



Fig. 2. Drawing showing the details of the 800B.

with a line-voltage variation of 10 per cent.

The tone arm exhibited no serious resonances down to 10 cps, the limit of our test record, and could track well with a stylus force of 1 gram, although we used a force of 1.5 grams for the complete series of tests. (We should mention that the cartridge we used, and found to be quite

excellent in this system, was the Stanton 481AA. We'll report more specifically on this cartridge in the near future.)

For those interested in an unusually fine turntable system designed to perform at top level for a long, long time, we recommend investigating the Stanton 800B system. **A-15**

H. H. SCOTT FM-STEREO TUNER-AMPLIFIER, MODEL 340-B

Without question, the 340-B is a radically new styling concept for H. H. Scott. Gone is the familiar circular tuning dial which was truly a trademark for so many years. In a way we hate to see any change that reminds of the passing years. On the other hand, we must admit that we like the new styling much better than the old; it looks as if it would go well in that expensive and elegant cabinet in the living room. In any case it's a daring thing for a manufacturer to radically change a characteristic which has won recognition in the past. We think they deserve credit both for doing it and for succeeding.

Now let us look at the instrument as a tuner-amplifier. The 340-B contains on one chassis an FM-sterEO tuner, a 70-watt (1HF) stereo amplifier, and a complete audio control center. From a circuitry standpoint, it would seem to be a Scott 350C tuner and 299D amplifier on one chassis.

Sounds simple enough. Just have to get a big enough chassis, and there we are. But wait a minute, why use two power supplies? Certainly would be more efficient to use one supply for both. Hold on again, if we used a chassis that big would it fit into most modern furniture? Probably not so it would be better to lay out the circuit more compactly. And what about heat? If the amplifier and tuner are brought into intimate contact aren't we going to have heat from the amplifier affecting the tuner? Possibly, so it would be better . . .

The point is quite obvious; a tuner-amplifier is a new design problem, even if the circuitry is exactly the same as the separate tuner and amplifier.

Does that mean that a tuner-amplifier cannot perform as well as its equivalent individual components? Absolutely not! It merely means that one has to engineer them to work together. In fact the proof of the pudding is the performance specifications. Not only does the 340-B measure as well as the 350-C, for instance, but it also includes automatic stereo switching with an indicator light. And, wonder of wonders, the 340-B costs slightly less than equivalent separate components. Probably the result of savings in production, packaging, and shipping.

A delightful feature of the 340-B is its built-in thinking circuit: in the Automatic Stereo position, the 340-B detects the presence of an FM-sterEO broadcast and automatically does all the internal switching necessary to process a stereo signal; if the FM signal is mono, it sets itself to deliver a mono signal to the speakers. When it sets itself to stereo, the 340-B graciously lights an indicator lamp to inform us mere mortals what it has done. Now if they would only include a circuit to start the coffee pot . . .

Another unique feature is the special balancing circuitry which permits balancing the speaker systems with any kind of program material, mono or stereo. One need only switch between the Bal-R and Bal-L positions on the Selector switch, and listen for equal loudness from both speakers. If they are not equal one rotates the balance control until they are. Simple and effective.

Now let's look at the individual sections of the 340-B:

The Tuner

The r.f., i.f., and detector sections are well-known Scott circuits, clearly related to the long line of Scott tuners. The r.f. section uses two triodes (6BS8/6BQ7A twin triode) in a cascode configuration, followed by a 6U8 oscillator-mixer. The entire front end assembly, including the first i.f. transformer, is a sub-assembly familiar to those who have seen Scott tuners in the past; it has achieved recognition as the "silver-plated" front end. Following this are two i.f. amplifier stages employing 6AU6A tubes. The signal-strength meter is located at this juncture, before the signal proceeds to the limiter stage (a 6HS6).

From the limiter the signal goes to the wideband ratio detector. As we said before, this part is really quite similar, if not identical, to the Scott 350C. Indeed, the multiplex circuitry is also identical. The major area of difference is the automatic switching with the indicator light. The automatic switching is completely electronic so that it is quiet as can be. It's not fooled by random noise either as some of the early stereo indicator circuits were. Except for the set warmup time, we found that the indicator very rarely would be triggered by anything but a stereo broadcast.

