

OPERATING INSTRUCTIONS AND WARRANTY



# THE FISHER<sup>®</sup>

**Electra**  
MODEL E-491

PRICE \$1.00

WORLD LEADER IN STEREOPHONIC HIGH FIDELITY

# CONGRATULATIONS!

With your purchase of a FISHER instrument you have completed a chain of events that began many months ago, in our research laboratories. For it is there that the basic concept of the equipment you have just acquired came into being—its appearance, its functions, its quality of performance, its convenience of use.

But the end step—your purchase—is merely a beginning. A door has now opened, for you and your family, on virtually unlimited years of musical enjoyment. Recognizing that one of the keys to pleasurable ownership is reliability, we have designed this instrument to give long and trouble-free service. In fact, instruments we made over twenty-seven years ago are still in use today.

Remember always that we want this equipment to give you the best performance of which it is capable. Should you at any time need our assistance toward that objective, please write me personally.

## AN IMPORTANT SUGGESTION

Many hours have been spent by our engineers and technical writers to create this instruction book for your guidance and enjoyment. If you want the **most** out of your FISHER, there is only one way to obtain it. With the equipment before you, please read this booklet carefully. It will be time well spent!

*Avery Fisher*

Founder and President

## FISHER FIRSTS—Milestones in the History of High Fidelity Reproduction.

- |             |  |             |  |             |  |
|-------------|--|-------------|--|-------------|--|
| <b>1937</b> | First high-fidelity sound systems featuring a beam-power amplifier, inverse feedback, acoustic speaker compartments (infinite baffle and bass reflex) and magnetic cartridges. | <b>1956</b> | First dual dynamic limiters in an FM tuner for home use.   | <b>1961</b> | First complete receivers with Multiplex.   |
| <b>1937</b> | First exclusively high fidelity TRF tuner, featuring broad-tuning 20,000 cycle fidelity.   | <b>1956</b> | First Performance Monitor in a high quality amplifier for home use.  | <b>1961</b> | First FM-Stereo-Multiplex tuners with STEREO BEAM.   |
| <b>1937</b> | First two-unit high fidelity system with separate speaker enclosure.   | <b>1956</b> | First FM-AM tuner with TWO meters.   | <b>1961</b> | First loudspeaker system with frameless woofer cone, eliminating all parasitic resonance.  |
| <b>1938</b> | First coaxial speaker system.  | <b>1956</b> | First complete graphic response curve indicator for bass and treble.   | <b>1961</b> | First internal switching system to permit immediate tape playback with use of all controls and switches.   |
| <b>1938</b> | First high fidelity tuner with amplified AVC.  | <b>1957</b> | First Golden Cascade FM Tuner.   | <b>1962</b> | First simplified-operation Control-Amplifier, with infrequently used controls behind a front-panel cover, yet immediately accessible.            |
| <b>1939</b> | First 3-Way Speaker in a high fidelity system.   | <b>1957</b> | First MicroRay Tuning Indicator.   | <b>1962</b> | First loudspeaker with eddy-current-damped voice coil.   |
| <b>1939</b> | First Center-of-Channel Tuning Indicator.  | <b>1958</b> | First Stereophonic Radio-Phonograph with Magnetic Stereo Cartridge.  | <b>1962</b> | First bass speaker with combined serrated-aluminum and fiber cone.   |
| <b>1945</b> | First Preamplifier-Equalizer with selective phonograph equalization.   | <b>1959</b> | First high-quality Stereo Remote Control System.   | <b>1962</b> | First FM Tuner Kit with separate d'Arsonval meter for tuning and separate cathode ray stereo broadcast indicator (STEREO BEAM).                  |
| <b>1948</b> | First Dynamic Range Expander with feedback.  | <b>1959</b> | First complete Stereophonic FM-AM Receiver (FM-AM tuner, audio control, 40-watt amplifier).  | <b>1962</b> | First Stereophonic FM Tuner with TUNE-O-MATIC Motor Tuning.  |
| <b>1949</b> | First FM-AM Tuner with variable AFC.   | <b>1959</b> | First high-compliance plus high-efficiency free-piston speaker system.   | <b>1962</b> | First Supersonic Wireless Remote Control in a high fidelity component.   |
| <b>1952</b> | First 50-Watt, all triode amplifier.   | <b>1960</b> | First to use MicroRay for FM tuning and as a Recording Audio Level Indicator.  | <b>1963</b> | First to use 8417 tubes with unique cavity-anode design.   |
| <b>1952</b> | First self-powered Master Audio Control.   | <b>1960</b> | First complete stereo FM-AM receiver with 60-watt power amplifier and new 7591 output tubes.   | <b>1963</b> | First power amplifier to use oscilloscope-type, frequency compensated input circuit.   |
| <b>1953</b> | First self-powered electronic, sharp-cut-off filter system for high fidelity use.  | <b>1960</b> | Smithsonian Institution, Washington, D.C. accepts for its collection America's first commercially manufactured high fidelity radio-phonograph, made by Avery Fisher in 1937. | <b>1963</b> | First amplifier kit with STRATABALANCE, visual dynamic balancing system.   |
| <b>1953</b> | First Universal Horn-Type Speaker Enclosure for any room location and any speaker.   | <b>1960</b> | First reverberation device, for use in high fidelity equipment—The Fisher Dynamic Spaceexpander.   | <b>1964</b> | First multiplex adaptor with 'flywheel synchronization.' Closely approaches theoretical limit of noise rejection, and of all spurious responses. |
| <b>1953</b> | First FM-AM Receiver with a Cascade Front End.   | <b>1960</b> | First stereo tuner with MicroTune.   | <b>1964</b> | First AFC with strong locking on weak signals, with no pull-in from adjacent strong signals.   |
| <b>1954</b> | First low-cost electronic Mixer-Fader.   | <b>1960</b> | First FM tuner with six IF stages.   |             |  |
| <b>1954</b> | First moderately-priced, professional FM Tuner with TWO meters.  | <b>1960</b> | First FM tuner with five limiters.   |             |  |
| <b>1955</b> | First Peak Power Indicator in high fidelity.   | <b>1960</b> | First front panel antenna selector switch, 72-300 ohm, Local-Distant positions.  |             |  |
| <b>1955</b> | First Master Audio Control Chassis with five-position mixing facilities.   | <b>1960</b> | First Multiplex units with STEREO BEACON and automatic switching, mono to stereo.  |             |  |
| <b>1955</b> | First correctly equalized, direct tape-head master audio controls and self-powered preamplifier.   |             |  |             |  |
| <b>1956</b> | First to use Power Monitor in a home amplifier.  |             |  |             |  |
| <b>1956</b> | First All-Transistorized Preamplifier-Equalizer.   |             |  |             |  |



