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THE SEQUERRA CO., INC.
71-07 WOODSIDE AVENUE
WOODSIDE, N.Y. 11377
(212) 651-4018

Dear Customer:

I would like to take this opportunity to personally thank you for becoming one of the discerning individuals to own a Sequerra Model 1 FM Tuner. This instrument represents a state of the art achievement in the Hi Fidelity industry, and embodies in excess of 25,000 hours of engineering.

When completed, your Model 1 FM Tuner was individually measured for a number of performance characteristics. The measurements are documented on a signed Certificate of Performance, bearing the serial number of your individual Tuner.

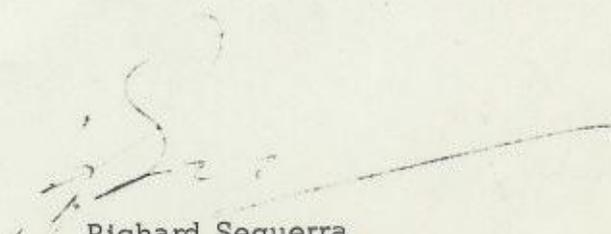
Your Model 1 is covered by the Sequerra Five Year Warranty to meet the standard specifications. I would like to call your attention to a number of exceptions to the plan:

1. The Model 1 Tuner must be purchased only from a Franchised Dealer.
2. Any resale, or gift of the Model 1, requires the factory's acceptance of the transfer of the unexpired Warranty.
3. The Company under no conditions would honor a Warranty if it does not meet all of the criteria set forth in the Warranty Registration Certificate.

Although the Warranty is in effect for five years, design and manufacture of your Tuner is aimed at a useful life of at least ten years. Should your Model 1 FM Tuner require servicing, please contact only your Franchised Dealer, or the factory directly, as the complexity of design renders it beyond the maintenance capabilities of the untrained serviceman.

Our Company is dedicated to the development of extremely high quality products, manufactured in very limited quantities. We anticipate that our products will always be in short supply, therefore we offer to every purchaser of the Model 1 FM Tuner, a preferential status vis-a-vis purchase of any of our future products, and we anxiously solicit your inspection of our future products. As with any small engineering based organization, we welcome suggestions and criticisms from our customers, and hope to enter into such a dialogue with you.

We feel your Tuner will provide you with years of satisfying performance and look forward to serving you again in the future.


Richard Sequerra
President

INSTALLATION INSTRUCTIONS

In installing the Sequerra Model 1 FM Tuner, certain precautions must be observed. Follow the Installation Instructions carefully, and in sequence. It is advised that you familiarize yourself thoroughly with the pushbutton displays and the back jack panel to appreciate the capabilities of the tuner.

The following pages will impart an in-depth understanding. The page entitled *Immediate Operation* explains how to quickly work your tuner once it is properly installed, without thoroughly understanding it. But to appreciate the full significance of the performance of the tuner, and to make allowable adjustments to enhance the listening quality, a thorough understanding of its operations is imperative.

Warning: Please keep in mind that the warranty does not cover damage caused by misuse, mishandling, insufficient ventilation, or excessive line voltage.

Placement - The tuner should not be placed near any source of heat. Allow a minimum of two inches clearance above, behind, and below the tuner for ventilation.

Custom Installation — If you are installing the tuner in an equipment cabinet, or behind a panel, use the mounting template (near back of this manual) to make the required holes and cut-outs.

Antenna — Choosing the proper antenna system is essential in order to minimize multipath interference. Signal reflections from surrounding buildings, towers, or hills cause multipath interference. This phenomenon, similar to "ghosts" in TV, produces distortion in the FM signals at the antenna. No FM tuner can completely eliminate multipath interference, therefore careful selection of an antenna is necessary in order to optimize performance of the system. The best FM reception is obtained with a steerable or rotatable antenna. This holds true for either an indoor or outdoor antenna used in conjunction with a rotor system. A comprehensive discussion of FM and FM system problems (including antennas) is available from the Sequerra Company in booklet form. The price of \$1.00 covers handling and mailing.

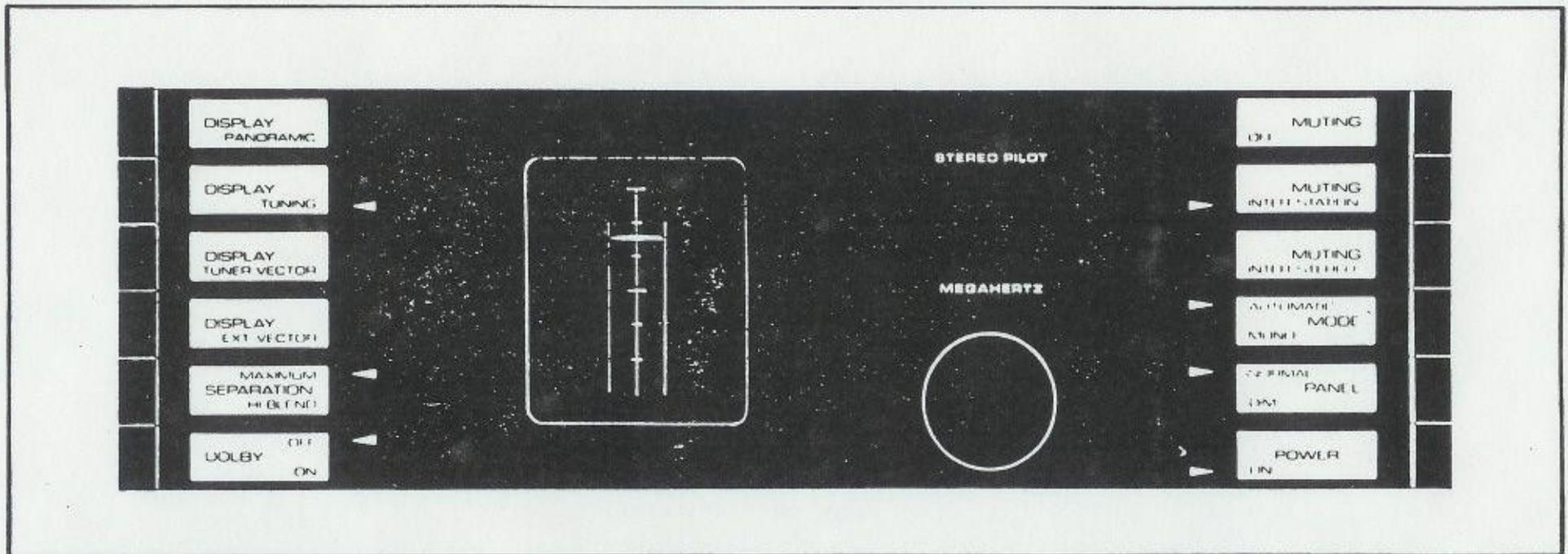
Output — Connect the tuner to the pre-amp using the tuner's Output Fixed jacks on the back panel. L & R stand for left and right. Be sure to connect left to left, and right to right, from tuner to pre-amp.

Domestic Units — Make sure that local power is nominally 120 volts AC at 60 Hz as marked on the tuner's back panel.

Export Units — Power transformer is adjusted for a line input voltage of 220 to 240 volts. A proper slow blow fuse has been installed.

Power Line — Unwind the power cord and plug it into an AC wall outlet.

FRONT ILLUSTRATION



For immediate operation (after properly following Installation Instructions) employ pushbuttons as shown by Function Arrows in this illustration.

IMMEDIATE OPERATION

To immediately operate the tuner (after it is properly connected and plugged in) without a fundamental understanding of the various pushbutton functions, simply depress the lowest right-hand pushbutton which bears the Sequerra "S". This will turn the set on. Turn the knob to tune in your desired station. The station's frequency appears on the digital readout display above the word *Megahertz*. An overcapacity of tuning is provided which permits the set to be tuned from 87.7 MHz through 108.3 MHz. The *Stereo Pilot* will be illuminated if the tuned station is broadcasting a stereo program. It is suggested that the following pushbuttons be employed:

Display:Tuning

Separation:Maximum

Dolby:Off

Muting:Inter-Station

Mode:Automatic

DESCRIPTION OF TUNER DISPLAYS

The two vertical rows of six pushbuttons each operate the functions described on their adjacent display windows. The arrows when lit, pointing to the displays, will indicate which displays are functioning. The upper four pushbuttons on the left are oscilloscope function selectors. They are interdependent, and depressing any one of the four will release any other one of the four which was previously depressed.

A similar structure exists with the three muting pushbuttons on the top right side. The remaining five pushbuttons are individually independent of any other, and when depressed will remain so until individually released by depressing them again.

The following descriptions cover pushbutton functions. A more detailed analysis of the oscilloscope's traces are explored later.

DISPLAY PANORAMIC The upper pushbutton, *Display:Panoramic*, displays all stations that are transmitting 1 MHz above and below the tuned frequency. The vertical pips of the scope's trace represent stations which are broadcasting a signal above the ambient interstation noise level, which is the base line. When tuned to a particular frequency, the station you are listening to will be centered on the scope's graticule.

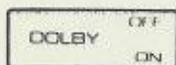
DISPLAY TUNING The second pushbutton on the left, *Display:Tuning* is used to properly tune the set. For proper tuning, the trace should be adjusted for the upper center of its path.

DISPLAY TUNER VECTOR The third pushbutton, *Display:Tuner Vector*, displays the audio components on an X-Y basis. This vector exhibits the left and right stereo channels along a perpendicular axis. It is used in checking the separation and phase characteristics of stereo program material. The wider the angle, the greater the separation. The higher the trace, the stronger the signal. A vertical line indicates no separation (as a centrally positioned announcer, or monophonic transmission).

DISPLAY EXT VECTOR The fourth pushbutton, *Display:Ext. Vector*, displays separation and phase characteristics of any stereo or four-channel programming. To be functional, proper connections have to be made to the External Vector Input section in the back panel. Stereo program material is displayed identically to Display:Tuner Vector. Four-channel program material is displayed on 4-legs of an "X" shaped trace, indicating the corners of front, rear, left, right. The separation, phase, and amplitude of each leg of quad programming can be observed.

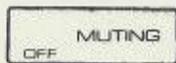
MAXIMUM SEPARATION H-BLEND The fifth pushbutton, *Separation:Maximum-Hi Blend*, controls the separation of the high frequencies in stereo broadcasting. It is used to eliminate some noise under difficult listening conditions. Ordinarily have it set to Maximum for best spatial and directional definition of listening material.

When encountering excessive interference or background noise, switch the Separation to Hi Blend. This position blends the high frequencies of the left and right channels together providing a good compromise, between moderate separation and moderate suppression, of out-of-phase noise and distortion. This permits you to maintain full frequency response, differing from conventional noise filters which eliminate noise by reducing high frequency response. Note: If the Hi Blend position does not satisfactorily reduce stereo noise, switching the Mode display function from Automatic to Mono (fourth pushbutton on right) completely eliminates all stereo noise, but the program will be received monophonically.



The bottom pushbutton on the left, *Dolby:Off-On*, interposes or removes a Dolby Type B decoder in the output audio lines, affording you the benefits of the Dolby noise reduction system when the station is transmitting Dolby.

The upper three pushbuttons on the right are for muting functions. They are interrelated and depressing any one cancels out the other two. The muting level is set by an adjustment on the back jack panel of the set (refer to Back Panel Muting Instructions).



Depressing the top pushbutton, *Muting:Off*, cancels out all muting functions. In this mode all inter-station noise is heard. Although most people find inter-station noise objectionable (with the high performance of the Sequerra Tuner this noise appears accentuated), it is useful in giving you a truer understanding of what is really happening throughout the entire broadcast band. It permits you to hear broadcasts, with a very weak signal strength, that are beneath the preset muting level.

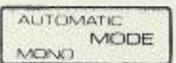


The second pushbutton down, *Muting:Inter-Station*, mutes all undesired noise (beneath the preset muting level) while tuning between stations.



The third pushbutton, *Muting:Inter-Stereo*, will mute not only inter-station noise but also monophonic broadcasts, allowing you to receive only stereo broadcasts.

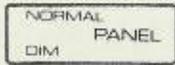
There is another muting system designed into the tuner which is non-adjustable. (The Muting Level adjustment is on the Back Jack Panel). It has to do with off-center tuning noise. To best understand it, consider the Display:Tuning pattern. When a station is properly tuned the trace is on the center line. As the trace approaches and goes down the sides of the tuning pattern (off center frequency) it is automatically muted. This muting circuit operates when either Inter-Station or Inter-Stereo muting is incorporated. It is by-passed when Muting:Off is engaged.



