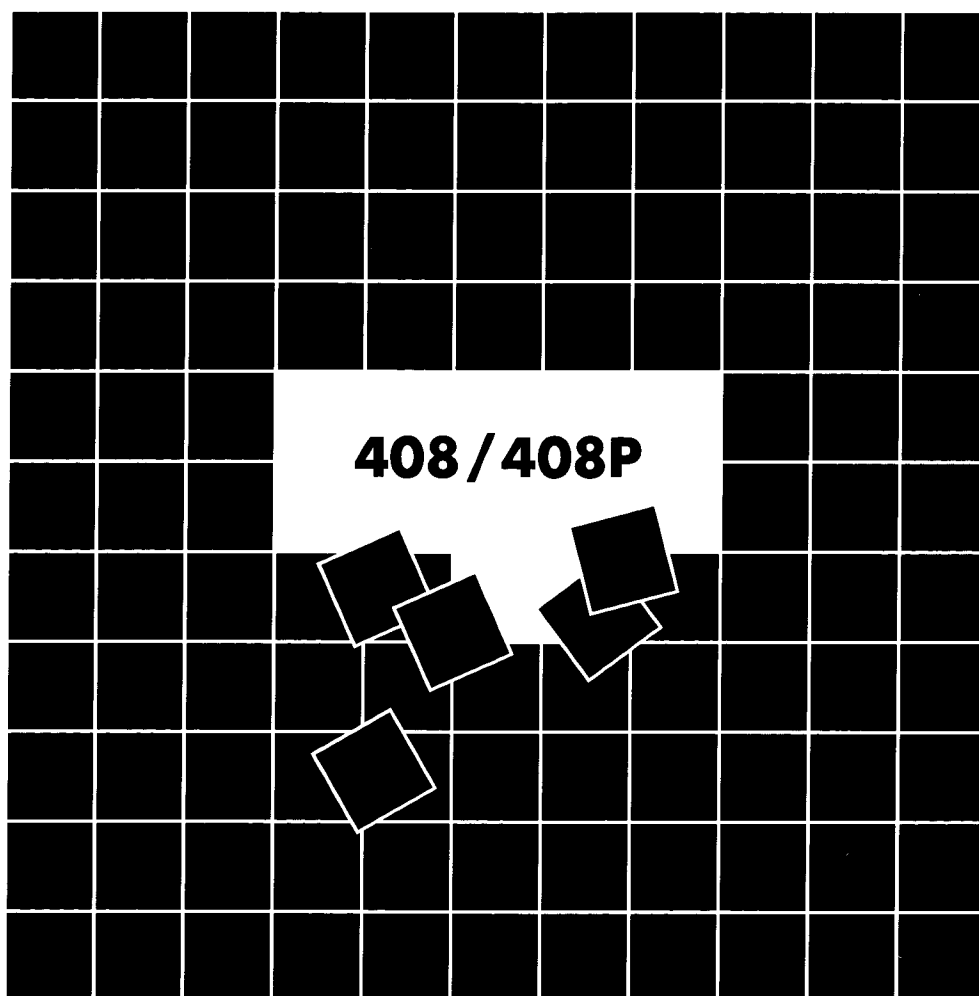


# LEADER

## PATTERN GENERATOR

INSTRUCTION MANUAL



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QUICK REFERENCE MANUAL



## 1. INTRODUCTION

The 408/408P is a universal pattern generator that can provide various types of pattern. The built-in video sweep and multiburst signal functions are used to check the frequency characteristics of video equipment. In addition, all-channel RF output allows the generator to adjust and check TV and VTR sets with built-in TV-band tuners. The GENLOCK and black burst functions make the universal pattern generator a synchronizing signal source for various types of video equipment.

The generator contains a synthesized RF output. A frequency can be set directly from the panel, or a country name, band, and channel (VHF, UHF, or CATV) can be selected from internal data. The 408 is based on the NTSC system; the 408P is based on the PAL system.

## 2. FEATURES

- Channel data is preset for VHF, UHF, and CATV.
- The GENLOCK function enables generator synchronization with another pattern generator.
- Audio signals of 1kHz and 400Hz can be output from internal sources.
- The video sweep function can be switched from 100kHz to 15MHz in two bands.
- The RF modulation function can modulate external video signals.
- The RGB output connector (8-pin square TTL output connector) is provided as standard.
- The 21-pin multi-connector is provided as standard.
- The Y/C separation terminals (S terminal and BNC) are provided as standard.
- Up to 100 addresses can be programmed. (The address range can also be set.)
- The remote function provides memory address control.
- The GPIB interface is optionally available.

### 3. SPECIFICATIONS

#### 3.1 Color Systems

408: NTSC-M  
408P: PAL-B, C, D, G, H, I, K, L

#### 3.2 Patterns

- (1) **Crosshatch** White line (100%, 15 (V) × 11 (H) ) on black background and white corner marker (100%) at upper-left corner of the screen.
- (2) **Convergence** Synthesized pattern of white line (100%, 15 (V) × 11 (H)) on black background and white dot (100%, 14 (V) × 10 (H))
- (3) **Window** White (100%) window on black background
- (4) **Checker** 8 (V) × 6 (H) white (100%) and black checker pattern
- (5) **5-step** Staircase luminance signal consisting of 5 equal steps  
40% modulation on/off (Chroma on/off selection)  
408 : 286mVp-p  
408P: 280mVp-p
- (6) **10-step** Staircase luminance signal consisting of 10 equal steps  
40% modulation on/off (Chroma on/off selection)  
408 : 286mVp-p  
408P: 280mVp-p
- (7) **Others** Several patterns selectable
- (8) **Demodulation patterns (DEM)**
- Chroma phase
- 408:
- Upper half of screen  
n lines: R-Y, - (R-Y), B-Y, - (B-Y), R-Y, - (R-Y), B-Y, - (B-Y)  
n + 1 lines: - (R-Y), R-Y, B-Y, - (B-Y), R-Y, - (R-Y), - (B-Y), B-Y
- Lower half of screen  
n lines: I, - I, Q, - Q, I, - I, Q, - Q  
n + 1 lines: - I, I, Q, - Q, I, - I, - Q, Q
- 408P:
- n lines: R-Y, - (R-Y), B-Y, - (B-Y), R-Y, - (R-Y), B-Y, - (B-Y)  
n + 1 lines: - (R-Y), R-Y, B-Y, - (B-Y), R-Y, - (R-Y), - (B-Y), B-Y
- (9) **Full-field color bars** 75% amplitude color bar  
The eight colors on screen from left to right are white, yellow, cyan, green, magenta, red, blue, and black. White can be switched to 75% or 100%.
- (10) **SMPTE color bars** Conforms to SMPTE ECR standard (1-1978).
- (11) **Rasters** 8 colors in RGB combinations

### (12) Multiburst

Frequencies: 408: 0.5, 1, 2, 3, 3.58, 4.2MHz fixed or variable (1 to 15MHz)  
408P: 0.5, 1, 2, 4, 4.8, 5.8MHz fixed or variable (1 to 15MHz)  
Amplitude: 50% or 100%, selectable  
Flatness:  $\pm 0.5\text{dB}$  (0.5 to 10MHz)  
 $\pm 1.0\text{dB}$  (10.1 to 15MHz)

### (13) Video sweep

Sweep frequency range: NARROW: 0.1 to 5MHz  
WIDE: 0.3 to 15MHz  
\* Two band selection  
Sweep speed: Synchronous with field scan  
Amplitude: 50% or 100%, selectable  
Flatness:  $\pm 0.5\text{dB}$  (0.1 to 10.0MHz)  
 $\pm 1.0\text{dB}$  (10.1 to 15.0MHz)  
Marker  
NARROW: 408: 0.5, 1, 2, 3, 3.58, 4.2MHz  
408P: 0.5, 1, 2, 3, 4, 5MHz  
WIDE: 2, 4, 6, 8, 10, 12, 14MHz

## 3.3 Sync Signal

No. of scanning lines: 408: 525 lines (interlaced scanning)  
408P: 625 lines (interlaced scanning)  
Line frequency: 408: 15.734kHz  
408P: 15.625kHz  
Field frequency: 408: 59.94Hz  
408P: 50Hz

## 3.4 Mode Control

- |                    |  |
|--------------------|--|
| (1) White          | White level selection of color bar/raster for 75% or 100%                          |
| (2) Red            | Red color bar/raster on/off  |
| (3) Green          | Green color bar/raster on/off  |
| (4) Blue           | Blue color bar/raster on/off   |
| (5) Burst          | Burst signal on/off  |
| (6) Luminance      | Luminance signal on/off  |
| (7) Chrominance    | Chrominance signal on/off  |
| (8) Invert         | Black-and-white inversion of crosshatch, convergence, window, and checker patterns |
| (9) Circle         | Synthesis of circle for crosshatch, convergence, window, and checker patterns      |
| (10) Moving marker | Synthesis of moving markers for all patterns                                       |

### 3.5 Amplitude Preset

Sync signal variable range:	408: 0 to 200% (286mV=100%) 408P: 0 to 200% (300mV=100%)
Burst signal variable range:	408: 0 to 200% (286mV=100%) 408P: 0 to 200% (300mV=100%)
Luminance signal variable range:	408: 0 to 200% (660mV=100%) 408P: 0 to 200% (700mV=100%)
Chrominance signal variable range:	408: 0 to 200% (678mV=100%) 408P: 0 to 200% (664mV=100%)
Setup signal variable range (Model 408 only):	0 to 20.0% (54mV=7.5%) (Settable for full-field color bars, SMPTE color bars, and raster. Fixed to 0% for other patterns.)

### 3.6 Front Panel Output

- Composite video signal output
  - Polarity: Positive (sync: negative)
  - Voltage: 1Vp-p fixed (into 75Ω load)  
0 to 1 Vp-p continuously variable (into 75Ω load)
  - Impedance: 75Ω
  - Amplitude accuracy:  $\pm 20$ mVp-p
  - Chroma phase accuracy: Within  $\pm 3\%$
- Trigger output
  - Mode: HD or VD selectable with panel switch
  - Output: TTL
- RF output
  - Frequency range: 30 to 900MHz
  - Frequency preset resolution: 10kHz,  $\Delta f$  function available in CH mode ( $\pm 10.00$ MHz)
  - Frequency switching time: 2 s or less
  - Frequency characteristic:  $\pm 5$  dB
  - Spurious:  $-10$ dBc
  - Voltage: Approx. 100μV to 10mV continuously variable
  - Impedance: 75Ω
  - Modulation polarity: Negative, Positive (According to country.)
- Sound output
  - Overlaid on RF output (ON/OFF possible)
  - System: Intercarrier system
  - Frequency: 408: 4.5MHz  
408P: 5.5, 6.0, and 6.5MHz selectable (According to country.)
  - Modulation signal: 400Hz, 1kHz, or external input
  - Modulation system: 408: FM  
408P: AM and FM (According to country.)
  - Frequency characteristic: 50Hz to 50kHz:  $\pm 1$ dB  
50kHz to 100kHz:  $\pm 3$ dB

### 3.7 Rear Panel Output

- Composite video output
  - Polarity: Positive (sync: negative)
  - Voltage: 1Vp-p fixed (into 75Ω load)  
0 to 1Vp-p continuously variable (into 75Ω load)
  - Impedance: 75Ω
  - Amplitude accuracy: ±20mVp-p
  - Chroma phase accuracy: Within ±3%
- Black burst output
  - Polarity: Positive (sync: negative)
  - Burst: 408: 0.286Vp-p (into 75Ω load) ±20mVp-p  
408P: 0.3Vp-p (into 75Ω load) ±20mVp-p
  - Sync signal: 408: 0.286Vp-p (into 75Ω load)  
408P: 0.3Vp-p (into 75Ω load)
  - Impedance: 75Ω
  - Output: Two BNC systems
- Subcarrier output
  - Frequency: 408: 3.579545MHz ± 50Hz  
408P: 4.43361875MHz ± 50Hz  
(±2Hz is available with option.)
  - Voltage: 2Vp-p (into 75Ω load)
  - Impedance: 75Ω
- Composite sync output
  - Polarity: Negative
  - Voltage: 4Vp-p (into 75Ω load)
  - Impedance: 75Ω
- Composite blanking output:
  - Polarity: Negative
  - Voltage: 4Vp-p (into 75Ω load)
  - Impedance: 75Ω
- Burst flag output:
  - Polarity: Negative
  - Voltage: 4Vp-p (into 75Ω load)
  - Impedance: 75Ω
- V. DRIVE output
  - Polarity: Negative
  - Voltage: 4Vp-p (into 75Ω load)
  - Impedance: 75Ω
- H. DRIVE output
  - Polarity: Negative
  - Voltage: 4Vp-p (into 75Ω load)
  - Impedance: 75Ω
- Sound output
  - Frequency: 400Hz and 1kHz
  - Voltage: 1Vp-p (into 1kΩ load)
  - Impedance: 1kΩ
  - No. of outputs: One each (total of two)
- R-Y output
  - Voltage: 0.7Vp-p (into 75Ω load)
  - Impedance: 75Ω



- B-Y output  
Voltage: 0.7Vp-p (into 75Ω load)  
Impedance: 75Ω
- Y output  
Voltage: 1Vp-p with SYNC (into 75Ω load)  
Impedance: 75Ω
- TTL output  
RGB output: Fan out 1 (positive logic)  
SYNC output: Fan out 1 (negative logic)  
H. SYNC and V. SYNC  
Connector: 8-pin square connector
- Y/C  
Voltage: Y: 1Vp-p (into 75Ω load)  
(between sync and white signals)  
C: 408: 0.286Vp-p (into 75Ω load)  
408P: 0.3Vp-p (into 75Ω load)  
Impedance: Y: 75Ω  
C: 75Ω  
Connector: Two systems: Round miniature connector (S connector) and BNC connector (Y output and C output)
- RGB multiple output  
408:

	Polarity	Voltage	Impedance
VIDEO	Positive (sync: negative)	1Vp-p (into 75Ω load)	75Ω
RGB	Positive	0.7Vp-p (into 75Ω load)	75Ω
SOUND		284mVrms	10kΩ
Ys		L 0 to 0.4V H 1 to 3V	75Ω
Ym		L 0 to 0.4V H 1 to 3V	75Ω
AV		L 0 to 0.4V H 3 to 5V	22kΩ

408P:

	Polarity	Voltage	Impedance
VIDEO	Positive (sync: negative)	1Vp-p (into 75Ω load)	75Ω
RGB	Positive	0.7Vp-p (into 75Ω load)	75Ω
SOUND		500mVrms	10kΩ
Ys		L 0 to 0.4V H 1 to 3V	75Ω
SLOW SW		L 0 to 2V H 9.5 to 12V	10kΩ

Connector: 21-pin connector (EIAJ21P)

\* The composite sync, composite blanking, burst flag, V. DRIVE, and H. DRIVE can be changed to [TTL OUT] by using an option.

### 3.8 Rear Panel Input

- EXT VIDEO input
  - Polarity: Positive (sync: negative)
  - Input voltage: 1Vp-p (into 75Ω load)
  - Input impedance: 75Ω
  
- GENLOCK input
  - Input type: 75Ω loop-through
  - Operating input range: 408: 286mV ± 3dB (sync signal amplitude)  
408P: 300mV ± 3dB (sync signal amplitude)
  - Horizontal delay: ± 2μs variable to input signal
  - Subcarrier lock range: 408: 3.579545MHz ± 50Hz  
408P: 4.43361875MHz ± 50Hz
  - Subcarrier phase: 0° to 360° continuously variable
  
- EXT SOUND
  - Frequency range: 50Hz to 100kHz
  - Input voltage: 1Vp-p (into 10kΩ load)
  - Input impedance: 10kΩ

### 3.9 Presettings

Up to 100 sets of pattern, mode, level, and RF frequency or channel can be stored in internal memory.

### 3.10 Others

Power requirements	AC100, 120, 220, or 240V ±10% (changable by internal tapping, maximum input voltage: 250V)
Frequency:	50/60Hz
Power consumption:	55VA
Environmental conditions	
Operating Temperature:	0 to 40°C
Humidity:	10 to 85%RH
Operating Environment:	Indoor use
Operating Altitude:	up to 2,000m
Overvoltage Category:	II
Pollution degree:	2
Dimensions:	426(W)x 88 (H) x 400(D)mm
Weight:	Approx. 9kg
Accessories:	BNC-BNC (3C-2V, 1m) cable ..... 1
	Power cord ..... 1
	Fuse ..... 1
	Instruction manual ..... 1

#### 4. PRECAUTIONS

- (1) Check the power supply voltage.  
The power supply voltage must be the rated voltage  $\pm 10\%$ . If the voltage is too low, the unit may not operate correctly. If the voltage is too high, the power supply section may overheat. The unit can be used in the four voltage ranges listed in Table 4.1 by changing the wiring.

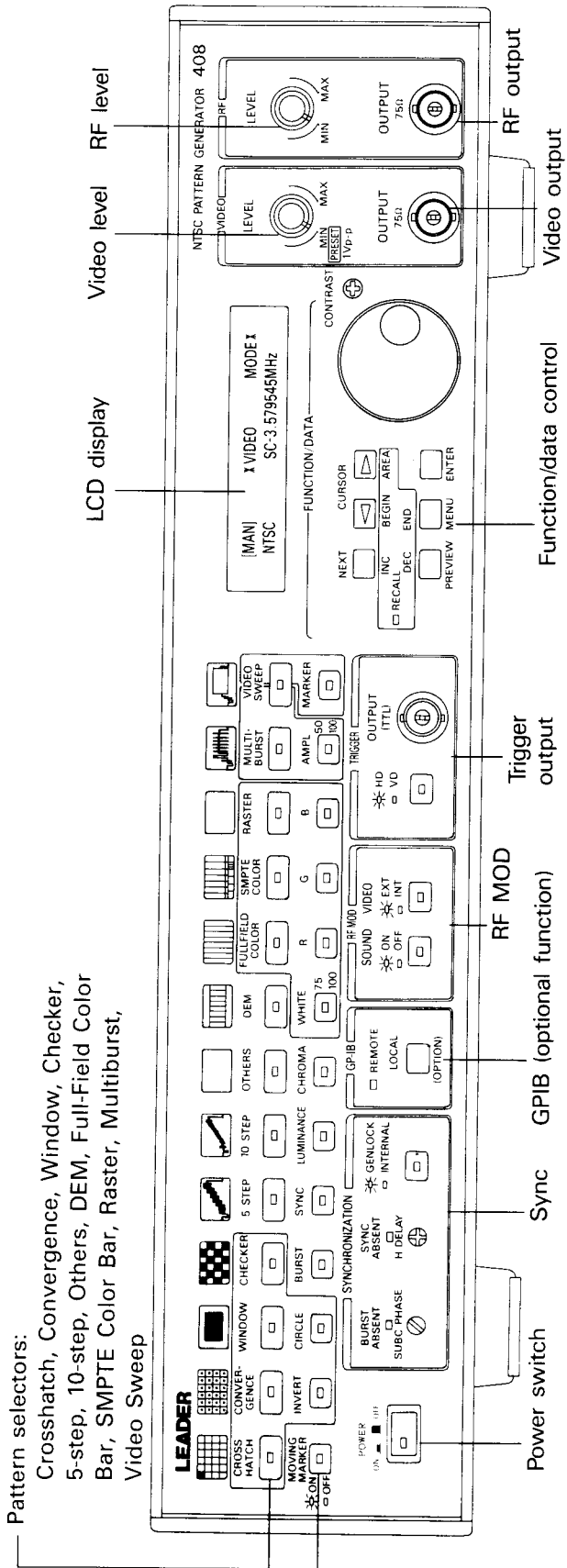
Table 4.1

Rated voltage	Operating voltage range	Fuse rating	Leader part number
100V 120V	90 to 110V 108 to 132V	2A Time lag	4363780002
220V 240V	198 to 242V 216 to 250V	1.25A Time lag	4363770009

- (2) The operating temperature range is 0°C to 40°C.  
When the unit is mounted in a rack, make sure that the internal temperature of the rack does not exceed 40°C. If necessary, install a fan on the rack or place the heat-generating equipment on top of the system.
- (3) Note the following when the unit is not used for a long time.  
The settings of the Model 408/408P are backed up for about one month. If the unit is not turned on for more than one month, the data stored in memory may be lost.
- (4) Do not apply an external voltage to the output connectors.  
This may cause a problem. If a bias voltage is being imposed on the circuit to be connected, remove the DC component with a capacitor before connecting the circuit. Do not apply a DC voltage exceeding  $\pm 15V$  to an input connector.

# 5. PANEL DESCRIPTIONS

## 5.1 Front Panel



Pattern selectors:

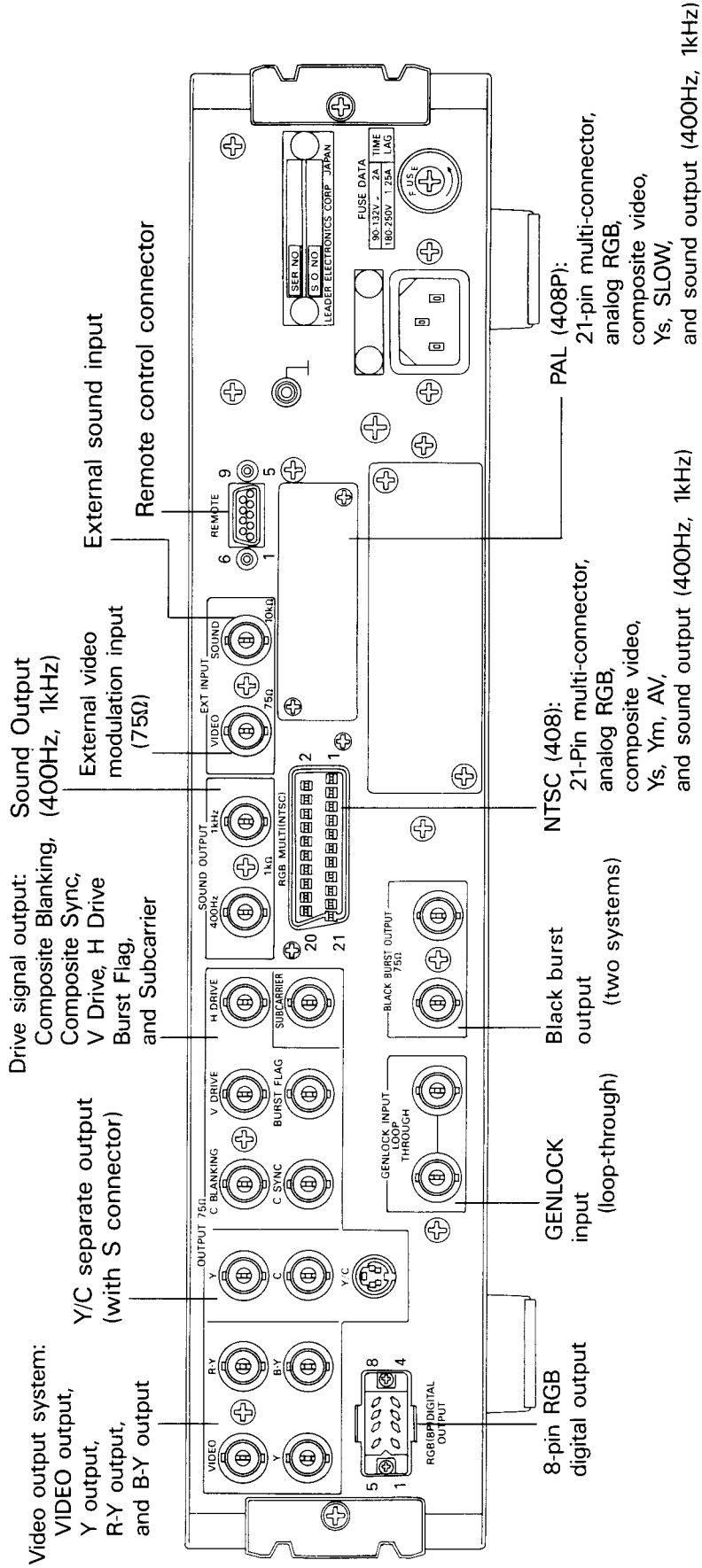
- Crosshatch, Convergence, Window, Checker,
- 5-step, 10-step, Others, DEM, Full-Field Color
- Bar, SMPTE Color Bar, Raster, Multiburst,
- Video Sweep

Mode control:

- Moving Marker, Invert, Circle, Burst, Sync, Lu-
- minance, Chroma, White, RGB, Amplitude,
- Sweep Marker

This figure shows the 408.