**ELECTRA**

**MODEL E-491**

**Stereophonic Radio-Phonograph**

Your new console is a prime example of the bold imagination, sound design and old-world craftsmanship which has made the FISHER name synonymous with leadership in high fidelity for over a quarter-century. Equipment built by FISHER, long-favored by music lovers of discriminating taste, has also proven itself in the demanding environments of laboratories, broadcast studios and government agencies. Professional musicians, who comprise a significant number of Fisher patrons, join with musical connoisseurs from all walks of life in praising FISHER radio-phonographs as truly *musical* instruments, whose faithful reproduction virtually removes the barriers between the performance and the listener.

All sources of high-fidelity music, both stereo- and monophonic, are provided for in the circuits of your console. The unusually sensitive tuner can be used for the reception of AM, FM and multiplexed FM stereo broadcasts. The multiplex section, which incorporates the exclusive FISHER STEREO BEACON\*, shows you whether or not a station is broadcasting stereophonically, and automatically switches the instrument into the correct mode of operation. The electron-ray Station Indicator makes precise tuning almost automatic for anyone. Eight controls, including Input and Mode Selector, and Speaker Selector switches, enable you to select any program source instantly, to adjust the volume

\*Patent Pending.

and tonal characteristics to your taste, and even to silence the speakers, if you wish, for private listening with headphones. Special facilities are provided for quick connection of the FISHER SPACEPANDER® and WS-1 Wide-Surround® speakers. If you desire, the automatic shut-off circuit will turn the entire instrument off after the last record in a stack has been played.

The new, transistorized 50-watt power amplifier represents a significant advance in the art of high fidelity component design. By eliminating the output transformers and precisely matching the output circuits to the characteristics of the two three-way speaker systems, a remarkably faithful reproduction of the most delicate of solo passages and the most thunderous and complex of orchestral crescendos is achieved.

The most important ingredients of *any* FISHER component, however, are not so obvious. These are the careful design, the use of costly, durable materials, the craftsmanship in construction, and the rigid test procedures behind every FISHER unit which receives the final stamp of approval. Before leaving the factory, your console has to pass a comprehensive series of stringent examinations. In this way we endeavour to maintain our long-established reputation for the very highest standards in both performance and reliability.

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### WHAT IS STEREOPHONIC SOUND?

Stereophonic sound (stereo) is a method of reproducing sound by means of two independent channels, left and right, so that a spatial feeling of direction and depth is recreated. It is the extension of high fidelity sound into three dimensions. In fact, it offers the closest approach to true high fidelity yet achieved because it comes closest to the ultimate aim of all high fidelity systems — a *perfect recreation of the original live sounds*. Thus, good stereophonic sound is high fidelity in the truest sense of the term.

This feeling of dimension is lost with monophonic (single channel) reproduction, because our ears help determine the relative position of separate instruments in an ensemble only if each hears a slightly different version of the sound, just as visual depth perception depends on the two separate, slightly different pictures received by the eyes. Merely using two or more speakers connected to a single amplifier does not solve the problem; it only spreads the single sound source without providing the all-important different 'aural viewpoints.'

True stereo sound, then, requires the use of two independent sound paths from the origin to your ears, kept separate at all times during recording, transmission and reception. This requires the use of two separate sets of recording amplifiers, a means of keeping the channels apart during recording and radio broadcasting, and finally, two independent amplifier and speaker systems in the home. For optimum stereo, it is best to have the equipment used in each channel as alike as possible. In a stereo record, each wall of the groove contains a separate signal, and the stereo cartridge is designed to pick up each of these two channels separately. The new system of FM stereo broadcasting (known as "multiplex" utilizes a separate ultrasonic signal, in addition to the main signal. By combining these two signals in a multiplex decoder, the original left and right channels are recovered. Stereo tape recordings are made by impressing the two channels on separate parallel tracks running along the length of the tape.

No attempt is made to keep the two channels completely separate acoustically. In a live performance, your left ear hears many of the sounds on your right, and vice versa. Thus, keeping the channels totally apart from the original recording session to the final playback in your home would result in an unnatural effect. But enough separation is maintained so that a definite feeling of direction occurs as you listen to the reproduced sound. The result is a *remarkably vivid illusion of great depth and spaciousness*, such as is normally obtained only at a live performance.

## FM MULTIPLEX STEREO

FM broadcasting has a frequency range far in excess of the normal hearing range. For example, Fisher wide-band tuners have a frequency range which extends to 75 kc, while the normal hearing range does not exceed 17 kc. This extra "space" in the frequency range has now been put into service for the transmission of a second and third signal simultaneously with the main signal. The third (and highest frequency) signal is used in commercial applications (for background music) and will not be received on home high fidelity equipment. The other two signals, however, are used for the reception of stereo programs. During stereo multiplex broadcasts, the main signal, which can be received by any FM tuner or receiver, contains the sum or blended signal from both stereo channels (left plus right). The second ultrasonic signal contains the additional information necessary to recreate the stereophonic sound. This "compatible" system makes it possible for an ordinary FM set to receive a fully balanced monophonic program even during a stereo multiplex broadcast. At the same time, however, the multiplex circuits of your console derive both stereo channels from the main and ultrasonic signals, providing you with all the added realism of full stereo sound.

