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ADS C2 CASSETTE DECK

Manufacturer's Specifications
Frequency Response: 30 Hz to 16 kHz, ±1 dB; 30 Hz to 18 kHz, ±1 dB, with metal tape.
Signal/Noise Ratio: 58 dBA, 74 dBA with Dolby C NR.
Separation: 35 dB.
Crosstalk: 70 dB.
Erasure: 65 dB.
Input Sensitivity: Mike, 0.2 mV; line, 30 mV.
Output Level: Line, 560 mV; headphone, 320 mV into 200 ohms.
Flutter: ±0.06% wtd. peak.
Wind Times: 80 seconds for C-60.
Dimensions: 17½ in. (440 mm) W × 2¾ in. (70 mm) H × 14¾ in. (375 mm) D.
Weight: 18.3 lbs. (8.3 kg).

Price: $549.00.
Company Address: One Progress Way, Wilmington, Mass. 01887.
For literature, circle No. 91

The ADS C2 stereo cassette deck is a member of the recently introduced Atelier series of matching components. All of the units are of the same basic size and shape, ready for stacking—on an optional stand if desired—or side-by-side placement. The front of the C2 has a clean, uncluttered look which at first hides its relationship to the world of cassettes. A push of the button marked "Slider" causes a good-sized drawer to move out from the left front panel of the deck, revealing a nicely illuminated horizontal well for the cassette. Loading is essentially a simple push-in-and-down operation, a quickly learned movement.

On the top of the drawer near the front are two sets of interlocked pushbutton switches. Three are for Dolby NR (off/B/C) and four for tape type (ferric/chrome/ferrichrome/

metal). There is also a multiplex filter on/off switch. These buttons are out of sight and mind when the drawer is closed, but they are very obvious and convenient when a tape is being inserted. On the front face of the drawer are light-touch bar switches for the six normal transport modes: Rewind, stop, play, fast forward, record and pause. Bright LED indicators for each function can easily be seen at a considerable distance. The logic allows shifting from any mode to any other, including flying-start recording from play or wind modes.

A seven-segment, three-digit counter display has large, bright digits which should be of aid to most users. There is the expected (and necessary) reset and also "Memo" which stops the deck at "000" in either direction of fast wind. Winding through zero is possible by just holding the appropriate wind button in. These are two useful characteristics of "Memo" which many decks do not have. With "Repeat" the C2 will automatically rewind from the end of the tape to the beginning and start play again. If "Memo" is set, rewind will stop at zero, and play will commence there. "Repeat" and "Memo" have the same light-touch switch bars and bright status lights as used for the transport modes.

The level meters consist of vertical, side-by-side LED-type bar-graphs. The 12 sets of double-bar segments in each meter are green up to zero and red above that. The zero of the meters is referenced to Dolby level, 200 nWb/m, though there is no double-D symbol on the scales to emphasize that fact. The separate dual concentric pots for both line and microphone inputs enable complete mixing of such inputs. The periphery of each knob is rubber covered to aid in rotating one section relative to the other for level balancing. The mike phone jacks are to the right of the pots: If a single mike is plugged into the left jack, it will be fed to both channels for an automatic mono effect. The green-colored "Power" on/off switch is at the opposite end of the front panel, right under the stereo phone jack for headphones.

The line in/out phono jacks are on the rear panel, along with an unswitched a.c. outlet, limited to 200 watts maximum. The ADS deck is supplied with a rear-panel cover which fits easily into place and conceals all of the back-unit cabling. This is perhaps a small convenience, but it could be quite appealing to those who like things neat.

The soldering of the p.c. boards was generally excellent with just a couple of spots having a little flux residue. The large, main circuit card had all adjustments labelled, and they were all completely accessible—not hidden under another card as happens with some decks. All parts were identified on all boards. There were two fuses in clips, and the power transformer was well shielded. The transport assembly was fairly rigid, and the drawer was well constructed, smooth in operation, and did not stop with a shock at its in and out positions. Close operation showed the drawer moves at two speeds, slowing towards the ends of its travel. The box chassis frame was made more rigid with the heavy-steel top cover, which had been removed for the internal examination.

Measurements

The playback responses were very good, with all points within ±1.5 dB except for the lowest frequency on the 120-μS test tape. The indicated play level was about 0.5 dB low, and tape play speed was 0.35% fast, which is quite good. Many tape formulations were tried with the ADS deck, recording and playing back pink noise recorded at −20 dB in Dolby C mode. Many tapes gave what would be classified as very good performance with noise reduction, and more had flat responses, as expected, without NR. The tapes selected for further testing, Maxell UD-XL I, Memorex HB II, BASF Professional III, and Fuji FR-Metal, gave the flattest responses in the important 100 Hz to 10 kHz region. Other good performers were: Denon DX5; Fuji FR-I; Loran High Bias; Maxell XL II-S; Nakamichi EX II and SX; Sony UCX-S and FeCr; TDK AD, SA, SA-X and MA-R, and Yamaha CR and MR.

