COM 760 TSO

VHF COMMUNICATIONS TRANSCEIVER

Installation / Owner's Manual

VAL®

Revision 6

August 1999

ONE YEAR LIMITED WARRANTY

The equipment delivered with this Standard Factory Warranty is manufactured by Val Avionics, Ltd. and is guaranteed against defective materials and workmanship for one year from date of original retail purchase. 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 of said defects are included in the warranty.

Val Avionics, LTD's liability under this warranty is limited to servicing, repairing or adjusting any equipment returned prepaid to the Val Avionics' factory by express written or verbal authorization for that purpose and to repair or replace defective parts thereof.

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, and repair by other than the factory, the repairs will be billed at costs. In such cases, an estimate will be submitted for approval before repair is initiated. In most cases, Val avionics, Ltd. will provide 48-hour turn around on its warranty and repair service. We recommend that contact be made with the FACTORY CUSOMER SERVICE DEPARTMENT prior to any unit return and obtain RETURN AUTHORIZATION AND INSTRUCTIONS. This will provide proper control and expedite service.

Val Avionics, Ltd. reserves the right of continuous product development without obligation to install changes in previously manufactured products.

Installation of Val Avionics, Ltd. products must conform to methods acceptable by the Federal Aviation Administration as described in the appropriate Federal Aviation Regulations (FAR's) and Advisory Circulars (AC's).

To ensure proper warranty registration, type or print clearly the application information on the enclosed PRODUCTS WARRANTY REGISTRATION FORM and return to Val Avionics, Ltd.

If shipping by UPS or FedEx:

Val Avionics, Ltd.

If shipping by US Mail

Val Avionics, Ltd.

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REVISION INSTRUCTIONS AND HISTORY

Where R & R appears in the action column, remove the page now in the Maintenance Manual and replace it with the enclosed page; otherwise, Add or Destroy pages as listed. Retain these instruction in the front of the Maintenance Manual as a Record of Revisions.

Beginning with Installation/Owner's Manual Revision 5 May 1996

REV NO.	REV DATE	PAGE NO.	PARA NO.	FIGURE NO.	ACTION
6	Aug 99	I			REPRINT MANUAL TO REMOVE REFERENCES TO THE VMT 100 MEMORY TIMER
		1		1-10	REPRINT MANUAL TO REMOVE REFERENCES TO THE VMT 100 MEMORY TIMER
		3	1.2		REPRINT MANUAL TO REMOVE REFERENCE TO THE VMT 100 MEMORY TIMER
		5	1.5.5		REPRINT MANUAL TO REMOVE REFERENCES TO THE VMT 100 MEMORY TIMER
		17		1-10	REMOVE
		20	2.3.3 C,D		REPRINT MANUAL TO REMOVE REFERENCE TO RG 58 A/U SPECIFIC CABLE
		20	2.3.3 E		REPRINT MANUAL TO REMOVE REFERENCES TO THE VMT 100 MEMORY TIMER
		23	3.1		REPRINT MANUAL TO REMOVE REFERENCES TO THE VMT 100 MEMORY TIMER

SECTION I – GENERAL INFORMATION

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1.1 INTRODUCTION

This manual provides information relative to the physical, mechanical and electrical characteristics of the COM 760 TSO VHF Communications Transceiver. Follow the procedures outlined in the manual for successful installation and designed performance.

1.2 DESCRIPTION OF EQUIPMENT

The COM 760 TSO VHF Transceiver is a quality-manufactured panel mounted 760 channel digitally synthesized communications transceiver covering the aviation communication frequencies from 118.000 to 136.975 MHz.

The COM 760 TSO design features large LED displays that are clear and easy to read from any viewing angle, and in all alight conditions. Our exclusive AUTO-TOGGLE frequency selection provides easy access to the desired frequency, The A/B channel selector allows dual channel "flip-flop" access at all times.

Rugged aluminum construction and design features of the COM 760 TSO will provide many years of dependable service.

With this combination of designed features the VAL AVIONICS, LTD. COM 760 TSO is unequaled in value and performance.

PARAGRAPH

1.3 TECHNICAL SPECIFICATIONS

1.3.1 ELECTRICAL

Voltage ---------- 13.75 VDC
Current ---------- 1.0 Amp Receive
4.0 Amp Transmit

1.3.2 PHYSICAL

Height ---------- 1.4 inches (3.56 cm)
Width ---------- 6.25 inches (15.88 cm)
Depth ---------- 12.5 inches (31.75 cm)
Weight ---------- 3.0 pounds (1.36kg)

1.3.3 TSO COMPLIANCE

Transmit ---------- C37c (DO-186, Class 4)
Receive ---------- C38c (DO0186, Class C)
Environmental ---------- RTCA DO-160B
Altitude and Temperature A1B1
Humidity ---------- Category A
Vibration ----------Category PKS
Temperature Range ----- -20 to +55 Degrees C
Short Time Operation --- +70 Degrees C

1.3.4 TRANSMITTER

Frequency Range-------- 118.000 to 136.975 MHz
Channel Spacing -------- 25 kHz
Power Output ---------- 8 watts nominal (50 Ohm Load)
Frequency Stability ----- ± .002%
Duty Cycle ---------- 25%
Microphone ---------- Transistorized Dynamic or Electret
Sidetone ---------- Adjustable up to 50 mw into 600 ohm load.

1.3.5 RECEIVER

Frequency Range ------- 118.000 to 136.975 MHz
Channel Spacing------- 25 kHz
Sensitivity ---------- 2uv will provide a 6db minimum Signal plus Noise-to-Noise Ratio.
Selectivity ---------- Greater than 60db
AGC Characteristics ---- From 10 UV to 200 MV the audio level will not vary more Than 3db.
Squelch ---------- Automatic Squelch with manual disable.
Audio Output ---------- 3 watts (minimum) 4 Ohm load 50 mw (minimum) 600 Ohm Load.
Intercom---------- Intercom capability, with optional intercom module. (Refer to appropriate installation diagram.)

PARAGRAPH

1.4 UNITS AND ACCESSORIES SUPPLIED

1.4.1 COM 760 TSO VHF Transceiver with mounting tray (VPN 801000-C)

1.4.2 COM 760 TSO Installation Kit (VPN 651000)

PART #	DESCRIPTION	QUANITY
501007	Speednut 6-32	4
501017	Wave washer	1
501018	Retaining Ring	1
501034*	Screw 4-40 X ¼	2
501055	Flat Washer	1
501053	Screw 6-32 x ½	4
501067	Screw 6-32 x 3/8	3
550022	BNC Connector	1
550028	Terminal Pin	20
550029*	Connector 18 Pin Molex (P101)	1
550030	Connector Right Angle BNC (P301)	1
610000	Cable Tie	2
610004	Locking Screw Hole Plug	1
610006	Cable Clamp	1
701002	Installation/Operator's Manual	1

*Items on mounting tray assembly when shipped.