The final processes in the tuner section are to amplify and de-emphasize the audio signal. Now, on to the amplifier section:

The Amplifier

As we indicated previously, the amplifier is rated at 35-watts per channel music power, and 30-watts per channel steady state. The output stage used to achieve this is a pair of 7591 pentodes in push-pull with 450 volts on the plates, and 430 volts on the screens. Well-filtered d.c. is provided for biasing.

The triode section of a 6U8 is used as a phase splitter, the pentode section operating as a voltage amplifier. Feedback from the 16-ohm tap of the output transformer goes to the cathode of the pentode section.

The preamp section utilizes four triodes (two 12AX7 twin triodes), two in the front end to amplify low-level signals and provide appropriate equalization. The remaining two triodes provide sufficient gain to make up for the losses of the tone and filter networks. Well-filtered d.c. is also provided for the filaments of all the pre-amp tubes.

The power supply utilizes eight 1N560 diodes in two bridge configurations, one bridge for B-plus and the other for the d.c. filament and bias supply. Additional separate transformer windings are used to provide a.c. filament voltage for the amplifier tubes which do not require d.c., and for all the tuner tubes.

Performance

Before detailing the vital statistics we have arrived at on the 340-B, we must point out that tuner statistics are not yet completely revealing, at least as far as the average consumer is concerned. In other words, most consumers, when confronted with an array of technical measurements, is not usually qualified to make valid deductions from these numbers. For instance, the fact that some numbers are higher, or lower, than equivalent ones for a different tuner does not necessarily mean that one is better than the other. That is the reason we always provide value judgments on this type of product.

Thus we say that the Scott 340-B is a top-notch tuner-amplifier; in fact a top-notch tuner and a top-notch amplifier if you wish to use those individual functions (as in tape recording FM broadcasts, or

Fig. 3. H. H. Scott FM-Stereo Tuner-Amplifier, Model 340-B.



playing records).

Now for some statistics: *Tuner*—the usable sensitivity, by IHF standards, was 1.9 μ v; harmonic distortion, 0.7 per cent; signal-to-noise ratio, 62 db (for 100 per cent modulation); selectivity, 34 db; capture ratio, 5.5 db; AM suppression, 55 db; and separation, 33 db. (We should mention that we now use a Scott 830 multiplex generator for measurements—unquestionably one of the finest measuring tools available for multiplex testing.)

Amplifier—power output, 35-watts rms

per channel; harmonic distortion for 30-watts output, 0.6 per cent; intermodulation distortion, 0.25 per cent; frequency response, within 1 db, 20–20,000 cps; hum and noise 84-db below 30-watts output; input for 30-watt output, 2.7 mv at Mag. Low input, 0.38 volts at Extra input. Listening tests revealed excellent transient response and over-all tone quality, the latter being quite noticeable when listening to FM. Altogether, we think the 340-B is quite worthy of the Scott name. **A-16**

THE CIPHER DENON 800 TAPE RECORDER

Many discerning audiophiles first became acquainted with the Cipher line of tape recorders at the 1963 New York High Fidelity Show. This line consists of a number of more or less "garden variety" recorders of fairly conventional appearance and characteristics, topped off by Model 800, which encompasses many operational features that make it especially suitable for the serious recordist who enjoys conveniences usually found only in professional-type machines. Made in Japan by Denon Corporation, a subsidiary of Nippon Columbia, the Cipher is distributed in the U.S. by Inter-Mark Corporation. Denon also makes a console professional machine, and readers may remember seeing one of these units pictured in the "Hi-Fi and Electronics in Japan" section in the March, 1963, issue.

The Cipher 800 is comparatively large, measuring 19-in. high, 16 $\frac{1}{4}$ -in. wide, and 8 $\frac{3}{4}$ -in. deep, and weighing 55 lbs.

The 800 is a 3-motor, 3-head machine, with pushbutton operating controls. Five buttons are provided—RECORD, interlocking with the PLAY button, STOP, REWIND, and FAST FORWARD. In addition, there are two rotary switches—one to control a.e. power and select tape speeds of 7 $\frac{1}{2}$ and 3 $\frac{3}{4}$ ips, and the other to select right or left channels for mono recording, or stereo. A slide switch connects the monitor jacks and the VU meters to either the record circuitry or to the playback amplifiers. In addition, there are dual-concentric record level and playback controls. Line-level input and output phono jacks are located in a compartment on the right side of the case, accessible by a hinged door, which also provides access to an octal socket for

the remote control switch box, and also accommodates the power cord. Microphone jacks are located on the front panel, as are two headphone monitor jacks, one for each channel.

