

March 18th 1957 April 8th 1957



THE FISHER[®]

Laboratory Standard **FM-AM TUNER**

INSTALLATION, OPERATING
AND SERVICE INSTRUCTIONS



MODEL 80-T

PRICE: \$1.00

FISHER RADIO CORPORATION

NEW YORK

THE FISHER



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MODEL 80-T

GENERAL INFORMATION

THE FISHER FM-AM Tuner, Model 80-T is designed to meet the requirements of the most exacting user, having been planned to professional standards from its inception. Despite its full complement of tubes and components the 80-T features an unusually compact chassis of fine design. It incorporates a two-band superheterodyne circuit with completely independent RF channels for FM and AM.

The FM section comprises a dual triode, cascode, tuned RF stage (for maximum signal-to-noise ratio) and two IF stages followed by two cascaded limiters. These are combined with a Foster-Seeley discriminator to produce a genuine Armstrong system, universally recognized as the ultimate in FM receivers. The Automatic Frequency Control (AFC) on FM assures accurate tuning and freedom from drift. The range of lock-in is adjustable from the front panel. It features a separate tuning meter for FM and dual antenna inputs: 72-ohm or 300-ohm balanced.

A tuned RF stage and two adjustable band-width IF stages are incorporated in the AM section. Because of the adjustable band-width, selectivity can be varied to achieve the maximum fidelity possible under the reception conditions prevailing at the time. The diode detector has been designed for minimum distortion under all operating conditions. A sharply tuned 10 Kc filter has been incorporated for rejection of adjacent channel heterodyne whistle. Dual antenna inputs on both

AM and FM afford maximum flexibility in antenna matching. A professional-type AM tuning meter permits micro-accurate tuning on AM.

A carefully designed flywheel tuning mechanism, equipped with an anti-backlash gear, makes selection of stations extremely simple and smooth. The edge-lighted glass slide-rule scale has large, easy-to-read numerals as well as a 0 to 100 logging scale for convenient spotting of the stations most frequently used. The front panel of the Model 80-T is a handsome brushed-brass fascia that adds distinction to any group of equipment.

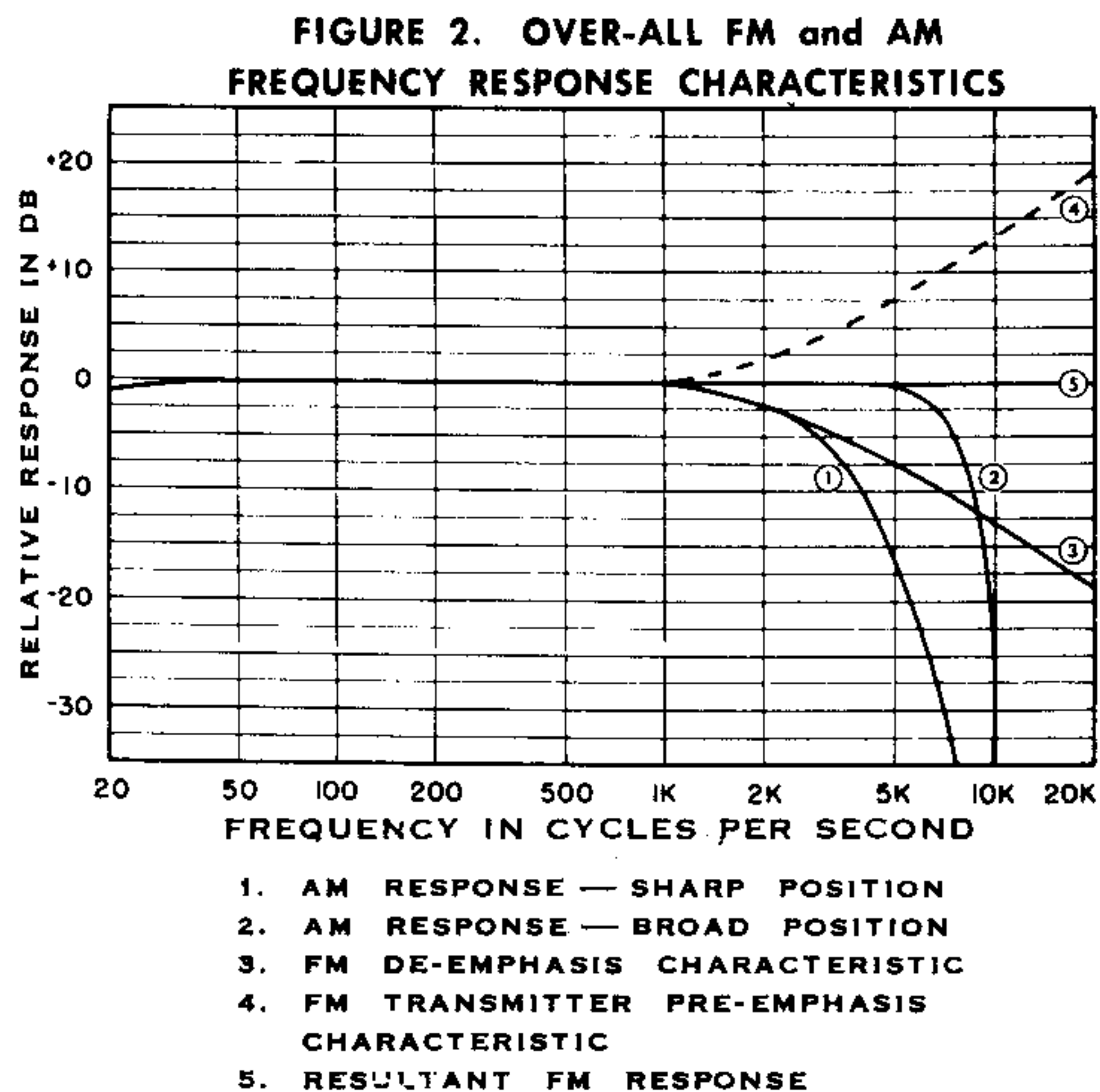
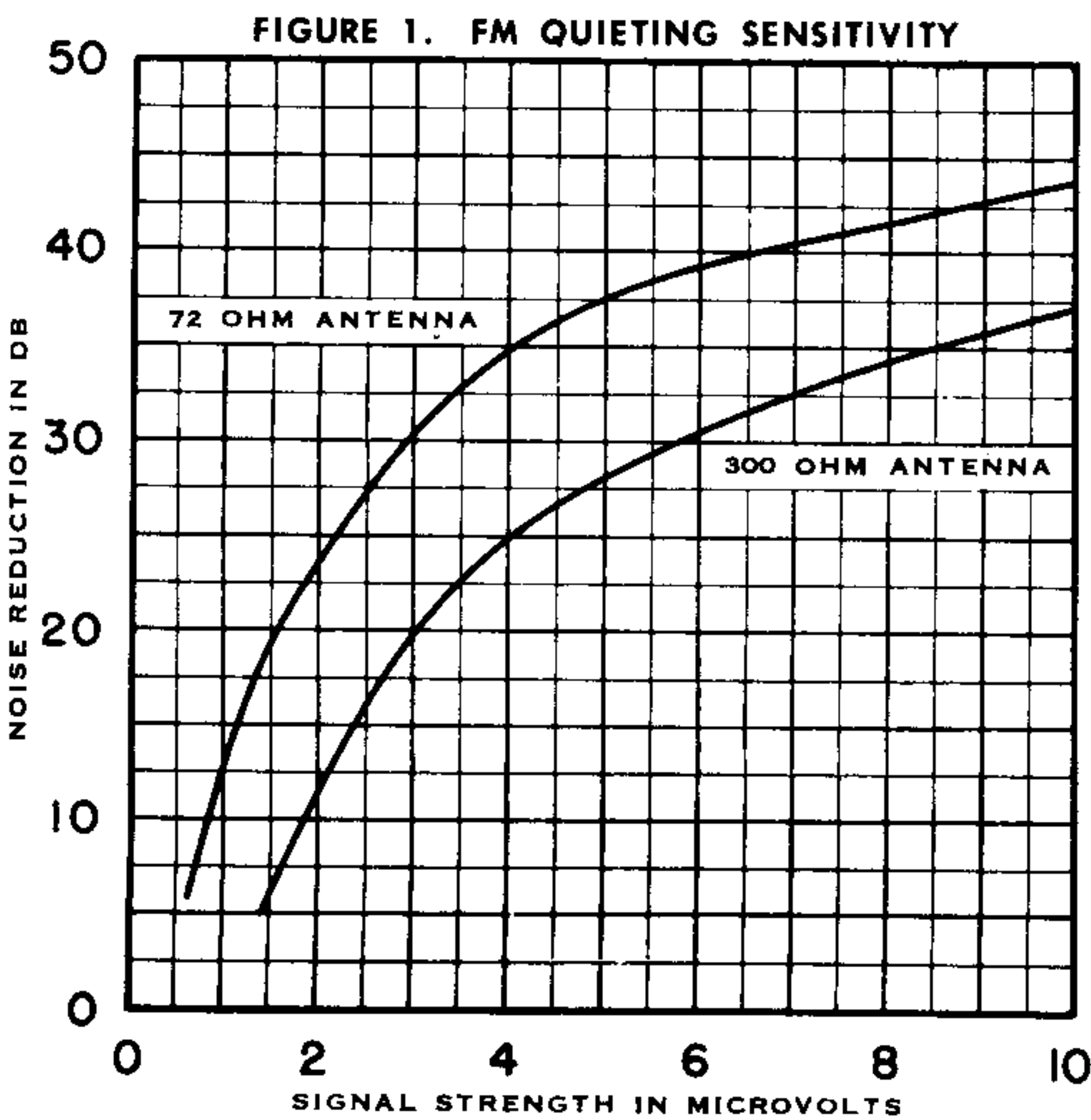
A second integrated chassis houses all of the audio and preamplifier stages. A dual VOLUME Control with an optional LOUDNESS position assures maximum signal-to-hum ratio, regardless of the setting of the Control. Both RECORDER and MAIN amplifier Outputs are of the cathode follower type to provide independence from output load characteristics and cable lengths. The RECORDER Output does not include the use of TONE Controls or VOLUME LOUDNESS Control for use in recording applications or where a second remote control chassis is to be used.

A complete phonograph and tape preamplifier for low-level magnetic cartridges and direct tape head playback is included in THE FISHER Model 80-T and provides six separate and complete record equalization settings to accommodate all of the popular records manufactured. There is also a correctly equalized setting for the standard NARTB tape playback characteristic.

