



VHF/AM SINGLE CHANNEL TRANSMITTERS Model TiL-92-SC

25 WATT TX, P/N 931037-1 TST-4100
15 WATT TX, P/N 931038-1 TST-4200
LOW POWER TX, P/N 931039-1 TST-4300



Installation and Operating Instructions

TiL Document No. 93RE126
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Technisonic Industries Limited

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REVISION HISTORY
[93RE126]

REV	SECTION - PAGE -	DESCRIPTION	DATE	Edited by
n/c		Original Document		
A-C				
D	Global	New Document Template (new file format) Title page changed, Headers/Footers added Added Revision page, Added Warranty page		
	2-5	Added <u>note</u> to §2.5 Channel Freq. Selection referring to units built after Jan 2012 with a USB port and added <u>Appendix A</u> (TDP-90 for USB AM units) with Installation and Operating Instructions.		
	2-12,13	updated Fig 2.3 & 2.4	FEB 2012	FM
E	2-10 2-12	Table 2.4 Note: SW2 must be in Land Line position Fig 2.3 updated as per Doc #106516 Rev B	APR 2012	FM
F	Title Pg iii	Simplify System description Updated FCC information including antenna and FCC labeling instructions. Simplify description under "Warning"		
	Global 1-5	"7 Watt" changed to "Low Power" Revise Transmitter Characteristics for FCC and ICAN information		
	2-5 2-10, 2-12	Updated para 2.3 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 Model 92-SC series, Rack Mounted Single Channel Transmitters, are 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 Transmitters, Model TiL-92-SC, Part Nos. 931037-1, 931038-1, and 931039-1 manufactured by Technisonic Industries Limited. These units are also referred to by Item No.'s TST-4100, TST-4200 and TST-4300 respectively.

The Model TiL-92-SC Transmitters are single channel, fixed frequency transmitters 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 transmitter configurations are based on the Model 90-6R pre-programmable transceiver module, modified for transmit only operation. All systems can be optionally configured for 2 Wire mode with Current, or Tone remote control operation. Each configuration consists of a Power Supply Module, Mother Board, and Control Board. The 15 Watt and 25 Watt configurations also consist of an RF Linear Amplifier Module.

The TST series transmitters now come standard with an RF Isolator which provides unidirectional coupling to the antenna in multiple transmitter configurations.

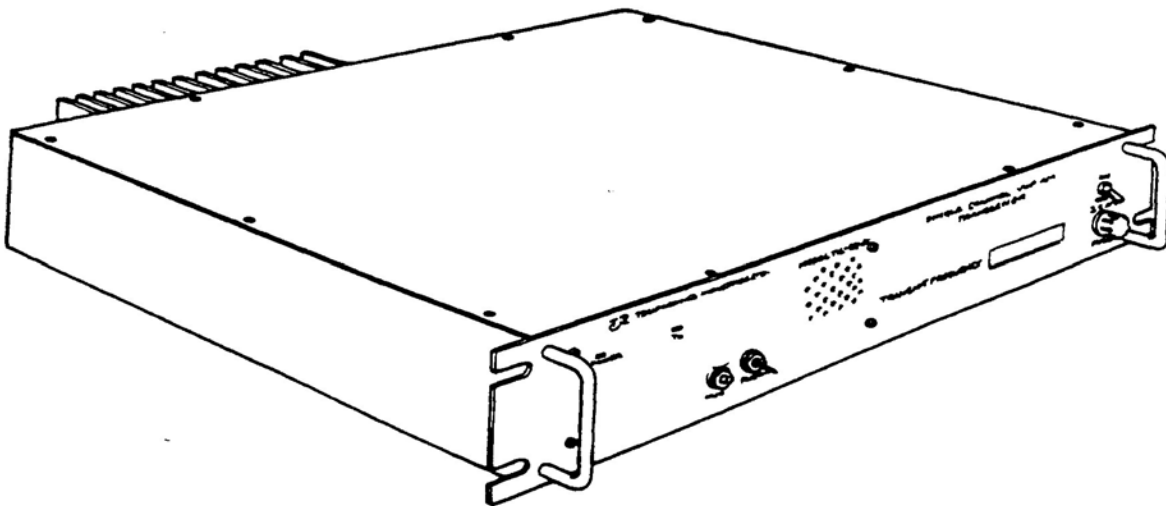


Figure 1.1 VHF/AM Single Channel Transmitter

1.2.1 Transmitter Module

The Single Channel Transmitter is based on Transceiver Model 90-6R, modified for transmit only operation. The transmitter module is a low power VHF/AM transmitter which can transmit on a single pre-programmable synthesized frequency, 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 transmitter module to facilitate ease of frequency programming.

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

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

1.2.3 RF Amplifier Modules - Models PA-15, 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 transmitter module.

1.2.4 Mother Board

The Mother Board provides all interconnection between the two external remote control connectors, RF Amplifier Module, Power Supply, Remote Control Board, and Transmitter. The Remote Control Board, 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

Provides remote control transceiver operation on 2 wire or 4 wire 600 ohm lines. This board can be configured to key the transmitter using a 2175 Hz* continuous tone (see below), plus/minus DC Voltages, ground keying and internal or external DC (15 mA) current loop keying. Transmit 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 transmitter 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 RF Isolator (Now standard on all units)

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.

1.3 MODES OF OPERATION

1.3.1 Local/Remote Operation

The Single Channel Transmitter can be operated in Local or Remote modes.

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 transmitter.
2. **REMOTE OPERATION** - In Remote operation, transmit audio and keying (PTT) 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 RF Output Power signal depending on the remote control board installed. Transmit audio is also routed to the internal loudspeaker at an externally (high/low switch) adjustable preset level (see conference audio).

