

colors are pure and consistent all over the screen.

Several features of the GR-25 appear to make it a far better value than most commercial color sets, particularly for the user who has sufficient interest to prefer to maintain his set himself rather than call in a service man every time some re-touching is necessary.

In the first place, the set is entirely enclosed in a steel cabinet to eliminate the effect of external magnetic fields—especially that of the earth itself. In the second place, automatic degaussing coils are built in (though these are common now) so the entire chassis and picture tube are “degaussed” every time the set is turned on. (The audio buff may want to read “erased” for “degaussed.” In the third place, an external degaussing coil (bulk eraser?) is furnished so as to demagnetize the cabinet and the tube screen whenever it becomes necessary. (If you doubt that an external magnetic field can affect a picture, just try holding a magnet near the screen of any TV set and see what happens to the picture.) Undoubtedly, everyone has heard that once a set is adjusted for perfect convergence in one location, and then pushed back to the wall to its normal position, it is likely to be out of adjustment again, because of the earth’s magnetic field. The steel cabinet largely eliminates this problem.

A second feature of special interest to the self-sufficient “handyman” type, which applies to the average audio buff, is the provision of a built-in dot generator, along with the ability to cut off any one of the color guns separately without having to resort to a “jury-rig” arrangement at the CR tube socket, even if that would work. A jumper wire with a clip on the end is provided which can be clipped on the wire lead of an upstanding resistor—one for each color—to eliminate any one of the three colors selectively. In making convergence adjustments, the blue gun is cut off and adjustments are made to obtain pure yellow dots, indicating convergence of red and green. When this is done to the user’s satisfaction, the blue gun is turned on and the adjustments

made to obtain pure white dots all over the screen. Similarly, with the blue and green guns cut off, one adjusts for purity of the red screen, which ensures that the red beam is properly positioned to strike only the red-phosphor dots. This is performed by moving the two purity rings, either together or separately.

The presence of the dot generator eliminates the need for an external test instrument. It provides a series of dots, in 9 to 15 horizontal rows, each dot being about $\frac{1}{4}$ in. wide and an inch high, and with 18 to 24 columns of the dots. These dots make it possible to perform all the convergence adjustments without external equipment, since the dot generator is actuated by the movement of a single slide switch.

Another desirable feature of the GR-25 is the hinged chassis, as shown in Fig. 2, which gives access to all of the electrical wiring in the cabinet proper. Figure 3 shows the convergence panel, which contains nine potentiometers and three adjustable coils on the circuit board, all of which serve in adjusting convergence. In addition, the panel mounts the height, vertical linearity, AGC, color killer, and sync controls, as well as one control which varies the number of rows of dots when the dot generator is turned on. This entire panel is accessible from the front—one simply tilts the speaker panel forward, and the convergence assembly is in convenient position. Most color sets seem to have their convergence controls at the rear, making it necessary to make all adjustments with a mirror.

Over-all “gray-scale” adjustment can be made from the rear of the chassis. It has been said that any color set will produce a color picture—it takes an especially good one to produce a good black-and-white picture, one that is not shaded over-all with either a greenish or a bluish cast. The GR-25 produces a pure gray scale throughout, resulting in a black-and-white picture of excellent quality.

Color Quality

One of the problems of color picture tubes of a year or so ago was that the brilliance of the red phosphors then available was so low—even at best—that the green and blue had to be reduced to balance with the red so as to make a pure white, and consequently the over-all brightness was low. The new “rare-earth” phosphor in the Hi-Lite tube provides a brightness more in keeping with the natural brightness of the blue and green, so the over-all brightness is now perfectly adequate, even enough to permit good color viewing in a well lighted room.

