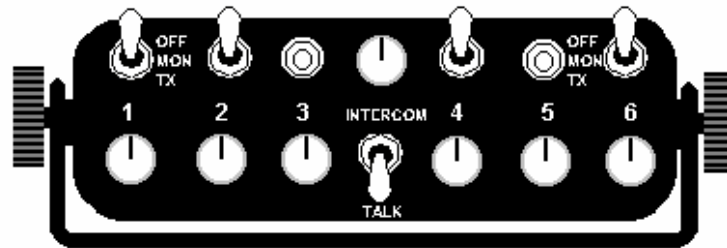


System 1600

Intercom & Radio Mixer



Setcom System 1600 Intercom and Radio Mixer

Installation and Operations

1.0. GENERAL

This Operating Instruction describes the features, components, installation, and operation for the Setcom System 1600 Intercom/Radio Mixer. Prior to commencing installation, read this manual completely through and check the components ordered against those received. If you need to return components for exchange; now is the time to do it. They should be in new and unused condition. Prior to installation the radios, alternator, and vehicle battery should be in good working order. Any pre-existing receive or transmit problems with any of the radios should be corrected prior to installation of the intercom.

2.0. SYSTEM DESCRIPTION

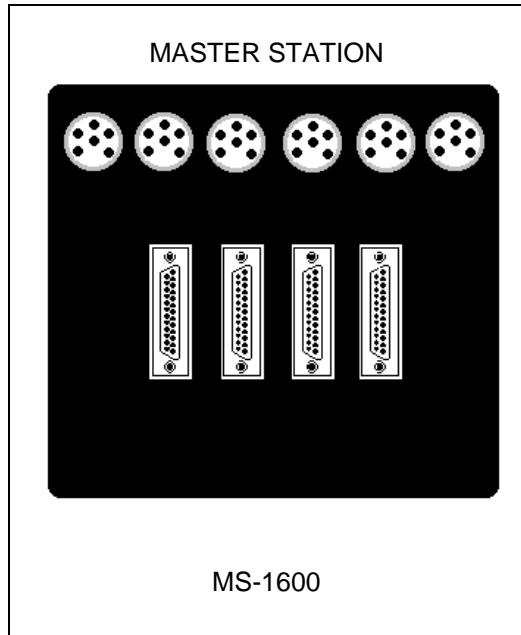
The system provides hearing protection through the use of dual muff noise attenuating headsets. It further provides clear voice communications for both full duplex intercom and simultaneous receive/transmit on six two-way radios. The system is immune to radio frequency interference (RFI) and vehicle induced electronic noise (EMI) from sirens, strobe lights, alternators, ignition system or any other vehicle electrical/electronic system. The system utilizes shielded cabling, an internal voltage regulator and DC line filter known to provide superior performance in mobile emergency response vehicle applications. All interfaces with radio equipment are through existing microphone and/or accessory ports; no radio modifications are required. No component disassembly, desoldering, or cutting of installed cabling is required for repair or replacement of the radio or any system component. Existing radio speakers and microphones may remain operational. The System includes a master station, remote stations, interconnecting cabling, headsets with hanger hooks, and all other components as required to make the system fully operational. The overall design is designed and fit for fire service use in mobile applications. Further information on specific components is given below.

2.1. STANDARD FEATURES SYSTEM 1600

- Up to 4 full function remote stations with transmit access on all radios.
- All remote stations have intercom access with operator controlled mode switch
- Automatic operation - no master station adjustment controls
- RFI and EMI protection
- Up to four intercom-only access stations
- Only the keying station transmits on radio
- Weatherproof stations for exterior mounting
- Hand microphones and cabin speakers may be retained and used normally

