



VHF/AM BASE STATIONS

Model TiL-91-DE

LOW POWER SYSTEM NO. 920607 (TBS-150)

15 WATT SYSTEM NO. 910815 (TBS-250)

25 WATT SYSTEM NO. 910825 (TBS-350)



Installation and Operating Instructions

TiL Document No. 92RE122

Rev. L

AUGUST 2012

Technisonic Industries Limited

240 Traders Boulevard, Mississauga, Ontario L4Z 1W7

Tel: (905) 890-2113 Fax: (905) 890-5338

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REVISION HISTORY
[92RE122]

REV	SECTION - PAGE -	DESCRIPTION	DATE	Edited by
A		Refers to PL revised/replaced in 94RE150		RR
B		Refers to Sections 5,8 in 94RE150	OCT 09/96	
C		Refers to Sections 5,8 in 94RE150 updated to reflect latest configuration		
D				
E				
F	Global Sect 2	New Document Template (new file format) Title page changed, Headers/Footers added Added Revision History and Warranty page Updated Fig 2.2 and 2.3 Remove reference of 90-6R from manual	JUL 2011	FM
G	1-7	Correct Revision History Rev and typos Table 1.2 correct typo (missing minus sign) temp range to -25°C & -55°C	OCT 2011	FM
H	3-7	The 10 channel (memories) will no longer be available on all 91-DE based radios, ONLY 25. Updated sect 3.3 for 10 & 25 channels	MAR 2012	FM
J	Title Pg iii Global 1-2 1-7,3-3	Simplify System description Updated FCC information including antenna and FCC labeling instructions. Simplify description under "Warning" 7 Watt (7 W) or 7-10 Watt changed to Low Power added NOTE: *Low Power description is found in Table 1.2 under Power Output. Revise Transmitter Characteristics for FCC and ICAN information	JULY 2012	FM
K		Clarified 10 / 25 Channel description.	JULY 2012	SM
L	2-10	Title page correction for 91-DE Fig 2.2 Revised as per Test Procedure 106516 Rev C	AUG 2012	FM

WARNING

Do not make physical contact with antenna when transmitter is on.

CAUTION ! STATIC SENSITIVE !



This unit contains static sensitive devices. Wear a grounded wrist strap and/or conductive gloves when handling printed circuit boards.

FCC COMPLIANCE INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.



WARNING: For compliance with FCC RF Exposure Requirements the mobile transmitter antenna installation shall comply with the following two conditions:

1. The transmitter antenna gain shall not exceed 3 dBi.
2. The transmitter antenna is required to be located outside of a vehicle and kept at a separation distance of 90 cm or more between the transmitter antenna of this device and person(s) during operation.

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

FCC LABELING INFORMATION:

When this device is permanently mounted in an enclosure where the FCC ID label can not be seen, another label must be placed on the outside of the enclosure stating 'contains FCC ID: IMA90-6R'.

WARRANTY INFORMATION

The Base Station Model TBS-150/250/350 is under warranty for one year from date of purchase. Failed units caused by defective parts, or workmanship should be returned to:

Technisonic Industries Limited
240 Traders Boulevard
Mississauga, Ontario L4Z 1W7

Tel: (905) 890-2113
Fax: (905) 890-5338

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SECTION 1 - GENERAL DESCRIPTION

1.1 INTRODUCTION

Sections 1 and 2 of this publication provide general information on Technisonic VHF/AM Base Station Systems, Item No.'s TBS-150, TBS-250 and TBS-350. Specific information for the Base Station Model indicated on the front cover can be found in Section 3.

All Base Station Systems consist of a simplex transceiver complete with microphone, operating over the frequency range of 117.975 MHz to 138.000 MHz. The Base Station Systems are intended for operation in an aeronautical environment and can operate from AC power or external DC power in local and remote operating modes.

1.2 DESCRIPTION

The three base station configurations utilize the keypad entry transceiver (TiL 91-DE) configured for Low Power, 15 Watt or 25 Watt operation. All systems are configured for use of optional Line Interface/Control boards for remote operation. Each base station consists of a Transceiver, Power Supply Module, RF Amplifier Module, Microphone and Control Board (optional). Refer to Table 1.1 for system configuration details.

To improve the rejection of interfering signals, dual conversion receiver technology has been incorporated on the Transmitter/Receiver (Module A1) board used in Technisonic VHF/AM base stations. The second IF is 455 kHz using a ceramic filter, which is immune to high energy ringing. The dual conversion module also has a second local oscillator, second mixer and ceramic filter. The first local oscillator is the original VCO.

The dual conversion receiver board, P/N 003494-1 was implemented into TBS and TSC series base stations starting in January 2001. An option label on the chassis will indicate OPTION 94 if the dual conversion board is installed. It is possible to retro-fit the dual conversion receiver/transmitter board into older TSC/TBS series base station employing the single conversion board. Please contact Technisonic for availability of an exchange board.

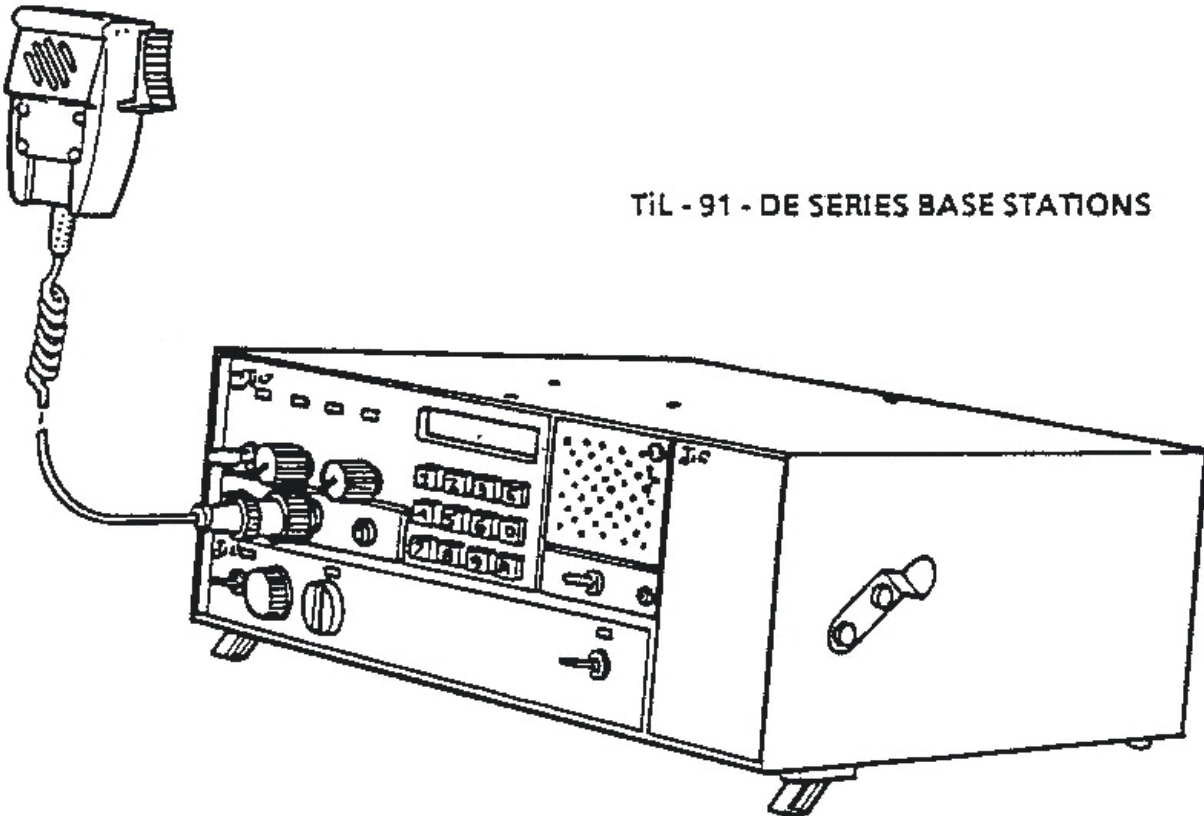
Note: If a new A1 Module has been retrofitted the squelch circuit must be aligned for the receiver squelch to operate correctly.

The dual conversion receiver's squelch knob must be rotated significantly more clockwise (4 o'clock position) to obtain the same squelch setting (3uV) as a single conversion receiver's squelch knob set to the 12 o'clock (straight up) position.

If the dual conversion receiver's squelch knob is set to the 12 o'clock position, signals with a level greater than 0.5uV will open the squelch. At most airports this will not be an adequate level of squelch. Please be aware of this squelch knob adjustment variance when setting and/or comparing squelch levels of dual conversion vs. single conversion base stations.

TABLE 1.1 BASE STATION CONFIGURATIONS				
System	Transceiver	Power Supply	RF Amplifier	Line/Remote Control Card
91-DE, Low Power Base Station System No. 920707 Item No. TBS-150	Model 91-DE P/N 901006	SPG-007 P/N 921020-1	Not Required	Optional in all Units
91-DE, 15W Base Station System No. 910815 Item No. TBS-250	Model 91-DE P/N 901006 Option 1	SPG-015 P/N 911018-1	PA-15 P/N 912025-1	Mark II series P/Ns 923051-1 943180-1
91-DE, 25W Base Station System No. 910825 Item No. TBS-350	Model 91-DE P/N 901006 Option 1	SPG-025 P/N 911019-1	PA-25 P/N 922062-1	

NOTE: *Low Power description is found in Table 1.2 under Power Output.



TIL - 91 - DE SERIES BASE STATIONS

FIGURE 1.1 TBS-Series Base Stations

1.2.1 Transceiver Model TiL-91-DE, P/N 901006-2

The basic model of each transceiver is required for the Low Power Base Stations. Option 1 indicates that the basic transceiver has a DC to DC convertor (Module A6) installed to facilitate operation with the RF Amplifier Module. Refer to Section 3 for specific details on the Transceiver unique to the systems indicated on the front cover of this document.

Transceiver Model Til-91-DE, Part Number 901006-2, is a microprocessor controlled, Low Power VHF/AM transceiver operating over the entire band of 117.975 to 138.000 MHz in 25 kHz steps. The transceiver will store ten user selected frequency channels in addition to the resident emergency channel of 121.500 MHz. Frequency Selection, Storage, Recall, Channel Scan, Search, and Toggle modes are all selected by the 12 key keypad. Current operating frequency is displayed on a backlit liquid crystal display (LCD).

Refer to above paragraph for details on new dual conversion receiver/transmitter A1 module.

1.2.2 Power Supply Modules - Models SPG-007, SPG-015, SPG-025

The Power Supply Modules provide the DC supply voltage to the Transceiver and Linear Amplifier, and houses a battery charger which can provide charging and trickle charging to external rechargeable batteries. Model SPG-007 is for use in the Low Power configurations, Model SPG-015 is for use in the 15 Watt configurations, Model SPG-025 is for use in the 25 Watt configurations.

1.2.3 RF Amplifier Modules - Models PA-15 and PA-25

The RF Amplifier modules provide 15 Watt (Model PA-15) or 25 Watt (Model PA-25) power output when the front panel switches are set to High. The RF Amplifiers are fed by the Low Power RF output from the transceiver. An internal mounted RF relay bypasses the RF Amplifier in receive and low power transmit modes.

