

SONY®

Micro Computer “GENLOCKER”

Operating Instructions <Supplement>

Please read this Operating Instructions <Supplement> before reading the “SMC-70 Operating Instructions”. This supplement tells how the SMC-70G differs from the SMC-70.

SMC-70G

OWNER'S RECORD

The model and serial numbers are located at the rear. Record the serial number in the space provided below. Refer to them whenever you call upon an authorized Sony representative regarding this product.

Model No. SMC-70G

Serial No. _____

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

WARNING: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna

Relocate the equipment with respect to the receiver

Move the equipment away from the receiver

Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

The Sony SMC-70G "GENLOCKER" microcomputer utilizes a circuit that enables GENLOCK¹⁾ synchronization of the computer output to a video signal.

The SMC-70G provides new computer video possibilities. The SMC-70G, when used in conjunction with an NTSC superimposer, will allow computer images to be overlayed onto video signals, which can then be recorded.

The SMC-70G is fully compatible with the SMC-70 and thus its peripherals may be used interchangeably²⁾.

This SMC-70G Operating Instructions <Supplement> explains circuit, structural, and utilization differences between the SMC-70 and SMC-70G.

Please utilize the six SMC-70 Instruction Manuals after examining the contents of this manual.

Operating Instructions (supplied)

Provides a system outline and basic handling instructions.

The specifications for system I/O and the method of attaching the SMC-70G expansion module are slightly different from those of the SMC-70, as explained in the <Supplement>.

Reference Charts (supplied)

All Sony BASIC and System Monitor commands are briefly explained. Please use these charts as a handy reference during daily programming.

Sony BASIC: Introductory Manual SML-7001 (optional)

A programming handbook for the computer beginner. Sony BASIC is explained in a way that is easy to understand.

Sony BASIC: Programming Reference Manual SML-7002 (optional)

Provides a detailed explanation of each Sony BASIC command, and program examples so that Sony BASIC can be fully utilized by the BASIC user.

1) GENLOCK means synchronization of a video signal to a particular reference signal. When the video signals of plural equipment are gen-locked to the same reference signal, video and color synchronization problems do not occur in synthesizing or switching these signals.

2) Except SML-7080 battery back-up unit. See page 22.

System Monitor: Reference Manual SML-7003 (optional)

Provides an explanation of each System Monitor command and an introduction to subroutines. It also provides the information necessary for generating machine-language subroutines and debugging.

Please read the <Supplement> first in regard to the System Monitor U command or Sony BASIC super high-resolution graphic display ("SMC-70G Softwares", page 27).

Hardware: Reference Manual SML-7004 (optional)

Provides an outline of SMC-70/70G hardware and internal signals that are handled by software, as well as an explanation of machine and assembly language operation so that the SMC-70/70G can be completely utilized.

Since the SMC-70G synchronous system circuit and CRT controller initializing values are different from those of the SMC-70, please read this <Supplement> together with the "Hardware: Reference Manual".

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SMC-70G FEATURES

The SMC-70G has the following characteristics in addition to those which are the same as the SMC-70.

BNC video input/output

The popular BNC connectors are used for the video signal input and output in order to facilitate interactive video system operation. BNC connectors which provide RGB and SYNC/B&W outputs (switch selectable) are installed in addition to the 25-pin RGB output and 8-pin B&W output.

Selection of three GENLOCK ON modes

Three GENLOCK ON modes can be selected by front panel switches, and can also be switched by software.

① EXT (External Synchronization) mode: Applies GENLOCK to an external synchronous signal input.

② INT (Internal Synchronization) mode: Applies GENLOCK to the NTSC black burst signal generated by the built-in sync generator.

③ AUTO (Automatic Switching) mode: A circuit determines whether there is an external synchronous signal or not. If one exists, external synchronization is automatically selected, and if not, internal synchronization is selected.

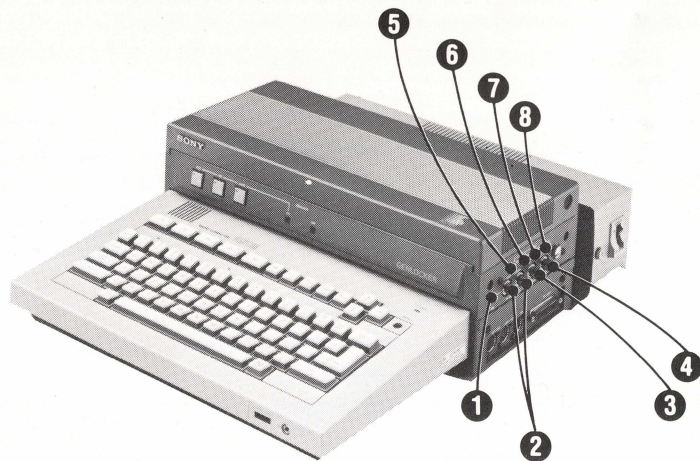
Also, the GENLOCK ON mode can be released by some software and be switched to the GENLOCK OFF mode providing the same operation as the SMC-70.

Four expansion slots

The power supply capacity to peripheral devices has been considerably increased compared to the SMC-70, and slots are provided for up to four expansion modules.

Two more modules can be used after the installation of the SMI-7074 NTSC superimposer which uses a two slot space.

PARTS IDENTIFICATION



① 75-ohm termination switch

Switches the REF IN 75-ohm termination resistance on and off. It is usually set to ON. When one of the REF IN connectors is used for loop-through output, set this switch to OFF and provide a 75-ohm termination resistance at the last connected equipment.

② REF IN (video/sync signal input) connectors (BNC)

Accept composite video signals, black burst signals, etc. from a VTR, video camera, videodisc player, or sync generator. One of these connectors is used as a loop-through output in a bridge connection.

③ KEY OUT (keying signal output) connector (BNC)

Outputs keying signals for special effects. The keying signal is a signal which is at low level during the blanking period and when the color displayed is dark green (color code 8). For other colors, the keying signal is at high level.

④ REF OUT (video/sync signal output) connector (BNC)

Outputs the signal to which the computer video signal is gen-locked when the PHASE switch is set to OFF. When the switch is turned ON, this connector outputs a black burst signal synchronized with the signal to which the computer video signal is gen-locked.

Relation between the REF OUT signal and the settings of the PHASE switch

GENLOCK ON mode	PHASE	
	ON	OFF*
INT	Black burst signal generated by the sync generator built into the computer.	
EXT	Black burst signal synchronized with the input signal from the REF IN connector. The H phase and SC phase are adjustable by the H PHASE and SC PHASE controls.	The signal from the REF IN connector is output as it is.
AUTO	Either INT or EXT mode is selected depending on whether there is an REF IN signal or not. In both cases, black burst signal is output.	Either the black burst or the input signal from the REF IN connector is output depending on whether there is an REF IN signal or not.

* When the PHASE switch is set to OFF, the H phase and SC phase cannot be adjusted.

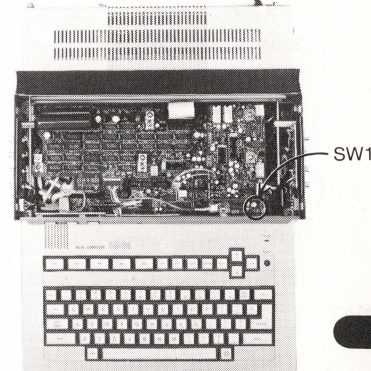
⑤ PHASE switch

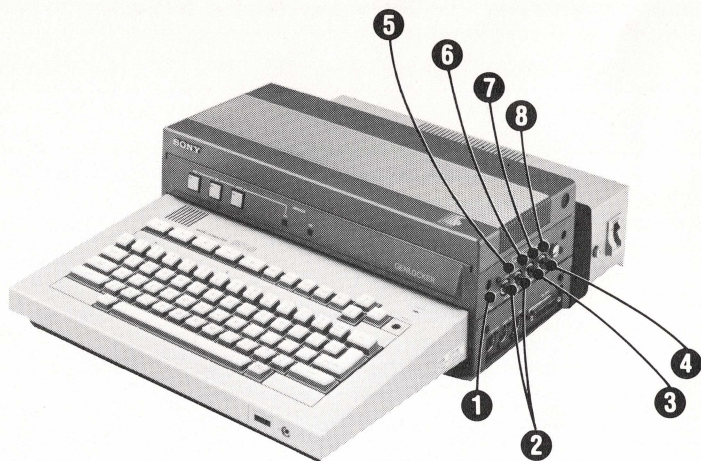
Enables or disables the H phase and SC phase adjustment. If this switch is ON, the H phase and SC phase of the REF OUT signal can be adjusted by means of H PHASE and SC PHASE controls and the 0°–180° selector.