Without professing to be an authority on color TV, this observer has begun to notice what other sets look like and it can be said that the color of the Heathkit GR-25 is the best that we have seen in any color set to date. Like most people with a new gadget, we were inclined to use too high a setting of the color control at first, resulting in somewhat gaudy coloring much like early Technicolor pictures. However, after living with the set for a few weeks, we gradually adopted a softer pastel coloring, which is pleasanter and

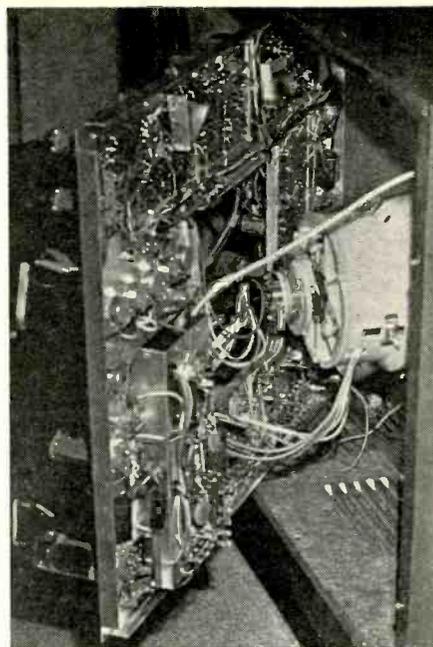


Fig. 2. Hinged swing-out chassis gives access to all wiring for easy servicing.

more natural, giving the effect seen in the movie “Tom Jones,” as compared to some other spectaculars such as “Inna la Douce.”

Details

The GR-25 is priced at \$469.95, with an additional \$59.95 for the GRA-25-1 Walnut cabinet shown in Fig. 1. This represents a real bargain to the user, since sets similar in appearance seem to run around \$700, without the built-in service features like the dot generator. Add to this the saving in service costs which the average set would require, since the builder would undoubtedly service his own set throughout its life, and the GR-25 is a real bargain. Besides that, it is capable of a great picture. Not that it matters, since one does not count on distance reception for TV, but we have played a station in Philadelphia—104 miles—with good color and little snow, and another in Wilmington, Delaware, both from our Mineola location and a built-in apartment antenna. This is more than adequate sensitivity.

Circle 200

DUAL 1019 AUTOMATIC TURNTABLE

Once upon a time you could tell the changers from the manuals. And furthermore, there was no question about the performance superiority of the manuals.

That has been changed in recent times. This Dual 1019 is the latest product to come along that convinces us that there is no longer a separation of the species.

Quite the contrary, this 1019 removes any vestige of doubt that may have lingered. There is no differentiation to be made in terms of performance capabilities.

The 1019 model is actually an embellishment of the earlier 1009—a unit that established performance standards for an automatic. All of the features, including an excellent and versatile change mechanism, have been retained. Control remains in the hands (as it were) of a single fric-



Fig. 3. Service and convergence controls are front accessible when the speaker panel is tilted forward



Fig. 4. The Dual 1019 Automatic Turntable.

tion-free lever. With it, automatic or manual operation is accomplished. The Duals will operate automatically (pick up and set down) even with a manual (short) spindle in place.

The short spindle has been changed from earlier models. It is now a snug friction fit into the center hole, becoming one with the platter. Thus one area of flutter (and rumble) generation has been improved.

An effective arm cue mechanism is now incorporated into 1019. This gently lowers the arm in an absolutely vertical direction. There is no side thrust—you can use this cue lever to interrupt a selection and then return to the same groove.

The arm itself is the center of many of the changes incorporated in this new unit. It has been made lighter; the cartridge shell locks into place securely; that shell allows the cartridge to be mounted for minimum tracking error (a gauge is provided). The main innovation, however, is at the base of the arm. Here a rotating wheel selects the amount of anti-skating compensation, commensurate with the stylus size and force being employed.

Dual provided us with a novel device they call a Skate-O-Meter. This attaches to the front of the arm in place of a cartridge and rides the grooves of a record with its own stylus. A meter pointer indicates the exact degree (in mg) of side thrust acting on the arm—in either direction. Thus, it acts readily to prove the effectiveness of anti-skating devices. It proved the system installed in the 1019 to be completely adequate to the needs of skating compensation.

Measurements

Rumble—41 dB below a recorded velocity of 3.54 cm/sec stereo.

Flutter and wow—0.08 per cent.

