

Midland  
70-066 & 70-076  
Service  
Manual  
Low Band

Midland 70-066 & 70-076 Service Manual

Part 3

# REPAIR INFORMATION

70-066/076

## CHIP COMPONENT IDENTIFICATION

Chip components used in Midland SYN-TECH transceivers can be identified as follows:

<u>COLOR</u>	<u>COMPONENT TYPE</u>
Black	Metal Film Resistor
White with value marking	Metal Film Resistor
Light Brown	Ceramic Capacitor
Green	Ceramic Capacitor
White (no marking)	Ceramic Capacitor

Resistor value marking is as follows:

1st two digits - significant digits  
3rd digit - number of added zeros

Example: 105 = 10 00000 = 1M Ohm

## CHIP COMPONENT REMOVAL/REPLACEMENT

NOTE: Temperature of soldering iron must be maintained at 600-700°F.

### COMPONENT REMOVAL

1. Place solder iron tip directly on component in order to melt solder and glue as shown in figure #1 & #2. Remove component with tweezers or long nose pliers.

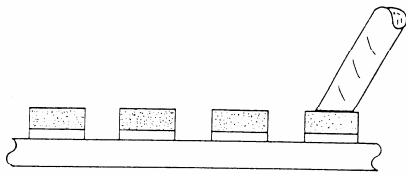


FIG. #1

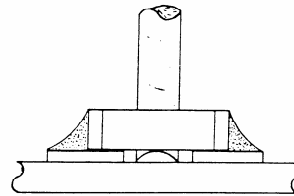
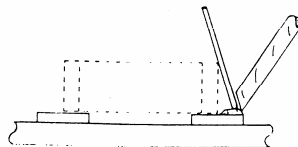


FIG. #2

2. Completely remove old solder from PC board, using a desoldering tool. Application of a small amount of flux will greatly aid in the removal of old solder.

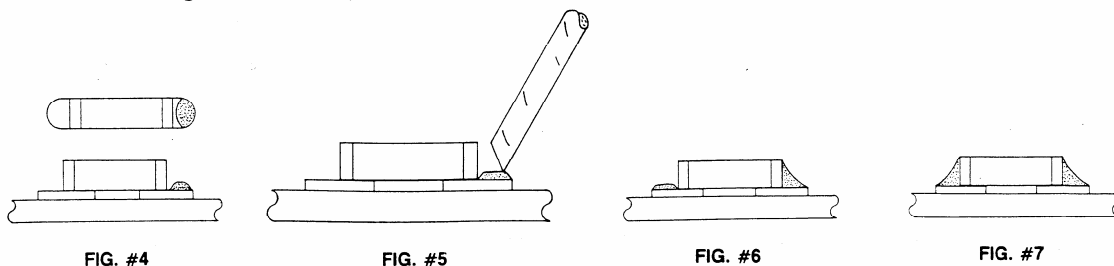
### CHIP COMPONENT REPLACEMENT

3. After component has been removed and PC pattern cleaned, apply a small amount of solder on PC pattern and let cool, as shown in figure #3.



CHIP COMPONENT REPLACEMENT (CONTINUED)

4. Insert new component and apply soldering iron tip to PC pattern as shown in figures 4, 5, 6 and 7.



**CAUTION:** As patterns and components are close to each other, extreme care must be exercised when soldering, as not to damage components or bridge PC pattern paths. High soldering iron temperatures can cause component damage. DO NOT apply the soldering iron tip to a new component during installation.

IC COMPONENT REMOVAL/REPLACEMENTCOMPONENT REMOVAL:

Extreme care must be exercised when removing and replacing defective transistors and IC's. Keep in mind that copper foil is employed on both sides of the printed circuit board. IC's and transistors may be removed from the circuit for testing. If IC's are to be removed from the circuit intact and unharmed, an IC desoldering tip attached to a soldering iron should be used. This tip will melt solder on all pin connections simultaneously and the IC may be pulled from the PC board.

A solder suction tool or braided desoldering wick may be used to remove the solder, freeing one pin at a time. Carefully and thoroughly remove solder from all IC pins until the IC can be removed without resistance. When removing transistors for testing, use needle nose or clamping type seizing pliers that will act as a heatsink on the transistor leads. If a transistor or IC is defective, it may be cut from the leads and removed. The leads may be unsoldered and removed one at a time.

REPLACEMENT:

If it is necessary to bend IC leads, firmly hold and bend the lead with needle nose pliers. Make sure the leads are free from solder and are parallel to the IC body. Remove all solder from the holes in the PC board before attempting replacement. When replacing an IC or transistor on the PC board, make sure the component is properly orientated. Before soldering an IC, verify there is no AC voltage between the solder iron tip and common ground.

## PC BOARD REMOVAL

### TX/SYNTHESIZER PC BOARD

To remove the TX/Synthesizer PC board, remove the 8 PC board mounting screws. Disconnect the 4 multi pin connectors at J363, J361, J362 and J364, located at the front of the board. Next disconnect the 2 Coaxial connectors at J365 and J366, located at the rear of the board. Slide the PC board to the rear of the radio to clear the front retaining tab, then pull up.

