

SONY

ANALOG TAPE RECORDER

APR-5001

APR-5002

APR-5003V

Series

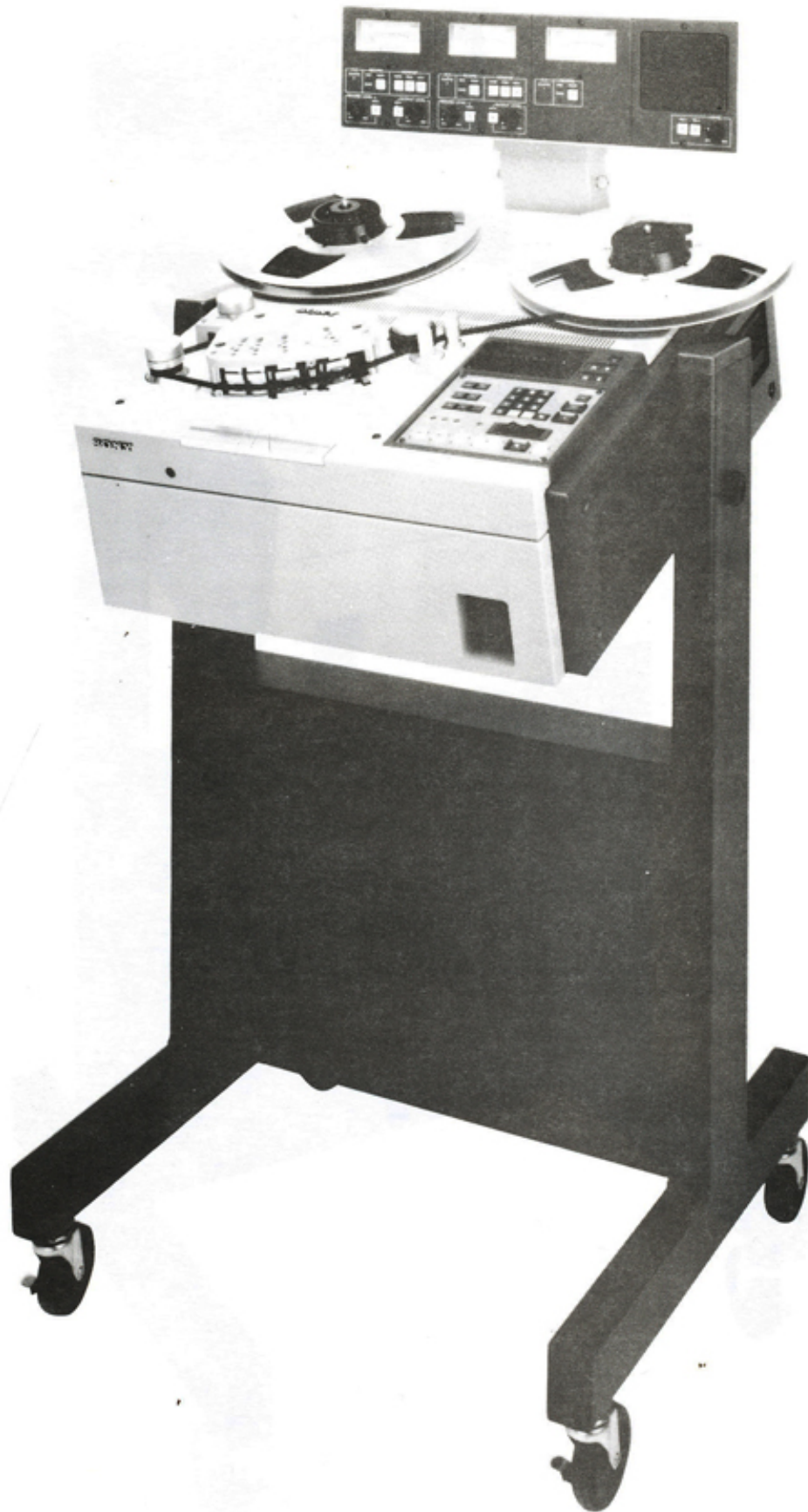
OPERATION AND MAINTENANCE MANUAL

1st Edition (Revised 2)

