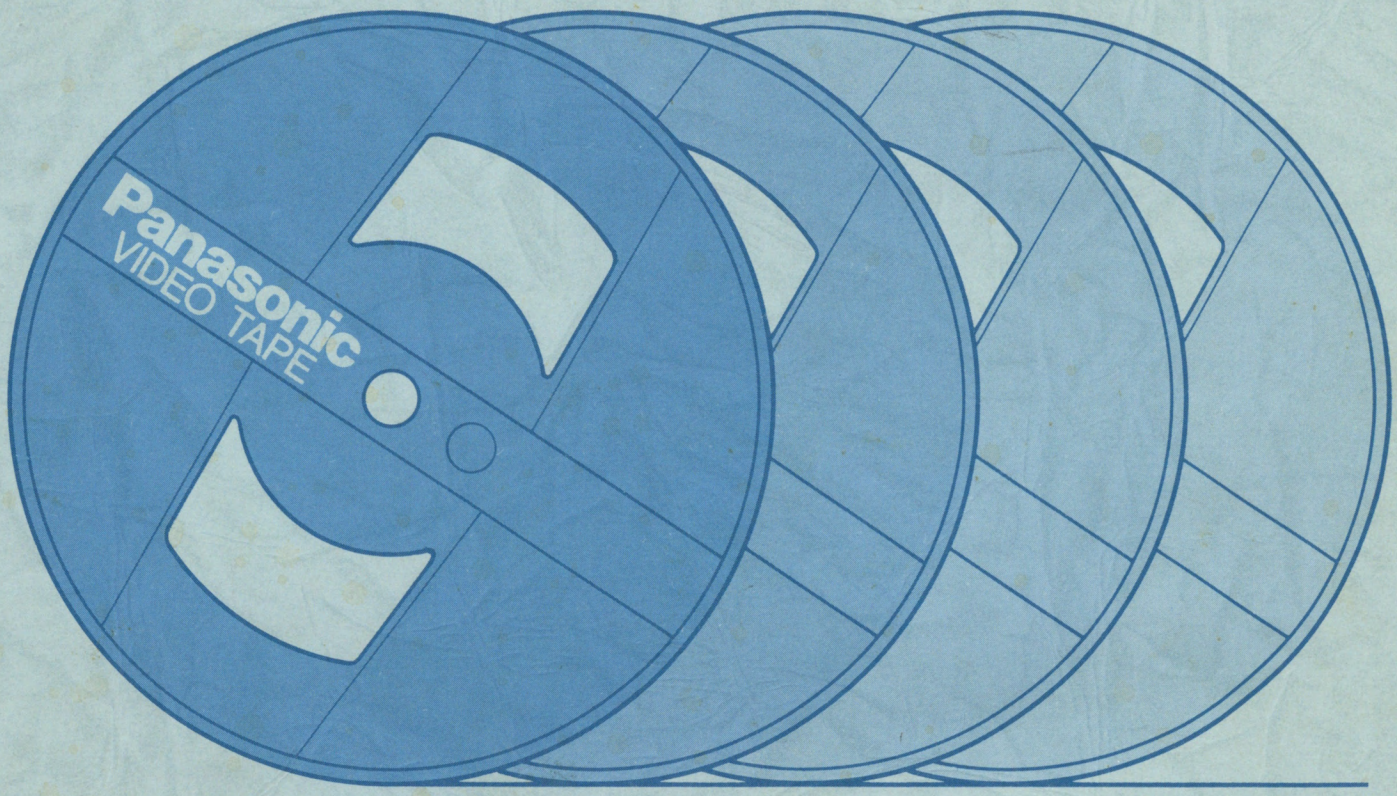
Tim Shafter

Technical Handbook



How to use

The Recorded Reference Tape

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INTRODUCTION

This handbook provides mechanical and electrical measurement and adjustment procedures using the recorded reference tape for VTR, so that the technician can make more effective service.
The recorded reference tape is supplied from the factory in order to maintain proper operating conditions of VTR/VCR machines at all times.
This handbook is composed of fundamental explanations of each reference tape and its application.
We recommend to use this handbook along with the service manual, in which these reference tapes are mentioned.
We believe this handbook will be very useful in field and shop service.

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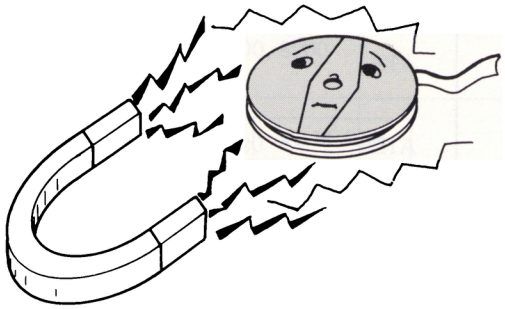
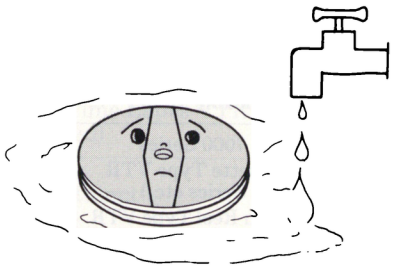
CAUTION POINTS FOR USING REFERENCE TAPE

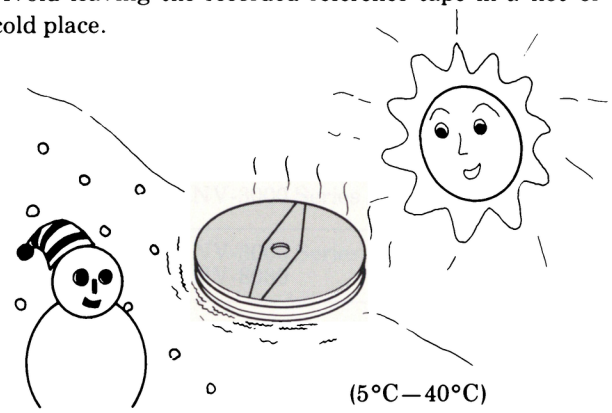
Avoid leaving the recorded reference tape in magnetic field.



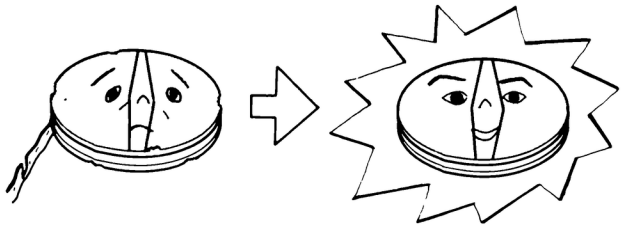
Avoid leaving the recorded reference tape in a damp place because excessive moisture may result in damage this tape.



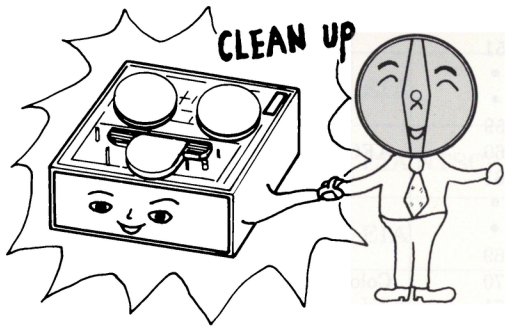
Avoid leaving the recorded reference tape in a hot or cold place.



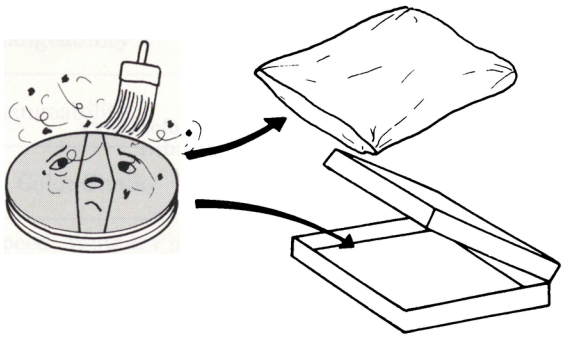
The recorded reference tape has a limit of used time, so please renew periodically.
500 times or 6 months from receipt.



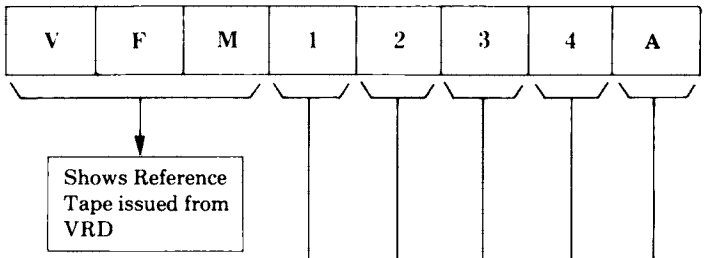
Before setting the recorded reference tape to the unit, clean the tape transportation of the unit (posts, cylinder, heads, shaft, roller etc.)



After using the recorded reference tape, pack it a polyethylene bag or case to prevent dust.



PART NUMBER SYSTEM



First Mark	Applicable Model
1	NV-8000, 7000 Series
2	3/4″ Cassette Type VTR (NV-2000 Series etc.)
3	1/2″ Open Reel Type VTR (NV-3000 Series, NV-8030 etc.)
4	1/2″ Portable Type VTR (NV-3082, NV-3085 etc.)
5	1/2″ Cartridge Type VTR (NV-5000 Series)
6	VTP (NV-5180, 5182)
7	•
8	•
•	•
•	•

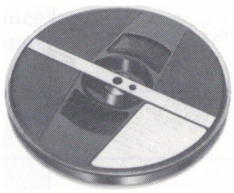
Fifth Mark	Tape Description
A	1mil Normal (Y) Tape
B	2/3mil Normal (Y) Tape
C	1/2mil Normal (Y) Tape
D	1mil High Density Tape
E	2/3mil High Density Tape
F	1/2mil High Density Tape
G	•
•	•
•	•
Z	•

Second Mark	TV System
0	EIA (B/W), NTSC (Color)
1	CCIR (B/W), PAL (Color)
2	•
3	•
•	•
•	•

Third and Forth Mark	For Use		
00	Interchangeability Adj.	•	•
01	•	•	•
02	•	49	•
•	•	50	Audio Azimuth
•	•	51	•
09	•	•	•
10	General Color Check (Not for Adj.)	•	•
11	•	59	•
•	•	60	AFC Check
•	•	61	•
19	•	•	•
20	Tape Speed and Wow-Flutter Measurements for Normal Tape Speed...No Control Signal.	•	•
21	Tape Speed and Wow-Flutter Measurements for Normal Tape Speed...Control Signal is Included	69	•
22	•	70	Color Flicker Adj.
•	•	71	•
•	•	•	•
29	•	•	•
30	Tape Speed and Wow-Flutter Measurements for Time Lapse VTR	79	•
31	•	80	General Reference Tape for Serviceman
•	•	81	•
•	•	•	•
39	•	•	•
40	Audio Level	89	•
41	•	90	APC Check
		91	•
		•	•
		•	•
		99	•

DESCRIPTION

Part No.	Applicable Model	TV System	for Use	Tape Description
VFM1000A	NV-7000, 8000 Series	EIA PATTERN	Interchangeability & Transportion	1 mil (γ) Tape
VFM1020A	NV-7000, 8000 Series	EIA	Tape Speed, Wow & Flutter Measurements (Video not recorded)	1 mil (γ) Tape
VFM1030A	NV-8020	EIA	Tape Speed, Wow & Flutter Measurements for Time Lapes VTR (Video is not recorded)	1 mil (γ) Tape
VFM2070D	3/4″ VCR	EIA NTSC	Color Flicker Adjustment	1 mil High Energy
VFM2080D	3/4″ VCR	EIA PATTERN	General Reference Tape	1 mil High Energy
VFM3000A	NV-3000 Series NV-8030	EIA PATTERN	Interchangeability & Transportation	1 mil (γ) Tape
VFM3010A	NV-3000 Series	EIA NTSC	General Color Check	1 mil (γ) Tape
VFM3020A	NV-3000 Series NV-8030	EIA	Tape Speed, Wow & Flutter Measurements	1 mil (γ) Tape
VFM3070A	NV-3000 Series	EIA NTSC	Color Flicker Adjustment	1 mil (γ) Tape
VFM3080A	NV-3000 Series NV-8030	EIA NTSC	General Reference Tape	1 mil (γ) Tape
VFM4000A	Portable	EIA PATTERN	Interchangeability & Transportation Adjustment	1 mil (γ) Tape
VFM4010A	Portable	EIA NTSC	General Color Check	1 mil (γ) Tape
VFM4021A	Portable	EIA	Tape Speed & Wow & Flutter Measurements	1 mil (γ) Tape
VFM5000A	1/2″ VCR	EIA	Interchangeability	1 mil (γ) Tape
VFM5000B	1/2″ VCR	EIA	Interchangeability	2/3 mil (γ) Tape
VFM5010A	1/2″ VCR	EIA NTSC	General Color Check	1 mil (γ) Tape
VFM5020A	1/2″ VCR	EIA	Tape Speed, Wow & Flutter Measurements	1 mil (γ) Tape
VFM5040 $^{A}_{B}$	1/2″ VCR	EIA	Audio Level	1 mil (γ) Tape 2/3 mil (γ) Tape
VFM5050 $^{A}_{B}$	1/2″ VCR	EIA	Audio Azimuth	1 mil (γ) Tape 2/3 mil (γ) Tape
VFM5060A	1/2″ VCR	EIA NTSC	AFC Check	1 mil (γ) Tape
VFM5070A	1/2″ VCR	EIA NTSC	Flicker Adjustment	1 mil (γ) Tape
VFM5080A	1/2″ VCR	EIA NTSC	General Reference Tape	1 mil (γ) Tape

OPEN REEL TYPE	CASSETTE TYPE	CARTRIDGE TYPE
		
MODEL NV-7000/8000 Series **NV-3000 Series** **NV-3082/3085** Tape Width: 12.7mm (1/2″) Dimentions: Diameter Width 178mm(7″) 22mm(7/8″) 127mm(5″) 20mm(13/16″) NET Weight: 350g (0.77lbs) (VFM3000 Series) 270g (0.6lbs) (VFM4000 Series)	**MODEL NV-2000 Series** Tape Width: 18.05mm (3/4″) Dimentions: 220mm(D)×140mm(W)× 30mm(H) (5-1/2″(D)×8-11/16″(W)× 1-3/16″(H)) NET Weight: 450g (0.99lbs)	**MODEL NV-5000 Series** Tape Width: 12.7mm(1/2″) Dimentions: 128mm(D)×130mm(W)× 30mm(H) (5-1/32″(D)×5-7/64″(W)× 1-3/16″(H)) NET Weight: 310g (0.68lbs) (for 10 min.) 350g (0.77lbs) (for 20 min.) 340g (0.75lbs) (for 30 min.)

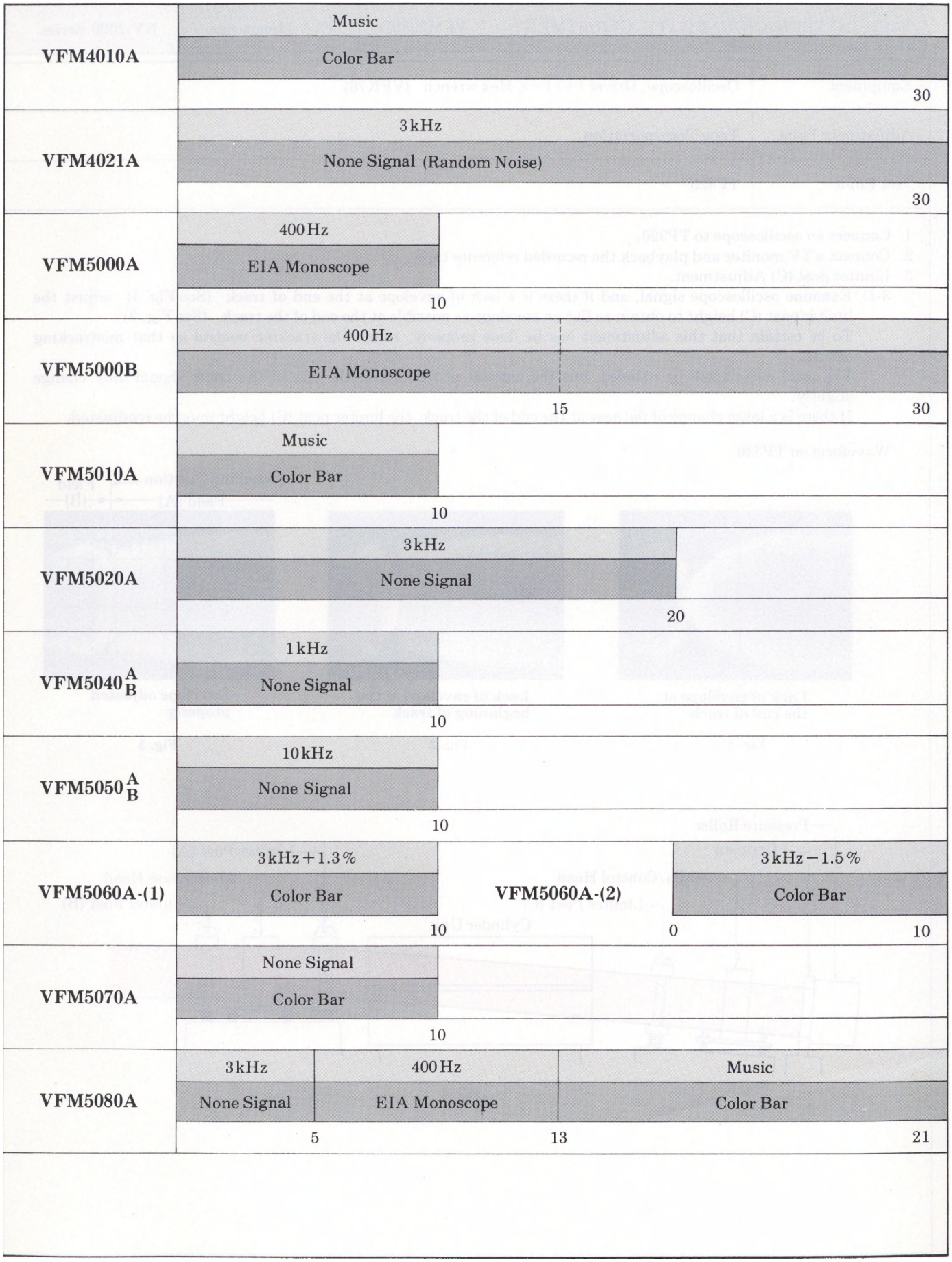
CONSTITUTION-1

For Use / PART NO.	TAPE SPEED cm/sec (i.p.s)	KINDS OF VIDEO SIGNAL/FOR USE/RECORDED TIME (min).					
		EIA MONOSCOPE	COLOR BAR		3 Stair-case Waveform	TV SIGNAL	NONE SIGNAL
		Interchange-ability	Color Check	Flicker Check	B/W S/N Color S/N	Checking	
VFM1000A	30.3(12) (Normal Speed)	Approx 20					
VFM1020A	30.3(12) (Normal Speed)						Approx 20
VFM1030A	6 Hours Mode...3.03(1.2) 12 Hours Mode...1.515(0.6)						
VFM2070D	9.5(3-3/4)			25			
VFM2080D	9.5(3-3/4)	15	10	5			
VFM3000A	19.05(7.5)	30					
VFM3010A	19.05(7.5)		30				
VFM3020A	19.05(7.5)						30
VFM3070A	19.05(7.5)			30			
VFM3080A	19.05(7.5)	5	7		B/W 4 Color 4	5	5
VFM4000A	19.05(7.5)	30					
VFM4010A	19.05(7.5)		30				
VFM4021A	19.05(7.5)						30
VFM5000A	19.05(7.5)	10					
VFM5000B	19.05(7.5)	15 or more					
VFM5010A	19.05(7.5)		10				
VFM5020A	19.05(7.5)						20
VFM5040 A/B	19.05(7.5)						10
VFM5050 A/B	19.05(7.5)						10
VFM5060A	19.05(7.5)		10				
VFM5070A	19.05(7.5)			10			
VFM5080A	19.05(7.5)	8	8				5

