4. VIDEO CIRCUIT

4-1 INPUT VIDEO SIGNAL

INPUT SIGNAL IS AVAILABLE FOR TWO CHANNELS VIDEO SIGNAL(NTSC, M-NTSC, PAL, SECAM), TWO CHANNELS ANALOG RGB VIDEO SIGNAL, AND ONE CHANNEL TTL RGB VIDEO SIGNAL, WHICH IS SHOWN AS SECTION 3.3 IN SPECIFICATION.

ONE OF THE TWO CHANNELS VIDEO SIGNAL CAN SELECT THE SEPARATED Y(BRIGHTNESS)/C (CHROMACITY) VIDEO SIGNAL(S-VHS).
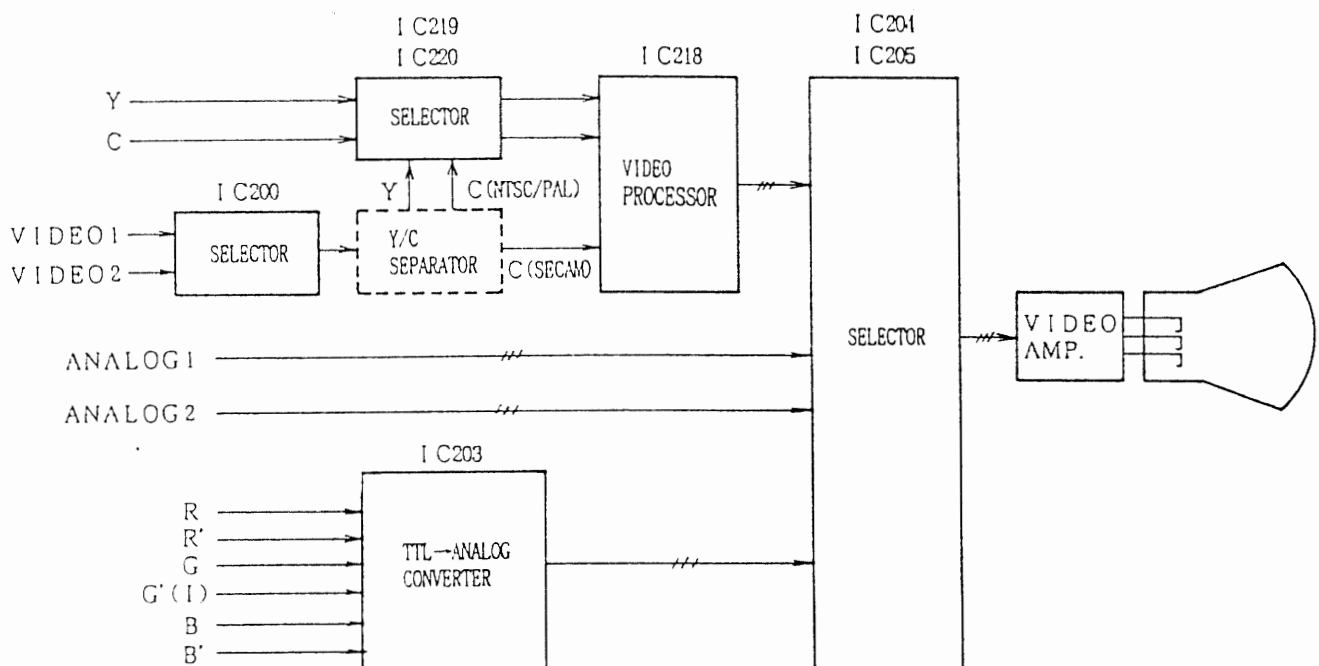
4-2 SELECTION OF INPUT SIGNAL

(1) VIDEO 1 OR 2 SIGNAL IS SELECTED BY IC200, WHICH SIGNAL OR SEPARATED Y/C VIDEO SIGNAL IS SELECTED BY IC219 AND IC220, SO THAT SELECTED SIGNAL IS APPLIED TO IC 218 OF VIDEO PROCESSING CIRCUIT.

IC218 PROVIDES THE SEPARATED RGB PRIMARY VIDEO SIGNAL TO ANALOG SWITCH OF IC204 AND IC205.

(2) TTL SIGNAL IS CONVERTED TO ANALOG LEVEL BY GATE ARRAY OF IC203, WHICH IS APPLIED TO ANALOG SWITCH OF IC204 AND IC205.

(3) IC204 AND IC205 CAN SELECT ONE CHANNEL RGB SIGNAL IN FOUR CHANNEL SIGNALS(ONE CHANNEL VIDEO, TWO CHANNEL ANALOG RGB, ONE CHANNEL TTL RGB), WHICH IS APPLIED TO VIDEO AMPLIFIER CIRCUIT.

BLOCK DIAGRAM OF INPUT SIGNAL PROCESSING

4-3 VIDEO SIGNAL

(1) VIDEO SIGNAL IS APPLIED FROM BNC CONNECTOR OR RCA JACK ON REAR PANEL, WHICH IS
    TERMINATED BY 75Ω IMPEDACE IN NORMAL OPERATION.

(2) WHEN THE MONITOR IS USED FOR LOOP THROUGH CONNECTION, THE TERMINATION SWITCH
    SHOULD SELECT TO "HIGH" IMPEDANCE POSITION WITH USING T-COUPLER, THEN THE FINAL
    MONITOR SHOULD BE SELECTED TO "75Ω" IMPEDANCE POSITION.

(3) VIDEO SIGNAL IS APPLIED TO ANALOG SWITCH OF IC200 THROUGH THE COUPLING
    CAPACITOR OF C2H8 AND C2H9.

(4) IC200 CAN SELECT VIDEO 1 SIGNAL WHEN ④, ⑥ AND ⑬ PIN IS "HIGH" LEVEL, AND
    ALSO SELECT VIDEO 2 SIGNAL WHEN ④, ⑥ AND ⑬ PIN IS "LOW" LEVEL.

(5) THE SELECTED VIDEO SIGNAL IS SEPARATED TO Y(BRIGHTNESS) AND C(CHROMACITY)
    SIGNAL BY PARIPHERAL CIRCUIT OF IC218 WHICH IS SHOW AS BELOW.
    (NTSC SIGNAL IS APPLIED TO COMB FILTER CIRCUIT OF IC221.)
    THE SEPARATED Y/C SIGNAL OR Y/C SIGNAL FROM S-TERMINAL ON REAR PANEL IS
    SELECTED BY IC219, WHICH SIGNAL OR SEPARATED Y/C SIGNAL BY COMB FILTER CIRCUIT
    IS SELECTED BY IC220, THEN THEY ARE APPLIED TO IC218 OF VIDEO PROCESSING
    CIRCUIT.
    HOWEVER, C SIGNAL OF SECAM IS DIRECTLY APPLIED TO ⑱ PIN OF IC218 AFTER
    THROUGH THE SEPARATOR CIRCUIT.
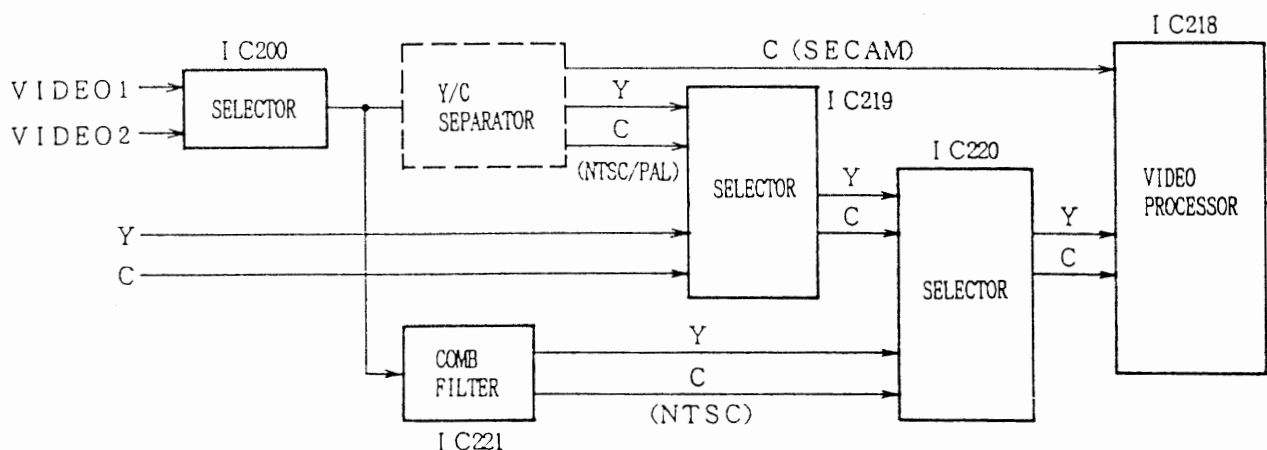
BLOCK DIAGRAM OF VIDEO SIGNAL PROCESSING CIRCUIT

(6) IC219 CAN SELECT THE SIGNAL FROM S-TERMINAL WHEN ⑨, ⑩ AND ⑪ PIN OF IC219
IS "HIGH" LEVEL, AND ALSO SELECT THE SEPARATED Y/C SIGNAL FROM PERIPHERAL
CIRCUIT OF IC218 WHEN ⑨, ⑩ AND ⑪ PIN IS "LOW" LEVEL.

