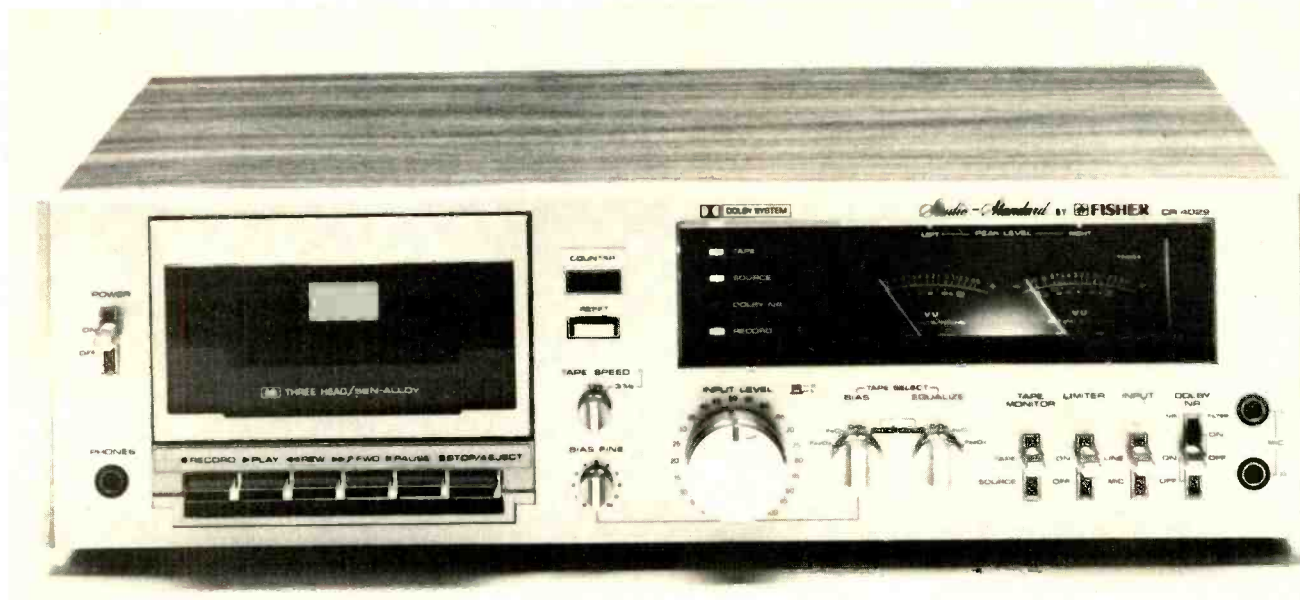


## Fisher CR-4029 Stereo Cassette Deck



### Manufacturer's Specifications

**Frequency Response:** 30 Hz to 14 kHz, to 20 kHz at 3 $\frac{3}{4}$  ips; 30 Hz to 16 kHz for FeCr and CrO<sub>2</sub> tapes, to 22 kHz at 3 $\frac{3}{4}$  ips; 30 Hz to 18 kHz with metal tape, to 25 kHz at 3 $\frac{3}{4}$  ips.

**Harmonic Distortion:** 1.5 percent; 1.2 percent at 3 $\frac{3}{4}$  ips.

**S/N:** 52 dB, CCIR/ARM; 62 dB with Dolby NR.

**Separation:** 45 dB.

**Crosstalk:** Down 70 dB.

**Erasure:** 70 dB.

**Flutter:** 0.06 percent W rms; 0.05 percent at 3 $\frac{3}{4}$  ips.

**Fast Forward and Rewind Times:** 120 S for C-60 cassette.

**Dimensions:** 17 $\frac{1}{2}$  in. (440 mm) W x 12 $\frac{1}{4}$  in. (310 mm) D x 4 $\frac{3}{4}$  in. (120 mm) H.

**Weight:** 17 lbs. (7.7 kg).

**Price:** \$499.95.

The Fisher CR-4029 cassette deck is one of the new breed that incorporates a tape speed of 3 $\frac{3}{4}$  ips, as well as the standard 1 $\frac{7}{8}$  ips. The unit also offers metal-tape compatibility and has three heads for full monitoring capability. The attractive front panel is brushed aluminum with black designations, which are easily read. The tape-motion lever switches do not match the sophistication of logic-controlled systems, but the force required for actuation is low, much better than most. *Eject* causes the cassette carrier to swing out gently, and the clear-window door is a snap to take out (pun intended), facilitating maintenance tasks. The counter does have a reset but lacks the desirable memory function. A status light shows when the tape-speed selector is set for 3 $\frac{3}{4}$  ips.

