



VHF/AM SINGLE CHANNEL TRANSCEIVER Model TiL-92-SC (TSC-4100/4200/4300)

25 WATT TRANSCEIVER P/N 921018-1 (TSC-4100)
15 WATT TRANSCEIVER P/N 921018-2 (TSC-4200)
LOW POWER TRANSCEIVER P/N 921018-3 (TSC-4300)



Installation and Operating Instructions

TiL Document No. 92RE125
Rev. L

AUGUST 2012

Technisonic Industries Limited

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[92RE125]

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G	2-11 2-13	R6 functional description revised, formerly incorrect. R6 description revised, formerly incorrect.	JUN 23/2000	RR
H	1-1,2 2-9 2-12 3-6	Changes to description in para. 1.2 To include information on new dual conversion receiver. Note at bottom of page regarding 2-wire only capability of RJ-11. Correct R22 - CW rotation direction will decrease level. Changes to para.3.4.2 regarding squelch knob adjustment for dual conversion receiver.	SEP 19/2002	RR
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	2-12,13	Updated Fig 2.3,2.4	JAN 2012	FM
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	2-10, 2-12	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 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 Rack Mounted Single Channel Transceiver, Model 92-SC series is under warranty for one year from date of purchase. Failed units caused by defective parts, or workmanship should be returned to:

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SECTION 1 - GENERAL DESCRIPTION

1.1 INTRODUCTION

This publication provides general information on the VHF/AM Single Channel Transceivers, Model TiL-92-SC, Part Nos. 921018-1, 921018-2, and 921018-3 manufactured by Technisonic Industries Limited. These units are also referred to by Item No.'s TSC-4100, TSC-4200 and TSC-4300 respectively. This document covers the configuration of this equipment that utilizes either of the following remote control cards; P/N 923051-1 (standard) or P/N 943180-1 (supplied upon request). These cards allow the transceiver to be remotely controlled over 600 ohm dedicated lines using a variety of keying methods.

The Model TiL-92-SC Transceivers are simplex, single channel, fixed frequency transceivers operating over the frequency range of 117.975 MHz to 138.000 MHz. These units are intended for base station operation in an air traffic environment. These systems can operate from AC power or external DC power in local and remote operating modes.

1.2 DESCRIPTION

The three rack mounted transceiver configurations are based on the Model 90-6R pre-programmable transceiver configured for Low power, 15 Watt or 25 Watt operation. All systems can be configured for 2 Wire and 4 Wire remote operation with a variety of remote keying methods (with 923051-1 standard card). Each configuration consists of a Power Supply Module, Mother Board, and a Remote Control Board. The 15 Watt and 25 Watt configurations also consist of an RF Amplifier Module.

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.

An optional RF Crystal Filter which provides higher receiver selectivity is available. These filters can be ordered to provide either an additional 20 dB (4 dB loss sensitivity) or 40 dB (7 dB loss) of selectivity. An RF Isolator which provides unidirectional coupling to the antenna in multiple transmitter configurations is now standard. Refer to Table 1.1 for system configuration details.

TABLE 1.1 TSC-4100/4200/4300 CONFIGURATIONS				
System	Motherboard w/ 25 pin connector	AC Power supply module	RF Amplifier	Remote Control Cards
TSC-4300	923056-2	922079-1	Not required	P/N 923051-1 or P/N 943180-1 (upon request)
TSC-4200	923056-2	922083-1	Model PA-15	
TSC-4100	923056-2	922083-1	Model PA-25	

1.2.1 Transceiver Module

The Single Channel Transceiver is based on Transceiver Model 90-6R. The transceiver module is a low power VHF/AM transceiver which can transmit or receive on independent, pre-programmable synthesized frequencies, with 25 kHz channel spacing in the frequency range 117.975 MHz to 138.000 MHz. The single-channel memory-set board, module A5A1 is mounted external to the 90-6R transceiver module to facilitate ease of frequency programming. Refer to above paragraph for details on new dual conversion receiver/transmitter A1 module.

1.2.2 Power Supply Modules - P/N's 922079-1, 922083-1

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. P/N 922079-1 is for use in the Low power configurations, P/N 922083-1 is for use in the 15 Watt configurations and the 25 Watt configurations.

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

The RF Amplifier modules provide 15 Watt (Model PA-15) or 25 Watt (Model PA-25) power output. The RF Amplifiers are fed by the Low power RF output from the transceiver module. An internal mounted RF Relay bypasses the RF Amplifier when in receive mode.

1.2.4 Mother Board, p/n 923056-2

Mother Board, p/n 923056-2 is supplied with the two available remote control cards and supports both a 25 pin "D" and 9-pin Positronics remote connectors on the back of the transceiver chassis. A RJ11 style connector is also provided which supports only 2-wire audio signals. The Mother Board provides all interconnection between the three external remote control connectors, RF Amplifier Module, Power Supply, Remote Control Board, and Transceiver. The Remote Control Boards, RF Isolator and all internal fuses are mounted on the Mother Board.

1.2.5 Remote Control Boards

1. Line Interface Board P/N 923051-1

This board provides remote control transceiver operation on 2-wire or 4-wire 600 ohm lines. The 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).

2. Line Interface Board P/N 943180-1

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.

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 92-SC has installed the Configuration label on the side of the rack mount chassis should be consulted.

1.2.6 Crystal Filter Board Assembly P/N 923069-1 (Option 1)

The Crystal Filter is a 25 kHz bandpass filter which provides additional selectivity during receive operation. The filter provides 5 dB (MAX) attenuation of RF signals ± 7.5 kHz from the receive frequency and 20 dB (MIN) attenuation of RF signals ± 50.0 kHz from the receive carrier frequency. Loss in sensitivity is about 4 dB. A higher 40dB attenuation crystal filter can also be ordered. Loss in sensitivity is about 7 dB. All crystal filters are cut to the required frequency and require 6-8 weeks lead time. This item is interchangeable in the field. Refer to Paragraph 2.2.5 for replacement instructions. If no crystal filter option is ordered, jumper board assembly P/N 923074-1 is installed.

1.2.7 RF Isolator

The RF Isolator is a broadband (118 MHz - 138 MHz) RF directional coupler. The RF Isolator provides 20 dB of isolation between the antenna and RF Amplifier while providing 0.7 dB (Max.) insertion loss. The RF isolator is located on the motherboard and is now provided in all 92-SC equipment.

1.3 MODES OF OPERATION

1.3.1 Local/Remote Operation

NOTE: Local operation is not disabled when operating in Remote mode and Remote operation is not disabled when operating in Local mode. The two operating modes operate in parallel.

1. **LOCAL OPERATION** - In local operation, voice audio, and keying (PTT) functions are routed from the microphone (not supplied) to the transceiver. Receive audio is routed to the internal loudspeaker and phone jack located on the front panel.
2. **REMOTE OPERATION** - In Remote operation, transmit audio, keying (PTT), and receive audio functions are routed over land lines to the 600 ohm remote inputs. Internal jumpers can be set for \pm DC, ground, or tone transmitter keying, and to provide a DC squelch signal and RF Output Power signal depending on the remote control board installed. Receive audio is routed to the internal loudspeaker and is adjustable by the volume control. Transmit audio is also routed to the internal loudspeaker at an internally adjustable preset level (see conference audio).

1.3.1.1 Conference Audio (Optional)

NOTE: This feature is only provided upon special order. The component (R7) discussed below is left unpopulated on standard configuration radios.

Conference Audio provides the operator with Tx voice on the transceiver speaker when the transmitter is remotely keyed from another location. The audio level of the transmit audio is internally adjustable from 0.0W to 0.5W of audio output. The adjustment is performed via rotation of the potentiometer R7 (see Figure 2.5 for location), which is accessible from the top of the transceiver after removing the top dust cover of the unit.

NOTE: The transmit audio level can be increased by rotating potentiometer R7 clockwise and decreased by counter clockwise rotation. If further adjustment of conference audio is required, the top cover of the transceiver module must be removed to gain access to potentiometer R63, located on the Audio Interface Module, A3 (see Figure 2.5 for location).

1.3.2 AC and DC Operation

The unit can be operated by external 120 VAC or external 28 VDC (13.7 VDC for Low power configurations). The AC power supply can also be set to allow operation on 240 VAC.

1. **AC OPERATION** - During AC operation, the unit can charge and trickle charge external batteries via the external connectors mounted on the rear panel of the unit. Refer to section 3 for remote connector pin details regarding DC operation.

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.

1.4 TECHNICAL SUMMARY

A summary of electrical, operational, mechanical and physical characteristics of the Single Channel Transceivers are provided in Tables 1.2.

