Equipment Profiles

This Month:

- Marantz Model Eighteen Stereo FM Receiver
- BSR Model 600/M44-E Automatic Turntable
- Jensen Model TF3B Speaker System

Marantz Model Eighteen Stereo FM Receiver

Fig. 1

MANUFACTURER'S SPECIFICATIONS — (AMPLIFIER SECTION) Power Output per channel (both channels operating): 40 watts rms at 4 and 8 ohms. Power Bandwidth (IHF): 10 Hz-30 kHz at 0.2% THD. Frequency Response: 20 Hz-20 kHz ±0.5 dB. Total Harmonic Distortion (at rated power): 0.2% max., less at lower power. IM distortion (at rated power): 0.2% max., less at lower power. High-Level Hum and Noise: —80 dB. Damping Factor: 30 min. (TUNER SECTION) FM Sensitivity (IHF usable): 2.8 μV. Total Harmonic Distortion (400 Hz, 100% mod.): 0.2% max. Multiplex Separation: 45 dB at 1000 Hz. Subcarrier Suppression: 65 dB Min. (GENERAL) Dimensions: 18¼" W x 6" H x 5¾" D. Price: $695.00.

A Marantz FM/FM stereo *receiver!* Six-hundred-and-ninety-five dollars! And therein lies drama.

Marantz was more cautious than most manufacturers in combining on one chassis preamplifiers, power amplifiers, and a multiplex FM tuner. The company had always traveled the separate-component high road with a few other manufacturers of truly elite equipment. Here the rally was for the buyer who wanted the best, hang the cost and the problems attendant with greater space requirements of separate components.

Now Marantz has introduced an all-in-one component receiver which, at $695, rings the bell as the highest-priced receiver available at this time. With Marantz' line of separate components costing twice as much, however, the new receiver's price might be considered to be startlingly low.

Features

The Marantz Model Eighteen receiver is imposingly big, as you might expect it to be. It's about an inch or two more in length, width and height than most other high-power receivers.

This does not detract from its general appearance, however, since the front panel is tastefully designed. Embossed sections in black complement gold-colored surfaces at the top and bottom of the panel. The entire panel is a solid casting, hinting at the quality of construction lying behind it.

The lower half of the panel contains the usual selector switch with positions for phono, FM, tape, Aux 1 and Aux 2. Next in line are the balance control and volume control, followed by clutch-operated separate bass and treble controls, a speaker selector switch, stereo headphone jack and the power on-off toggle switch. At the extreme lower left of the panel are two additional jacks used for dubbing from one tape recorder to another—an extremely useful feature for the user who wishes to copy tapes without going to the rear of the receiver each time this dubbing is attempted.

The upper section of the panel contains the tuning dial, which is itself unique to this equipment. Instead of the usual control knob, the tuning dial consists of a horizontally mounted flywheel, the front edge of which protrudes through the front panel. This edge is knurled or serrated, so that by passing one's thumb or forefinger across this edge, tuning from one FM station to another is effected with far less effort than is required for the twisting motion of a conventional tuning knob. The dial scale itself is fully ten inches long, permitting extremely accurate fine-tuning. This demands precise calibration and alignment on the manufacturer's part so that this capability can be fulfilled. To Marantz' credit, we found that frequency calibration was never off by more than a pointer width, despite the expanded dial scale. The upper portion of the panel also incorporates a stereo light to indicate stereo FM reception. In addition, Marantz' famous oscilloscope display and its associated centering controls are located here, of which we shall have much to say shortly.

In the interest of clean appearance and functional design, the many secondary controls have been blended into the black center strip which divides the upper and lower sections of the dress panel. These take the form of eight black push-button switches of the "push to actuate-push to release" type. The first of these buttons, when depressed, connects a second phono input pair of jacks, for the many users who have both a record changer and a manual turntable. The second button creates a monophonic or mixed L and R signal, useful for cancelling out noisy stereo FM reception. The third button effects the necessary circuit break for "tape monitoring" when used with three-headed tape decks or recorders. The next button provides for an alternate use of the 'scope display. When depressed, the scope displays combined left and right audio information; when released, the scope is used for accurate center-of-channel tuning of FM stations and many other analyses of reception quality which will be discussed later. The fifth button causes a blending of left and right channels to take place at high frequencies only. Much of the noise associated with weak stereo FM reception can be cancelled with the aid of this feature, with only a moderate reduction in apparent stereo separation.