(7) IC220 CAN SELECT THE SIGNAL FROM COMB FILTER CIRCUT WHEN ⑨, ⑪ PIN IS "HIGH"
LEVEL, AND ALSO SELECT THE SIGNAL FROM IC219 WHEN ⑨, ⑪ PIN IS "LOW" LEVEL.

(8) THE SEPARATED Y/C SIGNAL IS APPLIED TO ⑳ AND ㊽ PIN OF IC218.
⑪ PIN OF IC218 PROVIDES "HIGH" LEVEL SIGNAL WHEN INPUT 4.58MHz-NTSC, PAL, AND
SECAM VIDEO SIGNAL, IT ALSO PROVIDES "LOW" LEVEL SIGNAL WHEN INPUT SIGNAL IS
3.58MHz-NTSC VIDEO SIGNAL.
SO, IC220 CAN SELECT THE VIDEO SIGNAL ACCORDING TO ABOVE INPUT SIGNAL THROUGH
Q216, Q217 AND Q227.

(9) THE Y/C SIGNAL IS APPLIED TO IC218, WHICH PROVIDES THE RGB PRIMARY SIGNAL BY
㊶, ㊷ AND ㊸ PIN, THEN THEY ARE APPLIED TO ANALOG SWITCH OF IC204 AND IC205.

4-4 ANALOG RGB SIGNAL
(1) THE ANALOG RGB SIGNAL IS APPLIED FROM BNC CONNECTOR AND D-SUB CONNECTOR ON REAR
PANEL.

(2) THE TERMINATION OF INPUT SIGNAL IS USED FOR "75Ω" IMPEDANCE POSITION IN NORMAL
OPERATION.
HOWEVER, IT IS USED FOR "HIGH" IMPEDANCE POSITION WITH T-COUPLER WHEN OPERATES
THE ROOP THROUGH CONNECTION, THEN THE FINAL TERMINATION SHOULD SELECT TO "75Ω"
IMPEDANCE POSITION.

(3) THE ANALOG 1 INPUT SIGNAL IS APPLIED TO ANALOG SWITCH OF IC204 AND IC205
THROUGH THE COUPLING CAPACITOR OF C2K4~C2K9 AND EMITTER FOLLOWER OF Q255~
Q257.

(4) THE ANALOG 2 INPUT SIGNAL IS ALSO APPLIED TO ANALOG SWITCH OF IC204 AND IC205
THROUGH THE COUPLING CAPACITOR OF C2J4~C2J9 AND EMITTER FOLLOWER OF Q260~
Q262, WHICH SIGNAL IS APPLIED TO THE EXTERNAL RGB TERMINAL OF ㊼, ㊾, ⑤ PIN OF
IC218.

4-5 TTL RGB SIGNAL

(1) THE TTL RGB SIGNAL IS APPLIED FROM D-SUB CONNECTOR ON REAR PANEL WITH R, R', G, G'/I, B, B' OF INPUT SIGNAL, WHICH ARE TERMINATED TO 330 Ω AGAINST GND LEVEL AND 470 Ω AGAINST 5V LEVEL.

(2) THE TTL INPUT SIGNAL IS CONVERTED TO ANALOG LEVEL SIGNAL BY IC203 WITH PERIPHERAL CIRCUIT, WHICH IS APPLIED TO ANALOG SWITCH OF IC204 AND IC205.

(3) THE DISPLAY COLOR IS SELECTED BY INPUT SIGNAL TO ⑤ AND ⑥ PIN OF IC203 FROM IC222 (MPU), WHICH IS SHOWN AS BELOW.

	8 COLORS	SAT. 16 COLORS	PASTEL 16 COLORS	64 COLORS
⑤ PIN	L	H	L	H
⑥ PIN	L	L	H	H

H : 5 V   L : 0 V

4-6 SELECTION OF INPUT SIGNAL

THE INPUT SIGNAL IS SELECTED BY INPUT SIGNAL OF ⑨ AND ⑩ PIN ON IC204 AND IC205 FROM IC222 (MPU), WHICH IS SHOWN AS BELOW.

	VIDEO	ANALOG 1	ANALOG 2	TTL
⑨ PIN	H	L	H	L
⑩ PIN	H	L	L	H

4-7 CHARACTER DISPLAY

(1) IC230 PROVIES THE CHARACTER SIGNAL OF RGB WHICH IS APPLIED TO ANALOG SWITCH OF IC206.

(2) THE SELECTION SIGNAL BETWEEN NORMAL VIDEO AND CHARACTER IS DETERMINED BY INPUT SIGNAL TO ⑨, ⑩ AND ⑪ PIN OF IC206 FROM IC222(MPU).
THE CHARACTER SIGNAL IS DISPLAYED AT "HIGH" LEVEL, AND THE NORMAL VIDEO SIGNAL IS DISPLAYED AT "LOW" LEVEL INPUT SIGNAL.

(3) IC206 IS SWITCHED BY HIGH SPEED SELECTION SIGNAL BETWEEN CHACTER AND VIDEO SIGNAL, SO THAT WHICH MAKES OVERLAPPED DISPLAY IMAGE ON THE SCREEN.

4-8 CRT AMPLIFIER CIRCUIT

(1) THE SELECTED RGB SIGNAL BY ANALOG SWITCH OF IC204 AND IC205 IS APPLIED TO THE VIDEO AMP OF IC601 ON CRT BOARD THROUGH THE COUPLING CAPACITOR OF C6R1, C6G1, C6B1, C6R2, C6G2, AND C6B2.

(2) IC601 HAS FOLLOWING FUNCTION TO CONTROL THE VIDEO SIGNAL.
 ④, ⑧, ⑫ PIN : RGB DRIVE CONTROL
 ⑯ PIN : BRIGHTNESS CONTROL
 ⑭ PIN : CONTRAST CONTROL
THE OUTPUT SIGNAL IS FED FROM ㉑, ㉕ AND ㉙ PIN OF IC601 AFTER CONTROLLED BY ABOVE FUNCTION.

(3) ⑮ PIN OF IC601 IS USED FOR THE CLAMP PULSE INPUT TERMINAL, AND IS APPLIED FROM CLAMP PULSE CIRCUIT IN VIDEO BOARD, WHICH MAY CLAMP THE PEDESTAL LEVEL OF VIDEO SIGNAL.

(4) THE OUTPUT SIGNAL FROM IC601 IS APPLIED TO VIDEO AMP. WHICH IS COSISTED BY VOLTAGE AMP., PUSH-PULL EMITTER FOLLOWER AND CLAMP CIRCUIT.

(5) THE VOLTAGE AMP., WHICH IS CONSTRUCTED BY CASCADE AMP. AMPLIFIES APPROX. 85Vp-p AT RGB INPUT AND APPROX. 140Vp-p AT VIDEO INPUT.

(6) THE CLAMP CIRCUIT HAS DC VOLTAGE CONTROL FUNCTION, WHICH OPERATES TO CLAMP THE CATHODE VOLTAGE OF D6R3, D6G3 AND D6B3 ON APPROX. 190V AT ZERO AMPERE OF THE COLLECTOR CURRENT OF Q6R6, Q6G6, Q6B6.
WHEN THE COLLECTOR CURRENT OF Q6R6, Q6G6 AND Q6B6 REACHES APPROX. 1mA, THE CATHODE VOLTAGE OF D6R3, D6G3 AND D6B3 IS APPROX. 220V, WHICH OPERATES TO CLAMP THE MAX. VIDEO SIGNAL TO 220V.

5. SYNC. SIGNAL CIRCUIT

5-1 INPUT SYNC. SIGNAL

IT IS AVAILABLE FOR THE FOLLOWING SYNC. SIGNAL.