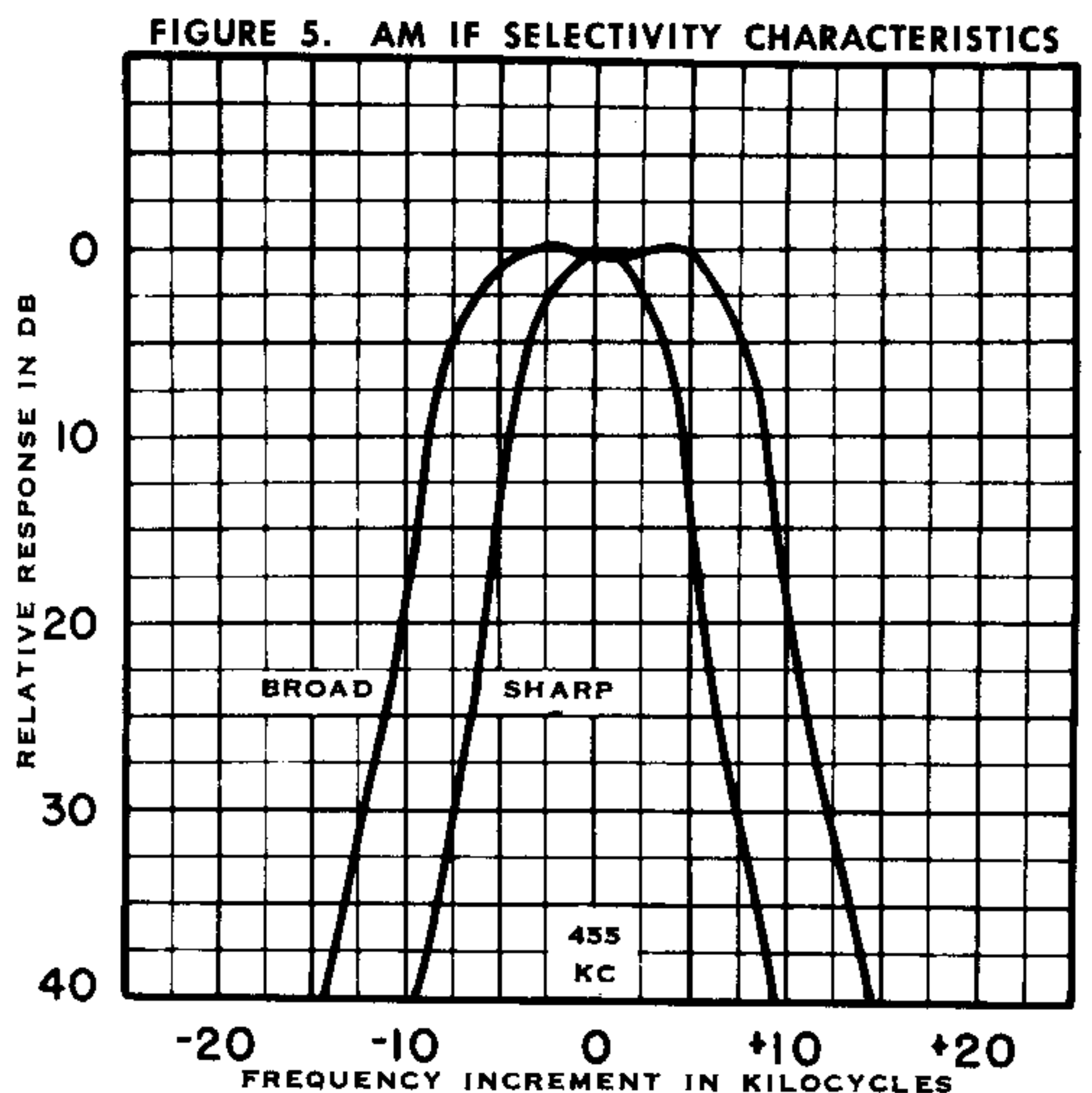
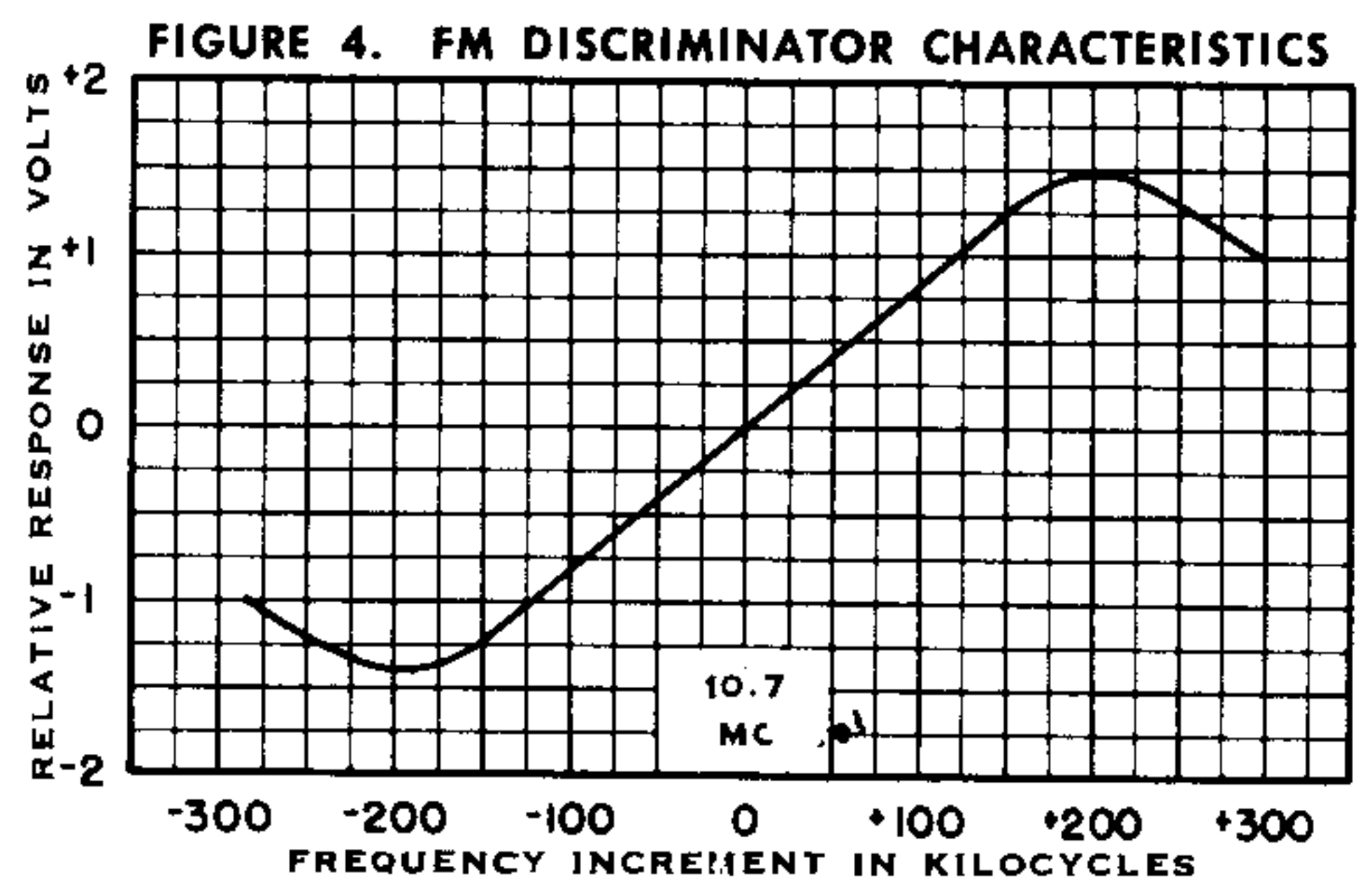
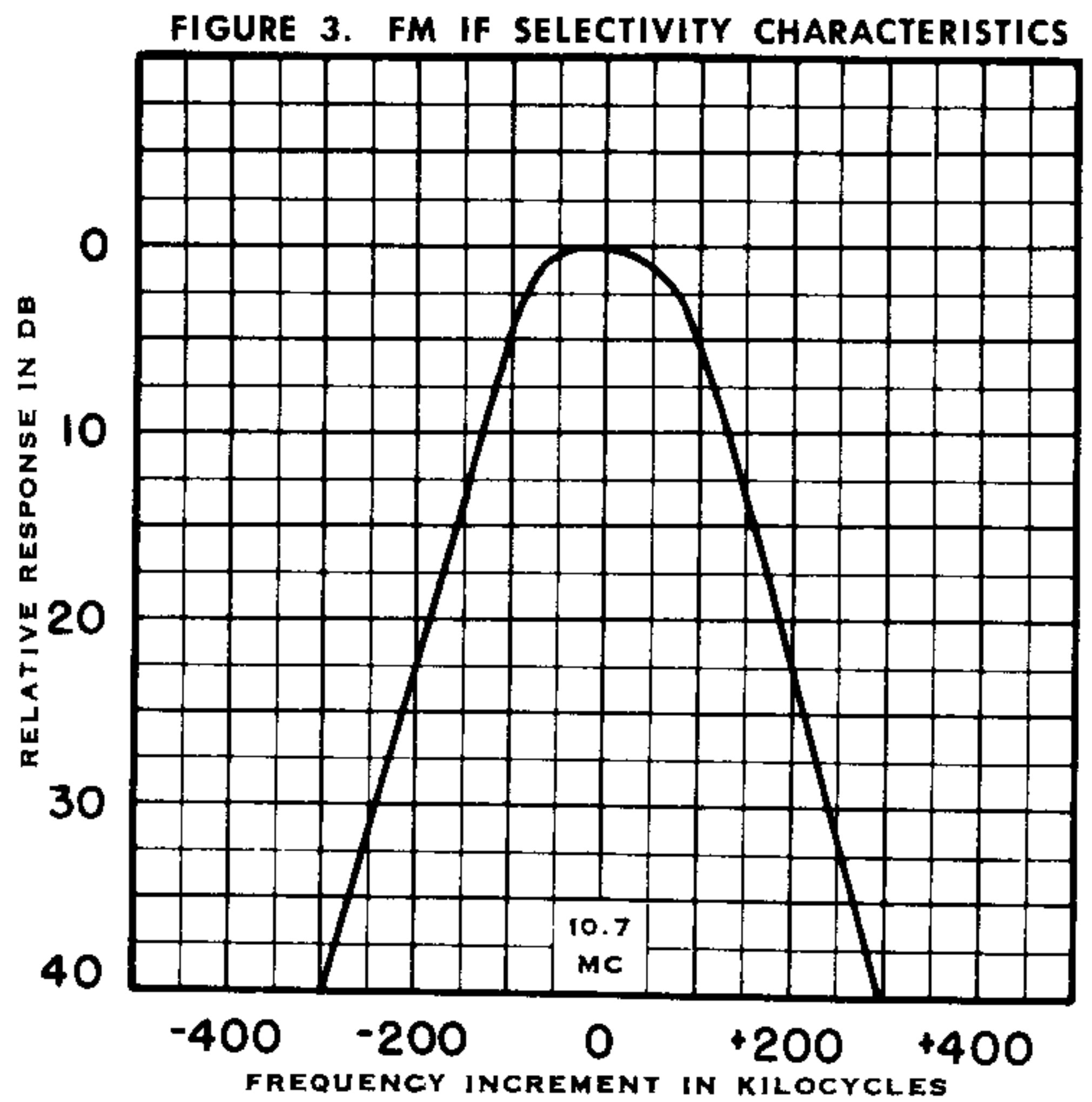
There are two auxiliary inputs for connection to the audio section of a TV receiver, crystal phonograph pick-up, microphone pre-amplifier, or self-contained tape recorder.

TECHNICAL SPECIFICATIONS

FREQUENCY MODULATION: Full limiting on signals as low as one microvolt. Sensitivity on 72-ohm antenna input: $1\frac{1}{2}$ microvolts for 20 db of quieting and $2\frac{1}{2}$ microvolts for 30 db of quieting. On 300-ohm antenna input: 3 microvolts for 20 db of quieting and 5 microvolts for 30 db of quieting. See FIGURE 1. Frequency response is uniform from 20 to 20,000 cycles ± 1 db. See FIGURE 2. Exclusive, variable Automatic Frequency Control can be switched out of the circuit from the front panel. For the FM IF selectivity and FM discriminator characteristic, see FIGURES 3 and 4.



tuning position. Band-width in sharp tuning position is 6 Kc wide at 6 db down. See FIGURES 2 and 5. Sensitivity: less than one microvolt input for one volt output. Dual antenna inputs: one for high impedance, conventional antenna; one for loop antenna. Built-in 10 Kc filter.



