

TX 720
VHF COMM TRANSCEIVER
OPERATOR/INSTALLATION MANUAL



TERRA Corporation
3520 Pan American Freeway N.E.
Albuquerque, New Mexico U.S.A. 87107-4796
Telephone 505-884-2321
Telex 9103803044 Terra Corp.
FAX 505-884-2384

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3520 PAN AMERICAN FREEWAY N.E.
ALBUQUERQUE, NEW MEXICO 87107-4796
PHONE # (505) 884-2321
FAX # 505 884 2384
TELEX # 9103803044

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VHF TRANSCEIVER

SECTION I

1. INTRODUCTION

1.1. SCOPE

This manual provides installation and operating instructions for the Terra TX 720 Communications Transceiver manufactured by Terra Corporation of Albuquerque, New Mexico.

1.2. DESCRIPTION

The Terra TX 720 is a small, lightweight, all solidstate amplitude modulated VHF transceiver. It provides simplex communication on any one of 720 channels. Channel spacing is 25 KHz.

The TX 720 features a digital frequency synthesizer that employs only 4 crystals for generating the frequencies required for all transmit and receive functions for 720 channels. Other features include automatic voice leveling on transmit and receive, crystal monolithic IF filters and integrated circuit IF amplifiers, low-noise MOSFET RF amplifier, automatic squelch circuit with manual over-ride, solid-state antenna switching and solid-state tuning.

The transceiver mounts in a single or dual mounting tray supplied with the unit. All power, control and antenna connections are made to connectors installed on the mounting tray.

The transceiver is locked securely to the mounting tray by a positive locking cam accessible through the front panel.

The TX 720 requires 13.75 volts for operation. An MLC 28-5 DC Converter is required for 27.5 volt operation. The converter is available from Terra Corporation as optional equipment.

The transceiver is designed to operate with standard aircraft microphones, headsets, speakers, auxiliary audio inputs and 50 ohm broad-band communication antenna systems.

SECTION II

2. SPECIFICATIONS

The following are pertinent specifications for the FCC type-accepted Terra Model TX 720 transceiver.

2.1. MECHANICAL SPECIFICATIONS

Mounting: Panel mounted using sleeve supplied with unit.

Overall Dimensions: 10.62" long, 3.20" wide, 1.62" high (27 cm long, 8.1 cm wide, 4.1 cm high).

Mounting Dimensions: 10.33" behind panel, 3.20" wide, 1.62" high (24.8 cm behind panel, 8.1 cm wide, 4.1 cm high).

Weight: 1.25 pounds (0.568 kg).

Connectors: Antenna input/output-BNC (Female).
Interconnect cable - 15 pin "D" type with snap-lock retainer.

Power Requirements: Volts input: 13.75 volts.
Note: MLC 28-5 converter is required for 27.5 volts operation.

2.2. ENVIRONMENTAL SPECIFICATIONS

Maximum Operating Conditions

Altitude: To 30,000 feet (9150 meters)

Humidity: To 95% @ 50 degrees C (122 degrees F)

Operating Temperature Range: -20 degrees C (-4 degrees F) to +60 degrees C (140 degrees F).

Vibration: 0.5 G from 5 to 500 Hz/Second

2.3. ELECTRICAL SPECIFICATIONS

RECEIVER

Frequency Range: 118.00 to 135.975 MHz
Number of Channels: 720
Channel Spacing: 25 kHz
Sensitivity: Less than 1 microvolt for 6dB signal plus noise to noise ratio
Selectivity: Typically -6dB at 14 kHz; - 60 dB at 40 kHz
Squelch Sensitivity: Automatic 50 to 10 microvolt
Manual 25 to 150 microvolt
Automatic Gain Control (AGC): Audio flat within 3dB for 3 microvolt to 30,000 microvolt input
Undesired Response: Greater than 60dB down
Adjacent Channel Rejection: Greater than 60dB
Auxiliary Inputs: 4 inputs with minimum of 30dB isolation. One volt input will produce one volt output at 1 kHz across a 3.2 ohm resistor connected to the speaker terminals.
Incidental Radiation: Certified per FCC Part 15 requirements

TRANSMITTER

Frequency Range: 118.000 to 135.975 MHz
Number of Channels: 720
Frequency Stability: +0.002% per FCC Type Acceptance
Power Output: 5 watts nominal, unmodulated carrier; 20 watts PEP
Modulation: Automatic audio leveling for a minimum of 80% and a limit of 95%
Output Termination: 50 ohms nominal
Spurious Responses: Greater than 50dB below carrier level
Sidetone: Up to 25 milliwatts into 600 ohm headphones
FCC Approval: Type accepted per FCC Part 87

