

Technics RS-1800

New Product Information

Quartz-Locked "Isolated Loop" Three-Motor Direct-Drive
Open-Reel Tape Deck with Quartz Synthesizer Pitch
Control and Automatic Adjustments of Bias and Equalization



RS-1800 A Professional in Every Sense of the Word

Technics has already announced the initial 3 models of the "Isolated Loop" Series... RS-1500US, an orthodox 2-track 38 cm/s (15 ips) model; the RS-1506US, a 4-track model designed for tape economy; and the RS-1700, an automatic-reverse model designed to give full play to the advantages of the symmetrical construction of the "Isolated Loop" tape path. Each of these 3 has dramatically advanced the existing frontiers of tape performance possibilities, and they have, by so doing, attracted the interested attention of a great many tape enthusiasts everywhere. With this new model, however, Technics adds a new tape speed—76 cm/s (30 ips)—to double the 38 cm/s (15 ips) speed. And thus this new model enables Technics to once again convincingly break through existing performance barriers. The RS-1800. Viewed from any aspect, it has precisely the outstandingly high performance, the incomparable reliability and the superb operational ease and precision to completely satisfy the most demanding professional... features which will be introduced fully in these pages.

Tape Transport Unit

76 cm/s (30 ips) Tape Speed

tape speed **76cm/s,**
38cm/s & 19cm/s
frequency response
30–35,000Hz, ± 3 dB
wow & flutter
0.010% WRMS

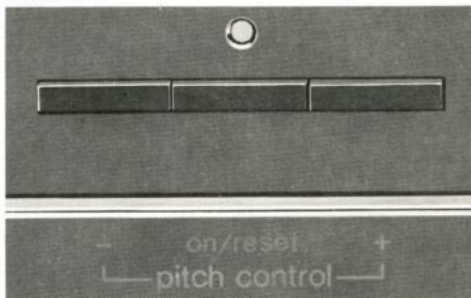
The RS-1800 has 3-speed operation capability: 76 cm/s, 38 cm/s and 19 cm/s (30 ips, 15 ips and 7-1/2 ips), and can be used for 2-track recording/playback and for 4-track playback. It's a machine that can be truly said to have the capability to get the complete high potential inherent in the "Isolated Loop" system. In other words, this machine convincingly demonstrates the truth of the fact that true high-fidelity recordings—with extended high frequency response, with less "hiss" noise, and with a wider dynamic range—become possible the faster speed is and the wider track width is. It proves it quite precisely, and much more expressively than mere words, by just two specifications: an overall frequency response of 30 ~ 35,000 Hz ± 3 dB, and an overall signal-to-noise ratio of 62 dB [both at 76 cm/s (30 ips)].

The faster tape speed is also beneficial from the point of view of tape transport stability: wow and flutter of less than 0.010% WRMS ($\pm 0.02\%$ DIN), and tape speed deviation of less than $\pm 0.08\%$ at 76 cm/s (30 ips)... both specifications which actually come quite close to ultimate performance! Such high performance specifications as these are, quite naturally, supported by the 3-motor direct-drive system used since the RS-1500US: a quartz-locked capstan motor and dual reel motors with a tape tension control system.

Quartz Synthesizer Pitch Control with Digital Display



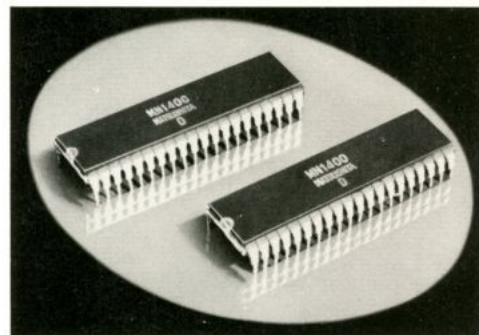
Unlike other quartz-locked phase-control systems (which are automatically cut out when the pitch control is employed), the unique quartz synthesizer pitch control featured in the RS-1800 is designed with quartz-locked accuracy at all pitch control settings. With this unique system, pitch may be varied by up to $\pm 9.9\%$ in increments/decrements of 0.1% per step, thus making it possible to select any one of 199 pitch settings for each rated speed of the unit. Tapes may be "tuned" accurately to the piano or other musical instruments of relatively accurate and constant pitch, or deliberately decreased in pitch (by -5.6% , or a half tone) to facilitate choral studies. Likewise, an increase by a half tone ($+5.9\%$) can add unexpected interest to a variety of musical renditions.



