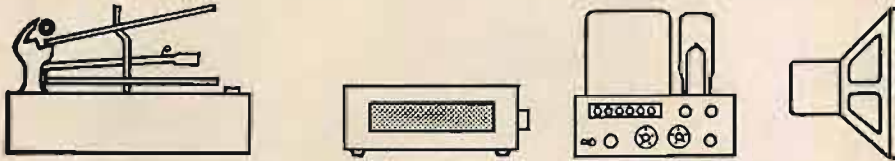


# EQUIPMENT



# PROFILE

## H. H. SCOTT STEREO AMPLIFIER KIT, MODEL LK-48.

The H. H. Scott Model LK-48 stereo amplifier kit encompasses a 24-watt (IHF<sub>M</sub>) stereo amplifier, a stereo pre-amplifier, and a stereo control center, all integrated on one convenient chassis. The control center contains the usual complement of controls and switches required to direct the variety of audio sources this unit will accommodate into the appropriate speaker-bound path. In addition, there are a few extra and worthwhile features. For example, the Stereo Selector control has a Bal A and also a Bal B position. In the Bal A position both channels coming into the LK-48 are combined and sent only to the left speaker. Conversely, in the Bal B position they are sent only to the right speaker. With these switch settings plus the Stereo Balance control, it is possible to compensate for differences in speaker efficiencies, room acoustics, and other sources of inequality between the two channels. Another feature of the LK-48 is the monophonic record position on this Stereo Selector. In this position the output of a stereophonic cartridge being used to play monophonic records is automatically combined thus effectively cancelling out vertical rumble in the signal.

The LK-48 will accept inputs from a magnetic cartridge, a tape deck, an AM tuner, an FM tuner and an FM-stereo tuner (not simultaneously with the mono AM and FM tuners). In addition, it will accept the stereo input from almost any high-level source. An additional low-level magnetic input is provided for tape heads so that a tape recording may be monitored while

the actual recording is taking place. Of course, this is only usable with tape decks with separate record and playback heads. Outputs are provided for the tape recorder and a derived center channel. One switched convenience outlet is provided which may be somewhat inadequate if one is to accommodate the variety of audio signal sources which this unit is capable of accepting. It would be desirable to have one or two more, one of them not switched (for the turntable).

As expected, the H. H. Scott LK-48 is a well-designed integrated stereo amplifier consisting of high-grade components.

### Circuit Description

There are two low-level inputs, magnetic high and magnetic low. The magnetic high is intended for phono-cartridge inputs and magnetic low for tape-head inputs. The magnetic high input is reduced in level by means of a 100,000-ohm resistor before it joins the magnetic-low input path. It should be noted that since both inputs feed the same line they cannot be used simultaneously. Then the signal goes to the pre-amplification stage which is a 12AX7. Equalization (RIAA or NAB) is introduced through a feedback path between the plate of the second section of the dual-triode and the cathode of the first section. After being preamplified, the low-level signals enter the first audio amplifier stage as do the high-level signals (tape, tuner, high-level ceramic cartridge). This first amplifier stage is a 12AX7 which functions both as amplifier and tone driver. Here again the feedback is used to achieve tone compensation (actually the equalization

networks in the preamplifier stage are tone correcting networks to compensate for the recording curve). A scratch filter is included at this point. After this first stage of audio amplification, the signal is fed through the volume control. Here a selector switch permits a Fletcher-Munson compensating network to be inserted (boosts low frequencies). The next stage is a driver and phase splitter consisting of a 7199 triode-pentode. The pentode section is the driver and it feeds the triode stage which is the phase splitter for the output stage. The input to the grid of the driver sections of both channels go to opposite ends of a stereo-balance potentiometer. The wiper arm is grounded. When the wiper arm is moved, it simultaneously raises the gain of one channel and reduces the gain in the other. Each output stage utilizes two 7189 pentodes operated in push-pull. The bias is fixed and d.c. balance is achieved by means of a potentiometer across the two grids. This insures precise balance of the output tubes. The procedure for obtaining d.c. balance is rather simple consisting merely of placing a 16-ohm resistive (and non-inductive) load at the proper terminals of the output transformer, connecting a 'scope (or a VTVM) to the same terminals as the resistor, removing the phase-splitter tube and adjusting for minimum 120-cps hum pattern on the scope (or minimum reading on the VTVM). The power supply consists of a 5AR4 rectifier which supplies B+ for all stages and a selenium bridge rectifier which supplies the fixed bias for the two output stages plus d.c. for the filament of the 12AX7 tubes in the preamplifier and first audio amplifier stages. A separate winding on the power transformer supplies filament current for the driver and output stages.