SECTION III

3. INSTALLATION AND OPERATION

3.1. EQUIPMENT SUPPLIED

1. 1 ea. VHF Transceiver Terra Model TX 720
w/lighted panel - Terra P/N 0900-0725-00
2. 1 ea. Mounting Tray (Sleeve)
Terra P/N 1900-1129-20
3. 4 ea. 6-32 x 3/8" flat head Phillips machine
screws
4. 4 ea. 6-32 Hex Nuts
5. 4 ea. #6 Internal Lock Washer
6. 1 ea. Owner/Installation Manual
7. 1 ea. Warranty Card
8. 1 ea. FCC Form 404
9. 1 ea. FCC Form 406

3.2. OPTIONAL EQUIPMENT

Noise-cancelling Microphone, Carbon, Push-to-talk
Terra P/N 0900-0151-01

Voltage Converter 13.75 to 27.5 V - Model MLC 28-5
Terra P/N 0900-3219-12

Push-to-talk Switch
Terra P/N 0900-0203-01

3.3. ADDITIONAL EQUIPMENT REQUIRED

Sufficient RG 58U or RG 58A/U, 50 ohm coaxial
antenna cable to reach from the transceiver to the
antenna. BNC coaxial fittings as required for the
particular installation.

3.4. LICENSE REQUIREMENTS

The operator of the Terra TX 720 transceiver is
required by the Federal Communications Commission
to hold a restricted radio-telephone operator's
permit, or a higher class of license. A
U.S. citizen may obtain the operator permit from
the nearest FCC office.

3.4. LICENSE REQUIREMENTS (Continued)

The transceiver, when installed in an aircraft, requires an Aircraft Radio Station License. This license may be obtained by filing an FCC form 404. The transceiver should be identified as Terra TX 720 on the form under Type Acceptance Number. If a copy of the filed Form 404 is kept in the aircraft, the TX 720 may be operated up to 30 days while awaiting the formal license.

For Ground Station operation, Form 406 should be filed as above.

3.5. PREPARATION FOR USE

Every precaution has been taken to protect your TX 720 during shipment. Upon receipt of the equipment, perform the following inspections:

1. Remove the unit from the shipping container and visually inspect for damage.
2. Check controls and switches to determine if they may have been damaged.
3. Make sure that all hardware and connectors listed in Section I, under "Equipment Supplied", are present.

If the unit is damaged, a claim must be filed with the carrier. The carrier assumes title of the unit when accepted for shipment. Do not return it to Terra or its representatives.

3.6. INSTALLATION

The following items and suggestions should be considered prior to installation of your Terra TX 720 Transceiver:

1. Select a location that provides ease of operation.
2. Avoid installing the TX 720 near heat sources. If it is mounted in a high heat area, additional cooling provisions are recommended.
3. Insure that adequate clearance exists behind the panel for the tray assembly. A minimum of 12" (30.5 cm) is recommended.
4. Refer to Terra TX 720 outline drawings (Fig. 2-1) for panel cut-out details and mounting dimensions.

3.6 INSTALLATION (Continued)

5. Install the tray assembly on the instrument panel. Comply with standards set forth in the FAA Aircraft Inspection and Repair Document AC 43.13.2.

NOTE: INSURE THAT THE TRAY IS INSTALLED WITH THE OPEN SIDE TOWARD THE TOP.

6. The 15 pin connector assembly supplied with the Terra TX 720 must be wired correctly to connect to the aircraft avionics system.
CAUTION! The operating voltage of the Terra TX 720 is 13.75 V nominal for direct connection to an aircraft 12-14 volt electrical system. If the aircraft electrical system supply is 24-28 volt, it will be necessary to employ a converter to reduce the 28 volts to 13.75 volts for the Terra TX 720. Terra can supply an optional converter specifically designed for this purpose. It is Terra P/N 0900-3219-12, Model MLC 28-5.
The interconnecting wiring for the 15 pin connector is shown in Figure 2-2. Comply with standard set forth in FAA Aircraft Inspection and Repair Document AC 43.12.1, Section 7.
7. Install the TX 720 in the mounting tray assembly. Use caution as the rear connectors mate. After the float mounts are positioned correctly, (a little twisting at the front panel may be necessary), the unit will fully engage the connectors with light to medium pressure on the front panel.
8. Insert a 7/64" Allen wrench in the front panel hole and engage the locking screw. Turn clockwise until the cam has engaged itself in the tray and is moderately tightened. Use caution to prevent stripping the threads on the locking cam or screw.
9. To remove the unit from the mounting tray, insert the 7/64" Allen wrench in the locking screw and turn counterclockwise. The cam will move the unit outward about 1/4" and disengage the connectors. The unit may now be pulled out of the mounting tray by hand.