Normally set this switch to OFF, so that the SMC-70G can synchronize with a wide range of external signals.

If it is necessary to adjust the H PHASE of the REF OUT signal, set this switch to ON. Once it is set to ON, the H phase and SC phase can be adjusted on the SMC-70G. In this case, the input signal from the REF IN connector should be a precise signal corrected by a time base corrector or a sync generator.

When the PHASE switch is ON in the GENLOCK ON EXT mode, be sure to set the cable compensation switch (SW1, see illustration) on the SG-97 board to ON or OFF, depending on the length of cable inputting the REF IN signal. If the cable is no longer than 150 m, the SW1 should be OFF. If it is 150 m to 300 m long, set the switch to ON. This switch is set to OFF at the factory.





⑥ H PHASE (horizontal sync phase) control

This control activates only when the PHASE switch is ON in the GENLOCK ON EXT or AUTO mode.

Turn this knob to adjust the H phase of the output signal of the REF OUT connector.

⑦ SC PHASE (sub-carrier phase) control

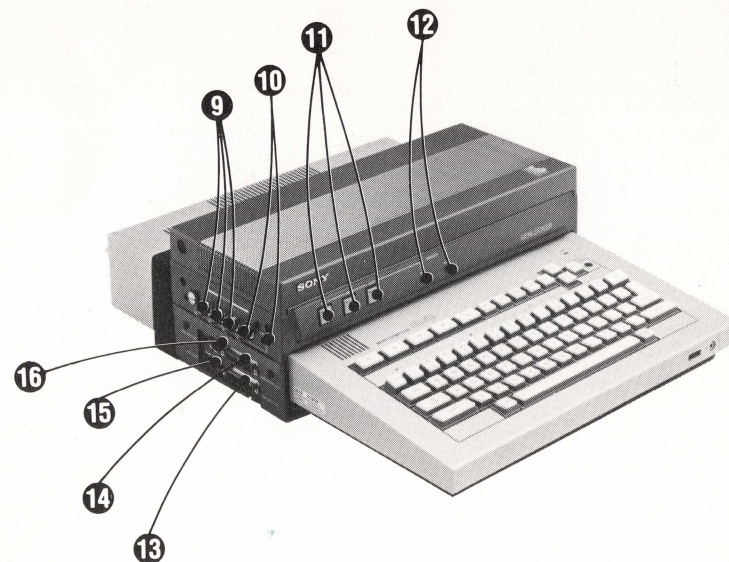
Activates only when the PHASE switch is ON in the GENLOCK ON EXT or AUTO mode.

After roughly adjusting the SC phase with the 0°–180° selector, adjust it precisely with this control.

⑧ 0°–180° selector

This switch roughly adjusts the sub-carrier phase of the output signal of the REF OUT connector.

It is operative only when the PHASE switch is ON in the GENLOCK ON EXT or AUTO mode.



⑨ RGB OUTPUT connectors (BNC)

Output the RGB analog signals to the color monitor.

⑩ SYNC/B&W output connector (BNC) and output selection switch

When the output selection switch is set to SYNC, a composite sync signal is output, and when it is set to B&W, a composite monochrome video signal is output.

⑪ GENLOCK ON mode selection switches and indicators

Select the GENLOCK ON modes. The indicator of the depressed switch is lit.

EXT: External synchronization

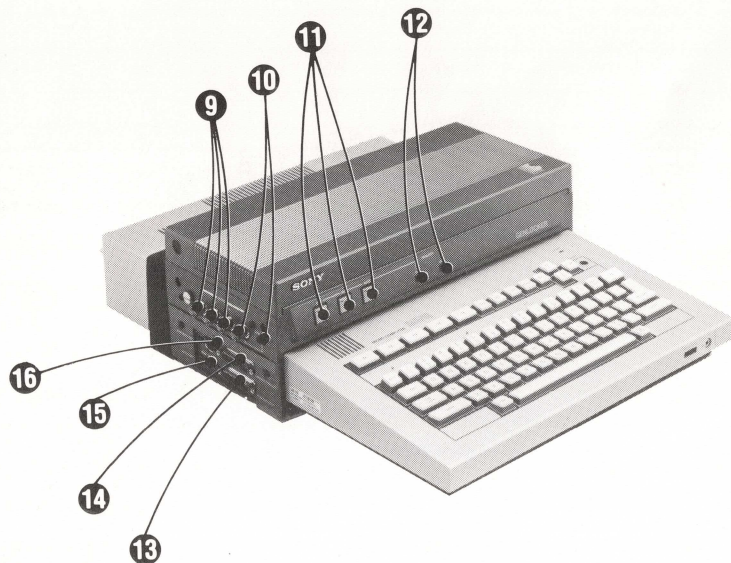
INT: Internal synchronization

AUTO: When an external sync signal is connected, this provides external sync, and when it is not connected, this provides internal sync.

(See page 30 for details).

⑫ GENLOCK ON/OFF indicators

Display whether GENLOCK is ON or OFF. When the power is on, the System Monitor sets GENLOCK to ON. When GENLOCK is switched off by software, the OFF indicator is lit.



The following parts are used the same as on the SMC-70.

13 RGB MULTI OUT connector (25 pins)

Connects a superimposer or a color monitor that is provided with an equivalent RGB MULTI input terminal.

14 PRINTER, PARALLEL connector (25 pins)

Connects an 8 bit parallel printer.

15 AUTO START switch

The AUTO START switch position determines whether the program start is automatic or not when the power is turned on.

ROM: A dedicated auto start ROM pack program automatically starts.

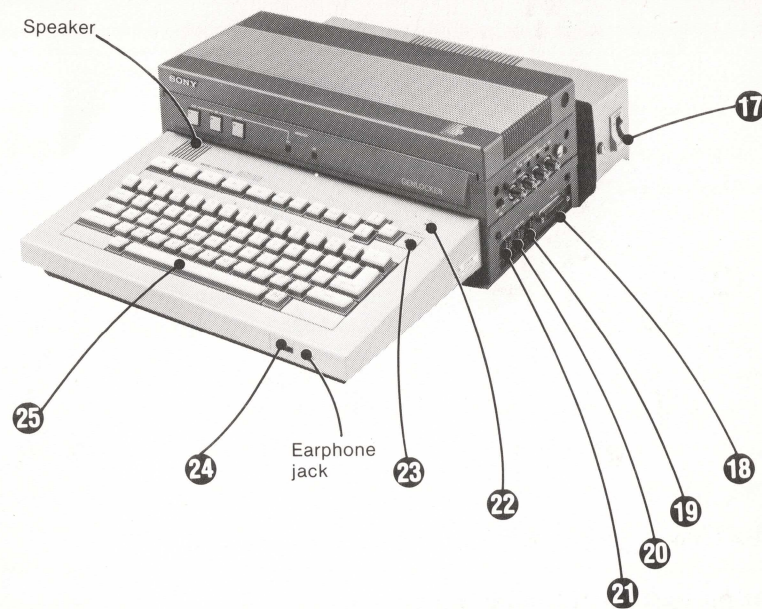
DISK: Automatic start of disk programs, such as CP/M, is provided.

OFF: Automatic program start does not occur. The System Monitor waits for your instructions.

Disk and ROM pack programs do not start automatically unless they have a certain format. Please refer to the instruction manual of your program to determine whether it will start automatically or not.

16 B&W MULTI OUT connector (8 pin DIN)

Connects a monochrome monitor that is provided with an equivalent input terminal.



17 POWER switch

Press the switch on the upper side with the white dot to turn on the computer.

