



# VHF/AM LOW COST BASE STATION

## Model TiL-91-DE

LOW POWER BASE STATION SYSTEM P/N 910807  
(TLC-150)



## Installation and Operating Instructions

TiL Document No. 92RE129  
Rev. F

JULY 2012

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### Technisonic Industries Limited

240 Traders Boulevard, Mississauga, Ontario L4Z 1W7  
Tel: (905) 890-2113 Fax: (905) 890-5338  
[www.til.ca](http://www.til.ca)

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**REVISION HISTORY**  
[ 92RE129 ]

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n/c		Original Document		
A				
B	Global	New Document Template (new file format) Title page changed, Headers/Footers added Added Revision page, Added Warranty page Remove reference of 90-6R from document.	FEB 2012	FM
C	4-6	The 10 channel (memories) will no longer be available on all 91-DE based radios, ONLY 25. Updated section 4.3	MAR 2012	FM
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E	Title Pg iii	Simplify System description Updated FCC information including antenna and FCC labeling instructions. Simplify description under "Warning"		
	Global 1-1	7 Watt (7W) changed to Low Power added NOTE: *Low Power description is found in Table 4.1 under Power Output.		
	4-2	Revise Transmitter Characteristics for FCC and ICAN information	JULY 2012	FM
F		Clarified 10/25 channel information	JULY 2012	SM



## **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 Low Cost Base Station, TLC-150 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



**TABLE OF CONTENTS**

SECTION	TITLE	PAGE
<b>SECTION 1 GENERAL DESCRIPTION</b>		
1.1	INTRODUCTION .....	1-1
1.2	DESCRIPTION .....	1-1
1.2.1	Transceiver - Model Til-91-DE .....	1-1
1.2.2	Power Supply Modules - Model SPG-010, P/N 911008-1 .....	1-1
1.2.3	Microphone P/N 861902 .....	1-2
1.2.4	Antenna .....	1-2
1.3	MODES OF OPERATION .....	1-2
1.3.1	Transmit/Receive Modes (Local Mode) .....	1-2
1.3.2	Local/Remote Operation .....	1-3
1.3.3	AC and DC Operation .....	1-3
1.4	TECHNICAL SUMMARY .....	1-3
<b>SECTION 2 PREPARATION FOR USE AND STORAGE</b>		
2.1	INTRODUCTION .....	2-1
2.2	DISASSEMBLY/ASSEMBLY .....	2-1
2.2.1	Remove/Replace Microphone .....	2-1
2.2.2	Remove/Replace Transceiver Unit .....	2-1
2.3	LOUDSPEAKER, HEADPHONE INSTALLATION .....	2-2
2.3.1	External Loudspeaker .....	2-2
2.3.2	Headset .....	2-2
2.4	OPERATIONAL CHECK .....	2-2
2.5	STORAGE .....	2-2
<b>SECTION 3 GENERAL OPERATING INSTRUCTIONS</b>		
3.1	INTRODUCTION .....	3-1
3.2	PREPARATION FOR USE .....	3-1
3.3	TRANSMITTER OPERATION .....	3-2
3.4	RECEIVER OPERATION .....	3-3
3.5	SWITCHING OFF .....	3-3
3.6	BATTERY CHARGING .....	3-4
<b>SECTION 4 TRANSCEIVER SET UP and OPERATING INSTRUCTIONS</b>		
4.1	INTRODUCTION .....	4-1
4.1.1	Transceiver Model Til-91-DE P/N 901006-2 .....	4-1
4.1.2	Scan Search and Toggle Modes .....	4-1
4.1.3	Technical Summary .....	4-1
4.2	OPERATOR'S SWITCHES, CONTROLS AND INDICATORS .....	4-1
4.3	FRONT PANEL KEYPAD OPERATION (10 or 25 channel memories) .....	4-6
4.3.1	Keypad "Beeps" .....	4-7
4.3.2	Keypad and LCD Display Lighting .....	4-7
4.3.3	Transmitter Time-out .....	4-7
4.3.4	Selecting a Frequency .....	4-8
4.3.5	Storing a Frequency to a Channel .....	4-9
4.3.6	Recalling a Stored Channel .....	4-9
4.3.7	Transmit Inhibit .....	4-10
4.3.8	Toggling Between Two Channels .....	4-10
4.3.9	Search Mode .....	4-11
4.3.10	Scan Mode .....	4-11

SECTION	TITLE	PAGE
SECTION 4 – (continued)		
4.4	FIXED CHANNEL FREQUENCY SET UP .....	4-13
4.4.1	System Configuration .....	4-13
4.4.2	Transceiver Disassembly/Assembly .....	4-13
4.4.3	Operational Check .....	4-13
WARRANTY .....		