TABLE 1.2 MODEL 92-SC LEADING PARTICULARS

POWER REQUIREMENTS:

*Low Power Transceiver	
AC Input Voltage/Current	100 to 132 VAC @ 1.0 Amp
DC Input Voltage/Current	11.5 VDC to 15 VDC @ 3.5 Amp
15 Watt Transceiver	
AC Input Voltage/Current	100 to 132 VAC @ 1.5 Amp
DC Input Voltage/Current	21.6 VDC to 30 VDC @ 4.0 Amp
25 Watt Transceiver	
AC Input Voltage/Current	100 to 132 VAC @ 2.0 Amp
DC Input Voltage/Current	21.6 VDC to 30 VDC @ 7.5 Amp

POWER OUTPUT:

*Power Output (FCC)	10 Watts MAX
*Power Output (ICAN)	8 Watts MAX
15 Watt Transceiver	15 Watts MAX
25 Watt Transceiver	25 Watts MAX

Microphone Compression Range	35 dB
Battery Charger Voltage & Current	27.5 Vdc, 3.5 Amps MAX

REMOTE CONTROL BOARD, P/N 923051-1 specifications:

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	2175 Hz, standard
Tx Tone Input Level	0 to -40 dBm
Tx Tone Control Response Time	<12 milliseconds
DC Keying	\pm 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	RF ON=Ground, RF OFF=Open Circuit
AGC Signal Output	Linear 0 to +6 Vdc

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	483 mm (19.0 in) MAX
Height	89 mm (3.5 in) MAX
Depth	432 mm (17.0 in) MAX
Weight	6.3 Kg (14 lbs) MAX

TABLE 1.2 92-SC LEADING PARTICULARS (Continued)

TRANSCEIVER MODULE

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	5-10 Watts
Audio Input	0.05 Vrms to 2.0 Vrms
Speech Processor Dynamic Range	35 dB
Modulation	95% MAX
Audio Distortion @ 90% mod (Low Power)	10% MAX
Audio Distortion @ 90% mod (with Linear Amplifier at High Power)	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	50 Ω , VSWR 2:1 MAX
Sensitivity (12 dB SINAD) @ 1 KHz 30% Mod	1.5 μ volts

Selectivity, 25 KHz Channel Spacing:

6 dB Bandwidth	Greater Than 14 KHz
80 dB Bandwidth	Less Than 50 KHz

Adjacent Channel Selectivity	Greater Than 85 dB
Spurious Response Attenuation	Greater than 95 dB
Frequency Stability (-40°C to +55°C)	\pm 1,000 Hz MAX
RF AGC (5 μ volts to 1 volt)	Audio Level change of less than 3 dB

Intermodulation:

Ultimate Sensitivity	70 dB
30 μ volts	45 dB
300 μ volts	30 dB

Unwanted Radiation	Less than 80 μ volts into 50 Ω
Hum & Noise @ 1mV RF 30% MOD	40 dB

Loudspeaker Output	3 W MAX
Phone Output	100 mW into 600 Ω
Audio Distortion 1mV RF Input, 30% MOD	3% MAX
Audio Distortion 1mV RF Input, 90% MOD	5% 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 50 msec

Audio Squelch Characteristics:

Squelch Type	Noise and Carrier Operated
Carrier Operated Squelch	Adjustable 2 to 15 μ volts

SECTION 2 – PREPARATION FOR USE AND STORAGE

2.1 INTRODUCTION

This section provides the information required for custom configuration and storage of the Single Channel Transceiver. Custom system configuration includes customizing remote control board functions, and Transmit/Receive frequency selection.

CAUTION: Antenna must be connected to transceiver before transmitting or permanent damage to the output stage may occur.

2.2 DISASSEMBLY/ASSEMBLY (Refer to Figure 2.1)

2.2.1 Remove/Replace Top Dust Cover Assembly

REMOVAL

- (1) Remove and retain twelve screws securing top dust cover to the 19" rack chassis.
- (2) Please note the location of the three longer screws which travel through the heatsink shims riveted to the inside of the top cover.
- (3) Lift cover clear of chassis to expose internal view of transceiver as shown in Figure 2.1.

REPLACEMENT

- (1) Position top cover on chassis.
- (2) Position one screw in each corner of the top cover mounting holes. Place the three longer screws into their correct holes located over the internal transceiver module.
- (3) Secure cover to chassis with remaining screws.

2.2.2 Remove/Replace Transceiver Module

REMOVAL

- (1) Remove dust cover as described in paragraph 2.2.1.
- (2) Disconnect RF and DC connectors from rear of transceiver module.
- (3) Remove and retain the screws securing the top cover of the internal transceiver module.
- (4) Remove and retain two screws and two washers securing flat cable to the side of the transceiver module and disconnect the flat cable. Disconnect the flat cable running out of the transceiver module at the connector on the external memory set board.
- (5) Remove and Retain four countersunk screws securing transceiver module to front panel.
- (6) Move the transceiver module slightly back from the front panel and disconnect the flat cable connecting the front panel assembly to the transceiver module, audio interface board A3. The connector is located on the A3 board.
- (7) Lift transceiver module clear of chassis.

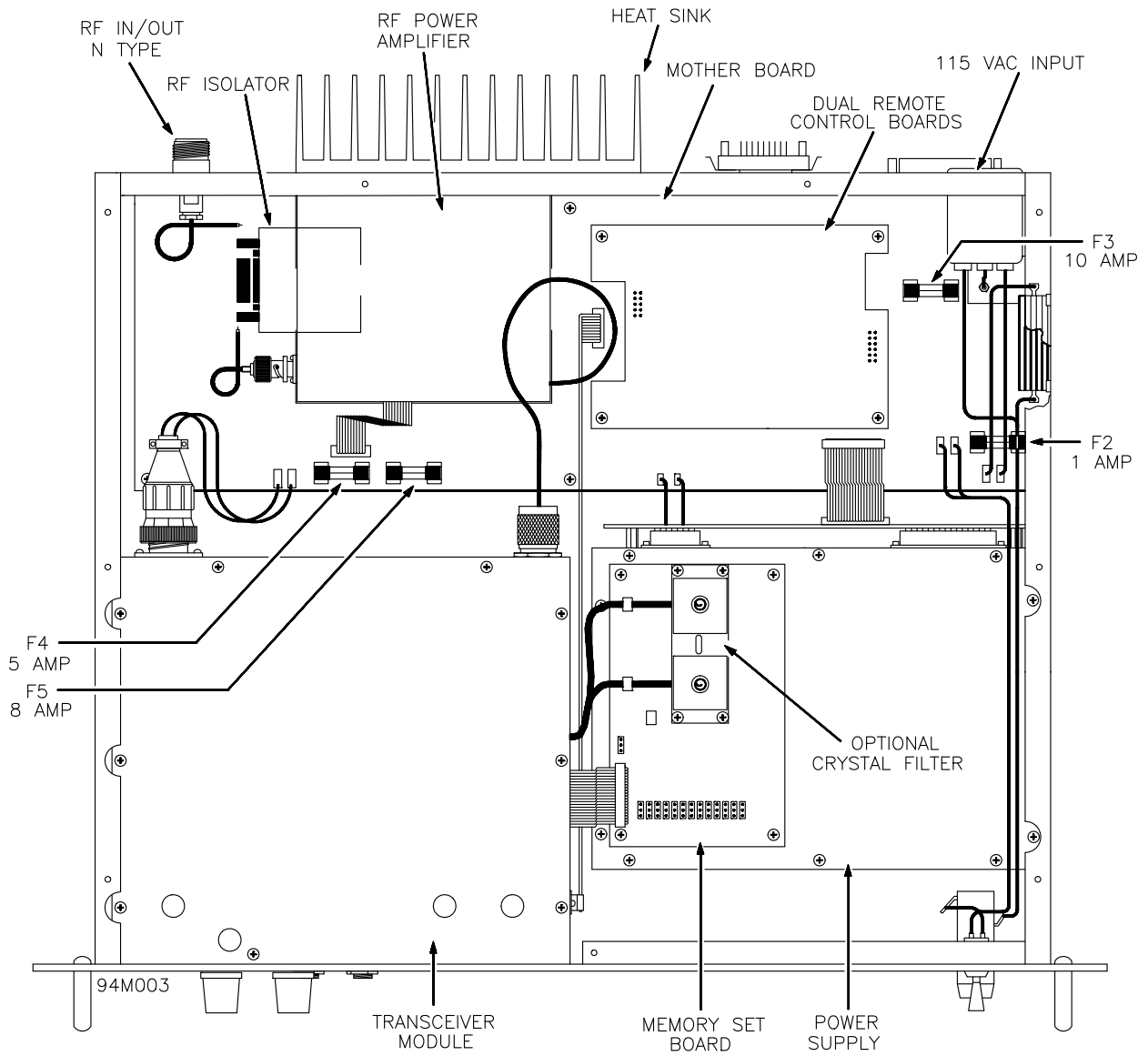


Figure 2.1 Single Channel Transceiver - Internal View

REPLACEMENT

- (1) Position the transceiver module into the chassis. While holding the transceiver module slightly back from the front panel, re-connect the flat cable from the front panel to the A3 board in the transceiver module.
- (2) Position and secure transceiver module to front panel with four countersunk screws.
- (3) Re-connect flat cable to transceiver module. Secure flat cable to the side of transceiver module with two screws and two washers. Connect flat cable running out of the transceiver module to the external memory set board. Connect DC and RF connectors to rear of transceiver module.
- (4) Replace and secure the top cover of the transceiver module with the screws removed in step (3) of the REMOVAL instructions. Replace top dust cover as described in paragraph 2.2.1.

