Meet the second generation AR-15
...new Heathkit AR-1500

In 1967 we introduced the Heathkit AR-15, a receiver that opened new horizons in stereo and FM/stereo circuitry. Experts agreed it was the most advanced receiver of its kind. Now meet the Heathkit AR-1500 — with impressive improvements in every critical area!

180 Watts Dynamic Music Power, 90 watts per channel (8 ohm load). 120 watts dynamic music power per channel with 4 ohm load, with less than 2% intermodulation distortion, less than .5% harmonic distortion. The 14-pot, power transformer and massive output transistor heat sinks make this definitive statement on power in the Heath tradition of conservative ratings. Direct coupled output and drive transformers are protected by limiting circuitry that electronically monitors voltage and current.

FM Selectivity greater than 80 dB, better phase linearity, separation and less distortion are made possible by two complete-designed 5-pole LC Filters. The improved 4-gang 6-tuned circuit front-end gives better stability, 15 uV sensitivity, 1.5 dB capture ratio, and 100 dB image and IF rejection. Four I/C’s are used, three in the IF, one in the Multiplier. Patented automatic squelch is both noise and deviation activated, fully adjustable for sensitivity.

Vastly Superior AM, an “also ran” with many other receivers, has two dual-gate MOSFET’s in the IF and Mixer section, one I/FET in the oscillator, 12-pole LC Filter in the IF, and broadband detector. Better overload characteristics, better AGC action, and no IF alignment.

Famous Heath “Black Magic” Lighting hides tuning scales and meters when the AR-1500 is not in use. You’ll appreciate such niceties as velvety-smooth single-knob flywheel tuning for FM and AM, function pushbuttons, chrome-plated die cast panel and knobs. And there are outputs for two separate speaker systems, bi-amplification (separable preamps and amplifiers), oscilloscope monitoring of FM multi-path inputs, inputs for phone, tape, tape monitor and auxiliary sources — all with individual level controls.

If you can build a kit, you can build an AR-1500! Ten plug-in circuit boards, two wiring harnesses and extensive use of snap-in connectors make the AR-1500 a kit-builder’s dream. Built-in test circuitry uses signal meter to make resistance and voltage checks before operation. Install in the new low-cost Heath kit, or in an old or use the black dust cover included in the kit. The coupon at right is your order blank. Or, if you still can’t believe the AR-15 was just a beginning, send for more information on the new Heathkit AR-1500.

Kit AR-1500, less cabinet, 42 lbs, mailable...

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The multiplex module has one complex IC that does the work formerly done by at least four or five discrete transistors plus a number of diodes. The multiplexer has two ICs, one for each channel. Premade permanent filters are used in the IF sections for both AM and FM, reducing the problems of alignment to its barest minimum. The power output circuitry is of the complementary symmetry form, employing a matched zero-bias output pair supplied with both positive and negative operating voltage (-48 and +48), so that no coupling capacitors are required between output circuit and loudspeakers.

**Measurements**

Certainly, the H. H. Scott Model 387 has about the best performing and most sensitive tuner section we have ever measured. Major monaural performance characteristics are shown in the graphs of Fig. 3. Full limiting and IHF sensitivity were at 1.8 mV (300 ohm input) and, more important, signal to noise had reached an incredible 50 DB at only 2.5 mV and 60 DB at 5 mV of signal input. Translated to more meaningful terms, this means that any incoming signal of 5 microvolts or better would sound as quiet as the strongest signal received on an average tuner, where 60 DB S/N is usually the limit at any signal level.

In the case of the Model 387, ultimate S/N reached 75 DB at 25 mV input. THD in monaural measured 0.4% while in stereo it was a bit more than 0.8% for full deviation. The muting circuit is effective at signals below 2.5 mV in strength. This means that you will be able to keep the mute switch depressed even when hunting for the distant weak signals. In fact, in our "count" of stations we deliberately scanned the dial with and without the mute circuit in effect and this is the first tuner where we can state that we counted exactly as many received stations in each case, since the mute threshold is so close to the IHF sensitivity figure. Furthermore, the mute is positive acting—there is no signal strength region in which the mute circuit is in partial effect, so there is no noticeable distortion or attenuation caused by this well engineered circuit.

Stereo FM separation, plotted in Fig. 4 was as good as any we have ever measured, reaching 40 DB at mid-band frequencies and remaining better than 30 DB at every frequency from 50 Hz to over 10 Khz. In addition to denoting an excellent multiplex circuit, this suggests that the IF sections are extremely phase linear and well aligned. While we normally do not show graphs of right and left channel separation (usually, the results are within 1 or 2 DB of each other), it should be noted that in the case of the H. H. Scott 387, balance between left and right channel separation was within 0.5 DB across the whole frequency band. Published specifications with respect to capture ratio and cross-modulation rejection were confirmed, while selectivity was measured at 45 DB, somewhat better than the 42 DB claimed. While this latter parameter is not the highest we have seen, we encountered no case of alternate channel interference in our listening tests.