1.3.1.1 Conference Audio

Conference Audio provides the operator with Tx voice on the transmitter speaker when the transmitter is remotely keyed from another location. A 3-position high-off-low switch is provided to externally control Tx audio levels. The Low position results in a 20dB lower audio level than when the switch is in the High position.

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 2.6 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 counterclockwise rotation. If further adjustment of conference audio is required, the top cover of the transmitter module must be removed to gain access to potentiometer R63, located on the Audio Interface Module, A3 (see Figure 2.6 for location).

1.3.2 AC and DC Operation

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

1. **AC OPERATION** - During AC operation, the unit can charge and trickle charge external batteries via the external connectors mounted on the rear panel of the unit. Refer to Table 1.2 for details.

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 Transmitters are provided in Table 1.1.

TABLE 1.1 LEADING PARTICULARS - TST-4100/4200/4300

POWER REQUIREMENTS:

***Low Power Transmitter**

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 Transmitter

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 Transmitter

AC Input Voltage/Current 100 to 132 VAC @ 2.0 Amp
DC Input Voltage/Current 21.6 VDC to 30 VDC @ 7.5 Amp

NOTE: 220V operation is selectable by internal power supply jumper. Tolerances are 190 to 250 VAC @ one-half the applicable current consumption in the 110 VAC mode.

POWER OUTPUT:

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

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

REMOTE CONTROL:

Remote Audio Input 2 wire, balanced 600 Ω lines
Remote Tx Timeout 30 to 300 seconds

Tone Keying:

Impedance 600 Ω floating with respect to ground
Tx Control Tone Selectable 1800 Hz to 3000 Hz
Tx Tone Input Level 0 to -40 dBm
Tx Tone Control Response Time <12 milliseconds
DC Keying ± 48 Vdc
Loop Resistance 10K Ω MAX
Ground Keying Closure to Ground
Loop Resistance 4 K Ω MAX

TX Interface Signals:

TX RF Output Signal RF ON=Ground, RF OFF=Open Circuit

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 1.1 LEADING PARTICULARS - TST-4100/4200/4300 (Continued)

TRANSMITTER 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

TECHNICAL:

Power Output (TX module w/o PA)	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

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 Transmitter. Custom system configuration includes customizing the remote control board functions and the transmit frequency selection.

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 transmitter 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 transmitter module.
- (3) Secure cover to chassis with remaining screws.

