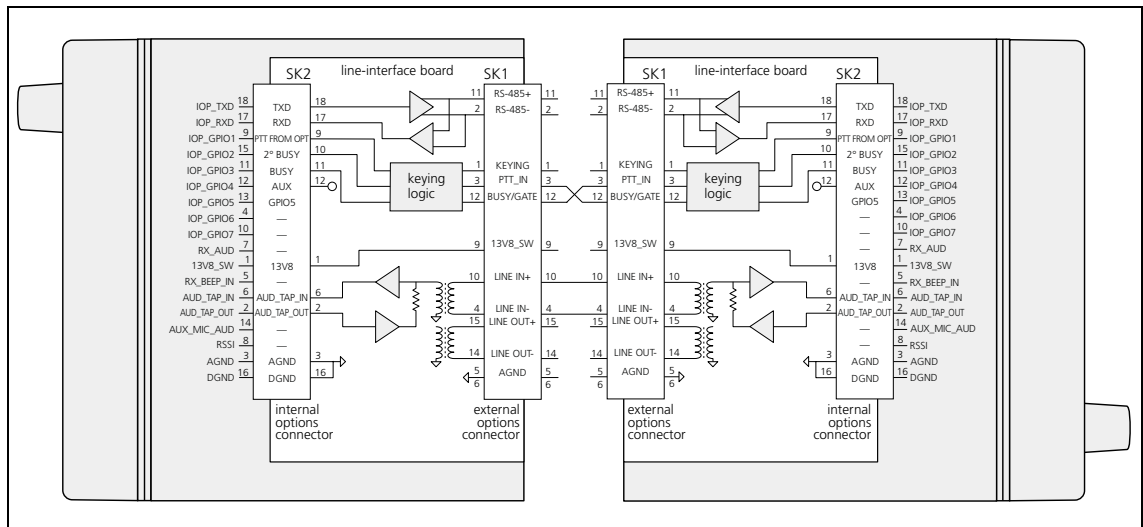
| Pin | Signal | Description |
|-----|-----------------|---|
| 1 | KEYING | signal line keying |
| 2 | — | not connected |
| 11 | — | not connected |
| 3 | PTT-IN | bi-directional keying input |
| 4 | 4W_LINE_IN - | 4-wire line in negative |
| 10 | 4W_LINE_IN + | 4-wire line in positive |
| 5 | GND | 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 1 kHz, 60% deviation | |
| Test Signal | -46dBm RF*, 0dBm line output, audio tap T4 *60% deviation at 1 kHz |
| 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-programmable 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 resistor is AC coupled into the line driver (U5) which is used in a bridged-output format, with gain set to provide the necessary 21 dB 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

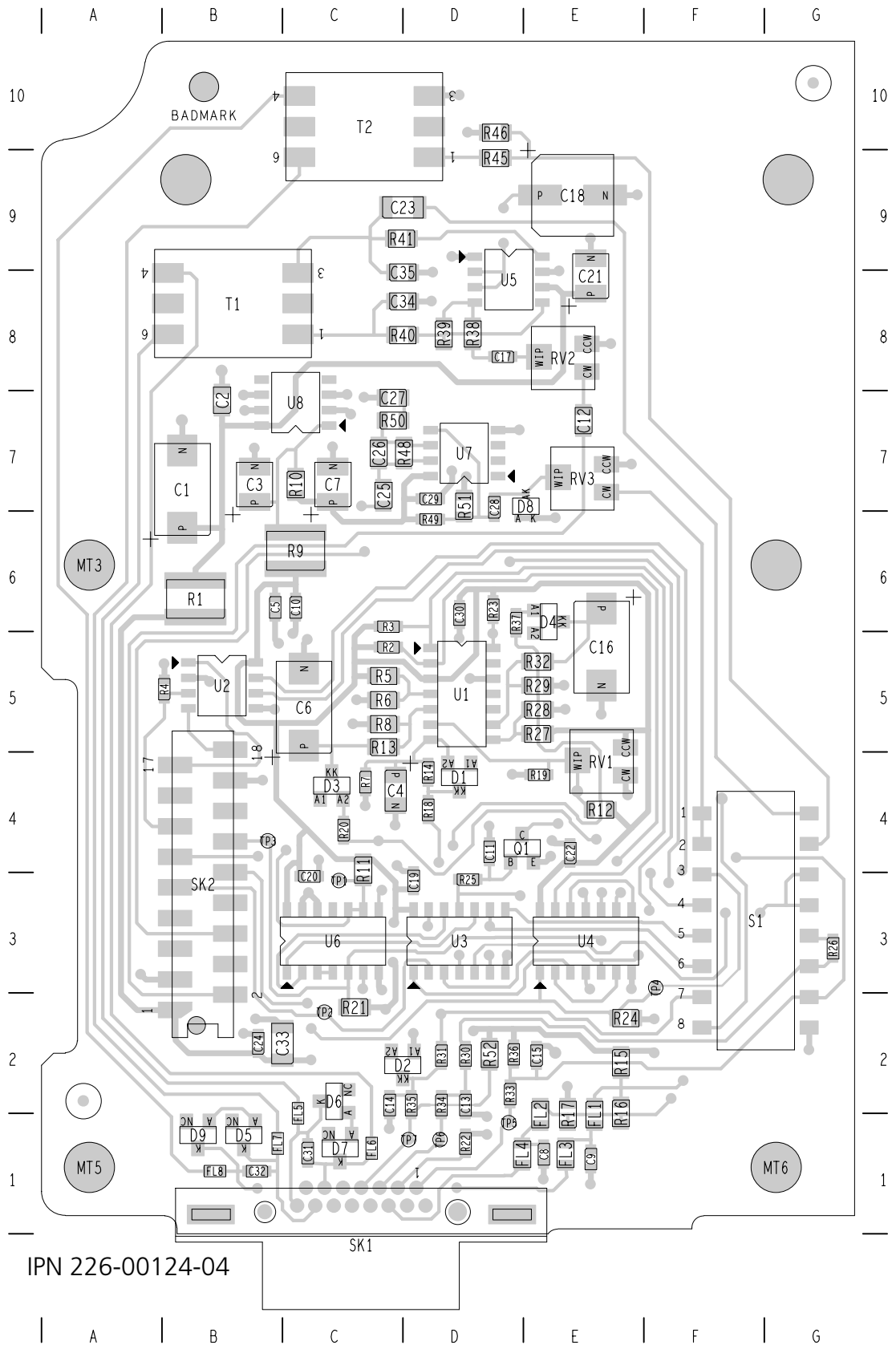
2.9.1 TMAA01-01 Parts List (PCB IPN 226-00124-04)

| Ref. | IPN | Description | Ref. | IPN | Description |
|------|--------------|-------------------------------|------|---------------------|--------------------------------|
| C1 | 014-08100-03 | Cap Tant SMD 10u 35v 20% D | R19 | 038-14270-00 | Res 0603 2k7 1/16w +-5% |