(1) SEPARATED HORIZONTAL/VERTICAL SYNC. :

   0.3~4Vp-p(TTL), POS./NEG. POLARITY

(2) COMPOSITE HORIZONTAL/VERTICAL SYNC. :

   0.3~4Vp-p(TTL), POS./NEG. POLARITY

(3) SYNC. ON GREEN:

   0.3V(FOR SYNC. SIGNAL), NEG. POLARITY

5-2 SYNC. SIGNAL FOR VIDEO INPUT

(1) THE SELECTED VIDEO SIGNAL BY IC200 IS APPLIED TO ⑬ PIN OF IC218, WHICH
SEPARATES SYNC. SIGNAL, THEN HORIZONTAL SYNC. SIGNAL IS PROVIDED FROM   PIN
AND VERTICAL SYNC. SIGNAL IS PROVIDED FROM
⑳ PIN.

(2) ABOVE OUTPUT SIGNAL IS APPLIED TO ① AND ⑫ PIN OF ANALOG SWITCH OF IC207.

5-3 SYNC. SIGNAL FOR ANALOG 1 INPUT

(1) THE CHANNEL OF ANALOG 1 IS AVAILABLE FOR SEPARATED HORIZONTAL/VERTICAL SYNC.
SIGNAL, HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL AND SYNC. ON GREEN SIGNAL.

(2) THE INPUT SIGNAL IS APPLIED FROM BNC CONNECTOR ON REAR PANEL WHICH CAN SELECT
THE TERMINATION OF "HIGH" OR "75Ω".

(3) THE HORIZONTAL SYNC. AND HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL IS APPLIED
TO ④ PIN OF IC207 THROUGH THE COUPLING CAPACITOR C2K2, BUFFER AMP. Q263 AND
S208.

(4) THE VERTICAL SYNC. SIGNAL IS APPLIED TO ⑪ PIN OF IC207 THROUGH THE COUPLING
CAPACITOR C2K3, BUFFER AMP. Q264.

(5) THE SYNC. ON GREEN SIGNAL IS APPLIED TO ④ PIN OF IC207 THROUGH THE COUPLING
CAPACITOR C2K5, C2K8, BUFFER AMP. Q256 AND S208.

5-4 SYNC. SIGNAL FOR ANALOG 2 INPUT

(1) THE CHANNEL OF ANALOG 2 IS AVAILABLE FOR SEPARATED HORIZONTAL/VERTICAL SYNC. SIGNAL AND HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL.

(2) THE SELECTION OF TERMINATION OF "HIGH" OR "75Ω" IS SELECTABLE BY PIN IN D-SUB CONNECTOR.

(3) THE SEPARATED HORIZONTAL SYNC. SIGNAL AND HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL IS APPLIED TO ⑤ PIN OF IC207 THROUGH THE COUPLING CAPACITOR C2J0, C2J1 AND BUFFER AMP. Q258.

(4) THE SEPARATED VERTICAL SYNC. SIGNAL IS APPLIED TO ⑭ PIN OF IC207 THROUGH THE COUPLING CAPACITOR C2J2, C2J3 AND BUFFER AMP. Q359.

5-5 SYNC. SIGNAL FOR TTL INPUT

(1) THE CHANNEL OF TTL INPUT IS AVAILABLE FOR SEPARATED HORIZONTAL/VERTICAL SYNC. SIGNAL AND HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL.

(2) THE SEPARATED HORIZONTAL SYNC. SIGNAL AND HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL IS APPLIED TO ② PIN OF IC207 VIA INVERTER OF IC237.

(3) THE SEPARATED VERTICAL SYNC. SIGNAL IS APPLIED TO ⑮ PIN OF IC207 VIA INVERTER OF IC237.

5-6 SELECTION OF SYNC. SIGNAL

(1) THE SELECTION OF SYNC. SIGNAL IS PERFORMED BY ANALOG SWITCH OF IC207.

(2) THE DISCRIMINATION OF SYNC. SIGNAL IS PERFORMED BY MPU OF IC222, WHICH PROVIDES THE SELECTION SIGNAL FROM ⑦ AND ⑧ PIN, THEN IT IS APPLIED TO ⑨ AND ⑩ PIN OF IC207 VIA Q245 AND Q246.

(3) THE SELECTION SIGNAL ON ⑨ AND ⑩ PIN OF IC207 IS AS FOLLOWS.

	VIDEO	ANALOG 1	ANALOG 2	TTL
⑨ PIN	L	H	L	H
⑩ PIN	L	H	H	L

H : 1 2 V   L : 0 V

5-7 DETECTION OF SYNC. SIGNAL

(1) THE SELECTED SYNC. SIGNAL BY IC207 IS APPLIED TO ④ AND ⑨ PIN OF COMPARATOR
    OF IC209 AND IC210 THROUGH C2G7 AND C2D9.

(2) THE APPLIED SYNC. SIGNAL TO ⑨ PIN OF IC209 AND IC210 IS COMPARED WITH VOLTAGE
    OF ⑩ PIN(3.54V).
    WHEN THE VOLTAGE OF SYNC. SIGNAL IS SMALLER THAN ⑩ PIN, ⑦ PIN PROVIDES "LOW"
    LEVEL SIGNAL, THEN Q247 OPERATES TO INCREASE THE VOLTAGE OF ⑨ PIN.
    WHEN THE VOLTAGE OF SYNC. SIGNAL IS BIGGER THAN ⑩ PIN, ⑦ PIN PROVIDES "HIGH"
    LEVEL SIGNAL, THEN Q247 OPERATES TO TURN OFF, SO THAT VOLTAGE OF ⑨ PIN WILL
    HOLD THE PRESENT VALUE.

(3) SO, THE MIN. VOLTAGE OF INPUT SIGNAL WILL BE HELD TO 3.54V BY ABOVE OPERATION.

(4) THE CLAMPED VOLTAGE TO 3.54V IS COMPARED WITH VOLTAGE OF ⑤ PIN(3.67V).
    WHEN THE VOLTAGE OF SYNC. SIGNAL SMALLER THAN ⑤ PIN, ⑫ PIN PROVIDES "LOW"
    LEVEL SIGNAL.
    THE OUTPUT SIGNAL FROM ⑫ PIN WILL BE REFORMED TO BELOW.

```
3.67V - - - - -|  |- - - -           ____    ____
3.54V - - - - __|  |__ - -               |  |
                                          |  |
  0V  _____               ___|  |___
```
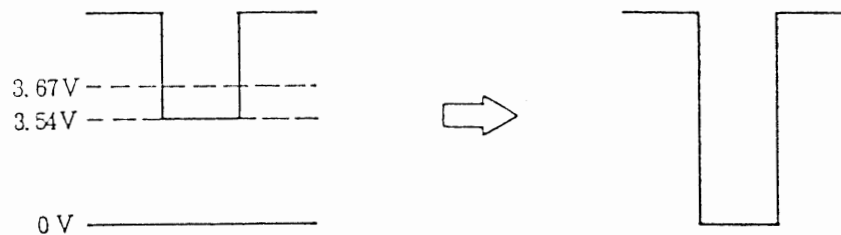
5-8 SYNC. SEPARATION

(1) THE DETECTED SYNC. SIGNAL IS FIXED TO NEGATIVE POLARITY BY IC213 AND IC211,
    THEN THE SEPARATED HORIZONTAL SYNC. SIGNAL AND HORIZONTAL/VERTICAL COMPOSITE
    SYNC. SIGNAL IS APPLIED TO SYNC. SEPARATION CIRCUIT, WHICH IS CONSISTED BY
    IC215 AND IC216.

(2) WHEN THE INPUT SIGNAL IS HORIZONTAL/VERTICAL COMPOSITE SYNC. THE HORIZONTAL
    SYNC. SIGNAL IS FED FROM ⑥ PIN OF IC217, AND THE VERTICAL SYNC. SIGNAL IS FED
    FROM ⑤ PIN OF IC216.

(3) WHEN THE SEPARATED HORIZONTAL SYNC. SIGNAL IS APPLIED FROM BNC CONNECTOR, ⑥ PIN OF IC217 PROVIDES THE HORIZONTAL SYNC. SIGNAL, AND ⑤ PIN OF IC216 PROVIDES THE "HIGH" LEVEL SIGNAL.