2.2.2 Remove/Replace Transmitter Module

REMOVAL

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

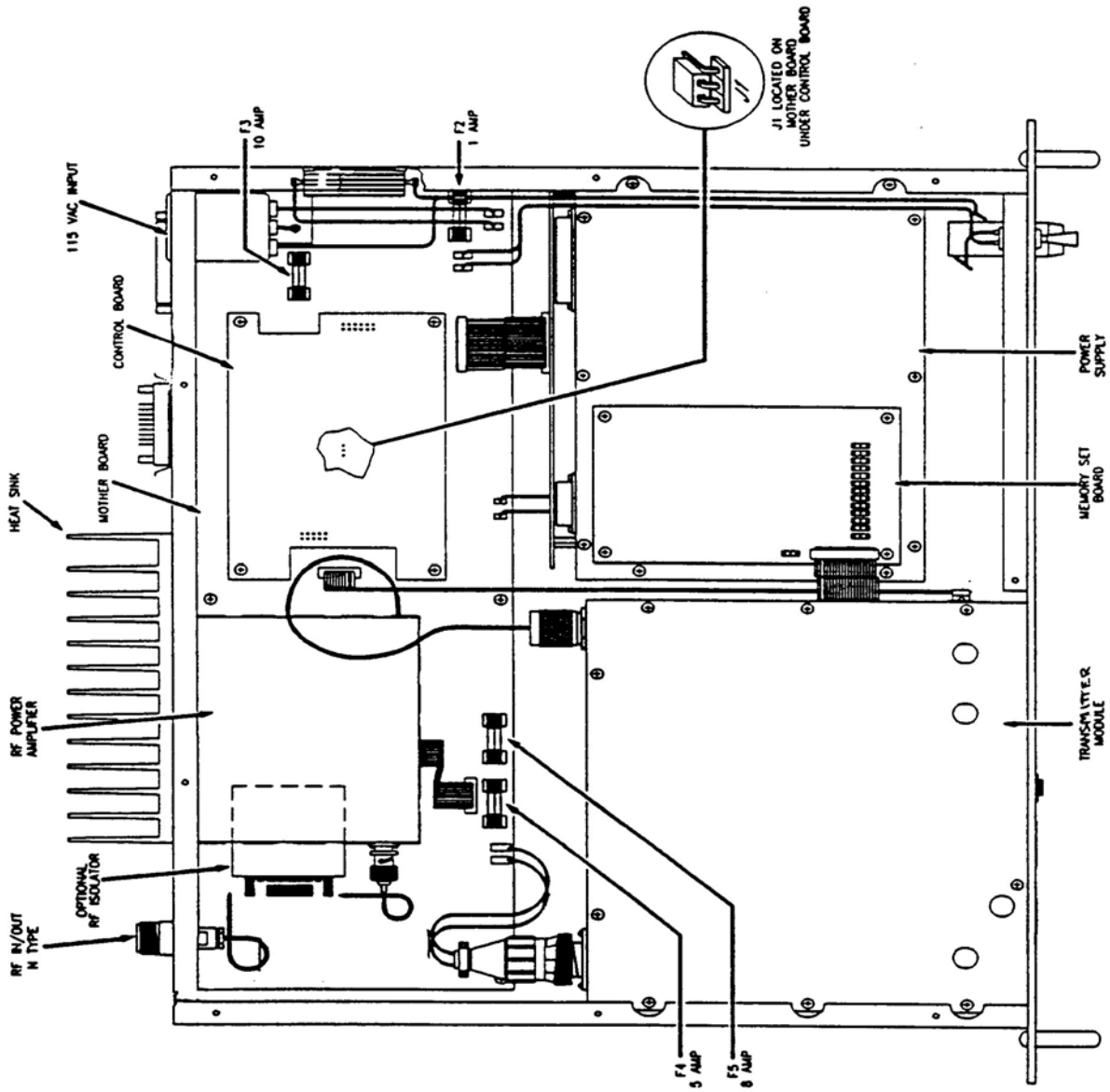


Figure 2.1 Single Channel Transmitter - Internal View

REPLACEMENT

- (1) Position the transmitter module into the chassis. While holding the transmitter module slightly back from the front panel, re-connect the flat cable from the front panel to the A3 board in the transmitter module.
- (2) Position and secure transmitter module to front panel with four countersunk screws.
- (3) Connect flat cable to transmitter module. Secure flat cable to transmitter module with two screws and two washers. Connect flat cable running out of the transmitter module to the external memory set board.
- (4) Connect DC and RF connectors to rear of transmitter module.
- (5) Replace and secure the top cover of the transmitter module with the screws removed in step (3) of the REMOVAL instructions.
- (6) 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.
- (2) 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

- (3) Secure the Memory Set Module to the stand-offs located on the power supply cover by the four screws.

2.2.4 Remove/Replace Control Board

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.

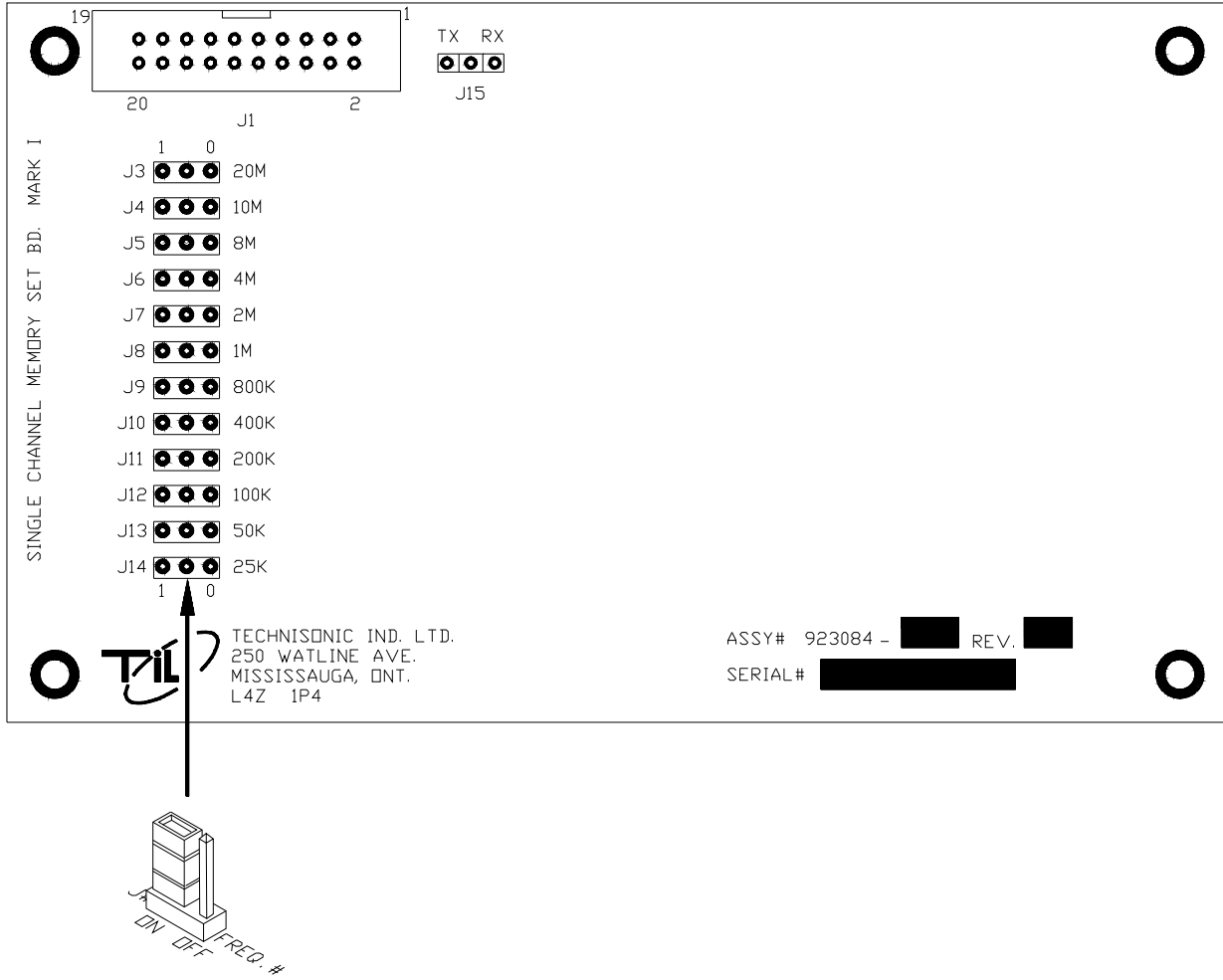


Figure 2.2 Single Channel Memory Set Module A5A1 - Component Layout

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, perform an operational check, as outlined in Section 3. If there is any operational deficiency or equipment malfunction, return transmitter to the manufacturer. Before use it is necessary to pre-program the operating 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

