PRECISION CRYSTAL FILTERS

Note: Attached to this document, as pages 5 and 6, is the Instruction Manual 68P81104E36 for installing the TLB6310A or TLD6340A Crystal Filter in a Micor Base or Repeater Station. When a preamplifier is used, the crystal filter should be upstream of the preamplifier.

IMPORTANT

These filters are frequency sensitive and must be ordered to a receiver's exact frequency. In addition, the filters are available only within the range of frequencies specified -- filters are not available for stations that operate outside these limits.

MODEL CHART

MODEL	FREQUENCY
TLB6310A	25-50 MHz
TLD6340A	136-174 MHz

1. APPLICATION

The filters listed in the Model Chart are used to improve reception in areas where strong off-frequency interfering signals are present. They are available as factory installed kits on new base station receivers or for field installation in existing base station receivers.

For installation information refer to the instructions packed with the installation kit.

APPLICATION TABLE

Type of Station	Filter & Installation Kit		Installation Kit Only
	25-50 MHz	136-174 MHz	
"Consolette" Base Station	TLN1040A	TLN1016A	TLN6714A (Section 68P81104A87)
Desk Top Base Station	TLN1041A	TLN1017A	TLN6715A (Section 68P81104A88)
"Compa-Station"® Base Station Indoor, Outdoor and Repeater Stations	TLN1042A	TLN1018A	TLN6716A (Section 68P81104A89)
Transistorized Indoor and Outdoor Stations; Transistorized "Compa-Station"® Base Radios and Solid-State Base Stations	TLN1077A	TLN1076A	TLN8224A (Section 68P81110A28)
"Micor"® Base Stations and Repeaters	TLN1539A	TLN1538A	TLN5120A (Section 68P81104E36)

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

GUARANTEED PERFORMANCE SPECIFICATIONS

BANDWIDTH	±7 kHz minimum at 1 dB	
MAXIMUM INPUT SIGNAL LEVEL	1 volt across 50 ohms (20 mW)	
IMPEDANCE, INPUT AND OUTPUT	50 ohms	
DIMENSIONS	3" x 1" x 11/16" overall	
FREQUENCY RANGE	25-50 MHz	136-174 MHz
INSERTION LOSS	4 dB max.	6 dB max.
DESENSITIZATION IMPROVEMENT ADJACENT CHANNEL: ALTERNATE CHANNEL & GREATER:	 11 dB min. 20 dB min.	 13 dB min. 20 dB min.
INTERMODULATION IMPROVEMENT ADJACENT/ALTERNATE CHANNELS ALL OTHERS:	 15 dB min. 20 dB min.	 17 dB min. 20 dB min.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

NOTE

THE FILTERS ARE SEALED UNITS AND SHOULD NOT BE OPENED. IF OPENED, THE MANUFACTURERS WARRANTY BECOMES VOID.

2. TYPES OF INTERFERENCE

2.1 GENERAL

Base station receivers are often located in areas with strong off-frequency signals, which can seriously impair their operation when receiving on-frequency signals. Specific interference problems caused by strong off-frequency signals are described in the following paragraphs.

2.2 DESENSITIZATION

The overall selectivity of a receiver is a composite of the rf and i-f selectivities respectively, each being more selective than the one preceding it. Thus, a strong signal near the operating frequency of the receiver can pass through a number of stages before being adequately rejected by the selective elements of the receiver. Although the off-frequency signal will eventually be attenuated, its large input amplitude may overload one of the earlier stages causing the gain and sensitivity of the receiver to be reduced, thereby degrading the on-frequency performance. Normal messages become weak and "fringe area" operation is lost completely. The performance of a receiver in the presence of a strong off-frequency signal is known as its desensitizing characteristic.

2.3 INTERMODULATION (IM)

When two or more signals appear together across a non-linear element, they can mix to form new frequencies known as IM products. If one of these frequencies falls on or near the operating frequency of a receiver, and has sufficient amplitude, it may cause interference to the desired signals. This mixing can take place in the earlier stages of a receiver or in the final stages of a transmitter. These two forms of IM are discussed in the following subparagraphs.