### RX PC BOARD

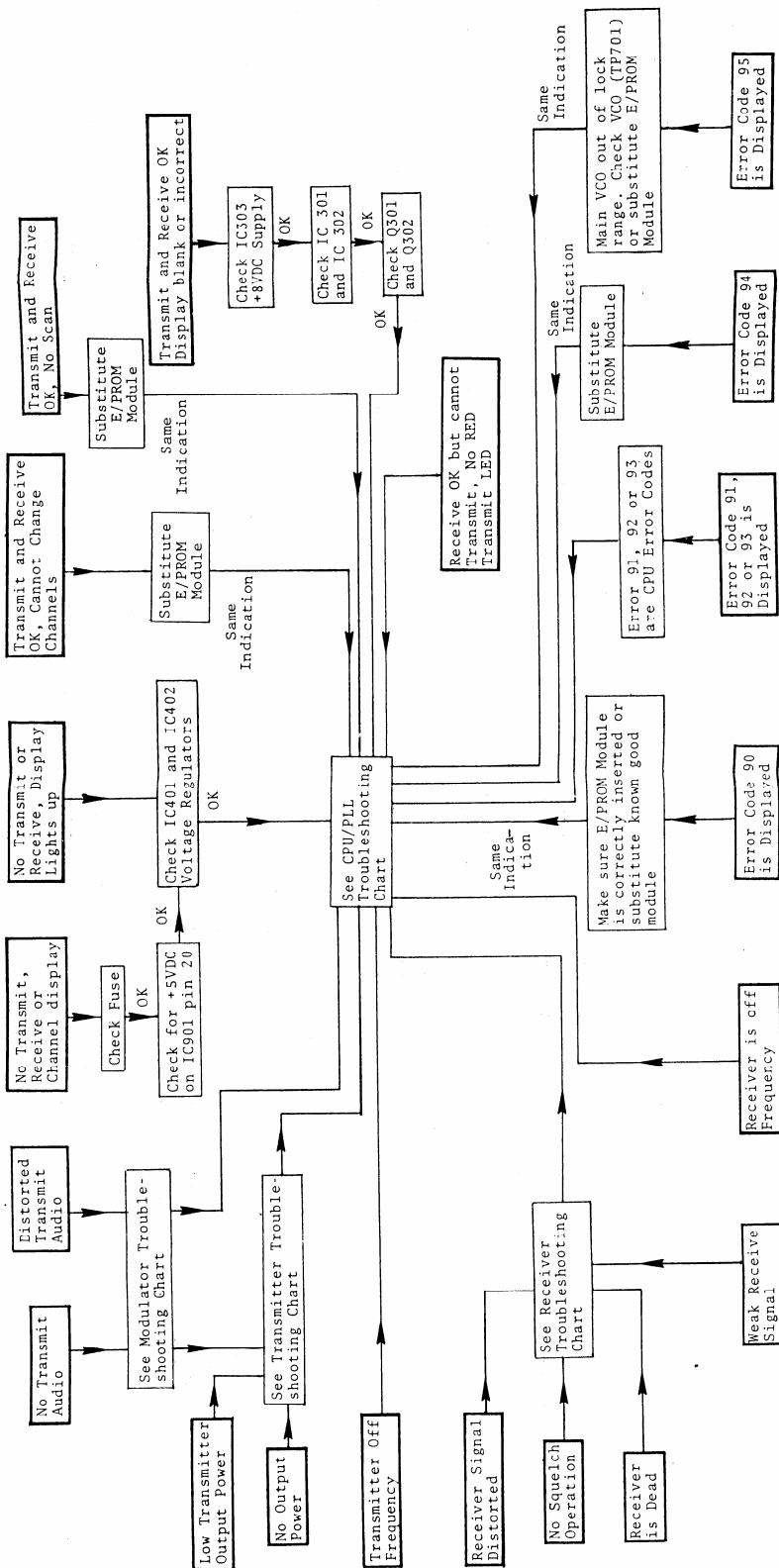
To remove the RX PC board, remove the 5 PC board mounting screws and disconnect the 5 multi pin connectors at J351, J354, J353, J352 and J358 located at the middle and front of the board. Next disconnect the 2 Coaxial connectors at J356 and J355 located near the rear of the board. Slide the PC board to the rear of the radio to clear the front retaining tab and then pull up. The board will still be retained by power wiring but access to the rear of the PCB is possible.

### PA PC BOARD

To remove the PA PC board, loosen the 4 screws (2 on each side) located to the outside rear of the unit. Tilt PA/heatsink downwards and remove the 2 PA cover retaining screws and cover. Remove the 10 mounting screws holding the PC board and output transistors. Next unsolder the antenna connector which extends through the PC board on the left hand side. The antenna connector is soldered to the board at 3 connections. All solder must be removed from these connections before attempting to remove the board. Next disconnect the 2 coaxial connectors at J372 and J371 and pull up on the board. The board will still be retained by power wiring but access to the rear of the PCB is possible.