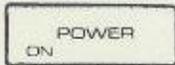
The fourth pushbutton on the right, *Mode:Automatic-Mono*, in the automatic position, automatically senses whether the received signal is stereo or mono, and channels the signal through the proper circuitry. Consequently it is usually kept in the Automatic position. The Stereo Pilot will light when a stereo program is being received. When a mono program is being received the set is designed to bypass the multiplex decoding circuitry, thus eliminating any possible stereo noise. With the Mode pushbutton depressed to Mono, it will receive stereo programs monophonically. This is useful in eliminating all stereo noises when stereo programming is being

received under difficult conditions, and the Separation:Hi Blend pushbutton does not sufficiently eliminate undesirable noise. Of course, in this mode, the program will be heard in mono.

It is also suggested to have the Mode in Mono when listening to a monophonic program, to eliminate any possibility of an unwanted signal triggering the Stereo Pilot. This would direct the programmed material through the multiplex decoder, and consequently pick up any concomitant stereo noise. If this occurs, the Stereo Pilot will flick on.

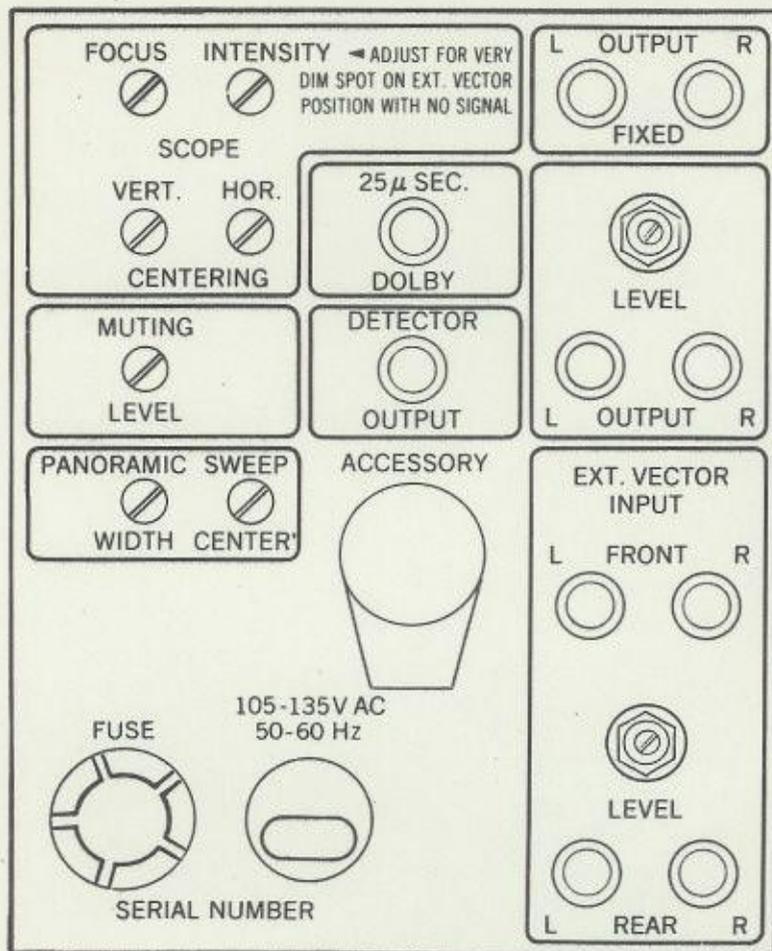


The *Panel:Normal-Dim*, pushbutton merely changes the intensity of the illumination of the display screens and oscilloscope.

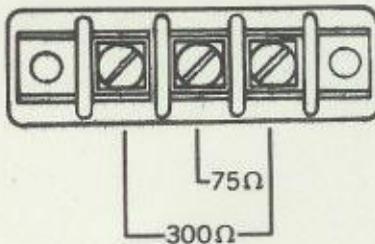


The *Power:On* pushbutton switches the tuner on and off. It is marked with the Sequerra "S", the only identification on the front of the set, which serves for easily locating the power button when the set is in its "blackout" position. In the On position it lights all functional displays.

BACK JACK PANEL



ANTENNA CONNECTION TERMINALS



Connect antenna leads to appropriate terminals (match impedances)

DESCRIPTION OF BACK JACK PANEL

The back Jack Panel has four inputs, five outputs, an accessory socket, scope and pan adjustments, a Dolby converter, a fuse, the line cord, and the serial number. Following is a description of their proper use.

Fuse — For U.S.A. a 1-amp, slow-blow, standard 3AG cartridge type fuse is used. For non-domestic use, the proper fuse for the country of use has been installed.

Power Line Cord — Plug only into AC outlet. In U.S.A. 115V AC 50-60 Hz. Proper operation will be had from 105-135V. European tuners are adjusted for 220V AC, 50 Hz (refer to Export Units in Installation Instructions section).

When taking the tuner from one country to another, take it only to an authorized dealer in the country of use for proper conversion. Servicing by user or unauthorized personnel will void warranty.

Output Fixed — Use this output to plug into stereo pre-amplifier. Delivers 1 volt RMS for 100% modulation from an internal impedance of 600 ohms into an open circuit or high impedance load. Can deliver ½ volt into 600 ohm external load. Can Drive as much as 100 feet of 33 picofarad cable on each output leg without causing any degeneration of signal.

Output Level — This output consists of a 5,000 ohm pot connected across the output of the Fixed Output. It has a varying internal impedance that cannot exceed 2800 ohms. It can be used to drive short standard cables into high impedance inputs.

External Vector Input — Input for four-channel signal source for scope display through the tuner's four-channel matrix circuit. Depress the Display:External Vector pushbutton. Also may be used to monitor external stereo sources. Use Front, L & R inputs.

Scope — All Sequerra tuners are properly adjusted before leaving the factory. If for any reason the scope's trace needs adjusting, follow the proper procedure:

1. Remove all inputs.
2. With small screw driver set the Scope Intensity adjustment to full counterclockwise position.
3. Set scope's Focus, Vertical, and Horizontal adjustments to center position.
4. Switch power on. Allow a minimum of 1 minute for tube to completely warm up. It is better to wait 15 minutes to allow the tuner to stabilize at full operating temperature, thus avoiding any possible drift effect.
5. Depress the Display:External Vector pushbutton.

6. Slowly turn Intensity Adjustment Clockwise until a very dim (barely visible) trace appears on the scope's screen. It is important to keep this trace extremely dim. Automatic brightening circuitry will adjust the intensity as required during performance. A bright spot will cause burn-in and shorten the oscilloscope tube's life. Such use will void the warranty. Now adjust the Focus control until the scope's trace becomes the smallest possible dot. Again adjust the Intensity control for the dimmest possible dot. The Vertical and Horizontal controls are used to bring the dot into the exact center of the scope. To properly center the dot, observe the tube exactly dead-on-center from the front to avoid any parallax. Use the center vertical line with its center cross mark to locate the exact center.

Muting Level – This adjustment is used to tune out all signals having noise level which is unacceptable to you.

1. Depress the Muting:Off pushbutton.
2. Tune in a station which you consider to be on the threshold of having an unacceptable noise level.
3. Depress the Muting:Inter-Station pushbutton.
4. Adjust the Muting Level control to the point where that station just mutes out.

Now any station with a noise level equal to, or more than the station just used will be muted out as you tune through the FM band. This muting level applies to both the Muting:Inter-Station, and Muting:Inter-Stereo pushbuttons. The potentiometer used for the Muting Level control has a range of 3 microvolts to 30 microvolts.

Panoramic Sweep – The electronics for the panoramic display function is optional and is not included in all sets. Again, remember that all tuners are adjusted before leaving the factory. But, in the event the panoramic trace needs adjustment, follow these procedures. This task can be made simpler with a proper understanding of what's on the screen. The important thing to understand is:

1. The vertical lines on the graticule are designed to be 400 Hz apart.
2. The FCC frequency assignments to alternate (primary) stations are 400 Hz apart. This spaces the adjacent stations midway (200 Hz) between the alternates.

In relative strong signal areas, it may be advantageous to remove the antenna leads and replace them with a small piece of wire. Although the pips will not be as strong, they may be more easily adjustable.

To Adjust Centering:

1. Depress the Display:Panoramic pushbutton and tune for a primary station by centering a large pip.
2. Now depress the Display:Tuning pushbutton for more accurate center tuning and checking the station frequency on the digital readout.

3. Now depress the Display:Panoramic button again. Do not touch the tuning knob, and if the station's pip is off center, center the pip by adjusting the Panoramic Sweep Center control.

To Adjust Width:

1. Depress the Display:Panoramic pushbutton.
2. Select a portion of the broadcast band where the primary alternate stations are broadcasting.
3. Identify the pips by using the digital readout (switch momentarily to Display:Tuning for more accurate tuning).
4. Then by using the Width adjustment control, align the pips of the primary alternate stations with the vertical lines on the graticule.

The Width adjustment may move the pips off center, in which case go back and adjust the centering. You may have to go back and forth several times before attaining optimum alignment. The final adjustment may not fall exactly on the lines, as the scope displays are approximate and not designed for hairline perfection. A highly usable compromise is easily achieved.

25 Microsecond Dolby — The present U.S. A. Dolby standard is for 75 microsecond de-emphasis. European sets are delivered to operate at 50 microsecond de-emphasis, which is the European standard. Conversion from one standard to the other is a simple matter, but should be done only by a Franchised Dealer.

Presently in the U.S.A. there are considerations by the FCC of permitting and/or standardizing on 25 microsecond operation. In instances of 25 microsecond broadcasting all that is required for the tuner to be properly converted is to insert a shorting plug into the 25 Microsecond Dolby jack.

Detector Output — This output supplies a signal, before de-emphasizing, directly from the output of the FM detector prior to multiplex decoding. This output has application to four-channel demodulation, broadcast testing, and other special purposes.

Accessory — When not in use, the shorting plug supplied with the tuner must be properly in the socket. If it is loose or absent, the digital readout will read either 189.3 MHz or below 88.0 MHz, and turning the tuning knob will not effect these readings.

The Accessory jack is used to interface the tuner with various accessories, i.e. the optional remote pushbutton tuning assembly.

DETAILED DESCRIPTION OF SCOPE

A thorough understanding of the information shown by the oscilloscope's trace will give an appreciation of what is being broadcast plus the quality of the broadcast. This presents an opportunity to make allowable adjustments, with the tuner and antenna, to achieve the best possible reception of receivable programs. All scope measurements and trace information are approximate. They are used to establish references and are not designed for hairline accuracy.

The cathode ray display tube requires greater warm-up time (about 30 seconds) than the displays before the trace becomes visible.

The oscilloscope display dims automatically whenever the trace reduces to a "dot" (at low or no audio signal levels). This automatic dimming action extends the life of the cathode ray tube and reduces the possibility of accidentally burning the screen phosphors.

Panoramic — In this mode the scope displays all stations broadcasting within a 2 MHz spectrum. (1 MHz each side of the tuned frequency). The height of the pips indicate the relative signal strength of the stations. The noticeable motion of the pips is the result of the material being broadcast plus multipath. The pan response is flat at the center although not across the entire 2 MHz. This will cause some slight diminishing of the height of the pips as they are tuned across the band away from center frequency. The height of the pips indicate the relative signal strength of the stations and corresponds to the approximate height of the trace of the tuning display (second push-button). This is just an approximate height match as the center vertical line on the pan display has a dynamic range of approximately 100dB. This is the result of some slight compression at the top and displacement at the bottom. The vertical center line on the graticule delineates the center frequency. The two vertical lines on either side of the center line are spaced at intervals of 400 kHz. This spacing corresponds to the FCC spacing of alternate stations on the bandwidth. Adjacent stations fall midway between the alternates at 200 kHz spacings, and when the set is tuned with a primary station on the center line, the alternate stations will be on the vertical lines, while the adjacent stations will fall between the lines.

A three-pointed trace represents a station with an SCA subcarrier. Some FM stations simultaneously broadcast a Subsidiary Communications Authority (SCA) signal on the same carrier frequency as their regular broadcast. SCA broadcasts are privately sold to commercial users such as restaurants, offices, stores, etc., and contain no commercial advertising.