KINDS OF AUDIO SIGNAL/FOR USE/RECORDED TIME (min.)						RECORDED TIME (Minute)
400 Hz	1 kHz	3 kHz	10 kHz	MUSIC	OPTIONAL CONSTANT SIGNAL	
As anounce for interchange-ability	Audio Level	Tape Speed Wow Flutter	Audio Azimuth	Checking		
Approx 20						Approx 20
		NORMAL PLAY Approx 20				Approx 20
		LONG PLAY	800 Hz (12 Hours Mode) 1600 Hz (6 Hours Mode)			Time varies according to the long play mode.
					25	25
		15	15			30
30						30
				30		30
		30				30
					30	30
5	4	5		7 5(TV Sound)		30
30						30
				30		30
		30				30
10						10
15 or more						15
				10		10
		20				20
	10					10
			10			10
		+1.3% 10 −1.5% 10				EACH 10
					10	10
8		5		8		21

CONSTITUTION-2

PART NO.	AUDIO SIGNAL / VIDEO SIGNAL
TIME (MINUTE)	0 — 5 — 10 — 15 — 20 — 25 — 30
VFM1000A	AUDIO: 400 Hz (0–20) / VIDEO: EIA Monoscope (0–20)
VFM1020A	AUDIO: 3 kHz (Normal Speed) (0–20) / VIDEO: None Signal (Random Noise) (0–20)
VFM1030A	AUDIO: 800 Hz (12 Hours Mode), 1600 Hz (6 Hours Mode) (0–30) / VIDEO: None Signal (Random Noise) (0–30)
VFM2070D	AUDIO: Optional Constant Signal (0–25) / VIDEO: Color Bar (0–25)
VFM2080D	AUDIO: 10 kHz (0–15), 3 kHz (15–30) / VIDEO: EIA Monoscope (0–15), Color Bar (15–30) / 0 15 30 (30 15 0)
VFM3000A	AUDIO: 400 Hz or other constant signal (0–30) / VIDEO: EIA Monoscope (0–30)
VFM3010A	AUDIO: Music (0–30) / VIDEO: Color Bar (0–30)
VFM3020A	AUDIO: 3 kHz (0–30) / VIDEO: None Signal (Random Noise) (0–30)
VFM3070A	AUDIO: Optional Constant Signal (0–30) / VIDEO: Color Bar (0–30)
VFM3080A	3 kHz None Signal (0–2.5) / 400 Hz EIA Pattern (B/W) (2.5–7.5) / Music 3 Stair-Case Waveform (B/W) (7.5–11.5) / 1 kHz 3 Stair-Case Waveform (Color) (11.5–15.5) / Music Color Bar (15.5–18.5) / TV Sound TV Picture (18.5–23.5) / 200 Hz Color Bar (for Flicker) (23.5–27.5) / 3 kHz None Signal (27.5–30)
VFM4000A	AUDIO: 400 Hz or other constant signal (0–30) / VIDEO: EIA Monoscope (0–30)


VFM4010A
Music
Color Bar
30
VFM4021A
3kHz
None Signal (Random Noise)
30
VFM5000A
400Hz
EIA Monoscope
10
VFM5000B
400Hz
EIA Monoscope
15
30
VFM5010A
Music
Color Bar
10
VFM5020A
3kHz
None Signal
20
VFM5040 A B
1kHz
None Signal
10
VFM5050 A B
10kHz
None Signal
10
VFM5060A-(1)
3kHz+1.3%
Color Bar
10
VFM5060A-(2)
3kHz−1.5%
Color Bar
0
10
VFM5070A
None Signal
Color Bar
10
VFM5080A
3kHz
None Signal
400Hz
EIA Monoscope
Music
Color Bar
5
13
21

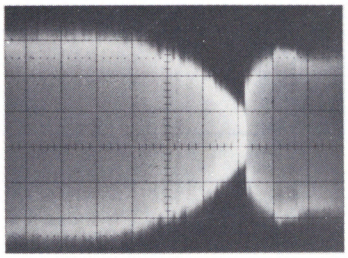
INSTRUCTIONS & PROCEDURE

TAPE INTERCHANGEABILITY ADJUSTMENT	VFM2080D	EIA Monoscope	NV-2000 Series

Equipment	Oscilloscope, Driver (+) (−), Hex wrench (VFK76)
Adjustment Point	Tape Transportation
Test Point	TP320

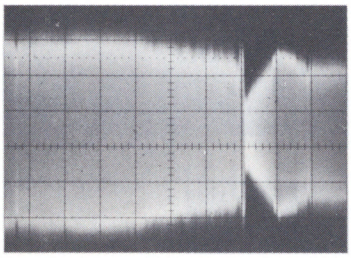
1. Connect an oscilloscope to TP320.
2. Connect a TV monitor and playback the recorded reference tape.
3. Limiter post (C) Adjustment.
   3-1) Examine oscilloscope signal, and if there is a lack of envelope at the end of track (See Fig. 1) adjust the limiter post (C) height to obtain as flat an envelope as possible at the end of the track. (See Fig. 3)
   To be certain that this adjustment has be done properly, rotate the tracking control so that mistracking occurs.
   The total output will be reduced, but the amount of flatness at the end of the track should only change slightly.
   If there is a large change of flatness at the end of the track, the limiter post (C) height must be readjusted.

Waveform on TP320



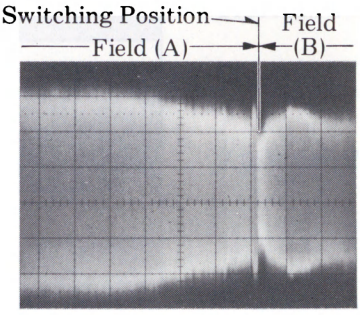
Lack of envelope at the end of track

Fig. 1



Lack of envelope at the beginning of track

Fig. 2



Envelope adjusted properly

Fig. 3

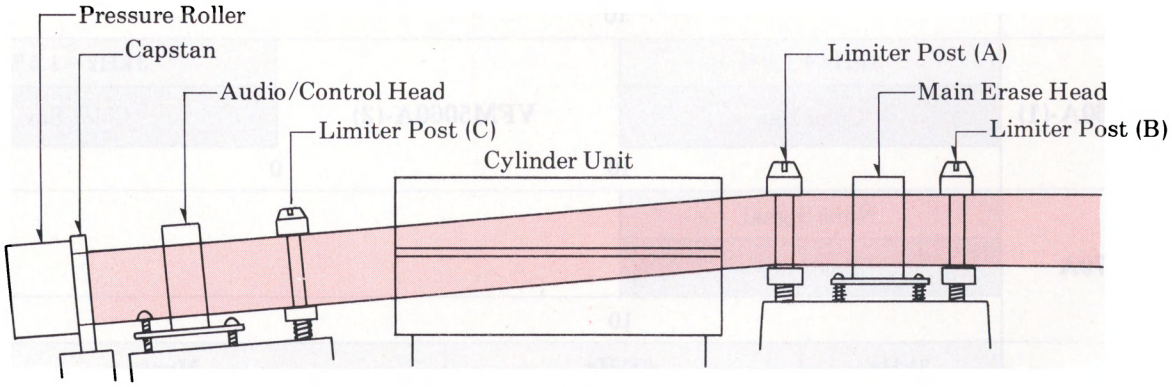


Fig. 4

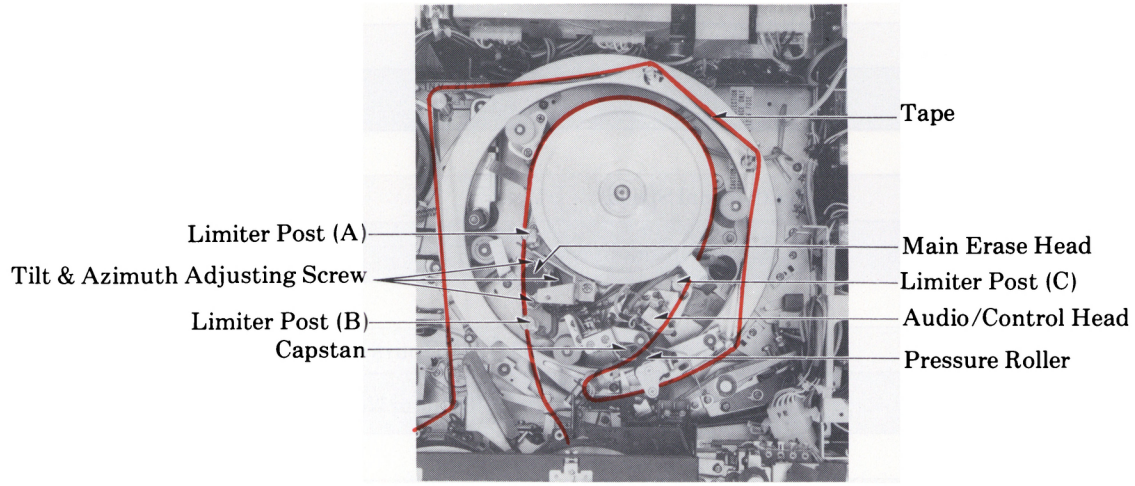


Fig. 5

Tape condition on the Limiter post (A) (B) (C)

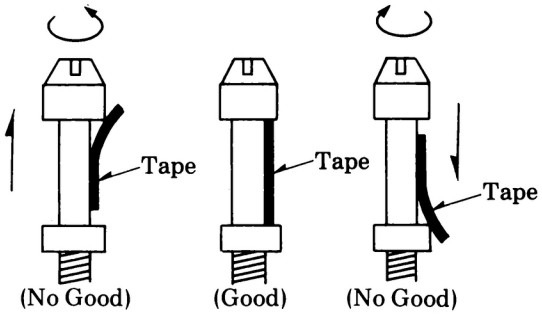


Fig. 6

3-2) After the limiter post (C) height has been adjusted, check to be sure that the tape is riding smoothly within the limiter post (C).
Be sure the edge of the tape are not rubbing against the edges of the limiter post (C).
If this problem does exist, adjust the tilt of the audio/control head to force the tape up or down as required.
The tilt can be adjusted with the 2 hex screws in front of the head and the back of the head. (See Fig. 11.)

3-3) After adjusting the audio/control head tilt, the "height" of the head must be checked.
Adjust the head height if necessary.
To adjust height, 2 hex screws must be turned equally so that "TILT" won't be changed.

4. Limiter post (A) and Limiter post (B) and Main erase head Adjustment.
   4-1) Examine oscilloscope signal and if there is a lack of envelope at the beginning of the track, (See Fig. 2) adjust the height of the limiter post (A) to obtain as flat an envelope as possible. (See Fig. 3)
   As with adjustment of limiter post (C) height, rotate tracking control so that mistracking occurs.
   Again check for flatness of envelope at the beginning of the track, and readjust the limiter post (A)height if necessary.
   4-2) After adjusting limiter post (A), be sure the edges of the tape are not rubbing against the edges of this post. If this is the case, change the height of the post situated next to the main erase head to prevent this problem if necessary.
   4-3) If the limiter post (A) and the limiter post (B) have been readjusted, the height of the main erase head must be adjusted as shown below.
   To adjust height, 3 screws must be turned equally so that "TILT" or "AZIMUTH" won't be changed.

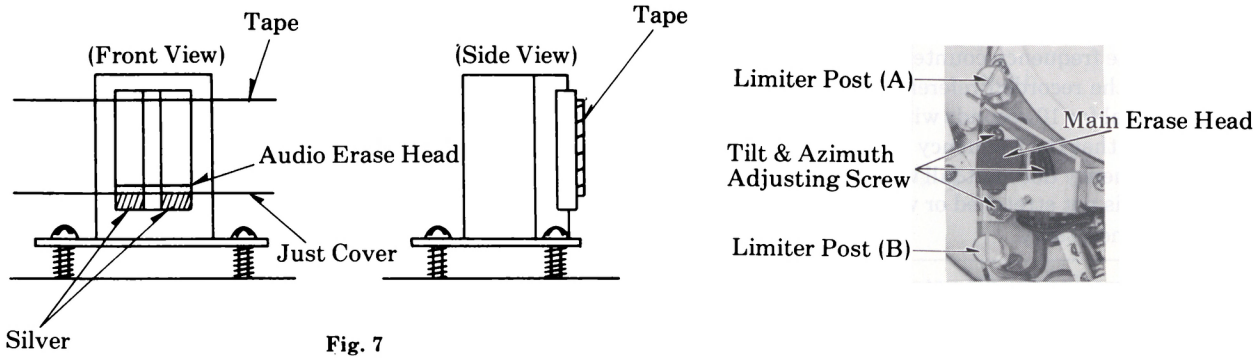


Fig. 7

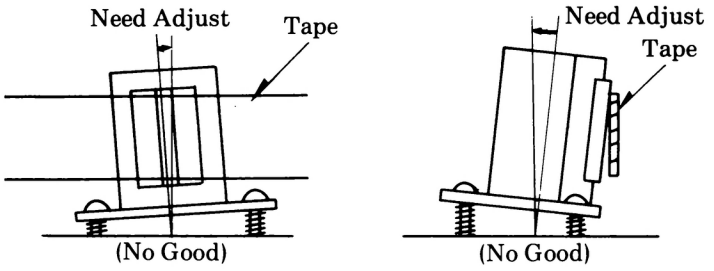


Fig. 8

5. Control Head Position Adjustment.
   5-1) Rotate tracking control to "FIX" position.
   5-2) Loosen 2 screws which hold the audio/control head assembly.
   Move the assembly along the tape path until the oscilloscope waveform at TP320 reaches maximum envelope.

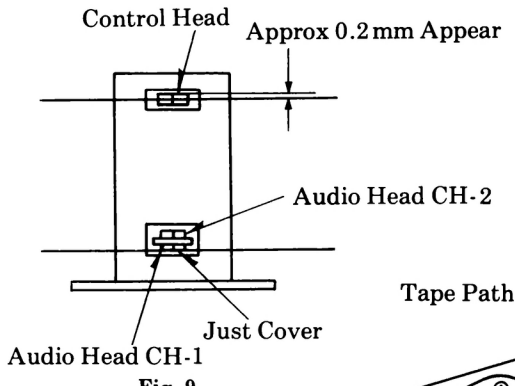


Fig. 9

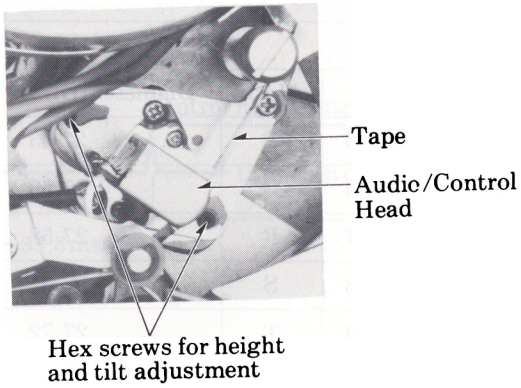


Fig. 11

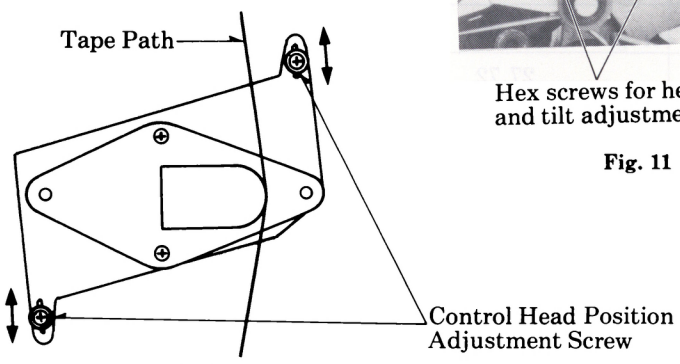


Fig. 10

Tape Speed	9.5cm/sec ±0.2% (3-3/4ips)
Tape Deviation	3,000±6Hz
Test Point	Audio Line Out
Equipment	Frequency Counter
Adjustment Point	Capstan Servo Pulley Lower

1. Connect the frequency counter to audio line out.
2. Playback the recorded reference tape for tape speed adjustment (3kHz signal on audio track) and measure the 3kHz signal for 10 seconds with the frequency counter in middle of the tape.
3. Make sure that the frequency is 2,994~3,006Hz.
4. If the frequency does not fall within the range of 3,000±6Hz, first check the capstan belt for stretch or wear. If the belt is not stretched or worn, check the capstan servo pulley for signs of wear. Replace if necessary.