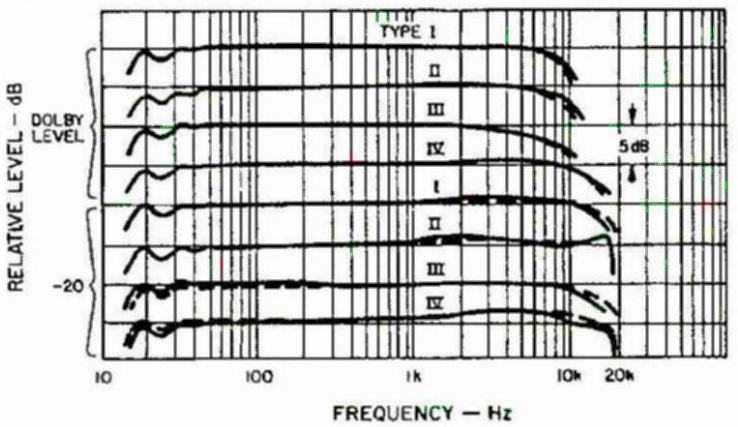


Fig. 1—Frequency responses with (solid line) and without (dashed line) Dolby C NR using Type I (Maxell UD XL-I), Type II (Memorex HB II), Type III (BASF Professional III), and Type IV (Fuji FR-Metal) tapes.

Figure 1 shows the swept-frequency response plots for the four tape types both at Dolby level and 20 dB below that, both with and without Dolby C NR. With the usual exception of Type III at Dolby level, the overall results are most notable for the flatness of the responses, particularly with Dolby C NR at −20 dB. The responses are also well extended at the low-frequency end, with minor head bumps. Most of the −20 dB responses are flat within ±1.5 dB from 17 Hz to 15 kHz or more. (The hotter tapes, such as Sony UCX-S and TDK SA-X, had slightly higher levels above 2 kHz with some extension of the roll-off point.) The −3 dB points for the responses plotted are listed in Table I. Additional checks with pink noise showed that the ADS C2, with its sharp roll-off at 20 kHz, is one of the few decks not influenced by above-band energy—a definite plus for synthesizer users.

Playback of a recorded 10-kHz tone had 10° of phase discrepancy between tracks and just 20° of phase jitter, better than most decks. The multiplex filter response was not down 1 dB until 15.9 kHz, better than most units. The attenuation was a good 31.8 dB at 19.00 kHz. These and other characteristics are listed in Table II. The separation and crosstalk figures are both excellent. The erasure of 60 dB at 100 Hz was quite good for the metal tape used and for that low frequency.

Measurements were made of the third-order distortion of

"ADS supplies a cover for the C2's rear panel—a small thing perhaps, but symbolic of their attention to detail."

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

	With Dolby C NR				Without Dolby NR			
	Dolby Lvl		−20 dB		Dolby Lvl		−20 dB	
Tape Type	Hz	kHz	Hz	kHz	Hz	kHz	Hz	kHz
Maxell UD-XL I	16	10.0	15	16.1	16	9.3	15	18.3
Memorex HB II	16	10.8	15	18.6	16	9.5	15	18.6
BASF Professional III	16	9.2	15	14.8	16	8.3	16	17.3
Fuji FR-Metal	16	15.9	16	19.3	16	15.0	15	19.8

Table II—Miscellaneous record/playback characteristics.

Erasure At 100 Hz	Sep. At 1 kHz	Crosstalk At 1 kHz	10-kHz A/B Phase		MPX Filter At 19.00 kHz
			Error	Jitter	
60 dB	49 dB	−80 dB	10°	20°	−31.8 dB

Table III—400-Hz HDL_3 (%) vs. record level (0 dB = 200 nWb/m).

		Record Level					HDL_3 =
Tape Type	NR	−10	−8	−4	0	+4	3%
Maxell UD-XL I	Dolby C	0.08	0.14	0.24	0.40	1.9	+5.2 dB
Memorex HB II	Dolby C	0.18	0.24	0.53	1.7		+2.4 dB
Fuji FR-Metal	Dolby C	0.11	0.15	0.29	0.75	2.1	+5.1 dB

Table IV—Signal/noise ratios with IEC A and CCIR/ARM weightings.

	IEC A Wtd. (dBA)				CCIR/ARM (dB)			
	W/Dolby NR		Without NR		W/Dolby NR		Without NR	
Tape Type	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%	@ DL	HD=3%
Maxell UD-XL I	69.3	74.1	52.5	57.8	69.8	74.6	50.2	54.5
Memorex HB II	69.5	71.7	53.3	55.2	70.2	72.4	51.0	52.9
Fuji FR-Metal	72.0	76.6	55.5	59.3	72.5	77.1	53.4	57.2

Table V—HDL_3 (%) vs. frequency at 10 dB below Dolby level.

