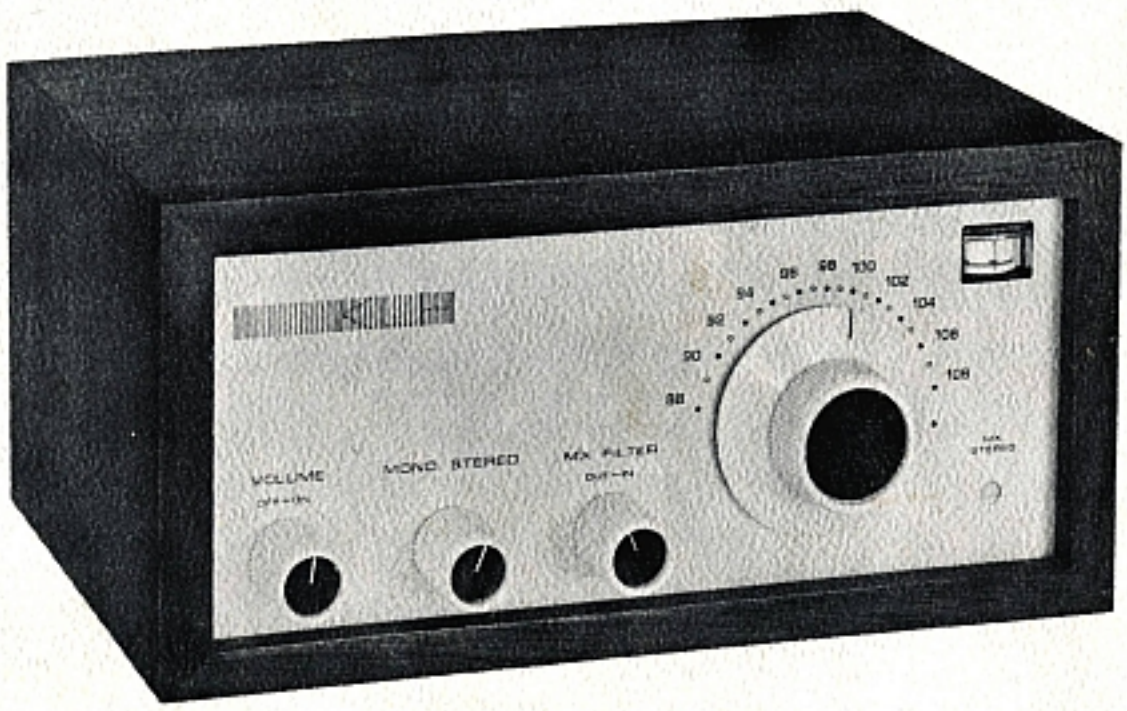
# INSTRUCTION MANUAL
## KLH MODEL EIGHTEEN FM MULTIPLEX TUNER




## INTRODUCTION

The KLH Model Eighteen is a fully transistorized FM multiplex tuner of exceptional performance. It has been designed to receive monophonic and stereophonic FM broadcasts under all reception conditions, including the least favorable. Incorporating several radical departures from standard tuner design, the Model Eighteen takes the fullest possible advantage of transistor characteristics, including their potential for eliminating the aging and deterioration of performance common to vacuum-tube equipment. Much attention, including the use of new types of transistors and of new IF transformers that will not shift out of alignment in use or during shipment, has been devoted to making certain that the Model Eighteen will sound new for years to come.

The sensitivity of the Model Eighteen makes it fully suitable for use in FM "fringe areas," where the strength of broadcast signals may be as low as a few microvolts (millionths of a volt). Equally important, the Model Eighteen will provide excellent reception in metropolitan areas, where stations spaced close together

on the FM dial and radiating signals of very high strength will not overlap or cause distorted sound quality. Because of its exceptional selectivity, the Model Eighteen will bring in distant stations that would otherwise be blanketed by strong local signals or images. To be sure of optimum performance, refer to the section of these instructions headed **Antennas.**

## OUTPUT CONNECTIONS

The Model Eighteen may be connected to KLH phonographs (Models Eleven, Eleven-W, and Fifteen), component audio systems, and tape recorders. Two pairs of output jacks, each coded "L" and "R" for proper stereo connection, are provided on the rear panel. The pair of jacks not used for connection to a KLH phonograph or component audio system may be used to feed a tape recorder directly for simultaneous or independent tape recording. A pair of shielded connecting cables, jacketed together for neatness of installation, are supplied with their plugs color-coded for proper stereo connection.