Note: Increasing the diameter increases the frequency.

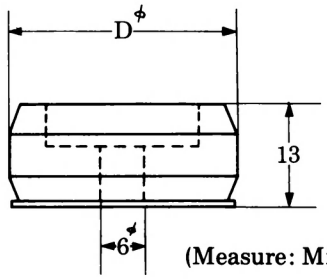
The diameter of the available pulley are listed on the chart.

60Hz		
Part No.	Mark	Diameter (D^{ϕ} ±0.01mm)
VDP5093	D	29.73
VDP5080	E	29.81
VDP5081	F	29.88
VDP5082	G	29.96
VDP5083	H	30.03
VDP5084	I	30.11

50Hz		
Part No.	Mark	Diameter (D^{ϕ} ±0.01mm)
VDP5085	P	27.43
VDP5086	Q	27.50
VDP5087	R	27.58
VDP5088	S	27.65
VDP5089	T	27.72

Fig. 12

Capstan Servo Pulley Lower



(Measure: Millimeter)

Fig. 13

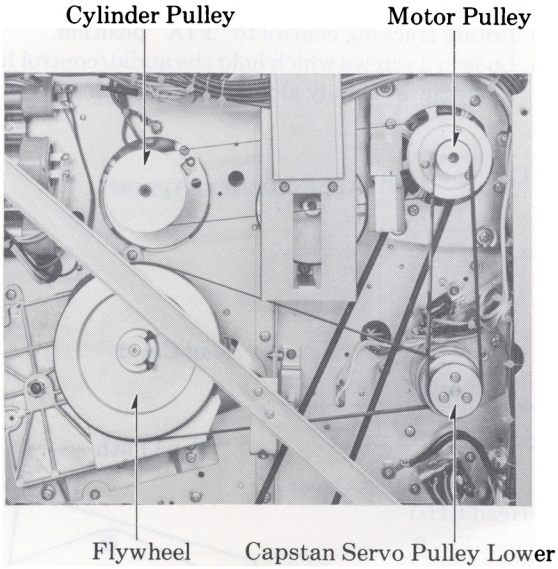


Fig. 14

CONTROL HEAD OUTPUT (1)	VFM2080D	EIA Monoscope	NV-2000 Series (Late Servo System)

Circuit Board	Servo Control
Test Point	TP215
Equipment	Oscilloscope V=0.005 V/cm, H=5 msec/cm, INT

1. Connect an oscilloscope probe to TP215.
2. Playback the reference tape and make sure of the waveshape of Fig. 15.

Late Type
Effective from serial No.
H5HD21001 (NV-2110M)
K5HE21001 (NV-2120)
G5HC21081 (NV-2125)

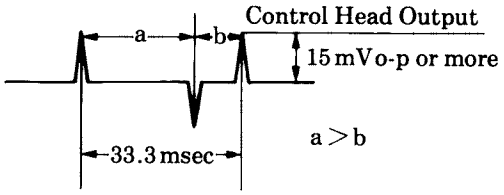


Fig. 15

CONTROL HEAD OUTPUT (2)	VFM2080D	EIA Monoscope	NV-2000 Series (Early Servo System)

Test Point	Connector P21 ③ (ground ②)
Equipment	Oscilloscope V=0.005 V/cm, H=5 msec/cm, INT

1. Remove solder of CP201 and connect an oscilloscope probes to P-21 ③, (ground ②).
2. Playback the reference tape and make sure of the waveshape of Fig. 16.
3. Solder CP201 after checking.

Early Type
Effective till Serial No.
F5HC21050 (NV-2110M)
F5HE21100 (NV-2120)
G5HC21080 (NV-2125)

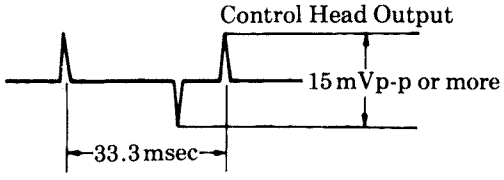


Fig. 16

ELECTRONIC HEAD SWITCHING ADJUSTMENT (1)	VFM2080D	EIA Monoscope	NV-2000 Series (Late Servo System)

Circuit Board	Servo Control, Video P.B
Test Point	TP211, TP320
Equipment	Oscilloscope CHOP Mode, Line TP211.....0.5 V/cm TP320.....0.005 V/cm, Normal→TV Delay 5 msec/cm→0.2 msec/cm
Adjustment Point	R217, R219

1. Connect a dual trace oscilloscope (CHOP mode) probes to TP211 (CH-2) and TP320 (CH-1).
2. Playback the reference tape.
3. Adjust R217 and R219 to remove head switching noise.

When scope with a TV DELAY mode is available, Head switching can be adjusted completely by the following method.

1. Operate the oscilloscope as follows:
   HORIZONTAL DISPLAY: TV DELAY mode.
   TIME/cm: 0.2 msec.
2. Tuning the TV delay time control of the oscilloscope, obtain the waveform shown in Fig. 20. (downward transient of pulse).
3. Adjust R219 so that the downward transient of pulse (TP211) comes to the center of the overlap.
4. Tuning the TV delay time control of the oscilloscope, obtain the waveform shown in Fig. 18. (upward transient of pulse).
5. Adjust R217 so that the upward transient of pulse comes to the center of the overlap.
6. Make sure of no switching gap noise at the head switching position.

For Late type
Effective from Serial No.
H5HD21001 (NV-2110M)
K5HE21001 (NV-2120)
G5HC21081 (NV-2125)

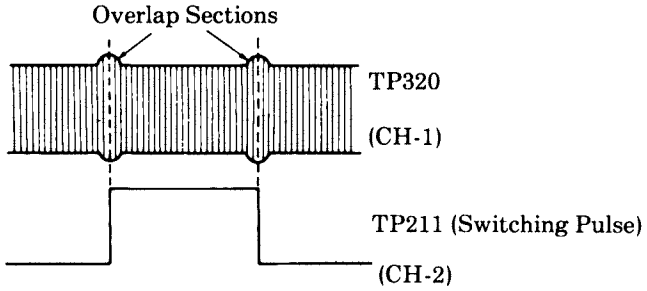


Fig. 17

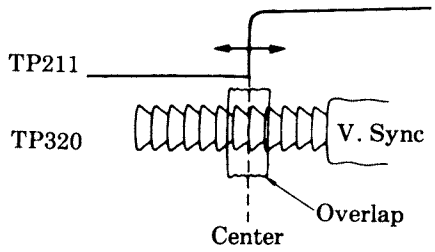


Fig. 18

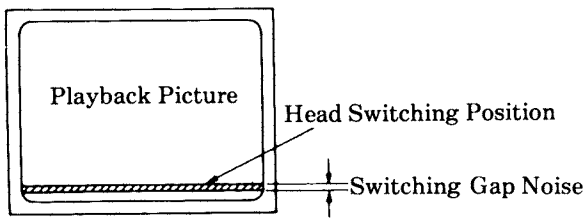


Fig. 19

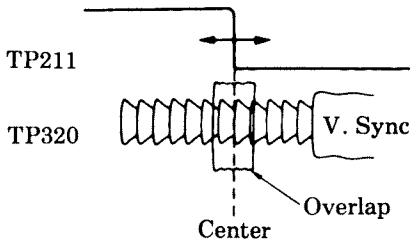


Fig. 20

ELECTRONIC HEAD SWITCHING ADJUSTMENT (2)	VFM2080D	EIA Monoscope	NV-2000 Series (Early Servo System)

Test Point	TP211, TP320
Adjustment Point	R236, R262
Equipment	Oscilloscope CHOP Mode, Line TP211.....0.5 V/cm, TP320.....0.005 V/cm, Normal⟶TV Delay 5 msec/cm→0.2 msec/cm

1. Disconnect the connection to playback amplifier from control board and connect a dual trace oscilloscope (CHOP mode) probes to TP211 (CH-2) amd TP320 (CH-1).
2. Playback the reference tape.
3. Adjust R236 and R262 for the relationship as shown in Fig. 17.
4. After adjusting, reconnect the connection in the original state, and make sure that no switching gap noise occurs at the video head switching position with observing the playback picture on the monitor TV.

or,

If TV DELAY mode is available: Head switching can be adjusted completely by the following method.

1. Operate the oscilloscope as follows:
   HORIZONTAL DISPLAY: NORM→TV DELAY mode,
   TIME/cm: 5 msec.→0.2 msec.
2. Tuning the TV delay time control of the oscilloscope, obtain the waveform shown in Fig. 20 (downward transient of pulse).
3. Adjust R236 so that the downward transient of pulse (TP211) comes to the center of the overlap.
4. Tuning the TV delay time control of the oscilloscope, obtain the waveform shown in Fig. 18 (upward transient of pulse).
5. Adjust R262 so that the upward transient of pulse comes to the center of the overlap.
6. After adjusting, reconnect the connection, observe the playback picture on the monitor TV, and make sure of no switching gap noise at the head switching position.

For Early type
Effective till Serial No.
F5HC21050 (NV-2110M)
F5HE21100 (NV-2120)
G5HC21080 (NV-2125)

PLAYBACK ACC BURST GATE PHASE	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP334
Equipment	Oscilloscope V=0.05 V/cm, H=20μsec/cm INT.
Adjustment Point	L363

1. Set R3302 to middle position and connect an oscilloscope to TP334.
2. Playback the reference tape (color bar signal).
3. Adjust L363 to obtain the burst signal at bottom of valley of gate pulse as shown in Fig. 21.

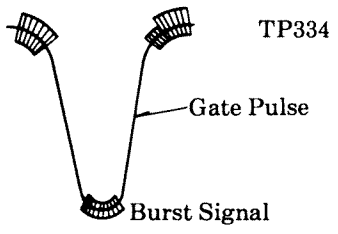


Fig. 21

4.27MHz BPF (Band Pass Filter) (1) CHECK	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP335
Equipment	Oscilloscope V=0.05 V/cm, H=20μsec/cm, INT.

1. Connect a TV monitor and playback the reference tape (color bar signal).
2. Connect an oscilloscope probe to TP335.
3. Make sure that the chroma (cyan) level is 0.6~ 1.1 Vp-p.

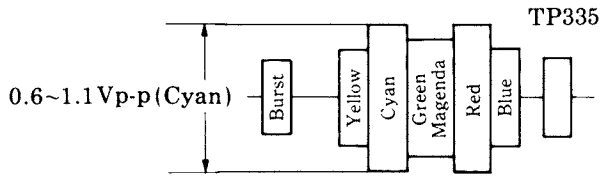


Fig. 22

PLAYBACK ACC LEVEL ADJUSTMENT	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP328
Equipment	Oscilloscope V=0.05 V/cm, H=20μsec/cm, INT.
Adjustment Point	R3302

1. Connect a TV monitor.
2. Playback the reference tape (color bar).
3. And then, connect a scope probe to TP328 and adjust R3302 to obtain 0.8 Vp-p chroma (cyan) level.

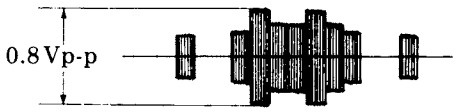


Fig. 23

PLAYBACK ACC FUNCTION CHECK	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP327, TP328
Equipment	Oscilloscope CHOP Mode V=0.02 V/cm (TP327) / 0.05 V/cm (TP328) H=20μsec/cm, INT.
Adjustment Point	R3317

1. Connect a TV monitor.
2. Connect a dual trace oscilloscope (CHOP mode) probes to TP327 and TP328, and playback the reference tape (color bar).
3. Turn R3317 and vary the chroma level at TP327 for 0.1—0.7 Vp-p, and make sure that the chroma level at TP328 is in the range of 0.5~0.9 Vp-p. After confirmation, set R3317 to middle position.

AFC (Automatic Frequency Control)	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP332
Equipment	Oscilloscope V=0.5V/cm, H=5msec/cm, INT. Frequency Counter
Adjustment Point	R3362, L364

1. Connect a monitor TV.
2. Cut CP302 and playback the reference tape (color bar).
3. Connect a frequency counter to TP332 and adjust R3362 for 15.15kHz.
4. Remove the frequency counter and connect an oscilloscope probe to TP332.
5. Tune L364 to obtain maximum amplitude.
6. In the above condition, turn R3362 fully clockwise and then turning it counterclockwise, set it at a point where the amplitude of TP332 shows maximum.
7. Connect a frequency counter to TP332 and make sure that the frequency is between 15.13—15.16kHz.
8. If frequency is not within range, repeat steps 3 to 7. After readjusting, connect the frequency counter again to TP332 and adjust R3362 for 15.72~15.74 kHz.

Note: After adjusting R3362 for 15.72~15.74kHz, reconnect CP302.

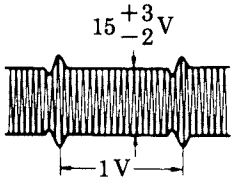


Fig. 24

3.58MHz OSCILLATION FREQUENCY & AMPLITUDE	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP331
Equipment	Oscilloscope V=0.1V/cm, INT., Resistor 4.7KΩ, 1/4W±5%, Capacitor 0.01μF Frequency Counter
Adjustment Point	C3274

1. Connect a monitor TV.
2. Connect a frequency counter to TP331 through a 4.7 KΩ, 1/4W, ±5% resistor and a 0.01μF capacitor in series and playback the reference tape (color bar).
3. Adjust C3274 so that the frequency becomes 3.579545 MHz ±5Hz.
4. After this, connect an oscilloscope probe to TP331 and make sure that the amplitude is 2.6Vp-p or more.

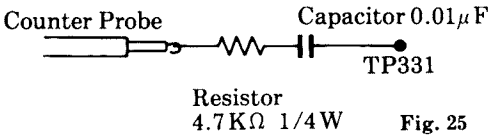


Fig. 25

TENTATIVE APC (Automatic Phase Control) OSCILLATOR ADJUSTMENT	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP333
Equipment	Oscilloscope V=0.5V/cm, H=20μsec/cm, INT.
Adjust Point	T315, T316, R6207 (APC Control on the jack panel), L365

1. Connect a monitor TV.
2. Connect an oscilloscope probe to TP333 and playback the reference tape (color bar).
3. Tune T316 to have 14~17Vp-p amplitude. If unadjustable with only T316, adjust T315 also.
4. Set R6207 (APC control on jack panel) to the center position and adjust L365 to obtain the normal color phase on the monitor TV.

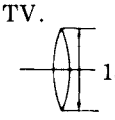


Fig. 26

4.27MHz BPF (Band Pass Filter) (2) CHECK	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP339
Equipment	Oscilloscope V=0.2V/cm, H=20μsec/cm, INT.

1. Connect a monitor TV.
2. Connect an oscilloscope probe to TP339 and playback the reference tape (color bar).
3. Confirm the 4~6 Vp-p waveform.

BALANCE MODULATOR BALANCE	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP338
Equipment	Oscilloscope V=0.02V/cm, H=20μsec/cm, INT.
Adjustment Point	R3317

1. Connect a monitor TV.
2. Connect an oscilloscope probe to TP338 and playback the reference tape (color bar).
3. Adjust R3317 to have minimum 4.27MHz leakage (120mVp-p or less).

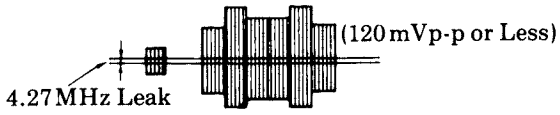


Fig. 27

CHROMA LEVEL ADJUSTMENT	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP326
Equipment	Oscilloscope V=0.5V/cm, H=10μsec/cm, INT.
Adjustment Point	R3324

1. Connect a TV monitor.
2. Connect an oscilloscope probe to TP326 and playback the reference tape.
3. Adjust R3324 so that the amplitude of burst signal becomes 0.55Vp-p.
4. Make sure that the output waveform becomes 2Vp-p.

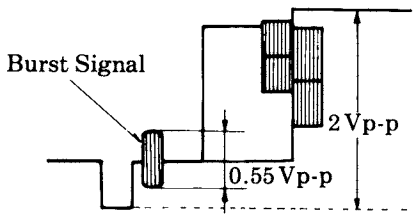


Fig. 28

HIGH RANGE ADJUSTMENT	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP326
Equipment	Oscilloscope V=0.5V/cm, H=10μsec/cm, INT.
Adjustment Point	R3276

1. Playback the reference tape.
2. Connect an oscilloscope (10:1) probe to TP326.
3. Adjust R3276 so that the waveform becomes as shown in Fig. 29 (B).

