TW7201I-MS

TW7201I

DHSL Remote Control Head

Operator/Technical Manual

Datron World Communications Inc.
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Change Description

Date of Revision	Revision Letter	Description of Changes	Pages Affected
01/08	E	Change ISDN designation to DHSL.	All

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Physical damage to the equipment or its parts that does not involve defects in design, material, or workmanship, including damage by impact, liquids, temperature, or gases.

Damage to the equipment or its parts caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages.

Defects or failures caused by unauthorized attempts to repair or modify the equipment.

Defects or failures caused by Buyer abuse or misuse.

Return of Equipment - Domestic: To obtain performance of any obligation under this warranty, the equipment must be returned freight prepaid to the Technical Support Services. Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92081. The equipment must be packed securely. Datron shall not be responsible for any damage incurred in transit. A letter containing the following information must be included with the equipment.

a. Model, serial number, and date of installation.
b. Name of dealer or supplier of the equipment.
c. Detailed explanation of problem.
d. Return shipping instructions.
e. Telephone or fax number where Buyer may be contacted.

Datron will return the equipment prepaid by United Parcel Service, Parcel Post, or truck. If alternate shipping is specified by Buyer, freight charges will be made collect.

Return of Equipment - International: Contact Datron or your local Representative for specific instructions. Do not return equipment without authorization. It is usually not possible to clear equipment through U.S. Customs without the correct documentation. If equipment is returned without authorization, Buyer is responsible for all taxes, customs duties, clearance charges, and other associated costs.

Parts Replacement: The following instructions for the supply of replacement parts must be followed:

a. Return the parts prepaid to “Parts Replacement” Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92081; and
b. Include a letter with the following information:
1. Part number
2. Serial number and model of equipment
3. Date of installation

Parts returned without this information will not be replaced. In the event of a dispute over the age of the replacement part, components date-coded over 24 months previously will be considered out of warranty.

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1/95

Safety Considerations

This product and manual must be thoroughly understood before attempting installation and operation. To do so without proper knowledge can result in equipment failure and bodily injury.

Caution: Before applying ac power, be sure that the equipment has be properly configured for the available line voltage. Attempted operation at the wrong voltage can result in damage and voids the warranty. See the manuals section on installation. DO NOT operate equipment with cover removed.

Earth Ground: All Datron products are supplied with a standard, 3-wire, grounded ac plug. DO NOT attempt to disable the ground terminal by using 2-wire adapters of any type. Any disconnection of the equipment ground causes a potential shock hazard that could result in personal injury. DO NOT operate any equipment until a suitable ground has been established. Consult the manual section on grounding.

Servicing: Trained personnel should only carry out servicing. To avoid electric shock, DO NOT open the case unless qualified to do so.

Various measurements and adjustments described in this manual are performed in ac power applied and the protective covers removed. Capacitors (particularly the large power supply electrolytics) can remain charged for a considerable time after the unit has been shut off. Use particular care when working around them, as a short circuit can release sufficient energy to cause damage to the equipment and possible injury.

To protect against fire hazard, always replace line fuses with ones of the same current rating and type (normal delay, slow-blow, etc.). DO NOT use higher value replacements in an attempt to prevent fuse failure. If fuses are failing repeatedly this indicates a probable defect in the equipment that needs attention.

Use only genuine Datron factory parts for full performance and safety of this product.

Made in the USA

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CHAPTER 1
INTRODUCTION

1.1 The TW7201I DHSL Remote Control Head

The TW7201I is the Datron High Speed Link (DHSL) remote control unit that uses a high speed modem to provide remote operation of the TW7000 series transceivers configured with the 7000RI option over a two-wire line. The TW7201I includes a DHSL modem that communicates with its DHSL counterpart (7000RI modem option) in the TW7000(F) transceiver.

The TW7201I is microprocessor controlled and features one full-duplex digitized voice channel and two full-duplex data channels.

The TW7201I remote control head includes the following features:

- Full remote control and operation of TW7000 series transceivers
- Dual front panel microphone jacks
- Front panel LCD
- Alphanumeric keypad and function buttons
- Dual rear panel accessory connectors
- AC and DC power source support

1.2 Specifications

Note: *All specifications subject to change without notice or obligation.*

Characteristic	Description
General	
Transmission type	High speed modem and audio.
Modem channels	2 data channels, 1 voice channel.
Range	2 km (maximum).
Control	Controls TW7000 series HF transceivers with 7000RI option.
Display	Front panel LCD.
Audio	Internal loudspeaker (2W output).
Input power AC DC	 120 VAC or 240 VAC. 13.8 Vdc.
Protection	Fused for AC and DC, overvoltage and reverse polarity.
Modem	
Format	High speed slave modem (MC145426) in remote head, master modem (MC145422) in transceiver.
Data	256 kHz modified differential phase shift burst.
Channels voice data	 One full-duplex 64 kb/second digitized voice channel. Two full-duplex 9600 baud data channels.
Remote interface	2-wire (maximum distance 2 km).
Physical	
Size (HWD)	10.16 cm x 33.02 cm x 15.24 cm. (4 in. x 13 in. x 6 in.).
Weight	3.175 kg (7 lbs.).
Environmental	
Temperature operating storage	 –30° C to +60° C. –40° C to +70° C.

1.3 TW7000 Series Family

The TW7000 series is a complete family of RF communications equipment that includes the following components:

- Transceivers (TW7000, TW7000F)
- Internal options
- External options
- Accessories
- Remote control devices

The TW7201I modem operates in conjunction with an DHSL modem (7000RI option) installed in a TW7000 series transceiver. The two modems connect through a 2-wire remote line.

1.3.1 Front Panel Control

When using transceivers such as the TW7000 that include front panel controls, the transceiver controls are the master. In this case, the transceiver controls are live from the transceiver and TW7201I. For security and limited operation applications, the key functions can be inhibited at either the transceiver or TW7201I control panels. Two variations of the TW7000 series transceivers, the TW7000E and TW7000C, do not include control panels.

1.3.2 7000RI Option

The TW7000 series transceiver must have a 7000RI option installed to communicate with the TW7201I remote head. The 7000RI option includes the DHSL Modem board, and a dual UART chip and two jumpers that must be installed on the transceiver Processor board.

1.3.3 TW7201I DHSL Remote Control

The TW7201I includes a DHSL Modem board that communicates with the DHSL Modem board (7000RI option) installed in the transceiver through a remote line using a high speed data packet format. The information is compressed and sent between the master (transceiver) and slave (remote head). Line loss and balance variations do not effect the system performance. The DHSL modem requires wide bandwidth so it does not work over standard analog telephone channel. This system is ideal for distances of 1.6 km (1 mile) or less (2 km max.) over a 2-wire pair.

Voice Channel

The TW7201I provides one voice channel. The voice audio is digitized before being sent over the modem link. This provides excellent voice quality even with poor line conditions and requires no adjustment even when line conditions change.

Data Channels

The TW7201I provides two data channels, using one channel for communications between the transceiver and the remote head. The other data channel is a spare, normally used by accessory equipment or other special functions. The second channel is typically used for an external computer

control device. This configuration allows for full computer control of the transceiver at the remote control head. Both channels are high speed data channels with a 9600 N81 standard interface.

Operating Modes

The TW7201I is designed to be a high speed modem link to the transceiver for both voice and data. The high speed characteristic allows for a wide variety of voice and data capabilities. The TW7201I supports all standard operating modes including USB, LSB, CW, PCS, and AME.

1.3.4 Options and Accessories

The TW7201I supports the following accessories:

- PM palm microphone for voice operation
- DM desk microphone for voice operation
- KEY CW key
- EPL lightweight headset
- TW7201MM mobile mounting kit
- TW7201RM rack mounting kit

The TW7201I is supported with the following optional maintenance and service items:

- TW7201I-TK tool kit
- TW7201I-MRK module repair kit
- TW7201I-MK module kit
- TW7201I-PSK spare parts kit

1.3.5 Accessory Equipment

The TW7201I supports the following optional external devices through the rear panel accessory connectors:

- Telephone couplers
- Data terminals
- Voice encryptors
- External speaker

1.4 Manual Conventions

Bold type denotes all items that appear in the display and for any button, knob or switch on the front panel. For example:

- Press **ALPHA 17**, then press **E**.
- Press **1** to set the status to **OFF**.

1.5 Referenced Manuals

- RC2-MSOP Radio Control 2 Operator Manual
- 7000ENCR-MSOP 7000-Series High-level Encryption Operator Manual
- 7000ALE-MSOP 7000ALE Radio Control Program Operator Manual

CHAPTER 2
INSTALLATION

2.1 Installation Types

The TW7201I can be installed in the following configurations:

- Desktop
- Mobile
- Rack

The desktop model is the standard configuration for the TW7201I and requires no additional mounting hardware.

For vehicle and marine applications, the TW7201I can be ordered with mobile mounting brackets (TW7201MM) that are designed for either top or bottom mounting.

For rack mount applications, the TW7201I can be ordered with the rack mount kit (TW7201RM).

For local operation, the TW7201I requires a 2-wire line between the remote head and the transceiver. The line connections are transformer-coupled at each end. The line length is limited by the time delay of the high speed packets as they travel from each end. Datron offers the C992307 10m (33 ft.) DHSL interface cable.

Datron offers an unterminated remote cable (C992309) for connecting to pre-existing wiring system. Two C992309 cables would be required: one for the transceiver; the other for the TW7201I.

2.2 The TW7000 Transceiver and 7000RI Option

To use the TW7201I with a TW7000 series transceiver, the transceiver must have the 7000RI option installed. This option includes the DHSL Modem board, a serial dual UART IC and jumpers that are installed on the transceiver Processor board. The remote system uses a 2-wire cable between the transceiver and the remote head.

2.3 Audio Connections

The TW7201I front panel hosts two 6-pin microphone connectors. These two connectors are wired in parallel and are compatible with various audio accessories. The input impedance is 150 ohms (nominal). The TW7201I supports most dynamic, ceramic and magnetic microphones.

Table 2-1 Audio Devices

Part Number	Description
DM	Dynamic desk microphone
PM	Heavy-duty hand microphone
HP	Headphones, twin
EP	Headphones
EPL	Lightweight headphones
KEY	CW key (Morse key)

All Datron audio accessories have the correct mating connector. Datron offers mating adapters for other low-level audio accessories.

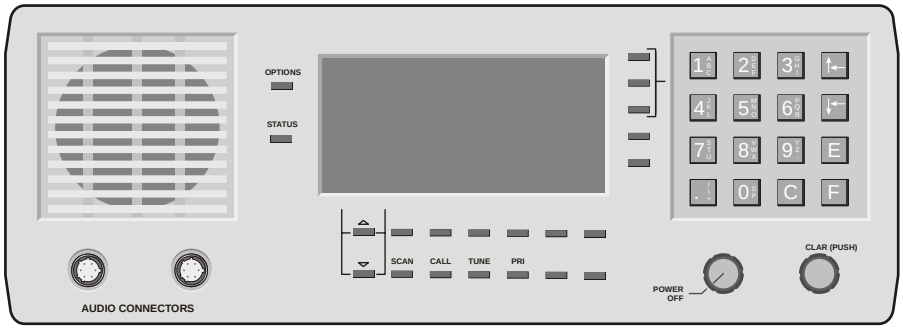


Figure 2-1 TW7201I Front Panel

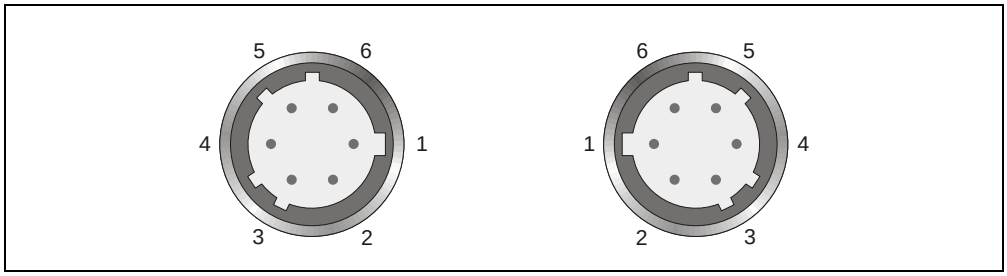


Figure 2-2 Microphone Jack J9 and J10 Pinouts

Table 2-2 Microphone Connector (J9) and (J10) Pin Assignments

Pin	Description	Pin	Description
1	GND	4	TX AUDIO
2	RX AUDIO	5	CW
3	PTT	6	+12 Vdc

2.4 Rear Panel Description

The rear panel provides the AC and DC power connections and fuse blocks, accessory connectors and the remote line connector to the transceiver.

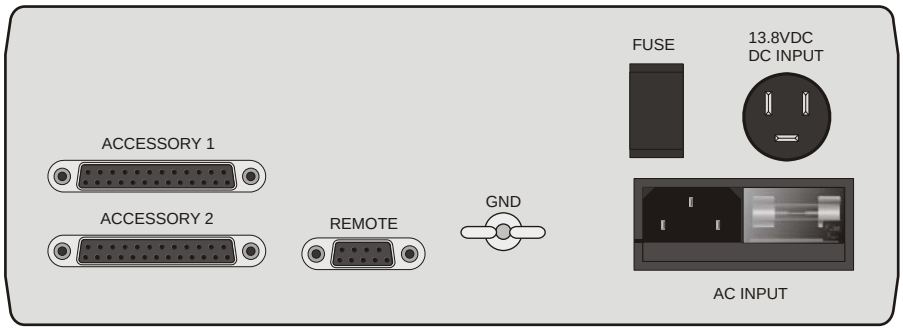


Figure 2-3 TW7201I Rear Panel

2.4.1 Input Power

The TW7201I can accept input power from either an AC or DC power source.

AC Power

The rear panel includes a standard IEC AC power connector that can be configured for 120 or 240 VAC. A standard AC power cable is included with the TW7201I (769004 IEC320 to NEMA 5-15). The AC connector includes a fuse holder and the AC voltage selector card. The AC fuse should be a 1A slow blow 3AG fuse (550014).

The AC power voltage selector card must be configured for the intended power source. The AC power is preconfigured for the AC power level in the area where it is shipped.

CAUTION: Always verify the correct AC power setting on the AC voltage selector card before applying AC power.

To reconfigure the AC power setting:

1. Move the clear plastic fuse cover to the left so that it covers the AC power connector. The AC voltage selector card is located just below the fuse. The current AC power setting is visible on the voltage selector card.

2. Pull the fuse ejector tab toward you and to the left. This forces the fuse partially out of the fuse holder.
3. Remove the fuse.
4. Using a long nose pliers, remove the AC voltage selector card.
5. Orient the card to the correct AC level to be used. The voltage selector card has two numbers on each side corresponding to AC power levels, 100 and 220 on one side, and 120 and 240 on the other side. To get the correct setting, hold the voltage selector card toward the AC connector/fuse holder, with the correct setting facing you as shown in Figure 2-4 below. In this example the TW7201I is configured for 220 VAC.

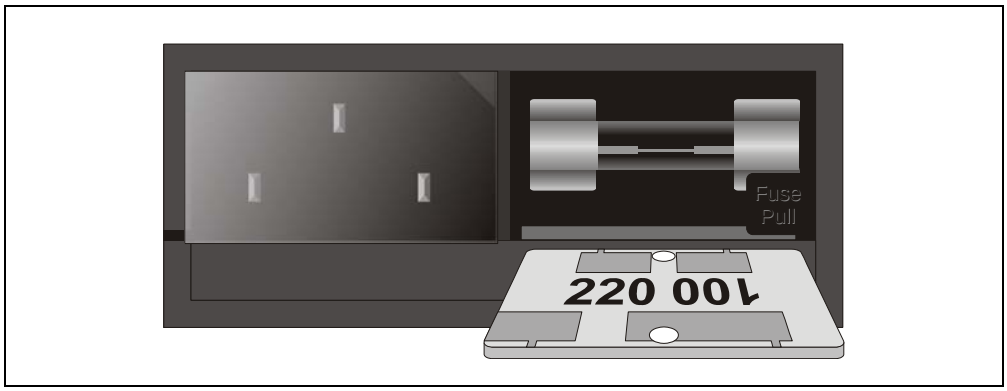


Figure 2-4 AC Voltage Selector Card

6. Insert the card below the fuse holder, install the fuse and push the fuse extractor handle back into the fuse holder.
7. Slide the fuse cover to the right to cover the fuse holder. Install the AC power cable into the AC power connector.

DC Power

The TW7201I rear panel also includes a DC power connector and fuse holder. The DC input circuitry is designed for 13.8 Vdc with a typical current requirement of approximately 300 mA. The recommended DC voltage range is 12 Vdc to 16 Vdc. An optional 2m (6.5 ft.) 3-conductor DC power cable is available (C991829). One end of the DC power cable is left without a plug for convenient connection to a variety of DC power sources.

The DC fuseholder should include a 3A 250VAC fast 3AG fuse (550003) and a spare fuse of the same rating. To access the fuse, push to the left on the fuseholder cover and pull out.

2.4.2 Remote Connector

The TW7201I communicates with the TW7000 series transceiver through a 10m (33 ft.) remote cable (C992307). The remote cable connects to the TW7201I through the rear panel 9-pin D Submini socket. The FSK remote head uses the same remote cable.

The 2-wire DHSL system uses the DHSL1 and DHSL2 lines to communicate between the remote head and the transceiver. The following table provides the pin assignments for the remote connector.

Note: *Datron offers an unterminated remote cable (C992309) for connecting to pre-existing wiring system. Two C992309 cables would be required: one for the transceiver; the other for the TW7201I.*

Note: *The C992307 remote cable is actually a 9-conductor cable. The DHSL modem in the remote head uses only two of the nine wires to communicate with the transceiver DHSL modem.*

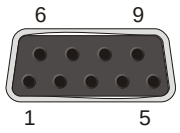


Figure 2-5 DB9 Remote Connector Pinout

Pin	Signal	Pin	Signal
1	GND	6	DHSL2
2	Not used	7	REMRXA (not used)
3	Not used	8	REMTXA (not used)
4	Not used	9	Not used
5	DHSL1		

2.4.3 Accessory Connectors

The rear panel hosts two DB25 accessory connectors **ACC 1** and **ACC 2** (refer to Table 2-3 on page 2-7and Table 2-4 on page 2-8) that support the following accessories:

- External encryption devices
- Audio interface devices
- Data terminal equipment (DTE)
- External speaker

Encryption Devices

An external encryption device can connect to either connector **ACC 1** or **ACC 2**.

Audio Interface Devices

Audio interface devices such as Datron's ACU1000 and ACU-T can use either accessory connector.

DTEs

The TW7201I can interface with data terminal equipment (computers) through accessory connector **ACC 1**. The TW7201I includes two data channels—the main channel provides full transceiver control; the spare channel is designed to interface with a computer (DTE) (data transmission only) so it can use RC2 or DatronLINK to operate and control the TW7000.

Note: *DatronLINK is a proprietary data network management and messaging program designed to automate message file transfers over radio links, LANs and through the Internet.*

External Speaker

The TW7201I includes a standard speaker mounted on the inside of the front panel. An external loudspeaker can be added to the transceiver through the **ACC 2** accessory connector.

Note: *If using the optional external speaker, turn off the internal speaker (push the **SPKR** button; the status icon displayed on the LCD above the **SPKR** button should be set to **OFF**).*

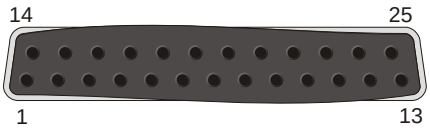


Figure 2-6 DB Accessory Connector Pinout

Table 2-3 ACC 1 Accessory Connector Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	COM1RXD	Receive data line for DTE connection
3	NC	No connection
4	COM1TXD	Transmit data line for DTE connection
5	NC	No connection
6	BALRXA1	Balanced line receive audio 1
7	BALRXA2	Balanced line receive audio 2
8	BALTXA1	Balanced line transmit audio 1
9	BALTXA2	Balanced line transmit audio 2
10	EXAUDPTT\	External audio PTT (active low)
11	NC	No connection
12	NC	No connection
13	+12V ACC	+12 Vdc supply for the accessory devices
14	EXTCWKEY	External CW key
15	NC	No connection
16	DCD	Not used
17	FPWSP1	Front panel spare port (not used)
18	NC	No connection
19	NC	No connection
20	NC	No connection
21	NC	No connection
22	NC	No connection
23	NC	No connection
24	NC	No connection
25	NC	No connection

Table 2-4 ACC 2 Accessory Connector Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	GND	Chassis ground
3	PWRON\	Remote power on/off (active low)
4	NC	No connection
5	NC	No connection
6	BALRXA1	Balanced line receive audio 1
7	BALRXA2	Balanced line receive audio 2
8	BALTXA1	Balanced line transmit audio 1
9	BALTXA2	Balanced line transmit audio 2
10	EXAUDPTT\	External audio PTT (active low)
11	NC	No connection
12	NC	No connection
13	+12V ACC	+12 Vdc supply for the accessory devices
14	GND	Chassis ground
15	NC	No connection
16	DCD	Not used
17	NC	No connection
18	NC	No connection
19	NC	No connection
20	TC/SCALM	Transcall/Secall alarm
21	NC	No connection
22	EXTSPKR	External speaker audio
23	NC	No connection
24	+12V ACC	+12 Vdc supply for the accessory devices
25	+12V ACC	+12 Vdc supply for the accessory devices

CHAPTER 3
OPERATION

The procedures discussed in this chapter use the TW7201I front panel to program the TW7000 series transceiver.