The good-sized VU-type level meters have white needles and scales with a medium gray background, and are quite

easy to read. Just above each meter is a peak-level indicator, which was a bit more difficult to see when looking at the deck from above. To the left of the meters are status lights to show *Tape* or *Source* monitoring, *Dolby NR*, and *Record*. The dual-concentric input level control has large, easily turned knobs, though some fine knurling would aid in setting one channel relative to the other. The bias and EQ switches rotate in opposite directions, sort of pointing at each other for *Metal*. The EQ switch causes a status light to go on in this position. There is a very helpful bias trim pot which can be essential in matching tape and machine, and the incorporated detent should prevent inadvertent bias changes.

Four spring-loaded, snap-action lever switches select *Tape* or *Source* monitoring, limiter on or off, *Line* or *Mic* input,

Fig. 1—Frequency responses in Dolby mode at 1 $\frac{7}{8}$  and 3 $\frac{3}{4}$  (---) ips with TDK AD tape.

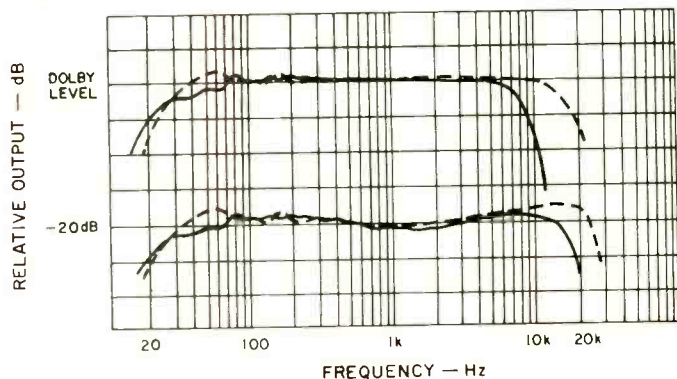
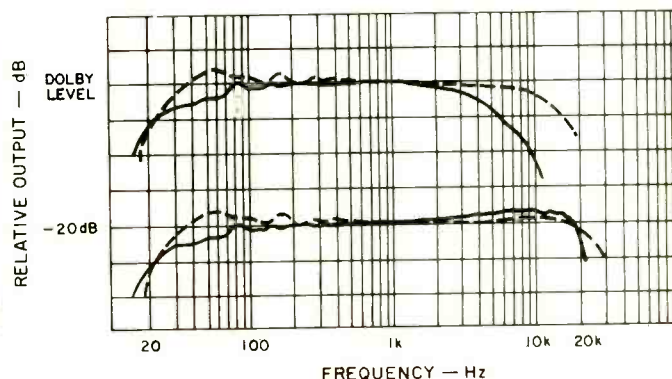
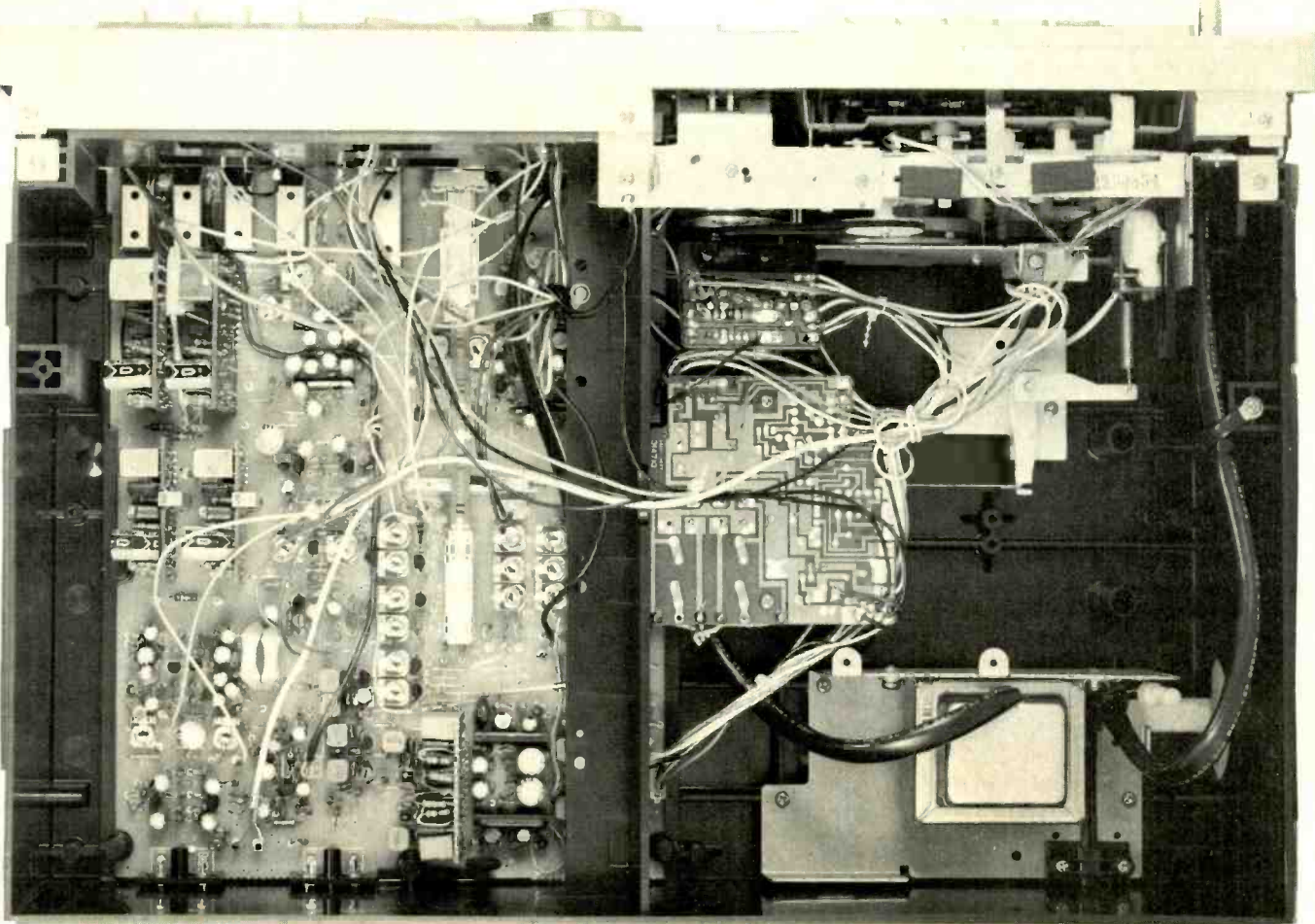