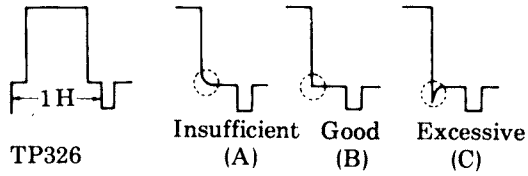


Fig. 29

APC ADJUSTMENT (1)	VFM2080D	Color Bar	NV-2000 Series

Test Point	Tr390 Emitter, TP331
Equipment	Frequency Counter, Capacitor 0.1μF, Resistor 4.7KΩ, Capacitor 0.01μF
Adjustment Point	L365, R6207 (APC Control on the jack panel)

1. Connect a monitor TV.
2. Set R6207 (auto phase control) to middle position and playback the reference tape (color bar). Turn L365 counterclockwise fully, and then gradually return clockwise to set it just after the hue of color bar has become in the normal range.
3. Connect TP331 to ground through a 0.1μF capacitor and a frequency counter to Tr390 emitter through a 4.7KΩ resistor and a 0.01μF capacitor in series.
4. Measure the frequency.....(f_1).
5. Remove the counter, capacitor and resistor connected previously.
6. Turn L365 gradually clockwise to carry the hue of color bar out of normal range.
7. Return L365 counterclockwise gradually and set it just after the hue of color bar has become in the normal range.
8. Connect a 0.1μF capacitor between TP331 and ground and a counter to Tr390 emitter through a 4.7KΩ resistor and a 0.01μF capacitor in series.
9. Measure the frequency.....(f_2).
10. Tune L365 to have center frequency between f_1 and f_2..... $\frac{f_1+f_2}{2}$
11. After this adjustment, remove the capacitors, resistor and counter.

Note: $f_1-f_2 \geqq 9$kHz

COLOR FLICKER ADJUSTMENT IN PLAYBACK MODE	VFM2070D	Color Bar	NV-2000 Series

Test Point	TP327 (Video Playback Process Section)
Equipment	Oscilloscope V=0.02V/cm, 5msec/cm, INT.
Adjustment Point	R526 (Audio & Video Amp. Section)

1. Connect an oscilloscope probe to TP327 and playback the reference tape (color bar).
2. Set the tracking control to the FIX position and adjust R526 to obtain the same color level every at vertical period.
3. Next set the tracking control in the reverse track condition, and make sure that the difference at each (vertical period) is within 1dB (one head to the other ratio is within 1.1).
4. In the case of more than 1dB on the reverse track, deviate R526 slightly and set R526 so that the balance will not differ between FIX tracking and reverse tracking.

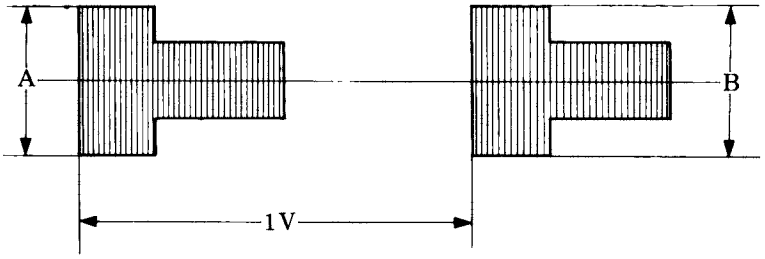


Fig. 30

BURST GATE	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP801
Equipment	Oscilloscope V=0.1V/cm, H=10μsec/cm, INT.
Adjustment Point	L802

1. Connect an oscilloscope probe to TP801 and playback the reference tape (color bar).
2. Adjust L802 to obtain a burst signal at the bottom of burst gate pulse.

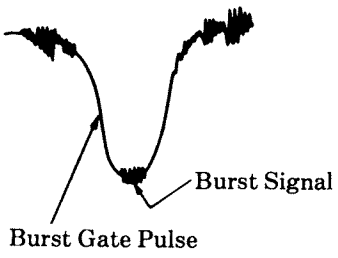


Fig. 31

BURST DETECTION LEVEL	VFM2080D	Color Bar	NV-2000 Series

Test Point	TP804
Equipment	Oscilloscope V=0.1V/cm, INT. DC Range, or VTVM, DVM
Adjustment Point	R801

1. Connect an oscilloscope probe to TP804 and playback the reference tape.
2. Adjust R801 so that the burst detection level becomes DC 2.5V.

SWITCHING BALANCE ADJUSTMENT	VFM2080D	EIA Monoscope/Color Bar	NV-2000 Series

Test Point	TP340 (Source Leads of TR361 and TR362), (misprinted as TP339 in the service manual.)
Equipment	Oscilloscope 20mV/cm, 10μsec/cm
Adjustment Point	R3410 (DC Balance)

1. Connect an oscilloscope to TP340 and playback the recorded reference tape (B/W portion).
2. Measure this DC voltage.
3. Then playback the color bar portion of the recorded reference tape and adjust the DC potential with R3410 to obtain a DC voltage equal to the DC voltage measured during B/W playback. (Av=Bv)

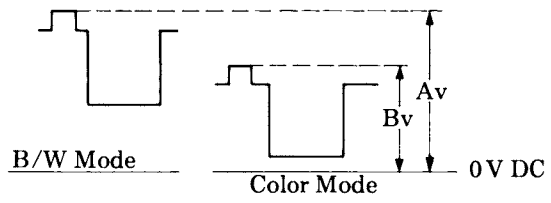


Fig. 32

AUDIO AZIMUTH ADJUSTMENT	VFM2080D	10kHz Audio	NV-2000 Series

Test Point	TP406
Equipment	Oscilloscope V=0.5V/cm, H=50μsec/cm, INT.
Adjustment Point	Audio/Control Head

1. Connect an oscilloscope probe to TP406 and playback the reference tape (10kHz audio).
2. Adjust the audio/control head angle to have maximum playback output. (See Fig. 10, 11)

TAPE SPEED ADJUSTMENT	VFM4021A	3kHz Audio	NV-3082/3085

Tape Speed	19.05 cm/sec. (7.5 ips)
Speed Deviation	±0.25% or less (3,000±7.5 Hz)
Test Point	Audio Line Output
Equipment	Frequency Counter
Adjustment Point	Capstan Motor Pulley

1. Playback the recorded reference tape for speed adjustment (3kHz signal on audio track) and measure the 3kHz signal at AUDIO LINE OUTPUT for 10sec. with the frequency counter in the middle of the tape.
2. If the frequency does not fall within the range of 3,000±7.5 Hz, first check the capstan belt for stretch or wear. If the belt is not stretched or worn, check the capstan motor pulley for signs of wear. Replace if necessary.

Note: Increasing the diameter increases the frequency.

The diameters of the available pulleys are listed on the chart.

Mark	Part No.	Diameter (D)
A	VDP0227	16.70±0.010mm
B	VDP0228	16.75±0.010mm
Z	VDP0300	16.65±0.010mm
H	VDP0340	16.60±0.010mm
I	VDP0342	16.55±0.010mm
J	VDP0343	16.50±0.010mm

Fig. 33

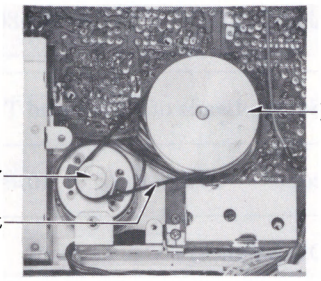
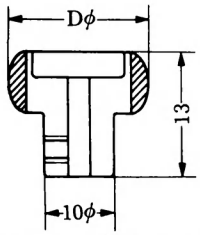


Fig. 34



(Measure: Millimeter)
Capstan Motor Pulley

HEAD SWITCHING TIME ADJUSTMENT	VFM4000A	EIA Monoscope	NV-3082/3085

Test Point	TP308
Equipment	Oscilloscope
Adjustment Point	Detection Head

1. Connect an oscilloscope probe to TP308 and place the tracking control in FIX position.
2. Playback the recorded reference tape.
3. Adjust the drum detection head positions so that there is no envelope gap as shown in Fig. 4. Do this for each head. Then move tracking control from FIX position and make certain there is no envelop gap at any position of the tracking control.

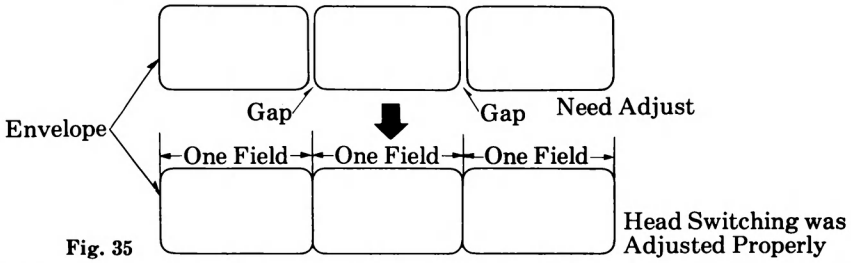


Fig. 35

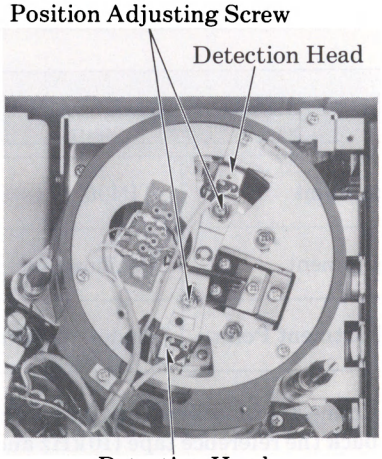
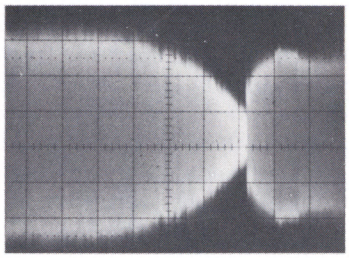


Fig. 36

Equipment	Oscilloscope, Driver (+) (−), Hex wrench
Adjustment Point	Tape Transportation
Test Point	TP304

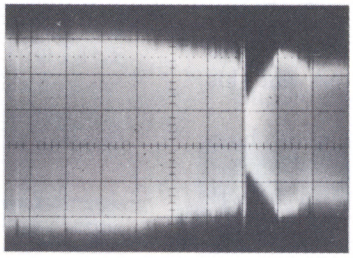
1. Connect an oscilloscope to TP304 (or video board 30pin connector No. C).
2. Connect a TV monitor and playback the recorded reference tape.
3. Limiter roller, main erase head adjustments.
   3-1) Examine oscilloscope signal, and if there is a lack of envelope at the end of the track (See Fig. 37) adjust the limiter roller height to obtain as flat an envelope as possible at the end of the track.
   To be certain that this adjustment has been done properly, rotate the tracking control so that miss-tracking occurs.
   The total output will be reduced, but the amount of flatness at the end of the track should only change slightly.
   If there is a large change of flatness at the end of the track, the limiter roller height must be readjusted.

TP304 (or Video Board 30-pin Connector No. C)



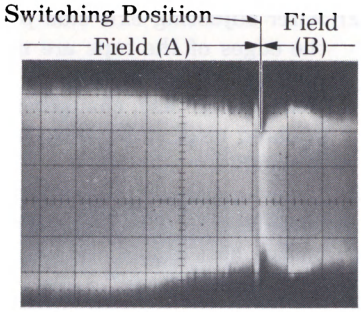
Lack of envelope at the end of track

Fig. 37



Lack of envelope at the beginning of track

Fig. 38



Envelope adjusted properly

Fig. 39

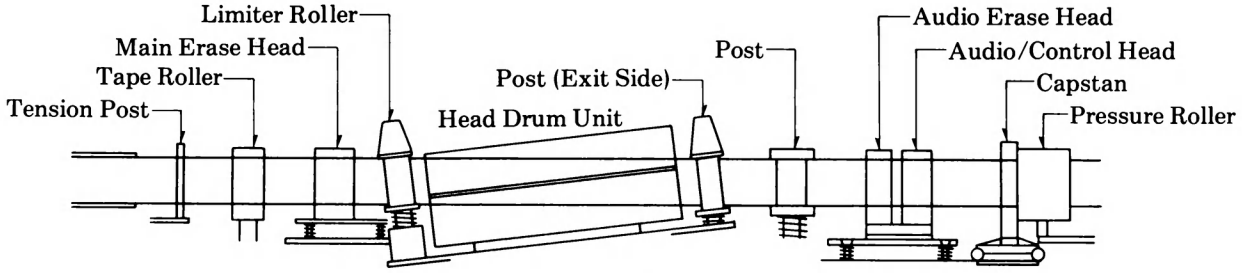


Fig. 40

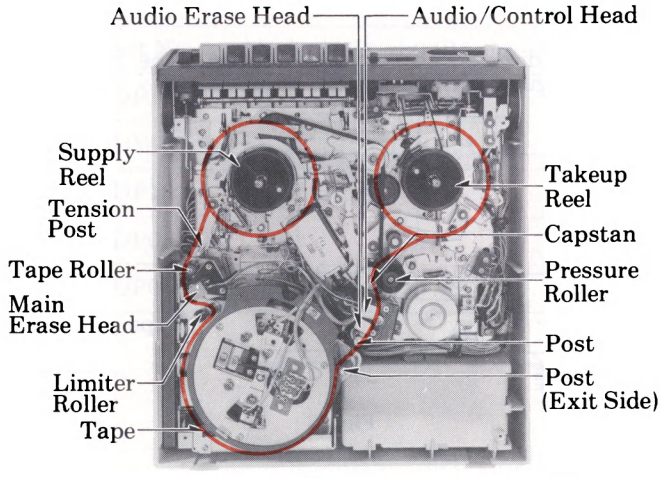


Fig. 41

3-2) After the limiter roller height has been adjusted, check to be sure that the tape is riding smoothly within the limiter roller.
Be sure the edges of the tape are not rubbing against the edges of the limiter roller.
If this problem does exist, adjust the tilt of the main erase head to force the tape up or down as required.
The tilt can be adjusted with the one phillips head screw in front of the head.

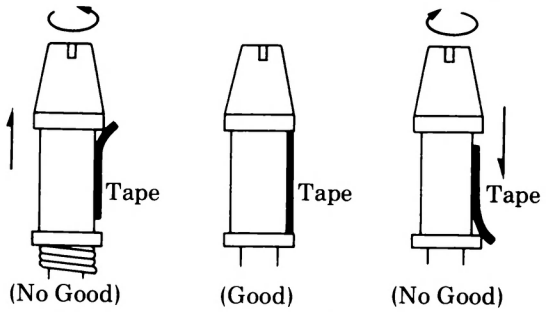
3-3) After adjusting the main erase head tilt, the "height" of the main erase head must be checked.
The main erase head gap must cover all tracks-audio, video and control.
Adjust the height if necessary.
To adjust height, all three screws must be turned equally so that "tilt", or "azimuth" will not be changed.(See Fig. 45.)

4. Post (exit side), post, and audio erase/audio/control head adjustments.

4-1) Examine oscilloscope signal and if there is a lack of envelope at the beginning of the track, adjust the height of the exit side post to obtain as flat an envelope as possible.
As with adjustment of limiter roller height, rotate tracking control so that mis-tracking occurs.
Again check for flatness of envelope at the beginning of the track, and readjust the exit side post height if necessary.

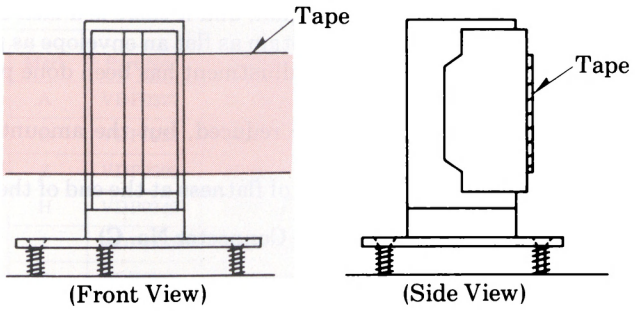
4-2) After adjusting exit side post height, be sure the edges of the tape are not rubbing against the edges of this post.
If this is the case, change the height of the post situated next audio erase head to prevent this problem.

4-3) If the post next to the audio erase head has been readjusted, the height of the audio erase/audio/control head must be adjusted as shown below.



Tape Condition on the Limiter Roller

Fig. 42



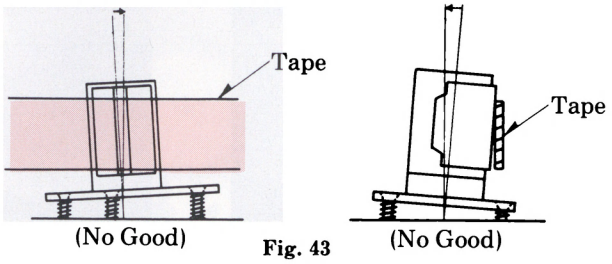


Fig. 43

Tape condition on the post.