Determine the operating frequency to be programmed and proceed as follows:

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 transmit frequency will be offset high.
 - (3) If J15 is installed in the Tx position, the transmit frequency will be offset low.
- (B) Trim capacitors C16 and C37, accessible from the bottom of the unit (see Figure 2.5), are used to accurately adjust the transmit frequency. For the Tx frequency to be higher than the receive frequency, proceed as follows:

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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

2.3.4 Offset Frequency Set (continued)

- (1) Set jumper J27 on the memory set board to Rx position.
- (2) Key PTT and set the transmitted frequency (without modulation) by rotating C16* to the desired Tx frequency. *(Revised from C37 in Rev. B document).
- (3) Set jumper J27 to Tx position. Key PTT and without modulation set the transmitted frequency by rotating trim capacitor, C37 to the desired Rx frequency.
- (4) Set jumper J27 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:

Set jumper J27 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.

Set Jumper J27 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.

Set jumper J27 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.

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 Transmitter. 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.

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	25-PIN	CONNECTOR PIN FUNCTIONS
A,B	9,21	2 Wire Tx Audio Line (600 Ω)
C,D	10,22	Not Connected
H	12,24	External DC In (+24 Vdc), For Low Power Transmitter (+12 Vdc)
N/A	8	Not Connected
K	13	Single Line Keying (PTT)
J	1,2,14,15	Ground
N/A	25	Not Connected
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

2.4.1 Two Wire Remote Control Board P/N 923051-1

Provides remote control transmitter operation on 2 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 is provided over two 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 position 2 if Pins 2 and 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. (Switch has no effect in Transmitter). 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 R22 R25 R44 R10	Sets Tx Audio IN Level (Range -18 dBm to +10 dBm). Sets Key Tone Level (Range -40 dBm to 0 dBm). Sets Rx Audio OUT Level (Range -15 dBm to +10 dBm). Sets Timeout Timer (Range 30 to 300 Seconds). 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 Transmitter operation on 2 wire 600 ohm lines. Two wire Line Interface board with EIA multi-tone, standard 2175 Hz 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).

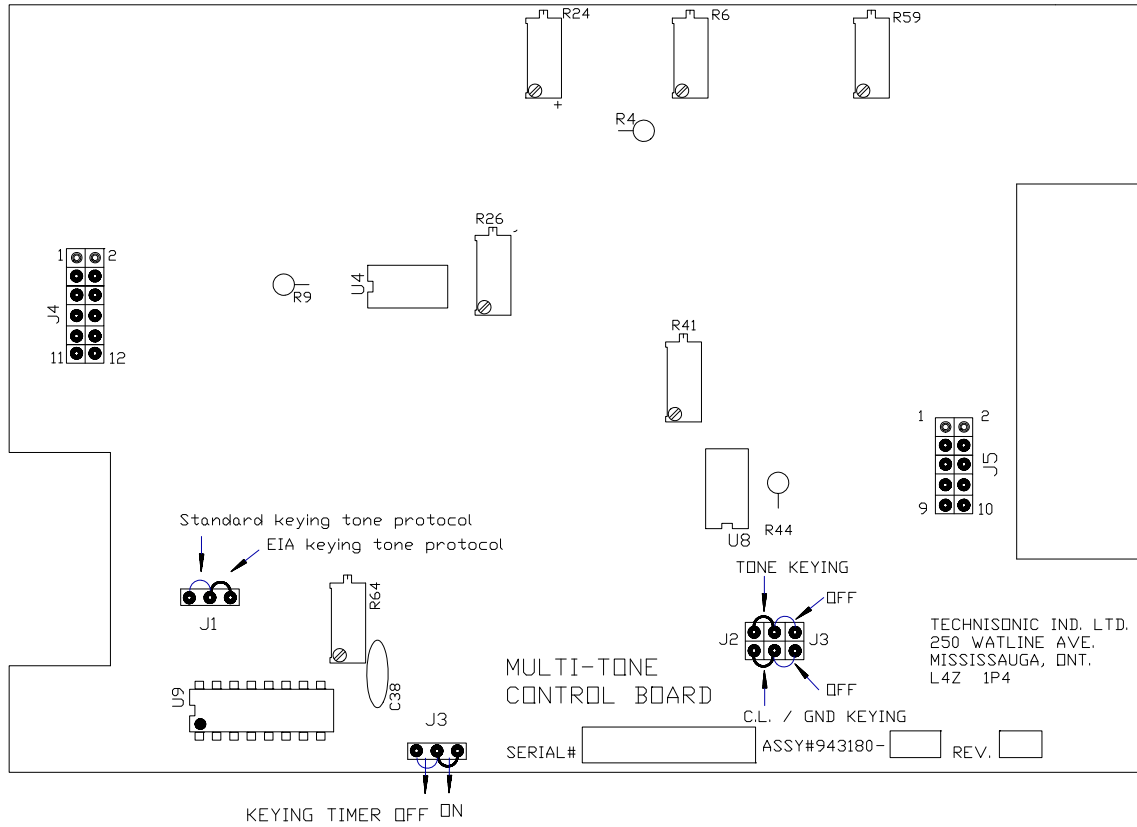
Set **J2** for Tone keying function **ON** (left jumper position) or **OFF** (right jumper position).