NOTE: All spectrum analyzers produce a varying number of ambiguous and erroneous displays. The Panoramic Display in the Model 1 Tuner is no exception. The types of erroneous displays that you may expect are listed as follows:

1. **Image Responses:** All stations having a signal strength of greater than 5000 microvolts will produce an image response in the display precisely 4.8 MHz above the station.
2. **Spurious Responses:** These responses, in this tuner, are attributed mainly to the dynamic range limitations of the system. The dynamic range upper threshold is 100,000 microvolts. Signal input greater than that produces significant displacement of the base line as well as a series of side band modulation products.

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3. Cross modulation products due to the out of band signals i.e., excessively strong television signals below the FM band and excessively strong aircraft signals above the FM band may produce spurious responses.
4. Clandestine FM transmitters i.e., bugging devices, radiation from other FM tuners, and other sources of electromagnetic radiation within the band will be read as responses in the Panoramic Display.

Tuning — The oscilloscope trace follows an approximate trapezoid. Spinning the tuning knob fast will give an idea of the band pass pattern. Signal strength is indicated by the relative height of the trace above the inter-station noise level (the lower and heavier horizontal path of the trace). The center graticule line displays a dynamic range of approximately 110 dB. It is divided into decades. These callouts are not meant to be exact but are only approximate. They're given for relative discernment of signal strength.

Modulation (or carrier deviation) is displayed by the instantaneous horizontal expansion and contraction of the trace when tuned at the upper center. Loud passages are indicated by wide traces, while softer passages are seen as proportionally shorter traces. Over-modulation by the transmitter is displayed as an excessively wide trace extending beyond the two vertical lines on either side of the center line. These vertical lines represent the instantaneous peak deviation of 75 kHz either side of the center line.

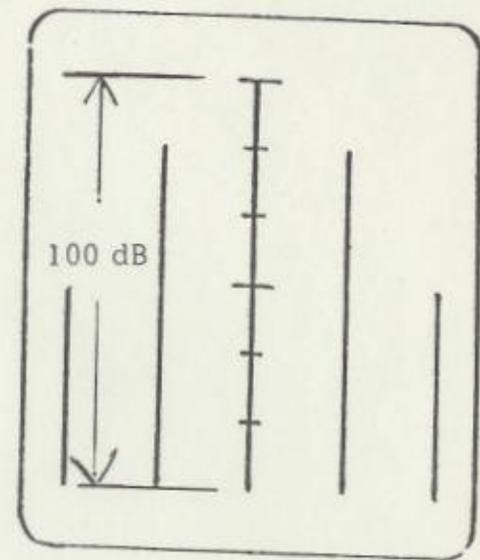
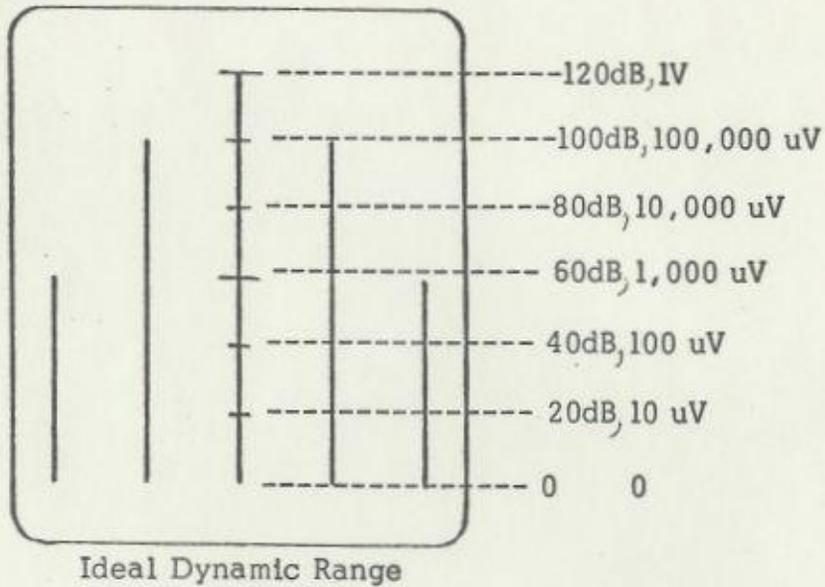
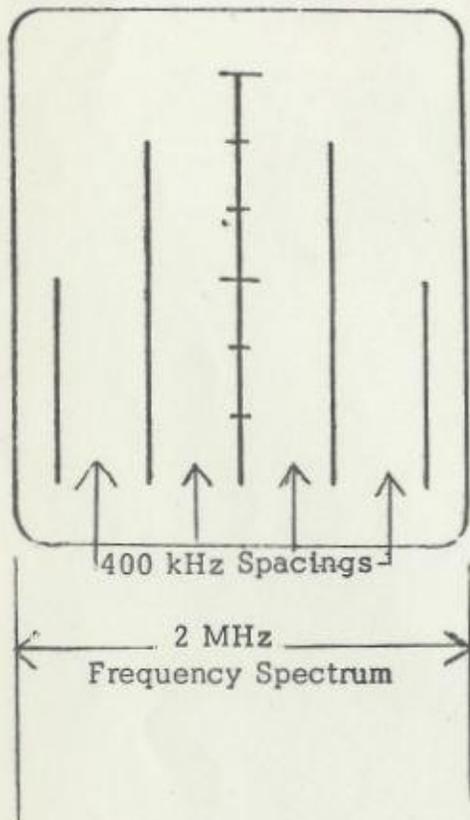
Weak distant stations can be seen on the scope although they may be below the tuner's set muting threshold. Adjusting antenna direction will frequently increase signal strength sufficiently to pull the signal out of the inter-station noise level and give good reception. In extreme cases, a very weak signal can be made audible by setting Muting to Off.

A station broadcasting an SCA sideband can also be seen with the Tuning Display. It is detected by an inward reach of the trace when the trace is at the upper portion of either side of the trace pattern.

Adjusting Antenna Direction For Minimum Multipath — The tuning display serves the important function by showing when the antenna is pointed to best possible direction to minimize multipath. Multipath interference, similar to a "ghost" in TV pictures, produces distortion in the FM signals at the receiving antenna. This results in a distorted sound. To minimize multipath interference, and obtain the best reception from each station, adjust the antenna to the direction which results in the smoothest and most horizontal trace. This direction frequently may not be the same as the direction for the strongest signal (maximum vertical deflection).

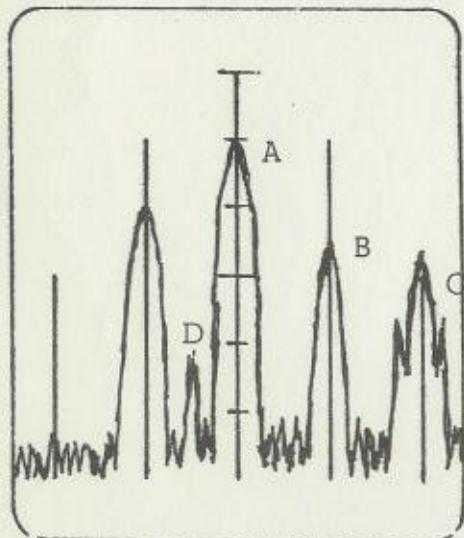
PANORAMIC

GRATICULE DESCRIPTIONS

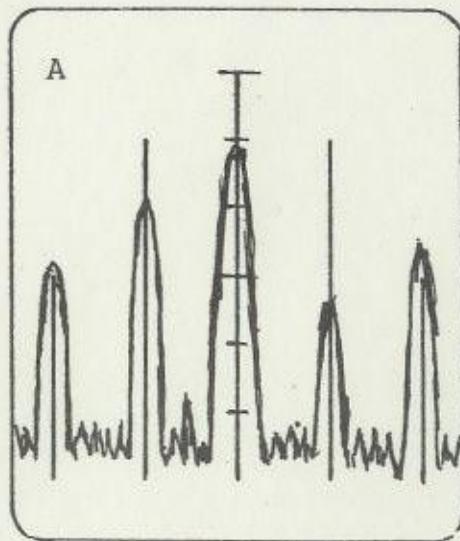


PANORAMIC

DESCRIPTION OF PIPS

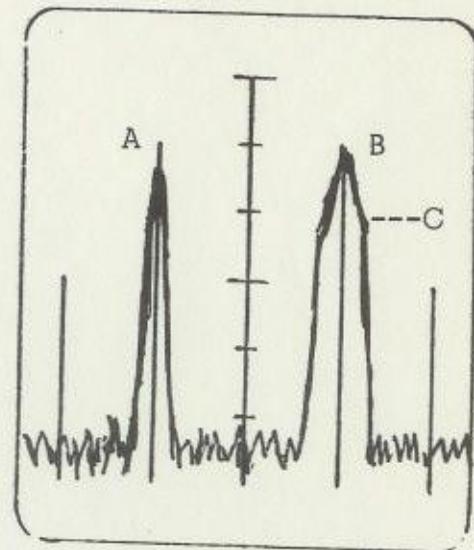
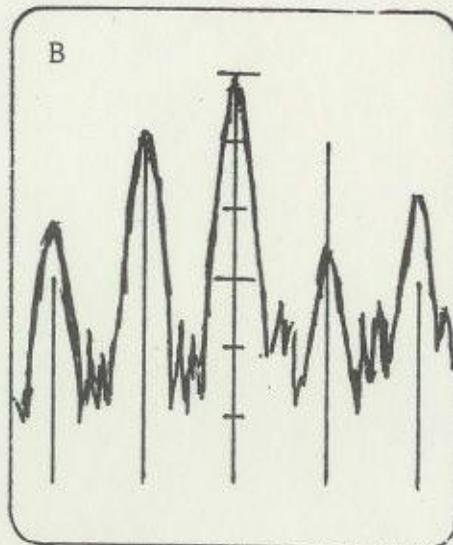


A. Tuned in station on center frequency.
B. Alternate station 400 kHz off center frequency
C. Alternate station 800 kHz off center frequency.
Note: 3-pointed pip indicates station simultaneously broadcasting SCA.
D. Adjacent station 200kHz off center frequency.



Same broadcast received by 2 different antenna systems.

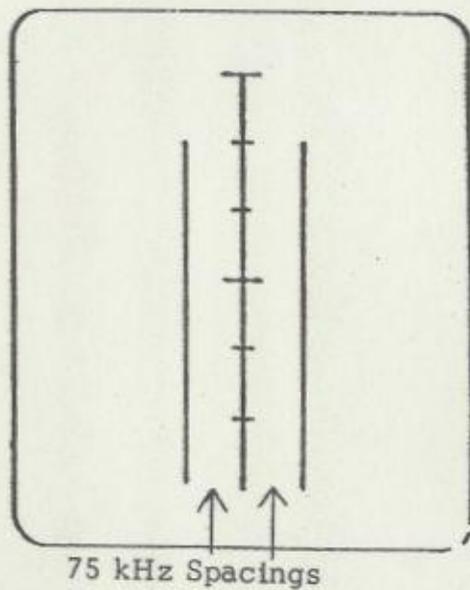
A. Rabbit ear FM antenna
B. Outdoor roof antenna (note overload). This was close line-of-sight developing 0.3V input to tuner.



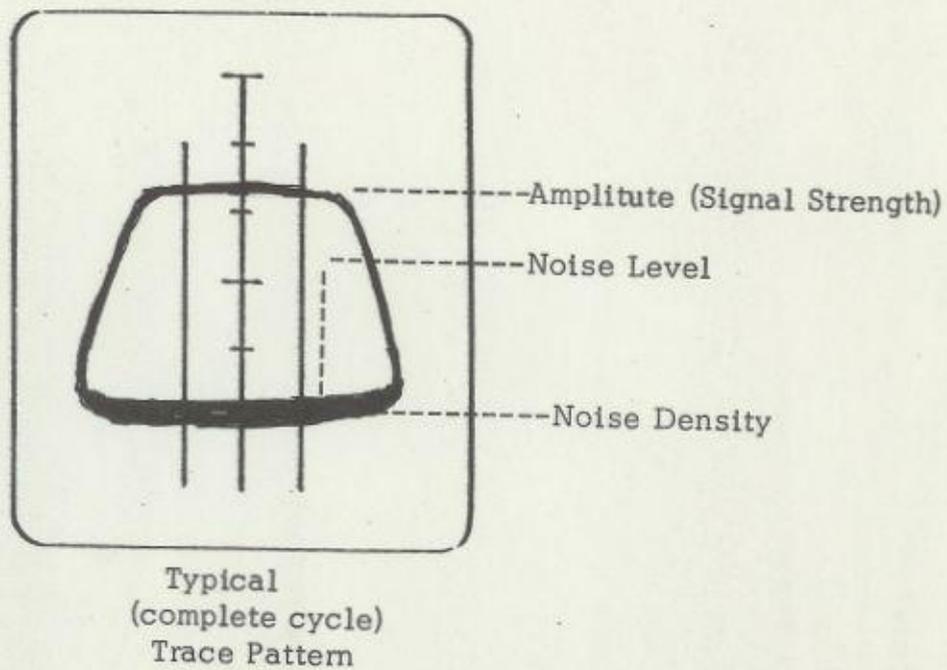
2 Stations with same signal strength
A. Monaural
B. Stereophonic
C. Bend at top of pip indicates stereo pilot.