Note: *The TW7000 transceiver must be powered on to program the transceiver from the TW7201I.*

To program the transceiver from a computer, refer to the Radio Control 2 Operator Manual (RC2-MSOP); the 7000ALE option must be installed in the radio.

3.1 Powering the TW7201I

To turn the TW7201I and TW7000 (or TW7000F) on, turn the **PWR OFF/VOL** knob clockwise until an audible click is heard. Power is off in the full counterclockwise position. When the transceiver is turned on, the LCD displays the software version level.

Display: **TW7000**
VER 701xx (where xx is the version level)

The BITE system runs automatically and verifies that the boards are functional.

Display: **TW7000 OK**
MODULES

The BITE system searches for any installed options. The LCD displays the following information:

- Options
- Current channel number (upper left corner)
- Channel frequency (upper center)
- Clarifier offset (if any, below the frequency).

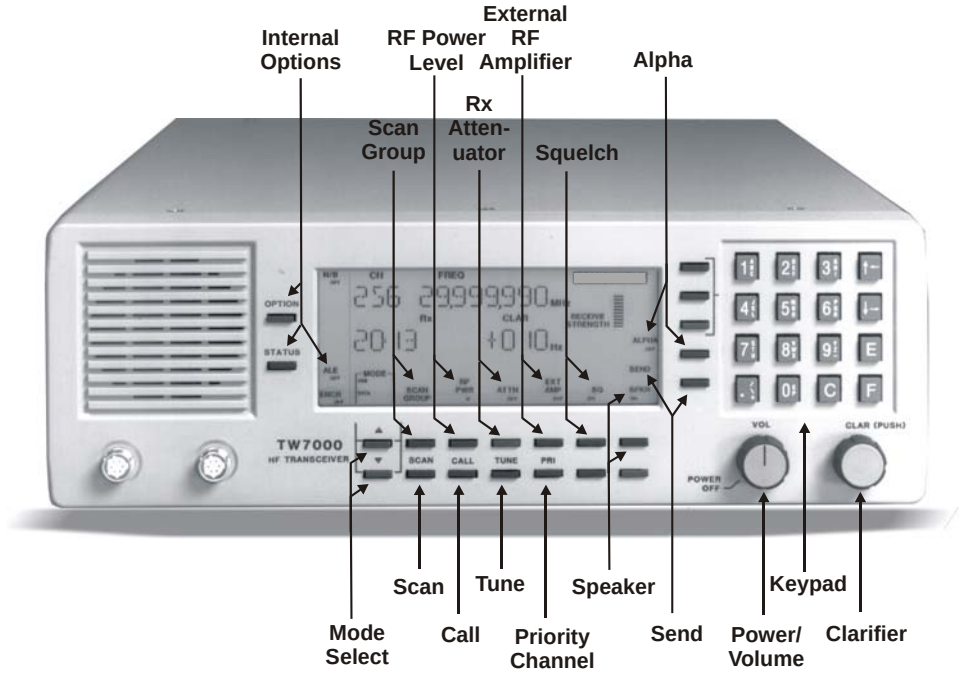


Figure 3-1 TW7000 Front Panel

3.2 Using Knobs, Buttons and Indicators

Front panel knobs, buttons and displayed indicators provide TW7201I function control and status including access to advanced features from menus. For the knob, button and indicator locations, refer to Figure 3-1 above.

3.2.1 Power/Volume

The **PWR/VOL** knob provides power to the TW7201I. It also provides volume control for the internal speaker. To increase volume, turn the **PWR OFF/VOL** knob clockwise.

3.2.2 Clarifier

The **CLAR** knob provides frequency fine tuning by adjusting the channel frequency to clarify the signal. The knob has continuous rotation and provides a maximum of -600 Hz and +600 Hz offset in 10 Hz steps. Turn the **CLAR** knob counterclockwise for negative offset and clockwise for positive offset (USB mode). The offset value is displayed on the right side of the LCD and is nulled by turning the knob until the offset reads +000 Hz, or by pressing the knob (off). When the clarifier is off, no clarifier information is displayed. Pressing the knob a second time restores the previous offset and refreshes the display.

3.2.3 Keypad

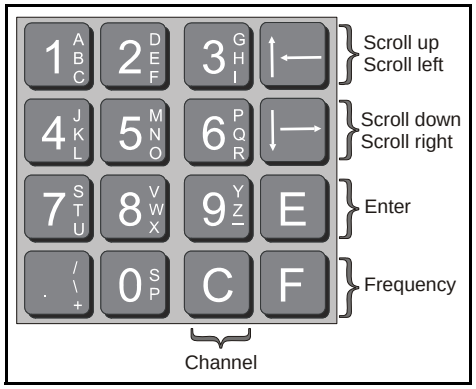
The keypad provides the following operations:

- Enters numeric or alpha characters
- Saves data
- Selects channels and frequencies
- Scrolls within menus

Entering Numbers

To enter numbers:

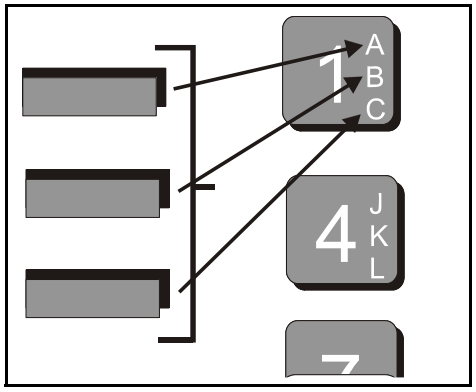
1. Press the desired keypad number. The display has a permanent decimal and comma in the frequency field.
2. If a value is entered that is below 10.000000 MHz, use the decimal button.



Entering Text

Alpha characters are entered using a combination of two buttons. For example:

1. On the keypad, press the top bracketed button, then **1** to enter character **A**.
2. Press the middle bracketed button, then **1** to enter character **B**.
3. Press the bottom bracketed button, then **1** to enter character **C**.



Editing Text

To enter a space, press any bracketed button, then **0**.

To delete a character, use the left and right arrows to position the cursor, then press the **C** button. All trailing characters move to the left.

Menu Navigation

To scroll through the menu selections, use the up and down arrow buttons. These arrows convert to left and right scrolling when editing in the text message mode. The scrolling rate remains constant while an arrow button is held down. The arrows remain active until another control function is selected.

Channel and Frequency Selection

The **C**, **F**, and **E** buttons enter channel and frequency information into memory.

To select a channel:

1. Press the **C** button.
2. Enter the channel number using the keypad.

3. Press **E** to enter the channel selection.

To select a frequency:

1. Press the **F** button.
2. Enter the frequency.
3. Press **E** to enter the frequency into memory.

3.2.4 Function Buttons

The TW7201I front panel includes preprogrammed function buttons such as **CALL**, **SEND**, **TUNE and ALPHA**. The LCD displays the icons at the left and bottom section of the LCD.

Alpha

The **ALPHA** button provides access to the Alpha menu. The Alpha button is in the group of five buttons immediately to the right of the LCD. The **ALPHA** button is the fourth from the top.

1. Press the **ALPHA** button to access the Alpha Menu.
2. To exit the menu, press **ALPHA** again.

Call

The **CALL** button initiates a call sequence in the ALE option or in the Transcall, Selcall, TransAdapt option. If these options are not installed or if they are turned off, this button is disabled.

For information on placing ALE calls, refer to Section 3.7 “Placing an ALE Call” on page 3-22. For information on placing Transcall, Selcall or TransAdapt calls, refer to Section 3.8 “Placing a TransAdapt, Transcall or Selcall” on page 3-23.

External RF Amplifier

The **EXT AMP** button transfers PTT control to an external amplifier connected to the TW7000 **ACC 3** accessory connector.

1. To automatically set and lock RF power in the **H** (high power) position, set it to **ON**.
2. To restore control, set it to **OFF** and the TW7000 no longer requires an external amplifier.

Priority Channel

The **PRI** button sets the TW7000 to a channel defined as the priority channel. The priority channel is preset to channel 001. To change the number of the priority channel, refer to Section 3.4 “Using Menus to Change Settings” on page 3-7.

RF Power Level

The **RF PWR** button allows scrolling through the **L** (low), **M** (medium), and **H** (high) power settings. Default settings for the three RF power levels are listed in the following table.

RF Power Level	Factory Preset	ALPHA 5 Setting
L (low)	10W (average power)	10
M (medium)	25W (average power)	30

RF Power Level	Factory Preset	ALPHA 5 Setting
H (high)	100W (average power)	200

To change these values, refer to Section 3.4 “Using Menus to Change Settings” on page 3-7.

RX Attenuator

The **ATTN** button reduces a strong receive signal by 20 dB by changing the status of the input receiver attenuator from **ON** (+20 dB input RX pad) to **OFF**.

Scan

The **SCAN** button initiates the function that searches the channels in the selected scan group for a clear frequency.

1. Press the **SCAN** button to begin scanning the channels in the selected scan group.
2. Press **SCAN** a second time to terminate the scan sequence and revert the TW7000 to the last channel scanned.

For more information, refer to Section 3.6 “Scanning (for TA/TC only)” on page 3-20.

Scan Group

A scan group is a collection of channels grouped together. After defining the scan groups, use the **SCAN GROUP** button to select a scan group. For more information on scan groups, refer to Section 3.6 “Scanning (for TA/TC only)” on page 3-20.

Send

The **SEND** button sends an ALE call to the last station with an established link. Press the **SEND** button to send an ALE call. For a more detailed description, refer to Section 3.7 “Placing an ALE Call” on page 3-22.

Speaker

The **SPKR** button switches the internal speaker on and off. To mute the speaker, press the **SPKR** button (located beneath the **SPKR** icon on the lower right side of the display). The status of the speaker (**ON** or **OFF**) is displayed under this icon.

Squelch

The **SQ** button changes the status of the squelch circuit from **ON** to **OFF**, or vice versa. In the **ON** setting, background noise is muted.

Tune

The **TUNE** button activates the tune cycle when using automatic antenna tuners like the RAT1000C with the TW7000.

Mode

The **MODE** buttons, located beneath the mode icon on the lower left side of the display, select an operational mode. Press the up or down arrow **MODE** buttons to scroll through the following choices.

Mode	Description
USB	Upper sideband voice: Standard voice grade IF filter and voice AGC time constants.
LSB	Lower sideband voice: Standard voice grade IF filter and voice AGC time constants.

Mode	Description
USB/LSB DATA	FSK AGC time constants, optional USB/LSB wideband data filter, 300-3300 Hz bandwidth.
USB/LSB AME	Same as USB/LSB mode with addition of carrier in transmit mode at a level of -6 dB relative to PEP.
USB PCS	Same as USB mode with addition of carrier in transmit mode at a level of -16 dB relative to PEP.
USB/LSB CW	Optional narrowband filter with 500 Hz bandwidth.

Note: *The LCD only displays these modes if a mode option is installed (7000WB1 or 7000CW). The mode buttons are disabled if the Lockout or Frequency Blank functions are turned on. For information on these functions, refer to Section 3.4 "Using Menus to Change Settings" on page 3-7.*

3.2.5 Internal Options

The **OPTION** and **STATUS** buttons change the status of the following installed options.

Option	Displayed Icon
FED-1045 ALE	ALE
Transcall/Selcall	TC/SC
TransAdapt	TA
Noise Blanker	NB
Voice Enhancement	OPT
Encryption	ENCR

When an option is installed in the TW7000, a corresponding icon is displayed on the outer edge of the LCD. The LCD displays the icon and the option's current status (**ON** or **OFF**).

To change the status of an installed option:

1. Press **OPTION** or **STATUS**. The icon of the last entered option flashes.
2. If you want a different option, press **OPTION** until the desired icon flashes.
3. Press **STATUS** to toggle between **ON** and **OFF**.

   Note: *If you press a button other than **OPTION** and **STATUS**, the icon stops flashing and the radio performs the function of that button. The icon also stops flashing after a time-out of 10 seconds.*

3.3 VSWR Feature

VSWR is a measurement of how much power is delivered to the antenna system. A high VSWR reading indicates a significant impedance mismatch between the transceiver and the antenna system. A low VSWR reading indicates a good impedance match resulting in more power transferred to the antenna system.

When the microphone is keyed, the LCD displays the VSWR on the second text line (except when using ALE, TA/TC/SC and tune). If there is adequate power transfer from the radio to accurately measure VSWR and VSWR is less than 9:1, the LCD displays **VSWR n-1**, where n is the ratio n:1. If the ratio is 9:1 or higher, the LCD displays **VSWR 9+**. If the power out is too low for a reliable determination of VSWR, the LCD displays **VSWR ----**.

Modes USB/LSB DATA are not available for selection unless the 5 MHz IF board includes the 7000WB1 or 7000CW options.

Note: *The VSWR feature requires that firmware 701AU (or later version) and Reference/Control board 001-00206 are installed.*

3.4 Using Menus to Change Settings

The TW7000 provides two menus for adjusting settings. The Alpha menu is for changing settings specific to the 7000TC option (Transcall, Selcall, and TransAdapt). The Alpha menu also provides access to the ALE submenu, which includes a set of functions for changing settings specific to the ALE option.

To access the Alpha menu:

1. Press **ALPHA** to display the first function on the menu.
2. Press the number of the desired function.
3. Press **E** to enter the selection.
4. After selecting and entering a function, use the arrow buttons on the keypad to scroll through any further selections within that function.
5. Press **E** to enter a selection.

For example, press **ALPHA 17**, then press **E** to access the ALE submenu.

3.4.1
Alpha Menu

Table 3-1 Alpha Menu

ALPHA Function	Description
1	OPTION (not used)
2	SCAN SET CHANNEL (for non ALE)
3	SCAN RATE (for non ALE)
4	PRIORITY CHANNEL
5	RF POWER (TX)
6	FREQ BLANK (blanks LCD frequency and disables mode changes)
7	LOCKOUT (disables frequency and mode changes
8	RECEIVE SET Rx ONLY (disables TX operation)
9	SET CLOCK (if option installed)
10	ALARM TIMER ON/OFF
11	SET ALARM
12	Time and date display
13	TA/TC/SC Rx ADDR (TransAdapt/Transcall/Selcall receive address)
14	TRANSADAPT BER NUM (TA bit error rate)
15	SCAN GROUP NUMBER (for non ALE)
16	TA/TC/SC/ Tx ADDR (TransAdapt/Transcall/Selcall transmit address)
17	ALE Submenu (access to the ALE functions in Table 3-2 on page 3-13.)
18	RECEIVE SET Rx/Tx (activated TX operation)
19	RF POWER ATU SET (tune power set)
20	BITE TEST INITIATED
21	OPTION 1 TYPE (Voice Enhancement Modulation)
22	COM 1 BAUD (comport configuration).
23	COM 2 BAUD (comport configuration).
24	BACKLITE OUT (ON/OFF).
25	FREQ INC HZ (frequency increment from 1 Hz to 10 MHz).
26	TEST REAR PANEL I/O (factory test).
27	ENC PASSWORD (Encryption menu).
28	PTT TIMER (sets maximum PTT time).

Table 3-1 Alpha Menu (continued)

ALPHA Function	Description
29	PRINTER.
30	CLONE RADIO.
31	GLOBAL POSITION SYSTEM (optional).
32	CW HOLD TIME.
33	SPLIT SITE (2 radios: TX and RX).
34	CLARIFIER ON/OFF.
35	100 CHANS

Alpha Menu Descriptions

Note: *These functions only apply if the 7000TC option is installed. The exception is function* ***Alpha 17*** *which allows access to the 7000ALE option.*

(1) OPTION Not currently available.

(2) SCAN SET CHANNEL

For customizing the selected scan group (selected with **ALPHA 15**). For more information on how to use this function, refer to Section "Customizing a Scan Group" on page 3-21.

(3) SCAN RATE For setting the rate at which channels within a selected scan group are scanned. Enter a speed between 1 and 30 seconds per channel.

(4) PRIORITY CHANNEL

For changing the number of the priority channel. The default is channel 1. To change the priority channel:

1. Press **ALPHA 4** and **E**. The existing priority channel is displayed.
2. Enter the new priority channel number, then press **E**. The new priority channel number is displayed.
3. Press the **PRI** button to set the new priority channel.

(5) RF POWER For changing RF power output settings of the TW7000. The defaults for the three power output levels are 10, 30, and 200. To change a value:

1. Connect a power meter to the antenna connector on the rear of the TW7000.

2. Press **RF PWR** (refer to Figure 3-1 on page 3-2)) until the desired level (**L**, **M**, or **H**) is displayed.
3. Press **ALPHA 5**, then **E**. The LCD displays the current power level.
4. CW key the TW7000, then scroll to the power level indicated on the power meter. When the LCD displays the desired power level, press **E**.
5. Adjust the other two levels in the same manner.
6. Press **E** twice to exit this mode.

(6) FREQ BLANK For blanking the frequency on the LCD so that only the channel number is displayed. Each time you press **ALPHA 6** the selection toggles between **ON** and **OFF**.

Note: *Setting to **ON** disables the mode select buttons.*

(7) LOCKOUT Prohibits changing any of the channel frequencies. Every time you press **ALPHA 7**, the selection toggles between **ON** and **OFF**.

Note: *Setting to **ON** disables the mode select buttons.*

(8) RECEIVE SET Rx ONLY

For making the displayed channel a receive-only channel by locking out the PTT. The status is automatically set to **ON** whenever you press **ALPHA 8**. Press **ALPHA 18** (TX) to reverse the receive-only state.

(9) SET CLOCK To set the internal clock (if installed) starting from the year, down to the second. Enter the year, date, hour, minute and second pressing **E** after each value.

(10) ALARM TIMER To automatically change the status of the timer from **OFF** to **ON** whenever **ALPHA 10** is pressed. In the **ON** position, you can set the alarm using **ALPHA 11**.

(11) SET ALARM Sets a time for the sounding of the internal alarm. Turn the alarm **ON** using **ALHPA 10**. Enter the year, date, hour, and minute pressing **E** after each value.

(12) TIME AND DATE Automatically displays the setting of the internal clock.

(13) TA/TS/SC Rx ADDR

For selecting a self ID. The LCD briefly displays the current self ID. Use numbers from 000 to 255. This number is usually the last three digits of a serial number.

(14) TRANSADAPT BER NUM

For setting the bit error rate (BER) to evaluate channel performance. The higher number corresponds to the better performing channel. The default is 70.

(15) SCAN GROUP NUMBER

For selecting a scan group. This is the scan group when using **ALPHA 2** and **ALPHA 3**. The default is scan group 00.

Note: *Also use the **SCAN GROUP** icon on the front panel to select a 7000TC scan group (provided ALE is **OFF** or not installed).*

(16) TA/TC/SC Tx ADDR

For identifying the address for the station being called. Numbers from 000 to 255 are available. This number is usually the last three digits of a serial number.

(17) ALE Submenu For configuring the ALE system. For information about the ALE submenu and how the system is configured, refer to Section "ALE Submenu Descriptions" on page 3-14.

(18) RECEIVE SET Rx/Tx

For automatically configuring the displayed channel to an RX and TX channel. Entering **ALPHA 8** changes the setting back to an RX channel.

(19) RF POWER ATU SET

For entering an RF power to use during the tune cycle for an external automatic antenna tuner. The default is 12. Enter a level from 0 to 33.

(20) BITE TEST INITIATED

Automatically starts the TW7000 BITE system.

(21) OPTION 1 TYPE For activating the Voice Enhancement option if the 7000VEM is installed in the option card slot. For more information, refer to Section 3.11 "Activating Voice Enhancement" on page 3-26.

(22) COM 1 BAUD For configuring the TW7000 COM1 port for communicating with a computer. Use the arrow buttons to scroll through and enter the baud rate, data bits, stop bits, and parity.

(23) COM 2 BAUD For configuring the TW7000 COM2 port for communicating with a computer. Use the arrow buttons to scroll through and enter the baud rate, data bits, stop bits, and parity.

(24) BACKLITE Automatically toggles the LCD backlight **ON** and **OFF**.

(25) FREQ INC HZ For setting the amount frequency increases or decreases when the arrow button is pressed to change frequency. The default is 100 Hz. Increments can be set from 1 Hz to 10 MHz.

(26) TEST REAR PANEL I/O

For manufacturing use only.

(27) ENC PASSWORD To access the Encryption menu for configuration, if the 7000ENCR option is installed. For detailed information, refer to the 7000-series High-level Encryption Operator Manual (7000ENCR-MSOP).

(28) PTT TIMER For changing the internal PTT time-out. It can be set from one second to one hour. Entering **0** sets it to **OFF** (no time-out). The default is 300 seconds.

(29) PRINTER For automatically printing complete channel information for the TW7000, if connected to an external printer.

(30) CLONE RADIO For cloning another transceiver by downloading all frequency and channel settings.

(31) GLOBAL POSITION SYSTEM

For configuring an external GPS device.

(32) CW HOLD TIME For setting the continuous wave hold time, in milliseconds.

(33) SPLIT SITE For configuring two radios: receive only (master), transmit only (slave). The receive radio controls the transmitter.

- Polling is set to **1** (**OFF**) or **2** (**ON**).
- Alarm timer sets the interval in minutes between system polling from the receiver to the transmitter.
- FP alarm activates the internal alarm when loss of communication occurs. Set to **1** (**OFF**) or **2** (**ON**).

- External alarm activates the external alarm when loss of communication occurs. Set to **1** (**OFF**) or **2** (**ON**).

(34) CLARIFIER For toggling the clarifier between **ON** and **OFF** (primarily for the RT7000 which does not have an off/on clarifier switch on the front panel).

