Equipment Profiles

Technics by Panasonic SA-5550 Stereo Receiver

MANUFACTURER'S SPECIFICATIONS

FM Tuner Section

Sensitivity: 1.8 μV (10.5 dBf). **S/N Ratio:** Mono, 70 dB. **THD:** Mono, 0.2%; Stereo, 0.4%. **Alternate Channel Selectivity:** 70 dB. **Capture Ratio:** 1.6 dB. **Image Rejection:** 50 dB. **I.F. Rejection:** 70 dB. **Spurious Rejection:** 65 dB. **AM Suppression:** 50 dB. **Frequency Response:** 20 Hz to 15 kHz, ±1 dB. **Stereo Separation:** 1 kHz, 40 dB; 10 kHz, 30 dB. **Leak Carrier:** 55 dB.

AM Tuner Section

Sensitivity: 30 μV, external antenna; 230 μV/M, internal antenna. **Selectivity:** 25 dB. **Image Rejection:** 45 dB. **I.F. Rejection:** 40 dB.

Amplifier Section

Power Output: 58 watts per channel, 8-ohm loads, continuous power from 20 Hz to 20 kHz, both channels driven; 72 watts/channel into 4 ohms. **Rated THD:** 0.3%. **IM Distortion:** 0.4%. **Damping Factor:** 40 at 8 ohms. **Input Sensitivity:** Phono, 2 mV; AUX, tape 1 & 2, 180 mV. **S/N,A Weighted:** Phono, 70 dB; AUX, 90 dB. **Frequency Response:** Phono, RIAA within 0.5 dB; AUX, 5 Hz to 90 kHz, +1, −3 dB. **Tone Control Range:** Bass, ±10 dB @ 50 Hz; Treble, ±10 @ 10 kHz. **High Filter:** 7 kHz, -6 dB/octave. **Low Filter:** 150 Hz, -6 dB/octave. **Tape Output Level:** 180 mV.

General Specifications

Power Requirements: 120 volts, 60 Hz, 189 watts maximum. **Dimensions:** 18-1/6 in. W by 5-1/2 in. H by 15-3/4 in. D. **Weight:** 28.2 lbs. **Retail Price:** $479.95.

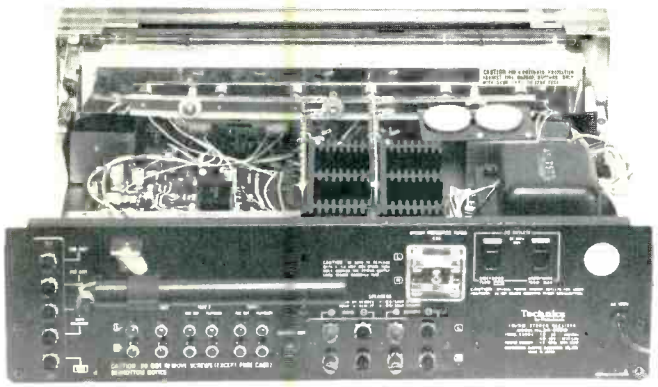

Fig. 1—Back panel.

Technics by Panasonic, one of serveral companies which has, in recent years, concentrated heavily on four-channel receiver design, has now turned its attention towards broadening its stereo receiver product line. The new family of receivers departs from the traditional "black-out" dial styling and offers, instead, a highly visible, light-colored, illuminated dial scale area with extra-long dial pointer travel and accurate calibration marks every half MHz over the linearly calibrated FM frequency scale. The SA-5550 is the top-priced receiver of this new line and, unlike the lower powered, lower costs models, features two tuning meters, positioned below the dial scale. The lower priced models employ only a single tuning-strength meter and lack the center-of-channel tuning meter found on the SA-5550.

All operating controls, including the large tuning knob, are located along the lower portion of the control panel. These include rotary controls for bass, treble, volume and balance adjustment, a speaker selector switch (the SA-5550 handles main and remote pairs of speakers singly or together, at any impedance from 4 ohms to 16 ohms, but the manual cautions against using lower than 8-ohm speakers if both pairs are to be operated simultaneously), and a program or input selector switch. Power on/off pushbutton switch and headphone jack are located at the extreme left of the panel. Pushbutton switches are used to activate low- and high-cut filters, loudness compensation, FM muting, tape 1 or tape 2 monitor circuits, and selection of mono or stereo operation. Reception of stereo signals is indicated by the usual illuminated inscription located just to the right of the two tuning meters.