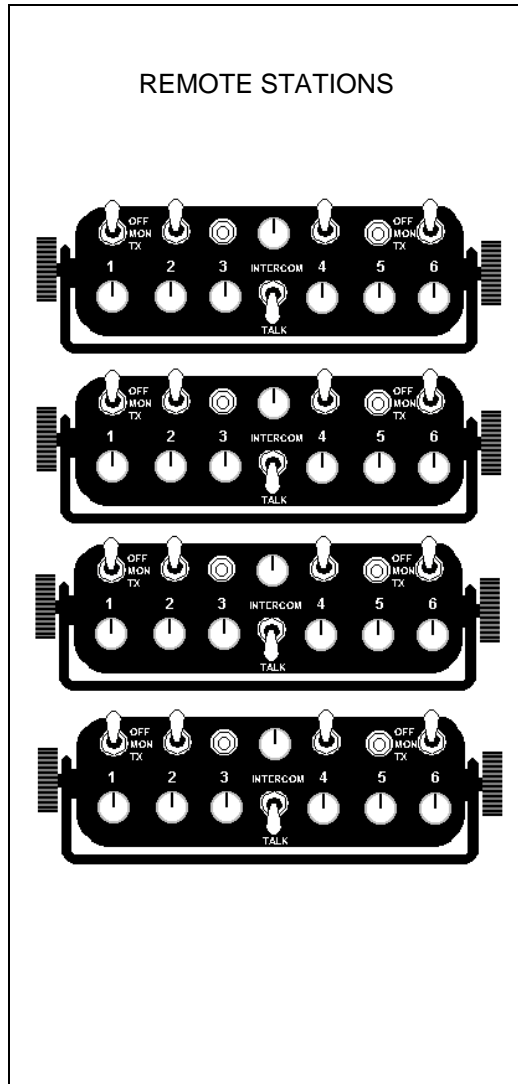
3.0. COMPONENTS

3.1. MS-1600 MASTER STATION



The master station operates on a vehicle power bus at 13.8 volts with a maximum current draw of .5 amps. The Master Station provides full isolation between up to six radios and the system. This is achieved by eliminating ohmic connections on transmit audio, receive audio, or push-to-talk lines between radios and the master station circuitry. All means necessary, including shielding signal lines between components, have been taken to eliminate interference and unwanted noise due to ground loops. Signal isolation on transmit or receive between all channels is greater than 40 dB. The master station is protected from transients and noise on the power system. It simultaneously matches both receive and transmit levels of any combination of six AM /FM radios. The master station has provision for four receive/transmit remote stations and four intercom only stations. To help eliminate the possibility of EMI/RFI the master station is of metal construction. The MS-1600's dimensions for mounting considerations are 10"W by 5.0"L by 4.5"H.