## 5.2 Rear Panel



This figure shows the 408.

## 6. OPERATING INSTRUCTIONS

The operation functions are indicated by arrows.

### 6.1 Power Supply

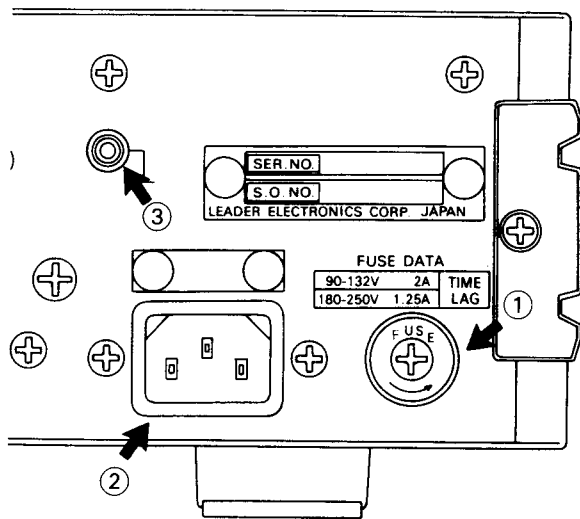


Figure 6.1

- ① Use a fuse of the rated voltage as specified on the rear panel. The unit is equipped with a fuse when shipped from the factory.

- ③ This is the cabinet ground terminal.

- ② Connect the accessory power cord to the inlet on the rear panel. Apply power of the voltage specified above the connector.

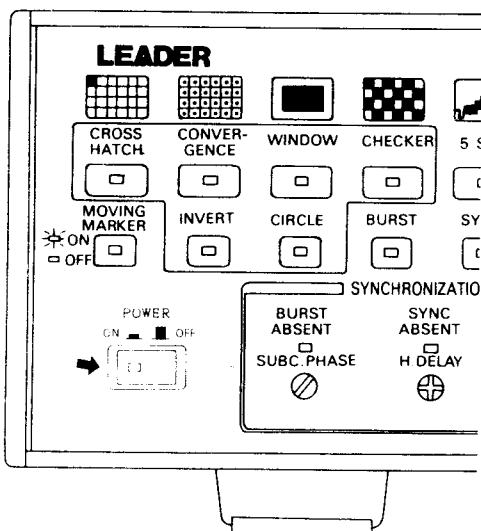


Figure 6.2

Press the switch in to turn on the power. The power lamp goes on. Press (release) the switch again to turn and the power off.

## 6.2 Pattern Selection

### 6.2.1 Pattern types

The following pattern selectors are arranged from the left side of the panel: Crosshatch, Convergence, Window, Checker, 5-step, 10-step, Others (Checker Color Bar, Horizontal Color Bar, Split Color, Bar, APL 10%, APL 90%, and Center

Cross), Demodulator, Full-Field Color Bar, SMPTE Color Bar, Raster, Multiburst, and Video Sweep. In addition, circle patterns and moving markers can be overlaid on specified patterns. See Section 6.2.2 for how to select patterns.

### 6.2.2 Selecting patterns

Pressing a pattern selection key turns on its lamp and outputs the specified pattern from the video and RF output connectors. Seven patterns belong to OTHERS: checker color bar, center cross, APL

10%, APL 90%, matrix, split color bar, and horizontal color bar. Pressing the Key displays a pattern name. The pattern can be changed sequentially by pressing the NEXT or PREVIEW key.

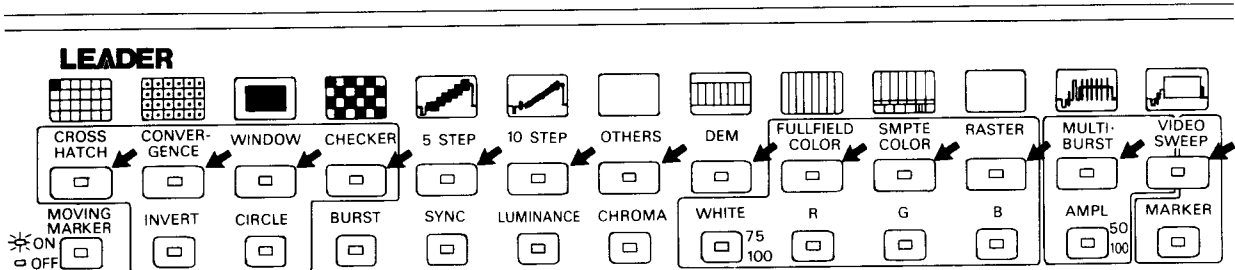


Figure 6.3

### 6.2.3 Black-and-white inversion of crosshatch, convergence, window, and checker patterns

Pressing the INVERT key turns on its lamp and inverts the pattern from black to white and white to black. Only the crosshatch, convergence, window, and checker patterns can be inverted.

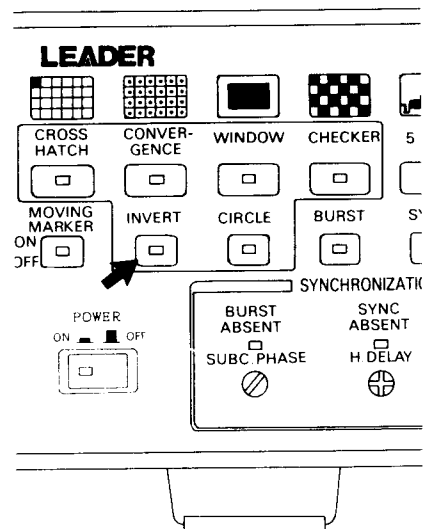


Figure 6.4

## 6.2.4 Outputting circle patterns

Pressing the CIRCLE key turns on its lamp and overlays a circle on the specified pattern.

The INVERT key is not effective for the circle pattern. There are two circle pattern modes: one is to overlay circles only on crosshatch, convergence, window, and checker patterns; the other is to overlay circles on all patterns.

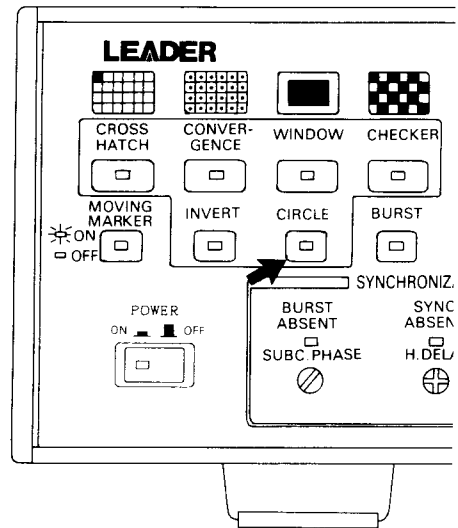


Figure 6.5

## 6.2.5 Outputting moving markers

Pressing the MOVING MARKER key turns on its lamp and displays a white moving marker below any pattern. The marker can be shifted from right to left and inverted by using the INVERT key.

Turn on the power switch while pressing the CIRCLE key. The following is displayed on the LCD panel:

[CIRCLE ON PATTERN]

■ NORMAL □ ALL

Select NORMAL to overlay circle patterns only on crosshatch, convergence, window, and checker patterns; select ALL to overlay circles on all patterns. When ALL is selected, the output may exceed the specified level due to multiburst, sweep, and color bar pattern selection.

Turn [□] of the desired mode to black by using the cursor keys, then press the ENTER key.

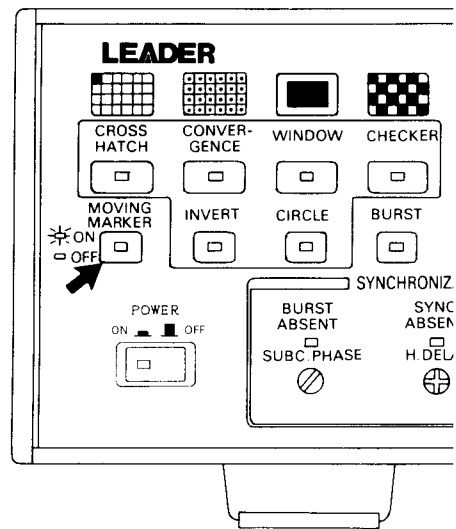


Figure 6.6



## 6.2.6 Selecting 100% or 50% level for multiburst or sweep output and sweep signal frequency

The multiburst or sweep output level can be set to 50% or 100% by using the AMPL key. Pressing the AMPL key turns on its lamp and sets the output level to 50%. When the lamp is off, the output level is 100%.

Pressing the MARKER key turns on its lamp and inserts a sweep marker to the sweep signal. The marker can be seen on a waveform or picture monitor by turning off the sweep signal to make the display dark (50% level).

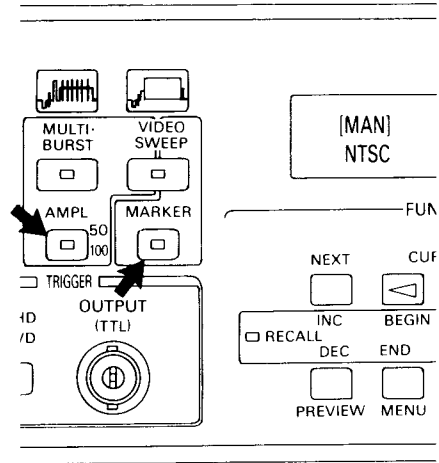


Figure 6.7

## 6.2.7 Setting last burst of multiburst pattern

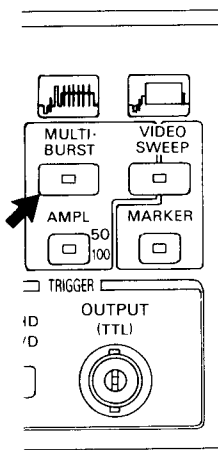


Figure 6.8

Pressing the MULTIBURST key displays either of the following screens on the LCD panel.

- ① (LAST BURST MODE)  
FIXED 4.2MHz
- ② (LAST BURST MODE)  
VAR 5MHz

Screen ① shows that the multiburst frequency is fixed to 4.2MHz (5.8MHz for model 408P). The last burst frequency displayed on Screen ② can be varied from 1 to 16MHz by using the jog dial. Pressing the NEXT or PREVIEW key alternately displays Screens ① and ②.

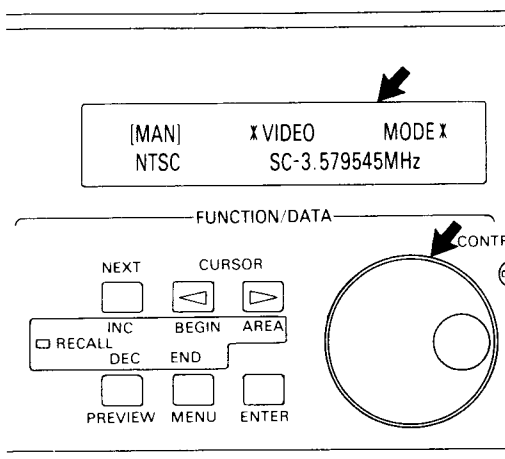


Figure 6.9

## 6.2.8 Selecting the sweep width

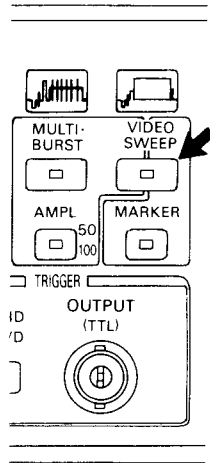


Figure 6.10

Pressing the VIDEO SWEEP key displays either of the following screens on the LCD panel.

(SWEEP WIDTH)  
NARROW

(SWEEP WIDTH)  
WIDE

The NARROW sweep width is from 100kHz to 5MHz.

The WIDE sweep width is from 300kHz to 15MHz. Use the NEXT or PREVIEW key to alternate the sweep width. This changes the marker at the same time.

## 6.2.9 Turning color bar or raster RGB on/off and selecting 100% or 75% white level

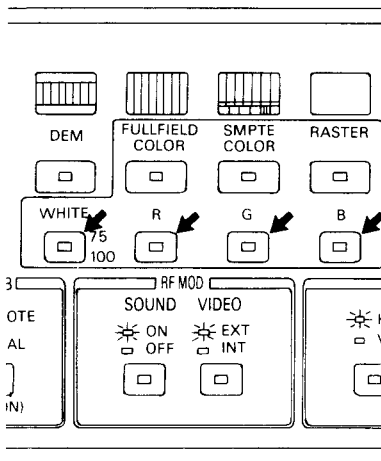


Figure 6.11

Pressing the RGB buttons turn the red, green, and blue colors of full-field, SMPTE color bar, and raster patterns on/off. When the colors are turned on, their lamps light. Eight colors (white, yellow, cyan, green, magenta, blue, and black) can be displayed by turning the RGB in raster patterns on/off.

When the FULLFIELD COLOR, SMPTE COLOR, or RASTER switch is turned on, SET UP LEVEL is displayed on the LCD panel. (The Model 408P does not display this message because it does not have a function to change the setup level.) To change the setup level to 0%, turn it off by using the NEXT or PREVIEW key. To use the setup level, turn it on. The video level is 1Vp-p when the setup level is 7.5%.

When all RGB switches are on, the white level can be changed to 50% or 100% by using the WHITE button.

The white level is 75% when the lamp is on and 100% when off. The key setting does not affect the next signal. The 100% white signal level below SMPTE and the white signal of analog and digital RGB output do not change.

### 6.2.10 Turning chroma and luminance signals on/off

Pressing the CHROMA key turns the chroma signal for each pattern on/off. The chroma signal is output when the lamp is on, but not when the lamp is off. However, analog and digital RGB output does not change.

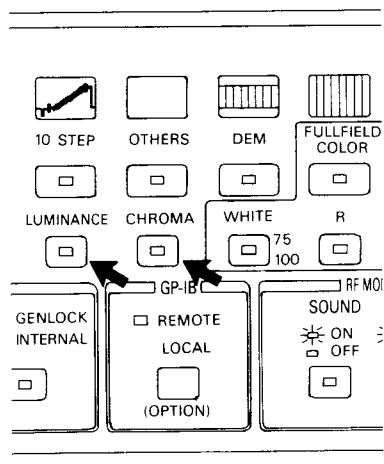


Figure 6.12

The luminance signal of each pattern can be turned on/off by pressing the LUMINANCE key. However, the color bar setup signal does not change.

### 6.2.11 Patterns and mode settings

Table 6.1

Pattern	Mode						
	INVERT	MOVING MARKER	WHITE 75, 100	RGB	AMPL 50, 100	SWEEP MARKER	CIRCLE
Sweep	—	○	—	—	○	○	* ○
Multiburst	—	○	—	—	○	—	* ○
Raster	—	○	○	○	—	—	* ○
SMPTE color bar	—	○	○	○	—	—	* ○
Full-field color bar	—	○	○	○	—	—	* ○
DEM	—	○	—	—	—	—	* ○
Checker color bar	—	○	—	—	—	—	* ○
Vertical color bar	—	○	—	—	—	—	* ○
Reverse color bar	—	○	—	—	—	—	* ○
APL 10% (APL 12.5%)	—	○	—	—	—	—	* ○
APL 90% (APL 87.5%)	—	○	—	—	—	—	* ○
Center cross	—	○	—	—	—	—	* ○
10 STEP	—	○	—	—	—	—	* ○
5 STEP	—	○	—	—	—	—	* ○
Checker	○	○	—	—	—	—	○
Window	○	○	—	—	—	—	○
Convergence	○	○	—	—	—	—	○
Crosshatch	○	○	—	—	—	—	○

○ : Applicable patterns

\* : Modes that can be set at power-on. (See 6.2.4)

### 6.2.12 Output and Patterns

Table 6.2

Pattern	Output				
	Composite video	Component video	TTL RGB	Analog RGB	Y/C
Sweep	○	○	—	—	Y ○
Multiburst	○	○	—	—	Y ○
Raster	○	○	○	○	○
SMPTE color bar	○	○	○	○	○
Full-field color bar	○	○	○	○	○
DEM	○	○	—	—	○
Checker color bar	○	○	○	○	○
Vertical color bar	○	○	○	○	○
Reverse color bar	○	○	○	○	○
APL 10%	○	○	—	—	○
APL 90%	○	○	—	—	○
Center cross	○	○	○	○	○
10 STEP	○	○	—	○	○
5 STEP	○	○	—	○	○
Checker	○	○	○	○	○
Window	○	○	○	○	○
Convergence	○	○	○	○	○
Crosshatch	○	○	○	○	○
Circle	○	○	○	○	○
Moving marker	○	○	○	○	○

○: Output pattern

### 6.3 Turning Sync and Burst Signals On/Off

Pressing the BURST key turns the burst signal for a composite video signal, Y/C output, or component signal on/off.

The burst signal is on when the lamp is on, and off when the lamp is off.

Analog, digital, and RGB output do not change.

Pressing the SYNC key turns the sync signal for a composite video and component signals on/off.

The sync signal is on when the lamp is on, and off when the lamp is off.

The sync signal for analog, digital, and RGB output does not change.

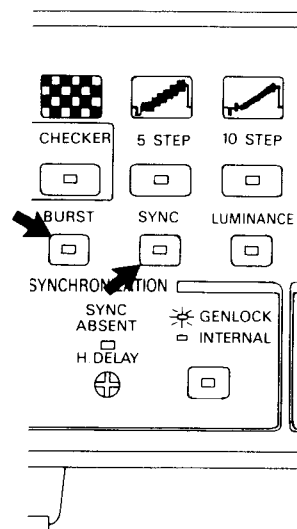


Figure 6.13

## 6.4 Setting Luminance, Chroma, Burst, and Sync Signal Levels

### 6.4.1 Changing general level or composite video signal

The general composite video output level can be changed as follows. Turn the knob fully counter-clockwise to set the level to the standard value of 1Vp-p. The level varies within the range from 0 to 1Vp-p. Note that 1Vp-p is the standard value when the luminance and sync signal levels are set to 100%. When the levels set to 200%, the standard value is doubled to 2Vp-p.

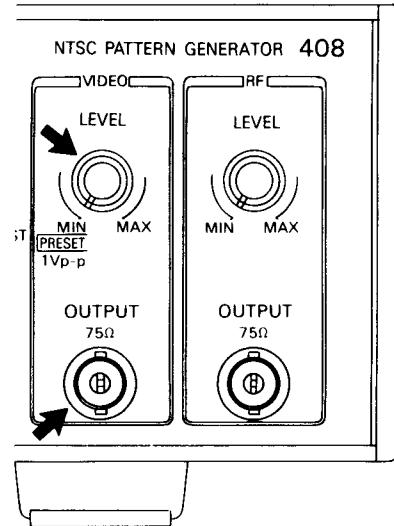


Figure 6.14

This is the composite video signal output connector with an output impedance of 75Ω. This connector is located on the front and rear panels.

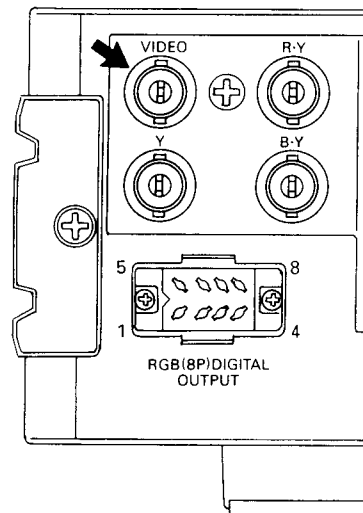


Figure 6.15

## 6.4.2 Changing luminance, chroma, burst, sync signal, and setup levels

The luminance chroma, burst, and sync signal levels of Models 408/408P can be varied independently or at the same time in a range from 0 to 200% by using the jog dial.

This mode applies to composite video and component output. To change the level, set one of the following modes by using the function keys.

### (1) MANUAL MENU → VIDEO → VIDEO MODE

This temporarily changes the level.

### (2) MANUAL MENU → RF FREQUENCY → FREQ → VIDEO AMPLITUDE

This temporarily changes the video level when the RF frequency is set.

### (3) MAIN MENU → PROGRAM MENU → ADDRESS PROGRAM → VIDEO → VIDEO MODE

This programs the video level.

### (4) MAIN MENU → PROGRAM MENU → ADDRESS PROGRAM → RF FREQUENCY → FREQ → VIDEO AMPLITUDE

This programs the video level with the RF frequency. The above four modes can be used to change the signal levels. To enter each mode, see Section 6.8 for how to use each function key.

## 6.5 Setting RF Channel Frequency

The RF output signal frequency of Models 408/408P can be varied within the range from 30 to 900MHz. The frequency can be set directly or by using the channels of each country.

To change the RF frequency, set one of the following modes by using the function keys.

### (1) MANUAL MENU → TV CHANNEL

This temporarily sets a channel of the country.

### (2) MANUAL MENU → RF FREQUENCY

This mode temporarily sets the RF frequency.

### (3) PROGRAM MENU → ADDRESS PROGRAM → TV CHANNEL

This mode programs the RF channel for each country.

### (4) PROGRAM MENU → RF FREQUENCY

This mode directly programs the RF frequency.

### (5) PRESET MENU → COUNTRY CHANNEL

This mode presets only the desired channels of the country.

The above five modes can be used to set the frequency.

The countries which use settings 408 and 408P are as shown in Table 6-3.