The rear panel of the SA-5550, pictured in Fig. 1, contains screw terminals for connection of 75-ohm or 300-ohm balanced FM antenna transmission lines, an external AM antenna, and a ground connection. In addition to the usual

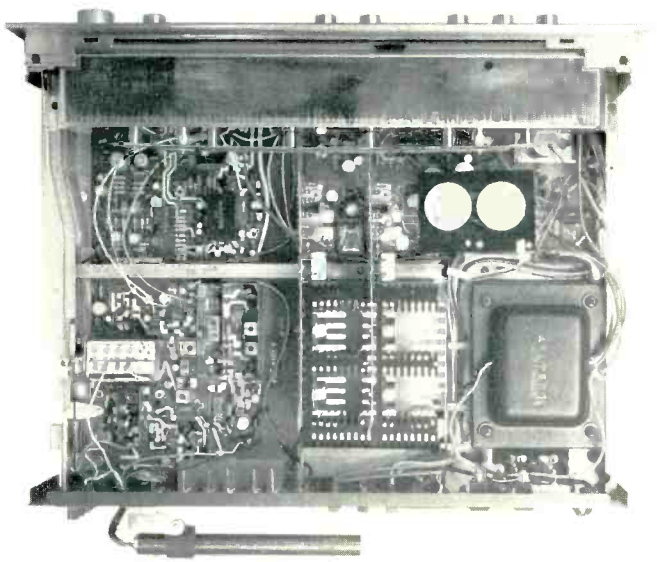

Fig. 2—Interior view.

phono, AUX and tape input and output jacks, there is a four-channel "MPX" output jack intended for future connection of a four-channel FM adaptor. Color-coded speaker terminals are of the screw type, but are widely separated to prevent possible shorts between adjacent exposed speaker wires. Individual speaker-line fuses are accessible from the rear panel by removing a transparent plastic cover which is retained in place by means of a single screw. The back panel also has a pair of convenience a.c. receptacles, one switched, and one unswitched, as well as the usual pivotable AM ferrite bar antenna.

Circuit Highlights

An internal view of the chassis of the SA-5550 is pictured in Fig. 2. The front-end features a 4-pole MOS-FET in the r.f. amplifier stage and uses a frequency-linear variable capacitor for both FM and AM tuning. The i.f. section of the receiver features six-stage construction, including three differential amplifier stages and three two-element ceramic filters. A phase-lock-loop circuit is used in the stereo multiplex section. Stereo detection or switching circuitry includes a double differential switching arrangement which is all part of the high density integrated circuitry used in this section.

A ceramic filter is also used in the i.f. section of the AM circuitry of the SA-5550. The preamp-equalizer stages of the receiver take the form of a PNP-NPN, 2-stage, direct-coupled circuit with direct-current, negative feedback applied from the emitter of the second stage to the base of the first stage. As for the SA-5550's main amplifier section, it is completely direct coupled with a differential amplifier input stage. The output stages are pure complementary symmetry type which use PNP and NPN transistors in combination. The power supply of the receiver is filtered by means of a pair (one for each polarity) of 10,000 μF electrolytic capacitors.

FM Performance Measurements

We measured usable sensitivity of 1.7 microvolts (10 dBf) for the SA-5550 FM tuner section, better than the 1.8 μV specified. The 50-dB quieting mark in mono was reached with a signal input of 3.0 μV (14.9 dBf), and maximum quieting or signal-to-noise ratio reached 73 dB with strong (65 dBf) signals. In stereo operation, usable sensitivity was 10 μV (24.5 dBf) and is governed by the threshhold for switching into stereo operation. Some 36 microvolts (36.5 dBf) were required in stereo for 50-dB of quieting.

The distortion measurements were considerably lower than claimed, with readings of just under 0.1% for mono (at 1 kHz) and 0.2% for the same test frequency in stereo operation. Quieting and distortion characteristics with increasing signal strength for both mono and stereo reception are plotted in Fig. 3. Alternate channel selectivity and i.f. rejection measured 70 dB, exactly as claimed, while capture ratio was a bit better than claimed at 1.4. Although the image rejection measured 52 dB (better than the 50 dB claimed), we expected somewhat better performance, with dB figures at least as good as those for selectivity and i.f. rejection, in view of the other measured characteristics of the tuner section. This low image-rejection capability may cause problems for some listeners who are too close to airport control towers or other sources of transmission in bands above the FM frequencies.

Stereo separation, plotted against audio frequency in Fig. 4, was excellent, reaching the unusually high figure of 52 dB at midfrequencies and remaining above 35 dB from 50 Hz to 10 kHz. Distortion in both mono and stereo, also plotted in Fig. 4, is consistently low at all audible frequencies, even at the high end where stereo distortion is less than 0.5% all the way up to 10 kHz (only 0.4% at the required test frequency of 6 kHz).

Muting threshold is set at 13 microvolts (27.7 dBf), by which time quieting has reached nearly 60 dB in mono and almost 40 dB in stereo operation. Use of the muting feature to define listenable stereo stations is therefore not particularly effective in this receiver and a user will have to judge listenability on the basis of background noise since the muting feature is not customer adjustable. Sub-carrier (19 kHz and 38 kHz) rejection was extremely effective, with carrier products fully 65 dB below 100% modulation in the stereo mode. Frequency response from 30 Hz to 15 kHz was within 0.6 dB of the prescribed 75-microsecond de-emphasis characteristic. No 25-microsecond de-emphasis is provided on this receiver and listerners wishing to use it for

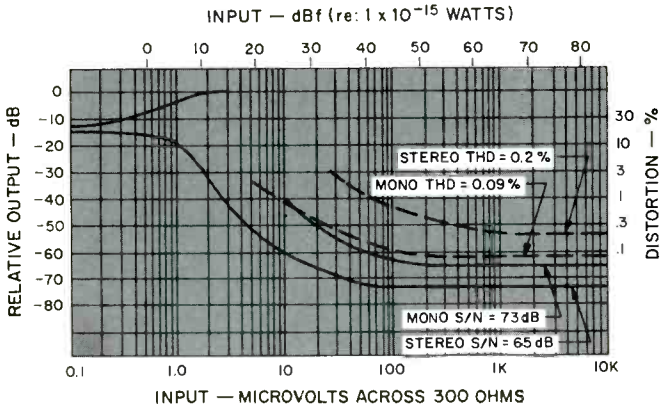

Fig. 3—FM quieting and distortion characteristics.