18 RS-232C connector (25 pins)

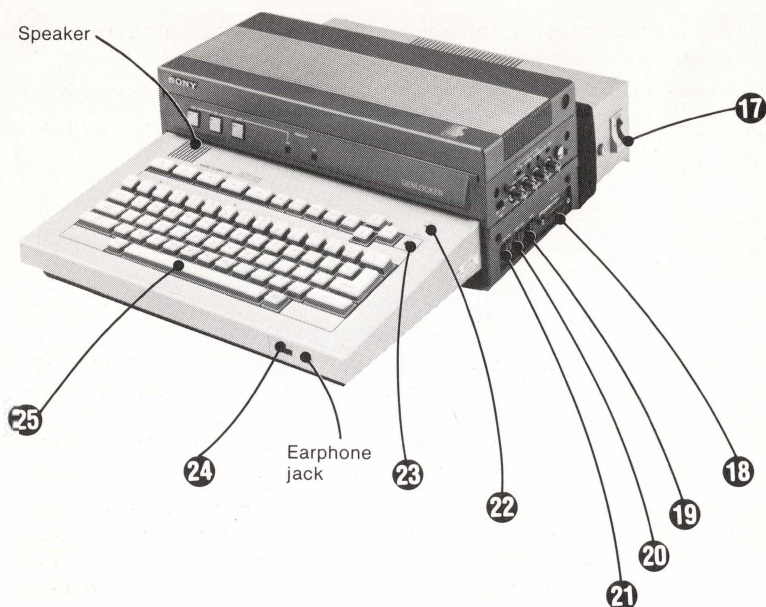
This interface connector is used for data communication with other computer systems, and for connecting this system to peripherals such as a printer or character display device. It is set at the factory to a mode that permits the SMC-70G to be connected to a terminal device with a 1200 baud transmission rate. The communication data format setting, and transmission/reception start are performed by the system monitor Z command. Please see the "System Monitor: Reference Manual" for details.

19 TAPE connector (8 pin DIN)

Used to connect an audio cassette tape recorder to provide an external memory for the microcomputer.

20 LIGHT PEN connector (5 pin DIN)

Connects a light pen to provide input from the display screen.



②① KEY PAD connector (13 pins)

Connects a numeric key pad to provide a keyboard for inputting numerical values.

②② POWER indicator

This green indicator lights when the computer's power is turned on.

②③ RESET button

This button is pressed with the eraser-end of a pencil or similar object when program control is lost, or when SMC-70G initialization is required. Although the computer returns to the same status as when it was first turned on, the memory content is retained.

②④ SOUND LEVEL selector

Selects the volume of the sound emitted from the built-in speaker or an earphone in three steps depending on the computer program.

②⑤ Keyboard

The keyboard is used to load programs or data into the computer. See the "Operating Instructions" for details.

SYSTEM EXAMPLES

To configure a basic microcomputer system, make connections to the terminals that match each peripheral.

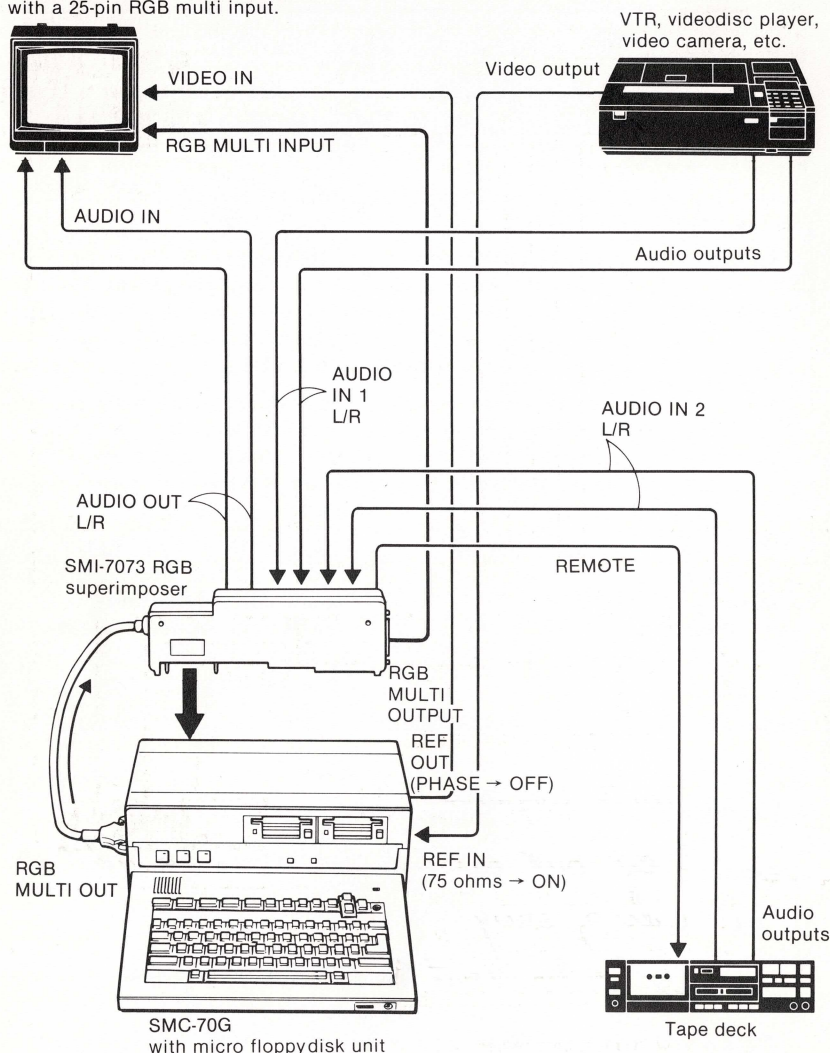
Examples of system connections to video equipment that uses BNC connectors, and expansion module installations are provided in this <Supplement>.

MAIN PERIPHERALS FOR THE VIDEO SYSTEM CONFIGURATION

Device name	Application	Major features
SMI-7074 NTSC superimposer	Synthesizes the video signals of general video equipment with computer signals, and enables video recording.	Superimposes computer signals by converting them into NTSC video signals. The synthesized video can be recorded with a VTR.
SMI-7073 RGB superimposer	Synthesizes the video signals of general video equipment with computer signals.	Superimposes clear video by using RGB signals. The audio and video can be selected with software. (Video recording cannot be performed.)
TRINITRON™ color character display PVM-1270Q, etc.	For color display	A monitor TV that can fully handle SMC-70G graphic functions. It can display either a VTR/TV video signal or a video signal from the computer. Signal switching can be performed with a program.

A) SUPERIMPOSING WITH RGB SIGNALS ON VIDEO IMAGES

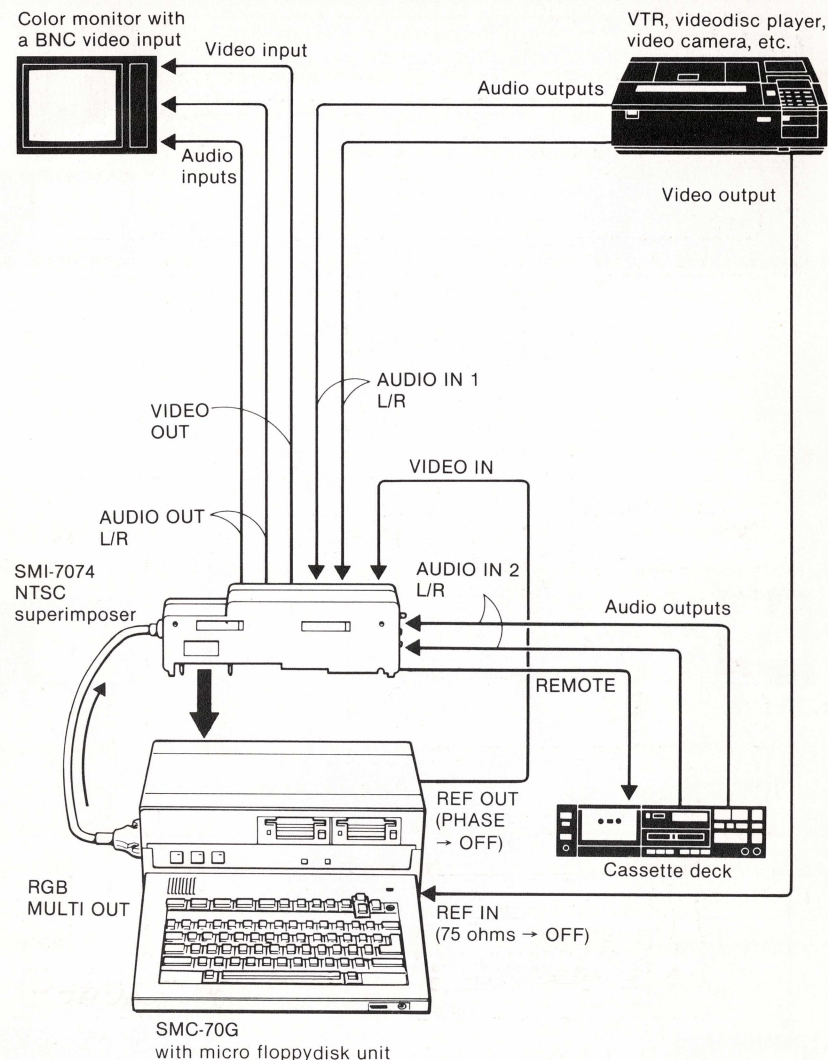
Trinitron color character display with a 25-pin RGB multi input.



