

AIRBORNE TRANSCEIVER MODEL TDFM-7300

User's Manual

July 2008

Technisonic Industries Limited


240 Traders Blvd, Mississauga, Ontario L4Z 1W7

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www.til.ca

CAUTION

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

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

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

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

NOTE: *This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning:

Changes or modifications not expressly approved by Technisonic Industries could void the users authority to operate the equipment.

WARRANTY INFORMATION

The Model TDFM-7300 Transceiver is under warranty for one year from date of purchase. Failed units caused by defective parts, or workmanship should be returned to:

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

Technisonic Industries Limited
Amherst,
New York

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Summary of DO-160C Environmental Testing for Technisonic Model TDFM-7300 Transceiver.

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to categories C4 and D1.
Vibration	8.0	Equipment is tested without shock mounts to categories B, M and N.
Magnetic Effect	15.0	Equipment is class Z.
Power Input	16.0	Equipment tested to category B.
Voltage Spike	17.0	Equipment tested to category B.
RF Emission	21.0	Equipment tested to category Z.

Installation Approval Note

Presently no TSO standard exists for airborne FM transceivers. To make it easier for installation agencies to provide their customers with an approved installation supported by an effective Airworthiness Approval, Technisonic has secured Supplemental Type Certificate (STC) Approvals (both US and Canadian) on its Airborne FM products for many helicopters currently being delivered in the US and Canada as well as a number of fixed wing aircraft. The above referenced DO-160C test data is also on file and available from Technisonic to support approval requirements in airframes for which Technisonic does not possess an STC.

Approved aircraft types are listed in the attachments to the formal STC documents. These STC's are the exclusive property of Technisonic and require the written authority of Technisonic for their use. To assist Factory Authorized Technisonic Dealers in the certification process, we have placed copies of our Canadian and US STC's on our web site along with a letter of authorization for their use. These documents may be downloaded and used as support for the technical submission to FAA or Transport Canada. Only factory authorized dealers/installers are permitted to download and make use of these documents on behalf of their customers (end users) in support of regulatory agency approval. Please refer to the Technisonic web site www.til.ca for the latest issue of available STC's and letter of authorization for use.

SECTION 1

GENERAL DESCRIPTION

1.1 DESCRIPTION

The TDFM-7300 is an airborne low band VHF FM transceiver capable of operating between 30 and 50 MHz.

1.2 TECHNICAL CHARACTERISTICS

<u>Specification</u>	<u>Characteristic</u>
Model Designation:	TDFM-7300
Physical Dimensions:	Approx. 3.75" X 5.75" X 8.0"
Weight:	~6.0 lbs. (2.7 kg)
Operating Temperature Range:	-30°C to +60°C
Power Requirement:	
Voltage:	28.0 Vdc, ± 15%
Current:	500mA minimum / 5A maximum
Audio Output Power (including sidetone):	600 mW into 600 ohms
Microphone Inputs:	Carbon or Equivalent
Panel Back Lighting:	
Voltage:	28 VDC or 5VAC (selectable)
Current:	10 uA

General

Memory Positions:	200
Tuning Increments:	2.5 kHz
Wide Band Channel Spacing:	20 kHz
Operating Mode:	FM (F3E)
PL / CTCSS Tones:	All Standard Tones RX & TX
DPL / DCS Codes:	All Standard Codes RX & TX
DTMF:	Transmit Encoder Only

Transmitter section

Frequency range: (MHz)	30 – 50
Power Output: (Watts)	1 or 10 max.
Harmonic Attenuation: (dBc)	-65
FM Hum and noise in dB (wideband):	-40
Audio Distortion:	< 5%
Frequency Stability (ppm):	± 2.5
Modulation Limiting	± 5 kHz

Receiver section**VLO**

Sensitivity: (uV)	0.35
Selectivity: (dB)	-75
Intermodulation: (dB)	-70
Spurious Attenuation: (dB)	-80
Image attenuation: (dB)	-70
Hum and Noise: (dB)	-40
Audio Distortion:	< 5%

SECTION 2 OPERATING INSTRUCTIONS

2.1 GENERAL

A 5-line display and a keypad and a rotary knob provide the operator control of the unit. The knob has multiple functions including volume, and channel. The microphone, key line and headphone audio can be wired separately for each of the 4 bands therefore switching from band to band is performed at an audio panel such as the Technisonic A71X series.