Because FM stereo multiplex broadcasts require new equipment and new techniques at FM stations, it is to be expected that not all programs will be of the same technical calibre during the first few months of their operation. Such occasional problems as may arise initially will no doubt be solved quickly, as the stations gain experience with the new procedures.

## FOR THE MAN IN A HURRY

It is not difficult to guess that you are most anxious to connect your console, to turn the set on, and *then* read the instructions as you listen to your favorite programs or records. Although this

method doubtless seems a pleasant one, we advise against it, since there are certain precautions which *must* be observed during installation. For this reason, we strongly suggest that you read the following section – reading time is but a few minutes – before proceeding to connect the unit. The 'man in a hurry' can then operate the set with the information contained in Table 1, on page 6. In spite of its convenience, Table 1 should not be considered a substitute for detailed information. Since maximum pleasure can be derived from a unit only through full knowledge of its capabilities, we urge you to read the *entire* section on installation and, at your earliest convenience, the one on operation.

## INSTALLATION

### 1. General

This section of the manual covers the major points you need to know to install your set properly. Although installation itself is a very simple matter, it is important that you read this section thoroughly *before* you attempt to connect your new radio-phonograph, since a full understanding of what each control does will help you obtain maximum pleasure from your FISHER.

The unit operates on AC *only*. Plugging it into a DC outlet will result in serious damage. The power cord extending from the rear of the cabinet should be connected to a wall outlet supplying 105 to 120 volts AC at 50 or 60 cycles. Power consumption at maximum output is 192 watts, 225 VA.

The 60-cycle current is available in almost all areas of the United States, but if you are in any doubt about your local power source, we suggest you check with your dealer, or local utilities company, to make sure. In the rare case that you have 50-cycle AC in your location, you will need a special adaptor pulley so that the Automatic Turntable will revolve at the correct speed. This pulley can be obtained from your FISHER dealer.

## 2. The Automatic Turntable

While the console is being shipped the record changer is held quite securely by a large brace or retaining bracket. Once the console has been placed in its permanent location the bracket can be removed by extracting the screws that hold it in place. The small blocks or wedges under the motor board must be removed too — just loosen the screws holding the machine to the wooden shelf. The record changer must ride freely on the springs which act as shock absorbers. (Press down on each side of the motor board to check for free movement on the spring mounts. If it does not move noticeably downward and up again, under hand pressure, consult your FISHER dealer.

The stylus is protected too. The V-guard must be removed — simply grasp the "V" between thumb and forefinger, and pull gently. To replace the V-guard, grasp the "V" of the assembly with the stylus down and slip the rod into the cavity as far as it will go.

For special details of the operation of the changer see the special instruction booklet for the changer.

## 3. The Antennas

There are two antennas already built into the unit: one for AM and one for FM. The AM antenna is a ferrite core loop, mounted on the Tuner-Control chassis. It will provide excellent reception of AM stations in almost all cases without the aid of an external antenna.

The FM antenna is made of 300-ohm "twin lead"—the same material used for TV antenna lead-in wire—cut and wired especially for use as an FM antenna. You will find it stapled to the back of the cabinet. It will give excellent results on both stereophonic and monophonic FM broadcasts, except possibly in fringe areas. If you have difficulty with FM reception, consult the *ANTENNAS* section, on page 12 of this manual.

## 4. Location of Cabinet

Cabinet location may be varied to suit your acoustic and decorative requirements. Your console is suitable for corner installation, along a wall, or as part of a room divider. Whichever location you prefer, be sure the cabinet is away from heat-producing radiators and ducts. Transistors are heat-sensitive components which, contrary to popular belief, *do* generate heat. Because of this, you should allow a minimum of two inches between the rear of the cabinet and the nearest wall to permit circulating air to cool the transistors. This provides the optimum environment for transistor operation.

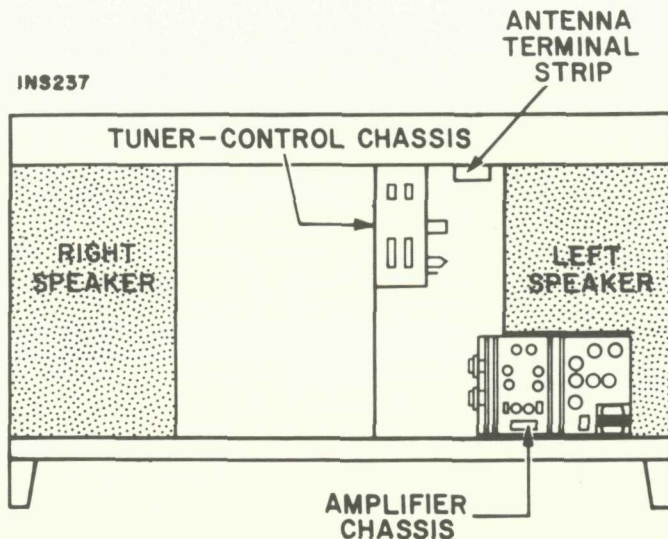


FIGURE 1. Rear View

## OPERATION

Your FISHER is now ready for operation, but like any fine electronic instrument, it must be operated correctly to deliver its best performance. We urge you to read the following instructions carefully, so that you may achieve optimum results. On page 6, there is an illustration of your set's dress panel, with all markings and controls shown. The controls have been set at the factory to the positions shown. You will find it helpful to refer to Figure 2 as you read, or, better still, to operate the controls themselves, in order to familiarize yourself with them.

### 1. Selector Switch

This switch permits you to choose among the various program sources of the console and to choose the mode of operation. The positions and their functions are described below.

**a. PHONO MONO**—Use this position to play monophonic records on the Automatic Turntable. You will hear the same sound from both speakers, since both the source and mode of operation are monophonic.