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 R24 R26 R41 R59 R64	Tx audio level Adjustment Keying Tone Attenuator 1950 Tone level Adjustment 2175 Tone Level Adjustment Sets Rx Audio Level Adjustment (Range -15 dBm to +10 dBm). Sets Timeout Timer (Range 30 to 300 Seconds)

**Control Configuration for Multi-Tone
Control Board**
Assembly #: 943180-1



⊃ 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 2.4 Line Interface/Remote Control Board P/N 943180-1 (TLI-180)

2.5 TRANSMITTER ADJUSTMENTS AND SETTINGS

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

2.6 OPERATIONAL CHECK

Perform an operational check of the transmitter after all adjustments. Ensure that the transmitter operates in both the transmit and stand-by 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.

2.7 STORAGE

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

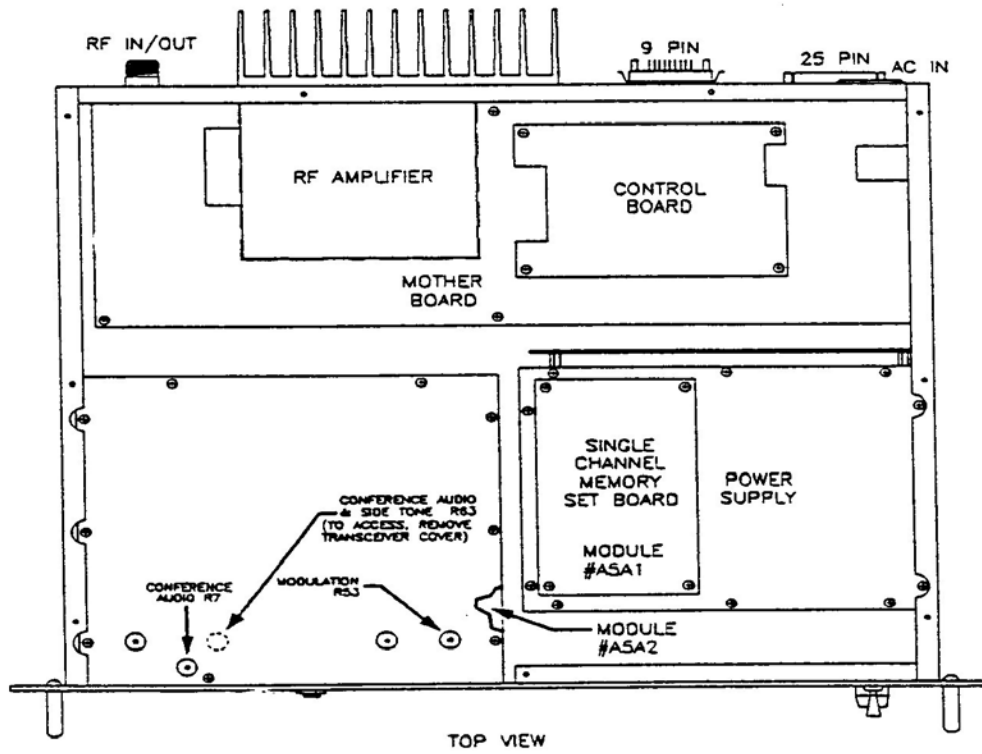
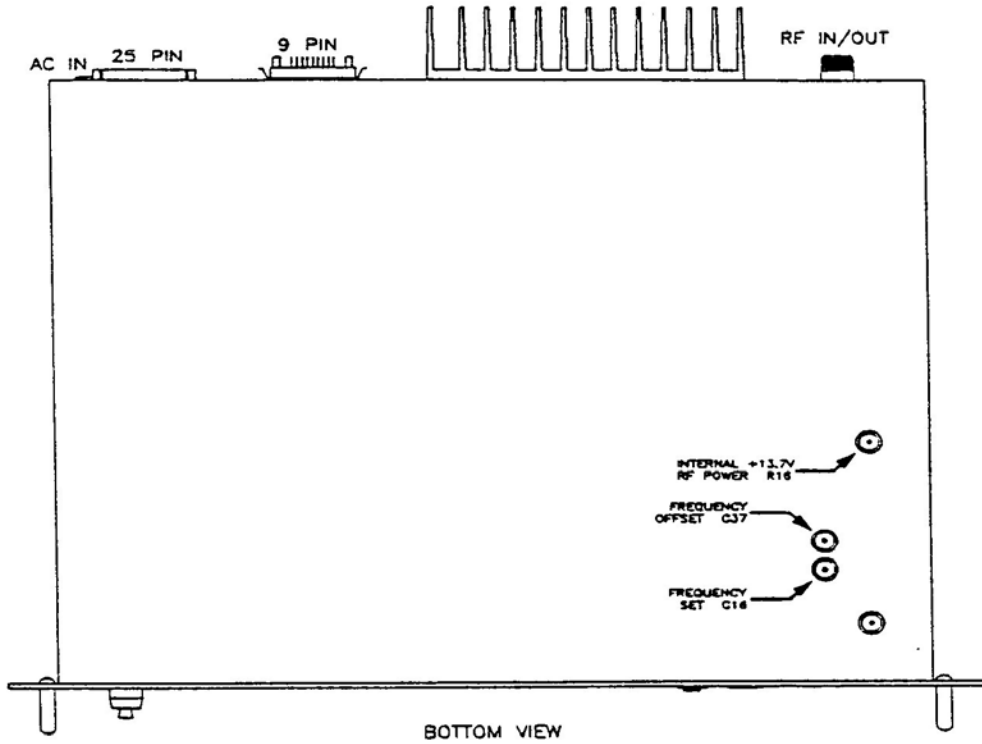


Figure 2.5 Transmitter Settings and Adjustments

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 Single Channel Transmitter, including the PRESS-TO-TALK switch located on the microphone. Operating instructions for transmit in the local or remote mode are also included.