Fig. 2—Frequency responses without Dolby NR at 1 $\frac{7}{8}$  and 3 $\frac{3}{4}$  (---) ips with Sony FeCr tape.





and Dolby NR *Off*, *On/Filter Off*, or *On/Filter On*. It was nice to see the limiter included, since this feature can be very useful if unattended recordings are to be made. The phone jacks for mike input are at the right end of the panel, and the jack for headphones and the power switch are at the left end.

The line-in/line-out phono jacks are on the back panel. The labels are molded into black plastic, so they are difficult to read at an angle in dim light. The metal top and side cover was removed for examination of the interior. The majority of the frame and chassis was ribbed black plastic. Attempts to bend and twist the frame did not reveal any lack of rigidity. Most of the circuitry was on one large p.c.b., and there were a number of small cards plugged into it. The soldering was excellent with very little flux residue. Interconnections were made with multi-pin plugs, in general. Parts were not identi-

fied, but most of the adjustments were clearly marked and were very accessible.

### Performance

The playback response of the CR-4029 with TDK and BASF test tapes was very good for the low and mid frequencies, but there was a roll-off of close to 5 dB at the extreme high frequencies with both equalizations. With the choice of four settings for bias and EQ in combination with the bias trim, it was possible to match all of the formulations checked with the  $\frac{1}{3}$ -octave RTA. The record/playback responses were plotted for TDK AD, Sony FeCr, TDK SA, and Scotch Metafine tapes, as shown in Figs. 1 to 4. Most of the figures include results for both 1 $\frac{1}{8}$  and 3 $\frac{3}{4}$  ips tape speed. There are obvious extensions in response at -20 dB with the higher speed, but

Fig. 3—Frequency responses with and without (---) Dolby NR at 1 $\frac{1}{8}$  ips with TDK SA tape.