3.7. COMMUNICATION ANTENNA INSTALLATION

A 50 ohm broadband VHF communication antenna covering the range of 118.0 to 135.975 MHz is recommended. Whips or bent antennas are not recommended if the radio is to be used over its entire range of 118-135.975 MHz. They may be used if the channels are grouped together over a narrow portion of the range. Connect the antenna to the Terra TX 720 using standard 50 ohm coaxial antenna cable such as RG 58A/U. Terminate the cable with BNC coaxial cable connectors as required.

CAUTION! Proper installation of the coaxial cable and the antenna per FAA Aircraft Inspection and Repair Document AC 43.13.2, Chapter 3, is very important to prevent possible mismatch of the transmitter output. Operation with a mismatch may destroy the output stages of the transmitter. **DO NOT** operate the transmitter for more than a few seconds until a proper match is obtained.

3.8. OPERATIONAL CHECKOUT

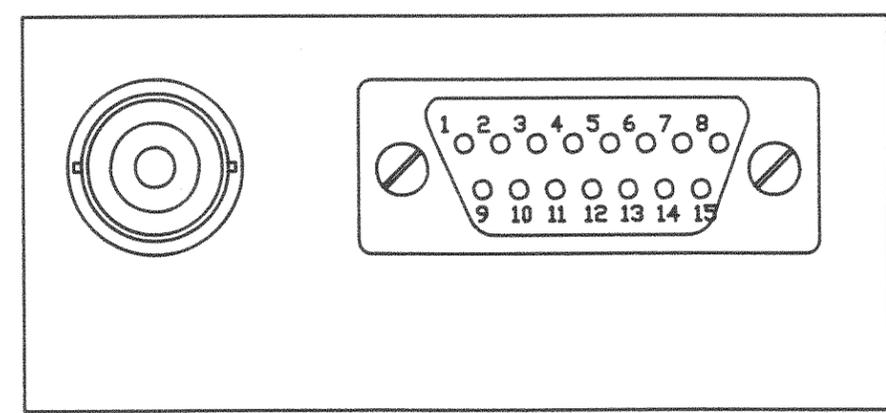
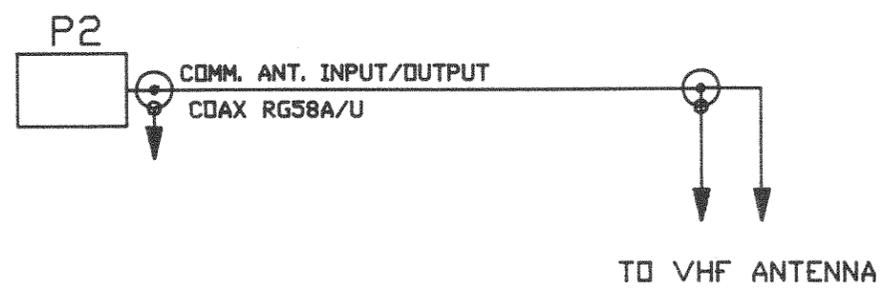
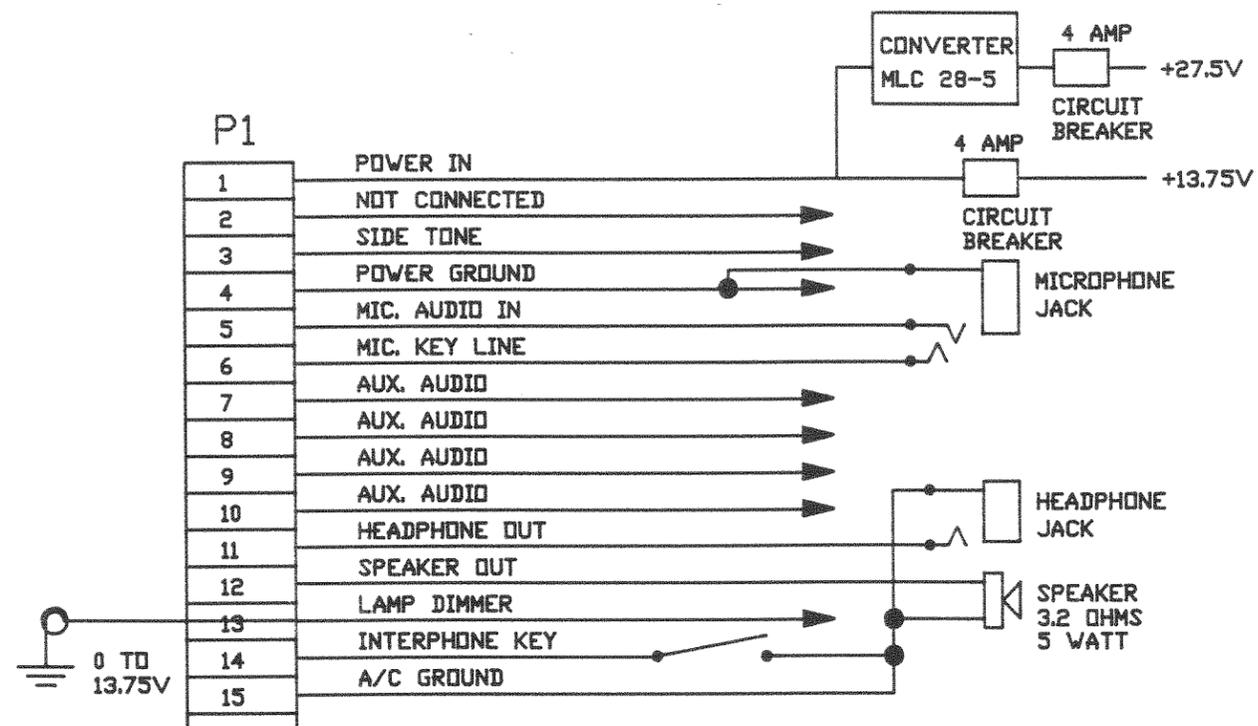
1. Rotate volume control clockwise to turn transceiver on.
 2. Adjust channel switch to desired frequency.
 3. Adjust squelch control until switch clicks into a fully counterclockwise position. This is the automatic squelch mode. No background should be heard. If there is a signal, it should be heard. Adjusting the squelch control in the clockwise direction activates the manual squelch mode. Rotate the control clockwise until background noise is heard, then rotate it slightly counterclockwise until the noise stops.
 4. Adjust volume for desired level during receipt of transmissions.
 5. Plug microphone into remote microphone jack.
 6. Verify transmitter operation by communicating with another station. Verify at the high, middle and low frequency channels, if possible.
 7. Plug headset into remote jack and observe quality of output. If transmit sidetone is used, verify quality and level in headset.
- NOTE:** If a loudspeaker is not used it will be necessary to connect a 47 ohm .5 watt resistor across the speaker terminals (pin 12 and pin 15) of the 15 pin connector. Damage to the output IC could occur if this is not done.