3.2 INSTALLATION

The Single Channel Transmitters 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 600 ohm 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 Transmitter in 19 inch rack with 4 screws.
- (2) Install Microphone in Microphone (PTT) connector if required.
- (3) Ensure that Transmitter 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 pinouts.)
- (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.

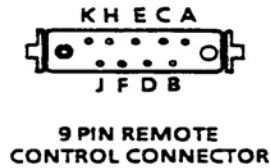
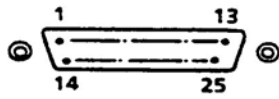
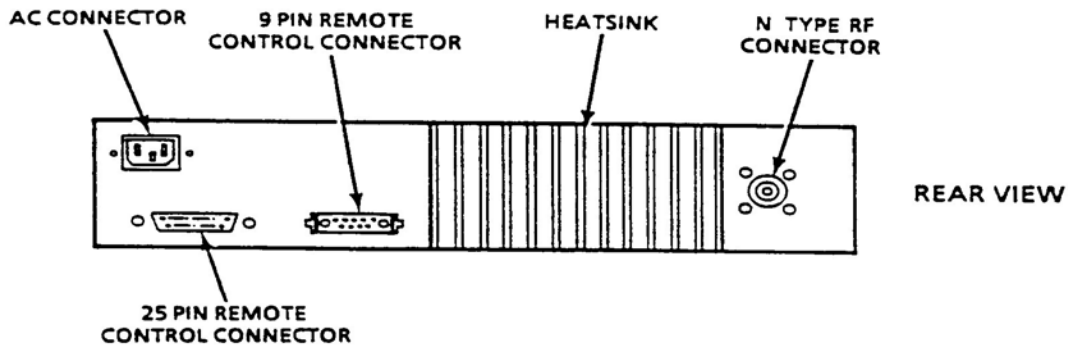
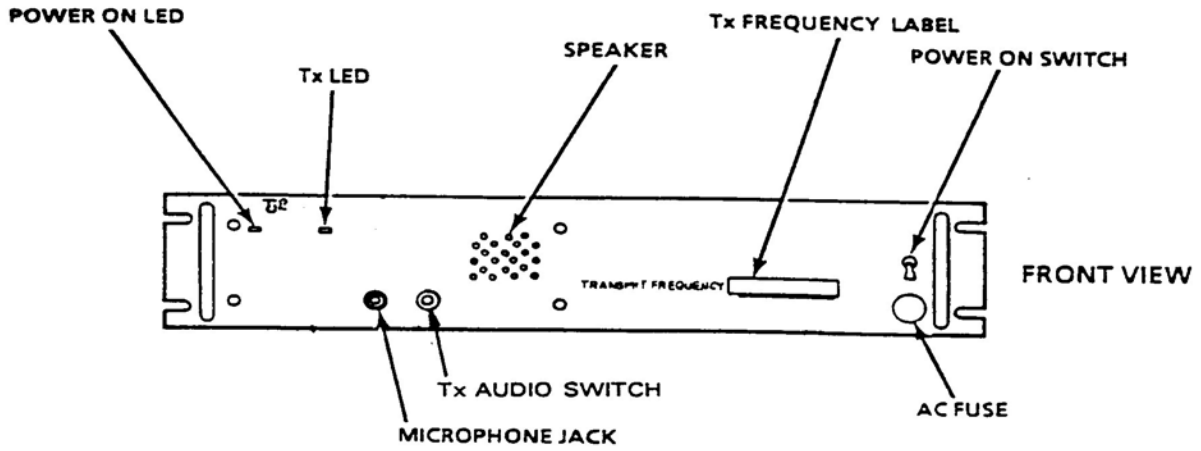


Figure 3.1 Single Channel Transmitter Controls and Indicators

TABLE 3.1 OPERATORS SWITCHES, CONTROLS AND INDICATORS		
Item No.	SWITCHES CONTROLS & INDICATORS	FUNCTIONAL DESCRIPTION (* Denotes items located on rear panel)
1	POWER ON/OFF SWITCH	A toggle switch applies the AC power to the power supply and the DC 27.5 or 13.7 Vdc nominal power to the transmitter. The transmitter is switched to ON in the toggle UP position the transmitter 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 transmitter.
3	Tx ON AMBER LED INDICATOR	An AMBER LED indicates when the transmitter is keyed by the microphone PRESS-TO-TALK (PTT) switch or remote land line, and the transmitter is in the Tx mode. The Tx ON AMBER LED switches OFF, when the transmitter is in the stand-by mode.
4	Tx AUDIO SWITCH	A three position high-off-low switch is provided to externally control the levels or to turn-off Tx audio input from a remote location.
5	MIC/PTT CONNECTOR	A standard 0.2 inch 3-pole jack is provided to connect a microphone with PTT to the transceiver front panel.
6	TX LABEL	Indicates the frequency programmed for transmit.
7	LOUDSPEAKER	An 8-ohm internal speaker reproduces the Tx audio input, for maintenance or conferencing functions.
8	AC FUSE	A 2.5 Amp fuse protects the Base Station power supply from power supply internal short circuit or transceiver short circuit.
9	* "N" TYPE CONNECTOR	A 50 ohm coaxial connector provides connection to external antenna.
10	*AC POWER CONNECTOR	3 Prong AC Connector for use with AC Power Cord P/N 927002-1.
11	*9 PIN REMOTE CONTROL CONNECTOR	9 Pin "D" type connector provides connections required for remote operation. Refer to Table 2.1 for connector details.
12	*25 PIN REMOTE CONTROL CONNECTOR	25 Pin "D" type connector provides connections required for remote operation. Refer to Table 2.1 for connector details.

