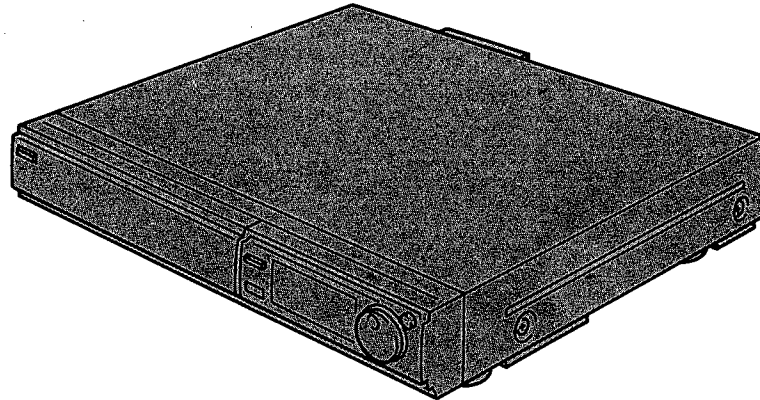


Service Manual

Operating Instructions
Disassembly Method
Maintenance
Mechanical Adjustment
Electrical Adjustment
Block Diagrams
Schematic Diagrams
Circuit Board Diagrams
Exploded Views
Replacement Parts List

Panasonic **SVHS** **Hi-Fi**
Professional/Industrial Video

Video Cassette Recorder
AG-1970P



SPECIFICATIONS

ITEM	SPECIFICATION	ITEM	SPECIFICATION
Power	Source: AC 120V, 50~60Hz Consumption: Approx. 42 watts	Audio	Head: Normal Audio/Control: 1 stationary head Hi-Fi Audio: 2 rotary heads; 26 μ m \times 2 Erase: 1 full track erase 1 Audio track erase
Television Format	EIA standard (525 lines, 60 fields) NTSC color signal TV Tuners: VHF: CH2-CH13, CHA-5~CHA-1, CHA~CHW, CHAA~CHFFF, CH5A UHF: CH14~CH69, CH66~CH94 75 Ω terminated		Track: 4 tracks (Normal: 1 track, Hi-Fi: 2 tracks)
Tape Speed	SP; 1-5/16 i.p.s. (33.35 mm/s) SLP; 7/16 i.p.s. (11.12 mm/s)		Input level: LINE IN (PHONO) \times 4; -10dBV, 47 Ω unbalanced MIC IN (M3); -30dBV
Tape Format	VHS tape, SVHS tape		Output level: LINE OUT (PHONO) \times 4; -8dBV, 1 k Ω unbalanced HEADPHONES (M3); -30dBV, 8 Ω
FF/REW Time	Approx. 2-1/2min. with NV-T120		Frequency Response: 60Hz~12kHz (NORMAL/SP) 20Hz~20kHz (Hi-Fi)
Video	Head: 4 rotary heads, 2 head-helical scanning system 49 μ m (SP) \times 2, 26 μ m (SLP) \times 2 1 flying (rotary) erase head 115 μ m		Hi-Fi Dynamic Range: more than 90dB (Hi-Fi)
	Luminance: FM azimuth recording	Signal-to Noise Ratio: better than 40dB (NORMAL), 65dB (Hi-Fi)	
	Color signal: Converted subcarrier phase shift recording	RF Output	
	Input level: LINE IN (Front: PHONO), (Rear: BNC); 1.0Vp-p, 75 Ω unbalanced S-VIDEO IN (4P) \times 2; Y; 1.0Vp-p, 75 Ω unbalanced C; 0.286Vp-p, burst level 75 Ω unbalanced	Operating Condition	
	Output level: LINE OUT (BNC) \times 2; 1.0Vp-p, 75 Ω unbalanced S-VIDEO OUT (4P); Y; 1.0Vp-p, 75 Ω unbalanced C; 0.286Vp-p, burst level 75 Ω unbalanced	Dimensions	
	Signal-to-Noise Ratio: Video more than 43dB (VHS/SP), 44dB (S-VHS/SP)	Weight	
Horizontal Resolution: Color more than 400 lines (VHS/SP), 230 lines (S-VHS/SP)	Accessories	1 pc. Infrared Remote Controller 1 pc. Coaxial Cable 1 pc. Stereo Type Phone Cable 1 pc. AC Power Cord 1 pc. S-Video Cable 2 psc. "AA" size Batteries	

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

INTRODUCTION

*This Service Manual contains all the technical information which will allow service personnel to understand and service this Panasonic **S-VHS** video cassette recorder model AG-1970P.*

By the use of the S-VHS system and the introduction of high reliability mechanisms, a sharp picture quality with high resolution is obtained.

Added to the basic VHS format, these features make the AG-1970P an ideal unit for business, education, entertainment, sales and training applications.

Just slightly ahead of our time...Panasonic

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SAFETY PRECAUTIONS

GENERAL GUIDELINES

1. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
2. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
3. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohm meter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1M ohm and 5.2M ohm. When the exposed metal does not have a return path to the chassis, the reading must be ∞ .

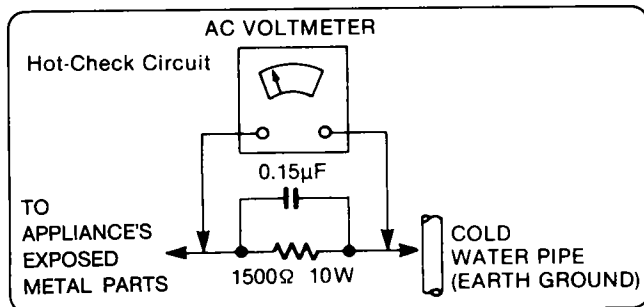


Figure 1

LEAKAGE CURRENT HOT CHECK (See Figure 1)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5k ohm, 10 watts resistor, in parallel with a 0.15uF capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in Figure 1.
3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 volts RMS. A leakage current tester (Simpson Model 229 equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 milliamp. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

ELECTROSTATICALLY SENSITIVE(ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION : Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

SECTION 1 GENERAL DESCRIPTIONS

1-1. TECHNICAL INFORMATION

INITIALIZATION OF CHANNEL MEMORY IC (IC7503/M6M80021P)

When replace the channel memory IC (IC7503/M6M80021P), the memory IC should be initialized to keep formal specification.

<<Note>>

1. It should be performed before tuner preset.
2. During initialization or after initialization within 1 second, do not stop the power source. (Do not disconnect AC cord)
3. Meaning of "INITIALIZATION" is to erase the "SKIP CH". In another to say the number of POSITION CH and DISPLAY CH to be same.