High- and low-frequency filters are inserted in the circuit by means of

Fig. 2—Pushbutton-activated low- and high-frequency filters are unusually effective, as shown here by their characteristics.

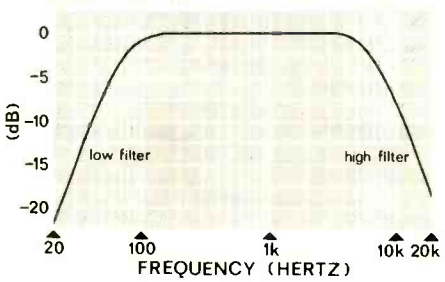


Fig. 3—Rear panel of the Marantz Eighteen stereo FM receiver.

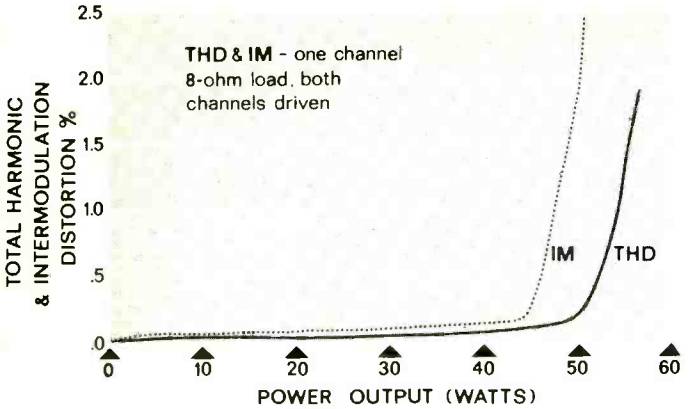


Fig. 4 – Harmonic distortion and IM distortion of the Marantz Eighteen's amplifier section.

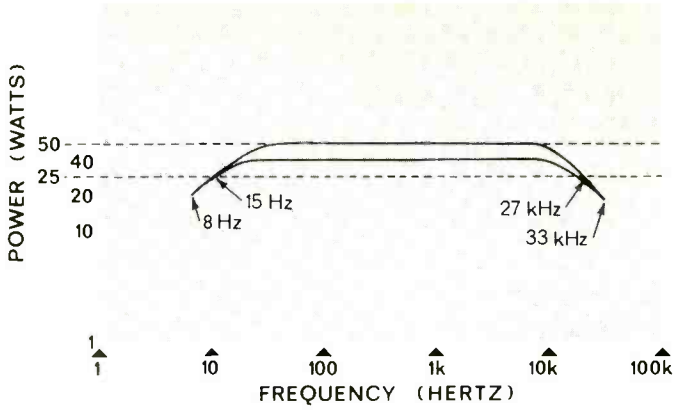


Fig. 5–Power bandwidth, referenced to both 40 watts and 50 watts per channel (8-ohm load).

the sixth and seventh buttons and, as can be observed in Fig. 2, they are designed with a 12-dB/octave slope, beginning at 8 kHz and 70 Hz, respectively. Unlike many so-called filters which exhibit only a 6-db/octave slope (and are therefore really nothing more than a second set of fixed tone controls), these filters are very effective in reducing rumble and high-frequency record hiss without seriously affecting overall tonal response.

The last button in this secondary control grouping defeats the interstation muting feature which is otherwise present. Normally, with the muting feature in the circuit, signal strengths of approximately 15 microvolts will overcome the muting and provide noise-free reception. But there are doubtless some DX'ers who prefer to receive distant stations even if they are noisy.

As for the rear connection panel, it contains the necessary input jacks and a pair of tape recording output jacks. These output jacks are always connected in parallel with the "Dubbing OUT" jacks on the front panel. The tape input jacks at the rear, on the other hand, are automatically disconnected when a tape recorder is connected to the "Dubbing IN" jacks at the front panel.

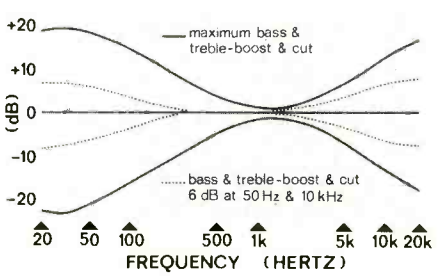
There is a single 2½-ampere fuse on the rear panel, since speaker line protection and output transistor protection is afforded by self-resetting circuit breakers. An unswitched a.c. outlet for auxiliary equipment is provided, and can be used for equipment requiring up to 500 watts. Speaker connections are made on a barrier terminal strip, as is the FM antenna. Proper matching of both 75-ohm and 300-ohm antennas is provided for by means of a balun-matching transformer. A convenient grounding terminal post completes the layout of the rear panel, which can be seen in Fig. 3.