2.3.1 Receiver Intermodulation

Receiver IM can occur when other powerful stations are located near the receiver being affected. The signals from these other stations can enter the receiver through the antenna. Normally, only desensitization would occur. However,

when these unwanted signals mix and accidentally create a signal on the receiver frequency, the unwanted product will pass through the receiver just like a normal message. The result is receiver IM interference.

2.3.2 Transmitter Intermodulation

Transmitter IM occurs when two or more powerful transmitters are close to each other. In this case, the mixing takes place within the final stages of the transmitters. It is merely brute power entering through the station antenna. This IM product frequency is retransmitted along with normal signals.

2.4 SPURIOUS RESPONSES OF THE RECEIVER

Although a receiver is designed to respond only to the desired operating frequency, it will also respond to signals on certain other frequencies if these signals are strong enough. These undesired frequency responses are known as spurious responses of the receiver. If the frequency of a nearby transmitter coincides with one of the spurious response frequencies of a receiver, the signal level from the transmitter may be strong enough to cause receiver interference.

3. ELIMINATION OF INTERFERENCE

Since desensitization, IM and spurious responses of the receiver are all caused by strong off-frequency signals, these specific interference problems can be eliminated by preventing the signals from entering the receiver. The Model TLB6310A and TLD6340A Precision Crystal Filters attenuate all off-frequency interfering signals before they enter the receiver and consequently improve the receiver desensitization, IM, and spurious response characteristics.

NOTE

Interference caused by IM products generated in a transmitter or any other nonlinear device external to a receiver cannot be rejected by this filter since the IM product is already on the desired receiver frequency when it enters the filter.

4. DESCRIPTION

The Model TLB6310A and TLD6340A Precision Crystal Filters operate in the antenna lead of the receiver and are tuned to one specific operating frequency; consequently, these filters must be ordered for a specific channel frequency. Since a filter passes only the desired channel frequency, and rejects all others (see selectivity curves), it is important that the system in which the filter is used is accurately netted. The received signals must be within ±.0005% (136-174 MHz) or ±.002% (25-50 MHz) of the assigned channel frequency to insure that they are centered in the passband of the filter. Any off-frequency interfering signals are attenuated by at least the amounts shown on the performance specifications before entering the receiver input.

The TLB6310A and TLD6340A Precision Crystal Filters are intended for use with single-frequency non-"Extender" type receivers fed from an antenna which is not shared with any other receiver (a normal installation with a receiver and a transmitter or receiver only). For applications involving multiple-frequency receivers or a receiver which is part of a multiple-receiver system fed from a common antenna, contact your Motorola Systems Engineering representative for further details.