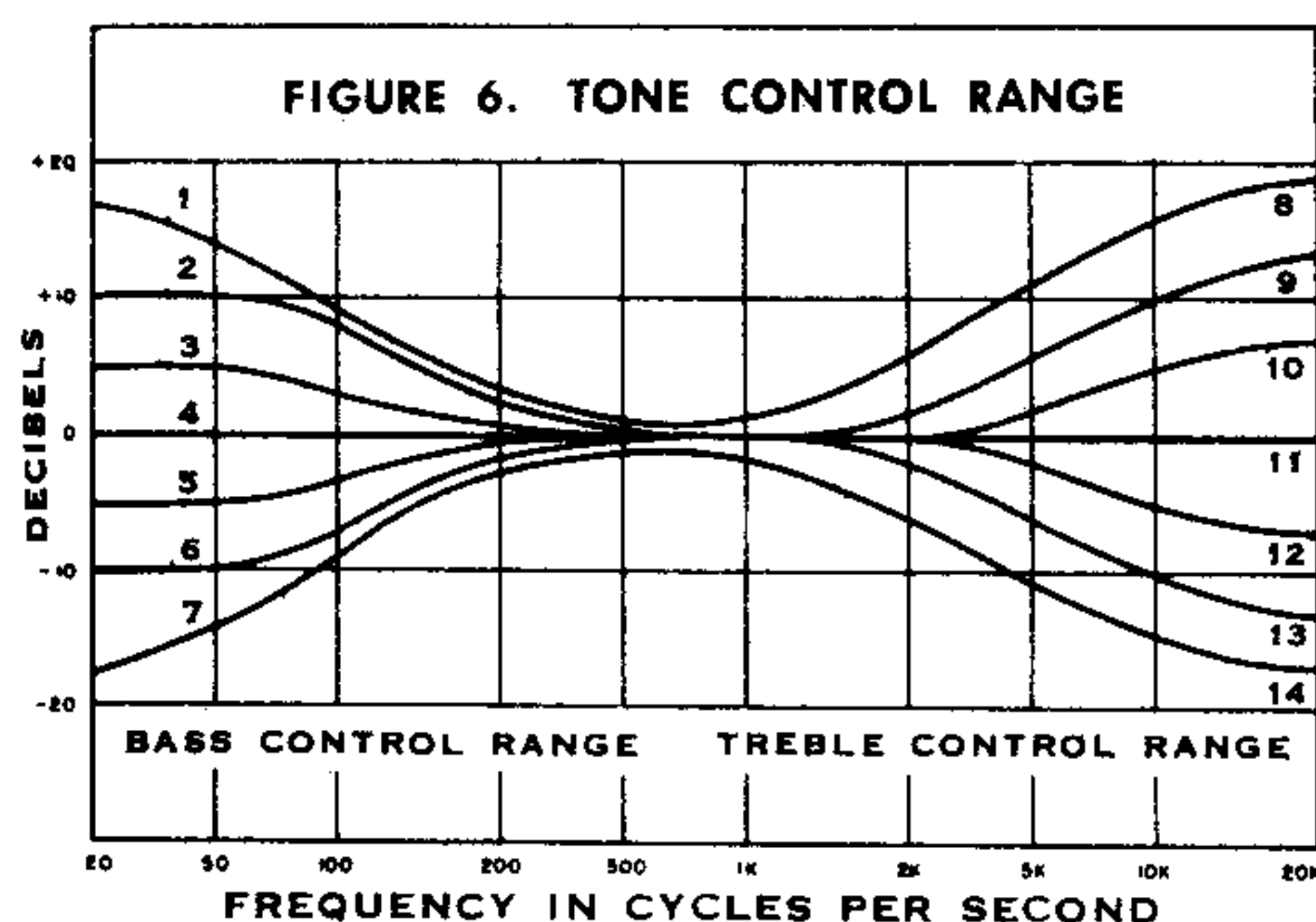
AMPLITUDE MODULATION: Two IF stages and one tuned RF stage. IF band-width is adjustable from the front panel. Frequency response: ± 2 db to 6,000 (-3 db at 7,000) cycles in broad

AUDIO: Uniform response, $\pm .5$ db, 20 to 20,000 cycles. Distortion less than .04% for one volt output; 0.5% for five volt output. Hum level on radio better than 72 db below 2 volts with VOLUME Control at maximum. Non-measurable with VOLUME Control at minimum. Hum level on phono better than 60 db below output with 10 mv input signal. Two outputs: low impedance cathode follower type; one before tone and volume controls for recorder; plus one main output for connection to power amplifier. Cables can be any length up to 100 feet.

CONTROLS: Total of eight:

1. BASS Control
2. TREBLE Control
3. EQUALIZATION SELECTOR
(7 positions: EUR, AES, RIAA, LP, NAB, 78, and TAPE)
4. VOLUME Control
5. LOUDNESS BALANCE Control
6. AFC Control and POWER Switch
7. CHANNEL SELECTOR
(6 positions: AM BROAD, AM SHARP, FM, PHONO, AUX 1, AUX 2)
8. STATION SELECTOR

BASS and TREBLE Controls are of the variable cross-over type and afford up to 15 db boost and cut at 50 and 10,000 cycles, respectively. See FIGURE 6 for range of controls. Adjustable LOUDNESS Control; can be turned on or off from front panel.



- | | |
|------------------------|-------------------------|
| BASS CONTROL | TREBLE CONTROL |
| 1: MAXIMUM BOOST | 8: MAXIMUM BOOST |
| 2: 2/3 ROTATION CW | 9: 2/3 ROTATION CW |
| 3: 1/3 ROTATION CW | 10: 1/3 ROTATION CW |
| 4: UNIFORM RESPONSE | 11: UNIFORM RESPONSE |
| 5: 1/3 ROTATION CCW | 12: 1/3 ROTATION CCW |
| 6: 2/3 ROTATION CCW | 13: 2/3 ROTATION CCW |
| 7: MAXIMUM ATTENUATION | 14: MAXIMUM ATTENUATION |

PHONOGRAPH AND TAPE PREAMPLIFIER: Two cascaded triode stages with adequate gain for even the lowest-level magnetic pick-ups; accommodates all makes. For phono equalization curves, see FIGURE 7. For tape playback equalization curve, see FIGURE 8.

GENERAL FEATURES: 16 tubes, separate front ends for AM and FM. Self-powered with separate DC supply for all audio tube filaments. Complete shock mounting of both tuner and audio chassis. Completely shielded construction including bottom plate and variable capacitor cover. Six-gang variable capacitor. Flywheel tuning. Attractive brushed-brass front panel. AM loop and FM dipole antennas supplied. High gain inputs for phono cartridge or tape head. Two auxiliary high impedance inputs. Two AC power receptacles at rear of audio chassis for connection of auxiliary equipment.

TUBE COMPLEMENT: A total of 16 including 2-6BQ7A, 1-6CB6, 1-6BE6, 1-6AU6, 1-6AL5, 2-12AX7, 2-6BJ6, 3-6C4, 2-6U8 and 1-6X4.

PHYSICAL DATA: Overall dimensions: 12 $\frac{3}{4}$ " wide, 8 $\frac{3}{4}$ " deep, 6" high. Allow an additional 1" depth for control knobs. Shipping weight: approximately 21 pounds.

INSTALLATION INSTRUCTIONS

The FISHER Model 80-T is supplied with the following:

- 1—Antenna Plug
- 1—AM Loop Antenna with plug attached
- 1—FM Folded Dipole with plug attached
- 4—Mounting screws and flat washers
- 1—Shielded Cable
- 2—Jumper Cables, installed
- 2—Mounting Templates
- 3—RETMA plugs

MECHANICAL INSTALLATION

THE FISHER Model 80-T is constructed with a completely self-contained front panel, housing the dial mechanism. It can thus be placed on a shelf, or it can be mounted in the conventional manner, behind a $\frac{1}{4}$ " to $\frac{3}{8}$ " plywood panel. The necessary cut-out should be made in accordance with TEMPLATE No. 1. The mounting holes should be drilled in accordance with TEMPLATE No. 2. To remove the front panel:

1. Remove all control knobs by pulling forward.
2. Remove the five $\frac{3}{8}$ " nuts on the control shafts. The front panel will come free.

When reassembling the $\frac{3}{8}$ " nuts on the control shafts, have the smooth washer-faced surface toward the panel. Finally, press the knobs back on the control shafts.

For installation in THE FISHER Custom Cabinets, Model TB or Model TM, see instructions supplied with these cabinets.

PROPER VENTILATION: In any of the installations described above, it is imperative that adequate ventilation be provided. The tuner should never be mounted in a totally enclosed cabinet of small dimensions. In cases where a completely enclosed cabinet cannot be avoided, cut air slots at the rear edge of the shelf on which the tuner rests, as well as at the top rear of this compartment (either in the rear wall, or the shelf above.) This is especially necessary where an amplifier or other heat-producing equipment will be placed in the same compartment with the tuner.

ELECTRICAL INSTALLATION

ANTENNA REQUIREMENTS: Both the FM and AM antenna connections are made with four-prong plugs (attached to the antennas furnished.) A folded dipole is supplied for FM use and is generally adequate, except in extreme fringe areas, or where there is a high noise level. The folded dipole can be affixed to the rear surface of the tuner compartment or placed under an adjacent carpet. Check for the best positioning of the dipole for maximum signal, before laying it under the carpet. The lead-in portion of the dipole can be extended if necessary, by adding 300-ohm, twin-lead. Should an external FM antenna be desired, it will be found that the FM antenna inputs have been designed to accommodate either a 300-ohm balanced system or a 72-ohm unbalanced, coaxial system. Connections for both types are shown on the antenna transformer shield.

A low impedance loop antenna is supplied for use on AM. This is generally adequate in most installations, except in weak signal areas, or extremely noisy locations. This antenna can be affixed to the rear wall of the tuner compartment or any other location conveniently close to the tuner. *Never shorten or lengthen the connecting lead from this antenna.* If an external AM antenna is desired, disconnect the loop antenna and connect the external system as shown on the antenna transformer shield. Because of the extreme sensitivity of THE FISHER FM-AM Tuner, Model 80-T, the length of an external AM antenna, exclusive of lead-in, should be kept as short as possible — generally less than 25 feet.

POWER REQUIREMENTS: THE FISHER Model 80-T is designed to operate on 105 to 125 volts, 50 to 60 cycles AC. It consumes approximately 60 watts.

CONNECTIONS TO ASSOCIATED EQUIPMENT: THE FISHER Model 80-T supplies sufficient audio output voltage to operate into any conventional power amplifier. Inasmuch as the performance of the Model 80-T will be limited only by the quality of the associated equipment, best results will be obtained when used with its companion units, THE FISHER Laboratory Standard Amplifiers, Models 50-AZ or 80-AZ and the Model 50-F, Hi-Lo Filter System. Used as a group, these three units comprise a perfectly matched high fidelity system of extreme flexibility.