3.9. FINAL INSPECTION

1. Insure that all wiring is secure. Dress cables neatly and secure them in place with cable ties. Check that connectors are right and locked to the radio. Be sure locking fastener holds radio securely in place. The cables should not be stretched so that they are strained and they should not put a strain on the connectors.
2. Add the Terra TX 720 to the aircraft equipment list and complete FAA Form 337. A weight and balance change may be required, depending on the type of aircraft.
3. Complete FCC license applications and file them. The type acceptance number for the application is Terra TX 720.

REVISIONS

LTR.	DESCRIPTION	DATE	CHG'D.BY	APPR.



VIEW FROM WIRING END

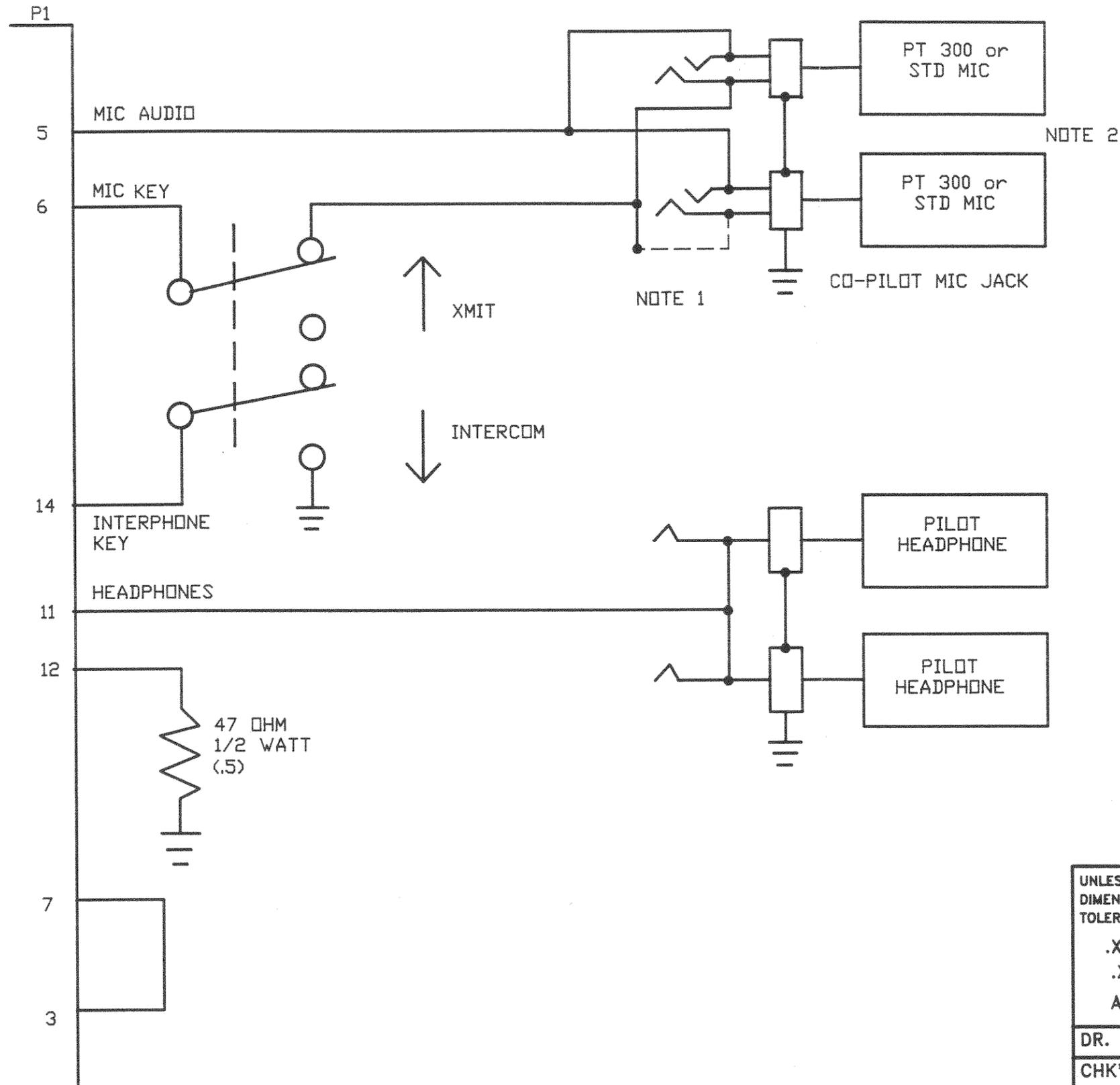
NOTES

- DO NOT PARALLEL SPEAKER OUTPUT WITH ANY OTHER RADIO EQUIPMENT. IF A LOUDSPEAKER IS NOT USED IT WILL BE NECESSARY TO CONNECT A 47 OHM, 1/2 WATT RESISTOR ACROSS THE SPEAKER TERMINALS (PIN 12 AND PIN 15). DAMAGE TO THE AUDIO OUTPUT IC COULD OCCUR IF THESE PRECAUTIONS ARE NOT FOLLOWED.
- FOR OPTIONAL SIDE TONE, PLACE JUMPER WIRE BETWEEN PINS 3 AND 11.
- USE 20 AWG FOR POWER AND GROUND CONNECTIONS.
- SPEAKER OUTPUT IS A 4 OHM OUTPUT. ALL OTHER AUDIO INPUT/OUTPUT LINES ARE 600 OHM.