Performance

Measurements on the Marantz receiver indicated that specifications published by the manufacturer were very much on the conservative side. For example, the power rating which we would apply to the amplifier section would be 50 watts/channel rms with both channels operating, whereas the specs claim only 40 watts/channel. It is at 50 watts (continuous power) that we reached the incredibly low total-harmonic-distortion (THD) figure of 0.2%! IM distortion reached the 0.2% point at 45 watts. Curves of IM and THD referenced to an 8-ohm load may be examined in Fig. 4.

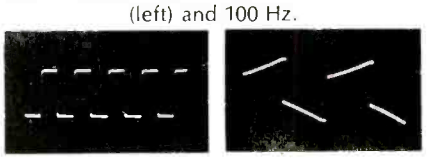
Two power bandwidth curves are shown in Fig. 5. The lower curve is referenced to 40 watts at 0.2% distortion, extending from 8 Hz to 33 kHz. Note that it exceeds the published claim of 10 Hz to 30 kHz. For consistency, we also plotted power bandwidth for a 50-watt level (which is the power rating we would assign to this amplifier) and came up with end points of 15 Hz and 27 kHz. Remarkable!

Fig. 6–Tone-control characteristics illustrate how "customized" compensation is achievable.



Tone control action is illustrated by the double set of curves shown in Fig. 6, in which the dotted curves represent partial rotation of the bass and treble controls. From these curves you can see that the variable crossover, feedback type of tone-control circuit is used, enabling a degree of "customized" tonal compensation not possible with less expensive "losser" circuits. As for frequency response, rather than resort to special graph paper, suffice it to say that we measured flat response from 8 Hz to 46 kHz (+0,–1 dB), again surpassing published specifications.

Fig. 7–Square-wave response at 10 kHz (left) and 100 Hz.



The FM section of the receiver proved to be an excellent match for the audio amplifier section. For example, the tuner section's harmonic distortion figure for 100% modulation at 400 Hz, which is stated as 0.2% maximum, measured *0.1%* on our sample.

FM sensitivity (IHF) read 3.0 microvolts at 98 MHz. A passive front end —that is, one that provides no amplification whatsoever–holds down the sensitivity a bit, but more than makes up for it in other areas, as will be dis-

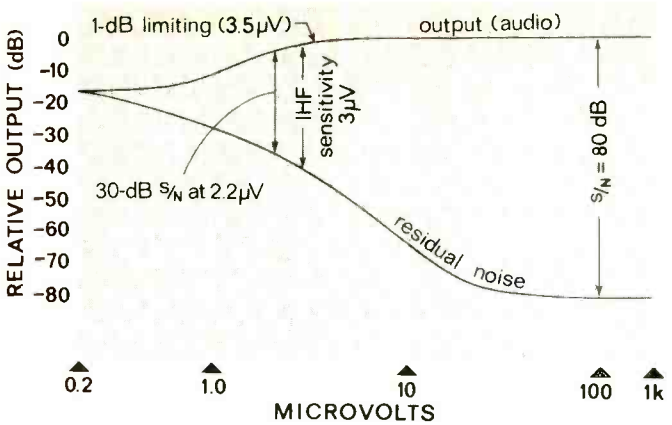


Fig. 8—FM quieting sensitivity of the Model Eighteen receiver with 100% modulation, 400 Hz. The 80-dB quieting figure at 100 microvolts and up is the greatest figure AUDIO has observed to date.