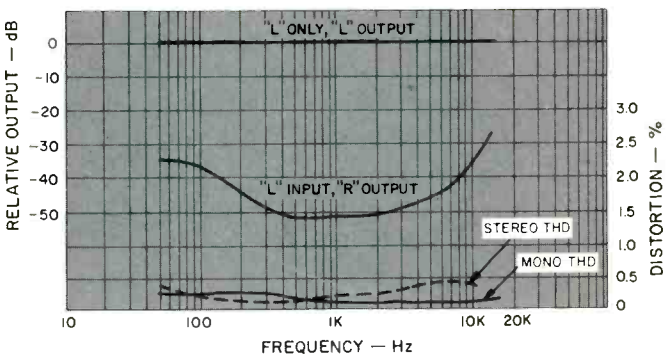

Fig. 4—Separation and distortion versus frequency.

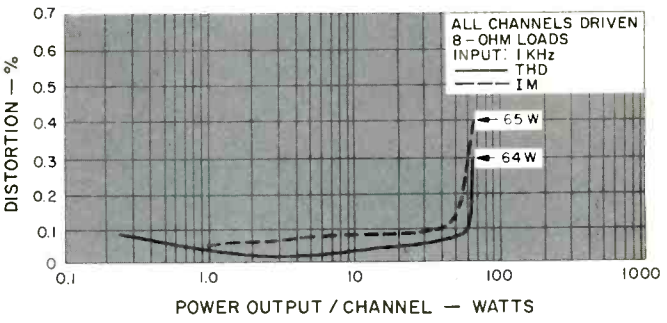

Fig. 5—Harmonic and intermodulation distortion characteristics.

Dolby FM broadcast reception would have to add an outboard adaptor (in addition to a Dolby adaptor) to convert the response to that required during reception of such programs.

Amplifier Section Measurements

The amplifier section of the receiver delivered 64 watts per channel into 8-ohm loads, with both channels driven at 1000 Hz before reaching the rated harmonic distortion figure of 0.3%. Technics by Panasonic also provides a 4-ohm rating for this model (very few manufacturers have been supplying such ratings of late, because of problems created by the new pre-conditioning rule of the Federal Trade Commission audio amplifier power rule), and we were therefore especially interested in checking out performance at this lower load impedance. With 4-ohm loads, power delivered at mid-band frequencies was 77 watts per channel, as opposed to 72 watts claimed. All output measurements were made after first preconditioning the receiver for the required one hour at one-third of full rated output. At rated power output, THD measured 0.091% under 8-ohm load conditions and 0.14% when driving 4-ohm loads with a 1-kHz signal applied. Distortion (harmonic and IM) versus power output is plotted in Fig. 5 for the 8-ohm load condition only. The power band claimed for this receiver (20 Hz to 20 kHz) is also conservatively stated, as can be seen by examining Fig. 7. Even at 20 Hz, THD measured only 0.2%. On the basis of a 0.3% THD rating, power band could have been listed as extending from 12 Hz to 40 kHz, or the power output rating might have been increased safely to 64 watts per channel and would still conform to FTC requirements from 20 Hz to 20 kHz.

Figure 6 is a 'scope photo of the spectrum analysis of a 1-kHz signal when the amplifier section is delivering full rated output (58 watts per channel at 8 ohms) and shows the presence of a minute amount of second-order harmonic content (2 kHz) with no evidence of higher order harmonics within the 70 dB range of the analyzer as it was set up for this display.

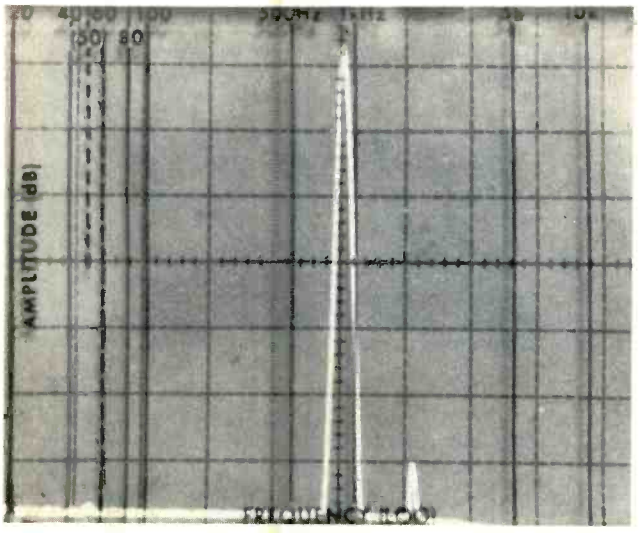

Fig. 6—Spectrum analysis of harmonic output with 1-kHz input at 58 watts per channel.