**LIST OF FIGURES**

FIGURE	TITLE	PAGE
4.1	91-DE Low Cost Base Station Front Panel Layout .....	4-3
4.2	91-DE Low Cost Base Station Rear Panel Layout .....	4-3
4.3	Fixed Channel jumper Locations .....	4-12

**LIST OF TABLES**

TABLE	TITLE	PAGE
1.1	Base Station Configurations .....	1-1
1.2	Remote Control Connector Signals .....	1-3
4.1	Model Til-91-DE Transceiver Leading Particulars .....	4-2
4.2	Operators Switches, Controls and Indicators .....	4-4
4.3	Channel/Function Selector Keypad .....	4-6



## **SECTION 1 - GENERAL DESCRIPTION**

### **1.1 INTRODUCTION**

This publication provides general information on the VHF/AM Low Cost Base Station System Nos. 910807 (TLC-150) manufactured by Technisonic Industries Limited. Specific information on the VHF/AM Transceiver Model TiL-91-DE can be found in Section 4 of this document.

These Low Power 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 base station operation in an air traffic environment. These systems can operate from AC power or external DC battery power.

### **1.2 DESCRIPTION**

The base station system consists of a Model 91-DE Transceiver, Model SPG-010 Power Supply/Battery Charger and a Microphone. Refer to Table 1.1 for system configuration details.

<b>TABLE 1.1 BASE STATION CONFIGURATIONS</b>			
<b>System</b>	<b>Transceiver</b>	<b>Microphone</b>	<b>Power Supply</b>
91-DE, Low Power Low Cost Base Station System No. 920607 (TLC-150)	Model 91-DE P/N 901006-2	P/N 861902-1	SPG-010 P/N 911008-1

NOTE: \*Low Power description is found in Table 4.1 under Power Output.

#### **1.2.1 Transceivers - Model TiL-91-DE**

The basic model of either transceiver is provided for the Low Power Base Stations. An optional 9-pin "D" connector (Option 2) is available on each transceiver to facilitate remote operation. Refer to Section 4 for specific details on the Transceiver Model unique to the System indicated on the Front Cover of this document.

##### **Transceiver Model TiL-91-DE, Part Number 901006-2**

Transceiver Model TiL-91-DE, Part Number 901006-2, is a microprocessor controlled VHF/AM Low Power 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. 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).

#### **1.2.2 Power Supply/Battery Charger - Model SPG-010, P/N 911008-1**

The Model SPG-010 converts 120 VAC to provide the 13.7 VDC supply voltage to the Transceiver and houses a battery charger which can provide trickle charging to external rechargeable batteries, if connected to the terminal block on the rear of the unit. When external batteries are connected the unit will automatically revert to DC operation if the AC main power fails. A 220VAC version of the SPG-010 can be specially ordered.

### 1.2.3 Microphone P/N 861902-1

Microphone Assembly Part Number 861902-1, Series 1, 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 pre-amplifier, 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 dc supply for the microphone is supplied by the transceiver. The microphone bracket can be mounted on the left or right side of the SPG-010 Power Supply/Battery Charger as required.

### 1.2.4 Antenna

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

## 1.3 MODES OF OPERATION

Refer to Section 4 for additional operating modes.

### 1.3.1 Transmit/Receive

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 4 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. Reception of the frequency displayed on the transceiver will occur.

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 (Option 2 required)

The Low Cost Base Station can only be operated in the Remote mode if the transceiver is ordered with a remote 9-pin connector (extra cost option) which is located on the side of the transceiver chassis.

Base Stations which employ the Model TiL 91-DE transceiver operate in local and remote modes simultaneously. Older units employ a front panel switch for local or remote selection.

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 signals and others are available on the 9-pin "D" connector. See Table 1.2 for remote connector signal details.