The MGTC (PHONO) and TAPE head inputs are located on the rear apron of the lower, or audio chassis of the Model 80-T. There are also two auxiliary inputs on the upper, or tuner chassis for connection to the audio portion of a TV receiver, crystal phonograph pick-up, microphone pre-amplifier, etc. Connection is made from the MAIN output located on the lower audio chassis to the power amplifier by means of the cable supplied. The RECORDER output on this chassis can be used to feed the input of a tape recorder directly. *The two interconnecting jumpers should be left as received.* They are used to connect the output of the tuner chassis to the input of the

audio portion and to feed preamplifier output voltages back into the tuner chassis so that all selection can be done by means of a single control on the tuner.

OPERATING INSTRUCTIONS

FREQUENCY MODULATION: Turn the OUTPUT LEVEL Control located on the rear apron of the tuner chassis fully clockwise to the maximum position. Turn the SELECTOR SWITCH to FM. Turn the POWER SWITCH located on the AFC Control clockwise until it clicks. After allowing sufficient time for warm-up, tune in the desired station. The center of the channel will be shown by the pointer of the FM TUNING Meter. (The pointer should rest on the center of the horizontal bar between - and +.) Set the BASS and TREBLE Controls for uniform response (with dots at the top.) Set the LOUDNESS BALANCE Switch to the OFF position. Adjust the VOLUME Control to the appropriate listening level.

SETTING OF AFC CONTROL: Turn the AFC Control to maximum clockwise. In this position, it will be found that the station will automatically lock in and remain correctly tuned when the dial pointer is moved in the vicinity of the desired channel. Under ordinary conditions, the Model 80-T can be used with the AFC in the maximum position at all times. When the pointer of the FM TUNING Meter rests on any position of the horizontal bar, the instrument is correctly tuned. The amount of dial pointer travel over which the lock-in feature operates for a given channel, can be adjusted by means of the AFC Control. In some locations, when a weak station is separated from a strong station by only one or two channels, the latter will tend to operate the control circuit, and make it difficult to bring in the weaker of the two stations.

When this condition prevails, turn the AFC Control counterclockwise to the degree necessary for normal reception of the weaker station.

AMPLITUDE MODULATION: Turn the SELECTOR Switch to the AM SHARP position and proceed to tune in a station for maximum deflection of the AM TUNING Meter.

For maximum fidelity from a given station with good reception conditions prevailing at the location, use the AM BROAD position of the SELECTOR Switch. When using this position, tune in the station on AM SHARP first, for accuracy, then switch to AM BROAD. Because of increased IF band width in the AM BROAD position, it should be used only where stations are reasonably strong and free from interference. The AM SHARP position offers selectivity equivalent to that of a good communications receiver, and therefore produces excellent reception even under difficult receiving conditions. The 10 Kc heterodyne filter is in the AM circuit at all times, to eliminate objectionable adjacent channel "whistle."

LOGGING SCALE: THE FISHER Model 80-T dial glass carries a logging scale consisting of linear divisions from 0 to 100. By referring to this scale, location of your favorite and frequently used stations is reduced to its simplest form.

ADJUSTMENT OF METERS: After the instrument has been in operation for ten or fifteen minutes, note the positions of the pointers on each meter. When the SELECTOR Switch is in the AM SHARP position and the AM antenna disconnected, the AM TUNING Meter pointer should be at zero. If this condition does not occur, proceed as follows:

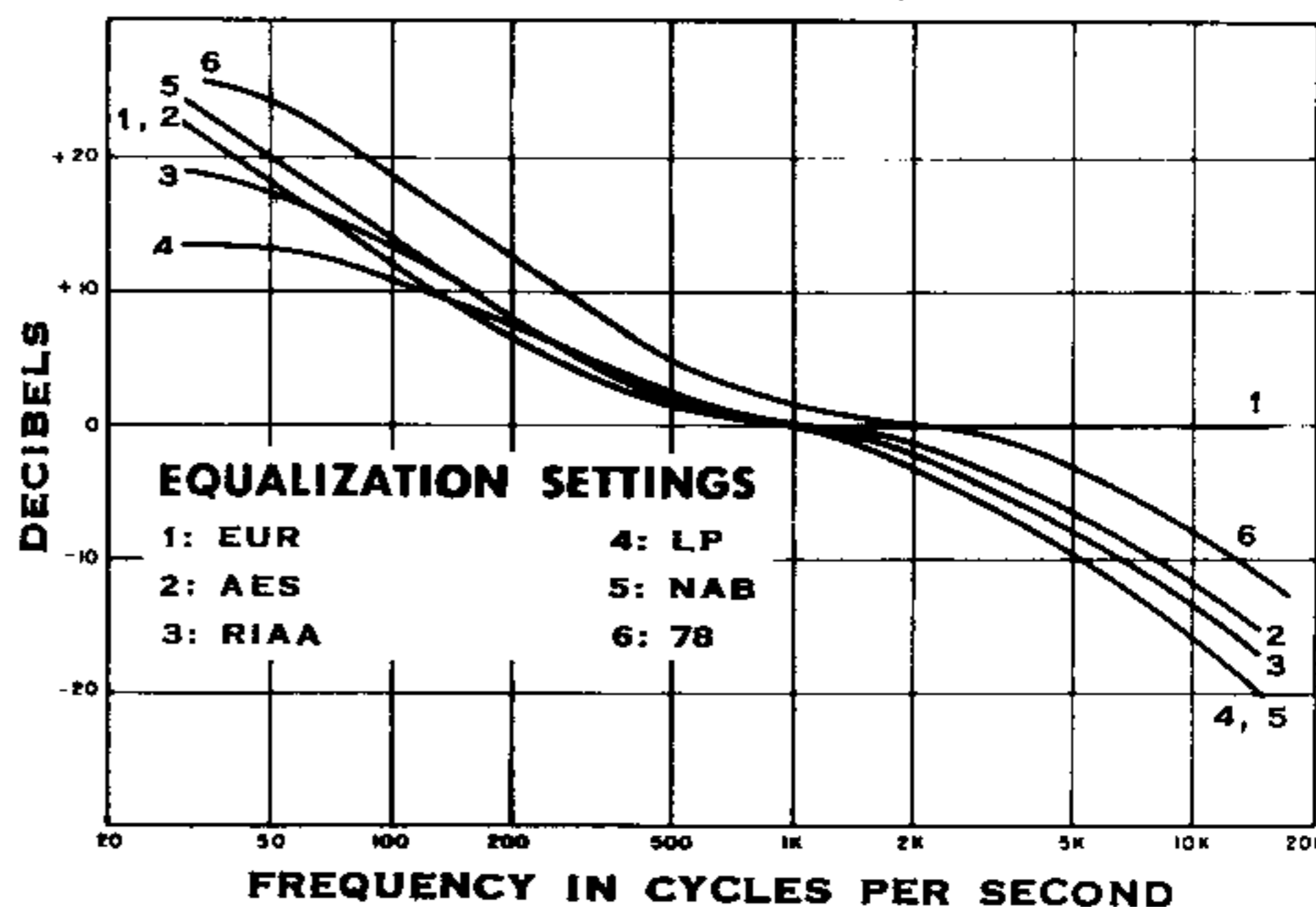
The AM METER Adjustment point is located directly behind this meter on the top surface of the chassis. Insert a screw driver in the slot and rotate until the Meter reads 0.

With the SELECTOR Switch in the FM position, and the FM antenna disconnected, the FM TUNING Meter pointer should be at the center of the horizontal bar. If this condition does not occur, make the adjustment as follows:

The FM METER Adjustment point is located directly behind this meter on the top surface of the chassis. Adjust the FM TUNING Meter by rotating the control so that the pointer will fall on the center of the horizontal bar.

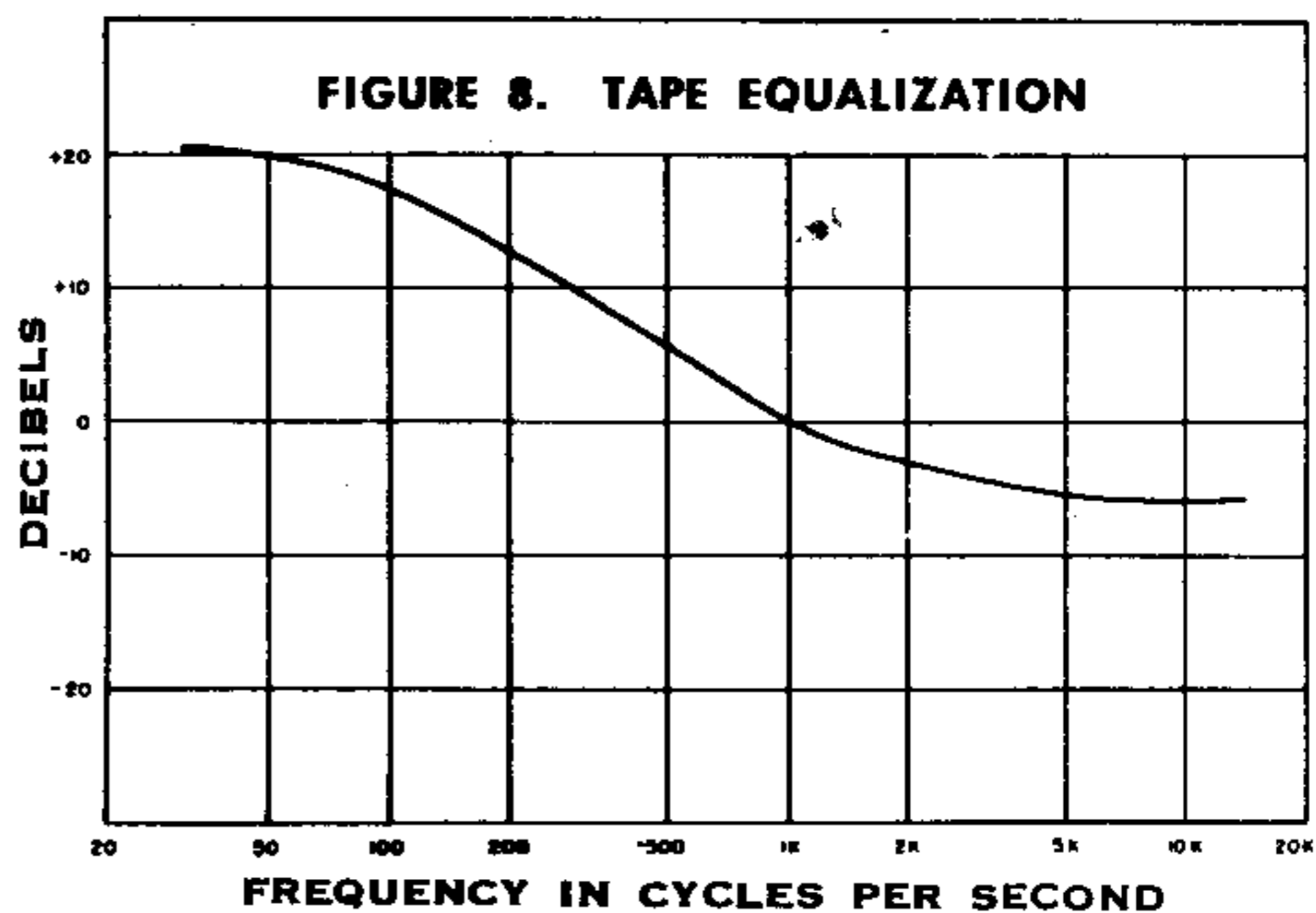
PHONOGRAPH OPERATION: In view of the variety of recording characteristics employed by record manufacturers, both the bass and treble frequencies must be properly equalized to match the original recording techniques. Because of the physical limitations of the record groove, frequencies below approximately 500 cycles are recorded with gradually decreasing amplitude as one approaches the lower frequencies. Conversely, in order to obtain an improved signal-to-noise ratio, treble boost is incorporated. The point at which low frequency attenuation begins, and the amount of high frequency pre-emphasis employed, vary considerably from manufacturer to manufacturer. THE FISHER Model 80-T provides six complete equalization settings for both low and high frequencies. Thus, knowing a given manufacturer's recording characteristic, the user can properly equalize for that recording and achieve optimum balance. A list of recommended settings of the equalization selector for various record manufacturers is enclosed. FIGURE 8 shows the equalization curves available with various settings of the PHONO EQUALIZATION Switch when using magnetic cartridges. It should be noted further that some of the popular magnetic cartridges presently manufactured require compensation at high frequencies to smooth out their response. For this type of compensation, a resistor is normally connected across the cartridge terminals. THE FISHER Model 80-T obviates the need for this resistor in most cases, because a 47,000 ohm resistor is already wired across the input jack, making it suitable for use with GE, Audak and Fairchild cartridges, without further modification. The Pickering cartridge should be equipped with an additional 47,000 ohm resistor across its terminals for optimum performance. For other cartridges, we suggest that you check the manufacturers' specifications to determine the loading required to achieve a 'flat' response. Set the SELECTOR Switch to PHONO and set the VOLUME Control as noted under FM operation.