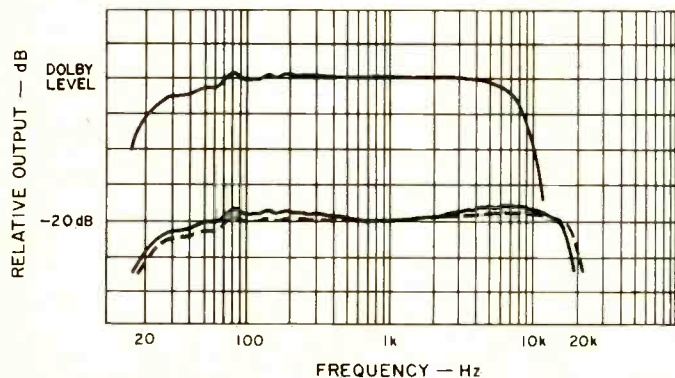
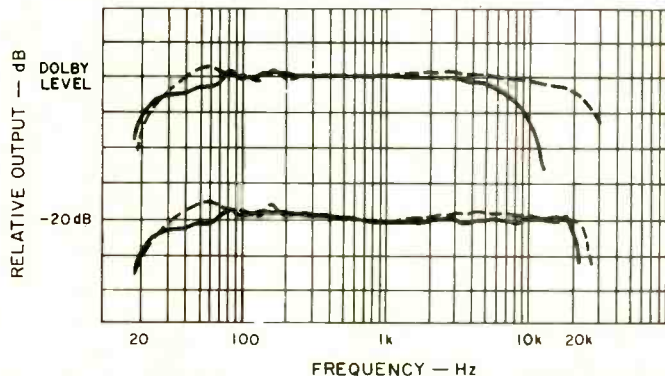
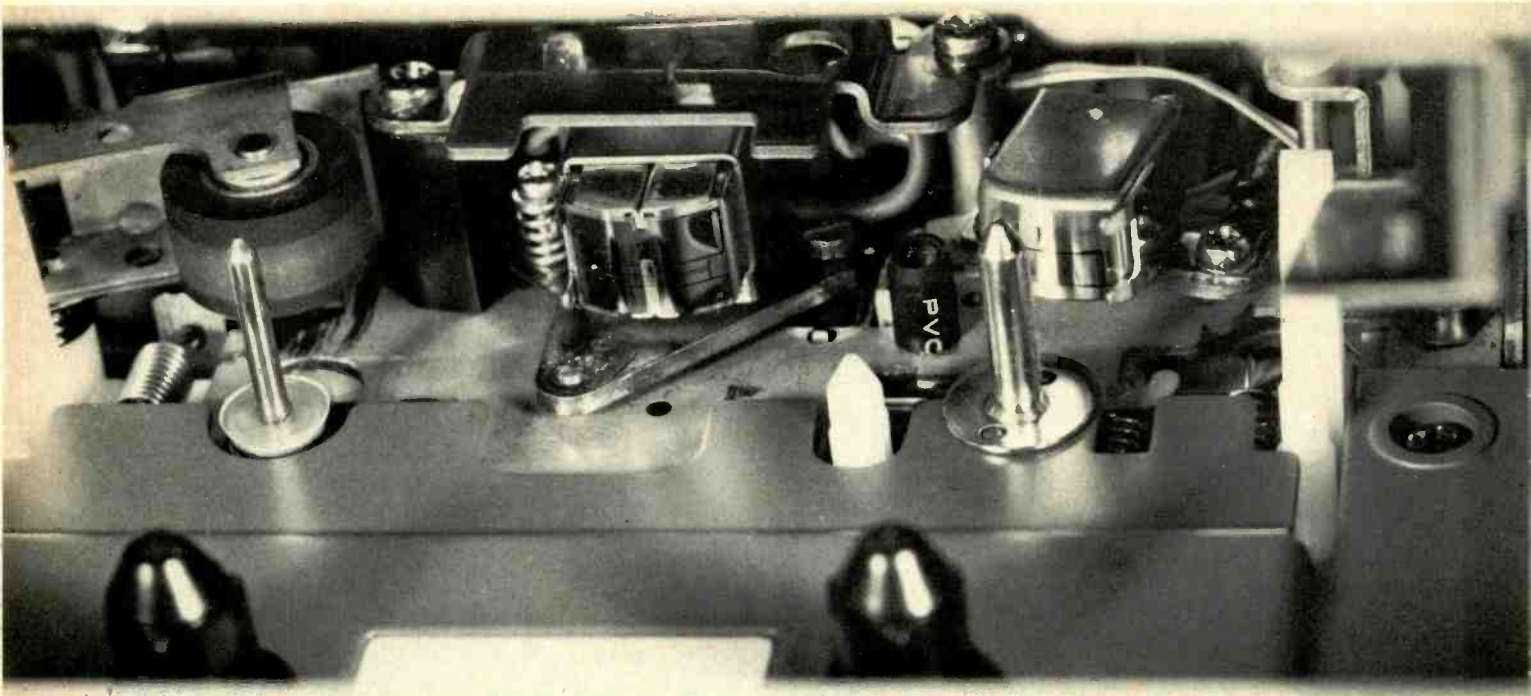