Sensitivity to line voltage—100-130 volts; insignificant. (The 1019 features a vernier speed adjustment of ± 3 per cent around each speed. Thus, any actual speed change vs. voltage can be exactly compensated. However, in practice, the drive motor of this unit is relatively insensitive to normal voltage variations.)

Maximum tracking error—1.25 deg. at the outside of a disc, reducing to near zero at a 3-inch diameter.

Arm resonance—well damped at 16 Hz.

Stylus force change vs. record stack thickness—0.1 gram.

Stylus force necessary to activate arm trip—0.25 grams.

These are the prime measurements. They

would be excellent if applied to a true manual system. For an automatic selling at \$129.50 less base, they are the proof that *no gulf at all* exists between manual and automatic. We suggest no cartridge restrictions for use with this table. Nor could we hesitate to suggest its use with any system, no matter how superior other components.

Circle 201

SONY 2010 VIDEOCODER AND CVC-2000 VIDEO CAMERA

To anyone accustomed to the operation of a conventional audio tape recorder, the acquisition of a Sony Videocorder will offer a brand new field of interest without introducing any complications in handling, so that even the novice can begin to enjoy the immense possibilities of the new medium at once. The actual mechanics of operation should require no special training or skill not possessed by anyone capable of tuning in a TV program.

The Sony Videocorder assembly comes in two forms—the 2010 pictured is in a carrying case with its monitor, and can be

considered a portable (it has handles), and the 2020 is in a walnut cabinet suitable for placement anywhere in the home, and comes with a clock-timer for recording desired programs automatically with no attendance. The recorder section alone is Model 2000; the monitor/TV receiver is a 9-in. CVM-51 UW which is hinged in the case and raises to an upright position for use. For transporting, the monitor is lowered into the case. The over-all dimensions of the entire unit are 18 by 28½ by 12 in.

The recorder unit alone measures 16 by 14 by 8½ in. and employs a helical-scan tape drive utilizing ½-in. tape. The feed reel is elevated approximately ½ in. above the take-up reel, and as the tape passes from one to the other it is guided around the scanning drum at an angle for one-half of the circumference of the drum. The scanning heads rotate in a horizontal plane, contacting the tape through a slot in the stationary drum, with the result that the scanning lines run diagonally across the tape. As the heads rotate at a speed of 1800 rpm, which is 30 rps, and the length of each scan is approximately 6½ in., the actual scanning speed is in the vicinity of 200 in./sec. Instead of recording the video signal directly, a frequency-modulated signal is employed in which the carrier of 1.7 MHz is modulated by the video signal with a deviation of ± 1 MHz. This method makes it possible to record a wide video-frequency range without deterioration of high-frequency response, which would, of course, adversely affect the picture quality.

Only one of the two rotating heads is used for recording. Since the *frame* frequency of a TV picture is 30/sec (the *field* frequency is 60/sec, but it takes two fields to make up one *frame*) the rotating record head actually records one field during its contact with the moving

