

MODEL M15 VHF AIRCRAFT BAND RADIO RECEIVER/TRANSMITTER

INSTALLATION

Installation is easy, but due to the great variety of aircraft and vehicles, mechanical installation is virtually a custom job. Mentor suggests that installation be performed by an avionics or a two-way radio shop technician. Experienced technicians can avoid potential problems and adapt each installation to the user's specific needs. All connections must be mechanically and electrically sound if the full reliability of the M15 is to be realized.

A U-shaped mounting bracket, supplied with the M15, is useful in most installations, especially in vehicles. Using this bracket obviates the need to drill holes in the radio cover, a step that must be done only with great care to avoid damage to internal components and to avoid metal chips or screws shorting internal connections. Holes may be drilled in the bracket as needed, with no danger to the radio. Thumb screws through the sides of the bracket fit into the no. 8-32 threads on each side of the M15. The threaded portion of these screws must be no longer than 1/2 inch. Rubber washers hold the M15 firmly when the thumb screws are tightened.

The speaker can be mounted in any location that provides the best combination of ease-of-mounting and good sound. In noisy environments, the speaker should be directed towards the listener; preferably it should be located within one to three feet of the listener's head. In very noisy locations, an optional earphone output plus cushioned earphones may be best. In vehicles, the speaker may be mounted in the place provided by the vehicle's manufacturer, or under the dashboard or even overhead. The speaker cone should be protected by a grille. The speaker should be four inches in diameter, or more, capable of handling about 5 watts, and should have an impedance of 4 ohms (an 8 ohm speaker is acceptable where the M15's full audio output is not required). Mentor Radio Co. can provide an optional weatherproof enclosed speaker suitable for mounting in vehicles. Earphones may be connected in place of the speaker, or in parallel with it. If only earphones are used, it is not necessary to install a shunt resistor in place of the speaker.

M15 electrical connections are made via a 9-pin molded nylon connector on the rear (mating connector supplied with radio). Pin numbers are molded into the connector, but are small and it is easier to refer to the attached diagram (dwg. 1101454) to determine pin functions. The mating connector is polarized—that is, it must be turned to the proper orientation or it cannot be pushed on. The two corner notches must be towards the right side of the radio (looking at the front panel). Be sure the two prongs on the panel connector pass through the openings at each end of the mating cable connector. The prongs will snap in to keep the cable connector from vibrating loose. To remove the cable connector, squeeze these prongs toward each other to release their hold; jiggle and pull the connector out.

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INSTALLATION (continued)

Drawing 1101454 shows connections for a typical installation, which uses only 4 of the 9 connector pins. (The extra pins are used for special options.) The pins are crimp type, but it is recommended that they also be soldered for best reliability. Wires for +14 volts and ground should be 16 ga. wire. Note that there is a fuse built into the M15, so that an external fuse is not required, although it will provide added protection should the 14 v wire in some way short to the vehicle chassis. The power ground wire should be connected firmly to the metal chassis or frame of the vehicle. The speaker ground wire should connect directly to the speaker. In some cases it will be acceptable to connect the ground of the speaker to the chassis/frame and use a single ground wire for both power and the speaker.

The M15 operates from 14 volt dc *negative ground only*. The radio will operate, with reduced specifications, for supply voltages down to about 10.5 volts. The voltage should not exceed 16 volts. A type 2AG 4 ampere fast acting fuse, located on the rear of the M15, protects the radio and internal and external wiring should a short occur within the radio. The fuse will also blow if the polarity of the supply is reversed. To open the fuse holder, press down on the top of the center section, then pull that section outward to its full extension of about 3/4 inch. There is a place in the fuse holder for a spare fuse, as well as the active one.

To simplify vehicular installation, Mentor Radio Co. supplies a “harness” which includes the mating connector and wires of suitable sizes having lengths that are sufficient for most installations.

RG-58A/U coaxial cable or equivalent should be used between the antenna and the M15. The M15 uses an SO-239 r.f. connector; the mating connector for the coax is type PL-259. The length of the coax is not critical, but a great deal of unnecessary length should be avoided. The antenna itself should be vertically oriented and should have an impedance of 50 ohms. A quarter-wave ground plane type is suggested. After installation and whenever antenna condition is doubtful, a standing wave ratio (SWR) measurement is recommended. In a good installation, the SWR should not exceed 1.5 at a frequency near the center of the range of channels.

Vehicular antennas purchased from Mentor Radio Co. include the antenna connector with sufficient coax for almost any installation. Excess coax may be coiled conveniently rather than cut off. If the antenna is a “narrow band” type (such as the 1/4 wave ground plane), it should be trimmed to a suitable length for the channel frequencies in use—refer to instructions accompanying the antenna.

If the M15 has more than one channel, and the difference in frequency between the highest and lowest channels exceeds 5 MHz, a broadband antenna will give better performance at frequencies farthest from the center of the frequency range.

Mentor Radio Co.
1101431-2 (rev 5-99)

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LICENSING

Federal Communications Commission (FCC) rules require that radio transmitters be licensed. Application is filed on FCC form 404 for aircraft or form 406 for vehicles.

IGNITION INTERFERENCE

The M15 contains an automatic series-gated noise limiter which greatly reduced interference from impulse noise sources such as engine ignition systems. However, such limiters can never completely eliminate interference from nearby severe ignition noise sources. While it is standard practice to use shielded ignition systems in aircraft, most vehicles do not contain such shielding, and may at times cause annoying interference. Trucks, tractors and older automobiles are usually the worst offenders. In severe cases it may be necessary to add shielding and/or filters to such ignition systems that cause severe interference to the M15.

ROTATING BEACON INTERFERENCE

The rotating beacons of emergency vehicles may cause significant radio noise interference. This is often caused by worn brushes on the motor—replacing the brushes can stop the interference. Filters that mount at the beacon are available to eliminate beacon interference. Mentor Radio can supply such filters, or they are usually available through local electronic distributors.

OTHER RADIO INTERFERENCE

When other radio transmitters are installed in the same vehicle as the M15, those transmitters can interfere with M15 reception. Commercial broadcast FM stations can cause interference in an M15 receiver, especially if the broadcast antennas are less than a few miles away. Mentor Radio Co. can provide applications notes and other assistance in solving interference problems.