Fig. 4—Frequency responses with Dolby NR at 1 $\frac{1}{8}$  and 3 $\frac{3}{4}$  (---) ips with Scotch Metafine tape.







the changes in the headroom at Dolby level are great indeed, particularly with Sony FeCr. Table I gives the measured response limits for all the combinations tried. The use of Dolby NR caused some shift from the very flat responses without it, but a little bias trimming minimized the deviations. The actual range of bias trim was about  $\pm 4$  dB at 10 kHz with TDK SA tape. Playback of a Dolby-level tape was indicated correctly, at +2.5 VU on the meters.

Close attention was given to a check on the alignment of the playback head with the record head, both mounted within the same assembly. In the past, other recorders had shown phase errors of 70 degrees or more at 10 kHz. Well, Fisher is really doing it right: The phase discrepancy was close to zero degrees at both tape speeds, the best ever seen with this type of head construction — in fact, the best of any type. Phase jitter was about 30 degrees at 1 7/8 ips, better than most decks, and was just 5 degrees at 3 3/4 ips. The multiplex filter was 3 dB down at 15.7 kHz and was an excellent 39 dB down at 19 kHz. The bias in the output during recording was very low.

With its two speeds, this recorder had twice as many test possibilities for checking distortion. A few fast tests showed that all tape types had lower distortion at the higher speed; the largest reduction was with Sony FeCr. TDK AD and Scotch Metafine were also used for taking detailed data. The levels of HDL<sub>3</sub> in Dolby mode were determined with a spectrum analyzer for each tape from the three-percent distortion point down to 10 dB below Dolby level. TDK AD had much the lowest distortion at 1 7/8 ips, as shown in Fig. 5, and Sony FeCr was much better when it was at 3 3/4 ips at all record

levels. Measurements of HDL<sub>3</sub> from 30 Hz to 7 kHz were made with Scotch Metafine in Dolby mode at 10 dB below Dolby level at both tape speeds. Figure 6 shows that for Metafine the minimum distortion was about the same at 1 7/8 and 3 3/4 ips but that there was a noticeable improvement at the frequency extremes with the higher tape speed. In all of the distortion tests, the level of other harmonics was very low, much better than most other decks. Without Dolby NR, there was an increase in distortion of about 30 percent.

Signal-to-noise ratios were measured with TDK AD, Sony FeCr, and Scotch Metafine at both tape speeds with and without Dolby NR with both IEC "A" and CCIR/ARM weighting. The results provided in Table II are certainly very good at both speeds. The increase in the ratio for Sony FeCr with 3 3/4 ips occurred because the much lower distortion gained a much higher maximum record level, as shown in Fig. 5. The separation between channels was 48 dB at 1 kHz, very good performance. Crosstalk was down at least 80 dB at 1 kHz, and erasure of Metafine at the same frequency was 76 dB. At the more challenging 100 Hz, erasure was 60 dB, quite good for the metal tape.