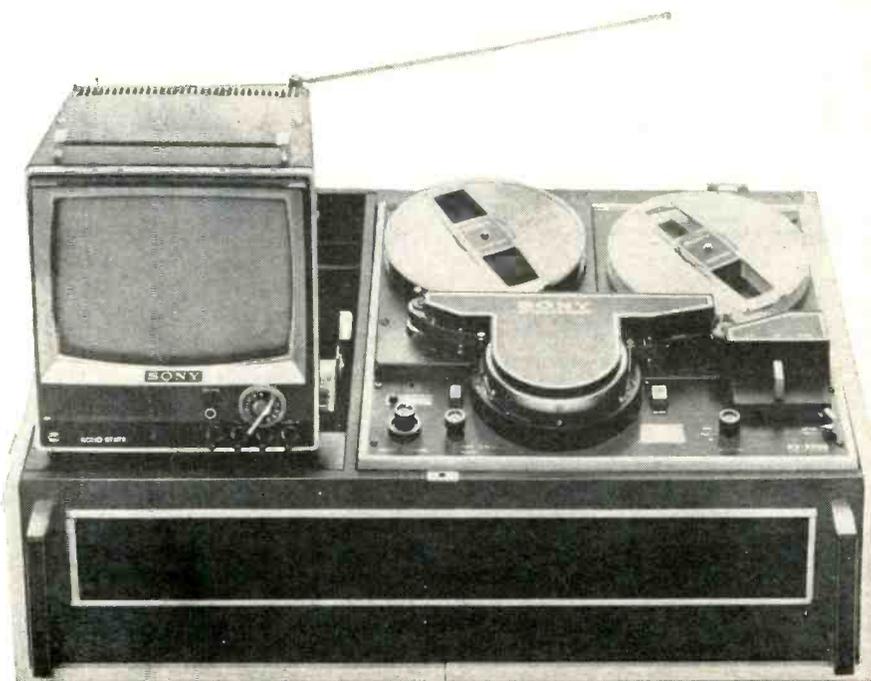


Fig. 5. Sony Model 2010 Videocorder, with its built-in 9-in. monitor/TV receiver.

tape, but during the second field, the head is passing around the open back of the scanning drum where there is no tape. Thus only the alternate fields are recorded.

On playback, however, both heads are in operation, and because of their differing placement, each recorded line is scanned twice—once by each of the heads. This is equivalent to a TV picture of half the normal number of lines, or what would be seen by a camera taking a still picture of a TV screen at a shutter speed of 1/60 sec. (To get a picture of *all* the lines in a TV picture, the shutter speed must be no greater than 1/30 sec.) This does reduce the *effective* number of lines in the picture by half, since on playback one sees one field twice, then the next field twice, and so on. However, it does eliminate the need for commutating the heads—one cause of the occasional discontinuity seen in taped TV programs. The head connections are made by simple slip rings.

To maintain synchronism, two separate pulse sensors are mounted with the scanning assembly. One consists of a magnets on the rotating head arm which pass through the poles of two fixed coils, thus generating a 30-Hz pulse used for speed control as well as a 60-Hz pulse which is fed to the camera for vertical sync. The other pulse frequency—15,750 Hz—is generated by a toothed wheel passing another coil, and this signal is fed to the camera for horizontal synchronization.

The 30-Hz pulses are doubled and compared with the transmitted sync signals from the TV set, then integrated and used to control the brake on the rotating head shaft to maintain synchronism. (Thus the "unbraked" speed is seen to be slightly higher than 30 rps.) Part of the pulse signal is recorded on the edge of the track during recording by the combination audio and control head, and is used to maintain synchronism during playback.

The CVC-2000 Video Camera, available as an accessory, employs a Sony Vidicon tube, 26 transistors, and 25 diodes, and has a video output of 1.4 V with a resolution of 400 lines (which is better than the average TV set). It operates from a 117-V a.c. line with a power consumption of only 10 watts. The normal lens is a 25-mm, f/1.9 unit in a standard "C" mount, thus permitting the use of any 16-mm camera lens. The automatic sensitivity system compensates for light variations by changing the gain of the video amplifier so the camera operates over a light range of about 6000 to 1. The unique circuit of the camera involves the amplification of the video signal in two ranges, with differing amounts of gain in each range. The d.c. component of the signal is amplified considerably less than the high-frequency portion, and since most of the noise is contained in the low-frequency portion, it does not appear in the over-all output since low end and noise have not been amplified as greatly. Thus detail is maintained without appreciable noise. This results in a S/N of some 40 db, which is good for a vidicon-equipped camera.

The sound signal is recorded on the other edge of the tape from the control signal by the audio/control head and sep-

arate amplifier circuitry. The tape speed is 7½ ips, which is more than adequate for the audio range of 80 to 10,000 Hz. The amplifier accommodates an unbalanced microphone input at a 600-ohm impedance, and a balanced, transformer-isolated auxiliary input at an impedance of 10,000 ohms. The recorder unit employs 49 transistors and 24 diodes, while the 9-in. monitor/TV receiver employs 27 transistors, 14 diodes, a selenium rectifier, two thermistors, and a tube-type high-voltage rectifier. Camera output and video input match at 75 ohms.

The monitor/TV receiver is modified from a conventional 9-in. Sony TV set, with a sensitivity of 5 μ V on both VHF and UHF. The video output available to the recorder is 1.0 V. composite with negative sync, and the input from the recorder on playback is of the same value.