3.2. RS-1600 REMOTE STATION

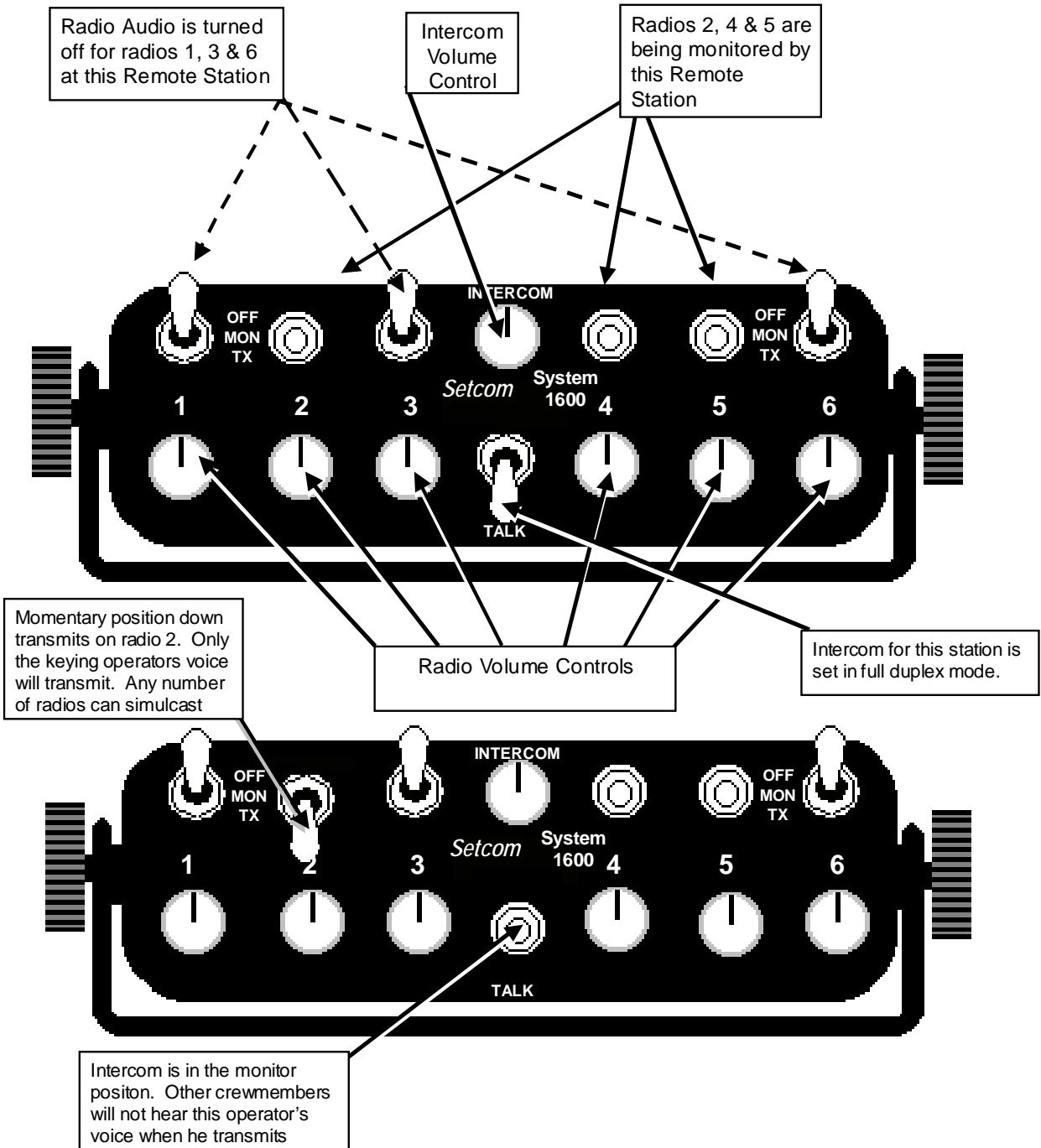


The System 1600 master station will accept up to four RS-1600 remotes. Remote stations are modular and interchangeable with their counterpart in any vehicle. The remote stations have connectors allowing them to be removed and replaced without the need to de-solder cable or disassemble the station. Remote stations are connected directly to the master station using a shielded cable terminated with DB-25 connectors. Cables and stations are provisioned to allow cable and station to be locked together with screws. Removing one station will have no effect on the operation of the master and remaining remote stations. The remote stations are equipped with a port to accept the headset extension station as detailed below. Remote stations enclosures are fabricated from metal to further isolate the system from EMI/RFI. Remote stations are trunion mounted to allow removal from the vehicle without the need to unbolt or unscrew the trunion bracket from the vehicle. Each crewmember's remote station control panel is laid out identically and as shown on Fig 3.2.1. Control panel includes a three-position large bat toggle switch and volume control for each of the six radios and the intercom. Radio control toggles are three position; Lock-up for radio audio off, Lock-center for monitor, and Momentary-down for radio PTT. Intercom toggle will have three lock positions; Audio-off, Monitor-only, Full-duplex intercom. A separate volume control is provided for each of the six radios and the intercom. Settings on each remote will not affect the settings on any other remote station. Refer to Attachment II for further details on remote station controls.