<<Method>>

1. Press the CH UP/DOWN Button so that the Channel indicator "--".
2. Connect the Diode (MA165) to Pin 54 of IC7501 for Anode, Pin 35 of IC7501 for Cathode twice.
3. Channel indication disappears, and approximately 3 seconds later Channel indicator indicates "2".

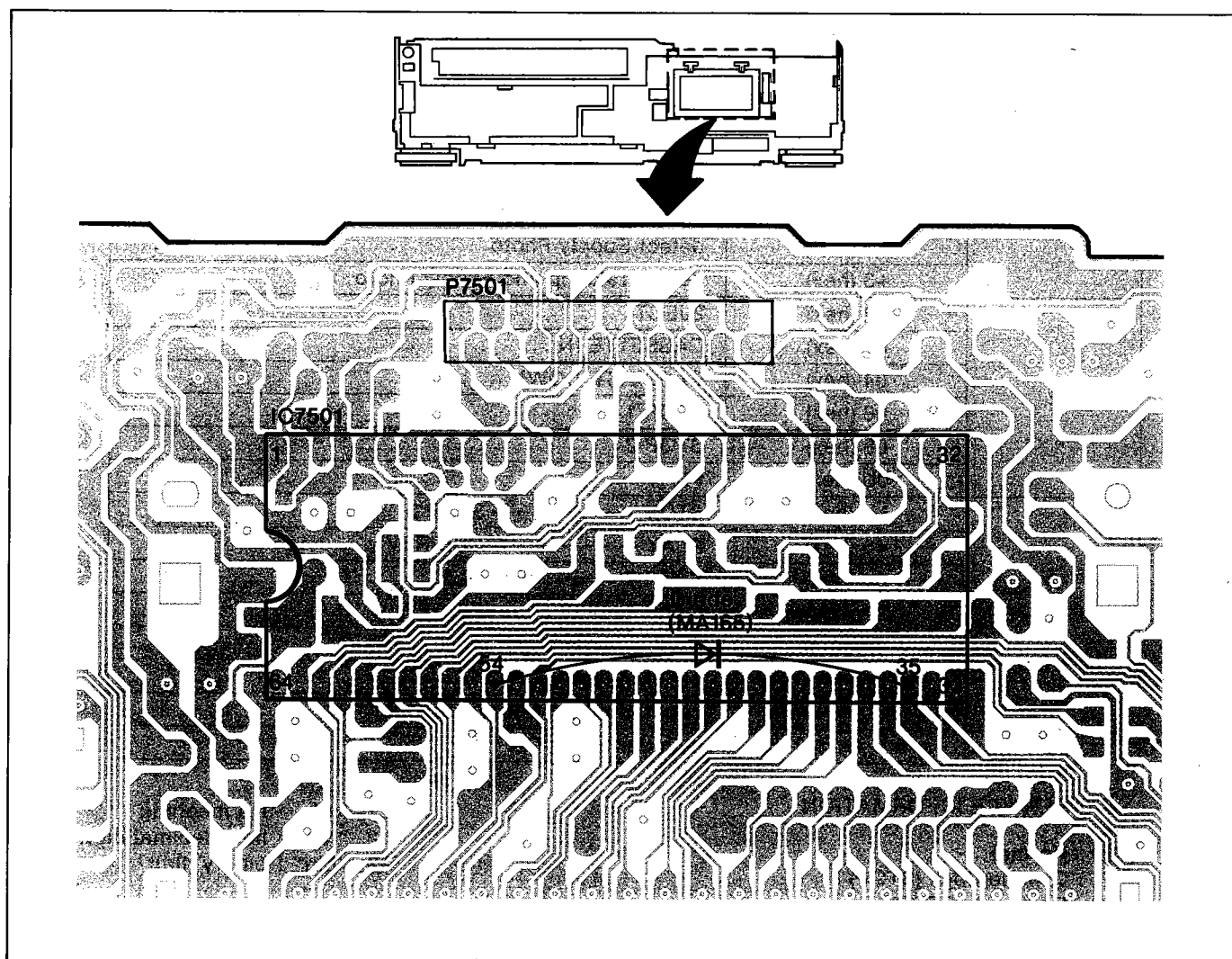


Figure T1

SERVICE NOTE

When repairing without the top panel unit, Tape Select Switch must be set to the T120 position to prevent the malfunction of the Take-Up Photo Sensor.

SERVICE INFORMATION DISPLAY

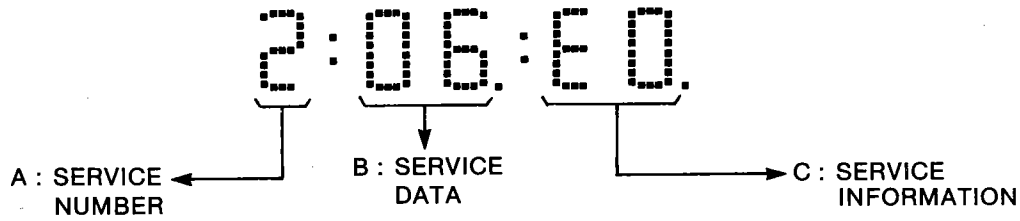
This unit can be confirmed the mode information which is detected by microprocessor IC6001 via multi function display.

<<Method>>

1. Press "EJECT", "FF" and "REW" keys at the same time.
2. The counter of multi function display indicates microprocessor data approximately 1 minutes as shown in FigureT2.

<<Note>>

1. This mode can be entered even when Power off.
2. Also it can be displayed the data when connect jumper wire between TP6001 and TPGND. In this case the data is indicated still open the TPSErv. (Press "EJECT", "FF" and "REW" keys at the same time, increment service number)



A: SERVICE NUMBER	B: SERVICE DATA	
1	*0 (hex)	can not detect Take-up and Supply Photo
	*9 (hex)	detect Take-up Photo
	*U (hex)	detect Supply Photo
	*3 (hex)	detect Take-up and Supply Photo
2	02 (hex)	EJECT
	03 (hex)	CASSETTE IN
	04 (hex)	CASSETTE DOWN
	06 (hex)	STOP 1
	08 (hex)	STOP 2
	0U (hex)	PLAY
3	L* (hex)	STOP 1 → STOP 2
	4* (hex)	PLAY → CUE/REV
	3* (hex)	STOP 2 → PLAY
	2* (hex)	STOP 1 → FF/REW
	1* (hex)	During Unloading
5	1*** **** (bin)	capstan motor ON
	**** 1*** (bin)	capstan motor reverse direction
6	***1 **** (bin)	cylinder motor ON

C : SERVICE INFORMATION

- E0 : Normal
- E1 : Cylinder lock (STOP)
- E2 : Reel lock (STOP)
- E3 : Rev Motor lock
- E4 : Mechanism lock during unloading
- E5 : Mechanism lock during mode transfer to FF or REW
- E6 : Mechanism lock during front unloading (Cassette out)
- E9 : Serial data (IC6001 – IC7501) can not be transmitted.

