

MODERN larry zide
RECORDING
& MUSIC

Looks At

Tape Recorders

Understanding The Specs

The charts that follow are divided into two sections: open reel recorders and cassette recorders. Both are used in the studio, and each has its place, but the simple truth is that if you want to record music in the highest quality, you want open reel.

By inference, this does not say that cassette recording is not serious; it can be. But it is also true that

anything sonic that cassettes can do, open reel can do better. For example, if you need multi-track, the most you can get in cassette systems is 4 tracks, while open reel decks have as many as 24 tracks (and may go beyond that in the near future). Then, too, if you need to edit tapes, your choice is open reel. At the studio standard speed of 15 inches per second, a 10.5-inch reel of 1.5 mil tape offers 30 minutes of recording. At

the 7.5 in./sec. speed, that time is, of course, doubled. And if thinner tapes are used, (see *MR&M's* October Directory of Tape), those times are increased by 50 percent.

Understanding the Specifications

In our charts for open reel recorders, there are separate specs for the Number of Channels and for the Number of Tracks. The first spec calls for the electronic channels on the recorder, the second for the number actually on the tape. Visually, this number is the same, but it need not be; it is possible for a recorder to have, for example, 4 channels but 8 tracks. To use all 8, one would have to record the first 4, bounce them (transfer them to the other 4 tracks) and then record 4 more tracks—for a total of 8 tracks from a 4-channel machine.

Open reel tape is made in four standard widths: $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, one inch, and two inch. For the same tape length on a reel, wider tape will cost more than narrower tape. But another factor to consider is the number of tracks a machine puts on a given width of tape. Some recorders will put 8 tracks on $\frac{1}{2}$ -inch tape, and others will put 8 tracks on $\frac{1}{4}$ -inch tape. The wider tape will also provide wider tracks and wider spaces between the tracks, resulting in better performance characteristics.

Every deck listed employs three motors for tape transport. Two in each deck drive the respective platters over which the reels of tape are positioned. They thus control high speed winding in both directions (and also serve to affect the tensioning of the tape against the recorder's heads). Better head contact is essential to achieve the best transfer of the signal from the electronics onto the tape (and off it in playback, as well).

The third motor is the tape drive motor. It powers the capstan, around which the tape is wrapped or pressed. This creates the actual tape speed. Many modern machines use DC-servo motors. Electronics drive these motors, often using electronic clocks to highly regulate the speed of the motor. Often, DC-servo drive motors permit electronic adjustment of the playback speed (hence the musical pitch) for special needs.

An earlier design, still in use is the ac hysteresis-synchronous motor. The speed of this motor is determined by the accuracy of the power company's 60 Hz. In the U.S., this regulation is exceptionally good.

All professional open reel recorders have at least three heads. There is, in the direction of tape travel, an erase head, record head, and playback head. This is the standard configuration, but some manufacturers offer extra heads for special purposes. If more than 3 heads are listed in the charts, the FEATURES column in the directory for that product should provide information on the special heads and their functions.

The maximum reel size determines the largest reel of tape that can be used. The standard today is 10.5 inch reel capacity, but some compact recorders can only accommodate 7 inch reels, while some expensive multi-channel recorders can accommodate reels larger than 10.5 inches.

Wow and flutter indicates the speed deviation of a recorder and is measured in percentage of variation in ratio to ips. The lower the percentage the better, and note that the spec is for top-speed flutter. On recorders with several speeds the flutter will usually be lowest at the highest speed—another argument for recording at the highest possible speed on a particular recorder.

Top-speed frequency response is important to know, and again, it is usual on recorders for the widest frequency response to be available at the highest tape speeds.

Microphone and high-level impedance specs dictate two questions: Will the console interface with the recorder? And will the microphone inputs, if the recorder has any, work with quality low-impedance mics?

RECORD-INDICATOR TYPES describes the kinds of meters or other level indicators that the recorder is equipped with. Under recording situations you want these devices to indicate the level going onto the tape.

THD (total harmonic distortion) and Unweighted S/N (signal-to-noise ratio) signify relative information about a particular recorder's performance, but you cannot always depend on the comparing of one manufacturer's products against another. This is because these dB figures are entirely dependent on the standard recording level against which they were measured. Since there are many standard recording levels, one recorder's 70 dB S/N could actually be the same as another's 67 dB. You ultimately must get more information from the manufacturer than can be put in any chart of this kind.

Finally, there are the various mechanical specs, the last of which is price. These are, of course, the manufacturer's suggested list prices.

The FEATURES column is where we have permitted the particular manufacturer to tell you what is important about his product.