(35) 100 CHANS Supports the RAT1000 (1 kW tuner with 14 memory channels) or the RAT1000C with 100 memory channels). Selecting this feature toggles it **ON** or **OFF**.

3.4.2 ALE Menu

Table 3-2 ALE Submenu - ALPHA 17

ALE Function	Description
1	SCAN RATE
2	SCAN GRP (scan group)
3	TUNE GRP (tune group)
4	Rx SELCT (tune select)
5	SELF ADRS (self address)
6	SELF NAME
7	OTHR ADRS (other address)
8	OTHR NAME (other name)
9	MOD GRP (modify scan group)
10	SND SELCT (sound select)
11	SND ADRS (sound address)
12	SND LEN (sound length)
13	SND INT (sound interval)
14	CALL LIM (call limit)
15	SLF TMOUT (self time-out)
16	OTR TMOUT (other time-out)
17	AUTO FILL
18	LQA EXCNG (Link Quality Analysis exchange)
19	LQA DECAY (Link Quality Analysis decay)
20	BER THRSD (BER threshold)
21	GOLAY THD (Golay threshold)
22	ERR THRSD (error threshold)

Table 3-2 ALE Submenu - ALPHA 17 (continued)

ALE Function	Description
23	MESSG OUT (message out)
24	NEW MESSG (new message)
25	MESSG IN (message in)
26	HANDSHAKE
27	NET ADRS (network address)
28	NET NAME (network name)
29	NET SLOT (network slot)
30	NET OTHER (network other)
31	SET TO
32	GET LQA
33	EXIT MENU

ALE Submenu Descriptions

To access ALE functions, enter **ALPHA 17** from the Alpha menu. Navigate through the ALE menu in one of two ways:

- Press the desired function number, then press **E** or
- Use the arrow buttons to scroll through the menu to the function, then press **E**.

For information on placing an ALE call, refer to Section 3.7 “Placing an ALE Call” on page 3-22. For detailed ALE operating instructions, refer to the 7000ALE Radio Control Program Operator Manual (7000ALE-MSOP).

(1) SCAN RATE For selecting the rate at which scanning proceeds. The arrow buttons toggle between **2** and **5** channels per second. The number to the left of the scan rate refers to option 1 (two seconds per channel) or option 2 (five seconds per channel).

(2) SCAN GRP For selecting an ALE scan group (from 0 to 9). This becomes the specified scan group when using **(3) TUNE GRP** and **(9) MOD GRP**.

(3) TUNE GRP For automatically tuning an ALE scan group (from 0 to 9). This tunes all the channels in the selected scan group.

(4) Rx SELCT For selecting a receive type:

- **1** for normal ALE receive/transmit (**Rx/Tx**)
- **2** for receive only (**Rx ONLY**)

- **3** for channel setup (**CH Rx/Tx**) of the RC2 software.

(5) SELF ADRS For selecting an address number to review, change, or add for this station (from 00 to 19).

1. To enter a new self address, enter the number.
2. To change an existing address, scroll to the number, then enter a new one.

(6) SELF NAME For entering a new self address name for the address number selected in **(5) SELF ADRS**. Any existing address name is briefly displayed.

1. Use the alpha characters on the keypad to enter from 3 to 15 characters (no spaces or punctuation).
2. To delete a name enter three periods (**...**).

(7) OTHR ADRS For selecting an address number to review, change or add for a station where messages are sent (from 00 to 99).

1. To enter a new other address, enter the number.
2. To change an existing address number, scroll to the number, then enter a new one.

(8) OTHR NAME For entering a new or different name for the other address selected in **(7) OTHR ADRS**. Any existing other address is briefly displayed.

1. Use the alpha characters on the keypad to enter from 3 to 15 characters (no spaces or punctuation).
2. To delete a name enter three periods (**...**).

(9) MOD GRP For modifying or defining channels to include in a scan group.

1. Scroll to the channel to set.
2. To include a channel in a scan group, enter **1** (**ON**).
3. To remove a channel from a group enter **2** (**OFF**).

(10) SND SELCT For enabling or disabling sounding. Enter **1** for sounding **OFF** and **2** for sounding **ON**.

(11) SND ADRS For setting the sounding feature to the self address selected in **(5) SELF ADRS**.

(12) SND LEN For setting the length of each sounding transmission. The recommended sounding length is 5 or 10 seconds.

(13) SND INT For setting the time intervals for sounding. Enter from 1 minute to 24 hours (0001 to 1439 minutes).

(14) CALL LIM For limiting the number of attempts made on each channel when trying to establish an ALE link (00 to 99).

(15) SLF TMOUT For setting the length of time this (self) transceiver remains linked after the transmission of all outgoing messages (000 to 600 in 15-second intervals).

(16) OTR TMOUT For setting the length of time the other radio remains linked when there are no incoming responses (000 to 600 in 15-second intervals).

(17) AUTO FILL For enabling the transceiver to automatically add the address of any station ALE hears to the list of approved other addresses. Enter **1** for **OFF** and **2** for **ON**, or use the arrows to toggle between **OFF** and **ON**.

(18) LQA EXCNG For requesting that a calling or called station exchange a measurement of the link quality received on the other end. Enter **1** for **OFF** (no request) or **2** for **ON** (yes request), or use the arrows to toggle between **OFF** and **ON**.

(19) LQA DECAY For entering the time period in which an LQA memory cell linearly decays from a state of perfect (30) to a state of dead (0). Selectable in periods of 0, 1, 2, 4, or 8 hours.

(20) BER THRSD For entering the acceptable bit error rate threshold (00 to 48) for received ALE words. A threshold of 00 allows for no errors; a threshold of 48 is the maximum amount of allowable errors. The default is 48 allowable errors.

(21) GOLAY THD For controlling the error correcting capability threshold (0 to 4). A value of 0 allows for no corrections while a value of 4 is the maximum amount of corrections allowable. The default is three allowable errors.

(22) ERR THRSD For controlling the number of errors allowed before a word is rejected (0 to 4). A value of 0 allows for no errors while a value of 4 is the maximum amount of errors allowable. The default is three allowable errors.

(23) MESSG OUT For assigning a number to an outgoing message (from 0 to 9). Enter a new assigned number or an existing number to review or change. To enter a new or different message, use **(24) NEW MESSG**.

(24) NEW MESSG For creating a new outgoing message for the number assigned in **(23) MESSG OUT**. Any existing message is briefly displayed. Use the alpha characters on the keypad to create a new message up to 90 characters.

(25) MESSG IN For selecting an incoming message for review (from 0 to 9). Messages are deleted when a tenth message is received.

(26) HANDSHAKE For setting the message exchange compatibility with other radios. Enter **1** for **NO Tx**, or **2** for **NO Rx**.

(27) NET ADRS For assigning a number to a network address.

1. Enter a new number or an existing number to review or change.
2. To enter a new or different address name, use **(28) NET NAME**.

(28) NET NAME For entering a new network address for the number assigned in **(27) NET ADRS**. The address you last entered is briefly displayed.

1. Use the alpha characters on the keypad to enter up to 15 characters.
2. To delete a name enter three periods (**...**).

(29) NET SLOT For assigning network timing slots to stations for network call responses (01 to 16).

Note: *You must set **(27) NET ADRS** and **(28) NET NAME** first.*

(30) NET OTHER For indicating whether a station is part of the network.

1. Scroll to find and display the ID number of the station.
2. Enter **1** for **ON** (part of the network) or **2** for **OFF** (not part of the network).

(31) SET TO For selecting a Other station (address) to determine its LQA score for each of its channels (applies to radios with software version 701BD or later).

1. Use the up and down arrow buttons on the keypad to scroll through the Other Addresses until the desired other station is found. Or, enter the number using the keypad.
2. Press **E** to enter the selection (the Other ID and Other Address line goes blank).

3. Select **(32) GET LQA t**o view the LQA score for each channel for that address.

(32) GET LQA For viewing the LQA score of the channels for the Other Address selected using **(31) SET TO**. The radio displays the LQA score for the first channel of the selected address. There are two score positions for each channel. The first score position is an analysis of the Other address by this radio with a range of 1 to 9. The second score position is an analysis of this radio with a possible range of 1 to 9. Scroll through the channels to view their scores.

(33) EXIT Exits the ALE Submenu.

3.5 Programming Channels and Frequencies

The TW7000 associates a frequency, mode, clarifier status, and offset value (if on) to each channel number. These can be different for each channel and can be viewed whenever that channel number is entered. Once frequencies are set to channels, you can assign channels to scan groups.

Note: *Scan groups are defined by channel number, not by frequency. Changing the frequency of a channel also changes the frequency of that channel within each scan group.*

3.5.1 Selecting a Channel and Scrolling

1. Press **C**.
2. Enter the desired 3-digit channel number.
3. Press **E**. The channel number with its frequency and the clarifier offset is displayed.
4. Use the arrows on the keypad to scroll through the channel numbers.

3.5.2 Entering a Channel Frequency

Acceptable transceiver frequencies range from 0.100000 MHz to 30.000000 MHz in the receive mode and 1.6 MHz to 30.000000 MHz in the transmit mode. Simplex operation uses identical RX and TX frequencies and must be in the transmit mode range.

Enter semi-duplex (split frequency) as an RX frequency first and then as a TX frequency. If you enter a frequency that is out of range, an error message is displayed and the previous frequency is restored.

When you enter a frequency, always include the decimal point unless there are all zeros after the decimal point. You do not need to enter leading or trailing zeros.

Entering a frequency between 0.100000 MHz and 1.6 MHz in the simplex mode makes the radio receiver-only (PTT inhibited).

Entering a Simplex Frequency

To select a channel and assign a new frequency:

1. Press **C**, then enter the 3-digit channel number.
2. Press **E**.
3. Press **F**, then enter the frequency in MHz, including the decimal point.
4. Press **E**. The channel number updates with the new frequency.

Example: To change the frequency of channel 041 from 13.330,000 MHz to 8.572,000 MHz:

1. Press **C**, then press **041**, then **E**.

   Display: **CH FREQ**
   041 13.330,000 MHz
   Rx

2. Press **F**, then press **8.572**, then **E**.

   Display: **CH FREQ**
   041 8.572,000 MHz
   Rx

Entering a Semi-duplex Frequency

To select a channel and assign a new frequency:

1. Press **C**, then enter the 3-digit channel number.
2. Press **E**, then **F**.

   Display: **xx. xxx, xxx**
   Rx

3. Enter the receive frequency.
4. Press **F** again.

   Display: **xx. xxx, xxx**
   Tx

5. Enter the transmit frequency, then press **E**. The LCD displays the new channel frequency.
6. Press **F** to toggle between the receive and transmit frequencies.

Example: To enter an RX frequency of 21.2 MHz and a TX frequency of 29.3 MHz on channel 041:

1. Press **C**, then press **041**, then **E**.

Display: **CH FREQ**
041 xx.xxx,xxx (where xx.xxx,xxx is the existing channel frequency)

2. Press **F**, then **21.2**.

   Display: **041 21.200,000**
   Rx

3. Press **F**, then press **29.3**, then **E**.

   Display: **041 29.300,000**
   Tx

   Note: *If you enter any numbers after pressing **F**, the existing frequency changes.*

Assigning RX Only Channels

To automatically limit a channel to a receive-only operation:

1. Enter **ALPHA 8**.
2. To convert the channel back to a standard RX/TX channel, enter **ALPHA 18**.

To change a displayed frequency:

1. Press **F**.
2. Use the up arrow button to increase the frequency and the down arrow button to decrease the frequency.
3. Press **E** to store the new frequency in channel memory.

   Note: *The default frequency increment is 100 Hz for scrolling. To change this increment, access **ALPHA 25**.*

Using the Manual Channel

The manual channel allows you to create frequencies without worrying about overwriting a frequency on another channel. This channel is defined as channel 000. Frequency settings on the manual channel can be copied to a fixed channel.

To copy the channel 000 data to another channel:

1. Press **C**, then enter the 3-digit channel number to indicate where data is stored.
2. Press **C**, then **E**. This copies data from the manual channel to the new channel. Data is retained in the manual channel.

3.6 Scanning (for TA/TC only)

Scan groups are arranged in the TW7000 according to number. You can have up to 32 different scan groups in the radio at one time, each one having a different scan group number. Each scan group can have up to 64 channels.

Because the TW7000 scans channels, not frequencies, you must assign a channel number to all desired frequencies in a scan group. Channel numbers are not exclusive to a particular scan group; the same channel can be used in different scan groups.

3.6.1 Creating or Selecting a Scan Group

1. Do one of the following:
   - If ALE is **ON**, press the **SCAN GROUP** button or select **(2) SCAN GRP** from the ALE submenu.
   - If ALE is **OFF**, press the **SCAN GROUP** button or **ALPHA 15**.

     Display: **SCAN GRP xxx**
2. Use the arrow buttons to scroll to a scan group number for identifying the group, or use the keypad to enter a scan group number.
3. Press **E**. The display briefly indicates the new scan group number.

   Display: **SCAN GRP xxx** (where xxx is the new scan group)

   This becomes the specified scan group when using menu functions.

3.6.2 Customizing a Scan Group

Customizing a scan group includes reviewing the contents of an existing scan group, adding and deleting channels from a scan group, and selecting the channels in that group to scan.

1. Press **ALPHA 2**.
2. Press **E**.

   Display: **SCAN SET CHANNEL x NNN**
   (where x is the channel status and NNN is the 3-digit channel number)

Review channels in a scan group by pressing the arrow buttons to scroll through them. Channels are displayed in numerical order. Change scan group channels by deleting existing channels and adding new ones.

To delete existing channels from the group:

1. Use the arrow buttons to locate the channel to delete.
2. Using the alpha characters on the keypad, press **D** (delete).
3. Press **E**.

To add new channels to the group:

1. Use the up arrow to scroll past the highest numbered channel until **xxx** is displayed.
2. Enter the number of the channel to add, then press **E**.

3. Continue adding channels as necessary.
4. Press **E** to exit this mode.

You can delete and enter a different single-digit channel at the same time by writing over the contents of an existing channel.

1. Scroll to the channel.
2. Press the single-digit number of the channel to add.
3. Press **E**.

3.6.3 Starting and Stopping Scanning

1. Press **SCAN** to start scanning within the selected scan group. Scanning begins with the first channel in the scan group and continues in numerical order as each channel number is displayed.
2. Press **SCAN** again to stop the scanning process.

3.7 Placing an ALE Call

The ALE option automatically selects frequencies that support communication traffic between stations in a network. This section does not cover the ALE option in detail. For detailed instruction on ALE operations, refer to the 7000ALE Radio Control Program Operator Manual (7000ALE-MSOP).

To initiate an ALE call:

1. Press **OPTION** until the **ALE** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **CALL**.
4. Scroll to find the desired calling option:
   THIS IS: Creates a link, exchanges messages, and remains linked.
   THIS WAS: Creates a link, exchanges messages, then terminates the link.
   RE-LINK: Automatically chooses the best possible channel using the information from a prior **THIS IS** call.
   POLLING: Automatically completes a **THIS WAS** call on each of the scan group channels. Link quality information is recorded for each channel.
5. Press **CALL** to make the selection.
6. Scroll to the type of call to make: **INDIVIDUAL** or **NET**.
7. Press **CALL** to make the selection.

   Display: **To:xx nnnn** (where xx is the destination address number and nnnn is the address name)
8. Scroll to the destination address.

9. Press **CALL**.

   Display: **FR-xx** (where xx is the self address number)

10. Scroll to display the self address.

11. Press **CALL**.

    Display: **AMD message** (Automatic Message Display)

12. Scroll to an existing message number, or select **NO AMD MSG** if you are not sending a message.

    Note: *To create a message, refer to the ALE submenu, function 24.*

13. Press **CALL** to attempt the ALE call.

    Display: **ALE LINK xxx** (where xxx is the channel selected)

    If you press **CALL** immediately after the message is sent, the call terminates and **CALL TERM** is displayed.

14. To initiate an ALE call to the last station with an established link, press **SEND**.

15. Before attempting another call, terminate the previous link.

If the link quality on a **THIS IS** call is poor:

1. Press **CALL** immediately to end it.
2. Press **CALL** again and select **RE-LINK**.
3. Press **CALL** a third time and the TW7000 tries the link again using the second best channel.
4. Repeat this for subsequent channels until the link quality is acceptable.

3.8 Placing a TransAdapt, Transcall or Selcall

The TW7000 is capable of supporting the following selective call systems: TransAdapt (TA), Selcall (SC), and Transcall (TC). Selcall is the basic, single-channel calling system. Transcall is a more advanced system that determines the best channel in a scan group for communications. TransAdapt is a faster system that determines if the selected channel is acceptable for voice-quality communications, not necessarily the best.

3.8.1 Call Setup

Before you initiate a call, turn on the appropriate option as follows:

1. Press **OPTION** until the correct icon flashes (either **TCSC** or **TA**).
2. Press **STATUS** to turn the option **ON**.

Note: *You can only select one call system at a time; You cannot turn the TCSC option on until the TA option is off.*

Before initiating TCSC operations, assign the TW7000 a call code (001 to 225). This is the call code that other stations use to contact this transceiver.

1. Press **ALPHA 13**.
2. Press **E**.

   Display: **TA/TC/SC**
   Rx ADDR xxx

3. Enter the receive call code and press **E**. The number must be from 001 to 255 and not assigned to another transceiver.

   Display: **xxx** (briefly shows the new receive code)

3.8.2 Selcall

To start a Selcall, set the TW7000 to a fixed channel (not scanning).

1. Press **OPTION** until the **TCSC** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **C**, then enter the channel from which to call.
4. Select the appropriate channel on the transceiver.
5. Press **CALL** to initiate the call.
6. Display: **Tx ADDR xxx**
7. Enter the Selcall code of the transceiver to call (001 to 255). A call to all channels (Allcall) is code 000.
8. Press **CALL** again. The TW7000 begins the call sequence. If the call is successful, a link alarm sounds.

   Display: **SC LINK**

   If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.

3.8.3 Transcall

To start a Transcall, place the TW7000 in scan mode:

1. Press **OPTION** until the **TCSC** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **SCAN**.
4. Press **CALL** to initiate the call.
5. Enter the Transcall code of the transceiver to call (001 to 255). A call to all channels (Allcall) is code 000.

6. Press **CALL** again. The TW7000 is now under full control of the Transcall circuit.

   The TW7000 starts transmission on each of the ten channels until it is synchronized with the station to call. When synchronized, both transceivers step through each channel by making a short transmission until the best available channel is reached. Once the best channel is reached, the TW7000 sounds an alarm indicating a successful Transcall connection.

   Display: **TC LINK**

   If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.

7. To break the connection, press **SCAN**.
8. To stop the call before connecting, press **CALL**.

   Note: *When scanning in Transcall, the receiving station also responds to a valid Selcall.*

3.8.4 TransAdapt

The TW7000 can be on a fixed channel or in scan mode. If it is set on a fixed channel, TransAdapt operates the same as Selcall. If used in scan mode, TransAdapt locates the first usable frequency, which may not be the best.

1. Press **OPTION** until the **TA** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **SCAN**.
4. Press **CALL** to initiate the call.
5. Enter the code of the transceiver to call (001 to 255). A call to all channels (Allcall) is code 000.
6. Press **CALL** again. The TW7000 is now under full control of the TransAdapt circuit.

   The TW7000 starts transmission on each of the ten channels until it is synchronized with the station called.

   Display: **TA LINK**

   If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.

7. To break the connection, press **SCAN**.
8. To stop the call before connecting, press **CALL**.

3.9 Activating the Noise Blanker

The Noise Blanker option (7000NB) eliminates impulse-type interference in high-noise environments.

1. Press **OPTION** until the **NB** icon flashes.
2. Press **STATUS** to turn the option **ON**.

3.10 Activating Encryption

The Encryption option (7000ENCR) provides high-level security.

1. Press **OPTION** until the **ENCR** icon flashes.
2. Press **STATUS** to toggle between **1** and **OFF**. The **1** position turns the Encryption option on.

For detailed information on this security option, refer to the 7000-Series High-Level Encryption Operator Manual (7000ENCR-MSOP).

3.11 Activating Voice Enhancement

The DSP-based Voice Enhancement option (7000VEM) suppresses various types of noise and interference on voice communications.

The 7000VEM has two modes of operation. Mode 1 is for adaptive peaking and reduces atmospheric noise and static normal with HF signals. Mode 2 adds the ability to remove man-made interferences like ignition and power line noises.

1. Press **OPTION** until the **OPT** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **ALPHA 21**, then press **E**.

   Display: **OPTION 1**
   TYPE x (briefly displays last mode entered)

4. Enter the mode (**1** or **2**) for this transceiver, then press **E**.

   Note: *To verify that the 7000VEM option is installed, look for* ***OPT 1 MODULE*** *to display during start-up.*

CHAPTER 4

THEORY OF OPERATION

The TW7201I is a remote control unit that uses a high speed digital modem to transmit and receive voice and data. The modem communicates using two data channels and one voice channel. The modem sends a packet of 10 bits over a 2-wire line. The packets from each side of the modem network are synchronized so they do not collide. This system is limited by line length between the transmit and receive packets. The DHSL system includes DHSL Modem board that consists of a master modem in the TW7000 transceiver and slave modem in the TW7201I remote control head connected by a DHSL interface cable (C992307).

