

# EQUIPMENT PROFILES

## H. H. Scott Models 2505 and 2504 Compact Stereo Music Systems

**MANUFACTURER'S SPECIFICATIONS—**  
System: FM receiver/automatic turntable  
with stereo cartridge/speaker systems (2).  
Total Music Power: 40 watts at 4 ohms.  
FM sensitivity, Usable: 2.0 microvolts.  
Prices: Model 2504 (with Scott S-14  
speaker systems), \$349.95; Model 2505  
(with Scott S-10 speaker systems), \$419.95.  
Optional smokey-gray plastic cover.

The so-called "compact" music system has earned an important place in the home sound entertainment market. Obviously, by offering equipment that requires only a single buying decision instead of the need to choose a variety of components to make up a system, component manufacturers can appeal more strongly to people who have very little knowledge of hi-fi.

Thus, "component" quality can be carried over into the somewhat less sophisticated approach of compacts, trading off what one might choose in the way of components for what the manufacturer has established as a whole system.

H. H. Scott has five compact music systems in its stable. They all appear to share the same audio amplifier. One is a phono-only system; two models are AM/FM/Phono, differing only in speaker systems; and two models are the same as the AM/FM/Phono units minus the AM broadcast function. The latter two are being examined here.

Scott offers, as a whole package, an FM stereo receiver/changer module with a pair of its S-14 loudspeaker systems, calling the ensemble "The 2504 Compact." The same receiver/changer module when purchased with a pair of Scott's larger S-10 speaker systems, is dubbed "The 2505 Compact."

The fact that these speakers are from Scott's regular line suggests that no audio modifications have been employed in the design of the receiver to

alter the response of the amplifier to improve loudspeaker performance. Thus, one can change speakers at some future time without concern that frequency-response doctoring will create any problems. We can, therefore, still treat these compacts from a conventional component viewpoint, though it must also be judged as a whole system.

### Features

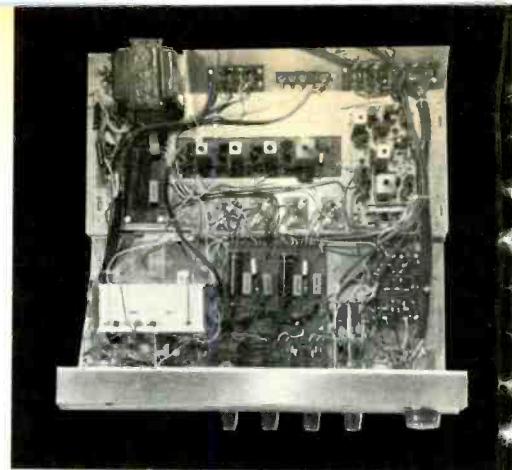
The gold-anodized brushed heavy aluminum front panel of the receiver-changer module slopes backward in the tuning dial area (see Fig. 1), matching the contour of the smartly styled oiled-walnut cabinet. The slope makes station selection highly visible when the unit is mounted on a table top or on a shelf, below eye level. Dual clutch-type controls are used for bass, treble

and loudness. By making the loudness control a clutch-type dual control, there is no need for a separate balance control, since each channel's loudness can be adjusted separately. It was found, however, that optimum balance was obtained with both loudness knob pointers perfectly in line with each other, indicating that the two amplifier sections are very closely matched, electronically, with respect to gain. As a result, unusual room acoustics, speaker placement or unbalanced program material would be the only reasons to off-set the separate sections of the loudness control. On this point, a special switch located underneath the module cabinet allows the listener to instantaneously switch from "left channel only" to "right channel only," which is a great aid in adjusting for equal levels from both channels.

Fig. 1—H. H. Scott's Model 2505 solid-state FM stereo compact with S-10 speaker systems.



Fig. 2—Inside view of the Scott 2504/2505 compact's receiver chassis shows its modular printed-circuit board.



Other rotary controls include the function switch and the tuning knob. In addition to PHONO, FM, SUB-CH. FILTER (for use under noisy stereo FM reception conditions) and EXTRA (for tape, TV sound, etc.), there is a position for MIC/GUITAR. And sure enough, Scott has provided for this very popular form of home music entertainment by providing front-panel jacks for either a microphone or a guitar or any other instrument requiring electronic amplification. In the stereo mode, if both a microphone and a guitar are used, the microphone will be heard from one of the loudspeakers while the guitar is heard from the other.

Of course, availability of these unusual inputs makes home recording of family talents quite simple, since direct connection can be made from the tape output jacks of the receiver (located at the rear underneath the receiver) directly to the high-level inputs of a tape recorder.