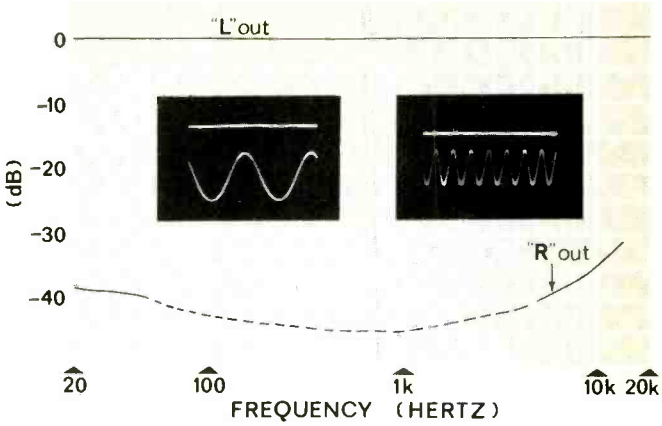


Fig. 9—FM stereo separation, left-channel output only (right channel is identical). See text concerning dashed line. Scope traces show separation at 1 kHz (left) and 10 kHz.

cussed later. Quickly, though, the design innovation makes it possible to receive more listenable stations than previously possible. The quieting sensitivity is plotted in Fig. 8. It ties in very well with published claims, exceeding the claims at 10 and 50 microvolts and reaching the incredible quieting figure of 80 dB at 100 microvolts and up. This is the *greatest figure of quieting we have ever observed with any FM receiver!*

Stereo FM performance and separation is plotted in Fig. 9. Only the left output is shown with respect to residual right output, since the reverse plot is so close to this one that the lines would be superimposed upon one another. The dashed-line area of the lower (separation) curve is a bit embarrassing—for us, that is. You see, our stereo FM signal simulator has a guaranteed separation capability of 40 dB. This is fully 10 dB more than is required of stations transmitting FM stereo, and we always thought it would be adequate for any equipment tests we might have to make. But here is the Marantz Eighteen, which claims separation of 45 dB MINIMUM at 1000 Hz! They probably make it or come close—but we will have to accept their word for it, since our equipment cannot confirm anything beyond 40 dB.

Invariably, when a prospective customer is confronted with a receiver retailing at around $700.00 in the face of competition in the $300, $400 or even $500 price class, he will ask, "What makes this one worth that much more?" or "Is it really that much better?" There is no "pat" answer to these questions, but here are some facts that may help you to decide for yourself.

With the exception of the Cathode ray tube ('scope tube), the Model Eighteen is an all-transistor receiver, embodying some of the same circuits and design philosophy as the Marantz Model 10B tuner, the 7T Preamplifier and the Model 15 Power Amplifier (combined cost: $1470, less cases). Its circuitry uses 73 transistors and 76 diodes, or a total of 149 solid-state devices.

Examination of the insides of this unit (see Figs. 10 and 11) discloses the use of parts such as electrolytic capacitors, toroidally wound inductors, precision resistors (often having power ratings four and five times greater than would be required in the given circuit) and even mechanical parts more often associated with the reliability and durability of military or industrial electronic equipment. The power transformer, which can be seen in the photos of Figs. 10 and 11, is larger than any we have seen since the days of high-powered tube-type power amplifiers. One half the size might easily have powered this receiver—but would it have run as cool to the touch after several hours of use as this one does?

The i.f. section and limiter section of this receiver does not use conventional i.f. transformers. To quote the Marantz manual:

"The i.f. section is a modified Butterworth-type filter configuration. The characteristics . . . are ideal in that the 200 kHz pass-band is phase linear with sharp cut-off slopes . . . assures the elimination of a major source of high-frequency distortion and loss of stereo separation . . . permits reception of adjacent channels under adverse reception conditions. This i.f. filter permits performance which is unobtainable with conventional i.f. transformer coupled circuits."

By way of illustration, a single such filter circuit is shown in Fig. 12. A glance at the number of components involved suggests the number of coils and capacitors usually found in many *entire* i.f. strips. Yet there are FOUR such interstage circuits in the Marantz i.f. strip, as distinguished from the limiter strip, which is a separate circuit

Fig. 10—The Marantz Eighteen receiver's outsize power transformer, seen in this top-side photo, runs exceptionally cool.

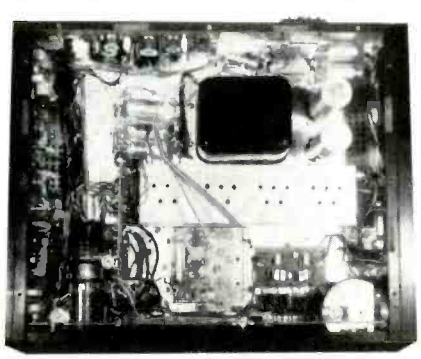
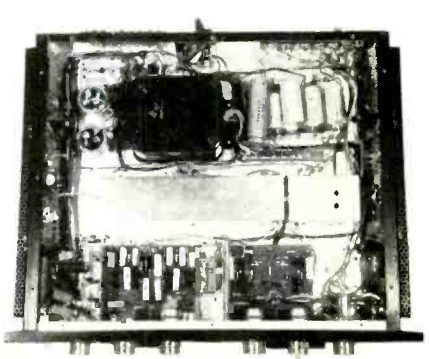


Fig. 11—The underside reveals high-quality components more often associated with industrial or military equipment.