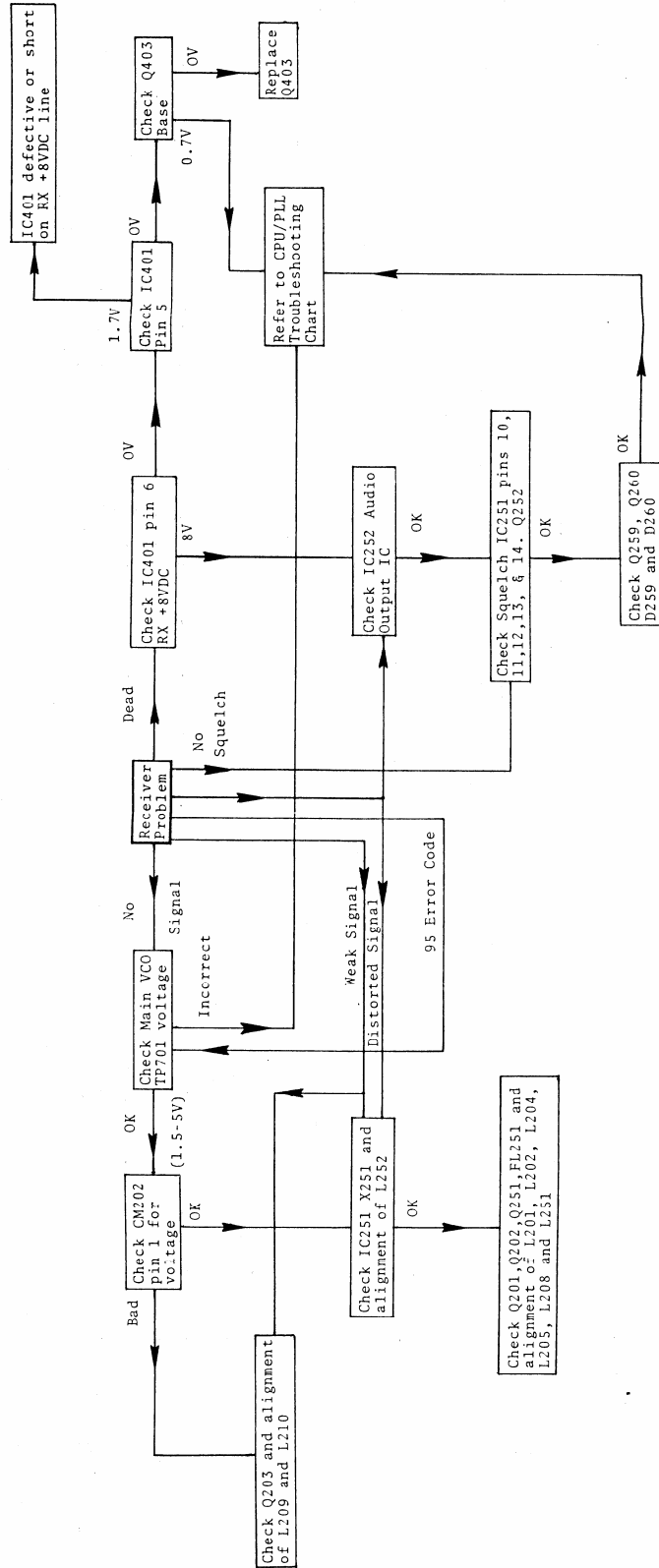
# GENERAL TROUBLE SHOOTING CHART

General Troubleshooting Chart



# RECEIVER TROUBLESHOOTING CHART

Receiver Troubleshooting Chart

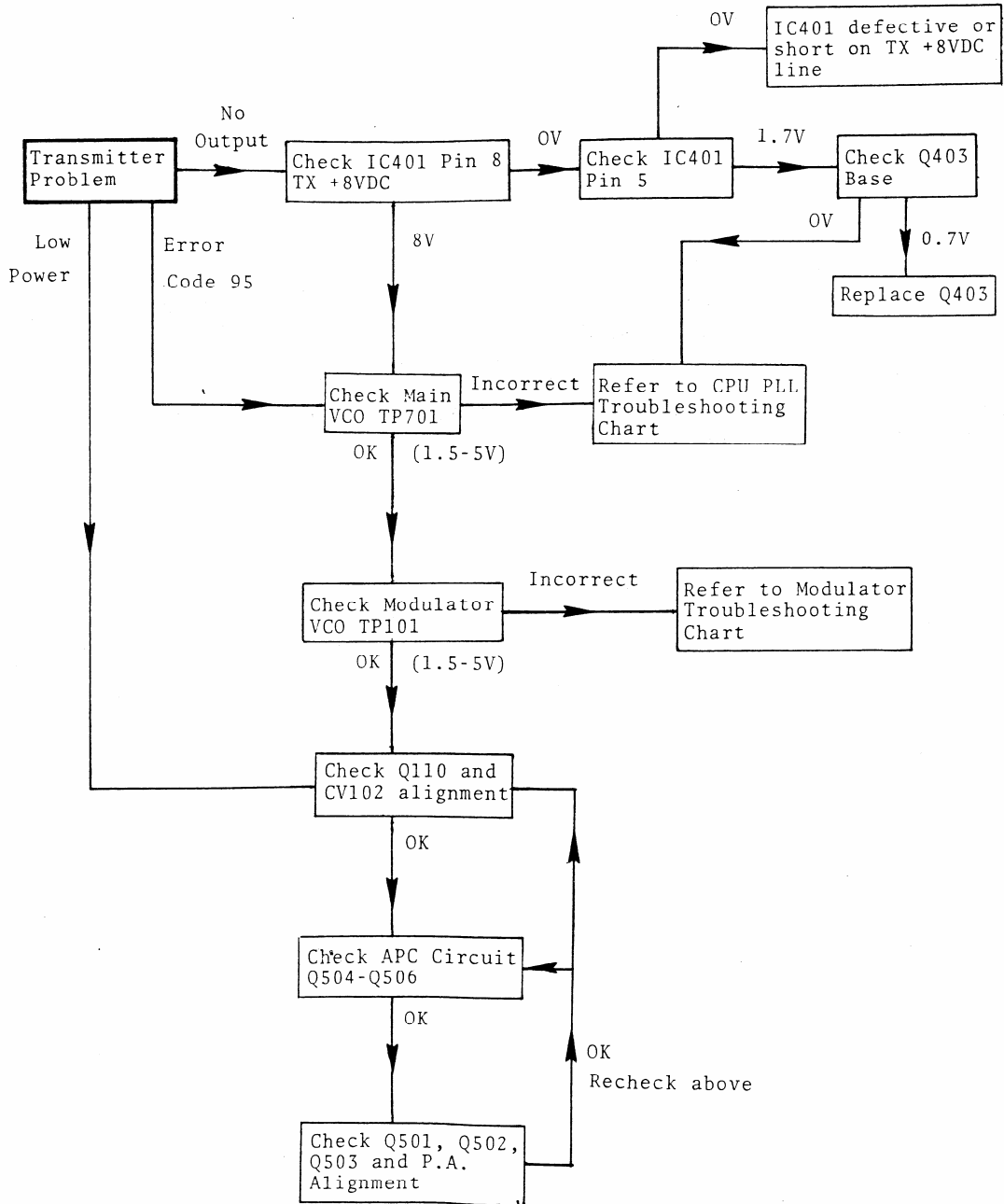


Fold Out →

# TRANSMITTER TROUBLESHOOTING CHART

70-066/076