**b. PHONO STEREO**—Use this position for playing stereophonic records. You will hear the left channel from the left speaker system, and the right channel on the right speaker system. The Balance control, explained in Paragraph 4 below, can be used to adjust the balance between the left and right channels, if necessary.

In order to better understand the FM positions, suppose we skip ahead to the FM AUTOMATIC position. Afterwards, we will immediately return to the positions we omitted, whose functions will be more readily apparent then.

**c. FM AUTOMATIC**—This position should be used for all FM broadcasts (both monophonic and stereo), except where unusually poor receiving conditions prevail. When the Selector switch is set here, the tuner automatically switches into the correct mode

of operation, depending upon the program being received. (See Paragraph 3, below.) For noisy stereo signals, or stereo signals which cause intermittent operation of the STEREO BEACON, use either the FM STEREO FILTER or FM MONO positions described below. If you encounter difficulties in FM reception, consult the section entitled *ANTENNAS*, on page 12.

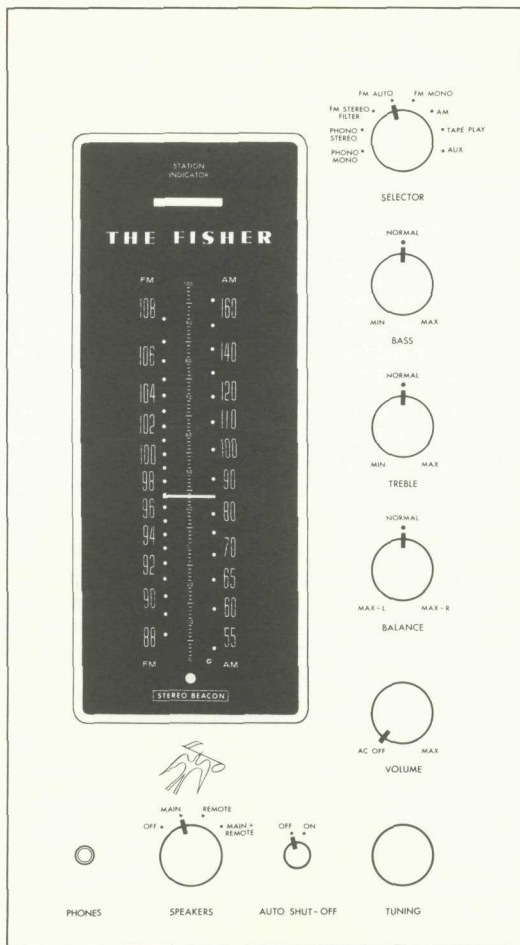
**d. FM STEREO FILTER**—Use this position for stereo broadcasts which are noisy or distorted, due to local interference or an unusually weak signal. This position operates in a manner similar to the FM AUTOMATIC position, and simultaneously switches on a noise filter which does not affect the program material. If satisfactory reception cannot be achieved by using this position, use the FM MONO position, described below.

**e. FM MONO**—Use this position for monophonic reception of stereo programs when you are unable to receive them stereophonically, because of an extremely weak signal or other conditions. This position locks the tuner section in the monophonic mode of FM reception.

**f. AM**—Use this position to receive standard AM broadcasts (550 to 1600 kilocycles). When tuning, follow the AM calibration on the tuning dial, or use the 0-100 logging scale. The Station Indicator (see Paragraph 3, below) will help you tune accurately to the center of the channel. Use it in the same way you do for FM, watching for maximum closure of the two bright bands.

**g. TAPE**—In this position of the switch, your console will accept signals from a stereophonic tape recorder or playback unit with internal preamplification and equalization. Use the jacks marked TAPE on the back of the Tuner-Control chassis. See the section entitled *ACCESSORIES* on page 8 of this manual before you make any connection to the set.

**h. AUX**—When the Selector switch is set here, the unit will reproduce an external high-level audio source connected to the



**FIGURE 2.** Dress Panel and Dial Glass

AUX input jacks on the Tuner-Control chassis. Such a source might be an additional tuner, audio from a TV set, an electronic organ, or a similar device. Again, see *ACCESSORIES* on page 8 before making any connections to the radio-phonograph.

Set controls as shown in Figure 2, and set the Selector switch as follows:

TO PLAY	MODE	SET SELECTOR TO:
RECORDS	MONO	PHONO MONO
	STEREO	PHONO STEREO
FM BROADCAST	MONO	FM AUTOMATIC*
	STEREO	FM AUTOMATIC*
AM BROADCAST	MONO	AM
TAPE RECORDINGS**	MONO	TAPE
	STEREO	TAPE
OTHER SOURCES**	MONO	AUX
	STEREO	AUX

\*For information on other switch positions, see paragraph 1.

\*\*For information on the connection of tape recorders and other auxiliary sources, see the *ACCESSORIES* section, on page 8.

Turn the Volume control clockwise until it clicks. Wait about thirty seconds for the tubes in the Tuner-Control section to reach operating temperature, and move the Volume control clockwise until the desired volume is obtained.

**TABLE 1.** Operating Guide for the 'Man in a Hurry'



## 2. Volume Control and Power Switch

This control combines the functions of power switching and volume control. In the AC OFF position, power to the entire set is shut off. Turning the control slightly clockwise until it clicks turns the power on. The tuner dial will then light, and the jewel indicator at the base of the set will also be illuminated. Wait about 30 seconds for the tubes in the Tuner-Control chassis to reach operating temperature before setting the volume level for the first time. Turning the control further clockwise increases the total volume level from both speakers; turning the control in the opposite direction has the opposite effect.

**NOTE:** If the unit appears to be inoperative after you have switched it on as described above, check to see that the Automatic Shutoff switch (described below) is in the OFF position.