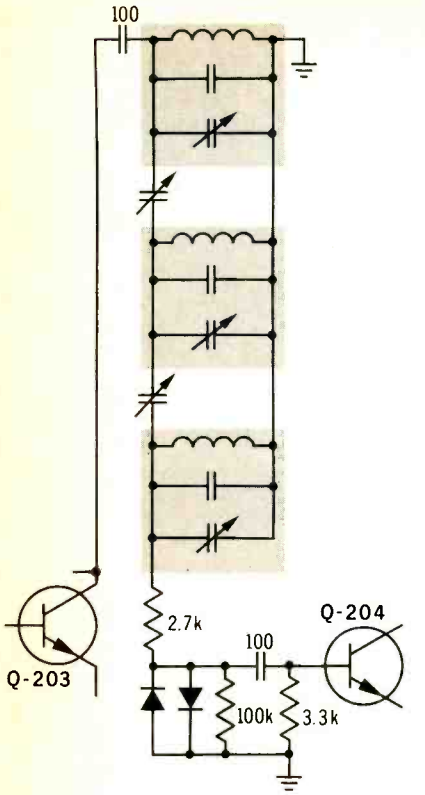


Fig. 12—One of several complex band-pass filters which are used instead of conventional i.f. transformers in the Marantz i.f. strip.

module containing four *additional* limiter stages!

Then, of course, we have the oscilloscope display. Is it just a "gimmick" or is it, indeed, an aid to better listening? Having had an opportunity to use it for several weeks, we can say without equivocation that it is a great aid to the serious FM listener intent upon achieving the best reception he can. The various traces of Fig. 13 tell the whole story. Trace A represents an FM station, with audio information applied, properly and centrally tuned. Had the station been detuned, the trace would appear either to the left or right of the vertical center line. (Up to this point, a "center of channel" tuning meter would do just as well.) The traces of Fig. 13, labelled B and C, show various degrees of "multipath" or signal reflections which cause a change in *amplitude* to the received signal. Such multipath reflections can seriously impair reception of stereo FM, causing distortion, decrease in separation and even momentary shifting of left and right channel information. The solution? Re-orientation of an adequate FM antenna to reduce the "multipath." But except for spotty aural detection, *how would you ever know without this visual aid?*

The traces of Fig. 14 illustrate the visual displays that might be seen when the alternate function of the display 'scope is used—the one engaged by depressing the front-panel pushbutton described earlier. Here, left- and right-channel amplitudes, singly or in combination, are visually apparent. Note that monophonic reception is indicated by a sloping line, denoting equal left and right information. An interesting fact is that we caught a station ostensibly engaged in stereo broadcasting playing a monophonic recording on four occasions. Ordinarily, the stereo light would have contributed nothing to our knowledge since it is illuminated whenever the station's 19-kHz pilot carrier is turned on. Once, when we were sure the recording involved was only issued in stereo, we actually telephoned the broadcast station and, sure enough, someone had failed to throw the "mono-stereo" (19-kHz pilot switch) in the studio.

All right, so the Marantz Eighteen enables the user to monitor a station's proficiency or deficiencies. But how does the equipment *sound?*

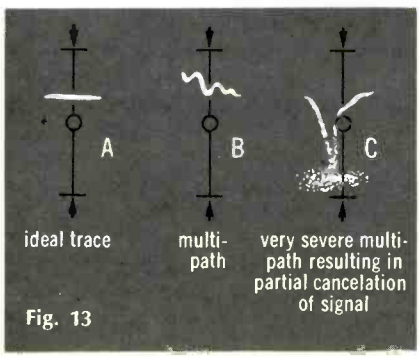
We found that the Marantz receiver provided a subtle superiority in performance over other modern receivers examined. This is not always immediately discernible, but it becomes clearly evident after awhile. For example, though 3 microvolts (IHF) usable sensitivity is not the best figure we have ever encountered in a receiver's tuner section, we were able to listen to 42 FM stations with satisfactory quieting and low enough distortion to make them truly listenable. This is four more than we have been able to receive on receivers measured heretofore. Conclusion: it takes more than just "sensitivity" to receive noise-free, distortion-free FM. Perhaps this is due to the elaborate i.f. system or the *passive* FM front end (no transistors, not even FETs; all the "gain" is accomplished at conversion or in the i.f. section—hence, no "cross modulation" problems or spurious responses attributable to non-linear characteristics of front-end amplifiers), or both.