Output from the SMI-703 RGB MULTI OUTPUT connector is synthesized with the output from the SMC-70G REF OUT connector (picture from the video equipment) on the monitor. (The synthesized image cannot be recorded with this connection).

B) SUPERIMPOSING BY USING NTSC SIGNALS

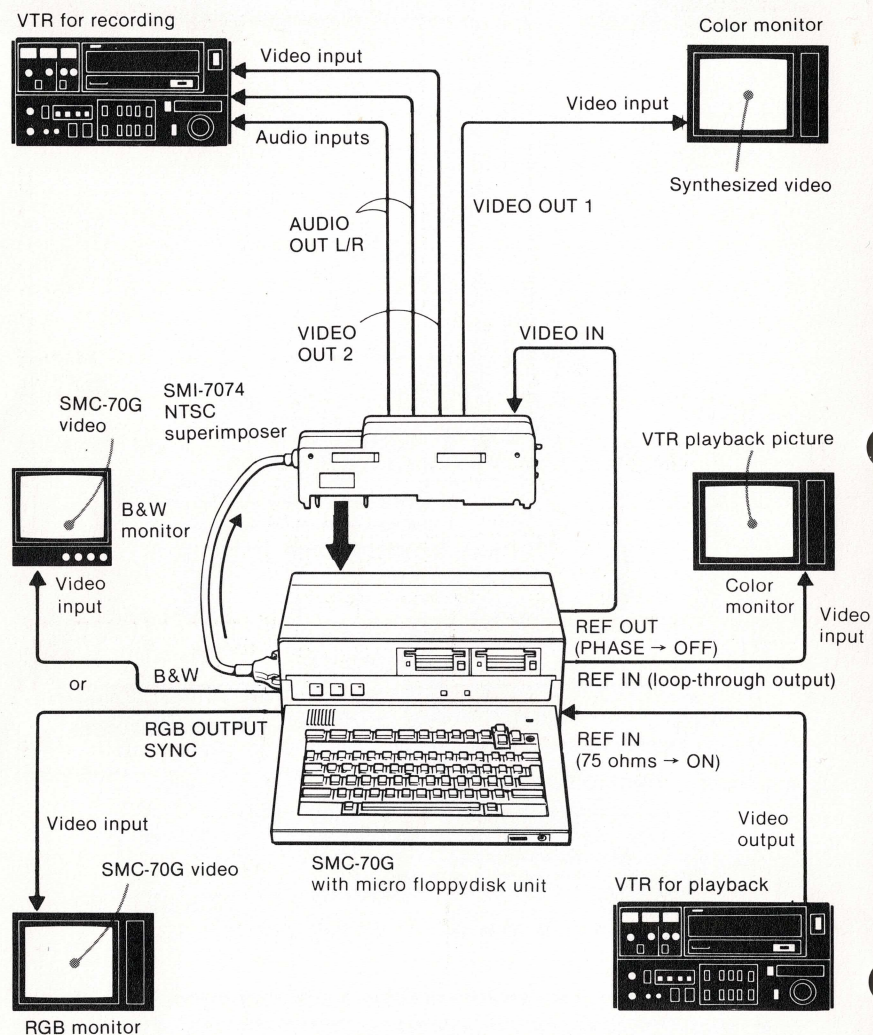
Color monitor with a BNC video input



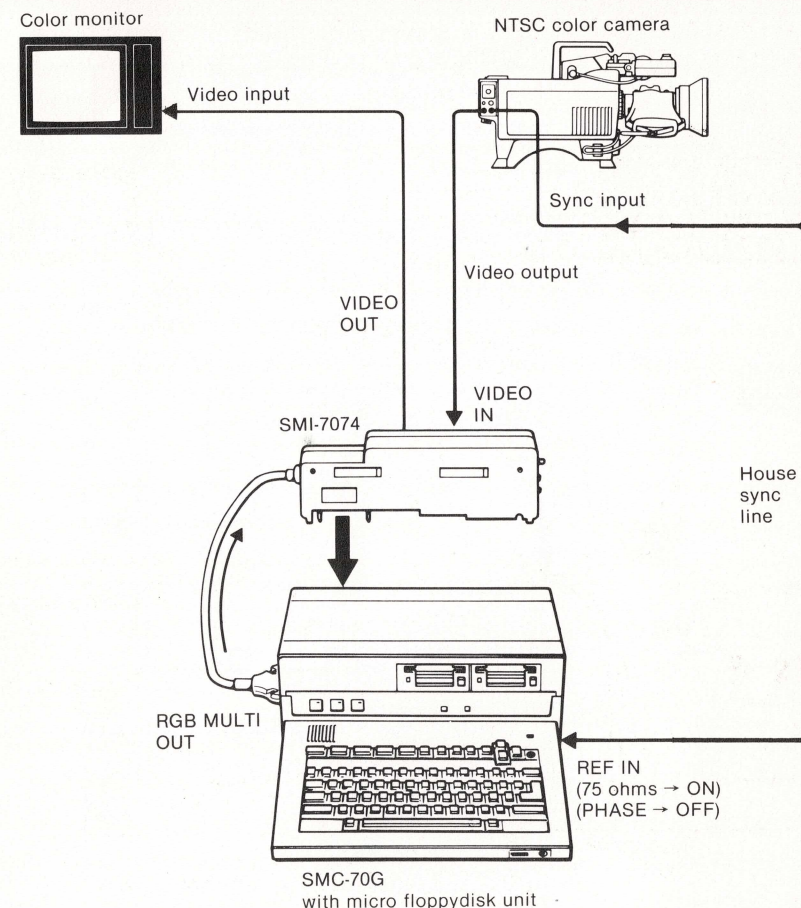
Computer video converted to an NTSC signal is synthesized with the video signal from a video source by the SMI-704, and is output from the VIDEO OUT connector. The synthesized image can be recorded by connecting the output signal to a VTR. (See example C).

C) RECORDING SYNTHESIZED VIDEO

The independent signals of the video tape and the computer, and the synthesized signal of these two video sources are separately monitored and the synthesized signal can be recorded on a VTR.

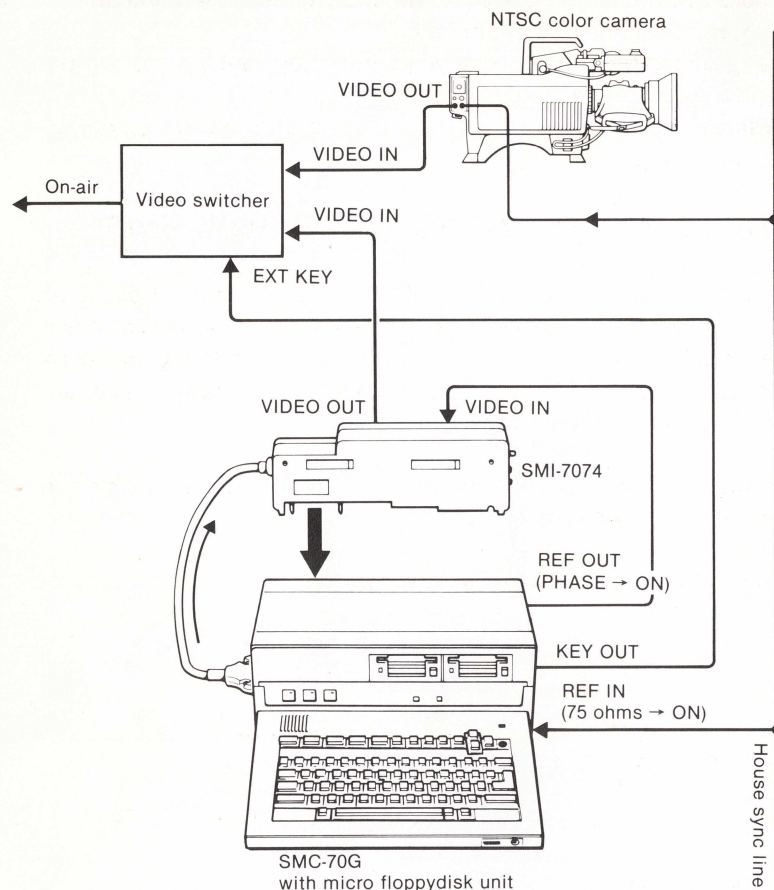


D) SUPERIMPOSING ON CAMERA PICTURE BY GEN-LOCKING TO A HOUSE SYNC LINE



By synchronizing both the SMC-70G and the camera to the same house sync line, the camera can be directly connected to the SMI-7074 for high-quality superimposing.