FIGURE 7. PHONOGRAPH EQUALIZATION



TAPE HEAD PLAYBACK: THE FISHER Model 80-T enables the user to listen to the growing library of pre-recorded tapes without having to purchase an expensive complete tape recorder. All that is needed is a commercially available tape transport mechanism incorporating a playback head. The cable from this playback head should be connected directly to the TAPE input jack on the rear apron of the audio chassis. The EQUALIZATION SELECTOR Switch should be set in the TAPE position. This setting connects the playback head to a special tape preamplifier properly equalized for tape playback in accordance with industry-wide accepted NARTB tape recording standards. See FIGURE 8. DO NOT connect a complete self-contained tape recorder to this input. Such recorders are best connected to either one of the two auxiliary inputs on the tuner chassis. The SELECTOR Switch should be left in the PHONO position.

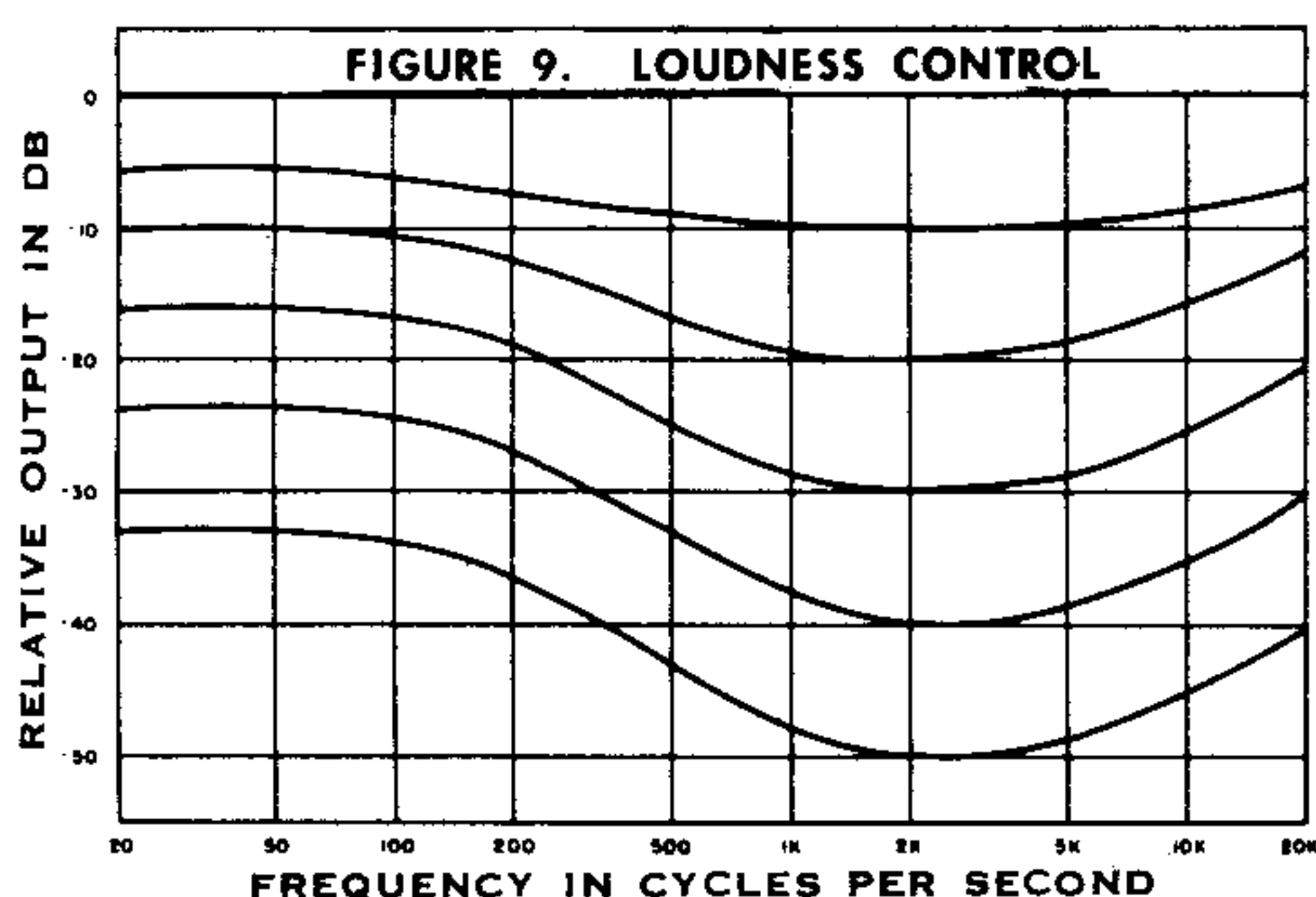
FIGURE 8. TAPE EQUALIZATION



LOUDNESS CONTROL: At low volume, human hearing does not respond with equal efficiency to all frequencies of the audible spectrum. At such volume, hearing follows a definite pattern, losing sensitivity to both low and high frequencies (with respect to the middle register) as the volume level decreases. Since the average listening level is often below that of the original performance, it is necessary that some form of equalization be incorporated to compensate for the resulting loss of balance. Such compensation occurs automatically when the LOUDNESS BALANCE Switch is on. Both the low and high frequencies are accentuated by this circuit as the volume is decreased. The amount of accentuation is inversely proportional to the volume setting. For proper use of the LOUDNESS BALANCE Control a good balance must be established by correct relative setting of the VOLUME

Control and the rear OUTPUT LEVEL Control as against the volume of sound in the room. This depends in large measure on the associated equipment, room acoustics and one's own taste. A good approximation may be accomplished as follows:

1. Set the VOLUME Control up one third.
2. With the LOUDNESS BALANCE Switch ON, vary the rear OUTPUT LEVEL Control until the resulting room volume is at approximately the level of the average speaking voice. The ultimate setting of these controls must perforce depend on personal taste. It should be noted that setting the rear OUTPUT LEVEL Control at a point higher than that suggested will cause a greater accentuation of the low and high frequencies for a given room volume. A lower setting will result in less accentuation of the low and high frequencies. See FIGURE 9.



TONE CONTROLS: When the BASS and TREBLE TONE Control dots are at the top, the response is uniform throughout the range. Turning either control to the right boosts the response, turning to the left attenuates the response. The effective range of these controls is shown in Figure 6. The preferred position of the TONE Controls will depend on personal taste and the particular program material being played. In your experiments to acquire the 'feel' of the controls, start with the dots in the top position (uniform response.) When using the LOUDNESS BALANCE Control, it is usually desirable to leave the TONE Controls in this position.

AT YOUR SERVICE

It is the constant desire of Fisher Radio Corporation to have your FISHER equipment give you its best possible performance. Toward that objective, we solicit your correspondence on any special problems that may arise. After you have had an opportunity to familiarize yourself with THE FISHER equipment you purchased, we would appreciate your letting us know how it is meeting your requirements.

SPECIAL NOTE: To maintain your equipment at peak performance, may we suggest that you avail yourself of the facilities and factory trained personnel at our Service Department.

FISHER RADIO CORPORATION

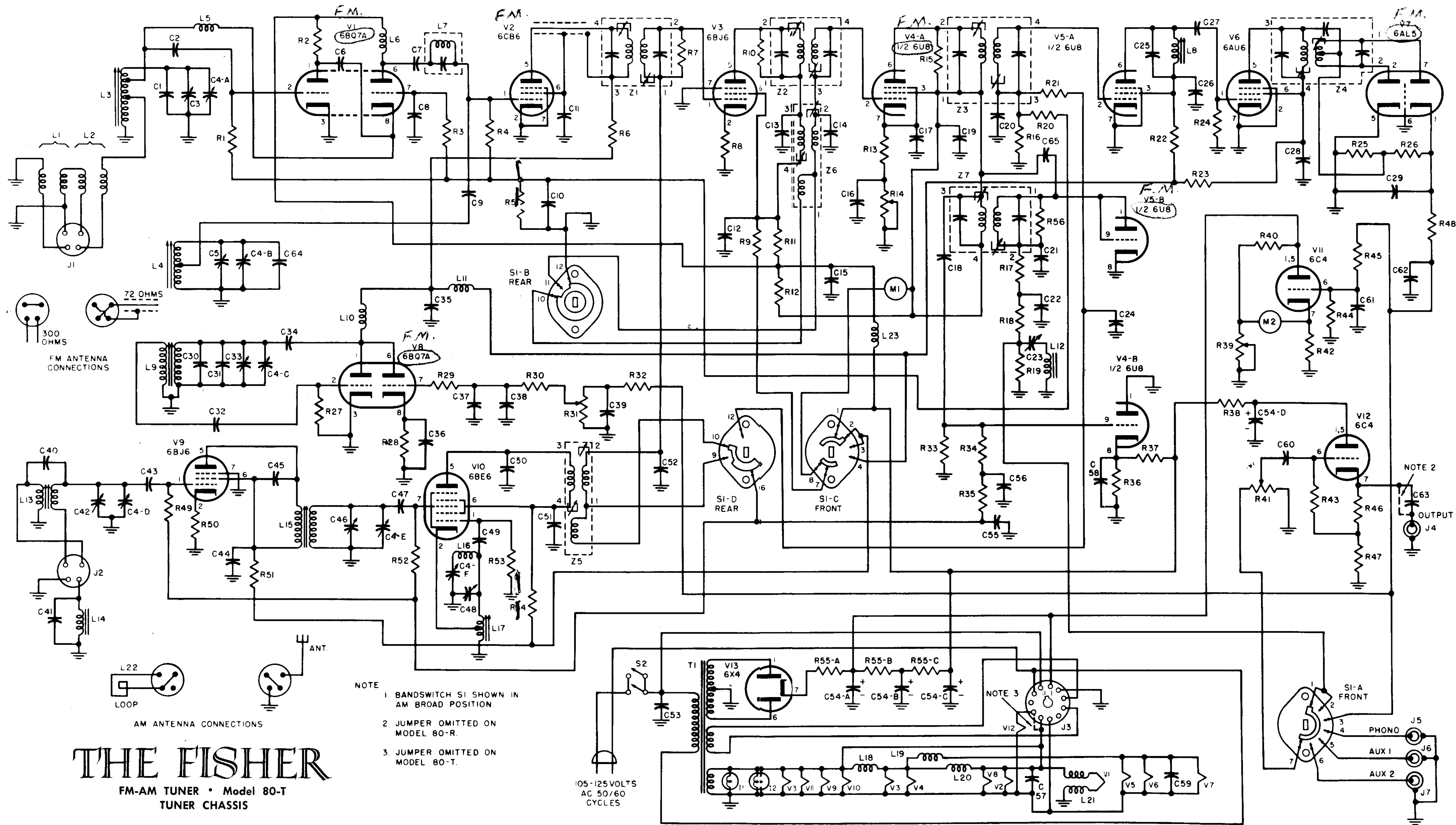
21-21 44th Drive
Long Island City 1, New York