Performance

The brief description of the components can only serve to arouse more curiosity, but a thorough outline of the circuitry would require a volume larger than this entire issue. After living with this unit some three months, we have found it reliable in performance and a real source of entertainment. Sony only claims a resolution of 180 lines, but this compares with many a 14 to 19-in. TV set on the market today. With the addition of an r.f. adapter, the recorder can feed any TV receiver (direct connection does not seem to be possible because of the negative sync), and it is likely that various methods of connection will be added as the demand grows.

At its 7½-ips speed, a 2400-ft. reel of tape (which can be had on a 7-in. reel) will run for a bit over an hour. If you are recording an old movie on the Late Show to build a library, you can stop the machine during commercials to get more running time on one reel, of course, starting the machine again when the commercial is over. When the tape transport is stopped, the heads scan the same scene over and over, giving a stop-motion picture when desired. Separate audio and video level controls are provided, along with a meter which indicates either of these levels—selectable by a switch, as well as the line voltage. The monitor can also be used as an ordinary TV set, with the motor of the recorder switched off. An automatic switch stops the machine when tape runs out.

One application of the camera which appeals to those who also indulge in photography is its use as a continuous monitor to aid in lighting a portrait, for example. It would seem as though it would be a great help, since the picture is, of course, in monochrome, making it easier for the photographer to see how the lighting will appear in the finished picture.

In all, the Videocorder offers a myriad of applications which should appeal to all true experimenters, and experience with it and its accessory camera could undoubtedly uncover hundreds of uses in the home, in addition to the commercial and industrial applications—to say nothing of the educational field, which could become its most important user. Consider, for example, the value of the Videocorder for storing educa-

tional programs, or telecast school work, for later study or review.

Or maybe even for improving your golf game?

Circle 203

SCOTT 342 RECEIVER

This is the low-end receiver of the Scott line but it is no low-end product. It is designed to sell under \$300, yet it is capable of performance characteristics far beyond what you would expect. It is also the first receiver to come our way (and the first on the market) to use a field-effect transistor in the FM front end. The results are impressive.

This is the first tuner of transistor design that we have seen that combines the virtues of high input sensitivity with an indifference to overload from strong local signals. Scott claims an IHF sensitivity of 2.5 μ V; we measured 2.2 μ V. At the same time, a bombardment with 100,000 μ V caused no problems. Frequency response of the tuner was also within specification, \pm 1 dB from 30 to 15,000 Hz. Stereo separation is an excellent 27 dB for either channel at mid-frequency points; it is still in excess of 20 dB above 10 kHz.

Tuning is by signal-strength meter and is light in feel. Any usable signal will present no tuning problems. Stereo switching is triggered by the 19 kHz sub-carrier; this also lights an indicator.

All of the front-panel expectations are on this receiver. Layout is logical and uncluttered. Some of the extras that have been included are a three-position switch for speakers—OFF, MAIN, REMOTE. In conjunction with the off position there is a low-impedance stereo earphone jack.

The Scott 342 is of modest power output.

(Continued on page 65)