| C2 | 015-26100-08 | Cap Cer 0805 100n 10% X7r 50v | R20 | 038-15100-10 | Res 0603 10k 1/16w +-1% |
| C3 | 014-07470-01 | Cap Tant SMD 4u7 25v 10% B | R21 | 036-14390-00 | Res M/F SMD 0805 3k9 5% |
| C4 | 014-18100-05 | Cap Tant SMD 10u 10v 10% A | R22 | 038-10000-00 | Res 0603 Zero Ohm 1/16w +-5% |
| C6 | 014-06220-00 | Cap Tant SMD 2.2Mf 50v | R23 | 038-15100-10 | Res 0603 10k 1/16w +-1% |
| C7 | 014-07470-01 | Cap Tant SMD 4u7 25v 10% B | R24 | 036-14390-00 | Res M/F SMD 0805 3k9 5% |
| C10 | 018-16100-00 | Cap 0603 100n 16vx7r+-10% | R25 | 038-15100-10 | Res 0603 10k 1/16w +-1% |
| C11 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R26 | 038-14100-10 | Res 0603 1k0 1/16w +-1% |
| C12 | 015-26220-08 | Cap 0805 220n 10% X7r 16v | R27 | 036-15820-00 | Res M/F SMD 0805 82k 5% |
| C13 | 018-14100-00 | Cap 0603 1n 50v X7r +-10% | R28 | 036-15470-10 | Res M/F SMD 0805 47k 1% |
| C14 | 018-14100-00 | Cap 0603 1n 50v X7r +-10% | R29 | 036-16120-00 | Res M/F SMD 0805 120k 5% |
| C15 | 018-14100-00 | Cap 0603 1n 50v X7r +-10% | R30 | 038-13100-10 | Res 0603 100e 1/16w +-1% |
| C16 | 014-06220-00 | Cap Tant SMD 2.2Mf 50v | R31 | 038-14100-10 | Res 0603 1k0 1/16w +-1% |
| C17 | 018-16100-00 | Cap 0603 100n 16vx7r+-10% | R32 | 036-16120-00 | Res M/F SMD 0805 120k 5% |