**Perfection**

A very valid tuning indication method, trademarked "Perfection" by the people at H. H. Scott, has been incorporated in the Model 387. Instead of the usual "zero-center" tuning meter, a special integrated circuit has been incorporated in the FM IF module. Fed with d.c. voltages derived from the ratio detector circuit, the IC acts as a "gate" for the Perfection indicator light, permitting it to become illuminated only when a station has been tuned to precise center of channel, the point of lowest distortion and best audio recovery. Interestingly, in the presence of a very strong signal, the range of dial spread over which the lamp remains illuminated is somewhat broader than it is for a weaker signal. This, of course, as it should be, since center tuning of a strong station is somewhat less critical than proper tuning of a relatively weaker signal. We noted, too, that in tuning into a stereo station, the stereo indicator lamp...
becomes illuminated as the station frequency is approached and remains on for some distance to either side of the perfection indication. In that connection, the stereo indicator is completely positive in its action and never gave a false indication because of interstation noise, regardless of the setting of the mute switch.

Harmonic Distortion and IM for the amplifier section are plotted in Fig. 2. The former reached its rated value of 0.5% at 60 watts per channel with both channels driven (as against 55 watts claimed), while the latter reached 0.5% at 57 watts. One per cent THD was noted at a power output of 65 watts per channel with an 8 ohm load and both channels driven. At 20 kHz, the response (with tone controls set for "flat") response is down some 3 dB. A slight boosting of the treble control restores uniform response to this upper audio level. At the lower end, audio response is down 1 dB at 17 Hz. Tone control action, shown in Fig. 7, is symmetrical and the range is adequate. A feedback Bassandall circuit is used, providing varsity crossover and the ability to introduce moderate amounts of low end boost and high end boost or cut without affecting mid-range response. We did find the loudness compensa-

circuit (the response of which is also shown in Fig. 7) to be a bit confusing. As pointed out in the instruction manual, depressing the lower push button (to provide unamplified flat response) results in the overall decrease in volume level of about 5 dB (at mid-band). We would prefer to see the "normal" (or un-pushed) position of the switch as the uncompensating position, since loudness compensation is a "sometime" thing. If there has to be a level shift from one position of the switch to the other, we would have preferred the level to decrease when using the compensating position of the loudness-volume switch since this position is likely to be used at lower listening levels.

The high cut filter, whose characteristics are also plotted in Fig. 8, follows the curve of maximum treble cut almost exactly (having a slope of only 6 db per octave) and is therefore somewhat redundant, inasmuch as its output is too far to the mid-range frequencies. Thanks to the extreme sensitivity and quieting ability of the 387 we did not find it necessary to use this filter on any stereo FM listening. For use with the older 387 or "scratched" 80 rpm records, the high frequency loss won't mean much anyway.

Listening Tests

The Model 387 is most outstanding in its FM performance. The perfection light lit up for us no fewer than 57 times as we scanned the FM dial and in 27 of those instances, the stereo indicator light flashed as well. That's using a multi-element directional antenna in our New-York City location, but NOT using our rotator. We received some stations clearly and with adequate quieting during which the signal strength meter barely moved and when you consider that a 50 microvolt signal causes that meter pointer to deflect over full division that should give you an idea of the kind of signals were able to listen to and enjoy. Calibration was just about perfect from one end of the dial to the other (and that was a blessing, because some of the stations received were so far out of our area that we had to consult our national list of station frequencies to identify some of them.

Audio power was more than adequate at all levels of single or dual speaker-pair listening in both recording and monitor settings. Residual hum in all instances was inaudible, confirming our 60 db quieting for all SMES and 40 db quieting for high-level input sources. We also experimented with the microphone inputs, using a single dynamic microphone to mix with and comment upon a taped program we had recorded earlier. By placing the mono-stereo switch in the mono position, the 387 serves as an effective two-channel mixer in the conventional fashion. It should be noted that when both sets of two speakers are used simultaneously, the circuit is arranged to insert high wattage damping in series with the volume control on the amplifier. This is done in an effort to prevent the net impedance presented to the amplifier from going below the safe 4-ohm limit. Although this feature does reduce maximum available audio power to the combination of speakers, there was still plenty in our instance, and it is preferable to lose a fraction of the available power than to keep blowing speaker line fuses because of too low an impedance load connected to the output terminals. Our transient response tests indicated excellent damping, though this parameter was not specifically measured, since no published specification was available with which to compare it.

The H. H. Scott Model 387 is a big receiver—big in power and performance, as well as in physical size. The serious audio enthusiast will, upon auditioning it, quickly recognize it as the product of one of the pioneering companies in our industry. While H. H. Scott was there when it all began, they have certainly kept up with technological progress in solid-state design—that is clearly evidenced by the Model 387.