2.2.3 Remove/Replace External Single Channel Memory Set Module A5A1

REMOVAL

- (1) Remove dust cover as described in paragraph 2.2.1, remove top cover of transceiver module.
- (2) Disconnect the two crystal filter co-axial cable leads for jumper J2/P3 on the Rx/Tx module A1, located in the transceiver module.
- (3) Remove and retain four screws securing Memory Set Board, Module A5A1 "piggy back" to the standoffs on the power supply cover. (See Figure 2.1 for location).

REPLACEMENT

- (4) Secure the Memory Set Module to the stand-offs located on the power supply cover by the four screws. Re-connect coaxial leads for RF crystal filter.

2.2.4 Remove/Replace Control Board

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.

REMOVAL

- (1) Remove dust cover as described in paragraph 2.2.1.
CAUTION: Care must be taken when removing or replacing Control Board to avoid damage to Motherboard Connector Pins.
- (2) Remove and retain four screws securing Control Board "piggy back" to the Mother Board standoffs. Remove Control Board from Mother Board.

REPLACEMENT

- (1) Align the two female connectors on the control board with the male connectors on the Mother Board using the four mounting holes and standoffs as a guide. Secure control board to the Mother Board standoffs with four screws and washers.
- (2) Replace dust cover as described in paragraph 2.2.1

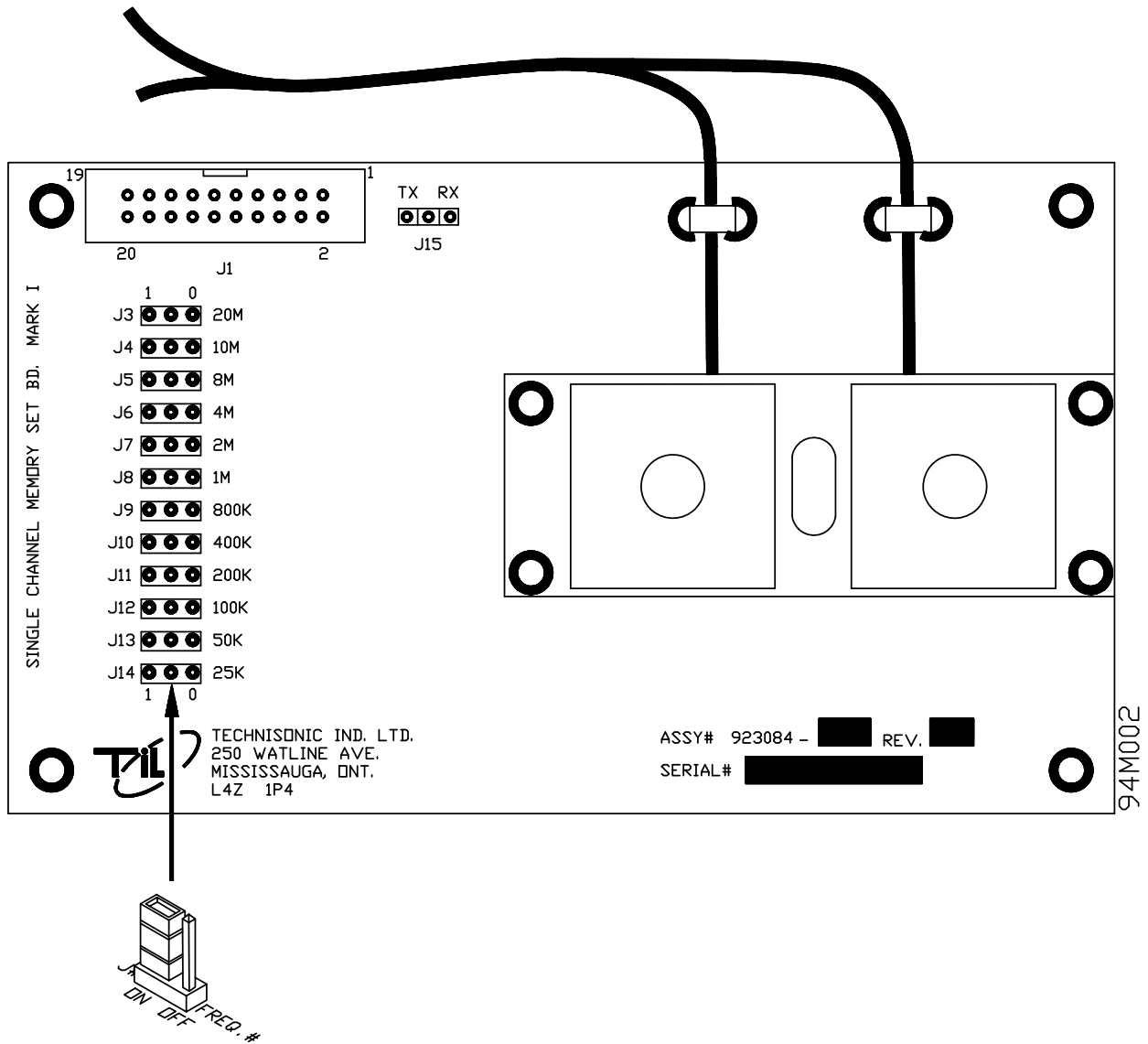


Figure 2.2 Single Channel Memory Set Board Module A5A1 - with Crystal Filter Option

2.2.5 Remove/Replace Crystal Filter Board, p/n 923069 or Jumper Board, p/n 923074

REMOVAL

- (1) Remove dust cover of unit as described in Paragraph 2.2.1.
- (2) Remove and retain the four screws securing the crystal filter board, p/n 923069-1 (or jumper Board, p/n 923074) to the standoffs on the external frequency set module A5A1. Pull the crystal filter board assembly straight up to avoid damaging the connector pins.

REPLACEMENT

- (1) Align the pins on the bottom of the crystal filter board with their sockets on the memory set board. Push the crystal filter board straight down until it rests on the memory set board standoffs and secure with the four mounting screws.
- (2) Connect Module A5A1 co-axial jumper leads to jumper J2/P3 on Rx/Tx Module A1, if not already connected. Either a crystal filter board, p/n 923074 or a jumper board, p/n 923074 must be installed and the A5A1 co-axial jumper leads connected to J2/P3 on the Rx/Tx Module A1, for the receiver to work.

NOTE: Make certain that the memory set board, module A5A1 is programmed to the same operating frequency as the crystal filter board assembly. If no crystal filter board assembly (option) is installed, jumper board assembly P/N 923074-1 must be installed.

2.3 CHANNEL FREQUENCY SELECTION

Early radios have their frequencies programmed by a diode matrix as described in Section 2.3.3. For radio units shipped after July 2012 and equipped with a USB port, please refer to Appendix A (TiL TDP-90 Programming Software User's Guide for USB Programmable AM Series Transceivers) - Document 11RE439.

2.3.1 Introduction

Before programming a new operating frequency, verify operation on the original frequency.

2.3.2 Frequency Range

The operating frequency may be programmed over the frequency range 117.975 MHz to 138.000 MHz with 25 kHz channel spacing.

2.3.3 Pre-programming Channel Frequency

FREQUENCY SELECTION MHz.

Refer to Table 2.1 Frequency Selection MHz. Using the OPERATING FREQUENCY (MHz) column, find the desired frequency in MHz. Cross-refer to the JUMPER LOCATION column, and install the jumper as required.

FREQUENCY SELECTION KHz

Refer to Table 2.2, Frequency Selection kHz. Using the OPERATING FREQUENCY kHz column, find the portion of the desired frequency in kHz. Cross-refer to the JUMPER LOCATION column, and install the jumpers in the locations as required.