| C18 | 016-08470-01 | Cap Elec SMD 47uf 6*4 16v | R33 | 038-13100-10 | Res 0603 100e 1/16w +-1% |
| C19 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R34 | 038-13100-10 | Res 0603 100e 1/16w +-1% |
| C20 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R35 | 038-14100-10 | Res 0603 1k0 1/16w +-1% |
| C21 | 014-07470-01 | Cap Tant SMD 4u7 25v 10% B | R36 | 038-15100-10 | Res 0603 10k 1/16w +-1% |
| C22 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R37 | 038-15100-10 | Res 0603 10k 1/16w +-1% |
| C23 | 015-07220-08 | Cap Cer 1206 2u2 16v X7r | R38 | 036-15120-00 | Res M/F SMD 0805 12k 5% |
| C25 | 015-26330-08 | Cap Cer 0805 330n 5% 10v X7r | R39 | 036-16180-00 | Res M/F SMD 0805 180k 5% |
| C26 | 015-23150-01 | Cap Cer 0805 150p 5% NPO 50v | R40 | 036-13180-00 | Res M/F SMD 0805 180e 5% |
| C27 | 015-26330-08 | Cap Cer 0805 330n 5% 10v X7r | R41 | 036-13180-00 | Res M/F SMD 0805 180e 5% |
| C28 | 018-16100-00 | Cap 0603 100n 16vx7r+-10% | R45 | 036-13180-00 | Res M/F SMD 0805 180e 5% |
| C29 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R46 | 036-13180-00 | Res M/F SMD 0805 180e 5% |
| C30 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R48 | 036-16120-00 | Res M/F SMD 0805 120k 5% |