* 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 transmitter.
- (2) Set the Tx AUDIO switch to the desired High, Low or OFF position.
- (3) Set the POWER ON/OFF switch to "ON".
- (4) Verify that the FUSE BLOWN red LED is OFF.
- (5) Verify that the POWER ON green LED is ON.
- (6) Proceed to operate in the transmit mode, as per paragraph 3.4.1.

3.4.1 Transmitter Operation (Local Mode)

To operate the transmitter 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 canceling 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 transmitter is now operating in the stand-by mode.
- (8) Verify that the Tx ON amber LED is OFF.

3.4.2 Switching OFF

To switch off the transmitter:

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

NOTE

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

3.4.3 EXTERNAL DC OPERATION

- (1) Set AC ON/OFF switch to OFF.
- (2) Refer to Figure 3.1 for External DC Power Connections.

NOTE

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

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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

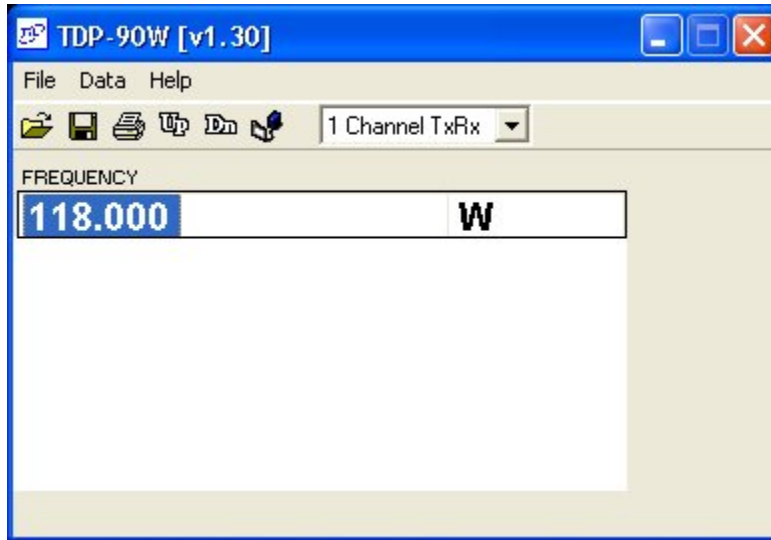


Figure 1

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

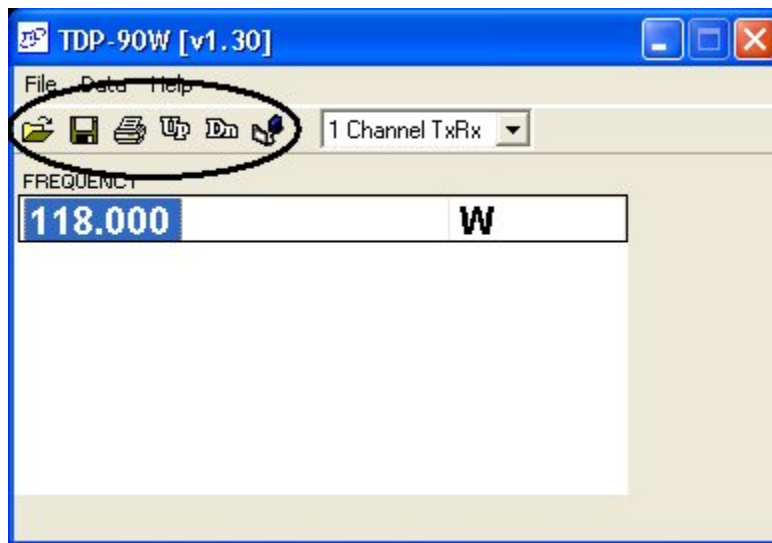


Figure 2

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.