		Frequency (Hz)						
Tape Type	NR	50	100	400	1k	2k	4k	6k
Fuji FR-Metal	Dolby C	0.12	0.13	0.11	0.13	0.14	0.19	0.36

Table VI—Input and output characteristics at 1 kHz.

Input	Level		Imp.,	Output	Level		Imp.,	Clip (Re:
	Sens.	Overload	Kilohms		Open Ckt.	Loaded	Ohms	Meter 0)
Line	29 mV	6.5 V	197	Line	500 mV	380 mV	3.8k	+14.3 dB
Mike	0.16 mV	23 mV	2.24	Hdphn.	450 mV	47 mV	68	

a 400-Hz tone with the three tapes in Dolby C NR mode from −10 dB up to the point where HDL_3 reached 3%. Table III lists the results of those tests, and it shows that UD-XL I and FR-Metal had close to the same good performance. Signal-to-noise ratios were secured both with and without Dolby C NR, for IEC A and CCIR/ARM weightings. The excellent results for all combinations are reported in Table IV. The Fuji Type IV tape was also used for evaluating the distortion across the band at 10 dB below Dolby level; Table V presents the figures obtained for frequencies from 50 Hz to 6 kHz. The results are quite good, and those at the frequency extremes are better than many decks.

Various input and output characteristics were measured, and as Table VI shows they were all substantially to specification. That this is so for the headphone output might not be clear; the standard test loading for a headphone output is 8 ohms, while ADS specifies 320-mV output with a 200-ohm load. Using their specified load, the measured output was 366 mV. In the checks with various headphones, there was quite a range in the acoustic levels at zero meter level. As there is no output-level control, the user may find an advantage in selecting phones to match personal level preferences. Mike and line input-pot sections both tracked within a dB from maximum down to about −50 dB, which is quite good. The line-out polarity was reversed from the input's in record mode, but it was the same in playback.

The level meters were only 1 dB down with a tone burst of just 10 mS duration, meeting this criterion for peak-responding meters. The decay was on the fast side, just 520 mS for a 20 dB drop as compared to the standard of at least 1.4 S. The thresholds of the 12 meter segments were all acceptably accurate, and those between "−2" and "+2" were within 0.3 dB, which is just fine. Because the meters are fed after the record equalization, the responses are not flat. Relative to 400 Hz, they were up about 4 dB at 20 Hz, +3.6 dB at 2 kHz, and increasing to +7 dB at 8 kHz. This is a metering design that I prefer because the indicated levels are better correlated to the low- and high-frequency energy that can cause distortion.

A 3-kHz tone was recorded the entire length of a C-90 cassette. The flutter measured in playback was consistently low wherever it was checked: 0.033% wtd. rms and ±0.055% wtd. peak. The tape play speed changed less than 0.05% with the line power varied anywhere from 110 to 130 V. With time the speed wandered less than 0.02%, also an excellent figure. The wind times for a C-60 cassette were 72 S, average for a deck. The time required to change modes, such as from wind to play, was less than a second. Tape runout to transport stop mode took 2 S.

Use and Listening Tests

The instruction manual has very well written text, making things clear without excessive detail. There is just one set of figures showing panel layouts, but the arrangement of the pages of informative words obviates the need for illustrations to make points. I do disagree, however, with the comments on Type I tape to the effect that their use should be restricted to "utility" purposes. I also noted that the manual did not mention pressing the pause button and then play and record for record/pause mode, which would be the

"Frequency responses, as well as third-harmonic distortion and S/N ratios, were excellent with a variety of tapes."

normal practice in order to set levels accurately before starting the recording process by again pressing pause.