1.2.4 Distribution Board

The Distribution Board provides all interconnection between the External DC connector, RF Amplifier Module, Power Supply/Charger, Remote Control Board (optional), and Transceiver. The optional Line Interface/Remote Control Boards are mounted on the Distribution Board. The distribution board provides a 9 pin D connector and RJ-11 (2-wire audio available only) telephone style jack for access to signals provided by the remote control board. The Line Interface/Remote Control boards indicated in Table 1.1 are available for use with this distribution board.

1.2.5 Remote Control Boards

1. Line Interface Board P/N 923051-1 (TLI-203)

Provides remote control transceiver operation on 2 wire or 4 wire 600 ohm lines. This board can be configured to key the transmitter using a 2175 Hz* continuous tone (see below), plus/minus DC Voltages, ground keying and internal or external DC (15 mA) current loop keying. Transmit and Receive audio is user selectable for two wires or four wires. *Crystals for tone frequencies other than 2175 Hz may be obtained by special order (i.e. 2380 Hz). An adjustable (30-300 second) Tx time out function is provided on this board.

2. Line Interface Board P/N 943180-1 (TLI-180)

Provides remote control transceiver operation on 2 wire dedicated 600 ohm lines utilizing the EIA multi-tone keying format found in the Land Mobile Industry. A high level 2175 tone followed by a 1950 Hz guard tone and then a low level 2175 Hz continuous tone is utilized to key the transceiver. The 943180-1 board can also be jumper strapped for standard aeronautical 2175 Hz continuous tone operation. DC (15mA) current loop and ground keying is also supported. However this board does not support 4 wire operation. An adjustable (30-300 second) Tx time out function is provided on this board.

NOTE

P/N 923051-1 is the default board supplied in all units. The EIA multi-tone board P/N 943180-1 must be special ordered. To determine which remote card your TBS-series base station has installed, the Configuration label on the back of the chassis should be consulted.

1.2.6 Microphone P/N 861902-1

An illustration of the Microphone Assembly Part Number 861902-1, is included in Figure 1.1. The Assembly P/N 861902-1 consists on microphone P/N 861901-1 and microphone retaining bracket P/N 863905-1. The unit is a rugged hand-held microphone housed in a high impact plastic case. The dynamic microphone is a noise cancelling type with a two-stage preamplifier, press-to-talk switch, and a retractable three-core cable terminated by a three-pin, male contacts, connector which mates with the MIC/PTT connector located on the front panel of the transceiver. The microphone dc supply for the microphone is supplied by the transceiver. The microphone bracket can be mounted on the left or right side of the Base Station as required.

1.2.7 Antenna

This unit is designed for use with a 50 ohm impedance antenna (not supplied). A 50 ohm RF N type connector (BNC available as an option) is provided on the rear of the unit for interfacing with an antenna.

1.3 MODES OF OPERATION

Refer to Section 3 for additional operating modes.

1.3.1 Transmit/Receive (Local Mode)

The transceiver may be operated in either of two modes, transmit or receive, as selected by the Press to Talk (PTT) switch on the microphone.

(1) TRANSMIT MODE - When the PTT switch on the microphone is pressed, the transceiver operates in the transmit mode. The PTT signal line is grounded by the microphone PTT switch via the microphone lead and the MIC/PTT connector to the transceiver. The Tx ON amber LED will go ON, indicating that the transmitter is activated.

Transmission will occur on the channel frequency indicated on the front panel. Refer to Section 3 for transceiver details.

(2) RECEIVE MODE - When the PTT switch on the microphone is released, the transceiver operates in the receive mode. The Tx ON amber LED will go OFF, indicating that the transmitter is inhibited.

The setting of the SQUELCH CONTROL determines the squelch threshold level. When the SQUELCH CONTROL is rotated in the counter-clockwise direction, the SQUELCH INDICATOR green LED will go ON, indicating that the squelch circuit is connecting the demodulated audio to the VOLUME CONTROL. The setting of the VOLUME CONTROL determines the audio level produced from the internal speaker. When the VOLUME CONTROL is adjusted in the clockwise direction, the audio level will increase.

NOTE

When the connector of the external loudspeaker or head phone is connected to the SPEAKER/PHONE jack, the internal loudspeaker is disconnected and the VOLUME CONTROL will control the audio level of the external loudspeaker or headphone.

1.3.2 Local/Remote Operation

Base Stations which employ the TiL-91-DE transceiver operate in local and remote modes simultaneously.

1. LOCAL OPERATION - In local operation, voice audio, and keying (PTT) functions are routed from the microphone to the transceiver. Receive audio is routed to the internal loudspeaker.

2. REMOTE OPERATION - In Remote operation, transmit audio, keying (PTT), and receive audio functions are routed over land lines to the 600 ohm remote input. Internal jumpers can be set for \pm DC, ground transmitter keying, tone keying or current loop keying, depending on the line interface/remote control board utilized.

1.3.3 AC and DC Operation

The unit can be operated by external 120 VAC (220 VAC operation available) or external 28 VDC (13.7 VDC for Low Power configurations).

1. AC OPERATION - During AC operation, the unit can charge and trickle charge external batteries via the External DC connector mounted on the rear panel of the Base Station. Refer Table 1.2 for details.

2. DC OPERATION - The unit can be operated from an external DC supply within the range of 21.6 Vdc to 30 Vdc for 15 watt and 25 watt configurations and within the range of 11.5 Vdc to 15.0 Vdc for Low Power configurations. A DC connector is mounted on the rear of the Base Station which mates with DC Power Cable P/N 863701-1 (Not Supplied) to facilitate external DC operation.

The following battery back-up kits are available for TBS-series base stations:

P/N 989978-1, 24 Volt Battery Back-up Kit (7.2 AH)

For use with 15watt / 25watt TBS-series Base Stations. Provides a minimum of 4 hours back-up for 25 watt unit with 20% Tx and 80% Rx duty cycle.

Note: Back-up time for 15 watt unit is approximately 40% longer.

Kit includes:

- qty. (1), P/N 987370-3, DC mating cable with battery connectors.
- qty. (2), P/N LCR 12V7.2P, 7.2 amp hour sealed lead acid batteries.
- qty. (1), P/N 987246-2, battery interconnect cable.
- qty. (1), P/N 968211, battery hook-up instructions.

P/N 989979-1, 12 Volt Battery Back-up Kit (7.2 AH)

For use with Low Power TBS-series Base Stations. Provides a minimum of 6.5 hours back-up for Low Power unit with 20% Tx and 80% Rx duty cycle.

Kit includes:

- qty. (1), P/N 987370-3, DC mating cable with battery connectors.
- qty. (1), P/N LCR 12V7.2P, 7.2 amp hour sealed lead acid battery.
- qty. (1), packing log/ instructions.

1.4 TECHNICAL SUMMARY

A summary of electrical, operational, mechanical and physical characteristics of the Base Station are provided in Tables 1.2 and 3.1.

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TABLE 1.2 BASE STATION SYSTEM LEADING PARTICULARS

POWER REQUIREMENTS:

Low Power Base Stations

AC Input Voltage/Current 100 to 132 VAC @ 1.0 Amp
 AC Input Voltage/Current (Available) 190 to 250 VAC @ 0.5 Amp
 DC Input Voltage/Current 11.5 VDC to 15 VDC @ 3.5 Amp

15 Watt Base Stations

AC Input Voltage/Current 100 to 132 VAC @ 1.5 Amp
 AC Input Voltage/Current (Available) 190 to 250 VAC @ 0.8 Amp
 DC Input Voltage/Current 21.6 VDC to 15 VDC @ 4.0 Amp

25 Watt Base Stations

AC Input Voltage/Current 100 to 132 VAC @ 2.0 Amp
 AC Input Voltage/Current (Available) 190 to 250 VAC @ 1.0 Amp
 DC Input Voltage/Current 21.6 VDC to 15 VDC @ 7.5 Amp

POWER OUTPUT:

***Low Power Base Stations**

*Power Output (FCC) 10 Watts MAX
 *Power Output (ICAN) 8 Watts MAX

15 Watt Base Stations (*Low/High) *Low/15 Watts MAX

25 Watt Base Stations (*Low/High) *Low/25 Watts MAX

Microphone Compression Range 35 dB

Battery Charger Voltage & Current (15 & 25 watt configurations) 27.5Vdc, 3.5 Amps MAX

OPTIONAL REMOTE CONTROL BOARD - TLI-203

Remote Audio Input 2 or 4 wire (selectable), balanced 600 Ω lines

Remote Tx Timeout 30 to 300 seconds

Tone Keying:

Impedance 600 Ω floating with respect to ground

Tx Control Tone Selectable 1800 Hz to 3000 Hz

Tx Tone Input Level 0 to -40 dBm

Tx Tone Control Response Time < 12 milliseconds

DC Keying ± 48 Vdc

Loop Resistance 10 K Ω MAX

Ground Keying Closure to Ground

Loop Resistance 4 K Ω MAX

Remote RX:

Range +10 dBm to -15 dBm (Factory set to -10dBm)

Impedance..... 600 Ω floating with respect to ground

RX/TX Interface Signals:

Squelch Signal Ground, Open circuit for Mute

TX RF Output Signal (Optional) RF ON = Ground, RF OFF = Open Circuit

AGC Signal Output Linear 0 to +6Vdc

Temperature & Humidity:

Operating Temperature Range -25°C(-13°F) to +55°C(+131°F)

Storage Temperature Range -55°C(-67°F) to +65°C(+149°F)

Relative Humidity 100%

Dimensions & Weight:

Width 305 mm (12.0 in) MAX

Height (including feet) 166 mm (6.5 in) MAX

Depth 274 mm (10.75 in) MAX

Weight 5.5 Kg (12 lbs) MAX

* Refer to Section 3 for Transmitter and Receiver Leading Particulars

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SECTION 2 – OPERATING INSTRUCTIONS

2.1 GENERAL

This section provides the information required for custom configuration of the base station, and storage. Custom system configuration includes customizing remote control set up, and removal and replacement of Power Amplifier Module, Transceiver, and Power Supply.

Refer to Section 3 for Channel/Frequency configuration.

Remote set up instructions for Mark II series Line Interface boards P/N's 923051-1 and 943180-1 are provided in paragraph 2.3 of this section.

2.2 DISASSEMBLY/ASSEMBLY (Refer to Figure 2.1)

2.2.1 Remove/Replace Microphone

REMOVAL

- (1) Disconnect microphone (item 7) from front panel of transceiver (item 8). Slide microphone clear of bracket (item 6).
- (2) Remove and Retain two screws (item 5) securing microphone bracket (item 6) to cover (item 2).

REPLACEMENT

- (1) Secure microphone bracket (item 6) to left or right side of cover (item 3) as required with two screws and two washers (item 5).
- (2) Connect microphone (item 7) to front panel connector on transceiver (item 8). Slide microphone onto bracket (item 6).

2.2.2 Remove/Replace Cover Assembly

NOTE

It is necessary to first remove Microphone Bracket before removing Cover.