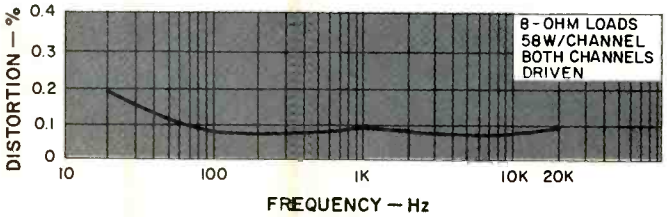

Fig. 7—Distortion versus frequency.

Frequency response for the phono preamp-equalizer section was within 0.8 dB of the RIAA curve from 30 Hz to 15 kHz, and input sensitivity was exactly 2.0 mV as claimed. A signal input level of 115 mV at 1 kHz was handled by the phono input circuits before 0.3% THD was observed. Overall frequency response through the high level inputs was flat within 1 dB from 8 Hz to 40 kHz, and the -3 dB roll-off point was reached at a frequency of 75 kHz. Hum and noise in phono was a very good −71 dB without using a weighting network (Technics claims only −70 dB with "A" weighting), while in high level operation, the S/N ratio was −87 dB—also unweighted.

Range of bass and treble tone controls is shown graphically in the 'scope photo of Fig. 8, with extra traces superimposed to compare the action of the low- and high-cut filters. Note that the filter action is moderate and slopes are at a rate of only 6 dB per octave, so that little is accomplished by these circuits that could not have been done by use of the bass and treble controls in less than their extreme cut positions.

Action of the loudness control circuitry is shown in the 'scope photo of Fig. 9 for different settings of the volume control and only bass compensation is afforded by this circuit at low listening levels (as opposed to some loudness circuits which accentuate both bass and treble frequencies when the volume control settings are reduced).

Listening and Use Tests

The amplifier section of the SA-5550 performed nicely for us during our extended listening tests and delivered enough power to drive two sets of low-efficiency speaker systems to good listening levels. Under normal listening conditions, heat sinks remained comfortably cool even after extended "on" time, and the amplifier seemed stable and well protected even when driven to clipping for short periods. We appreciated the click-stop action of the tone controls when enable us to repeat favored settings of these controls exactly. In addition to being able to record onto two tape

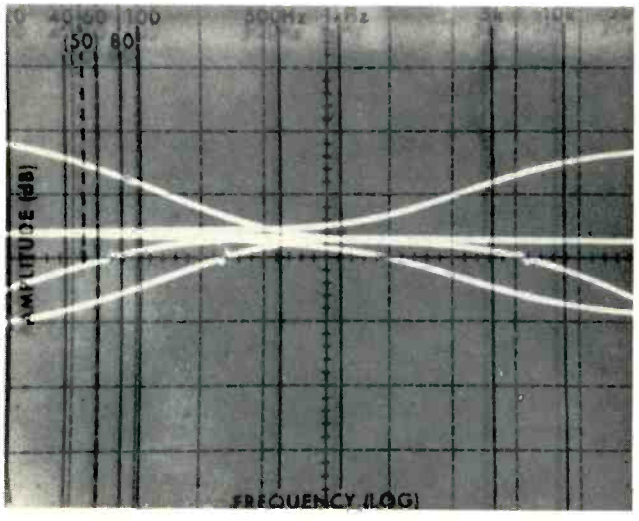

Fig. 8—Bass and treble control and high- and low-filter characteristics.

decks, the SA-5550 makes provision for recording from the tape 1 outputs to the tape 2 inputs, or, from deck "1" to deck "2." Monitoring of either tape deck's output is possible by choosing the right combination of front panel tape buttons, a feature which will no doubt find favor with recording enthusiasts.

If one were asked to judge between the amplifier and the tuner sections of this well-executed receiver, picking a clear-cut winner would be a difficult matter. The tuner section has good sensitivity in both mono and stereo, and the 50-dB quieting mark is reached with fairly low signal levels. In addition, the distortion, ultimate quieting, and selectivity performance figures are all rather good for a receiver in this price class. The amplifier section delivers a good deal of power over a fairly wide band with quite reasonably low distortion, and it is one of the few units these days which is specifically rated for 4-Ohm operation. All in all, this receiver from Technics is an all-around winner, regardless of whether you live close to stations or in the deep fringes. With a suggested price tag of $479.95, judging the SA-5550 as a superior receiver isn't hard at all. *Leonard Feldman*