2.3.4 Offset Frequency Set

- (A) Jumper J15, located on the single channel memory set board, module A5A1 selects the frequency offset as follows:
- (1) If J15 is not installed, frequency offset is inhibited.
 - (2) If J15 is installed in the Rx position, the transmitted frequency will be higher than the receive frequency.
 - (3) If J15 is installed in the Tx position, the transmitted frequency will be lower than the receive frequency.
- (B) Trim capacitors C16 and C37, accessible from the bottom of the unit (see Figure 2-5), are used to accurately adjust the transmit and receive frequency.

For the Tx frequency to be higher than the receive frequency, proceed as follows:

- (1) Set jumper J15 on the memory set board to Rx position.
- (3) Key PTT and set the transmitted frequency (without modulation) by rotating C16* to the desired Tx frequency. *(Revised from C37 in Rev. D document).
- (4) Set jumper J15 to Tx position. Key PTT and without modulation set the transmitted frequency by rotating trim capacitor, C37 to the desired Rx frequency.
- (5) Set jumper J15 to the Rx position, key the PTT and without modulation, verify that the transmitted frequency is the desired Tx frequency. If not, repeat steps 2, 3 and 4.

For the Tx frequency to be lower than the Rx frequency proceed as follows:

- (1) Set jumper J15 to the Rx position. Key the PTT and without modulation set the transmitted frequency, rotating trim capacitor C16 to the desired Rx frequency. Release PTT.
- (2) Set Jumper J15 to the Tx position. Key the PTT and without modulation set the transmitted frequency by rotating trim capacitor C37 to the desired transmit frequency. Release PTT.
- (3) Set jumper J15 to the Rx position. Key the PTT and without modulation, verify that the transmitted frequency is the desired receive frequency. If not repeat steps 1, 2, and 3. If it is, release the PTT and set jumper J15 to the Tx position, thus completing the frequency tuning.

TABLE 2.1 FREQUENCY SELECTION MHz						
OPERATING FREQUENCY (MHz)	JUMPER LOCATION					
	20 MHz	10 MHz	8 MHz	4 MHz	2 MHz	1 MHz
117	0	1	0	1	1	1
118	0	1	1	0	0	0
119	0	1	1	0	0	1
120	1	0	0	0	0	0
121	1	0	0	0	0	1
122	1	0	0	0	1	0
123	1	0	0	0	1	1
124	1	0	0	1	0	0
125	1	0	0	1	0	1
126	1	0	0	1	1	0
127	1	0	0	1	1	1
128	1	0	1	0	0	0
129	1	0	1	0	0	1
130	1	1	0	0	0	0
131	1	1	0	0	0	1
132	1	1	0	0	1	0
133	1	1	0	0	1	1
134	1	1	0	1	0	0
135	1	1	0	1	0	1
136	1	1	0	1	1	0
137	1	1	0	1	1	1
138	1	1	0	0	0	0

LEGEND: 0 = JUMPER BETWEEN CENTRE AND 0

1 = JUMPER BETWEEN CENTRE AND 1

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TABLE 2.2 FREQUENCY SELECTION kHz						
OPERATING FREQUENCY (kHz)	DIODE LOCATION					
	800 kHz	400 kHz	200 kHz	100 kHz	50 kHz	25 kHz
000	0	0	0	0	0	0
025	0	0	0	0	0	1
050	0	0	0	0	1	0
075	0	0	0	0	1	1
100	0	0	0	1	0	0
125	0	0	0	1	0	1
150	0	0	0	1	1	0
175	0	0	0	1	1	1
200	0	0	1	0	0	0
225	0	0	1	0	0	1
250	0	0	1	0	1	0
275	0	0	1	0	1	1
300	0	0	1	1	0	0
325	0	0	1	1	0	1
350	0	0	1	1	1	0
375	0	0	1	1	1	1
400	0	1	0	0	0	0
425	0	1	0	0	0	1
450	0	1	0	0	1	0
475	0	1	0	0	1	1
500	0	1	0	1	0	0
525	0	1	0	1	0	1
550	0	1	0	1	1	0
575	0	1	0	1	1	1
600	0	1	1	0	0	0
625	0	1	1	0	0	1
650	0	1	1	0	1	0
675	0	1	1	0	1	1
700	0	1	1	1	0	0
725	0	1	1	1	0	1
750	0	1	1	1	1	0
775	0	1	1	1	1	1
800	1	0	0	0	0	0
825	1	0	0	0	0	1
850	1	0	0	0	1	0
875	1	0	0	0	1	1
900	1	0	0	1	0	0
925	1	0	0	1	0	1
950	1	0	0	1	1	0
975	1	0	0	1	1	1

LEGEND: 0 = JUMPER BETWEEN CENTRE AND 0

1 = JUMPER BETWEEN CENTRE AND 1

2.4 REMOTE OPERATION SETUP

The Procedures listed below enable the user to custom configure the unit for external remote control hardware. Refer to Table 2.3 for connector pin details on Remote Control D Connector located at rear of Single Channel Transceiver. Position Jumpers on Control board as indicated in Table 2.4 or Table 2.5 as required. Refer to Figure 2.3 and Figure 2.4 for board locations. 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 2.3 REMOTE CONTROL CONNECTOR FUNCTIONS		
9 PIN NO	25 PIN NO	Connector Pin Functions
A,B	9,21	4 Wire Tx Audio Line or 2 Wire Rx/Tx Audio Line (600 Ω)
C,D	10,22	4 Wire Rx Audio Line (600 Ω)
H	12,24	External DC In (+24 Vdc)
N/A	8	AGC
K	13	Single Line Keying (PTT)
J	1,2,14,15	Ground
N/A	25	Squelch
E(-),F(+)	23(-),11(+)	Carrier Control
N/A	20	RF Indicator
N/A	3,4,5,6,7,16,17,18, 19	Not Connected, allocated for future functions

NOTE: A modular RJ-11 Jack is also provided on the rear of the 19" rack chassis 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 9 and 21 on the 25 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.

2.4.1 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 Figure 2.3 for location of jumpers referred to in the following table. Pins are numbers increase as you go from top to bottom or left to right on the connector.

TABLE 2.4 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 ± DC Keying or Ground Keying. Note: SW2 must be in Land Line position 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 ± DC Keying (Land Line). Jumper Pin 2 and Pin 3 for Ground Keying (Single Key Line). Jumper Pin 3 and Pin 6 for ± DC Keying (Single Key Line). Jumper Pin 2 and Pin 5 for No Function.
J3	Jumper Pin 1 and Pin 2 for ± 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.

(*) P/N 923051-1 with 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.

2.4.2 Two Wire Line Interface Board P/N 943180-1

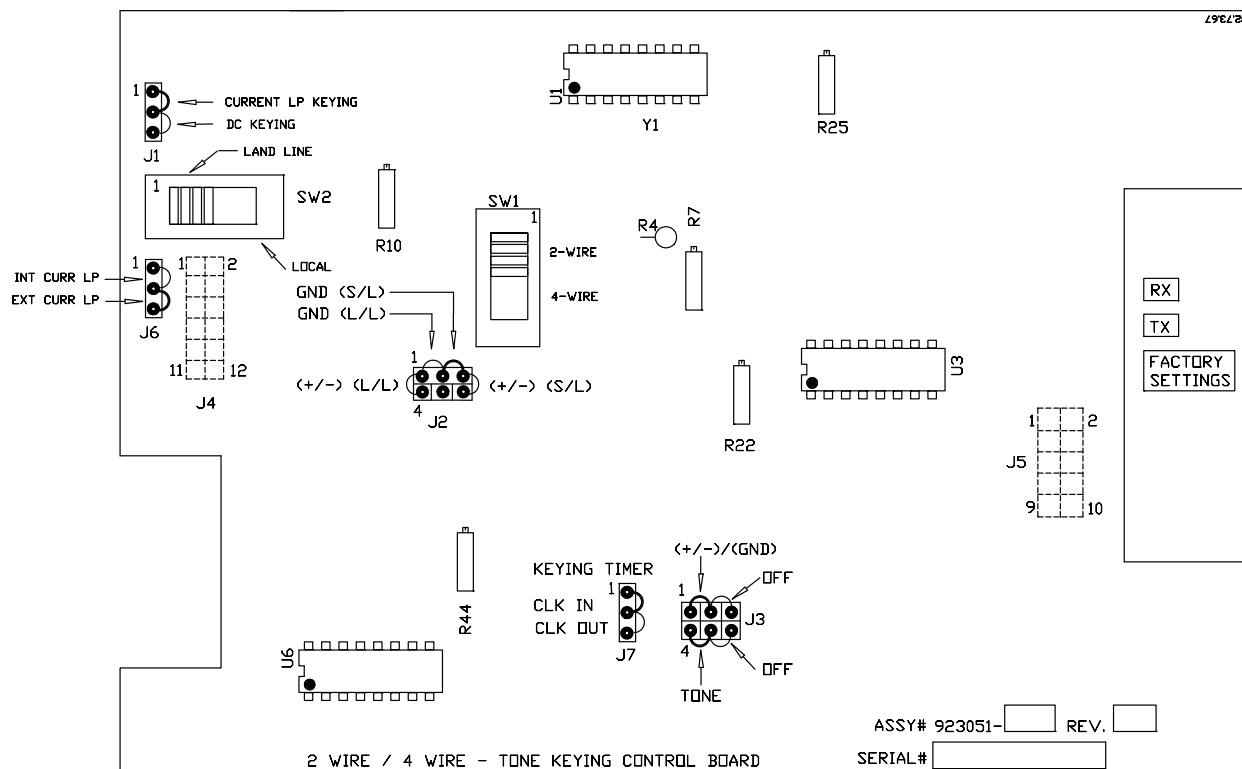
Provides remote control Base Station operation on 2 wire 600 ohm lines. Two wire Line Interface board with EIA multi-tone, standard 2175Hz continuous tone, DC keying of ground keying over audio lines. The multi-tone keying format consists of a high level 2175 tone followed by a 1950 Hz guard tone and 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 2175Hz 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 Figure 2.4 for location of jumpers and left/right orientation.

