

## REMOTE RADIO OPERATIONS USING MENTOR BASE STATIONS

The Mentor Radio base station radios can be operated remotely, using optional remote control equipment. There are several reasons for installing and using remote control on a base station radio.

1. To maximize the transmitted radio frequency power radiated from the antenna it's important to keep the power loss from the coax to a minimum. There are two ways to do this.
  - a. Keep the length of coax between the radio and the antenna as short as possible.
  - b. Use a low loss cable.

Remote controls make sense when the antenna cannot be mounted sufficiently near the operator's station, so that a long coaxial cable run would be required. That way the radio can be installed near the antenna and remote control can be located at the operator's station.

2. Remote controls permit operation of one radio from multiple locations.
3. Remote controls extend the radio operation area so users don't have to go to a central location to operate the radio.
4. If the radio has a digital remote interface that can be connected through the internet, additional remote control capability may be available. Depending upon the radio remote control interface implementation additional remote features may include, measuring and returning test point values for diagnostic / monitor purposes, controlling squelch level, changing configuration parameter values, selecting operating channel and transmitter output power level, switching to backup hardware, turning power on and off, etc...

Remote interfaces can be either analog or digital types. The analog remote control interface provides discrete analog signals on individual signal lines at the radio that allow connection between the controller and a radio. There are two basic controllers you can connect to a radio using this style of interface. They are Local Extension controllers and Tone Remote Controllers. Connecting a radio with local extension controllers normally only allows connecting a small number of users to receive signals and key up the radio to transmit. Most do not allow any other functions.

Connecting the radio to Tone Remote system is only slightly different. All tone remote control systems require a tone remote adapter and tone remote controllers. One tone remote adapter may connect to many tone remote controllers. All the controllers are connected to the adapter by regular flat ribbon telephone cable with RJ-11 connectors. The tone remote adapter connects to the radio using a special adapter cable for the radio it will be connected to.

There is a new enhanced analog remote interface used on the new M2115B that allows connecting the new radio to a new style tone remote adapter that will allow remote users to remotely select up to 16 channels. If an external Rf power amplifier is used, only eight remote channels may be selectable instead of 16.

All older Mentor Radios use the basic analog interface. The M15-25, MB and M15B all have this type of interface. The only extra feature that Mentor Radio ever incorporated was a two channel remote frequency selection.

The digital interface would be some form of port connection to allow a computer to be connected to the radio. It could be either a serial port using RS-232 or USB serial communications or even an Ethernet connection allowing remote users to connect directly to the radio or through a network.

Not all the controls on a radio may be remotely operated. The minimum remote control system allows only a remote speaker and a remote microphone. The radio's on-off switch, squelch setting and channel select controls normally cannot be changed at the remote location. If the remote location is out of sight from the radio, obviously all front panel indications and lights cannot be observed.

The Mentor Radio model M2115B includes an enhanced analog interface.

There are two basic ways to connect Mentor Radio base radios to remote controls.

1. Local Extension System uses a multi-conductor cable or set of wires to connect discrete analog signals between the radio and the controller(s). When adding more than one controller, all units must be wired in parallel. The maximum recommended number of parallel controller units should not exceed 6 units. Local extension controllers also require a special shielded cable. There also is a maximum length limit on the wires. The total length of all controllers wiring should not exceed 1000 ft.
2. A Tone Remote system uses a "2-wire" or "4-wire" wire pair: either an extension line, a regular phone line, or phone line may be leased from the telephone company. A tone remote system needs a tone termination panel to connect between the radio and the remote station, but can be used over much larger distances without the wire length limitation.

## Phone Patches:

A phone patch allows pilots to make a phone call from the aircraft using their aircraft radio. The phone patch may refer to either the process of placing a phone call or the device that is connected to a ground based radio and telephone line that allows the connection. Phone patch connections can be accomplished without ground based user intervention. The phone patch device is connected to a radio analog remote interface and also is connected to the phone line. When the ground based radio receives a certain DTMF tone sequence it activates the ground based phone patch device that connects the radio's received audio to a telephone circuit. Each phone patch has its own activation sequence so the radio can't activate more than the one phone patch intended.

It will manage the phone call handling the keying of the radio to send phone signals back to the aircraft. Several "dial" remote systems exist. Some of these require that the aircraft have some method of producing DTMF tones. Special microphones with numeric keypads may be used. Separate DTMF encoders that have built in speakers are also available. Users may hold the encoder to the microphone and after keying the radio, pressing character keys on the device will produce the sounds that are transmitted over the radio to activate the phone patch. A dedicated phone line is usually not required.