Remove screws securing Heat Sink to cover last, after removing all other top and bottom screws.

2.2.2 Remove/Replace Cover Assembly - continued

REMOVAL

- (1) Remove and retain two top screws (item 1) securing cover (item 3) to chassis (item 4).
- (2) Remove and retain four bottom screws (item 2) securing cover to chassis.
- (3) Remove and retain the two heatsink screws.
- (4) Slide cover forward or backward to lift cover clear of chassis.

REPLACEMENT

- (1) Slide cover (item 3) forward or backward onto chassis (item 4), positioning screw access holes on cover over chassis threaded inserts.
- (2) Secure heatsink to cover with two screws.
- (3) Secure cover to chassis with four bottom screws (item 2), then with two top screws (item 1).

2.2.3 Remove Replace Transceiver

REMOVAL

- (1) Remove Cover as described in paragraph 2.2.2.
- (2) Disconnect coaxial connector (item 9) from rear of transceiver (item 8).
- (3) Disconnect DC connector (item 10) from rear of transceiver.
- (4) Remove and retain two screws and two washers (item 11) securing flat cable (item 12) to transceiver. Disconnect flat cable from transceiver.
- (5) Remove and Retain two screws and two washers (item 13) securing transceiver to chassis bracket.
- (6) Slide transceiver toward rear of chassis. Lift transceiver clear of chassis.

REPLACEMENT

- (1) Slide transceiver from rear of chassis into top window of Base Station front panel.
- (2) Secure transceiver to chassis bracket with two screws and two washers (item 13).
- (3) Connect flat cable (item 12) to transceiver. Secure flat cable to transceiver with two screws and two washers (item 11).
- (4) Connect DC connector (item 10) to rear of transceiver.
- (5) Connect coaxial connector (item 9) to rear of transceiver.
- (6) Replace Cover as described in paragraph 2.2.2.

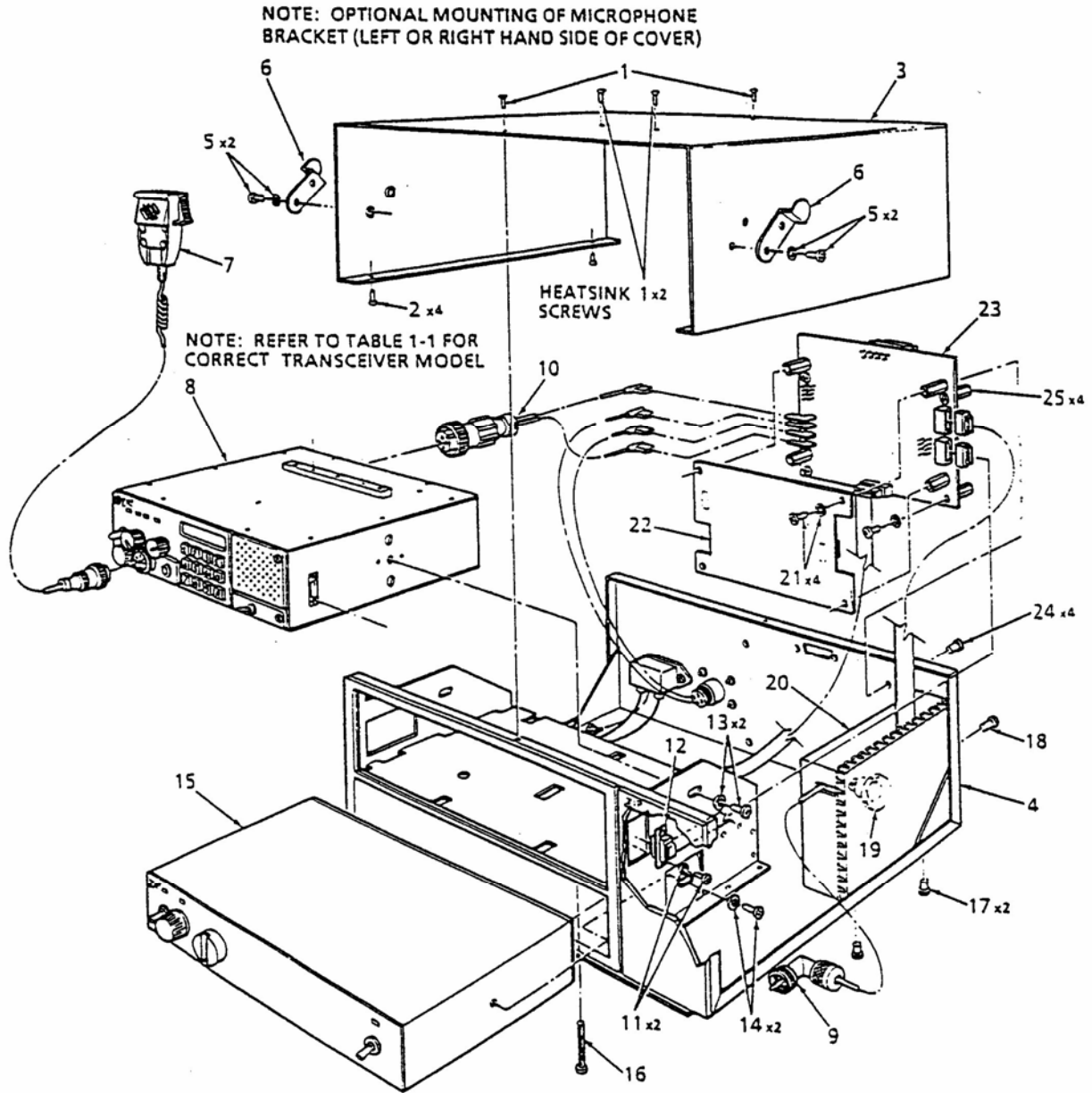


FIGURE 2.1 Base Station Assembly/Disassembly

2.2.4 Remove Replace Power Supply

REMOVAL

- (1) Remove Cover as described in paragraph 2.2.2.
- (2) Loosen two screws and two washers (item 14) securing Power Supply (item 15) to chassis (item 3).
- (3) Remove and retain one screw (item 16) securing Power Supply to bottom of chassis.
- (4) Slide Power Supply forward through window using partially loosened screws (item 14). Remove and retain two screws and two washers and remove Power Supply from chassis.

REPLACEMENT

- (1) Slide Power Supply (item 15) part way into lower front panel window until screw inserts are visible through chassis bracket holes.
- (2) Partially install screws and washers (item 14).
- (3) Grasp two screws (item 14) with fingers to position Power Supply into chassis mounted connectors. Press into position from front panel.
- (4) Secure Power Supply to chassis with one screw (item 16) on bottom of chassis.
- (5) Tighten screws (item 14)
- (6) Replace Cover as described in paragraph 2.2.2.

2.2.5 Remove/Replace RF Power Amplifier Module

REMOVAL

CAUTION

Do not adjust nut or shaft (item 19) protruding from RF Power Amplifier Module. This is a Power Transistor Mounting Stud.

- (1) Remove Cover as described in paragraph 2.2.2.
- (2) Disconnect coaxial connector (item 9) from Transceiver (item 8).
- (3) Disconnect Flat Cable from Distribution Board (item 23).
- (4) Remove and retain two bottom screws (item 17) and one rear screw (item 18) securing RF (15W) Power Amplifier (item 20) to chassis (item 4).

Note: 25W RF Power Amplifier has four bottom screws (item 17) securing it to the chassis.

REPLACEMENT

- (1) Secure RF Power Amplifier (item 20) to chassis with bottom screws (item 17) and one rear screw (item 18).
- (2) Connect UHF Connector (item 9) to Transceiver and flat cable to distribution board.
- (3) Replace Cover as described in paragraph 2.2.2.

2.2.6 Remove Replace Distribution Board

REMOVAL

- (1) Remove Cover as described in paragraph 2.2.2. Disconnect flat ribbon cables.
- (2) Remove and retain four screws (item 25) securing the distribution and control boards (item 23, 24) to the rear of chassis (item 4).

REPLACEMENT

- (1) Secure Distribution Board and Control Board (item 23) to the rear of chassis (item 4) with four screws (item 25).
- (2) Reconnect flat ribbon cables and replace Cover as described in paragraph 2.2.2.

2.2.7 Remove Replace Control Board

REMOVAL

- (1) Remove Cover as described in paragraph 2.2.2.
- (2) Remove Distribution Board as described in paragraph 2.2.6.

CAUTION

Care must be taken when removing or replacing Control Board to avoid damage to Distribution Board Pins.

- (3) Remove and retain four screws (item 21) securing Control Board (item 22) "piggy back" to the Distribution Board (item 23). Remove Control Board from Distribution Board.

REPLACEMENT

- (1) Align the two female connectors on the control board with the male connectors on the Distribution Board using the four mounting holes and standoffs as a guide.
- (2) Secure control board "piggy back" to the distribution board (item 23) with four screws (item 21).
- (3) Replace Distribution Board as described in paragraph 2.2.6 and replace Cover as described in paragraph 2.2.2.

2.3 REMOTE OPERATION SET UP - Line Interface Boards

The Procedures listed below enable the user to custom configure the unit for external remote control hardware. Refer to Table 2.1 for connector pin details on Remote Control D Connector located at rear of Base Station or Table 2.2 for connector pin out on the special order Positronics 9-pin connector. Position jumpers on Line Interface Board as indicated Figures 2.2, or 2.3 as required. Verify Remote Control operation in accordance with manufacturer’s instructions.

TWO WIRE SETUP - In two-wire operation, a single balanced 600 ohm pair is provided for transmit and receive audio. The transmitter can be keyed on the same pair or externally.

FOUR WIRE SETUP - In four-wire operation, separate balanced 600 ohm pairs are provided for transmit and receive audio. The transmitter can be keyed on the Tx audio pair or externally.

DC KEYING - In \pm DC keying, a positive voltage between +10 Vdc and +48 Vdc or negative voltage between -10 Vdc and -48 Vdc will key the transmitter. A DC voltage between -5 Vdc and +5 Vdc will not key the transmitter.

***TONE KEYING** - In Tone keying a tone of 2175 Hz or 2380 Hz (Optional) can be used to key the transmitter. Tone sensitivity is adjustable from -40 dBm to 0 dBm.

GROUND KEYING - In Ground Keying the transmitter is keyed by shorting the control point (landline or External Keying) to chassis ground.

CURRENT LOOP KEYING - In Current Loop keying, an internal or external current source (15 mA) is used to key the transmitter.

EIA TONE KEYING - The EIA multi-tone keying format is found in the Land Mobile Industry. A high level 2175 Hz tone followed by a 1950 Hz guard tone then a low level 2175 Hz continuous tone is utilized to key the transceiver.