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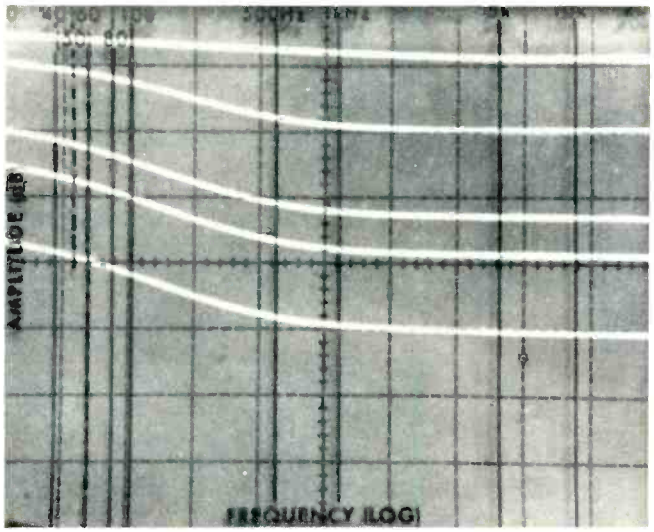
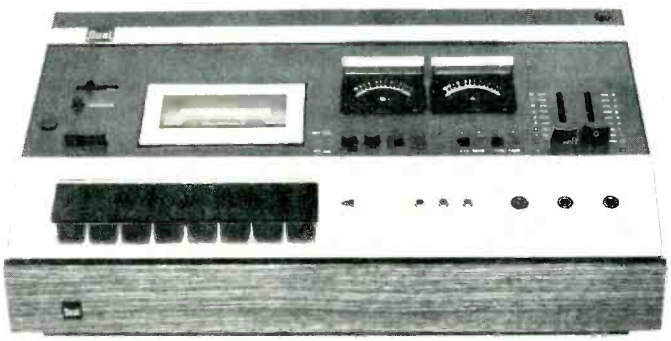


Fig. 9—Loudness control action.

Dual Auto/Reverse Cassette Deck



MANUFACTURER'S SPECIFICATIONS

Frequency Response: Standard Tape, 20 Hz to 14,000 Hz ± 2.5 dB; CrO2, 20 Hz to 16,000 Hz ± 2.5 dB. **Wow and Flutter:** Less than 0.07%. **Dynamic Range:** IEC curve "A", Better than 51 dB; with Dolby, better than 60 dB. **Harmonic Distortion:** Less than 2.0% at 1 kHz. **Tape Speed Accuracy:** ±0.5%. **Erasure:** 70 dB. **Channel Separation:** 60 dB in opposite direction; 30 dB or better between stereo channels. **Bias Frequency:** 85 kHz. **Input Level:** 0.22 mV, mike inputs; 65 mV, line. **Output Level:** 0.75 volts. **Fast Wind Time:** 60 seconds for C-60 cassette. **Headphone Impedance:** 8—16 ohms. **Power Requirements:** 120/240 V 50/60 Hz. **Dimensions:** 16 ½ in. W x 4-13/16 in. H x 11-13/16 in. D. **Weight:** 15¼ lbs. **Price:** $450.00.

Fig. 1—Back view of the Dual Cassette Deck.

It is no great surprise to find that the people who produce one of the most popular lines of automatic and manual turntables in the world should have come up with a cassette deck which incorporates one of the most sophisticated tape transport systems to be found in any cassette deck. The standard features one has come to expect from a high quality cassette deck are all there, but there is much that is new and different. The first thing we noticed upon unpacking this smartly styled unit is the absence of any power *on/off* switch. Depressing any one of the four transport motion keys both turns on power and causes the appropriate tape motion to begin. Why four transport keys, instead of the usual three (*Play, Rewind* and *Fast Forward*)? Simply because this machine can play *and* record in either direction of tape travel, so that a *Play-left* and a *Play-right* transport key are necessary. Other keys along the lower edge of the front panel include a *Stop* key, a *Continuous Play* key, the usual record key (colored with a red warning stripe), and a pause key. When the *Continuous Play* key is depressed, a cassette will first play one side, then play in reverse (picking up the appropriate alternate pair of tracks) and then play all over again, continuing until the key is released. Even without the *Continuous Play* button depressed, a cassette will be played

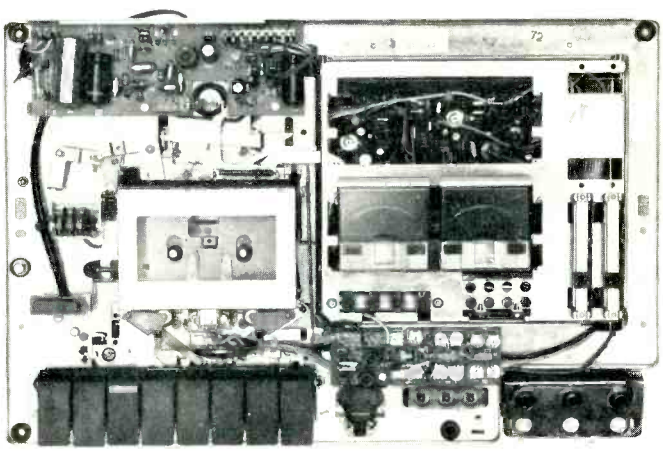


Fig. 2—Top view without protective cover.

in both directions and the mechanism will shut off after both sides have been completed. The automatic reversing feature will not occur during recording, though it is possible to record in either direction by manually depressing the appropriate "play" key together with the *Record* key. A pair of arrow-shaped indicator lights denote direction of tape travel at all times.