PART NUMBER	DESCRIPTION	NOTE	QTY	ITEM
SCALE: NONE	UNLESS SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES: .XX ± .015 .XXX ± .005 ANGLES ± 1/2°	TERRA CORP. ALBQ. N.M. U.S.A. TITLE: TX720 INTERCONNECT DIAGRAM		
MAT'L:				
FINISH:	DR. BY: DMA	DATE: 2/27/89	DWG. NO. 9-1130-0004-02	REV A
	CHK'D:			
	APPR.: <i>Feb B</i>	USED ON: TX720	SHEET 1	OF 1

TX720 INTERCOM WIRING DIAGRAM

REVISIONS				
LTR.	DESCRIPTION	DATE	CHG'D.BY	APPR.
A	ORIGINAL RELEASE	5/16/90		



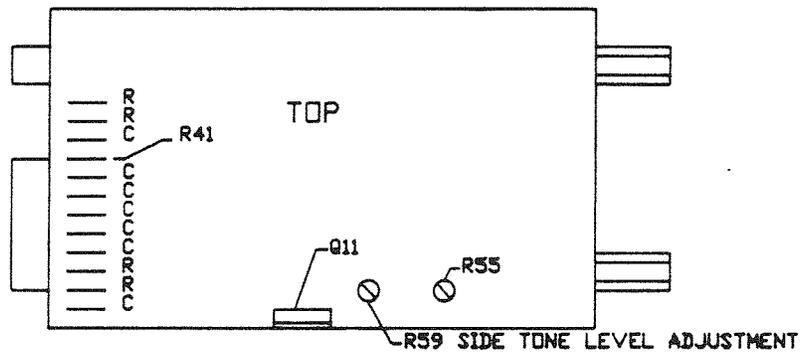
- NOTE:
1. JUMPER INSTALLED FOR CO-PILOT XMIT CAPABILITIES
 2. PTT 300 (PN 0900-0203-01) USED WITH BOOM MIC INSTALLATION

UNLESS SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES:		TERRA CORP.  ALBQ. N.M. U.S.A. TITLE: TX720 INTERCOM WIRING DIAGRAM		
.XX ± .015 .XXX ± .005 ANGLES ± 1/2°				
DR. BY: JRG	DATE: 05-16-90	DWG. NO. 9-1130-0006-02	REV A	
CHK'D: 	APPR.: 	USED ON:	SHEET 1 OF 1	

3.13. SIDE TONE ADJUSTMENT

1. Remove top cover
2. Position radio as indicated in Figure below for pot identification purpose.
3. Adjust R59 for desired side tone level. Fully clockwise equals maximum output.

- NOTE:
1. Side tone level is adjusted for maximum output at Terra.
 2. Maximum output equals 5vp-p with .5vrms @ 1000 Hz injected into mic audio input.
 3. If side tone level is insufficient with R59 fully CW, R41 can be selected for additional side tone output. Minimum value should be no less than 100 ohms.



SECTION IV

4. WARRANTY

4.1. LIMITED WARRANTY OF TERRA PRODUCTS

All equipment manufactured by TERRA Corporation is guaranteed against defective materials and workmanship for a period of one year from date of shipment. An extended second and third year limited warranty becomes valid at the end of this first year, which warrants that the original owner will not pay more than \$100.00 in each of the second and third years should repairs be necessary. Should warranty not be required in the second year and only in the third year, then the original owner will not pay more than \$200.00 should repairs be necessary. Any unit found to be defective due to material and workmanship during the warranty period will be repaired and put in original manufactured operating condition. Any labor charges which are incurred as a result of said defects are included in this warranty.

TERRA Corporation's liability under this warranty is limited to servicing, repairing or adjusting any equipment returned prepaid to the factory by express written or oral authorization for that purpose and to repair or replace defective parts thereof. Fuses and batteries are specifically excluded from any liability.

If, upon examination, it is determined that a malfunction has been caused by misuse of the equipment, installation or operation not in accordance with factory instructions, accident or negligent damage, alterations of any manner, or repair by other than the factory, the repairs will be billed at cost. In such cases, an estimate will be submitted for approval before repair is initiated.

This TERRA Corporation Limited Warranty is void unless the Warranty Registration Card is filled out and returned within 10 days after purchase.

4.1. LIMITED WARRANTY OF TERRA PRODUCTS (Continued)

Warranty Assurance to the aircraft owner/end-user cannot be maintained if the equipment is not installed in a certified aircraft by an authorized TERRA dealer. Exception, to assure warranty for the aircraft owner/end-user, for homebuilt/experimental aircraft without installation by an authorized TERRA dealer, is allowed when the end-user notifies TERRA that the homebuilt/experimental aircraft has been issued a special airworthiness certificate by the FAA.

No warranty will be activated for TERRA products unless the installation is approved and the warranty card is completed by the supplying dealer or upon receipt by TERRA OF FAA form(s) 337 or 8130-().

THE IMPLIED WARRANTY AND ALL OTHER IMPLIED WARRANTIES ARE HEREBY EXCLUDED

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