An important application in professional work such as broadcasting is the ability to fit a given tune into a given time slot or to record a 32-minute disc onto a 30-minute tape. Pitch will of course change, but there are cases where time conformity is of overriding importance. The amount of pitch increase or decrease (the variation ratio) is digitally displayed by LED's, together with, at the same time, the rated speed setting.

Microcomputer Digital Display

The RS-1800 uses its digital display, moreover, for much more than simply indicating the rated speed and the amount of



pitch increase or decrease. Various other bits of information related to tape transport are also displayed. The rotational speed of the reversing roller is detected by a photoelectric transistor and LED lamp, and this information is processed by the microcomputer for control purposes and, at the same time, displayed digitally. This use of a microcomputer in a tape deck is truly a revolutionary approach deserving of close attention.

Tape Speed Display

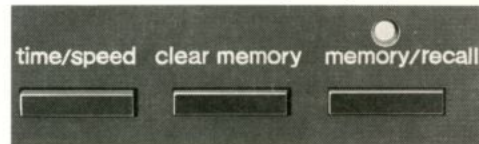
The display might show, for example, a display readout of $+0.03\%$ 76 cm/s" to indicate the deviation from rated tape speed for each tape. This feature is a strong indication of the full confidence that Technics has in the tape transport accuracy of the RS-1800.

Time Counter Display



Elapsed tape transport time is indicated by this display. During tape rewind, a negative indication will appear when "0" is passed. The indication can, of course, be reset to "0" by pressing the reset button. By pressing and holding the "+" button, the indication can be advanced as desired, up to a maximum of +19 hours, 59 minutes and 59 seconds. In the same way, the "-" button can be pressed to subtract as much as -19 hours, 59 minutes and 59 seconds. Display indication is extremely precise: $\pm 0.5\%$ at 76 cm/s (30 ips).

Time Counter Memory Display



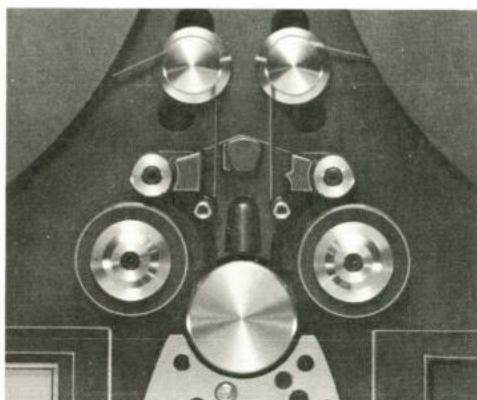
If the "memory" button is pressed while the display is functioning as a time counter, the microcomputer will memorize that precise time. This time will be digitally indicated and an LED will illuminate for confirmation. Then, unless the "clear memory" button has been pressed, tape movement will automatically

stop when the time displayed by the time counter is the same as the previously memorized time. (The memorized time is cleared when the power is shut off.) This memory function is designed not to function during recording, and, even if there is a slight tape overrun during a fast winding mode (fast forward or rewind), the tape will immediately reverse itself to the designated position and stop...all with an error of less than one second!

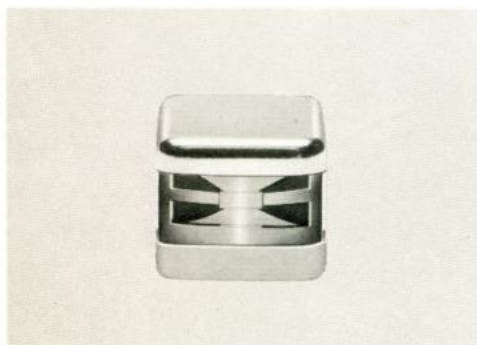
"Auto-Play" and "Auto-Repeat"



The RS-1800 has two other interesting operating functions in addition to the "Memory Auto-Stop" function described previously: "Auto-Play" and "Auto-Repeat." These are variations of the "Auto-Reverse" function already found on model RS-1700, in which the transparent control tape attached to the end of the tape causes an automatic reverse of tape movement when the control tape is optically detected by a system (consisting of an infrared LED, an infrared pass filter and an infrared-sensitive photo transistor) located between the tension roller and the capstan. The "Auto-Play" function—which makes it possible to automatically change from the rewind mode to playback—is especially convenient to playback a master tape, which is usually wound up when it "tails out."