## 3. Tuning

This control enables you to select AM stations in the 550- to 1600-kilocycle band and FM stations in the 88- to 108-megacycle band. The single knob controls both sections of the console's tuner; which mode you receive depends upon the position of the Selector switch, which is explained above. The FM markings are on the left of the dial glass, and the AM calibration on the right. Between them is a 'logging' scale, which is calibrated in linear fashion from 0 to 100. This scale may be used to locate either AM or FM stations, by noting the position of the dial pointer on the logging scale when you are tuned to these stations. Many people find this method more convenient than remembering exact station frequencies. To help you tune more accurately (especially important on FM), we have incorporated an electron-ray tube Station Indicator, which functions on both AM and FM. Observe the indicator (located at the rear edge of the dial glass) as you tune to a station: the two bright bands of light will converge toward the center. Exact center-of-station tuning is achieved when the two bands are as close together as they will go—that is, when the

dark portion at the center is the smallest. The amount of the dark portion which is eliminated by the two bright bands will depend upon the strength of the received signal.

If the Selector switch is in the FM AUTOMATIC position, and you tune to a station which is broadcasting a multiplexed FM stereo program, the STEREO BEACON jewel (at the rear edge of the dial glass) will light, and the tuner will switch automatically into the stereophonic mode of reception. When the station stops multiplexing, or when you tune to another station which is broadcasting monophonically, the STEREO BEACON light will go out, and the set will switch itself back into the monophonic mode.

**NOTE:** When you first turn the set on, the STEREO BEACON will light briefly, regardless of where the Tuning control is set, but it will go out again in a few seconds (unless you are tuned to a stereo broadcast) when the tubes warm up.

## 4. Balance Control

This control is used to equalize the sound levels from both speaker systems, to achieve the optimum stereo effect. If the left and right channels of the program source are exactly balanced, you will hear equal sound levels from the left and right speakers with the control in mid-position (marked NORMAL). If, however, there is an imbalance in the program levels, you can re-balance the sound levels by turning the balance control either clockwise (to increase the sound level on the right and decrease the sound level on the left) or counterclockwise (to increase the left and decrease the right). The Balance control is not a substitute for the Volume control, since the same overall volume is maintained as it is adjusted. With the Balance control fully counterclockwise, only the left speaker will be heard; with the control fully clockwise, only the right speaker will be audible.

## 5. Bass and Treble Control

The Bass and Treble controls affect the tonal balance of the program material.

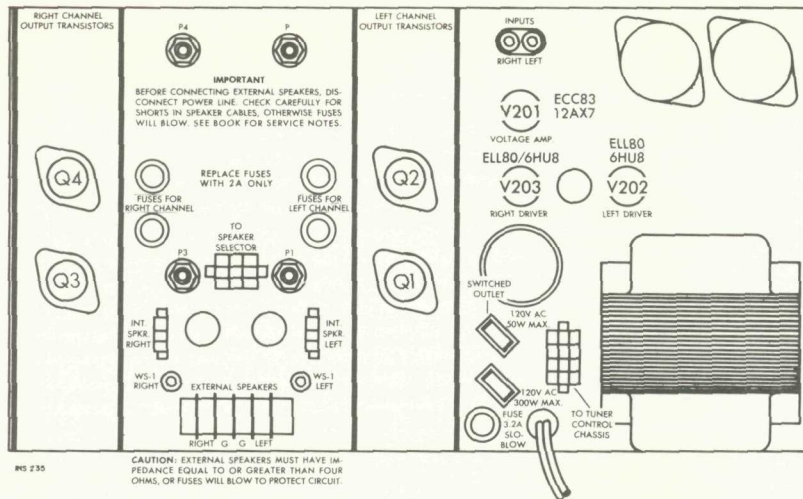


FIGURE 4. Chassis Layout of Power Amplifier Section

A pair of jacks, labelled RCRDR OUTPUT and located on the rear skirt of the Tuner-Control chassis, will feed high-level, independent right and left stereo signals to a stereo tape recorder. Any program source selected by the Selector switch is fed to these jacks, but the volume and tone controls have no effect on the signals at the jacks. Thus you can record in complete silence, if you wish, by turning the console's Volume control all the way down, or set the Volume control anywhere you like for pleasant listening, using the Bass and Treble controls, if desired, without any effect on the recording. Recording volume is determined only by the appropriate knob on the tape recorder.

### 3. Auxiliary Sources

A pair of auxiliary input jacks, labeled AUX INPUT (one for each channel) is located directly above the tape inputs in the rear skirt

of the Tuner-Control chassis. These are high-impedance, high-level inputs, suitable for audio from a TV set, electronic organ, or other stereo or mono high-level source. If the source is monophonic, the right and left channel inputs (marked R and L) must both be fed with the same signal, otherwise the sound will be heard from only one side of your set. This can be done by using a "Y connector," about which your dealer or TV repairman can advise you.

### 4. SPACEXPANDER®

Special SPACEXPANDER jacks are located on the rear skirt of the Tuner-Control chassis for connecting this exciting reverberation device. To make the connections, you will have to remove the jumper plugs which are presently inserted in the jacks. But be sure

to store them in a safe place for possible future use. *Either the SPACEEXPANDER or these jumpers must be connected to the jacks, or the radio-phonograph will be completely inoperative.*

The proper connections are as follows:

- a. — TO REV OUT L jack on tuner-control chassis to Channel A Output jack on SPACEEXPANDER.
- b. — TO REV OUT R jack on tuner-control chassis to Channel B Output jack on SPACEEXPANDER.
- c. — TO REV IN L jack on tuner-control chassis to Channel A Input jack on SPACEEXPANDER.
- d. — TO REV IN R jack on tuner-control chassis to Channel B Input jack on SPACEEXPANDER.

Remember that if the SPACEEXPANDER is not connected, the jumper plugs must be in place or the instrument will not operate.

## 5. WS-1 Wide-Surround® Speakers

Jacks for connecting a pair of FISHER WS-1 speakers (one for each channel) are provided on the Power Amplifier chassis. These speakers will augment the stereo sound pattern to a startling degree, and they are equally effective in monophonic operation. They work in conjunction with the speaker systems built into the set. Simply plug the WS-1 speaker cords into the WS-1 jacks on the Power Amplifier. Place the speaker connected to the L jack on the left side of the room (as viewed from your listening area), and the one connected to the R jack on the right side of the room.