#### NOTE

**In the 91-DE the audio and PTT signals are connected in parallel. This allows the PTT and TX audio to be functional on the 9 pin connector as well as on the microphone connector. The RX audio is routed to the internal speaker via the volume control and to the 9-pin connector at a constant level.**

TABLE 1.2 REMOTE CONTROL CONNECTOR SIGNALS	
PIN NO	91-DE 9 pin Connector Signals
2	Remote RX Audio Signal (100 Ω)
6	Squelch
3	Remote Recorder Signal (100 Ω)
9	+5 Vdc
4	Microphone - TX Audio (220 Ω)
5	Remote PTT
1	Ground
7	Clock Out
8	Strobe Out

### 1.3.3 AC and DC Operation

The unit can be operated by external 120 VAC or external 13.7 VDC battery power.

1. **AC OPERATION** - During AC operation, the unit can trickle charge external batteries via the +/- Battery connections located on the terminal block mounted on the rear of the SPG-010 Power Supply. The external battery ON/OFF switch must be in the ON position for these functions to occur when an external battery is connected. A 220Vac version of the SPG-010 can be specially ordered.

**DC OPERATION** - The transceiver unit can be operated from an external DC battery supply within the range of 11.5 Vdc to 15.0 Vdc. A DC connector is mounted on the rear of the 91-DE which mates with DC Power Cable P/N 863701-1 (Supplied). Spade connectors are provided on the other end of this cable to mate with the DC +/- output connections on the terminal block of the SPG-010. A 12 Volt Battery Back-up Kit (7.2 AH), P/N 989979-2 is available. See section 3.6 of this document for details.

## 1.4 TECHNICAL SUMMARY

A summary of electrical, operational, mechanical and physical characteristics of the Base Station are provided in Tables 4.1.

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## **SECTION 2 – PREPARATION FOR USE AND STORAGE**

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### **2.1 INTRODUCTION**

This section provides the information required for use and storage of the low cost base station. Refer to Section 4 for Channel/Frequency configuration.

### **2.2 DISASSEMBLY/ASSEMBLY**

#### **2.2.1 Remove/Replace Microphone**

##### **REMOVAL**

- (1) Disconnect microphone from front panel of transceiver. Slide microphone clear of bracket.
- (2) Remove and Retain two screws securing microphone bracket to the side of the SPG-010 Power Supply/Battery Charger.

##### **REPLACEMENT**

- (1) Secure microphone bracket to left or right side of the SPG-010 Power Supply/Battery Charger as required, with two screws and two washers.
- (2) Connect microphone to front panel connector on transceiver. Slide microphone onto bracket.

#### **2.2.2 Remove/Replace Transceiver Unit**

##### **REMOVAL**

- (1) Disconnect the DC cable and RF antenna cable from the appropriate connectors located at the rear of the transceiver.
- (2) Remove and retain the two wing screw and nylon washers securing the transceiver to the "U" shaped mounting bracket located on the SPG-010 chassis.
- (3) Slide the transceiver upward to clear the "U" shaped mounting bracket.

##### **REPLACEMENT**

- (1) Slide the transceiver downward into the mounting bracket, aligning the mounting bracket holes with the threaded transceiver mounting holes.
- (2) Screw transceiver to the mounting bracket using the two wing screws and nylon washers included in Mounting Hardware kit, Part Number 869024-1.
- (3) Adjust angle of transceiver on nylon clutches as required, before tightening the two wing screws.

## 2.3 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 4.1.

### 2.3.1 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.

### 2.3.2 Headset

Headset impedance should be 150 to 600 ohms. The headset cable must terminate in a 1/4 in., 3 pole phone 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).

## 2.4 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.

## 2.5 STORAGE

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

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## **SECTION 3 – GENERAL OPERATING INSTRUCTIONS**

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### **3.1 INTRODUCTION**

This section covers general operating procedures applicable to all base station configurations. Set Up and Operating details for specific transceiver Models can be found in Section 4.

### **3.2 PREPARATION FOR USE**

To prepare the transceiver for use (Refer to Figures 4.1, 4.2 and Table 4.2).

- (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 meters 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 and the SPG-010 Power supply, AC and External Battery ON/OFF switches are set to OFF.
- (4) Install AC line cord in AC chassis connector on rear panel of the SPG-010 Power Supply/Charger. Hook up External Battery to appropriate connector on rear panel of the SPG-010 Power Supply if required.
- (5) Connect antenna connector to rear of transceiver chassis UHF connector.
- (6) Connect 9-pin connector for Remote Operation (91-DE Transceiver with 9-pin connector ONLY).
  - (a) For Remote Operation Connect appropriate wires to the 9 pin connector provided on the side of the transceiver. Note: Unit will operate locally and remotely in parallel.