APR-5001 Serial No.10001 and Higher

APR-5002 Serial No.20001 and Higher

APR-5003V Serial No.10001 and Higher



APR-5003V, Analog Tape Recorder (Time Code Center Track)

1.6 SPECIFICATIONS

1.6.1 Transport Specifications

POWER REQUIREMENTS	AC100/110/120/200/220/240V at 48Hz to 64Hz (Selectable)	
POWER CONSUMPTION	300 Watts Max.	
FUSE RATING	5A (100V), 4A (110V), 2A (200V) (Normal Load Fuse)	
REEL SIZE	3 to 12½ inches	NAB or EIA, plastic or metal reels DIN hubs optional
TAPE WIDTH	1/4-inch 2-track 1/4-inch 2-track 1/4-inch 3-track 1/2-inch 2-track	NAB track standard DIN track standard Center Track Time Code
TAPE SPEED	Standard (high speed) Variable Speed	7.5, 15, and 30 ips ± 50% of fixed speed
SPEED STABILITY	Better than 0.02%	
TAPE TENSION NOMINAL	120 grams	
START-UP TIME/ FLUTTER SPECIFICATION	900 msec at 30 ips 500 msec at 15 ips 500 msec at 7.5 ips	% DIN 45507 flutter (with 10½-inch reels) 0.3% 0.15% 0.15%
FAST WIND TIME	110 sec for 2400 feet of tape 170 sec for 4800 feet of tape	
SPOOL WIND TIME	370 sec for 2400 feet of tape	
MVC VELOCITY	From full stop to 1.9 meters per second in either direction.	

Table 1-1. Transport Specifications

1.6.2 Audio Specifications

AUDIO AMPLIFIER ELECTRONICS	Input Impedence 10 k ohms Output Impedence 120 ohms Output Clipping +24 dBm (no load condition)																							
BIAS FREQ	400 kHz																							
ERASE FREQ	100 kHz																							
WOW AND FLUTTER (DIN 45507 weighted)	Less than 0.025 % at 30 ips Less than 0.035 % at 15 ips Less than 0.055 % at 7.5 ips Less than 0.100 % at 3.75 ips																							
DISTORTION (1 kHz fundamental frequency, reference level of 510 nW/b) 3 % third harmonic fluxivity level	30 ips AES 15 ips NAB 7.5 ips NAB 30 ips AES 15 ips NAB 7.5 ips NAB	<table border="0"> <thead> <tr> <th></th> <th style="text-align: center;"><u>3rd Harmonic</u></th> <th style="text-align: center;"><u>2nd Harmonic</u></th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">Less than 0.35 %</td> <td style="text-align: center;">Less than 0.10 %</td> </tr> <tr> <td></td> <td style="text-align: center;">Less than 0.52 %</td> <td style="text-align: center;">Less than 0.10 %</td> </tr> <tr> <td></td> <td style="text-align: center;">Less than 1.60 %</td> <td style="text-align: center;">Less than 0.10 %</td> </tr> <tr> <td></td> <td style="text-align: center;">1040 nW/b</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">1020 nW/b</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">1000 nW/b</td> <td></td> </tr> </tbody> </table>		<u>3rd Harmonic</u>	<u>2nd Harmonic</u>		Less than 0.35 %	Less than 0.10 %		Less than 0.52 %	Less than 0.10 %		Less than 1.60 %	Less than 0.10 %		1040 nW/b			1020 nW/b			1000 nW/b		
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DISTORTION/NOISE SPECIFICATION DISCALIMER	<p>Distortion and record/reproduce noise are primarily functions of tape formulation and may vary from one formulation to another, even from one reel of tape to another.</p> <p>Bias settings play a very significant role in the case of distortion, and are a user-chosen parameter based on average program fluxivity and desired frequency response.</p> <p>The specifications shown indicate achievable performance with 3M Scotch 226 at reference fluxivity of 250 nW/b for the standard NAB head configuration.</p>																							