2.3 POWER SWITCH

To switch the transceiver on, press and hold the knob until the radio powers up. The display will show *TECHNISONIC* and the software version installed followed by the model number along with which RF modules are installed. The display will then show the normal display. To switch off the transceiver at any time, press and hold the knob for 2 seconds until the display shows *OFF* then release. If it is desired that the radio turns on with the radio master in the aircraft, a power jumper may be installed (see installation instructions) such that the radio is always on. The battery master must be used to turn the radio off with this jumper installed.

2.4 KNOB

The knob is a rotary encoder, which turns endlessly, meaning its actual position is not important. The knob also has a push button incorporated in it so you can press the knob as well as turn it. The knob will start out as a volume control. Pressing the knob again will change its function to act as the channel selector. Pressing the knob again causes the keypad function to change from function keys to number keys. The knob in this mode acts as a volume control. Another knob press will bring you to the recall mode. In the recall mode, typing in the channel number will bring you quickly to that channel without scrolling through channels in between. Pressing the knob again brings it back to the volume control mode. The current function of the knob is shown at the bottom right of the display.

2.5 SOFT KEYS AND HOME

The transceiver has three *soft* keys, which assume the function shown on the menu above them on the display. Menu items include:

PWR - Selecting PWR will allow the power output of the radio to be set to high or low.

SCAN – Selecting SCAN will invoke the radio to scan the channels previously programmed into the scan list.

FPP – Front Panel Programming mode. Allows you to program channels with TX/RX frequencies, channel name, tones or codes.

At any time while in one of these functions, you can escape back to the normal mode by pressing the HOME key.

2.6 FUNC KEY

Pressing the FUNC key will bring up the first functions menu:

F1-F4 = Channels – Pressing one of these keys will load a preprogrammed channel.

4 = Record – Pressing 4 will cause the transceiver to record the next message received on the band selected.

5 = Playback – Pressing 5 will play the last message recorded.

Pressing the FUNC key again will bring up the second menu. The following functions are available:

2 = Configuration – Enters the configuration menu (see 2.18 configuration menu). This is the same menu that can be invoked during boot up.

4 = F1-F4 Programming – Allows you to program a channel and zone to the F1 to F4 keys.

5 = Simplex Repeat – When turned on, the band selected will become a simplex repeater. Simplex repeat (sometimes called parrot repeat) will record an incoming message and immediately retransmit the message on the same frequency.

2.6 MUP AND MDN KEYS (Memory Up and Down Keys)

Pressing these keys allow you to scroll up and down through the 200 available channels. The function of the rotary knob is automatically set to CHAN.

2.8 BRT AND DIM KEYS

Use these keys to dim or brighten the display. The radio powers up at full brightness for normal use but can be dimmed for night operations.

SECTION 3

INSTALLATION INSTRUCTIONS

3.1 GENERAL

This section contains information and instructions for the correct installation of the TDFM-7300 Transceiver.

3.2 EQUIPMENT PACKING LOG

Unpack the equipment and check for any damage that may have occurred during transit. Save the original shipping container for returns due to damage or warranty claims. Check that each item on the packing slip has been shipped in the container.