TUNING

Graticule Description



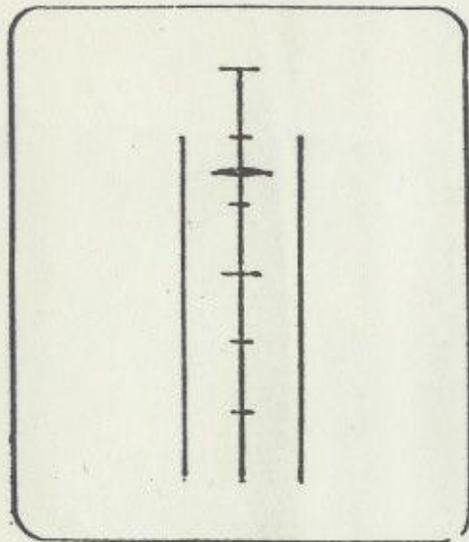
Trace Description



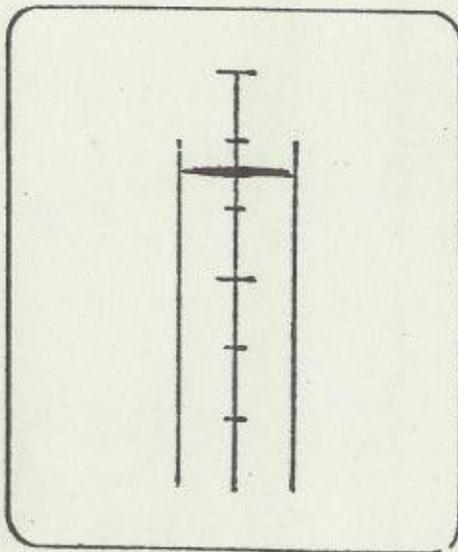
For Dynamic Range see Panoramic Graticule Description

TUNING

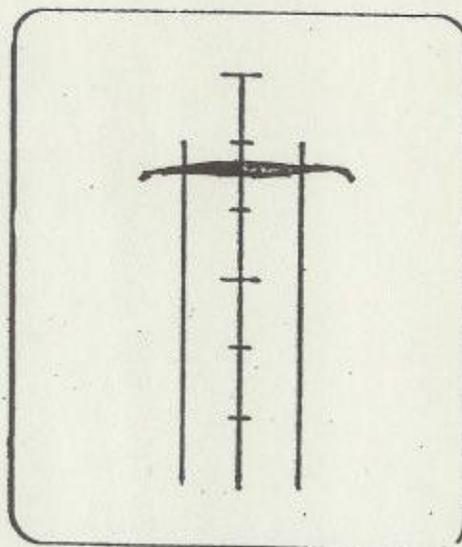
TRACE DESCRIPTIONS



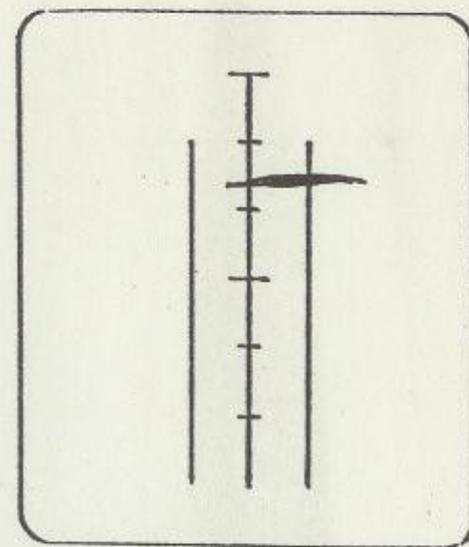
Soft Passages



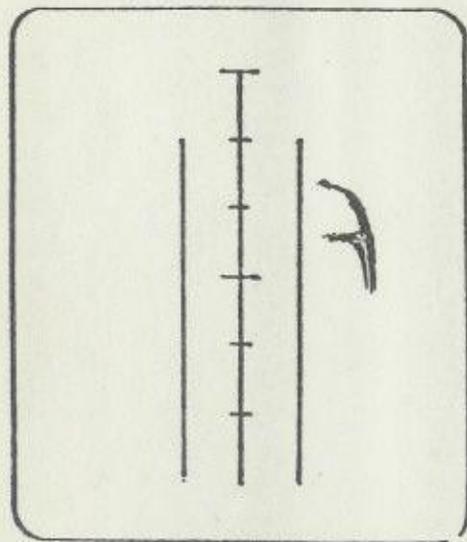
Loud Passages
(Full Modulation)



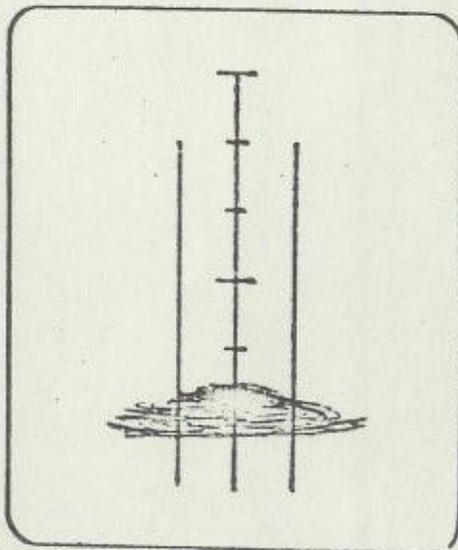
Overmodulation by
broadcaster
(causes distortion)



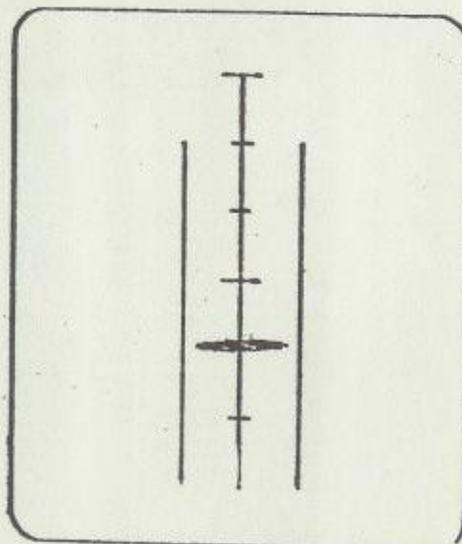
Station not properly tuned



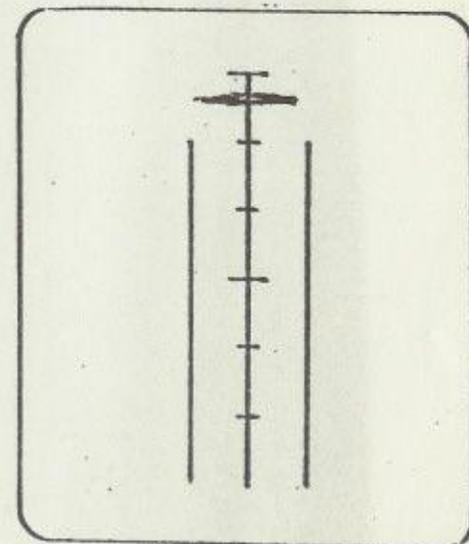
Off-Tuned trace
(Showing SCA sub-
carrier)



Weak Station



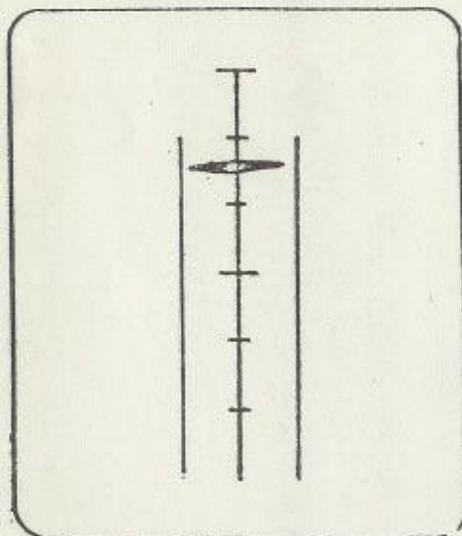
Station with Low Amplitude



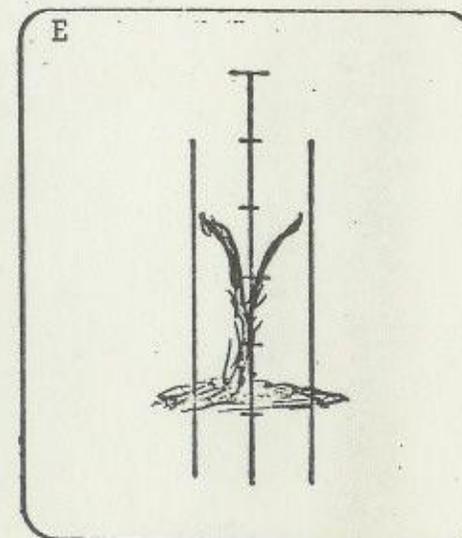
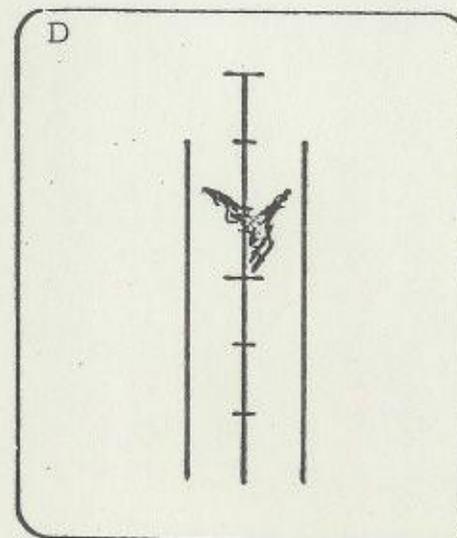
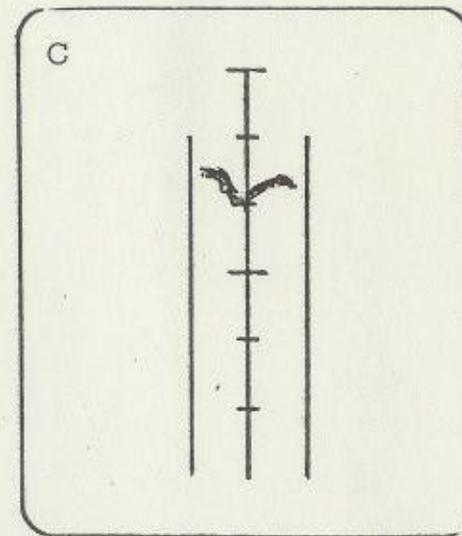
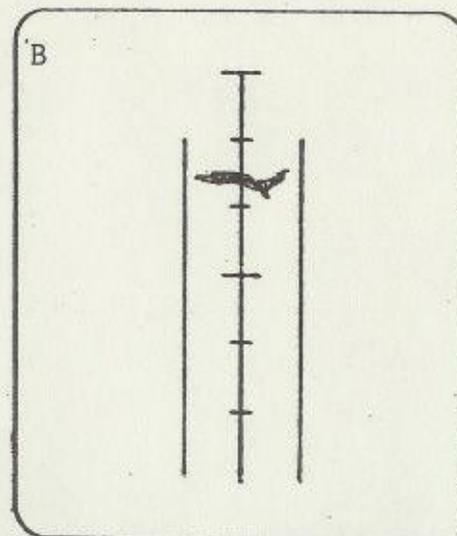
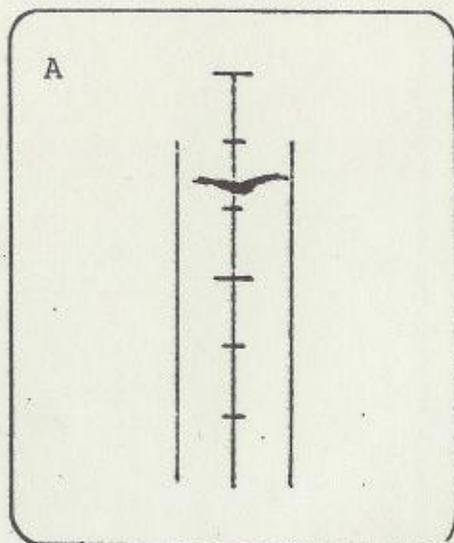
Station with High Amplitude