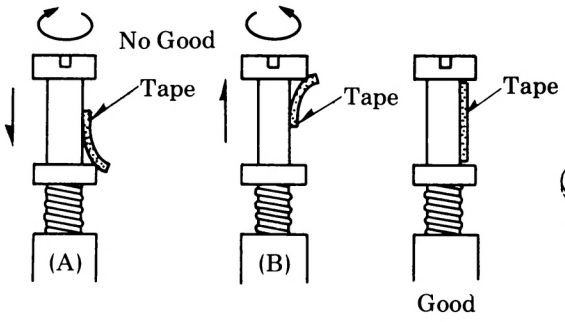


Fig. 44

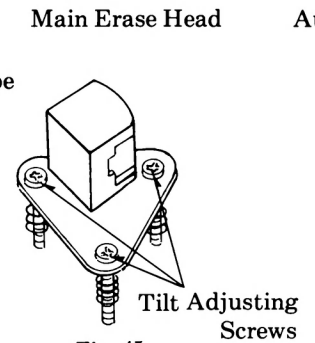


Fig. 45

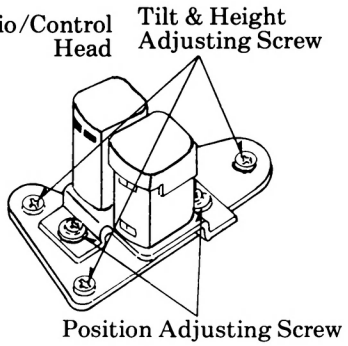


Fig. 46

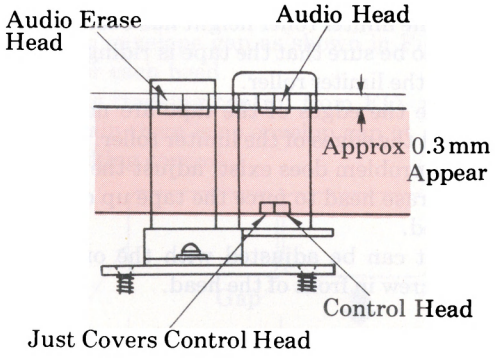


Fig. 47

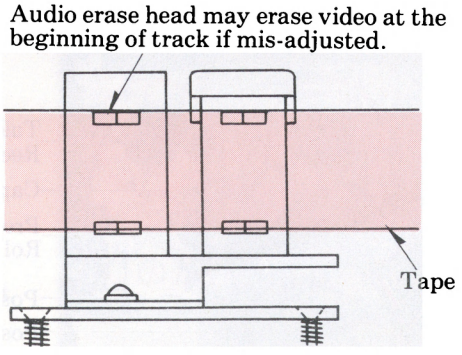


Fig. 48

5. Control head position adjustment.
   5-1) Rotate tracking control to "FIX" position.
   5-2) Loosen 2 screws which hold the audio erase/audio/control head assembly.
   Move the assembly along the tape path until the oscilloscope pattern at TP304 (video board 30pin connector No. C), reaches maximum envelope.
   5-3) Retighten 2 screws.

TAPE SPEED ADJUSTMENT	VFM3020A	3kHz Audio	NV-3000 Series (Except NV-3130, 3160)

Tape Speed	19.05cm/sec (7.5ips)
Speed Deviation	±0.25% or less (2993～3007Hz) (Skew knob in the center position)
Test Point	Audio Line Out Terminal (TP401)
Adjustment Point	Capstan Motor Pulley

1. Connect the frequency counter to the AUDIO LINE OUT TERMINAL (TP401) and playback the recorded reference tape for the tape speed adjustment.
2. Measure the signal for 10 seconds with the frequency counter in middle of the tape.
3. Make sure that the frequency counter indicates 2993～3007Hz.
4. If the frequency does not fall within the range of 3000 ±7Hz first check the capstan belt for stretch or wear.
   If the belt is not stretched or worn, check the capstan motor pulley for signs of wear.
   Replace if necessary.

Note: Increasing the diameter increases the the frequency.

The diameters of the available pulleys are listed on the chart.

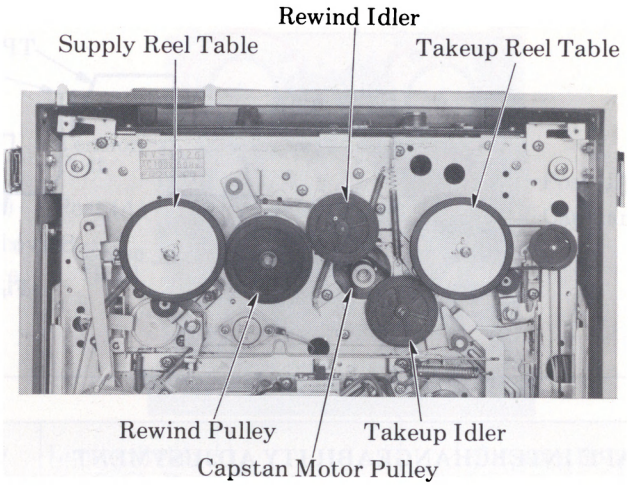
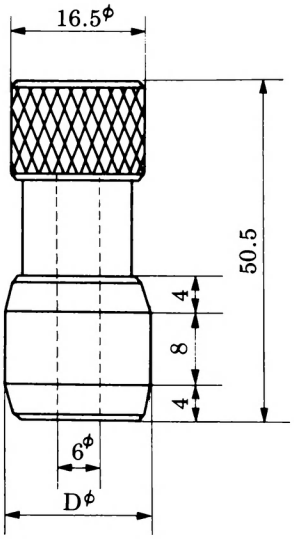


Fig. 50

Part No.	Mark	D ±0.015mm
VDP159	A	17.32
VDP160	B	17.39
VDP161	C	17.46
VDP0413	K	17.25
VDP0414	L	17.18

Fig. 49



(Measure: Millimeter)

Fig. 51

TAPE SPEED ADJUSTMENT	VFM3020A	3kHz Audio	NV-3160

Tape Speed	19.05 cm/sec
Speed Deviation	±0.25% or less (2993～3007 Hz) (Skew knob in the center position)
Test Point	TP24C, TP25C, Audio Out
Equipment	Frequency Counter
Adjustment Point	R248

1. Short-circuit between base of TR222 and ground by jumper wire.
   (In order to record new control signal only.)
2. Playback the beginning of the recorded reference tape where only a 3kHz audio signal is recorded (approx. 10 digits on counter.)
3. At this time, make sure that capstan servo is ON (Refer to Fig. 52).
4. Disconnect the jumper wire before rewinding tape (to prevent erasing the newly recorded control signal).
5. Connect a counter to AUDIO OUT.
6. Playback the recorded reference tape again and make sure that the frequency is 3000±7 Hz.
7. If the frequency is out of this range, adjust R248 slightly and repeat steps 1 to 6 until the proper frequency is obtained.

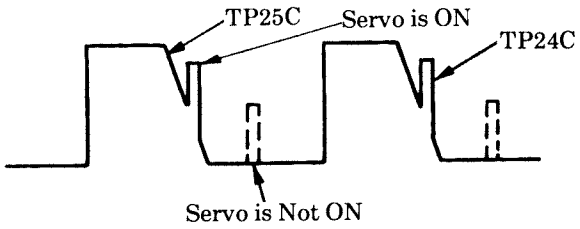


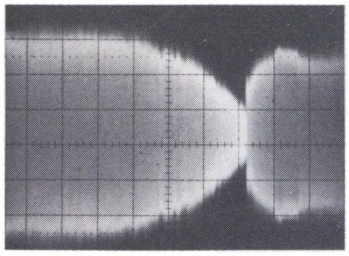
Fig. 52

TAPE INTERCHANGEABILITY ADJUSTMENT	VFM3000A	EIA Monoscope	NV-3000 Series

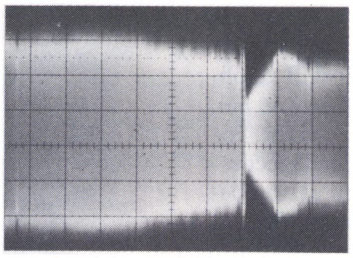
Equipment	Oscilloscope, Drive (+) (−), Hex wrench
Adjustment Point	Tape Transportation
Test Point	TP304 (Video Circuit Board)

1. Connect an oscilloscope to TP304 (Video circuit Board).
2. Connect a TV monitor and playback the recorded reference tape.
3. Limiter roller, Post A, Erase head Adjustment.
   3-1) Examine oscilloscope signal, and if there is a lack of envelope at the end of the track (See Fig. 53) adjust the limiter roller height to obtain as flat an envelope as possible at the end of the track. (See Fig. 55).
   To be certain that this adjustment has be done properly, rotate the tracking control so that mistracking occurs.
   The total output will be reduced, but the amount of flatness at the end of the track should only change slightly.
   If there is a large change of flatness at the end of the track, the limiter roller height must be readjusted.
   3-2) After the limiter roller height has been adjusted, check to be sure that the tape is riding smoothly within the limiter roller.
   Be sure that the edges of the tape are not rubbing against the edges of the limiter roller.
   If this problem does exist, adjust the height of the post A to force the tape up or down as required.

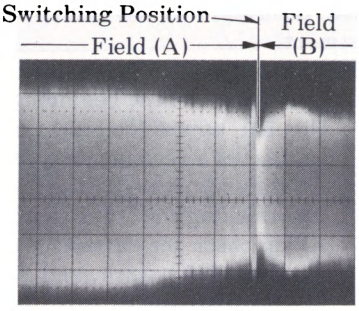
Waveform on TP304 (Video Circuit Board)



Lack of envelope at the end of track Fig. 53



Lack of envelope at the beginning of track Fig. 54



Envelope adjusted properly Fig. 55

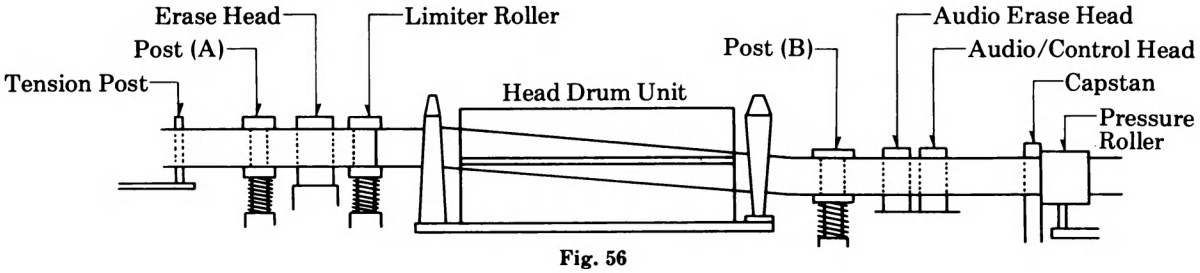


Fig. 56

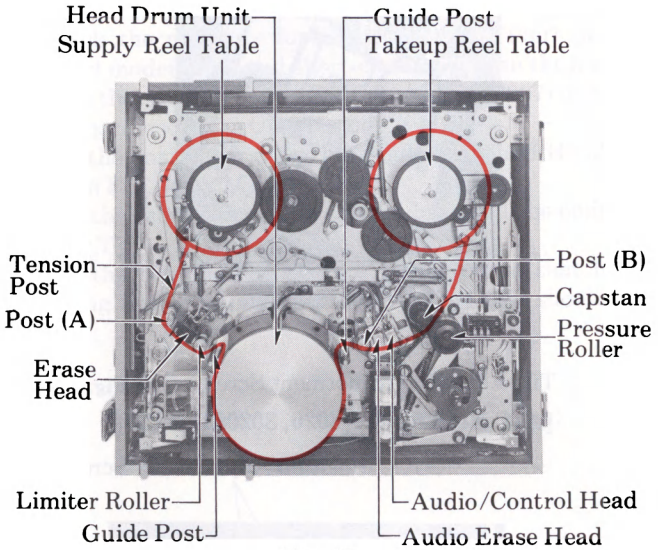


Fig. 57

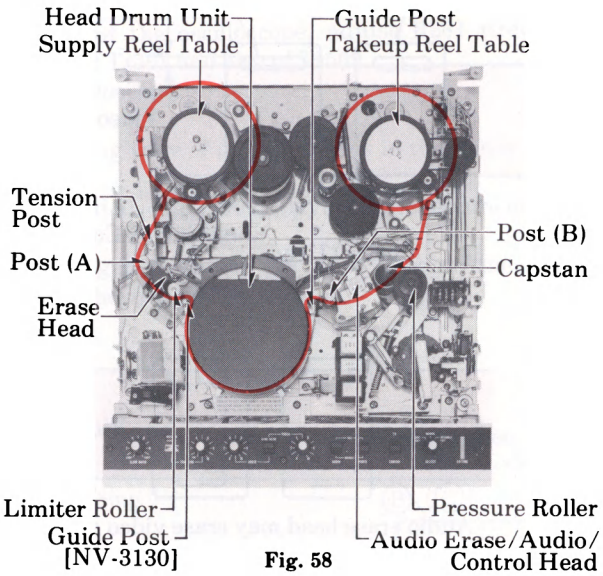


Fig. 58

3-3) After adjusting the limiter roller height and the post A height, the height of the Erase head must be checked.
The erase head gap must cover all tracks-control, video and audio.
Adjust the height if necessary.
To adjust height, all three screws must be turned equally so that "TILT" or "AZIMUTH" won't be changed.

Tape condition on the limiter roller.

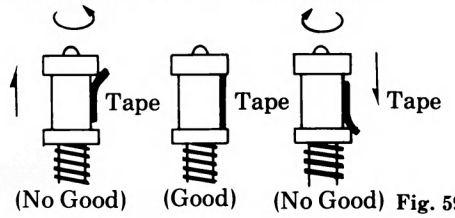


Fig. 59

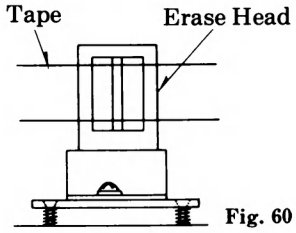


Fig. 60

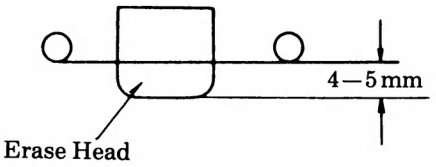


Fig. 61

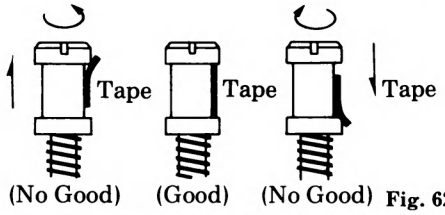


Fig. 62

Tape condition on the post (A) or post (B).

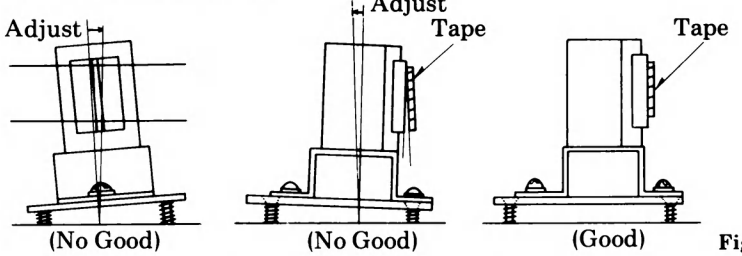


Fig. 63

4. Post B, Audio erase/Audio/Control Head Adjustment.
   4-1) Examine oscilloscope signal and if there is a lack of envelope at the beginning of the track, (See Fig. 53), adjust the height of the Post B to obtain as flat an envelope as possible. (See Fig. 55). As with adjustment of limiter roller height, rotate tracking control so that mistracking occurs. Again check for flatness of envelope at the beginning of the track, and readjust the Post B height if necessary.
   4-2) After adjusting Post B height, be sure the edges of the tape are not rubbing against the edges of the post.
   If this is the case, change the tilt of the audio erase/audio/control head to prevent the problem.
   4-3) If the tilt of the audio erase/audio/control head has been adjusted, the height of the audio erase/audio/control head must be adjusted as shown below.

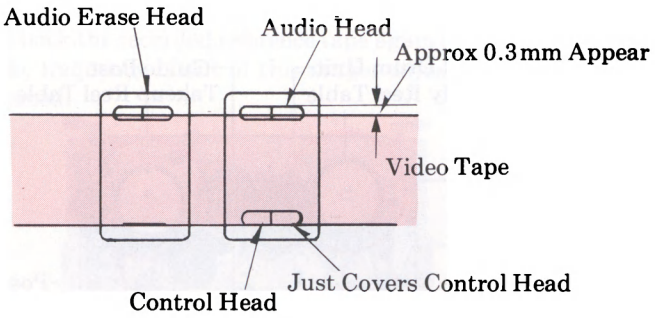


Fig. 64

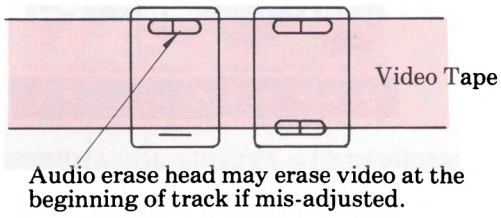


Fig. 65

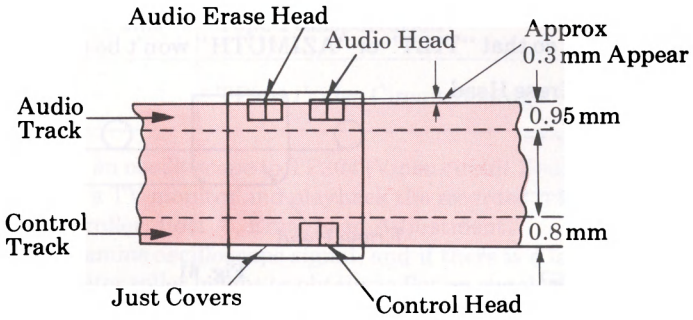


Fig. 66

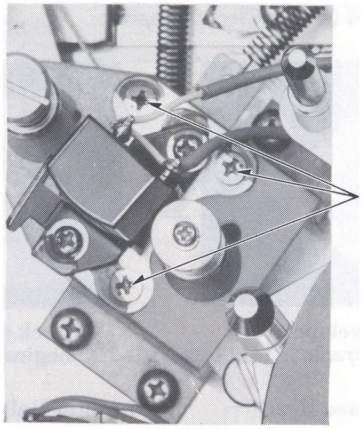


Fig. 67

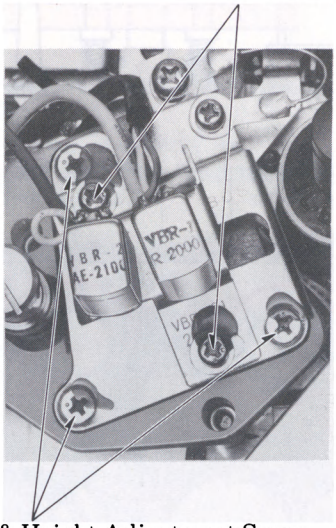


Fig. 68

[A/C Head for NV-3020, 3020SD, 3120]

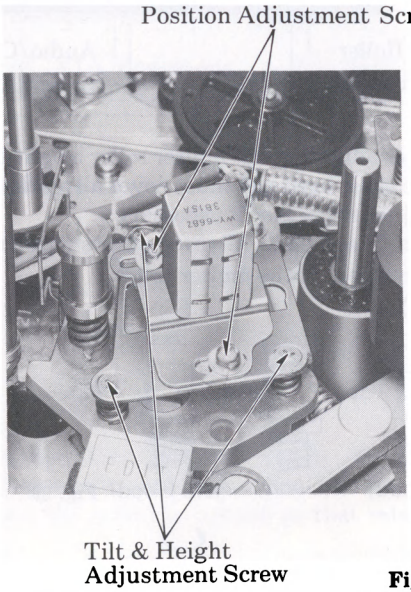


Fig. 69

[A/C Head for NV-3130, 3160]

5. Control Head Position Adjustment.
   5-1) Rotate tracking control to "FIX" position.
   5-2) Loosen two screws which hold the audio erase/audio/control head assembly.
   Move the assembly along the tape path until the oscilloscope pattern at TP304 reaches maximum envelope.