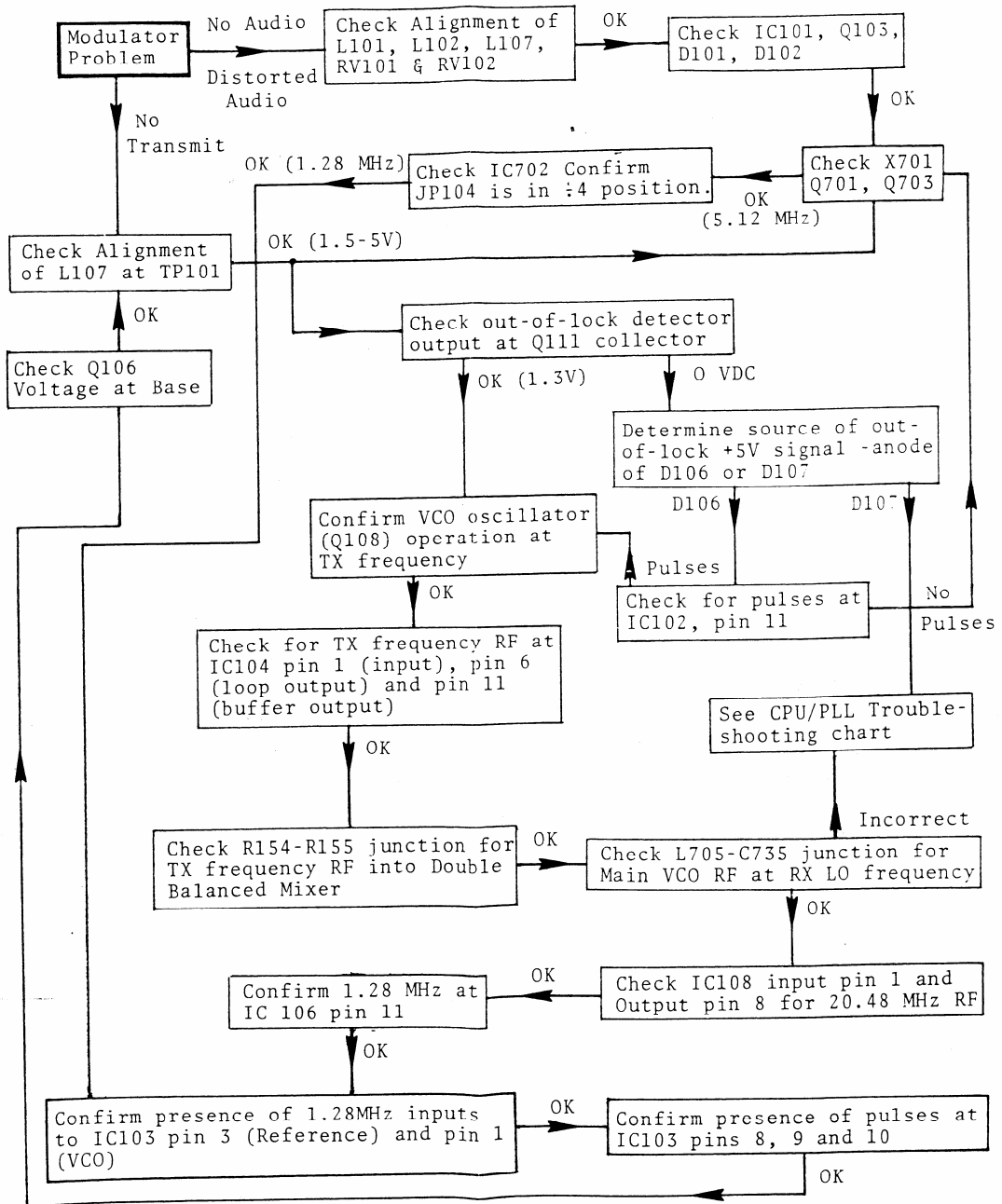
Transmitter Troubleshooting Chart



# MODULATOR TROUBLESHOOTING CHART

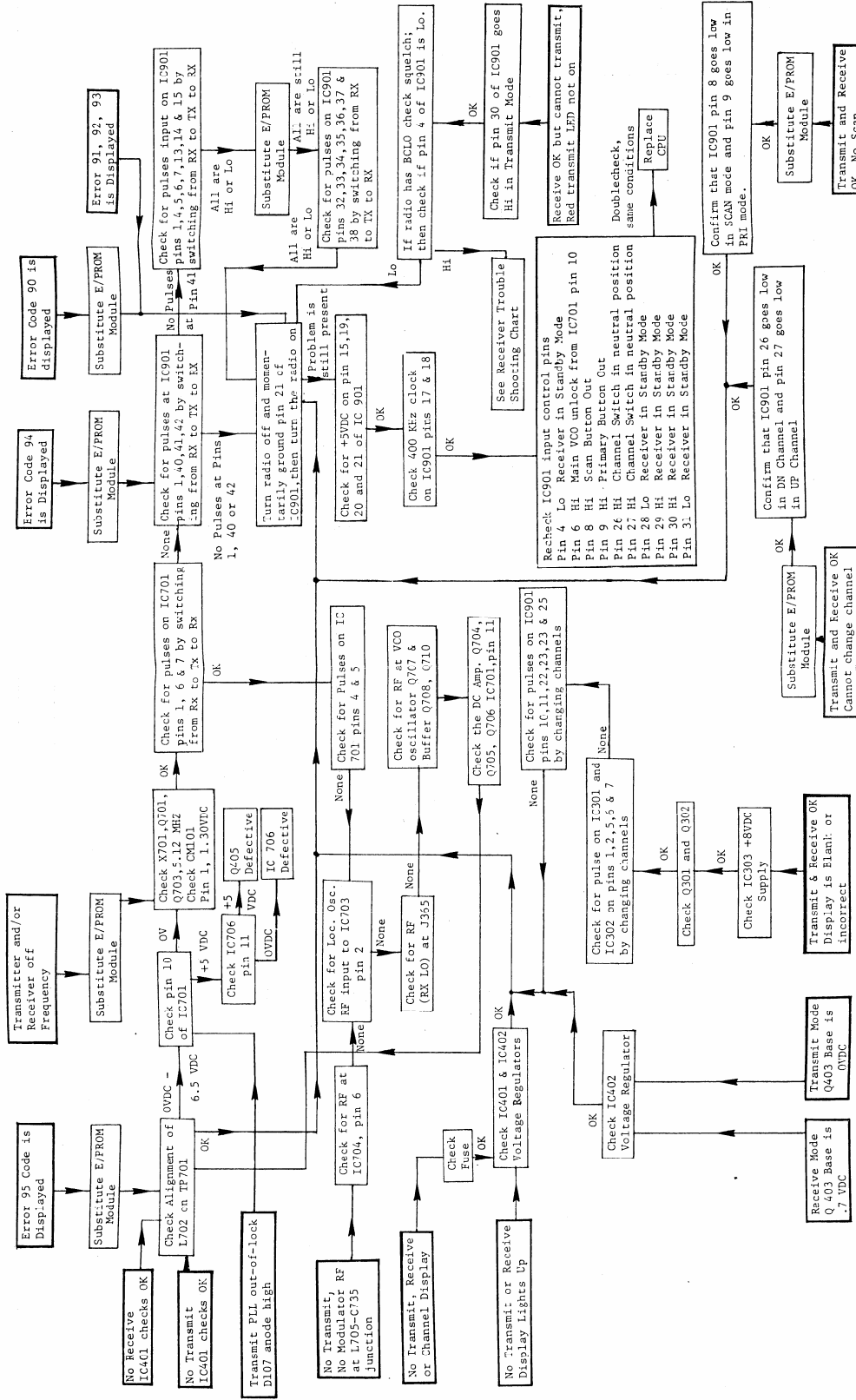
70-066/076

Modulator Troubleshooting Chart





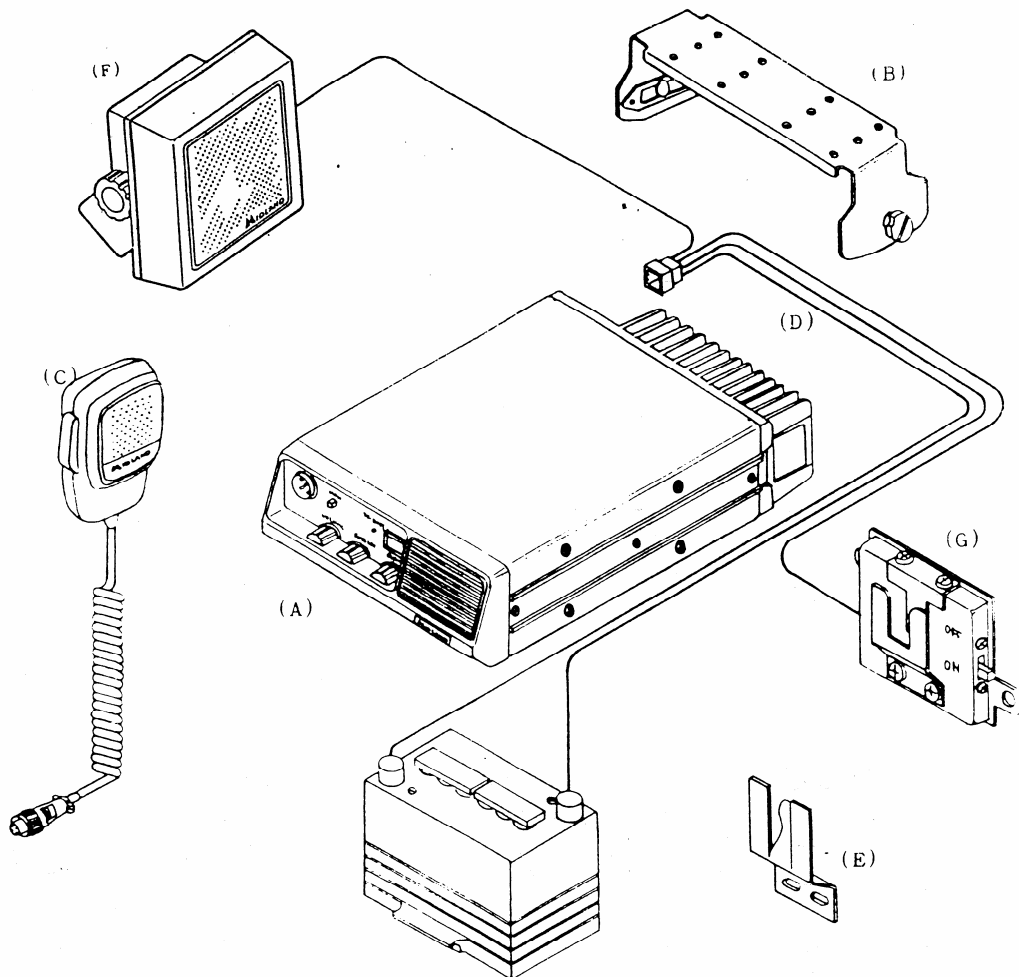
CPU/PLL Troubleshooting Chart



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# MOBILE INSTALLATION DIAGRAM

70-066



UNIT AND INCLUDED ACCESSORIES:

- (A) Under Dash Type Land Mobile Radio
- (B) Mobile Mounting Bracket
- (C) Dynamic Microphone
- (D) DC Power Cord
- (E) Microphone Clip

MODEL NO.