#### **NOTE**

**Refer to Paragraph 1.3.2 of this document for remote operation details.**

#### **NOTE**

**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 AC POWER, External Battery (if connected) and transceiver ON/OFF switch to "ON".
- (11) Verify that the FUSE BLOWN red LED on the transceiver is OFF.
- (12) Verify that the POWER ON green LED on both the transceiver and Power Supply are ON.
- (13) Proceed to operate in the transmit mode, paragraph 3.3 or operate in the receive mode, paragraph 3.4 as required.

### 3.3 TRANSMITTER OPERATION

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

- (1) To operate the transceiver in the transmit mode, proceed as follows:

#### NOTE

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

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



### 3.4 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 4 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.
- (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 Section 4 for transceiver specific operating modes.

### 3.5 SWITCHING OFF

To switch off the Low Cost Base Station:

- (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.
- (3) Set the External Battery ON/OFF switch on the SPG-010 Power Supply to OFF.
- (4) Set the AC ON/OFF Power Switch on the SPG-010 Power Supply/Battery Charger to the OFF position.

### 3.6 BATTERY CHARGING

- (1) Set AC ON/OFF switch to OFF.
- (2) Set External Battery ON/OFF switch to OFF.
- (3) Connect the batteries to be charged, to the appropriate terminals located on the rear of the SPG-010 Power Supply/Charger.
- (4) Set AC ON/OFF switch to ON.
- (5) Set External Battery ON/OFF switch to ON.

The following battery back up kit is available for use with the TLC-150 base station:

**P/N 989979-2**  
**12 Volt Battery Back-up Kit (7.2 AH)**

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 027330-1, 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.

## **SECTION 4 – OPERATING INSTRUCTIONS**

### **4.1 INTRODUCTION**

#### **4.1.1 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. The current operating frequency is displayed on a backlit liquid crystal display (LCD).

#### **4.1.2 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 transceiver operates 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.

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.

#### **4.1.3 TECHNICAL SUMMARY**

A summary of electrical, operational, mechanical and physical characteristics of the transceiver, is provided in Table 4.1.

### **4.2 OPERATOR'S SWITCHES, CONTROLS AND INDICATORS**

A view of the front and rear panels of the Low Cost Base Station is given in Figure 4.1 and Figure 4.2. A functional description of each of the operator's switches, controls and indicators, and the microphone PRESS-TO-TALK switch, is given in Table 4.2, Operator's Switches, Controls and Indicators and in Table 4.3, Channel/Function Selector Keypad.

**TABLE 4.1 MODEL TiL-91-DE TRANSCEIVER LEADING PARTICULARS**

**GENERAL:**

**Dimensions & Weight:**

Width .....	216 mm (8.5 in) MAX
Height .....	70 mm (2.75 in) MAX
Depth .....	260 mm (10.25 in) MAX
Weight .....	1.8 Kg (3 lb 15 oz) MAX

**TRANSMITTER:**

*Power Output (FCC) .....	10 Watts MAX
*Power Output (ICAN) .....	8 Watts MAX
Audio Input .....	0.05 Vrms to 2.0 Vrms
Speech Processor Dynamic Range .....	35 dB
Modulation .....	95% MAX
Audio Distortion @ 90% modulation .....	10% 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 .....	50 $\Omega$ , VSWR 2:1 MAX
Sensitivity (12 dB SINAD) @ 1 kHz 30% Mod .....	1.5 $\mu$ volts
Selectivity, 25 kHz Channel Spacing:	
6 dB Bandwidth .....	Greater Than 15 kHz
80 dB Bandwidth .....	Less Than 50 kHz
Adjacent Channel Selectivity .....	Greater Than 80 dB
Spurious Response Attenuation .....	Greater than 90 dB
Frequency Stability (-40°C to +55°C) .....	$\pm$ 1,000 Hz MAX
RF AGC (5 $\mu$ volts to 1 volt) .....	Audio Level 3 dB

**Intermodulation:**

Ultimate Sensitivity .....	70 dB
30 $\mu$ volts .....	45 dB
300 $\mu$ volts .....	30 dB
Unwanted Radiation .....	Less than 80 $\mu$ volts into 50 $\Omega$
Hum & Noise @ 1mV RF 30% MOD .....	40 dB
Loudspeaker Output .....	3 W MAX
Phone Output .....	100 mW into 600 $\Omega$
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 .....	Noise and Carrier Operated
Carrier Operated Squelch .....	Adjustable 2 to 15 $\mu$ volts