E) SUPERIMPOSING ON A VIDEO SWITCHER USING THE SMI-7074 AS AN NTSC ENCODER



Be sure to set the SMC-70G to the GENLOCK ON EXT or AUTO mode. The SMI-7074 should be set to output only the picture from the computer.

With this connection, you can adjust the H phase and SC phase of the video output signal from the SMI-7074 by means of the H PHASE and SC PHASE controls of the SMC-70G if you set the PHASE switch to ON. There is no need to adjust the SC PHASE switch and control of the SMI-7074.

The keying signal output from the KEY OUT connector is synchronized with the RGB analog output from the SMC-70G.

However, it advances approximately $1\mu\text{s}$ in comparison with the video output signal of the SMI-7074, since the video signal is delayed inside the SMI-7074. Correct this time delay on the video switcher.

CONNECTIONS

BEFORE CONNECTIONS

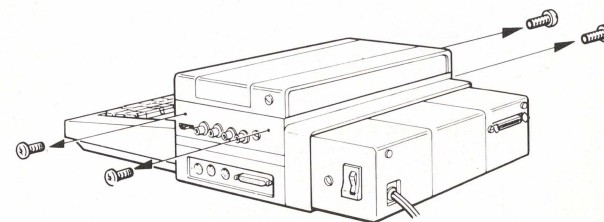
- Be sure to turn off the power of the equipment to be connected or the internal ICs may be destroyed.
- When removing connectors, always pull them out by holding the plug. Never pull on the cord itself.
- The power cord should only be connected after all other connections are completed.

INSTALLATION OF MICRO FLOPPYDISK UNIT¹⁾

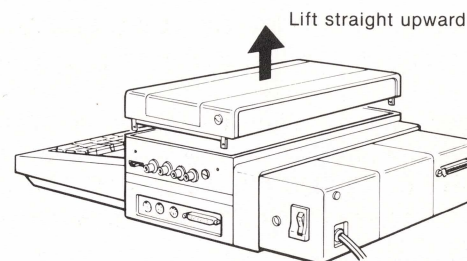
To mount the SMI-7011/7011A or SMI-7012/7012A micro floppydisk unit, you must remove the top cover of the computer. When the cover of the SMC-70G is removed for installation, the SMC-70G could be damaged. Therefore, it is recommended that this installation be performed by an authorized Sony representative.

If you decide to attempt this installation yourself, please follow the procedure given below.

1. Remove the four screws on both sides.

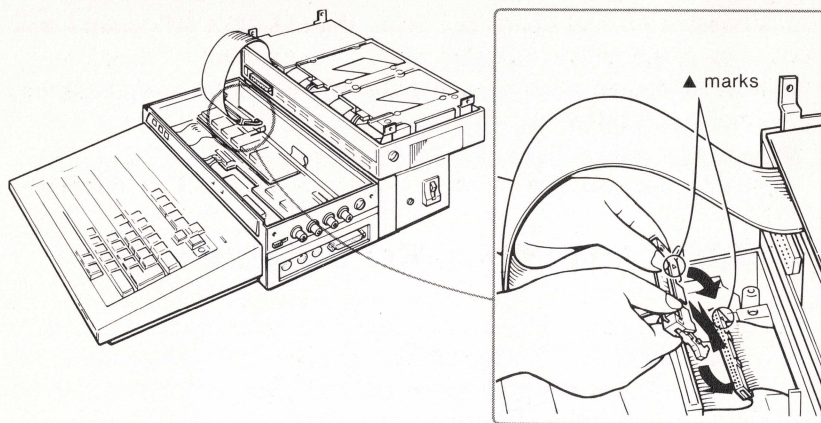


2. Remove the cover.

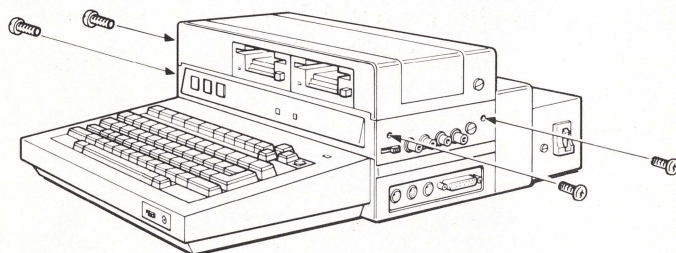


¹⁾ Some floppydisk units may require the mounting bracket replacement before the installation. Refer to the instructions enclosed with an extra mounting bracket in a vinyl bag.

3. Connect the disk unit cable to the internal connector.



4. Place the disk unit on the main unit, and tighten the four screws.



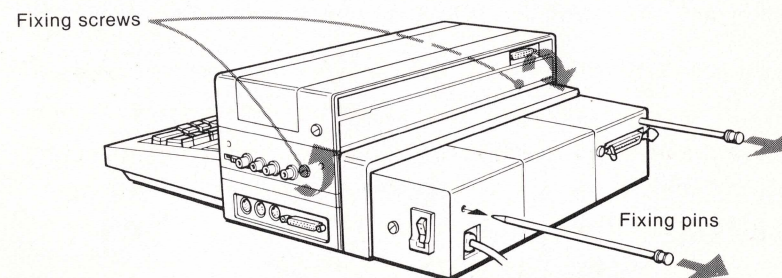
Caution

If these screws are loose, a read error may occur.

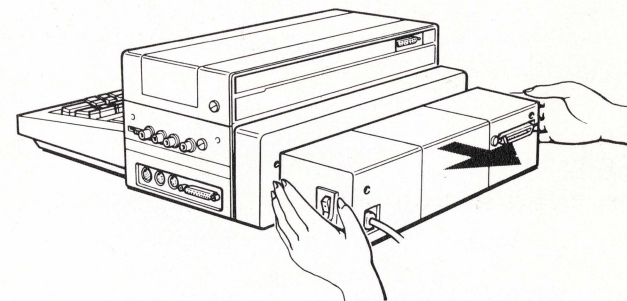
SUPERIMPOSER INSTALLATION/CONNECTION

Although the example used is that of the SMI-7074 NTSC superimposer, other expansion modules can be installed in the same way. While each module can be inserted at any position, be sure to use the innermost connector first.

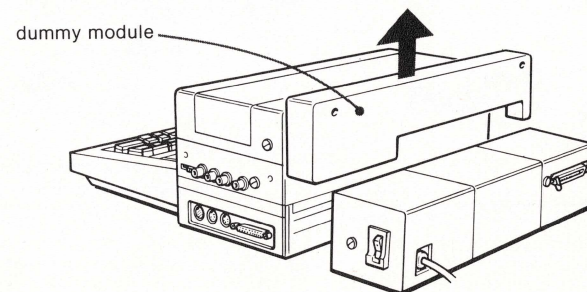
1. Loosen the two screws on the sides of the SMC-70G, then remove the two fixing pins.
 - Do not remove the screws; just loosen them.



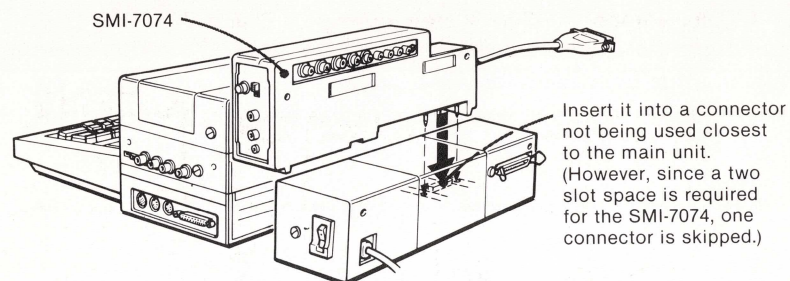
2. Pull out the power supply block.