Inasmuch as we received the machine without either operating instruction book, service manual, or schematic, we were in about the same position as the average purchaser of a recorder before he reads the instruction book, and consequently we are unable to give a circuit description as we usually do. However, certain information can readily be gleaned from a general inspection of the recorder, and from conventional performance measurements. Bias frequency is approximately 71 kc, permitting recording to at least 14 kc on the basis of having a bias frequency at least five times the highest signal frequency. Separate right and left bias controls are provided under a protection cover on the rear of the case, along with a bias-balance control to adjust the bias current to optimum waveform. The following shows playback performance from Ampex Standard Frequency Tape No. 31321-01, 7 $\frac{1}{2}$ ips:

TABLE I

Frequency—cps	Relative Output—db
700	0.0
15000	+0.2
12000	+2.0
10000	+1.3
7500	+1.4
5000	+1.7
2500	+0.1
1000	0.0
500	+0.9
250	+1.5
100	+2.0
50	+2.3

At standard operating level (3 per cent harmonic distortion), the maximum playback level measured 2.6 volts. At 3 $\frac{3}{4}$ ips, playback response, measured with Ampex Standard Tape No. 31331-01 is shown in Table II.

TABLE II

Frequency—cps	Relative Output—db
500	-1.6
7500	-1.6
5000	-2.0
2500	-2.6
1000	-1.8
500	-1.0
250	-0.5
100	-0.0
50	0.0

Maximum playback output at standard operating level measured 2.05 v.

Frequency response in the record-playback mode at 7 $\frac{1}{2}$ ips is shown in Table III. Feeding in a constant signal of 1.0 v.,

and with the recording volume control set for a "0" indication on the VU meter at 100 cps, it was noted that this indication varied slightly with frequency, as noted in the second column of figures in the table. The third column indicates playback level.

TABLE III

Frequency—cps	VU ind.	Relative Output—db
1000	0.0	0.0
15000	+0.5	-1.4
12000	+4.0	+2.0
10000	+3.2	+2.0
7000	+1.5	+1.6
5000	+1.0	+1.0
3000	+1.2	+1.0
1000	0.0	0.0
500	0.0	-0.1
250	0.0	0.0
100	-1.0	-1.0
50	-3.5	-3.0

Thus it is seen that the playback output relates quite closely to the VU meter indication, even though there is a small variation, with frequency, of the VU indication when a constant-voltage signal is fed in. In-out harmonic distortion, measured with a record VU indication of "0" level measured 2.5 per cent at 1000 cps, 2.0 per cent at 10,000 cps, and 2.0 per cent at 100 cps. Wow and flutter measured 0.17 per cent at 7 $\frac{1}{2}$ ips, 0.2 per cent at 3 $\frac{3}{4}$ ips.

Record-play response at 3 $\frac{3}{4}$ ips measured within ± 2 db from 50 to 7000 cps.

Mechanical

For its mechanical features, the Denon-Cipher 800 rates high honors. Since all tape handling is done by relay-actuated solenoids, the pushbuttons, required only to make electrical contacts, are smooth and without any mechanical resistance. A tensioning lever at the right side of the capstan actuates the stop relay, so that the transport stops when the tape runs out, regardless of direction of motion. A tensioning arm is provided at the left side to smooth out tape movement off the feed reel. In the play and record modes, the idler roller is held against the capstan by a solenoid, and a shielding cover is closed to mate with the playback head shield. While it is possible to operate the pushbuttons in an incorrect sequence and break the tape, we must admit that we have never yet seen a pushbutton-controlled machine which would not break tape with incorrect operation. That is, you can break tape if you try, but you are not likely to with reasonably intelligent operation.

In short, we found this machine a delight to use in every respect. We would like to see this recorder incorporate a remote digital counter into the remote switch panel, and we feel that provision should have been made for a stereo headphone jack, rather than for two mono jacks. This latter is a very minor criticism, however, and it is likely that any recordist would replace one of the jacks within the first week that he had the machine in his possession, assuming he was interested in any amount of stereo recording. **A-17**



Fig. 4. The Cipher Denon Model 800 recorder.

FOR INFORMATION ABOUT PROFILED PRODUCTS CIRCLE INDICATED NUMBER ON READER SERVICE CARD.