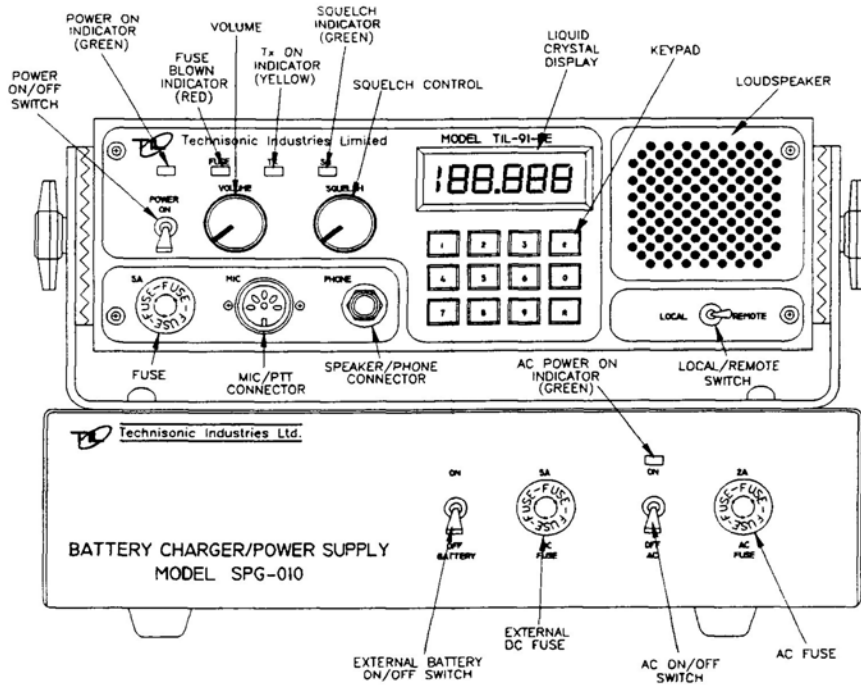


Figure 4.1 TIL-91-DE Low Cost Base Station Front Panel Layout

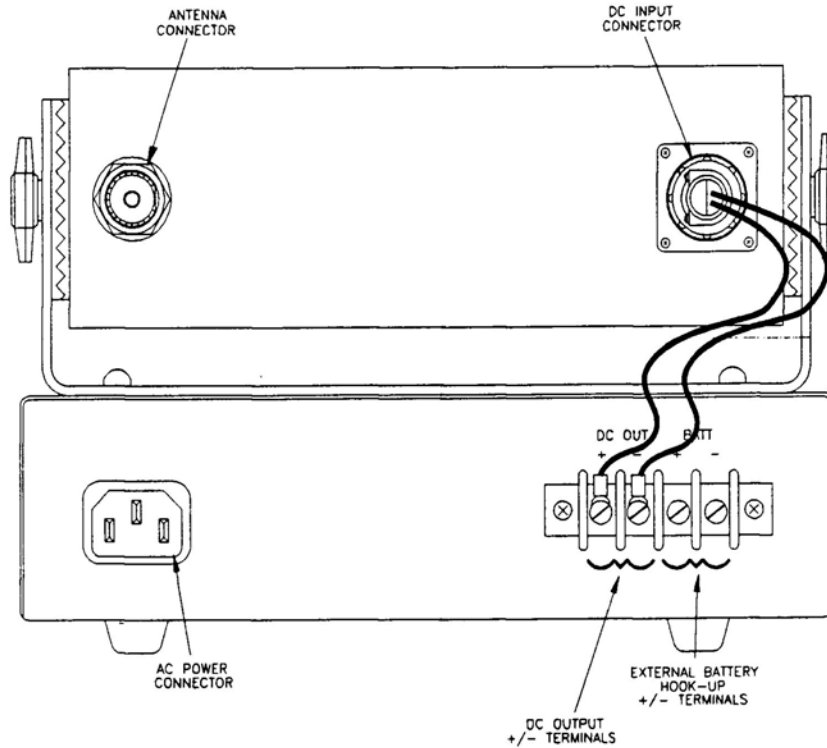


Figure 4.2 TIL-91-DE Low Cost Base Station Rear Panel Layout

**TABLE 4.2 OPERATORS SWITCHES, CONTROLS AND INDICATORS**

	<b>SWITCHES CONTROLS &amp; INDICATORS</b>	<b>FUNCTIONAL DESCRIPTION</b>
1	POWER ON/OFF SWITCH	A toggle switch applies the 13.7 volts nominal power supply to the transceiver. The transceiver is switched to ON in the toggle UP position and 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 13.7 volts dc nominal power supply line.
4	FUSE BLOWN RED LED INDICATOR	A RED LED indicates when the 5 Amp fuse is blown, and External DC Battery 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 GREEN LED	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.
11	LOCAL/REMOTE SWITCH	Selects Local or Remote operation (Refer paragraph 2.3) for remote set up details.
12	KEYPAD	Performs Chan/Freq and Special Feature Selection (Refer Table 4.3).

<b>TABLE 4.2 OPERATORS SWITCHES, CONTROLS AND INDICATORS (Continued)</b>		
	<b>SWITCHES CONTROLS &amp; INDICATORS</b>	<b>FUNCTIONAL DESCRIPTION</b>
13	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.
14	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.
15	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.
16	AC ON/OFF SWITCH	A single pole switch applies external AC power to the Model SPG-010 Power Supply/Battery Charger.
17	AC POWER ON LED INDICATOR	A GREEN LED indicates when AC power is applied to the SPG-010 and the AC POWER SWITCH is set to ON. It also indicates that the SPG-010 Power Supply is functioning.
18	AC FUSE	A 2.5 Amp fuse protects the SPG-010 Power Supply from internal short circuit or transceiver short circuit.
19	EXTERNAL DC FUSE	A 5 Amp fuse protects the 13.7 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.
20	External Battery ON/OFF Switch	A toggle switch allows external batteries (when connected) to be switched in or out of the circuit. Switch should be in the ON position to trickle charge external batteries when connected. DC Battery power will be automatically selected should AC power fail. Switch should be in OFF position if external batteries are not connected or if transceiver is operating with batteries that are deeply discharged or that have a defective cell.
21	*AC POWER CONNECTOR	3 Prong AC Connector for use with AC Power Cord P/N 927002-1.