SX (Sendust Extra) Head Assembly



In order to obtain the maximum potential from the extended high-frequency response of the 76 cm/s (30 ips) tape speed, the 2-track recording head, the 2-track playback head and the 4-track playback head of the RS-1800 use the SX (Sendust Extra) type of head, a head

originally developed by Technics. The main features of these heads can be summarized by the following 3 points:

Superb High-Frequency Response

To take full advantage of the feature of the material Sendust—high magnetic flux density—Technics was able to obtain superb high-frequency response by technically precise processing of a Sendust alloy developed by Technics, and by finishing the heads to a gap width of 2μ for the playback heads and 15μ for the record head.

Low Distortion

Compared to conventional core materials, Sendust has a dramatically greater saturation flux density, which means that distortion is remarkably reduced, even for high level input signals.

Extra Durability

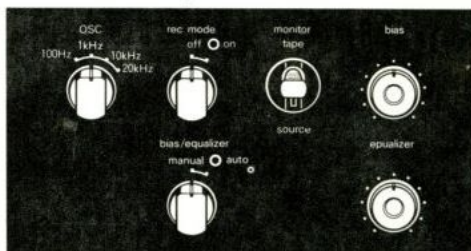
Although it has long been known that the wear resistance of Sendust is superb, as well as its electromagnetic characteristics, there were problems with its casting which delayed its popular use. Technics, however, successfully developed a new casting process, and also added a special hardening treatment which placed the SX head on an almost par with the HPF head with respect to resistance to wear.

Cue/Edit Switch

In order to gain the fullest possible advantage of the convenience of the 2-track format for editing, the RS-1800 is newly equipped with a cue/edit switch. If this switch is pushed to the left during the fast winding mode, the sound can be monitored, making it easier and faster to find the beginning of a certain piece of music or the place where editing is to be made, just as with other models in the series. If, however, this switch is pushed all the way to its locked position while the unit is in the stop mode, and then playback is started, only the supply reel and capstan will turn, "spilling" tape out in the desired amount to make editing easier. It might also be noted that the edit switch can be used directly during the playback mode without any problem.

Amplifier Unit

Automatic Adjustments of Bias and Equalization



The unique feature of the amplifier unit of the RS-1800, and the most practical feature as well, is this capability for automatic adjustments of bias and equalization. It detects, in other words, the optimum bias value and the optimum amount of equalization for the tape being used, and then makes automatic adjustments accordingly, thus making very easy work of problems very crucial for professional recordists: "use of the

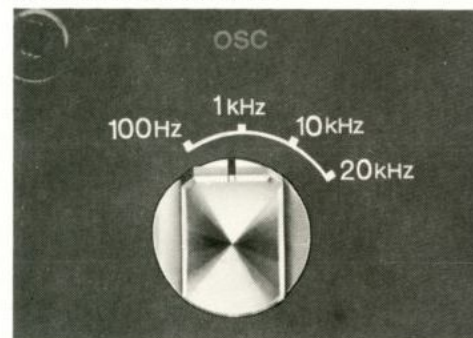
proper tape for the job" or "eliciting the very limit of fine performance for every tape used." It might also be noted here that manual adjustment of both bias and equalization is also possible.

Automatic Adjustments

If the bias/equalization selector is set to its "auto" position during tape movement in the recording mode, the LED lamp illuminates in red, a 1 kHz test tone is generated from the built-in oscillator, and the automatic adjustment of bias begins. At this time, if the function of the meters is changed from that of VU meters to bias meters, variations in the bias value can be visually monitored. After about 15 seconds, when the adjustment is completed, the equalization is then automatically adjusted, and the LED lamp flickers during this period to indicate that this adjustment is being made.