DETECTION HEAD POSITION ADJUSTMENT	VFM3000A/3080A	EIA Monoscope	NV-3000 Series

Test Point	TP201/304 (NV-3000 Series) TP207/307 (NV-3130)
Adjustment Point	R233/H201/H202 (NV-3000 Series), R281/H201/H202 (NV-3130)
Equipment	Oscilloscope

[For NV-3000 Series]

1. Playback the reference tape (test pattern signal), observe the TP304 output on CH-1 of the oscilloscope, adjust R233 (tracking adjuster) moderately, and short-circuit between the base and emitter of Tr503 and also of Tr506.
2. Observe the rectangular waveform output (TP201) on CH-2 of the oscilloscope.
3. Set the oscilloscope to CHOP mode.
4. Adjust the position of detection head H202 so that the rising edge of pulse becomes in the center of A shown in Fig. 70 and 71.
5. Reopen the short-circuit between the base and the emitter of Tr503 and also of Tr506, playback the picture on the monitor TV. Adjust the detection head (H201) position so that head switching gap noise will not take place on the head switching line. Azimuth of the detection heads should be within 1 H (horizontal).
6. Make sure that the above condition is maintained in spite of turning of P.B. shifter.

[For NV-3130]

1. Playback the reference tape, observe the TP307 output on CH-1 of the oscilloscope, adjust R281 (tracking adjuster) moderately, and short-circuit between the base and emitter of Tr503 and also of Tr509.
2. Observe the rectangular waveform output (TP207) on CH-2 of the oscilloscope.
3. Set the oscilloscope to CHOP mode.
4. Adjust the position of detection heads H201 and H202 so that the rising edge of pulse becomes in the center of A shown in Fig. 70 and 71.
5. Reopen the short-circuit between the base and the emitter of Tr503 and also of Tr509, playback the picture on the monitor TV.
   Adjust the detection head (H201) position so that head switching gap noise will not take place on the head switching line. Azimuth of the detection heads should be within 1 H (horizontal).

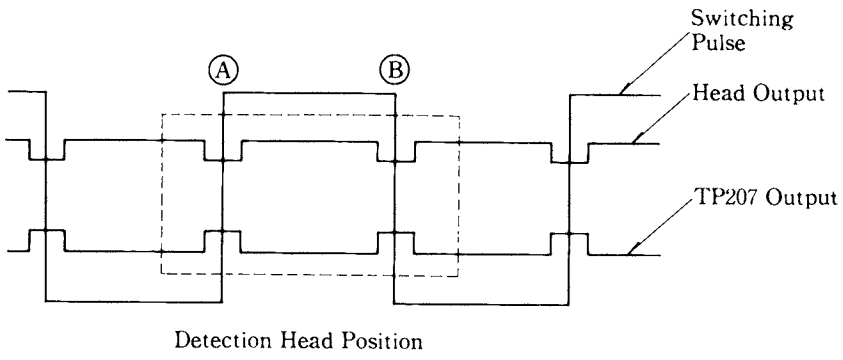


Fig. 70

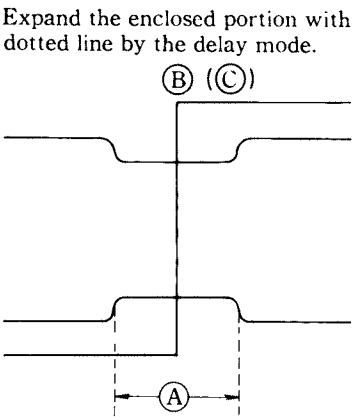


Fig. 71

TRACKING CONTROL ADJUSTMENT	VFM3000A/3080A	EIA Monoscope	NV-3130

Test Point	Playback Picture
Adjustment Point	R205
Equipment	Monitor TV

1. Playback a recorded reference tape and, with the tracking control set at FIX, fix the potentiometer R205 at the position of ON TRACK.
2. At this time, adjust it so that the tracking meter indication becomes maximum. (The playback control phase is the same as the record control phase.)

CAPSTAN MOTOR SYNC PULL-IN ADJUSTMENT	VFM3000A/3080A	EIA Monoscope	NV-3160

Test Point	M6, TP24C, TP25C
Equipment	Oscilloscope
Adjustment Point	R1120 (DC motor rotation adjustment)

1. Playback the reference tape.
2. Connect a dual trace oscilloscope to TP24C and TP25C, and set it to ADD mode.
3. Set R1120 to center portion, and make sure that the servo is ON as shown in Fig. 72.
4. Fully turn R1120 counterclockwise, and then gradually return it clockwise to set it just after the pulse of TP24C locks on trapezoid waveform of TP25C as shown in Fig. 73.
5. At this time, connect an oscilloscope to M6.
6. Measure DC level of M6 [E_1].
7. Connect a dual trace oscilloscope to TP24C and TP25C, and set it to ADD mode.
8. Fully turn R1120 clockwise, and then gradually return it counterclockwise to set it just after the pulse of TP24C locks on trapezoid waveform of TP25C as shown in Fig. 74.
9. At this time, connect an oscilloscope to M6.
10. Measure DC level of M6 [E_2].
11. Adjust R1120 so that DC level of M6 becomes $\frac{E_1+E_2}{2}=E_3$.
12. Connect a dual trace oscilloscope to TP24C and TP25C, and set it to ADD mode.
13. Make sure that servo is ON as shown in Fig. 72.

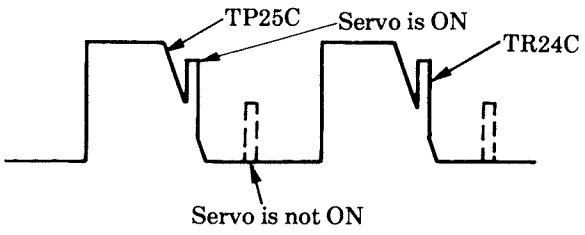


Fig. 72

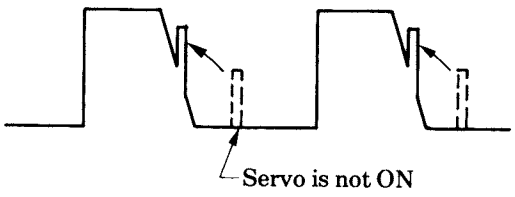


Fig. 73

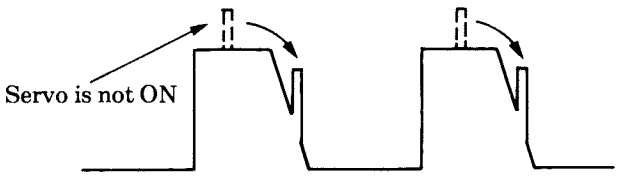


Fig. 74

CAPSTAN SERVO CONTROL PULSE POLARITY	VFM3000A/3080A	EIA Monoscope	NV-3160

Test Point	M1
Equipment	Oscilloscope

1. Place the unit in B/W mode and normal (γ) tape mode.
2. Connect an oscilloscope to M1.
3. Playback the reference tape.
4. Make sure that the waveform of M1 becomes as shown in Fig. 75.

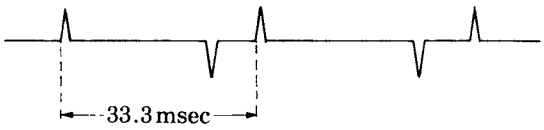


Fig. 75

OUTPUT OF CAPSTAN SERVO CONTROL SIGNAL	VFM3000A/3080A	EIA Monoscope	NV-3160

Test Point	Control Head Terminal
Equipment	Oscilloscope

1. Open the control head terminal.
2. Connect an oscilloscope to the control head terminal by using 1 : 1 probe.
3. Playback the reference tape.
4. Make sure that the waveform of the control head terminal becomes as shown in Fig. 76.

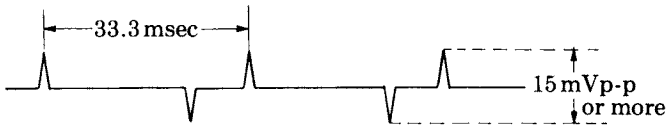


Fig. 76

FLICKER ADJUSTMENT	VFM3070A	Color Bar	NV-3000/3160 Series

Test Point	M1 (VEP0833A) (for NV-3160), TP814 (for NV-3000 Series)
Equipment	Oscilloscope
Adjustment Point	R538/R856 (for NV-3160), R537/R863 (for NV-3000 Series)

1. Playback the reference tape.
2. Connect an oscilloscope to M1 or TP814.
3. Adjust the tracking control so that the waveform of M1 or TP814 becomes maximum.
4. Adjust R538 or R537 so that the waveform amplitude of each vertical period becomes equal as shown in Fig. 77.
5. Set R856 or R863 to center portion, and record the color bar signal in normal (γ) tape mode.
6. Playback the recorded portion, and make sure that the output waveform becomes equal (Ⓐ = Ⓑ).
   If Ⓐ and Ⓑ is not equal, adjust R856 or R863.

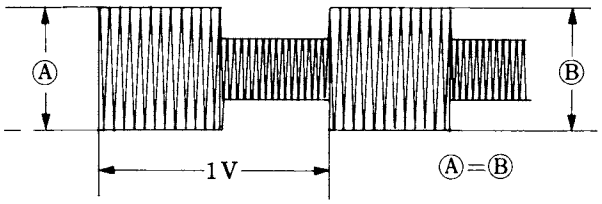


Fig. 77

180° AZIMUTH ADJUSTMENT (Head Switching Position)	VFM3000A/3080A	EIA Monoscope	NV-3000 Series

Test Point	TV Picture or Playback Picture
Adjustment Point	PG Coil or Detection Head, Screw (a)

1. Playback the reference tape.
2. Place the unit in Still mode.
3. Visual inspection on TV monitor.
4. Adjust screw (a) for 2 switching pulse noises (appearing at the head switching position) to be superposed.

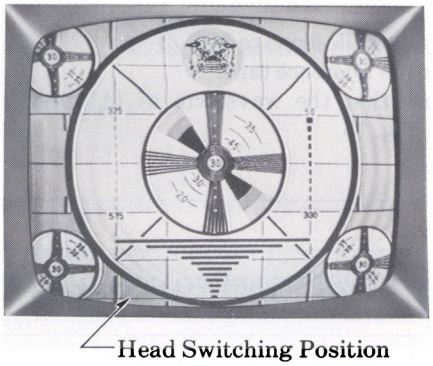
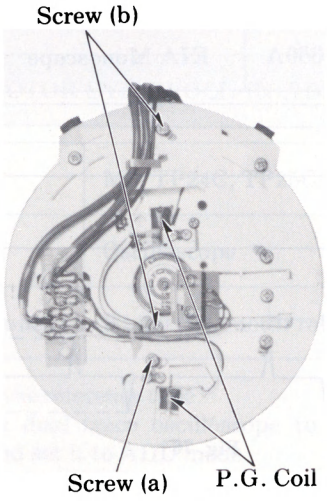


Fig. 79



[NV-3160 Only]

Fig. 78

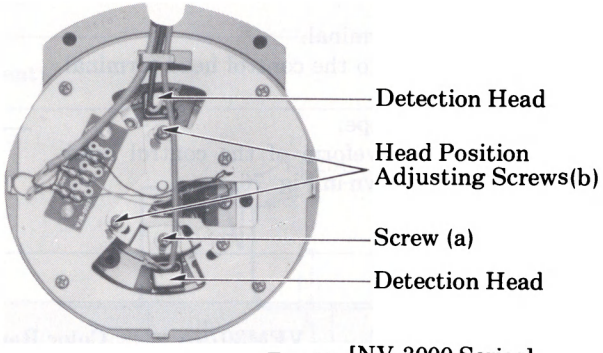


Fig. 80 [NV-3000 Series]

HEAD SWITCHING GAP NOISE ADJUSTMENT	VFM3000A/3080A	EIA Monoscope	NV-3000 Series

Test Point	TV Screen
Adjustment Point	PG Coil or Detection Head. Screw (b)

1. Playback the reference tape.
2. Visual inspection on TV monitor.
3. Adjust screw (b) (Fig. 78 or Fig. 81) so that the head switching gap noise becomes minimum as shown in Fig. 81.

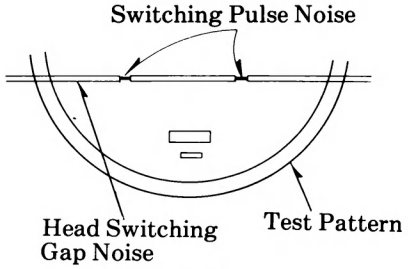


Fig. 81

Tape Speed	19.05 cm/sec (7.5 ips)
Speed Deviation	3,000 ± 7 Hz (±0.25 % or less)
Test Point	Audio Line Out Terminal
Equipment	Frequency Counter
Adjustment Point	Motor Pulley

1. Connect a frequency counter to the audio line out terminal and playback the recorded reference tape (3 kHz audio signal).
2. Make sure that the frequency counter indicates 2,993 ~ 3,007 Hz in middle of the tape.
3. If the frequency does not fall within the range of 3,000 ± 7 Hz, first check the capstan belt for stretch or wear. If the belt is not stretched or worn, check the motor pulley for signs of wear. Replace if necessary.

Note: Increasing the diameter increases the frequency.

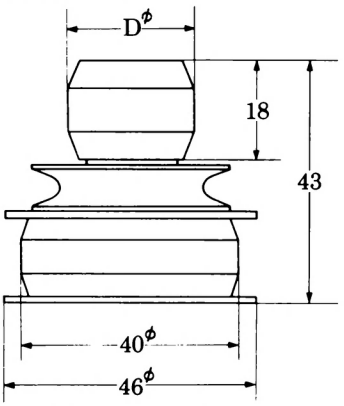
The diameters of the available pulleys are listed on the chart.

60 Hz		
Part No.	Mark	Diameter (D^{ϕ} ±0.01 mm)
VDP236	C	23.3
VDP253	D	23.4
VDP254	E	23.5

50 Hz		
Part No.	Mark	Diameter (D^{ϕ} ±0.01 mm)
VDP238	W	28.2
VDP239	X	28.3
VDP256	Y	28.4

Fig. 82

Motor Pulley



(Measure: Millimeter)

Fig. 83

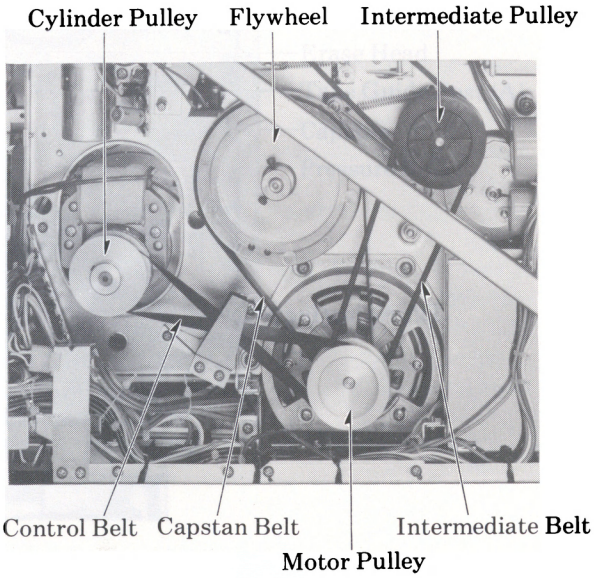


Fig. 84

PLAYBACK AMPLIFIER GAIN ADJUSTMENT	VFM5040$\frac{A}{B}$	1kHz Audio	NV-5000 Series

Specification	P.B Output of TP402 0.9V (rms)
Test Point	TP402
Equipment	Vacuum Tube Voltmeter
Adjustment Point	R406

1. Connect a Vacuum Tube Voltmeter to TP402.
2. Playback the reference tape.
3. Adjust R406 so that playback output at TP402 becomes 0.9V [rms].