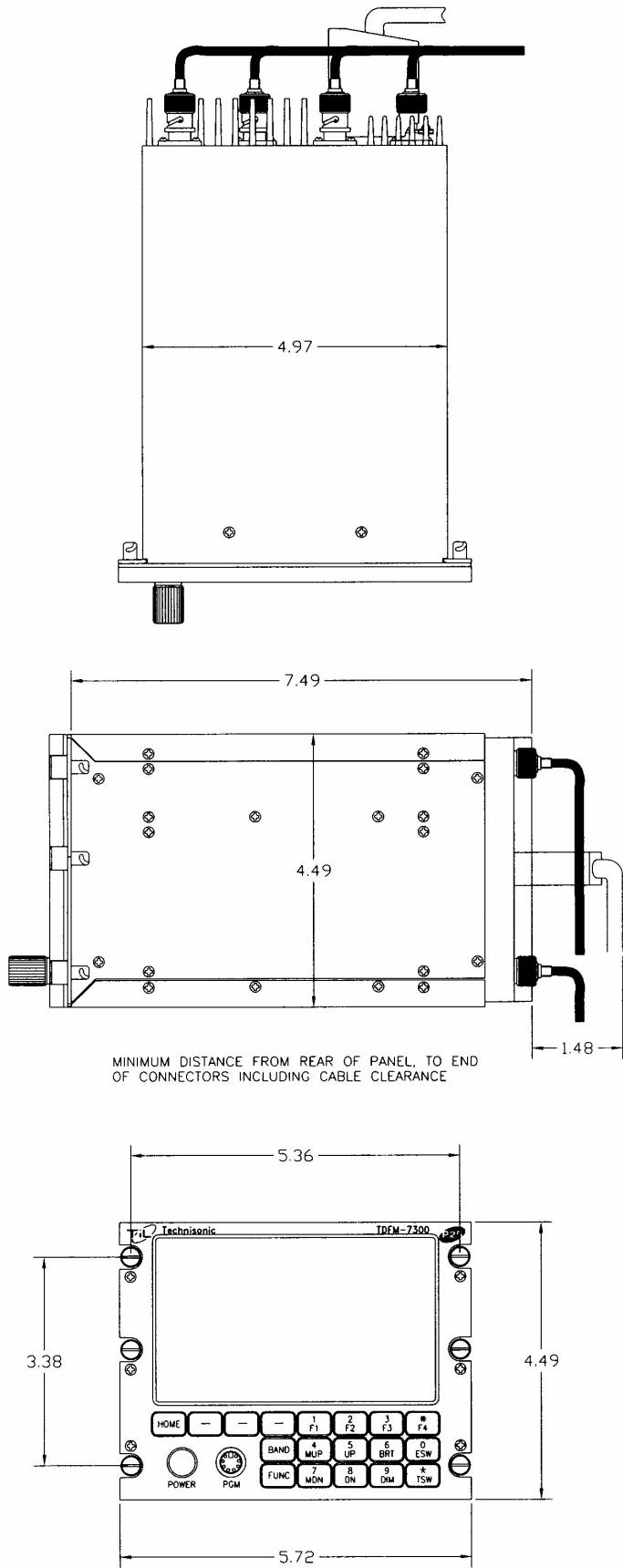
3.3 INSTALLATION

The TDFM-7300 Transceiver is designed to be Dzus mounted and should be installed in conjunction with an IN-7300 installation kit. See Figure 3-1 for an outline drawing of the unit with dimensions to facilitate the installation.

3.4 INSTALLATION KIT - CONTENTS

The IN-7300 installation kit (P/N 059615-1) consists of:

1. One 25 pin Cannon D mating connector (female) complete with crimp pins and hood.
2. One 9 pin Cannon D mating connector (female) complete with crimp pins and hood.
3. 4 BNC connectors.



MINIMUM DISTANCE FROM REAR OF PANEL, TO END OF CONNECTORS INCLUDING CABLE CLEARANCE

FIGURE 3-1 Outline Drawing for Model TDFM-7300

3.6 INSTALLATION - PIN LOCATIONS AND CONNECTIONS

J1 - 25 Pin D Connections - Use FEMALE Connector	
Pin #	Description
1	Ground
2	Main Power +28 VDC
3	Mic 1
4	Audio 1
5	PTT 1
6	Mic 2
7	Audio 2
8	PTT 2
9	Mic 3
10	Audio 3
11	PTT 3
12	TX Data
13	RX Data
14	Ground
15	Main Power +28 VDC
16	Channel Up
17	Channel Down
18	LH Data
19	SB9600 Busy
20	OPTB+
21	CTS Out
22	Boot DIN
23	RTSBIN
24	RS232DIN
25	Panel Backlighting

TABLE 3-1

J2 - 9 Pin D Connections – Use FEMALE Connector	
Pin #	Description
1	Ground
2	Audio Combined
3	PTT 4
4	PTT Combined
5	Audio 4
6	Mic 4
7	Mic Combined
8	On Power
9	Speaker Combined

TABLE 3-2

P1 - 15 Pin (high density) D Connections – Use FEMALE Connector	
Pin #	Description
1	4 MHz
2	8 MHz
3	10 MHz
4	20 MHz
5	40 MHz
6	Audio 5
7	No connection
8	No connection
9	No connection
10	Tune Indicator
11	Speaker 5
12	Tune Enable
13	Ground
14	PTT5
15	Mic 5

TABLE 3-3

3.7 INSTALLATION - WIRING INSTRUCTIONS

Figure 3-2 shows all required connections and recommended wire sizes for the TDFM-7300 transceiver.