When both of these adjustments have been completed, the color of the LED will change to green, and the optimum bias and equalization obtained from these adjustments will be memorized by the unit. This information will be retained in the memory, even if the power is turned off, until the selector is set to the "manual" position (or until other automatic adjustments are made for a different type of tape).

Manual Adjustments



An oscillator is also provided—separate from automatic adjustments of bias and equalization—for manual adjustments which can be made in 4 steps: 100 Hz, 1 kHz, 10 kHz and 20 kHz. Of these, 20 kHz is included in order to cope with the superb high-range characteristics that the 76 cm/s (30 ips) tape speed gives. The test tone from the oscillator can be taken out from the line output terminals (3 sets), and, because the output level controls are ganged, this feature can be used for checking other equipment as well. Extremely precise adjustments are possible, moreover, because the bias meter calibrations cover a wide range (from 40% to 160%) in 10% increments.

DC Constructed Playback Amplifier

To complement the perfection of the high-performance tape transport unit, it was inevitable that the RS-1800 would have a separate amplifier unit, and that the playback equalizer and line amplifier would make use of DC construction features. The features—and they are very significant—of the DC design are improvement of low-range frequency response and phase dislocation, in other words, improvement of waveform fidelity, thus resulting in sharp, clear playback sound starts.

Differential amplifier construction is used in the first-stage of the line amplifier, and ultra-

low-noise single-packaged dual FET's are used for stable circuit operation and to improve the signal-to-noise ratio. The playback equalizer is adjusted to conform to NAB standards, but there is also a 2-position selector on the rear panel of the transport unit which can be used to change characteristics and thus make it possible to playback tape recorded by IEC standards. The time constants for both are shown in the following table.

	19 cm/s (7-1/2 ips)	38 cm/s (15 ips)	76 cm/s (30 ips)
NAB	3180 μ S/50 μ S	3180 μ S/50 μ S	∞ /17.5 μ S
IEC	∞ /70 μ S	∞ /35 μ S	∞ /35 μ S

Phase-Linear Recording Amplifier

Although the 76 cm/s (30 ips) tape speed and the use of SX heads have made it possible for the RS-1800 to record and playback in the region of 50 kHz, Technics didn't design the unit with this capability merely to make catalog specifications look better. This capability is, rather, in order to place even greater importance upon the sound quality within the necessary frequency range (although, even so, we feel that a specification of 30 ~ 35,000 Hz $\pm$ 3 dB is in itself extremely appealing). Thus it was that Phase-Linear circuitry was designed into the recording amplifier in order to take the fullest possible advantage of the 76 cm/s (30 ips) tape speed. Furthermore, considering that the RS-1800 is certain to see a great deal of tough professional service, expansion of the dynamic range was emphasized, and SEPP (Single-Ended Push Pull) circuitry was incorporated in the output stage. As a result, a linearity reaching higher than 30 dB with respect to the reference recording level (0 VU) was assured, and distortion was suppressed to less than 0.02%.

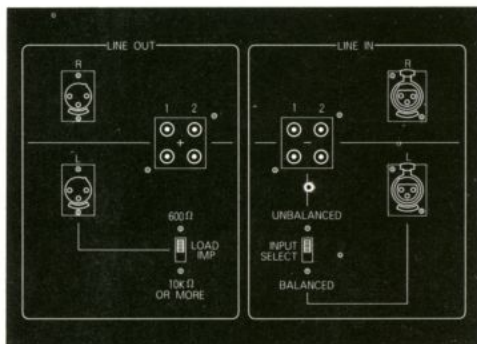
High-Precision VU Meters



The VU meters of the RS-1800 have very high precision: conforming to ASA standards, and can be switched over for use as peak meters, enabling them to satisfy DIN standards, and thus cope with any recording condition. The selector used for VU/PEAK switching has, of course, one more function: to switch over to the "bias meter" function already explained.

Balanced Cannon Connectors

There are 3 sets each of line input and line output terminals, and for one set of each the balanced Cannon type of connector—widely used for professional broadcasting equipment—is used to thus make connections easier and more secure. The other terminals use the ordinary unbalanced phono (pin) type of jacks. The impedance of the Cannon



output terminals can be switched over (600 Ω $\leftrightarrow$ 10 k Ω or more). The ratings of these terminals are as shown in the following table.