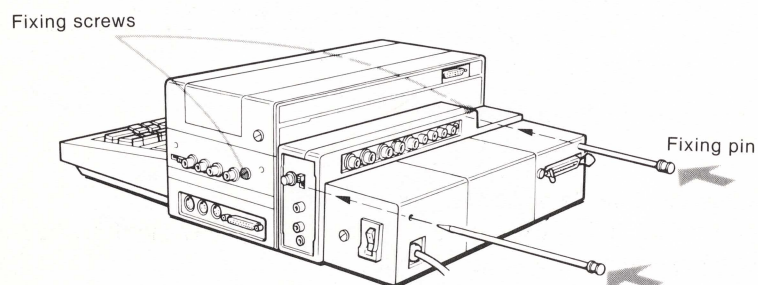
3. Remove the dummy module.



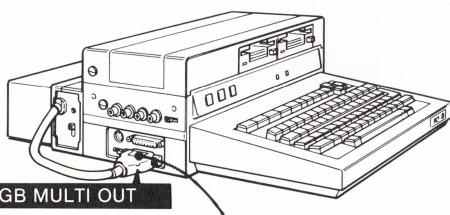
4. Install the superimposer.



5. Push the power supply block back towards the main unit as far as possible, then insert the fixing pins and retighten the two screws.

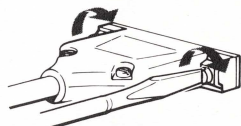


6. Connect the cable of the superimposer to the RGB MULTI OUT connector.



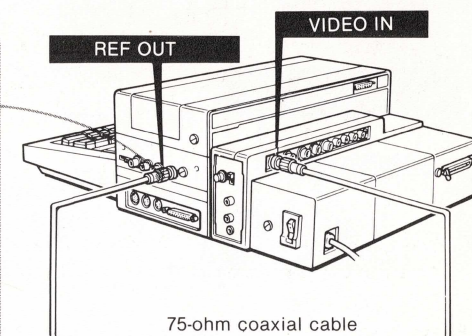
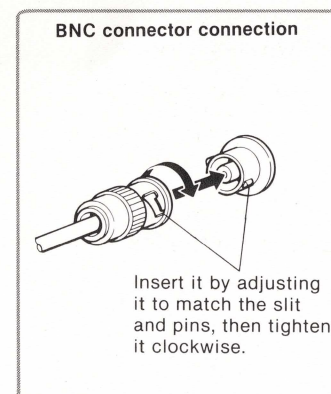
1 Align the plug with the receptacle.

2 Affix the inserted plug with the screws.



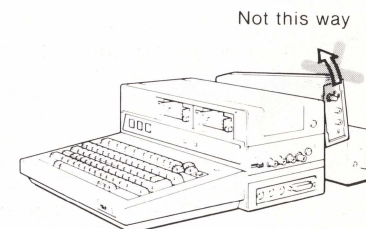
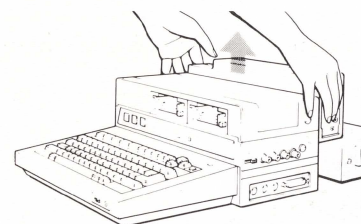
Loosen the screws before pulling the plug out.

7. Connect the REF OUT connector¹⁾ to the VIDEO IN connector of the superimposer. (See System examples B and C.)



Expansion Module Removal

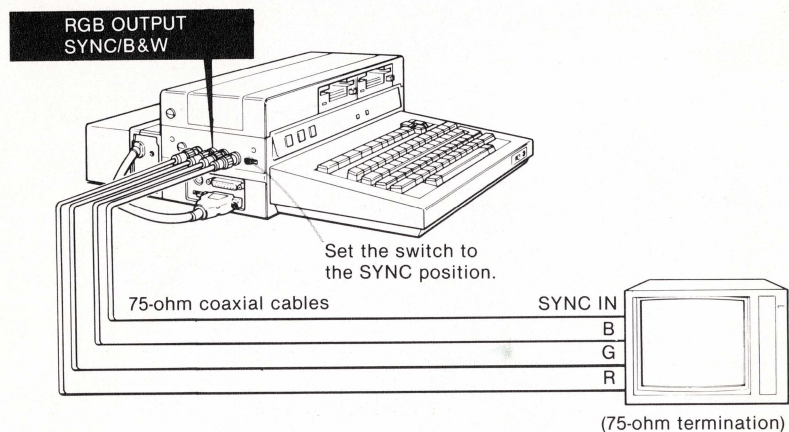
Lift the module straight up. Never lift a module by only the right side because the connector may be damaged.



1) The one of the REF IN connectors which is not used for input can also be connected to the superimposer VIDEO IN connector to provide a loop-through output. In this case, turn the 75-ohm termination switch OFF.

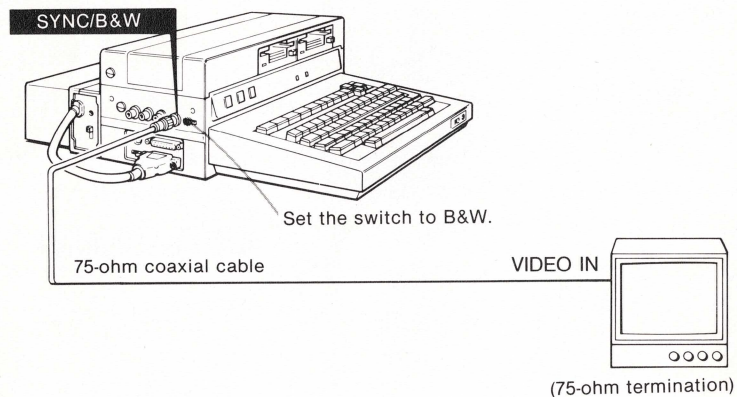
RGB MONITOR CONNECTION

Monitor connection for watching SMC-70G color video independently.
(See System example C.)



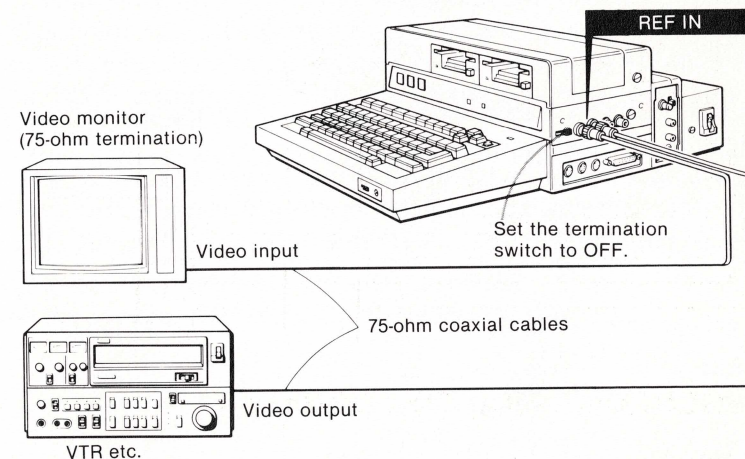
MONOCHROME MONITOR CONNECTION

Monitor connection when watching SMC-70G video in monochrome.
(See System example C.)



CONNECTION OF VIDEO EQUIPMENT AND VIDEO MONITOR FOR PLAYBACK PICTURE

Playback picture from the video equipment connected to the REF IN connector can be monitored. (See System example C. The Video of a VTR, etc. can be monitored in examples A and B in the same way.)



POWER CONSUMPTION PRECAUTIONS

When several peripheral devices such as a micro floppydisk unit or superimposer are used, precautions should be taken so that the total current drain of the units and modules connected to 50 pin I/O slots does not exceed the current capacity of the SMC-70G.

The maximum current supplied by the SMC-70G is as follows.

+5V : 3.4 A
+12V : 1.55 A
-12V : 150 mA

- See the operating instructions of each unit for the current consumption of connected units.

For example, when the SMI-7012 dual micro floppydisk unit, SMI-7074 NTSC superimposer, and two SMI-7050 cache disk units are used together, the total current drain will be as follows.

	+5 V	+12 V	-12V
SMI-7012	1,260 mA	1,090 mA	0
SMI-7074	475 mA	150 mA	95 mA
SMI-7050 × 2	800 mA (400 mA × 2)	0	0
Total	2,535 mA	1,240 mA	95 mA

The table shows the current drain stays within the limits in this case. You have to use the SMI-7040 expansion unit when the total current drain exceeds the maximum allowable current drain of the SMC-70G.