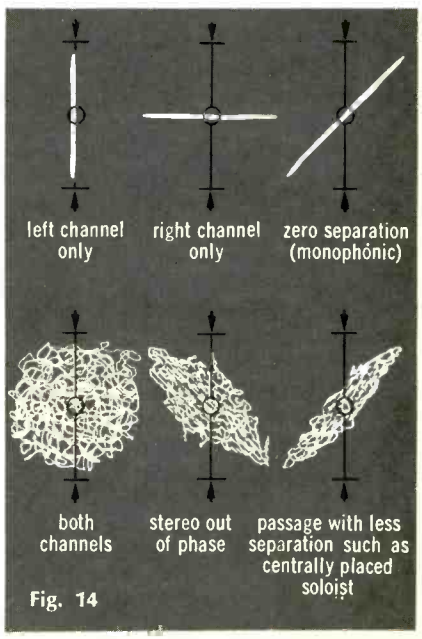
In the presence of a strong signal, the Model Eighteen imparts a cleanness of stereo in FM listening that approaches listening to master tapes. Obviously, separation, per se, is not the only criterion. When we increased the vertical gain of our scope, after photographing the separation characteristics of the stereo FM portion of the receiver at 1 kHz and 10 kHz (Fig. 8), we noted that what little "cross talk" there was (not visible in the photos because of the scale used) was not made up of second and third harmonic components, but was primarily a fundamental of the signal in the opposite channel.

Records were reproduced on the Model Eighteen with much less apparent IM distortion than we were used to hearing. Truly, it can be said that whatever IM remained was a function of the cartridge and not the preamplifier or amplifier. We tried, in vain, to tax the dynamic range of this amplifier during our LP-record auditioning, employing everything from intimate string quartet ensembles (full of pauses and quiet passages) to large orchestral works. With some of the better-quality

Fig. 13 (below)—The Model Eighteen's built-in oscilloscope can pinpoint the spot on a dial where minimal distortion is present.

Fig. 14 (right)—Here are some of the various audio displays which are observable on the Model Eighteen's scope.





recordings, there was the wonderful feeling of transparency that good solid-state amplifiers impart.

Based on the foregoing tests and observations, the Marantz Eighteen receiver appears to bridge the gap between separate components and today's increasingly popular receivers. It looks like a receiver, combining all electronics on one chassis, while it performs like good-quality separate components. Though it is not quite the peer of Marantz' own line of separate components, the Marantz receiver shares many of its design and long-life construction virtues. And it's half the price! So if you've aspired to own Marantz equipment in the past and could never swing the price, there's another turn at bat for you.

Addenda to Sony/Superscope Model 230 Stereo Tape Recorder Equipment Profile (May 1968)

It was erroneously stated in reviewing the Sony/Superscope Model 230 four-track stereo tape recorder that it had a signal-to-noise ratio lower than that claimed by the manufacturer, where, in fact, S/N was higher. This variance in measurement was due to using different references. Whereas AUDIO employed a reference point of 0 VU at 1% distortion, Sony/Superscope's specifications clearly note that measurements were taken at *peak level*, which would be at the 3% mark commonly used by many tape recorder manufacturers. This would indeed enable the machine to easily meet its signal-to-noise specifications since it increases the ratio by 6 to 8 dB.

Also worth noting is omission of mention of the machine's inclusion of a "scrape flutter filter." Usually found only in professional recording equipment, the "scrape flutter filter" is a special idler located between erase and record/playback heads. Its purpose is to eliminate tape-modulation distortion.

BSR McDonald Model 600/M44-E Automatic Turntable

Fig. 1

MANUFACTURER'S SPECIFICATIONS – Speeds: Four. Platter Diameter: 11". Wow (at 33⅓ rpm): 0.1% rms. Flutter (at 33⅓ rpm): 0.04% rms. Tracking Error: Two deg. max. Stylus-Force Range: 0-6 gms. Arm Resonance: 15 Hz. Price: $89.50, including Shure M44-E cartridge, WB-6 deluxe base and DC-3 deluxe dust cover.