	Balanced Cannon Type	Unbalanced Phono Type (1 & 2)
Input Sensitivity & Impedance	-20 dBm/10 k Ω	60 mV (-24 dB) /50 k Ω
Output Level & Load Impedance	+4 dBm/600 Ω , 10 k Ω or more	0.775 V/22 k Ω or more

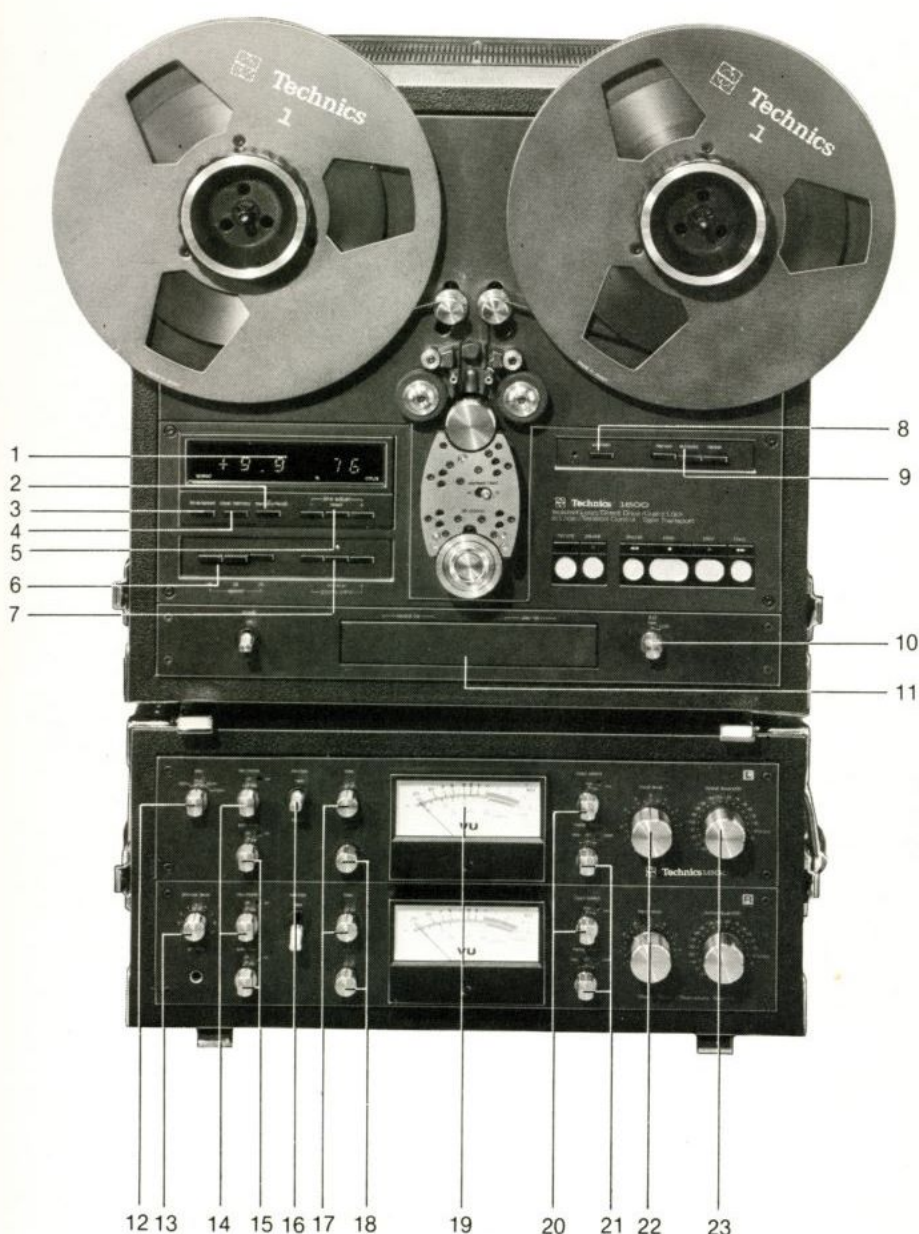
Recording and Playback Level-Calibration Controls

The transport unit includes controls for adjustment of the recording level and the playback level. The RS-1800 is pre-adjusted with Technics RT-10B218 (Scotch #207) as the reference tape.