1.5 ACCESSORIES REQUIRED (NOT SUPPLIED)

1.5.1 VHF Communications Antenna

1.5.2 Headphones and Speaker.

1.5.3 Voltage Converter, 27.5 VDC to 13.75 VDC, VC760 (VPN 801002).
Required for 27.5 VDC operation only.

1.5.4 Microphone.
Standard aircraft quality microphone. (Mic gain has been preset at the factory with an Electret microphone for optimum performance).

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PARAGRAPH

1.6 LICENSE REQUIREMENTS

The installation of the COM 760 TSO Communications Transceiver in an aircraft requires an Aircraft Radio Station License.

Forms (FCC 404, New Aircraft Station License or FCC Form 405A, Renewal of Aircraft Station License) can be obtained from your nearest FCC Field Office.

CAUTION

THE VHF TRANSMITTER IN THE EQUIPMENT IS GRARANTEED TO MEET FEDERAL COMMUNICATIONS COMMISSION ACCEPTANCE OVER THE OPERATING TEMPERATUR RANGE ONLY WHEN A VAL AVIONICS. LTD. CRYSTAL IS USED IN THE VOLTAGE CONTROLLED

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SECTION II – INSTALLATION

PARAGRAPH

FIGURE 1-1 BASIC INTERCONNECT DIAGRAM - GENERAL

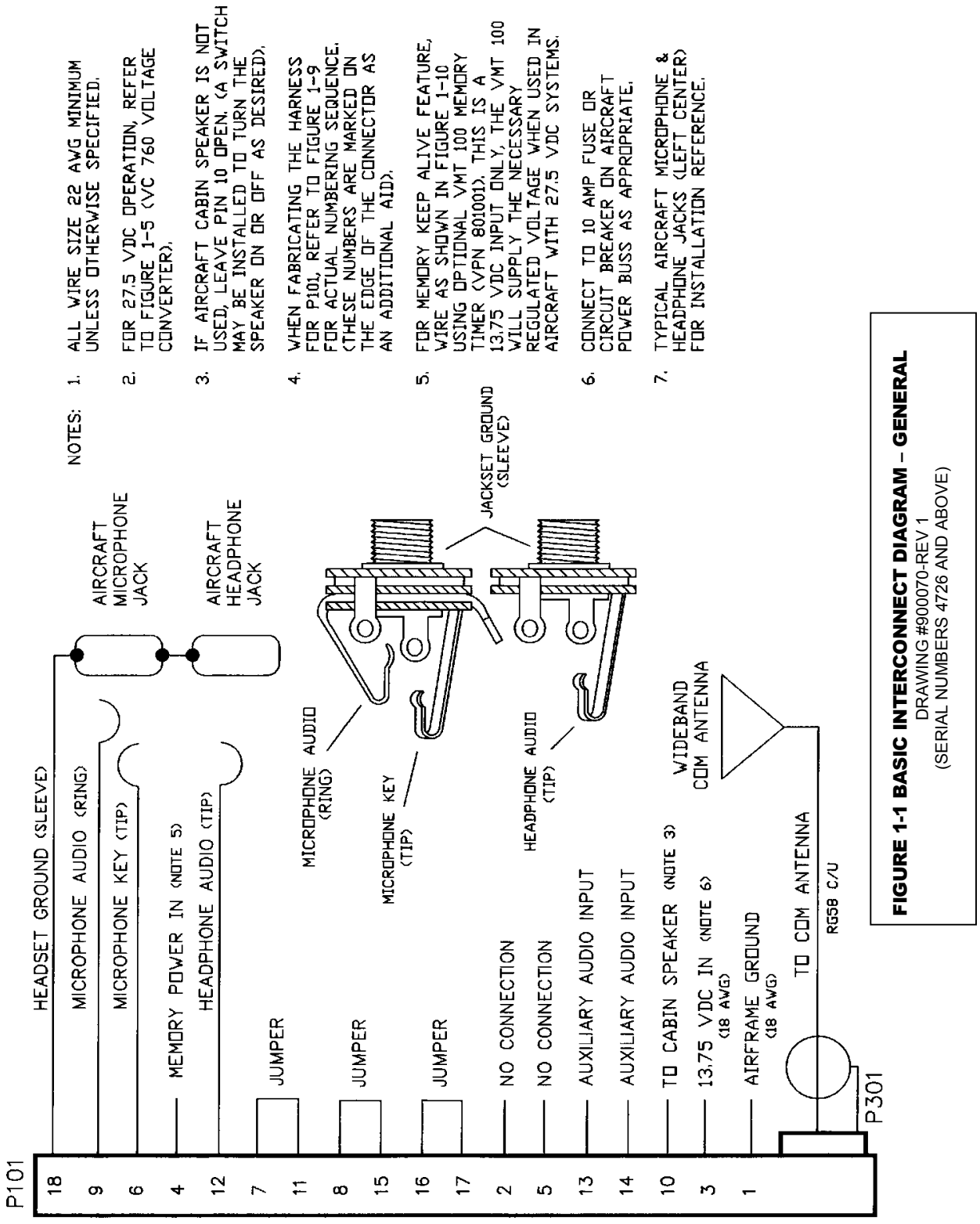


FIGURE 1-1 BASIC INTERCONNECT DIAGRAM – GENERAL
DRAWING #900070-REV 1
(SERIAL NUMBERS 4726 AND ABOVE)

Disregard Line 5 Beginning with Revision 6. VMT instructions no longer apply.