The BSR 600/M44-E is a complete record-playing unit. That is, it consists of an automatic turntable with a Shure Model M44-E elliptical-stylus stereo cartridge already installed, and a walnut-finish wood base topped by a plastic dust cover.

The Model 600 changer used here is the top unit in a line of moderately priced BSR McDonald record changers. The changer itself has a retail price of $74.50. In contrast, the whole package is available for only $15.00 more (if bought separately, the components and accessories would total $128.00.)

The turntable incorporates most of the features of higher-priced automatic turntables, though in some cases in a more simplified way. The changer unit features a low-mass tubular arm that comes with a sectional counterweight to balance against a wide range of cartridge weights. Both counterweights are resiliently mounted and are easily adjustable for see-saw balance before the tracking force is "dialed." The arm's ball-bearing pivot is angled parallel to the plane of the clip-in cartridge shell. There are 2 spindles: One short one for manual play and a long one for automatic play. Tracking force is set by dialing a number next to the arm pivot. The dial is calibrated in ⅓-gram increments. And it is pretty accurate once a good zero reference is established by sliding the rear counterweight to the proper place for balance. A most handy feature is the arm lock that automatically clamps the arm after shut-off and releases it during start. A muting switch shorts out the cartridge output during record changing and a "pop" filter eliminates motor on-off noises.

The cueing mechanism, which allows one to handle a lightweight tone arm manually without fear of dropping it on a record, operates with mechanical linkages. Therefore, the rate of tone-arm descent is proportional to the speed with which the lever is thrown. While this method works well, it is not quite as effective as the pneumatic-type systems used in more expensive tone-arm designs. However, this cueing device is an especially useful feature, meeting all but very precise tape recording needs.

Drive and changing mechanisms are rugged and simple. A four-pole induction motor has a stepped pulley mounted to its shaft, which drives a rubber interwheel. The wheel drives the inside of a sub-platter (7-in. diameter) that is riveted to the main 11-in. cast-aluminum platen. A novel speed-changing mechanism uses a nylon rack and pinion linkage to smoothly raise and lower the interwheel with the speed selector control, thereby lining it up with the different pulley steps. The entire mechanism was found to be jam-free and reliable in operation.

Performance

The BSR 600/M44-E performed as follows: Rumble, including vertical and lateral components, was measured at −27 dB referred to 1.4 cm/sec at 100 Hz (or 3.54 cm/sec, 45 deg. velocity

Fig. 2–View of the BSR 600 with turntable platter removed.

at 1000 Hz), the standard NAB method for rumble measurement. With the vertical-rumble components cancelled by paralleling the cartridge outputs, the rumble was −31 dB. This is satisfactory for all but speaker systems that can exhibit great output in the very deep bass region. Wow was checked at 0.15% and flutter was about .04%. The speed at 33⅓ rpm was more than 1% fast, as well as running fast at the other speeds. Speed remained constant over a range of 85 to 135 volts, however, which is excellent. There was no arm resonance down to 20 Hz and the unit mounted to its base was not particularly sensitive to shock and vibration or acoustic feedback.

The Shure M44-E stereo cartridge which comes fitted to this BSR unit is the $34.50 member of the Shure family of high-performance ellipticals. It has the highest output voltage and, as an excellent performer at just under 3 grams of tracking force, appropriately complements the BSR 600 automatic turntable.

The sculptured walnut base of the BSR 600/M44-E package has an attractive metal sash around its girth, and the matching tinted plastic cover, with its distinctive walnut stripe, is effective in protecting the unit from dust and other hazards. In addition to presenting an attractive appearance, the BSR Model 600/M44-E succeeds admirably in filling the need for a modest-priced all-in-one record playing unit that incorporates many refinements normally found only in more expensive automatic turntables.

Check No. 40 on Reader Service Card

Jensen Model TF3B Speaker System

MANUFACTURER'S SPECIFICATIONS — Frequency Response: 25 Hz-20 kHz. Crossover Frequencies: 2000 Hz, 10 kHz. Impedance: 8 ohms. Power Rating: 25 watts. Woofer Resonance: 30 Hz. Dimensions: 13½" H x 23¾" W x 11⅜" D. Shipping Weight: 40 lbs. Price: Oiled Walnut, $122.00; unfinished, $109.00.

The model TF-3B, a 4-speaker, 3-way bookshelf-size unit, is the least expensive one in Jensen Manufacturing's new series of five loudspeaker systems.