Table 1-2. General Audio Specifications

Audio Specifications

FREQUENCY RESPONSE

<u>Speed</u>	<u>Record/Repro</u>	<u>Record/Sync</u>
30 ips AES	57 Hz to 28 kHz, +.75/-3 dB	57 Hz to 20 kHz, +.75/-3 dB
15 ips NAB	30 Hz to 24 kHz, +.75/-2 dB	30 Hz to 16 kHz, +.75/-2 dB
7.5 ips NAB	20 Hz to 20 kHz, +.75/-2 dB	20 Hz to 8 kHz, +.75/-2 dB

SIGNAL TO NOISE, RECORD REPRODUCE

<u>Speed</u>	<u>Unweighted (See note 2)</u>	<u>Weighted dB (A)</u>
30 ips AES	-64 dB	-68 dB
15 ips NAB	-62 dB	-64 dB
7.5 ips NAB	-61 dB	-64 dB

DEPTH OF ERASE, 1 KHZ TONE

Better than -76 dB at 30 ips

ERASE/BIAS CROSSTALK TO AUDIO

Less than 150 mVp-p at 7.5 ips

GAP COMPENSATIONS

<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u>	<u>RCB</u>
30 ips	C1	C1	C0	C1
15 ips	CA	CC	C9	C5
7.5 ips	CB	CE	C4	C3

HEADSTACK DIP SWITCH SETTINGS

<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Code setting	1	1	0	0	1	0	0	1

NOTES:

1. Unless otherwise noted, all audio specifications are referenced to 250 nW/m, using 3M Scotch 226.
2. 20 Hz to 20 kHz third order harmonics.

Table 1-3 . 1/4 inch Mono NAB Specifications

Audio Specifications

FREQUENCY RESPONSE

<u>Speed</u>	<u>Record/Repro</u>	<u>Record/Sync</u>
30 ips AES	57 Hz to 28 kHz, +.75/-3 dB	57 Hz to 20 kHz, +.75/-3 dB
15 ips NAB	30 Hz to 24 kHz, +.75/-2 dB	30 Hz to 16 kHz, +.75/-2 dB
7.5 ips NAB	20 Hz to 20 kHz, +.75/-2 dB	20 Hz to 8 kHz, +.75/-2 dB

SIGNAL TO NOISE, RECORD REPRODUCE

<u>Speed</u>	<u>Unweighted (See note 2)</u>	<u>Weighted dB (A)</u>
30 ips AES	-59 dB	-64 dB
15 ips NAB	-56 dB	-61 dB
7.5 ips NAB	-56 dB	-61 dB

DEPTH OF ERASE, 1 KHZ TONE

Better than -76 dB at 30 ips

ERASE/BIAS CROSSTALK TO AUDIO

Less than 150 mVp-p at 7.5 ips

GAP COMPENSATIONS

<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u>	<u>RCB</u>
30 ips	C1	C1	C0	C1
15 ips	CA	CC	C9	C5
7.5 ips	CB	CE	C3	C3

HEADSTACK DIP SWITCH SETTINGS

<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Code setting	1	1	0	0	1	0	1	0

NOTES:

1. Unless otherwise noted, all audio specifications are referenced to 250 nW/m, using 3M Scotch 226.
2. 20 Hz to 20 kHz third order harmonics.

Table 1-4. 1/4 inch 2-Track NAB Specifications

Audio Specifications

FREQUENCY RESPONSE

<u>Speed</u>	<u>Record/Repro</u>	<u>Record/Sync</u>
30 ips AES	57 Hz to 28 kHz, +.75/-3 dB	57 Hz to 20 kHz, +.75/-3 dB
15 ips NAB	30 Hz to 24 kHz, +.75/-2 dB	30 Hz to 16 kHz, +.75/-2 dB
7.5 ips NAB	20 Hz to 20 kHz, +.75/-2 dB	20 Hz to 8 kHz, +.75/-2 dB