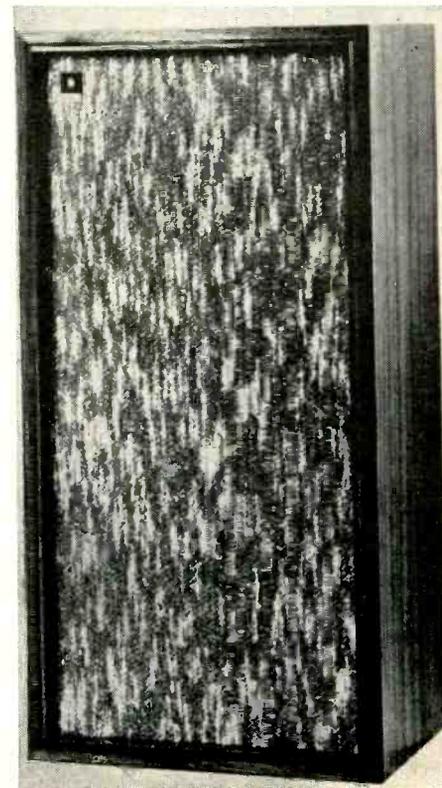


Fig. 6. Scott S-8 Speaker System

Bulk Erasing

Q. Can you explain how to bulk-erase tape without leaving residual magnetism in the form of very-low-frequency thumps or disturbances? For years I have followed all the instructions carefully. I rotate the reel on the degausser, turn it over, and move it away very slowly before releasing the "on" button. Nevertheless, some magnetism is invariably left on the tape. This is seldom a problem in normal operation because of the extremely low frequency of the disturbances. But it is noticeable when rewinding fast across the head.

A. I haven't encountered the problem of low-frequency disturbances with bulk erased tape, perhaps because I haven't looked for them, perhaps because I erase very carefully, perhaps because my tape machine lifts the tape away from the heads during rapid wind. I would first suggest that you find some way of lifting the tape away from the heads during rapid wind. This can often be done by simply removing the tape from the tape slot and winding directly from reel to reel. Another method is to insert a piece of smooth celluloid between the heads and the tape during rapid wind (this also protects the heads from undue wear). Finally, I can describe the bulk eraser and erasing procedure that I use, with the thought that you may find a clue here to solving your problem: The bulk eraser is one I made from a hefty power transformer weighing about six pounds. I removed the E and I plates from the core, threw away the I plates, and replaced the E plates *all in the same direction*, leaving a powerful electromagnet which can be used about one or two minutes before heating substantially. Before bringing the tape reel in the vicinity of the eraser, I turn the latter on. I gradually bring the reel of tape to the eraser, then remove it gradually while describing a rotary motion so as to cut all parts of the magnetic field. I turn the reel over, again bring it to the eraser, remove it very gradually while describing a rotary motion, and slowly bring the reel to a resting place about 10 feet away. Then I shut off the bulk eraser.

Dep't of Easy Answers

*Q. I have a **** tape deck and a **** amplifier. Everything seems to work except the following: (1) If I hook the monitor outputs of the deck to the monitor jacks of the amplifier, I get no sound, although at first I did for a very short time. (2) If I hook the monitor outputs of the tape deck to the auxiliary inputs of the amplifier, the deck plays back all right. (3) If I hook the amplifier outputs of the tape deck to the monitor jacks of the amplifier, it monitors all right but not as loud as the hookup described in (2) above. I had the tape deck checked by the authorized service agency for my tape machine, and they could not find anything wrong. Would you kindly explain why the amplifier jacks work for one circuit but not for another, Can you suggest any remedy?*

*Q. (Two days later). Please ignore my letter of several days ago regarding trouble with my **** tape deck. It suddenly began to function. I do not know why. May-*

be a screw was shorting something. Thank you.

A. I wish they were all that easy.

Editor's Note

The Tape Guide column in the February issue erroneously stated Mr. Burstein's belief that the RIAA standards of tape equalization are the first officially promulgated for 7.5 and 3.75 ips. Mr. Burstein has informed us that John G. McKnight of the Ampex Corporation has written to state that the NAB Standard Magnetic Tape Recording and Reproducing (Reel to Reel) April 1965 did cover these speeds. Mr. Borstein extends his apologies to all concerned.

EQUIPMENT PROFILE

(from page 52)

As with most transistor amplifiers, actual power is dependent upon the load. So that at 4 ohms, the 342 delivers 25 watts per channel. At 8 ohms this is reduced to an 18-watt figure; at 16 ohms it is 10 watts. Power bandwidths for the various loads are constant extending +0, -2 dB from 50 to 20,000 Hz. Over-all 1-watt response was measured at ± 1.5 dB from 15-30,000 Hz.

Amplifier IM distortion, the downfall



S-10
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Self Contained Convenience

FET circuitry eliminates external power supply • Permanently polarized
Powered by 1000-hour battery • Frequency Response: 40 — 20,000 Hz
Pressure gradient • Mylar diaphragm • Cardioid Pattern • 20 db discrimination
• No overload protection needed • Low noise (less than 23 db)
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nickel finish • Only 9 ounces with battery • Full accessory line • Wind
screen • Elastic suspension • Desk stand • Fully guaranteed • \$240 complete
(with battery, case, swivel mount, 20-feet of cable) • Made in U.S.A.