TUNING

MULTIPATH



Ideal Trace
(No Multipath)

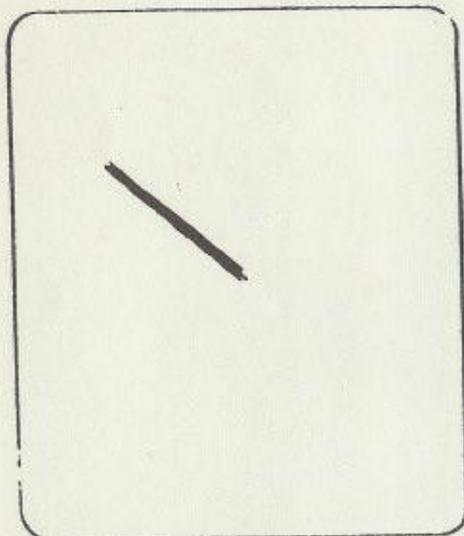


Multipath progressively worse (A through E). The long gentle curve of A is preferable to B, etc. In tuning to eliminate or minimize multipath, rotate your antenna to get the smoothest trace. This will be your best listening position, even if it has less amplitude than in other positions.

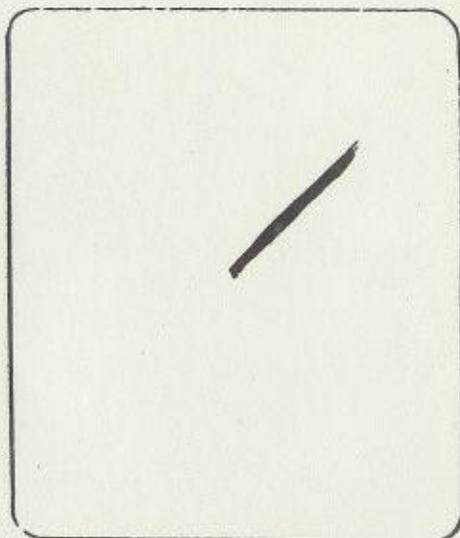
Very severe multipath
(partial cancellation of signal)

TUNER VECTOR

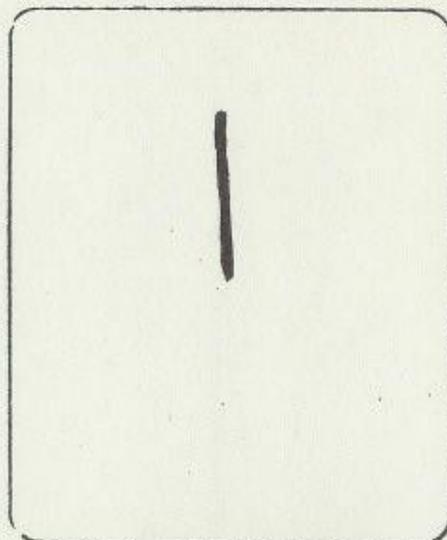
TRACE DESCRIPTION



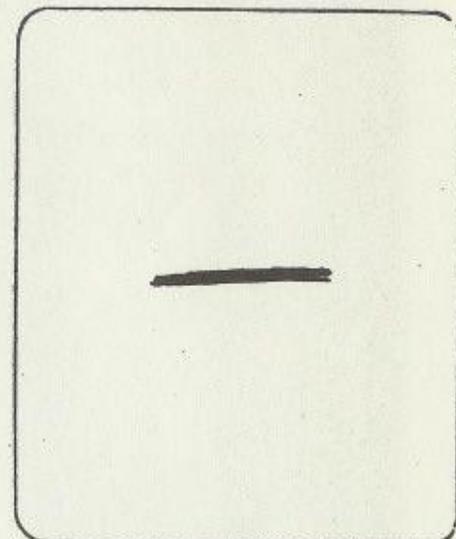
Left Channel Only



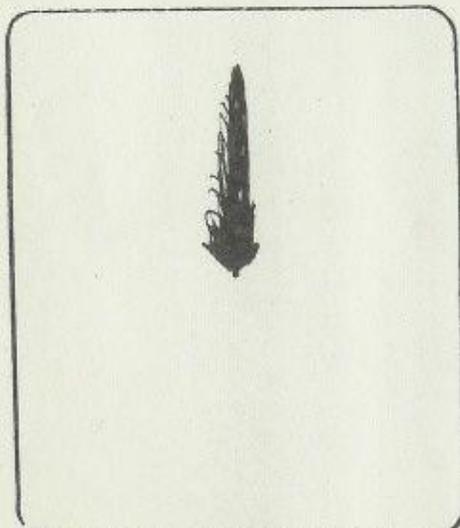
Right Channel Only



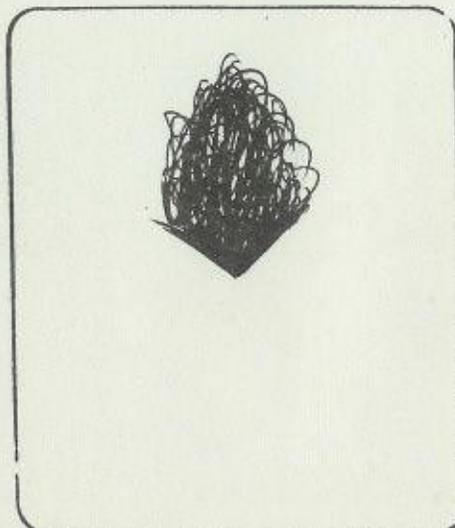
No Separation Between Channels (Monophonic)



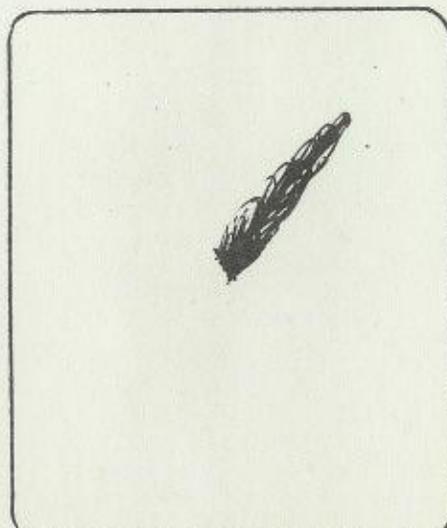
L - R Out of phase Stereo



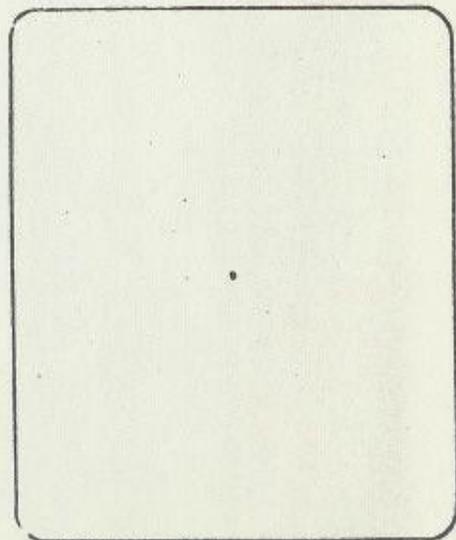
Little Separation Between Channels (Such as Centrally Placed Soloist)