PART NUMBER

70-2201	70-158066
70-2301	70-038013
70-2211	70-034031
	70-158015

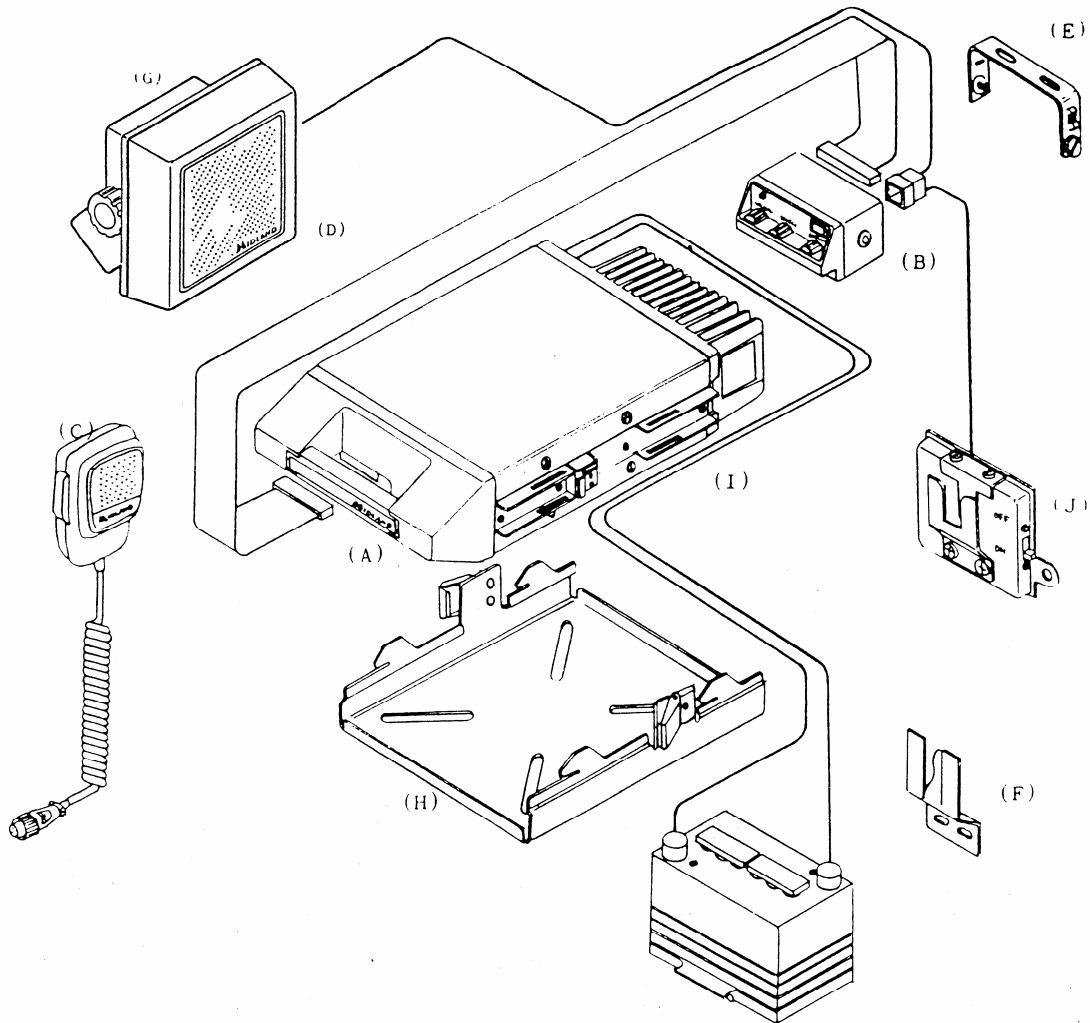
OPTIONAL ACCESSORIES:

- (F) Mobile Trunk Mount External Speaker
- (G) Microphone Hang Up Box

70-2353A  
70-2195

# MOBILE INSTALLATION DIAGRAM

70-076



UNIT AND INCLUDED ACCESSORIES:

- (A) Trunk Mount Type Remote Unit
- (B) Trunk Mount Type Control Head
- (C) Dynamic Microphone
- (D) Trunk Mount Control Cable
- (E) Bracket, Control Head
- (F) Microphone Clip
- (G) External Speaker
- (H) Mounting Tray, Remote Unit, W/Keys
- (I) DC Power Cord

MODEL NUMBER

PART NUMBER

70-2206	
70-2301	70-038013
70-2222	70-034061
	70-158069
	70-158015
70-2353A	
70-2205	70-158068
70-2212	70-034032

OPTIONAL ACCESSORIES:

- (J) Microphone Hang Up Box

70-2195

## INSTALLATION INSTRUCTIONS

70-066/076

### LOCATION

#### UNDER DASH UNIT:

Where you place the transceiver in the vehicle is not critical to its performance; convenience and accessibility are the key factors when installing the transceiver. The mobile mounting bracket will provide you with some guide as to placement. Locations where it can be mounted with metal screws, bolts or pop-rivets generally will work.

#### REMOTE UNIT:

The remote unit may be mounted up to 4 meters away from the control head utilizing the flat cable assembly supplied with the unit. In larger vehicles, longer control cables available from Midland or assembled in the field may be used. Refer to the accessory list for part numbers of bulk cable, connectors and assembly tooling. The flat cable allows routing under vehicle carpeting if desired. When installing, route the connecting cables away from locations where they will be exposed to exhaust system heat, sharp edges or mechanical damage and where it will be out of the way of the driver and passengers. Wherever possible, existing holes in the trunk wall, door channels and window columns should be utilized. The remote unit may be mounted horizontally, vertically or on it's side. Select a location with sufficient room for the unit to be unlocked and removed from the mounting tray. The mounting tray can be attached using the sheet metal screws and washers provided with the unit.

#### CONTROL HEAD:

Control head mounting location is not critical to it's performance. Convenience and accessibility are the key factors when installing. Refer to the Mobile Installation Diagram for the control head mount bracket. The mount bracket may be installed with metal screws, bolts or pop rivets.

#### POWER REQUIREMENTS: (Under dash and trunk mount units):

This transceiver is designed to operate from any 13.8 V DC, 10 amp negative ground source. A standard automotive, 12 volt negative ground system generally is adequate. Inspection of the vehicle's electrical system is recommended prior to installation of the transceiver. A low battery, worn generator/alternator or poor voltage regulator can impair the operation of the transceiver. Noise interference or low voltage output can sometimes be traced to these problems. If an external AC power supply is used with the transceiver, it must be adequately regulated for voltage and current. Low voltage output will produce unsatisfactory results from the transceiver. Receiver sensitivity and transmitter output will be greatly impaired.

CAUTION: EXCESSIVE VOLTAGE OUTPUT ABOVE 16 V CAN CAUSE DAMAGE TO THE TRANSCEIVER. CHECK THE VOLTAGE SOURCE BEFORE CONNECTING THE POWER CABLE.

## INSTALLATION INSTRUCTIONS

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Included with the transceiver is a DC power cable. The red wire is positive (+) and the black wire is negative (-). If at all possible, make direct connection to the battery terminals to prevent random noise and transient spikes from being fed back into the transceiver and also insure adequate operating voltage. If this type of installation cannot be made, a convenient voltage lead or terminal and chassis ground in the vehicle may be used. This transceiver operates on a negative ground system only, do not attempt to operate in a positive ground vehicle.

### ANTENNA:

The most important single factor that can influence the performance of any communications system is the antenna. A good quality antenna of 50 ohms impedance, designed for VHF applications in the 66-88 MHz range is recommended. When adjusting the antenna, whether mobile or fixed, be sure to follow the manufacturers suggested instructions. When adjusting the antenna for VSWR, a high quality SWR meter must be used. The transceiver equipped with an Automatic Protection Circuit (APC) which will disable the transmitter should a high SWR or short circuit in the antenna system occur.