| C31 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R49 | 038-16150-00 | Res 0603 150k 1/16w +-5% |
| C32 | 018-15100-00 | Cap 0603 10n 50v X7r +-10% | R50 | 036-15120-00 | Res M/F SMD 0805 12k 5% |
| C34 | 015-23470-08 | Cap Cer 0805 470p 10% X7r 50v | R51 | 036-16120-00 | Res M/F SMD 0805 120k 5% |
| C35 | 015-23470-08 | Cap Cer 0805 470p 10% X7r 50v | R52 | 036-16120-00 | Res M/F SMD 0805 120k 5% |
| D1 | 001-10000-70 | Diode SMD BAV70 D-Sw SOT23 | S1 | 230-10010-44 | Sw SMD Spst 16dil X8 |
| D2 | 001-10000-70 | Diode SMD BAV70 D-Sw SOT23 | SK1 | 240-00011-67 | Skt 15w Drng Ra Slim Dsub 7912 |
| D3 | 001-10000-70 | Diode SMD BAV70 D-Sw SOT23 | SK2 | 240-10000-11 | Conn SMD 18w Skt M/Match |
| D4 | 001-10000-70 | Diode SMD BAV70 D-Sw SOT23 | | | |
| D5 | 001-10084-51 | Diode SMD BZX84C5V1 Zen SOT23 | T1 | 054-00010-18 | Xfmr Line SMD 600 Ohm P2781 |
| D6 | 001-10084-51 | Diode SMD BZX84C5V1 Zen SOT23 | T2 | 054-00010-18 | Xfmr Line SMD 600 Ohm P2781 |
| D7 | 001-10084-51 | Diode SMD BZX84C5V1 Zen SOT23 | | | |
| D8 | 001-10099-01 | Diode BAV99w Dual Ss | U1 | 002-10339-00 | IC SMD LM339 4x CMplt S014 |
| D9 | 001-10084-51 | Diode SMD BZX84C5V1 Zen SOT23 | U3 | 002-10740-40 | IC SMD 74AHCT04 S014 Hex Inv |