SIGNAL TO NOISE, RECORD REPRODUCE

<u>Speed</u>	<u>Unweighted (See note 2)</u>	<u>Weighted dB (A)</u>
30 ips AES	-59 dB	-64 dB
15 ips IEC	-56 dB	-61 dB
7.5 ips IEC	-56 dB	-61 dB

DEPTH OF ERASE, 1 KHZ TONE

Better than -74 dB at 30 ips

ERASE/BIAS CROSSTALK TO AUDIO

Less than 150 mVp-p at 7.5 ips

GAP COMPENSATIONS

<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u>	<u>RCB</u>
30 ips	C1	C1	C0	C1
15 ips	CA	CA	C3	C2
7.5 ips	C4	C6	C4	C3

HEADSTACK DIP SWITCH SETTINGS

<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Code setting	1	1	0	1	1	0	1	0

NOTES:

1. Unless otherwise noted, all audio specifications are referenced to 250 nW/m, using 3M Scotch 226.
2. 20 Hz to 20 kHz third order harmonics.
3. 7.5 ips specifications are referenced to 79 nW/m, -10 dB.
4. Ensure that all speeds are set to IEC on the EQ STD section of the ALN panel.

Table 1-5. 1/4 inch 2-Track DIN Specifications

Audio Specifications

FREQUENCY RESPONSE			
<u>Speed</u>	<u>Record/Repro</u>	<u>Record/Sync</u>	
30 ips AES	35 Hz to 25 kHz, +.75/-3 dB	37 Hz to 25 kHz, +.75/-3 dB	
15 ips NAB	22 Hz to 24 kHz, +.75/-2 dB	25 Hz to 20 kHz, +.75/-2 dB	
7.5 ips NAB	15 Hz to 22 kHz, +.75/-2 dB	18 Hz to 10 kHz, +.75/-2 dB	
SIGNAL TO NOISE, RECORD REPRODUCE			
<u>Speed</u>	<u>Unweighted (See note 2)</u>	<u>Weighted dB (A)</u>	
30 ips AES	-62 dB	-65 dB	
15 ips NAB	-57 dB	-60 dB	
7.5 ips NAB	-56 dB	-60 dB	
DEPTH OF ERASE, 1 KHZ TONE		ERASE/BIAS CROSSTALK TO AUDIO	
Better than -76 dB at 30 ips		Less than 150 mVp-p at 7.5 ips	
GAP COMPENSATIONS			
<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u> <u>RCB</u>
30 ips	C0	C0	C0 C1
15 ips	C9	CA	C0 C5
7.5 ips	C3	C6	C2 C3
HEADSTACK DIP SWITCH SETTINGS			
<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u>
Code setting	1	1	0 1 0 0 1 0
NOTES:			
1. Unless otherwise noted, all audio specifications are referenced to 250 nW/m, using 3M Scotch 226.			
2. 20 Hz to 20 kHz third order harmonics.			

Table 1-6 . 1/4 inch 2-Track Amorphous NAB Specifications

Audio Specifications

FREQUENCY RESPONSE

<u>Speed</u>	<u>Record/Repro</u>	<u>Record/Sync</u>
30 ips AES	40 Hz to 25 kHz, +.75/-3 dB	40 Hz to 25 kHz, +.75/-3 dB
15 ips NAB	25 Hz to 24 kHz, +.75/-2 dB	20 Hz to 20 kHz, +.75/-2 dB
7.5 ips NAB	25 Hz to 22 kHz, +.75/-2 dB	20 Hz to 10 kHz, +.75/-2 dB

SIGNAL TO NOISE, RECORD REPRODUCE

<u>Speed</u>	<u>Unweighted (See note 2)</u>	<u>Weighted dB (A)</u>
30 ips AES	-62 dB	-66 dB
15 ips NAB	-59 dB	-64 dB
7.5 ips NAB	-59 dB	-64 dB

DEPTH OF ERASE, 1 KHZ TONE

Better than -72 dB at 15 ips

ERASE/BIAS CROSSTALK TO AUDIO

Less than 100 mVp-p at 7.5 ips

GAP COMPENSATIONS

<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u>	<u>RCB</u>
30 ips	C1	C1	C0	C0
15 ips	C9	CA	C1	C6
7.5 ips	CB	CE	C6	C3

HEADSTACK DIP SWITCH SETTINGS

<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Code setting	1	1	1	0	1	0	1	0

NOTES:

1. Unless otherwise noted, all audio specifications are referenced to 250 nW/m, using 3M Scotch 226.
2. 20 Hz to 20 kHz third order harmonics.