### MICROPHONE HANG-UP BOX:

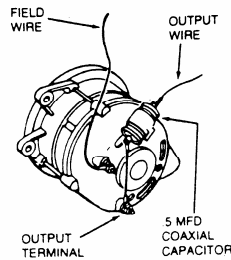
The optional accessory microphone hang-up box (Model 70-2195) is intended to be used in conjunction with the CTCSS option board Model 70-2102A. This unit may be installed in place of the microphone clip or any other location convenient to the operator. The hang-up box may be mounted on a metal or non-metallic surface with the two screws provided. Wiring instructions are shown in the accessory jacks diagrams.

### EXTERNAL SPEAKER:

The 70-076 is supplied with an external speaker (Model 70-2353A). The 70-2353A can also be attached to the 70-066 in applications requiring higher audio levels. Consult the installation wiring diagrams for hook up instructions. The external speaker impedance is rated at 3.2 ohms.

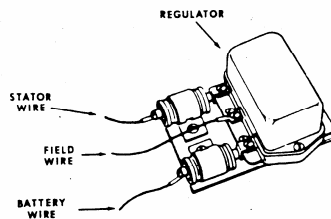
## 1. ALTERNATOR:

The alternator slip rings should be clean and the brushes should make good contact. A .5uf coaxial capacitor may be installed at the alternator output terminal. Verify that the current rating of the capacitor is sufficient to handle the alternator output current.



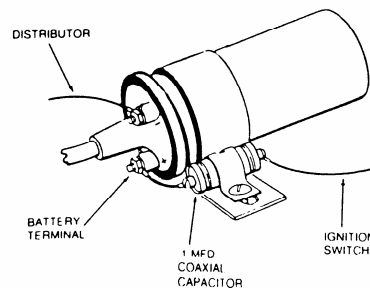
## 2. Voltage Regulator Interference:

Vibrating breaker contacts in the voltage regulator can cause arcing which results in interference. This interference can be noted as popping in the receiver which will change in frequency as engine speed is varied. To reduce voltage regulator noise, place two .5 uf coaxial capacitors as shown.



## 3. Ignition Coil Interference:

A .1uf coaxial capacitor placed at the battery side of the ignition coil, will eliminate pulses from the low voltage leads. Refer to diagram.



#### 4. Distributor Interference:

Should sparking in the distributor cause radio interference, replace wire connecting the ignition coil to the distributor cap with a piece of radio ignition wire. Some vehicles are factory equipped with radio ignition wire.

#### 5. Battery Connection:

Connecting the leads of the power cable directly to the vehicle battery will greatly help reduce noise by preventing random noise and transient spikes from being fed back into the transceiver.

# ACCESSORIES

70-066/0

## ACCESSORIES

### USE DESIGNATION:

UD  
TM  
NO DESIGNATION

### PART APPLICATION:

70-066A, 70-066B  
70-076A, 70-076B  
70-066A, 70-066B, 70-076A, 70-076B

### ACCESSORIES INCLUDED WITH UNIT

USE	DESCRIPTION	MODEL NO.	PART NO.
TM	Microphone	70-2301	
	Control Head	70-2206	
	Microphone Clip		70-158015
UD	Mounting Bracket	70-2201	
UD	Nut, Mounting Bracket		70-151354
UD	Plate Side, Mounting Bracket		70-158075
TM	Mounting Bracket, Cont. Head		70-158069
TM	Screw, Mounting Bracket		70-151362
TM	Washer (outside) Mtng. Brkt.		70-151363
TM	Washer (inside) Mtng. Brkt.		70-151364
TM	Clamp, Cable, Mtng. Brkt.		70-158079
TM	Screw, Cable Clamp, Mtng. Brkt.		70-151366
UD	DC Power Cable, 2M	70-2211	70-034031
TM	DC Power Cable, 6M	70-2212	
	Fuse, 10A		70-204001
TM	Remote Cable Assy. 4M	70-2222	
TM	Mounting Tray, W/Keys	70-2205	
TM	Remote Speaker, 5W	70-2353	

### OPTIONAL ACCESSORIES

	CTCSS Assembly	70-2102	
	2PPM Frequency Stability Kit	70-2124	
	2.5PPM Frequency Stability Kit	70-2125	
	Low Side Injection Kit	70-2173	
	12.5KHz Channel Spacing Kit	70-2137	
	12.5KHz 1st/2nd IF Filter (Kit	70-2135	
	for 70-2134)	70-2141	
UD	Scan Kit	70-2141	
TM	Scan Kit	70-2142	
UD	Remote Speaker, 5W	70-2353	
TM	Remote Cable Assy. 2M, Flat	70-2223	
	Microphone Hang-Up Box	70-2195	
TM	Remote Cable Assy. 4M, Round	70-2226	
TM	Remote Cable Assy. 2M, Round	70-2227	
TM	Connector, Remote Cable	70-2228	
TM	Cable, 34 Cond. Flat (Bulk)	70-2225	
UD	Tray Mounting W/Lock Kit	70-2256	
UD	Lock, with Keys Kit	70-7080	

### OPTIONAL ACCESSORY EQUIPMENT

	E/Prom Programmer (110/220V)	70-1000	
	E/Prom Eraser (110V)	70-1100	
	E/Prom Eraser (220V)	70-1101	
	E/Prom Printer (110V)	70-1300D	
	E/Prom Printer (220V)	70-1300B	
	LMR Test Set	70-E10	

