

AN/TRC-97 Radio Set



The **AN/TRC-97 Radio Set**, or AN/TRC-97, is a radio set that has 12 multiplex channels and 16 telegraph channels connected to an analog radio. The radio set is a mobile terminal that can transmit up to 40 miles straight line-of-sight at up to 1 watt, using a traveling wave tube amplifier, or 96 miles in tropospheric scatter at up to 1 kilowatt, using a tunable klystron amplifier, at a frequency range of **4.4 to 5 Gigahertz**.

The AN/TRC-97 can be connected to one of three mobile antennas, depending on the distance and signal strength needed.

1. The First antenna that can be used with the AN/TRC-97 is the MRT-2 parabolic tropospheric antenna, measuring 15 feet across, which is designed to cover distances of up to 160 km, or 96 miles.
2. The Second antenna was a simple feed horn type mounted on a 30 ft pole.
3. The Third antenna is a set of 8 foot parabolic dishes on 15' masts (*pictured in the photo*).

These antennas are transported on trailers and have to be manually erected every time they are used, so knowledge of mechanics as well as electronics was needed to erect and maintain the equipment.

The system was powered by a 3 cylinder diesel or later by a turbine generator (TG). a typical crew would consist of 2 to 3 RF Communication-Electronics Maintenance Technicians and 1 Generator Maintenance Technician to service the generator set.

Two units could be used back to back to provide a Radio Relay capability for extra long haul traffic. this was usually done at the baseband level without need of any other equipment other than cables. it also could be remotely monitored from up to 2 miles away using the BZ109 test and monitor set. this was accomplished by connecting a single pair of field wires (common military phone line). the BZ109 would provide remote order wire, some basic measurements and alarm monitoring.

Three modes of propagation could be used; Tropospheric scatter, Obstacle Gain Diffraction, and line-of-sight. Tropospheric Scatter and Obstacle Gain Diffraction typically used the 1 kW Klystron while the line-of-sight mode used the 1W Traveling Wave Tube (TWT). The TWT was replaced late in the 97s life by a solid-state 1W amplifier.

The receiver of the AN/TRC-97 can pick up very faint radio signals as low as -105 dBm. The modified AN/TRC-97A (with 12 channels of added multiplex) can receive signals as low as -102 dBm. It uses tunnel diodes, which utilize quantum mechanics theory, to amplify those very low signals. The signals from the two receivers are then sent to a comparator, where they are compared, combined, or used separately, if necessary.

The AN/TRC-97 Radio Set is quite small, as radio sets go. It is housed in a van that is little more than 5'6", and is delicately loaded onto a M1028 pickup truck. A trailer hauling a twin set of parabolic antennas and generator is usually pulled by the truck when it goes on its many maneuvers and deployments in support of the American defense system.

The AN/TRC-97 was superseded by a more modern, less maintenance intensive, digital radio set called the AN/TRC-170.

The AN/TRC-97 was initially made for the Marine Corps to help them with their military operations, such as the Vietnam War. It originally only had only 12 multiplex channels, but when the Air Force decided to use the equipment, they added an additional 12 channels in another module called the baby mux, next to the cabinet that houses the klystron. (This modification caused the equipment to be recognized as the AN/TRC-97A.) Wired to voice channel 1 was a 16 channel teletype multiplexer.