Cassettes

In our cassette charts, not all the specs we asked for on open reel recorders appear. This is primarily because many manufacturers do not give all specs, and also because, in general, a cassette recorder is not a mastering machine in the same sense that open reel is. For these machines—and we have tried to list only those products that are useful to your professional needs—you may well find that the most important spec (besides price) is the FEATURES column, in which the manufacturer lists what it considers to be the important facts about the recorder.

Now, on the charts:

Model	Number of Channels	Number of Tracks	Tape Width	No. of Motors	No. of Heads	Drive Mtr Type	Capstan Drive	Reel Size, in.	Flutter, %	Freq. Resp, dB	Mic. Imp, ohms	Hi Level Imp, ohms	Record Indicators	THD, %	S/N, dB	Dimensions, in.	Weight, lbs.	Price, \$	Features
OPEN REEL																			
Fostex																			
A-2	2	2	$\frac{1}{2}$	3	3	dc servo	belt	7	0.06	40-20k +/-3	n/a	10k	2 meters	1.0	65	13.5 14.0 6.8	29	850.00	Two track with sync, 7.5 and 15 in/sec. speeds.
A-4	4	4	$\frac{1}{2}$	3	3	dc servo	belt	7	0.06	40-20k +/-3	n/a	10k	4 meters	1.0	63	13.5 14.0 6.8	29	1450.00	Similar to above unit but 4 track.
A-8	4	8	$\frac{1}{2}$	3	2	dc servo	belt	7	0.06	45-18k +/-3	n/a	10k	8 meters	1.0	60	14.0 13.5 6.8	29	1995.00	The original $\frac{1}{2}$ -in. 8-track with Dolby C. Records up to 4 tracks at the same time.
A-8LR	8	8	$\frac{1}{2}$	3	2	dc servo	belt	7	0.06	45-18k +/-3	n/a	10k	8 meters	1.0	60	14.0 13.5 6.8	29	2500.00	As A-8 above but records all 8 tracks at the same time.
B-160	16	16	$\frac{1}{2}$	3	2	dc servo	direct	10.5	0.06	40-18k +/-3	n/a	10k	16 LED bargraph	1.0	63	17.0 17.5 9.3	67	6800.00	Has Dolby C, NR, and can be video interlocked. Other versions of this unit are available.

Model	Number of Channels		Number of Tracks	Tape Width	No. of Motors	No. of Heads	Drive Mtr Type	Capstan Drive	Reel Size, in.	Flutter, %	Freq. Resp, dB	Mic. Imp, ohms	Hi Level Imp, ohms	Record Indicators	THD, %	S/N, dB	Dimensions, in.	Weight, lbs.	Price, \$	Features
Otari																				
5050B-II	2	2	1/2	3	4	dc servo	direct	10.5	0.04	30-20k +/-2	150-10k	10k	2 meters w LED pk	0.5	72	22.1 17.4 8.1	60	2295.00	Microprocessor controlled counter, 3 speed select, full or 1/2 trk also available.	
5050BQ-II	4	4	1/2	3	4	dc servo	direct	10.5	0.04	30-20k +/-2	50k	50k	4 meters w LED pk	0.7	66	22.1 17.4 8.1	60	2995.00	Microprocessor controlled counter, compatible with SMPTE time code systems.	
5050-MK3-2	2	2	1/2	3	4	dc servo	direct	10.5	0.04	25-22k +/-2	150-10k	10k	2 meters w LED pk	0.5	72	18.8 17.3 28.3	89	2795.00	Microprocessor controlled counter, 3 speeds, SMPTE connector, plug-in heads.	
5050-Mk4-4	4	4	1/2	3	3	dc servo	direct	10.5	0.05	30, 20k +/-2	50k	50k	4 meters w LED pk	0.3	70	18.8 17.3 27.5	77	3895.00	Same as Mk3 above.	
ARS-1000	2	2	1/2	3	2	hyst. sync.	direct	10.5	0.06	50-18k +/-2	n/a	10k	none	0.2	60	15.7 19.0 7.6	45	1595.00	Two speeds, Tape lifters, cue control with 25 kHz sensor, plug-in electronics.	
5050 Mk3-8	8	8	1/2	3	3	dc	direct	10.5	0.04	40-25k +/-2	n/a	50k	8 meters w LED pk	0.7	68	17.3 16.9	77	5295.00	Microprocessor controlled, vari-speed, master channel switching, LED counter, +4 or -10 dB level.	
MTR-10-2	2	2	1/2	3	3	dc	direct	10.5	0.04	33-27k +1,-2	n/a	20k	2 meters w LED pk	0.15	77	45.0 22.8 25.3	220	6450.00	Model is also available in full, quarter-inch two track, or half inch four track formats.	
MX-70	8	8	1	3	3	dc	direct	10.5	0.04	50-24k +/-2	10k	10k	8 meters w LED pk	0.2	72	-	-	12500.00	Prewired for 16 track. Full 16 track system is \$14950.00.	
Studer ReVox																				
B77 MKII	2	2	1/2	3	3	ac servo	direct	10.5	0.06	30-22k +2,-3	22k	220k	2 meters w LED pk	0.6	68	16.5 17.8 8.3	37.5	1799.00	Edit mode, vari-speed, full logic, die cast chassis, 1/2 and 1/4-track versions.	
PR99 MKII	2	2	1/2	3	3	ac servo	direct	10.5	0.06	30-22k +2,-3	22k	5k	2 meters w LED pk	0.3	68	17.8 19.0 8.0	40.5	2250.00	Balanced in and out, reel time counter, address and zero locate, self-sync, tape dump, vari-speed.	
A810	2	2	1/2	3	3	ac servo	direct	11.1	0.04	40-22k +/-2	n/a	10k	2 meters pk read	0.3	79	19.5 19	68.3	6870.00	Total microprocessor control of transport and electronics, computer interface, SMPTE code option.	