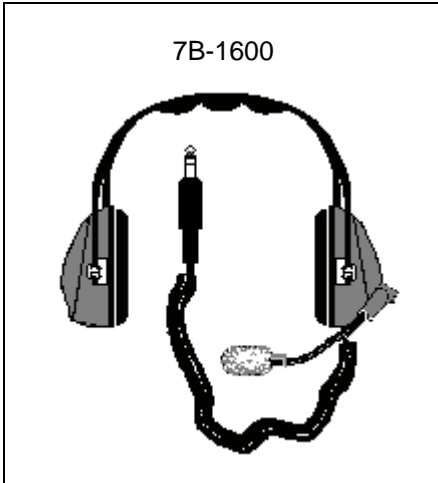
If a RIA-1600 Remote Intercom access station is to be used, one of the remotes will need to be a RS-1600-1 Remote Station with the Intercom only access port configuration.

3.2.1. RS-1600 REMOTE STATION OPERATION

Note! The below illustration shows remote station operation with the toggle switches in one possible combination. The toggle switches can be set to allow for any combination of simultaneous monitoring of available audio circuits. Additionally, four crewmembers can simultaneously transmit on any combination of available transmit frequencies.

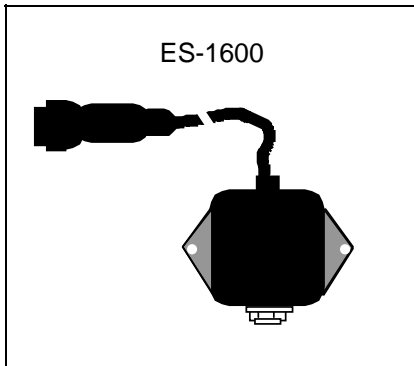


3.3 HEADSETS



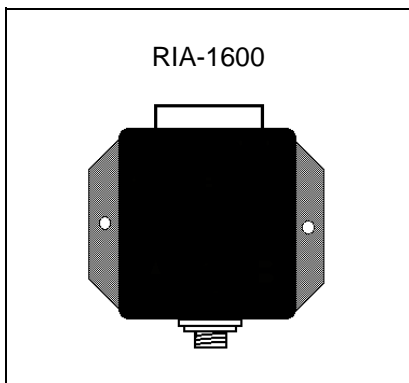
The 7B-1600 headset is a dual muff, noise-attenuating, over-the-head headband style fitted with a noise canceling boom mic. Noise attenuation rating (NRR) is 24dB or greater. Headset weight is 11oz. The microphone is fitted to a flexible, rotating boom to allow full adjustment for mic positioning and to further allow the headset to be worn right or left dress. The boom microphone is a waterproof, amplified-electret type. Noise canceling exceeds 20 dB at 300 Hz and 12 dB at 1 kHz.

3.4. ES-1600 STATIONS



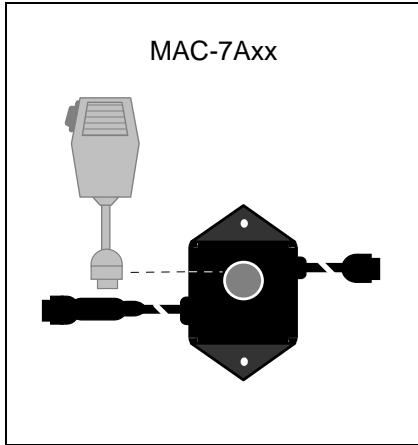
The ES-1600 Extension Station allows the headset jack-in point to be remote from the RS-1600. This allows the RS-1600 with it's controls to be mounted in the operator's line of sight with the headset jack-in point above and behind the operator's head.

3.4. RIA-1600 REMOTE INTERCOM-ONLY ACCESS STATION



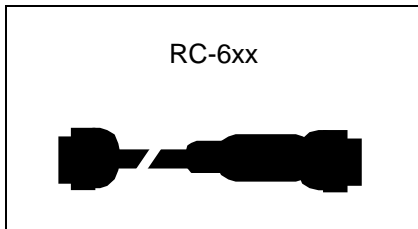
The Remote Intercom-only Access Station allows adding additional intercom only stations. Intercom only stations may be either internal station for crew not requiring radio access or exterior stations for maintenance or communication with the crew. See Section 4.0 for location of the RIA-1600.