Just to the right of the transport buttons and tape-direction lights are three more indicator lights. The first of these is a peak level indicator which flashes whenever signal levels exceed the +3 dB point, relative to 0 VU on the record level meters. The other two lights indicate that recording is in process or that Dolby circuitry is turned on. At the lower right of the panel are headphone and left and right microphone input jacks. An eject button at the left of the cassette compartment raises the cassette holder smoothly and slowly, permitting insertion of the cassette along guide rails at a convenient angle, and when this door-holder is snapped shut, the cassette is perfectly positioned for record or playback. A three digit counter is located above the eject button and above the counter is a tape bias switch with settings for standard and CrO_2 tape. While this switch can be operated manually, its mechanism is also arranged to sense the extra notch in newer CrO_2 cassettes and will switch automatically from STD to CrO_2 setting when such tapes are inserted. Subsequent insertion of any standard tape (or non-notched CrO_2 tape) causes the switch to pop back to the STD position.

The two illuminated VU meters at the right of the cassette compartment are calibrated from −20 dB to +5 dB and can be tilted up to an angle of 30 degrees for easy viewing when the machine is operated in the horizontal plane. This deck, by the way, is one of the few we have tested that can be operated either horizontally or vertically, and a pair of mounting brackets are supplied should you want to mount the entire unit vertically on a wall surface. Below the meters are four more buttons. Three of these are two-position switches for mono/stereo selection, activation of an automatic level control circuit, and activation of the Dolby noise reduction circuitry. The fourth button is a momentary switch that introduces a 400-Hz test tone used for calibrating bias for proper Dolby calibration. Alongside the buttons are four screwdriver adjustment controls for calibrating Dolby (left and right channels) when standard tape or CrO_2 tape is used. At the extreme right of the panel are a pair of slider input level controls which affect only recording level. Playback output is not adjustable on the deck itself but must be controlled by the volume control on your amplifier or receiver. When the *Automatic Level Control* button is depressed, the slide level controls are bypassed and all record level adjustments are performed automatically.

Line input and output connections are made on the rear apron of the unit, which also houses a record/playback DIN connector. While line and microphone inputs may be used simultaneously, there are no provisions on the Dual deck for separately adjusting the gain of each such input with respect to the other.

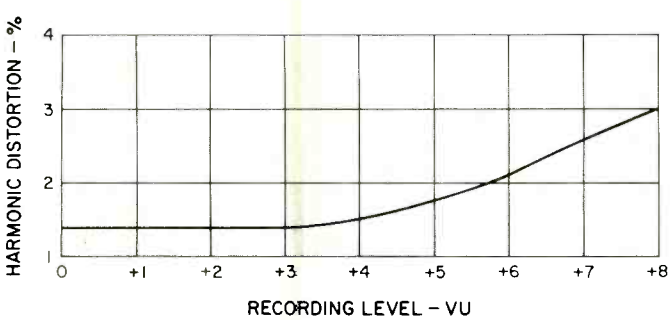


Fig. 3—THD versus recording level.

Circuitry and Mechanical Features

Separate circuit board modules are employed for the input amplifiers, bias oscillator, automatic level control circuitry, Dolby circuits, output amplifiers, recording amplifiers, meter and indicator amplifiers, test-tone generator, tape-end limit switch circuitry, and power supply. The solid-state complement of the Dual cassette deck includes 4 ICs, 3 FETs, 31 transistors, and 38 diodes.

The record/play head of the unit is a Permalloy type which Dual believes is superior in its characteristics to Ferrite types and for which a life-expectancy of 3000 hours is claimed by the manufacturer. Because of the unique reverse-play-and-record arrangement of this deck, two erase heads are required, mounted on either side of the record/play head. When the deck is put in the play (or record) mode, the entire head assembly swings in toward the cassette so that only the record/play head and one erase head, corresponding to the direction of tape motion, contact the tape. A continuous-pole/synchronous motor (similar to the motor used in Dual's better turntables) provides power to a flywheel and capstan through a precision ground belt. Tape takeup drive is provided separately by a second belt also attached to the motor shaft pulley. Two capstans are used in the tape-drive system. One is centered on the flywheel. The other is driven via a pulley and belt. It is this dual capstan arrangement which, according to the maker, results in the low wow and flutter figure claimed for this machine.

Laboratory Measurements

In measuring the performance of the Dual cassette deck, we elected to use Maxell UD-XL tape for all tests in the "standard" bias position and Nakamichi CrO_2 tape for tests of performance with bias switch set to the Chrome position. (Editor's Note: We understand that Nakamichi no longer has the chrome tape in its line.) Dolby circuits were individually calibrated for these two types of cassette tapes, as per instructions supplied in the owner's manual. We did note one discrepancy here. Whereas the booklet suggests calibrating the Dolby circuitry for "0 dB" playback of the test tone recorded at "0 dB," the VU meters themselves have a Dolby trademark symbol inscribed at about the +3 dB point which would seem to contradict the manual instructions. Nevertheless, we went by the written instructions. If these are incorrect, we urge Dual to amend the booklet. If they are correct, rescreening of the built-in-meters would help the user.