TABLE 2.1 9-Pin "D" TYPE CONNECTOR FUNCTIONS			
PIN NO	Two Wire Line Interface Board P/N's 943180-1	PIN NO	Four/Two Wire Line Interface Board P/N 923051-1
8,9	2 Wire Remote TX/RX Audio (600Ω)	8,9	4 Wire Remote TX Audio or 2 Wire Rx/Tx Audio (600Ω)
6	Ground	4,5	Remote RX Audio Line (600Ω)
2	RF Indicator	6	Ground
7	Squelch	2	RF Indicator (Optional)
3	External PTT	7	Squelch
1	AGC	3	External PTT
4,5	Not Connected	1	AGC

NOTE: A modular RJ-11 Jack is also provided on the rear of the chassis (on later units) for quick connection to the 2 wire, Tx/Rx Audio. The red and green wire connections (centre pins) on the RJ-11 are connected parallel to pins 8 and 9 on the 9 pin connector. This RJ-11 jack CANNOT be used if the remote control card is set to 4 wire operation as it does not have the necessary connections.

TABLE 2.2 9-Pin POSITRONICS TYPE CONNECTOR FUNCTIONS			
PIN NO	Two Wire Line Interface Board P/N's 943180-1	PIN NO	Four/Two Wire Line Interface Board P/N 923051-1
A,B	2Wire Remote TX/RX Audio (600Ω)	A,B	4Wire Remote TX Audio Line (600Ω) or 2Wire RX/TX Audio (600Ω)
J	Ground	D,C	4Wire Remote RX Audio (600Ω)
H	+ 12 Vdc Output	J	Ground
F	Squelch	H	+ 12 Vdc Output
K	External PTT	F	Squelch
E	Not Connected	K	External PTT
D,C	Not Connected	E	Not Connected

2.3.1 Two/Four Wire Remote Control Board P/N 923051-1

Provides remote control base station operation on 2 wire or 4 wire, 600 ohm lines. This board can be configured to key the transmitter using a 2175 Hz tone (2380 Hz upon request), plus/minus DC Voltages, ground keying and internal or external current loop keying. Transmit and Receive audio is user selectable for two wires or four wires. Crystals for tone frequencies other than 2175 Hz or 2380 Hz may be obtained by special order.

See Table 2.3 for jumper settings and their functions. See Figure 2.3 for location of jumpers referred to in the Table 2.3. Pins are numbers increase as you go from top to bottom or left to right on the connector.

2.3.2 Two Wire Remote Control Board P/N 943180-1

Provides remote control Base Station operation on 2 wire 600 ohm lines. Two wire Line Interface board with EIA multi-tone, standard 2175Hz continuous tone, DC keying of ground keying over audio lines. The multi-tone keying format consists of a high level 2175 tone followed by a 1950 Hz guard tone and then a low level 2175 Hz continuous tone is utilized to key the transceiver. This board will also support 15mA current loop or ground keying. Refer to Figure 2.4 for jumper locations to set functions and line level adjustments for this board. Summary of jumper settings follow. Pins are numbers increase as you go from top to bottom or left to right on the connector.

Set **J1** for **ST** (standard 2175 Hz continuous) Tone keying or for **EIA** (multi-tone keying format).

Set **J2** for Tone keying function **ON** (left jumper position) or **OFF** (right jumper position).

Set **J3** for Time out timer **OFF** (left jumper position) or **ON** (right jumper position).

See Table 2.4 for jumper settings and their functions. See Figure 2.3 for location of jumpers and left/right orientation referred to in the Table 2.4.

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TABLE 2.3 REMOTE CONTROL BOARD P/N 923051-1 SETTINGS

CONTROL	FUNCTION
J1	Jumper Pin 1 and Pin 2 for DC Current Loop Keying Jumper Pin 2 and Pin 3 for \pm DC Keying or Ground Keying. Note: SW2 must be in position2 if Pins 2 & 3 are jumpered.
J2	Jumper Pin 1 and Pin 2 for Ground Keying (Land Line). Jumper Pin 1 and Pin 4 for \pm DC Keying (Land Line). Jumper Pin 2 and Pin 3 for Ground Keying (Single Key Line). Jumper Pin 3 and Pin 6 for \pm DC Keying (Single Key Line). Jumper Pin 2 and Pin 5 for No Function.
J3	Jumper Pin 1 and Pin 2 for \pm DC or Ground Keying. Jumper Pin 4 and Pin 5 for Tone Keying. Note: Both Options may be selected. Jumper Pin 2 and Pin 3 for No Function. Jumper Pin 5 and Pin 6 for No Function.
J7	Jumper Pin 1 and Pin 2 to enable Timeout Timer. Jumper Pin 2 and Pin 3 to disable Timeout Timer.
J6	Jumper Pin 1 and Pin 2 to for Internal Current Loop Keying. Jumper Pin 2 and Pin 3 to for External Current Loop Keying.
SW1	Position 1 Selects 2 Wire Operation. Position 2 Selects 4 Wire Operation.
SW2	Position 1 Selects Normal (Land Line Keying). Position 2 Selects Local (Single Line Keying).
Y1,Y2	Determines Keying Tone Frequency.
R7	Sets Tx Audio IN Level (Range -18 dBm to +10 dBm).
R22	Sets Key Tone Level (Range -40 dBm to 0 dBm).
R25	Sets Rx Audio OUT Level (Range -15 dBm to +10 dBm).
R44	Sets Timeout Timer (Range 30 to 300 Seconds).
R10	Sets Receive Audio Output Balance.

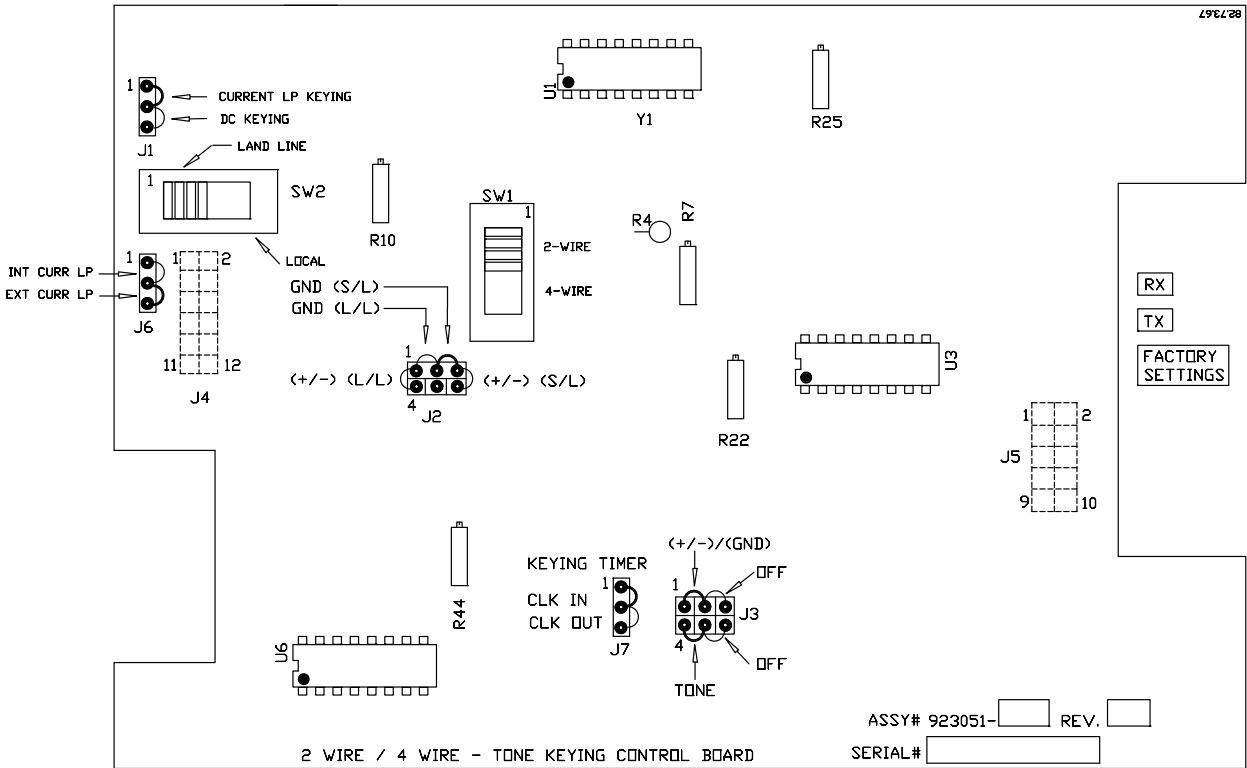
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TABLE 2.4 REMOTE CONTROL BOARD P/N 943180-1 SETTINGS

CONTROL	FUNCTION
J1	Jumper Pin 1 and Pin 2 for ST (standard 2175 Hz continuous) tone Keying Jumper Pin 2 and Pin 3 for EIA multi-tone Keying.
J2	Jumper Pin 1 and Pin 2 for Tone Keying. Jumper Pin 4 and Pin 5 for Current Loop (15mA DC) or Ground Keying. NOTE: Both options may be selected Jumper Pin 2 and Pin 3 to disable Tone Keying. Jumper Pin 5 and Pin 6 to disable Current Loop and Ground Keying.
J3	Jumper Pin 1 and Pin 2 to enable Timeout Timer. Jumper Pin 2 and Pin 3 to disable Timeout Timer.
R6	Tx audio level Adjustment
R24	Keying Tone Attenuator
R26	1950 Tone level Adjustment
R41	2175 Tone Level Adjustment
R59	Sets Rx Audio Level Adjustment (Range -15 dBm to +10 dBm).
R64	Sets Timeout Timer (Range 30 to 300 Seconds)

**Control Configuration for 2/4 Wire ± DC/Ground/Tone/
(Current Loop) Keying Control Board**
Assembly P/N 923051-1, Layout 929147



NOTE: Bold Italics indicate Factory default configurations.

- | | | | |
|--------------|---|-------------|---|
| R7: | Tx Audio (-25 dBm sensitivity; increases CW (clockwise). | J1: | Selects DC or Current Loop Keying operation |
| R10: | 2 Wire Rx Balance at 600Ω (1mV _{RF} at 1 kHz, 30% Mod.) R10 adjusted for minimum amplitude at C6/R4 junction. | J2: | Selects either Land Line (L/L) or Single Line (S/L) and ± DC or Ground keying operation |
| R22: | Keying Tone (-30 dBm sensitivity; decreases CW) | J3: | Selects Tone and/or ± DC Keying enable or disable |
| R25: | Rx Audio (-10 dBm output level; increases clockwise) | J6*: | Selects between Internal or External Current loop keying (ICL/ ECL) |
| R44: | Time Out Timer (15 to 300 sec.; 90 sec. nominal; increases clockwise) | J4: | Input Connector |
| SW1: | Selects either 2-Wire or 4-Wire operation | J5: | Output Connector |
| SW2*: | Selects either Local or Land Line Current Loop Keying | J7: | Keying timer position CLK IN / CLK OUT |