### 1. Connection to KLH Phonographs —

The two output jacks marked **Volume Controlled Outputs** must be used for connection to KLH phonographs. The shielded cables provided should be connected to the **Aux Input** jacks on the control panel of your Model Eleven, Eleven-W, or Fifteen. The **Aux Input** jacks are coded "L" and "R" for proper stereo connection. If there is no stereo broadcasting in your area, a single cable may be used for connection if convenient. In this case, the **Mono-Stereo** switch on the phonograph must be placed in the **Mono** position to provide sound through both speakers.

When it is properly connected to your KLH phonograph, the Model Eighteen's volume level will be governed by its own **Volume** control as well as the phonograph's. It is advisable to rotate the Model Eighteen's **Volume** control to a convenient point that will permit you to switch back and forth between radio broadcasts and records without disconcerting changes in volume level between the two sources.

The shielded cables supplied with the Model Eighteen are three feet in length. If you wish to place the tuner at a greater distance from your phonograph, cables of up to ten feet may be substituted. Cables longer than ten feet will occasion slight losses in high-frequency response. These losses may be compensated to some degree by advancing the treble control on your KLH phonograph slightly beyond the normal setting indicated by the dot on the control panel. For best results in connection with KLH phonographs, however, maximum cable length should be limited to fifteen feet.

**2. Connection to Component Audio Systems —**

For connection to component amplifiers, either the **Fixed Level Outputs** or **Volume Controlled Outputs** of the Model Eighteen may be used. **The Volume Controlled Outputs** will permit you to set the **Volume** knob on the Model Eighteen to provide the desired level for a particular setting of your amplifier's volume control. Some amplifiers may require more than the nominal 0.8-volt maximum output supplied by the **Volume Controlled Output.** In such cases, the **Fixed Level Outputs** (approximately 1.4 volts) may be used. These outputs are unaffected by the **Volume** knob on the Model Eighteen.

The **Fixed Level Outputs** are also recommended for use with connecting cables of more than ten feet in length. Up to twenty-five feet of standard shielded cable (30 uuf/foot) may be connected to these outputs without high-frequency losses.

The output impedance of the **Fixed Level Outputs** is 10,000 ohms. The impedance of the **Volume Controlled Outputs** is 25,000 ohms.

**3. Direct Connection to Tape Recorders —**

Either the **Volume Controlled Outputs** or the **Fixed Level Outputs** of the Model Eighteen may be connected directly to the high-level inputs of a tape recorder. If the **Fixed Level Outputs** are used, the taping of a radio broadcast may be done completely independently of a component amplifier or KLH phonograph, and the **Volume** control of the tuner, amplifier, or phonograph may be turned down without affecting the level of the signal being taped.

## OPERATION

The Model Eighteen combines simplicity of operation with all of the control features needed for fully satisfactory reception of monophonic and stereophonic FM broadcasts. A few minutes of experimentation on reception of stations across the FM dial will allow you to become familiar with the tuner's basic operation. You can then give special attention, if necessary, to the techniques needed for good reception of difficult stations.

### Tuning

The vernier tuning dial of the Model Eighteen is designed for easy and precise tuning. The shaft of the tuning knob is directly connected to the tuning capacitor for maximum stability; there is no dial cord to cause slippage or gradual change in apparent location of stations on the dial.