Note

Since the maximum current supplied by the SMC-70G, in order to be combined with video equipment, is increased compared to that of the SMC-70, the SMI-7080 battery back-up unit for the SMC-70 cannot be used.

SMC-70G SOFTWARES

RESIDENT SOFTWARES

The SMC-70G has the System Monitor and Sony BASIC in a shadow ROM format.

System Monitor

The System Monitor, which conducts the basic operation of the SMC-70G, places the SMC-70G in the GENLOCK ON AUTO mode during initialization. Selection of the GENLOCK OFF mode can be performed by a U command. The GENLOCK ON mode can be resumed by using the UG command which is a U command extension command. (See page 32 for details.)

All the other commands and function calls can be used the same as for the SMC-70.

Sony BASIC

Sony BASIC is activated by the System Monitor B command. All commands can be used the same as for the SMC-70.

APPLICATION PROGRAMS

When the system is improved by adding a disk drive unit, various application programs can be used with CP/M¹⁾ as the standard disk operating system.

Use **CP/M 2.2 Version 1.2 or higher** for the SMC-70G. (Version No. appears on the carton. Confirm it when the purchase is made.)

By using the CP/M's SETUP command, the GENLOCK mode can be easily switched ON and OFF. The SETUP command also enables changing of the display area position. (For details, refer to the "CP/M" Manual.)

Main softwares those are effective for image processing are as follows.

Sony Disk-BASIC SMW-7011 (Version 1.2 or higher)

Although interlaced scanning with the GENLOCK QFF mode is necessary for the GMODE3, the GENLOCK ON mode can be used for other commands the same as for the SMC-70. (When GMODE3 is executed in the GENLOCK ON mode, an error message is displayed.)

Sony Video Utility For Sony Disk-BASIC SMW-7014

Sony Disk-BASIC commands are extended so that a videodisc player or a superimposer can be controlled from the SMC-70G.

Sony Video Typewriter SMW-7070

A program for generating a display, such as a title or comments, to be superimposed over the picture of a video unit.

Sony Graphics Editor SMW-7072

Many commands are provided which allow enlarged picture operation to be performed, and complicated patterns to be easily created.

Sony Disk-BASIC, Video Typewriter and Graphics Editor can own graphic data files in common and transfer them.

GENLOCK MODE SELECTION

External synchronization, which uses the external sync signal as the video circuit clock, and internal synchronization, which uses the black burst signal generated by the built-in generator, can be selected in the SMC-70G GENLOCK ON mode, depending on the system utilization.

External Synchronization

R.G.B., sync, or monochrome signals of the computer are output by synchronization with an external signal coming from the REF IN connector. This allows synchronization to all video sources such as the composite video signals of camera, video tape, video disc, etc. as well as black burst or sync signals.

Internal Synchronization

R.G.B., sync or monochrome signals of the computer are output by synchronization with the black burst signal generated by the built-in sync generator.

1) CP/M is the registered trademark of Digital Research, Inc.

GENLOCK ON MODE SELECTION SWITCHES

When GENLOCK is ON (the ON indicator is lit), the GENLOCK mode can be selected by the three switches on the front panel.

When the PHASE switch is OFF

AUTO (Auto Switching Mode) Switch:

When this switch is depressed, an internal circuit determines if there is an external sync signal at the REF IN connector. If there is, external synchronization is automatically selected, and if there is no external sync signal, internal synchronization is automatically selected¹⁾.

When the power is turned on, the System Monitor automatically lights the indicator of this switch and enters the Auto Switching mode.

EXT (External Sync Mode) Switch:

Used to select external synchronization. If an external sync signal is not connected to the REF IN connector when this switch is pressed, problems will occur in the R.G.B. (or monochrome) output signals.

INT (Internal Sync Mode) Switch:

Selects internal synchronization without any relationship to an external sync signal appearing or not appearing at the REF IN connector.

When the PHASE switch is ON

AUTO (Auto Switching Mode) Switch:

When this switch is depressed, an internal circuit determines if there is an external sync signal at the REF IN connector. If there is, external synchronization is selected and black burst signal synchronized with the input signal from the REF IN connector is output from the REF OUT connector. If there is not, internal synchronization is selected and black burst signal generated by the internal sync generator will be output.

EXT (External Sync Mode) Switch:

When this switch is pressed, the SMC-70G synchronized with the external signal from the REF IN connector. This external sync signal should be connected via a sync generator or a TBC so that it has no jitter.

If an external sync signal is not connected to the REF IN connector, the output signal from the REF OUT connector may be unstable. If this happens, switch to the internal sync or auto switching mode.

INT (Internal Sync Mode) Switch:

When this switch is pressed, the SMC-70G operates in the same way as when the PHASE switch is OFF. The H and SC phases cannot be adjusted in this mode.

Mode selection by software

The switches on the panel are effective only when both Bit 7 and Bit 6 of the SMC-70G 3DH port are "0". Thus, if you change Bit 7 and/or Bit 6, the GENLOCK mode selection can be made with software, making the switches on the panel inoperative.

Do not change the other bits than the two upper bits.

Bit No.	7	6	
	0	0	Switch selection is valid.
Value specified	0	1	Set to the EXT mode
	1	0	Set to the INT mode
	1	1	Set to the AUTO mode

} Switches do not operate.

Programs assigned to the AUTO mode are as follows.

Mnemonic representation			ANN representation
IN	A, (3DH)	: Data reading	a=p(3D)
AND	3FH	} Auto mode specification data	a=a&3F
OR	0C0H		a=a C0
OUT	(3DH), A	: Data output	p(3D)=a

1) The condition of the connected VTR (stop mode, etc.) may cause the picture distortion. In this case, select the internal synchronization with the INT switch.

GENLOCK OFF MODE SELECTION

The GENLOCK ON mode picture display uses interlaced scanning with a 525 line raster. When the display uses a 625 line raster, or when non-interlaced scanning must be performed, select the GENLOCK OFF mode; the same as for the SMC-70. Also, the super high-resolution graphic mode requires interlaced scanning in the GENLOCK OFF mode.

Because GENLOCK ON/OFF cannot be selected by hardware, use software to make the selection.

1) Selection by the System Monitor

To select the GENLOCK OFF mode, enter:

>U↵¹⁾

The GENLOCK OFF mode is selected, and this sets the display for 525 line non-interlaced scanning.

To select the GENLOCK ON mode again, use the UG command which is an U command extension.

This is input as:

>UG↵

The GENLOCK ON mode is selected, and this sets the display for 525 line interlaced scanning.

2) Selection by CP/M

After CP/M 2.2 Version 1.2, the SMC-70G standard disk operating system, the GENLOCK ON/OFF mode can be selected by the SETUP command. When the SMC-70G is used together with a floppydisk unit, it allows the selection to be performed as follows.

1. Set the AUTO START switch on the left side of the SMC-70G to the DISK position.
2. Place the CP/M system disk in Drive A.
3. Turn the power on.
4. After CP/M operation starts and A > is displayed, enter:
SETUP↵
from the keyboard.
Then the main menu of the SETUP program is displayed.
5. Press the **[2]** key to select Main Menu "2. Screen Attributes".
The Screen Attributes menu is displayed.
6. Select the GENLOCK mode item.
To select OFF, press the **[→]** or **[←]** key.
7. Press the **[HOME]** key to return to the main menu, then press the **[6]** key to select "6. Save System".

When the **[RETURN]** key is pressed, the setting mentioned above is registered on the CP/M system disk so that the GENLOCK OFF mode is set during CP/M activation regardless the System Monitor setting.

To return to the GENLOCK ON mode, select ON in step 6.

1) ↵ means the pressing on the **[RETURN]** key

3) Selection by assembly language

Selection of the GENLOCK OFF Mode (525 line non-interlaced scanning) is performed by the following procedure.

1. Set Bit 4 of the I/O port 20H GCW to 0.
2. Set the MSB (Bit 7) of the I/O port 3CH to 0.
(Data other than the MSB must be saved.)
3. Output 02H to I/O port 1CH.
(Outputs the 525/625 conversion signal to the RGB MULTI OUT connector.)
4. Set the CRT controller register data as follows.