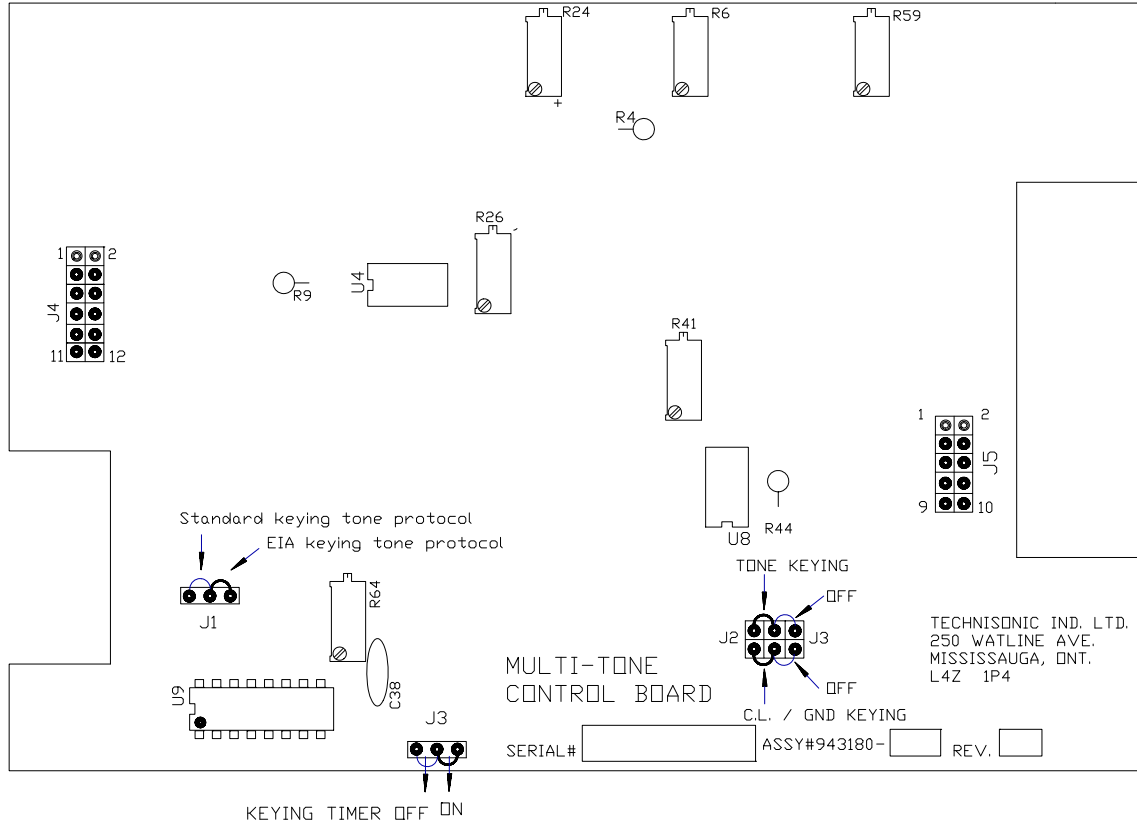
NOTE: P/N 923051-1 Rev N and up (Aug 2006) has SW2 and J6 removed.

*The SW2 function is now hard wired in the **landline** current loop keying position and J6 is hard wired for **external** current loop.

CAUTION: Ensure that the J7 jumper is set to the **CLK IN** position, otherwise damage may occur when transmitting.

FIGURE 2.2 Line Interface/Remote Control Board P/N 923051-1

**Control Configuration for Multi-Tone
Control Board**
Assembly #: 943180



⊔ DENOTES FACTORY DEFAULT CONFIGURATION

R6	Tx audio level adjustment (-25 dBm)	J1	Standard or EIA Keying tone protocol
R24	Keying Tone Attenuator	J2	Selects Tone and/or Current Loop (C.L.)
R26	1950 Hz tone level adjustment		/Ground - Keying enable or disable
R41	2175 Hz tone level adjustment	J3	Selects Keying timer Enable/Disable
R59	Rx Audio level adjustment (-10 dBm)	J4	Input Connector
R64	Time out timer (90 sec default)	J5	Output Connector

NOTE: **Bold Italics** indicate Factory default configurations.
Refer to the maintenance manual (94RE150) for alignment and test.

FIGURE 2.3 Line Interface/Remote Control Board P/N 943180-1

2.4 OPTIONAL LOUDSPEAKER, HEADPHONE INSTALLATION

Provision is made for connection of an external loudspeaker or headphone to the SPEAKER/PHONE jack of the transceiver, as shown in Figure 3.2.

2.4.1 External Loudspeaker

When an external loudspeaker is to be installed, an 8 ohm nominal impedance loudspeaker should be used. The loudspeaker cable should be terminated by a 1/4 in., 3 pole telephone plug (male), with the loudspeaker connected between tip and sleeve (ground). Insert the external loudspeaker connector into the SPEAKER/PHONE jack located on the front panel of the transceiver. When the external loudspeaker is connected to the transceiver SPEAKER/PHONE jack, the internal loudspeaker is automatically disconnected.

2.4.2 Headset

Headset impedance should be 150 to 600 ohms. The headset cable must terminate in a 1/4 in. 3 pole telephone plug (male), to mate with the SPEAKER/PHONE jack located on the front panel of the transceiver. The internal loudspeaker is automatically disconnected. Connect the headset as indicated below for receiver audio with or without transmit audio.

- (1) HEADSET WITHOUT TRANSMIT AUDIO - When receiver audio only without transmit audio is required, the headset should be connected between the tip and sleeve (ground) of the telephone plug.
- (2) HEADSET WITH TRANSMIT AUDIO - When receiver audio with transmit audio is required, the headset should be connected between the ring and sleeve (ground).

2.5 OPERATIONAL CHECK

Perform an operational check of the transceiver after all adjustments. Check each channel in use in both the transmit and receive modes of operation, using the Operating Instructions given in Section 3 of this document and the appropriate specified operating procedures during transmission.

2.6 STORAGE

To store for an extended period, store unit in its original shipping container in a dry place,

SECTION 3 – TRANSCEIVER SET UP AND INSTALLATION INSTRUCTIONS

3.1 INTRODUCTION

3.1.1 Transceiver Model TiL-91-DE P/N 901006-2

The Transceiver is a microprocessor controlled VHF/AM transceiver operating over the entire band of 117.975 to 138.000 MHz in 25 kHz steps. The transceiver will store 10 or 25 user selected frequency channels in addition to the resident emergency channel of 121.500 MHz. The TiL-91-DE transceiver was available in either 10 or 25 channel versions until July 2012. The 25 channel version can be identified by '25' or '1283T' on the option label on those units. All units manufactured after July 2012 are 25 channel only. Frequency Selection, Storage, Recall, Channel Scan, Search, and Toggle modes are all selected by the 12-key keypad. Current operating frequency is displayed on a backlit liquid crystal display (LCD). Option 1 of Model TiL-91-DE P/N 901006-2 has an internal DC to DC converter for operation of an RF Power Amplifier in the 15 Watt and 25 Watt Base Stations.

3.1.2 Scan, Search, and Toggle Modes

1. **SCAN MODE** - In Scan Mode, the transceiver cycles through the preset Channel Frequencies and locks on to the first channel received in scan sequence. Audio is enabled for 5 seconds for operator identification. Pressing the Press-to-Talk switch exits the scan mode. If there is no operator action then the transceiver remains operating in the scan sequence continuously.
2. **SEARCH MODE** - In Search mode the transceiver cycles through the preset Channel Frequencies and locks on to the first channel received in the scan sequence and normal operation is resumed.
3. **TOGGLE MODE** - In toggle mode the transceiver alternates between the current channel selection and the previous channel selected.

3.1.3 Technical Summary

A summary of electrical, operational, mechanical and physical characteristics of the transceiver, are provided in Table 3.1.

3.2 OPERATOR'S SWITCHES, CONTROLS AND INDICATORS

A view of the front and rear panel is given in Figure 3.2. A functional description of each of the operator's switches, controls and indicators, and the microphone PRESS TO TALK switch, is given in Table 3.2, Operator's Switches, Controls and Indicators and in Table 3.3, Channel/Function Selector Keypad.

This section includes a functional description of each switch, control, indicator and connector located on the front and rear panels of the portable transceiver, including the PRESS TO TALK switch located on the microphone. Operating instructions for transmit/receive and the special functions are also included.