It contains four speakers—a 10-in. woofer, two 3½-in. midrange units, and a spherical-radiator tweeter. Housed in a dark walnut cabinet (an unfinished model is also available), it features dark olive-color cloth that matches walnut strips which divide the front into three sections. The outside two sections are covered with a gold metal grille, giving the unit a modern-style appearance. The metal grille also offers extra protection against accidental poking to the two mid-range speakers which are mounted behind one section. Two screw terminals (color-marked for polarity identification) are recessed in the rear of the enclosure, together with knurled shaft of a high-frequency level control.

The cabinet of the TF-3B is made of a plywood-flakeboard walnut veneer combination, ¾-in. thick. The backs of the mid-range and tweeter speakers are sealed with metal, an integral part of the speaker "basket" assembly. The woofer, which has a 1¼-lb. magnet, utilizes the enclosure's ducted port (a heavy cardboard tube, 7-in. long and about 3-in. in diameter) for bass loading; a rubber gasket ensures a tight seal of the enclosure rear. Crossovers are of the L-C (inductor-capacitor) type. The high-frequency-level potentiometer controls both mid-range and tweeter level, since mid-range crossover takes place at a high 2000 Hz.

Performance

With the HF level control turned up all the way, the measured frequency response of the TF-3B averaged about ±6 dB between 60 and 16,000 Hz. This is particularly fine. Response dropped off below 60 Hz and doubling could be induced below 50 Hz at high input levels. At low levels, we could measure output down to 30 Hz. There were no significant peaks or dips in the response. Tone bursts, shown in Fig. 2, back up the excellent transient response of the speakers, with no evidence of ringing anywhere. The high-frequency dispersion was good, as would be expected from the dome-type super tweeter. In a hard room, one might turn down the HF level control just a bit. Otherwise, full up is OK. Efficiency of the speaker system is low. Therefore, we recommend a 25-watt (rms) amplifier for use in a 12 by 18 ft. room. In a smaller room, a lower-power amplifier would suffice, of course.

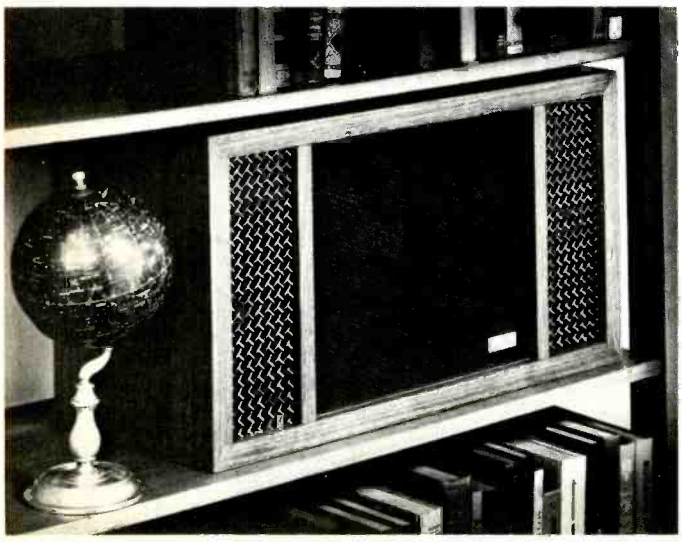
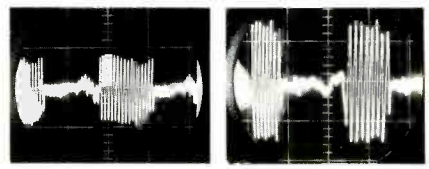


Fig. 1—Jensen Model TF3B bookshelf speaker system.

Fig. 2—Tone bursts taken at 250 Hz and 10 kHz.



In listening tests, we found that the TF-3B had a full, warm sound. There was a slight tendency to be boomy at very high listening levels, but a speaker of this type should not be used to produce sound pressure levels that can burst ear drums. It offered its best sound in a small room, at medium and lower acoustic output levels. When listening to a stereo pair of TF3B's, we observed excellent stereo balance, with no wandering or peaking, which denotes close similarity in the two units.

The TF-3B, therefore, turns out to be an excellent performer in its class. It should serve well in complementing a medium-priced sound system. Persons who want a moderate-sized bookshelf speaker system with a little more sculptured face to go along with fine performance will find the TF-3B very appealing, indeed.

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