TABLE 2.5 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 (<i>-25 dBm</i> sensitivity; increases CW (clockwise). | J1: | Selects DC or <i>Current Loop</i> Keying operation |
| R10: | 2 Wire Rx Balance at 600Ω (<i>1mV</i> RF at 1 kHz, 30% Mod.) R10 adjusted for <i>minimum amplitude</i> at C6/R4 junction. | J2: | Selects either Land Line (L/L) or <i>Single Line (S/L)</i> and ± DC or <i>Ground keying</i> operation |
| R22: | Keying Tone (<i>-30 dBm</i> sensitivity; decreases CW) | J3: | Selects <i>Tone</i> and/or ± DC Keying enable or disable |
| R25: | Rx Audio (<i>-10 dBm</i> output level; increases clockwise) | J6*: | Selects between Internal or <i>External</i> Current loop keying (ICL/ <i>ECL</i>) |
| R44: | Time Out Timer (15 to 300 sec.; <i>90 sec.</i> nominal; increases clockwise) | J4: | Input Connector |
| SW1: | Selects either <i>2-Wire</i> or 4-Wire operation | J5: | Output Connector |
| SW2*: | Selects either Local or <i>Land Line</i> Current Loop Keying | J7: | Keying timer position <i>CLK IN</i> / CLK OUT |

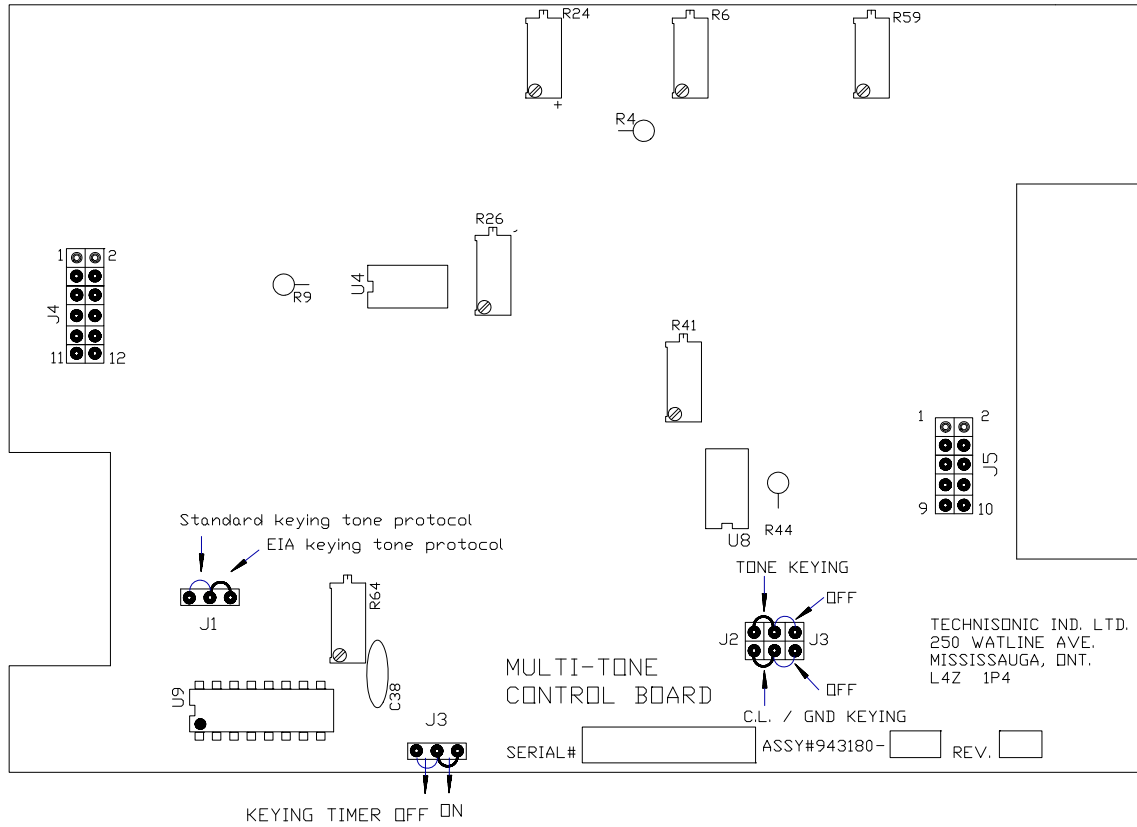
NOTE: P/N 923051-1 Rev N and up (Aug 2006) has SW2 and J6 removed.

*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 (TLI-203)

**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.

FIGURE 2.3 Line Interface/Remote Control Board P/N 943180-1 (TLI-180)

2.5 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 3.1.

2.5.1 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.

2.5.2 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).

2.6 TRANSCEIVER ADJUSTMENTS AND SETTINGS

The locations at which certain transceiver settings and adjustments can be performed are shown in Figure 2.5. The top dust cover of the transceiver must be removed as described in paragraph 2.2.1 to access the AGC, Squelch and Modulation settings. The plastic plugs must be removed prior to adjustment of the remaining settings which are accessed from the bottom of the transceiver chassis. If alignment procedures for these settings are required please consult the manufacturer or the appropriate service manual.

2.7 OPERATIONAL CHECK

Perform an operational check of the transceiver after all adjustments. Ensure that the transceiver operates 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 for use with the Remote Control Unit.