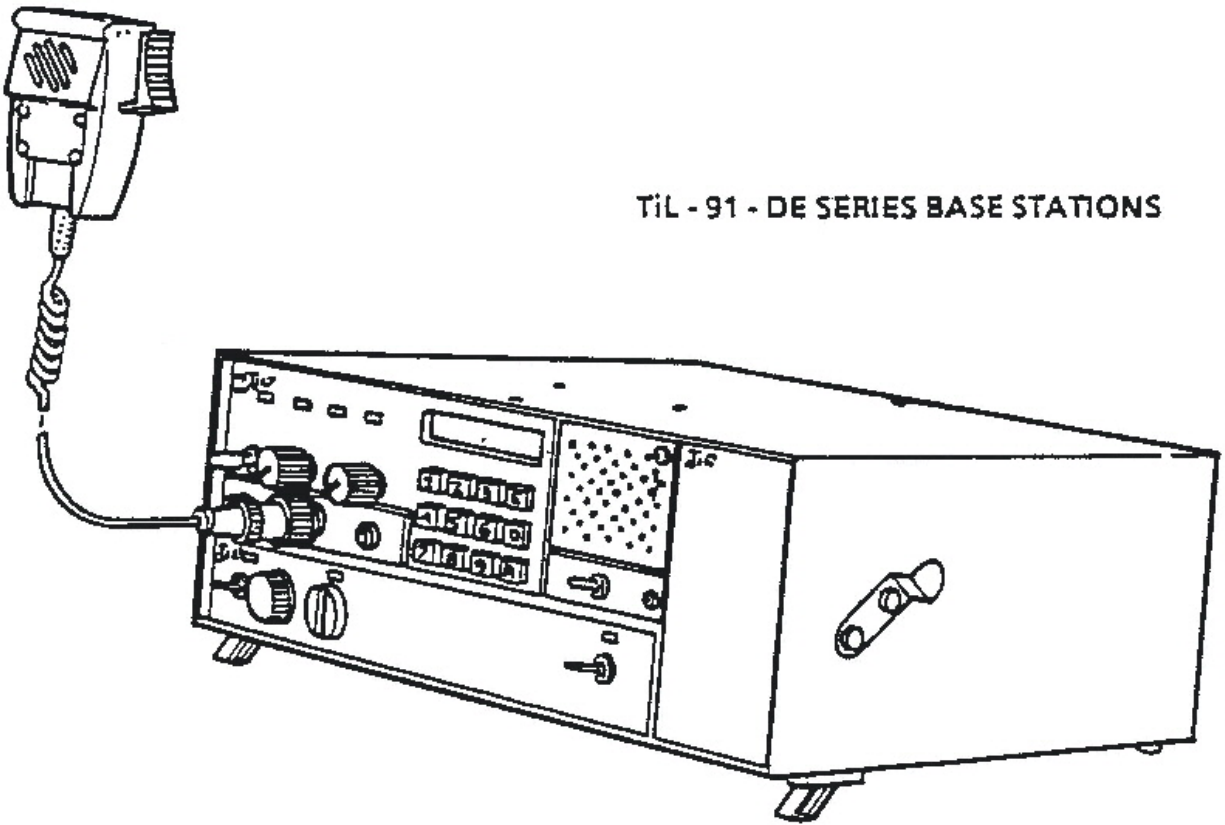


FIGURE 3.1 91-DE Base Station Setup

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TABLE 3.1 MODEL TiL-91-DE TRANSCEIVER LEADING PARTICULARS

GENERAL:	
Dimensions & Weight:	
Width	216 mm (8.5 in) MAX
Height (including feet)	70 mm (2.75 in) MAX
Depth	260 mm (10.25 in) MAX
Weight	1.8 Kg (3 lbs 15 oz) MAX
TRANSMITTER	
*Power Output (FCC)	10 Watts MAX
*Power Output (ICAN)	8 Watts MAX
Speech Processor Dynamic Range	35 dB
Modulation	95% MAX
Audio Distortion @ 90% mod	10% MAX
Audio Distortion @ 90% mod (with 15W or 25W Linear Amplifier)	15% MAX
Audio Frequency Response	300 Hz to 2,500 Hz, +1 -3 dB
Spurious Emissions	60 dB below carrier
Hum and Noise	45 dB below modulated carrier
RECEIVER	
RF Input Impedance	50Ω, VSWR 2:1 MAX
Sensitivity (12 dB SINAD) @ 1 KHz 30% Mod	1.5 μvolts
Selectivity, 25 KHz Channel Spacing:	
6 dB Bandwidth	Greater Than 15 KHz
80 dB Bandwidth	Less Than 50 KHz
Selectivity, 50 KHz Channel Spacing:	
6 dB Bandwidth	Greater than 30 KHz
80 dB Bandwidth	Less than 100 KHz
Adjacent Channel Selectivity	Greater than 80 dB
Spurious Response Attenuation	Greater than 90 dB
Frequency Stability (-40°C to +55°C)	± 1,000 Hz MAX
RF AGC (5 μvolts to 1 volt)	Audio Level 3 dB
Intermodulation:	
Ultimate Sensitivity	70 dB
30 μvolts	45 dB
300 μvolts	30 dB
Unwanted Radiation	Less than 80 μvolts into 50 Ω
Hum & Noise @ 1mV RF 30% MOD	40 dB
Interference Suppression	SINAD 6 dB MIN
Loudspeaker Output	3 W MAX
Phone Output	100 mW into 600 Ω
Audio Distortion 1mV RF Input, 30% MOD	5% MAX
Audio Distortion 1mV RF Input, 90% MOD	10% MAX
Audio Output Limiting	Less than 1 dB @30 to 100% MOD
Audio Frequency Response 300 Hz-2500 Hz	+1 -3 dB
Audio Acquisition Time	Less than 100 msec
Audio Squelch Characteristics:	
Squelch Type	Carrier Operated
Carrier Operated Squelch	Adjustable 2 to 15 μvolts

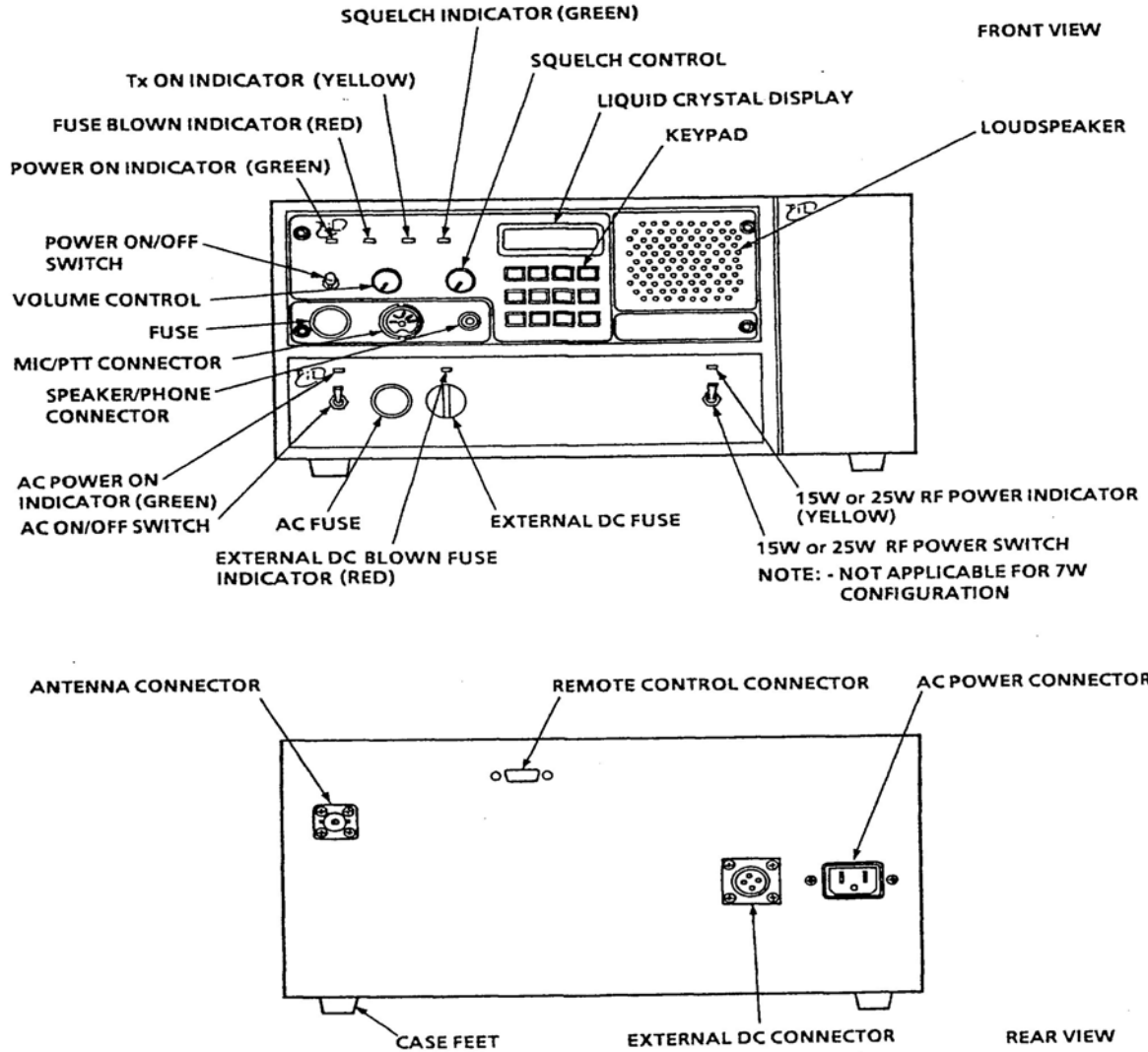


FIGURE 3.2 Base Station Front and Rear Panel Layout

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TABLE 3.2 OPERATORS SWITCHES, CONTROLS AND INDICATORS		
No.	SWITCHES CONTROLS & INDICATORS	FUNCTIONAL DESCRIPTION
1	POWER ON/OFF SWITCH	A toggle switch applies the 27.5 volts nominal power supply to the transceiver. The transceiver is switched to ON in the toggle UP Position the transceiver is switched OFF in the toggle DOWN position.
2	POWER ON LED INDICATOR	A GREEN LED Indicates when the POWER ON/OFF switch is set to ON and voltage is applied to the transceiver.
3	FUSE	A 5 Amp FUSE protects the 27.5 volts nominal power supply line.
4	FUSE BLOWN RED LED INDICATOR	A RED LED indicates when the 5 Amp fuse is "blown", and External DC or AC power is present.
5	SQUELCH CONTROL	A linear potentiometer determines the squelch threshold level. When the SQUELCH CONTROL is rotated in the counter-clockwise direction, the SQUELCH GREEN LED indicates that the squelch is connecting demodulated audio to the VOLUME control.
6	SQUELCH INDICATOR	A GREEN LED indicates the squelch circuit is connecting demodulated audio signal to the VOLUME control.
7	Tx ON AMBER LED INDICATOR	An AMBER LED indicates when the transceiver is keyed by the microphone PRESS TO TALK (PTT) switch or remote land line, and the transceiver is operated in the Tx mode. The Tx ON AMBER LED switches OFF, when the transceiver is operated in the receive mode.
8	VOLUME CONTROL	A logarithmic potentiometer determines the audio level applied to the internal speaker when the transceiver is operated in the receive mode. When the SPEAKER/PHONE connector is in use the internal loudspeaker is disconnected and the VOLUME CONTROL sets the audio level applied to the external speaker or headphone.
9	MIC/PTT CONNECTOR	A 5 pin connector functions as Microphone/PTT and Test Connector. Pin 1 - PTT Signal Line Pin 2 - Microphone Signal Ground Pin 3 - Microphone Signal and Microphone DC Supply Line Pin 4 - AGC test voltage Pin 5 - Squelch test voltage
10	MICROPHONE PTT	PRESS TO TALK (PTT) switch determines transceiver operating mode. When the PTT switch is pressed, the transceiver operates in Tx mode. When the PTT switch is released, the transceiver operates in Rx mode.

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TABLE 3.2 OPERATORS SWITCHES, CONTROLS AND INDICATORS (Continued)		
No.	SWITCHES CONTROLS & INDICATORS	FUNCTIONAL DESCRIPTION
11	KEYPAD	Performs Channel/Frequency and Special Feature Selection (Refer Table 3.3).
12	LIQUID CRYSTAL DISPLAY	A 5½ digit Liquid Crystal Display (LCD) displays the FREQUENCY/ CHANNEL that the transceiver is currently operating on. IN SCAN mode it displays the current frequency scanned if RF signal is present.
13	LOUDSPEAKER	An 8 ohm internal speaker reproduces the receiver audio output. The audio line is disconnected from the internal loudspeaker when the transceiver is operated in Tx mode or when the SPEAKER/PHONE connector is in use.
14	SPEAKER/PHONE CONNECTOR	A 3 pole connector provides interconnection to either an external loudspeaker or headphone. When in use, the internal speaker is disconnected and the VOLUME control sets the audio level applied to the external speaker or headphone.
15	AC ON/OFF SWITCH	A single pole switch applies external AC power to the Base Station power supply.
16	AC POWER ON LED INDICATOR	A RED LED indicates when AC power is applied to the unit and the AC POWER SWITCH is set to ON. Also indicates that the Base Station power supply is functioning.
17	AC FUSE	A 2.5 Amp fuse protects the Base Station power supply from power supply internal short circuit or transceiver short circuit.
18	EXTERNAL DC FUSE	A 5 Amp fuse protects the 27.5 volt nominal power supply line. As part of reverse polarity protection, the fuse will "blow" when polarity of the External DC supply line is reversed.
19	EXT DC BLOWN FUSE INDICATOR	A RED indicates when External DC fuse is blown.
20	RF POWER SWITCH	Selects Low Power or High Power (15W/25W) Transmit Operation, in Base Stations with a Linear Amplifier. Not provided on Low Power units.
21	15/25 W RF POWER LED INDICATOR	An AMBER LED indicates that 15/25 Watt (High) RF Power output has been selected and transceiver is operating in transmit mode. The LED is driven by sampled RF and indicates that RF is present.
22	*AC POWER CONNECTOR	3 Prong AC Connector for use with AC Power Cord P/N 927002-1.
23	*REMOTE CONTROL CONNECTOR	9-Pin "D" type connector provides connections required for remote operation. Refer to Table 2.1 for connector details.
24	-*EXTERNAL DC CONNECTOR	Chassis mounted connector provides for Connection to External DC Supply Source. Mates with DC power cable P/N 863701-1.
* Denotes items located on rear panel.		