**NOTE:** When a pair of WIDE SURROUND speakers is used with the set, install them as described above. If the volume of the WS-1 speakers appears to be too great, cut the wire link on the back of each speaker. This will reduce the volume level.

## 6. Remote Speakers

Two external speaker systems (one for each channel) may be

fed from the set by connecting their cables to the screws on the rear of the power amplifier marked EXTERNAL SPEAKERS. These can be used for stereo or mono listening in another room. The *Speakers* switch (see Paragraph 7 on page 8) allows you to select the built-in speakers, the remote speakers, or both sets together.

Any 4- to 16-ohm speakers will work satisfactorily, but as with any other stereo speakers, they should be identical for best performance. However, when extension speakers are used with the set, and the Speaker Selector switch is in the MAIN + REMOTE position, power is divided between two pairs of speakers. As a result, some decrease in volume will be apparent in the main speakers when both pairs of speakers are used together. You may compensate for this effect by using a more clockwise (higher) setting of the Volume control. In addition, we recommend that extension speakers have an impedance of 8 to 16 ohms, to minimize this change in volume.

Connect one of the speakers to G and RIGHT on the EXTERNAL SPKR terminal strip, and place it on the right side of your second listening area. The other speaker should be connected to the terminals (on the same strip) marked LEFT and G and placed at the left of your second listening area.

**CAUTION:** Take the following precautions before connecting remote speakers:

- Disconnect the power cord from the wall socket *before* connecting remote speakers. This will prevent the fuses which protect the power output transistors from blowing, in the event that the set is on, and an accidental short occurs during wiring.
- Be sure extension speakers have an impedance greater than four ohms, since a lower speaker impedance could overload the output stage and blow the fuses.

## 7. Headphones

Your radio-phonograph has provision for connecting a pair of

stereo headphones. The jack labelled PHONES, located in front of the control panel, next to the *Speakers* switch, permits connection of a pair of FISHER headphones, which are engineered to precisely complement the excellent acoustic characteristics of your console. These headphones are available from your dealer, who will assist you in the installation of several pairs, should you desire.

To use your headphones for private listening, plug the connector on the end of the headphone cable into the PHONES jack. Turn the *Speakers* switch to the OFF position and adjust the Volume control to suit your requirements.

## ANTENNAS

### 1. General

Your set has two built-in antennas; one for AM and one for FM. These will suffice for all monophonic and stereophonic reception except under unusual conditions, such as those encountered in an extreme "fringe" area, or one where a great deal of interference prevails. In such cases, an outdoor or attic antenna may be required, especially for FM stereo reception. If you wish, you can also experiment with an external AM antenna.

Figure 5 is a copy of the Antenna Terminal Identification Label pasted on the back of the cabinet. It will be helpful to refer to as you read what follows.

### 2. FM Antenna

An outdoor or attic antenna will often make a world of difference in the quality and reliability of reception. We suggest you see your dealer or TV serviceman for detailed information about makes and types. If you use an external antenna, first disconnect the two lugs of the built-in FM antenna from the terminal screws, and then connect the wires from the new antenna to the terminals marked

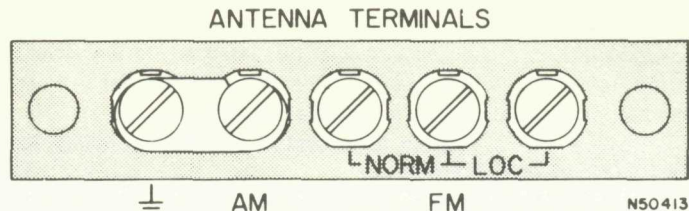


FIGURE 5. Antenna Terminal Strip Detail

NORM. If you find that you are receiving a strong local FM station at more than one point on the tuning dial, it is overloading the FM Tuner section. To reduce this effect, connect your FM antenna to the terminals marked LOC. In areas near an extremely strong FM station, this may even be necessary when using the radio-phonograph's built-in FM antenna.

Often a TV antenna will serve very well for FM reception, both mono and stereo. Since the relative success or failure of an attempt to use a TV antenna for FM is subject to many unpredictable factors, all we can say definitely is that it is worth a try. Temporarily connect your television antenna to the set. If it appears to improve reception, purchase a good-quality two-set coupler so that you can use the same antenna for both TV and console.

Since multiplexed FM reception requires more signal at the antenna terminals than monophonic FM, you may find that stereophonic broadcasts are noisy even though monophonic programs from the same station are quiet. If this is the case, you may need to relocate your FM antenna, reorient it, or use one with higher gain or directional properties.

When you use a directional antenna (many TV antennas are of such a design) you will often obtain good reception from one compass direction only; if this is true in your case, you may need to use a rotator with your antenna.

### 3. AM Antenna

A suitable external AM antenna can be anything from a few feet of wire strung behind a picture molding or draped behind the cabinet, to an elaborate "long-wire" array on poles outdoors. A complicated system is generally unnecessary, however, and it may cause overload and distortion of the sound. If you wish to use an external antenna for AM reception, loosen the screw marked AM and the one marked with a ground symbol, both on the antenna terminal strip. The "jumper" link should swing free. Tighten the ground screw to keep the link from rattling, and make sure that the link is not touching the AM terminal screw. This AM terminal is now free for the connection of an AM antenna wire.

## CONSOLE MAINTENANCE

### 1. Replacing Dial Lamps

Before replacing the dial lamps, disconnect the power plug from the wall outlet. Proceed as follows:

- 1 — Remove all control knobs from their shafts, by pulling them gently away from the control panel.
- 2 — Remove the two screws located on the upper right side of the partition which separates the Turntable compartment from the control section.
- 3 — Slide the entire control panel (the plate and wood panel to which it is fastened) to the right and upward. The panel can then be lifted off to expose the chassis.
- 4 — The lamps, tubular in shape, are held in spring clips at either end of the dial glass, and can be removed by lifting gently.
- 5 — Install the new lamp, making sure that the white, painted side faces away from the dial glass. Press the lamp down until it snaps into place.
- 6 — Replace the panel by reversing steps 1 to 3 above.