Model	Number of Channels		Number of Tracks	Tape Width	No. of Motors	No. of Heads	Drive Mtr Type	Capstan Drive	Reel Size, in.	Flutter, %	Freq. Resp, dB	Mic. Imp, ohms	Hi Level Imp, ohms	Record Indicators	THD, %	S/N, dB	Dimensions, in.	Weight, lbs.	Price, \$	Features
Tandberg																				
TD20A SE	2	4	1/2	4	3	hyst sync	belt	10.5	0.03	20-30k +/-2	500	150k	2 peak meters	2.0	70	17.3 7.2 17.5	37	1195.00	Actilinear, sync, flying start record, 4-input line or mic mixing, SE/EQ for enhanced s/n switchable.	
TD 50	2	*	1/2	3	3	qz. lock	direct	12.0	0.04	30-22k +/-3	n/a	10k	2 peak meters	2.0	67	-	-	-	*All 1/2-in. formats, microprocessor control, optional RS232 computer interface, ruby tape guides.	
TASCAM																				
22/2	2	2	1/2	3	3	dc servo	belt	7	0.07	40-22k +/-3	10k	50k	2 meters	1.0	58	16.2 12.9 9.2	30.8	775.00	Also available in 4-track version at 1425.00.	
32	2	2	1/2	3	3	dc servo	belt	10.5	0.06	40-22k +/-3	100k	50k	2 meters	0.8	60	16.4 16.2 10.3	44.0	1300.00	Also available as model 34 four track at \$1700.00.	
38	8	8	1/2	3	3	dc servo	belt	10.5	0.06	40-22k +/-3	n/a	50k	8 meters	0.8	60	16.2 18.2 12.5	59.6	2750.00		
42NB	2	2	1/2	3	3	dc servo	direct	10.5	0.05	30-22k +/-3	1.2k	10k	2 meters	0.8	62	17.0 19.9 12.2	70.6	2295.00		
480B	8	8	1/2	3	3	dc servo	direct	10.5	0.05	40-22k +/-3	n/a	10k	8 meters	0.8	62	17.0 19.9 12.2	81.6	4495.00	Model 440B is similar but is a 4-track, 1/2-in. version at \$2995.00.	
580B	8	8	1/2	3	3	dc servo	direct	10.5	0.04	30-24k +/-2	n/a	10k	8 meters	0.8	62	19.9 17.0 12.7	88.5	5995.00	Model 52NB is similar but is 4-track, 1/2-in. version at \$3495.00, both offer SMPTE compatibility.	
Technics																				
RS1500US	2	2	1/2	3	4*	dc servo	direct	10.5	0.018	40-20k +/-2	4.7k	150k	2 meters	0.8	60	17.5 19.4 10.2	57.3	1600.00	*Extra 1/2-track play head, isolated loop transport, three tape speeds.	
RS-1520	2	2	1/2	3	4	dc servo	direct	10.5	0.018	40-20k +/-2	4.7k	10k	2 meters	0.8	60	19.8 18.0	61.8	2100.00	Similar to model above with NAB/IEC eq, fine bias and eq adjust, bal./unbal. in/out, logic control.	
RS--1700	2	4	1/2	3	5	dc servo	direct	10.5	0.018	40-20k +/-	4.7k	150k	2 meters	0.8	60	17.5 19.4	58.5	2100.00	All features of RS-1500 with auto reverse.	