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3.3 FRONT PANEL KEYPAD OPERATION

Note: The TiL-91-DE transceiver was available in either 10 or 25 channel versions until July 2012. The 25 channel version can be identified by '25' or '1283T' on the option label on those units. All units manufactured after July 2012 are 25 channel only.

All frequencies within the range of 117.975 MHz to 138.000 MHz in steps of 25 kHz can be stored in one of the available memories. Channels and feature settings are stored in non-volatile memory. Removal of external power source or batteries will not erase stored channels or configurable features. Emergency channel 121.500 is always available as described below. Refer to paragraph 3.3.6 for details. Table 3.3 Provides a Quick Reference of the CHANNEL/FUNCTION SELECTOR KEYPAD Functions.

TABLE 3.3 CHANNEL/FUNCTION SELECTOR KEYPAD	
KEYPAD	FUNCTIONAL DESCRIPTION
DIGIT 0-9	For direct frequency entry. If followed only by the 'E' key the transceiver will tune to that frequency but nothing will be saved in memory. If followed by 'E' and one digit (for 10 channel radios) or two digits (for 25 channel radios) the transceiver will tune to that frequency and save to the memory selected.
"R"	Recalls stored channel frequency when followed by digits 0 to 9 or 00 to 25. Recalls last frequency displayed when preceded by the "E" key.
"E"	* Stores a frequency to channel when followed by digits 0 to 9 or 00 to 25. Enables Special Features (See Below).
"E", "0"	Recalls permanently stored emergency channel 121.500 MHz.
"E", "1"	Selects Automatic Lighting of Keypad and LCD Display.
"E", "2"	Selects Continuous Lighting of Keypad and LCD Display.
"E", "3"	Disables Keypad and LCD Display Lighting.
"E", "4"	Selects SEARCH mode.
"E", "5"	Selects SCAN mode.
"E", "6"	Enables 90 second Tx time-out protection.
"E", "7"	Disables 90 second Tx time-out protection.
"E", "8"	Toggles Key "Beeps" ON and OFF.
"E", "9"	Disables/Enables transmit on selected frequency.
"E", "R"	Toggles between currently displayed frequency and the previously displayed frequency.
<p>Note: There is a 5 second keypad time out. If while entering a frequency or setting a function, no key has been pressed within 5 seconds, the function will be aborted and the display will return to the previous frequency.</p>	

3.3.1 Keypad "Beeps"

Audible "Beeps" are generated when a key is pressed (default condition). Beeps can be enabled/disabled by toggling the "E", "8" keys.

Press **E**, **8** to disable Key "Beeps".

Press **E**, **8** to enable Key "Beeps".

3.3.2 Keypad and LCD Display Lighting

Three Display and keypad lighting modes are available to the operator. The default mode provides no keypad or LCD display backlighting. In Continuous mode, display backlight and keypad lighting is permanent until power is removed or until lighting mode exited. In automatic mode, display backlight and keypad lighting is off until a key on the keypad is pressed or until the lighting mode is exited.

Press **E** **1** to initiate automatic lighting.

Press **E** **2** to initiate continuous lighting.

Press **E** **3** to turn to lighting OFF.

3.3.3 Transmitter Time-out

A 90 second time-out timer is provided to prevent accidental continuous transmission.

Press **E** **6** to initiate 90 second Tx time-out protection.

Press **E** **7** to disable 90 second Tx time-out protection.

3.3.4 Selecting a Frequency

To select a frequency, press the keypad digits in the sequence indicated (Refer to Fig 3.2 Base Station Front and Rear Panel Layout).

1st digit - must be 1 for 100 MHz, all other digits are ignored.

2nd digit - must be 1, 2 or 3, all other digits are ignored.

NOTE

Entry of 117 MHz fills 975 in remaining digits.

Entry of 138 MHz fills 000 in remaining digits.

4th digit - Can be any digit.

5th + 6th digits are paired.

Entry of 5th digit 0 results in 00 displayed.

Entry of 2 results in 25.

Entry of 5 results in 50.

Entry of 7 results in 75.

Examples:

Press **1 1 7**

117.975 is displayed on screen.

Press **1 1 8 0 0**

118.000 is displayed on screen.

Press **1 3 8**

138.000 is displayed on screen.

After keypad entry of a desired frequency, normal Tx/Rx operation can begin or the frequency can be stored as a channel as described in paragraph 3.3.5 (Storing a Frequency to a Channel).

3.3.5 Storing a Frequency to a Channel

Up to 10 Frequencies can be stored and recalled in channels 0 to 9 as follows or ,
up to 26 Frequencies can be stored and recalled in channels *00 to 25* as follows:

- (1) Enter the frequency to be stored as described in paragraph 3.3.4 (Selecting a Frequency) followed immediately by pressing "E" and the desired Channel number "#" or "##" (for 25 channels).

NOTE

"E", "#" or "E", "##" (for 25 channels) **must be pressed within 5 seconds of entry or frequency will not be stored.**

Examples:

Radios with 10 channels

Press **1 1 7 E 0**
Frequency 117.975 MHz is stored as channel 0.

Press **1 1 9 7 5 E 1**
Frequency 119.750 MHz is stored as channel 1.

Press **1 3 8 E 2**
138.000 MHz as channel 2.

Radios with 25 channels

Press **1 1 7 E 0 0**
Frequency 117.975 MHz is stored as channel 00.

Press **1 1 9 7 5 E 0 1**
Frequency 119.750 MHz is stored as channel 01.

Press **1 3 8 E 0 2**
138.000 MHz as channel 02.

3.3.6 Recalling a Stored Channel (10 or 25 Channel Memories)

To recall the permanently stored emergency channel 121.500 MHz, press "E", "0".

Radios with 10 channels

Channel 1 frequency 119.750 MHz stored in the previous example will be displayed.

Example:
Press **R 1**

Radios with 25 channels

Channel 01 frequency 119.750 MHz stored in the previous example will be displayed.

Example:
Press **R 0 1**

3.3.7 Transmit Inhibit

To Inhibit the transmit function on a desired channel press "E","9" immediately followed by the channel "#" or "##" to be inhibited. Subsequent pressing of "E","9","#", or "E","9","##" will enable the transmit function.

NOTE

After inhibiting the transmit function, the Tx inhibited channel must be recalled from memory for this function to take effect.

Examples:

Press **R I** or Press **R 0 I** (for 25 channels)
 Channel 1 frequency 119.750 MHz stored in the previous example will be displayed.
 Press the PRESS TO TALK switch. Observe that the TX indicator LED lights.

Press **E 9 I** Press **R I** or
 Press **E 9 0 I** Press **R 0 I** (for 25 channels)
 Press the PRESS TO TALK switch. Observe that the TX indicator LED does not light.

Press **E 9 I** Press **R I** or
 Press **E 9 0 I** Press **R 0 I** (for 25 channels)
 Press the PRESS TO TALK switch. Observe that the TX indicator LED lights.

3.3.8 Toggling Between Two Channels

Press **R E** to recall previous channel.

Example:

Recall Channel 0 as described in para. 3.3.6 (Recalling a Stored Channel).
 117.975 will be displayed.

Recall Channel 2
 138.000 will be displayed.

Press **R E**
 117.975 will be displayed.

Press **R E**
 138.000 will be displayed.

3.3.9 Search Mode

In SEARCH MODE the receiver steps through each stored channel until a signal is found. The receiver will lock on to the first signal strong enough to quiet the squelch circuit. SEARCH mode is exited when a signal is found. Normal operation resumes as if the SEARCH frequency was selected from the keypad or recalled from memory.

Press **E** **4** to enter SEARCH mode.

Press **E** to exit SEARCH mode.

3.3.10 Scan Mode

In SCAN MODE the receiver steps through each stored channel until a signal is found. The receiver will lock on to the first signal strong enough to quiet the squelch circuit. When a signal is found, the frequency is displayed and the audio is enabled for as long as the squelch is held open by the RF signal. After the signal drops below the squelch threshold SCAN is resumed until the next frequency is found and the process is repeated. SCAN mode is continuous until the operator exits or the unit is switched off.

NOTE

PTT is inhibited during SCAN mode.
Pressing PTT once exits SCAN mode.
Pressing PTT twice is required to Key the Transmitter.

Press **E** **5** to enter SCAN mode.

Press PTT to Lock on SCANned Frequency or

Press **E** to exit SCAN.

3.4 FIXED CHANNEL FREQUENCY SET UP

The following procedure disables keypad entry of frequencies so that the operator will only be able to select stored channels for receive or transmit.

3.4.1 System Configuration

- (1) Configure channel frequencies as desired (Refer to Section 3.3.5).
- (2) Select channels for Rx only (transmit inhibit) operation (Refer to paragraph 3.3.7).

3.4.2 Transceiver Disassembly/Assembly and Jumper Installation

- (1) Refer to Paragraph 2.2.1 for Transceiver installation and removal procedures.
- (2) Remove and retain 12 flathead screws (1) and 3 Panhead screws (2) securing transceiver top cover (3) to chassis (4). Refer to Figure 3.3.
- (3) Position Jumper J6 on pin 1 and pin 2 to disable keyboard entry of frequency selection and lock operating configuration.
- (4) Position Jumper J6 on pin 2 and pin 3 to enable keypad frequency selection and unlock operating configuration.
- (5) Position Transceiver Cover (3) on Chassis (4). Ensure that cover holes are aligned with threaded inserts.
- (6) Position 12 flathead screws (1) and 3 Panhead screws (2) through cover (3) holes into chassis (4) threaded inserts. Tighten screws with fingers.
- (7) Tighten screws securing Transceiver Cover (3) to Chassis (4).
- (8) Refer to paragraph 2.2.1 for Transceiver installation and removal procedures.

3.4.3 Operational Check

- (1) Turn Unit On (Refer to paragraph 3.5).
- (2) Recall Channels "0" through "9" (Refer to paragraph 3.3.6). Ensure that the frequencies indicated for each channel displayed correspond to those selected.
- (3) Transmit on each channel. Observe that the TX Led (Refer to Figure 3.2, for location) does not light on channels selected to operate exclusively in receive mode.
- (4) Enter a valid frequency (within the frequency range of (117.975 MHz to 138 MHz) that differs from the frequency stored in channel "0".
- (5) Store the frequency in channel "0" (Refer to paragraph 3.3.5).
- (6) Recall Channel "0" frequency. Channel "0" frequency displayed shall be the same frequency entered before Locking the operating configuration (i.e.. different from the frequency entered in step 4).
- (7) Perform Steps 4 through 6 for each channel.