Replacement dial lamps can be ordered from Fisher Radio Corporation, Long Island City 1, New York. Please send all requests for parts to the attention of the Parts Department. The part No. is 150441-3.

### 2. Replacing Stereo Beacon Lamp

Before replacing the STEREO BEACON lamp, disconnect the power plug from the wall outlet. The lamp assembly is accessible from the rear of the cabinet. It is housed in a white cylinder on the chassis, directly below the dial, and located near the front of the set. Replace the lamp as follows:

- 1 — Locate the white cylinder described above. Follow the two leads which protrude from the rear of the cylinder to the chassis.
- 2 — Slide the clips, located on the other ends of the leads, off the terminal strip contacts by moving them gently away from the chassis.
- 3 — Remove the white flexible band which secures the bulb leads to the cylinder. Remove the bulb from the cylinder by pulling gently on the leads.
- 4 — Place the new bulb in the cylinder, and secure it with the flexible band removed in the previous step.
- 5 — Slide the clips on the bulb leads over the terminal strip contacts.

Replacement STEREO BEACON lamps can be ordered from Fisher Radio Corporation, Long Island City 1, New York. Please send all requests for parts to the attention of the Parts Department. The part number is 150461-3.

### 3. Replacing Fuses

**a. POWER FUSE** — To protect against line surges and other adverse conditions sometimes encountered by electronic equipment, the unit, is fused at strategic locations. If the unit appears to be inoperative, check to see if the dial lamps light when the

Volume control is turned clockwise from the AC OFF position. If the lamps do not light, the unit may have a blown power fuse.

To replace the fuse, which is located in a black receptacle on the lower right-hand side of the Power Amplifier, proceed as follows:

1. Turn the Volume control to the AC OFF position.
2. Disconnect the power cord from the wall receptacle.
3. Push the cap of the fuseholder in, and turn it counterclockwise. The cap will disengage, and you can pull it out, with the fuse remaining in its clip. Replace the fuse with a 3.2-amp Slo-Blow fuse only. Return the cap and fuse to the receptacle, and restore power to the set.

**NOTE:** If the power fuse replacement fails to restore normal operation, or if a replaced fuse blows immediately, call your authorized FISHER serviceman.

**b. SPEAKER FUSES** — If the dial is lit, yet one or both channels of the set does not play, *no matter what program source* (e.g., tuner, turntable, tape recorder, etc.) *is used*, it may be the result of a blown fuse in the output stage of the Power Amplifier. Power transistors could easily be destroyed if the EXTERNAL SPEAKER terminals were accidentally shorted to each other, or to the chassis. To protect the transistors, as well as the speakers, each output stage uses two fuses, which are contained in receptacles labelled FUSES FOR LEFT CHANNEL and FUSES FOR RIGHT CHANNEL. These fuses are precisely rated, and manufactured to function within extremely narrow tolerances. These fuses must be replaced only with fuses rated at 2 amperes. Replacement with any other type of fuse, or with Slo-Blow fuses of the same value may result in damage to the unit, and voids the warranty. If either channel (or both) is inoperative, pull the power plug from the wall receptacle and remove both fuses used in that channel. Simply push the cover of each fuseholder down, rotate it counterclockwise, and lift it from its receptacle. Replace the fuse(s) with a known good fuse (two spare speaker fuses are supplied with your set). Additional

fuses are available from your dealer as Fisher part No. F755-145 (2 amp), or from your local radio supplier. Next, plug the set in, and turn it on. If the channel(s) remain inoperative, consult your dealer or authorized Fisher Service Station.

If either channel sounds badly distorted or noticeably low in volume, turn off the set and replace *one* of the fuses in the affected channel. If the distortion or low volume persist after you have turned the set on again, replace the *other* fuse in that channel (with the set turned off, of course). If poor sound still persists, consult your dealer or authorized FISHER serviceman.

## FOR THE TECHNICALLY-MINDED LISTENER

This Fisher instrument is a high-fidelity stereophonic radio-phonograph console, incorporating a tuner capable of receiving AM, FM, and multiplexed FM stereo broadcasts; an automatic turntable, a power amplifier, and two matched speaker systems.

The FM tuner portion uses an ECC85/6AQ8 in its 'front end,' with the first half of this dual triode tube used as a grounded-grid RF amplifier, and the second half as a local oscillator and mixer. The mixer produces the 10.7 megacycle intermediate frequency (IF), which is amplified by two IF stages. Following the IF stage is a limiter, which effectively clips off any spurious amplitude variations that may have affected the FM signal, and thus provides the noise-free reception which contributes so much to the popularity of FM. A wide-band, low-distortion ratio detector, which uses two matched semiconductor diodes, provides additional limiting.

The multiplex decoder of the FM tuner is the device which extracts separate left and right channels from the multiplexed signal transmitted by the radio station. In all FISHER tuners, decoding is accomplished by the far superior time-division switching tech-

nique, resulting in better separation than available with other methods, less noise, and greater long-term stability.

The unique STEREO BEACON indicates by means of a light when a multiplex FM stereo program is being broadcast, and automatically switches the multiplex and audio circuits to stereophonic operation in the FM AUTO or FM STEREO FILTER modes.

Turning to the AM portion of the tuner, we find a tuned RF amplifier stage (EF93/6BA6), which gives the tuner a sensitivity and selectivity far above that of most conventional AM radios. Conversion to the 455 kc IF is accomplished in the oscillator-mixer stage, which employs an EK90/6BE6.