FIGURE 1-2 INTERCONNECT DIAGRAM WITH OPTIONAL ICM 801009

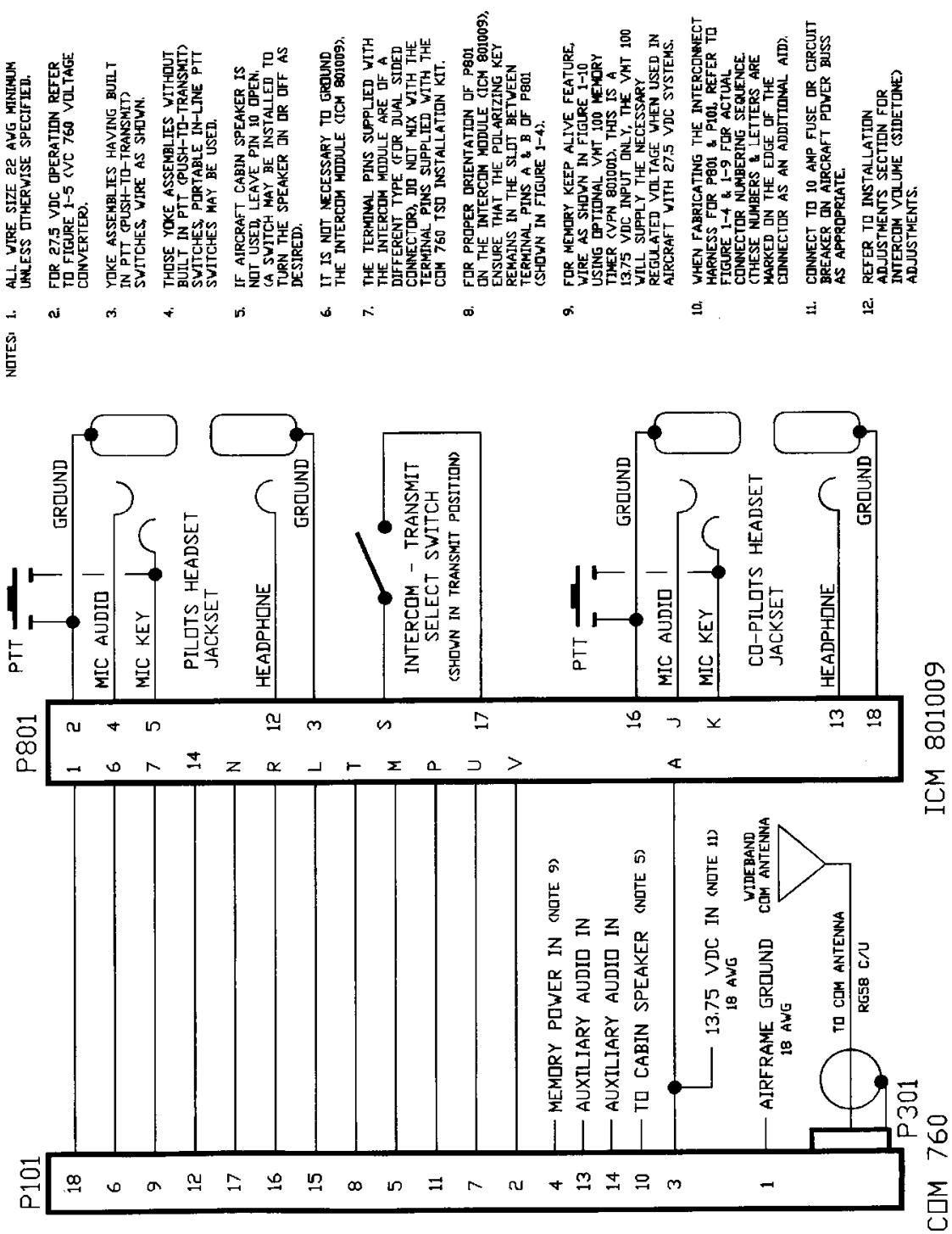


FIGURE 1-2 INTERCONNECT DIAGRAM WITH OPTIONAL INTERCOM MODULE (ICM 801009)
DRAWING #900080-REV 1 (SERIAL NUMBERS 4726 AND ABOVE)

Disregard Line 9 Beginning with Revision 6. VMT instructions no longer apply

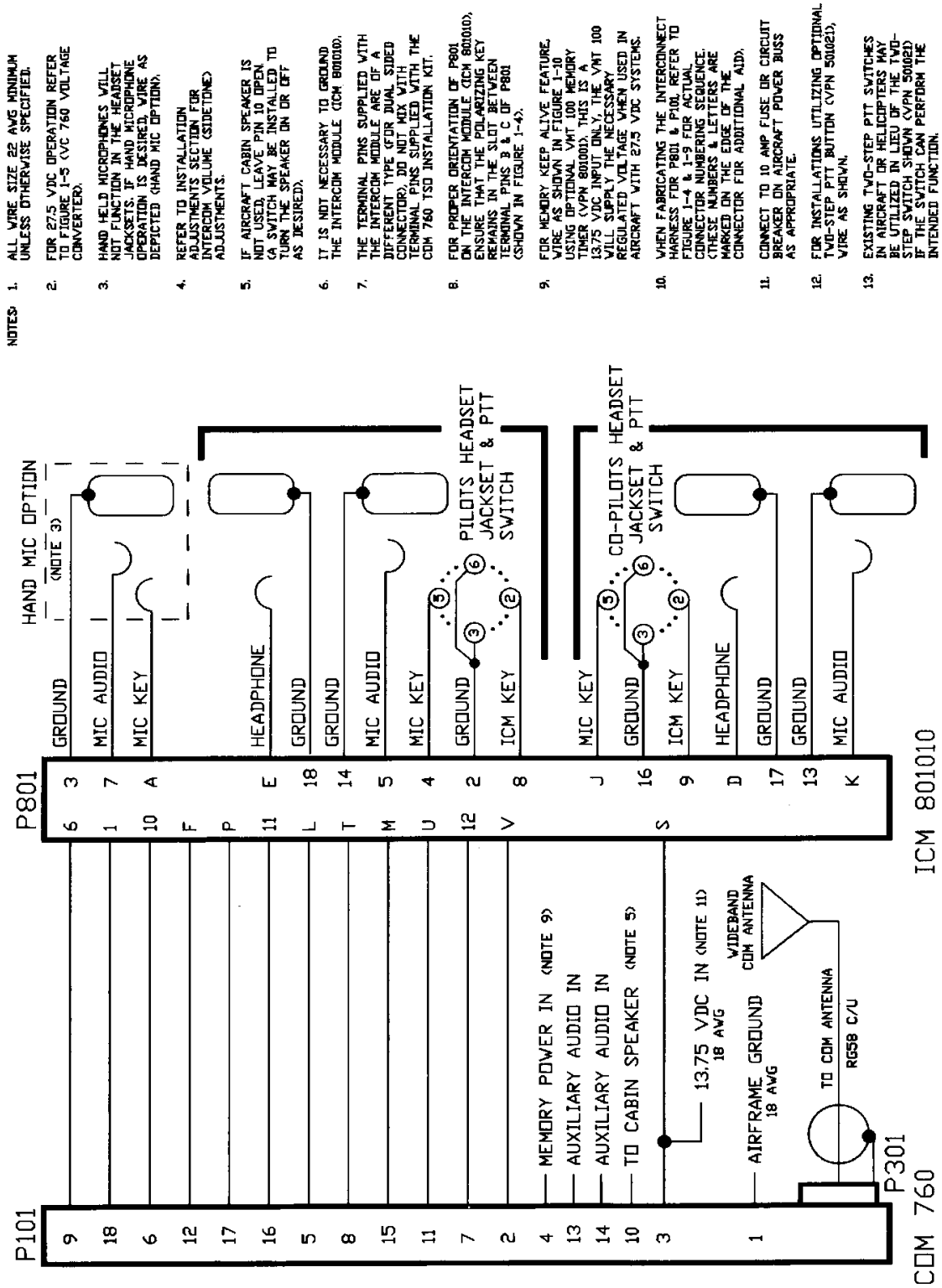
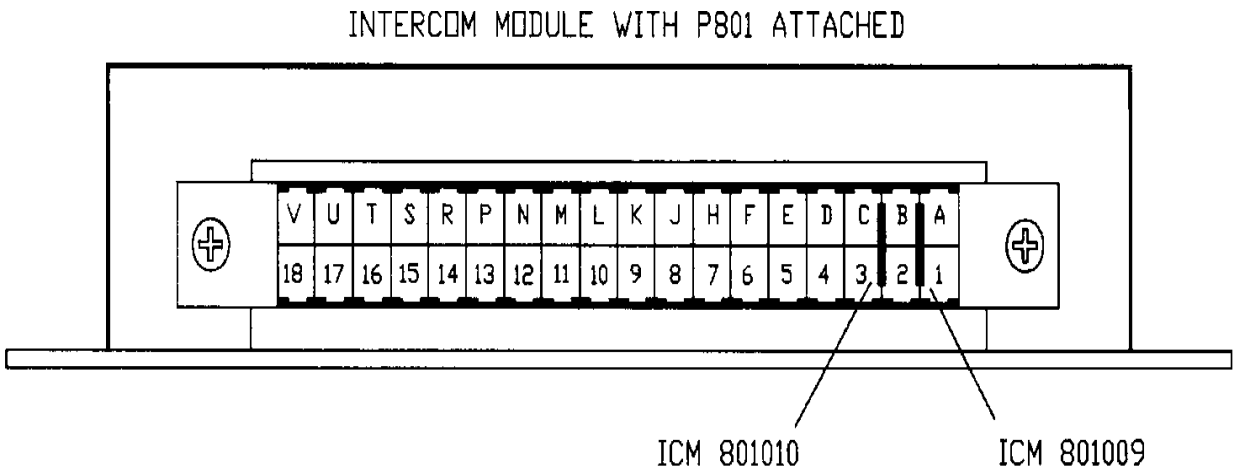