Refer to the Quick Reference Manual for the channel frequencies. The above four modes can be used to change the signal levels.

To enter each mode, see Section 6.8 for how to use each function key.

Table 6-3

408		408P	
JAPAN	VHF	CCIR	V (B)
	UHF	CCIR	V (C)
	CATV	CCIR	U (G)
USA	VHF	CCIR	U (H)
	UHF	CCIR	U (I)
	CATV	CCIR	CV (B)
TAIWAN	V	CCIR	CU (G)
		INDONESIA	V
		UNITED	
		KINGDOM	V
		ANGOLA	V
		IRELAND	V
		ITALY	V
		AUSTRALIA	V
		NEW	
		ZEALAND	V
		SOUTH	
		AFRICA	V
		CHINA	V
		CHINA	U

## 6.6 Setting Analog RGB Output of 21-pin Multi connector

Models 408/408P have a 21-pin connector whose control pins can be set freely. The control connectors are Ys, Ym, and AV for 408, and Ys and SLOW for 408P. Their functions are as follows:

- 408

Ys HI: Switches the output to analog RGB signals.

LO: Switches the output to internal signals of the TV.

Ym HI: Sets internal signals of the TV to the half-tone mode.

LO: Sets internal signals of the TV to the full-tone mode.

AV HI: Displays a signal from the 21-pin connector on the monitor.

LO: Switches the output to internal signals of the TV.

The internal signals refer to video and RF input signals of the TV. The above functions can be set in the following two modes:

### (1) MANUAL MENU → MULTI RGB CONTROL

The Ys, Ym, and AV functions are temporarily controlled in this mode.

### (2) PROGRAM MENU → ADDRESS PROGRAM

The Ys, Ym, and AV functions are programmed in this mode. To enter each mode, see Section 6.8 for how to use the function key.

- 408P

- Ys

This function selects the 21-pin RGB signal or broadcast/video signal. To select the broadcast or video signal, use the SLOW function.

Ys	LO	Broadcast/video signal
	HI	21-pin RGB signal

- SLOW

This function selects the broadcast signal or video signal.

SLOW	LO	Broadcast signal
	HI	Video signal



## 6.7 Setting the RF Mod

### 6.7.1 Video and sound signal modulation

This key selects the internal or an external video signal source for modulation into an RF signal. When the lamp is on, an external video signal is used. The input voltage of the signal must be 1Vp-p. The external video signal input connector is located on the rear panel.

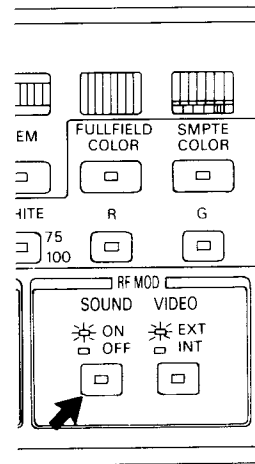


Figure 6.16

This key is used to modulate a sound signal into an RF signal. Press the key to display the current modulation mode on the LCD panel. Then press the [NEXT] or [PREVIEW] to sequentially change the mode and select the desired setting: INT 1kHz, INT 400Hz, EXT SIGNAL, SIF CARRIER ONLY, or SIF CARRIER OFF.

The meanings of the messages are as follows:

INT 1kHz:	Internal oscillator (1kHz signal)
INT 400Hz:	Internal oscillator (400Hz signal)
EXT SIGNAL:	Signal through external input connector on rear panel
SIF CARRIER ONLY:	Non-modulated carrier signal only
SIF CARRIER OFF:	No carrier signal

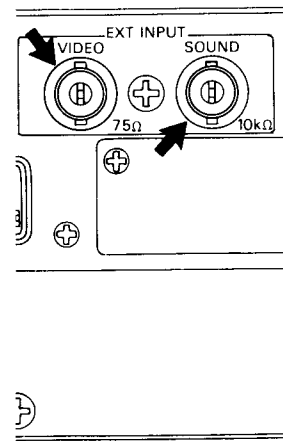


Figure 6.17

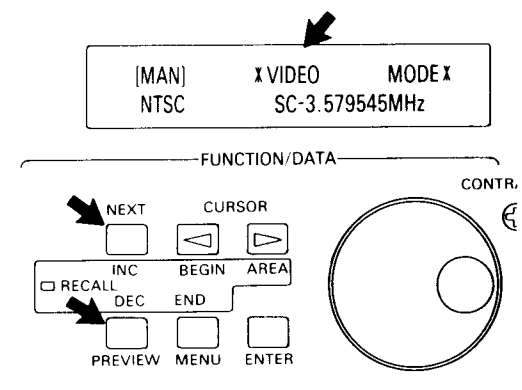


Figure 6.18

## 6.8 Function Keys and Setting Items

### 6.8.1 Function Key Usages

The unit has six types of function keys: NEXT, PREVIEW, two CURSORS, ENTER, MENU, and jog dial.

The level, channel, RF frequency, and program reset functions can be used freely with the basic keys and LCD panel. This section explains the basic key usages and control items.

Figure 6.19 shows the items in a tree structure. The MAIN MENU comes first in the directory and the level deepens from left to right (the numbers become larger). To advance to deeper levels, use

the ENTER key. Pressing the ENTER key displays the next item in the directory. When there are multiple items, the NEXT or PREVIEW key sequentially displays the items. At the bottom level, set your desired function by using the ENTER, MENU, jog dial, and CURSOR keys.

To return to higher levels, press the MENU key. Each time the key is pressed, the unit control returns to the higher level. Also refer to the Quick Reference Manual for the function key usages.

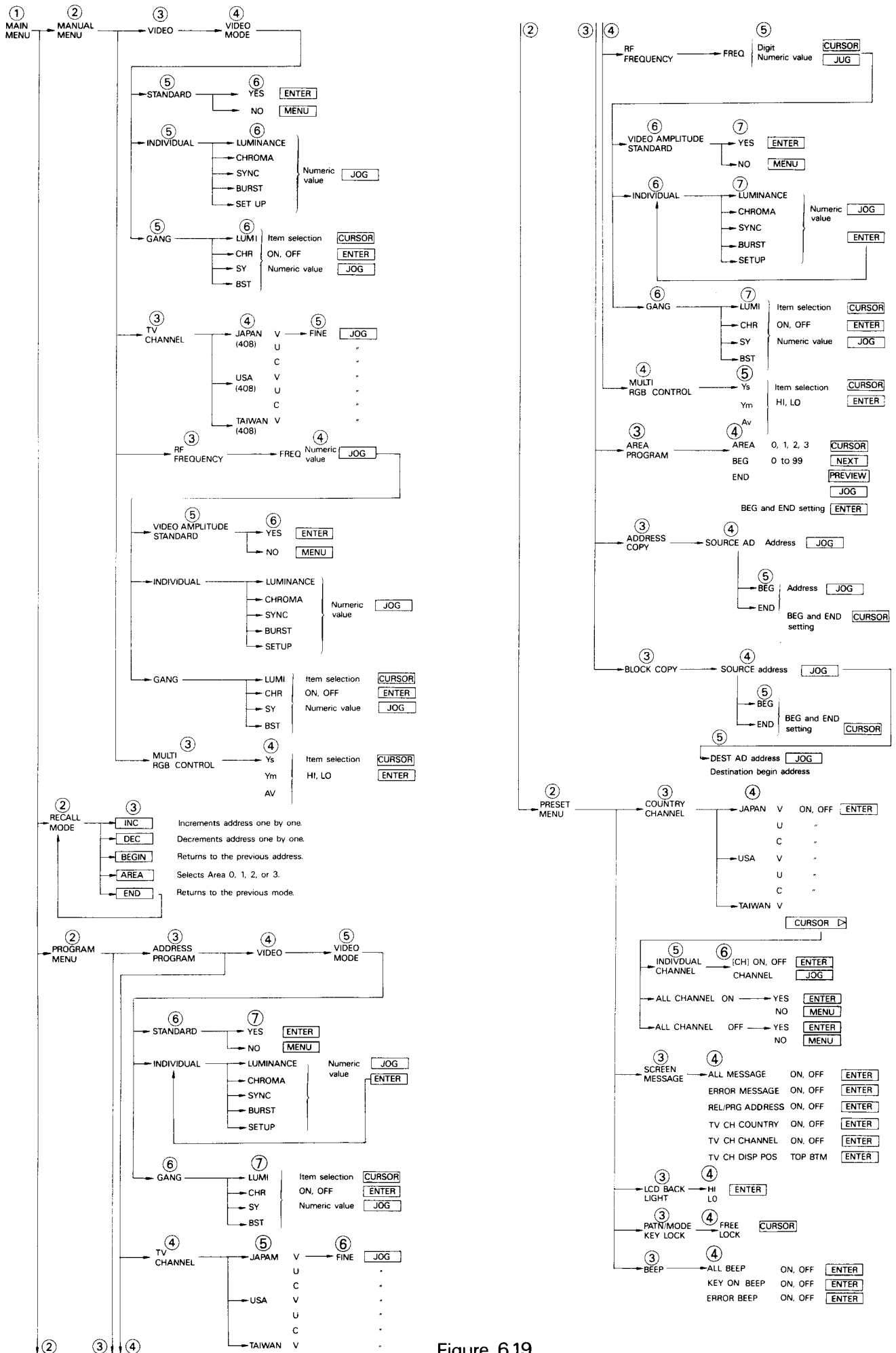


Figure 6.19

## 6.8.2 Explanation of each item

### (1) MANUAL MENU

The video level, RF channel, and MULTI RGB CONTROL settings can be changed temporarily in this mode.

### (2) RECALL MODE

Programmed settings can be recalled in this mode.

### (3) PROGRAM MENU

The pattern, video level, RF channel, frequency, MULTI RGB CONTROL, and program area can be set in this mode.

### (4) PRESET MENU

The RF channel recall conditions, message display on the monitor, LCD backlight brightness, pattern key lock, and beep on/off can be set in this mode.

### (5) VIDEO MODE

Only video signals without RF signals can be used in this mode. From this mode, the video level change mode can be easily activated. The following items can be set.

**STANDARD:** The internal standard level is set. The value is prescribed in the specifications manual.

**INDIVIDUAL:** The LUMINANCE, CHROMA, SYNC, BURST, and SETUP levels can be set by using the jog dial in the range from 0% to 200% (0% to 20% for the SETUP level).

**GANG:** The LUMINANCE, CHROMINANCE, SYNC, and BURST levels can be changed at the same time with the jog dial.

### (6) TV CHANNEL

This mode is used to set RF frequencies according to the TV channels of each country by using the jog dial.

See Section 6.5 for the names of countries whose TV channels can be set. A set frequency can be adjusted in the range of  $\pm 10\text{MHz}$  by using the FINE function with the jog dial.

### (7) RF frequency

RF frequencies can be set directly in this mode. The VIDEO AMPLITUDE mode is attached to this mode to enable video levels to be set without activating the VIDEO mode.

### (8) MULTI RGB CONTROL

The Ys, Ym, and AV (Ys and SLOW for Model 408P) can be controlled in this mode by using the CURSOR and ENTER keys.

### (9) ADDRESS PROGRAM

The VIDEO MODE, TV CHANNEL, RF FREQUENCY, and MULTI RGB CONTROL can be programmed in this mode.

### (10) AREA PROGRAM

Four areas can be set by specifying their BEGIN and END addresses.

### (11) ADDRESS COPY

The programmed contents can be copied from one address to another. If part of the contents should be changed, copy only the necessary part for quicker programming.

### (12) BLOCK COPY

This mode is used to copy the programmed contents from an address to another in units of blocks.

### (13) COUNTRY CHANNEL

This is used to set an RF channel. The Models 408/408P can accept the channels of various countries, but it is also possible to specify a country or channel. To specify a channel, use the INDIVIDUAL CHANNEL mode.

(14) SCREEN MESSAGE

The Models 408/408P display a function on the LCD panel. Characters can be overlaid on composite signals and checked on the monitor. ALL MESSAGE can be used to turn all characters on/off. ERROR MESSAGE outputs a message in case of an incorrect key operation.

RCL/PRG ADRES turns the recall and program address display on/off. TVCH COUNTRY turns the RF channel and country display on/off.

(15) LCD BACK LIGHT

This is function is used to change the back-light brightness of the LCD display panel in two steps.

(16) PATN/MODE KEY LOCK

This function is used to lock the pattern keys on the panel so that the pattern cannot be changed by mistake. All keys (except the function keys) are locked.

(17) BEEP

When a panel key is pressed, a beep sound may be generated. ALL BEEP turns all beep functions on/off. KEY ON BEEP turns the function that generated a beep sound on/off when a key is pressed. ERROR BEEP turns the function that generated a beep sound in case of an error.

## 6.9 Trigger Output Signal Selection

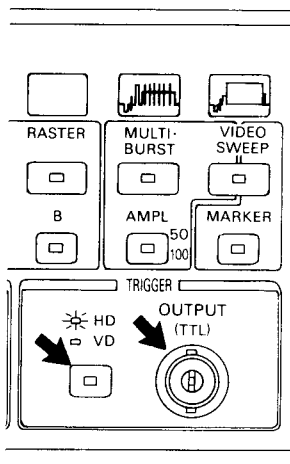


Figure 6.20

The trigger output connector is used to monitor a waveform on an oscilloscope. It outputs negative HD and VD timing signals at a TTL level. Select HD or VD by using the key. The lamp goes on in the HD output mode and off in the VD output mode.

## 6.10 RF Output

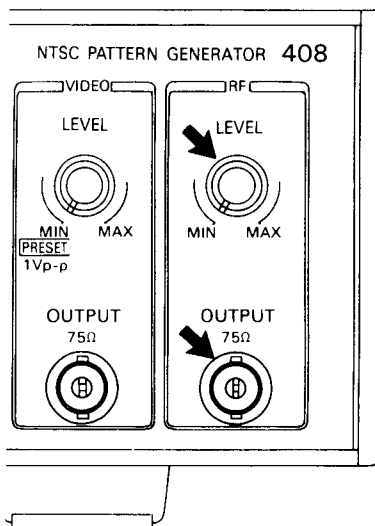


Figure 6.21

The RF output frequency range is from 30 to 900MHz. (See Section 6.5 for how to set the channel.) The output level can be varied from 10mV to 100 $\mu$ V by using the level control knob. The setting range differs slightly depending on the frequency.

## 6.11 GENLOCK Method

The GENLOCK function synchronizes Models 408/408P with an external black burst signal. Apply a 0.44Vp-p burst signal to the GENLOCK INPUT connector.

The burst signal frequency error (fsc) of the 408 is 3.579545MHz ± 50Hz. The sync signal frequency (fH) must have a ratio of 4fsc/910. The burst signal frequency error (fsc) of the 408P is 4.43361875MHz ± 50Hz. Sync signal frequencies fH and fsc must have the following relationship:

$$f_{sc} = \frac{1135}{4} f_H + 25\text{Hz}$$

Because loop-through input connectors are used, the one not being used must be terminated with a 75Ω.

To activate the GENLOCK mode, press the GENLOCK/INTERNAL key until the lamp comes on. When a normal-level black burst signal is input, the SYNC ABSENT and BURST ABSENT lamps remain off. When there is no black burst signal or the signal level is insufficient, the lamps light.

Adjust the chroma phase difference with the input burst signal by using the SUBC PHASE adjustment; adjust the sync signal phase difference by using the H DELAY adjustment. The chroma phase adjustment range is 360° and the H DELAY adjustment range is ± 2μs or more.

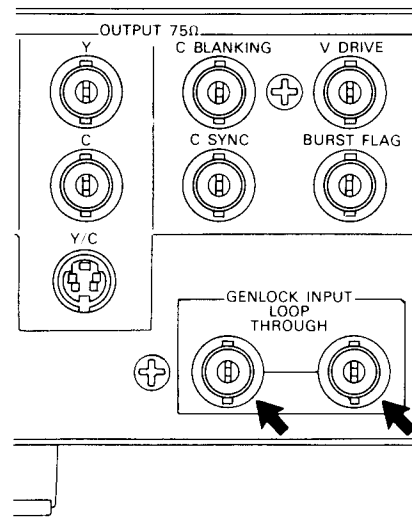


Figure 6.22

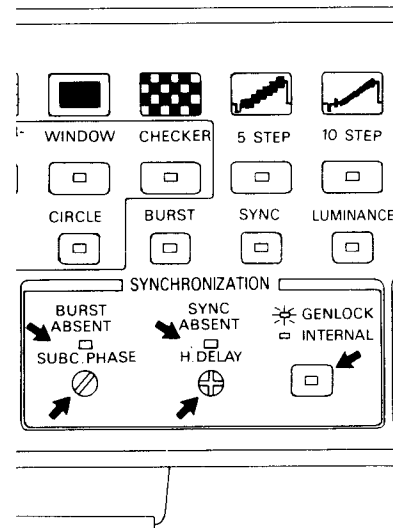


Figure 6.23

## 6.12 Video Signal Output

### 6.12.1 Types of Composite Video, Component Video, and Y/C Output Signals

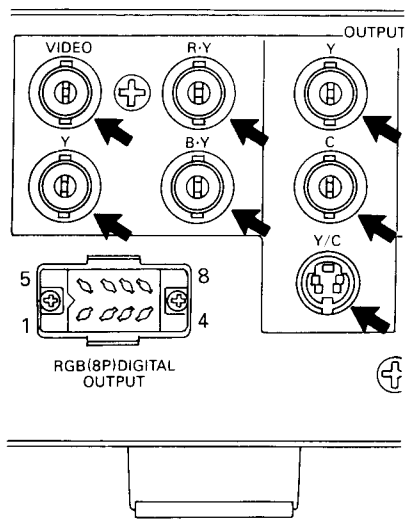


Figure 6.24

#### SIGNALS

- Y : Luminance signal
- C : Chroma signal
- S : Sync signal
- B : Burst signal
- R-Y : Color difference signal
- B-Y : Color difference signal

Table 6.3

Signal		Output Level	
Name	Type	Preset value	Variable range
Composite video	Y, C, S, B	1Vp-p	Y, C, S, B simultaneous variable: 0% to 200% Y, C, S, B independent variable: 0% to 200%
Component Y	Y, S	1Vp-p	Y, S independent variable: 0% to 200%
Component R-Y	R-Y	0.7Vp-p	R-Y and B-Y simultaneous variable: 0% to 200%
Component B-Y	B-Y	0.7Vp-p	
Y of Y/C output	Y, S	1Vp-p	Y, S independent variable: 0% to 200%
C of Y/C output	C, B	(408: 0% setup) 0.678Vp-p (408: 7.5% setup) 0.627Vp-p (408P) 0.664Vp-p	C, B independent variable: 0% to 200%

- When using R-Y and B-Y, burst must be selected OFF position.



### 6.12.2 TTL RGB signal output

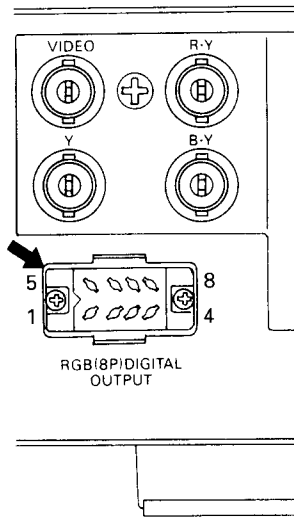


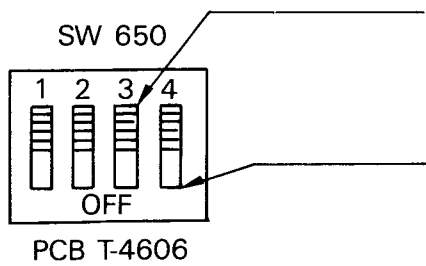
Figure 6.25

This TTL-level RGB digital signal output connector is used to inspect a computer monitor. The connector has eight pins.

Table 6.4

Pin. No.	Signal name	Polarity
1	NC	—
2	R	Positive
3	G	Positive
4	B	Positive
5	GND	—
6	GND	—
7	H sync	Negative
8	V sync	Negative

Although the standard sync signal polarity is negative, it can be changed to positive by using an internal DIP switch.



PCB T-4606

Figure 6.26

- ① The switch sets the polarity of the H sync signal. The lever is normally set upward. Set the lever down to change the polarity to positive.
- ② The switch sets the polarity of the V sync signal. The level is normally set upward. Set the lever down to change the polarity to positive.

### 6.12.3 21-pin multiconnector

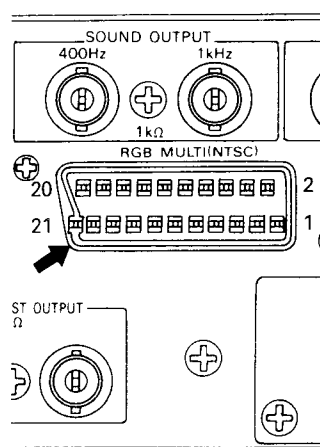


Figure 6.27

The 21-pin multiconnector is compatible with TV sets. The terminal outputs analog RGB, sound, and composite video signals. The Ys, Ym, and AV (Ys and SLOW) signals are also output as control signals. The connector is the same as that attached to new media monitors, and can be used for character broadcast or computer display. See Section 6.6 for details on controlling the Ys, Ym, and AV (Ys and SLOW) signals.

Table 6.5

a) 408

Pin No.	Signal name	Output level
1	NC	
2	AUDIO OUT (L) 1 kHz	142mVrms
3,4	GND	
5	NC	
6	AUDIO OUT (R) 400Hz	142mVrms
7,8	GND	
9	NC	
10	VIDEO OUT	1Vp-p
11	AV CONT	TTL level
12	Ym	TTL level
13,14	GND	
15	R	700mVp-p
16	Ys	TTL level
17,18	GND	
19	G	700mVp-p
20	B	700mVp-p
21	GND	

b) 408P

Pin No.	Signal name	Output level
1	AUDIO OUT (R)	500mVrms
2	NC	
3	AUDIO OUT (L)	500mVrms
4,5	GND	
6	NC	
7	B	700mVp-p
8	SLOW SW	0/12V
9	GND	
10	NC	
11	G	700mVp-p
12	NC	
13,14	GND	
15	R	700mVp-p
16	Ys	0/3V
17,18	GND	
19	VIDEO OUT	1Vp-p
20	NC	
21	GND	

## 6.13 Sync Signal

### 6.13.1 Blanking, sync, VH, HD, burst flag, and subcarrier signal output

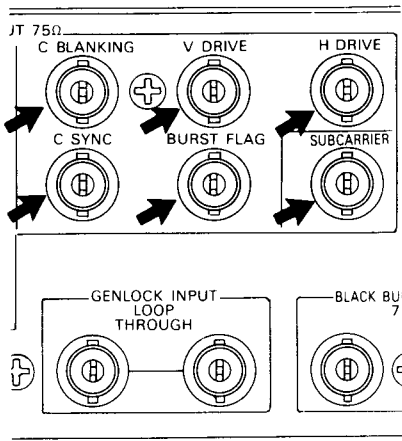


Figure 6.28

These connectors output signals needed to generate video signals. The signals are also used to synchronize other equipment. The subcarrier signal is used to carry color signals.