### Tuning Meter

As you tune across the FM band, the excellent selectivity of the Model Eighteen (designed to separate the most closely-spaced stations without any audible overlap) will cause stations to "pop in" abruptly. At the same time, the needle of the Model Eighteen's "zero-center" tuning meter will deflect abruptly from its normal center rest position. As soon as deflection occurs on a station's signal, you can then tune in the station until the indicator needle moves back to the center position. This is the correct tuning point for best reception of a station, with minimum distortion and noise. In rare instances — when, for instance, you are tuning in a very weak station located next to a very strong one on the dial — there may be disagreement between the indicator's exact center position and the audible point of best reception. In any such case, of course, your own ear should take precedence over the meter.

### MX Stereo Indicator and Mono-Stereo Switch

For best results under all conditions, stations should be tuned-in with the Model Eighteen's **Mono-Stereo** switch in the **Mono**

position. If the tuning-in of a station causes the Model Eighteen's **MX Stereo** indicator light to glow steadily, the station is transmitting a multiplex stereo broadcast. The **Mono-Stereo** switch can then be placed in the **Stereo** position for stereo reception.

Note that the **MX Stereo** indicator light will glow intermittently between stations and on some stations received with significant background noise. This does not indicate a stereo broadcast. Only a steady glow of the indicator on a tuned station indicates a multiplex stereo signal. If the light flickers severely on a known stereo broadcast, this usually indicates that the station is too distant for satisfactory stereo reception or that the Model Eighteen's antenna is improperly positioned. (See the section of these instructions on **Antennas.**) In many cases, a station that yields poor stereo reception will sound excellent in the **Mono** position of the **Mono-Stereo** switch. Generally, of course, good mono reception is far easier to listen to than stereo of marginal quality.

### Volume Control

The Model Eighteen's Volume control will be operative only when the **Volume Controlled Outputs** of the tuner are connected to your KLH phonograph, component amplifier, or tape recorder. For suggestions on the use of this control, see the earlier section on **Output Connections.**

### MX Filter

The nature of stereo broadcasting is such that background noise is more often noticeable than on mono broadcasts. When a stereo signal is relatively weak, background noise may become too obtrusive for comfortable listening. In such a case, switch in the **MX Filter** on the front panel to see how much of an improvement you can make in overall listening quality. Very often, the filter will make a decidedly audible improvement. The filter does not affect frequency response or mid-range separation.

Note that the real value of the **MX Filter** is in making a

marginal stereo broadcast listenable. It can not eliminate the noise that may accompany a very weak signal (mono or stereo) from a distant station. To cope with reception under difficult conditions, see "Getting The Most From FM."