Note:

1. "*" : No meaning
2. "hex" : hexadecimal digit
3. "bin" : binary digit

ex.

bin	hex
0000	0
0001	1
⋮	⋮
1010	U
1110	L

Figure T2

Precautions

Please read these precautions before you operate this VCR.

Cassette Compartment Door

When first unpacking the VCR, the cassette compartment door may be open partially. This is due to a safety device designed to protect the VCR from vibration during shipment; it is not a malfunction. After the AC Power Cord is connected to an AC outlet, the door returns to its original position.

Avoid Sudden Temperature Changes

If the VCR is suddenly moved from a cold to a warm place, moisture may form on the tape and inside the VCR. In such a case the Dew Indicator " " will flash on and off and the VCR will not operate.

Humidity and Dust

Avoid places with high humidity or a lot of dust. These can damage internal parts.

Avoid Covering Ventilation Holes

The ventilation holes prevent abnormal increased temperature in the VCR. Do not block or cover these holes. Especially avoid covering the holes with soft materials such as cloth or paper.

Keep away from High Temperature

Keep the VCR away from extreme direct heat such as direct sunlight, radiators, or in closed automobiles.

Keep Magnets away

Never bring a magnet or magnetized object near the VCR because it will adversely affect the performance of the VCR.

No Fingers or Other Objects Inside

Touching internal parts of the VCR is dangerous, and may cause serious VCR damage. Do not attempt to disassemble the VCR. There are no user-serviceable parts inside.

Keep Away from Water

Keep the VCR away from flower vases, tubs, sinks, etc. CAUTION: If liquids are spilled into the VCR, serious damage may occur. If you spill any liquid into the VCR, immediately disconnect the AC Power Cord and consult qualified service personnel.

Lightning

To avoid damage by lightning, disconnect the antenna plug from the VCR.

Keep VCR Clean

Wipe the VCR with a clean, dry cloth. Never use cleaning fluid, or other chemicals. Do not use compressed air to remove dust.

Stacking

Place the VCR in a horizontal position and do not place anything heavy on it.

Video Head Clogging

The video heads place picture signals on the tape during recording, and read picture signals from the tape during playback. Therefore they are of critical importance for the picture quality. To ensure that they can always provide optimum picture quality, this VCR is equipped with an Auto Head Cleaning Function that removes tape particles and dust from the video heads. However, if the VCR is used over extremely long periods of time, these heads may still become dirty and clogged. In such a case, the signals can no longer be recorded correctly, and the playback picture will be distorted accordingly. This is the case, for example, if during playback sound is reproduced normally, but no picture is seen, or the picture is greatly distorted. When such symptoms occur consult your dealer for further advice.

If Dew Condensation Forms in the VCR

Condensation may form in the VCR if:

- The VCR is in a room where the heater has just been turned on.
- The VCR is in a room with steam or high humidity.
- The VCR is brought from cold surroundings into a well-heated room.
- The VCR is suddenly brought from cool surroundings, such as an air-conditioned room or car, to a hot and humid place.

When dew forms in the VCR:

The Dew Indicator " " on the VCR Display will flash on and off all the function buttons are made non-operational to protect the tape and the video heads. When the Dew Indicator flashes, wait until this indicator disappears. If dew condensation forms inside the VCR while the power is off, it will turn on automatically and the Dew Indicator will flash on and off. As soon as the dew condensation has been dissolved, the VCR will turn itself off again.

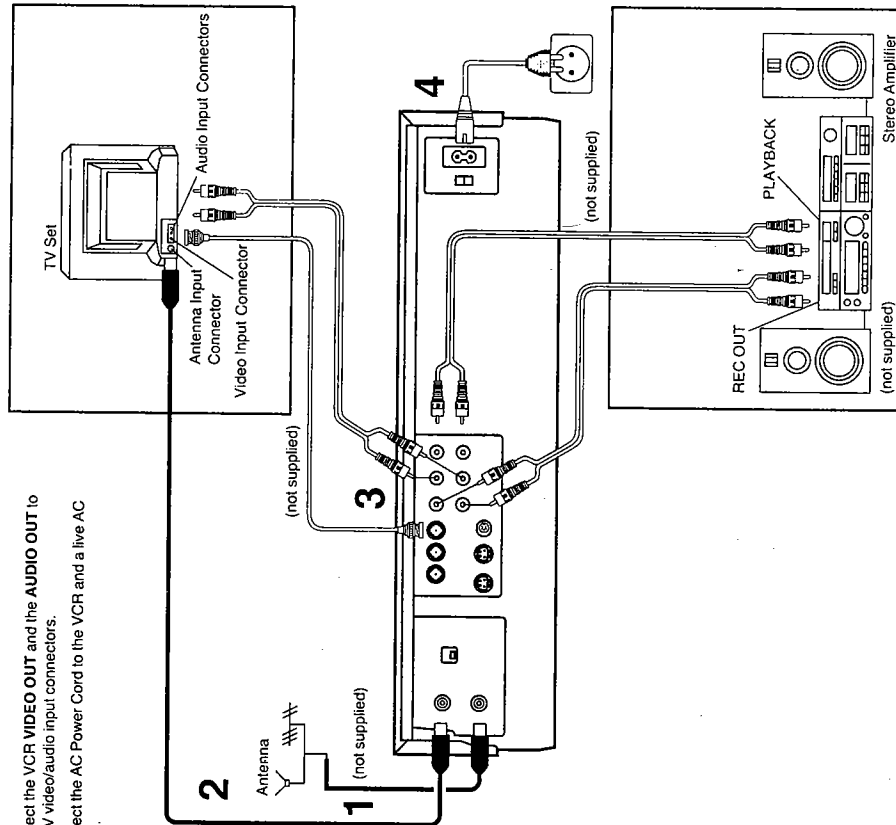
Connections

The following connections are required to operate the VCR for recording and playback through a TV set.

Procedure of connection to TV without S-Video Input

- 1 Unplug VHF/UHF antenna plug from the TV antenna input connector and plug it into the VCR VHF/UHF IN.
- 2 Connect the VCR VHF/UHF OUT to the TV antenna input connector with the Coaxial Cable supplied with the VCR.
- 3 Connect the VCR VIDEO OUT and the AUDIO OUT to the TV video/audio input connectors.
- 4 Connect the AC Power Cord to the VCR and a live AC outlet.