In the Control portion of the Tuner-Control chassis we find the preamplifier and switching center of the unit. Here are the Tone controls, providing 17 db total variation of bass and treble; the Volume and Balance controls; and the Selector switch, which selects any one of eight possible program sources or modes of operation. A pair of dual-triode preamplifiers (ECC83/12AX7), one for each channel, supply the gain and RIAA equalization needed for the magnetic phonograph cartridge. Equalization is accomplished by frequency-selective feedback, resulting in reduced

noise and distortion combined with accurate playback characteristics. Output jacks are provided for feeding a tape recorder with a signal unaffected by Tone or Volume control settings.

The Power Amplifier chassis, located in the rear of the set, contains the DC power supply, which provides operating voltages for the tubes on both the Amplifier and Tuner-Control chassis, as well as for the transistors on the Amplifier chassis. There are actually two distinct amplifiers here, each channel being amplified independently by a separate power amplifier. The power amplifiers provide superior power bandwidth (output power at extremely high and low frequencies) and improved transient response, due to the lack of output transformers. Each amplifier consists of a two-stage vacuum tube voltage-amplifier-driver circuit, feeding two transistors in a single-ended push-pull configuration. The power amplifiers provide 50 watts, both channels (IHF Music Power Standards). Each amplifier is double-fused to prevent overloading of its output stage and destruction of the transistors by accidental shorts, and to protect the speaker from the possibility of DC overload due to shorted transistors. Feedback is obtained directly from the hot side of the load in the output stage, and fed back to the cathode of the voltage amplifier.

## TECHNICAL DATA

<b>Music Power Output (IHF standard both channels)</b>	50 watts	<b>FM Tuner Sensitivity (IHF standard)</b>	2.3 microvolts
<b>Peak Power Output</b>	70 watts	<b>AM Tuner Sensitivity (IHF standard)</b>	5.0 microvolts
<b>Harmonic Distortion At normal listening levels</b>	less than 0.2%	<b>Speaker Complement (each channel)</b>	One 10" woofer One 5" midrange unit One 2½" tweeter Crossovers at 300 cps and 2500 cps
<b>At maximum rated Music Power Output</b>	1.0%	<b>Automatic Turntable</b>	Dual 1010
<b>Frequency Response</b>	Uniform throughout audible range as an integrated system	<b>Cartridge</b>	Pickering V-15F/AT
<b>FM-multiplex Stereo Separation</b>	Better than 35 db at 400 cps	<b>Total Power Consumption including Turntable</b>	
<b>Amplifier Channel Separation</b>	50 db at 1 kc	<b>At Low Levels</b>	112 watts, 132 VA
<b>Sensitivity (AUX and TAPE inputs) for Rated Output</b>	250 millivolts	<b>At Full Power</b>	192 watts, 225 VA

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT, FISHER RADIO CORPORATION RESERVES THE RIGHT TO MODIFY ANY DESIGN OR SPECIFICATION WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION.



# WARRANTY TO OWNER

The warranty on a product reflects the confidence of its maker in the quality of materials and workmanship that go into it. The unique FISHER warranty protects your investment. Please read it carefully.

All FISHER equipment is fully guaranteed to the original using purchaser against defects in materials and workmanship, subject to the following:

All parts are guaranteed for two years, except tubes, record changers and tape recorders which are guaranteed for one year. Any defective part will be repaired or replaced without charge, including parts of record changers and tape recorders. For the first ninety days there is no charge for warranty labor.

All service on FISHER Radio Phonographs will be provided by the FISHER franchised dealer from whom the unit was purchased.

The warranty is void if our inspection shows that the equipment has been tampered with, or installed, altered or repaired at variance with factory-designated procedures, subjected to negligence, misuse or accident, damaged by excessive line voltage or insufficient ventilation, or had its serial number altered, defaced or removed.

This warranty is in lieu of all other warranties, express or implied, and all other obligations or liabilities on the part of FISHER. No person, including any dealer, agent or representative of FISHER, is authorized to assume any liability for FISHER except to refer purchasers to this warranty.

This warranty takes effect only if the warranty-registration card has been fully and properly filled out and returned to FISHER RADIO CORPORATION within ten (10) days from the date of purchase.

## **Be Sure to Register Your FISHER Equipment and Enjoy the Following Advantages:**

- Full benefits of the FISHER warranty. ■ Prompt handling of correspondence with our Customer Service Department. ■ Assistance in finding your equipment or establishing its value in case of loss through theft, fire, etc.
- News bulletins on important developments in high fidelity equipment.

**FOR WARRANTY SERVICE, CONSULT YOUR DEALER**



## THE MAN BEHIND THE PRODUCT

**AVERY FISHER**  
Founder and President,  
Fisher Radio Corporation

Twenty-seven years ago, Avery Fisher introduced America's first high fidelity radio-phonograph. That instrument attained instant recognition, for it opened a new era in the faithful reproduction of records and broadcasts. Some of its features were so basic that they are used in all high fidelity equipment to this day. One of these models is now in the permanent collection of the Smithsonian Institution as an example of the earliest high fidelity instruments commercially available in this country.

The engineering achievements of Avery Fisher and the world-wide reputation of his products have been the subject of descriptive and biographical articles in *Fortune*, *Time*, *Pageant*, *The New York Times*, *Life*, *Coronet*, *High Fidelity*, *Esquire*, *The Atlantic*, and other publications. Benefit concerts for the National Symphony Orchestra in Washington and the Philadelphia Orchestra, demonstrating recording techniques, and the great advances in the art of music reproduction, used FISHER high fidelity instruments both for recording and playback, to the enthralled audiences. FISHER equipment formed the key part of the high fidelity demonstration at the American National Exposition in Moscow, July 1959. FISHER FM and FM-AM tuners are the most widely used by broadcast stations for monitoring and relay work, and by research organizations—under conditions where absolute reliability and maximum sensitivity are a 'must.'

The FISHER instrument you have just purchased was designed to give you many years of pride and enjoyment. If you should desire information or assistance on the installation or performance of your FISHER, please write directly to Avery Fisher, President, Fisher Radio Corporation, Long Island City 1, New York.