2.8 STORAGE

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

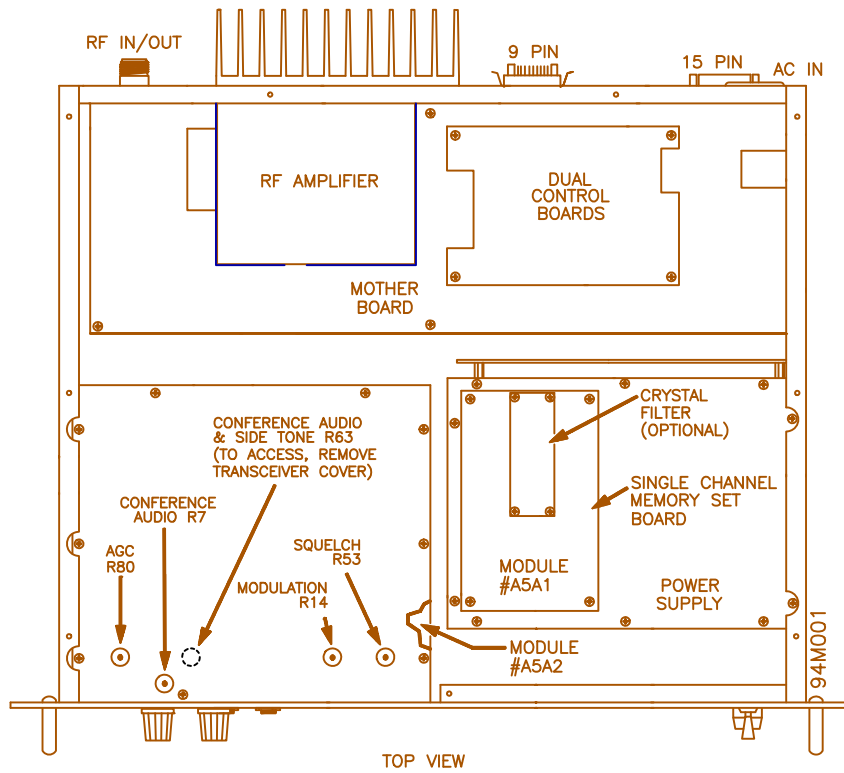
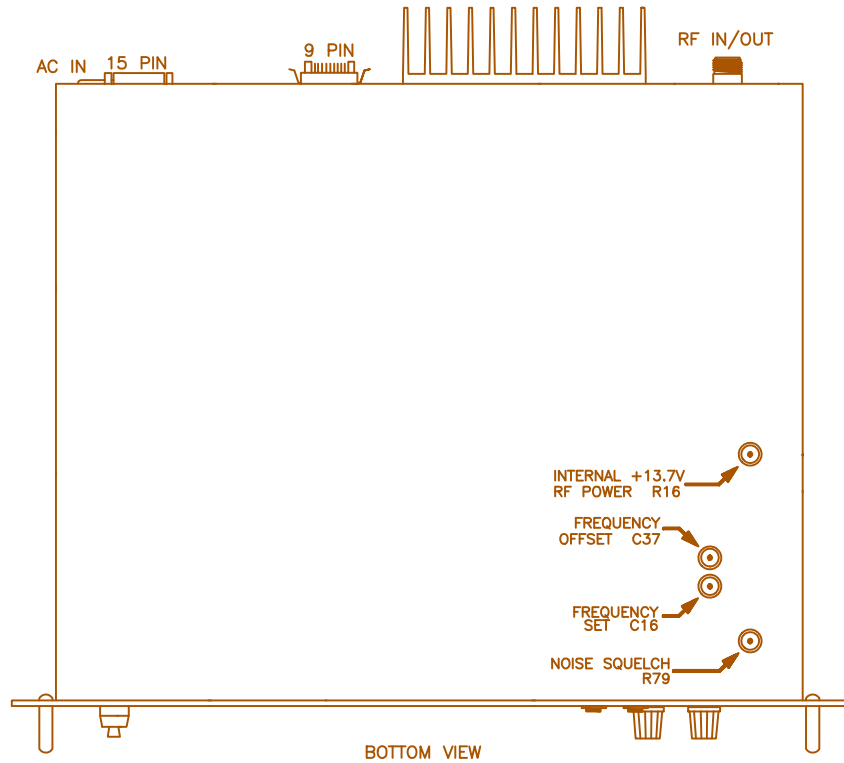


Figure 2.5 Transceiver Adjustments and Settings

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SECTION 3 – OPERATING INSTRUCTIONS

3.1 INTRODUCTION

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.

3.2 INSTALLATION

The Single Channel Transceivers are designed for mounting in a 19 inch rack. An AC Line cord P/N 927002-1 is supplied for connection to AC Power. A 9 Pin connector (mates with Positronic GM9MSCG000VL or equivalent) and a 25 Pin Connector (mates with Amphenol 17D-B-25S or equivalent) are provided for connection with external DC and 2 Wire or 4 Wire 600 ohm dedicated lines. A 50 ohm "N" Type connector is provided for connection to an external antenna. Refer to Section 2 for frequency selection and remote control setup details.

- (1) Mount Transceiver in 19 inch rack with 4 screws.
- (2) Install Microphone in Microphone (PTT) connector if required.
- (3) Ensure that Transceiver POWER ON/OFF switch is set to OFF.
- (4) Install AC line cord in AC chassis connector on rear panel.
- (5) Install Remote Control connector to 9 Pin or 25 Pin connector as required. (Refer to Figure 3.1 for connector pin outs.)
- (6) Connect antenna connector to rear panel chassis N Type connector.

3.3 OPERATOR'S SWITCHES, CONTROLS AND INDICATORS

A view of the front and rear panel is given in Figure 3.1. A functional description of each of the operator's switches, controls and indicators, and the microphone PRESS-TO-TALK switch, is given in Table 3.1, Operator's Switches, Controls and Indicators.

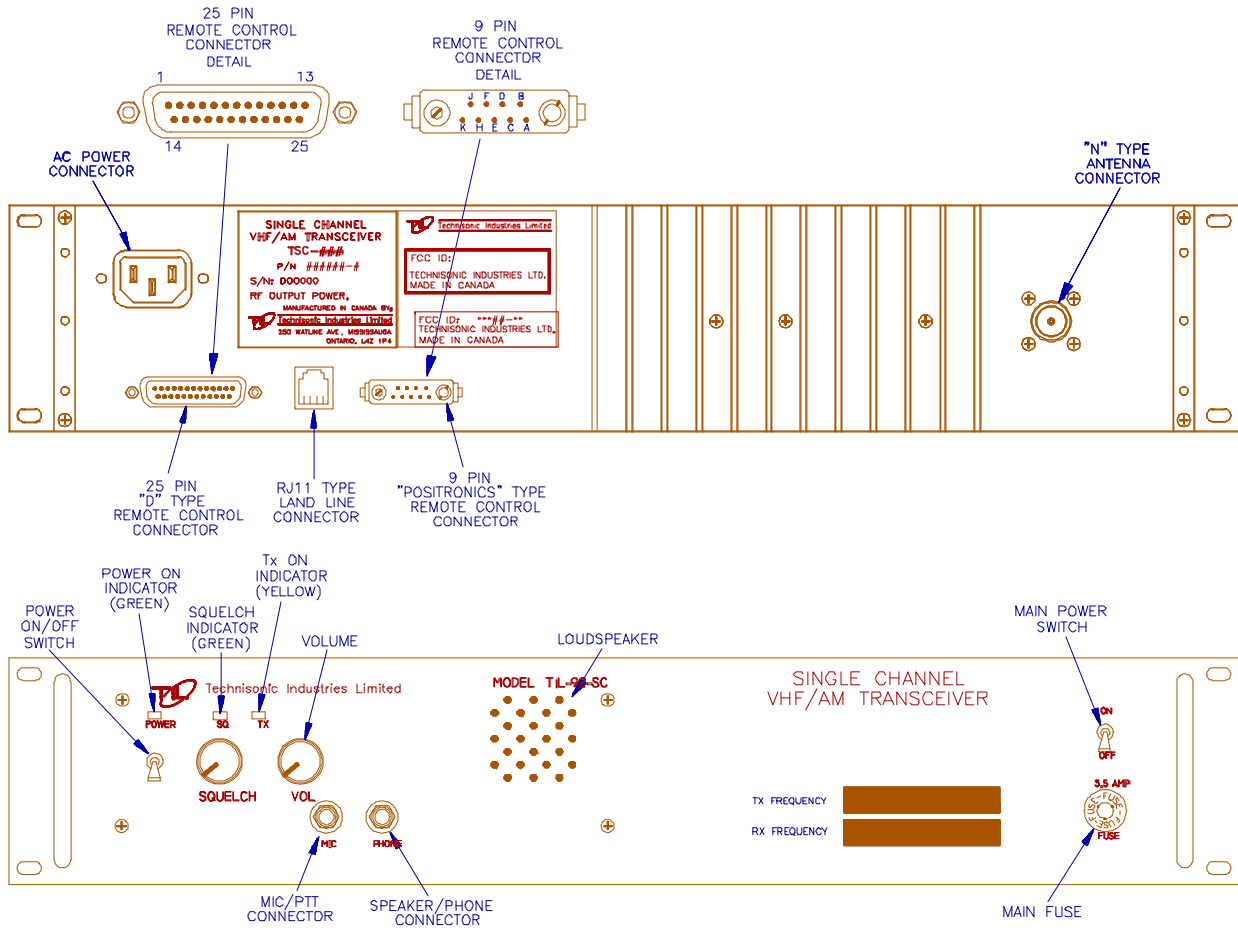


Figure 3.1 Single Channel Transceiver Controls and Indicators

TABLE 3.1 OPERATORS SWITCHES, CONTROLS AND INDICATORS

SWITCHES CONTROLS & INDICATORS	FUNCTIONAL DESCRIPTION
POWER ON/OFF SWITCH	A toggle switch applies the AC power to the power supply and the DC 27.5 volts nominal power to the transceiver. The transceiver is switched to ON in the toggle UP position the transceiver is switched OFF in the toggle DOWN position.
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.
FUSE	A 5 Amp FUSE protects the 13.7 dc volts nominal power supply line.
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.
SQUELCH INDICATOR	A GREEN LED indicates the squelch circuit is connecting demodulated audio signal to the VOLUME control.
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.
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.
MIC/PTT CONNECTOR	A standard 0.2 inch 3-pole jack is provided to connect a microphone with PTT to the transceiver front panel.
TX LABEL	Indicates the frequency programmed for transmit.