Selection of MAIN and REMOTE speaker system is made by "rocker" switches. If two pairs of speakers are connected, either or both pairs can be switched on by means of these switches. Another "rocker" switch is used to turn on power to the unit, enabling the user to leave all other controls at optimum settings between listening sessions.

Two more "rocker" switches select mono or stereo mode and tape monitoring for those tape recorders equipped with monitoring facilities. The now-standard stereo headphone jack and stereo FM indicator light complete the front panel layout. The softly illuminated tuning-dial area also features a tuning meter which is adjusted for maximum indication and the familiar 0-100 logging scale which many users find more easy to use than the mHz or direct-reading frequency scale. While tuning meters are always a welcome addition to a receiver, maximum indication is somewhat more difficult to set accurately than is the center-of-channel type of meter movement. Too, the meter action was found to be highly non-linear. That is, the first 40 or 50  $\mu\text{V}$  of incoming r.f. signal pushes the needle almost to the top of the scale, with very little additional deflection taking place for higher signal strengths. Thus, with reasonable signal strengths (the more usual situation), it is difficult to determine precise center-of-channel.

The record changer, mounted above the chassis, is manufactured by Garrard and, though imprinted with the Scott name, is a first cousin to the Model 40 MK II, available separately from Garrard. It is equipped with a

Pickering Model V-15/CAC stereo cartridge and a diamond stylus. The changer is properly shock mounted above the receiver, and circuitry is so positioned that there is no danger of any motor hum fields being induced in the receiver's preamp.

This Garrard changer plays all four speeds, manually or automatically. A separate "stub" spindle is supplied for manual operation. The tubular tone arm has a removable cartridge head and is adjustable for tracking of different cartridges, should the user decide to change cartridges at a later date. Automatic operation of this changer is controlled by just two levers. The first selects speed while the second turns on the motor and starts the changer mechanism (when it is moved all the way to the "reject" position). A locking device clamps the tone arm in place on the tone arm rest, preventing accidental damage to the cartridge and stylus should the arm be pushed off its rest accidentally or during transport of the compact.

An added feature is incorporated on this specially-made version for Scott; a tiny soft-bristle brush is affixed right to the changer base plate in such a location that the diamond stylus of the Pickering cartridge passes through the bristles each time the changer goes through its changing cycle. Since most people ignore the need for "flicking off" dust particles which tend to collect on the stylus tip, this feature is worth a good deal more than its negligible cost. It's a lot safer for the stylus than the right forefinger which many record enthusiasts use in lieu of a proper brush.

As for the cartridge, it is one of a series in the V-15 group popularized by Pickering. Intended primarily for changer applications, it is designed for tracking pressures at between 2 and 5 grams. As adjusted in the 2504/2505 compact, it tracked successfully on even the most dynamically recorded passages of Moussorgsky's "Pictures at an Exhibition" as well as the old standby, "The 1812 Overture" recorded with the

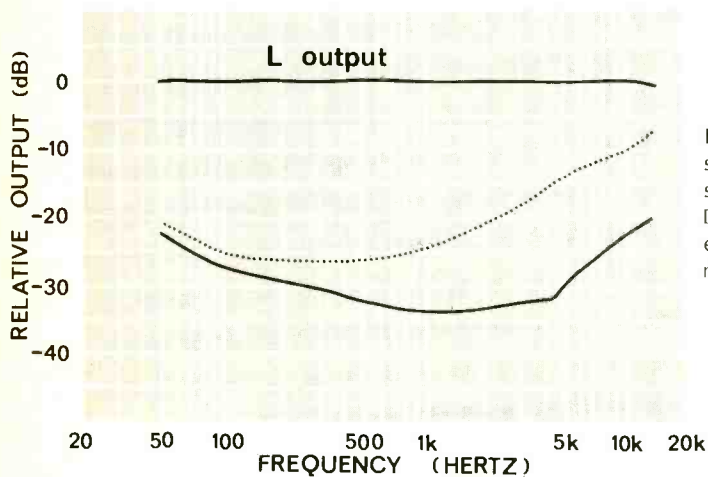


Fig. 3—FM stereo separation with "L" signal applied. Dashed line shows effect when the multiplex filter is "on."

West Point Cannons in the finalé. Tracking pressure was measured at just over 4 grams, a rather high setting, but not unusual for record changers.