3.8 MAIN GROUND – J1 PINS 1 AND 14

Both pins should be connected to ground. The main ground is internally connected to the chassis.

3.9 MAIN POWER +28 VDC – J1 PINS 2 AND 15

Both pins should be connected to +28 volts DC +/- 15%.

3.10 MIC 1, 2, 3, 4 AND 5 – J1 PINS 3, 6, 9, J2 PIN 6 AND P1 PIN 15

The microphone input signals shall be connected using shielded wire with the shield connected to ground (pin 1 or 14). It is recommended for best results to leave the other end of the shield floating to prevent ground currents unless you are connecting to an audio panel with floating hi and lo inputs (like the Technisonic A710 or A711 series) in which case the shield must be connected to the lo input.

3.11 AUDIO 1, 2, 3, 4, 5 AND COMBINED – J1 PINS 4, 7, 10 J2 PINS 5, 2 AND P1 PIN 6

Audio outputs are 600 ohms impedance against ground. The output power is 600 mW maximum. Unused outputs do not have to be terminated and should be left unconnected.

3.12 PTT 1, 2, 3, 4, 5 AND COMBINED – J1 PINS 5, 8, 11, J2 PINS 3, 4 AND P1 PIN 14

The PTT lines should be floating when in receive and grounded for transmit. The input has a pull up resistor to 5 volts. Connecting an audio panel that wishes to see more, may result in no receive audio. Connect a

1N4006 diode in series with the cathode towards the audio panel in this case.

3.13 TX DATA AND RX DATA – J1 PINS 12 AND 13

These pins provide RS-232 serial communications for use with the RC-7300 remote control head if installed. Consult the RC-7300 installation manual for details.

3.14 CHANNEL UP AND CHANNEL DOWN – J1 PINS 16 AND 17

These pins can be used to scroll up and down through the zone/channel/mode/talk group selections for the band currently displayed on the screen. The inputs normally floating are grounded to activate. Two push buttons or a center off, SPDT, spring loaded toggle switch are typically used on these inputs. If both pins are grounded simultaneously, the next band will be selected.

3.15 LH DATA, SB9600 BUSY, OPTB+, CTS OUT, BOOT DIN, RTSBIN AND RS232DIN – J1 PINS 18 THROUGH 24

These pins are used for programming or updating the transceiver using Motorola Customer Programming Software (CPS™) or encryption key loading and are left unconnected. They may be used to update the radio once it is removed from the aircraft. These pins are also brought out to the TDFM-7300's front panel mini-DIN connector to allow programming in the aircraft.

3.16 PANEL BACKLIGHTING – J1 PIN 25

Connect to aircraft panel dimming bus. The transceiver is capable of supporting 28 VDC or 5 VAC backlighting circuits. Select 28 volts DC or 5 volts AC via the configuration menu (see section 2.18). No damage will occur if the wrong setting is made.

3.17 ANTENNA TUNER CONTROL LINES – P1 PINS 1, 2, 3, 4, 5, 6, 10 AND 12

These connections are to control an antenna tuner system such as the Foxtronics FLX-3050B. Connect according to the manufacturer's instructions. In the case of the FLX-3050B, the tune indicator which is normally connected to a light, can be connected to pin 10 so that the tuning indication will show on the TDFM-7300 display.

3.18 POWER JUMPER

The radio must be turned on manually each time the avionics bus is switched on. If it is desired that the radio comes on with the radio master in the aircraft, remove the right side panel from the radio and install the supplied 0.1" jumper across JP1 (two pins) near the rear of the radio on the right side of the MCU board. The radio is shipped with the jumper on only one of the two pins. If you attempt to turn off the radio with the jumper installed across the two pins, it will just come back on again in 5 seconds.