(4) IN CASE OF SEPARATED VERTICAL SYNC. SIGNAL, THE DETECTED VERTICAL SYNC. SIGNAL IS APPLIED TO ⑤ PIN OF IC212, THEN "HIGH" LEVEL SIGNAL IS APPLIED TO ④ PIN OF IC212 FROM ⑤ PIN OF IC216, SO THAT IC212 PROVIDES VERTICAL SYNC. SIGNAL.

(5) IN CASE OF HORIZONTAL/VERTICAL COMPOSITE SYNC. SIGNAL AND SYNC. ON GREEN SIGNAL, THE OUTPUT SIGNAL FROM VERTICAL SYNC. DETECTION CIRCUIT IS CLAMPED TO "LOW" LEVEL, AND ⑤ PIN OF IC212 IS CLAMPED TO "HIGH" LEVEL, THEN THE SEPARATED VERTICAL SYNC. SIGNAL IS APPLIED TO ④ PIN OF IC212, SO THAT IC212 PROVIDES THE SEPARATED VERTICAL SYNC. SIGNAL.

(6) AS THE RESULT OF THESE OPERATION, ⑥ PIN OF IC217 PROVIDES THE HORIZONTAL SYNC. SIGNAL, AND ⑥ PIN OF IC213 PROVIDES THE VERTICAL SYNC. SIGNAL, WHICH ARE USED FOR THE DRIVE PULSE OF DEFLECTION CIRCUIT.

6. MPU AND PERIPHERAL CIRCUIT

6-1 FUNCTION OF MPU

1) THERE IS 8-BIT MICROPROCESSOR ON THE VIDEO BOARD WHICH HAS THE FOLLOWING FUNCTION.

(1) POWER ON/OFF CONTOROL

(2) DISCRIMINATION OF HORIZONTAL/VERTICAL FREQUENCY

(3) C_s, C_R etc. SELECTION SIGNAL CONTROL

(4) SOURCE AND MODE SELECTION CONTROL

(5) DISCRIMINATION OF REMOTE CONTROL SIGNAL

(6) D/A CONVERTER CONTROL

(7) READ OR WRITE OPERATION TO E^2PROM

(8) ON SCREEN DISPLAY CONTROL

2) INTERNAL BLOCK DIAGRAM OF MPU
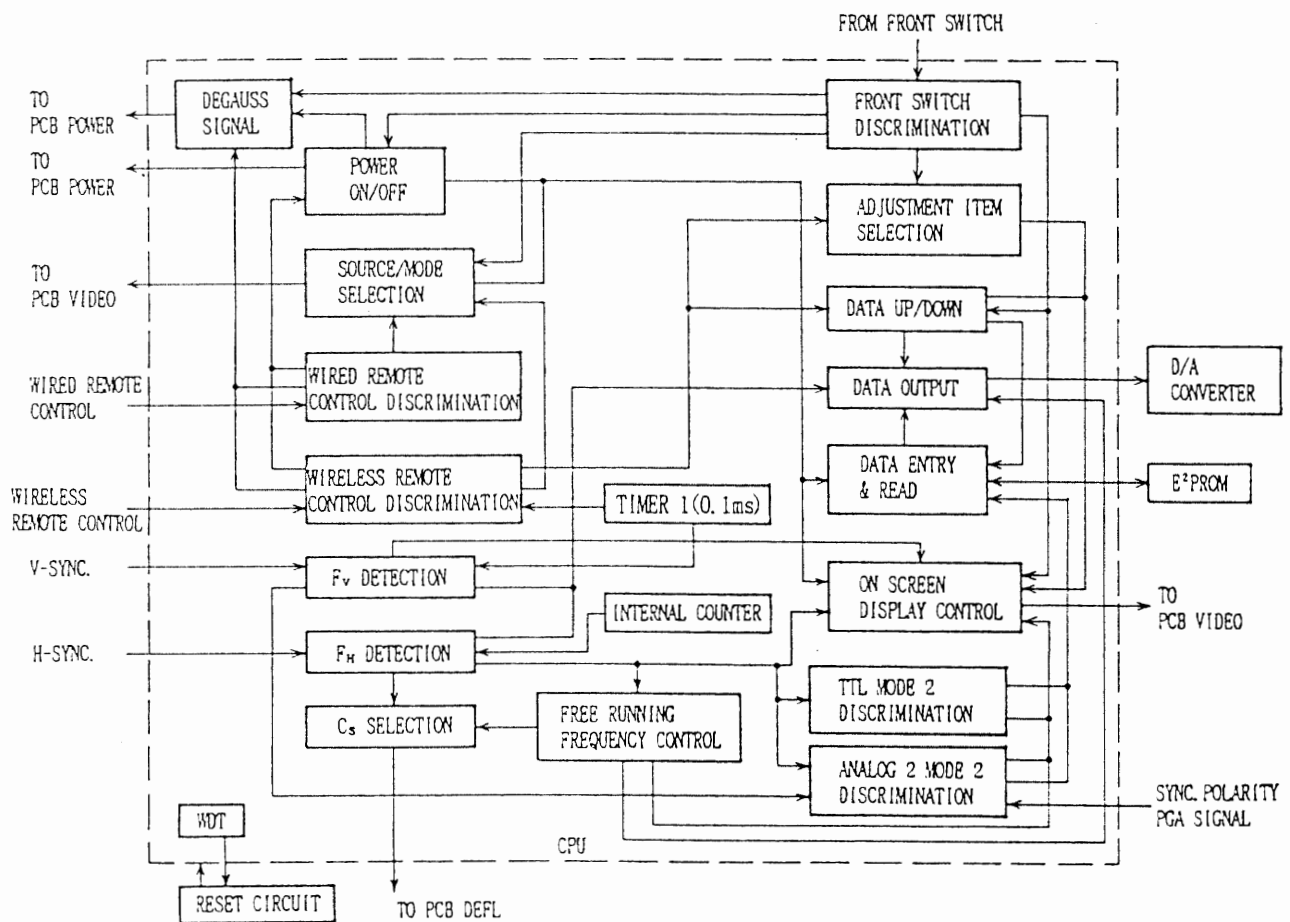
3) PIN ASSIGNMENT & I/O OF MPU(IC222)