The input sensitivity for mike was 0.16 mV, and the overload point was at 36 mV — quite good. The line sensitivity was 77 mV, and the input overload was at 5.8 V, which is high enough for any normal conditions, albeit lower than most current decks. Output clipping was at a level equivalent to +14.5 VU on the meter. The input pot sections tracked within a dB from maximum down 45 dB. The action of the limiter started at +2 VU, and higher levels caused very little increase

**Table I—Record/playback responses (−3 dB limits).**

Tape Type	Tape Speed Ips	With Dolby NR				Without Dolby NR			
		Dolby Lvl		−20 dB		Dolby Lvl		−20 dB	
		Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
TDK AD	1 7/8	25	7.5	23	17.1				
	3 3/4	25	14.2	24	24.3				
Sony FeCr	1 7/8					30	4.5	27	20.0
	3 3/4					25	11.8	24	24.6
TDK SA	1 7/8	27	7.7	23	17.2	27	7.8	25	19.8
Scotch Metafine	1 7/8	27	7.5	23	21.2				
	3 3/4	27	24.1	24	24.9				

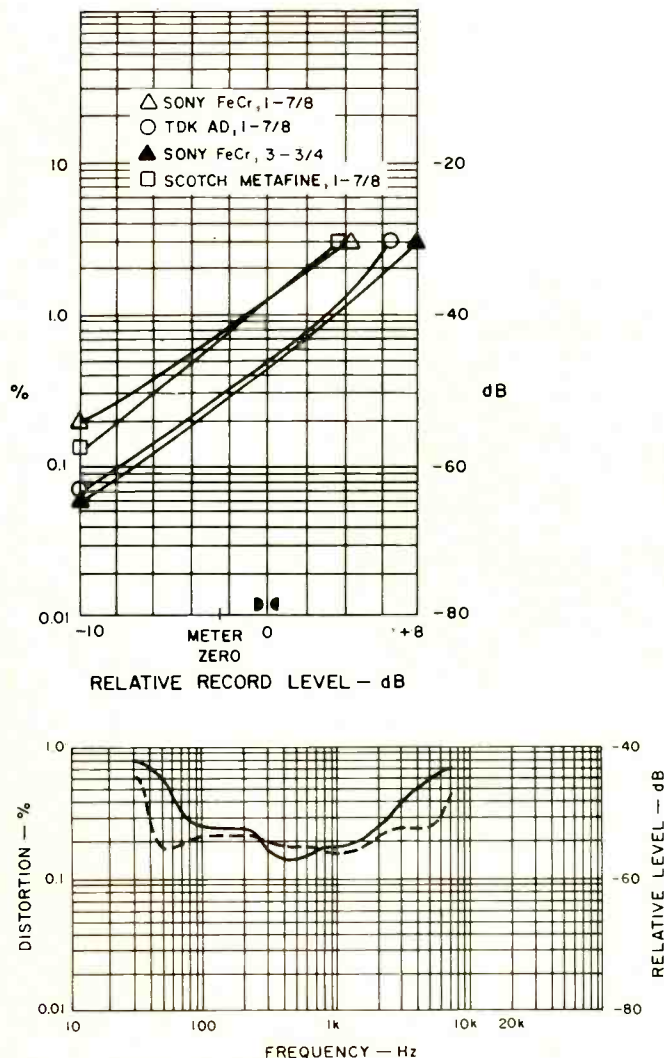
**Table II—Signal/noise ratios with IEC "A" and CCIR/ARM weightings.**

Tape Type	Tape Speed Ips	IEC "A" Wtd. (dBA)				CCIR/ARM (dB)			
		W/Dolby NR		Without NR		W/Dolby NR		Without NR	
		@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%
TDK AD	1 7/8	58.8	65.1	53.0	58.5	59.2	65.5	50.9	56.4
	3 3/4		64.3				64.7		
Sony FeCr	1 7/8	61.0	65.0	56.3	59.3	63.0	67.0	55.3	58.3
	3 3/4		69.0				71.0		
Scotch Metafine	1 7/8	62.3	66.0	57.3	60.6	65.7	69.4	56.4	59.7
	3 3/4		66.3				69.7		