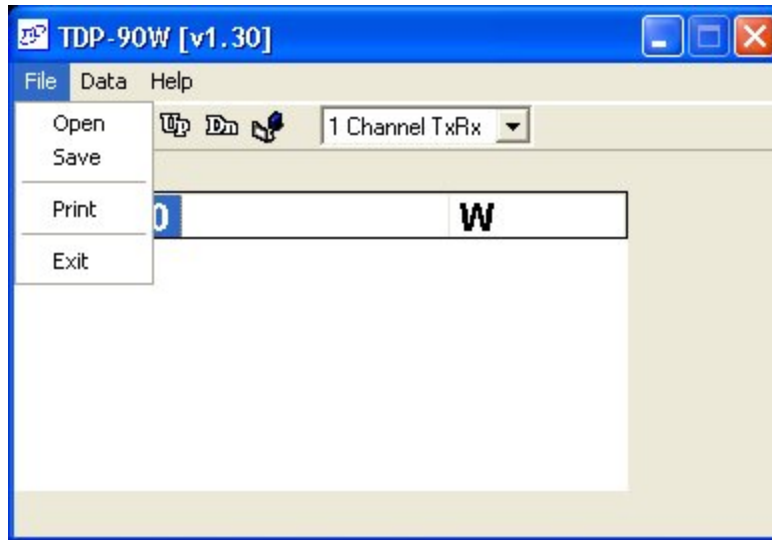
FILE MENU

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

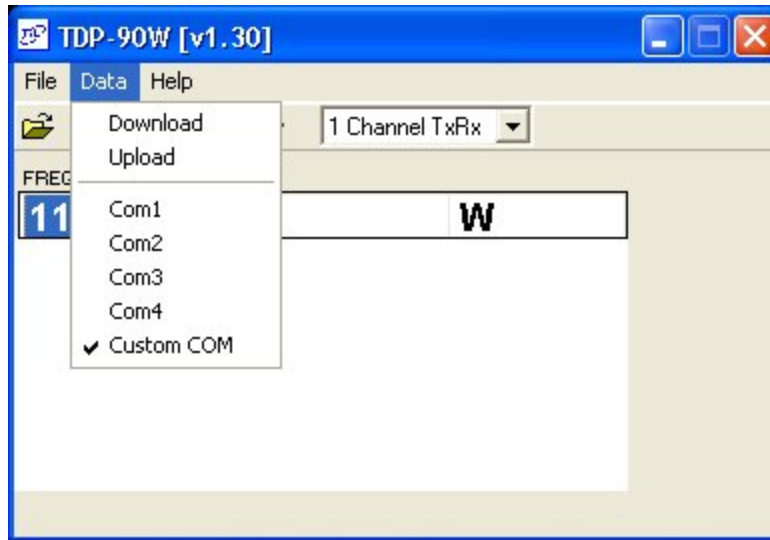
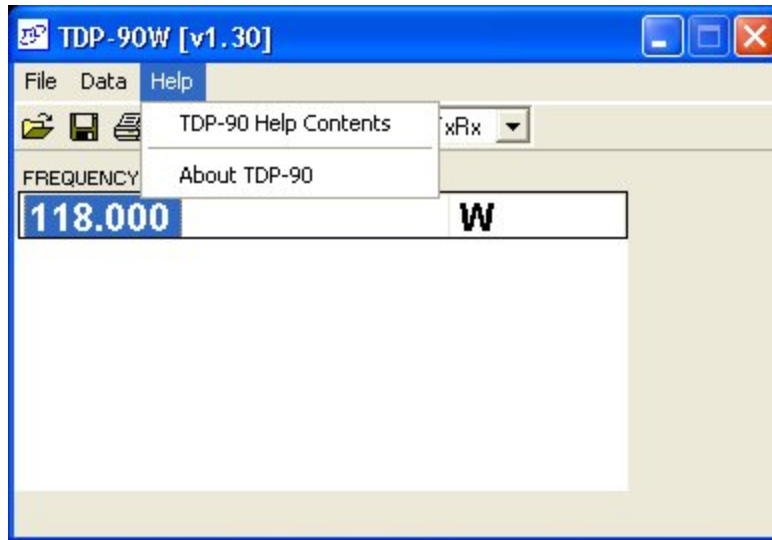


Figure 4

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

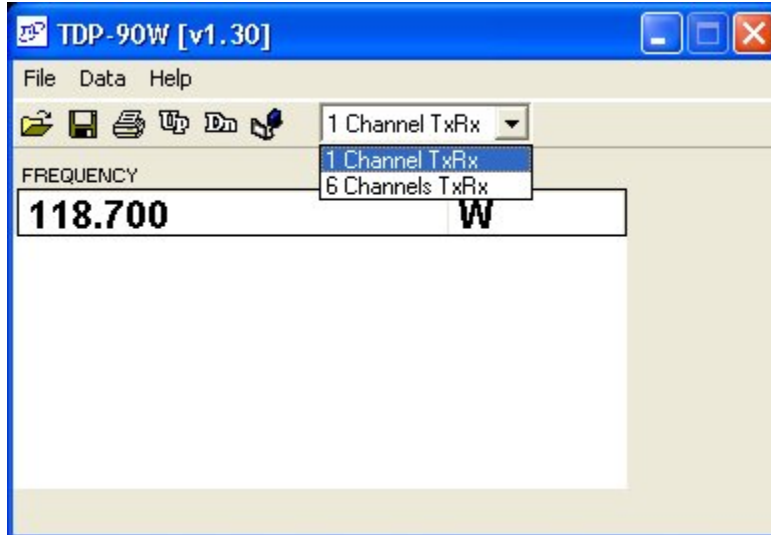


Figure 6

6 CHANNEL TRANSCEIVER

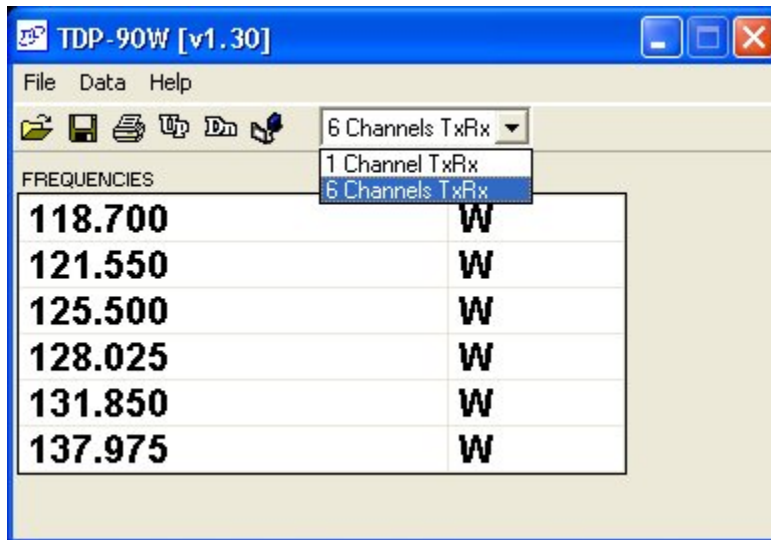


Figure 7

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.