Table 6.6 Signal names, output levels, and polarities

Signal name	Output level	Polarity
H DRIVE	-4V	Negative
V DRIVE	-4V	Negative
Composite sync	-4V	Negative
Composite blanking	-4V	Negative
Burst flag	-4V	Negative
Subcarrier	2Vp-p	Positive and negative

The output levels are set when the connectors are terminated with 75Ω.

### 6.13.2 Black burst signal

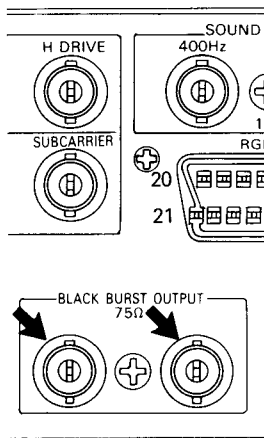


Figure 6.29

The black burst signal is a sync signal consisting of sync and burst signals. It enables the GEN LOCK function to be used with other equipment. There are two output systems, and the output level is 0.44Vp-p.

### 6.14 Sound signal output

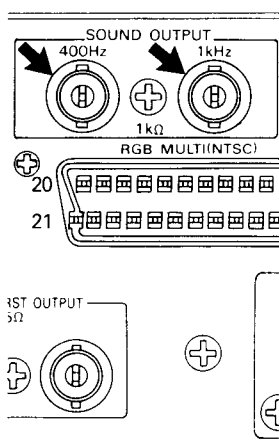


Figure 6.30

These are the sound output signal connectors. To simplify the inspection of stereo systems 1kHz and 400Hz signals are simultaneously output. The output level is 1Vp-p.

## 6.15 Remote Control

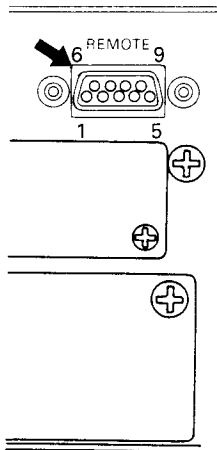


Figure 6.31

Table 6.7 lists the pin numbers and names of the control connector.

Table 6.7

Pin No.	Name
1	GND
2	$\overline{\text{INC}}$
3	$\overline{\text{DEC}}$
4	$\overline{\text{BEG}}$
5	Connect to GND.
6	$\overline{\text{ST}}$
7	BANK 0
8	BANK 1

This is the remote control connector. External patterns can be input through this connector for remote control.

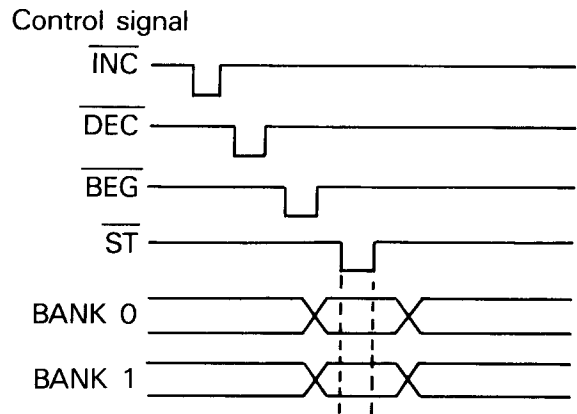


Figure 6.32

The Models 408/408P must first be set to the RECALL mode to enable remote control. Turn the remote connector input in this state on and off to set the RECALL mode.

The control functions are as follows (TTL signal level):

- $\overline{\text{INC}}$  : Increments the RECALL mode address one by one.
- $\overline{\text{DEC}}$  : Decrements the RECALL mode address one by one.
- $\overline{\text{BEG}}$  : Returns the RECALL mode address to the start point.
- $\overline{\text{ST}}$  : Sets the area specified by BANKs 0 and 1.

- BANKs 0 and 1 : Specifies an area. Table 6.8 lists the relationships between the areas and BANKs.

The INC, DEC, BEG, and ST signals must not go low at the same time.

Table 6.8

BANK 1	BANK 0	Area
0	0	0
0	1	1
1	0	2
1	1	3

## 7. TEST PATTERNS

### 7.1 Color Bar Patterns

#### 7.1.1 Full-field color bar pattern

The full-field color bar pattern consists of eight-color vertical bars. The figures below show the

pattern and video waveform.

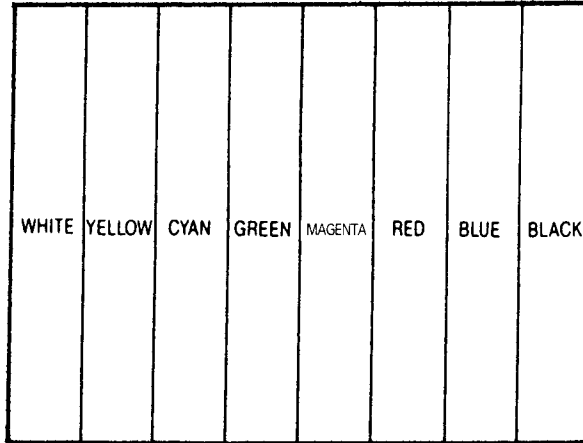
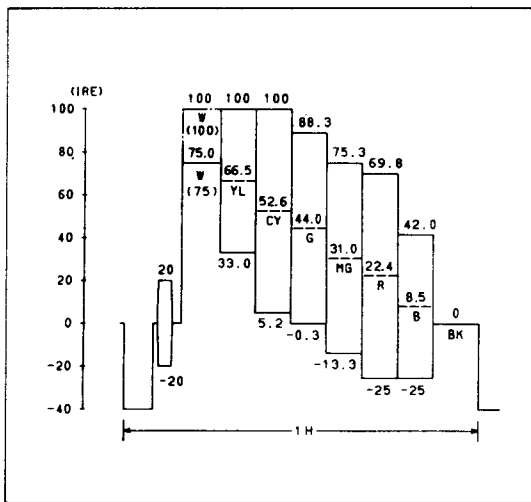
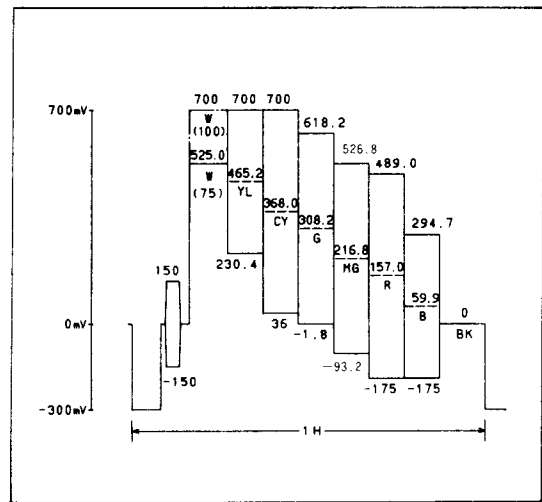


Figure 7.1



408



408P

Figure 7.2

This pattern is commonly used to inspect the characteristics of video equipment.

### 7.1.2 SMPTE color bar pattern

The SMPTE color bar pattern is based on the SMPTE ECR-1-1978 standard color bars. The figures below show the pattern and video waveform.

The color bar is generated by adding a chroma set signal (reverse blue bar) and black set signal to the EIA color bars. The chroma set signal con-

sists of four color bars containing blue (with an arrangement opposite that of the EIA color bar) and black sections. The black set signal has a setup level of  $7.5 \text{ IRE} \pm 4 \text{ IRE}$  (408), pedestal level  $\pm 4\%$  (408P). The first bar is slightly darker; the third bar is slightly lighter than standard black.

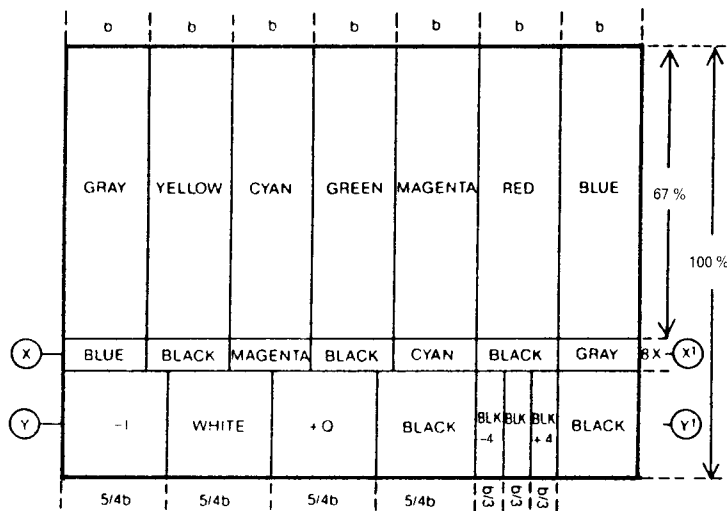


Figure 7.3

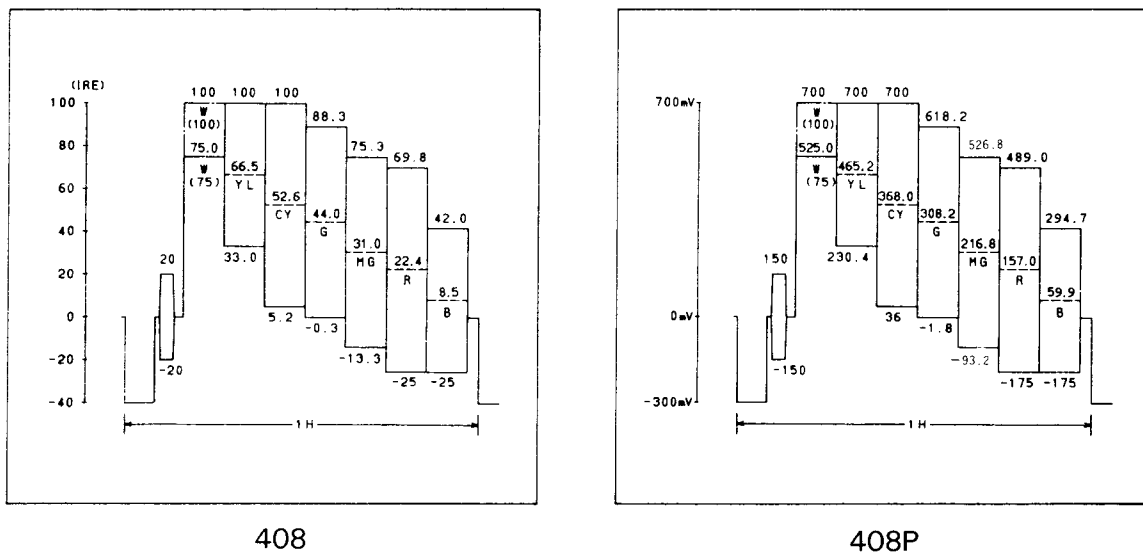
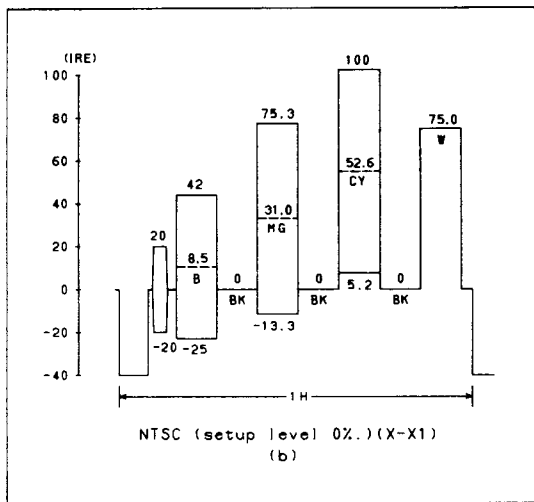
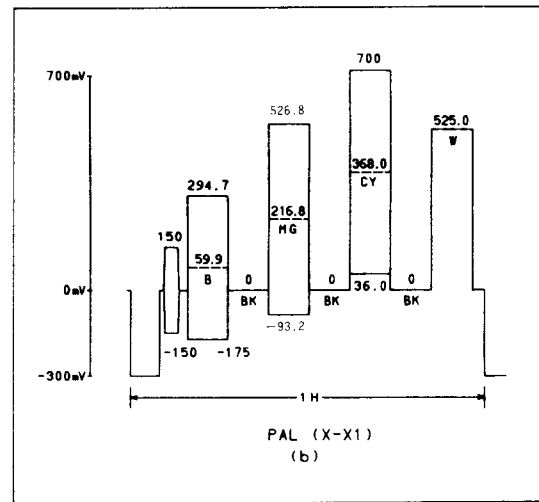


Figure 7.4

X-X1 section:



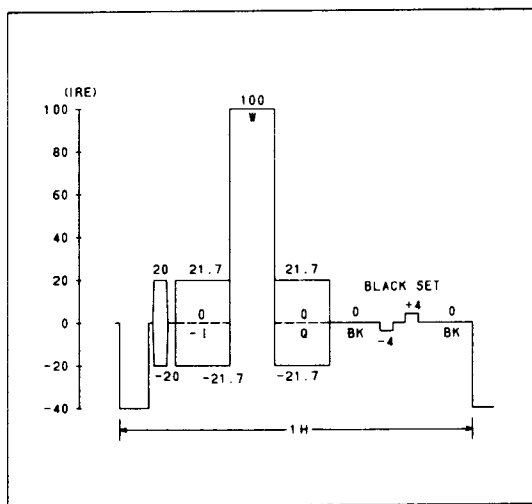
408



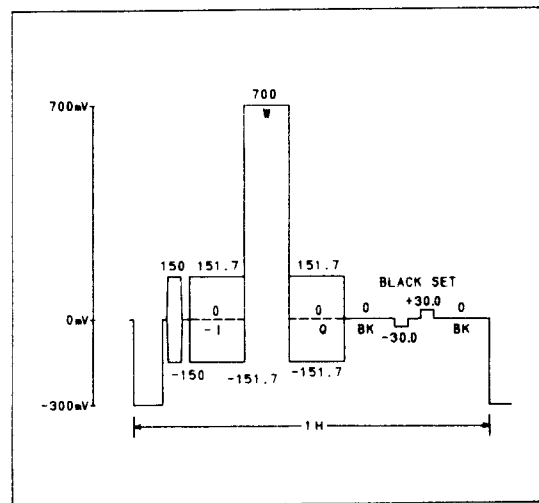
408P

Figure 7.5

Y-Y1 section:



408



408P

Figure 7.6

### 7.1.3 Vertical color bar pattern

The vertical color bar pattern consists of vertical color bars lined horizontally. The figure below shows the pattern.

The vertical color bar pattern is used to inspect changes in the vertical color bars and the characteristics of color transition points.

YELLOW
CYAN
GREEN
MAGENTA
RED
BLUE

Table 7.7

### 7.1.4 Split reverse color bar pattern

The split reverse color bar pattern can be divided into upper and lower sections. The upper half consists of the same color bars as the full-field color bar pattern; the lower half consists of reverse color bars. The figures below show the pattern and video waveform.

The reverse color bar pattern is used to check the phase difference between luminance and chroma signals. Video equipment should be adjusted to match green and magenta transition points.

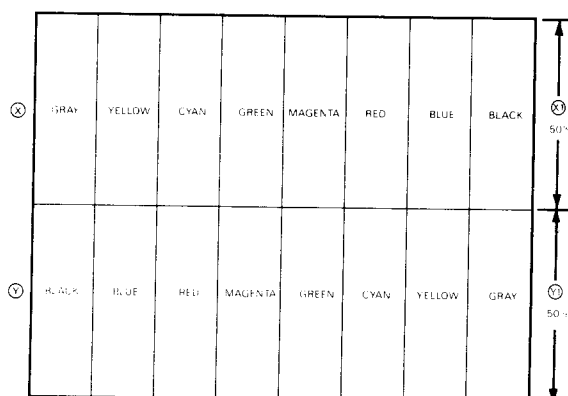
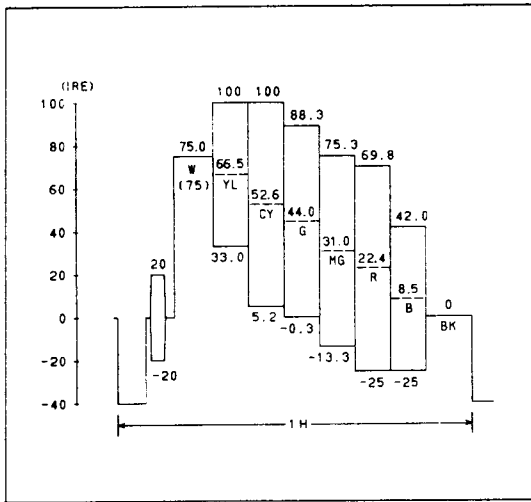


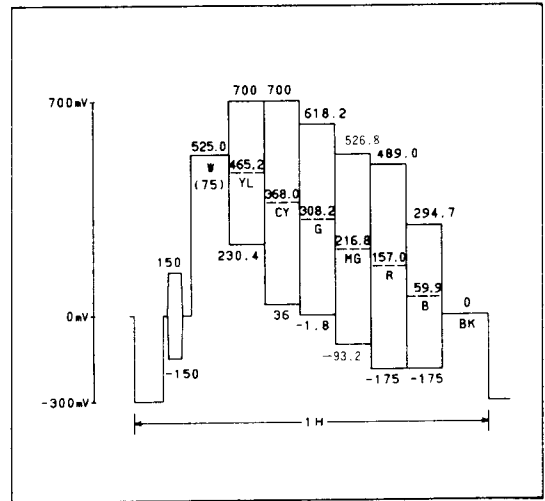
Figure 7.8



X-X1 section:



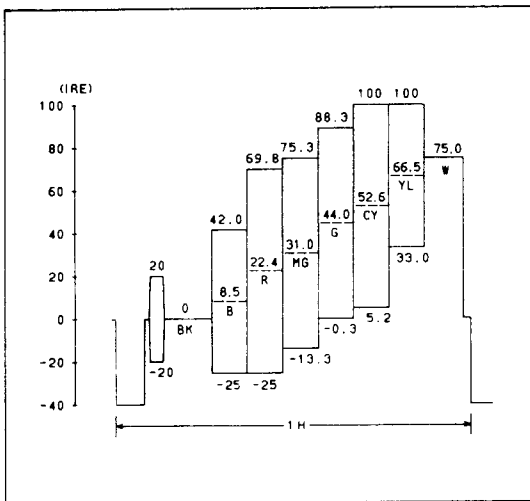
408



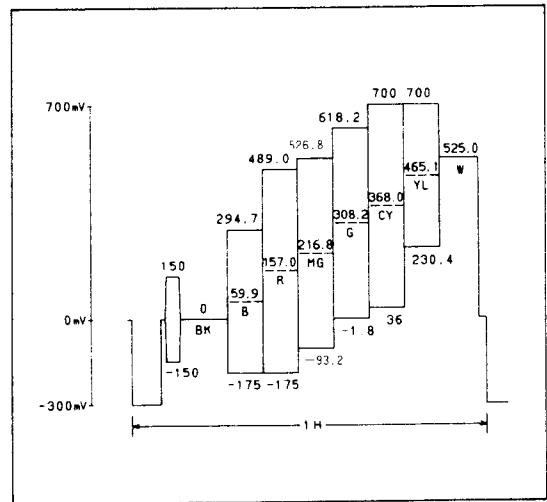
408P

Figure 7.9

Y-Y1 section:



408



408P

Figure 7.10

### 7.1.5 Checker color bar pattern

The checker color bar pattern consists of vertical color bars divided into six horizontal sections. Each horizontal section is shifted sequentially from right to left. The pattern is as follows:

W	YL	CY	G	MG	R	B	BL
BL	W	YL	CY	G	MG	R	B
B	BL	W	YL	CY	G	MG	R
R	B	BL	W	YL	CY	G	MG
MG	R	B	BL	W	YL	CY	G
G	MG	R	B	BL	W	YL	CY

- W : White (Gray)
- YL : Yellow
- CY : Cyan
- G : Green
- MG : Magenta
- R : Red
- B : Blue
- BL : Black

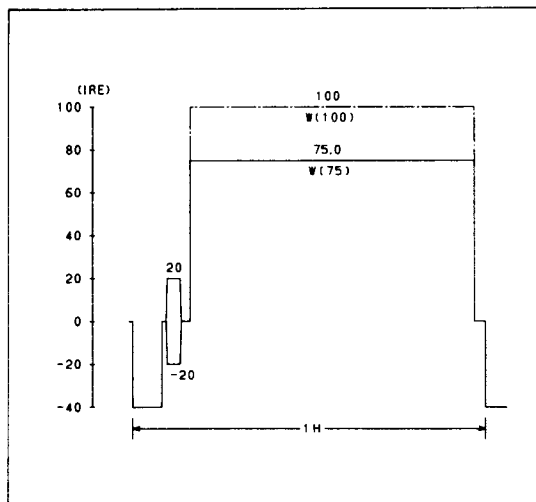
Figure 7.11

This pattern is used to check the horizontal and vertical linearity of a monitor.