FIGURE 1-3 INTERCONNECT DIAGRAM WITHOPTIONAL ICM 801010

Disregard Line 9 Beginning with Revision 6. VMT instructions no longer apply

FIGURE 1-4 INTERCOM MODULE



NOTE: ENSURE PROPER POLARIZING KEY PLACEMENT AS DESCRIBED ON THE APPROPRIATE INTERCOM MODULE INTERCONNECT DIAGRAM.

FIGURE 1-4 INTERCOM MODULE
WITH P801 PIN OUT CONFIGURATION
DRAWING #9000090-REV 1

FIGURE 1-5 VC 760 VOLTAGE CONVERTER

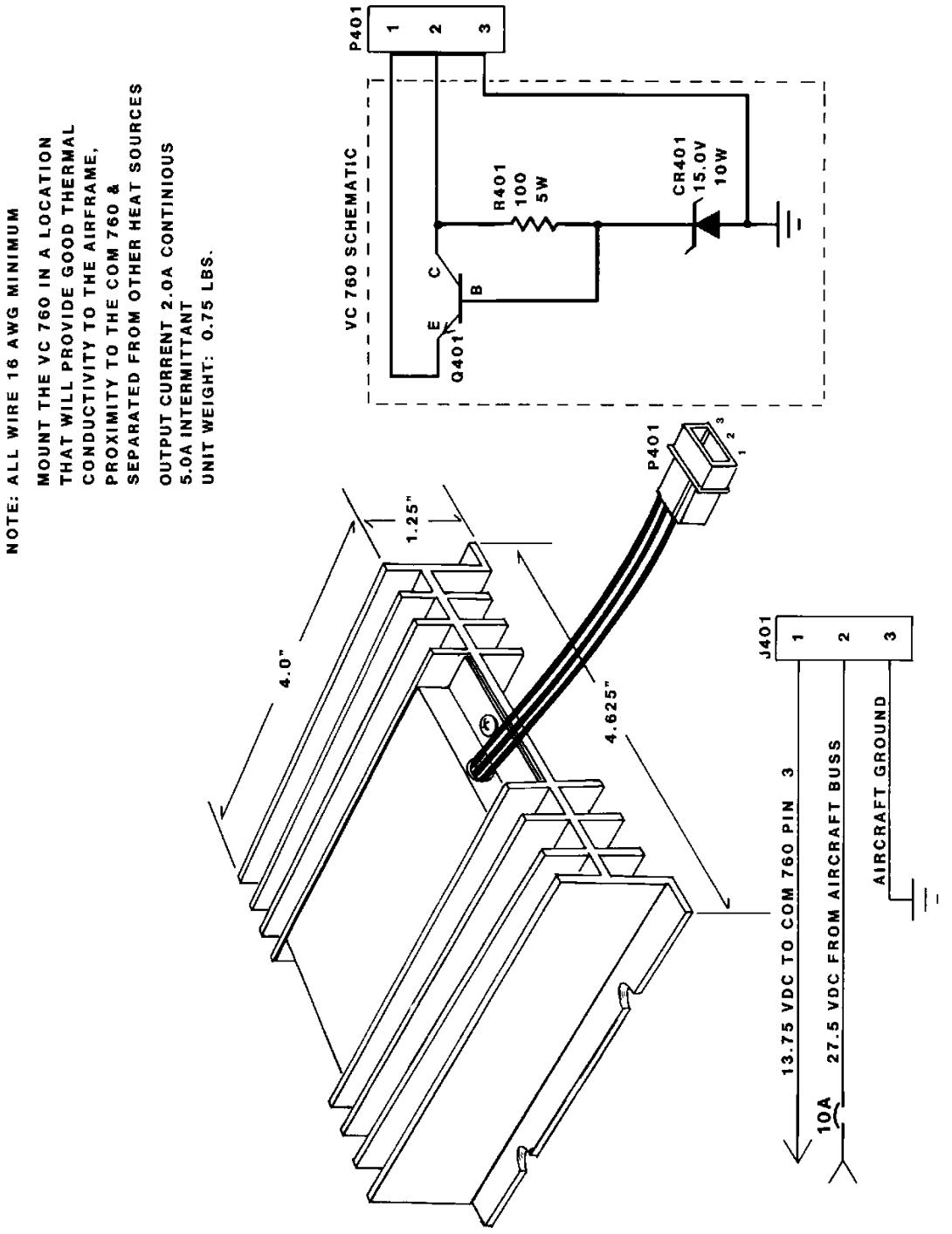


FIGURE 1-5 VC 760 VOLTAGE CONVERTER
(27.5 VDC TO 13.75 VDC)