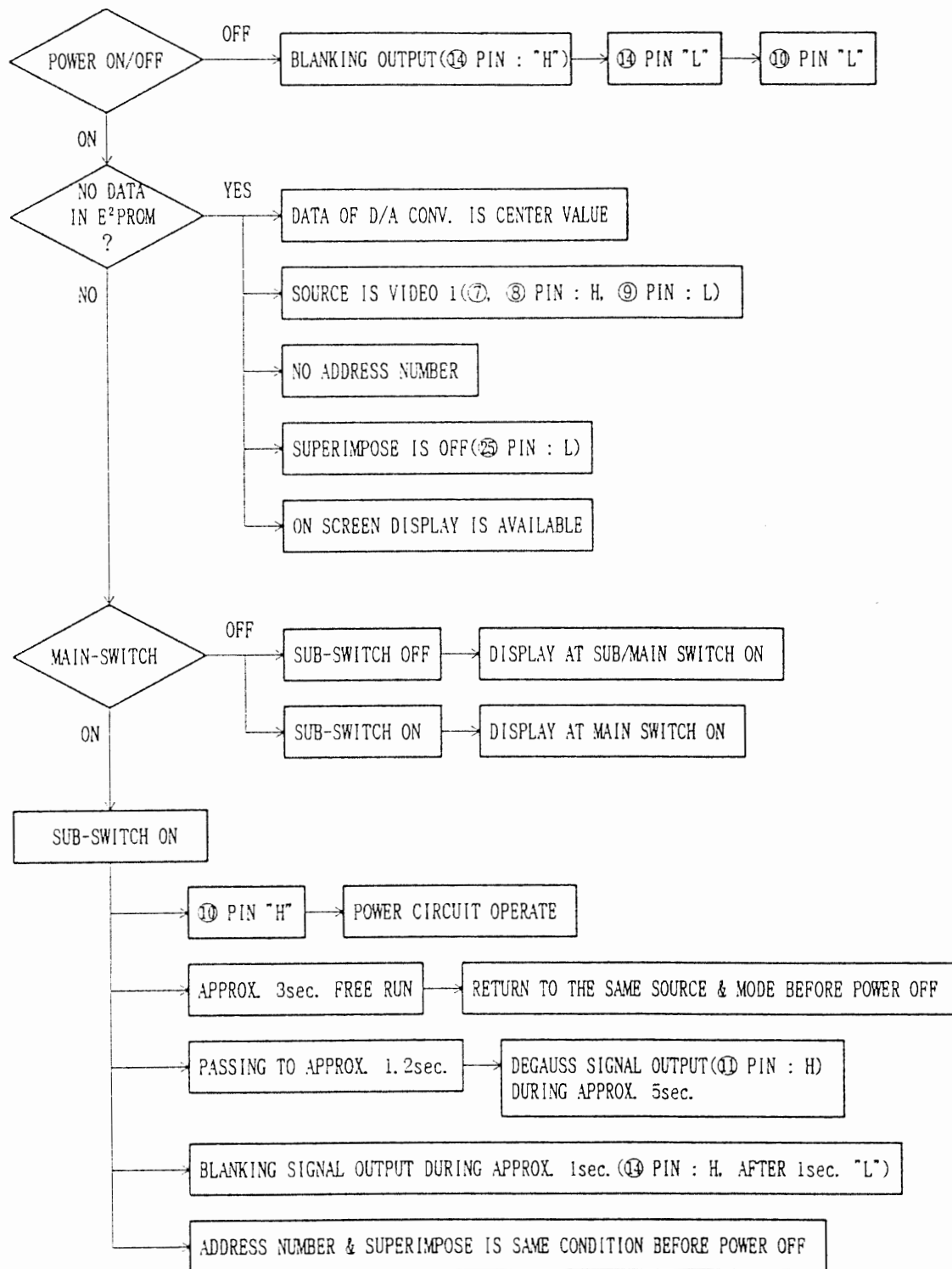| Left Signal	Direction	PIN NO.		PIN NO.	Direction	Right Signal
V_{cc}(5V)		1		64	→	D/A CONV. DATA OUTPUT
WATCH DOG TIMER OUTPUT	←	2		63	→	CLOCK OUTPUT FOR D/A CONV.
DATA OUTPUT FOR LED	←	3		62	→	LOAD PULSE OUTPUT 1 FOR D/A CONV.
CLOCK OUTPUT FOR LED	←	4		61	→	LOAD PULSE OUTPUT 2 FOR D/A CONV.
TTL COLOR SELECTION OUTPUT	←	5		60	→	
	←	6		59	→	C_s SELECTION OUTPUT
SOURCE SELECTION OUTPUT	←	7		58	→	
	←	8		57	→	
	←	9		56	→	
POWER OUTPUT(H:ON, L:OFF)	←	10		55	→	
DEGAUSS OUTPUT	←	11		54	→	
F_v LIMIT OUTPUT	←	12		53	→	I/O FOR FRONT SWITCH
F_H LIMIT OUTPUT	←	13		52	←	
BLANKING OUTPUT	←	14		51	←	
ON SCREEN DATA OUTPUT	←	15		50	←	
ON SCREEN CLOCK OUTPUT	←	16		49	←	
ON SCREEN STROBE OUTPUT	←	17		48	←→	
OUTPUT FOR EXT. CONTROL	←	18		47	←→	I/O FOR E²PROM ADDRESS DATA
	←	19		46	←→	
	←	20		45	←→	
SELECTION SIGNAL FOR COMP. SYNC.	←	21		44	→	E²PROM INITIALIZATION OUTPUT
CNTR(HD) INPUT	→	22		43	→	E²PROM CLOCK OUTPUT
REMOTE CONTROL INTERRUPT INPUT($\overline{INT_2}$)	→	23		42	→	E²PROM CE OUTPUT
OUTPUT FOR AUTO-ADJUSTMENT	←	24		41	←	E²PROM $\overline{BUSY}$ INPUT
SUPERIMPOSE OUTPUT(H:ON, L:OFF)	←	25		40		N. C.
INTERRUPT INPUT($\overline{INT_1}$(VD))	→	26		39	←	INPUT FOR AUTO-ADJUSTMENT
V_{ss}(0V)		27		38	←	PGA SIGNAL(ANALOG2, MODE2)
$\overline{RESET}$ INPUT	→	28		37	←	VGA H-POLARITY INPUT(ANALOG2, MODE2)
CLOCK INPUT(X_{IN})	→	29		36	←	VGA V-POLARITY INPUT(ANALOG2, MODE2)
CLOCK OUTPUT(X_{OUT})	←	30		35	←	INPUT FOR EXT. CONTROL
N. C.		31		34		N. C.
V_{ss}(0V)		32		33		N. C.

```
                OFF
POWER ON/OFF ──────────→ BLANKING OUTPUT(⑭ PIN : "H") ──→ ⑬ PIN "L" ──→ ⑩ PIN "L"

     │ ON
     ▼
                  YES
NO DATA         ──────────→ DATA OF D/A CONV. IS CENTER VALUE
IN E²PROM
    ?                     ──→ SOURCE IS VIDEO 1(⑦. ⑧ PIN : H, ⑨ PIN : L)
     │ NO
     │                    ──→ NO ADDRESS NUMBER

     │                    ──→ SUPERIMPOSE IS OFF(㉕ PIN : L)

     │                    ──→ ON SCREEN DISPLAY IS AVAILABLE
     ▼
                 OFF
MAIN-SWITCH    ──────────→ SUB-SWITCH OFF ──→ DISPLAY AT SUB/MAIN SWITCH ON

     │ ON                ──→ SUB-SWITCH ON ──→ DISPLAY AT MAIN SWITCH ON
     ▼
SUB-SWITCH ON

     │         ──→ ⑩ PIN "H" ──→ POWER CIRCUIT OPERATE

     │         ──→ APPROX. 3sec. FREE RUN ──→ RETURN TO THE SAME SOURCE & MODE BEFORE POWER OFF

     │         ──→ PASSING TO APPROX. 1.2sec. ──→ DEGAUSS SIGNAL OUTPUT(⑪ PIN : H)
     │                                            DURING APPROX. 5sec.

     │         ──→ BLANKING SIGNAL OUTPUT DURING APPROX. 1sec. (⑭ PIN : H. AFTER 1sec. "L")

     └───────→ ADDRESS NUMBER & SUPERIMPOSE IS SAME CONDITION BEFORE POWER OFF
```
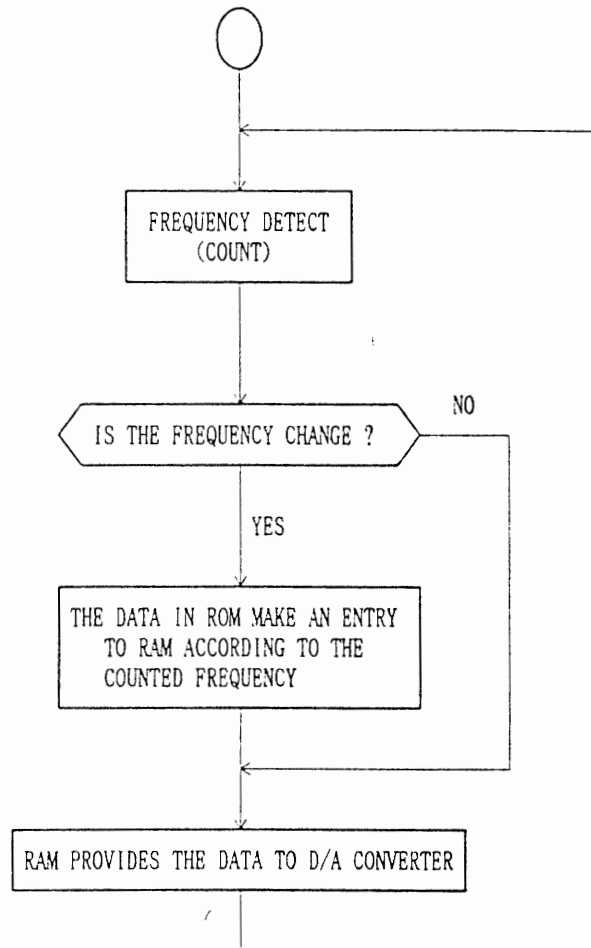
6-3 HORIZONTAL/VERTIVCAL FREQUENCY DETECTION WITH SELECTION SIGNAL

   1) FLOW CHART OF FREQUENCY DETECTION

   THE FREQUNECY IS DETECTED BY MPU OF IC222 WHICH CONTROLL TO STABILIZE THE
   OPERATION OF AUTO-TRACKING CIRCUIT IN WIDE FREQUENCY RANGE.

```
                    ○
                    │
      ┌─────────────┴─────────────┐
      │     FREQUENCY DETECT       │
      │        (COUNT)             │
      └─────────────┬─────────────┘
                    │
                    │                    NO
         ◁──────────┴──────────▷──────────┐
           IS THE FREQUENCY CHANGE ?       │
                    │                      │
                    │ YES                  │
      ┌─────────────┴─────────────┐        │
      │ THE DATA IN ROM MAKE AN ENTRY       │
      │    TO RAM ACCORDING TO THE          │
      │    COUNTED FREQUENCY        │        │
      └─────────────┬─────────────┘        │
                    │                      │
                    ◄──────────────────────┘
                    │
      ┌─────────────┴─────────────────┐
      │ RAM PROVIDES THE DATA TO D/A CONVERTER │
      └─────────────┬─────────────────┘
                    │
                    └──────────────────────►
```

   2) VERTICAL FREQUENCY(Fv) DETECTION

   (1) THE VERTICAL FREQUENCY IS COUNTED BY INPUT SIGNAL OF ㉖ PIN OF IC222.