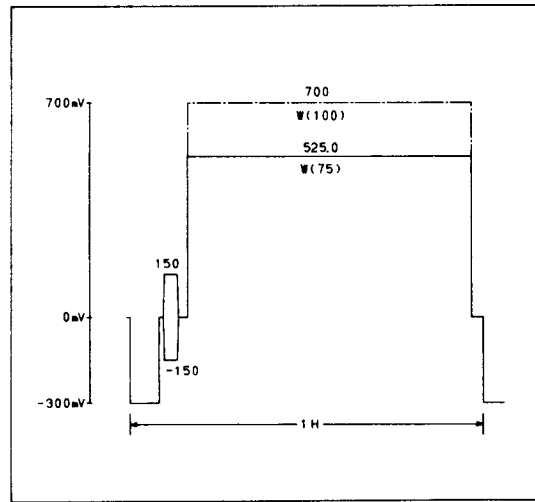
## 7.2 Raster Pattern

Each raster pattern has one color. By using the RGB and WHITE buttons, 100% or 50% white, yellow, cyan, green, magenta, red, blue, and black

patterns can be created. The patterns are used to adjust the display purity of a monitor. The representative signal waveforms are as follows:



408

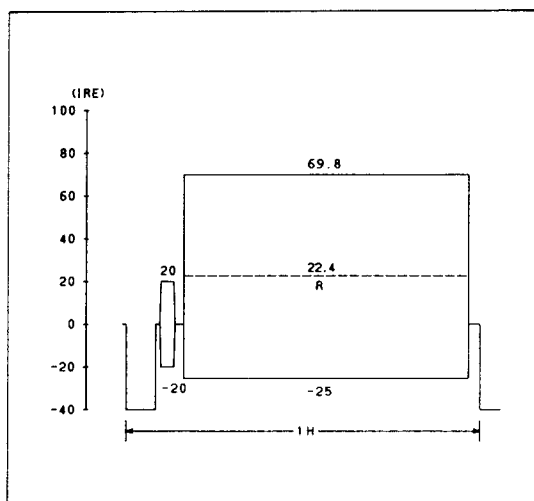


408P

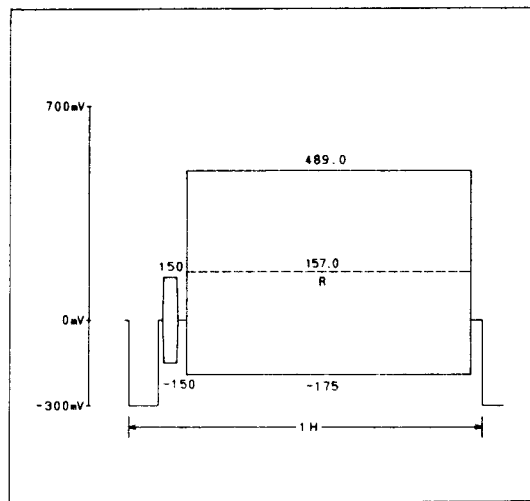
White raster (dotted line: 100 IRE)

Figure 7.12

Color raster



408



408P

Red raster (dotted line: Y level)

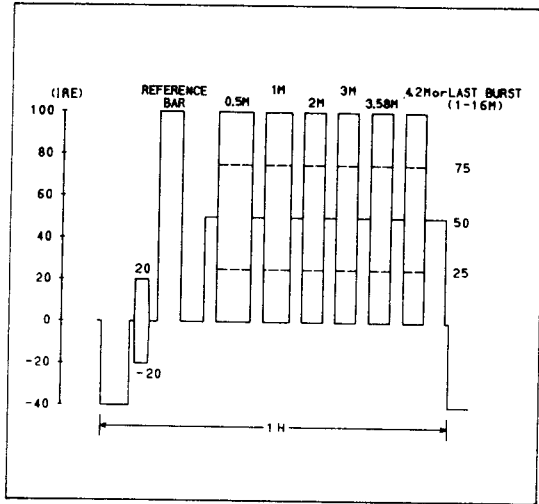
Figure 7.13

## 7.3 Multiburst Sweep Patterns

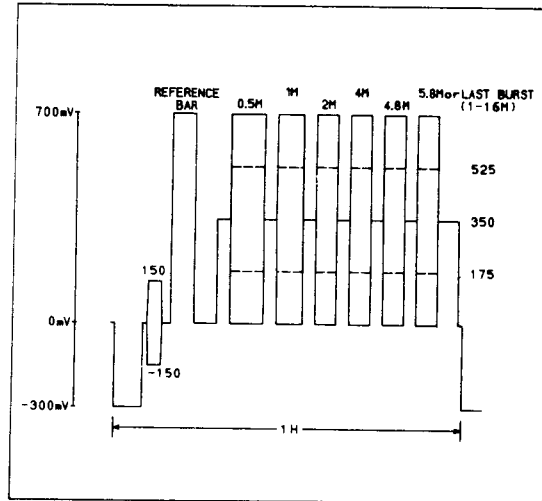
### 7.3.1 Multiburst pattern

The multiburst pattern consists of 100% white vertical bars with six types of frequency. This pattern is used to check frequency characteristics. The signal waveform is as follows:

The figure 7.14 shows signal waveform.  
408 : 0.5, 1, 2, 3, 3.58, 4.2MHz  
408P: 0.5, 1, 2, 3, 4.8, 5.8MHz



408



408P

Figure 7.14

The burst signal level can be changed to 50% or 100%. The reference bar does not change. The multiburst pattern is also used to check the resolution of a monitor. For example, when the

4.2MHz multiburst pattern can be displayed on the screen, the frequency (MHz) should be multiplied by 80 to calculate the resolution. Here,  $4.2 \times 80 = 336$ .

### 7.3.2 Sweep signal pattern

The sweep signal is available in two frequency bands: 100kHz to 5MHz and 300kHz to 15MHz. The sync mode is V. The figure below shows the

waveform. The marker is displayed when the waveform is notched (with the marker switch set on).

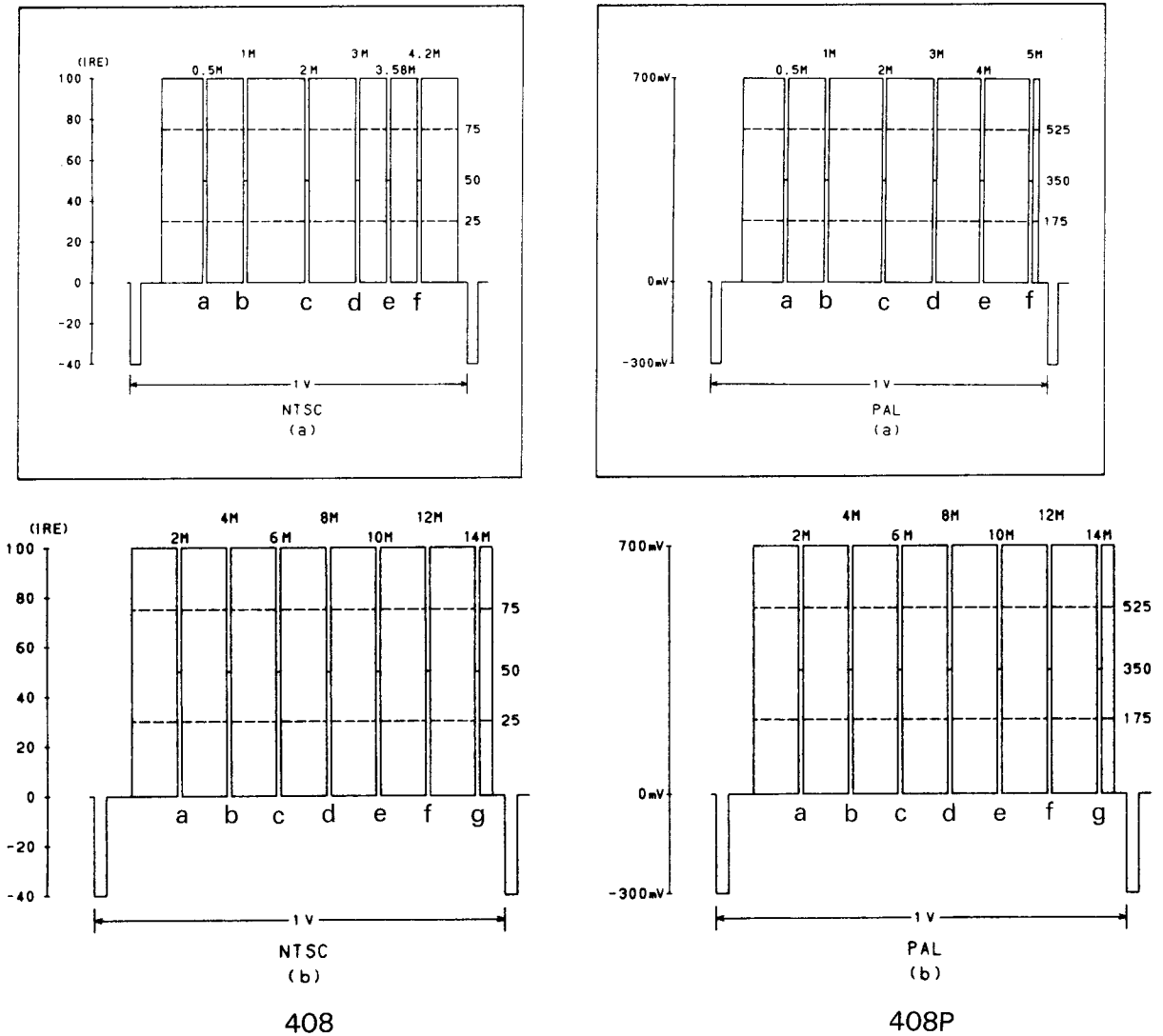


Figure 7.15

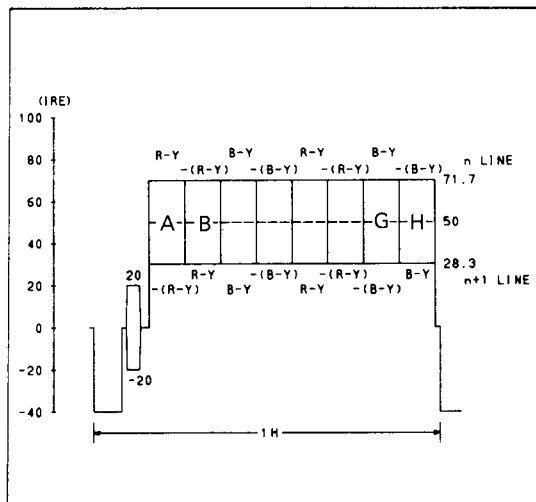
Table 7.1 Marker frequency

Position	NARROW (100kHz to 5MHz)		WIDE (0.3MHz to 15MHz)
	408	408P	
a	0.5MHz	0.5MHz	2MHz
b	1MHz	1MHz	4MHz
c	2MHz	2MHz	6MHz
d	3MHz	3MHz	8MHz
e	3.58MHz	4MHz	10MHz
f	4.2MHz	5MHz	12MHz
g	—	—	14MHz

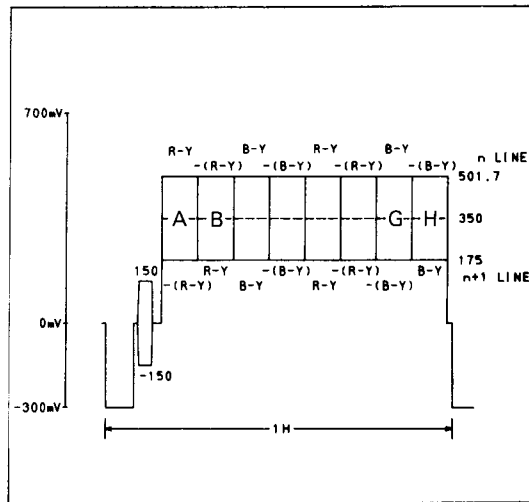
### 7.4 DEM

The demodulator pattern consists of two signals: one signal has a chroma signal whose phases of the R-Y, B-Y, I, and Q axes (408) or the R-Y and B-Y axes (408P) are alternately inverted, the other has a non-inverted chroma

signal. This pattern is used to adjust a Y/C separation circuit using a delay line. The figure below shows the signal waveform.



408

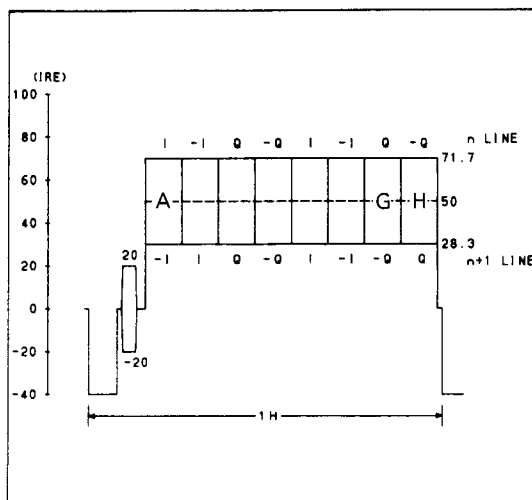


408P

Figure 7.16A

When the circuit is fully adjusted, the A, B, G, and H bars on both sides are gray. Otherwise the bars are colored.

The I and Q signals are displayed on the lower half of the screen for the Model 408 only.



408

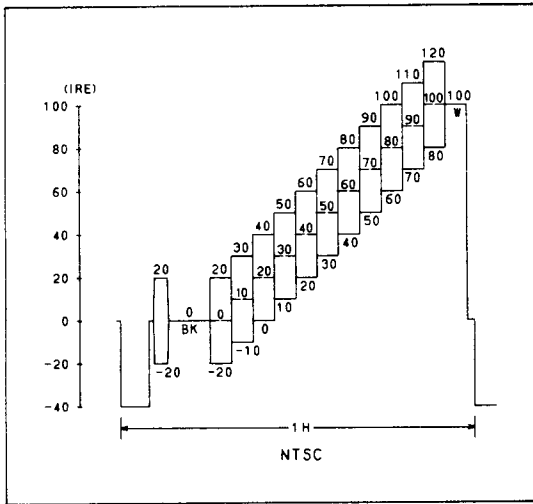
Figure 7.16B

**7.5 5 STEP, 10 STEP, and APL (408: 10% or 90%; 408P: 12.5% or 87.5%)  
Patterns**

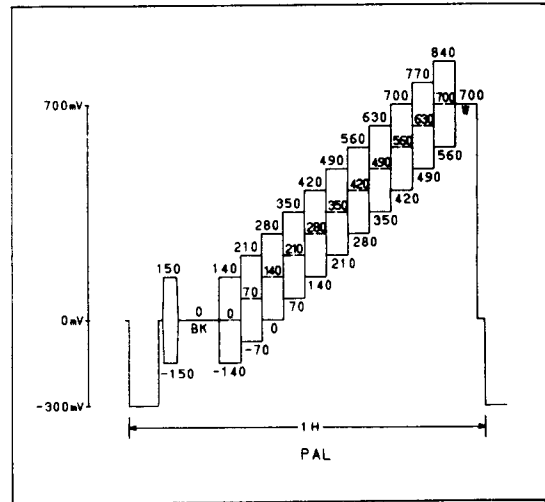
**7.5.1 5 STEP/10 STEP**

The 5 STEP/10 STEP pattern has a luminance signal that expands in 5 or 10 equal steps from left to right. This pattern is used to check the linearity of a transmission system. The modulated staircase wave, consisting of this signal overlaid with the chroma compo-

nent of the same amplitude and phase, is used for DG or DP measurements. The figure below shows an example of a modulated 10 STEP waveform. Use the CHROMA key to turn the chroma signal on/off.



**408**  
286mVp-p



**408P**  
280mVp-p

Figure 7.17 Chroma level

### 7.5.2 APL 10% and 90% (408) or 12.5% and 87.5% (408P)

The APL signal alternately outputs one 10 STEP staircase wave and 100% white or 0% black waves (four waves the 408 or three waves for the 408P).

The APL 90% pattern consists of four white waves and four 10% black waves. The APL

87.5% pattern consists of three white waves and three 12.5% black waves. The APL patterns are used to measure the DG and DP values caused by fluctuation in the flat level of a video signal. These patterns are effective when measuring the dynamic range of video equipment.

408

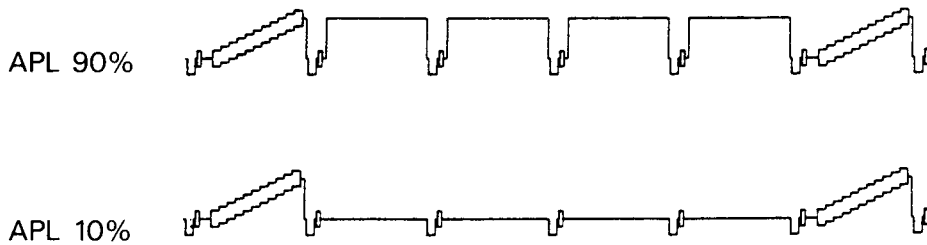


Figure 7.18A

408P

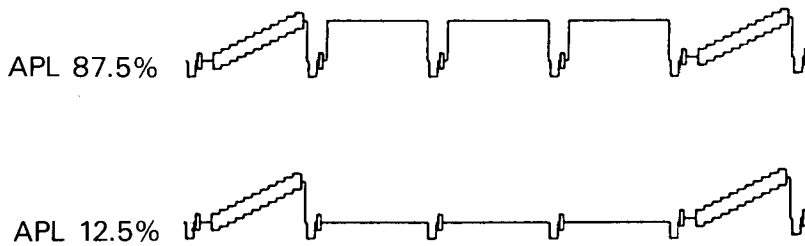


Figure 7.18B

### 7.6 Checker Pattern

The checker pattern consists of 48 black and white squares alternately arranged on the screen. This pattern is used to adjust focusing and verti-

cal and horizontal linearities of video equipment. The pattern is as follows:

W	BL	W	BL	W	BL	W	BL
BL	W	BL	W	BL	W	BL	W
W	BL	W	BL	W	BL	W	BL
BL	W	BL	W	BL	W	BL	W
W	BL	W	BL	W	BL	W	BL
BL	W	BL	W	BL	W	BL	W

W : White  
BL : Black

Figure 7.19



## 7.7 Window

The window pattern has a 100% white window at its center. The pattern and video waveform are as follows:

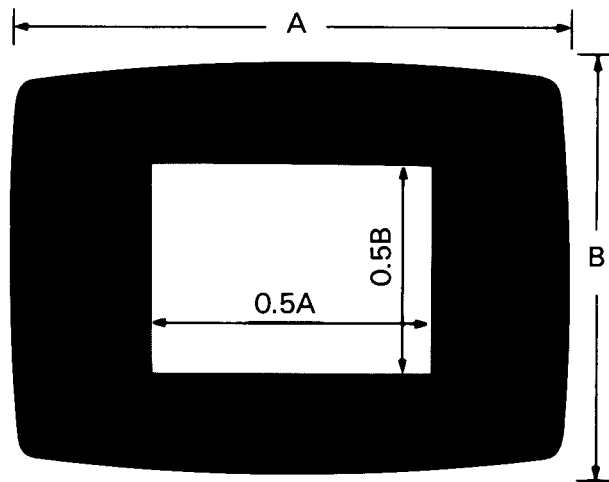


Figure 7.20

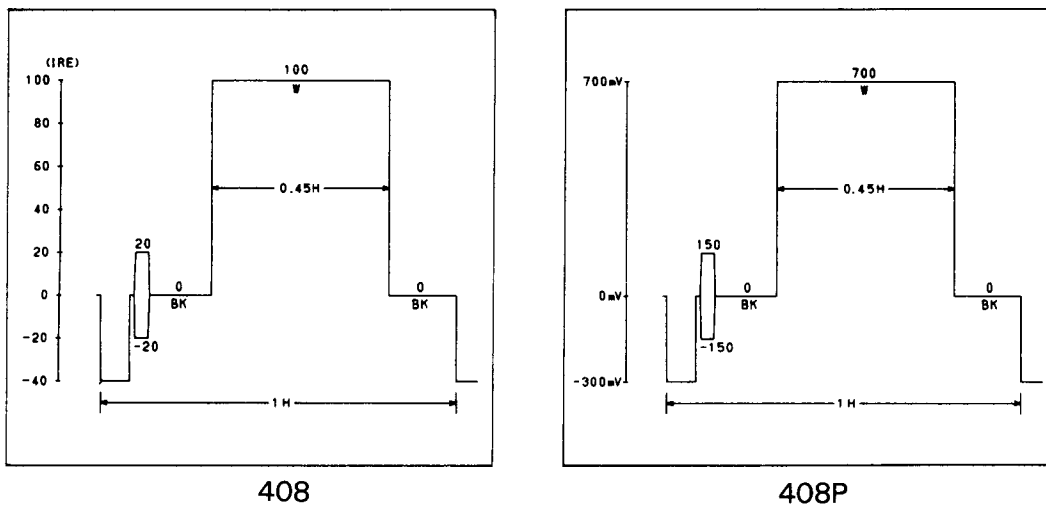


Figure 7.21

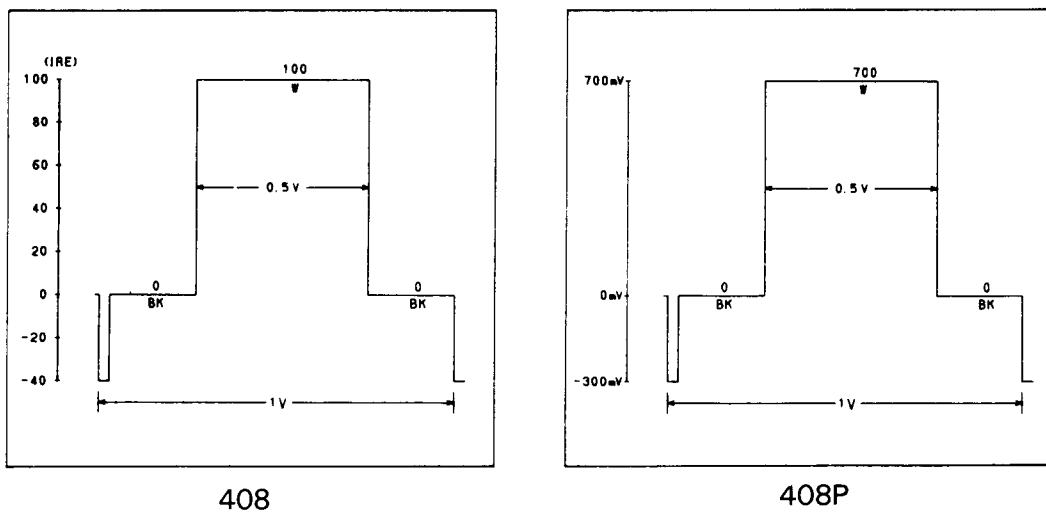


Figure 7.22

## 7.8 Convergence and Crosshatch Patterns

The convergence and alignment patterns are used to adjust the convergence and alignment of a TV set or picture monitor. The alignment pattern has

a corner marker at its upper-left portion to check deflection yoke polarity. The figures below show the convergence and alignment patterns.

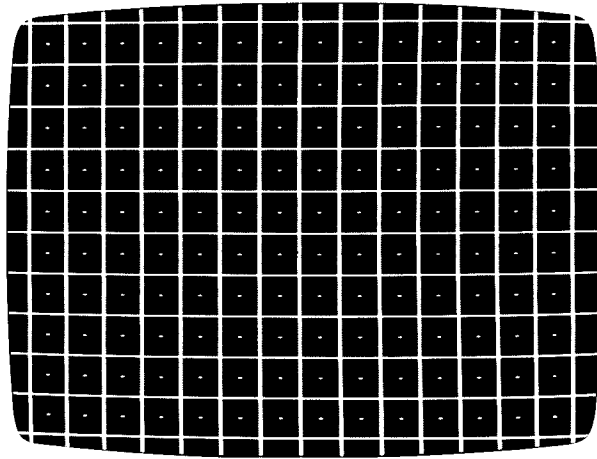


Figure 7.23

Convergence pattern

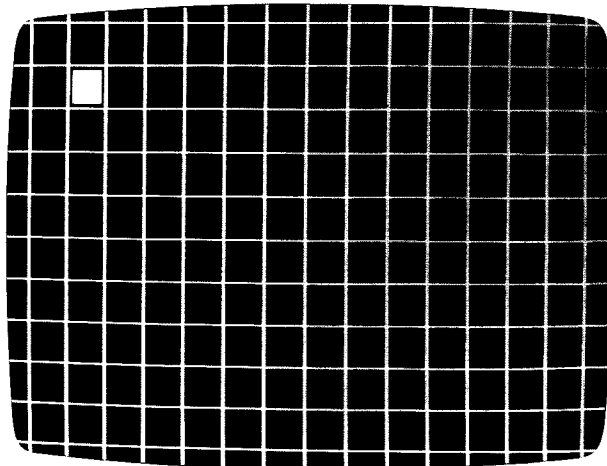


Figure 7.24

Alignment pattern

### 7.9 Circle Pattern

The circle pattern can be overlaid on a different type of pattern. This pattern is mainly used to align a CRT. The crosshatch pattern is common-

ly used to check the linearity of a CRT. Using the circle pattern with the crosshatch pattern makes such checking easier.