3.5. MAC-7A MICROPHONE ADAPTER CABLES



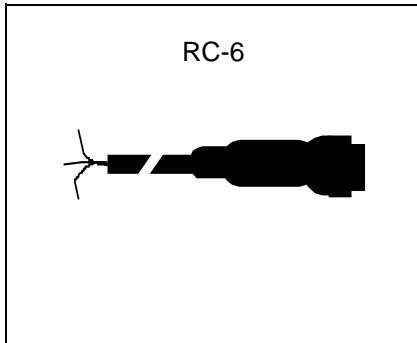
A MAC-7A allows plug-in installation, retention of the hand mic, and easy exchange of the radio for maintenance. Use of a Setcom MAC will not void new radio warranty and eliminates problems that can occur if a radio cable is miswired. The "xx" termination code will be replaced by the Setcom identifier for the radio. For example a MAC-7AMU is a MAC for a Motorola Spectra. A standard MAC-7A has a 20 inch radio cable, and a **3 foot cable** MAC to MS-1600. Although a MAC Extension Cable is available, we recommend returning the unused standard MAC to exchange it for a MAC built with a longer cable if you find the standard length is too short for your installation needs. Some radios offer accessory ports that provide these same features through using a terminated radio cable, see 3.6

3.6. RC-6XX RADIO CABLES



A terminated radio cable is fitted with a connector to attach to the MS-1600 on one end and radio's accessory port on the other end. A six foot cable is the most common length cable we sell, however, various length radio cables are available.

3.8. RC-6 RADIO CABLE



The RC-6 is an unterminated radio cable. One end is fitted with a connector to attach to the MS-1600, and the other end is unterminated. An unterminated radio cable is hardwired by a radio technician directly to the radio. A unterminated radio cable is not recommended when a terminated cable or Microphone Adapter Cable is available. Installation of an unterminated radio cable should not be attempted by personnel not normally engaged in technical services for radio equipment. **Warning!** A radio manufacturer's warranty may be voided if the radio case is opened or if a radio cable is soldered directly to the radio. To insure preservation of warranty a *terminated* Radio Cable or Microphone Adapter Cable should be used.

