SONY

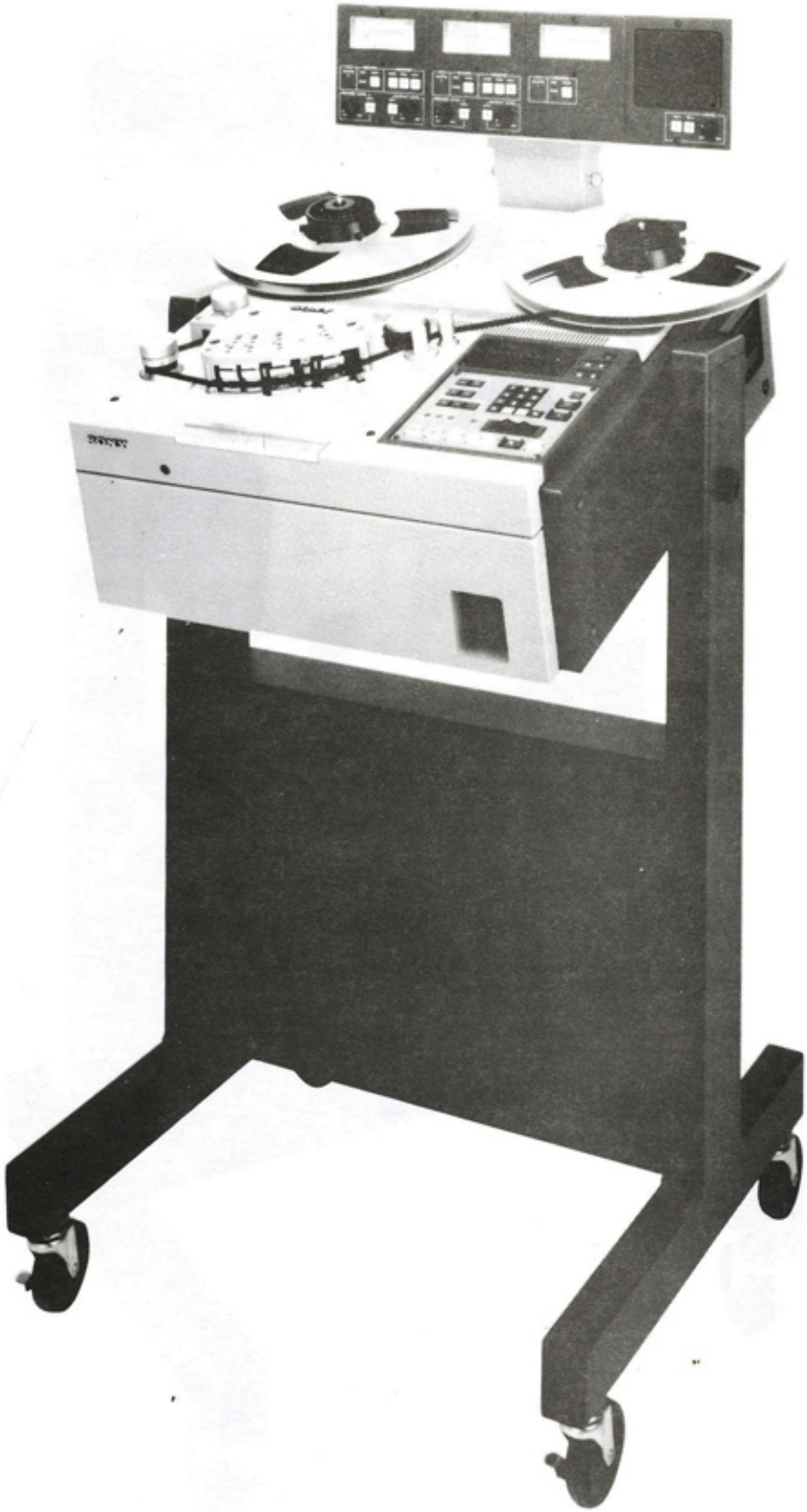
ANALOG TAPE RECORDER

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		**% DIN 45507 flutter (with 10½-inch reels)**
	900 msec at 30 ips	0.3%
	500 msec at 15 ips	0.15%
	500 msec at 7.5 ips	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)		3rd Harmonic	2nd Harmonic
	30 ips AES	Less than 0.35 %	Less than 0.10 %
	15 ips NAB	Less than 0.52 %	Less than 0.10 %
	7.5 ips NAB	Less than 1.60 %	Less than 0.10 %
3 % third harmonic fluxivity level	30 ips AES	1040 nW/b	
	15 ips NAB	1020 nW/b	
	7.5 ips NAB	1000 nW/b	
DISTORTION/NOISE SPECIFICATION DISCALIMER	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. 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. The specifications shown indicate achievable performance with 3M Scotch 226 at reference fluxivity of 250 nW/b for the standard NAB head configuration.		

Table 1-2. General Audio Specifications

Audio Specifications

FREQUENCY RESPONSE

Speed	Record/Repro	Record/Sync
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

Speed	Unweighted (See note 2)	Weighted dB (A)
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

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

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
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

FREQUENCY RESPONSE

Speed	Record/Repro	Record/Sync
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

Speed	Unweighted (See note 2)	Weighted dB (A)
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

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

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
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

FREQUENCY RESPONSE

Speed	Record/Repro	Record/Sync
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

Speed	Unweighted (See note 2)	Weighted dB (A)
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

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

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
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

Speed	Record/Repro	Record/Sync
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

Speed	Unweighted (See note 2)	Weighted dB (A)
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

Better than -76 dB at 30 ips

ERASE/BIAS CROSSTALK TO AUDIO

Less than 150 mVp-p at 7.5 ips

GAP COMPENSATIONS

Speed	RGC	SGC	RCF	RCB
30 ips	C0	C0	C0	C1
15 ips	C9	CA	C0	C5
7.5 ips	C3	C6	C2	C3

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
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

Speed	Record/Repro	Record/Sync
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

Speed	Unweighted (See note 2)	Weighted dB (A)
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

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

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
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 impedence	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)

Speed	RGC	SGC	RCF	RCB
30 ips	-	C0	C0	C0
15 ips	-	C3	C0	C0
7.5 ips	-	C3	C0	C0

TRACK 3 PRESETS

Sync Low Freq	Sync Hi Freq	Rec Hi Freq	Bias Lvl
FF	00	FF	30
FF	00	FF	20
FF	00	FF	10

HEADSTACK DIP SWITCH SETTINGS

DIP switch	1	2	3	4	5	6	7	8
Code setting	1	1	0	0	1	0	1	1

TIME CODE/TAPE TACH RELATIONSHIP

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	Composite Sync or Video Setting–Input impedance 10K (jumper installed at JU1 on BVT board) Video–Standard RS-170A level (nominal) or Sine wave input–0.4 Vp-p min, 6.0 Vp-p max or Square wave input–0.2 Vp-p min, 6.0 Vp-p max Logic Setting–100K input impedance (jumper installed at JU2 on BVT board) Accomodates either TTL or CMOS logic families directly or Sine wave input–3.0 Vp-p min, 20 Vp-p max or Square wave input–1.5 Vp-p min, 20 Vp-p max

Table 1-9. APR-5003V Specifications

1.6.4 Mechanical Specifications

Weight: **Table Top** **Stand Type**	91 pounds (46.26 Kg.) 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