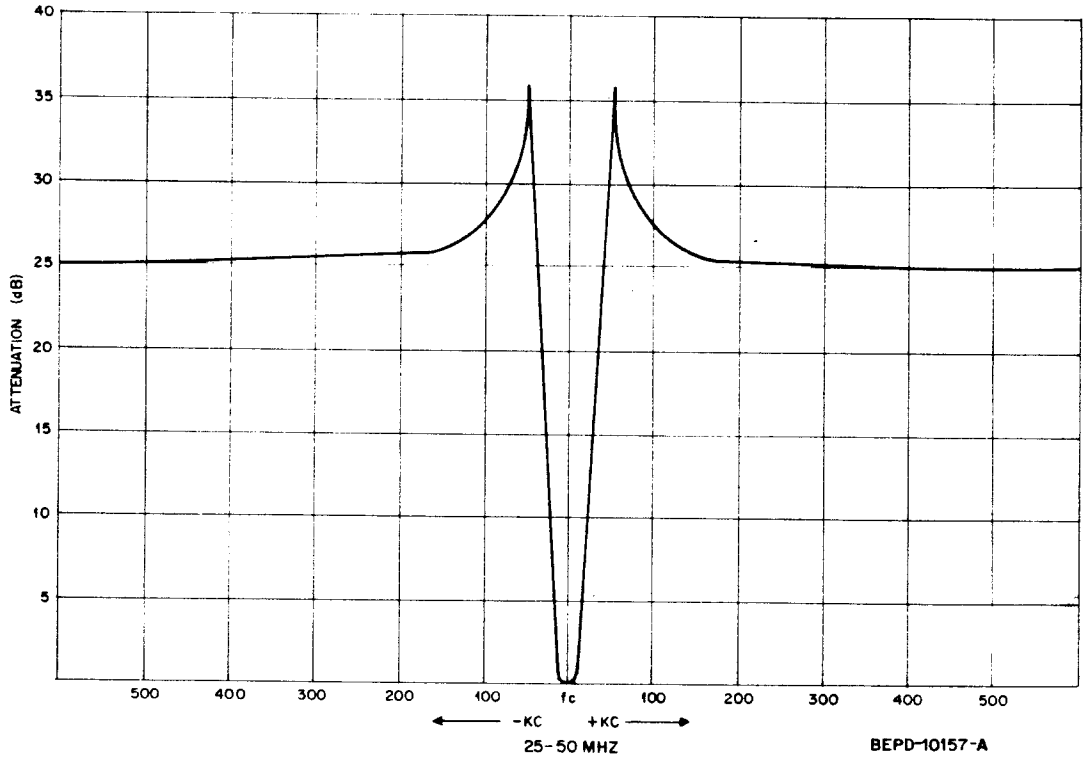
NOTE

A crystal filter must not be used on an "Extender" type receiver since the circuitry would not function properly with the filter selectivity introduced ahead of the receiver.

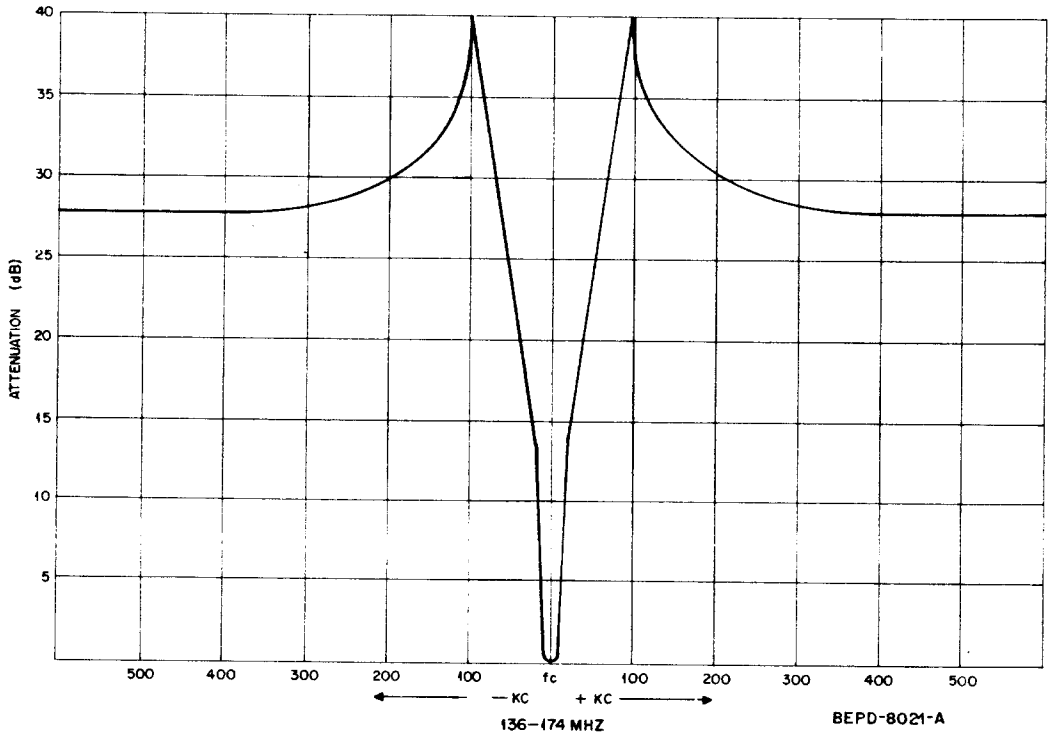
The receiver antenna lead must be connected directly to the input of the filter (via the antenna changeover relay when a transmitter shares the antenna). It must not be connected following a preamplifier, since that would limit filter performance.