FIGURE 1-6 INSTALLATION ASSEMBLY

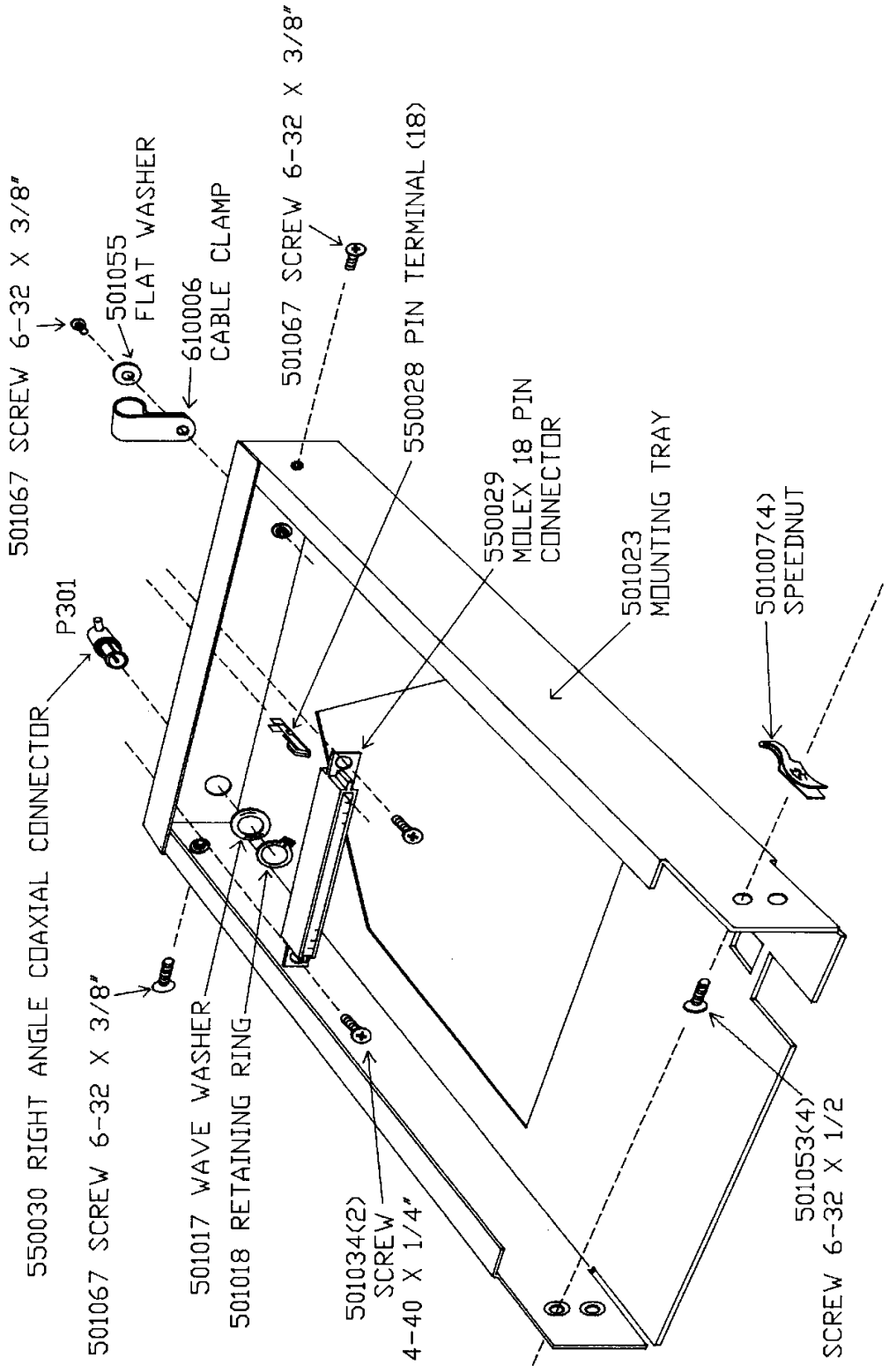


FIGURE 1-6 INSTALLATION ASSEMBLY
DRAWING #900120-REV 1

FIGURE 1-7 CRIMPING AND EJECTOR TOOLS

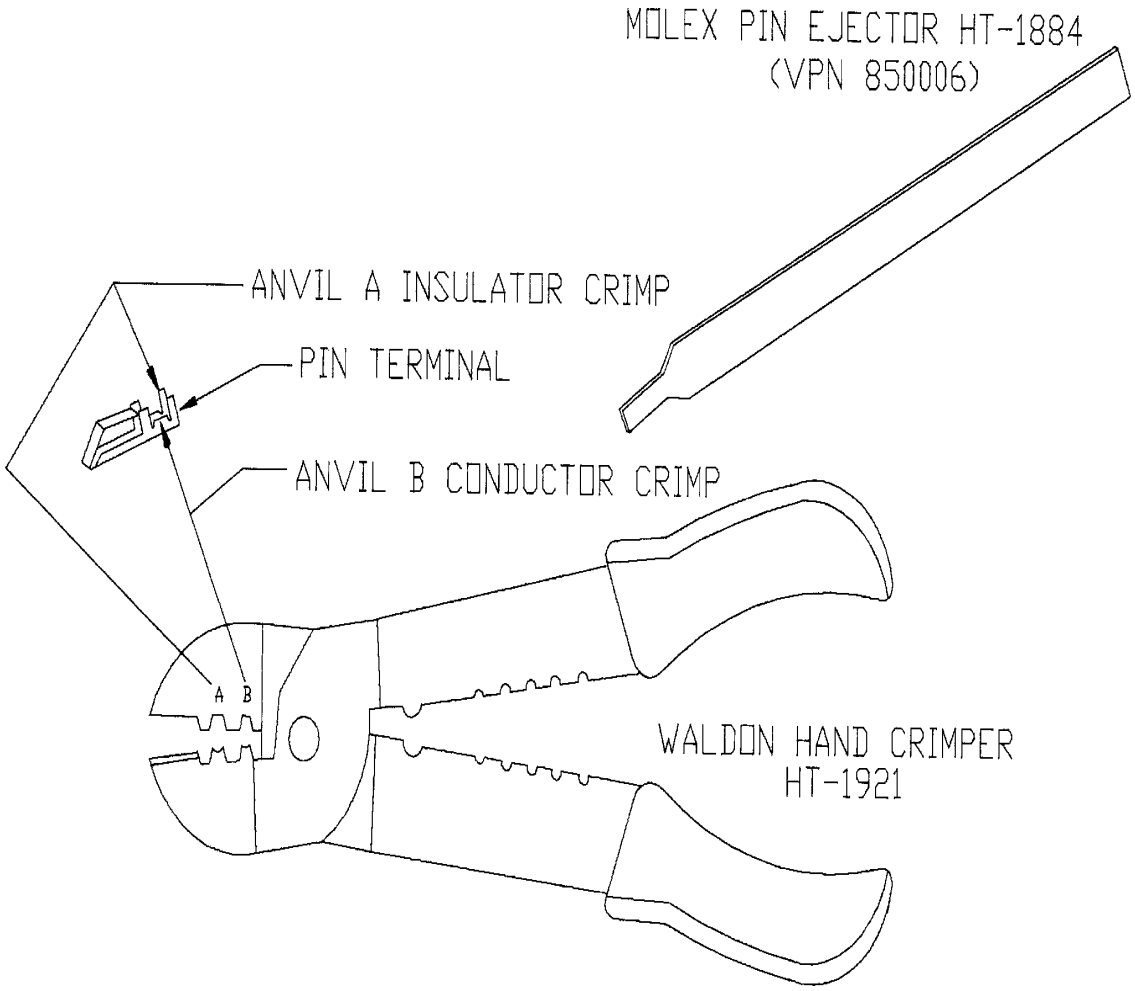
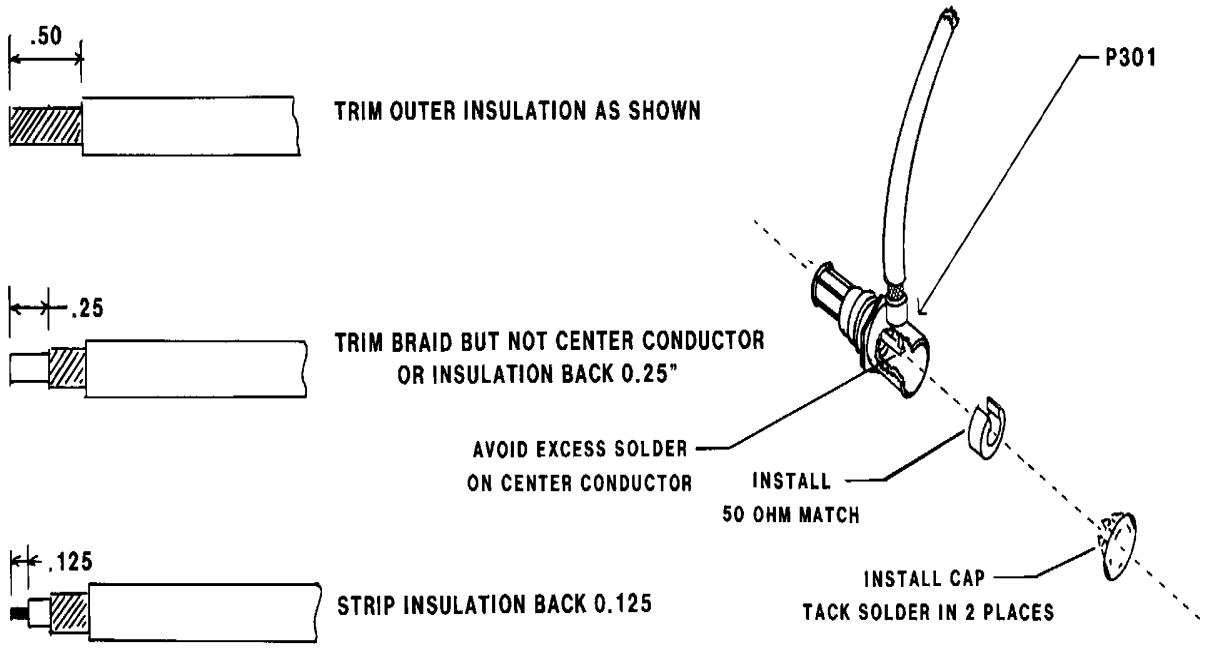


FIGURE 1-7 CRIMPING AND EJECTOR TOOLS
DRAWING #900130-1

FIGURE 1-8 COAXIAL CABLE ASSEMBLY



INSERT CABLE THROUGH SIDEWALL OF CONNECTOR AND SOLDER CENTER CONDUCTOR TO CENTER PIN OF THE CONNECTOR SLEEVE AND AT THE SAME TIME APPLY SOLDER BETWEEN BRAID AND SLEEVE CONTINUE TO APPLY HEAT UNTIL THE SOLDER FLOWS INSTALL 50 OHM MATCH, INSERT CONNECTOR CAP INTO END OF FITTING AND TACK SOLDER IN 2 PLACES