Table 1-7. 1/2 inch 2-Track NAB Specifications

Time Code Specifications

INPUT	
Input Impedence	100 k ohms
Minimum level	0.6 V differential p-p
Maximum level	20 V differential p-p
Common Mode Rejection, balanced input	10 Vp-p, 10 Hz to 100 kHz

OUTPUT	
Output impedance	120 ohms
Nominal level	4.0 V differential p-p
Maximum level	7.5 V differential p-p

RS-422 TYPE OUTPUT	
Driver Output Level	+/- 2 V minimum
Driver Load	100 ohm minimum
Receiver Input Resistance	4 k ohm
Receiver Sensitivity	+/- 200 mV

INTERNAL GENERATOR ACCURACY	+/- 0.005 %
SYNCHRONISATION ACCURACY	Less than +/- 50 uSec
CROSSTALK TO AUDIO	Less than 85 dB at 15 ips
TRACK WIDTH	0.36 mm
NOMINAL RECORDING LEVEL	700 nW/m (250 nW/m RMS)

GAP COMPENSATIONS (Track three only)					TRACK 3 PRESETS			
<u>Speed</u>	<u>RGC</u>	<u>SGC</u>	<u>RCF</u>	<u>RCB</u>	<u>Sync Low</u> <u>Freq</u>	<u>Sync Hi</u> <u>Freq</u>	<u>Rec Hi</u> <u>Freq</u>	<u>Bias</u> <u>Lvl</u>
30 ips	-	C0	C0	C0	FF	00	FF	30
15 ips	-	C3	C0	C0	FF	00	FF	20
7.5 ips	-	C3	C0	C0	FF	00	FF	10

HEADSTACK DIP SWITCH SETTINGS									TIME CODE/TAPE TACH RELATIONSHIP
<u>DIP switch</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	
Code setting	1	1	0	0	1	0	1	1	16 pulses per frame, SMPTE 30 ips 19.2 pulses per frame, EBU 30 ips

Table 1-8 . Time Code Specifications

1.6.3 APR-5003V Specifications

All specifications for the **APR-5003V** remain the same as for the current **APR-5003** except for the following items which reflect the new video related features:

VIDEO INPUT/OUTPUT CONNECTORS	Two BNC Connectors with switchable 75Ω termination
INPUT LEVEL	<p>Composite Sync or Video Setting—Input impedance 10K (jumper installed at JU1 on BVT board)</p> <p>Video—Standard RS-170A level (nominal)</p> <p>or</p> <p>Sine wave input—0.4 Vp-p min, 6.0 Vp-p max</p> <p>or</p> <p>Square wave input—0.2 Vp-p min, 6.0 Vp-p max</p> <p>Logic Setting—100K input impedance (jumper installed at JU2 on BVT board)</p> <p>Accommodates either TTL or CMOS logic families directly</p> <p>or</p> <p>Sine wave input—3.0 Vp-p min, 20 Vp-p max</p> <p>or</p> <p>Square wave input—1.5 Vp-p min, 20 Vp-p max</p>

Table 1-9. APR-5003V Specifications

1.6.4 Mechanical Specifications

Weight:	
Table Top	91 pounds (46.26 Kg.)
Stand Type	----- 138 pounds (70.15 Kg.)
Operating Temperature	+5°C to +35°C (+41°F to 95°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	10 to 90 non-condensing
Operating Position (SU-14 Stand)	Horizontal or 15 degrees tilt
Specification Guarantee Temperature	25°C (77°F)

Table 1-10. Mechanical Standards