4.1 TW7201I Assemblies

The TW7201I consists of six board assemblies:

- Front Panel Processor board
- Display board
- Switch board
- Keypad
- DHSL Modem board
- Power supply/Interface board

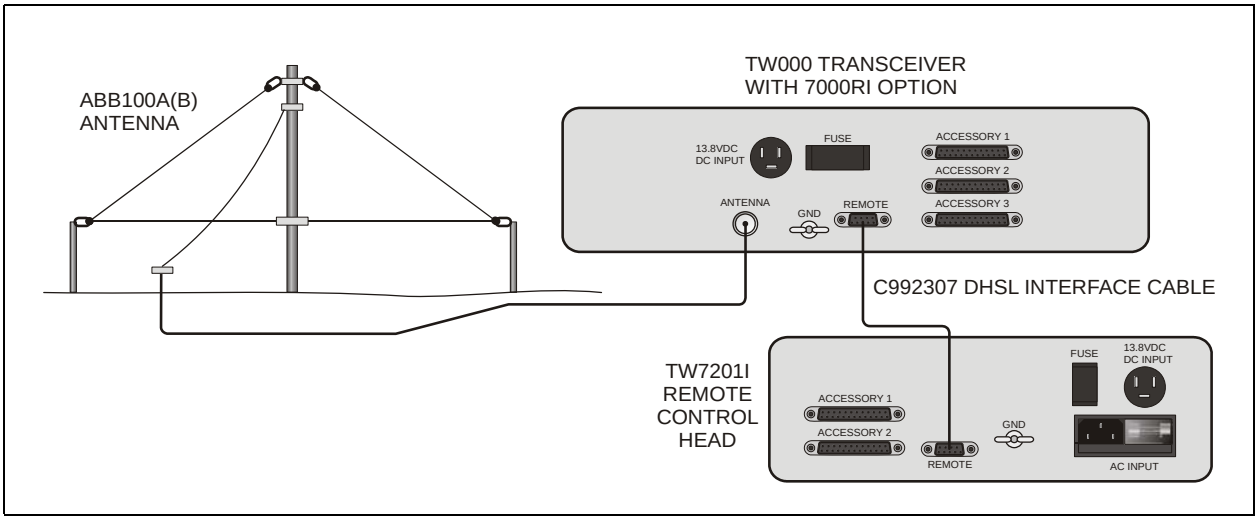


Figure 4-1 TW7201I Remote System

4.2 Front panel Assembly

The front panel assembly includes the die-cast front panel and four PC boards (refer to the Figure 4-2 below) and is connected to the DHSL Modem board by a ribbon cable through connector J1.

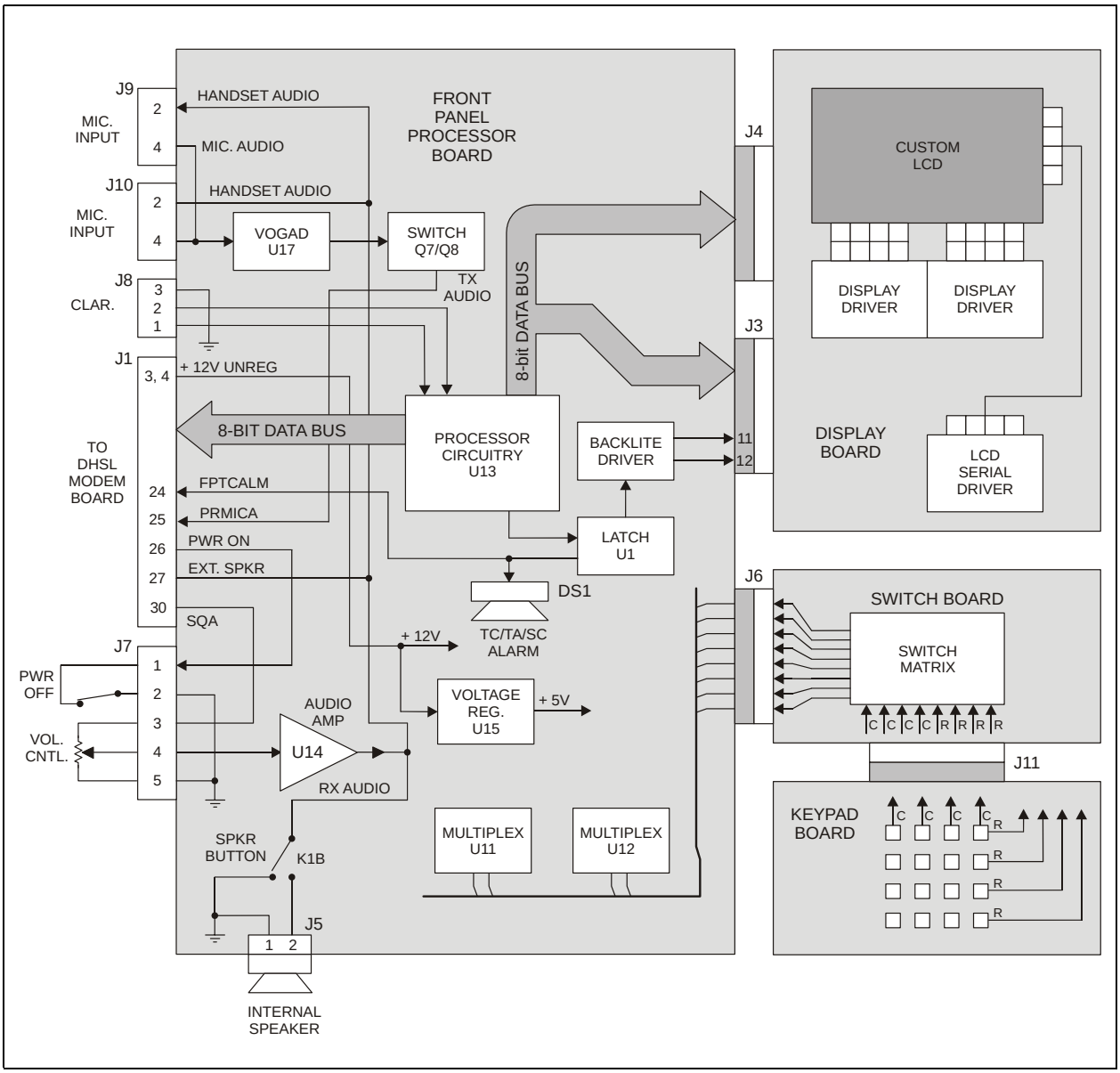


Figure 4-2 Front Panel Assembly Block Diagram

4.2.1 Front Panel Processor Board

The main function of the Front Panel Processor board is to process commands and interact with the transceiver through the DHSL modem. It also provides transmit and receive paths for front panel audio processing.

Front Panel Connections

The Front Panel Processor board connects directly to the microphone connectors (J9, J10), **CLAR** control (J8), **PWR OFF/VOL** switch (J7), LCD board (J3 and J4), Switch Matrix board and Keypad (J6) and DHSL Modem board (J1).

Transmit Audio

The Front Panel Processor board receives transmit audio from the front panel microphone through connectors J9 or J10 pin 4. The transmit audio goes to the voice operated gain adjusting device (VOGAD) U17 which also provides speech compression. The transmit audio continues through switch Q7 and is output to the DHSL Modem board through J1 pin 25 (PRMICA).

Receive Audio

The Front Panel Processor board inputs receive audio from the DHSL Modem board as squelch audio (SQA) through J1 pin 30. It then goes to the top of volume control (J7 pin 3) and returns through the volume wiper (J7 pin 4). The receive audio goes to the audio amplifier U14 that amplifies the audio signal and outputs it to the speaker through J5. Switching relay K1 connects the receive audio to the speaker. The receive audio is also routed to microphone jacks J9 and J10 pin 2.

External Speaker and Alarm

External speaker audio is routed to J1 pin 27. The external speaker output goes through the DHSL Modem board and Power Supply/Interface board, then out the **ACC 2** accessory connector on the rear panel. A separate call alarm buzzer (DS1) alerts the operator of incoming calls and links transcall (TC)/transadapt (TA) operation.

Wake-up Circuitry

The Front Panel Processor board uses the parity tree device U5 to monitor input lines from the front panel (PTT, CW, clarifier and keypad) to the processor. When one of these input lines changes state (asserted), the output of U5 is asserted to trigger the one-shot multivibrator U4 which sends a 20 ms pulse to the processor interrupt line (pin 2) through Q1.

Voltage Monitor, Clock and Data Busses

Voltage detector U16 monitors and conditions the on/off power line to the processor. At power up, U16 holds the processor in reset until the supply voltage reaches a percentage of the set voltage (5 Vdc). If the supply voltage drifts above or below the set voltage, U16 places the processor in reset until the VDD is within a percentage of the set voltage.

The crystal oscillator Y1 (2.3576 MHz) provides the internal clock for the processor at pins 42 (OSC1) and 43 (OSC2). The processor includes three 8-bit I/O data bus interfaces PA, PB and PC. The PB bus provides data to the Display board updating the display as required. The PB bus to the DHSL Modem board is not used. The PA bus provides specific signals to the DHSL Modem board while the PC bus provides specific signals to the Display board.

Front Panel Keypad

Pressing a key on the front panel Keypad asserts a row line that connects to multiplexer U11 and a column line connected to muliplexer U12. These muliplexers send a pulse to U12 pin 3 that stops the keypad oscillator U19C. The oscillator drives counter U9 which scans the row and column lines. When the keypad scanning stops, shift register U10 records the count at the point it stops; this corresponds to a unique key. After reading the key, the processor restarts the scanning loop by toggling U3 pin 7.

Configuration Jumper Block

Jumper block J11 provides configuration settings for front panel functions. Multiplexer U2 converts the parallel settings to serial data that the processor reads at power up. Table 4-1 below lists the functions controlled by the J11 jumper block.

Table 4-1 Jumper Block J11 Default Settings

Jumper	Function	Default
1	All function lockout	Off
2	Frequency change lockout	Off
3	Frequency display lockout	Off
4	Mode change lockout	Off
5	Power change lockout	Off
6	PTT lockout	Off
7	CW lockout	Off
8	TW7000 lockout	Off
9	Not assigned	Off
10	Not assigned	Off

4.2.2 Switch Board

The Switch Matrix board attaches to the front panel and provides an interface for the keypad alphanumeric keys.

4.2.3 Keypad

The Keypad attaches to the front panel and provides a way for the operator to interface with the TW7000 transceiver through the TW7201I using alphanumeric keys.

4.2.4 Display Board

The Display board attaches to the front panel and includes the LCD and display drivers for the LCD. It also includes a serial to parallel driver that takes serial transmit data in U3 and provides parallel data for the display bar graph and other indicators.

The LCD is a high resolution back-lit alphanumeric display that provides channel number, channel frequency, time, clarifier offset, mode and relative signal strength/output power, as well as the status of available options. Two

alphanumeric lines are also available for alphabetic characters (English) for BITE status, and submenus for composing and receiving ALE orderwire or data messages.

4.3 Rear Panel Assembly

4.3.1 Power Supply/ Interface

The TW7201I can be powered from an AC or DC power source. The AC input can be configured for 120 VAC or 240 VAC. The DC input is typically 13.8 Vdc. Refer to Figure 4-3 on page 4-6 for the TW7201I AC power distribution.

AC/DC Power Input

The power supply/interface module is mounted to the rear panel. The voltage input module/filter mounted on the rear panel provides connection to the AC power source. A voltage selector card configures the AC input for either 120 VAC or 240 VAC. The selector card places the transformer T1 primary windings in series for the 120 VAC position and in parallel for the 240 VAC position. The output of T1 is stepped-down and goes to the full-wave rectifier BR1. The rectifier bridge produces a DC output (typically 20 Vdc unloaded at TP1). Diode D2 provides overvoltage protection and D3 provides isolation for the DC input. A low voltage drop-out regulator consisting of transistors Q1, Q2, Q3 and U1 provides 12 Vdc at TP2. If the regulators fail, zener diode D4 provides overvoltage protection. Either the front panel **PWR OFF/VOL** switch or the rear panel power line can activate the power switch relay K1 to provide +12 Vdc to the other boards.

Audio Interface

Voltage regulator U3 provides 8 Vdc to operational amplifier U2B which supplies power (+4 Vdc) to op amp U2A, U2C and U2D.

U2A functions as an accessory audio transmit input buffer. The nominal balanced input from each accessory connector is 0 dBm at 600 ohms (2 Vpp). The **ACC 1** connector audio transmit level can be adjusted using trimmer resistor R27. The **ACC 2** connector audio transmit level can be adjusted using trimmer resistor R29.

Buffer amplifier U2C provides a nominal 0 dBm at 600 ohms balanced receive output at accessory connector **ACC 1** which can be adjusted using R19. Buffer amplifier U2D provides a nominal 0 dBm at 600 ohms balanced receive output at accessory connector **ACC 2** which can be adjusted using R22.

Remote Line Interface

The Power Supply/Interface board provides an interface between the rear panel and the DHSL Modem board. The remote lines DHSL1 and DHSL2 run through the Power Supply/Interface board to the DHSL Modem board at J10. The main interface to the modem board is connector J5. Connector J2 provides the power to the modem board.

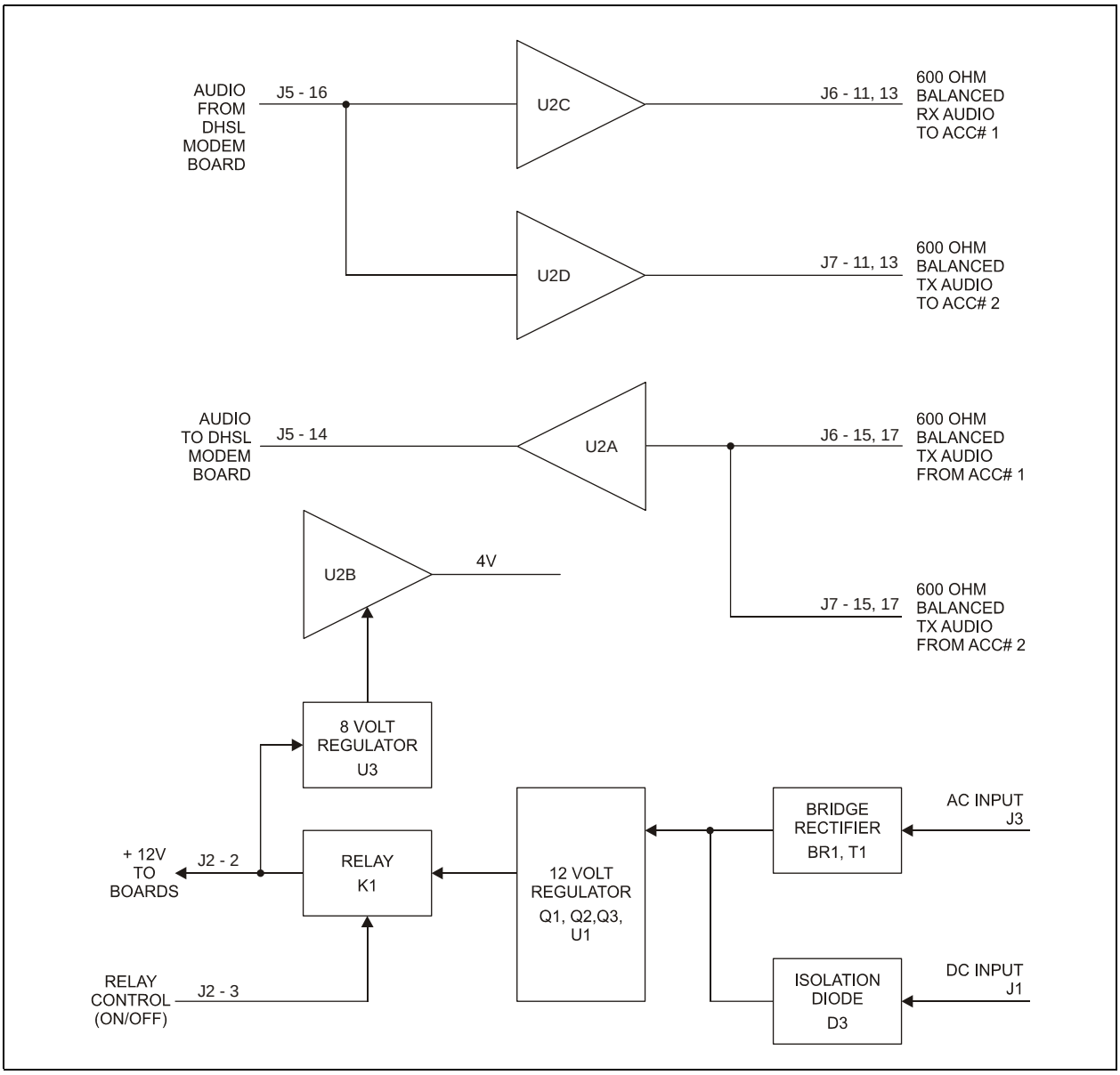


Figure 4-3 Power Supply/Interface Block Diagram

4.3.2 DHSL Modem Board

The DHSL Modem board includes the following components:

- DHSL modem IC
- 2-wire interface
- Codec IC
- Analog interface circuits

	The DHSL modem transmits data in a 10-bit burst over a 2-wire line. Of the 10 bits, eight bits are digitized voice and two bits are data. The modem link is synchronous. The two data bits are separated and stacked by two data set interfaces (DSI) to give two digital channels. One digital channel provides transceiver control; the other channel is a spare.
Power and Ground	Power and ground are routed from the Power Supply/Interface board to the DHSL Modem board through the J2 connector. Connector J3 provides the remote line interface and the front panel interface is through J1. Connector J11 is used for the accessory connector interface. Voltage regulators U14 (5 Vdc), U17 (8 Vdc) and U12 (9 Vdc) provide regulated power to the various circuits.
Modem Clock	Crystal oscillator Y1 (4.096 MHz) and associated logic (U10F, U10E, U10D, U8 and U9) generate the modem clock that provides timing to the modem IC U7, CODEC IC U11 and the two DSI chips U3 and U4.
RS-232 Interface	The TW7201I can communicate with a DTE using RS-232 receiver/driver U5. U5 provides an RS-232 interface to both accessory connectors. The baud rate for the RS-232 interface is configured by the 8-position DIP switch S1 to 9600 through the data set interface (DSI) U3. DSI U4 provides a 9600 baud spare data channel between the TW7201I front panel and the transceiver. Alternatively, the spare channel can be used as a switch using Q6 as the output. The input is set by the 3-pin header JU9 set to the BC position.
Codec	The codec U11 is a voice digitization and reconstruction device. In transmit mode, the TW7201I uses the codec to digitize audio signals from the front panel microphone or an external transmit audio source connected to either of the rear panel accessory connectors. U11 then sends this audio to the DHSL modem U7 to transmit to the transceiver. In receive mode, the codec receives digital information from the modem and returns it to audio signals that are output to the front panel speaker through the Front Panel Processor board or to an external speaker connected to either of the accessory connectors.
DHSL Modem	The DHSL modem U7 interfaces with the transceiver across a 2-wire remote line coupled through transformer T1. U7 receives from and returns digitized audio to the codec U11. The modem receives digitized audio from the codec and digital control signals from the front panel, then transmits them to the transceiver and vice versa. It can also receive data from a DTE through DSIs U3 and U4.
Receive Path	The DHSL Modem board receives digitized audio from the transceiver through the 2-wire remote line, then sends it to the codec to be decoded to analog audio. The receive audio output from the codec is coupled via C30 to the audio amplifier U13D, then output to the front panel speaker (SQA) via output amplifier U15C. The receive audio can be routed to an external speaker via the 600 ohm accessory connectors (600RXA) driven by amplifier U13C. Refer to Figure 4-4 on page 4-9.

Transmit Path

U13A is the transmit audio amplifier with inputs from the front panel (PRIMCA) and accessory connectors (600TXA). The 600 ohm accessory transmit audio can only be enabled using a rear panel key (EXAUDPTT) which enables switching FET Q3. The codec U11 receives the transmit audio, converts it to a digital information, then sends it to DHSL modem U7. The modem transmits the digitized transmit audio along with control data to the transceiver through the 2-wire remote line. Refer to Figure 4-4 on page 4-9.

CW Oscillator

The CW 1 kHz oscillator circuit is optimized for a short rise time. Amplifier U15A and U15B make up a side tone oscillator that is output at U15D pin 14 and summed in with the squelch audio at U15C.