FIGURE 1-8 COAXIAL CABLE ASSEMBLY
DRAWING #900140-REV 0

FIGURE 1-9 COM 760 OUTLINE AND MOUNTING DIMENSIONS

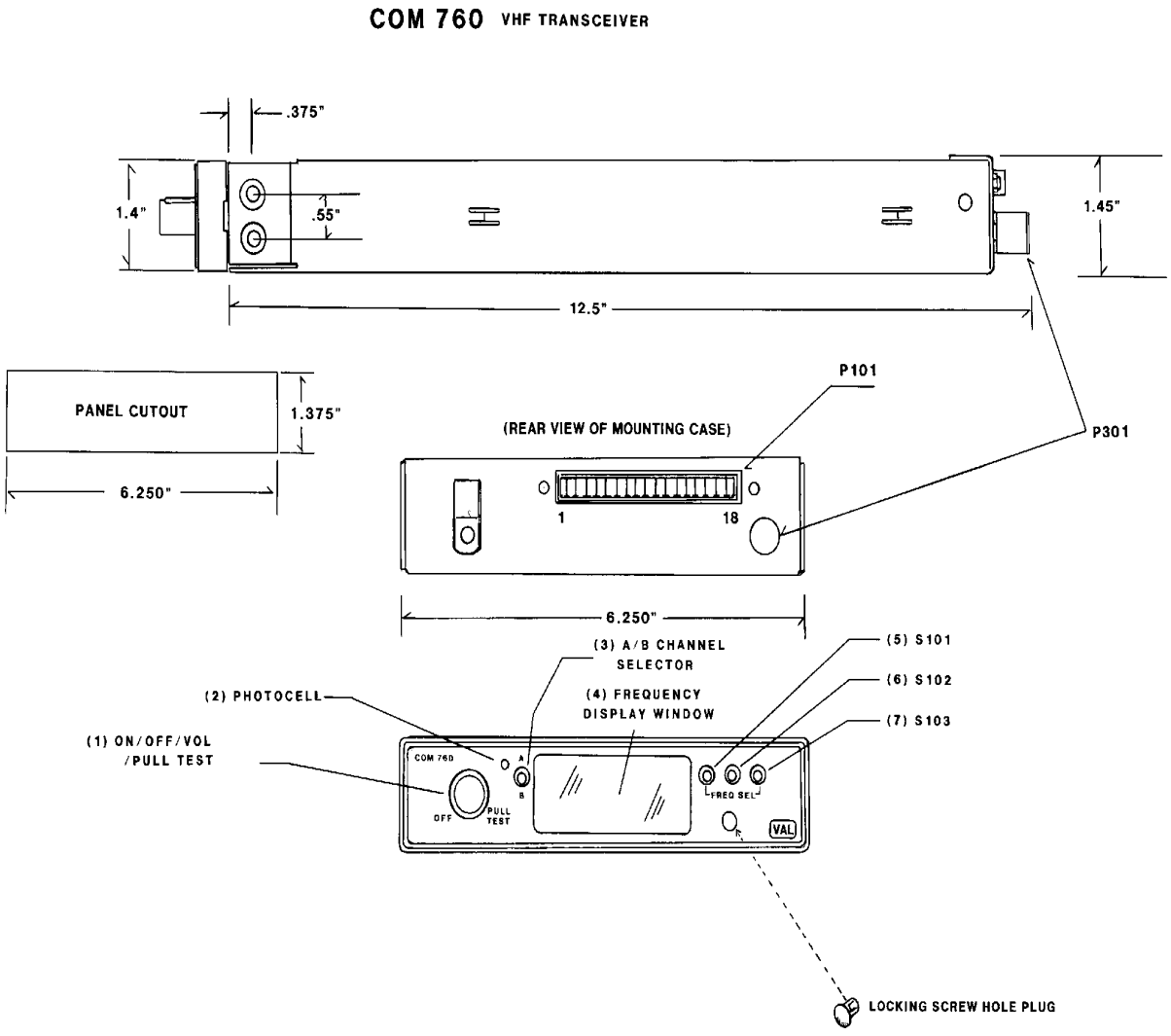


FIGURE 1-9 COM 760 OUTLINE AND MOUNTING DIMENSIONS
DRAWING 900150-REV 0

PARAGRAPH

2.1 INSTALLATION – GENERAL INFORMATION

This section provides interconnect diagrams and installation criteria for the COM 76O TSO VHF Communications Transceiver.

By following these instructions, the COM 76O TSO VHF Communications Transceiver will perform as specified and provides excellent performance to meet its design.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Exercise care when unpacking the equipment. Visually inspect the unit for any evidence of damage incurred during the shipment. It is advisable to retain the shipping carton and packing material should it b necessary to return the unit.

2.3 INSTALLATION

Details and other considerations for the installation of the COM 76O TSO VHF Communications Transceiver are as follows:

2.3.1 Location

The first consideration after the visual inspection has been made to locate the position on the aircraft panel where the unit and tray will be mounted. The tray is to be mounted rigidly in the aircraft panel with rear support brackets (fabricated by the installer) attached from the rear provisioned 6-32 nutserts (one on each side at rear of mounting tray) to airframe.

Once a location has been decided upon , a visual inspection should be made of the area directly behind the panel which will be occupied by the COM 76O TSO VHF Communications Transceiver mounting tray and harness assembly for obvious obstructions such as heater ducts, control cables, fuel and oil lines or any other obstruction. Pay particular attention to control yoke assemblies. They should be physically moved the full limit of their travel and verified that sufficient clearance exists prior to beginning installation.

2.3.1.1 Cooling Requirements

The COM 76O TSO VHF Communications Transceiver does not required forced air cooling when installed by itself or in a very loose avionics stack. However, the heat generated from several units tightly stacked one on top of the other could certainly cause damage. Therefore, forced air stack cooling is recommended in any condition where excessive heat may be present.

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2.3.2 Antenna Installation

Antenna selection for the COM 76O TSO VHF Communications Transceiver should be a 50-ohm vertically polarized COM antenna. Wide band COM antennas provide efficient operation over the VHF communications band. Antenna should be installed per the manufacturer's recommendations and applicable FAA regulations.

1. Mount the antenna firmly on a flat metal surface or install a ground plan at least 18 inches square for the other than metal surfaces.

2. As the particular aircraft design permits, the antenna should be located well removed from any projections, engines, propellers and other antenna.

3. Aircraft of similar design may serve as an aid in determining antenna placement.

2.3.3 Fabricating the Harness Assembly

Determine the cable lengths that will be required for various runs to antenna, cabin speaker, aircraft electrical buss and microphone/headphone jacks. (Refer to the appropriate installation diagram). Use only aircraft quality stranded wire with at least 600-volt insulation that will not support a flame. Minimum wire size will be 22 AWG unless otherwise specified.

The COM 76O TSO VHF Communications Transceiver uses a special Moles 18 pin connector, P101 (VPN 550029) that mates directly with the circuit board at the rear of the unit. Waldrom Hand Crimper HT-1921 (VPN 850007) should be used to provide a superior connection while fabricating cable harness. Cut wires to lengths a previously determined and refer to Figure 1-7.

A. Fabricate the harness as follows:

1. Strip wire 5/32” for pin terminals (VPN 550028).
2. Open tool (engraved side toward you), from the opposite side, place the conductors tab section of the pin on Anvil B. Close tool slightly (until tabs touch the female jaw.)
3. Insert stripped conductor until insulation is level with outside of jaw. Crimp is made.
4. Move leads and pin to Anvil A. Crimp again until jaws are fully closed or sufficient crimp is made.
5. If necessary, straighten pin while still being held in the jaw.