CAUTION

The crystal filter is a low power device. It should never be connected in a way subjecting it to the transmitter power, since this would damage the filter.



Model TLB6310A Precision Crystal Filter Selectivity Curve



Model TLD6340A Precision Crystal Filter Selectivity Curve

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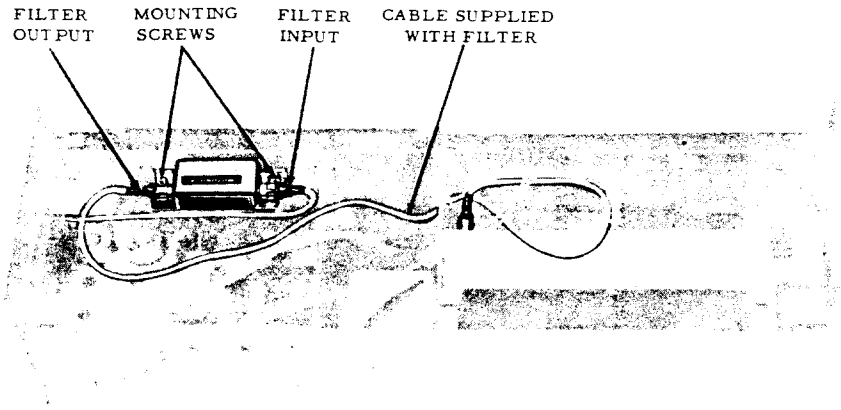
INSTALLATION KIT

MODEL TLN5120A



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1. DESCRIPTION

1.1 The Model TLN5120A Installation Kit is supplied with the TLN1539A (25-50 MHz) and TLN1538A (136-174 MHz) Crystal Filter Kits.

1.2 It is used for field installation of the Model TLB6310A (25-50 MHz) or TLD6340A (136-174 MHz) Precision Crystal Filters in "Micor"® base and repeater stations.

1.3 The kit consists of the following items:

Qty.	Motorola Part No.	Description
1	1-80737B80	CABLE, COAXIAL ASSEMBLY. includes: 28-82331G01 PLUG, single contact; 2 req'd. 30-83794C01 CABLE, Coaxial; 15" length
2	3-134169	SCREW, tapping #4-40 x 1/4", Phillips hex. hd.

2. INSTALLATION PROCEDURE

IMPORTANT

Three concepts must be realized before installing this filter:

- The filter is a low power device and therefore must not be connected in a way that subjects it to transmitter power. To do so would damage the filter.
- The filter is frequency sensitive and therefore two filters must be used with two receiver stations (if, in fact, both receivers are experiencing interference, possibly only one of the receivers may need a filter). If an antenna coupling unit is used, the filter(s) must be connected between the coupler and receivers.
- If a receiver preamplifier is used, the filter is most effective when connected to the station before the preamplifier.

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Otherwise, the filter would limit receiver performance.

Step 1. Unlock and remove the station's rear door.

Step 2. Pull off (by pulling straight out) the 50-conductor flat cable connector connected to the receiver(s).

Step 3. If the station is equipped with a receiver shield kit, remove the shielding to expose the receiver.

Step 4. Two applicable filter bracket mounting tabs (each with a screw hole) are now exposed along the upper left edge of the receiver. Fasten the filter and bracket assembly to these tabs using the two screws provided. This puts the INPUT receptacle to the right of the output receptacle.

Step 5. Disconnect the receiver antenna connector from the receiver input receptacle (or from the preamplifier INPUT receptacle if a preamplifier is used) and reconnect this connector to the filter INPUT receptacle.

Step 6. Connect the cable supplied with this kit to the filter output receptacle.

Step 7. Connect the other end of the output cable to the receptacle that was just disconnected in step 5.

Step 8. This completes the installation of the filter. Reassemble the station.

END OF DOCUMENT