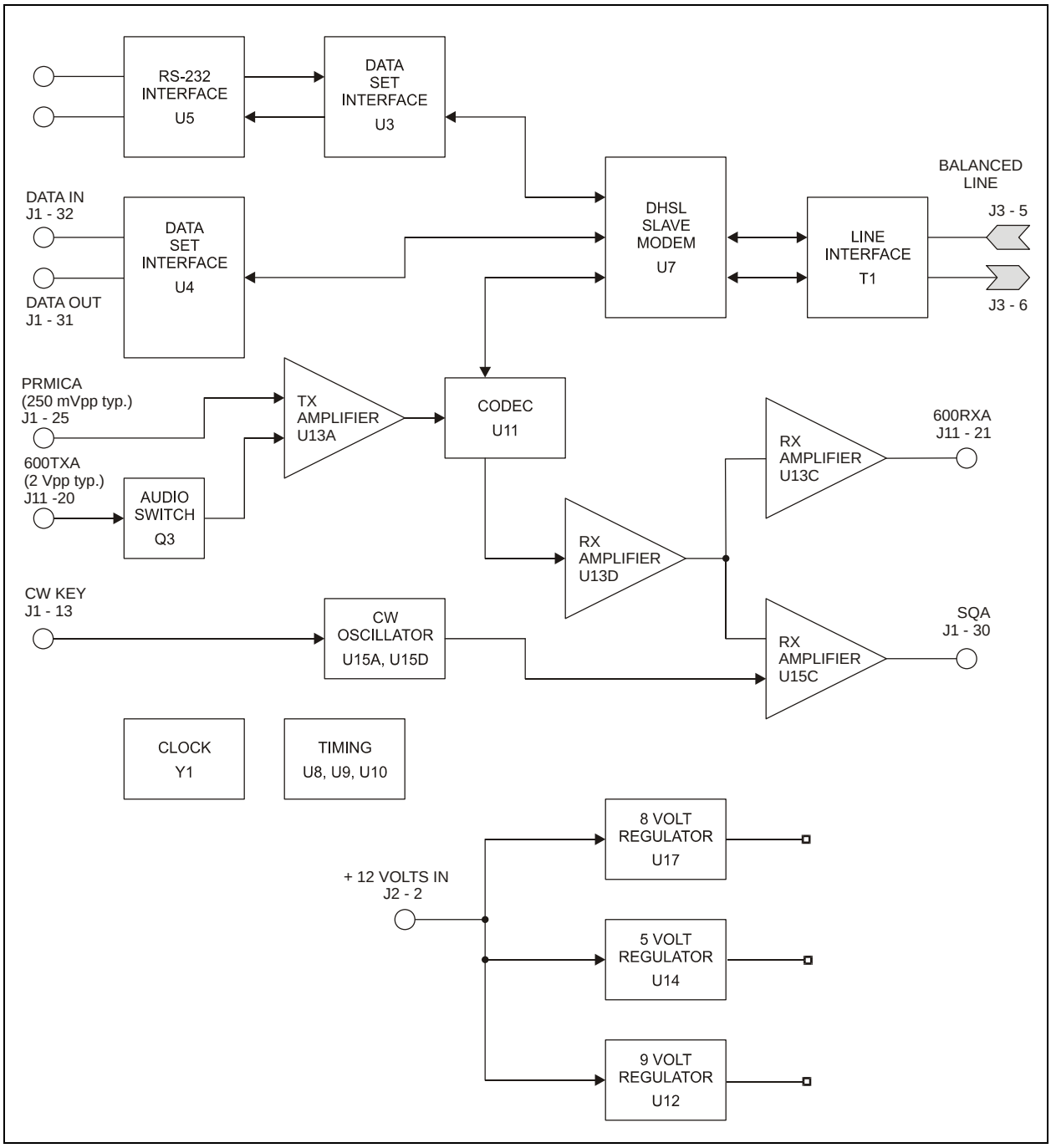


Figure 4-4 DHSL Modem Board Block Diagram (Remote Head)

4.4 7000RI Option

The 7000RI option is the remote control DHSL Modem board in the transceiver. The 7000RI DHSL Modem board must be installed in a TW7000 or TW7000F transceiver to communicate with the TW7201I remote head.

The 7000RI consists of an DHSL Modem board installed in the transceiver's FSK/DHSL slot. It also includes a serial dual UART chip and two jumpers that configure the transceiver's processor. On the transceiver Processor board, jumpers must be installed on jumper/headers JU11B and JU12A.

The DHSL Modem board interfaces with the Front Panel Processor board through connectors J11 and J12 (J1 is not used in the transceiver DHSL Modem board).

4.4.1 Power and Ground

Power and ground are routed to the modem board through the J11 connector. Connector J12 provides the remote line interface through the DC regulation and interface board; it also connects to the Processor board. Connector J1 is not used on the 7000RI DHSL Modem board. Connector J11 connects to the Audio board, and the DC regulation and interface board. Voltage regulators U14 (5 Vdc), U17 (8 Vdc) and U12 (9 Vdc) provide regulated power to the various circuits.

4.4.2 BITE Circuitry

The BITE circuit consists of transistors Q4 and Q5. The 5V supply keeps Q5 biased on whenever the DHSL Modem board has power. If the DHSL Modem board loses power, Q5 turns off and Q4 turns on (active low) to indicate a BITE failure to the processor. Converter U1 output QB is set low to disable the BITE for certain tests.

4.4.3 Modem Clock

Crystal oscillator Y1 (4.096 MHz) and associated logic (U10F, U10E, U10D, U8 and U9) generate the modem clock that provides timing to the modem IC U6, codec IC U11 and the two data set interfaces U3 and U4.

4.4.4 RS-232 Interface

The RS-232 interface is available for the remote control head DHSL Modem board but not the 7000RI DHSL Modem board.

4.4.5 Codec

The codec U11 is a voice digitization and reconstruction device. In transmit mode, the 7000RI uses the codec to digitize an audio signal from the front panel microphone or an external microphone connected to one of the rear panel accessory connectors. The codec sends the transmit audio to the DHSL modem U6 to transmit to the TW7201I through a 2-wire remote cable.

In receive mode, the DHSL Modem board receives digital information from the TW7201I, then sends the digitized audio on the voice channel to the codec to be reconstructed to analog audio. The codec outputs the audio to front panel speaker through the Audio board or to an external speaker connected to either of the rear panel accessory connectors.

4.4.6 DHSL Modem

The DHSL modem IC U6 interfaces with the TW7201I across a 2-wire remote line coupled through transformer T1. It also sends and receives digitized audio from the codec U11. The modem receives digitized audio from the codec and digital controls signals from the processor, then transmits them to the TW7201I and vice versa.

4.4.7 Transmit Path

The 7000RI DHSL Modem board receives transmit audio from the Audio board on the ECRXA line through audio amplifier U13A and outputs it to the codec. The codec digitizes the audio and sends it to the DHSL modem. Along with control signals from the Processor board, the modem sends the digital information to the TW7201I over the 2-wire remote line.

4.4.8 Receive Path

The 7000RI DHSL Modem board receives digital information through the DHSL Modem board from the TW7201I. The control signals go to the Processor board. The transmit audio from the TW7201I are routed to the codec for reconstruction to analog audio. The codec outputs the audio to the Audio board on the ECTXA line through the audio amplifier U13D.

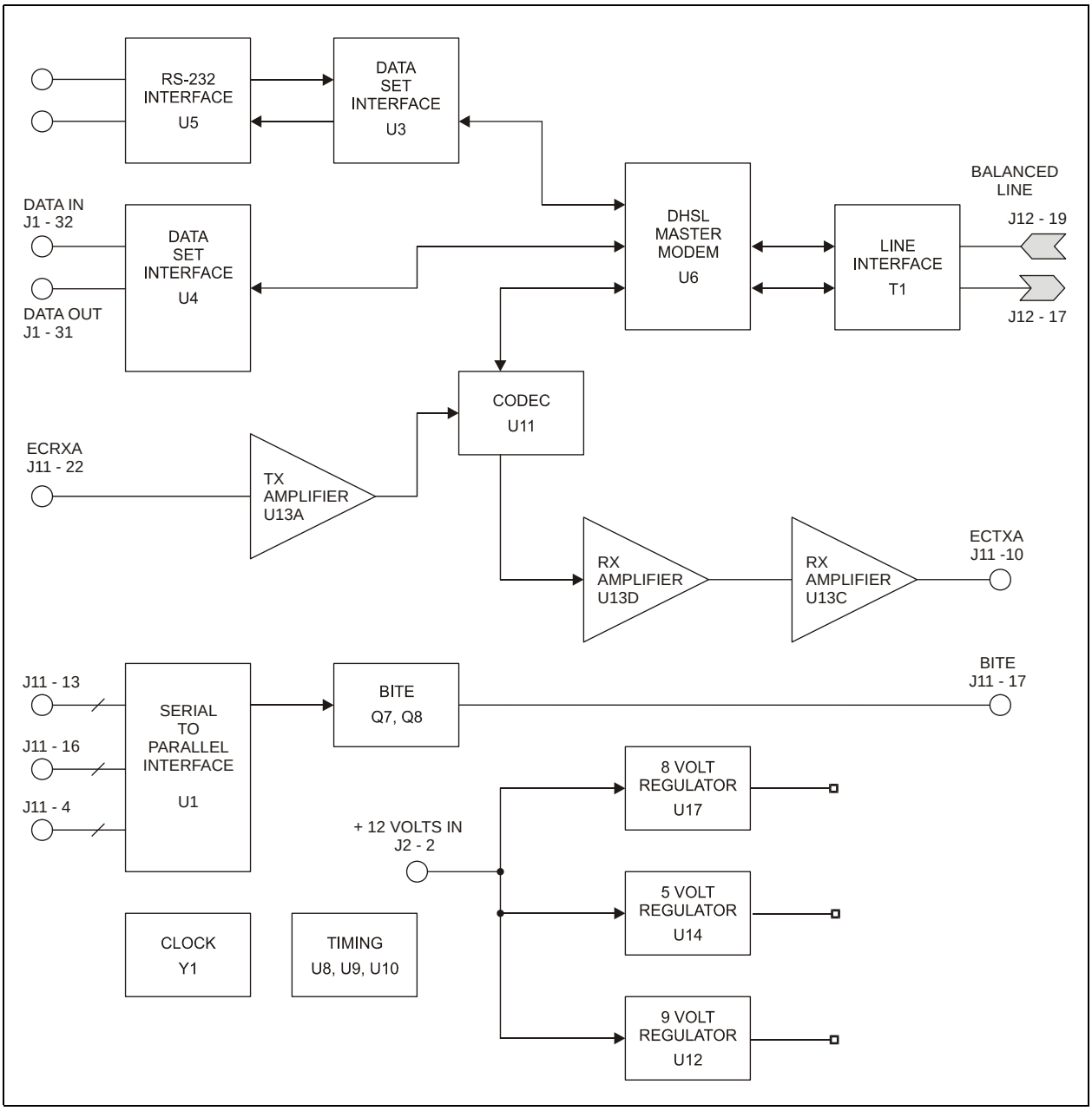


Figure 4-5 DHSL Modem Board Block Diagram (Transceiver)

CHAPTER 5

TESTING AND TROUBLESHOOTING

The following sections provide procedures for testing and troubleshooting the TW7201I system. The test procedures provide a quick and accurate method of evaluating the essential TW7201I operating characteristics to verify operational integrity. If a fault is detected, the troubleshooting procedures aid in determining the necessary intermediate action.

The TW7201I consists of a final assembly (002-03000) and an accessory kit (002-03001). Table 5-1 provides the main functional subassemblies and their respective circuit boards and cable assemblies.

Table 5-1 TW7201I Subassemblies

Subassemblies	Description
001-03000	**Front Panel Assembly**
001-00110	Switch board
001-00120	LCD assembly
001-00130	Keypad
001-00141	Ribbon cable assembly
001-00142	Front panel software
001-03001	Front Panel Processor board
001-00150	Volume cable assembly
001-00161	Clarifier cable assembly
001-00170	Speaker assembly
001-00180	Microphone connector J9 assembly
001-00185	Microphone connector J10 assembly
002-03200	**Rear Panel Assembly**
001-00220	Ribbon cable assembly 25D
001-00230	Ribbon cable assembly 9D
001-00240	DC cable assembly
001-03210	AC cable assembly

Table 5-1 TW7201I Subassemblies

Subassemblies	Description
002-03005	Power Supply Board
002-03100	DHSL Modem Board

5.1 Test Procedures

This section includes test procedures for verifying the operation of various TW7201I functions.

5.1.1 Test Equipment

The test procedures in this section require the following equipment:

- Attenuator
- Wattmeter
- Signal generator
- Frequency counter
- SINADDER
- Oscilloscope
- Power supply
- Multimeter
  PF voltmeter
- Microphone
- CW key

5.1.2 Disassembly

To troubleshoot the TW7201I, it is necessary to disassemble the TW7201I, disconnect cable assemblies and remove circuit boards.

To disassemble the TW7201I:

1. Remove the screws from the top and bottom cover.
2. Remove the two large screws from each side panel.
3. To remove the DHSL Modem board, disconnect connectors J1, J2, J3, J4 and J11, then remove the screws securing the DHSL Modem board to the front panel assembly.
4. To remove the Power Supply/Interface board, disconnect connectors J1 through J10, then remove the six screws securing the Power Supply/Interface board to the rear panel.

5.1.3 Operational Test

The operational test checks the overall operational integrity of the TW7201I and should be performed during initial inspection, after the TW7201I has been repaired or any time there is a suspected degradation of performance.

To perform the operational test:

1. Turn the TW7000 transceiver on.

   The TW7000 includes an internal BITE circuit that activates automatically at powerup. If a fault is detected, the front panel LCD indicates the fault. If the internal 7000RI option is present, the front panel LCD displays **INSTALLED ISDN REMOTE** during the BITE sequence.

2. Turn the transceiver **PWR OFF/VOL** switch on and adjust the knob until audible noise can be heard in the speaker.

   Check the LCD to make sure the internal speaker is enabled. If it is not, press the **SPKR** button below the icon to enable the speaker.

3. Select a known frequency (WWV for example) and monitor the receive audio.
4. Change to a channel with a clear frequency. Push the PTT button on the microphone and speak into the microphone. Receive audio should stop and the transceiver should transmit at the channel frequency.
5. Connect the TW7201I to the TW7000 transceiver using the remote cable (C992307).
6. Turn the TW7201I on. The transceiver should begin to update the remote head information (it takes about two seconds for the front panel to update).
7. Make sure the speaker is turned on at the TW7201I. Monitor the receiver audio.
8. Install a microphone to the TW7201I. Change to a channel with a clear frequency and push PTT on the microphone. The receive noise should stop and the transceiver should transmit at the channel frequency.

5.2 Troubleshooting

This section provides information for troubleshooting the TW7201I down to the subassembly level. The objective is to identify a faulty board in the remote head.

After replacing a faulty board, verify the fault no longer exists and perform the operational test described in the previous section.

CAUTION: Use extreme caution when powering the TW7201I from an AC power source. Using AC power produces high voltage on the power supply board. Use a DC power source when performing testing and servicing.

5.2.1 Transceiver 7000RI

1. Power on the TW7000 transceiver.
2. Verify the transceiver detects and indicates the presence of the 7000RI option on the front panel LCD.
3. Verify the correct remote cable wiring (where applicable).

5.2.2 Power

If the TW7201I does not power up:

1. Verify the TW7201I is receiving the correct input power (13.8 Vdc or 110/220 VAC).
2. For AC input, verify the AC voltage selector card is set for the correct AC input.
3. Check the fuses in the DC input/fuse block on the rear panel.

   Note: *If the fuse is blown, determine the reason and perform the necessary repairs before continuing with further testing.*

4. Verify the DC input voltage on the Power Supply/Interface board at test points TP1 and TP2 is 12 Vdc.
5. Check the **PWR OFF/VOL** switch. Ground the PWRON line to verify proper switch operation. The relay on the Power Supply/Interface board should activate.
6. Measure the following voltages on the Power Supply/Interface board: TP1 input voltage (source voltage), TP2 12 Vdc.
7. Check **PWR OFF/VOL** knob operation and backlight operation (**ALPHA 24**).

5.2.3 Receive Audio

If there is no receive audio or noise at the TW7201I:

1. Verify the receiver signal/noise is present at the transceiver. Check for correct DHSL Modem board configuration according to the system configuration.

   Note: *The audio is transmitted as digital data. If data information (for example, front panel) is okay but there is no receive audio, check JU5, JU6, JU7 and JU8.*

2. Check the audio signal received at the codec IC J11 on the DHSL Modem board. The codec chip converts the audio to and from digital information (Rx on J11 pin 2 and Tx on J11 pin 5).
3. Check the audio signal transmitted from the DHSL Modem board at U15C pin 8. This signal goes to the front panel speaker through the Front Panel Processor board.
4. Check the audio signal at the volume potentiometer and on the wiper (J7 pin 1 and 2).
5. Check for the audio signal at the audio amplifier output on the Front Panel Processor board (U14 pin 4).
6. Check for the audio at the speaker on the Front Panel Processor board (J5 pin 2).

5.2.4 Communication Between TW7201I and TW7000

If there is no communication between the TW7201I and the TW7000 transceiver:

1. Verify the backlight and **PWR OFF/VOL** switch are operational. This indicates the Front Panel Processor board is functional.
2. Cycle power to the transceiver and TW7201I. Verify the TW7201I is receiving audio from the transceiver. If the remote head is receiving audio, this indicates the DHSL modems are communicating.
3. Check the transceiver DHSL Modem board, configuration and cable.

5.3 Component Locations, Pin Assignments, Schematics and Part Lists

The following section provides component locations, schematics and parts lists for the Front Panel Processor board, DHSL Modem board and the Power Supply/Interface board.

5.3.1 Front Panel Processor Board

Table 5-2 Front Panel Processor J1 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	GND	Chassis ground
3	+12V	Unregulated +12 Vdc input
4	+12V	Unregulated +12 Vdc input
5	PB7	Data line for display drivers
6	PB6	Data line for display drivers
7	PB5	Data line for display drivers
8	PB4	Data line for display drivers
9	PB3	Data line for display drivers
10	PB2	Data line for display drivers
11	PB1	Data line for display drivers
12	PB0	Data line for display drivers
13	FPCWKEY	CW key output to modem board (turns on the CW oscillator)
14	FPCWA	Not used
15	FPWSPI	Not used (spare)
16	FPPTT	Output to modem board that indicates a front panel PTT
17	FPSPITXD	Serial peripheral interface transmit data
18	FPSPIRXD	Serial peripheral interface receive data
19	FPSPICLK	Serial peripheral interface clock
20	FPBITE\	BITE input from DHSL Modem board (active low)
21	ENA	Enable line for serial data input to modem board
22	FPWSP2	Spare port

Table 5-2 Front Panel Processor J1 Pin Assignments

Pin	Signal	Description
23	DHSLMSEL	DHSL modem select (high selects the DHSL Modem board)
24	FPTCALM	Transcall alarm tone
25	PRMICA	Microphone audio output
26	PWR ON\	Power status (active low)
27	EXTSPKR	External speaker audio
28	FPSP3	Not used
29	MODEM EN	Modem enable line from Front Panel Processor board
30	SQA	Audio input from modem board
31	FPRXD	Receive data from modem board
32	FPTXD	Transmit data to modem board
33	FPSP1	Not used
34	EXAUDPTT\	External audio PTT input from modem board (active low)

Table 5-3 Front Panel Processor J3 Pin Assignments

Pin	Signal	Description
1	PB0	Data line for display drivers
2	PB1	Data line for display drivers
3	PB2	Data line for display drivers
4	PB3	Data line for display drivers
5	PB4	Data line for display drivers
6	PB5	Data line for display drivers
7	PB6	Data line for display drivers
8	PB7	Data line for display drivers
9	+5V	Regulated +5 Vdc output
10	GND	Chassis ground
11	BKLIT1	Backlight driver
12	BKLIT2	Backlight driver

Table 5-4 Front Panel Processor J4 Pin Assignments

Pin	Signal	Description
1	SYNC	LCD sync pulse
2	WE\	Write enable (active low)
3	RE\	Read enable (active low)
4	READY	Not used
5	+12V	Heater
6	CS2	Chip select 2
7	CS1	Chip select 1
8	SPITXD	Serial peripheral interface transmit
9	CLKDIS	Not used
10	HEATER SW	Heater switch
11	SENSE 1	Not used
12	CONTRAST	Contrast adjust

Table 5-5 Front Panel Processor J5 Pin Assignments

Pin	Signal	Description
1	SPKR AUD	Speaker audio
2	GND	Chassis ground

Table 5-6 Front Panel Processor J6 Pin Assignments

Pin	Signal	Description
1	C0	Column matrix data
2	C1	Column matrix data
3	C2	Column matrix data
4	C3	Column matrix data
5	C4	Column matrix data
6	C5	Column matrix data
7	C6	Column matrix data
8	C7	Column matrix data
9	R0	Row matrix data
10	R1	Row matrix data
11	R2	Row matrix data

Table 5-6 Front Panel Processor J6 Pin Assignments

Pin	Signal	Description
12	R3	Row matrix data
13	R4	Row matrix data
14	R5	Row matrix data
15	R6	Row matrix data

Table 5-7 Front Panel Processor J7 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	PWR ON\	Power status (active low)
3	SQA	Squelch receive audio (top of pot.)
4	RXAUDVOL	Volume-controlled receive audio (wiper of volume potentiometer)
5	GND	Chassis ground

Table 5-8 Front Panel Processor J8 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	CLCA	Clarifier control A
3	CLCB	Clarifier control B

Table 5-9 Front Panel Processor J9 and J10 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	RX AUDIO	Receive audio
3	PTT	Press-to-talk signal
4	TX AUDIO	Transmit audio
5	CW KEY	CW key input
6	+12V	Unregulated +12 Vdc