One of the advantages of compacts is the popular "automatic shut-off" feature, more common in mass-produced, console equipment. Thus, with the power switch on the main receiver panel in the off/auto position, the unit can be turned on by actuating the record changer on/reject lever. All previously stacked records will play through and, after the last record has been played, both the record changer and the receiver will automatically shut off, even if the user has dozed off or left the room.

The S-10 speaker systems, associated with the 2505, are actually H. H. Scott's "controlled impedance" units, sold separately, too, as components. Unlike many loudspeakers of the air suspension type, it has a relatively high order of efficiency. Consequently, it requires only a few watts of amplifier power to drive it to loud listening levels. The system incorporates a 10-in. woofer and a 3½-in. paper cone tweeter. Crossover frequency is 1200 Hz. The walnut enclosure measures 23½-in. by 11¾-in. by 9-in. deep.

The S-14 speaker systems that accompany the Model 2504 compact music system are similar in type to the above speaker systems. However, they incorporate a 6-in. woofer and a 3-in. tweeter, with crossover frequency at 2000 Hz. The smaller systems measure 16-in. by 10-in. by 6½-in. deep.

### Circuitry

Figure 2, a photo of the inside of the Scott chassis, discloses that the receiver is constructed of seven neatly arranged printed-circuit modules with carefully positioned interwiring harnesses. The completely shielded module at the upper right of the photo is the FM front end, which features a Field Effect Transistor as the r.f. stage plus two NPN silicon units in the local oscillator and converter circuits.

The i.f. strip employs four identical  $\mu$ A703 integrated circuits, each of which houses the equivalent of five NPN transistors plus a pair of biasing resistors. By proper external connection, these units serve both as amplifiers and limiters, feeding a conventional ratio detector circuit. The multiplex automatic demodulator module follows, and it is a well compensated, sophisticated design with fully twice as many circuit components as the common variety of multiplex decoder. This makes possible excellent stereo separation capabilities over the entire audio spectrum, as well as extremely low distortion and residual 38 kHz and 19 kHz undesired outputs.

Next, the signals are fed through the Filter Module, which introduces a sharp high-frequency cut-off filter for use with noisy FM stereo signals. This module also includes the special channel-balancing feature mentioned earlier. The tone control and preamp module follows, and includes a dual integrated circuit and two more FET's. Half of the IC is used as a preamp for each channel; each half contains eight transistors and nine resistance elements. In addition to the FM signal input, this module also accepts the phono, tape, guitar and microphone signals selected by the function switch. The output of the preamp and tone module is fed to a driver P.C. module which is, in turn, connected to the four power output silicon NPN transistors. The output devices, mounted to the surface of the chassis for proper heat sinking, are supplied with 30 volts of d.c. from a power supply P.C. module. The module also makes available the necessary +12 volts d.c. required by the r.f. and i.f. modules. The entire receiver is fused with a 1¼ ampere line fuse, readily replaceable from the underside of the cabinet.

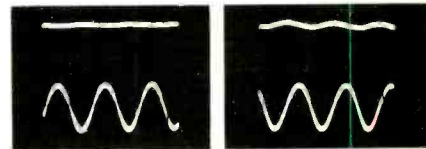
If you were to add the total number of transistor elements in this receiver (including the multiple devices incorporated in the various IC's), it would be a staggering total of fifty eight, not to mention some twenty-two diodes

used throughout the circuitry and in the power supply. Hardly a "compromise" compact design, to say the least!

### Measurements

While H. H. Scott does not publish many technical specifications for its compacts (the premise being that these units are bought by a less-sophisticated group of audio enthusiasts), we nevertheless measured some of the more important parameters of the receiver. FM sensitivity (IHF) proved to be 2.8  $\mu$ V at just about any point in the FM band. This compares favorably with the 2.0  $\mu$ V spec Scott lists, taking into account production tolerances and test generator leakage. Ultimate signal-to-

Fig. 4—Good FM stereo separation at 1 kHz (left) is somewhat degraded when the multiplex filter is activated to reduce noisy stereo reception, as shown at right.



noise on FM was a respectable 60 dB. Distortion at full deviation was a very satisfactory 1.2%, while capture ratio was a mere 1.8 dB.

Automatic stereo switching takes place with only 5  $\mu$ V of r.f. signal input and, it should be noted, the stereo indicator light only comes on when stereo is actually received and switched on. There are no false indications caused by interstation noise or other extraneous effects.