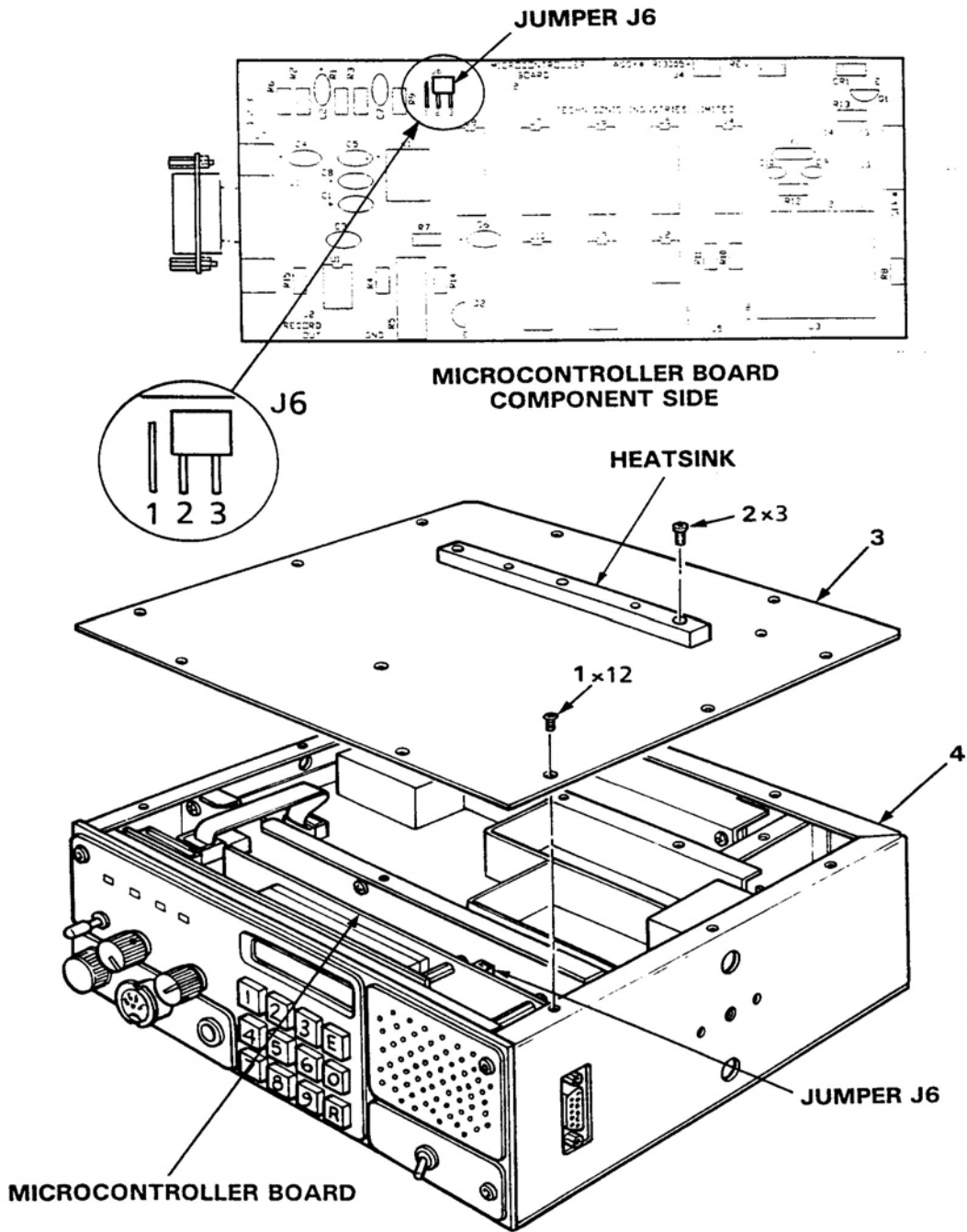


FIGURE 3.3 Fixed Channel Jumper Locations

3.5 GENERAL OPERATING INSTRUCTIONS

This section covers general operating procedures applicable to all base station configurations. Set Up and Operating details for specific transceivers can be found in the previous paragraphs.

3.5.1 Preparation for Use

To prepare the transceiver for use (Refer to Figures 1.2, 3.2 and Table 3.2).

- (1) Location for Transmit/Receive Operation.
The VHF frequency band is essentially line of site communication. When selecting an antenna location there should be no obstacles between the communicating radio sites. Objects greater than two metres will reflect the RF signal and foliage greatly attenuates signal strength.

WARNING

Do not make physical contact with antenna when transmitter is on.

- (2) Install Microphone in Microphone (PTT) connector.
- (3) Ensure that transceiver POWER ON/OFF switch is set to OFF.
- (4) Install AC line cord in AC chassis connector on rear panel and/or install External DC Cable in External DC chassis connector on rear panel as required.
- (5) Connect antenna connector to rear panel chassis BNC connector.
- (6) For Remote Operation Connect Land Line to DB-9 connector provided on rear of Base Station.

NOTE

91-DE Series Base Stations are capable of simultaneous local and remote operation. No switch is provided for exclusive remote or local mode operation.

Refer to previous section and appropriate Operating Instructions for remote use with a remote DC or tone controller. The following operating procedures are intended specifically for Local Operation.

- (7) Ensure that the microphone connector is connected to the MIC/PTT connector of the transceiver.
- (8) Set the SQUELCH control in the fully counter-clockwise (CCW) position.
- (9) Set the VOLUME control in the 12 o'clock centre position.
- (10) Set the POWER ON/OFF switch to "ON".
- (11) Verify that the FUSE BLOWN red LED is OFF.
- (12) Verify that the POWER ON green LED is ON.
- (13) Proceed to operate in the transmit mode, paragraph 3.5.3 or operate in the receive mode, paragraph 3.5.4 as required.

3.5.2 Transmitter Operation

To operate the transceiver in the transmit mode, proceed as follows:

- (1) Set RF POWER switch (if applicable) to desired operating level.
- (2) Hold the microphone in one hand, with the upper edge of the microphone as close as possible to the upper lip.

NOTE

This technique activates the noise cancelling feature of the microphone. The microphone is most effective when sound is ½ inch (12.7 mm) or more away from the microphone.

- (3) Press and hold the PRESS TO TALK switch of the microphone during transmission.
- (4) Ensure that the Tx ON amber LED is ON.
- (5) Speak slowly and distinctly into the microphone using specified operating procedures during transmission.
- (6) When message is ended, release the PRESS TO TALK switch of the microphone.
- (7) The transceiver is now operating in the receive mode.
- (8) Verify that the Tx ON amber LED is OFF.
- (9) Refer to previous paragraphs for Transceiver Operation and additional operating modes.

3.5.3 Receiver Operation

To operate the transceiver in the receive mode, proceed as follows:

- (1) Ensure that the PRESS TO TALK switch on the microphone is NOT depressed, and verify that the Tx ON amber LED is OFF.
- (2) Verify that the correct operating frequency is indicated on the front panel. Refer to section 3.3 for Channel/Frequency selection.
- (3) Adjust the SQUELCH control to suit local reception conditions. When the SQUELCH control is rotated in the counter-clockwise direction, the SQUELCH indicator green LED will switch to ON, indicating that the squelch circuit is connecting the demodulated audio output to the VOLUME control.

Further adjustment of the SQUELCH control determines the squelch setting.

IMPORTANT NOTE

The dual conversion receiver's squelch knob must be rotated significantly more clockwise (4 o'clock position) to obtain the same squelch setting (3uV) as a single conversion receiver's squelch knob set to the 12 o'clock (straight up) position.

If the dual conversion receiver's squelch knob is set to the 12 o'clock position, signals with a level greater than 0.5uV will open the squelch. At most airports this will not be an adequate level of squelch.

Recommended procedure:

The squelch taper on a dual conversion receiver looks as follows:

Squelch knob position	Squelch setting
12 o'clock	0.5uV
3 o'clock	1.2uV
3:30 position	2.5uV
4 o'clock	3uV
Fully clockwise	9uV

It is recommended that the squelch be set to at least 2.5uV (3:30 knob position) at busy airport locations. If ACARS signals are present on adjacent or nearby channels the squelch level should be at least 3uV (4 o'clock) to prevent ACARS bleed through.

- (4) The VOLUME control can then be adjusted in a clockwise direction to increase the audio level, or in a counter-clockwise direction to decrease the audio level which can be heard on the internal loudspeaker.

NOTE

When an external loudspeaker or headset is connected to the SPEAKER/PHONE jack of the transceiver, the internal loudspeaker is automatically disconnected. The VOLUME control will now control the audio level applied to the external loudspeaker or headset, as applicable.

- (5) Refer to previous paragraphs for transceiver specific operating modes.

3.5.4 Switching OFF

To switch off the transceiver:

- (1) Set the POWER ON/OFF on transceiver to switch to OFF.
- (2) Verify that all indicator LED's on the front panel are OFF.

NOTE

When the transceiver is switched OFF there is no current drain from external DC.

3.5.5 Battery Charging

- (1) Set AC ON/OFF switch to OFF.
- (2) Install External DC Power Cable P/N 863701-1 (Not Supplied) or equivalent to DC Connector on rear of Panel. Connect to batteries to be charged.
- (3) Set AC ON/OFF switch to ON.

3.5.6 External DC Operation

- (1) Set AC ON/OFF switch to OFF.
- (2) Install External DC Power Cable P/N 863701-1 (Not Supplied) or equivalent to DC Connector on rear of Panel. Connect to External DC Source.

NOTE

Ensure that the DC source voltage does not exceed 30 Vdc. The 15 watt and 25 watt units can operate within the range 21.6 Vdc to 30 Vdc. The Low Power units can operate within the range of 11.5 Vdc to 15 Vdc.

Technisonic Industries Limited
240 Traders Blvd., Mississauga, ON Canada L4Z 1W7
Tel: (905) 890-2113 Fax: (905) 890-5338

**IMPORTANT
WARRANTY**

All communication equipment manufactured by Technisonic Industries Limited is warranted to be free of defects in Material or Workmanship under normal use for a period of one year from Date of Purchase by the end user.

Warranty will only apply to equipment installed by a factory approved and/or authorized facility in accordance with Technisonic published installation instructions. Equipment falling under the following is not covered by warranty:

- equipment that has been repaired or altered in any way as to affect performance,
- equipment that has been subject to improper installation,
- equipment that has been used for purposes other than intended,
- equipment that has been involved in any accident, fire, flood, immersion or subject to any other abuse.

Expressly excluded from this warranty are changes or charges relating to the removal and re-installation of equipment from the aircraft. Technisonic will repair or replace (at Technisonic's discretion) any defective transceiver (or part thereof) found to be faulty during the Warranty Period.

Faulty equipment must be returned to Technisonic (or its authorized Warranty Depot) with transportation charges prepaid. Repaired (or replacement) equipment will be returned to the customer with collect freight charges. If the failure of a transceiver occurs within the first 30 days of service, Technisonic will return the repaired or replacement equipment prepaid.

Technisonic reserves the right to make changes in design, or additions to, or improvements in its products without obligation to install such additions and improvements in equipment previously manufactured. This Warranty is in lieu of any and all other warranties express or implied, including any warranty of merchantability or fitness, and of all other obligations or liabilities on the part of Technisonic.

This Warranty shall not be transferable or assignable to any other persons, firms or corporations.

**For warranty registration please complete the on-line
Warranty Registration Form found at www.til.ca.**