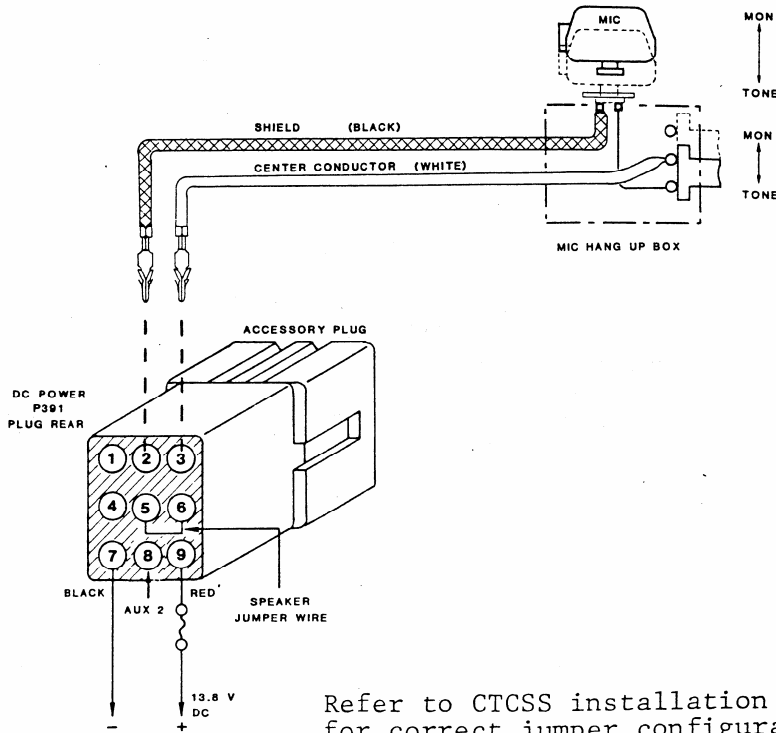
### ACCESSORY TOOLS:

USE	DESCRIPTION	MODEL NO.	PART NO.
TM	Hand Press	70-2229	
	Tuning Tool, Single Metal Blade		70-156019
	Tuning Tool, Double Metal Blade		70-156020



## UNDER DASH DC POWER/ACCESSORY PLUG INSTRUCTIONS 70-066

The accessory jack J391 is designed to accept the 9 pin plug supplied with the unit for DC power. Connections to the plug are shown in the following diagram.



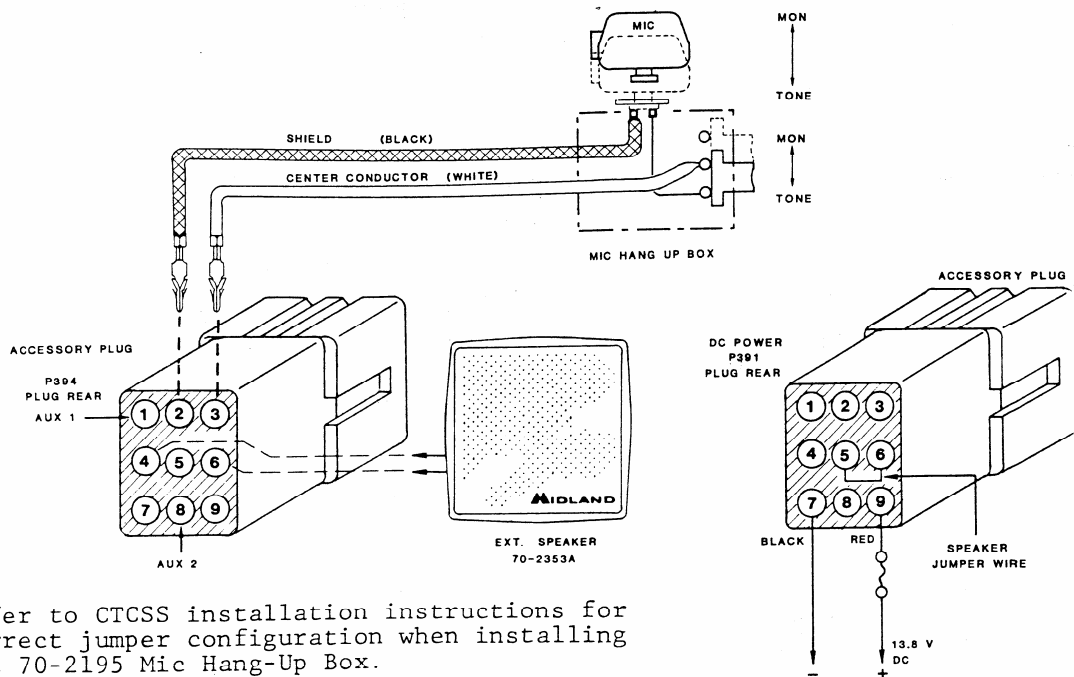
Refer to CTCSS installation instructions for correct jumper configuration when installing the 70-2195 Mic Hang-up Box.

- A. For internal speaker operation, pins #5 and #6 are connected as shown.
- B. For external speaker connections, remove pins #5 and #6 and connecting jumper wire with Molex extractor tool. Speaker wires are equipped with male Molex pins. Insert striped speaker wire in #4 pin position (ground) and insert plain speaker wire to #6 pin position.
- C. For CTCSS operation, connect pins #2 and #3, as shown to mic hang-up box.
- D. Pins #1 and #8 are not connected.

NOTE: Accessory plug P391 utilizes .093" mail pins, Molex #02-0902143. Use Molex crimping tool #HT-1919 and extractor tool #11-03-0006.

## TRUNK MOUNT DC POWER/ACCESSORY PLUGS INSTRUCTIONS 70-

The DC power jack 391 is designed to accept the 9 pin plug supplied with the unit for DC power. The control head accepts the 9 pin Accessory plug supplied with the unit for connection of the external speaker and MIC hang up box. Connections to the plugs are shown in the following diagrams.



Refer to CTCSS installation instructions for correct jumper configuration when installing the 70-2195 Mic Hang-Up Box.

- A. The external speaker is normally connected to P394, the Accessory plug as shown above. Insert the male Molex pin connected to the striped wire in pin position #4 (ground), and the other wire in pin position #6. Do not remove the jumper wire between pins 5 and 6 of the DC Power plug P391.
- B. For subaudible tone (CTCSS) operation, the Mic hangup box 70-2195 is connected as shown above to pin positions 2 and 3 of the Accessory plug.
- C. Depending on the installation and the user's preference, the external speaker may be connected directly to the remote unit DC power plug P391 instead of at the control head. If this is desirable, the molex pins and connecting jumper wire between positions 5 and 6 of the DC Power plug P391 should be removed. The external speaker molex pins can then be inserted, the striped wire in pin position 4 and the plain wire in pin position 6. If it becomes desirable to relocate the external speaker and connect it to the control head plug as outlined in (A) above, a jumper connection between pins 5 and 6 of P391 must be made.

NOTE: Plug P391 and P394 utilize .093" male pins, Molex #02-0902143. Use Molex