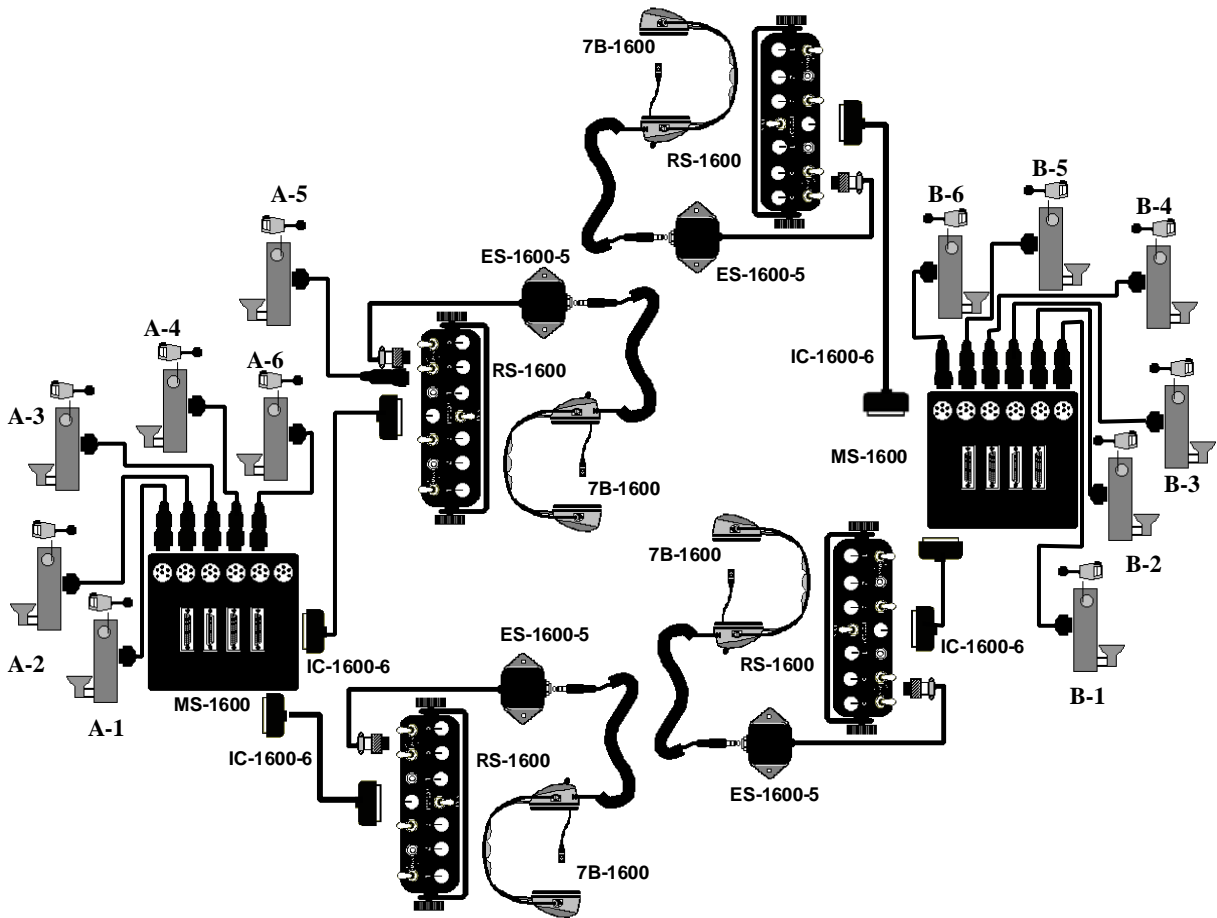
4.0. REPRESENTATIVE SYSTEM

Two Systems Configured for Two Men/Six Radios Each

System 1600

Command Vehicle System

Glendale PD



5.0. INSTALLATION

5.1. BEFORE STARTING

Prior to installing hardware, be sure you have an overall understanding of the system you are installing. Compare the number of stations, headset style, model of radios to the System Drawing prepared for your order and insure they agree with the hardware you have received. The MS-1600 unit is set at the factory to correctly modulate the radio models identified at the time of purchase. The MS-1600 will interface with these radios without need of any internal adjustments. If the radio model is changed before installation, a different radio interface device (MAC or Radio Cable) and a different setting on one or more of the internal gain setting may be required to allow the MS-1600 to correctly modulate a new radio. You will need to call our toll free service line 1-800-966-1034 to determine the correct radio interface device and the gain setting required for the new radio. If you wish to exchange components, now is the time to contact the factory. After you have determined that all components, including cable lengths, are correct you are ready to start.

5.2. NEGATIVE GROUND

The Setcom MS-1600 is designed for 12-volt negative ground electrical system. A common grounding point is provided on the MS-1600 Master and each of the RS-1600 Remote Stations. A common ground wire should connect these component grounds to chassis ground. If vehicle has a positive ground, a DC converter must be used.

5.3. PRE-EXISTING CONDITIONS

Due to the fact the headset will reduce background noise by over 90%, any alternator whine or other objectionable noise will become more noticeable. Presence of such noise can be detected prior to intercom installation by placing your ear directly against the radio speaker with a normal volume setting on your radio, and with the vehicle engine running. Check both with a modulated carrier being received and with the radio in the standby mode. In some instances it may be necessary to connect a set of headphones across the speaker if it is not possible to listen directly to the speaker itself. If a problem exists and you have a Motorola or GE radio with a remote control head, first check the power leads. These radios will normally have two leads for power. The orange wire (Motorola) is connected to the ignition switch; the green lead is connected to a continuously hot 12-volt power source. The green wire typically powers the audio speaker amplifier. Connecting a suitable filter in line with the green lead will usually reduce alternator whine to an acceptable level. Filters such as Radio Shack Part Number 270-051 can be used and are inexpensive. If there is detectable whine in the transmitted signal, a similar filter should be installed in series with the orange lead.

