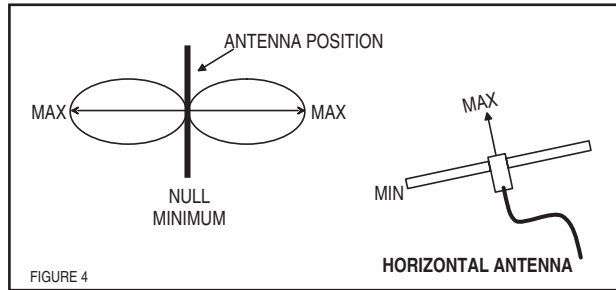


Horizontal Antennas: The horizontal antenna is best suited for situations where the signals are normally coming from a known path such as a road entrance or the area of coverage is long and narrow. If the radio can be placed at the approximate center of the coverage area then the bi-directional pattern can be an advantage. See Figure 4.



NOTE: The horizontal antenna can also be used to null out interfering signals. If a known source of interference (such as a military base or computer system) is known, the null minimum can be oriented so that it is towards the interference.

Common Errors of Wireless Installations

1. Wireless is not "MAGIC". With the right installation and the right antenna, it can be very reliable.
2. Wireless is not foolproof. Other signals can interfere with the transmitters and cause short range or totally block the signal. Knowing the difference between blockage and problems in the equipment requires experience and some basic test equipment.
3. The biggest and tallest antenna is not always the best for your particular installation. Usually you don't need 1000' of range. Anything beyond immediate visual range is wasted coverage and a safety hazard. Excess range may pick up interference that could cause the system to not operate correctly.

LINEAR LIMITED WARRANTY

This Linear product is warranted against defects in material and workmanship for twelve (12) months. The Warranty Expiration Date is labeled on the product. **This warranty extends only to wholesale customers** who buy direct from Linear or through Linear's normal distribution channels. Linear does not warrant this product to consumers. Consumers should inquire from their selling dealer as to the nature of the dealer's warranty, if any. **There are no obligations or liabilities on the part of Linear Corporation for consequential damages arising out of or in connection with use or performance of this product or other indirect damages with respect to loss of property, revenue, or profit, or cost of removal, installation, or reinstallation.** All implied warranties, including implied warranties for merchantability and implied warranties for fitness, are valid only until Warranty Expiration Date as labeled on the product. **This Linear Corporation Warranty is in lieu of all other warranties express or implied.**

All products returned for warranty service require a Return Product Authorization Number (RPA#). Contact Linear Technical Services at 1-800-421-1587 for an RPA# and other important details.

IMPORTANT !!!

Linear radio controls provide a reliable communications link and fill an important need in portable wireless signaling. However, there are some limitations which must be observed.

- For U.S. installations only: The radios are required to comply with FCC Rules and Regulations as Part 15 devices. As such, they have limited transmitter power and therefore limited range.
- A receiver cannot respond to more than one transmitted signal at a time and may be blocked by radio signals that occur on or near their operating frequencies, regardless of code settings.
- Changes or modifications to the device may void FCC compliance.
- Infrequently used radio links should be tested regularly to protect against undetected interference or fault.
- A general knowledge of radio and its vagaries should be gained prior to acting as a wholesale distributor or dealer, and these facts should be communicated to the ultimate users.
- This device complies with FCC Part 15 and Industry Canada Rules and Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FT-1

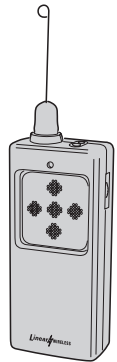
Field Test Receiver

Operation Manual

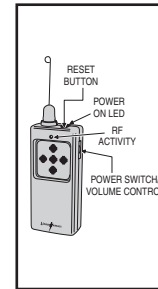


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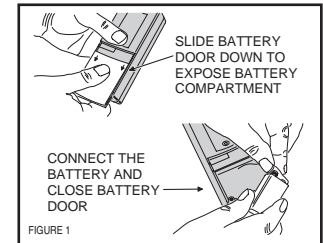
Description



The FT-1 is a field test receiver for testing the RF environment around 318 MHz. It will decode any Megacode® formatted RF data transmission and then give a short "Beep" signal from the loudspeaker. Ambient RF noise or possible interference can be monitored. A steady hissing noise is normally heard. This is the background noise of the radio. Any steady pulsing, low frequency buzzing or even voice traffic indicates an interfering signal that may reduce the maximum range of the system. In most cases the effects of these interfering signals can be reduced or eliminated, but the techniques vary due to type of installation and antennas.

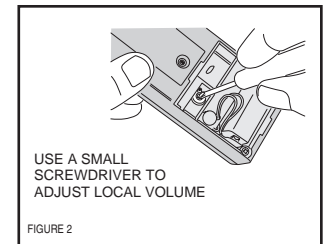
Powering the Receiver

The FT-1 is powered by a 9-volt alkaline battery. To install the battery, open the battery compartment door by sliding the door down. Snap the power terminals onto the battery then place the door closed. Rotate the power switch/volume control on the side of the FT-1 to turn power on. The FT-1 receiver will power up (the RED Power LED lights). The FT-1 is equipped with a sleep timer which will cause it to go into a sleep mode after 10 minutes. Pressing the RESET button will reset the 10-minute timer. The sleep mode conserves battery life but the on/off switch should be turned off when the receiver is not in use.



Connecting the Antenna

Turn the volume control up until you hear a hissing sound from the loudspeaker. Screw the antenna into the antenna connector. The background noise should increase and any local interference can now be heard.



Testing Megacode® Transmitters

Transmit a Megacode® signal and you will hear a beep sound above the background noise. The volume of the beep can be changed with the local volume control which is located inside the rear case and can be accessed by removing the battery door.