RECORD EQUALIZATION GUIDE

MANUFACTURER	EQUALIZATION SETTING
ALLEGRO	LP
ALLIED	RIAA
AMERICAN REC. SOCIETY*	RIAA
ANGEL	RIAA
ATLANTIC*	NAB
BACH GUILD	LP
BANNER	LP
BARTOK	NAB
BLUE NOTE*	AES
BOSTON*	LP
CAEDMON	AES
CANYON*	AES
CAPITAL*	AES
CAPITOL-CETRA	AES
CETRA-SORIA	LP
COLOSSEUM*	LP
COLUMBIA*	LP
CONCERT HALL*	AES
COOK	AES
CONTEMPORARY*	AES
CORAL*	AES
DECCA*	AES
DIAL	LP
ELEKTRA	NAB
EMS*	AES
EPIC*	LP
ESOTERIC	RIAA
FESTIVAL	LP
FOLKWAYS	NAB
GOOD TIME*	AES
HANDEL SOCIETY	LP
HAYDN SOCIETY*	LP
HMV-AMER	AES
HMV-ENGLISH	LP
L'OISEAU-LYRE*	RIAA
LONDON*	RIAA
LYRICHORD*	NAB
MERCURY*	AES
MGM	RIAA
MONTILLA	RIAA
NEW RECORDS	LP
OCEANIC*	LP
OXFORD	LP
PACIFIC JAZZ	RIAA
PERIOD	NAB
PHILHARMONIA*	AES
POLYMUSIC*	NAB
RACHMANINOFF SOCIETY	RIAA
RCA VICTOR	ORTHO**
REMINGTON*	NAB
RENAISSANCE	RIAA
RIVESIDE	RIAA
ROMANY	RIAA
SAVOY	RIAA
STRADIVARI	LP
TEMPO	RIAA
URANIA*	LP
VANGUARD*	LP
VOX*	LP
WALDEN	RIAA
WESTMINSTER	RIAA
OLD EUROPEAN LP'S	EUR
OLD 78 RPM	78

* Beginning sometime in 1954 records made from new masters require RIAA equalization.

** The Ortho characteristic is identical to the RIAA.



THE FISHER

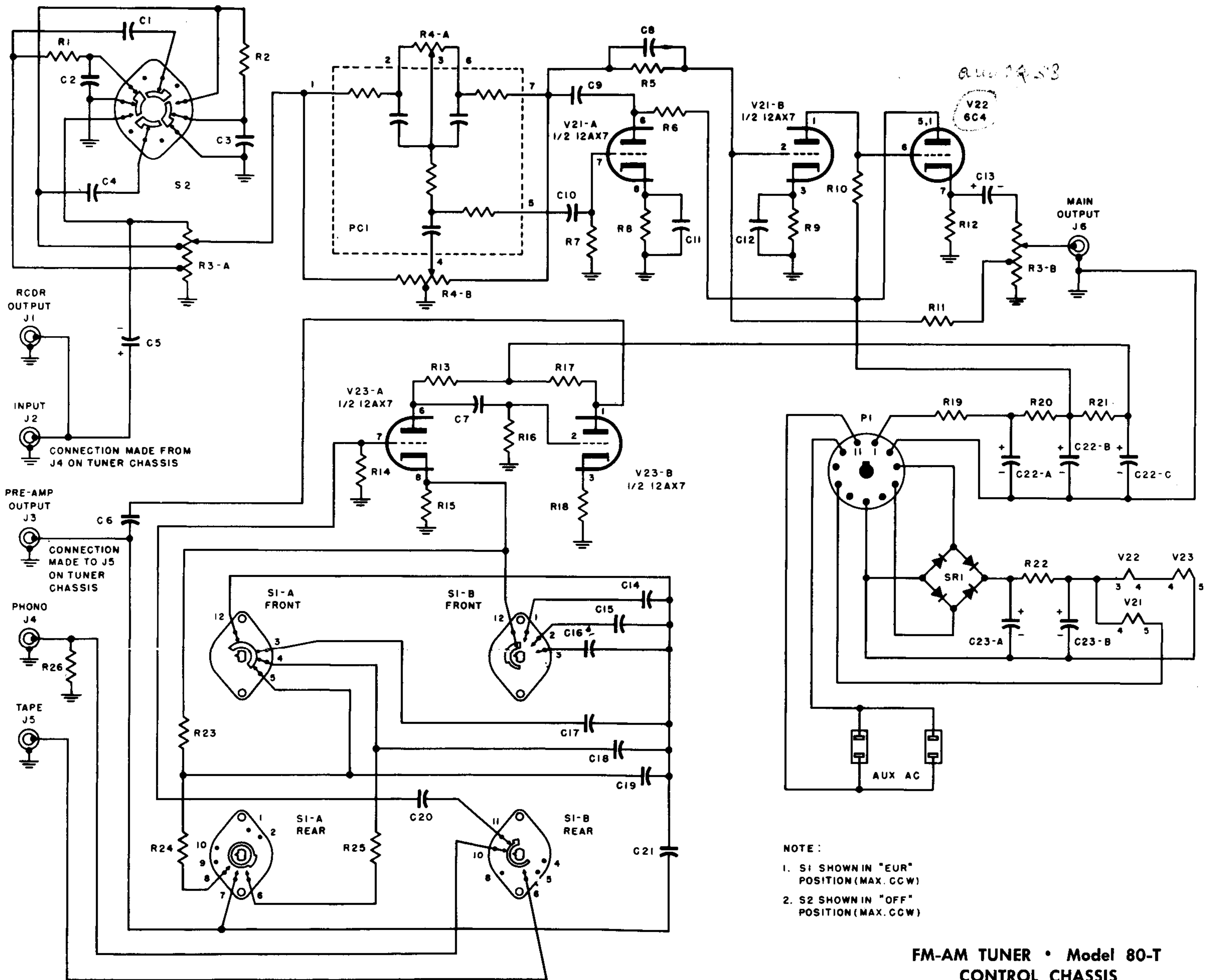
FM-AM TUNER • Model 80-T
TUNER CHASSIS

- NOTE
1. BANDSWITCH SI SHOWN IN AM BROAD POSITION.
 2. JUMPER OMITTED ON MODEL 80-R.
 3. JUMPER OMITTED ON MODEL 80-T.

105-125 VOLTS
AC 50/60
CYCLES

NOTE 2
OUTPUT
J4

NOTE 3



**FM-AM TUNER • Model 80-T
 CONTROL CHASSIS**

PARTS DESCRIPTION LIST

CONTROL CHASSIS

Symbol	DESCRIPTION	Part No.	Symbol	DESCRIPTION	Part No.
C-1	Capacitor, Ceramic: 470 mmfd, 10%; 500 V	CC21GP471K5	R-1, R-2	Resistor, Composition: 10,000 ohms, 10%; 1/2 W	RC20BF103K
C-2, C-3	Capacitor 0.02 mfd, 10%; 200 V	C68P203K2	R-3A,-B	Potentiometer, Composition: Dual Vol.- Loudness Control	RS-552-117
C-4	Capacitor, Ceramic: 1000 mmfd, 10%; 500 V	CC26GP102K5			
C-5	Capacitor, Electrolytic: 1 mfd; 250 V	C-546-126	R-4-A,-B	Potentiometer, Composition: Dual Tone Control	R-552-118
C-6	Capacitor: .047 mfd; 400 V	C68P473M4	R-5, R-6	Resistor, Composition: 100,000 ohms, 10%; 1/2 W	RC20BF104K
C-7	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-7	Resistor, Composition: 2.2 megohms, 10%; 1/2 W	RC20BF225K
C-8	Capacitor, Ceramic: 47 mmfd, 10%; 500 V	CC21GP470K5	R-8, R-9	Resistor, Composition: 2700 ohms, 10%; 1/2 W	RC20BF272K
C-9	Capacitor, 0.1 mfd; 400 V	C68P104M4	R-10	Resistor, Composition: 220,000 ohms, 10%; 1/2 W	RC20BF224K
C-10	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-11	Resistor, Composition: 470,000 ohms, 10%; 1/2 W	RC20BF474K
C-11	Capacitor, Electrolytic: 25 mfd; 10 V	C-3340	R-12	Resistor, Composition: 47,000 ohms, 10%; 1/2 W	RC20BF473K
C-12	Capacitor: .0047 mfd; 200 V	C68P472M2	R-13	Resistor, Composition: 220,000 ohms, 10%; 1/2 W	RC20BF224K
C-13	Capacitor, Electrolytic: 1 mfd; 250 V	C-546-126	R-14	Resistor, Composition: 2.2 megohms, 10%; 1/2 W	RC20BF225K
C-14	Capacitor, Ceramic: 440 mmfd, 10%; 500 V	CC21GP441K5	R-15	Resistor, Composition: 2700 ohms, 10%; 1/2 W	RC20BF272K
C-15	Capacitor, Ceramic: 120 mmfd, 10%; 500 V	CC21GP121K5	R-16	Resistor, Composition: 2.2 megohms, 10%; 1/2 W	RC20BF225K
C-16	Capacitor, Ceramic: 220 mmfd, 10%; 500 V	CC21GP221K5	R-17	Resistor, Composition: 220,000 ohms, 10%; 1/2 W	RC20BF224K
C-17	Capacitor: .0025 mfd, 10%; 200 V	C68P252K2	R-18	Resistor, Composition: 2200 ohms, 10%; 1/2 W	RC20BF222K
C-18	Capacitor, Ceramic: 1000 mmfd, 10%; 500 V	CC26GP102K5	R-19, R-20	Resistor, Composition: 3300 ohms, 10%; 1/2 W	RC20BF332K
C-19	Capacitor, Ceramic: 720 mmfd, 10%; 500 V	CC21GP721K5	R-21	Resistor, Composition: 10,000 ohms, 10%; 1/2 W	RC20BF103K
C-20	Capacitor: .022 mfd; 200 V	C68P223M2	R-22	Resistor, Composition: 15 ohms, 10%; 2 W	RC40BF150K
C-21	Capacitor: .002 mfd, 10%; 200 V	C68P202K2	R-23	Resistor, Composition: 150,000 ohms, 10%; 1/2 W	RC20BF154K
C-22A,-B,-C	Capacitor, Electrolytic: 40 mfd; 200 V	C-520-117	R-24	Resistor, Composition: 1.2 megohms, 10%; 1/2 W	RC20BF125K
C-23A,-B	Capacitor, Electrolytic: 1000 mfd; 25 V	C-552-106	R-25	Resistor, Composition: 3.3 megohms, 10%; 1/2 W	RC20BF335K
J-1, J-2, J-3, J-4, J-5, J-6	Jack: 1 female contact	J-3143	R-26	Resistor, Composition: 47,000 ohms, 10%; 1/2 W	RC20BF473K
PC-1	Printed Circuit: Tone Control	PC-552-105	S-1	Switch: Equalization Selector	S-552-113
P-1	Plug: Eleven male contacts	P-552-119	S-2	Switch: Loudness-Volume: Part of R-3	—