5.4. SECURING STATION HARDWARE

Take into consideration the radio cable routing, station orientation, and drilling location to determine the installation position. When location has been determined insure that pilot holes will not damage hidden vehicle components such as radiators, electrical wiring, etc. Mark hole locations with pencil. Using a #25 drill bit, drill pilot holes. Number 6 sheet metal screws, supplied in the PN-21-8003 Installation Kit if purchased, are recommended. Using the number 6 sheet metal screw, screw down the station until it is held snugly. When mounting enclosures to steel backing panels greater than 1/16" thick or aluminum panels greater than 1/8" thick, it is advisable to use self tapping machine screws or to drill and tap for the mounting screws. This precaution will eliminate the possibility of shearing off the screw heads during installation. Pass through holes for the interconnecting cabling connectors should be 3/4". Split ring grommets as provided in the installation kit should be installed in pass through holes to protect system cabling. Double-sided tape may only be used to mount the MS-1600 Master Station.

5.5. MS-1600 MASTER STATION

It is best to first locate and mount the MS-1600 Intercom/mixer station and the microphone adapter cables and any radio cables followed by the remote stations. Select a mounting point convenient to the radio and centrally located for the routing of the radio interface cabling and the remote to master station cabling. The location should be chosen as to not interfere with normal operations of the crew and need not be accessible as there are no user operated controls on the master.

5.6. MICROPHONE ADAPTER CABLES

The MACs should be located close to the radio or the radio control head, usually 11 inches. Remove the hand microphone from the radio/control head. Attach the MAC radio cable to the radio/control head. Position all cables to prevent interference with normal operation prior to finalizing the MAC location. Some radios will not have receive audio on the hand mic port, in these cases a single flying lead from the MAC needs to be connected to the speaker-high-lead of the external speaker connections for the radio. If you cannot identify the speaker-high lead connect the MAC lead to either of the two speaker leads. If the audio level is too low, connect to the remaining lead, this should be the speaker-high lead and give you a good level of receive audio. You cannot damage the radio by this procedure. On many radios you will be able to connect to either external speaker lead with the same result. In some cases mating connectors to the original hand mic connector are not available for installation in the MAC. In such cases a generic connector is provided with the MAC and you will need to modify your microphone. Cut the connector off the hand microphone and install the supplied connector. A schematic to determine correct pin-outs is included with each MAC. Plug the hand microphone into the MAC and perform a radio check using both the hand microphone and headsets.

5.6.1. Typical MAC-9 Installation

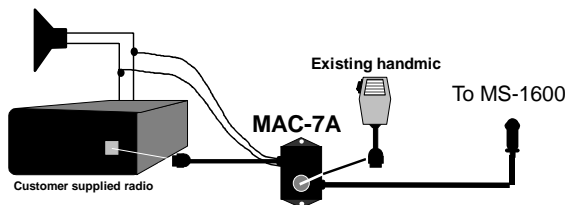


Figure left shows typical MAC-7A installation. Radio transmit access and radio ground is gained through mic port. Receive audio is taken from the external speaker leads.

5.9. CABLE INSTALLATION

Route the cables along existing grooves and ducts if possible. Where ducts or grooves are not available, select routing that will not interfere with normal operations of the crew. Note! Many truck manufactures provide additional 3/4" knockouts in the vehicle cab floor, check for availability of knockouts prior to cutting additional holes. Note! It is not recommended to disconnect the connector from cable. Tie-wrap all cables to prevent unnecessary cable movement. All interconnect and radio cables have weatherproof connectors. Mating panel mount connectors on Intercom/Mixer are labeled. Install cable into proper mate as follows;

- A. Align key way slot cable with key on panel mounted connector. Key for a panel mount receiving female connector will be in the 12 o'clock position with the mounting surface of the station being at 6 o'clock
- B. Push connector on until firmly seated.
- C. Twist connector ring clockwise 1/4 turn until locked.