• Connection to a TV Set without an S-Video Input



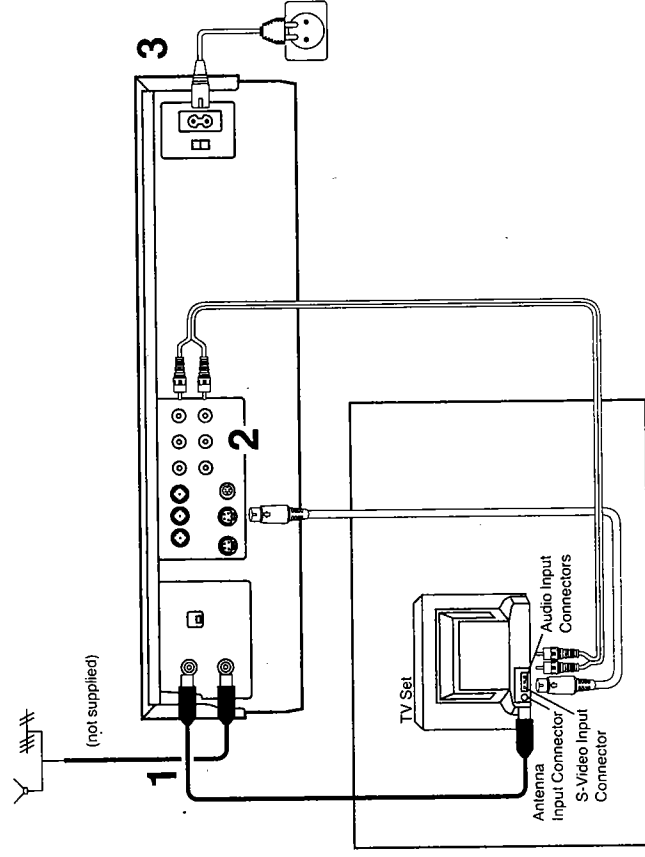
• Connection to a Stereo Amplifier

Procedure of connection to TV having S-Video Input

- 1 Execute steps 1 and 2 on page 5.
- 2 Connect the VCR S-VIDEO OUT and the AUDIO OUT to the TV S-Video and audio input connectors.
- 3 Connect the AC Power Cord to VCR and live AC outlet.

The S-VHS format used in this VCR enables you to obtain high resolution and high picture quality when high performance S-VHS video cassette tapes are used. The conventional VCR video connectors output and input signals which are composed of the luminance signal (Y) and color signal (C) which are then recorded on the video tape. The new S (Separate)-Video Connector allows separate transmission of signals in order to obtain clearer pictures.

The connection with the S-Video Cable can also be used for playback of a tape that was recorded in the conventional VHS system. The "S" in the "S-Video Connector" stands for "SEPARATED Y/C", not for "S-VHS".

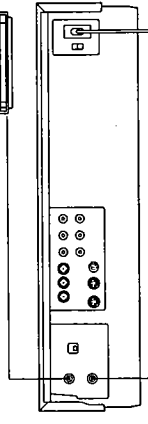


•Connection to a TV Set with S-Video Jack

Cable Connection

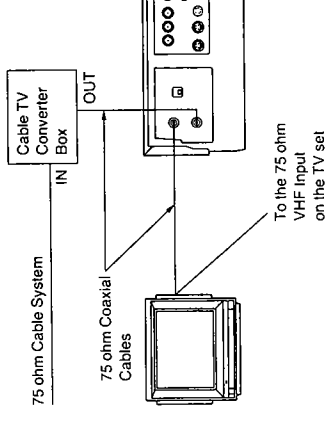
Cable-VCR-TV (For CATV/PAY Channels Recording/Playback)
 The VCR has an extended range, and can tune the Low-Band, Mid-Band, Super-Band, Hyper-Band, Ultra-Band and Special cable channels (Channels A-W, AA-FFF, A-5-A-1, 66-94, 5A). Also, the VCR can tune to any of the 56 UHF channels (1-4-69). Refer to Storing TV Channels on your VCR on page 10.

BASIC Hook-Up
 Since the VCR can tune Mid and Super Bands, this connection will provide with the reception of all cable channels except those which are intentionally scrambled.

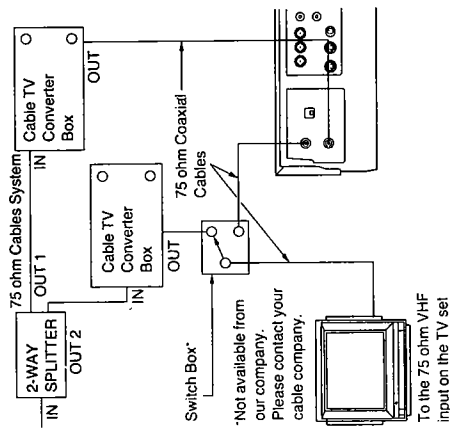


75 ohm coaxial cable Channels 2-13 and 5A, A-5-A-1, A-W, AA-FFF, 66-94 However, if you subscribe to a special channel which is scrambled—you will probably have a descrambler box for proper reception. The VCR by itself cannot properly receive a scrambled program since it does not contain a descrambler. In order for the VCR to properly receive a scrambled program, your existing descrambler must be used. There are two commonly used methods of connection in this case.

Typical Cable System Hook Ups with Cable Converter/Descrambler Boxes



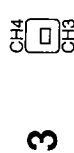
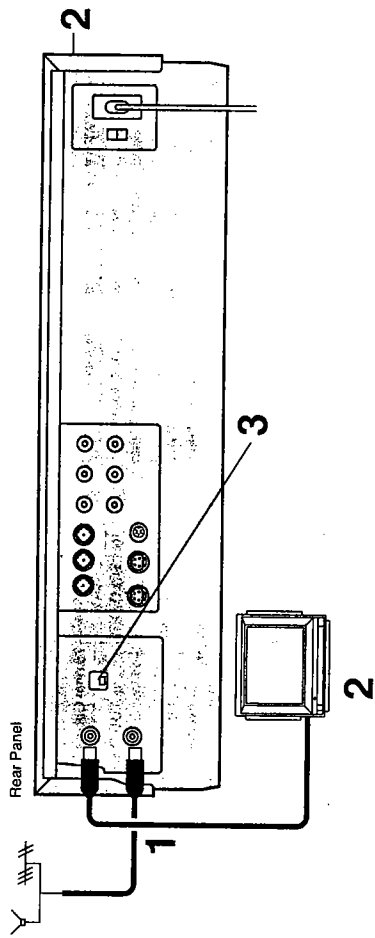
The above cable hook-up allows VCR-TV functions except for viewing one channel while recording another.