PARAGRAPH

B. The cable harness with pins attached may now be inserted in the appropriate numbered slots marked on the 18 pin connector, P101 (Refer to Figure 1-9). Proceed as follows:

1. The pins cannot be inserted upside down in the translucent connector housing. Right side up, it slides in effortlessly. Be sure to push it all the way in, until a "click" can be felt, heard or even seen (by turning the translucent housing over).

2. It is not necessary to pull back on the lead itself except to test for the "locking feature", and then only with a moderate pull.

3. If a pin is erroneously inserted into the wrong connector positions, or if at some later time a circuit change is desired, the in can be easily removed. Slip the flat narrow blade portion of the Molex contact ejector tool, HT 1884 (VPN 80006) into the mating side of connector housing upside down so that you can see the blade slice in and up to the stop. This action picks up the locking key and allows the lead and pin to slop out of its position using a light pulling action on the lead. Neither pin nor position has been damaged allowing re-insertion in the same or another positions.

C. Coax Connector:

Refer to Figure 1-8 for the details in connecting the right angle BNC connection (P301) to the coaxial cable. Pay particular attention when stripping the Coaxial cable. Allow sufficient insulation to remain on center conductor. This will prevent the notched out on the 50 ohm match from making contact with the center conduction and shorting out. Complete the soldering as described in Figure 1-8 and install the connector into the mounting tray.

D. BNC Connector:

For termination instructions of the BNC connector on the coaxial cable for connection to the aircraft VHF antenna, refer to the instructions n the BNC package.

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2.3.4 COM 760 TSO Installation

1. Looking at the bottom of the unit, make certain the front lobe of the hold down device is in a vertical position.

2. Slide the unit in the mounting tray until the front lobe touches the mounting tray.

3. Insert a 7/64" Allen wrench through the hole in the font panel to engage the locking screw. Turn clockwise until the rear lobe engages the mounting tray. This will start pulling the unit in. Continue turning until the rear of the faceplate is flush with the mounting tray and first resistance is met

DO NOT OVERTIGHTEN!

4. To remove, turn the locking screw counter clockwise, using a 7/64" allen wrench, until the unit disengages from the mounting tray. Pull the unit out of the tray by pulling on the recessed notches (one located on each side of the rear of the faceplate).

5. After installation of unit in the mounting tray, install locking screw hole plug. (Refer to Figure 1-9).

2.3.4.1 Installation Adjustments

Microphone Gain (MIC GAIN – CW in increase), Sidetone (SIDETONE – CCW to increase) have been preset at the factory to optimum levels prior to shipment. Should it be necessary to vary these levels, locate the access holes marked appropriately on the bottom or top of the unit. Use a small flat narrow insulated screwdriver and turn the adjusting potentiometer as required to achieve the desired level. Be careful not to force the potentiometer past the normal operating stops. If necessary, call the factory for details and assistance. (Microphone Gain and Sidetone levels were set at the factory with an Electret microphone).

NOTE: SIDETONE is the same as Intercom volume for those installations utilizing the intercom FUNCTION OF THE COM 76O TSO VHF Communications Transceiver. See Intercom Diagrams Figures 1-2 through 1-4.

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2.3.5 Post Installation Check

An operational performance flight test is recommended after the installation to insure satisfactory performance of the equipment in its intended environment. Prior to conducting the in-flight test, visually and functionally check that all aircraft control assemblies have full travel and that no obstructions are present to interfere with their normal operation. To operationally check the COM 76O TSO VHF Communications Transceiver climb to and maintain an appropriate altitude and contact a ground station of a distance of at least fifty nautical miles. Then contact a ground station close in. If possible, verify the communications capability on both the high and low end of the VHF communications band.

Note: A transmit indication decimals will be present at the lowered right hand side of the display when a transmit condition exist as will a horizontal bar on the far left center during intercom operation. (if wired for intercom option).

Intermittent breakup of incoming calls or complete lack of expected calls ban be overridden by pulling out the volume control know and defeating the automatic squelch feature (Received calls from out of range stations can cause this condition.)

2.4 WIRE COLOR, CONNECTOR TERMINAL ASSIGNMENT & FUNCTION FOR UNIT WITH FACTORY PRE-WIRE OPTION

BLACK	P101-1	Power Ground
GRAY	P101-18	Headset Ground
BROWN	P101-9	Microphone Audio
WHITE	P101-6	Microphone Key
YELLOW	P101-4	Memory Power In
BLUE	P101-12	Receiver Audio (HEADPHONE)
VIOLET	P101-13 & 14	Auxiliary Audio Input
GREEN	P101-10	Cabin Speakers
RED	P101-3	13.75VDC Power Input
GRAY & WHTE		(Twisted Pair) connect to aircraft PTT Switch n Yoke is used, otherwise cap wires and tie off for future use.

SECTION III – OPERATION AND THEORY OF OPERATION

PARAGRAPH

3.1 OPERATING INSTRUCTIONS

Controls and accessories of the Front Panel from left to right: (Refer to Figure 1-9)

1. ON/OFF/VOLUME/PULL TEST
2. Auto-Dimmer Photocell
3. A/B Channel Selector
4. Frequency Display Window
5. 118.000 to 136.000 Frequency Select Toggle (S101)
6. .0 to .9 MHz Frequency Select Toggle (S102)
7. 25 kHz Frequency Select Toggle (S103)

On initial turn on, two common ground control frequencies will be displayed as follows:

121.70 MHz on Channel A
121.90 MHz on Channel B

Any other of 760 desired frequencies can be selected by toggling S101 down to 118 MHz to up to 136 MHz, then S102 either up or down to the desired .0 through .9 and finally S103 up of down until the desired 25 kHz frequency .000 MHz, .050 MHz or .075 MHz appear.

Note: S101 does not "roll over" below 118 MHz or above 136 MHz as in the operation of S102 and S103. The operator can only toggle "up" from 118 MHz or "down" from 136 MHz.

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Upon initial selection of a desired frequency in either A or B channel, the A/B channel Selector may be operated and a second frequency can be selected.

The operator will then have two desired frequencies controlled by the A/B Channel Selector.

The pull test function of the Volume Knob will defeat the squelch action of the receiver and un-squelched receiver audio will be present. This is a convenient time to set the receiver audio to a comfortable level.

The auto-dimmer photocell monitors the ambient light and will dim the display in dark conditions and brighten the display for bright daylight conditions.

Note: Transient power conditions within the aircraft (voltage spikes during engine starting, fluctuating power, etc.) may cause an invalid frequency to be displayed or revert to the standard default frequencies. If this should happen, re-select the desired frequency.

NOTES