## ANTENNAS

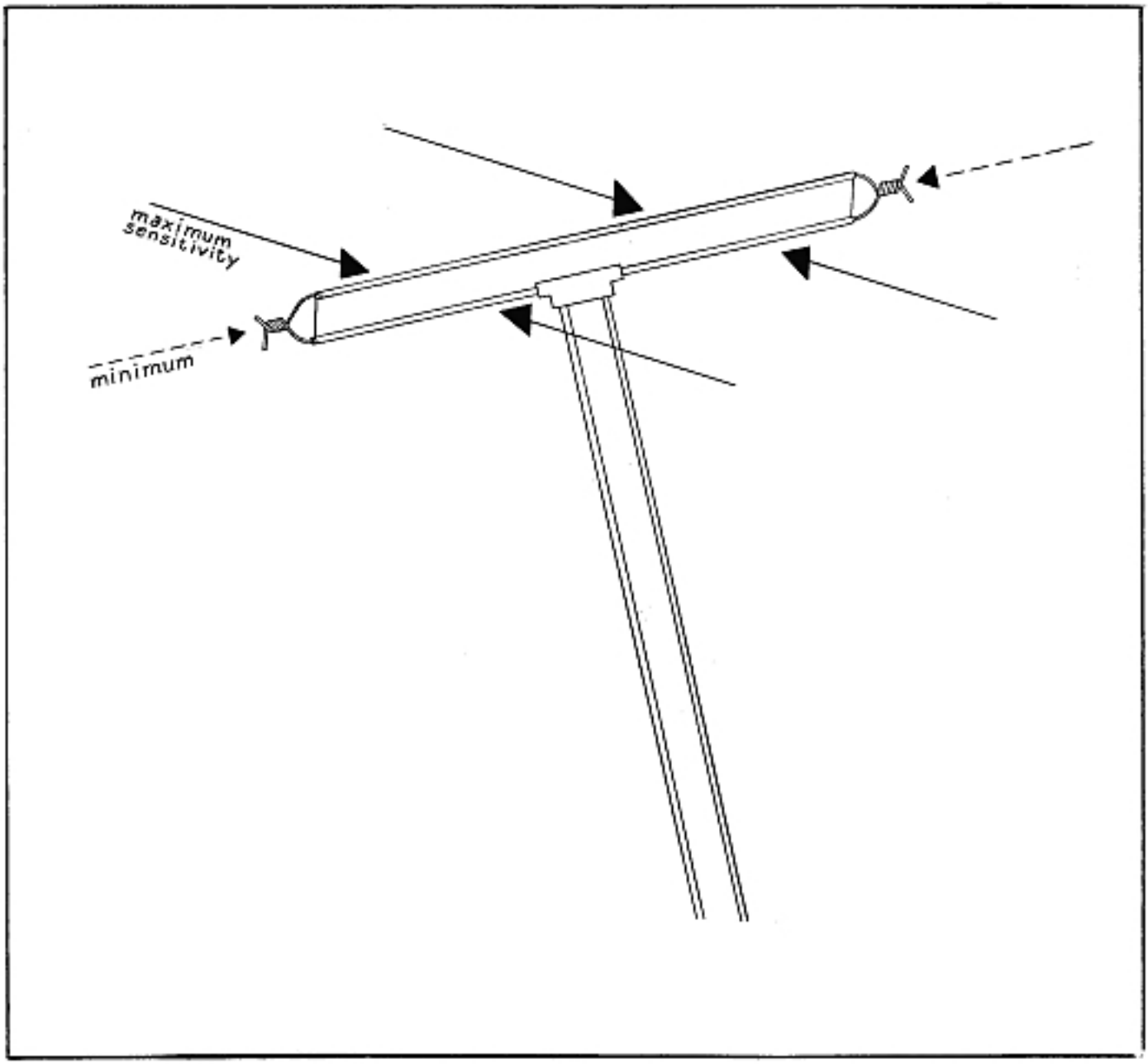
The Model Eighteen is supplied with two antennas: a short length of wire and a "folded dipole" indoor antenna. In most cases, one or the other will provide good reception in metropolitan and suburban areas. In "fringe areas" at great distances from all stations, and in some metropolitan areas where FM reception is made difficult by surrounding tall buildings and other obstacles, an outdoor antenna may be necessary for fully satisfactory reception.

The short-wire antenna is supplied connected to one of the two screw terminals on the rear panel of the Model Eighteen. For best results, particularly on stereo broadcasts, the wire must be stretched flat to full length rather than coiled or folded. Initially, the wire may be stretched horizontally or vertically behind the tuner. If some stations do not come in fully, or exhibit a "fuzzy" sound quality, experiment with other orientations of the wire — always keeping it stretched flat — to see whether satisfactory reception can be obtained.

If the short-wire antenna seems inadequate after reasonable experimentation, remove it and connect the folded dipole antenna to the two screw terminals on the rear panel. (Either of the dipole's two spade lugs may be connected to either of the two terminals.) The antenna should be stretched to full length to form a "T" shape.