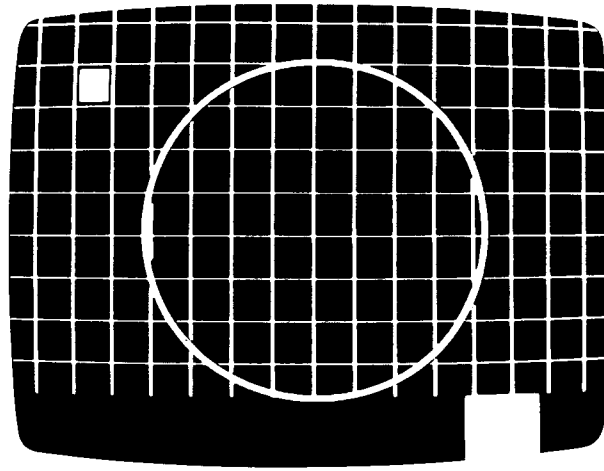


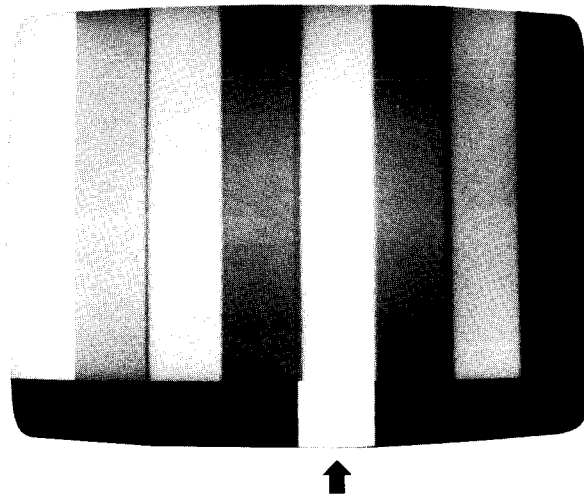
Figure 7.25

Circle pattern

### 7.10 Moving Marker

The moving marker is a small square that moves from right to left at the bottom of the screen. This

pattern can be inserted below any pattern to check the recording/playback test of a VTR.



This pattern sequentially moves to the left.

Figure 7.26

## 7.11 Pattern Uses

Optimum patterns can be selected according to the purpose of video equipment inspection.

Table 7.2

Pattern	Subject equipment	Inspection and adjustment item
Sweep	VTR, PM	Resolution
Multiburst	VTR, other	Frequency characteristic
Raster	TV, PM	Purity
	VTR	Noise
SMPTE color bar Full-field color bar Checker color bar	TV, PM	Brightness, color adjustment, and overall check
	VTR, other	Overall performance check
DEM	TV, PM, VTR	Delay line amplitude and phase adjustment
Vertical color bar	TV, PM	Vertical dot disturbance
Reverse color bar	TV, PM	Luminance and chroma phase adjustment
APL 10%, 90% 10 STEP 5 STEP	TV, PM	Tone
	VTR, other	DG and DP measurement
Checker	TV, PM	Focusing, and H and V linearity
Window	TV, PM, VTR	Medium and low-wave frequency characteristic
	Other	
Convergence Crosshatch Circle	TV, PM	H and V linearity, focusing, convergence, and alignment
Moving marker	VTR	Double-speed check

PM : Picture monitor

TV : TV set

VTR : Video tape recorder

## 8. PRINCIPLES OF OPERATION

### 8.1 Block Diagram

The figure below shows the block diagram.

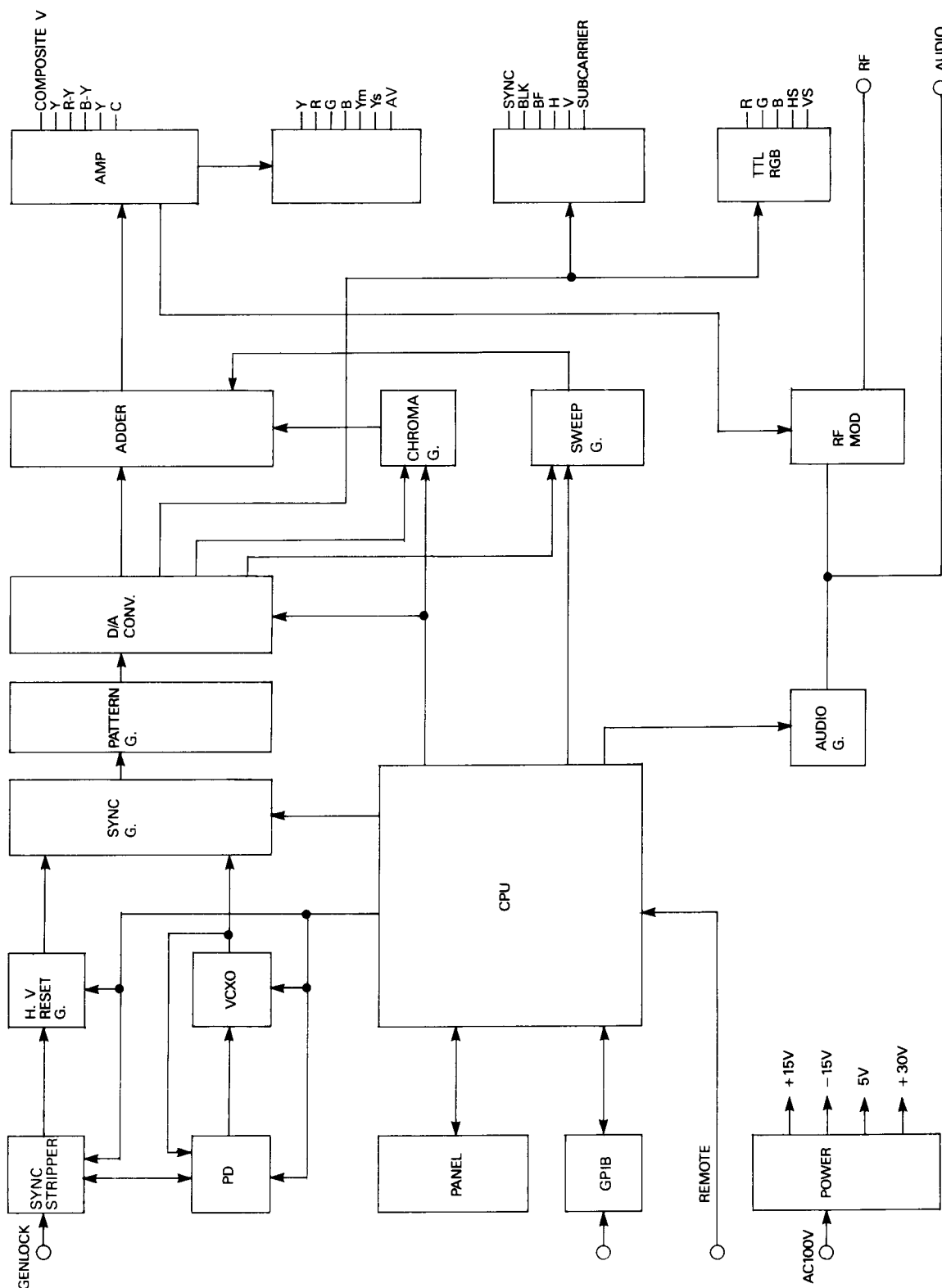


Figure 8.1

## 8.2 Operation of Each Section

### 8.2.1 GENLOCK section

The GENLOCK circuit synchronizes the models 408/408P with an external black burst signal. The subcarrier frequency (fsc) lock range of the 408 is 3.579545MHz  $\pm$ 50Hz.

The sync signal frequency (fH) and subcarrier frequency (fsc) must have the following relationship:  $fH = 4 fsc/910$ .

The subcarrier frequency (fsc) lock range of the 408P is 4.43361875MHz  $\pm$ 50Hz.

The sync signal frequency (fH) and subcarrier frequency (fsc) must have the following relationship:  $fsc = 1135 fH/4 + 25Hz$ .

The circuit samples a sync signal from the input black burst signal and synchronizes the sync regenerator by PLL. Then, the sync signal is regenerated from the sync regenerator. In addition, a burst signal is sampled and PLL based on this signal is applied to the subcarrier oscillator to regenerate the subcarrier signal.

### 8.2.2 Sync signal generator section (SYNC G.)

Horizontal and vertical sync signals are generated by dividing the the sync regenerator signal. The sync signal generator also generates a blanking signal burst flag signals by using sync regenerator. All image timing signals are generated based on these signals.

### 8.2.3 Pattern timing signal generator section (PATTERN G.)

The pattern timing signal generator generates pattern timing signals. The timing patterns are written in ROM. There are two types of ROM: one is for horizontal timing, the other is for vertical timing. The timings are combined to create optimum patterns.

### 8.2.4 D/A converter section (D/A CONV.)

The D/A converter generates a pattern signal according to the signal generated by the timing generator.

The following signals can be generated:

1. Y signal
2. Color difference signal

### 8.2.5 Chroma generator section (CHROMA G.)

The chroma generator generates a chroma signal from the color difference signals generated by the D/A converter. The chroma signal is a sub-carrier signal modulated by a color difference signal.

### 8.2.6 Sweep multiburst signal generator (SWEEP G.)

The sweep multiburst signal generator produces sweep and multiburst signals of 100kHz to 15MHz.

### 8.2.7 Adder section (ADDER)

The adder section adds a Y signal generated by the D/A converter, a chroma signal generated by the chroma signal generator, and a signal generated by the sweep multiburst signal generator.

### 8.2.8 Amplifier section (AMP)

The amplifier section amplifies and outputs the composite video, component, Y/C, and RGB signals generated by the adder.

### 8.2.9 Panel control section (PANEL)

Data set by the panel keys and jog dial is sent to the CPU to enable pattern selections and level settings.

### 8.2.10 GPIB section (GPIB)

This input connector is used to externally control patterns and functions. The GPIB section (option) can be built into your unit as specifies when placing your order.

### 8.2.11 Remote control section (REMOTE)

This input connector is used to externally control patterns. Only a simple interface is needed for pattern control.

### **8.2.12 CPU section (CPU)**

Each section is controlled according to data entered from the panel, GPIB connector, and remote control connector.

### **8.2.13 Audio generator section (AUDIO G.)**

This oscillator is used to output 1kHz and 400Hz signals. The signals are used as modulation signals for the RF modulator or Output to external equipment.

### **8.2.14 RF Modulator section (RF MOD.)**

The RF modulator modulates 30 to 900MHz signals with video and sound signals. The polarity of each signal is automatically changed by AM modulation. The SIF frequency of each sound signal is also set automatically. The synthesizer system ensures accurate frequency setting and sets the SIF frequency in the same way.

### **8.2.15 Power section (POWER)**

The power section supplies four types of voltage: + 15, - 15, + 5, and + 30V. The power supplies are regulated and hardly effected by drift in the primary power.

**PATTERN GENERATOR**  
**408/408P**  
**QUICK REFERENCE MANUAL**





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## 1. BASIC OPERATIONS

### 1.1 Meanings of LCD Display Symbols

#### o NEXT/PREVIEW key operation

◆: When there are multiple selected items, this symbol indicates that there are more items before and after the one being displayed. This also means that the selected items can be toggled.

▲ ▼: When there are multiple selected items, this symbol indicates that the item now being displayed is the last one. The [NEXT] key is effective when ▲ is displayed; the [PREVIEW] key is effective ▼ is displayed.

#### o CURSOR key operation

◆: When both of these symbols are displayed, an item can be selected by using the [CURSOR] keys.

◀ ▶: When either of these symbols is displayed, the specified key can be used to display additional setting items.

#### o ENTER key operation

ET: This means the ENTER key can be used to turn operation on/off.

### 1.2 CRT display

To simplify the use of the models 408/408P functions, the menu and data can be overlaid on video signals for monitoring. The display contents are basically the same as those on the LCD display. Multiple selections are all displayed (except the preset channel and 408P country). A selected item is marked with ■ or \*.

! The CRT display can be turned off if not necessary. See Section 10.3 (Screen Messages) for the method of operation.

### 1.3 Basic Key Operations

- ① Editor keys: NEXT, PREVIEW, CURSOR, ENTER, MENU, and JOG  
The editor keys are outlined below. See the related section on each key for details on operation.
- NEXT and PREVIEW: These keys are used select items.  
(Menu and country selections in the TVCH MODE)  
! The [NEXT] and [PREVIEW] keys are respectively replaced by the [INC] and [DEC] keys in the RECALL MODE.
  - CURSOR: These keys are used for the following purposes.
    - Ⓐ To specify a variable digit for the jog dial used to set the frequency
    - Ⓑ To select an item  
(Ⓐ Frequency setting in the FREQ MODE, Ⓑ RGB PRESET item selection)  
! The [◀] and [▶] keys are respectively replaced by the [BEGIN] and [AREA] keys in the RECALL MODE.
  - ENTER : This key is used for the following purposes.
    - Ⓐ To set a selected item (move control to a lower hierarchy level)
    - Ⓑ To temporarily shift to a different operation
    - Ⓒ To turn operation on/off  
(Ⓐ Menu selection, Ⓑ Changing the video level in the VIDEO Mode, Ⓒ Channel preset)
  - MENU : This key is used to move control to a higher directory level from the current mode. This is opposite the Ⓐ function of the [ENTER] key.  
! Pressing the [MENU] key also returns control from the RECALL MODE to the MAIN MENU MODE.

- JOG dial: This dial is used to change numeric settings.  
(Changing the frequency, video level, channel, or address)
- INC, DEC, BEGIN, AREA: These keys are used to change  
an address in the RECALL MODE.  
! The keys are effective when the [RECALL] LED on the  
panel is on.  
Note that [END] [MENU] does not mean the end address.

## ② Pattern keys

The pattern keys are used to select a necessary pattern. The LED of the selected pattern lights. These keys are effective in any operation state. When a pattern is selected, some items may be displayed. Select and set necessary items and press the [ENTER] key to return to the previous display.

- OTHERS: This contains seven different patterns.  
Select one of them by using the [NEXT] or [PREVIEW] key.
- FULLFIELD COLOR, SMPTE COLOR, and RASTER: The setup levels of these patterns can be turned on or off by using the [NEXT] or [PREVIEW] key. To change the setup level, use the [AMPL PRESET MODE].  
! The Model 408P does not have this function.
- MULTIBURST: FIXED (fixed) or VAR (variable) can be selected for the last burst by using the [NEXT] or [REVIEW] key. When VAR is selected, the frequency can be varied by using the jog dial.
- VIDEO SWEEP: WIDE or NARROW can be selected for the sweep width by using the [NEXT] or [PREVIEW] key.

### ③ Mode keys

These keys are used to set the necessary functions. An LED lights to indicate that its corresponding function was turned on.

- When the [RF MOD-SOUND] is turned on, the sound modulation selection mode is displayed on the LCD display. Select an item with the [NEXT] or [PREVIEW] key, then press the [ENTER] key to return to the previous display.

! When the Mode key is pressed, the following message may be displayed with an alarm being sounded. Note that the key may not work.

WARNING!

PATTERN MISMATCH!

This occurs if a key effective only for a specific pattern is used without selecting the pattern.

Example: When the [AMPL 50/100] key is used without selecting [MULTIBURST] and [VIDEO SWEEP]

WARNING!

G.B.R. OFF!

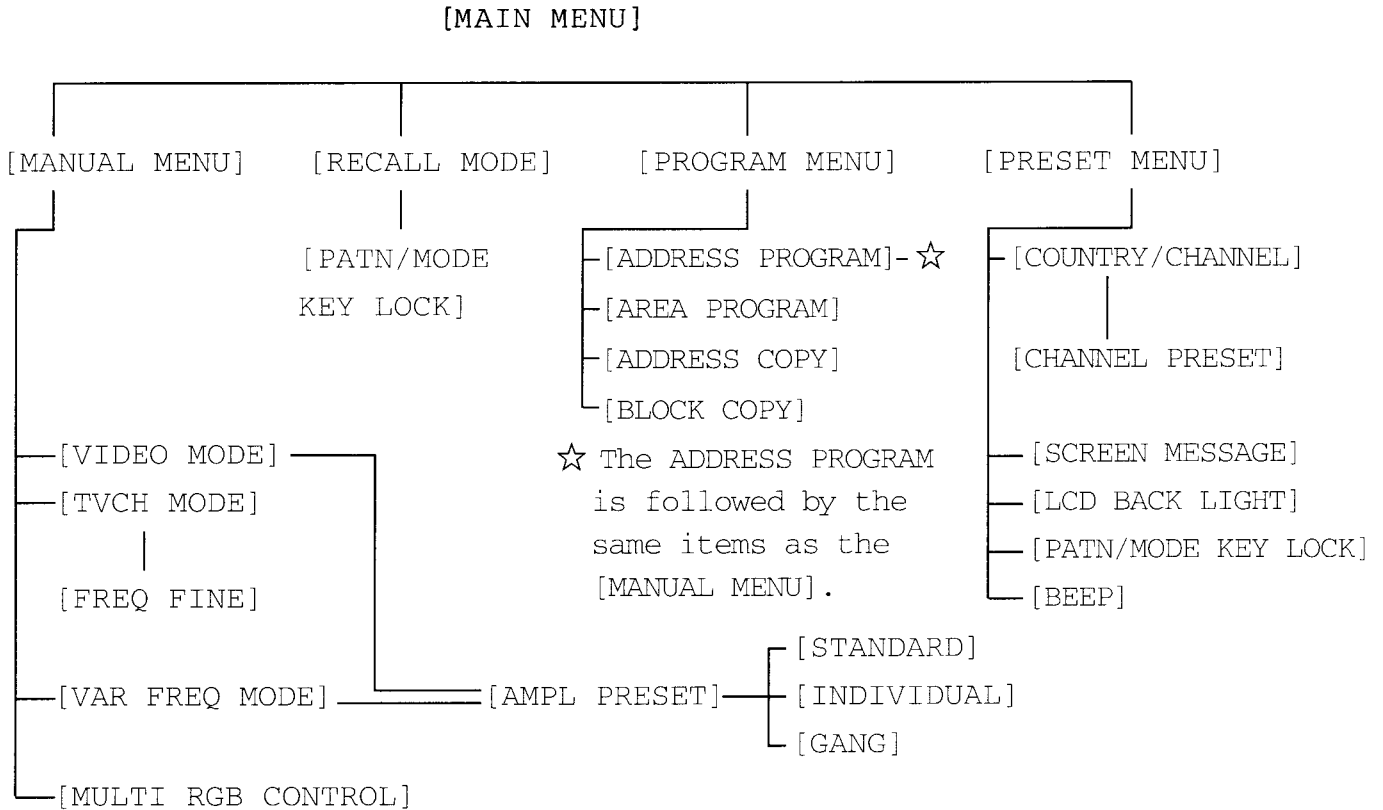
This message is displayed if the [WHITE 75/100] key was pressed with the [R], [G], or [B] key off. Note that 75% or 100% can be switched only when [R], [G], and [B] are all on. If [R], [G], or [B] is off, 75% is automatically set.

? : "KEY LOCKED!" means the pattern/mode key is locked. To release the key, set FREE to PATN/MODE KEY LOCK in the PRESET MODE.



## 2. MENU CONFIGURATION

The 408/408P has a tree-shaped menu configuration. To make full use of the model, the configuration should be fully understood.



! Press the [ENTER] key to go to a Lower hierarchy level; press the [MENU] key to go to higher directory level.

- o Pattern/mode key; Effective in any of the above modes (! except when the key is locked).

Pressing the pattern/mode key may create a unique directory as follows:

[FULLFIELD], [SMPTE], [RASTER] keys on: [SET UP LEVEL]

(Model 408 only)

[MULTIBURST] key on : [LAST BURST MODE]

[VIDEO SWEEP] key on : [SWEEP WIDTH]

[SOUND] key on : [SOUND MOD. MODE]

### 3. WHEN PATTERN OR MODE KEY IS PRESSED

Pressing a pattern or mode key selects its pattern or turns the mode on/off. However, the following keys may not work or may require special pattern settings:

1) [FULLFIELD COLOR], [SMPTE COLOR], [RASTER]: Model 408 Only

For these three types of patterns, an inquiry to the operator is output asking whether the setup should be turned on or off. The LCD displays the current setting. Specify ON to display the current setup level set at [VIDEO AMPLITUDE].

- o Change the setting by using the [NEXT] or [PREVIEW] key (◆ is displayed on the LCD display).
- o Press the [ENTER] key after making the setting.

2) [MULTI BURST]

When the [MULTI BURST] key is pressed, the system requests the last burst setting. The LCD displays the current setting. FIXED (4.2MHz; 5.8 MHz for Model 408P) or VAR (1MHz to 16MHz) can be selected for the last burst.

- o Change the setting by using the [NEXT] or [PREVIEW] key (◆ is displayed on the LCD display).
- o Press the [ENTER] key after making the setting.
- o When the mode is on, change the frequency with the jog dial.

3) [VIDEO SWEEP]

When the [VIDEO SWEEP] key is pressed, the system requests the sweep width setting. The LCD displays the current setting. WIDE or NARROW can be selected.

- o Change the setting by using the [NEXT] or [PREVIEW] key (◆ is displayed on the LCD display).
- o Press the [ENTER] key after making the setting.

4) [INVERT] and [CIRCLE]

The [INVERT] and [CIRCLE] keys are effective only when [CROSSHATCH], [CONVERGENCE], [WINDOW], or [CHECKER] is selected. If a different pattern is displayed, an error message is output with the sounding alarm.

! If the circle pattern is set to ALL, pressing the [CIRCLE] key does not cause result in a sounding alarm or error message. See Section 11 (others) for details on ALL.

5) [WHITE LEVEL], [R], [G], and [B]

The [WHITE] (white level), [R], [G], and [B] keys are effective only when [FULLFIELD COLOR], [SMPTE COLOR], or [RASTER] is selected.

If a different pattern is selected, an error message is output with the sounding alarm.

6) [AMPL]

The [AMPL] (amplitude) key is effective only when [MULTIBURST] or [VIDEO SWEEP] is selected.

If a different pattern is displayed, a error message is output with the sounding alarm.