TABLE 3.1 OPERATORS SWITCHES, CONTROLS AND INDICATORS (Continued)	
SWITCHES CONTROLS & INDICATORS	FUNCTIONAL DESCRIPTION
RX LABEL	Indicates the frequency programmed for receive.
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.
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.
AC FUSE	A 2.5 Amp fuse protects the Base Station power supply from power supply internal short circuit or transceiver short circuit.
* "N" TYPE RF CONNECTOR	A 50 ohm coaxial connector provides connection to external antenna.
*AC POWER CONNECTOR	3-Prong AC Connector for use with AC Power Cord P/N 927002-1.
*9 PIN REMOTE CONTROL CONNECTOR	9-Pin "D" type connector provides connections required for remote operation. Refer to Table 2.3 for connector details.
*25 PIN REMOTE CONTROL CONNECTOR	25-Pin "D" type connector provides connections required for remote operation. Refer to Table 2.3 for connector details.
*RJ-11 REMOTE CONNECTOR	RJ-11 type connector provides parallel connection to the 2-Wire Tx/Rx audio from remote/line interface board. This connector supports 2 wire operation only.
* Denotes items located on rear panel.	

3.4 OPERATING INSTRUCTIONS

NOTE

Refer to appropriate Operating Instructions for use with Remote Control Unit.

NOTE

The following operating procedures are intended specifically for Local Operation.

- (1) Ensure that the microphone connector is connected to the MIC/PTT connector of the transceiver.
- (2) Set the SQUELCH control in the fully counter-clockwise (CCW) position.
- (3) Set the VOLUME control in the 12 o'clock centre position.
- (4) Set the POWER ON/OFF switch to "ON".
- (5) Verify that the FUSE BLOWN red LED is OFF.
- (6) Verify that the POWER ON green LED is ON.
- (7) Proceed to operate in the transmit mode, paragraph 3.4.1 or operate in the receive mode, paragraph 3.4.2 as required.

3.4.1 Transmitter Operation (Local Mode)

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.

3.4.2 Receiver Operation (Local Mode)

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.

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.

3.4.3 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.

3.4.4 EXTERNAL DC OPERATION

- (1) Set AC ON/OFF switch to OFF.
- (2) Refer to Table 2-3 for pin numbers and Figure 3.1 for pin locations to hook up external DC Power.

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 15.0 Vdc.

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**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.**

APPENDIX A

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TiL TDP-90 Programming Software User's Guide

for USB Programmable
AM Series Transceivers

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INTRODUCTION

This document contains instructions for proper installation and operation of the TDP 90 software for USB programmable Technisonic AM series transceivers and details the various elements of the Graphical User Interface (GUI).

NOTE: The images in this document are examples only and may not reflect your particular data settings, or current TDP software version.

The TDP-90 programming software can be found under the “Programming Software” link at <http://www.til.ca/>

SOFTWARE INSTALLATION

Note: The USB driver must be installed before attempting to use the TDP-90 software.

USB Driver

The USB hardware in your Technisonic AM transceiver is configured as a Virtual Com Port (“VCP”) which emulates a serial COM. This driver is available for free distribution from Future Technology Devices International (“FTDI”). Download and install the latest release of the VCP driver for Windows per the instructions on the web page located at this link:

<http://www.ftdichip.com/Drivers/VCP.htm>

TDP Software

Download and install the latest release of the TDP-90 software for Windows from the web page located at this link:

<http://til.ca/content.php?page=programming-software-tdp90>

Once completed there will be a “TDP90” icon on your computer desktop.

TRANSCIVER TO COMPUTER CONNECTION

Connect the transceiver to the computer USB port using a standard USB-A male to USB-B male cable. The USB port is located on the rear panel of mobile and base station transceivers and on the front panel of rack mount transceivers.

GETTING STARTED

To start the TDP 90 program, double click the TDP90 icon on the desktop. The following Graphical User Interface will appear. The current version number is shown in square brackets on the title bar.

MAIN GRAPHICAL USER INTERFACE

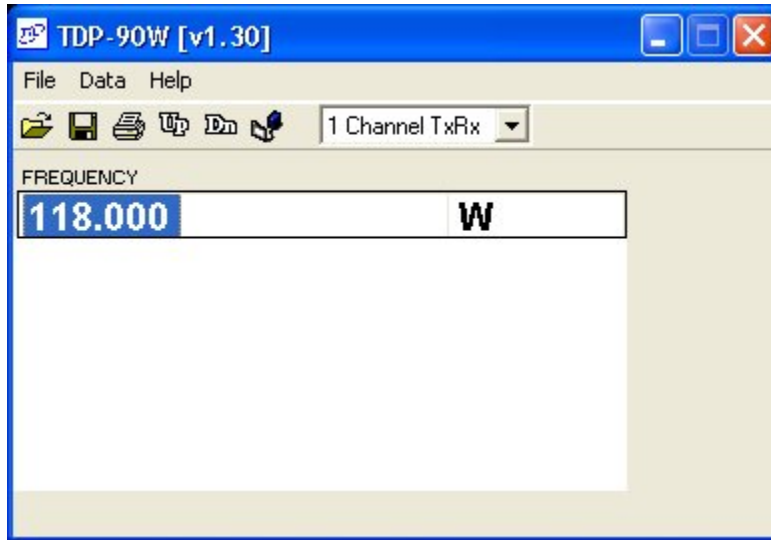


Figure 1

ICONS AND PULL DOWN MENUS

The **icons and pull-down menus** provide the set-up and operating functions. The **Channels** pull-down tab provides selection for single or six channel transceivers (use the 6 channel window for 4 channel transceivers). The number of channels in the **Frequency editing window** changes accordingly. The frequency of each channel, as displayed in the **Frequency editing window**, can be changed by clicking on the desired channel window and entering the frequency.

ICONS

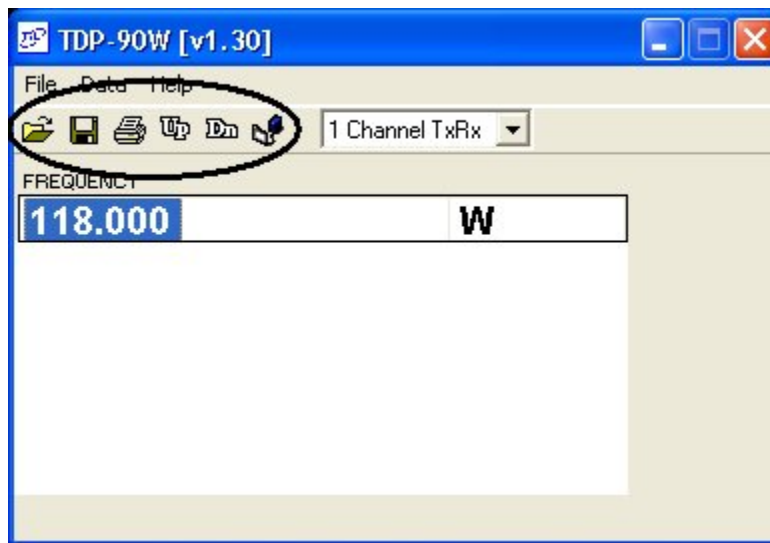


Figure 2

The icons provide single-click access to the features in the pull down menus. Details of these features are explained in the Pull Down Menu descriptions that follow.

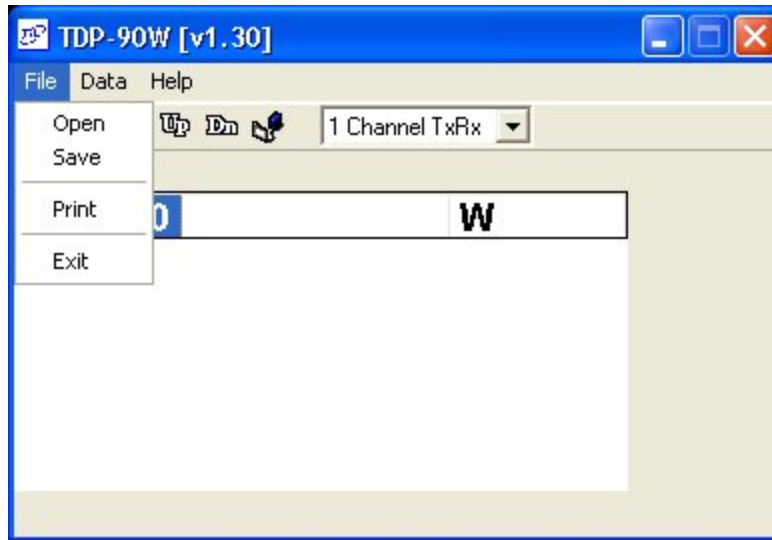
FILE MENU

Figure 3

Open will allow you to select and load an existing file that was previously saved on disk. The yellow folder icon provides the same function in a single mouse click.