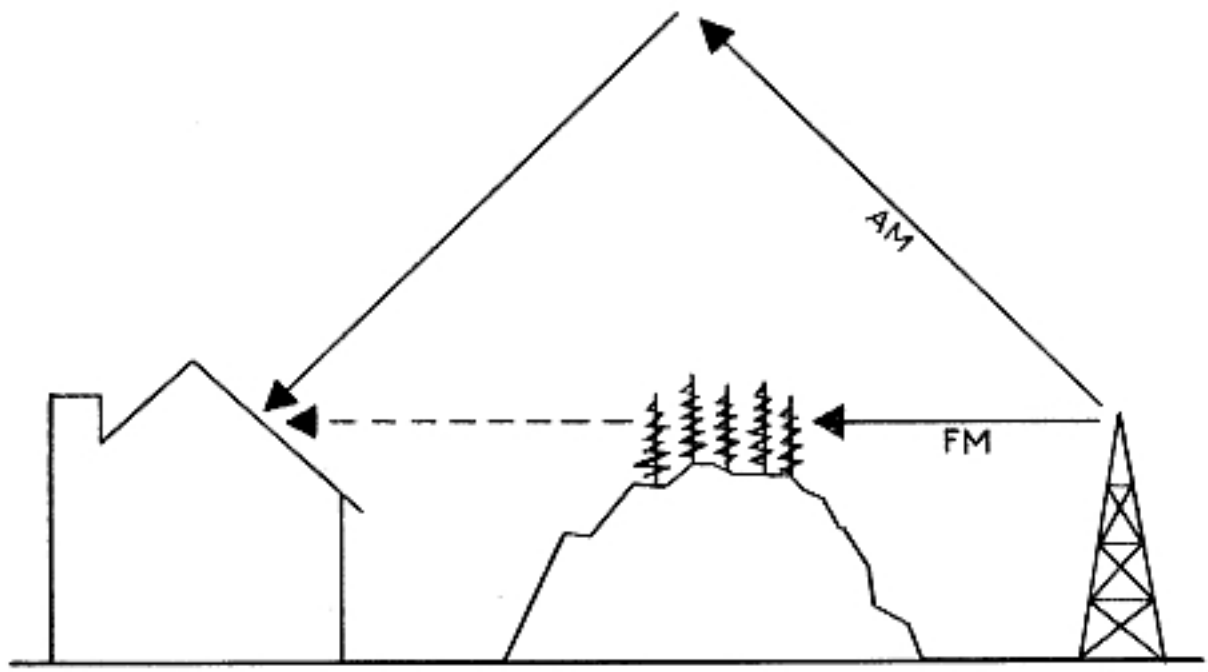
The folded dipole will exhibit significantly greater sensitivity ("gain") than the short-wire antenna. At the same time, however, it will be more affected by its positioning. The dipole's sensitivity is greatest when its "arms" (the crossbars of its "T" shape) are exactly broadside (90 degrees) to the direction of an FM signal. Its sensitivity is at a minimum when the antenna arms are parallel to the direction of the signal. When placed in the optimum broadside position, the dipole will be equally sensitive to the front and rear.

A few minutes of experimenting with the orientation of the folded dipole will generally indicate the best positioning for reception of various stations in your area. If all the stations you want lie in the same general direction (or in roughly opposite directions), you may be able to find a single best position for the dipole and tack it permanently into place. But if stations lie in several directions, you may have to reposition the antenna frequently. If so, you may find it easier to use a familiar "rabbit-ears" TV antenna than the flexible dipole. Or you may prefer simply to tack the dipole for easy rotation to two pieces of wood nailed together in a "T" shape. To prevent needless expense and disappointment, you should note that the many elaborate and expensive indoor antenna systems now available are seldom as satisfactory as a properly-used folded dipole or "rabbit-ears."



## GETTING THE MOST FROM FM

There are two especially good reasons why FM broadcasting has become an important entertainment medium. One is the relative ease with which FM handles the full range of musical frequencies. The other is its substantial freedom from static pulses and other forms of interference common to AM broadcasting. But FM has limitations as well. Probably the most important is that FM signals, like those of TV, travel a line-of-sight path from the transmitter. They therefore can not travel more than a fraction of the distance covered by other kinds of radio signals that radiate upward and bounce off the earth's ionosphere. FM's effective coverage is limited still further by any obstacles — hills, buildings, trees — between the transmitter and the listener, which serve to dissipate the signal rapidly.