7) [MARKER]

The [MARKER] key is effective only when [VIDEO SWEEP] is selected. If a different pattern is displayed, a error message is output with the sounding alarm.

8) [GPIB]

The [GPIB] local key is effective only with the GPIB option.

! The sounding alarm and error message displayed on the CRT are only output when the functions are turned on beforehand with the [BEEP] and [SCREEN MESSAGE].

## 4. VIDEO OUTPUT AND DIGITAL RGB

### 4.1 Setting the Video Mode

Set the Video Mode as follows:

Key	Display	Operation
◆	[MAIN MENU]	[MANUAL MENU] Selection
[ENTER]	[MANUAL MENU]	[MANUAL MENU] Setting
◆	[MANUAL MENU]	[VIDEO] Selection
[ENTER]	[MAN] *VIDEO MODE*	[VIDEO] Setting

### 4.2 Changing the Video Level

Press the [ENTER] key in the Video Mode. When [VIDEO AMPLITUDE] is displayed, change the video level. See chapter 9 (CHANGING THE VIDEO LEVEL) for details.

- o Change the video level by using the [ENTER] key.

## 5. RF OUTPUT BY CONTINUOUSLY CHANGING THE FREQUENCY

### 5.1 Setting the Frequency Mode

Set the Frequency (FREQ) Mode as follows:

Key	Display	Operation
◆	[MAIN MENU]	[MANUAL MENU] Selection
[ENTER]	[MANUAL MENU]	[MANUAL MENU] Setting
◆	[MANUAL MENU]	[RF FREQUENCY] Selection
[ENTER]	[MAN] *FREQ* NTSC-M	[RF FREQUENCY] Setting

### 5.2 Changing the Video Level

Press the [ENTER] key in the Frequency Mode. When [VIDEO AMPLITUDE] is displayed, change the video level. See chapter 9 (CHANGING THE VIDEO LEVEL) for details.

- o Change the video level by using the [ENTER] key.

### 5.3 Changing the Frequency

Change the frequency with the jog dial. Turn the jog dial to change the frequency digit at which the cursor is positioned. The cursor is moved by using the [CURSOR] keys.

- o Change the frequency with the jog dial.
- o Move the cursor by using the [CURSOR] keys.

### 5.4 Changing the RF System (408P only)

The RF system of the Model 408P can be changed as follows. One of the following eight types of RF systems can be selected by using the [NEXT] or [PREVIEW] key.

B, C, G, H, I, L, D, or K.

- o Select an RF system by using the [NEXT] or [PREVIEW] key.

## 6. RGB MULTI-CONNECTOR

### 6.1 Setting the Multi-RGB Mode

Set the Multi-RGB Mode as follows:

Key	Display	Operation
◆	[MAIN MENU]	[MANUAL MENU] Selection
[ENTER]	[MANUAL MENU]	[MANUAL MENU] Setting
◆	[MANUAL MENU]	[MULTI RGB CONTROL] Selection
[ENTER]	[MAN] *RGB* ◀ ▶ E <sub>T</sub>	[MULTI RGB CONTROL] Setting

### 6.2 Ys, Ym, and AV (Ys and SLOW for 408P) Operation

Use the [ENTER] key to turn each item HI or LO. The items can be selected by using the [CURSOR] keys.

- o Turn HI or LO Ys, Ym, or AV (Ys, SLOW) with the [ENTER] key.
- o Move the cursor for selection by using the [CURSOR] keys.

## 7. TV CHANNEL MODE

The 408/408P contains TV channel frequency data for all applicable countries. Use this mode when an RF signal is needed for TV adjustment.

See Appendix Table (page 24 to 35) for the data contents. The countries use the same frequencies as those listed in the table. See Table (page 36 to 44) for the correspondence. The 408P sets an RF system according to the country selected.

### 7.1 Setting the TV Channel Mode

Key	Display	Operation
◆	[MAIN MENU]	[MANUAL MENU] Selection
[ENTER]	[MANUAL MENU]	[MANUAL MENU] Setting
◆	[MANUAL MENU]	[TV CHANNEL] Selection
[ENTER]	[MAN] *TVCH* NTSC-M	[TV CHANNEL] Setting

### 7.2 Selecting the Country and Changing Channels

The country is selected by using the [NEXT] or [PREVIEW] key, and the channel can be changed by using the jog dial.

- o Select a country by using the [NEXT] or [PREVIEW] key.
- o Change the channel with the jog dial.

! The channels of each country can be preset so that a necessary one can be recalled immediately. See Section 10.1 (Presetting the Country and Channels) for details on making these settings.

#### \* Display contents

JAPAN    : V    12ch  
 ↑            ↑            ↑  
 Country    Band        Channel

#### Band symbol

V        : VHF  
 V(B)    : VHF RF system=B  
 V(C)    : VHF RF system=C  
 U        : UHF  
 U(G)    : UHF RF system=G  
 U(H)    : UHF RF system=H  
 U(I)    : UHF RF system=I  
 C        : CATV  
 CV(B)   : CATV-VHF RF system=B  
 CU(G)   : CATV-UHF RF system=G

### 7.3 Fine Frequency Adjustment

When the 408/408P is in the TV Channel Mode, a set channel frequency can be adjusted within a range of  $\pm 10$ MHz (in 10kHz steps). Press the [ENTER] key to activate the Fine Adjustment Mode.

Key	Display	Operation
[ENTER]	[MAN] *TVCH* NTSC-M	Selection of Fine Adjustment Mode
	[MAN] FINE+ .00MHz	Start of Fine Adjustment

! " $\Delta$ " is displayed to the right of the band displayed on the CRT screen.

The frequency is changed by using the jog dial, and the cursor is moved by using the [CURSOR] keys.

- o Change the frequency with the jog dial.
- o Move the cursor by using the [CURSOR] keys.

### 7.4 Release from Fine Frequency Adjustment

There are four methods of releasing the Fine Adjustment Mode.

- ① Press the [ENTER] key.  
This restores the original status. When the Fine Adjustment Mode is activated again, the previous frequency is cancelled.
- ② Change the country.  
Then the frequency of the previous frequency is cancelled.
- ③ Change the channel  
The previous frequency is cancelled.
- ④ Press the [MENU] key.  
The menu is displayed. When the TV Channel Mode is activated again, the Fine Adjustment Mode is restored and the previous frequency is reproduced.



## 8. PROGRAMMING

The 408/408P has a function to store manual settings so that they can be recalled as required. Up to 100 settings can be stored at addresses 0 to 99, and the 100 addresses can be divided into four areas (overlapping acceptable).

### 8.1 Programming Operation

#### 8.1.1 Setting the Program Mode

Set the Program Mode as follows:

Key	Display	Operation
↕	[MAIN MENU]	[PROGRAM MENU] Selection
[ENTER]	[MANUAL MENU]	[PROGRAM MENU] Setting

The PROGRAM MENU has the following four modes.

- ① ADDRESS PROGRAM : A program is created for each address.
- ② AREA PROGRAM : The address recall area is determined.
- ③ ADDRESS COPY : The contents of a specified address are copied to an arbitrary address.
- ④ BLOCK COPY : The contents within a specified address range are copied to an arbitrary position.

#### 8.1.2 Address programming (ADDRESS PROGRAM)

Select ADDRESS PROGRAM on the PROGRAM MENU. The message is displayed:

[PROGRAM] ADDR= 5 ← Address

In this mode, the contents of the program at the displayed address are recalled and the settings are executed according to the contents. If the address is changed or the menu is restored, the settings are stored at the displayed address.

Execute program operation as follows:

- ① Select a Program address with the jog dial.
- ② Set the program contents in the same way as for manual mode operation.
- ③ Press the [MENU] key to return to the mode selection level.
- ④ Repeat steps ① to ③. When the necessary programming is completed, press the [MENU] key to release the mode.

### 8.1.3 Call address area programming (AREA PROGRAM)

Select AREA PROGRAM on the PROGRAM MENU. The following message is displayed:

```

                Area number
                |
                v
[AREA SET] AREA= 0 ◀▶
BEG: 0      END: 99  ET
  |           |
  v           v
Begin address End address
```

Select an area number by using the [CURSOR] keys. The begin or end address is alternated each time the [ENTER] key is pressed. Set the necessary address area with the jog dial.

#### 8.1.4 Programming techniques (ADDRESS COPY, BLOCK COPY)

The Program Copy functions are very useful function when a program of the same contents is repeated.

① [ADDRESS COPY] To repeat the contents of an address

② [BLOCK COPY] To repeat the contents of an area

- ① Select ADDRESS COPY on the PROGRAM MENU. The following message is displayed:

Key	Display	Operation
◆	[ADDRESS COPY]	
[NEXT] • [PREVIEW] (Jog dial)	SOURCE AD=0	Source address selection
[ENTER]	[AD COPY] DEST ADDR	Source address setting
[CURSOR]	BEG: 0 END: 99	BEGIN/END selection
[NEXT] • [PREVIEW]		Address selection
[ENTER]		Transfer

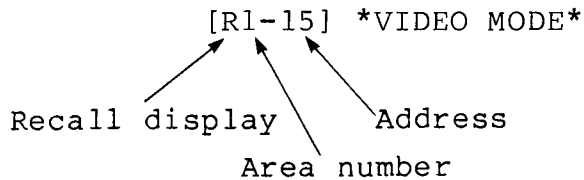
- ② Select BLOCK COPY on the PROGRAM MENU. The following message is displayed:

Key	Display	Operation
[ENTER]	[BLOCK COPY] SOURCE	Source address range setting
[CURSOR]	BEG: 0 END :99	BEGIN/END selection
[NEXT] • [PREVIEW] (Jog dial)		Address selection
[ENTER]	[BLOCK COPY]	
[NEXT] • [PREVIEW] (Jog dial)	DEST AD=0	Destination address selection
[ENTER]		Transfer

! If there are more than 50 source addresses, the first destination address is included in the source addresses. If the end address exceeds 99, an error message is displayed and the data cannot be copied.

## 8.2 Program Recall (RECALL MODE)

The Recall Mode is used to recall the programmed contents. To set the Recall Mode, select RECALL MODE ON MAIN MENU. The display changes as shown below and the [RECALL] LED on the panel lights.



In the Recall Mode, the editor key functions changes as follows:

- o           ▶ : [AREA]. Area change
- o           ◀ : [BEGIN]. Begin address setting
- o    [NEXT] : [INC]. Address increment
- o [PREVIEW] : [DEC]. Address decrement
- o    [MENU] : [END]. Recall mode end (to main menu)
- o Jog dial : Address increment/decrement
- o [ENTER] : To [PATTERN/MODE KEY LOCK MODE]

! Pattern and mode key operation in Recall mode

When the keys are not locked, the pattern and mode can be changed temporarily. Once the address is changed, however, the programmed contents are restored.

! Key lock

Pressing the [ENTER] key activates the [PATTERN/MODE KEY] mode. Select [FREE] or [LOCK] by using the [CURSOR] keys.

## 9. CHANGING THE VIDEO LEVEL

Pressing the [ENTER] key in the Video or Frequency Mode activates the [VIDEO AMPLITUDE] mode. The video level can be changed by the following three methods:

- [STANDARD] : Set all levels to 100% (Setup level: 0%).  
[INDIVIDUAL] : Change each level.  
[GANG] : Change one to four levels together (except the setup level).  
! The setup level can be set in the 408.

The following levels can be changed: Burst, H.sync, chroma, luminance, and setup (408 only).

### ① Standard level setting

Select [STANDARD] on the [VIDEO AMPLITUDE] menu. The following message is displayed:

```
STANDARD SET OK?  
YES: ENTER NO: MENU
```

Press the [ENTER] key.

### ② Individual Mode

Select [INDIVIDUAL] on the [VIDEO AMPLITUDE] menu. The following message is displayed:

```
[INDIVIDUAL ADJ]  
◆ SYNC : 100%
```

- o Select an item by using the [NEXT] or [PREVIEW] key.
- o Change the level with the jog dial.

### ③ GANG (interlocked change)

Select [GANG] on the [VIDEO AMPLITUDE] menu. The following message is displayed:

```
[GANG] SEL = ◀▶100%  
■BST ■SY □CHR □LUMI
```

The items marked '■' are interlocked.

- o Select items by using the [CURSOR], [NEXT], or [PREVIEW] key.
- o Interlock or release by using the [ENTER] key.
- o Change the level with the jog dial.

## 10. PRESETTINGS

Various data items can be preset to make the 408/408P easier to use. Select [PRESET MENU] on the [MAIN MENU]. Then select the necessary item by using the [NEXT] or [PREVIEW] key.

### 10.1 Presetting the Country and Channel (COUNTRY/CHANNEL)

This operation presets the country and channel to be used in the TV Channel Mode. Select [COUNTRY/CHANNEL] with the [NEXT] or [PREVIEW] key. The following message is displayed.

[COUNTRY] ON/OFF=ENT

◆ JAPAN : V (ON)▶

- Select a country by using the [NEXT] or [PREVIEW] key.
- Turn on and off the item by using the [ENTER] key.
- "▶" sets the Channel Preset Mode when the country is on.

### 10.2 Channel Preset Mode (INDIVIDUAL, ALL CHANNEL ON, and ALL CHANNEL OFF)

The Channel Preset Mode is divided into two modes: the Individual Mode to set each channel, and the All Channel On/Off Mode to turn all channels on/off.

When the Country Mode is changed to the Preset Mode, the display changes as follows:

[CH PRESET MENU]

◆ ALL CHANNEL ON

- Select an item by using the [NEXT] or [PREVIEW] key.
  - Set the item by using the [ENTER] key.
- ① [INDIVIDUAL]
    - Change the channel by using the jog dial.
    - Turn on and off the item by using the [ENTER] key.
    - Return to the Country Preset Mode by using the ◀ key.
  - ② [ALL CHANNEL ON]
    - Use the [ENTER] key to execute.
    - Use the [MENU] key cancel.
  - ③ [ALL CHANNEL OFF]
    - Use the [ENTER] key to execute.
    - Use the [MENU] key to cancel.

### 10.3 Screen Messages

The screen message function turns the screen messages displayed on the monitor on/off.

- \* ALL MESSAGE : All messages
  - \* ERROR MESSAGE : Error message
  - \* RCL/PRG ADDR : Recall and Program Mode address display
  - \* TVCH COUNTRY : Country display in TV Channel mode
  - \* TVCH CHANNEL : Channel display in TV Channel Mode
  - \* TVCH DISP POS : TV channel mode display position  
(TOP: Top; BTM: Bottom)
- o Select an item by using the [NEXT] or [PREVIEW] key.
  - o Turn the item on/off by using the [ENTER] key.

### 10.4 Adjusting LCD Backlight Brightness

The brightness of the LCD backlight can be set to HI or LO by using the [ENTER] key.

### 10.5 Pattern and Mode Key Lock

The pattern and mode keys can be locked or unlocked. See the section on the Recall Mode for details on operating these keys.

- o Select FREE or LOCK by using the [CURSOR] keys.

### 10.6 Beep Sound

The beep sound is set. It can be turned off when not necessary.

- \* ALL BEEP : All beep sound
  - \* KEY ON BEEP : Beep sound during key operation
  - \* ERROR BEEP : Error message beep sound
- o Select an item by using the [NEXT] or [PREVIEW] key.
  - o Turn the item on/off by using the [ENTER] key.

## 11. OTHERS

### 11.1 Overlaying the Circle Pattern on All Patterns

The circle pattern of the 408/408P is usually overlaid only on four types of patterns: Crosshatch, convergence, window, or checker. To overlay the circle pattern on another type of pattern, perform the following:

- 1 Turn off the power.
- 2 Turn on the power again while pressing the [CIRCLE] key.
- 3 When the following message is displayed, select ALL by using the cursor keys.

[CIRCLE ON PATTERN]

■ NORMAL      □ ALL

- 4 Press the [ENTER] key to terminate selection.
  - ! If the backup battery is depleted, the setting returns to NORMAL. Therefore, set the item again when necessary.
  - ! If the circle pattern is overlaid on a color bar signal, an overshoot exceeding 140 IRE may occur around the edge of the circle.

### 11.2 Checking the Software Version

The software version is checked as follows:

- ① Turn off the power.
- ② Turn on the power again while pressing the [ENTER] key.

### 11.3 Battery Backup

The settings and program contents of the 408/408P are backed up by an internal battery. The backup battery lasts for about 10 days when fully charged. It is charged automatically when the unit power is on.



## 12. TV CHANNEL FREQUENCY TABLE

### TV Frequency Table

#### JAPAN channel frequency assignments

ch No.	fv [MHz]	fs [MHz]	ch No.	fv [MHz]	fs [MHz]
1	91.25	95.75	32	585.25	589.75
2	97.25	101.75	33	591.25	595.75
3	103.25	107.75	34	597.25	601.75
4	171.25	175.75	35	603.25	607.75
5	177.25	181.75	36	609.25	613.75
6	183.25	187.75	37	615.25	619.75
7	189.25	193.75	38	621.25	625.75
8	193.25	197.75	39	627.25	631.75
9	199.25	203.75	40	633.25	637.75
10	205.25	209.75	41	639.25	643.75
11	211.25	215.75	42	645.25	649.75
12	217.25	221.75	43	651.25	655.75
13	471.25	475.75	44	657.25	661.75
14	477.25	481.75	45	663.25	667.75
15	483.25	487.75	46	669.25	673.75
16	489.25	493.75	47	675.25	679.75
17	495.25	499.75	48	681.25	685.75
18	501.25	505.75	49	687.25	691.75
19	507.25	511.75	50	693.25	697.75
20	513.25	517.75	51	699.25	703.75
21	519.25	523.75	52	705.25	709.75
22	525.25	529.75	53	711.25	715.75
23	531.25	535.75	54	717.25	721.75
24	537.25	541.75	55	723.25	727.75
25	543.25	547.75	56	729.25	733.75
26	549.25	553.75	57	735.25	739.75
27	555.25	559.75	58	741.25	745.75
28	561.25	565.75	59	747.25	751.75
29	567.25	571.75	60	753.25	757.75
30	573.25	577.75	61	759.25	763.75
31	579.25	583.75	62	765.25	769.75

Note: fv ... Visual frequency  
 fs ... Sound frequency

CATV Frequency Table

JAPAN channel frequency assignments

ch No.	f <sub>v</sub> [MHz]	f <sub>s</sub> [MHz]	ch No.	f <sub>v</sub> [MHz]	f <sub>s</sub> [MHz]	ch No.	f <sub>v</sub> [MHz]	f <sub>s</sub> [MHz]
1	91.25	95.75	C39	319.25	323.75	26	549.25	553.75
2	97.25	101.75	C40	325.25	329.75	27	555.25	559.75
3	103.25	107.75	C41	331.25	335.75	28	561.25	565.75
C13	109.25	113.75	C42	337.25	341.75	29	567.25	571.75
C14	115.25	119.75	C43	343.25	347.75	30	573.25	577.75
C15	121.25	125.75	C44	349.25	353.75	31	579.25	583.75
C16	127.25	131.75	C45	355.25	359.75	32	585.25	589.75
C17	133.25	137.75	C46	361.25	365.75	33	591.25	595.75
C18	139.25	143.75	C47	367.25	371.75	34	597.25	601.75
C19	145.25	149.75	C48	373.25	377.75	35	603.25	607.75
C20	151.25	155.75	C49	379.25	383.75	36	609.25	613.75
C21	157.25	161.75	C50	385.25	389.75	37	615.25	619.75
C22	165.25	169.75	C51	391.25	395.75	38	621.25	625.75
4	171.25	175.75	C52	397.25	401.75	39	627.25	631.75
5	177.25	181.75	C53	403.25	407.75	40	633.25	637.75
6	183.25	187.75	C54	409.25	413.75	41	639.25	643.75
7	189.25	193.75	C55	415.25	419.75	42	645.25	649.75
8	193.25	197.75	C56	421.25	425.75	43	651.25	655.75
9	199.25	203.75	C57	427.25	431.75	44	657.25	661.75
10	205.25	209.75	C58	433.25	437.75	45	663.25	667.75
11	211.25	215.75	C59	439.25	443.75	46	669.25	673.75
12	217.25	221.75	C60	445.25	449.75	47	675.25	679.75
C23	223.25	227.75	C61	451.25	455.75	48	681.25	685.75
C24	231.25	235.75	C62	457.25	461.75	49	687.25	691.75
C25	237.25	241.75	C63	463.25	467.75	50	693.25	697.75
C26	243.25	247.75	13	471.25	475.75	51	699.25	703.75
C27	249.25	253.75	14	477.25	481.75	52	705.25	709.75
C28	253.25	259.75	15	483.25	487.75	53	711.25	715.75
C29	259.25	263.75	16	489.25	493.75	54	717.25	721.75
C30	265.25	269.75	17	495.25	499.75	55	723.25	727.75
C31	271.25	275.75	18	501.25	505.75	56	729.25	733.75
C32	277.25	281.75	19	507.25	511.75	57	735.25	739.75
C33	283.25	287.75	20	513.25	517.75	58	741.25	745.75
C34	289.25	293.75	21	519.25	523.75	59	747.25	751.75
C35	295.25	299.75	22	525.25	529.75	60	753.25	757.75
C36	301.25	305.75	23	531.25	535.75	61	759.25	763.75
C37	307.25	311.75	24	537.25	541.75	62	765.25	769.75
C38	313.25	317.75	25	543.25	547.75			

## TV Frequency Table

U S A channel frequency assignments

ch No.	fv [MHz]	fs [MHz]	ch No.	fv [MHz]	fs [MHz]
2	55.25	59.75	43	645.25	649.75
3	61.25	65.75	44	651.25	655.75
4	67.25	71.75	45	657.25	661.75
5	77.25	81.75	46	663.25	667.75
6	83.25	87.75	47	669.25	673.75
7	175.25	179.75	48	675.25	679.75
8	181.25	185.75	49	681.25	685.75
9	187.25	191.75	50	687.25	691.75
10	193.25	197.75	51	693.25	697.75
11	199.25	203.75	52	699.25	703.75
12	205.25	209.75	53	705.25	709.75
13	211.25	215.75	54	711.25	715.75
14	471.25	475.75	55	717.25	721.75
15	477.25	481.75	56	723.25	727.75
16	483.25	487.75	57	729.25	733.75
17	489.25	493.75	58	735.25	739.75
18	495.25	499.75	59	741.25	745.75
19	501.25	505.75	60	747.25	751.75
20	507.25	511.75	61	753.25	757.75
21	513.25	517.75	62	759.25	763.75
22	519.25	523.75	63	765.25	769.75
23	525.25	529.75	64	771.25	775.75
24	531.25	535.75	65	777.25	781.75
25	537.25	541.75	66	783.25	787.75
26	543.25	547.75	67	789.25	793.75
27	549.25	553.75	68	795.25	799.75
28	555.25	559.75	69	801.25	805.75
29	561.25	565.75	70	807.25	811.75
30	567.25	571.75	71	813.25	817.75
31	573.25	577.75	72	819.25	823.75
32	579.25	583.75	73	825.25	829.75
33	585.25	589.75	74	831.25	835.75
34	591.25	595.75	75	837.25	841.75
35	597.25	601.75	76	843.25	847.75
36	603.25	607.75	77	849.25	853.75
37	609.25	613.75	78	855.25	859.75
38	615.25	619.75	79	861.25	865.75
39	621.25	625.75	80	867.25	871.75
40	627.25	631.75	81	873.25	877.75
41	633.25	637.75	82	879.25	883.75
42	639.25	643.75	83	885.25	889.75