The above cable hook-up allows VCR functions, including viewing one channel while recording another, but it requires two cable TV Converter Boxes, one Switch Box and one 2-Way Splitter.

Since the VCR has an extended range of tuning, tuning-programming of non-scrambled Mid-Band and Super-Band TV programs is possible. When a cable converter or descrambler box is connected to the VCR, all timer-controlled recording functions will continue to operate with the exception of changing channels automatically. CATV Channel selection will have to be performed with the cable converter. Timer-controlled recording from CATV Channels is therefore limited to one channel at any given time.

Tuning the TV into your VCR



After connecting your VCR to a TV set, you are ready to set the RF converter. This will allow you to view tapes in playback and to use your TV as a monitor. Your VCR contains an RF converter which translates the video and audio signals in the VCR to a standard broadcast signal that your TV can receive. The RF converter can transmit this signal on channel 3 or 4. To prevent any interference it is advisable that you select the channel that is not normally broadcast in your area.

Tuning procedure

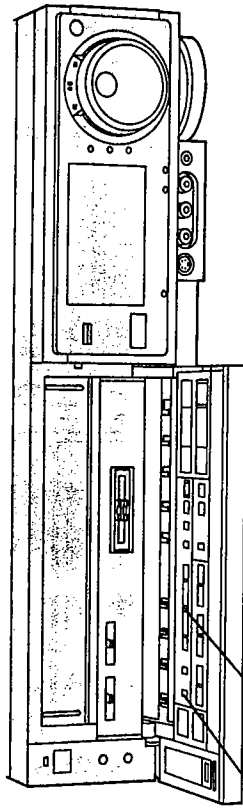
- 1 Refer to pages 5 and 6 confirm that the VCR and TV have been connected correctly.
- 2 Turn on the VCR and TV.
- 3 Set RF Converter Channel Selector (on the rear panel) to "CH3" or "CH4", whichever is not normally broadcast or the least viewed. This is to select a channel for video playback.

Channel Reception Check

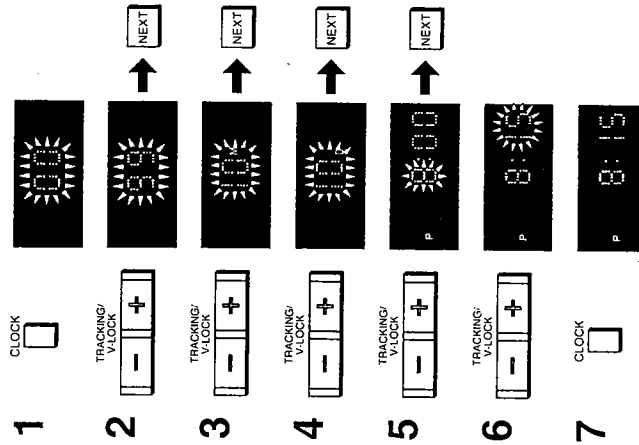
- 1 Set channel 3 or 4 on your TV (selected in step 3) in order to check a proper broadcast reception.
- 2 Press VCR/TV (on the front panel) to "VCR" to select the "VCR" operation mode.
 - The "VCR" indicator appears on the VCR Display.
- 3 Select channels on the VCR that you would normally receive clearly in your area to check proper reception.

Tuning the TV into your VCR Setting the Clock of the VCR

Setting the Clock of the VCR



1, 7 2~6



The built-in digital clock employs the 12-hour system.

Preparation

Turn the VCR on.

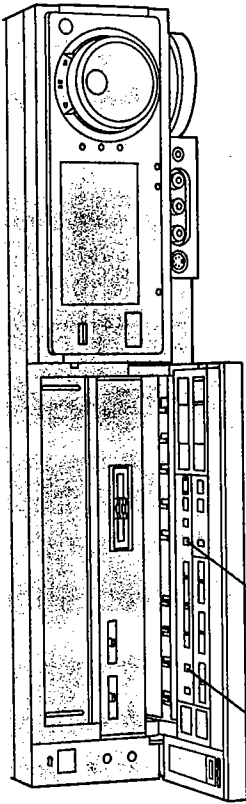
Setting procedure

- 1 Press **CLOCK** to start Clock Setting.
- 2 Press **TRACKING/V-LOCK** "-" or "+" to set the **YEAR**, then press **NEXT**.
- 3 Press **TRACKING/V-LOCK** "-" or "+" to set the **MONTH**, then press **NEXT**.
- 4 Press **TRACKING/V-LOCK** "-" or "+" to set the **DAY**, then press **NEXT**.
- 5 Press **TRACKING/V-LOCK** "-" or "+" to set the **HOURL**, then press **NEXT**.
- 6 Press **TRACKING/V-LOCK** "-" or "+" to set the **MINUTE**.
- 7 Press **CLOCK** to finish the setting.

Note:

In case of a power failure, the back-up system retains the present time memory for about 60 minutes.

Storing TV Channels on your VCR



Storing TV Channels on your VCR

Fine Tuning Procedure

- 1 Press **PRESET/FINE/NORMAL** twice.
- 2 Press **TRACKING/V-LOCK** "+" or "-" to correct tuning.
 - "A" indicator does not appear.
 - To return the tuning to its former state, press **ANT SELECT**.
- 3 Press **PRESET/FINE/NORMAL**.

Blanking of unoccupied program positions

- 1 Press **PRESET/FINE/NORMAL**.
- 2 Press **✓** or **∧** (channel button) to select the program position that is not to be occupied with a TV station.
- 3 Press **ADD/DELETE**. ("—") appears on the Program Position Display.
 - Repeat steps 2 and 3 for all program positions which are not occupied by a TV station. Afterwards, these program positions can no longer be called up.
 - To cancel the blanked program position, select the corresponding program position on VCR and then press **ADD/DELETE**.
- 4 Press **PRESET/FINE/NORMAL** twice.

1



2



TV mode



CATV NORMAL mode



CATV HRC mode



CATV IRC mode



PX mode



3



Introduction

The VCR is fitted with its own tuner (just like a normal TV set) and can be preset to receive up to 155 TV broadcast stations.

Preparations

- Turn the TV on.
- Select Channel 3 or 4 on the TV for video playback.
- Set the VCR/TV to "VCR".

Direct Tuning

Your VCR is preset at factory. This means that all channels can be received at the program positions shown in the chart on the next page. This is achieved by selecting the desired Tuning mode.

- Blanking unwanted channels so that they will be skipped during the channel selection will allow you to find your desired channel quickly. Refer to the next page how to blank program positions.

Selecting the Tuning Mode

This VCR can select from among 5 tuning modes: TV, CATV, CATV H, CATV I and PX.