Detent-Type Output Level Controls

Precision-calibrated 22-step detent-type attenuators are used for the left and right output level controls. The reference output level (0 VU) indication is at the -10 dB position. In addition to the line output controls, there is also a separate control exclusively for adjustment of the output level to the headphones.

Full Complement of Professional Controls



1. Speed/Time Display
2. Time Counter Memory Button
3. Speed/Time Display Selector
4. Time Counter Memory Clear Button
5. Time Counter Adjustment Buttons
6. Speed Select Buttons
7. Pitch Control Buttons
8. Cue/Edit Switch
(The design of this switch will be changed to a lever type.)
9. Auto/Manual Transport Mode Selectors
10. NAB/IEC Playback EQ Selector
(This selector will be located on the rear panel.)
11. Recording/Playback Level Calibration Controls
(The positions of these controls will be moved to the right end.)
12. OSC Frequency Selector
13. Headphone Output Level Control
14. Recording Mode Selectors
15. Automatic Bias/EQ Adjustment Switches
16. Tape Monitor Switches
17. Manual Bias Adjustment Controls
18. Manual EQ Adjustment Controls
19. VU/Peak/Bias Meters
20. Line/OSC Input Selectors
21. Meter Function Selectors
22. Input Level Controls
23. Detent-Type Output Level Controls

"Isolated Loop" Open-Reel Tape Decks in a Class of Their Own



RS-1500US

2-track 2-channel record/playback and 4-track 2-channel playback with 3 speeds

RS-1506US

4-track 2-channel record/playback and 2-track 2-channel playback with 3 speeds

RS-1700

Auto-reverse 4-track 2-channel record/playback with 3 speeds

Technical Specifications (tentative)

Track System:	2-track 2-channel recording/playback and 4-track 2-channel playback	Frequency Response:	76 cm/s (30 ips); 30—35,000 Hz, ± 3 dB
Head System:	4-head system SX (Sendust Extra) head for recording ($\times 1$) SX (Sendust Extra) head for playback ($\times 2$) Double-gap ferrite head for erasing ($\times 1$)		38 cm/s (15 ips); 30—30,000 Hz, ± 3 dB
Motors:	3-motor direct-drive system		19 cm/s (7-1/2 ips); 30—25,000 Hz, ± 3 dB
Capstan;	Quartz-phase-locked DC brushless direct-drive motor ($\times 1$)	Signal-to-Noise Ratio:	Weighted, 1 kHz (rec. level = 185 nWb/m $+6$ dB)
Reel Table;	Tape tension controlled DC brushless direct-drive motor ($\times 2$)		62 dB at 76 cm/s (30 ips)
Reel Size:	13 cm to 26.5 cm (5" to 10-1/2") outside diameter	Distortion (THD):	measured via tape at 400 Hz
	Automatic tape tension control for above size of reel	Operating level (0 VU)	less than 0.8% at any of 3 speeds
Tape Speed:	76 cm/s, 38 cm/s and 19 cm/s (30 ips, 15 ips and 7-1/2 ips)	Channel Separation:	better than 50 dB at 76 cm/s (30 ips), 1 kHz
Wow and Flutter:	0.010% WRMS ($\pm 0.02\%$ DIN)	Inputs:	
76 cm/s (30 ips);	0.015% WRMS	BALANCED;	Cannon type
38 cm/s (15 ips);	0.03% WRMS		Sensitivity -20 dBm/input
19 cm/s (7-1/2 ips);	less than $\pm 0.08\%$ at 76 cm/s (30 ips)	UNBALANCED;	impedance 10 k Ω
Speed Deviation:	less than 0.03% at 76 cm/s (30 ips)		Phono type (1 & 2)
Speed Fluctuation:		Outputs:	Sensitivity 60 mV (-24 dB)/input
		BALANCED;	impedance 50 k Ω
		UNBALANCED;	Cannon type
			Output level $+4$ dBm
			Load impedance 600 Ω /10 k Ω or more
			Phono type (1 & 2)
			Output level 0.775 V
			Load impedance 22 k Ω or more

Technics
Matsushita Electric