Register	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9
Data	7F	50	60	3A	1F	06	19	1C	A0	07

This can be programmed as follows.

	Mnemonic representation		ANN representation
LOOP:	IN	A, (20H)	20H port Bit 4 is set to 0.
	AND	0EFH	
	OUT	(20H), A	3CH port MSB is set to 0.
	IN	A, (3CH)	
	AND	7FH	
	OUT	(3CH), A	
	LD	A, 02H	02H output to 1CH port.
	OUT	(1CH), A	
	LD	HL, DATA	Specifies data table.
	LD	B, 00H	
	LD	A, B	Checks whether write operation was performed from R0 to R9 resistors.
	CP	09H	
	JP	Z, 00H	
	OUT	(18H), A	
	LD	A, (HL)	Data write.
	OUT	(19H), A	
	INC	HL	Next data specification.
	INC	B	
	JR	LOOP	Next register specification.
DATA: DB		7FH, 50H, 60H, 3AH, 1FH	Data table.
DB		06H, 19H, 1CH, 0A0H, 07H	

To return to the GENLOCK ON mode again:

1. Set the 20H port GCW Bit 4 to 0.
2. Change the 3CH port MSB to 1.
3. Output 02H to the 1CH port.
4. Set the CRT controller registers as follows.

Register	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9
Data	73	50	5C	3A	1E	08	19	1B	A0	07

SPECIFICATIONS

CPU

Processor used	Z-80A
Clock frequency	4.028 MHz
Wait	10% or less during graphic RAM accessing (none in other cases)
Interrupt	Non-maskable interrupt Z-80A mode 1 maskable interrupt
Resetting	Automatic at power on/Manual (Memory contents are saved at manual resetting.)

Memory

Main memory	64K bytes (64K bits/chip dynamic RAM)
Video RAM	Graphic: 32K bytes (16K bits/chip dynamic RAM) Character: 2K bytes Attributes: 2K bytes } (16K bits/chip static RAM) PCG: 2K bytes
ROM	32K bytes, shadow ROM format System Monitor: 9K bytes Sony BASIC: 22K bytes Character font: 1K bytes

CRT display

CRT controller	HD4650S-1
Display screen	Character display screen, Graphic display screen, Border area
Character display	8 × 8 dot matrix/character 80 or 40 characters × 25 lines 8 colors
Graphic display	160 × 100 dots, 16 colors, 4 pages 320 × 200 dots, 16 colors 640 × 200 dots, 4 colors 640 × 400 dots, black and white (only in GEN-LOCK OFF mode)
Border area	16-color display
Output interface	Color: RGB analog signal, 0.7 Vp-p, 75 ohms Monochrome: composite video signal 1 Vp-p, 75 ohms Sync: TTL level separate sync signal, composite sync signal 1 Vp-p, 75 ohms, composite sync signal 2 Vp-p, 75 ohms Horizontal sync signal frequency: 15.734 kHz Vertical sync signal frequency: 59.94 Hz or 50 Hz

I/O interface

Keyboard	Keyboard encoder with microprocessor Total number of keys: 72 Display control keys: 8 Programmable function keys: 5 Programmable help key: 1 Input for numeric key pad: 13-pin connector
Audio cassette interface	8-pin DIN jack Baud rate: 1200 b/s Remote control function provided
Printer interface	25-pin connector TTL level Standard 8-bit parallel transfer
RS-232C interface	25-pin connector TTL level Baud rate: 75–19,200 b/s (selectable)
Speaker	8 ohms, 3.6 cm dia Output level: selectable between 3 outputs
Earphone	Minijack Output level: selectable between 3 outputs
RGB video outputs	25-pin connector/BNC connectors 0.7 Vp-p, 75 ohms
Monochrome video outputs	8-pin DIN jack 1 Vp-p, 75 ohms, sync negative BNC connector 1 Vp-p, 75 ohms, sync negative, commonly used for composite sync output (2 Vp-p, 75 ohms) by selecting the switch setting.
Lock-in frequency range	15.734 kHz $\pm$ 120 Hz min. (NTSC signal with the PHASE switch OFF)
External sync inputs (REF IN)	BNC connector $\times$ 2 with a 75-ohm termination switch (One can be used to provide loop-through output.) Composite video signals 1 Vp-p, 75 ohms, or black burst signals 0.45 Vp-p (both sync and burst 0.3 Vp-p), 75 ohms

Sync outputs (REF OUT)

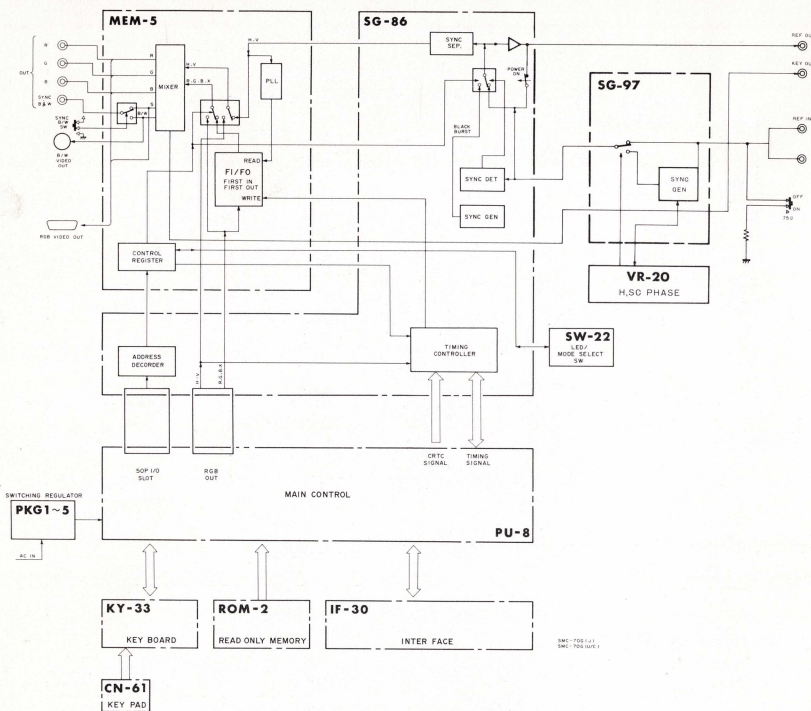
BNC connector	Composite video signal 1 Vp-p, 75 ohms, or black burst signal 0.45 Vp-p (both sync and burst 0.3 Vp-p), 75 ohms
Keying signal output (KEY OUT)	0.7 Vp-p, 75 ohms (without sync signal)
Light pen interface	5-pin DIN jack
Slots for expansion	50-pin connector Inside: 2 slots Outside: 4 slots Maximum dc current drain (total of 6 slots) + 5 V ... 3.4 A +12 V ... 1.55 A –12 V ... 150 mA
Connector for expansion unit	50-pin connector

General

Power requirement	120 V ac $\pm$ 10%, 50/60 Hz
Power consumption	31 W (for main unit only) 83 W (max.)
Operating conditions	Temperature: 5°C to 35°C (41°F to 95°F) Humidity: 20 to 80%
Storage temperature	–15°C to +60°C (5°F to 140°F)
Dimensions	388 $\times$ 133 $\times$ 484 mm (w/h/d) (15 ³ / ₈ $\times$ 5 ¹ / ₄ $\times$ 19 ¹ / ₈ inches) main unit only, including projecting parts and controls
Weight	7 kg (15 lb 9 oz)

Design and specifications subject to change without notice.

BLOCK DIAGRAM



These MEM-5 and SG-86 printed circuit boards provide the contact points for the SMC-70G internal and external sync signals. This includes the circuit which determines if an external sync signal is provided or not, and the black burst sync generator. The SG-97 board generates a black burst signal in synchronization with the REF IN signal. This signal is supplied to the SG-86 board. The circuit of the SG-97 board is passed when the PHASE switch is set to OFF. The RGB sync signal, sent through the 26-pin connector by the sync control circuit which sets the CRT controller and the external sync signal (or internal black burst) timing, is written once to the FIFO (First-In First-Out) memory. Since the dot clock, synchronized with the external sync signal (or internal black burst) by the PLL circuit, is used for read out from this memory, the RGB signal is sent to the mixer with complete synchronization where it is converted to a program signal. The Control Register and Address Decoder Circuit are used to control sync on/off depending on the program.

For details on other parts, see the "Hardware: Reference Manual".