Maximum Separation Between Channels

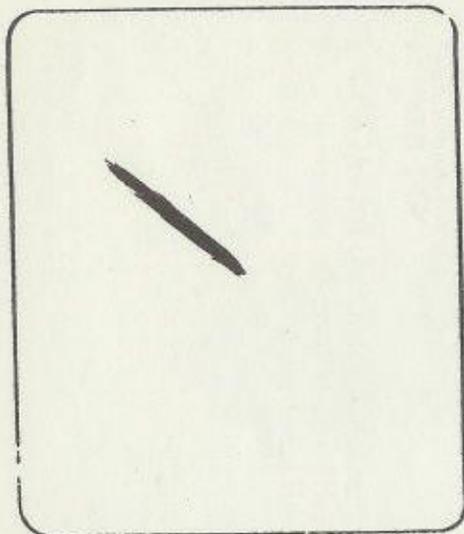


Improper Balance to the Right

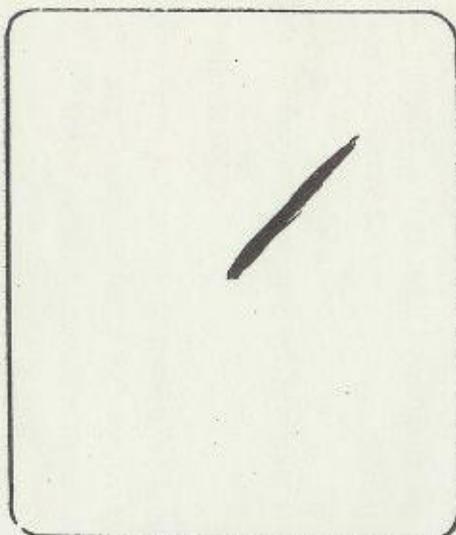


EXTERNAL VECTOR

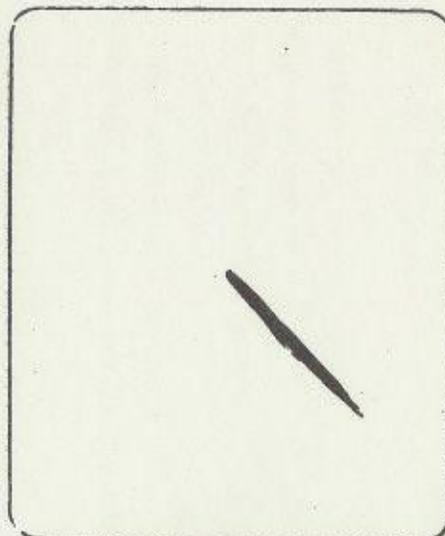
4 CHANNEL TRACE DESCRIPTION



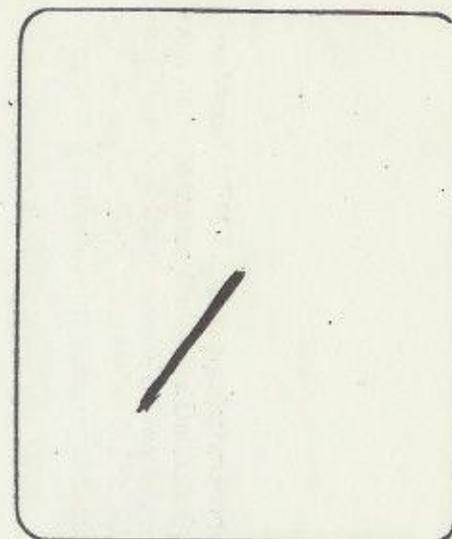
Front Left Channel Only



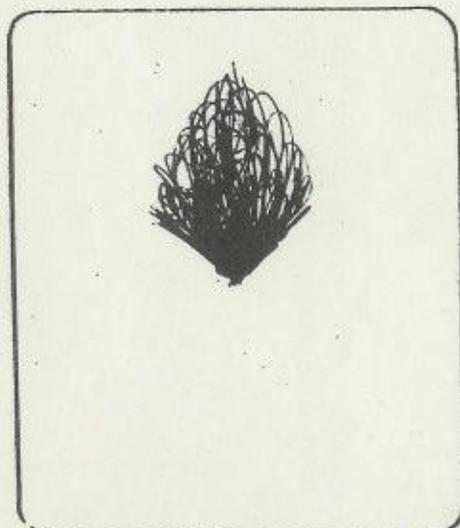
Front Right Channel Only



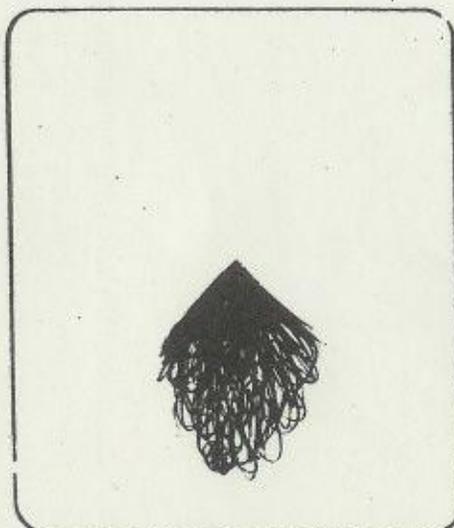
Rear Right Channel Only



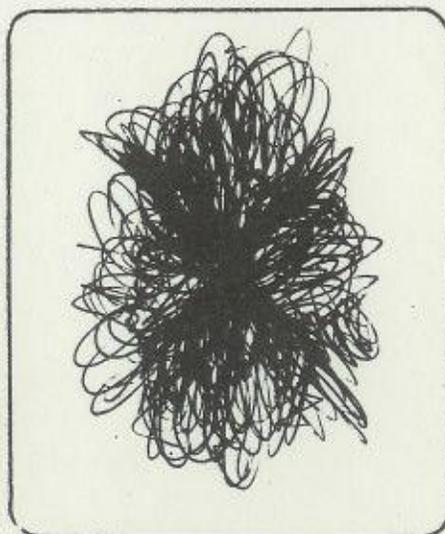
Rear Left Channel Only



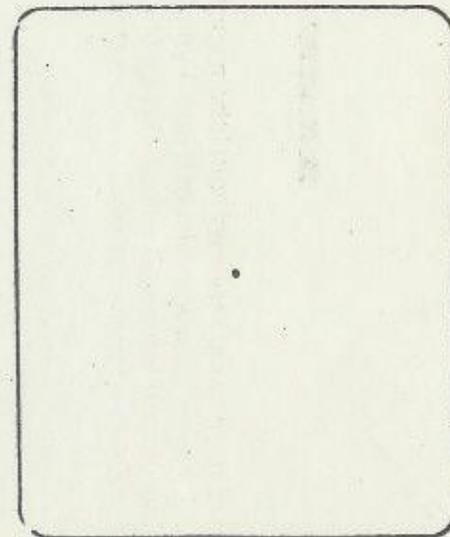
Stereo L&R Front Inputs Only.
(Same as Stereo for Tuning
Vector) Maximum Separation



Stereo L&R Rear Inputs Only.
Maximum Separation



4 Channel - Maximum
Separation Between Channels



SIMPLIFIED THEORY OF OPERATION

The Model 1 FM Tuner is a superheterodyne frequency modulation receiver consisting of two RF Subsystems, a Stereo Multiplex Decoder System, a Dolby Noise Reduction System, an Instrument Type X-Y Oscilloscope, a Frequency Counter, and a small Analog Computer that derives all of the Audio Displays. The Model 1 FM Tuner can be most easily understood in terms of the functions of the individual modules it contains.

The following modules are in the Model 1 Tuner:

1. Front End
2. FM IF Filter
3. FM Limiter
4. FM Detector
5. Multiplex Decoder
6. Dolby Noise Reducing System
7. Frequency Counter
8. Four Channel Display Computer
9. Panoramic Sweep Generator Oscillator Mixer
10. Panoramic IF
11. Panoramic Log Detector
12. X-Y Oscilloscope
13. A Number of Regulated Power Supplies
14. Visual Display System

NOTE: These units are defined by similar key numbers in the block diagram.

1. FRONT END

The Front End performs three basic functions.

1. It provides the initial RF selectivity by utilizing a differentially coupled 3 pole amplifier.
2. With its internal Local Oscillator it mixes the selected RF frequency to derive the IF frequency which is used to drive both the FM IF and the Panoramic IF.
3. It provides the signal to drive the Frequency Counter.

2. FM IF FILTER

The IF Filter has the function of supplying sufficient selectivity to separate stations that are at least 400 Hz apart on the FM dial. The FM IF also supplies the AM signal which derives the last decade of the vertical display in the tuning mode.

5174

3. FM LIMITER

The FM Limiter provides a means of removing all of the AM noise produced from the selected signal, leaving only the zero axis crossing information to be fed to the FM Detector. The FM Limiter also supplies the first five decades of vertical information from the Tuning Display.

4. FM DETECTOR

The FM Travis-Smith Detector takes the information contained on the zero axis crossing from the Limiter and converts that time displacement into an audio signal. Its output drives the Multiplex Decoder, and the horizontal axis of the oscilloscope in the Tuning Display.

5. MULTIPLEX DECODER

The input circuit to the Multiplex Decoder is used to separate the 19 KHz pilot and to remove the 67 KHz (SCA) signal from the composite stereo signal. This is a uniquely designed filter system which precisely controls the phase amplitude relationships of both L+R signal, and the L-R signal. This system can be termed a quasi-vestigial side band processing circuit. At this point, the separate 19 KHz signal is fed into a frequency doubler which is used to phase lock the free running 38 KHz constant amplitude oscillator.

From the 38 kHz phase synchronized oscillator, the multiplex peak decoder switching system is driven. The peak detection system is the one that permits the least possible phase error in the demodulation process and can be properly called a push-pull peak detector.

The output of the multiplex system is fed into the output filter system which performs the following functions: First it inserts the normal 75 usec. (50 usec. available on special order) de-emphasis curve; then it adds to it the roll off whose inflection point is around 23 kHz; an additional notching filter is inserted after this to remove the remaining components of the 38 kHz oscillator. This system is capable, with a saturating signal, of a signal to noise ratio of greater than 70 dB below peak levels.

6. DOLBY

The Dolby demodulator performs the function of the automatic frequency correction of a Dolby encoded signal. It is only used when the station is broadcasting in a Dolby encoded mode.

7. FREQUENCY COUNTER

The Frequency Counter displays the frequency of the station that the set is tuned to. It operates in the following manner: This counter has been designed to count to 200. In its reset arithmetic it is always set to 189.3. A signal from the local oscillator in the Front End is fed into the input of the counter. Since the local oscillator's frequency is 10.7 MHz higher than the stations frequency, the counter in its scaling will read the stations frequency. This counter uses a 1 MHz crystal as its time base, and has an accuracy of ± 100 Hz reference to the stations frequency.

NOTE: All counters have a potential ambiguity of reading in the last digit. This is defined as the readable resolution of the counter. As the stations frequencies are changed by tuning the knob, it is possible in an off station mode to see a reading ambiguity in the last digit.

8. FOUR CHANNEL DISPLAY COMPUTER

The Four Channel Display Computer is a device for separating the phase amplitude components of either a left or right stereo signal or an externally applied stereo, or four channel signal. This system displays in the Four Channel quadrants, the phase amplitude characteristics of the input signals as compared to any of the other 3 input signals. All vectors have the center of the oscilloscope as their origin (see illustrations of trace descriptions).

9. PANORAMIC SUBSYSTEMS

- 10.** The Panoramic Subsystem consists of a Sweep Generator which is used to both drive the Horizontal Axis of the oscilloscope in the Panoramic Mode, and to change the frequency of the panoramic local oscillator ± 1 MHz. The panoramic mixer uses the panoramic oscillator sweeping frequency and mixes it with the output of the mixer in the front end to derive the 2.4 MHz Panoramic IF Frequency. The Panoramic IF provides sufficient selectivity to separate for visual display, stations on the dial that are less than 200 kHz apart. The Panoramic Log Detector provides the 6 decades of vertical display on the oscilloscope in the Panoramic Mode.

12. X-Y OSCILLOSCOPE

The X-Y Oscilloscope utilizes an instrument type 4½ inch flat faced tube and has an approximate sensitivity of .5 RMS volts per inch on either axis. It has a band width of approximately 100 kHz on both axis. In addition the automatic dimming circuit is activated in 2 modes, either signal amplitude or preset for the mono-audio display.

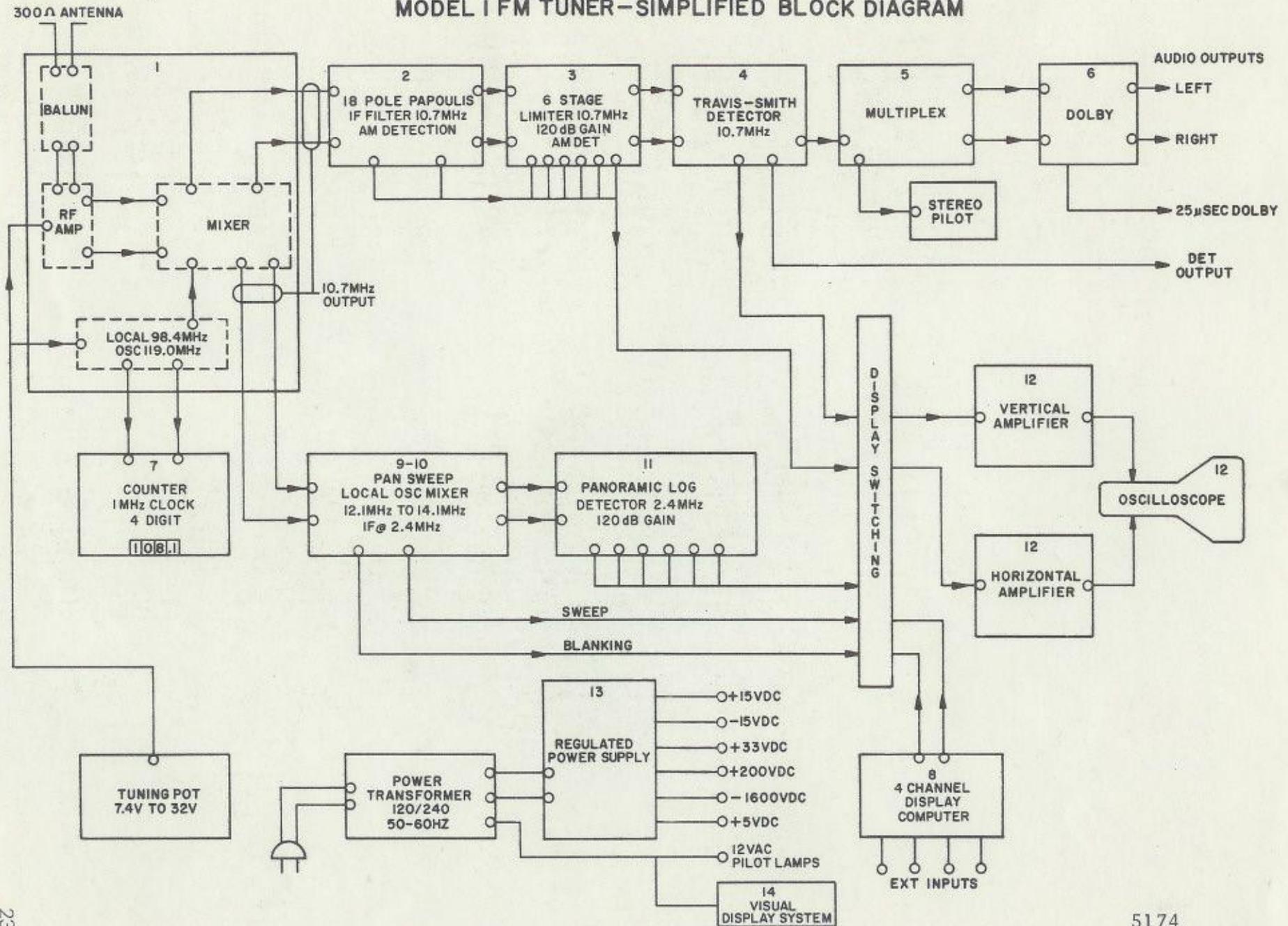
13. REGULATED POWER SUPPLIES

This power supply system provides the necessary regulated voltages to all the previous systems. It is short circuit proof, and can be adjusted for either 120 or 240 volt operation.