- 1 Press **PRESET/FINE/NORMAL**.
- 2 The tuning mode can be changed by pressing **ANT SELECT**.
- 3 Press **PRESET/FINE/NORMAL** twice to select the VCR normal operation mode.

CHANNEL CHART

- TV mode

CHANNEL DESIGNATIONS	CHANNEL RECEIVED OFF THE AIR	CHANNEL SELECTION & INDICATION ON VCR
VHF	2-13	2-13
UHF	14-69	14-69

- CATV modes (NOR, HRC, IRC)

CHANNEL DESIGNATIONS	CATV CHANNEL RECEIVED FROM CABLE	CHANNEL SELECTION & INDICATION ON VCR
BROADCAST VHF	2-13	2-13
CATV LOW BAND	A-5-A-1	95-99
CATV MID/SUPER BANDS	A-W	14-36
CATV HYPER BAND	AA-FFF	37-65
ULTRA BAND	66-94	66-94
SPECIAL CATV CHANNEL	5A (HRC, IRC only)	1 (HRC, IRC only)

- PX mode (AFN-TV in Europe)

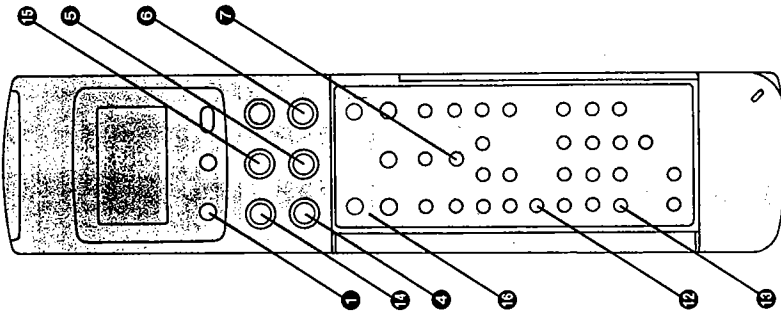
CHANNEL DESIGNATIONS	CHANNEL RECEIVED OFF THE AIR	CHANNEL SELECTION & INDICATION ON VCR
VHF (USA)	2-13	2-13
UHF (CCIR)	E21-E69	21-69

(NV-FS200PX ONLY)

(NV-FS200PX ONLY)

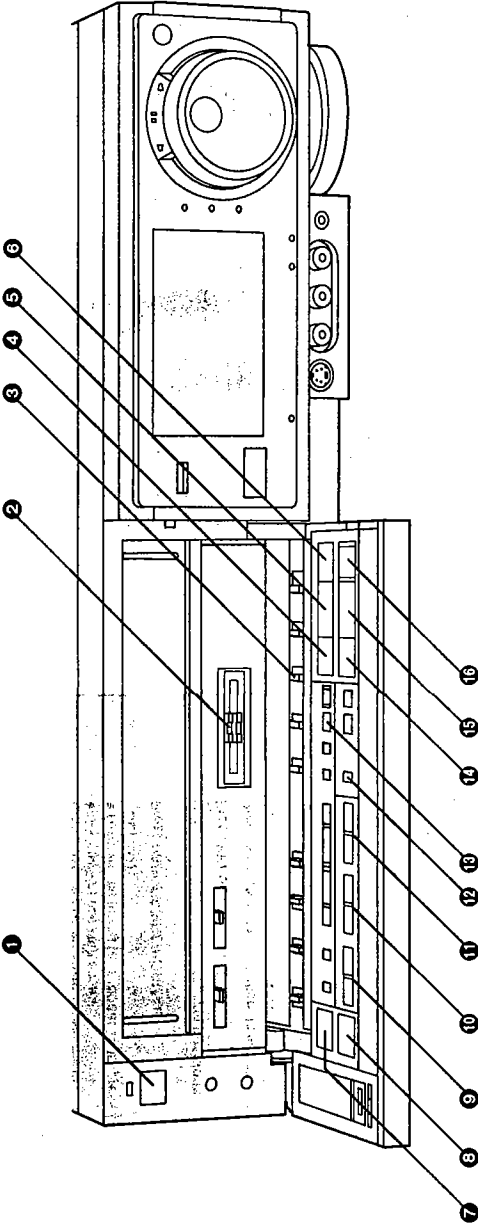
Controls, Indicators and Connectors

Controls, Indicators and Connectors



Basic Controls

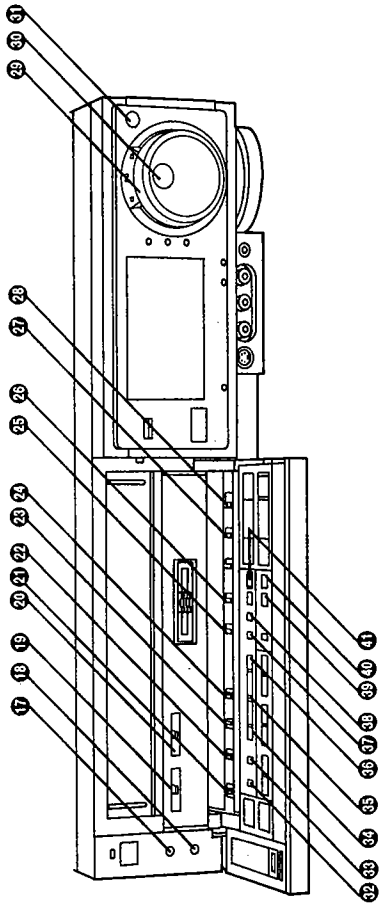
- 1 POWER Button with Indicator**
Turns the VCR on and off.
Inserting a video cassette automatically turns the VCR on.
- 2 HI-FI REC LEVEL Control**
Adjusts the Hi-Fi recording level so that the peak reaches about +4 dB on the Audio Level Meter.
- 3 S-VHS Selector**
Selects the correct tape recording mode.
ON: S-VHS cassettes are recorded in the S-VHS System.
• The S-VHS indicator is lit.
OFF: S-VHS cassettes are recorded in the VHS system.
• The S-VHS indicator is not lit.



- 4 REW Button**
Used to rewind the tape rapidly. "◀◀" appears on the VCR Display.
When this button is held pressed during Normal playback or Rewind operation, the picture is played back at higher speed in reverse direction. (Review Playback)
If you tap this button during Normal Playback, Review Playback remains activated. Press PLAY to resume Normal Playback.
- 5 PLAY Button**
Starts normal playback. "▷" is lit on the VCR Display.
- 6 FF Button**
Used to advance the tape rapidly. "▶▶" appears on the VCR Display.
When this button is held pressed during Normal playback or Fast Forward operation, the picture is played back at higher speed in forward direction. (Cue Playback)
If you tap this button during Normal Playback, Cue Playback remains activated. Press PLAY to resume Normal Playback.