SYNCRON CORPORATION
WALLINGFORD, CONN., U. S. A.

Circle 135 on Reader Service Card

of many a transistor unit, measured extremely well. Judge from the following table (both channels were quite close):

Equiv. Power	1M Distortion
1 w. (8Ω)	0.20 per cent
5 w.	0.12 per cent
10 w.	0.27 per cent
15 w.	0.65 per cent
18 w.	0.98 per cent

The Phono-input circuit is unusual in that a front-panel switch selects PHONO LOW or PHONO HIGH. These are the same magnetic phono inputs as on the rear panel. The two different positions serve to change the input sensitivity (and hence the overload point). At maximum sensitivity 5.9 mV will provide rated output and the overload point will be 56 mV. The other position results in 9 mv being needed for full output but 115 mV must be reached before overloading sets in. Thus, Scott offers moderately good sensitivity for owners of low-output cartridge; while high-output cartridge owners can use the 342 without encountering overloading of the input circuit.

RIAA equalization accuracy is ± 2 dB from 30-15,000 Hz. There is permanent loudness compensation added to the volume control so that at 12 o'clock settings there is an additional 3 dB of bass boost at 100 Hz. At 9 o'clock, 100 Hz boost is +9dB.

Our listening tests confirmed what our instruments found. This is a good-sounding product, providing a level of performance that far exceeds the relatively modest price asked. Plainly, we like this unit. Circle 204

SCOTT S-8 SPEAKERS.

Also included at the time we received the 342 were a pair of S-8 speakers. These are two-way systems of modest dimension, approximately 12" x 24" x 9" and finished in a glossy walnut.

They are made to be used either as separate component speakers or with the several Scott modular systems. Toward these ends, they contain dual inputs on their rear panel. The usual screw terminals are there. In addition, however, a parallel RCA-type phono female is provided. Impedance is 8 ohms and there is a continuously variable tweeter-level control.

We were duly impressed by the quality of these units. Their range is not tremendous—there is little output below 50 Hz and although rolloff commences at 10 kHz, the speakers are still usable to 15 kHz. However, the frequency sweeps we made revealed a constant output smoothness that we have not come to expect from modestly-priced speakers. In point of fact, not too many high-priced units can do better than this little S-8.

Power requirements are modest. An amplifier such as that found on the Scott 342 is more than adequate.

This speaker "listens" well. It produces a sound at once gentle and full. One of the effects we have noticed in the past is that a speaker that has no serious bumps or dips in its response appears to have wider range than is actually the case. Such is true here.

This S-8 is suitable as a modest investment for either primary or remote listening applications. Circle 205



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The remarkable ReVox boasts features found only in the most expensive, professional tape recorders. Each of the two reels, for example, has its own Pabst motor. Direct coupling eliminates wow and flutter; no belts to break or slip. Tension adjustment control allows use of any reel up to 10½ inches (the only recorder in its price class that takes a 10½-inch reel.) All operating modes switched electrically.

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- Records up to 4800 feet of LP tape • Complete 4-track stereo recorder • 10½" reels • For horizontal or vertical mounting • Cathode follower outputs • Oversize solenoid brakes assure quick, positive breaking even with extremely fast rewinding speeds • Automatic stop at end of tape • Two VU meters

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It works simply and precisely, and independently of the arm and turntable mechanism. A flip of a lever raises a small platform, and elevates the arm a bare fraction of an inch, so that it can be moved across the record without touching the surface. Thus the stylus can be positioned exactly over any band or groove. Resetting the lever lets the platform (and arm) sink slowly, gently lowering the stylus into the selected groove. All Miracord 40 Series turntables are pre-drilled to accept this accessory. Price is \$12.50 at most hi-fi dealers.

Benjamin Electronic Sound Corp., 40 Smith Street, Farmingdale, N. Y. 11736

Miracord 40 Series Cueing Device



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