   (2) THE OUTPUT SIGNAL OF D/A CONVERTER HAS THE FOLLOWING CHARACTERISTICS, WHICH TO
      OBTAIN THE AUTO-TRACKING FUNCTION AND CONSTANT VERTICAL HEIGHT IN WIDE
      FREQUENCY RANGE.

VERTICAL FREQUENCY (Hz)
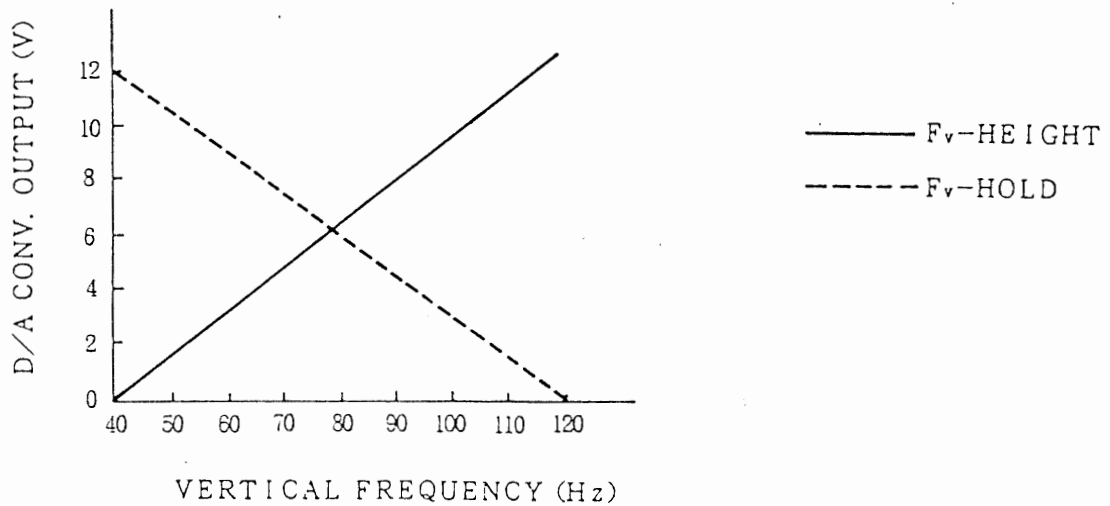
(3) FV-HOLD AND FV-HEIGHT DATA IS SELECTED BY DATA OF ROM IN IC222.

(4) IC403 PROVIDES THE FOLLOWING ADJUSTMENT SIGNAL.

⑪ PIN : F_V-HOLD , ⑩ PIN : F_V-HEIGHT

(5) THE DETECTED VERTICAL FREQUENCY IS USED FOR THE CONTROL SIGNAL OF DISPLAY POSITION AT THE ON SCREEN DISPLAY.

(6) ALSO, THE DETECTED VERTICAL FREQUENCY IS USED FOR THE DISCRIMINATION OF LIMIT FREQUENCY.

3) HORIZONTAL FREQUENCY(F_H) DETECTION

(1) THE HORIZONTAL FREQUENCY IS DETECTED BY INPUT SIGNAL TO ㉒ PIN OF IC222 IN THE FOLLOWING PERIOD(6ms).
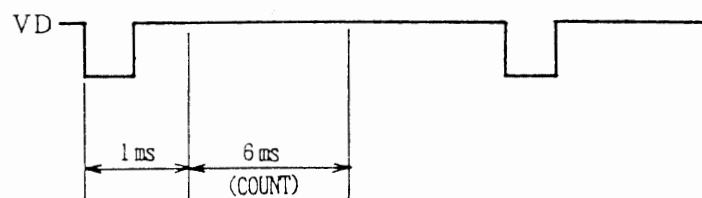

(2) THE DETECTED HORIZONTAL FREQUENCY IS USED FOR C_S SELECTION, ON SCREEN DISPLAY CONTROL AND LIMIT FREQUENCY DISCRIMINATION.

(3) THE DETECTED SIGNAL("HA") IS PROVIDED FROM ⑫ PIN OF IC233, WHICH SIGNAL IS CONTROLLED BY MPU OF IC222.

(4) ABOVE "HA" SIGNAL IS USED FOR THE DRIVE CONTROL OF BASE OF Q950, WHICH IS CONTROLLED BY Q961 AND Q962 THROUGH T902.

(5) THE CHARACTERISTICS OF HORIZONTAL FREQUENCY VS. D/A CONVERTER(IC233) OUTPUT IS
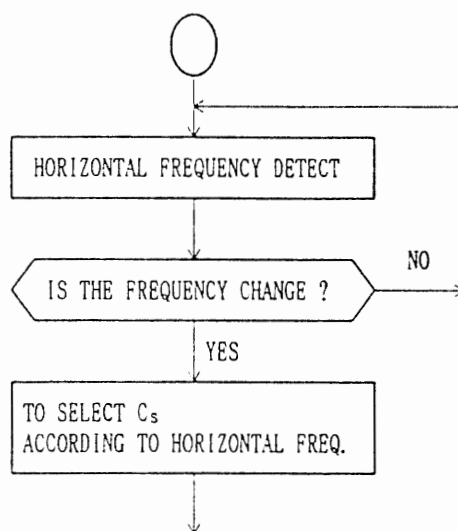AS FOLLOWS.
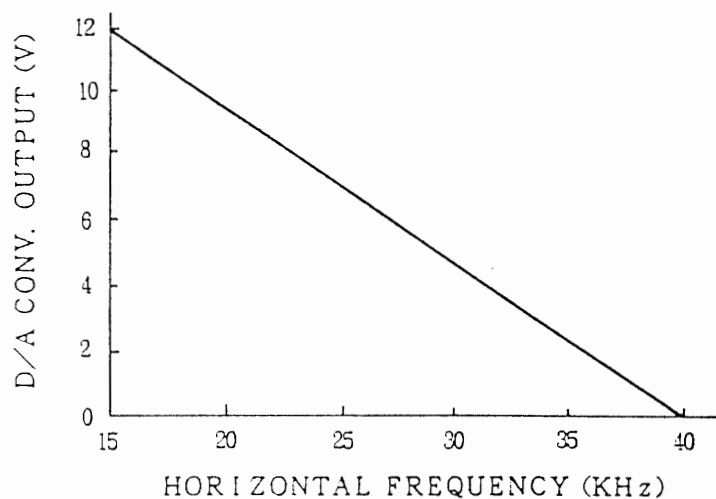
4) C$_s$ SELECTION

(1) THE C$_s$ IS SELECTED BY OUTPUT SIGNAL OF ⑤⑦ ~ ⑥⓪ PIN OF IC222 ACCORDING TO THE
FOLLWOING TABLE, WHICH TO OBTAIN THE OPTIMUM LINEARITY IN WIDE FREQUENCY RANGE.

HORIZONTAL FREQUENCY	⑤⑦ PIN	⑤⑧ PIN	⑤⑨ PIN	⑥⓪ PIN
LESS THAN 16.9KHz	L	L	L	L
16.9 ~ 18.8KHz	L	L	H	H
18.8 ~ 20.9KHz	H	L	L	H
20.9 ~ 23.3KHz	H	L	H	L
23.3 ~ 26.0KHz	H	H	L	L
26.0 ~ 29.0KHz	H	H	L	H
29.0 ~ 32.3KHz	H	H	H	L
MODE THAN 32.3KHz	H	H	H	H

(2) FLOW CHART OF Cs SELECTION

```
                    ○
                    │
                    ↓ ←───────────────┐
        ┌───────────────────────┐     │
        │ HORIZONTAL FREQUENCY DETECT │ │
        └───────────────────────┘     │
                    │                  │
                    ↓           NO     │
        ╱───────────────────────╲──────┤
        ╲  IS THE FREQUENCY CHANGE ? ╱  │
                    │                  │
                    │ YES              │
        ┌───────────────────────┐      │
        │ TO SELECT Cs           │      │
        │ ACCORDING TO HORIZONTAL FREQ. │
        └───────────────────────┘      │
                    │                  │
                    ↓──────────────────┘
```

5) VERTICAL LINEARITY(V-LIN.S) CONTROL

(1) IT IS NECESSARY TO CONTROLL THE VERTICAL LINEARITY IN WIDE FREQUENCY RANGE,
    WHICH IS CONTROLLED BY OUTPUT VOLTAGE OF ⑫ PIN ON IC401.