## CATV Frequency Table

U S A channel frequency assignments

ch No.	fv [MHz]	fs [MHz]	ch No.	fv [MHz]	fs [MHz]
2	55.25	59.75	R	265.25	269.75
3	61.25	65.75	S	271.25	275.75
4	67.25	71.75	T	277.25	281.75
5	77.25	81.75	U	283.25	287.75
6	83.25	87.75	V	289.25	293.75
A-6	85.25	89.75	W	295.25	299.75
A-5	91.25	95.75	AA	301.25	305.75
A-4	97.25	101.75	BB	307.25	311.75
A-3	103.25	107.75	CC	313.25	317.75
A-2	109.25	113.75	DD	319.25	323.75
A-1	115.25	119.75	EE	325.25	329.75
A	121.25	125.75	FF	331.25	335.75
B	127.25	131.75	GG	337.25	341.75
C	133.25	137.75	HH	343.25	347.75
D	139.25	143.75	II	349.25	353.75
E	145.25	149.75	JJ	355.25	359.75
F	151.25	155.75	KK	361.25	365.75
G	157.25	161.75	LL	367.25	371.75
H	163.25	167.75	MM	373.25	377.75
I	169.25	173.75	NN	379.25	383.75
7	175.25	179.75	OO	385.25	389.75
8	181.25	185.75	PP	391.25	395.75
9	187.25	191.75	QQ	397.25	401.75
10	193.25	197.75	RR	403.25	407.75
11	199.25	203.75	SS	409.25	413.75
12	205.25	209.75	TT	415.25	419.75
13	211.25	215.75	UU	421.25	425.75
J	217.25	221.75	VV	427.25	431.75
K	223.25	227.75	WW	433.25	437.75
L	229.25	223.75	XX	439.25	443.75
M	235.25	239.75	YY	445.25	449.75
N	241.25	245.75	ZZ	451.25	455.75
O	247.25	251.75	AAA	457.25	461.75
P	253.25	257.75	BBB	463.25	467.75
Q	259.25	263.75	CCC	469.25	473.75

TV Frequency Table

TAIWAN channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

TV Frequency Table

CHINA channel frequency assignments

ch No.	fv [MHz]	fs [MHz]	ch No.	fv [MHz]	fs [MHz]
1	49.75	56.25	30	647.25	653.75
2	57.75	64.25	31	655.25	661.75
3	65.75	72.25	32	663.25	669.75
4	77.25	83.75	33	671.25	677.75
5	85.25	91.75	34	679.25	685.75
6	168.25	174.75	35	687.25	693.75
7	176.25	182.75	36	695.25	701.75
8	184.25	190.75	37	703.25	709.75
9	192.25	198.75	38	711.25	717.75
10	200.25	206.75	39	719.25	725.75
11	208.25	214.75	40	727.25	733.75
12	216.25	222.75	41	735.25	741.75
13	471.25	477.75	42	743.25	749.75
14	479.25	485.75	43	751.25	757.75
15	487.25	493.75	44	759.25	765.75
16	495.25	501.75	45	767.25	773.75
17	503.25	509.75	46	775.25	781.75
18	511.25	517.75	47	783.25	789.75
19	519.25	525.75	48	791.25	797.75
20	527.25	533.75	49	799.25	805.75
21	535.25	541.75	50	807.25	813.75
22	543.25	549.75	51	815.25	821.75
23	551.25	557.75	52	823.25	829.75
24	559.25	565.75	53	831.25	837.75
25	607.25	613.75	54	839.25	845.75
26	615.25	621.75	55	847.25	853.75
27	623.25	629.75	56	855.25	861.75
28	631.25	637.75	57	863.25	869.75
29	639.25	645.75			

TV Frequency Table

C C I R channel frequency assignmentes

ch No.	fv [MHz]	fs [MHz]	ch No.	fv [MHz]	fs [MHz]
2	48.25	53.75	40	623.25	628.75
3	55.25	60.75	41	631.25	636.75
4	62.25	67.75	42	639.25	644.75
5	175.25	180.75	43	647.25	652.75
6	182.25	187.75	44	655.25	660.75
7	189.25	194.75	45	663.25	668.75
8	196.25	201.75	46	671.25	676.75
9	203.25	208.75	47	679.25	684.75
10	210.25	215.75	48	687.25	692.75
11	217.25	222.75	49	695.25	700.75
12	224.25	229.75	50	703.25	708.75
21	471.25	476.75	51	711.25	716.75
22	479.25	484.75	52	719.25	724.75
23	487.25	492.75	53	727.25	732.75
24	495.25	500.75	54	735.25	740.75
25	503.25	508.75	55	743.25	748.75
26	511.25	516.75	56	751.25	756.75
27	519.25	524.75	57	759.25	764.75
28	527.25	532.75	58	767.25	772.75
29	535.25	540.75	59	775.25	780.75
30	543.25	548.75	60	783.25	788.75
31	551.25	556.75	61	791.25	796.75
32	559.25	564.75	62	799.25	804.75
33	567.25	572.75	63	807.25	812.75
34	575.25	580.75	64	815.25	820.75
35	583.25	588.75	65	823.25	828.75
36	591.25	596.75	66	831.25	836.75
37	599.25	604.75	67	839.25	844.75
38	607.25	612.75	68	847.25	852.75
39	615.25	620.75	69	855.25	860.75

CATV Frequency Table

C C I R channel frequency assignments

ch No.	f <sub>v</sub> [MHz]	f <sub>s</sub> [MHz]	ch No.	f <sub>v</sub> [MHz]	f <sub>s</sub> [MHz]
E 2	48.25	53.75	S14	252.25	257.75
E 3	55.25	60.75	S15	259.25	264.75
E 4	62.25	67.75	S16	266.25	271.75
X	69.25	74.75	S17	273.25	278.75
Y	76.25	81.75	S18	280.25	285.75
Z	83.25	88.75	S19	287.25	292.75
Z+1	90.25	95.75	S20	294.25	299.75
Z+2	97.25	102.75	S21	303.25	308.75
S 1	105.25	110.75	S22	311.25	316.75
S 2	112.25	117.75	S23	319.25	324.75
S 3	119.25	124.75	S24	327.25	332.75
S 4	126.25	131.75	S25	335.25	340.75
S 5	133.25	138.75	S26	343.25	348.75
S 6	140.25	145.75	S27	351.25	356.75
S 7	147.25	152.75	S28	359.25	364.75
S 8	154.25	159.75	S29	367.25	372.75
S 9	161.25	166.75	S30	375.25	380.75
S10	168.25	173.75	S31	383.25	388.75
E 5	175.25	180.75	S32	391.25	396.75
E 6	182.25	187.75	S33	399.25	404.75
E 7	189.25	194.75	S34	407.25	412.75
E 8	196.25	201.75	S35	415.25	420.75
E 9	203.25	208.75	S36	423.25	428.75
E10	210.25	215.75	S37	431.25	436.75
E11	217.25	222.75	S38	439.25	444.75
E12	224.25	229.75	S39	447.25	452.75
S11	231.25	236.75	S40	455.25	460.75
S12	238.25	243.75	S41	463.25	468.75
S13	245.25	250.75			



## TV Frequency Table

### NEW ZEALAND channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
1	45.25	50.75
2	55.25	60.75
3	62.25	67.75
4	175.25	180.75
5	182.25	187.75
6	189.25	194.75
7	196.25	201.75
8	203.25	208.75
9	210.25	215.75
10	217.25	222.75
11	224.25	229.75

### SOUTH AFRICA channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
4	175.25	181.25
5	183.25	189.25
6	191.25	197.25
7	199.25	205.25
8	207.25	213.25
9	215.25	221.25
10	223.25	229.25
11	231.25	237.25
12	—	—
13	247.43	253.43

TV Frequency Table

INDONESIA channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
1A	44.25	49.75
2	55.25	60.75
3	62.25	67.75
4	175.25	180.75
5	182.25	187.75
6	189.25	194.75
7	196.25	201.75
8	203.25	208.75
9	210.25	215.75
10	217.25	222.75
11	224.25	229.75

TV Frequency Table

ANGOLA channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
1	43.25	49.25
2	52.25	58.25
3	60.25	66.25
4	175.25	181.25
5	183.25	189.25
6	191.25	197.25
7	199.25	205.25
8	207.25	213.25
9	215.25	221.25
10	223.25	229.25

IRELAND channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
A	45.75	51.75
B	53.75	59.75
C	61.75	67.75
D	175.25	181.25
E	183.25	189.25
F	191.25	197.25
G	199.25	205.25
H	207.25	213.25
J	215.25	221.25

TV Frequency Table

ITALY channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
A	53.75	59.25
B	62.25	67.75
C	82.25	87.75
D	175.25	180.75
E	183.75	189.25
F	192.25	197.75
G	201.25	206.75
H	210.25	215.75
H1	217.25	222.75
H2	224.25	229.75

AUSTRALIA channel frequency assignments

ch No.	fv [MHz]	fs [MHz]
0	46.25	51.75
1	57.25	62.75
2	64.25	69.75
3	86.25	91.75
4	95.25	100.75
5	102.25	107.75
5A	138.25	143.75
6	175.25	180.75
7	182.25	187.75
8	189.25	194.75
9	196.25	201.75
10	209.25	214.75
11	216.25	221.75

### 13. COUNTRY/GEOGRAPHICAL AREA AND SYSTEM USED IN BANDS

Country	System used in bands		
	VHF	UHF	Channel
■ Asia			
Afghanistan	D/SECAM	–	C.C.I.R.
United Arab Emirates	B/PAL	G/PAL	C.C.I.R.
Republic of Yemen	B/PAL	G/PAL	C.C.I.R.
Israel	B/PAL	G/PAL	C.C.I.R.
Iraq	B,G/SECAM	G/SECAM*	C.C.I.R.
Iran	B/SECAM	G/SECAM	C.C.I.R.
India	B/PAL	–	C.C.I.R.
Indonesia	B/PAL	–	Indonesia
Oman	B/PAL	G/PAL	C.C.I.R.
Qatar	B/PAL	G/PAL	C.C.I.R.
Korea (Republic of )	M/NTSC	M/NTSC	U.S.A.
Combdia	B/PAL	G/PAL*	C.C.I.R.*
Korea(Democratic People's Republic of)	D/PAL	K/PAL	O.I.R.T.
Cyprus	B/PAL	G/PAL	C.C.I.R.
Kuwait	B/PAL	G/PAL*	C.C.I.R.
Saudi Arabia	B/SECAM, B/PAL	G/SECAM	C.C.I.R.
Syrian Arab Republic	B/PAL	G/PAL	C.C.I.R.
Singapore	B/PAL	G*/PAL	C.C.I.R.
Sri Lanka	B/PAL	G/PAL	C.C.I.R.
Thailand	B/PAL	G/PAL*	C.C.I.R.
China (People's Republic of)	D/PAL	D/PAL	China
Turkey	B/PAL	G/PAL	C.C.I.R.
Nepal	B/PAL		
Pakistan	B/PAL	G/PAL	C.C.I.R.
Bahrain	B/PAL	G/PAL	C.C.I.R.
Bangladesh	B/PAL	–	C.C.I.R.
Myanmar	M/NTSC	–	U.S.A.
Philippines	M/NTSC	M/NTSC	U.S.A.
Bhutan	–	–	–
Viet-Nam	D/SECAM	K/SECAM	
Malaysia	B/PAL	G/PAL	C.C.I.R.
Yemen (People's Democratic Republic of)	B/PAL	–	C.C.I.R.
Maldives	B/PAL	–	C.C.I.R.
Mongolia	D/SECAM	–	O.I.R.T.*
Jordan	B/PAL	G*/PAL	C.C.I.R.
Lao People's Democratic Republic	M/PAL		

Country	System used in bands		
	VHF	UHF	Channel
Lebanon	B/SECAM*		C.C.I.R.
Brunei Darnssalam	B/PAL	–	C.C.I.R.
Hong Kong	–	I/PAL	United Kingdom
Macao		I/PAL	
Taiwan	M/NTSC		U.S.A.
Japan	M/NTSC	M/NTSC	Japan
<b>■ Oceania</b>			
Australia	B/PAL	B/PAL	Australia
Kiribati	–	–	–
Solomon Islands	–	–	–
Tuvalu	–	–	–
Tonga	–	–	–
Nauru	–	–	–
Western Samoa	(M/NTSC)		(U.S.A.)
New Zealand	B/PAL	G/PAL	New Zealand
Vanuatu	B/PAL	–	–
Papua New Guinea	B/PAL	G/PAL	
Fiji	–	–	–
Guam	M/NTSC		U.S.A.
New Caledonia	K./SECAM		F.O.T.
Hawaii	M/NTSC		U.S.A.
French Polynesia	K./SECAM		F.O.T.
American Samoa	M/NTSC		U.S.A.
Micronesia	M/NTSC*		U.S.A.
<b>■ Africa</b>			
Algeria	B/PAL	G/PAL	C.C.I.R.
Angola	I/PAL	I/PAL*	Angola
Uganda	B/PAL	–	C.C.I.R.
Egypt	B/PAL	G/PAL	C.C.I.R.
Ethiopia	B,G/PAL	G/PAL*	C.C.I.R.
Burkina Faso	K./SECAM	K./SECAM*	O.I.R.T.
Ghana	B/PAL	B/PAL*	C.C.I.R.
Cape Verde	K./SECAM*	K./SECAM*	
Gabonese Republic	K./SECAM	K./SECAM*	F.O.T.
Cameroon	B/PAL	G*/PAL	
Cambia	I/PAL	I/PAL*	(F.O.T.)

Country	System used in bands		
	VHF	UHF	Channel
Guinea	K <sub>i</sub> /SECAM, K/PAL	K <sub>i</sub> /PAL*	
Guinea-Bissau	I/PAL*	I/PAL*	
Kenya	B/PAL	B,G/PAL*	C.C.I.R.
Côte d'Ivoire	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM*	Ivory Coast
Comoros	K <sub>i</sub> /SECAM*	K <sub>i</sub> /SECAM*	
Congo	K <sub>i</sub> /SECAM*	K <sub>i</sub> /SECAM*	F.O.T.*
Zaire	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM*	F.O.T.
Sao Tome and Principe	B/PAL	–	
Zambia	G/PAL*	G/PAL*	C.C.I.R.
Sierra Leone	B/PAL	G/PAL*	C.C.I.R.
Djibouti	B/SECAM	–	F.O.T.
Zimbabwe	G/PAL*	G/PAL*	C.C.I.R.
Sudan	B/PAL	G/PAL*	C.C.I.R.
Swaziland	G/PAL*		
Equatorial Guinea	B/PAL	G/PAL*	
Seychelles	B/PAL	–	
Senegal	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM*	F.O.T.
Somali Democratic Republic	B/PAL	G/PAL*	
Tanzania	I/PAL	I/PAL	C.C.I.R.
Chad	K <sub>i</sub> /SECAM*	K <sub>i</sub> /SECAM*	
Central African republic	K <sub>i</sub> /SECAM*	K <sub>i</sub> /SECAM*	
Tunisia	B/SECAM, B/PAL	G/SECAM, G/PAL	C.C.I.R.*
Togolese Republic	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM*	F.O.T.*
Nigeria	B/PAL	I/PAL*	C.C.I.R.
Namibia	I/PAL	I/PAL	
Niger	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM	F.O.T.*
Burundi	K <sub>i</sub> /SECAM*	K <sub>i</sub> /SECAM*	
Benin	K <sub>i</sub> /SECAM	K <sub>i</sub> /SECAM	F.O.T.*
Botswana	I/PAL	I/PAL*	
Madagascar	K <sub>i</sub> /SECAM	K/SECAM*	F.O.T.*
Malawi	I/PAL	I/PAL*	
Mali	B/SECAM	G/SECAM*	
South Africa	I/PAL	I/PAL	South Africa
Mozambique	G/PAL*	G/PAL	
Mauritius	B,G/SECAM	B,G/SECAM*	C.C.I.R.
Mauritania	B/SECAM	B/SECAM*	
Morocco	B,G/SECAM	G/SECAM	Morocco
Libya	B,G/PAL	B,G/PAL*	C.C.I.R.
Liberia	B/PAL	G/PAL*	C.C.I.R.

Country	System used in bands		
	VHF	UHF	Channel
Rwandaese Republic	B/PAL	K;/SECAM*	
Lesotho	I*/PAL	I*/PAL	
<b>■ Europe</b>			
Iceland	B/PAL	G*	C.C.I.R.
Ireland	I/PAL	I/PAL	Ireland
Albania	B/PAL	G/PAL	Italy*
Andorra	–	–	
United Kingdom	–	I/PAL	United Kingdom
Italy	B/PAL	G/PAL	Italy
Austria	B/PAL	G/PAL	C.C.I.R.
Netherlands	B/PAL	G/PAL	C.C.I.R.
Greece	B/SECAM	G/SECAM	C.C.I.R.*
San Marino	–	–	Italy
Switzerland	B/PAL	G/PAL	C.C.I.R.
Sweden	B/PAL	G/PAL	C.C.I.R.
Spain	B/PAL	G/PAL	C.C.I.R.
C.I.S.	D/SECAM	K/SECAM	O.I.R.T.
The Czecho Republic	D/SECAM	K/SECAM	O.I.R.T.
The Slovak Republic	D/SECAM	K/SECAM	
Denmark	B/PAL	G/PAL	C.C.I.R.
Germany (Federal Republic of)	B/PAL	G/PAL	C.C.I.R.
Norway	B/PAL	G/PAL	C.C.I.R.
Vatican (State of the City of)	–	–	–
Hungary	D/SECAM	K/SECAM	O.I.R.T.
Finland	B/PAL	G/PAL	C.C.I.R.
France	L/SECAM	L/SECAM	New France
Bulgaria	D/SECAM	K/SECAM	O.I.R.T.
Belgium	B/PAL	H/PAL	C.C.I.R.
Poland	D/PAL	K/PAL	O.I.R.T.
Portugal	B/PAL	G/PAL	C.C.I.R.*
Malta	B/PAL	–	C.C.I.R.
Monaco	L/SECAM	G/PAL G/SECAM	C.C.I.R.
Yugoslavia	B/PAL	G/PAL	C.C.I.R.
Liechtenstein	B/PAL	G/PAL	–
Luxembourg	B/PAL	G/PAL L/SECAM	C.C.I.R.*
Romania	D/PAL	G/PAL	O.I.R.T.



Country	System used in bands		
	VHF	UHF	Channel
<b>■ South and North America</b>			
United States of America	M/NTSC	M/NTSC	U.S.A.
Argentine Republic	N/PAL	N/PAL	U.S.A.
Uruguay	N/PAL	–	U.S.A.*
Ecuador	M/NTSC	M/NTSC	U.S.A.
El Salvador	M/NTSC		U.S.A.*
Guyana	M/NTSC*		F.O.T.
Canada	M/NTSC	M/NTSC	U.S.A.
Cuba	M/NTSC	M/NTSC	U.S.A.*
Guatemala	M/NTSC*		U.S.A.
Grenada	M/NTSC*	–	
Costa Rica	M/NTSC	M/NTSC	U.S.A.
Colombia	M/NTSC	M*	U.S.A.*
Jamaica	M/NTSC*	–	U.S.A.*
Surinam	M/NTSC	–	U.S.A.
St. Christopher and Nevis	M/NTSC	–	
St. Vincent and the Grenadines	M/NTSC*	–	
Saint Lucia	M/NTSC*		U.S.A.*
Chile	M/NTSC	M/NTSC	U.S.A.
Dominican Republic	M/NTSC*		U.S.A.*
Commonwealth of Dominica	M/NTSC*	–	U.S.A.*
Trinidad and Tobago	M/NTSC*		U.S.A.*
Nicaragua	M/NTSC*		U.S.A.*
Haiti	M/NTSC*		U.S.A.*
Panama	M/NTSC	M*/NTSC	U.S.A.*
Bahamas	M/NTSC*		U.S.A.*
Paraguay	N/PAL*		U.S.A.*
Barbados	M/NTSC*	–	U.S.A.
Brazil	M/PAL	M/PAL	U.S.A.
Venezuela	M/NTSC	M/NTSC	U.S.A.
Peru	M/NTSC	M/NTSC	U.S.A.
Bolivia	M/NTSC	M/NTSC	U.S.A.
Belize	M/NTSC	–	
Honduras	M/NTSC*		U.S.A.
Mexico	M/NTSC	M/NTSC	U.S.A.

Country	System used in bands		
	VHF	UHF	Channel
■ Others			
Greenland	M/NTSC*		U.S.A.*
Bermuda	M/NTSC	–	U.S.A.
Puerto Rico	M/NTSC*		U.S.A.*
St. Pierre et Miquelon	K <sub>1</sub> /SECAM*		F.O.T.*
Antigua and Barbuda	M/NTSC		U.S.A.
Guadeloupe	K <sub>1</sub> /SECAM*		F.O.T.*
Martinique	K <sub>1</sub> /SECAM*		F.O.T.*
Netherlands Antilles	M/NTSC*	–	U.S.A.*
St. Kitts	M*		U.S.A.*
Turks & Caicos Is.	M/NTSC*		U.S.A.*
Virginia Is. (American)	M/NTSC*		U.S.A.*
Virginia Is. (British)	M/NTSC*	–	U.S.A.*
Guiana (French)	K <sub>1</sub> *		F.O.T.*
Azores Is.			C.C.I.R. U.S.A.
Gibraltar	B/PAL	G/PAL	C.C.I.R.
Canary Is.	B*		C.C.I.R.*
Madeira Is.	B*		C.C.I.R.*
Reunion	K <sub>1</sub> /SECAM*		U.S.A.*
Diego Garcia	M/NTSC*		U.S.A.*
Johnstone Is. (American)	M/NTSC*		U.S.A.*
Midway Is. (American)	M/NTSC*		U.S.A.*
Tahiti Is.	K <sub>1</sub>		F.O.T.*

Note : Abbreviations used in the channel section are as shown in the following table.

U.S.A.	United States of America
C.C.I.R.	International Radio Consultative Committee
O.I.R.T.	International Radio and Television Organization
F.O.T.	French overseas territories

- ★ : Estimated
- ( ) : There is no their own broadcast station, but one can listen to a broadcast from the neighboring country.
- : There is no broadcast.  
Without marking .. Unknown.







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