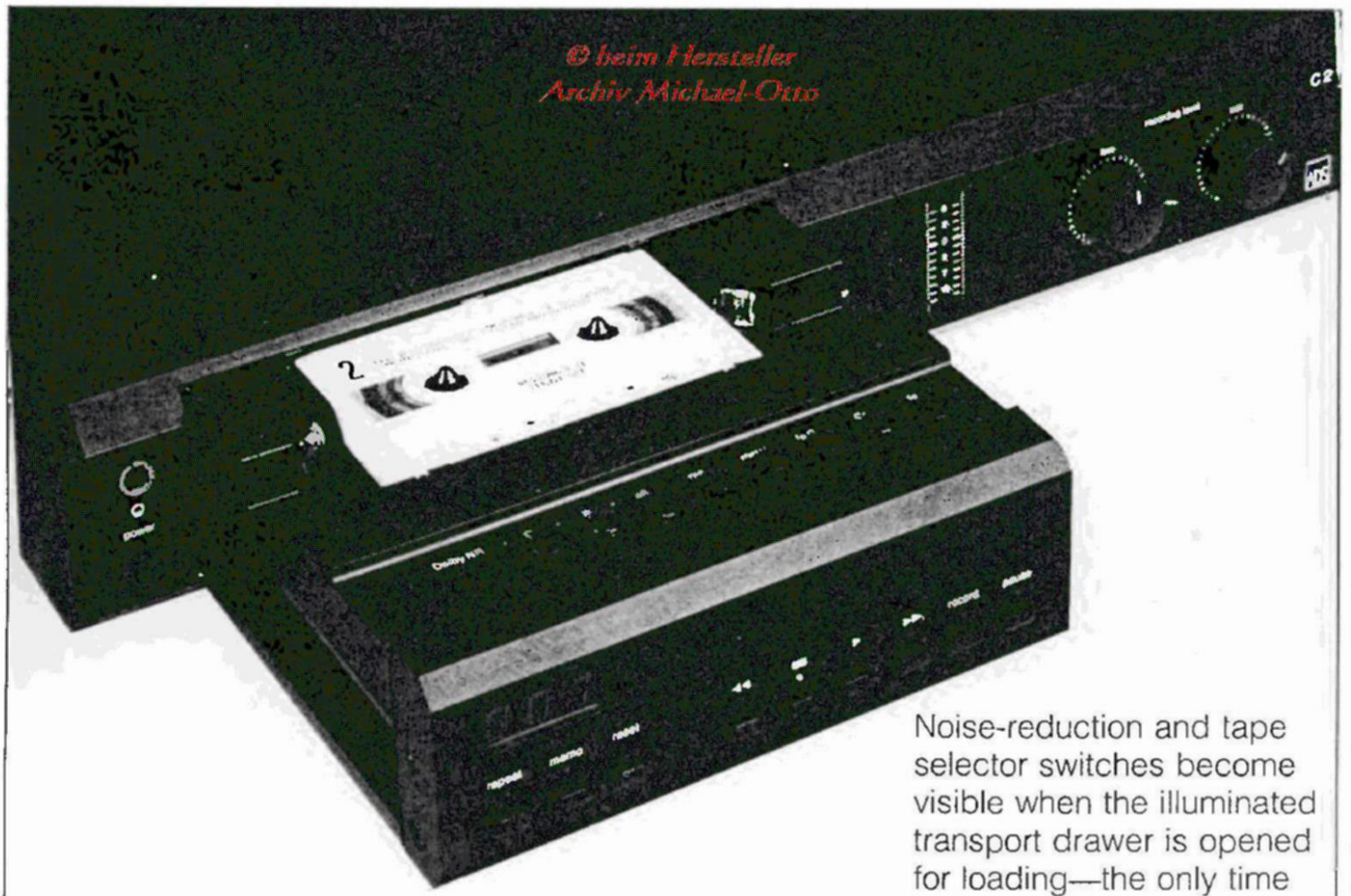
After a little experience with the C2, pushing "Slider" to make the drawer move out seemed as natural as pushing an eject button. Putting the cassette in place did require more care, but little more time, than dropping it in a carrier. A bit of practice here gained the facility to insert the tape with the back down, pushing against the spring loading and snapping down the front—all in one motion. Maintenance of the heads was best performed with the deck in play, to make tape-path components more accessible. All switches and controls were completely reliable throughout the tests.

The length of the level displays had seemed somewhat short at first, but their fast response made adjustments quite easy. I found the friction between input-level pot sections to be rather high, which made channel balancing touchier than it might have been. At first I also made mistakes because there is no front-panel designation to remind the user that the front knob is for the right channel. The combination of white lettering on a black background, bright status lights and well-illuminated counter and meter displays did make for easy use under a wide range of lighting conditions. Even with Dolby C NR, record and pause perturbations appeared to be nonexistent by ear or meter, and the stop "clunk" was barely detectable.

The listening tests with a pink-noise source demonstrated how well matched the Dolby C NR responses were, with no evidence of mistracking at any time. The playback of selected discs was most satisfying, aided I am quite certain by the exact level setting possible with the C2's excellent metering. The extended low-end response contributed to the feeling of solidity with some of the discs.

The ADS C2 provides excellent responses, well-designed metering, low noise and distortion, mike/line mixing, and low flutter—all for a moderate price. The C2 does not have a host of convenience features or a third head for simultaneous playback, but it does do the essentials very well—and it is one of the simplest decks to use, with a minimum of confusion. Even if one isn't interested in purchasing an entire system such as the Atelier series, the C2 will be of interest to those who are looking for a cassette deck with ease of operation, distinctive appearance, and excellent performance. The moderate-level price of the ADS C2 isn't likely to hurt either.

Howard A. Roberson



Noise-reduction and tape selector switches become visible when the illuminated transport drawer is opened for loading—the only time they're likely to need resetting.