Save will allow you to save the current data into a file with a name of your choice. The filename may be any length up to 64 characters. The program will automatically append the .90 suffix to the filename. The diskette icon provides the same function in a single mouse click.

Print will create a text file of the channel list, as presented in the Frequency List window. Once the Print function is invoked, you will be prompted to enter the serial number of the currently connected transceiver. The printout will append a header to the top of the page that includes the serial number of the transceiver as well as the time and date. The printout can be filed as a record of the frequencies that are programmed into that particular transceiver. The printer icon provides the same function in a single mouse click.

Exit will quit the TDP-90 program. If you have not saved your data, or if any changes were made to your data set since your last save, the TDP will warn you of this, and allow you to do so before quitting.

DATA MENU

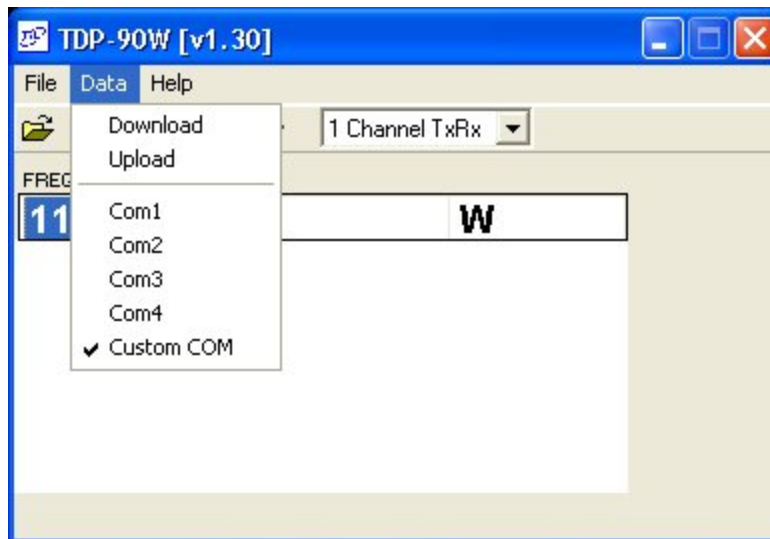
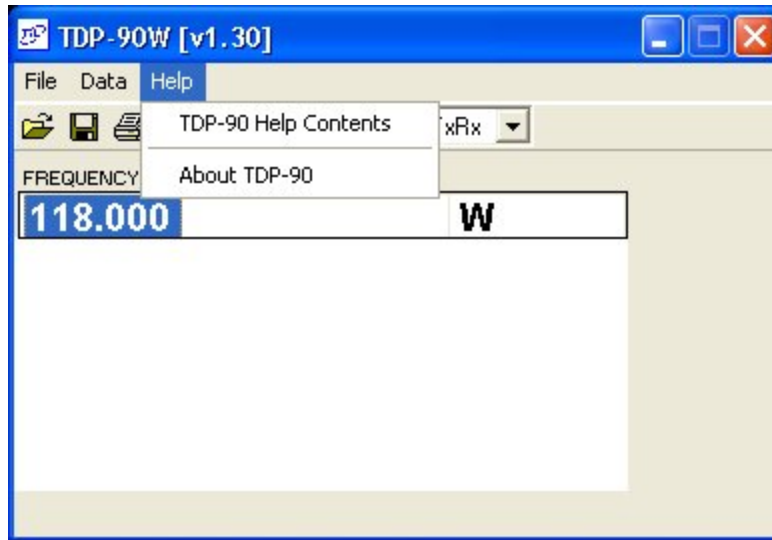


Figure 4

Download (to Radio) instructs the TDP 90 software to transfer the frequency data in the list to the memory channels in the connected AM transceiver. The Dn icon provides the same function in a single mouse click.

Upload (from Radio) instructs the TDP 90 program to wait for and read the channel data from the memory channels in the connected AM transceiver. The Up icon provides the same function in a single mouse click.

Com1 (2,3,4, Custom COM) allows you to select the COM port on your computer to which the transceiver is connected. The computer may assign a random unused COM port number to the Virtual Com Port (VCP) when the USB driver is installed so “Custom COM” can be selected when it is beyond the normal range of COM1-4. The assigned VCP can be determined by accessing the Device Manager (access in WinXP by right-clicking on “My Computer – Properties – Hardware – Device Manager – Port (COM & LPT)). Note the COM number that was assigned to USB Serial Port. The Port (5th) icon provides the same function in a single mouse click.

HELP MENU**Figure 5**

TDP-90 Help Contents opens the Windows Help dialog for the TDP-90 software. Here, you will find hardware connection and operating information as well as troubleshooting tips and answers to some Frequently Asked Questions.

About selection displays Technisonic company and contact information as well as the revision number of the TDP software in the “Terminal window” screen.

CHANNEL SELECTION PULLDOWN

1 CHANNEL TRANSCEIVER

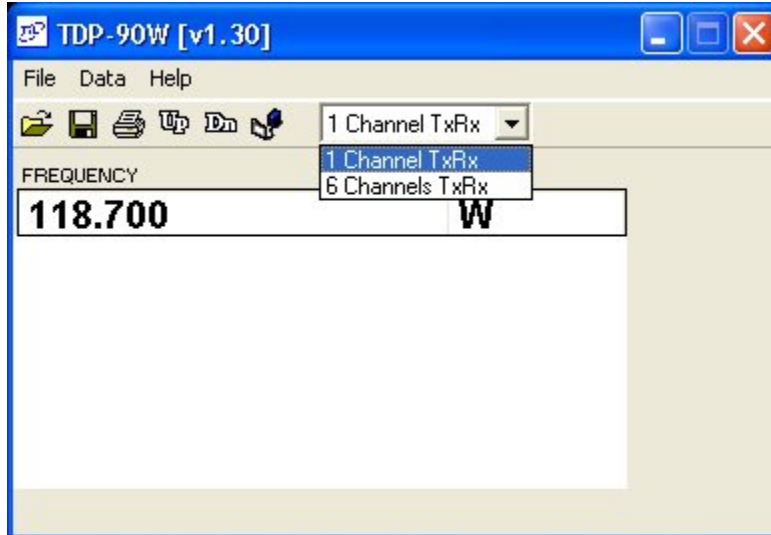


Figure 6

6 CHANNEL TRANSCEIVER



Figure 7

The **x Channel(s)** pull-down tab allows you to select for single or six channel AM transceiver use. The frequency editing window changes accordingly. The “W” indicates that the channels are 25kHz (**Wide**) channel spacing and as such, only channels in 25kHz increments are accepted. Be sure to set the channel pulldown appropriately for your transceiver otherwise frequency programming may be unpredictable. For 4 channel transceivers use the first 4 entries in the 6 channel window.

SAMPLE UPLOAD AND DOWNLOAD

- (1) Connect the transceiver to the computer USB port using a standard USB-A male to USB-B male cable. The USB port is located on the rear panel of mobile and base station transceivers and on the front panel of rack mount transceivers. Turn on the power to the transceiver.
- (2) Assuming that the USB driver is already installed, determine which Virtual Com Port has been assigned by accessing the Device Manager (accessed in WinXP by right-clicking on "My Computer – Properties – Hardware – Device Manager – Ports (COM & LPT). Note the COM number that was assigned to USB Serial Port.
- (3) Run the TDP-90 program on the computer.
- (4) Click on the **Data** pull-down list and select the serial port to which the transceiver is connected. Select Custom COM and enter the assigned port number if it is outside the normal range of Com1-4.
- (5) Set the program for 1 or 6 channels as applicable using the channel pulldown list.
- (6) Click on the **Up** icon to retrieve the frequencies from the radio. "UPLOADING" will appear at the bottom of the window as data is being transferred.
- (7) Edit the frequencies as desired. (The program only accepts 25 kHz spaced frequencies.)
- (8) Click on the **Dn** icon to copy the frequencies to the transceiver. "DOWNLOADING" will appear at the bottom of the window as data is being transferred.
- (9) Click on the **diskette** icon to save the file. Hint: Use the transceiver serial number or some other unique filename to identify the specific transceiver. The program will automatically append the .90 suffix to the filename.
- (10) Click on the **printer** icon to print a hard-copy of the frequencies.