14. VISUAL DISPLAY SYSTEM

The Model 1 Tuner has a very complex Visual Display System which is driven by the 12 volt AC power system. It is used to illuminate the main screen (see illustration), to illuminate the 3 individual graticule systems (refer to Scope Display), and to light the Stereo Pilot and the Megahertz word. This system is individually fused and the fuse is located on the step shelf of the power supply chassis.

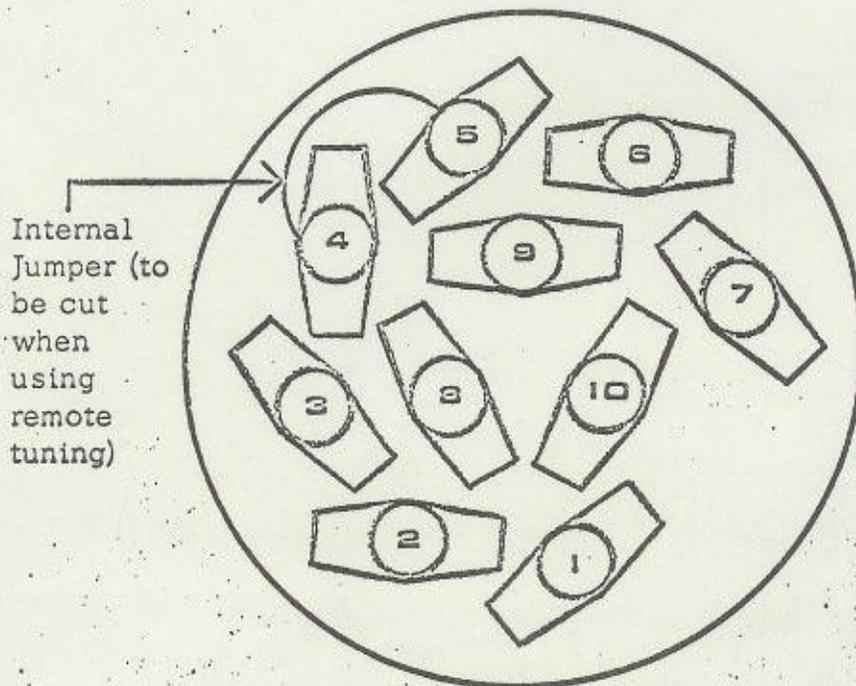
MODEL I FM TUNER—SIMPLIFIED BLOCK DIAGRAM



REAR VIEW OF SOCKET
on BACK JACK PANEL

(Enlarged 8 Times)

1. +15 Volt Supply
2. -15 Volt Supply
3. Tuning Bias Supply
4. Tuning Potentiometer Voltage Output
5. Front End Tuning Voltage Input
6. Front End Tuning Ground
7. Chassis Ground
8. n.c.
9. 25 μ Sec Dolby
10. Detector Signal



CABINET MOUNTING

INSTRUCTIONS & TEMPLATE



REMOVE FOR USE

CABINET MOUNTING INSTRUCTIONS

(Read and understand thoroughly before doing any cutting)

This sheet is designed for those wishing to house the tuner inside a cabinet with only the face of the tuner positioned to be visible through the cabinet's front paneling.

For cabinet installation of The Sequerra Model 1 FM Tuner, it is essential to provide sufficient ventilation. This will assure trouble free operation and long life. The supporting shelf inside the cabinet should be at least $3/4$ " thick. The internal cabinet area housing the tuner should be a minimum of 18" wide by 9" high by $14\frac{1}{4}$ " deep. Leave the back of the cabinet open above and below the supporting shelf to assure good ventilation. There should be no heat producing equipment directly under the tuner's supporting shelf. If your system is such that heat producing equipment must be under the tuner, a small air circulation fan is mandatory.

On the other side of this sheet the Cabinet Mounting Template is printed. It is used to establish the areas to be drilled and cut out of both the front panel and the supporting shelf. The Cabinet Mounting Template consists of two parts: (1) "Part A"--Front Panel Cutout Template, (2) "Part B"--Inside Shelf Cutout Template. Line "A" is common to both Parts. "Part A" will be used to establish the cutout in the front panel of the cabinet through which the tuner will fit. "Part B" will be used to establish the anchoring holes and the ventilation holes on the shelf on which the tuner will rest.

1. With a scissors, cut the template along Line "A" separating the two Parts. Also cut out the two notches "D" from "Part B".
2. Place the "Part A" Template inside the cabinet, flat up against the back of the cabinet's vertical front panel. It should be placed on the inside exactly where the cutout will be in the panel, through which the tuner will fit. Make sure that Line "A" (which is the bottom of "Part A") is flush with the top surface of the shelf on which the tuner will rest. Hold the Template in this position and with a pointed instrument mark the rear surface of the cabinet's panel through the three alignment points "B" of the Template.
3. Remove the Template and drill $1/16$ " holes through the cabinet's panel at the alignment point marks. Make sure the drill is held perpendicular to the panel and parallel to the supporting shelf.

4. Now, place the "Part A" Template on the front outside surface of the cabinet, keeping Line "A" as the bottom, and align the points "B" with the 1/16" holes drilled through the cabinet's panel. With the Template in this position, mark the four corners, points "C", on the front panel of the cabinet with a pointed instrument. Remove the Template and with a straight edge connect the corner points. (It is through this rectangular area that the tuner will be positioned in the cabinet.) Saw out the rectangular opening. The sawing should be done carefully from the front of the cabinet to avoid chipping or marring the cabinet's finish around the opening. When properly completed, the bottom edge of the rectangular panel opening should be flush with the top of the supporting shelf.

5. Place the "Part B" Template inside the cabinet. It should lie flat on the supporting shelf. The notches "D", which were cut out of the Template, will permit the Line "A" edge to be placed into the rectangular cutout of the cabinet's panel. The Line "A" edge should be positioned flush with the bottom front surface edge (the outside edge) of the cabinet's cutout.

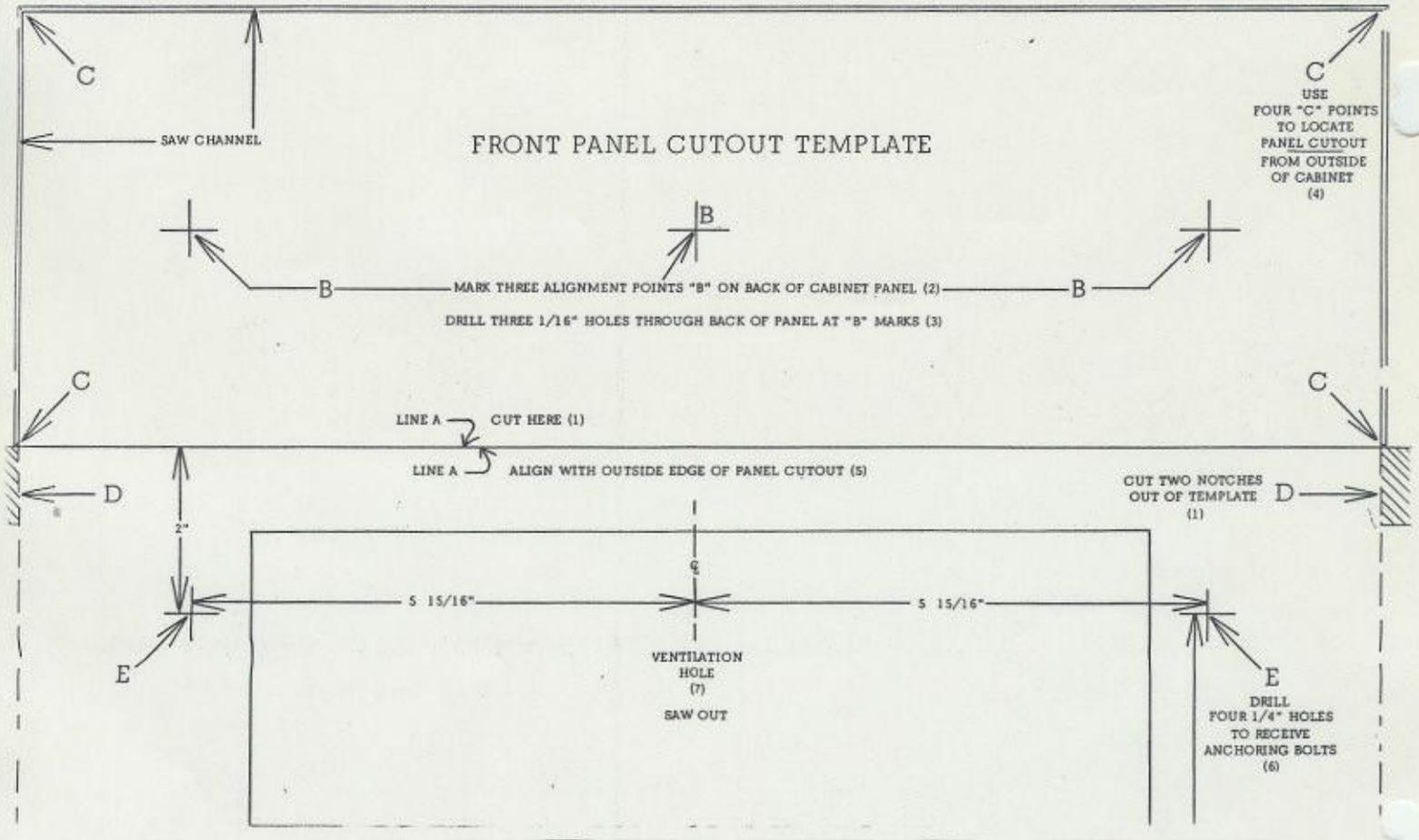
6. With the Template in this position, use a pointed instrument to mark the surface of the cabinet's shelf through the four points "E" of the Template. Remove the Template and drill 1/4" vertical holes into the shelf of the cabinet at the four "E" point marks. These holes will be used to anchor the tuner to the shelf.

7. Again place the "Part B" Template into the cabinet as per step 5. With a pointed instrument, mark the corners of the two rectangular ventilation holes, indicated on the Template, onto the shelf of the cabinet. Remove the Template and with a straight edge connect the corner points of each of the two ventilation holes. Then saw out the two ventilation holes from the shelf. These holes will permit air circulation and prevent heat build-up.