**FM signals travel line-of-sight path from transmitter and are easily obstructed.**

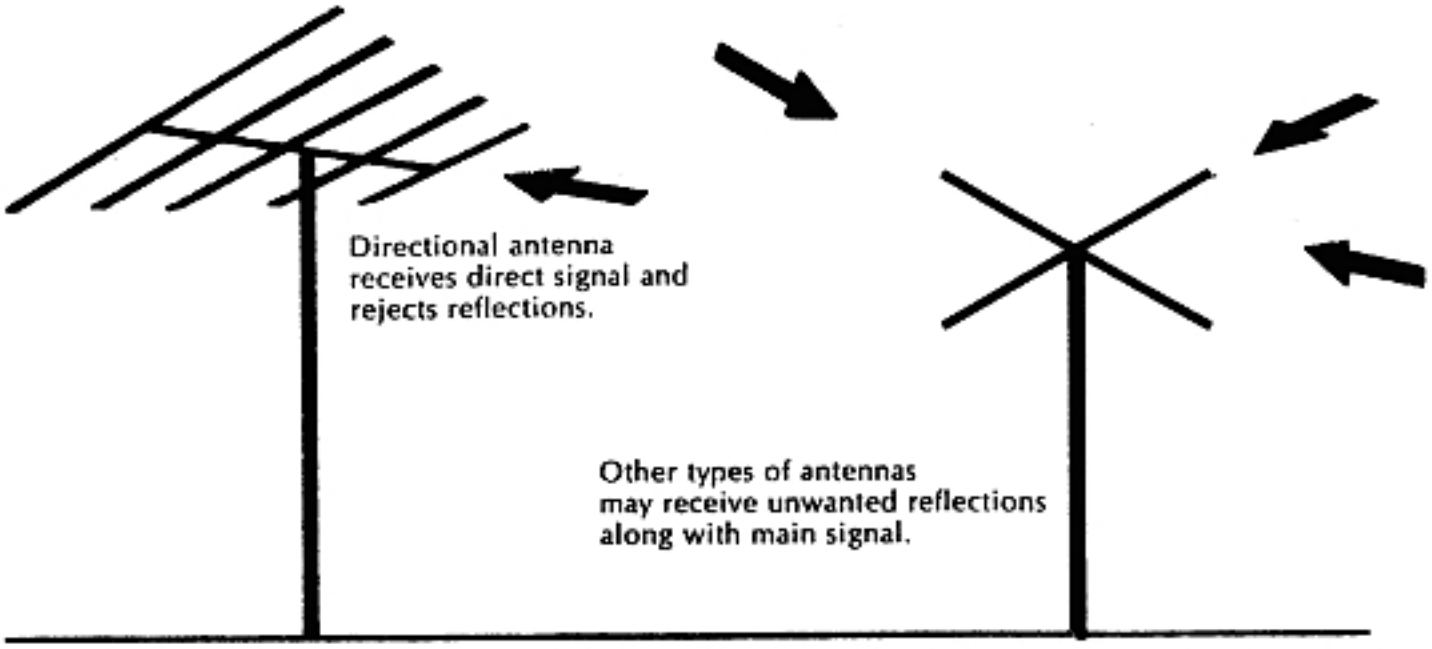
To make the most of the generally limited strength of FM signals, good tuners such as the Model Eighteen are sensitive enough to receive signals of as low as a few microvolts (millionths of a volt). The tuning circuitry of the Model Eighteen is further designed to achieve full "limiting" (suppression of background noise) on signals only a few microvolts stronger than needed for any audible reception. In some locations, however, it is difficult to achieve even the minimal signal-strength needed at the antenna

terminals of the Model Eighteen. If you live in a "fringe area" thirty miles or more from most stations, or in any location where signals are very weak for one reason or another, you may need to invest in an outdoor FM antenna with more "gain" than that provided by any indoor antenna. We will return to this subject in a moment.

Whether you live in an area of high or low signal-strength, there is one other very important consideration. The obstacles that an FM signal encounters in its line-of-sight path tend to reflect the signal in many directions. And in many locations, a FM receiver picks up not only the primary signal "beam" of a station but also several secondary reflections of the signal from various directions. These signal reflections arrive at the receiver out of step with the primary signal, and they tend to blur the image picked up by the receiver. The result, known as "multipath distortion," is the equivalent of the familiar "ghosts" in TV reception. The effect can range from a barely audible "fuzziness" to severely distorted sound quality — depending on the number and relative strength of the signal reflections.