22	**REMOTE CONNECTOR	9 Pin "D" type connector (Optional) provides signals to facilitate remote operation. Refer to Table 1.2 for connector details.
23	*TERMINAL BIK	Terminal Block with DC output and external battery, +/- connections.
24	*EXTERNAL DC CONNECTOR	Transceiver chassis mounted connector provides for Connection to SPG-010 DC output terminal block. Mating DC connector included.
<p>* Denotes items located on rear panel. ** Item not shown, located on side of the transceiver chassis, if ordered.</p>		

### 4.3 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 3.2 provides a Quick Reference of the CHANNEL/FUNCTION SELECTOR KEYPAD Functions.

<b>TABLE 4.3 CHANNEL/FUNCTION SELECTOR KEYPAD</b>	
<b>KEYPAD</b>	<b>FUNCTIONAL DESCRIPTION</b>
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>	



#### 4.3.1 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".

#### 4.3.2 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.

#### 4.3.3 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.

#### 4.3.4 Selecting a Frequency

To select a frequency, press the keypad digits in the sequence indicated (Refer to Fig 4.2 Base Station Front and Rear Panel Layout, and Table 4.2 Operators Switches Controls and Indicators).

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 automatically fills 975 in remaining digits.**

**Entry of 138 MHz automatically 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 4.3.5 (Storing a Frequency to a Channel).

#### 4.3.5 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 4.3.4 (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.

#### 4.3.6 Recalling a Stored Channel (10 or 25 Channel Memories)

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

Example:

##### 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**

#### 4.3.7 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.

#### 4.3.8 Toggling Between Two Channels

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

Example:

Recall Channel 0 as described in para. 4.3.6 (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.

#### 4.3.9 Search Mode

In SEARCH MODE the receiver steps through each stored channel until a transmitted 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.

#### 4.3.10 Scan Mode

In SCAN MODE the receiver steps through each stored channel until a transmitted 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.