FM stereo separation exceeds 30 dB throughout the important upper-low, middle and medium-high audio range, as can be seen in the curves of Fig. 3. The dashed curve shows the reduction in separation caused by introducing the MPX filter. The photos in Fig. 4 compare separation with and without MPX filter. We found, however, that all the stereo stations received in our area (a total of eleven) were so free of reception noise that the filter was never

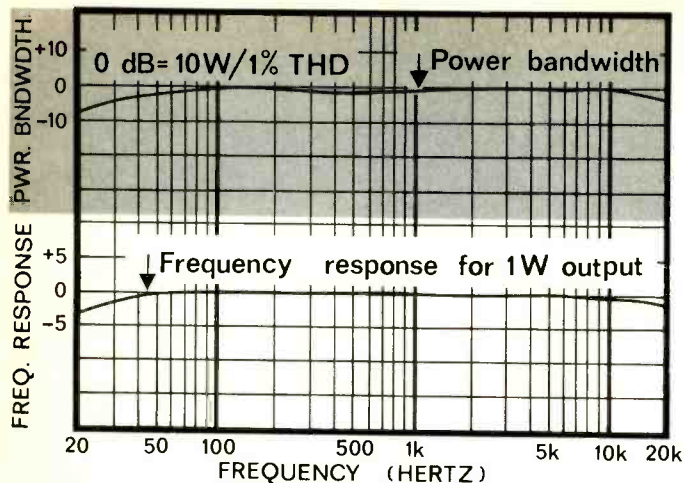


Fig. 5—Power bandwidth and frequency response.

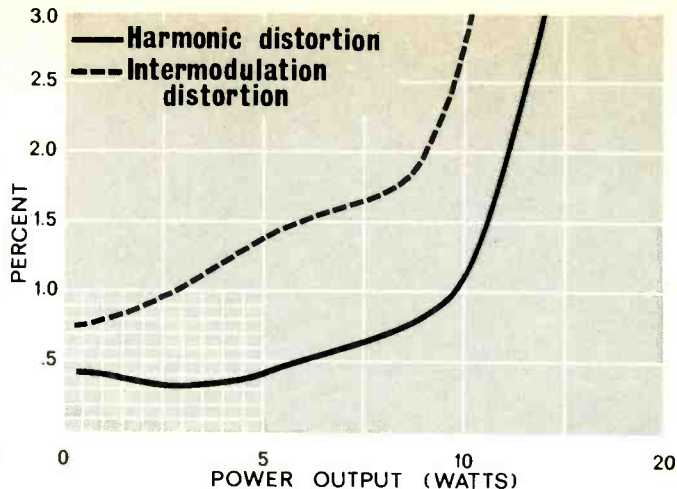


Fig. 6—Per cent distortion vs. power output.

required to be used. While the 2504/2505 receiver is equipped with an “in-door” FM antenna (a small capacitor coupled to the power cord), a proper outdoor FM antenna should be used for distant FM stereo reception (over 25 miles or so).

The power rating of the amplifier section of the receiver was found to be a total of 32 watts (IHF) music power at 8 ohms—40 watts (IHF) at 4 ohms—or just under 10 watts rms *per channel*, with both channels operating, at 1% total harmonic distortion. Power bandwidth at the 10 watt figure extends from 20 Hz to 30 kHz, as shown in Fig. 5. Frequency response at a nominal 1 watt level is 30 Hz to 20 kHz, within  $\pm 1$  dB. IM distortion is 2.4% for 9 watt rms output, as shown in Fig. 6. PHONO and GUITAR/MIC hum levels both measured 60 dB below full output, and the input sensitivity for full output for these two services measured 5 mV and 7 mV, respectively.

Figure 7 shows the total range of the bass and treble controls and Fig. 8 is a plot of the loudness contour compensation built into the loudness controls. The compact's versatility would have been enhanced even further if this loudness feature was defeatable, for while it may approximate desired compensation for FM listening (since the unit has full control over FM audio levels, providing all FM stations modulate properly), recordings, especially tape recordings, exhibit widely differing signal levels. Thus, a “heavily” recorded disc may make it best for the listener to lower the loudness control to, say, the mid-point and still achieve “live” listening levels. Under such circumstances, loudness compensation would not be desirable. Yet, with the control at this setting, about 8 dB of

bass boost (at 100 hZ) would be present—like it or not. The only solution would be to turn the bass control counterclockwise to compensate for the added bass introduced by the loudness contour action.