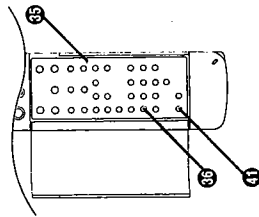
- 7 VCR/TV Button**
Selects "VCR" or "TV" operation mode.
- 8 EJECT Button**
Eject the cassette.
• If this button is pressed to eject a cassette loaded in the VCR when the power is turned off, the VCR is turned on for automatic ejection and, afterwards, turned off.
- 9 Channel V and A Buttons**
Selects the program positions (channels), the VCR can memorize TV stations in 99 program positions.
- 10 OTR ON + and - Buttons**
Used to set the OTR (One-touch Timer Recording) starting time.
- 11 OTR OFF + and - Buttons**
Used to set the OTR ending time.
- 12 AUDIO OUT Button**
Selects the audio track. Each time you press this button, the audio track changes as follows:
Hi-Fi stereo (L and R) → Hi-Fi mono left (L) → Hi-Fi mono right (R) → Normal (Hi-Fi Off) → Hi-Fi Stereo...

- 13 RECORDING SP/SLP Button**
Selects the recording tape speed.
"SP" for normal tape speed gives the best picture quality.
"SLP" for one-third tape speed gives the longest (3 times) normal recording time.
• The VCR selects the correct tape speed during playback.
- 14 PAUSE/STILL Button**
Used to interrupt recording temporarily (Recording Pause).
Pressing this button again resumes recording.
Used to view a still picture during playback "still" again resumes playback.
• The VCR automatically switches to the Stop mode to protect the tape and the video heads if Recording Pause or Still Playback continues for more than 5 minutes.
- 15 STOP Button**
Stops Recording or Playback.
- 16 REC Button**
Starts Recording. ("▷ REC" appears on the VCR Display.)
On the Remote Controller, you must press two buttons simultaneously.

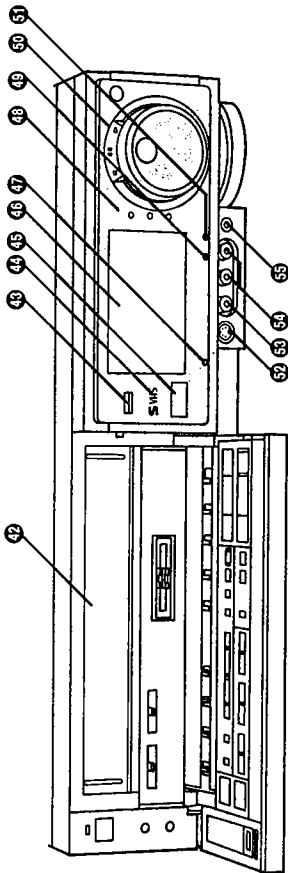


Additional Controls

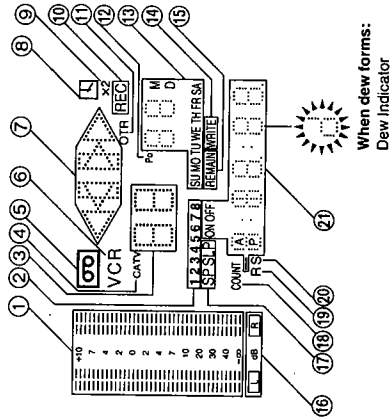
- 17 MIC Jack**
For connecting a microphone. If a microphone is connected, other audio inputs are automatically switched off.
- 18 PHONES Jack**
For connecting stereo headphones.
- 19 PHONES LEVEL Control**
Adjusts the volume of connected stereo headphones.
- 20 PICTURE Control**
Adjusts the picture sharpness during playback.
- 21 NOISE FILTER/EDIT Selector**
OFF: For normal VCR operation.
EDIT: For dubbing. (PICTURE Control is not operative.)
NOISE FILTER ON:
For playback of tapes whose picture quality is inferior, for example, from repeated dubbing.
• This position has no effect on the playback of S-VHS recordings.
- 22 TBC Switch (Time Base Corrector)**
When playing back a tape which is loose or damaged, or when the tape movement is unstable during recording or playback, the playback picture may shake from side to side and be distorted. You can improve the picture quality by setting TBC Switch to "ON". Normally, this switch must be set to "OFF".
• During playback of some pre-recorded tapes, the playback picture may shake vertically. If this occurs, set TBC Switch to "OFF".
• The TBC function works only during normal playback.
- 23 SEARCH SOUND Selector**
OFF: The sound is played back only during normal playback.
ON: The sound can also be heard during Cue playback and Review playback.
• No sound may be heard during playback of SLP recordings if VCR and TV have been connected each other with only coaxial cable.
- 24 HI-FINORMAL MIX Switch**
Audio signal is recorded on both the Hi-Fi and normal audio tracks.
OFF: Normal position for Hi-Fi audio playback.
ON: Both audio tracks are played back simultaneously. (For playback of tapes edited by Insert Editing or Audio Dubbing.)
- 25 INPUT SELECT Switch**
Used to select the corresponding connectors if you wish to perform recording through the external input connectors.
Select the program position "A1" or "A2" on Channel Display with **INPUT SELECT** on the Remote Controller.
S-VIDEO: For recording through the S-VIDEO IN and AUDIO IN.
LINE: For recording through the VIDEO IN and AUDIO IN.
- 26 TAPE SELECT Switch**
Set according to the cassette tape length in order to obtain correct indication of the remaining tape time.
-T120: For cassettes T30, T60, T90, T120
T140-T180: For cassettes T140, T160 and T180.
- 27 MONO Switch**
OFF: For normal recording.
ON: For recording normal sound during a stereo or Audio II broadcast. Select this position if the stereo sound is distorted due to poor reception.
- 28 MTS Switch**
For selecting the audio track to be recorded.
- 29 SHUTTLE Ring**
Used to adjust the playback speed step by step in both forward and reverse directions.
- 30 JOG Dial**
Used to locate any desired frame precisely.
- 31 JOG/SHUTTLE Button**
Switches to JOG and SHUTTLE operation.
• To resume Normal playback, press **PLAY** or this button again.
- 32 CLOCK Button**
For setting the date and time, and memorizing the setting.
- 33 PRESET/FINE/NORMAL Button**
For storing TV stations on the VCR.
- 34 PROG/CHECK Button**
For selecting the program number (up to 8) for limer recording and checking the limer programming.
- 35 TRACKING/V-LOCK + and - Buttons**
• Used to input data for clock setting and timer programming.
• For manual tracking adjustment: minimize color and noise bar distortions which cannot be eliminated by the automatic digital tracking control. After the manual adjustment, simultaneously press **TRACKING/V-LOCK +** and **-** Buttons to return to automatic digital tracking control.
If tapes recorded on another VCR are played back, manual tracking adjustment may be required to reproduce optimum Hi-Fi sound and picture quality.
- 36**
- 37**
- 38**
- 39**
- 40**
- 41**