Using our Maxell tape and recording at 0 VU, we read a total harmonic distortion during playback (at 1 kHz) of 1.4%, well below the 2.0% claimed by the manufacturer. At +3 (the point at which the peak indicator light begins to flash), THD remained constant at 1.4%. At +5 VU, THD increased to 1.7%. The 3% THD point was not reached until we recorded signals at a +8 VU. Referring to the 3% THD recording level, we measured a signal-to-noise ratio of 53 dB without Dolby (using an "A" weighting network) and just over 60 dB when Dolby was introduced into the recording and playback. Frequency response for the complete record-play cycle was measured at −20 dB recording levels as well as at 0 dB. Readers may take issue with the first of these techniques, since saturation of tape occurs at the high, pre-emphasized frequencies, but we think that this set of read-

ings is useful if only in that it describes the available headroom of the machine and the tape being tested. The upper curve of Fig. 4 should therefore not be interpreted as an indication of frequency response capability (the −20 dB curve serves for that purpose), but rather as a measure of relative headroom of the machine (based on its 0 VU settings) and of the tape being tested. The more meaningful lower curve exhibited a peak of around 4 dB at 15 kHz and rolled off sharply beyond that frequency to −7 dB at 17 kHz. It is obvious that bias and equalization are not precisely set for this variety of tape (which has excellent high-frequency characteristics), but unfortunately, the Dual owner's manual does not specify the tape brand or type for which the machine was specifically calibrated. A note or phone call to United Audio (the people who distribute Dual products) would probably elicit that information, since many manufacturer's are beginning to name brands in their owners' manuals for just this reason. In any case, most users will probably be happy with the slight rise in response at around 15 kHz since the problem is usually one of not getting enough output at these frequencies.

Figure 5 shows frequency response measured using the Nakamichi CrO_2 tape. Again, a rising characteristic was noted for this tape at the high frequency end, but this time, response extended to 17 kHz and was down some 6 dB at 18.5 kHz, referred to a −20 dB recording level. As was to be expected, there was less "headroom" available using the CrO_2 tape. At 0 VU recording level, THD measured just a fraction below 2.0%, while at +3 VU, distortion had already exceeded 3.0%. Signal-to-noise ratio referred to the 3% THD point measured 57 dB without Dolby, and 62 dB with Dolby, both readings taken with an "A" weighting network. In terms of available dynamic range, therefore, the CrO_2

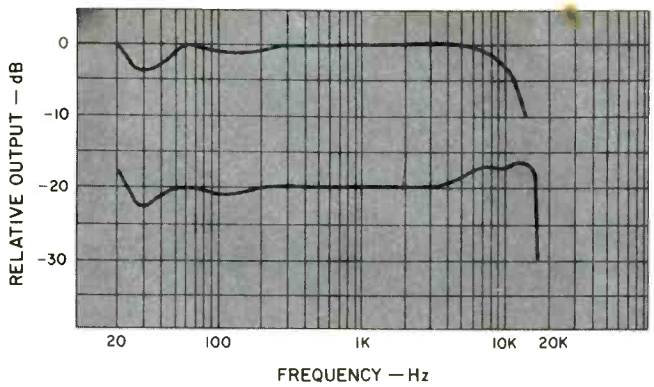


Fig. 4—Record/playback response using Maxell tape.

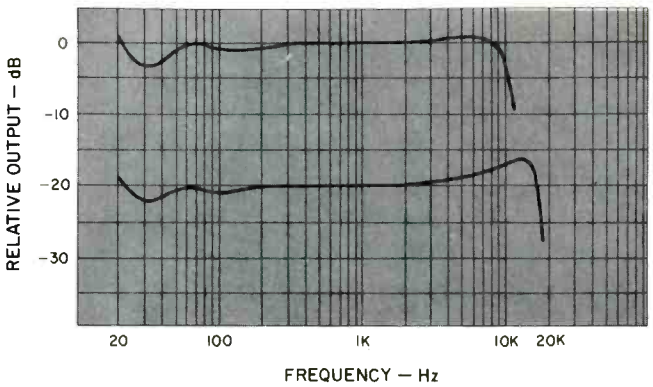


Fig. 5—Record/playback response with $Cr0_2$ tape.

tape was better even though its 3% THD point was reached at a lower setting on the VU meters.

Wow and flutter was indeed extremely low, measuring 0.065% (W RMS), and the fast-wind mechanism of this deck is about the fastest and smoothest we have encountered. A C-60 cassette was fully rewound in 55 seconds. We also checked a couple of C-120 cassettes and found that the Dual deck was able to handle them smoothly. Some cassette decks have trouble with this longer, thinner tape and discourage its use.