(2) THE OUTPUT OF IC401 IS MODULATED BY PARABOLIC WAVE, WHICH VOLTAGE IS CONTROLLED
    TO INCREASE BY IC222, WHEN THE VERTICAL FREQEUNCY IS INCREASING.

6-4 SOURCE/MODE SELECTION

1) SOURCE SELECTION

(1) THE INPUT SIGNAL SOURCE IS SELECTED BY OUTPUT SIGNAL FROM MPU OF IC222, WHICH
    SHOWN AS BELOW.

SOURCE	⑦ PIN	⑧ PIN	⑨ PIN
VIDEO 1	H	H	L
VIDEO 2	H	H	H
ANALOG 1	L	L	H
ANALOG 2	H	L	L
TTL	L	H	L

(2) ⑭ PIN OF IC222 PROVIDES THE BLANKING PULSE DURING APPROX. 0.5~2sec. WHEN
    SELECT THE SOURCE.

2) MODE SELECTION

(1) THE INPUT SIGNAL SOURCE OF ANALOG 1, ANALOG 2 AND TTL HAS MODE 1 OR 2, WHICH ARE AVAILABLE FOR THE FOLLOWING ADJUSTMENT ITEMS.

ADJUSTMENT ITEM	VIDEO		ANALOG 1		ANALOG 2								TTL		
	NTSC	PAL SECAM	MODE 1	MODE 2	MODE 1	MODE 2							MODE 1	MODE 2	
						PGA		VGA				MAC		CGA	EGA
H-WIDTH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H-PHASE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
V-HEIGHT	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
V-POSITION	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BRIGHT	○	○	○		○									○	
CONTRAST	○	○	○		○									○	
COLOR	○	○	—		—									—	
TINT	○	—	—		—									—	
SHARPNESS	○	○	—		—									—	
COLORS	—		—		—								8/P16/ S16/64	P16	64
VOLUME	○														
BALANCE	○														
PURITY	○														

(2) THE SELECTION OF MODE 1 OR 2 IS SELECTABLE BY THE OPERATION OF FRONT PANEL SWITCH, WIRELESS REMOTE CONTROLLER AND WIRED REMOTE CONTROLLER.

(3) NTSC OR PAL/SECAM SIGNAL IS DISCRIMINATED BY VERTICAL REQUENCY.

6-5   WIRELESS REMOTE CONTROLLER

　　　THE WIRELESS REMOTE CONTROLLER HAS THE FOLLOWING FUNCTIONS.

　　(1) POWER ON/OFF(SUB-SWITCH)

　　(2) SELECTION OF SOURCE/MODE

　　(3) DISPLAY CONDITION ADJUSTMENT

　　(4) ADDRESS NUMBER ENTRY AND CALL

　　　(THE ADDRESS NUMBER MEANS NUMBER OF MONITOR WHEN THE MULTI-DISPLAY.)

　　(5) SUPERIMPOSE ON/OFF

　　(6) DEGAUSS ON

　　(7) COLOR SELECTION OF TTL/MODE1

　　(8) SELECTION OF COMPOSITE SYNC. AT ANALOG OR TTL INPUT

　　(9) ON SCREEN DISPLAY CALL/CLEAR
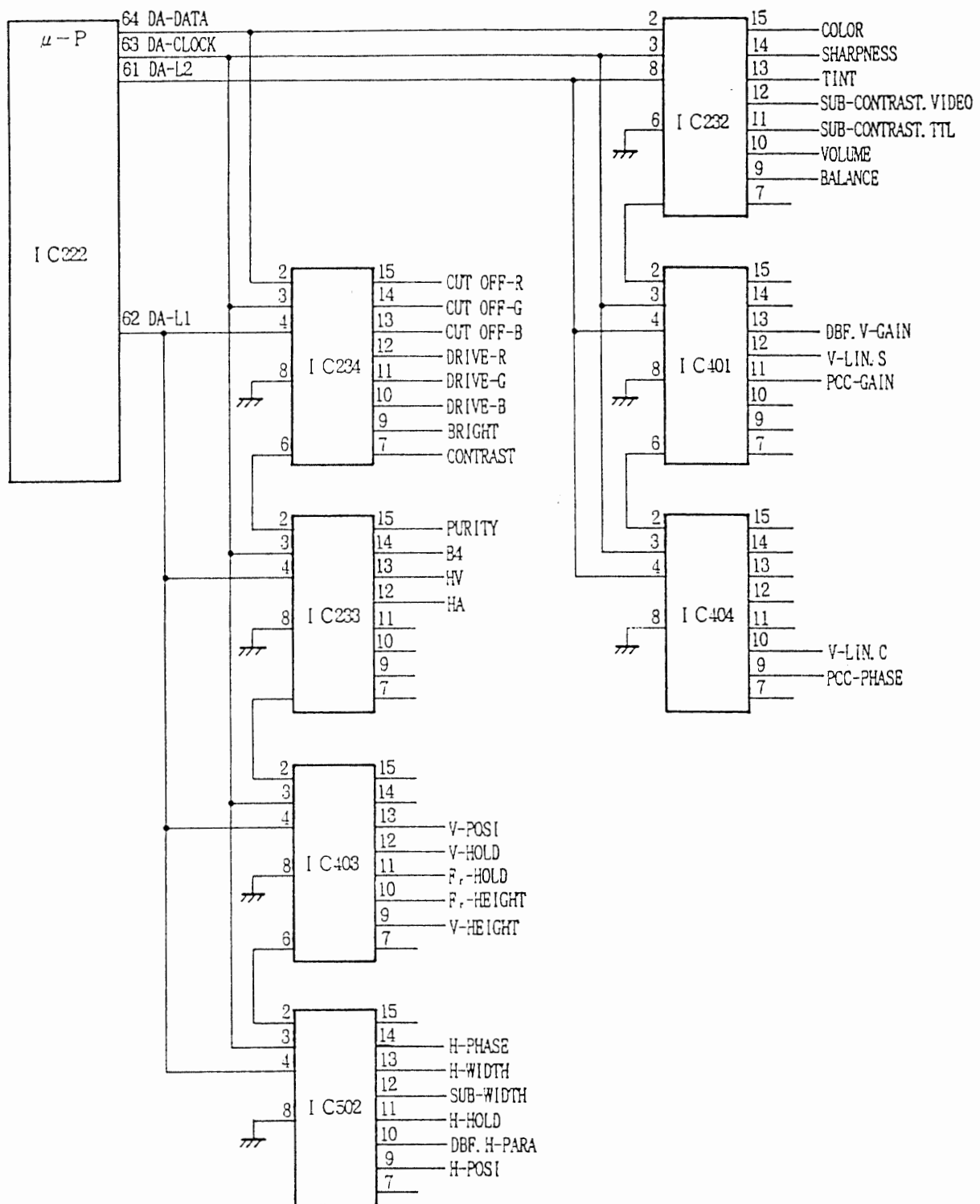
　　(10) ON SCREEN DISPLAY ON/OFF (DISPLAY OFF)

6-6   D/A CONVERTER

　　1) THE MPU OF IC222 POVIDES THE FOLLOWING SIGNAL TO D/A CONVERTER.

　　(1) DATA SIGNAL (64 PIN)

　　(2) CLOCK SIGNAL (63 PIN)

　　(3) LOAD SIGNAL (62, 61 PIN)

　　2) CONNECTION DIAGRAM AND OUTPUT SIGNAL OF D/A CONVERTER SHOW AS NEXT IS SEPARATED
　　　TO FOUR PAIR CIRCUITS(IC234, IC233, IC403, AND IC502) AND THREE PAIR CIRCUITS
　　　(IC232, IC401 AND IC404).
　　　THESE CIRCUITS ARE CONTROLLED BY MPU OF IC222, THEN THEY ALTERNATELY PROVIDE
　　　THE OUTPUT SIGNAL EVERY ONE PERIOD OF LOAD SIGNAL.