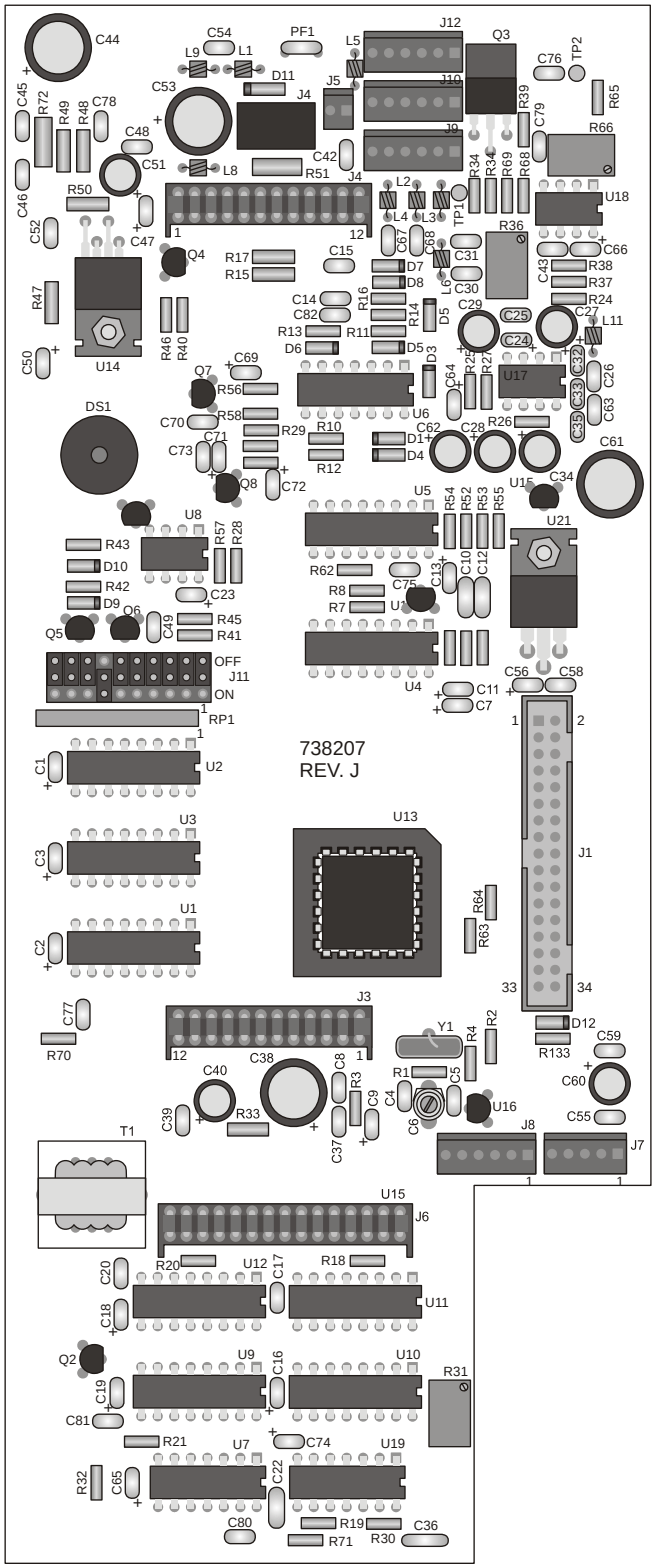


Figure 5-1 Front Panel Processor Board Component Locations (738207 Rev. J)

REV	ECN	DESCRIPTION	DATE	APPR
A	7000-290	RELEASE	13MAY98	
B	99-0267	REVISED PER ECO	TW	
C	01-0539	U15 WAS 78L05 BB	10-23-01	
D	03-0101	C40 WAS 100 UF BB	04-16-03	
E	05-0099	DNP U8 BB	11-4-05	

Figure 5-2
Front Panel
Processor Board
Schematic Diagram
(994359 Rev. E)
5-11

TW7201I-MS

4 INDUCTANCE IS IN MICROHENRYS
3 DIODES ARE 1N4148
2 CAPACITANCE IS IN MICROFARADS
1 RESISTANCE IS IN OHMS
NOTES: UNLESS OTHERWISE SPECIFIED

DATRON WORLD COMMUNICATIONS INC.
3030 Enterprise Ct.
Vista, CA 92083
(760)597-3777

Title: Schematic
TW7201 FRONT PANEL

Size: D | Drawn: A.MARTINEZ | Date: 13MAY98 | Drawing Number: 994359 | Rev: E
Appr: | Date:

File: 994359E.sch | Date: 4-Nov-2005 | Time: 14:01:34 | Sheet 1 of 1

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
C1	241020	CAP,2.2MF DIP TANTALUM
C10	254203	CAP,0.02MF 10% MYLAR
C11	241020	CAP,2.2MF DIP TANTALUM
C12	254203	CAP,0.02MF 10% MYLAR
C13	241020	CAP,2.2MF DIP TANTALUM
C14	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C15	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C16	241020	CAP,2.2MF DIP TANTALUM
C17	241020	CAP,2.2MF DIP TANTALUM
C18	241020	CAP,2.2MF DIP TANTALUM
C19	241020	CAP,2.2MF DIP TANTALUM
C2	241020	CAP,2.2MF DIP TANTALUM
C20	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C22	210121	CAP,120 PF DISC NPO
C23	241020	CAP,2.2MF DIP TANTALUM
C24	241020	CAP,2.2MF DIP TANTALUM
C25	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C26	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C27	241100	CAP,10MF DIP TANTALUM
C28	241100	CAP,10MF DIP TANTALUM
C29	241100	CAP,10MF DIP TANTALUM
C3	241020	CAP,2.2MF DIP TANTALUM
C30	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C31	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C32	241020	CAP,2.2MF DIP TANTALUM
C33	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C34	241100	CAP,10MF DIP TANTALUM
C35	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C36	254153	CAP,0.015MF 100V MYLAR
C37	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C38	231471	CAP,A,470UF,16V,20%,RA,.20SP
C39	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C4	210270	CAP,27PF NPO 50V 5% 0.1LS DISC

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
C40	231103	CAPACITOR,16V,1000 UF 10X16
C44	231471	CAP,A,470UF,16V,20%,RA,.20SP
C45	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C46	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C47	241100	CAP,10MF DIP TANTALUM
C48	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C49	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C5	210270	CAP,27PF NPO 50V 5% 0.1LS DISC
C50	241010	CAP,1.0 MF DIP TANTALUM
C51	231101	CAP,100U,16V,20%,RADIAL,.1SP
C52	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C53	231471	CAP,A,470UF,16V,20%,RA,.20SP
C54	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C55	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C56	241100	CAP,10MF DIP TANTALUM
C58	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C59	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C6	261600	CAP,6-50PF,TRIMMER,GREEN
C60	231101	CAP,100U,16V,20%,RADIAL,.1SP
C61	231471	CAP,A,470UF,16V,20%,RA,.20SP
C62	231101	CAP,100U,16V,20%,RADIAL,.1SP
C63	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C64	241020	CAP,2.2MF DIP TANTALUM
C65	241020	CAP,2.2MF DIP TANTALUM
C66	241020	CAP,2.2MF DIP TANTALUM
C67	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C68	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C69	241100	CAP,10MF DIP TANTALUM
C7	241020	CAP,2.2MF DIP TANTALUM
C70	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C71	241100	CAP,10MF DIP TANTALUM
C72	241100	CAP,10MF DIP TANTALUM
C73	214103	CAP,C,0.01U,50,10%,X,RA,.1SP

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
C74	241020	CAP,2.2MF DIP TANTALUM
C75	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C77	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C78	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C8	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C80	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C81	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C82	214103	CAP,C,0.01U,50,10%,X,RA,.1SP
C9	241020	CAP,2.2MF DIP TANTALUM
D1	320002	DIODE, 1N4148/1N4150 DO-35
D10	320002	DIODE, 1N4148/1N4150 DO-35
D11	320002	DIODE, 1N4148/1N4150 DO-35
D12	320002	DIODE, 1N4148/1N4150 DO-35
D2	320002	DIODE, 1N4148/1N4150 DO-35
D3	320002	DIODE, 1N4148/1N4150 DO-35
D4	320002	DIODE, 1N4148/1N4150 DO-35
D5	320002	DIODE, 1N4148/1N4150 DO-35
D6	320002	DIODE, 1N4148/1N4150 DO-35
D7	320002	DIODE, 1N4148/1N4150 DO-35
D8	320002	DIODE, 1N4148/1N4150 DO-35
D9	320002	DIODE, 1N4148/1N4150 DO-35
DS1	710104	BUZZER,MICRO
J1	620050	HEADER 34PIN RT ANGLE
J10	610103	HEADER,MLX,6PIN,.100
J11	614017	HEADER,30 PIN MALE 3 X 10
J12	610103	HEADER,MLX,6PIN,.100
J3	613155	CONN,BOTTOM ENTRY,12 PIN,GOLD
J4	613155	CONN,BOTTOM ENTRY,12 PIN,GOLD
J5	610105	HEADER, 1X2 W/LB-LOCK 0.1 TH
J6	613156	CONNECTOR,15 PIN BOTTOM ENTRY
J7	610215	HEADER,PIN 1X5 MLX 0.1 W/LOCK
J8	610103	HEADER,MLX,6PIN,.100
J9	610103	HEADER,MLX,6PIN,.100

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
K1	540077	RELAY,SP PCB MOUNT
L1	459032	IND ASY,3T#30 MAGNET 1-490201
L11	459032	IND ASY,3T#30 MAGNET 1-490201
L2	459032	IND ASY,3T#30 MAGNET 1-490201
L3	459032	IND ASY,3T#30 MAGNET 1-490201
L4	459032	IND ASY,3T#30 MAGNET 1-490201
L5	459032	IND ASY,3T#30 MAGNET 1-490201
L6	459032	IND ASY,3T#30 MAGNET 1-490201
L8	459032	IND ASY,3T#30 MAGNET 1-490201
L9	459032	IND ASY,3T#30 MAGNET 1-490201
PF1	550042	FUSE,POLY RESISTOR 1.4 AMPS
Q1	310057	XISTOR,NPN,PN2222A,TO92
Q2	310057	XISTOR,NPN,PN2222A,TO92
Q4	310057	XISTOR,NPN,PN2222A,TO92
Q5	310057	XISTOR,NPN,PN2222A,TO92
Q6	310057	XISTOR,NPN,PN2222A,TO92
Q7	310033	XSTR, J310 N-JFET TO92
Q8	310033	XSTR, J310 N-JFET TO92
R1	113105	RES,1M 1/8W 5% CARBON FILM
R10	113473	RES,47K 1/8W 5% CARBON FILM
R11	113473	RES,47K 1/8W 5% CARBON FILM
R12	113473	RES,47K 1/8W 5% CARBON FILM
R13	113473	RES,47K 1/8W 5% CARBON FILM
R133	113103	RES,10K 1/8W 5% CARBON FILM
R14	113473	RES,47K 1/8W 5% CARBON FILM
R15	124471	RES,470 OHM 1/4W 5% CF
R16	113473	RES,47K 1/8W 5% CARBON FILM
R17	124471	RES,470 OHM 1/4W 5% CF
R18	113221	RES,220 OHM 1/8W 5% CF
R19	113154	RES,150K 1/8W 5% CARBON FILM
R2	113473	RES,47K 1/8W 5% CARBON FILM
R20	113472	RES,4.7K 1/8W 5% CARBON FILM
R21	113474	RES,470K 1/8W 5% CARBON FILM

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
R24	113105	RES,1M 1/8W 5% CARBON FILM
R25	113333	RES,33K 1/8W 5% CARBON FILM
R26	113122	RES,1.2K 1/8W 5% CARBON FILM
R27	113474	RES,470K 1/8W 5% CARBON FILM
R28	113474	RES,470K 1/8W 5% CARBON FILM
R29	113101	RES,100 OHM 1/8W 5% CF
R3	113473	RES,47K 1/8W 5% CARBON FILM
R30	113474	RES,470K 1/8W 5% CARBON FILM
R31	170213	RES,1M 20Y TRIMMER VRT
R32	113472	RES,4.7K 1/8W 5% CARBON FILM
R33	124100	RES,10 OHM 1/4W 5% CARBON FILM
R4	113563	RES,56K 1/8W 5% CARBON FILM
R40	113472	RES,4.7K 1/8W 5% CARBON FILM
R41	113473	RES,47K 1/8W 5% CARBON FILM
R42	113472	RES,4.7K 1/8W 5% CARBON FILM
R43	113472	RES,4.7K 1/8W 5% CARBON FILM
R45	113472	RES,4.7K 1/8W 5% CARBON FILM
R46	113221	RES,220 OHM 1/8W 5% CF
R47	124020	RES,2.2 OHM 1/4W 5% CF
R48	124221	RES,220 OHM 1/4W 5% CF
R49	124100	RES,10 OHM 1/4W 5% CARBON FILM
R5	113473	RES,47K 1/8W 5% CARBON FILM
R50	124101	RES,100 OHM 1/4W 5% CF
R51	134470	RES,47 OHM 1/2W 5% CARBON FILM
R52	113104	RES,100K 1/8W 5% CARBON FILM
R53	113472	RES,4.7K 1/8W 5% CARBON FILM
R54	113104	RES,100K 1/8W 5% CARBON FILM
R55	113472	RES,4.7K 1/8W 5% CARBON FILM
R56	113474	RES,470K 1/8W 5% CARBON FILM
R57	113474	RES,470K 1/8W 5% CARBON FILM
R58	113474	RES,470K 1/8W 5% CARBON FILM
R59	113474	RES,470K 1/8W 5% CARBON FILM
R6	113104	RES,100K 1/8W 5% CARBON FILM

Table 5-10 Front Panel Processor Board Parts List (001-03001 Rev. E)

Designator	Part Number	Description
R60	113101	RES,100 OHM 1/8W 5% CF
R62	113103	RES,10K 1/8W 5% CARBON FILM
R63	113104	RES,100K 1/8W 5% CARBON FILM
R64	113104	RES,100K 1/8W 5% CARBON FILM
R7	113472	RES,4.7K 1/8W 5% CARBON FILM
R70	113624	RES,620K OHM 1/8W 5%
R71	113274	RES,270K 1/8W 5% CARBON FILM
R72	134015	RES,1.5 OHM 1/2W 5% CF
R8	113472	RES,4.7K 1/8W 5% CARBON FILM
R9	113104	RES,100K 1/8W 5% CARBON FILM
RP1	182002	RES,9 X 100K PAK
T1	410071	TRANSFORMER,50K/1K,CT,AUDIO
U1	330348	IC,74HC259N
U10	330381	IC,74HC589
U11	330194	IC CD4051BE
U12	330194	IC CD4051BE
U13	001-00144	SOFTWARE TW7000 FPNL PROC
U14	330043	IC TDA2002-H TO220
U15	330015	IC, 7805 VREG 5V 1A 4% TO-220
U16	330341	IC, VOLTAGE DETECTOR
U17	330029	IC, SL6270C VOGAD PREAMP DIP-8
U19	330342	IC,MC14093BCP
U2	330349	IC, 74HC251N
U3	330380	IC,74HC137
U4	330115	IC MC14528BCP
U5	330130	IC,MC14531 PARITY TREE DIP16
U6	330342	IC,MC14093BCP
U7	330040	IC,DIG,CD4013,DIP14,FLIP-FLOP
U9	330057	IC CD4520BE
XU13	621019	SOCKET, IC PLCC-44
XY1	364001	INSULATOR CRYSTAL HC25/U
Y1	361085	XTAL,2.4576 MHZ

5.3.2 DHSL Modem Board

Table 5-11 DHSL Modem J1 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	GND	Chassis ground
3	+12V	Unregulated +12 Vdc
4	+12V	Unregulated +12 Vdc
5	PB7	Parallel data input from fp processor
6	PB6	Parallel data input from fp processor
7	PB5	Parallel data input from fp processor
8	PB4	Parallel data input from fp processor
9	PB3	Parallel data input from fp processor
10	PB2	Parallel data input from fp processor
11	PB1	Parallel data input from fp processor
12	PB0	Parallel data input from fp processor
13	FPCWKEY	CW key input (turns on the CW oscillator)
14	FPCWA	Not used
15	FPSWP1	Not used (spare)
16	FPPTT	Input from front panel processor that indicates a front panel PTT
17	FPSPITXD	Serial peripheral interface transmit data
18	FPSPIRXD	Serial peripheral interface receive data
19	FPSPICLK	Serial peripheral interface clock
20	FPBITE	BITE output to transceiver processor
21	ENA	Enable line for serial data input
22	FPSWP2	Spare port
23	DHSLMSEL	DHSL modem select (high selects the DHSL Modem board)
24	FPTCALM	TC/SC/TA alarm output. Open collector output from front panel. Goes to external TC/SC/ TA alarm
25	PRMICA	Processed microphone audio
26	PWRON\	Power on input (active low)
27	EXTSPKR	External speaker output
28	CWKEY	CW key line output

Table 5-11 DHSL Modem J1 Pin Assignments

Pin	Signal	Description
29	MODEM EN	Modem enable line from Front Panel Processor board
30	SQA	Audio (with squelch) output to speaker
31	FPRXD	Receive modem data
32	FPTXD	Transmit modem data
33	FPSP1	Not used
34	EXAUDPTT\	External audio PTT output to front panel processor (active low)

Table 5-12 DHSL Modem J2 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	+12V	+12 Vdc to DHSL Modem board
3	PWRON\	Power on line to DHSL Modem board (active low)

Table 5-13 DHSL Modem J3 Pin Assignments

Pin	Signal	Description
1	REMRXA	Not used
2	REMTXA	Not used
3	GND	Chassis ground
4	GND	Chassis ground
5	DHSL1	DHSL modem line 1
6	DHSL2	DHSL modem line 2

Table 5-14 DHSL Modem J4 Pin Assignment

Pin	Signal	Description
1	GND	Chassis ground
2	EXTSPKR	External speaker output
3	TCALARM	Alarm output

Table 5-15 DHSL Modem J11 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	+12V	No connection
3	SPIRXD	No connection
4	SPICLK	No connection
5	SPITXD	No connection
6	RS232-2T	RS-232 transmit line to **ACC 1**
7	RS232-2R	RS-232 receive line to **ACC 1**
8	DCD\	DCD line to **ACC 2** (active low)
9	NC	CW key line to Power Supply/Interface board
10	ECTXA	Transmit audio to Audio board (transceiver modem only)
11	NC	No connection
12	NC	No connection
13	EN12	No connection
14	GND	Chassis ground
15	+12V	No connection
16	SPITXD	No connection
17	BITE	No connection
18	RS232-1R	RS-232 receive line to **ACC 2**
19	RS232-1T	RS-232 transmit line to **ACC 2**
20	600TXA	600 ohm accessory transmit audio input from either accessory connector
21	600RXA	600 ohm accessory receive audio output to either accessory connector
22	ECRXA	Receive audio from Audio board (transceiver modem only)
23	EXAUPTT\	External audio PTT input from the Power Supply/Interface board (active low)
24	FPWSP1	Spare channel to **ACC 1** accessory connector
25	FPWSP2	No connection

Table 5-16 DHSL Modem J12 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	RMTA0	Not used on TW7201I
3	RMTA1	Not used on TW7201I
4	RMTA2	Not used on TW7201I
5	RMTDATA	Not used on TW7201I
6	RMTCLK	Not used on TW7201I
7	RMTWR	Not used on TW7201I
8	SYNC	Serial synchronization line to processor
9	SER1TXD	serial transmit line to processor (transceiver). Handles control functions
10	SER1RXD	Serial receive line to processor (transceiver). Handles control functions
11	SER2TXD	Serial transmit line to processor (transceiver). Handles display data
12	SER2RXD	Serial receive line to processor (transceiver). Handles display data
13	RMTTXD	Not used on TW7201I
14	GND	Chassis ground
15	REMTXA	Not used on TW7201I
16	REMRXA	Not used on TW7201I
17	DHSL2	DHSL remote line to TW7201I
18	REMSP	Not used on TW7201I
19	DHSL1	DHSL remote line to TW7201I
20	AUXPTT\	Auxiliary PTT line from transceiver **ACC 1** or **ACC 2** connector (active low)
21	+12V	+12 Vdc supply
22	NC	No connection
23	LPB7	Not used
24	LPB6	Not used
25	RMTTXD	Not used on TW7201I

5.3.3 DHSL Jumper Settings

Table 5-17 DHSL Modem Board Jumper Settings

Jumper	Default Setting	Jumper	Default Setting
Control Head		**Control Head**	
JU3	BC	JU11	Not used
JU4	AB	JU12	Not used
JU5	AB	JU13	BC
JU6	AB	JU14	BC
JU7	AB	S1	1,2,5 on 3,4,6,7,8 off
JU8	BC		
JU9	AB	U6	Not installed
JU10	BC	U7	Installed

Transceiver/master		Transceiver/master	
JU3	BC	JU11	Not used
JU4	BC	JU12	Not used
JU5	BC	JU13	BC
JU6	BC	JU14	BC
JU7	BC	S1	1,2,5 on 3,4,6,7,8 off
JU8	BC		
JU9	AB	U6	Not installed
JU10	BC	U7	Installed

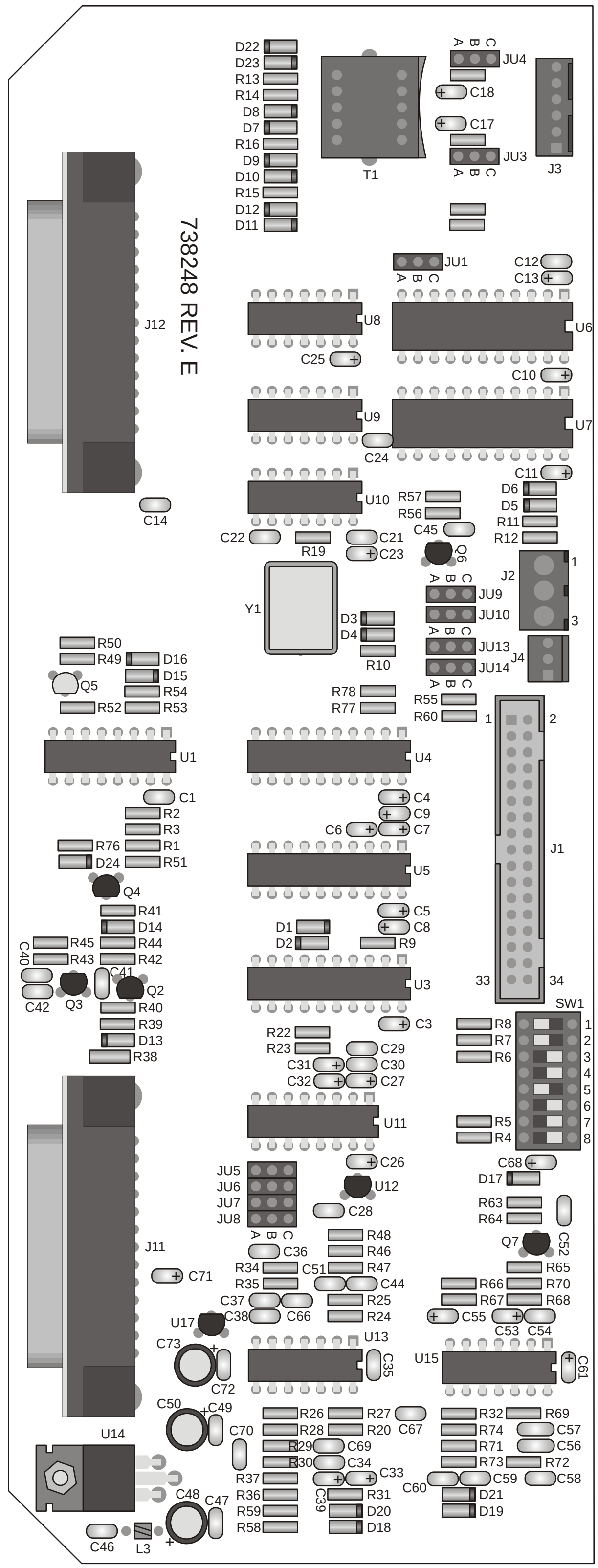


Figure 5-3 DHSL Modem Board Component Locations (738248 Rev. E)

REV	ECN	DESCRIPTION	DATE	APPR
A	7000-067	RELEASE	2SEP93	
B	7000-126	SEE ECN BS	4-15-94	
C	7201-002	SEE ECN BS	9-21-94	
D	7201-004	SEE ECN BS	9-21-94	
E	06-0123	R30 WAS 470 OHMS BB	5-01-06	

TW7201I-MS

Figure 5-4
DHSL Modem Board
Schematic Diagram
(994184 Rev. E)
5-25

5 MASTER AT RADIO END; SLAVE AT CONTROL HEAD.

4 INDUCTANCE IS IN MICROHENRYS
3 DIODES ARE 1N4148
2 CAPACITANCE IS IN MICROFARADS
1 RESISTANCE IS IN OHMS

NOTE8: UNLESS OTHERWISE SPECIFIED

DATRON WORLD COMMUNICATIONS INC.