Multipath distortion can be particularly troublesome in FM stereo reception. Stereo broadcasts consist of several signal components transmitted on the same radio wave, and any blurring of the relationship of these signal components can degrade or destroy final stereo quality. This is one reason why an FM station may sound better in mono than in stereo reception.

Since even the best FM tuner can not completely separate a primary signal from "ghost" reflections, the problem of multipath must be dealt with before reception takes place. The only fully satisfactory solution is a directional antenna designed to accept signals from one direction and discriminate against reflections from other directions. So far, only outdoor antennas have been successfully designed to be sensitive in only one direction. The indoor dipole is directional to some extent, since it tends to reject signals arriving from its sides. But its equal sensitivity to both front and back leaves it free to pick up spurious signals bounced back over a wide area.




For the sake of its directionality, a good outdoor antenna actually may be more valuable in some metropolitan locations (where the proportion of reflected-to-direct signal may be very high) than in some relatively distant suburban or fringe areas. In areas where FM signals are reasonably strong, an outdoor antenna need not have extremely high gain as long as it is properly directional. In weaker-signal areas, more elaborate, higher-gain antennas will be required. The following antennas have been found to be excellent for FM stereo reception. The first in each pair listed is the lower-priced antenna suited to most general purposes; the second is the more expensive, higher-gain version:

1. Finco FM-4G
2. Finco FM-5G
3. JFD LPL-FM6
4. JFD AFM-350
5. Apparatus Development FM/Q Jr.
6. Apparatus Development FM/Q Super Special

In areas where signals are received from several directions, an antenna rotor will be necessary to reposition the antenna for various stations. Installation of both rotor and antenna is best left to a competent serviceman.

It is generally not a good idea to buy a TV antenna in the hope that it also will be suitable for FM. Many TV antennas are designed to reject FM to prevent interference with TV signals. If you already own a broadband TV antenna, however, it is worth connecting to the Model Eighteen to see if it is of value for FM. If so, the antenna may be connected permanently both to your TV set and the Model Eighteen through an "antenna coupler." Among couplers we have found satisfactory are:

1. Channel Master 0038
2. Blonder-Tongue A-102
3. Tricraft 114-088

In very rare cases, a high-gain antenna will be useful only for one or two distant stations, and stronger stations received through the antenna may overload the Model Eighteen and cause distortion. In such case, it would be necessary either to put a switchable attenuator in the antenna line to reduce the signal when necessary or to disconnect the outdoor antenna for stronger signals.

## TWO YEAR WARRANTY

In designing, manufacturing, and setting performance standards for our products, we at KLH feel an obligation to go beyond the customary standards for home-entertainment products. Accordingly, all KLH products are guaranteed well beyond the point usually considered adequate for products designed for the home.

The KLH Model Eighteen Tuner is fully guaranteed against all defects in materials and workmanship for two years from the date of purchase from an Authorized KLH Dealer. During that period, through any service agency authorized by KLH, KLH will replace any defective part and correct any defect in workmanship without charge either for parts or for labor.

For this warranty to apply, the Model Eighteen must be installed and used according to its written instructions. The warranty card must be filled out and returned to KLH within ten days of purchase. **In the event of difficulty, servicing must be accomplished by a service agency authorized by KLH.** If necessary, the Model Eighteen must be delivered to and returned from the service agency at the owner's expense. Servicing information should be obtained from the dealer from whom the purchase was made or from the KLH Customer Service Department.

Accidental damage and shipping damage are not considered defects under this Warranty, and KLH assumes no responsibility for defects resulting from abuse or from servicing attempted by any person or agency not specifically authorized by KLH.

## IMPORTANT

**Do not attempt to return the Model Eighteen or any part thereof to the KLH factory without first requesting and receiving a Return Authorization form and sticker. Shipments arriving at the factory without the proper Return Authorization and sticker must be refused by the KLH receiving department.**

**Do not ship the Model Eighteen by Parcel Post.**