Locating Interfering Signals

Several techniques of simple direction finding can be used to locate a direction and source of interference. The sound level from the loudspeaker indicates the strength of the signal. A stronger signal will produce a louder speaker output.

Using only the 9-1/2" wire whip antenna it is possible to get an idea of the location of a nearby local interfering signals by holding the FT-1 receiver close to possible offending sources. As the interfering signal increases in loudness, you are getting closer to the source of interference. If the signal is so strong that it cannot be easily located, remove the antenna and use only the FT-1. If the signal is strong enough, it may be received, even without an antenna.

Locating Distant Sources of Interference

Set the volume of the FT-1 to a comfortable listening level. Place it tight against the front of your body and slowly turn around. When the interfering signal is at its weakest, the source of the interference will be directly behind you. The human body shields RF energy. It acts as an attenuator and can reduce signal strength. This is why if a transmitter is held close to the body or it is wrapped tightly in the hand, the transmitter's range is reduced. To get the best possible range, hold the transmitter away from the body and loosely grip it between two fingers.

Correcting the Effects of Interference

It is beyond the scope of this instruction manual to provide a comprehensive list of electromagnetic interference (EMI) solutions. The following are some examples and possible solutions. Note: Radio Shack components are used only as examples; other sources of EMI filters are available.

Signal and control lines can conduct RF emissions and conduct RF energy from an offending source to the receiver. Radio Shack sells a series of snap-on ferrite filters (P/Ns 273-104 and 273-105). These will often clean up the signal if placed close to the source of the interference or at the receiver terminal strip. If possible, wrap several turns around the ferrite core before snapping the core shut.

Power line EMI filters/surge suppressors (P/N 61-2333) will reduce power supply noise from computers and other noise generators. NOTE: It is less effective to place them at the receiver, but this may still help if the source of the interference is not known.

Likewise, the telephone line can conduct RF signals and interfere with the radio receiver. A Radio Shack telephone RF Line Noise Filter P/N 43-150 may help to clean up the noise.

The clamp on ferrites may be effective for an isolated low voltage AC transformer. Wrap several turns around the ferrite material (P/Ns 273-104 and 273-105) before closing the clamp. Place the ferrite core close to the power input terminal strip.

If DC power is being used, Radio Shack has a series of filters that are used for automobile radios and stereos that may be effective. For short runs of wiring, first try the AC power line filter on the DC power supply. If that is not effective, use noise filters (P/Ns 270-030 (3A), 270-051 (10A) or 270-055 (20A)) depending on availability and required current ratings.

Short Range RF Remote Control Installations

Garage door operators will generally use simple permanently mounted wire antennas. Access Control consoles (examples AE-1, AE-2) installations will use an "F" connector removable wire antenna or the EXA series antennas.

Vertical (up or down) Wire Antennas: Linear garage door receivers come equipped with a small 9-1/2 inch wire antenna that is mounted directly to the PCB. The best reception is usually when the wire antenna is pulled up and straight, away from the operator.

EXA-1000 Antenna: The EXA-1000 was originally designed as a vertically polarized remote antenna for protected interior use. For exterior use it can be weather sealed using silicon sealant and electrical tape.

EXA-2000 Antenna: The EXA-2000 was specifically designed to address the problems of outdoor mounting and tampering. It is designed to be "stealthy" and can easily be painted to match surrounding structures. The EXA-2000 is optimized as a horizontally polarized antenna, but it may

be operated vertically. The antenna, matching transformer and 15' long interconnecting coaxial cable are weather sealed inside of a heavy wall plastic pipe. The cable may be extended beyond the original 15' but the additional cable loss may hurt rather than help the installation.

Extension Cables: Use the best grade of copper shielded cable you can find (95% coverage). Tin foil shielded cable is cheaper and more readily available but typically has higher loss and has more leakage than good quality copper braided cable. Copper braided cable can be soldered and will hold up better over the long term. RG-59/U with "F" connectors are most commonly used for short runs (30' and less).

Antenna leads may become corroded and dirty. They should be cleaned to be sure that they are making good connections. Poor antenna connections may cause the RF signal level to be reduced or the signal to be noisy.

Antenna Placement and Height: There is an old adage about antennas that "Bigger is better and taller is best of all". This is true if additional range is all you care about, but other concerns sometimes cause us to modify this adage to "Generally, bigger is better and taller is most often best of all".

1. Extra height can be a curse as well as a help. Extra height means that you will pick up desired signals from a longer distance, but you may also pick up more undesired interference. Interfering signals tend to limit the range just as if there was a poor antenna. The interference will not activate the Linear controls, but may reduce the range as if there was a poor or even no external antenna on the receiver.
2. Linear's garage door operators come equipped with a small wire antenna permanently attached to the receiver's PCB. This antenna is generally acceptable for short-range use (up to 150') in normal home environments.
3. Remote antennas are required if the Access Control console is inside of a metal structure or placed near other metal housings. These tend to block (or reflect) the RF signals and cause the receiver to have poor or no range outside of the metal building. Remote antennas are also required if there are noise generating devices, i.e. computers, brush type motors, electronic ballasts with fluorescent lights, etc. in the immediate area around the receiver. Getting the antenna away from the noise sources can enhance the range of the system.

Access Control RF Input Attenuators: A RF input attenuator is used to limit the range of the system. It may also help to eliminate RF interference from a distant transmitter. In most installations, position a transmitter at the maximum desired distance and adjust the attenuator to just allow the signal to activate the receiver. If the transmitters are normally inside of a vehicle, be sure to have the transmitter inside of a vehicle when this test is done. There is no reason for more range in a system than is required for safe operation.

Vertical Antennas: The vertical antenna is best for situations where you are not sure of the direction of the desired transmitter's signal. Randomly placed transmitters will have a higher chance of getting into the system. See Figure 3.