- For slow tracking adjustment:
Used to minimize the noise bar distortions during Still, Still Advance or Slow playback. Put VCR in Slow playback to make this adjustment.
- For vertical locking adjustment:
Used to minimize vertical jitter during Still playback.
- 36 NEXT Button**
Used to memorize input data and to change to the next display segment. Each time you press this button, the flashing indication on Date Display changes in the order YEAR, MONTH, DAY, HOUR, MINUTE.
- 37 ANT SELECT Button**
Used to select the tuning mode.
- 38 ADD/DELETE Button**
Used to blank unoccupied program positions.
- 39 AUDIO DUB Button**
Used to make Audio Dubbing. (The Audio Dubbing Indicator is lit.)
- 40 INSERT Button**
Used for Insert Editing. (The Insert Editing Indicator is lit.)
- 41 TIMER REC Button**
Used to enter VCR Timer Recording; standby mode. When Timer Recording has been activated ("T") appears on the VCR Display, the VCR cannot be operated manually.
Press this button again to operate the VCR. Pressing this button if no Timer Recording data is programmed or no cassette is inserted, "T" flashes on and off to indicate that Timer Recording cannot be performed.

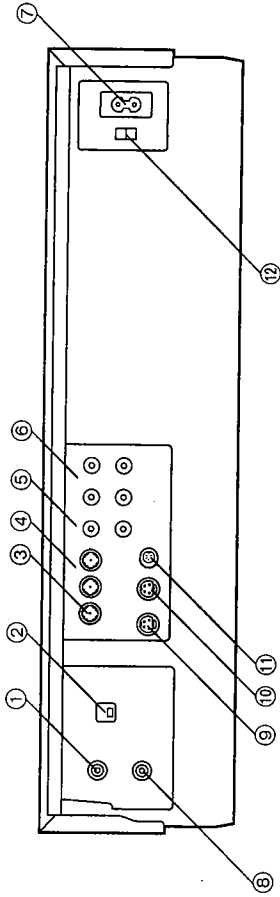


- 12 Cassette Compartment
- 13 PUSH-OPEN
Open the control panel.
- 14 S-VHS Indicator
- 15 Infrared Remote Control Receiver Window
Receives signals from the Remote Controller.
- 16 Multi-Function Display



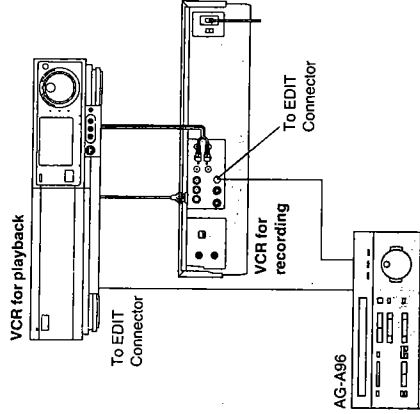
- 1 Audio Level Meter
- 2 Timer Program Number
- 3 Channel Display
- 4 Cable TV Indicator
- 5 Cassette-in Indicator
- 6 VCR Mode Indicator
- 7 Tape Running Indicator
- 8 Timer Recording Indicator
- 9 Double Speed Indicator (NV-FS200PX ONLY)
- 10 Recording Indicator
- 11 OTR Mode Indicator

- 12 Position Indicator
- 13 Date Display
- 14 Write Indicator
- 15 Remaining Tape Time Indicator
- 16 Audio Track Indicators
- 17 Tape Speed Indicator
- 18 Tape Counter Mode Indicator
- 19 Repeat Indicator
- 20 Search Indicator
- 21 Clock/Tape Counter Display
- 22 TBC Indicator
- 23 Reception Indicators of Stereo, Audio II and Mono
Indicates the sound system of a broadcast.
- 24 Audio Dubbing Indicator
- 25 JOG/SHUTTLE Indicator
Lights up if JOG/SHUTTLE Button or SEARCH Button is pressed.
- 26 Insert Editing Indicator
- 27 S-VIDEO IN Connector (AV2)
For connecting the S-video cable of a video camera or another VCR equipped with an S-VIDEO OUT connector.
- 28 VIDEO IN Connector (AV2)
For connecting the video cable of a video camera or another VCR.
- 29 AUDIO IN Connectors (AV2)
For connecting the audio cable(s) of a video camera, a Hi-Fi stereo system or another VCR.
- 30 SYNC. EDIT Connector
For connecting to a Movie Camera or another VCR equipped with a Synchro Edit Function.



- 1 VHF/UHF OUT Connector
For connecting to a TV antenna connector.
- 2 CH3/CH4 Switch
Used to select the RF Converter Channel (CH3 or CH4).
- 3 VIDEO IN Connector (AV1)
For connecting to another VCR or to a signal source equipped with a video output connector.
- 4 VIDEO OUT Connector
For connecting to another VCR or to a TV equipped with a video input connector.
- 5 AUDIO IN Connector (AV1)
For connecting the audio cables of a stereo audio system.
- 6 AUDIO OUT Connectors
For connecting the audio cables to a stereo audio system or to a TV equipped with audio input connectors.
- 7 AC IN--
For connecting an external antenna.
- 8 VHF/UHF IN Connector
For connecting to another VCR or to a signal source equipped with an S-Video output connector.
- 9 S-VIDEO IN Connector (AV1)
For connecting to another VCR or to a signal source equipped with an S-Video output connector.
- 10 S-VIDEO OUT Connector
For connecting to another VCR or to a TV equipped with an S-Video input connector.
- 11 EDIT Connector
By connecting the optional Editing Controller AG-A96 to this connector, editing functions can be performed more quickly and efficiently between two VCRs or between a VCR and a camera recorder.
- 12 Voltage Selector (NV-FS200PX ONLY)
Use a screwdriver to set this selector to the voltage range that covers the AC power voltage of the country in which this VCR is to be used.

The use of the Editing Controller AG-A96 (optional) gives you control over both the playback and the recording VCRs directly from this controller, to let you perform such editing functions as Assemble Editing, Insert Editing and Audio Dubbing more quickly and efficiently.



Carefully read the operating instructions for the AG-A96.

Caution:
When using the AG-A96, switch the AG-A96 to the standard speed mode. Do this by pressing the EDIT STOP button and PLAYER button simultaneously.