μ − P

64 DA-DATA
63 DA-CLOCK
61 DA-L2

I C222

62 DA-L1

I C234
2
3
4
8
6
15 CUT OFF-R
14 CUT OFF-G
13 CUT OFF-B
12 DRIVE-R
11 DRIVE-G
10 DRIVE-B
9 BRIGHT
7 CONTRAST

I C233
2
3
4
8
15 PURITY
14 B4
13 HV
12 HA
11
10
9
7

I C403
2
3
4
8
6
15
14
13 V-POSI
12 V-HOLD
11 Fr-HOLD
10 Fr-HEIGHT
9 V-HEIGHT
7

I C502
2
3
4
8
15
14 H-PHASE
13 H-WIDTH
12 SUB-WIDTH
11 H-HOLD
10 DBF. H-PARA
9 H-POSI
7

I C232
2
3
8
6
15 COLOR
14 SHARPNESS
13 TINT
12 SUB-CONTRAST. VIDEO
11 SUB-CONTRAST. TTL
10 VOLUME
9 BALANCE
7

I C401
2
3
4
8
6
15
14
13 DBF. V-GAIN
12 V-LIN. S
11 PCC-GAIN
10
9
7

I C404
2
3
4
8
15
14
13
12
11
10 V-LIN. C
9 PCC-PHASE
7

3) THE PAIR OF FOUR D/A CONVERTERS ARE CONTROLLED BY LOAD SIGNAL 1(63 PIN), AND
   THE PAIR OF THREE D/A CONVERTERS ARE CONTROLLED BY LOAD SIGNAL 2(61 PIN), ON
   MPU OF IC222.

4) CONCERNING BETWEEN D/A CONV. OUTPUT AND DISPLAY CONDITION

ITEM	D/A DATA(UP←→DOWN)			DISPLAY CONDITION		
H-WIDTH	INC.	←→	DEC.	NARROW	←→	WIDE
SUB-WIDTH	INC.	←→	DEC.	NARROW	←→	WIDE
H-PHASE	INC.	←→	DEC.	LEFT	←→	RIGHT
H-POSI	INC.	←→	DEC.	LEFT	←→	RIGHT
V-HEIGHT	INC.	←→	DEC.	NARROW	←→	WIDE
V-POSI	INC.	←→	DEC.	DOWN	←→	UP
BRIGHT	DEC.	←→	INC.	DARK	←→	LIGHT
CONTRAST	DEC.	←→	INC.	DARK	←→	LIGHT
COLOR	DEC.	←→	INC.	LIGHT	←→	SHADE
TINT	INC.	←→	DEC.	RED	←→	GREEN
CUT-OFF(R)	INC.	←→	DEC.	DARK	←→	LIGHT
CUT-OFF(G)	INC.	←→	DEC.	DARK	←→	LIGHT
CUT-OFF(B)	INC.	←→	DEC.	DARK	←→	LIGHT
SHARPNESS	DEC.	←→	INC.	SOFT	←→	SHARP
VOLUME	DEC.	←→	INC.	SMALL	←→	LOUD
BALANCE	DEC.	←→	DEC.	LEFT	←→	RIGHT
PURITY	DEC.	←→	INC.	NORTH	←→	SOUTH
B4	INC.	←→	DEC.	VOLTAGE DEC.	←→	INC.
HIGH VOLTAGE	INC.	←→	DEC.	VOLTAGE DEC.	←→	INC.
V-HOLD	INC.	←→	DEC.	FREQUENCY DEC.	←→	INC.

6-7 READ OR WRITE OPERATION TO E²PROM

(1) IN BASICALLY, THE OPTIMUM DISPLAY DATA IS MEMORIZED TO E²PROM IN FACTORY.

(2) IN CASE OF NO DATA IN E²PROM, THE MONITOR DISPLAYS RASTER ACCORDING TO FLOW CHART IN SECTION 6-2

(3) IN CASE OF ANALOG 1/ANALOG 2(MODE 1)/TTL(MODE 1), THE ADJUSTMENT DATAS ARE AUTOMATICALLY MEMORIZED TO E²PROM WHEN OPERATES TO PUSH THE SWITCHES OF FRONT PANEL AND WIRELESS REMOTE CONTROLLER.
THEREFORE, THESE DATAS WILL BE STORAGED IN E²PROM AFTER TURN OFF THE POWER SWITCH OR TO SELECT THE OTHER SOURCES OR MODES.

(4) IN CASE OF VIDEO/ANALOG 2(MODE 2)/TTL(MODE 2), THE ADJUSTMENT DATA IS MEMORIZED
ONLY TO PUSH THE BOTH SWITCHES OF "DEGAUSS" AND "CALL" AT THE SAME TIME.

(5) IN NORMALLY, ADJUSTMENT ITEMS ARE DISPLAYED ON THE SCREEN WHEN OPERATE TO PUSH
THE FRONT SWITCHES OR WIRELESS REMOTE CONTROLLER.
HOWEVER, IF NECESSARY FOR THE FURTHER ADJUSTMENTS(FOR EXAMPLE, HIGH VOLT. OR B4
VOLT. etc.), IT IS NECESSARY TO SET UP S209 ON VIDEO BOARD.
(PLEASE REFER TO ADJUSTMENT SECTION.)

6-8 ON SCREEN DISPLAY

IC230 FOR ON SCREEN CHARACTER DISPLAY IS PROVIDED TO THE FOLLOWING SIGNALS FROM
MPU OF IC222.
(1) DATA SIGNAL   (⑰ PIN)
(2) CLOCK SIGNAL   (⑯ PIN)
(3) STROBE SIGNAL (⑮ PIN)
ABOVE SIGNALS ARE USED FOR THE DISPLAY OF SCREEN FOR SOUCE/MODE, ADJUSTMENT
ITEMS, ADJUSTMENT VALUE AND ADDRESS NUMBER.

6-9 EXTERNAL WIRED REMOTE CONTROL

1) THE EXTERNAL WIRED REMOTE CONTROL IS AVAILABLE FOR THE FOLLOWING CONTROLS.

(1) SELECTION OF EXT.(WIRED REMOTE CONTROL)/INT. (WIRELESS REMOTE CONTROL OR FRONT
SWITCHES)

(2) POWER ON/OFF   } IT IS AVAILABLE ONLY EXT. SIGNAL.
(3) SOURCE/MODE SELECTION

2) SIGNAL DISCRIMINATION AND SELECTION

(1) THE SELECTION SIGNAL SHOWN AS NEXT IS DETEMINED BY COMBINATION THAT INPUT AND
OUTPUT SIGNAL BETWEEN IC222 AND IC231.

(2) THE PIN ASSIGNMENT OF IC231 IS AS FOLLOWS.

IC231	LEVEL	SELECTION SIGNAL
⑬ PIN	L	EXTERNAL
	H	INTERNAL
⑫ PIN	L	POWER ON
	H	POWER OFF
④ PIN	L	VIDEO 1
③ PIN	L	VIDEO 2
② PIN	L	ANALOG 1
① PIN	L	ANALOG 2
⑮ PIN	L	TTL
⑭ PIN	L	MODE 1
	H	MODE 2

THEY ARE AVAILABLE ONLY TO SELECT THE EXTERNAL SIGNAL.

(3) IF NECESSARY FOR THE MANUAL DEGAUSSING, IT IS AVAILABLE THAT ⑬ PIN IS HIGH LEVEL AND ⑫ PIN IS LOW LEVEL.

HOWEVER, IF CONTINUOUSLY SELECT THE "INTERNAL" SIGNAL ON ⑬ PIN, IT IS NECESSARY TO DISCONNECT THE WIRED REMOTE CONTROLLER OR TO SELECT THE "INTERNAL" SIGNAL AFTER SELECT THE "POWER OFF" (⑫ PIN : H).

(4) THE SOURCE SELECTION SIGNAL HAS THE FOLLOWING PRIORITY.

VIDEO 1 > VIDEO 2 > ANALOG 1 > ANALOG 2 > TTL

(5) IT IS NOT AVAILABLE FOR THE WIRELESS REMOTE CONTROLLER AND POWER/SOURCE/MODE SWITCHES OF FRONT PANEL, WHEN SELECT THE EXTERNAL SIGNAL BY WIRED REMOTE CONTROLLER. (THE OTHER SWITCHES ARE AVAILABLE.)