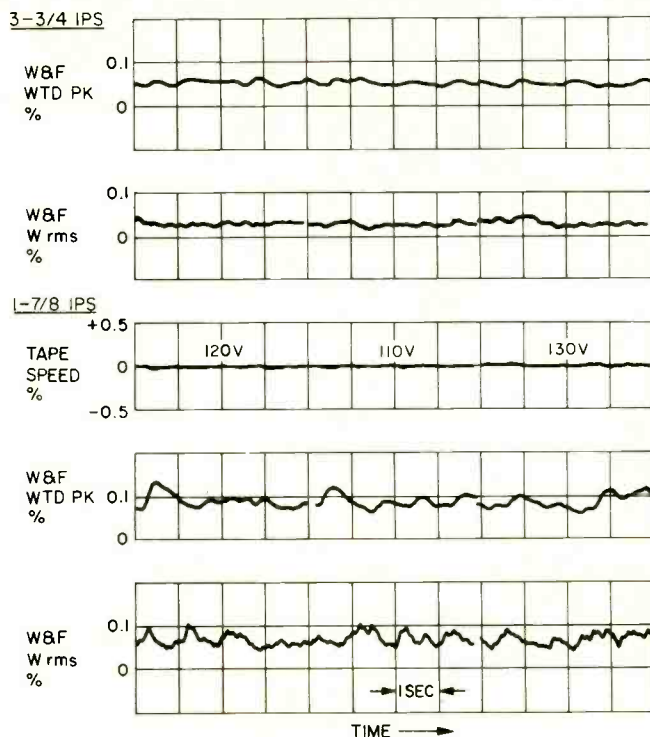
above this indication. The response time was about 10 mS for a tone burst at 10 dB above meter zero. The line outputs were 0.9 V, slightly below spec, but higher than quite a few decks. The level at the headphone jack with 8-ohm loading was 25 mV, which was a good volume for most of the headphones tried. The VU meter response was down 3 dB at 21 Hz and 20.1 kHz. The dynamic response to the 300-mS test burst was close to VU meter standards, but there was about 0.5 dB extra overshoot. The scale calibration was accurate in most cases, but was about a dB high at levels below -10 VU. The peak indicators fired at +3 VU with a continuous signal, and they gave a good indication with a single-cycle burst of 1 kHz at +4 VU.

The flutter was the same as specified at 1 7/8 ips, but was about half the specified figure at the higher tape speed. Tape play speed was about one percent slow and did not vary with changes in line voltage. Fluctuations with time were very low. The wind time for a C-60 cassette was 110 seconds, bet-

**Fig. 5—Third harmonic distortion vs. level in Dolby mode at 1 kHz with TDK AD, Sony FeCr, and Scotch Metafine tapes.**



**Fig. 6—Third harmonic distortion vs. frequency in Dolby mode, at 10 dB below Dolby level, at 1 7/8 and 3 3/4 (---) ips with Scotch Metafine tape.**



**Fig. 7—Wow and flutter (three trials) at 1% and 3 3/4 ips and tape play speed vs. line voltage at 1 7/8 ips.**

ter than the spec. This is slower than many decks, but the wind was quite smooth.

### In-Use Tests

All tape loading and unloading and head maintenance were easy tasks. Controls worked smoothly, and the lever switches snapped positively into position. The long, white needles of the level meters and the meter scales stood out well from the gray background over a range of room illumination. The peak indicators were definitely helpful in setting for the highest possible levels. The owner's manual has an open format with simple, but very clear, illustrations. The instructions on setting bias with FM noise as a test source would be improved by adding a note on the need to make the recordings perhaps 20 dB down from 0 VU.

Various sources were recorded, both for simultaneous monitoring and for playback later. Some material from FM was used, and discs included *A Cut Above* with the Brubeck Quartet, *Strauss' Also Sprach Zarathustra*, and recordings by Virgil Fox and Buddy Spicher. Shifts in response when switching Dolby NR in and out were at most very minor, generally not detected at all. The biggest change noted was that recordings at higher levels were definitely improved with the higher tape speed. The results with the limiter were fairly good, much better than what would have happened without its use, but there was some muffling of the sound at the very highest levels. Record, pause and stop clicks were all very low, not even detected in some cases.

The Fisher CR-4029 is a very well performing deck with excellent capabilities in a number of areas. The higher tape speed improved the results, especially with lower flutter and the significantly extended headroom at the highest recording levels. The deck does not have the sophisticated logic control of tape motion, but the lever switches do most of the same things, with a gentle push. The lack of mike/line mixing might be important to some; I missed the memory function more. All in all, the deck is very worthy of consideration in this price range.

Howard A. Roberson

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