| | | | U4 | 002-10740-80 | IC SMD 74AHCT08 S014 4x2IP AND |
| FL5 | 057-11220-02 | Ind 0603 Blm11a221 Emi Supr | U5 | 002-10854-10 | IC TDA8541T 1w Audio Amp |
| FL6 | 057-11220-02 | Ind 0603 Blm11a221 Emi Supr | U6 | 002-10740-80 | IC SMD 74AHCT08 S014 4x2IP AND |
| FL7 | 057-11220-02 | Ind 0603 Blm11a221 Emi Supr | U7 | 002-10003-58 | IC SMD LM358 Dual 0-Amp |
| FL8 | 057-11220-02 | Ind 0603 Blm11a221 Emi Supr | U8 | 002-10078-05 | IC SMD 78105 5v Reg |
| Q1 | 000-10084-82 | Xstr BC848C NPN SS SOT23 | | 226-00124-04 | PCB TMA 600 Ohm Intfc |
| R1 | 036-02100-03 | Res 1218 10e 5% 1w PRC201 | | 365-00011-38 | Lbl Static Warning Yel |
| RV1 | 042-05100-05 | Res Pre SMD 10k Cer 4mm Sq | | 365-00011-54 | Lbl White R1556/2 90*24mm |
| R2 | 038-15100-10 | Res 0603 10k 1/16w +-1% | | 399-00010-53 | Bag Plstc 150*250mm |
| RV2 | 042-05100-05 | Res Pre SMD 10k Cer 4mm Sq | | 399-00010-86 | Bag Static Shldng 127x203mm |
| R3 | 038-15100-10 | Res 0603 10k 1/16w +-1% | | 410-01064-02 | Pkg Hdr Card New Logo |
| RV3 | 042-05100-05 | Res Pre SMD 10k Cer 4mm Sq | | 600-00009-00 parts: | |
| R5 | 036-15820-00 | Res M/F SMD 0805 82k 5% | | 240-00010-80 | Plg 15w Drng Hi-D |