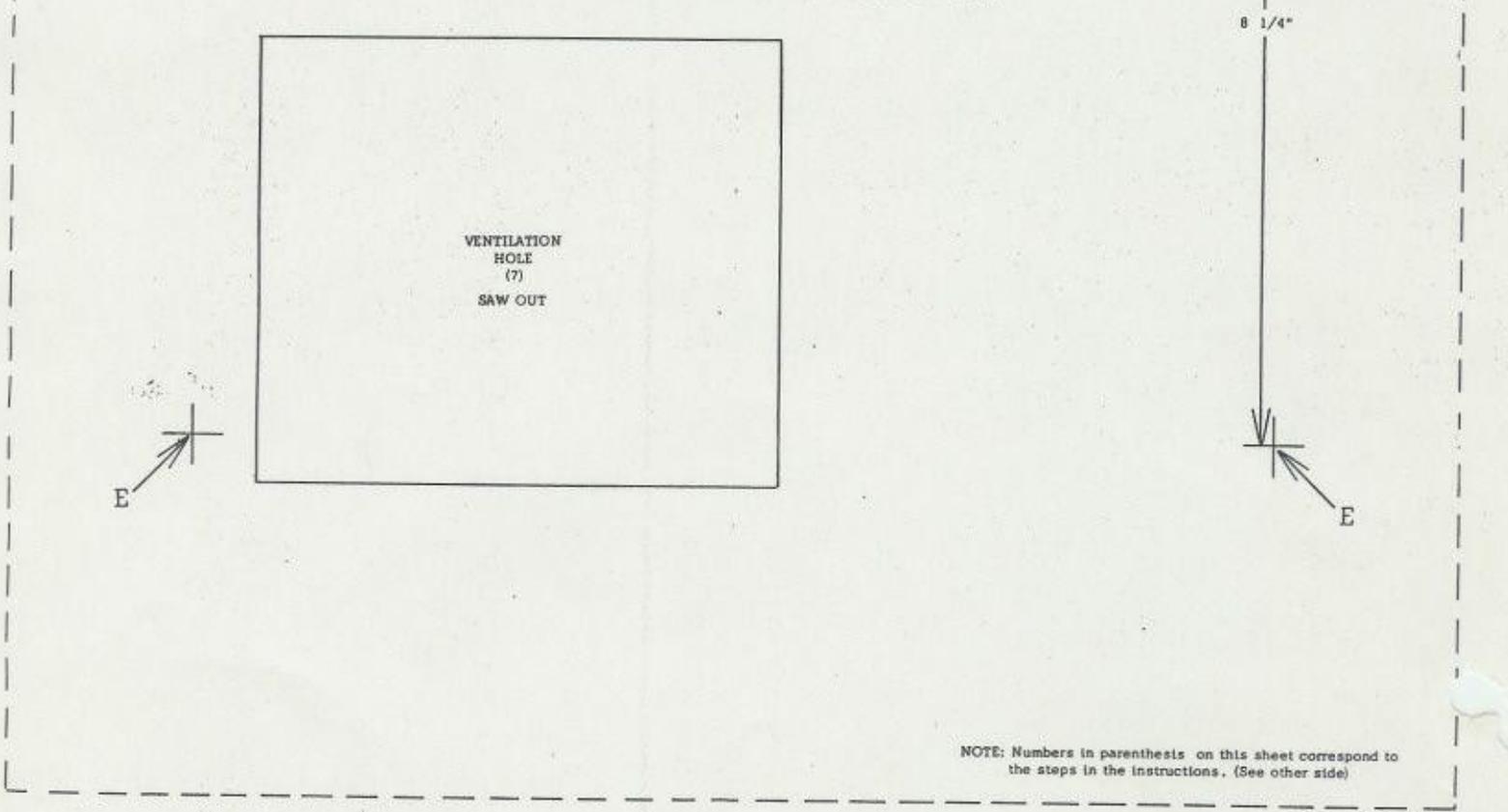
8. Remove the four feet from the tuner by unscrewing them. The feet are not used in a cabinet installation. Insert the tuner through the front of the rectangular panel opening of the cabinet. To anchor the tuner to the shelf use the four #8 X 32 Phillips head screw bolts and the four #8 flat washers and the four #8 lock washers supplied in the spare parts pouch. Anchor the tuner to the cabinet by passing the bolts up through the "E" holes and screwing them into the feet-holes of the tuner. The lock washers should be sandwiched between the heads of the screw bolts and the flat washers. When the bolts are tightened, the flat washers should be pressing up against the bottom of the cabinet's supporting shelf. NOTE: The bolts should not penetrate the tuner more than 1/2" (length of bolt should not exceed thickness of shelf plus 1/2").

CABINET MOUNTING TEMPLATE

FRONT PANEL CUTOUT TEMPLATE



INSIDE SHELF CUTOUT TEMPLATE



NOTE: Numbers in parenthesis on this sheet correspond to the steps in the instructions. (See other side)

SAVE ALL PACKING CARTONS AND MATERIALS

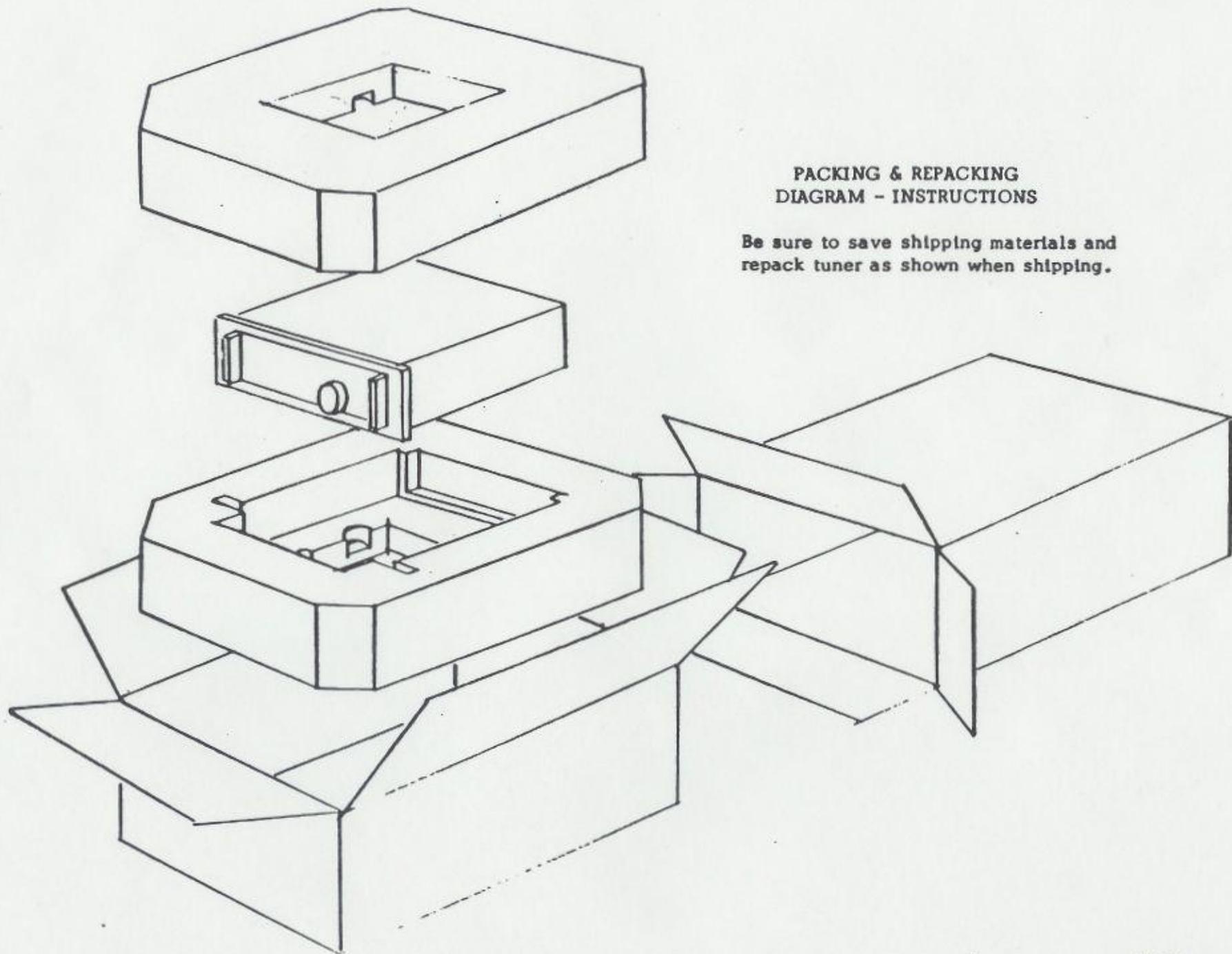


The SEQUERRA COMPANY takes every precaution in the manufacturing, testing, and packaging of its equipment to insure long life and to preclude servicing. However, if it ever becomes necessary to ship this unit, following the procedures outlined below will afford protection against damage in shipment.

1. Use original carton and filler material properly packaged, sealed, and labeled.
2. If original carton is unavailable, use a carton of sufficient strength and size. It should be firmly packed with plenty of padding between the unit and all surfaces of the carton.
3. For your protection, select a reputable carrier and insure shipment for its full value.

THE SEQUERRA COMPANY, INC.

71-07 WOODSIDE AVENUE, WOODSIDE, N.Y. 11377



**PACKING & REPACKING
DIAGRAM - INSTRUCTIONS**

**Be sure to save shipping materials and
repack tuner as shown when shipping.**

SPARE PARTS LIST

The spare parts are found in a packet following this page. The packet contains:

One bayonet #1815 bulb mounted in the reflectors behind the display windows.

For Domestic (110-120 VAC) Units:

One 1 Amp slow-blow Fuse

For Export (220-240 VAC) Units:

One 1/2 Amp slow-Blow Fuse

NOTE: This fuse is positioned in the Back Jack Panel.

One 5 Amp filament fuse positioned on the shelf of the power supply, protects display lights.

Four 6-32 1/4" flat head, black oxide Phillips screws used in securing tuner covers.

THE SEQUERRA  COMPANY, INC.
71-07 WOODSIDE AVENUE, WOODSIDE, N.Y. 11377



THE SEQUERRA MODEL 1 FM TUNER

SERIAL NUMBER _____

FIVE YEAR WARRANTY

THE SEQUERRA CO. INC.
143-11 ARCHER AVE.
JAMAICA, N. Y. 11435
(212) 297-5000

The Sequerra Company, Inc. warrants to the original using purchaser that the Sequerra Model 1 FM Tuner shall be free from defects in workmanship and materials under normal and proper use for a period of five years from the date of purchase.

STATEMENTS OF WARRANTY

A. Warranty registration shall become valid only when both the authorized retail franchised dealer selling the tuner and the customer have filled out their respective sections of the Warranty Registration Certificates, and the Factory's Copy of the Certificate has been mailed to The Sequerra Company within ten days of original purchase.

B. The Sequerra Company will repair or replace all defective parts returned within five years from date of purchase at no charge to the original owner for either labor or materials.

C. All defective equipment, parts, or modules shall be returned to The Sequerra Company or its authorized service station, shipping and handling prepaid for both directions, only with the expressed written authorization from the Company.

D. The Sequerra Company reserves the right to conduct an inspection of the defective parts and materials and prove to its satisfaction that the equipment has not been repaired, altered, or modified by any unauthorized personnel.

E. The oscilloscope tube and incandescent lamps are covered only for a period of one year.

F. All replacement parts supplied under this warranty shall carry the unexpired portion of the original warranty on a pro rata basis.

G. The warranty is transferable only with the expressed written authorization from The Sequerra Company.

H. The Sequerra Company reserves the right to modify, change, or redesign without notice, the Model 1 in whole or in part at any time without prior notification thereof, and therefor is not obligated to incorporate any possible future changes or modifications into any Sequerra Model 1 Tuner in the field.

This warranty states fully and expressly, and in lieu of all other warranties implied or expressed by any other party, the total obligation of The Sequerra Company.

OWNER _____

DATE OF PURCHASE _____

ADDRESS _____

CITY _____

STATE _____

DEALER _____

AUTHORIZED SIGNATURE _____

ADDRESS _____

CITY _____

STATE _____

THE SEQUERRA COMPANY, INC.

143-11 ARCHER AVE. JAMAICA, N.Y. 11435



**FIVE YEAR WARRANTY
REGISTRATION CERTIFICATE**

**FOR
THE SEQUERRA MODEL I FM TUNER**

SERIAL NUMBER _____

To register your Five Year Warranty, please fill in the requested information below, on both copies of the Registration Certificates. Mail one certificate to The Sequerra Company and the other to the franchised dealer where the tuner was purchased. Stamped envelopes are enclosed for your convenience. A delay of more than ten days will void the warranty.

DATE OF PURCHASE

ORIGINAL PURCHASER (PLEASE PRINT)

ADDRESS

CITY

STATE

ZIP

DEALER

ADDRESS

CITY

STATE

ZIP

SIGNATURE OF PURCHASER

THE SEQUERRA COMPANY, INC.
~~2300 WOODBORO RD, WOODBORO, NJ 07091~~

1-Factory's Copy

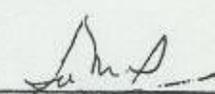
TEST MEASUREMENTS

Tuner Serial No. _____

Date _____

1. Volume Sensitivity (2 dB)		1.6 ut	
2. Quieting Mono	30 dB	1.9 ut	
	50 dB	3 ut	
	60 dB	8 ut	
	70 dB	35 ut	
	Ultimate S/N	7-72 db	
3. Quieting Stereo	30 dB	3 ut	
	50 dB	25 ut	
	60 dB	125 ut	
	70 dB	Noise Masking	
	Ultimate S/N	Noise Masking	
4. THD Mono 1000 uV input	30 Hz	.06%	
	400 Hz	.06%	
	15 kHz	.55%	
	No de-emphasis @ detector output 15 kHz	2.5%	
5. THD Stereo 1000 uV input	100Hz	.15%	
6. Stereo Separation		Left to Right	Right to Left
	30 Hz	- 50 db	- 50 db
	400 Hz	- 52 db	- 52 db
	10 kHz	- 52 db	- 52 db
	15 kHz	- 52 db	- 52 db
7. Selectivity $\frac{30 \text{ dB interference}}{70 \text{ dB Sig. Diff.}}$ Freq. \pm		105 db	
8. Capture Ratio	30 dB	0.9	
	50 dB	0.75	
9. Minimum Discernable Signal Panoramic		1.6 ut	

(Original on file at the Sequerra Company)



 TESTER