PARTS DESCRIPTION LIST

TUNER CHASSIS

Symbol	DESCRIPTION	Part No.	Symbol	DESCRIPTION	Part No.
C-1	Capacitor, Ceramic: 10 mmfd; 500 V	CC20CH100G5	L-15	Coil: AM RF	L-550-123
C-2	Capacitor, Ceramic: 470 mmfd; 600 V	C-520-143	L-16	Choke: RF	L-520-156
C-3, C-5	Capacitor, Ceramic Trimmer: 1.5 — 10 mmfd	C-520-158	L-17	Coil: AM Oscillator	L-550-122
C-4	Capacitor, FM-AM Variable	C-550-118	L-18, L-19, L-20	Choke, RF	L-520-156
C-6	Ceramic: 500 mmfd; 500 V	C-1315	L-21	Choke, RF: Bi-Filar Winding	L-509-140
C-7	Capacitor, Ceramic: 33 mmfd; 500 V	CC21GP330M5	L-22	Coil: AM Loop	L-509-133
C-8	Capacitor, Ceramic: 500 mmfd; 500 V	C-1315	L-23	Choke, RF: 2.2 Microhenrys	L-3352
C-9	Capacitor, Ceramic: 5000 mmfd; 500 V	C-3338	M-1	Meter, AM Tuning	M-550-132-1
C-10, C-11	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	M-2	Meter, FM Tuning	M-550-132-2
C-12, C-19	Capacitor, Ceramic: .02 mfd; 600 V	CK62GP203V6	R-1, R-3, R-4	Resistor, Composition: 1 megohm, 10%; 1/2 W	RC20BF105K
C-13, C-14	Capacitor, Mica: 470 mmfd; 5%; 300 V	C-3334	R-2	Resistor, Composition: 470 ohms, 10%; 1/2 W	RC20BF471K
C-15	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-5	Resistor, Composition: 220,000 ohms, 10%; 1/2 W	RC20BF224K
C-16, C-17	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	R-6, R-11	Resistor, Composition: 1000 ohms, 10%; 1/2 W	RC20BF102K
C-18, C-20, C-24	Capacitor, Ceramic: 47 mmfd; 500 V	C-3350	R-7	Resistor, Composition: 33,000 ohms, 10%; 1/2 W	RC20BF333K
C-21, C-22	Capacitor, Ceramic: 100 mmfd; 500 V	CC21GP101M5	R-8	Resistor, Composition: 100 ohms, 10%; 1/2 W	RC20BF101K
C-23	Capacitor, Mica Padder	C-3347	R-9	Resistor, Composition: 2700 ohms, 10%; 1/2 W	RC20BF272K
C-25	Capacitor, Ceramic: 47 mmfd; 500 V	C-3350	R-10	Resistor, Composition: 470,000 ohms, 10%; 1/2 W	RC20BF474K
C-26, C-28	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	R-12	Resistor, Composition: 1500 ohms, 10%; 1/2 W	RC20BF152K
C-27	Capacitor, Ceramic: 220 mmfd; 500 V	CC21GP221M5	R-13	Resistor, Composition: 100 ohms, 10%; 1/2 W	RC20BF101K
C-29	Capacitor, Ceramic: 100 mmfd; 500 V	CC21GP101M5	R-14	Rheostat, Wirewound: 250 ohms	R-550-135-2
C-30	Capacitor, Ceramic: 5 mmfd, N750; 500 V	C520-181	R-15	Resistor, Composition: 330,000 ohms, 10%; 1/2 W	RC20BF334K
C-31	Capacitor, Ceramic: 10 mmfd, N080; 500 V	CC20LK100M5	R-16, R-18	Resistor, Composition: 47,000 ohms, 10%; 1/2 W	RC20BF473K
C-32	Capacitor, Ceramic: 47 mmfd; 500 V	C-3350	R-17, R-22	Resistor, Composition: 33,000 ohms, 10%; 1/2 W	RC20BF333K
C-33	Capacitor, Ceramic Trimmer: 1 — 6 mmfd; NPO	C-520-159	R-19	Resistor, Composition: 100,000 ohms, 10%; 1/2 W	RC20BF104K
C-34	Capacitor, Ceramic: 500 mmfd; 500 V	C-1315	R-20, R-21	Resistor, Composition: 1 megohm, 10%; 1/2 W	RC20BF105K
C-35, C-36, C-37	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	R-23	Resistor, Composition: 22,000 ohms, 10%; 1/2 W	RC20BF223K
C-38	Capacitor: .047 mfd; 200 V	C-68P473M2	R-24	Resistor, Composition: 10,000 ohms, 10%; 1/2 W	RC20BF103K
C-39	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	R-25, R-26	Resistor, Composition: 100,000 ohms, 10%; 1/2 W	RC20PF104K
C-40	Capacitor: 2.2 mmfd; 500 V	C-3039	R-27	Resistor, Composition: 4700 ohms, 10%; 1/2 W	RC20BF472K
C-41	Capacitor, Ceramic: 15 mmfd, 10%; NPO; 500 V	CC21CH150K5	R-28	Resistor, Composition: 1000 ohms, 10%; 1/2 W	RC20BF102K
C-42, C-46, C-48	Capacitor, Mica Trimmer: 2 — 22 mmfd	C-550-129	R-29	Resistor, Composition: 100 ohms, 10%; 1/2 W	RC20BF101K
C-43, C-47, C-49	Capacitor, Ceramic: 220 mmfd; 500 V	CC21GP221M5	R-30, R-34	Resistor, Composition: 1 megohm, 10%; 1/2 W	RC20BF105K
C-44	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-31	Potentiometer, Composition: 2 megohms	RS550-124
C-45	Capacitor: 4.7 mmfd; 500 V	C-1779	R-32	Resistor, Composition: 470,000 ohms, 10%; 1/2 W	RC20BF474K
C-50, C-52	Capacitor, Mica: 470 mmfd; 5%; 300 V	C-3334	R-33	Resistor, Composition: 2.2 megohms, 10%; 1/2 W	RC20BF225K
C-51	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-35, R-37	Resistor, Composition: 220,000 ohms; 10%; 1/2 W	RC20BF224K
C-53	Capacitor, Molded Tubular: .01 mfd; 600 V	C-2747	R-36	Resistor, Composition: 22,000 ohms, 10%; 1/2 W	RC20BF223K
C-54A, B, C, D	Capacitor, Electrolytic: 40 mfd; 250 V; 40/40/30 mfd; 200 V	C-550-130	R-38	Resistor, Composition: 2200 ohms, 10%; 1/2 W	RC20BF222K
C-55	Capacitor: .047 mfd; 200 V	C-68P473M2	R-39	Rheostat, Wirewound: 2500 ohms	R-550-135-1
C-56, C-57			R-40	Resistor, Composition: 47,000 ohms, 10%; 1/2 W	RC20BF473K
C-58, C-59	Capacitor, Ceramic: .005 mfd; 600 V	CK62GP502V6	R-41	Potentiometer, Composition: 500,000 ohms	R-520-139
C-60, C-61	Capacitor, Ceramic: .01 mfd; 600 V	CK62GP103V6	R-42	Resistor, Composition: 3300 ohms, 10%; 1/2 W	RC20BF332K
C-62	Capacitor, Ceramic: 720 mmfd, 10%; 500 V	CC21GP721K5	R-43, R-44	Resistor, Composition: 1 megohm, 10%; 1/2 W	RC20BF105K
C-63	Capacitor: 1 mfd; 200 V	C-68P104M2	R-45	Resistor, Composition: 2.2 megohm, 10%; 1/2 W	RC20BF225K
C-64	Capacitor, Ceramic: 5 mmfd; NPO; 500 V	CC20CH050F5	R-46	Resistor, Composition: 2200 ohms, 10%; 1/2 W	RC20BF222K
C-65	Capacitor: 1 mmfd; 500 V	C-1786	R-47	Resistor, Composition: 47,000 ohms, 10%; 1/2 W	RC20BF473K
I-1, I-2	Lamp: Pilot Light #47	I-50009-1	R-48	Resistor, Composition: 150,000 ohms, 10%; 1/2 W	RC20BF154K
J-1, J-2	Jack: FM-AM Antenna	J-520-137	R-49, R-52	Resistor, Composition: 1 megohm, 10%; 1/2 W	RC20BF105K
J-3	Jack: 11 Contact	J-2020	R-50	Resistor, Composition: 100 ohms, 10%; 1/2 W	RC20BF101K
J-4, J-5, J-6, J-7	Jack: 1 Female Contact	J-3143	R-51, R-54	Resistor, Composition: 1000 ohms, 10%; 1/2 W	RC20BF102K
L-1, L-2	Coil: Elevator Transformer	L-509-139	R-53	Resistor, Composition: 22,000 ohms, 10%; 1/2 W	RC20BF223K
L-3	Coil: FM Antenna Assembly	AS-520-177	R-55A, B, C	Resistor, Wirewound: 1130 ohms tapped at 220 ohms and 550 ohms	R-550-134
L-4	Coil: FM RF Assembly	AS-520-176	R-56	Resistor, Composition: 68,000 ohms, 10%; 1/2 W	RC20BF683K
L-5	Coil: Neutralization	L-520-178	S-1	Switch, Band Selector	Part of RS550-124
L-6, L-11	Choke, RF: 2.2 microhenrys	L-3352	S-2	Switch, Power	Part of RS550-124
L-7	Choke, RF	AS-520-190	T-1	Transformer, Power	T-550-115
L-8	Coil: FM Limiter	L-550-131	Z-1, Z-2	Transformer, FM IF	ZZ-509-130
L-9	Coil: FM Oscillator Assembly	AS-520-174	Z-3	Transformer, FM IF	ZZ-2987
L-10	Choke, RF	L-509-147	Z-4	Transformer, FM Discriminator	ZZ-509-131
L-12	Coil: 10 KC Filter; 1 henry	L-509-145	Z-5, Z-6	Transformer, AM IF	ZZ-509-132
L-13	Coil: AM Antenna	L-509-137	Z-7	Transformer, AM IF	ZZ-2984
L-14	Coil: AM Antenna Loading	L-509-135			

ALIGNMENT INSTRUCTIONS: READ WITH EXTREME CARE BEFORE ATTEMPTING ALIGNMENT. To set pointer, turn the tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial. Set OUTPUT LEVEL Control to maximum clockwise, AFC Control to minimum, counterclockwise. Use an insulated screwdriver for alignment adjustment.