Use Tests

There is a distinct feeling of quality about the Dual cassette deck. All transport operations are extremely smooth, and very little finger pressure is required to operate the various transport keys. Meter ballistics are excellent and correspond very closely to true VU meter action (a rarity in cassette decks). We would have preferred to have mike/line mixing facilities to provide greater control flexibility in recording but, of course, the serious recordist can always purchase a suitable multi-channel mixer for use with this basic deck. Cueing up of a program before recording begins is easily accomplished by first depressing the *pause* button (which remains in that position) and then simultaneously depressing the *record* button and the appropriate *left-play* or *right-play* buttons. The *record* button stays down, while the *play* button pops up, but the moment the *pause* button is released, recording begins in smooth fashion. Even though the unit provides automatic reverse in playback, it is just as well that in the record mode it is necessary to start the recording process all over again in the reverse direction at the end of the first tape pass. Otherwise a few seconds would be lost if reversal during recording took place, since there are several inches of "leader" tape at each end of nearly all cassettes. We detected no audible difference in response when playing tapes in either direction, indicating a high degree of precision in tape head alignment.

The Dual Cassette Deck is another outstanding example of the great strides that have been made in cassette deck technology in recent years. It is ruggedly constructed, uses high-grade components throughout, and seems well worth the price. A one-year warranty covering parts and labor is included in the purchase price. *Leonard Feldman*

Check No. 91 on Reader Service Card

Sansui Model SR-717 Direct-Drive Turntable

MANUFACTURER'S SPECIFICATIONS

Speeds: 33⅓ and 45 rpm. **Fine Speed Adjust:** ±4%. **Wow and Flutter:** 0.035% weighted rms. **Signal-To-Noise Ratio:** Better than 60 dB. **Tonearm:** Statically balanced, S-shaped tubular. **Features:** Oil-damped tonearm lifter, lateral balancer, direct-readout stylus-force dial, inside force cancellor. **Dimensions:** 20 in. W x 15½ in. D x 7½ in. H. **Approximate Nationally Advertised Value:** $350.00.

There's no doubt about it, these modern turntables bear little resemblance to the old models of just a few years ago! A prime example is the SR-717, Sansui's new top-of-the-line direct-drive unit *par excellence*. It is rather larger than most turntables, measuring 20 inches wide by 15½ inches deep. The top plate and in fact the whole unit is finished in a charcoal black with silver trim, making a nice contrast with the polished wooded endpieces. The 9¼-in. arm is an S-type, and it has a gimbel suspension using knife-edge supports in the vertical plane. The rotatable counterbalance is calibrated in pressures from 0 to 2.5 grams, and there is provision for an additional weight if the cartridge is heavier than 11 grams. On the left of the arm pivot is a shaft for a lateral balance weight, and a suspended weight with calibrated spindle is used for the anti-skating adjustment—what Sansui calls the "inside force cancellor."

The controls are simplicity itself: a pressbutton for 33⅓, another for 45 rpm, each one having a small variable speed control next to it. There is a 3-position lever switch marked *Off, On* and *Play,* the last named position operating the arm lowering device. The strobe light is mounted at the front to the left, and the strobe speed markings (50 and 60 Hz) are on the turntable rim. The turntable is made of an aluminum alloy and turns the scales at just over 3 lbs. The motor is a 20-pole d.c. brushless servo type driven by an electronic supply unit that employs 20 transistors plus an IC. A voltage selector is underneath with the phono sockets at the rear, and the complete unit is mounted on four heavy-duty shock-absorber feet—a method of suspension I have always favored.

Measurements

As the cables supplied were low-capacity types, a CD-4 phono cartridge (Audio-technica AT-20) was used for the tests—or most of them. Setting up took a little longer than usual due to the more complicated anti-skating arrangement and the cartridge needed that extra arm weight for correct balancing. Then there was the lateral balancing to be done, but the whole process only took a few minutes. The first test was for wow and flutter, and the measured figure was very low indeed at 0.04% using the DIN 45-507 standard.

I expected rumble to be low too, and I was not disappointed as it measured better than −67 dB (ARLL), which is exceptionally good. The speed control gave a variation of +5 and −3% at 33⅓ and ±4% at 45 rpm. As with most modern arms, the vertical and lateral friction were too low to measure accurately although no figures are quoted by Sansui. Tracking error was within 0.5 degrees per inch, a good figure for this type of arm. Accuracy of the stylus-force dial was well within 5%, and the anti-skating calibration was

found to be very satisfactory. (It gives a choice of four positions: 0.5, 1, 1.5 and 2 grams.) As the motor is servo controlled from a stabilized power supply, speed accuracy is not determined by the line voltage or frequency. Once the speed control has been set, the speed remains rock steady and no further adjustment will be required.

Use Test

The SR-717 was on test over a period of several weeks—it was such an easy unit to use, I was reluctant to change it! After playing a number of CD-4 records, including ones made with the experimental RCA Quadralator, I changed the cartridge for a Shure V-15 Mk III to find the optimum tracking force. As expected, this came out at 1¼ grams and the anti-skating device was also set at that force. As I have pointed out previously, CD-4 cartridges with a Shibata stylus need rather more force but the effective weight on the record is spread over a greater area. I ought to have mentioned earlier that the unit comes complete with a transparent, hinged plastic lid which adds the finishing touch to a very handsome piece of equipment. As we have seen, it is a top performer too—certainly one of the best half dozen units now available at any price. It's not particularly cheap but then products of this caliber rarely are. . . . *George W. Tillett*