This circuit holds few surprises and is designed primarily for reliability. The output stage is operated at about 75 per cent of the "design average" values thus ensuring long tube life and generally superior performance. It should be noted that the LK-48, in common with all H. H. Scott amplifiers, incorporates a low-frequency rolloff below 20 cps. The reason for this is to prevent the amplification of low-frequency rumble such as produced by a turntable or record.

### Construction

It required eighteen hours and fifteen minutes to construct the LK-48. Approximately one hour of this time was spent getting familiar with the instruction manual and checking the parts. The use of full color in the instruction manual, plus unusually well thought out and simplified procedures, makes it so easy to build the LK-48 that the only conceivable reason for the unit not operating properly upon completion is carelessness. Even the novice kit builder can construct this unit without difficulty. The step-by-step layout of wiring and parts is on a left-to-right basis (wonder what would happen if the constructor were left-handed?). The only difficulty we experienced was the complete absence of one small wire and another wire being shorter than it was supposed to be. On the other hand, all other parts and wires were appropriate for their location and of proper size. Considering the large number of individual pieces in this kit, it is a remarkable feat of production that everything measured so beautifully. As a suggestion to the manufacturer, we felt that it would be valuable if the prices for replacement parts were included. A final suggestion (in keeping with the editorial in the February issue), we feel that it would be extremely helpful if information were included as to why certain leads must be kept



Fig. 1. H. H. Scott amplifier kit, Model LK-48.

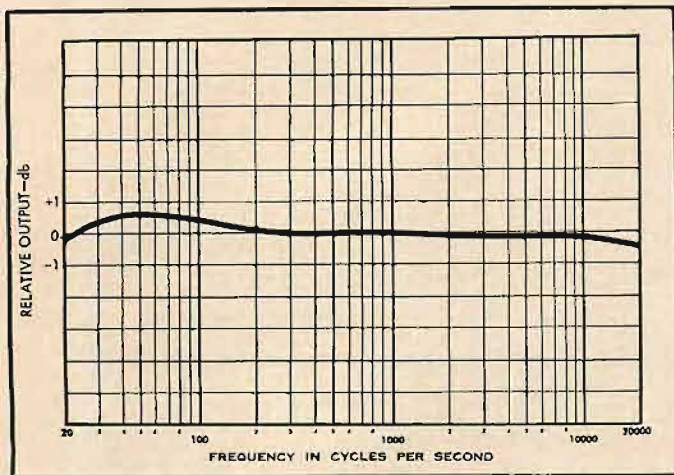


Fig. 2. Frequency response of the LK-48.

to a minimum length and why certain sections must be shielded.

### Performance

The performance of the LK-48 is quite excellent. *Figure 2* shows the frequency response at normal listening levels. The poor bandwidth at rated distortion (IHF method) was at least 20-20,000 cps and perhaps even greater. (Our test equipment wouldn't permit further exploration.) The IM distortion at an output of 12 watts (half power) was 0.5 per cent. Harmonic distortion at this power was 0.6 per cent. Sensitivity at the high-level input was 0.41 volts. The RIAA and NAB equalization curves were respectively within 1.5 and 2 db of the standard curve at all points.

In summation the H. H. Scott LK-48 stereo amplifier kit is easy to build, easy to buy, and well worth consideration by the kit-building audiophile who requires a stereo amplifier. **D-20**

## H. H. SCOTT FM-STEREO TUNER KIT, MODEL LT-110

In February, 1961, we had occasion to report on the then new LT-10 FM Tuner Kit. Several months later, the FCC permitted multiplex broadcasts so that we could enjoy FM stereo and, naturally, it was inevitable that the kit we thought so highly of then should be modified for reception of stereo broadcasts. In essence, the LT-110 is that very same LT-10 with the addition of the H. H. Scott multiplex circuitry. Of course, there have been some improvements in the basic circuit, plus changes which were necessitated by the necessity to handle stereo signals.