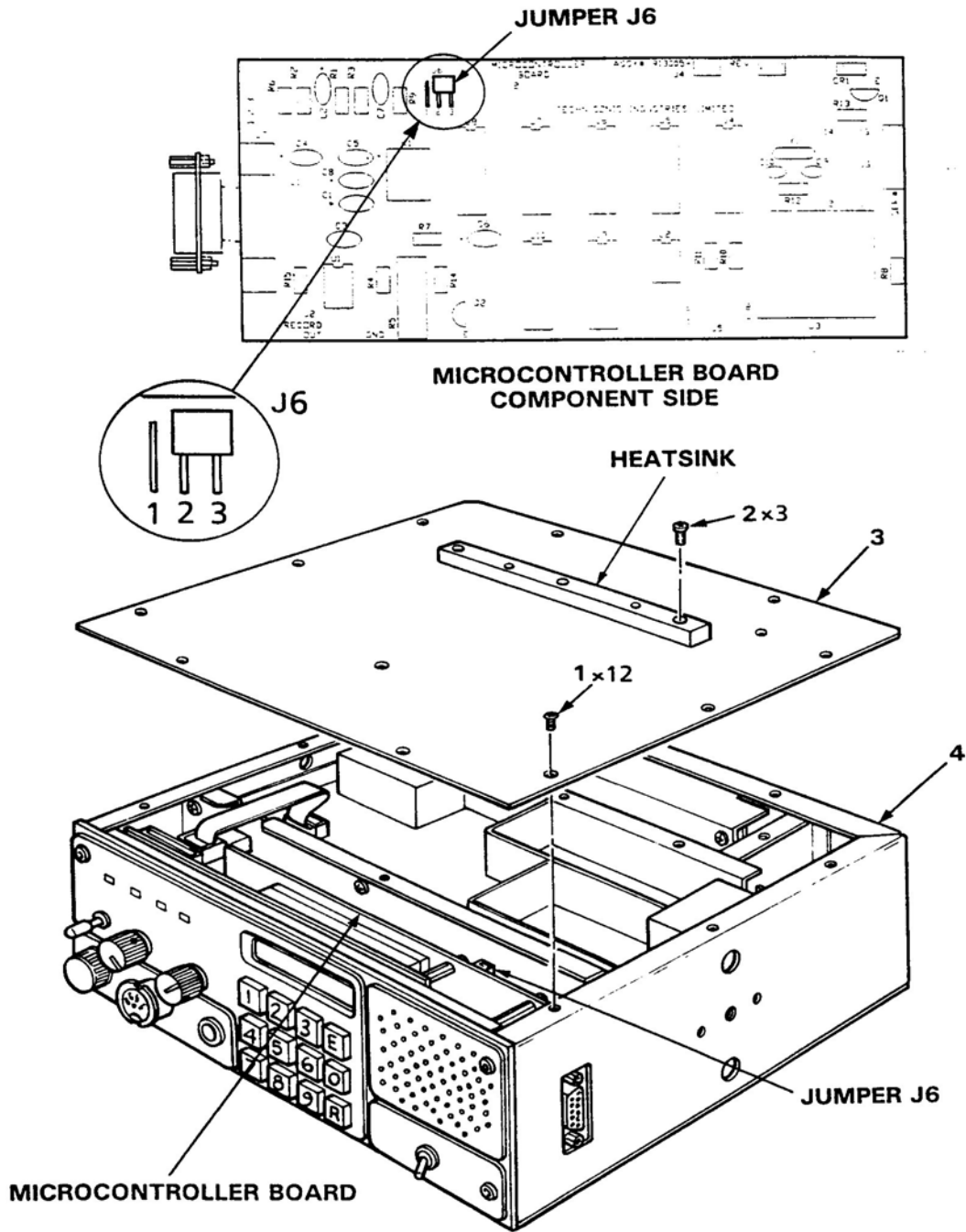


Figure 4.3 Fixed Channel Jumper Locations

## 4.4 CHANNEL FREQUENCY SELECTION

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

### 4.4.1 System Configuration

- (1) Configure channel frequencies as desired (Refer to Section 4.3.5).
- (2) Select channels for Rx only (transmit inhibit) operation (Refer to paragraph 4.3.7).

### 4.4.2 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 4.3.
- (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.

### 4.4.3 Operational Check

- (1) Turn Unit On (Refer to paragraph 3.2).
- (2) Recall Channels "0" through "9" (Refer to paragraph 4.3.6). 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 4.2, 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 4.3.5).
- (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.

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**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](http://www.til.ca).**