STEPS	DUMMY ANTENNA	COUPLING	FREQUENCY	MODULATION	BAND SWITCH SETTING	DIAL POINTER SETTING	INDICATING METER	ADJUST	REMARKS
1	.01 mfd	Pin 7 (Grid) V-10 (6BE6)	455 KC	400 CPS AM	AM Sharp	1000 KC (approx.)	AC Voltmeter to audio output	Z-5, Z-6, Z-7, Top & Bottom	Adjust for maximum deflection.
2	"	"	"	FM at least 30 KC sweep	AM Broad	"	Oscilloscope to audio output	Z-7, Bottom	Adjust slightly for symmetrical curve observed on oscilloscope. If this equipment is not avail- able, omit this step.
3	200 mmfd	J-2 (AM Antenna Jack)	1400 KC	400 CPS AM	AM Sharp	1400 KC	AC Voltmeter to audio output	C-42, C-46, C-48	Disconnect loop. Connect for ex- ternal antenna. Adjust for max- imum deflection.
4	"	"	600 KC	"	"	600 KC	"	L-13, L-15, L-17	"
5	Repeat Steps 3 and 4								
6	Connect audio generator to Pin 1 of V-5. Set generator very accurately to 10 KC. Connect AC Voltmeter as in Step 4. Adjust C-23 for minimum indication.								
7	—	To shield of V-2 (6CB6) Unground shield	10.7 MC	None	FM	Point of no interference	DC VTVM to Test Point A	Z-1, Z-2, Z-3, Top & Bottom	Adjust for maximum deflection.
8	—	"	"	"	"	"	DC VTVM, 1 Meg. to Pin 1 of V-6	L-8	"
9	—	"	"	"	"	"	DC VTVM to Pin 6 of V-11	Detune Z-4 top slightly. Adjust Z-4 bottom	"
10	—	"	"	"	"	"	"	Adjust Z-4 top	Adjust for zero between positive and negative reading.
11	Two 120 ohm carbon resistors	Connect for 300 ohms	106 MC	400 CPS FM (22.5 KC deviation)	FM	106 MC	DC VTVM to Test Point A	C-33	Adjust for maximum deflection.
12	"	"	90 MC	"	"	90 MC	"	L-9	"
13	Repeat Steps 11 and 12								
14	Two 120 ohm carbon resistors	Connect for 300 ohms	106 MC	400 CPS FM (22.5 KC deviation)	FM	106 MC	Test Point A	C-3, C-5	Adjust for maximum deflection.
15	"	"	90 MC	"	"	90 MC	"	L-3, L-4	"
16	Repeat Steps 14 and 15								

RESISTANCE REFERENCE CHART

TUNER CHASSIS

SOCKET PINS

TUBE	1	2	3	4	5	6	7	8	9
V-1, 6BQ7A	30K	1.2 Meg.	0	0.1	0.1	30K	1.2 Meg.	0	0
V-2, 6CB6	1.2 Meg.	0	0	0.05	30K	30K	0	—	—
V-3, 6BJ6	1.0 Meg.	100	0	0.05	30K	30K	0	—	—
V-4, 6U8	0	7	30K	0.05	0	30K	100* 350	22K	2.2 Meg.
V-5, 6U8	180K	47K	15K	0.05	0	15K	0	0	180K
V-6, 6AU6	10K	0	0.05	0	50K	50K	0	—	—
V-7, 6AL5	0	100K	0.05	0	200K	0	100K	—	—
V-8, 6BQ7A	30K	4.7K	0	0	0.05	30K	1 Meg.	1K	0
V-9, 6BJ6	4.5 Meg.	100	0	0.05	50K	50K	0	—	—
V-10, 6BE6	22K	0.5	0.05	0	50K	50K	4.5 Meg.	0	0
V-11, 6C4	20K	—	0	0.05	20K	700K	1000** 1500	—	—
V-12, 6C4	24K	170K	0	0.05	24K	1 Meg.	50K	—	—
V-13, 6X4	70	—	0	0.05	—	68	22K	—	—

AUDIO CHASSIS

V-21, 12AX7	240K	200K	2700	Fil.	Fil.	120K	22 Meg. †	2700	Fil.
V-22, 6C4	25K	—	Fil.	Fil.	25K	240K	47K	—	—
V-23, 12AX7	250K	2.2 Meg.	2700	Fil.	0	250K	2.2 Meg.	2200	Fil.

CAUTION: Be certain to disconnect AC line cord when making these measurements.

NOTES: Band Switch in FM position except in AM when measuring V-9 and V-10. AFC Control at minimum (CCW). Output Level Control at maximum (CW.) All resistances in ohms unless otherwise specified. Meg equals Megohms. K equals Kilohms.

Measurements taken with respect to chassis.

*Depends upon setting of R-14.

**Depends upon setting of R-39.

VOLTAGE REFERENCE CHART

TUNER CHASSIS

SOCKET PINS

TUBE	1	2	3	4	5	6	7	8	9
V-1, 6BQ7A	110	-0.8	0	6.3AC	0	110	-0.8	0	0
V-2, 6CB6	-2.3	0	0	6.3AC	110	110	0	—	—
V-3, 6BJ6	-0.3	1.1	0	6.3AC	105	105	0	—	—
V-4, 6U8	0	0	105	6.3AC	0	105	1.7	9	-0.3
V-5, 6U8	0.7	-0.4	19	6.3AC	0	19	0	0	0.7
V-6, 6AU6	-0.4	0	6.3AC	0	38	38	0	—	—
V-7, 6AL5	0.3	-8.5	6.3AC	0	0	0	-2.1	—	—
V-8, 6BQ7A	115	-1	0	0	6.3AC	115	0	2.3	0
V-9, 6BJ6	0	1.2	0	6.3AC	100	100	0	—	—
V-10, 6BE6	-9.2	0	6.3AC	0	105	105	0	—	—
V-11, 6C4	170	—	0	6.3AC	170	0	8	—	—
V-12, 6C4	110	0	0	6.3AC	110	32	55	—	—
V-13, 6X4	190AC	—	0	6.3AC	—	190AC	186	—	—

AUDIO CHASSIS

V-21, 12AX7	80	0	1.0	18	6	110	0	1.0	12
V-22, 6C4	155	—	18	12	155	80	85	—	—
V-23, 12AX7	80	0	0.6	12	0	86	0	0.75	6

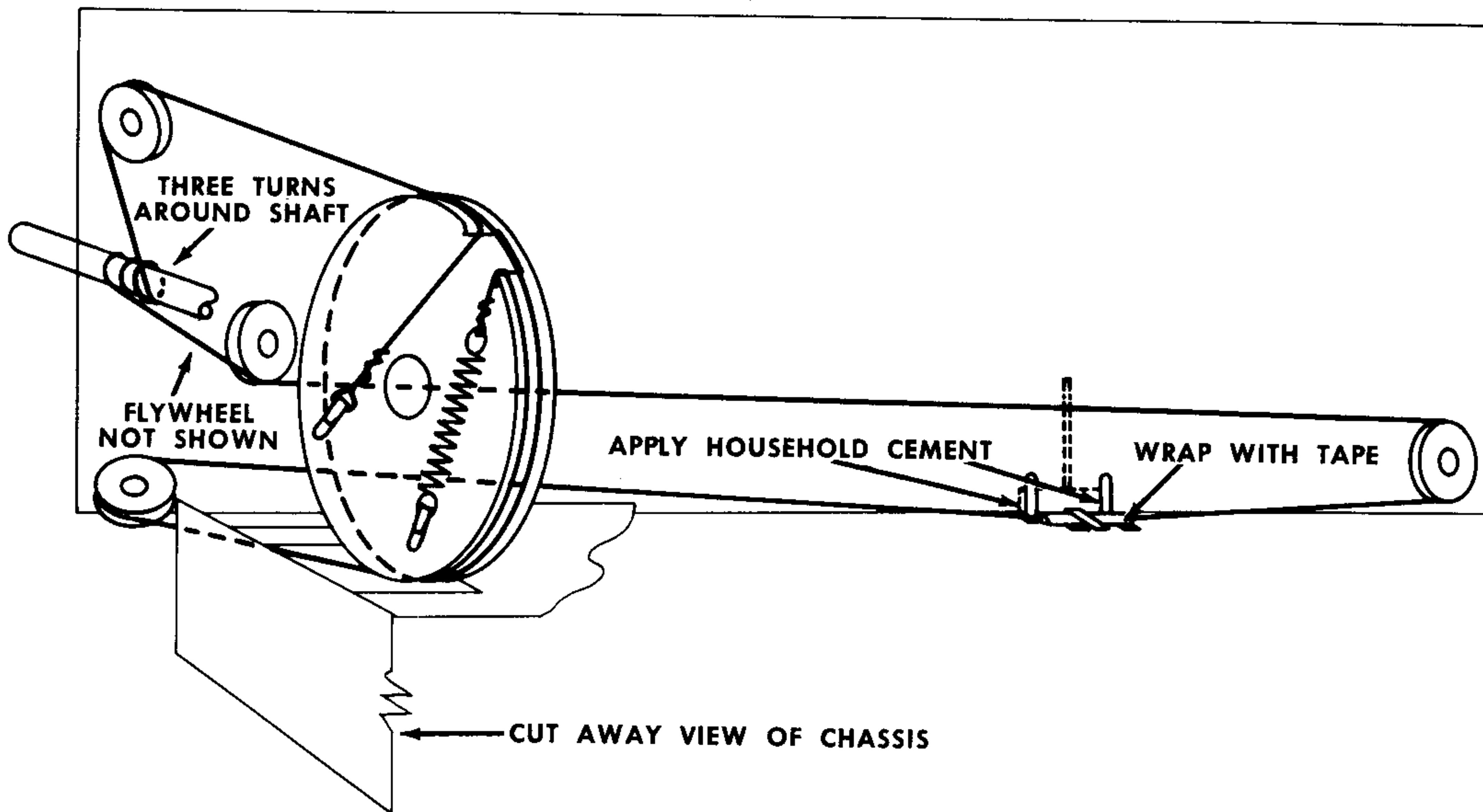
NOTES: Line voltage set at 117 volts, 60 cycles. Voltage readings may vary 10% under normal operating conditions. All voltages read with a vacuum-tube voltmeter under no-signal conditions. Band switch at FM except in AM for V-9 and V-10.

AFC Control set to minimum. Measurements taken with respect to chassis.

Readings are DC positive unless otherwise specified.

NOTE

For servicing and measuring Model 80-T tuner chassis remove the five self-tapping sheet-metal screws which fasten the audio control chassis to the main tuner chassis. Separate the two chassis, carefully unplugging P-1 from J-3 (see schematic). Insert a jumper between pins 7 and 8 of J-3 to provide filament voltage for V-12. Also disconnect the two audio interconnecting jumpers at the rear of the chassis to facilitate complete separation of the two units.



DIAL CORD REPLACEMENT INSTRUCTIONS

1. Remove defective cord and dial pointer.
2. Restring new cord as shown in illustration.
3. Mount dial pointer, and with variable capacitor fully in counterclockwise position, center pointer over index mark at low-frequency end of dial.
4. Wrap dial string with adhesive type tape where string is inserted under pointer tabs as shown in illustration.
5. Secure dial pointer in place by applying household cement.

NOTES

6CH out Put tube replaced Aug 23/58
 6C4 " " " " Aug 1/59
 6BQ7A V14V8 replaced Sept 16/65
 +550-115 Power Transformer replaced NOV 10/67
 6X4 Tube Engineering 9 Sound NOV 10/67
 12AT7 tube NOV 10/67
 1-02 SFD 600V capacitor NOV 10/67
 5U4 2B Replaced RCA sound. Very weak Oct 7/71
 6BQ7A or 6BZ7 FM Reversed tubes due to Oct 8/71
 faded out completely no sound