* This adjustment should be made after the audio head position adjustment is completed.

CONFIRMATION OF ACC	VFM5060A	3kHz+1.3%, 3kHz−1.5% Audio/Color Bar	NV-5000 Series

1. Playback the reference tape.
2. Make sure that the color is not turned on the signal of 1.3%-up and 1.5%-down. (Visual inspection on the picture)

AUDIO AZIMUTH ADJUSTMENT	VFM5050$\frac{A}{B}$	10kHz Audio	NV-5000 Series

Test Point	TP402
Equipment	Oscilloscope 0.5V/cm, 50μsec/cm, INT.
Adjustment Point	Audio/Control Head

1. Connect an oscilloscope probe to TP402 and playback the reference tape (10kHz audio).
2. Adjust the audio/control head angle to have maximum playback output.

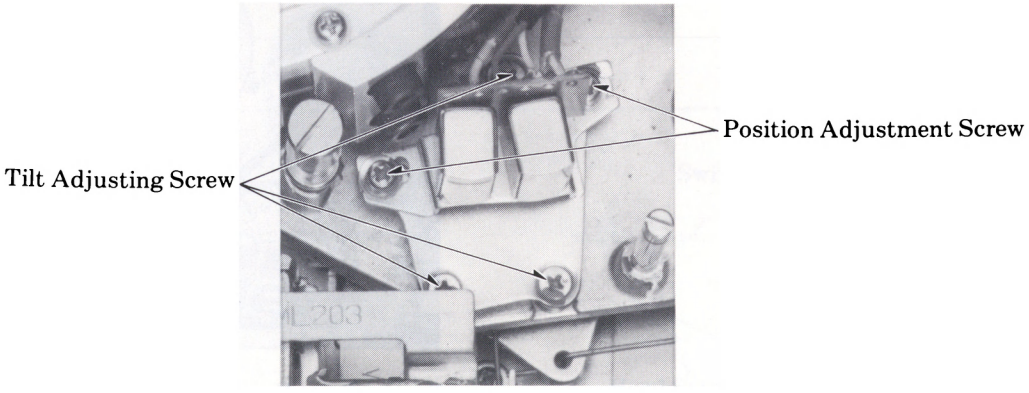
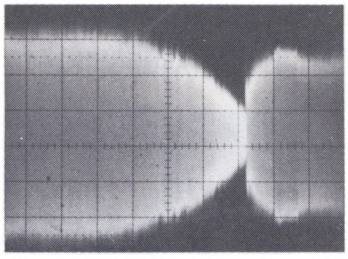


Fig. 85

Equipment	Oscilloscope, Driver (+) (−), Hex wrench
Adjustment Point	Tape Transportation
Test Point	TP301 (Video Playback (2) Board)

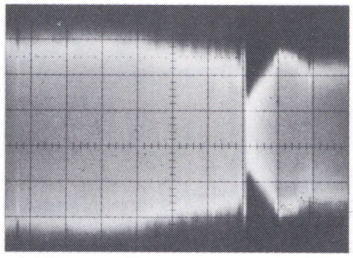
1. Connect an oscilloscope to TP301 (Video playback (2) Board).
2. Connect a TV monitor and playback the recorded reference tape.
3. Limiter roller, Tape guide post (A), Erase head Adjustment.
   3-1) Examine oscilloscope signal, and if there is a lack of envelope at the end of the track (See Fig. 86) adjust the limiter roller height to obtain as flat an envelope as possible at the end of the track.
   To be certain that this adjustment has be done properly, rotate the tracking control so that mistracking occurs.
   The total output will be reduced, but the amount of flatness at the end of the track should only change slightly.
   If there is a large change of flatness at the end of track, the limiter roller height must be readjusted.

Waveform on TP301.



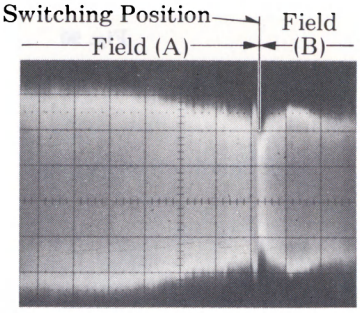
Lack of envelope at the end of track

Fig. 86



Lack of envelope at the beginning of track

Fig. 87



Envelope adjusted properly

Fig. 88

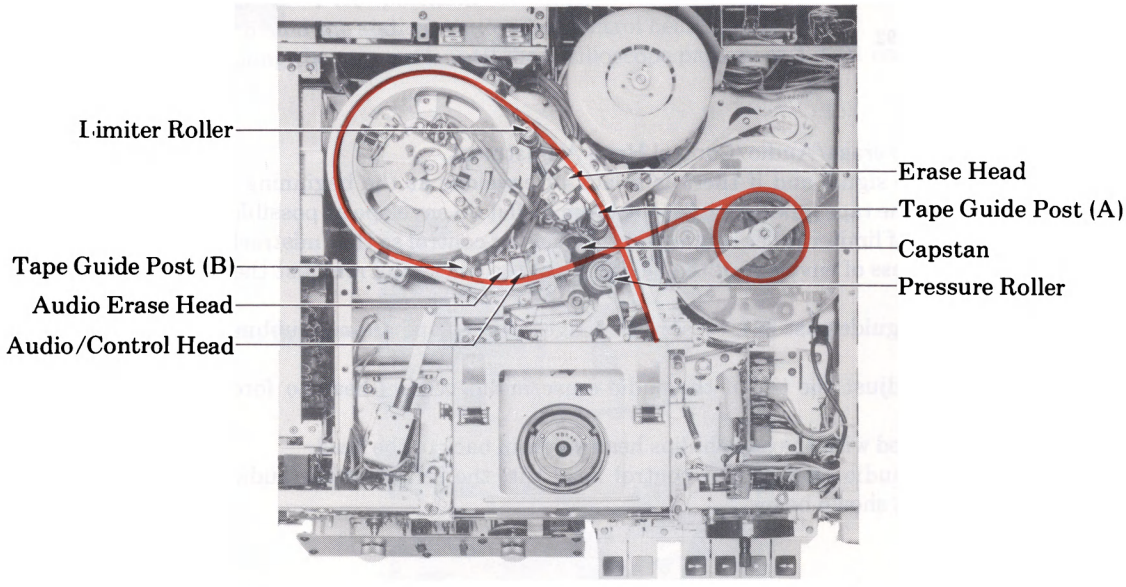


Fig. 89

3-2) After the limiter roller height has been adjusted, check to be sure that the tape is riding smoothly within the limiter roller.
Be sure the edges of the tape are not rubbing against the edges of the limiter roller.
If this problem does exist, adjust height of the "Tape guide post (A)" or "Erase head tilt" if necessary.

3-3) After adjusting the tape guide post (A) height and the erase head tilt, the height of the erase head must be checked.
The main erase head gap must cover all tracks-control, video and audio.
Adjust the height if necessary.
To adjust height, 2 screws must be turned equally so that "TILT" won't be changed.

Tape condition on the Limiter roller.

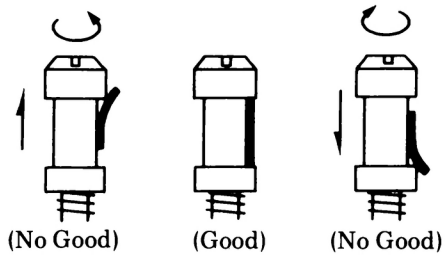


Fig. 90

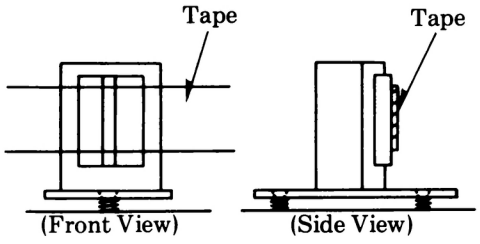


Fig. 91

Tape condition on the tape guide post.

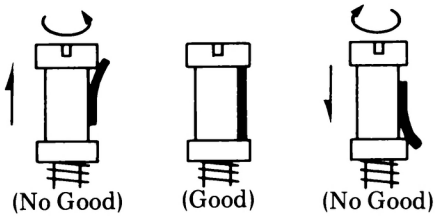


Fig. 92

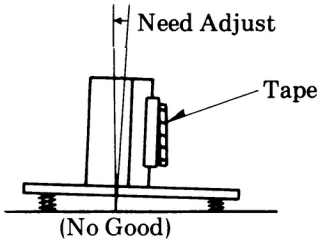


Fig. 93

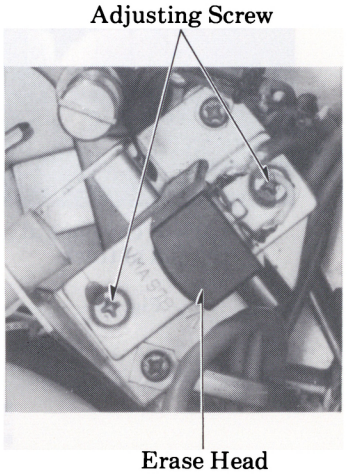


Fig. 94

4. Tape guide post (B), Audio erase/Audio/Control Head Adjustment.

4-1) Examine oscilloscope signal and if there is a lack of envelope at the beginning of the track, (See Fig. 87) adjust the height of the tape guide post (B) to obtain as flat an envelope as possible.
As with adjustment of limiter roller height, rotate tracking control so that mistracking occurs.
Again check for flatness of envelope at the beginning of the track, and readjust the tape guide post (B) height if necessary.

4-2) After adjusting tape guide post (B), be sure the edges of the tape are not rubbing against the edges of this post.
If this is the case, adjust the tilt of the audio erase/audio/control head to force the tape up or down as required.
The tilt can be adjusted with the one phillips head screw in back of the head.

4-3) After adjusting the audio erase/audio/control head tilt, the height of the audio erase/audio/control head must be readjusted as shown below.

Tape condition on the tape post (B)

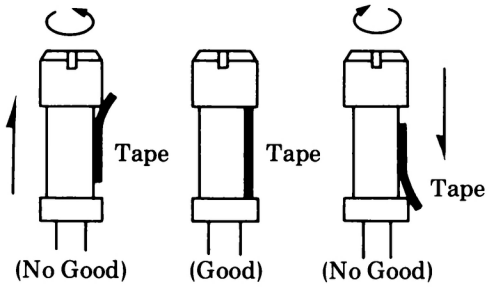


Fig. 95

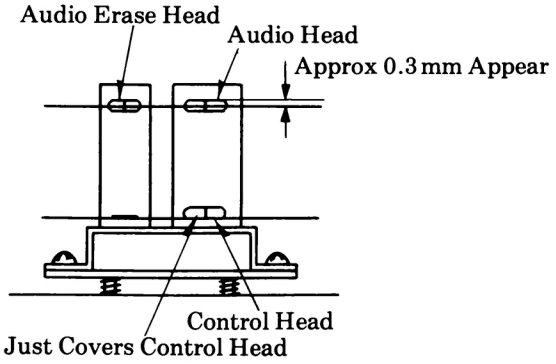


Fig. 96

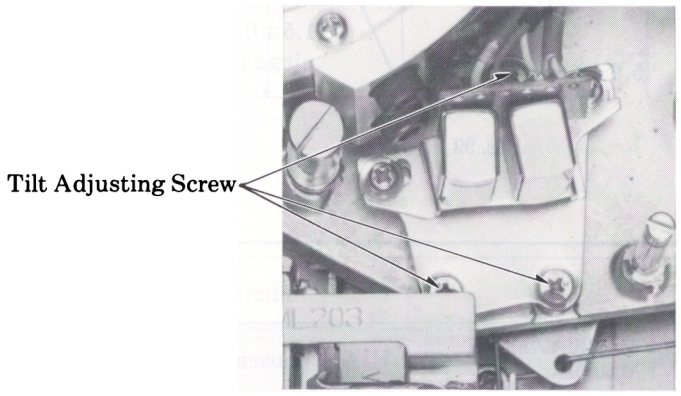


Fig. 97

5. Control Head Position Adjustment.
   5-1) Rotate tracking control to "FIX" position.
   5-2) Loosen 2 screws which hold the audio erase/audio/control head assembly.
   Move the assembly along the tape path until the oscilloscope pattern at TP301 reaches maximum envelope.
   5-3) Retighten the 2 screws.

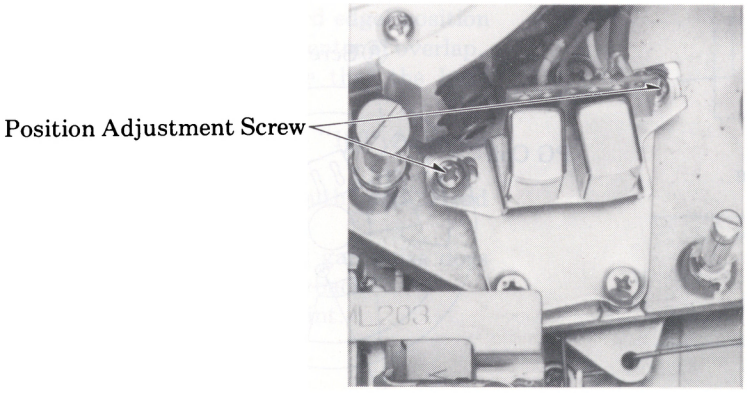


Fig. 98

PLAYBACK TRAPEZOID WAVEFORM CONFIRMATION	VFM5000A/5000B VFM5080A	EIA Monoscope	NV-5000 Series

Circuit Board	Servo Control Circuit
Specification	See Below
Check Point	TP209
Equipment	Oscilloscope V=0.5/cm H=1msec/cm

1. Connect an oscilloscope to TP209.
2. Place the unit in Playback mode.
3. Make sure that waveform of TP209 becomes in Fig. 99.

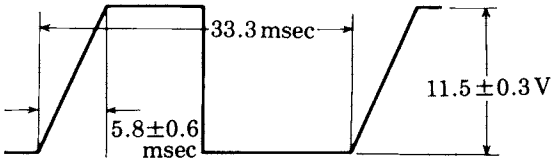


Fig. 99

180° AZIMUTH ADJUSTMENT	VFM5000A/5000B VFM5080A	EIA Monoscope	NV-5000 Series

Check Point	TV Picture
Equipment	TV Monitor
Adjustment Point	Screw (A) (PG Coil)

1. Place the unit in still mode. (Use the reference tape.)
2. Visual inspection on TV monitor.
3. Adjust Ⓐ screw for 2 switching pulse noise (appearing at the head switching position) to be superposed.
   * 2 pulses should be within 1H.

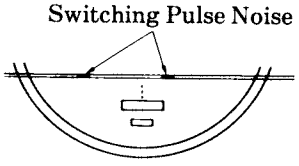


Fig. 100

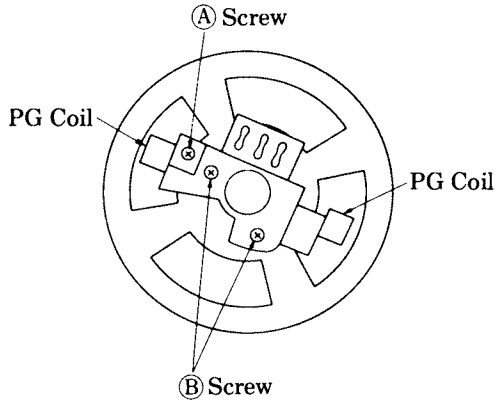


Fig. 101

HEAD SWITCHING GAP NOISE ADJUSTMENT	VFM5000A/5000B VFM5080A	EIA Monoscope	NV-5000 Series

Check Point	TV Picture
Equipment	TV Monitor
Adjustment Point	Screws Ⓑ (PG Coil) (Refer to "180° Azimuth Adj.)

1. Place the unit in playback mode. (Use the reference tape.)
2. Visual inspection on TV monitor.
3. Adjust 2 screws of Ⓑ.

* Moving to right and left, adjust the PG coil base to where no head switching gap noise appears.
ing gap noise appears.
* After setting, lock the screw of Ⓐ and Ⓑ with paint.
* After adjusting the head switching gap noise, confirm the 180° azimuth.
If not satisfied, make the adjustment again.

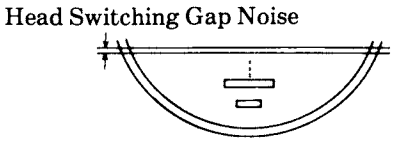


Fig. 102

Circuit Board	Servo Control Circuit
Check Point	TP208/TP301
Equipment	Oscilloscope Ch1 0.002 V/cm 5 msec→50 μsec Ch2 0.5 V/cm 5 msec→50 μsec CHOP Mode (from NORMAL to DELAY)
Adjustment Point	Screws Ⓑ (Refer to 180° Azimuth Adj.)

1. Unsolder CP201.
2. Connect an oscilloscope probes to TP208 and TP301 and ground.
3. Make observations of both waveforms at CHOP mode.
4. Change the Delay time into 50 μsec, move the PG coil base so that upward edge (downward edge) position of the switching pulse comes to the center of overlap.
5. Solder CP201 and then make sure that the head switching gap does not appear.
6. After this adjustment, reaffirm the "180° Azimuth Adjustment".
If no good, readjust the "180° Azimuth" and "Head Switching Gap".
7. Make sure that the head switching gap noise does not appear on self-recording and playback.
8. After adjustment, hold screws by paint.