### Performance

At first, one might wonder whether a nominal ten watts rms per channel would provide adequate levels of sound in a reasonably large living room. In the test listening set-up, possibly the worst of all L-shaped areas for treble dispersion and good coverage, it can be stated unequivocally that a setting of about two o'clock on the loudness control provided sufficient volume on both recorded selections and FM listening. The control was even cranked to full level and, though we were treated to “louder than life” sound, there was no evidence of “break-up,” either from the amplifier or from the S-10 speaker systems.

Wandering about the listening area, searching for “holes in the middle” and loss of highs, it can be reported that, even positioned at the far end of the “short leg” of the “L-shaped area with one speaker totally out of view, the highs were very much in evidence. Extended listening in a more suitable location in the room caused no evidence of “fatigue,” further indication that distortion, considered in terms of the total system, is extremely low. Although a “tweeter” adjustment is provided on the enclosures, factory setting (about mid-way) seemed right for this acoustic environment.

The Model 2505 compact's S-10 speaker systems can stand alone as a clean-sounding “bookshelf” type. Its high-frequency element exhibits excel-

lent angular dispersion. Clean, fundamental bass was measured down to 40 Hz (below which, severe doubling occurred). They did not exhibit any “peaking,” nor did they create any of the “barrel-boom” effects sometimes associated with small enclosures. The middle frequencies were good, not projected or depressed.

The 2504's S-14 speaker systems are much smaller in size (and price) than the 2505's. They exhibited good fundamental response down to about 60 Hz before falling apart. While the ultra highs did not seem to extend quite as far as in the S-10's, angular dispersion was nevertheless excellent and overall

Fig. 7—Bass and treble tone control range.

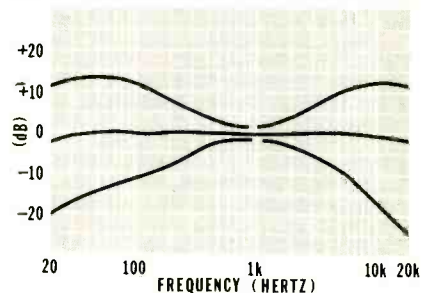
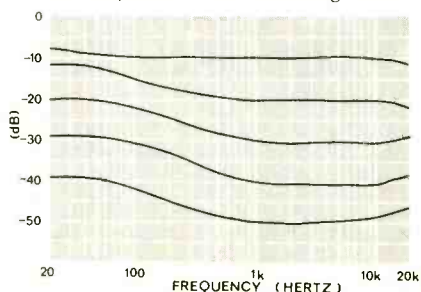


Fig. 8—Loudness contour for enhanced bass response at low listening levels.



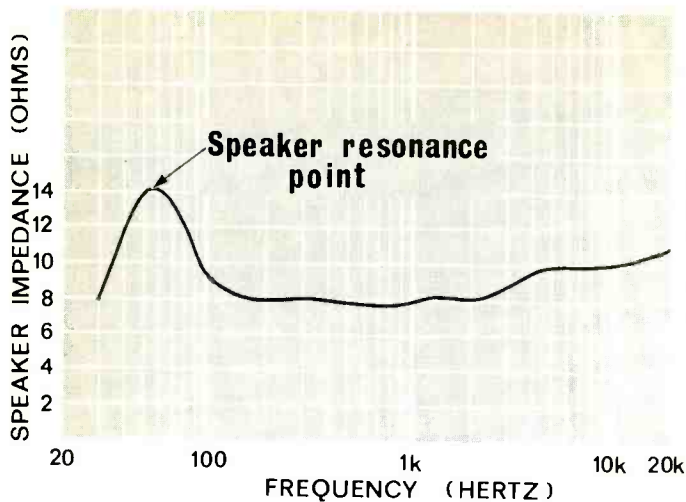


Fig. 9—Speaker impedance of the S-10 system remains 8 ohms or more throughout the audio range, affording high protection to power output transistors.

frequency balance was quite satisfactory. Middles were not as good as the S-10's, as might be expected. Probably the low-middle frequencies are being masked a bit by the bottom end.

Both sets of loudspeaker systems were also tested by extended operation with a different receiver from that offered in the compact system. In that way, they were also judged independently, as loudspeaker systems per se. No audible difference was detected.

From an equipment protection point of view, the manufacturer claims that these speakers have an impedance of 8 ohms or greater at all audio frequencies, so that there is no danger of approaching a "short circuit" condition across the output transistors. By this time most everyone knows that extremely low impedances (under 4 ohms) across most power output solid-state circuits can damage the output devices. The speakers were put to the test and impedance was measured at all significant frequencies. The results are plotted in Fig. 9 and, as can be seen, the curve is so smooth it could be mistaken for an amplifier frequency response curve rather than a loudspeaker's impedance curve (which usually is full of extreme mountains and, what's worse, valleys).