| R6 | 036-15470-10 | Res M/F SMD 0805 47k 1% | | 240-06010-29 | Conn 9w Hood/Cvr Lets |
| R7 | 038-16220-00 | Res 0603 220k 1/16w +-5% | | 600-00010-00 parts: | |
| R8 | 036-16120-00 | Res M/F SMD 0805 120k 5% | | 219-00329-00 | Loom TMA Int Opt |
| R9 | 036-02100-03 | Res 1218 10e 5% 1w PRC201 | | 354-01043-00 | Fsnr Scrw Lok 1pr 4-40 |
| R10 | 036-13100-10 | Res M/F SMD 0805 100e 1% | | 362-01108-01 | Seal Drng Cvr 9way TMA |
| R11 | 036-14390-00 | Res M/F SMD 0805 3k9 5% | | 362-01111-00 | Seal Drng 9way TMA |
| R12 | 036-14330-10 | Res M/F SMD 0805 3k3 1% | | 347-00011-00 | Scrws 4-40*3/16 Unc P/P Blk |
| R13 | 036-16120-00 | Res M/F SMD 0805 120k 5% | | 349-02062-00 | Scrws M3*8 T/T P/T ContIR |
| R14 | 038-16220-00 | Res 0603 220k 1/16w +-5% | | | |
| R18 | 038-14100-10 | Res 0603 1k0 1/16w +-1% | | | |

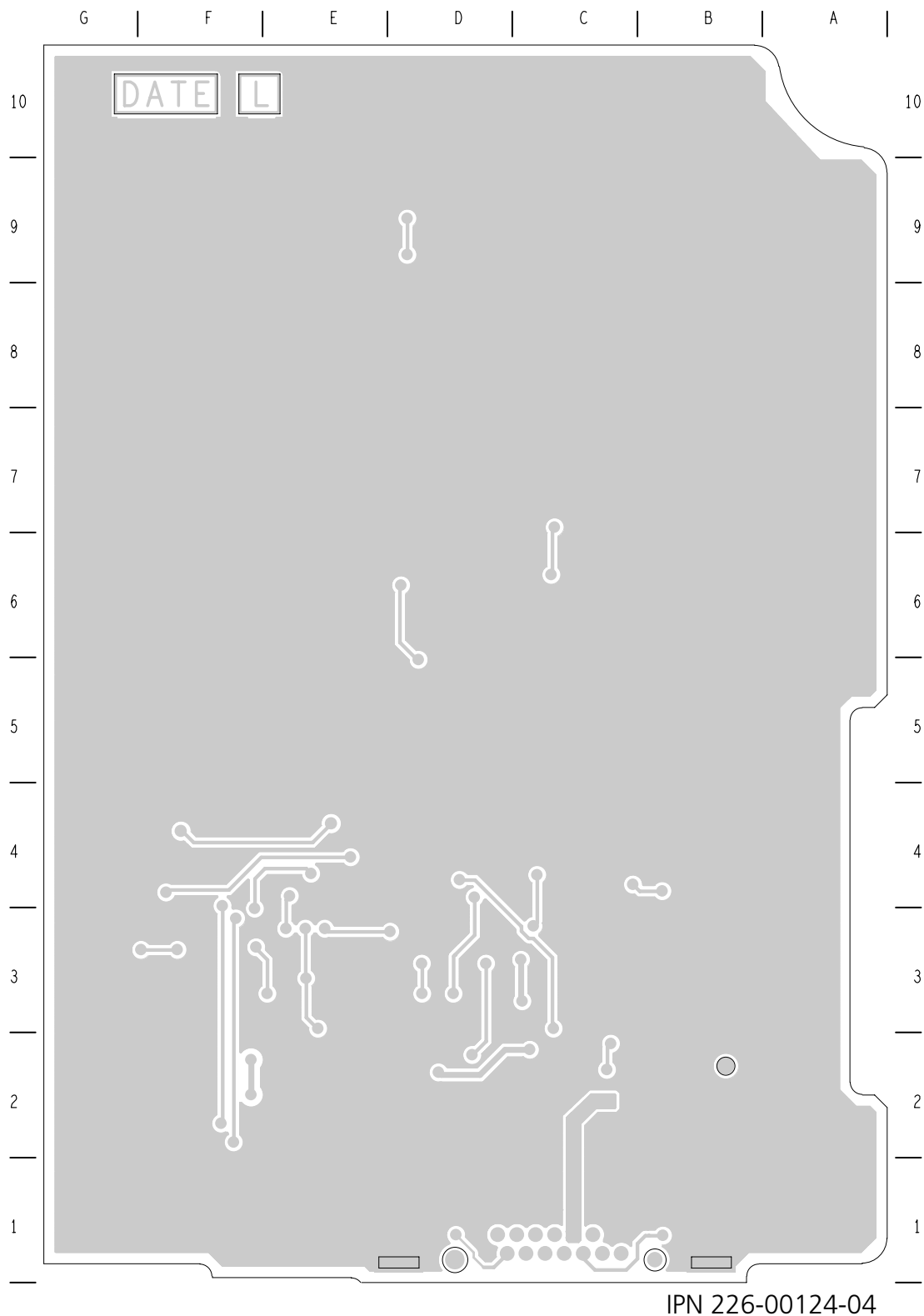
2.9.2 TMAA01-01 Grid Reference List (PCB IPN 226-00124-04)

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

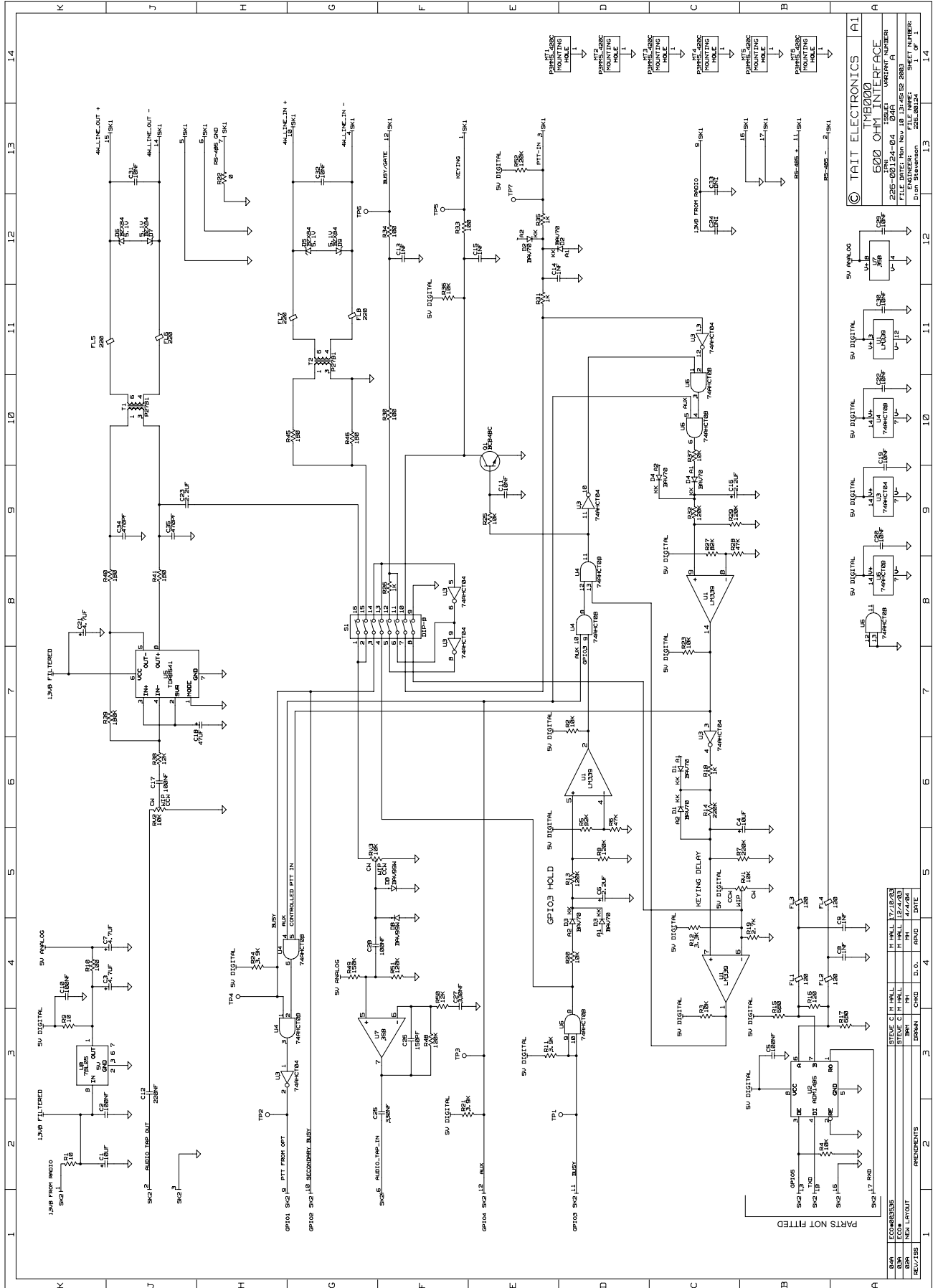
2.9.3 Line-Interface Board Layout (top side)



2.9.4 Line-Interface Board Layout (bottom side)



2.9.5 Line-Interface Board Circuit Diagram



TELCOM

www.telcomsa.es

Tel. (+34) 91 103 30 00