CASSETTES

Model	Number of Channels	Number of Motors	Number of Heads	Tape Speed(s), in./sec.	Drive Motor Type	Top Speed	Top Speed Flutter, %	Top Speed Overall Response, Hz, dB	Mic Input High Level Impedance, ohms	Record Impedance, ohms	Thd at 0 VU, %	Signal to Noise, dB	Dimensions, H-W-D	Weight, lbs.	Price, \$	Features
Fostex																
250	4	2	2	3.75	belt	0.06	20-18k +/-3	50	20k	4 meters	1.5	53	3.25 17.0 14.0	19.0	1300.00	4-track recorder with Dolby C nr, internal 4 x 4 mixer.
X-15	2	1	2	1.875	belt	0.1	40-12.5 +/-3	50	20k	2 LED bar	1.5	50	3.0 11.5 9.0	6.4	4955.00	4-track recorder with Dolby B nr, internal mixer, battery portable, tracks 1-2 are fully compatible with home/auto cassettes.
Studer ReVox																
B-710	2	4	3	1.875	direct servo	0.035	22-22k +2,-3	10k	220k	2 LED bar	1.0	72	6.0 18.0 14.0	23	1999.00	Die-cast transport, azimuth stable headblock, microprocessor transport control, modular electronics, tape-type sensor, mic/line mixing.
A-710	2	4	3	1.875	direct servo	0.035	30-18k +/-3	n/a	5k	2 LED bar	1.0	72	6.0 19.0 14.0	24.5	2200.00	Same as B-710 but has balanced in/out.
TEAC Tascam																
225	2	1	2	1.875	belt dc	0.07	40-14k +/-3	10k	12k	2 meters	1.5	60	4.375 17.0 11.813	11.0	349.00	
1228	2	-	3	1.875 3.34	dc servo	0.04	35-14k +/-3	n/a	50k	2 meters	1.0	56	5.8 19.0 13.6	19.8	825.00	Two speeds.
234	4	3	2	3.75	dc servo	0.04	40-14k +/-3	10k	22k	4 meters w peak LEDs	1.0	52	5.813 19.0 14.06	21.6	900.00	4-channel recorder.
244	4	-	2	3.75	-	0.06	40-14k +/-3	10k	60k	4 meters	1.5	75*	4.75 17.06 14.56	20.0	1300.00	*S/n spec with built-in dbx nr. 4-channel recorder.
mini-studio Porta One	4	1	2	1.875	-	0.06	40-12k +/-3	10k	n/a	-	-	-	-	-	599.00	Complete portable 4-channel studio.

Model	Number of Channels	Number of Motors	Number of Heads	Tape Speed(s), in/sec.	Drive Motor Type	Top Speed Flutter, %	Top Speed Overall Response, Hz, dB	Mic Input Impedance, ohms	High Level Impedance, ohms	Record Indicator Type	Thd at 0 VU, %	Signal to Noise, dB	Dimensions, H-W-D	Weight, lbs.	Price, \$	Features
Tandberg																
TCD 3014	2	4	3	1.875	belt	0.09	20-20k	n/a	150k	2 peak dc +/-2 meters	1.0	73*	6.56 17.18 13.75	21.8	1385.00	*S/n spec with Dolby C nr.
TCD-910	2	4	3	1.875	belt dc	0.09	20-20k +/-2	n/a	150k	2 peak meters	1.0	73*	6.56 17.18 13.75	21.8	1895.00	Pro deck with XLR connectors, balanced lines, RS-232 port, custom software 8-bit processor w/32k memory.*S/n spec with Dolby C nr.
TCD 911	2	4	1	1.875	belt dc	0.1				2 peak meters	1.0	73*	6.56 17.18 13.75	21.8	1695.00	Same as TC 910 but playback only with play azimuth adjust and pitch control. *S/n spec with Dolby C nr.
Technics																
RS-B-100	2	3	3	1.875	direct dc qtz locked	0.022	20-23k +/-3	n/a	47k	2 meters floures- cent	-	60	3.87 16.87 10.75	12.3	800.00	Has Dolby B,C and dbx nr, phase comp circuitry, microprocessor control, vernier bias adjust, electronic tape counter, optional remote.
Yamaha																
MT44	4/2	1	2	1 7/8	DC servo	0.08	40-14k 3	50k	-	4 LED- bar mtrs	1.0	67*	4.25 13.37	12.25	570.00	*S/n spec in table with nr on. Dolby B or C nr available, full logic controls, play and record 2 or 4 track, pitch control.
12.37																

Manufacturers

Fostex 15431
 Blackburn Avenue
 Norwalk, CA 90650
 Otari Corporation
 2 Davis Drive
 Belmont, CA 94002
 Studer/Revox America
 1425 Elm Hill Pike
 Nashville, TN 37210
 Tandberg of America Inc.
 1 Labriola Court
 Armonk, NY 10504
 Teac/Tascam
 7733 Telegraph Road
 Montebello, CA 90640
 Technics
 1 Panasonic Way
 Secaucus, NJ 08512
 Yamaha International Corp.
 P.O. Box 6600
 Buena Park, CA 90622