FM reception is flawless and noise free. A total of 35 FM stations were logged, 11 of which were broadcasting noise-free stereo. The least powerful of these (but nevertheless quite listenable) registered a meter indication equivalent to only 10  $\mu$ V of signal at the antenna terminals.

In terms of the compact's record-playing facility, we would have liked to see the music system employing the next grade or two up in the Garrard and Pickering lines of automatic turntables and stereo cartridges, respectively. (Scott's AM-FM stereo compact does incorporate a more sophisticated Garrard changer.) That's one of the

shortcomings of buying a fixed system. With separate components, it is axiomatic that various components be matched in terms of quality and cost.

Still, at \$349.95 for the Model 2504 and \$419.95 for the Model 2505, it must be admitted that overall performance and sound quality rivals that of component systems in which these prices were for the receiver alone. Also, the views expressed here have to be tempered by considering the wider, less-demanding audience that many of the compacts are headed for.

Both compact systems represent excellent value, reproducing records or FM broadcasts in a very satisfying manner. There is no doubt that "component" quality has been incorporated into the units. Refinements such as tracking as low as  $\frac{1}{2}$  gram, an elliptical stylus, anti-skating control, etc., are absent, of course. But then the compact end-user will probably not even miss it, or if he does, console himself with a "that'll be next when I have the money" rationalization.

Choice of speaker systems made a distinct difference in performance. Judging the compacts as systems rather than as components, the more expensive Model 2505 (\$70 more) clearly produced better sound. Whereas the Model 2504 with its S-14 speaker systems sounded very much like a good receiver played through \$49.95 speakers (which it is), which is not to be sneezed at, the Model 2505 with speakers at \$79.95 each (if bought separately as component speakers) could well pass for, say, \$109.95 speakers.

A-B'ing the two compact music systems, the less expensive Model 2504 (with S-14 speakers) just didn't exhibit the sparkle and crispness displayed by the S-10 speaker systems when they were substituted. The 2504's S-14 speaker systems came off sounding relatively dull; certainly less realistic than the S-10s did.

The lesson here is that a stereo hi-fi system is only as good as its weakest link. In our estimation, therefore, the Model 2505 offers better value if you've got the extra \$70 and truly care about good sound. The S-10 speakers are bigger than the S-14 ones, of course, defeating compactness somewhat. But they're worth it. Combining tasteful design (an optional smokey-gray plastic cover is a *must*), nice overall performance (especially with the S-10 speaker systems), and modest cost, the compact Scotts should find their way into many apartments and homes where space is at a premium.

Check No. 54 on Reader Service Card

## Ampex Micro 85 Stereo Cassette Recorder Player

**MANUFACTURER'S SPECIFICATIONS—**Frequency response: Playback, 6-dB envelope; Overall 8-dB envelope, 100 Hz to 8000 Hz. S/N ratio: 40 dB min. Crosstalk: 50 dB min., mono, at 100 Hz (side 1 to side 2); 20 dB min., stereo, at 1000 Hz. Mic input sensitivity: 1 mV min. Line input sensitivity: 200 mV min. Input impedance: Mic, 1000 ohms; line, 1 megohm. Line output level, 500 mV min. (100k ohm load). Speaker output level, 800 mW min. Speed accuracy: 5%. Flutter: 0.4%. Price: \$199.95.

This is the first time we have been able to study a home-type stereo cassette player, and it is really an eye-opener. Not that it is *really* high fidelity, but it is nevertheless a fine compact instrument for playing cassette tapes, and recording them as well. The unit is furnished complete with a stereo microphone, a table stand, two patch cords—about which more later—and two speaker systems.

By compact, we mean just that. The recorder/player measures 14 $\frac{3}{4}$  in. wide by 8 $\frac{1}{2}$  in. deep by 4 $\frac{1}{4}$  in. high over the knobs, of which there are four—recording level, balance, volume and on/off switch, and tone. There are also seven piano-key operating controls—record, cassette, play, rewind, fast forward, pause, and stop. The record key is red, and must be depressed along with the play key when you wish to record. The cassette key releases the cassette holder to allow a cassette to be inserted or removed. The other keys are self explanatory, with the possible exception of the pause key, which allows the recordist to set levels with the controls in the record position but without actually recording the tape. It also serves as a momentary stop key to allow the user to answer the ubiquitous telephone call so often mentioned in the ads. A digital counter with a push-