TITLE: SCHEMATIC
REMOTE, DHSL TW7000

SIZE D | DRAWN: SATTEL | ENGR: | DRAWING NUMBER 994184 | REV. E

SCALE: | 7 APR 92 | SHEET 1 OF 1

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
(U14)	831403	WASHER INTERNAL LOCK #4 SS
C1	241020	CAP,2.2MF DIP TANTALUM
C10	241020	CAP,2.2MF DIP TANTALUM
C11	241020	CAP,2.2MF DIP TANTALUM
C12	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C13	241010	CAP,1.0 MF DIP TANTALUM
C14	241010	CAP,1.0 MF DIP TANTALUM
C17	241020	CAP,2.2MF DIP TANTALUM
C18	241020	CAP,2.2MF DIP TANTALUM
C21	210220	CAP,22PF NPO 50V 5% 0.1LS DISC
C22	210220	CAP,22PF NPO 50V 5% 0.1LS DISC
C23	241020	CAP,2.2MF DIP TANTALUM
C24	241020	CAP,2.2MF DIP TANTALUM
C25	241020	CAP,2.2MF DIP TANTALUM
C26	241020	CAP,2.2MF DIP TANTALUM
C27	241020	CAP,2.2MF DIP TANTALUM
C28	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C29	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C3	241020	CAP,2.2MF DIP TANTALUM
C30	241020	CAP,2.2MF DIP TANTALUM
C31	241020	CAP,2.2MF DIP TANTALUM
C32	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C33	241100	CAP,10MF DIP TANTALUM
C34	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C35	241020	CAP,2.2MF DIP TANTALUM
C36	241100	CAP,10MF DIP TANTALUM
C37	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C38	241100	CAP,10MF DIP TANTALUM
C39	241020	CAP,2.2MF DIP TANTALUM
C4	241020	CAP,2.2MF DIP TANTALUM
C40	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C41	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C42	214103	CAP,C,0.01U,50,10%,X,RA,.1SP

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
C44	241020	CAP,2.2MF DIP TANTALUM
C45	241100	CAP,10MF DIP TANTALUM
C46	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C47	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C48	231101	CAP,100U,16V,20%,RADIAL,.1SP
C49	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C5	241100	CAP,10MF DIP TANTALUM
C50	231101	CAP,100U,16V,20%,RADIAL,.1SP
C51	241100	CAP,10MF DIP TANTALUM
C52	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C53	241100	CAP,10MF DIP TANTALUM
C54	275101	CAP,ML NPO 100PF 100V 5% 0.2S
C55	241100	CAP,10MF DIP TANTALUM
C56	254153	CAP,0.015MF 100V MYLAR
C57	254153	CAP,0.015MF 100V MYLAR
C58	275101	CAP,ML NPO 100PF 100V 5% 0.2S
C6	241100	CAP,10MF DIP TANTALUM
C60	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C61	241020	CAP,2.2MF DIP TANTALUM
C66	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C67	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C68	241020	CAP,2.2MF DIP TANTALUM
C69	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C7	241020	CAP,2.2MF DIP TANTALUM
C70	210102	CAP,.001UF Y5P 50V 20% 0.1LS
C71	241100	CAP,10MF DIP TANTALUM
C72	275104	CAP, 0.1UF X7R 50V 10% 0.1LS
C73	231101	CAP,100U,16V,20%,RADIAL,.1SP
C8	241100	CAP,10MF DIP TANTALUM
C9	241100	CAP,10MF DIP TANTALUM
D1	320002	DIODE, 1N4148/1N4150 DO-35
D10	320002	DIODE, 1N4148/1N4150 DO-35
D11	320002	DIODE, 1N4148/1N4150 DO-35

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
D12	320002	DIODE, 1N4148/1N4150 DO-35
D13	320002	DIODE, 1N4148/1N4150 DO-35
D14	320002	DIODE, 1N4148/1N4150 DO-35
D15	320002	DIODE, 1N4148/1N4150 DO-35
D16	320002	DIODE, 1N4148/1N4150 DO-35
D17	320002	DIODE, 1N4148/1N4150 DO-35
D18	320002	DIODE, 1N4148/1N4150 DO-35
D19	320002	DIODE, 1N4148/1N4150 DO-35
D2	320002	DIODE, 1N4148/1N4150 DO-35
D20	320002	DIODE, 1N4148/1N4150 DO-35
D21	320002	DIODE, 1N4148/1N4150 DO-35
D22	320002	DIODE, 1N4148/1N4150 DO-35
D23	320002	DIODE, 1N4148/1N4150 DO-35
D24	320002	DIODE, 1N4148/1N4150 DO-35
D3	320002	DIODE, 1N4148/1N4150 DO-35
D4	320002	DIODE, 1N4148/1N4150 DO-35
D5	320002	DIODE, 1N4148/1N4150 DO-35
D6	320002	DIODE, 1N4148/1N4150 DO-35
D7	320002	DIODE, 1N4148/1N4150 DO-35
D8	320002	DIODE, 1N4148/1N4150 DO-35
D9	320002	DIODE, 1N4148/1N4150 DO-35
J1	620038	CONN HDR 2X17 SHROUDED PC MNT
J11	613163	CONN,DB-25 RT ANGLE PC PLUG
J12	613163	CONN,DB-25 RT ANGLE PC PLUG
J2	610209	HEADER,MLX,3PIN,.156,POLAR
J3	610197	HEADER,MLX,6PIN,.100
J4	610285	HEADER,PIN 1X3 MLX 0.1 W/LOCK
JU1	620030	HEADER,3 PIN.025 SQ POST
JU10	620030	HEADER,3 PIN.025 SQ POST
JU13	620030	HEADER,3 PIN.025 SQ POST
JU14	620030	HEADER,3 PIN.025 SQ POST
JU3	620030	HEADER,3 PIN.025 SQ POST
JU4	620030	HEADER,3 PIN.025 SQ POST

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
JU5	614004	HEADER 3X4.1 LEAD SPACING
JU6	614004	HEADER 3X4.1 LEAD SPACING
JU7	614004	HEADER 3X4.1 LEAD SPACING
JU8	614004	HEADER 3X4.1 LEAD SPACING
JU9	620030	HEADER,3 PIN.025 SQ POST
L3	459032	IND ASY,3T#30 MAGNET 1-490201
Q2	310052	XSTR, PN2907A PNP TO92
Q3	310033	XSTR, J310 N-JFET TO92
Q4	310057	XISTOR,NPN,PN2222A,TO92
Q5	310057	XISTOR,NPN,PN2222A,TO92
Q6	310057	XISTOR,NPN,PN2222A,TO92
Q7	310052	XSTR, PN2907A PNP TO92
R1	113101	RES,100 OHM 1/8W 5% CF
R10	113104	RES,100K 1/8W 5% CARBON FILM
R11	113103	RES,10K 1/8W 5% CARBON FILM
R12	113474	RES,470K 1/8W 5% CARBON FILM
R13	113472	RES,4.7K 1/8W 5% CARBON FILM
R14	113472	RES,4.7K 1/8W 5% CARBON FILM
R15	113221	RES,220 OHM 1/8W 5% CF
R16	113221	RES,220 OHM 1/8W 5% CF
R17	113102	RES, 1K, 1/8W, 5%, CF
R18	113102	RES, 1K, 1/8W, 5%, CF
R19	113106	RES,10M 1/8W 5% CARBON FILM
R2	113101	RES,100 OHM 1/8W 5% CF
R20	113472	RES,4.7K 1/8W 5% CARBON FILM
R22	113103	RES,10K 1/8W 5% CARBON FILM
R23	113103	RES,10K 1/8W 5% CARBON FILM
R24	113103	RES,10K 1/8W 5% CARBON FILM
R25	113103	RES,10K 1/8W 5% CARBON FILM
R26	113103	RES,10K 1/8W 5% CARBON FILM
R27	113103	RES,10K 1/8W 5% CARBON FILM
R28	113103	RES,10K 1/8W 5% CARBON FILM
R29	113103	RES,10K 1/8W 5% CARBON FILM

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
R3	113101	RES,100 OHM 1/8W 5% CF
R30	113103	RES,10K 1/8W 5% CARBON FILM
R31	113103	RES,10K 1/8W 5% CARBON FILM
R32	113103	RES,10K 1/8W 5% CARBON FILM
R34	113103	RES,10K 1/8W 5% CARBON FILM
R35	113103	RES,10K 1/8W 5% CARBON FILM
R36	113102	RES, 1K, 1/8W, 5%, CF
R37	113621	RES,620 OHM 1/8W 5% CF
R38	113103	RES,10K 1/8W 5% CARBON FILM
R39	113104	RES,100K 1/8W 5% CARBON FILM
R4	113104	RES,100K 1/8W 5% CARBON FILM
R40	113103	RES,10K 1/8W 5% CARBON FILM
R41	113103	RES,10K 1/8W 5% CARBON FILM
R42	113474	RES,470K 1/8W 5% CARBON FILM
R43	113474	RES,470K 1/8W 5% CARBON FILM
R44	113474	RES,470K 1/8W 5% CARBON FILM
R45	113621	RES,620 OHM 1/8W 5% CF
R46	113823	RES,82K 1/8W 5% CARBON FILM
R47	113103	RES,10K 1/8W 5% CARBON FILM
R48	113103	RES,10K 1/8W 5% CARBON FILM
R49	113103	RES,10K 1/8W 5% CARBON FILM
R5	113104	RES,100K 1/8W 5% CARBON FILM
R50	113474	RES,470K 1/8W 5% CARBON FILM
R51	1111502	RESISTOR 15K 1/8W 1%
R52	113104	RES,100K 1/8W 5% CARBON FILM
R53	113104	RES,100K 1/8W 5% CARBON FILM
R54	113473	RES,47K 1/8W 5% CARBON FILM
R55	113103	RES,10K 1/8W 5% CARBON FILM
R56	113103	RES,10K 1/8W 5% CARBON FILM
R57	113473	RES,47K 1/8W 5% CARBON FILM
R58	113101	RES,100 OHM 1/8W 5% CF
R59	113101	RES,100 OHM 1/8W 5% CF
R6	113104	RES,100K 1/8W 5% CARBON FILM

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
R60	113473	RES,47K 1/8W 5% CARBON FILM
R61	113103	RES,10K 1/8W 5% CARBON FILM
R62	113103	RES,10K 1/8W 5% CARBON FILM
R63	113104	RES,100K 1/8W 5% CARBON FILM
R64	113103	RES,10K 1/8W 5% CARBON FILM
R65	113102	RES, 1K, 1/8W, 5%, CF
R66	113103	RES,10K 1/8W 5% CARBON FILM
R67	113103	RES,10K 1/8W 5% CARBON FILM
R68	113103	RES,10K 1/8W 5% CARBON FILM
R69	113103	RES,10K 1/8W 5% CARBON FILM
R7	113104	RES,100K 1/8W 5% CARBON FILM
R70	113273	RES,27K 1/8W 5% CARBON FILM
R71	113152	RES,1.5K 1/8W 5% CARBON FILM
R72	113104	RES,100K 1/8W 5% CARBON FILM
R73	113272	RES,2.7K 1/8W 5% CARBON FILM
R74	113473	RES,47K 1/8W 5% CARBON FILM
R76	113104	RES,100K 1/8W 5% CARBON FILM
R77	113104	RES,100K 1/8W 5% CARBON FILM
R78	113104	RES,100K 1/8W 5% CARBON FILM
R8	113104	RES,100K 1/8W 5% CARBON FILM
R9	113104	RES,100K 1/8W 5% CARBON FILM
S1	530010	SWITCH DIP 8 SECT SPST
T1	410062	TRANSFORMER,DHSL
U1	330273	IC 74HC595
U10	330482	IC,4069 HEX INVERTER
U11	330485	IC, MC145503P
U12	330484	IC,78LO9 9VOLT REGULATOR TO92
U13	330322	IC, MC33079 QUAD OP-AMP DIP-14
U14	330015	IC, 7805 VREG 5V 1A 4% TO-220
U15	330322	IC, MC33079 QUAD OP-AMP DIP-14
U17	330018	IC,VREG,78L08,TO94,8V
U3	330489	IC,MC145428P
U4	330489	IC,MC145428P

Table 5-18 DHSL Modem Board Parts List (002-03100 Rev. L)

Designator	Part Number	Description
U5	330488	IC, MC145407P
U6	621007	SOCKET, IC DIP-22 PIN
U7	330487	IC,MC145426 80KBPS UDLT SLAVE
U7	621007	SOCKET, IC DIP-22 PIN
U8	330305	IC,74HC393 DBL RIPL CNTR DIP14
U9	330483	IC,74HC74 DUAL D FLIP FLOP
Y1	360037	CRYSTAL HC18/U HOLDER 4.096MH

5.3.4 Power Supply/ Interface Board

Table 5-19 Power Supply/Interface Board J1 Pin Assignments

Pin	Signal	Description
1	DC IN	DC input line (12 Vdc to 28 Vdc)
2	GND	Chassis ground

Table 5-20 Power Supply/Interface Board J2 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	+12V	+12 Vdc power line
3	PWR ON\	Power status (active low)

Table 5-21 Power Supply/Interface Board J3 Pin Assignments

Pin	Signal	Description
1	AC IN	AC input line (120 VAC to 240 VAC)
2	AC IN	Connected to pin 1
3	GND	Chassis ground
4	T1 CTR TAP	Transformer center tap to voltage selector card
5	T1 CTR TAP	Transformer center tap to voltage selector card
6	AC RTN	AC return line (neutral)
7	AC RTN	Connected to pin 6

Table 5-22 Power Supply/Interface Board J5 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	GND	Chassis ground
3	+12V	No connection
4	+12V	No connection
5	SPIRXD	No connection
6	SPITXD	No connection
7	SPITCLK	No connection
8	BITE\	No connection
9	PTT\	No connection
10	RS232-1R	RS-232 receive line to **ACC 2**
11	RS232-2T	RS-232 transmit line to **ACC 1**
12	RS232-1T	RS-232 transmit line to **ACC 2**
13	RS232-2R	RS-232 receive line to **ACC 1**
14	600TXA	600 ohm accessory transmit audio input from either accessory connector
15	DCD\	Not used
16	600RXA	600 ohm accessory receive audio output to either accessory connector
17	CWKEY	CW key line to **ACC 1**
18	ECRXA	No connection
19	ECTXA	No connection
20	EXAUPTT\	External audio PTT output to modem board (active low)
21	NC	No connection
22	FPWSP1+	Spare channel to **ACC 1**
23	NC	No connection
24	FPWSP2+	No connection
25	EN12	No connection
26	NC	No connection

Table 5-23 Power Supply /Interface Board J6 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	CWKEY	CW key line to **ACC 1**
3	RS232-2R	RS-232 receive line to **ACC 1**
4	NC	No connection
5	NC	No connection
6	DCD\	Not used
7	RS232-2T	RS-232 transmit line to **ACC 1**
8	FPWSP1+	Modem receive audio input to **ACC 1**
9	NC	No connection
10	NC	No connection
11	BALRXA1	Balanced receive line to **ACC 1**
12	NC	No connection
13	BALRXA2	Balanced receive line to **ACC 1**
14	NC	No connection
15	BALTXA1	Balanced transmit line from **ACC 1**
16	NC	No connection
17	BALTXA2	Balanced transmit line from **ACC 1**
18	NC	No connection
19	EXAUPTT\	External audio PTT input from **ACC 1** connector (active low)
20	NC	No connection
21	NC	No connection
22	NC	No connection
23	NC	No connection
24	NC	No connection
25	12V	+12 Vdc
26	12V	+12 Vdc

Table 5-24 Power Supply /Interface Board J7 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	GND	Chassis ground
3	RS232-2R	RS-232 receive line to **ACC 2**
4	NC	No connection
5	PWRON\	Power status line (active low)
6	DCD\	Not used
7	NC	No connection
8	NC	No connection
9	NC	No connection
10	NC	No connection
11	BALRXA1	Balanced receive line to **ACC 2**
12	NC	No connection
13	BALRXA2	Balanced receive line to **ACC 2**
14	TC/SC ALARM	Transcall/Selcall alarm to external speaker on **ACC 2**
15	BALTXA1	Balanced transmit line from **ACC 2**.
16	NC	No connection.
17	BALTXA2	Balanced transmit line from **ACC 2**
18	EXTSPKR	Speaker audio to external speaker to **ACC 2** connector
19	EXAUPTT\	External audio PTT input from **ACC 2** connector (active low)
20	NC	No connection
21	RS232-1R	RS-232 receive line to **ACC 2**
22	12V	+12 Vdc supply
23	RS232-1T	RS-232 transmit line to **ACC 2**
24	12V	+12 Vdc supply
25	12V	+12 Vdc supply
26	12V	+12 Vdc supply

Table 5-25 Power Supply /Interface Board J8 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	EXTSPKR	Speaker audio to external speaker to **ACC 2**
3	TC ALARM	TC alarm to external speaker to **ACC 2**

Table 5-26 Power Supply /Interface Board J9 Pin Assignments

Pin	Signal	Description
1	GND	Chassis ground
2	DHSL2	DHSL remote line to transceiver
3	12V	+12 Vdc (strapped to pin 5)
4	REMRXA	Not used on TW7201I
5	12V	+12 Vdc
6	REMTXA	Not used on TW7201I
7	REMSP	No connection
8	PWR ON\	Power status line (active low)
9	DHSL1	DHSL remote line to transceiver
10	NC	No connection

Table 5-27 Power Supply /Interface Board J10 Pin Assignments

Pin	Signal	Description
1	REMRXA	Not used on TW7201I
2	REMTXA	Not used on TW7201I
3	GND	Chassis ground
4	GND	Chassis ground
5	DHSL1	DHSL remote line to transceiver
6	DHSL2	DHSL remote line to transceiver