Before proceeding much further, we should note our appreciation for the excellent thinking that went into this kit. We were favorably impressed when we built its forerunner, the LT-10, and we are still impressed. In comparing the earlier model with the LT-110, we did note several improvements in the manual. Also, and surprisingly, considering that the basic circuit is unchanged, the sensitivity of the tuner has been improved.

### A New-Old Circuit

Although the circuit of the LT-110 is almost exactly the same as its forerunner, the LT-10—and we described the latter in February, 1961—we will repeat the description and point out the very few differences.

Starting from the tuned antenna input circuit, the signal is fed to a cascode r.f.

amplifier consisting of a 6BS8/6BQ7A. The tuning meter samples the output of the first section of the r.f. amplifier. After leaving the r.f. stage, the signal goes through the tuning circuit and into the grid of the mixer tube, which is the pentode section of a 6U8. The triode section of this 6U8 is the local oscillator. After leaving the mixer, the signal goes through two i.f. stages consisting of the coupling transformers and a pair of 6AU6 i.f. amplifier tubes. From there it goes through the limiter, which is also a 6AU6 (in the LT-10 the limiter was the pentode section of a 6U8). Then the signal goes through the detector transformer and into the ratio detector which consists of a pair of 1N294/1N541 diodes. After leaving the ratio detector, the signal is then fed into the multiplex adapter. The multiplex adapter in this kit is preassembled and requires only a few connections to integrate it with the rest of the tuner. We won't describe the circuitry of this adapter since it was described so well by Daniel R. von Recklinghausen in our June, 1961, issue. The schematic was shown in our August, 1961, issue. The audio output of the adapter is by means of anode followers, thus permitting up to 70 feet of cable, with a maximum capacitance of 1000 pf.

The only other change, except for some obvious ones in the power supply (to accommodate the four extra tubes), is the inclusion of a switch in the a.g.c. circuit to permit the tuning meter and a.g.c. to be more sensitive for the lower signal levels normally encountered in stereo transmission. Again, in common with all of the H. H. Scott FM tuners, the LT-110 does not provide a.f.e. And, again, it didn't need it.



Fig. 3. H. H. Scott FM-Stereo tuner kit, Model LT-110.

### A New Alignment Procedure

The H. H. Scott engineers have demonstrated their ingenuity once again by devising a new detector alignment procedure. The i.f. "cans" are tuned in the usual manner. That is, the tuning slugs are turned in or out, as necessary, to achieve maximum indication on the tuning meter; in other words they are "peaked." It is in tuning the detector that the new *piece de resistance* is revealed. The procedure simply involves injecting hum from the filament of the first i.f. tube to the grid of the same tube through a .05  $\mu$ f capacitor, and adjusting the tuning slug on the detector transformer until minimum hum is achieved. That's all there is to it; we are simply adjusting the detector for maximum limiting. In spite of the simplicity of this method, we found that it worked quite well. Only the barest whisper of a touch up was required.

### Still Easy to Build

We won't go into a long explanation of the construction techniques because the ease of construction of these very well designed kits is well known by now. The full-color illustrations, the Part-Charts on which all of those parts are mounted corresponding to a particular page in the manual, the clear and full instructions, and the easy-to-build-in box, make the LT-110 so simple to build that we unhesitatingly recommend it for even the novice.

It took us some eleven hours to construct the LT-110 and perhaps it would have taken us somewhat less if the part numbers on the check list had been organized in the same sequence as the parts on the Part-Chart.

### Performance

As we noted previously, the sensitivity of the LT-110 is better than its forerunner. We found that the useable sensitivity (IHF method) was 2.1  $\mu$ v, which is 16 per cent more sensitive than the LT-10. Of course, this added sensitivity is of great value in multiplex reception, inasmuch as the signal levels in this mode are usually lower than the standard FM reception. The audio output was 1.7 volts. The capture ratio was 6 db, which means that it would reject signals which were of the same frequency but 6 db lower in level than the desired frequency. Stereo separation was better than 31 db.

Altogether, the H. H. Scott Model LT-110 FM-stereo tuner kit is both a fine stereo tuner and an unusually easy kit to build. **D-21**