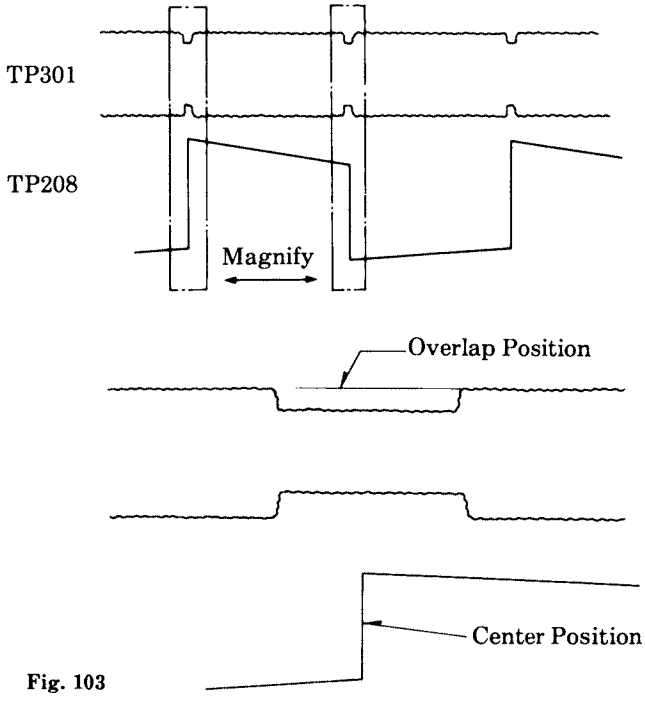


Fig. 103

VIDEO OUTPUT VOLTAGE CONFIRMATION AND ADJUSTMENT	VFM5010A/5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (2) Circuit
Check Point	TP306
Adjustment Point	R364
Equipment	Oscilloscope V = 0.05 V/cm, H = 10 μsec/cm

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to B/W.
3. Connect an oscilloscope to TP306.
4. Adjust R346 so that the waveform becomes in Fig. 104. (Standard; 2.0 ± 0.2 Vp-p)

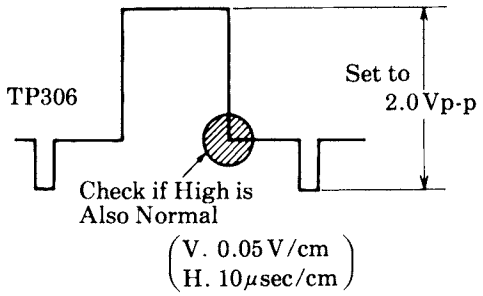


Fig. 104

PLAYBACK ACC LEVEL CONFIRMATION AND ADJUSTMENT	VFM5010A/5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (1)
ACC Level	1.0 ± 0.1 Vp-p
Check Point	TP8202
Equipment	Oscilloscope 0.02 V/cm, 10 μsec/cm
Adjustment Point	R8211

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color.
3. Connect an oscilloscope to TP8202.
4. Adjust R8211 so that waveform becomes in Fig. 105.

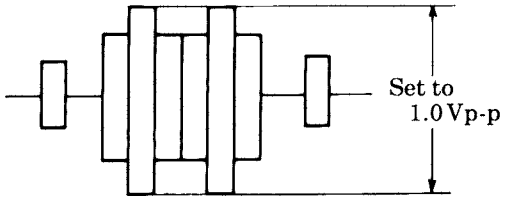


Fig. 105

APC FREQUENCY ADJUSTMENT	VFM5010A/5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (1) Circuit
APC Frequency	$f_1 - f_2 \geqq 9$ KHz allowable up to $f_0 \pm 0.5$ kHz
Check Point	TP8203, TP8204
Equipment	Frequency Counter 4.7KΩ Resistor 0.01μF Capacitor
Adjustment Point	L8205/R6209

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color.
3. Set the Color lock R6209 (mounted on the chassis) to center.
4. Adjust L8205 so that the hue of monitor picture becomes normal.
5. Turn L8205 clockwise (as seen from the pattern side) slowly, and set it immediately before the hue becomes unstable.
6. Connect TP8203 to the ground through 0.1μF myler capacitor.
7. Connect the frequency counter to TP8204 as shown in Fig. 106.
8. Read frequency f_1 kHz, and remove it after measurement.
9. Disconnect 0.1μF myler capacitor from TP8203.
10. Slowly turn L8205 counterclockwise (as seen from the pattern side) and set it immediately before the hue becomes unstable.
11. Same as 7, and 8.
12. Read frequency f_2 kHz.
13. In the condition of 12, adjust L8203 so that f_0 comes in between f_1 and f_2.
    $f_0 = f_1 + f_2/2$ (kHz)

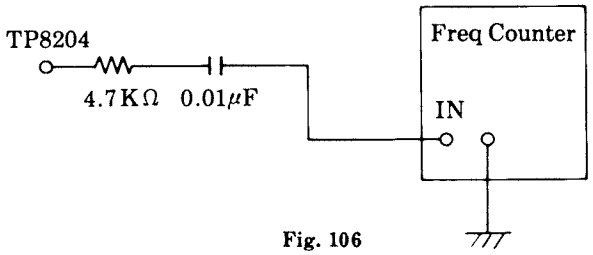


Fig. 106

CHROMA OUTPUT LEVEL ADJUSTMENT	VFM5010A/5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (1) & (2)
Output Level	0.55±0.05 Vp-p
Check Point	TP306 (Video P.B (2))
Equipment	Oscilloscope V=0.01V/cm, H=10μsec/cm
Adjustment Point	R8231

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color.
3. Connect an oscilloscope to TP306.
4. Adjust R8231 so that the waveform becomes in Fig. 107.

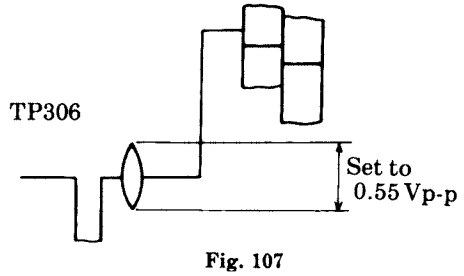


Fig. 107

FLICKER ADJUSTMENT	VFM5070A/5080A	Color Bar	NV-5000 Series

Circuit Board	Head Amp. Circuit, Video Rec. Circuit (NV-5120/5125)
Check Point	TP8201 (Video P.B (1))
Equipment	Oscilloscope V=0.01 V/cm, H=5 msec/cm
Adjustment Point	R538 (Head Amp), R888 (Video Rec)

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color mode.
3. Connect an oscilloscope probe to TP8201 and ground.
4. Adjust the tracking control so that the waveform (envelope) becomes maximum.
5. Then, adjust R538 or R888 so that the amplitude of waveform becomes equal on every field.

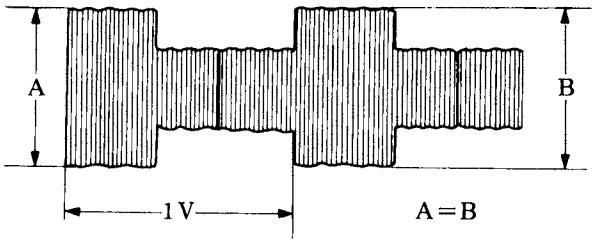


Fig. 108

APC FREQUENCY CHARACTERISTIC ADJUSTMENT	VFM5010A VFM5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (1)
Check Point	Visual Inspection
Equipment	Monitor TV
Adjustment Point	R8262

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color mode.
3. Adjust R8262 so that horizontal noise on the playback picture becomes minimum.
4. If the variation of noise is little, set to center position.

APC FREQUENCY CHARACTERISTIC ADJUSTMENT ON STILL MODE	VFM5010A VFM5080A	Color Bar	NV-5000 Series

Circuit Board	Video P.B (1) Circuit
Frequency	$f_0 = (f_1 - 14)$ kHz
Check Point	TP8204
Adjustment Point	R8287
Equipment	Frequency Counter

1. Place the unit in playback mode (use the reference tape).
2. Set the color/B/W selector switch to color mode.
3. Connect TP8203 to the ground through 0.1μF myler capacitor.
4. Connect the frequency counter to TP8204 as shown in Fig. 109.
5. Read this frequency in play mode.....f_1 kHz.
6. At the same condition, adjust R8287 so that frequency is 14 kHz down than f_1 kHz.
7. After adjustment, remove capacitor and resistor from TP8203/TP8204.

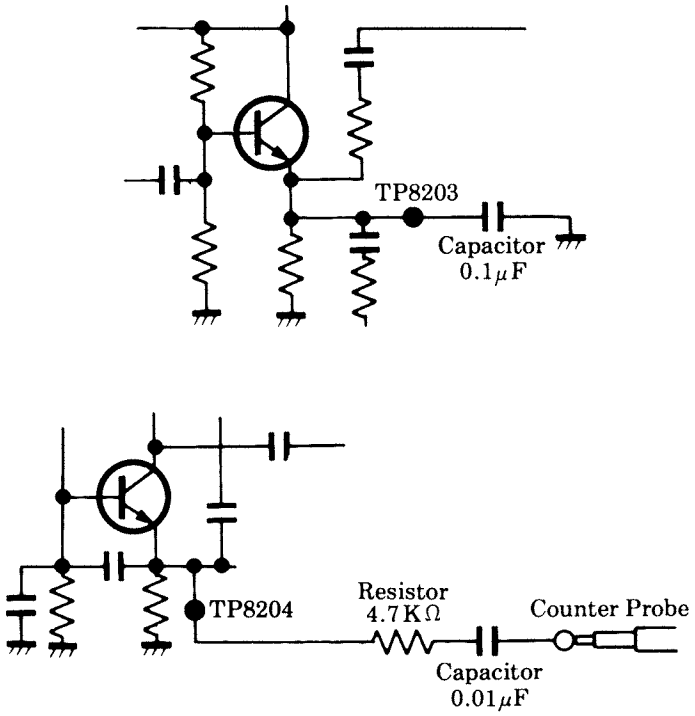


Fig. 109

TEST PATTERN DEFINITIONS

1. **Switching Noise**

   Approximately 3—5 lines above blanking are the switching lines. This line should be maximum of 3 lines including noise. (Typically 1-2 lines)

2. **Beat**

   RF interference and distortions occuring between the extreme contrasts or shades. Although inherent in most VTRs, the pattern should be minimized for optimum quality. Part A normally does not exhibit extremes noted in pattern.

3. **Line by Line Horizontal Jitter**

   Severe horizontal displacement of high contrast areas.
   Experience has shown that is due to poor head to tape contact.
   Adjust tape guides according to location on monitor.

4. **Rolling**

   Low frequency horizontal displacements.

5. **Cogging**

   Servere horizontal movement usually only experienced during production testing.

6. **Flickering**

   Vertical instability usually occurring at top and bottom of raster resulting from field A field B misalignment.

7. **Streaking**

   Contrast smear usually associated with video amplifier response characteristics.

8. **Ringing**

   High frequency patterns usually associated with over peaking of video amplifier.

9. **Slip-ring Noise**

   Similar to item (13) except distribution pattern is more dense. Clean video slip ring to minimize or eliminate entirely.

10. **Jitter**

    High frequency horizontal movement usually associated with tape transport or control problems.

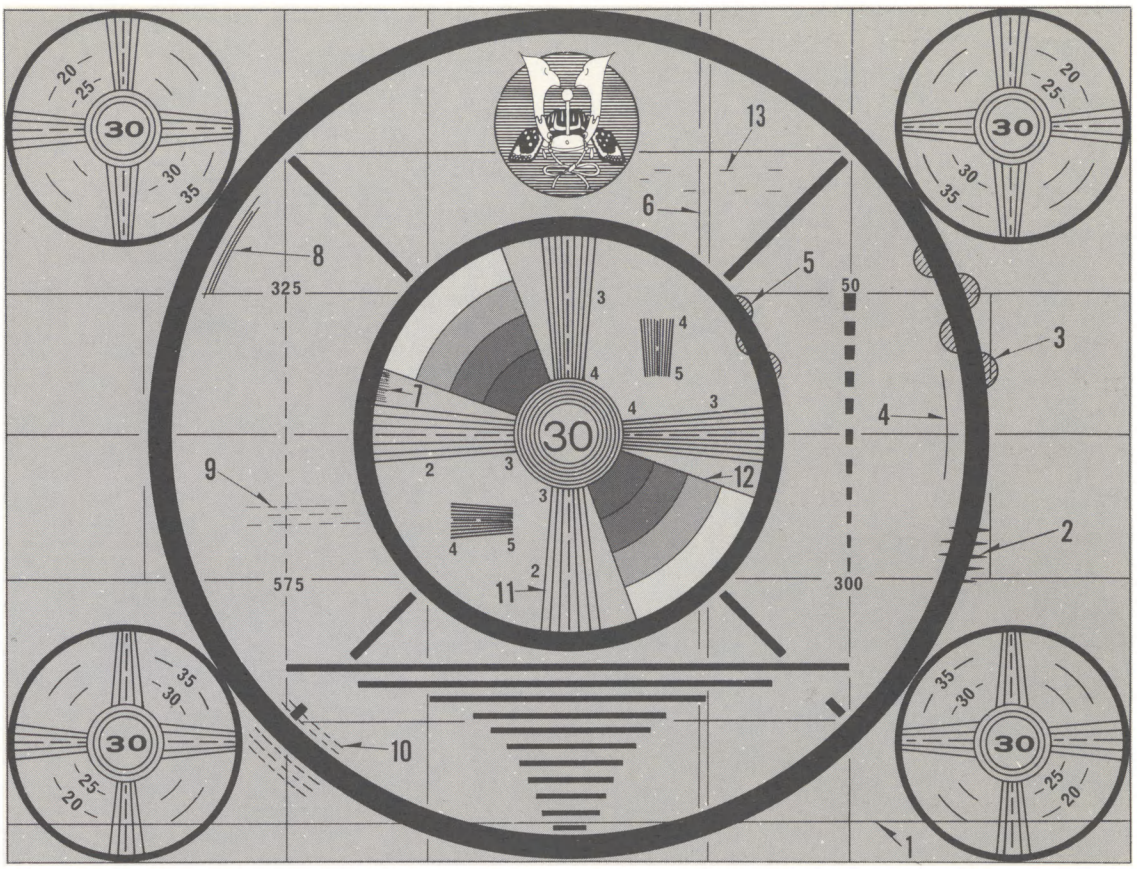
11. **Resolution (More than 270 lines)**

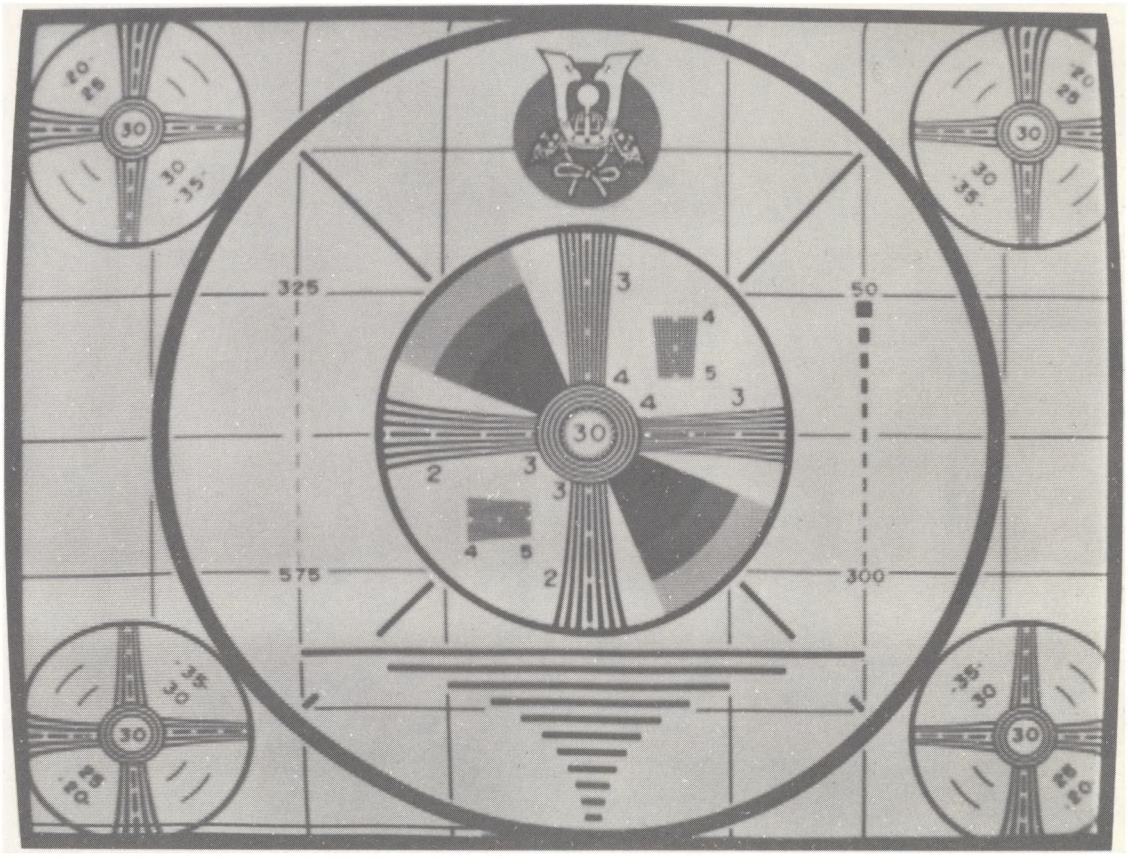
12. **Contrast Check**

13. **Noise Specs Random**

    Colored flecks of noise appearing in small areas throughout full raster usually caused by slip-ring noise. Clean slip-ring for elimination of noise.

TEST PATTERN





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