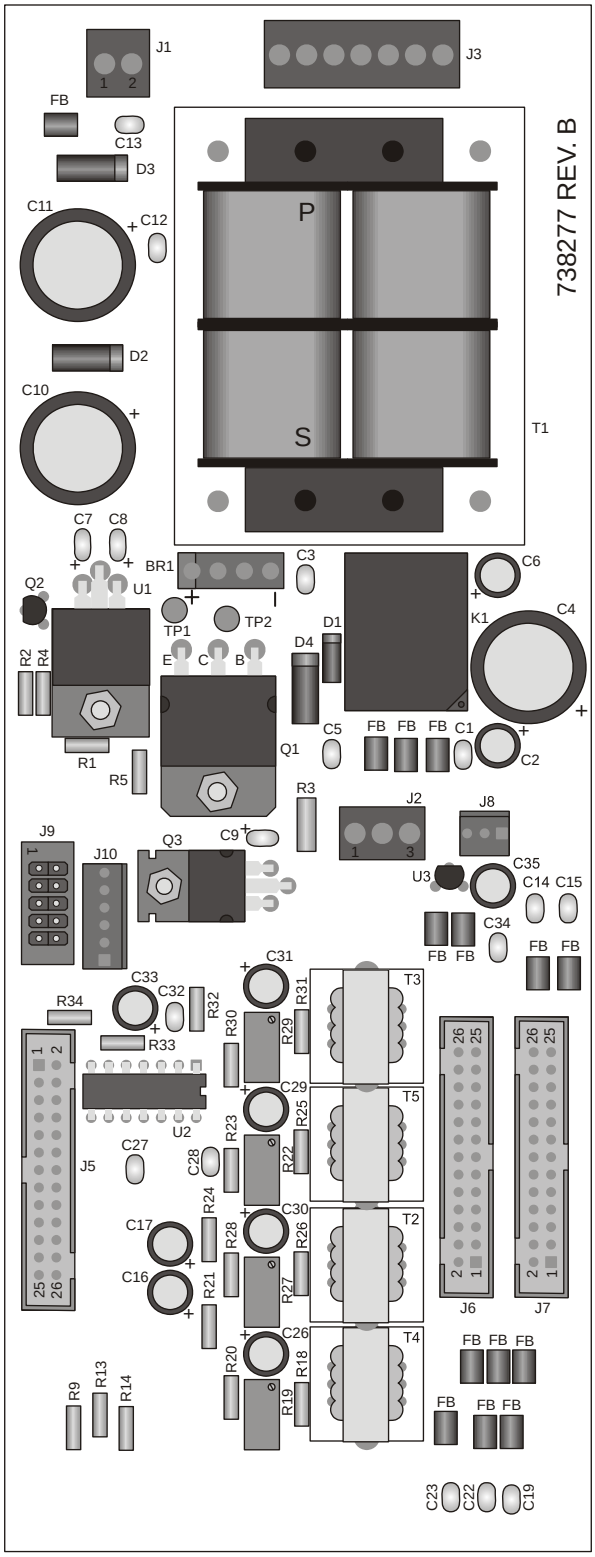


Figure 5-5 Power Supply/Interface Board Component Locations (738277 Rev. B)

REV	ECN	DESCRIPTION	DATE	APPR
A	7000-064	RELEASE	9/1/93	
B	7000-110	MOV CW KEY	120693	
C	7000-126	SEE ECN BS	2-16-94	
D	7201-002	SEE ECN BS	9-21-94	

FRONT PANEL

RCU MODULE

RCU POWER SUPPLY ASSY

REAR PANEL CONNECTIONS

GND REMOTE (DB9)
+12V
+12V
REMSP (SPARE)
DHSL1
DHSL2
REMRXA
REMTXA
PWRON

ACCESSORY 1 (DB25)
GND
RS232-2R
NC
RS232-2T
NC
BALRXA1
BALRXA2
BALTXA1
BALTXA2
EXAUDPTT
NC
NC
+12V
CWKEY
NC
DCD
FPWSP1
NC
NC
NC
NC
NC
NC
NC

ACCESSORY 2 (DB25)
GND
GND
PWRON

BALRXA1
BALRXA2
BALTXA1
BALTXA2
EXAUPTT
RS232-1R
RS232-1T
+12V
GND
NC
DCD

TC/SC ALARM
EXTSPKR
NC
+12V
+12V

GROUND STUD

AC INPUT VOLTAGE CHG. MODULE
VOLTAGE SELECTOR CARD CONNECTIONS
100V 8A/CD/EF
120V 8C/DF
230V 8B/DE
240V 8A/DE
631002

13.8VDC INPUT

MIC CON
GND
AUDIO
PTT
MIC
CW
+12V

MIC CON
GND
AUDIO
PTT
MIC
CW
+12V

VOL/PWR ON-OFF
GND
GND

SPKR
GND

CLAR
A
B
GND

CLAR ON/OFF PUSH/PUSH

LCD
12
12

J1 GND
J1 GND
J1 +12V UNREG
J1 +12V UNREG
J1 PB7
J1 PB6
J1 PB5
J1 PB4
J1 PB3
J1 PB2
J1 PB1
J1 PB0
J1 FPCWKEY
J1 FPCWA
J1 FPNSP1
J1 FPPTT
J1 FPSPITXD
J1 FPSPIRXD
J1 FPSPICLK
J1 FPBITE
J1 ENA
J1 FPWSP2
J1 DHSLMSEL
J1 FPTCALM
J1 PRMICA
J1 PWRON
J1 EXTSPKR
J1 CWKEY
J1 MODEMEN
J1 SQA
J1 FPRXD
J1 FPTXD
J1 FPSP1
J1 FPSP2

J3 REMRXA
J3 REMTXA
J3 GND
J3 GND
J3 DHSL1
J3 DHSL2

J4 GND
J4 EXTSPKR
J4 TC ALARM

J11 GND
J11 +12V
J11 SPIRXD
J11 SPICLK
J11 PTT
J11 RS232-2T
J11 RS232-2R
J11 DCD
J11 CW KEY
J11 ECTXA
J11 EN12
J11 GND
J11 +12V
J11 SPITXD
J11 BITE
J11 RS232-1R
J11 RS232-1T
J11 600TXA
J11 600RXA
J11 ECRXA
J11 EXAUDPTT
J11 FPWSP1*
J11 FPWSP2*

J12 GND
J12 RMTA0
J12 RMTA1
J12 RMTA2
J12 RMTDATA
J12 RMTCLK
J12 RMTWR
J12 SYNC
J12 SERITXD
J12 SERIRXD
J12 SER2TXD
J12 SER2RXD
J12 RMTRXD
J12 GND
J12 REMTXA
J12 REMRXA
J12 DHSL2
J12 REMSP
J12 DHSL1
J12 AUXPTT
J12 +12V
J12 NC
J12 LPB7
J12 LPB6
J12 RMTTXD

J10 1 2 3 4 5 6
J8 1 2 3
J5 1 3 5 7 9 11 13 15 17 19 21 23 25 2 4 6 8 10 12 14 16 18 20 22 24 26
J2 GND +12V PWRON

J6 1 3 5 7 9 11 13 15 17 19 21 23 25 2 4 6 8 10 12 14 16 18 20 22 24 26
J7 1 3 5 7 9 11 13 15 17 19 21 23 25 2 4 6 8 10 12 14 16 18 20 22 24 26
J3 1 2 3 4 5 6 7
J1 1 2

C16 2.2
R21 10K
R20 1K
R19 100K
CW
C27 100PF
U2C 33079
+4V
C26 10
R18 620
T4
FB
+12V
R13 10
C23 .001
R14 100
C22 .001
R28 1K
R27 100K
C30 10
T2
R26 620
C33 10
R32 10K
C32 .001
U2A 33079
+4V
R30 1K
R29 100K
C31 10
T3
R31 620
R9 10
C19 .001
C17 2.2
R24 10K
R23 1K
R22 100K
CW
C28 100PF
U2D 33079
+4V
C29 10
R25 620
T5
C15 .001
C14 .001
U3 78L08 IN OUT GND
C35 10
C34 .01
R33 10K
U2B 33079
+4V
R34 10K
TP2
+12V
TP1
D6 1N6276A
Q1 TIP36A
BR1
T1
C1 .1
C4 2200
C2 10
K1
C3 .01
R5 10K
C10 1000/50V
D8 1N6284 36V
C9 2.2/50V
Q3 TIP31A
D1 1N4005
C5 .01
C6 100
R1 6.8K
R2 3.9K
R3 22-1/2W
R4 470
Q2 2N3638
U1 LM2931 5.0
C7 2.2
C8 2.2/35V
C11 1000/50V
C12 .1/50V
D3
C13 .01
F1 3A

TW7201I-MS

Figure 5-6
Power Supply/Interface Schematic Diagram
(994222 Rev. D) 5-39

PCBD 738277
BOM 002-02300

DATRON WORLD COMMUNICATIONS INC.

TITLE: TW7201 MAINFRAME/ POWER SUPPLY SCHEMATIC

SIZE	DRAWN: COBBE	DRAWING NUMBER	REV.
D	ENGR:	994222	D
SCALE:		SHEET	

Table 5-28 Power Supply/Interface Board Parts List (003-03005 Rev. G)

Designator	Part Number	Description
(T1)	876009	HIGH VOLTAGE LABEL RED/WHITE
BR1	320502	BRIDGE RECT, 2A 600V
C1	277104	CAP,C,0.1U,50,10%,X,AX,.25SP
C10	233102	CAP, 1000UF 50V ELECT VRT
C11	233102	CAP, 1000UF 50V ELECT VRT
C12	277104	CAP,C,0.1U,50,10%,X,AX,.25SP
C13	277103	CAP,C,0.01U,100,10%,X,AX,.25SP
C14	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C15	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C16	241020	CAP,2.2MF DIP TANTALUM
C17	241020	CAP,2.2MF DIP TANTALUM
C19	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C2	241100	CAP,10MF DIP TANTALUM
C22	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C23	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C26	241100	CAP,10MF DIP TANTALUM
C27	277101	CAP,C,100PF,NPO,AX,5%,.25SP
C28	277101	CAP,C,100PF,NPO,AX,5%,.25SP
C29	241100	CAP,10MF DIP TANTALUM
C3	277103	CAP,C,0.01U,100,10%,X,AX,.25SP
C30	241100	CAP,10MF DIP TANTALUM
C31	241100	CAP,10MF DIP TANTALUM
C32	277102	CAP,C,1000P,100,10%,X,AX,.25SP
C33	241100	CAP,10MF DIP TANTALUM
C34	277103	CAP,C,0.01U,100,10%,X,AX,.25SP
C35	241100	CAP,10MF DIP TANTALUM
C4	232222	CAP,2200MF 35V ELECT
C5	277103	CAP,C,0.01U,100,10%,X,AX,.25SP
C6	231101	CAP,100U,16V,20%,RADIAL,.1SP
C7	241020	CAP,2.2MF DIP TANTALUM
C8	241020	CAP,2.2MF DIP TANTALUM
C9	241020	CAP,2.2MF DIP TANTALUM
D1	320101	DIODE, 1N4005 1A 600V DO-41

Table 5-28 Power Supply/Interface Board Parts List (003-03005 Rev. G)

Designator	Part Number	Description
D2	320211	DIODE, 1N6283A 28V TVS DO-204
D3	320420	DIODE,IN5822 3 AMP SCHOTTKY
D4	320437	DIODE 1N6276A 16V TVS DO-204
FB	490204	BEAD FERRITE SHIELD 43 MAT
J1	610165	HEADER,MLX,2PIN,.156,W/LK
J10	610197	HEADER,MLX,6PIN,.100
J2	610209	HEADER,MLX,3PIN,.156,POLAR
J3	610164	HEADER,MLX,7PIN,.156,W/LK
J5	613020	HEADER,PCB 2X13 BOX LOW-PFL TH
J6	613020	HEADER,PCB 2X13 BOX LOW-PFL TH
J7	613020	HEADER,PCB 2X13 BOX LOW-PFL TH
J8	610285	HEADER,PIN 1X3 MLX 0.1 W/LOCK
J9	613054	HEADER,DIN,10PIN,.100,VERTICAL
K1	540079	RELAY,SPDT 12VDC 10 AMP
Q1	310068	XISTOR,PNP,TIP36A,TO218
Q2	310007	XISTOR,PNP,PN3638A,TO92
Q3	310023	XISTOR,NPN,TIP31,TO220
R1	124682	RES,6.8K 1/4W 5% CARBON FILM
R13	124100	RES,10 OHM 1/4W 5% CARBON FILM
R14	124101	RES,100 OHM 1/4W 5% CF
R18	124621	RES,620 OHM 1/4W 5% CF
R19	170210	RES,100K 3/8” 25T TRIMMER
R2	124392	RES,3.9K 1/4W 5% CARBON FILM
R20	124102	RES,1K 1/4W 5% CARBON FILM
R21	124103	RES,10K 1/4W 5% CARBON FILM
R22	170210	RES,100K 3/8” 25T TRIMMER
R23	124102	RES,1K 1/4W 5% CARBON FILM
R24	124103	RES,10K 1/4W 5% CARBON FILM
R25	124621	RES,620 OHM 1/4W 5% CF
R26	124621	RES,620 OHM 1/4W 5% CF
R27	170210	RES,100K 3/8” 25T TRIMMER
R28	124102	RES,1K 1/4W 5% CARBON FILM
R29	170210	RES,100K 3/8” 25T TRIMMER

Table 5-28 Power Supply/Interface Board Parts List (003-03005 Rev. G)

Designator	Part Number	Description
R3	134220	RES,22 OHM 1/2W 5% FILM
R30	124102	RES,1K 1/4W 5% CARBON FILM
R31	124621	RES,620 OHM 1/4W 5% CF
R32	124103	RES,10K 1/4W 5% CARBON FILM
R33	124103	RES,10K 1/4W 5% CARBON FILM
R34	124103	RES,10K 1/4W 5% CARBON FILM
R4	124471	RES,470 OHM 1/4W 5% CF
R5	124103	RES,10K 1/4W 5% CARBON FILM
R9	124100	RES,10 OHM 1/4W 5% CARBON FILM
T1	410064	TRANSFORMER PWR 16VCT 0.7 AMP
T2	410019	XFMR, AUDIO MINI 600CT - 600CT
T3	410019	XFMR, AUDIO MINI 600CT - 600CT
T4	410019	XFMR, AUDIO MINI 600CT - 600CT
T5	410019	XFMR, AUDIO MINI 600CT - 600CT
U1	330499	IC, LM2931.5 VOLT REGULATOR
U2	330322	IC, MC33079 QUAD OP-AMP DIP-14
U3	330018	IC,VREG,78L08,TO94,8V

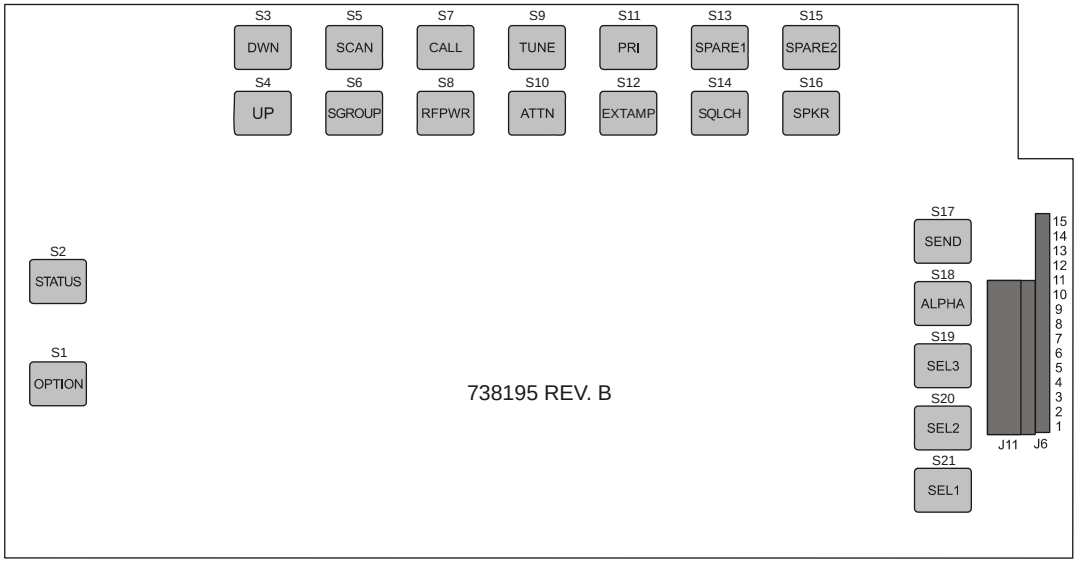


Figure 5-7 Switching Board Component Locations (738195 Rev. B)

REV	ECN	DESCRIPTION	DATE	APPR
A	7000-009	PRODUCTION RELEASE	1DEC92	

TO FRONT PANEL CONTROL PC BOARD

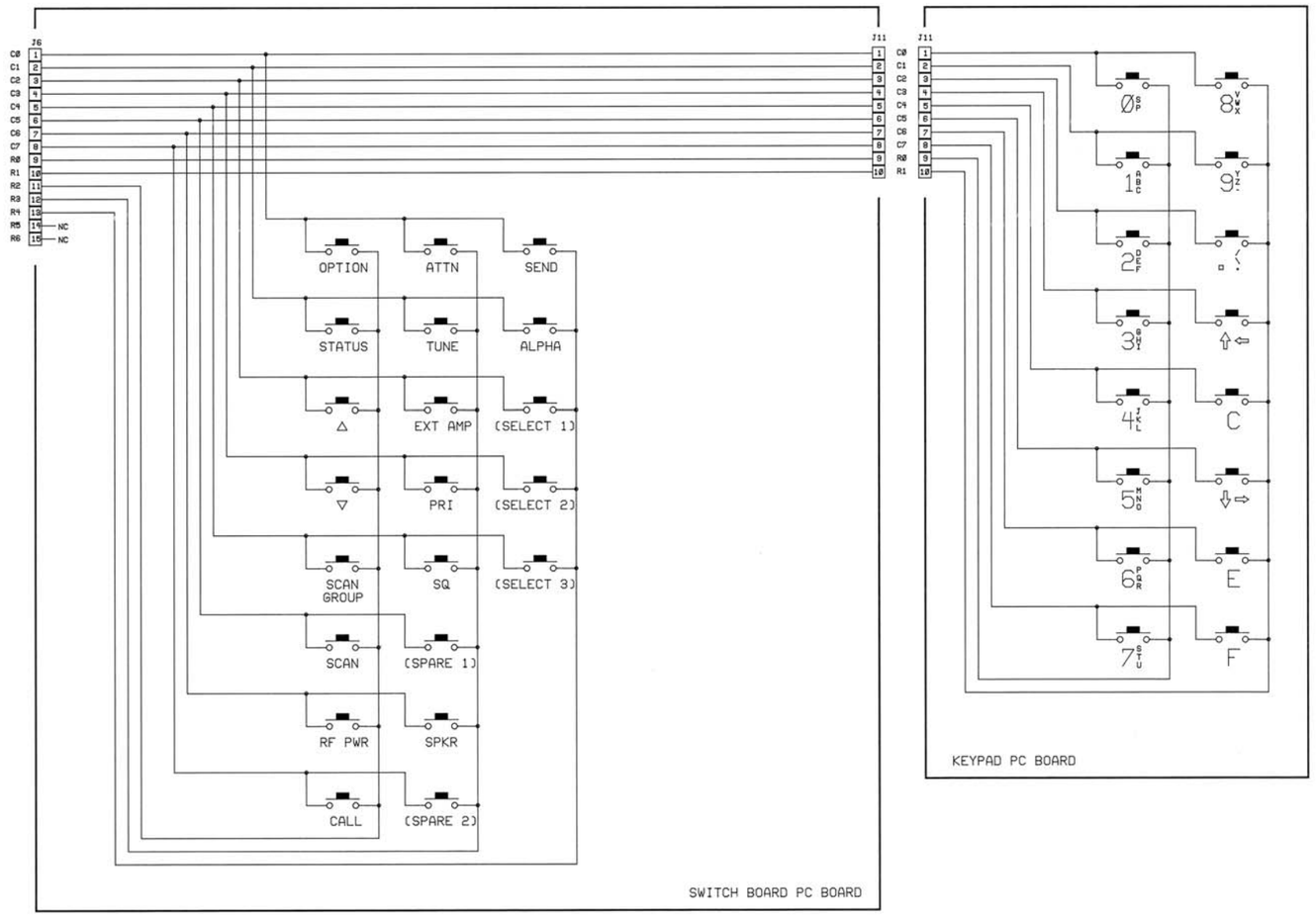


Figure 5-8
Switching Board
Schematic Diagram
(994149 Rev. A)

DATRON WORLD COMMUNICATIONS INC.

TITLE: SCHEMATIC FRONT PANEL SWITCHING TW7000			
SIZE D	DRAWN: SATTEL ENGR: RE	DRAWING NUMBER 994149	REV. A
SCALE:	3 SEP 91	SHEET 1 OF 1	

Table 5-29 Switch Board Parts List (001-00110 Rev. A1)

Designator	Part Number	Description
J11	614027	CONN, 10 POS BOTTOM ENTRY MOLX
J6	610286	HEADER,SIL,15PIN,.100,
S1	530105	SWITCH, TW7000 NO-SPST PB
S10	530105	SWITCH, TW7000 NO-SPST PB
S11	530105	SWITCH, TW7000 NO-SPST PB
S12	530105	SWITCH, TW7000 NO-SPST PB
S13	530105	SWITCH, TW7000 NO-SPST PB
S14	530105	SWITCH, TW7000 NO-SPST PB
S15	530105	SWITCH, TW7000 NO-SPST PB
S16	530105	SWITCH, TW7000 NO-SPST PB
S17	530105	SWITCH, TW7000 NO-SPST PB
S18	530105	SWITCH, TW7000 NO-SPST PB
S19	530105	SWITCH, TW7000 NO-SPST PB
S2	530105	SWITCH, TW7000 NO-SPST PB
S20	530105	SWITCH, TW7000 NO-SPST PB
S21	530105	SWITCH, TW7000 NO-SPST PB
S3	530105	SWITCH, TW7000 NO-SPST PB
S4	530105	SWITCH, TW7000 NO-SPST PB
S5	530105	SWITCH, TW7000 NO-SPST PB
S6	530105	SWITCH, TW7000 NO-SPST PB
S7	530105	SWITCH, TW7000 NO-SPST PB
S8	530105	SWITCH, TW7000 NO-SPST PB
S9	530105	SWITCH, TW7000 NO-SPST PB