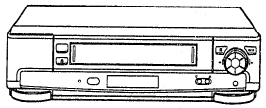
HITACHI

SERVICE MANUAL



TK No. 4621E

VT-F99EM (SWNA)
VT-F99EM (HKN)
VT-F99EM (JU)

US MECHANISM

This service manual does not include information on the US Mechanism used in this model.
Refer to the following manual for the US Mechanism.

Manuals to be referred
VT-F99EM(SWNA),(HKN),(JU).

Name of manual	Manual No.
US Mechanism	4527E

VHS
This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

October 1996 Image & Information Media Systems Division, Tokai

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without any danger of electrical shock.

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CHAPTER 1 GENERAL INFORMATION

Specifications

Format:	VHS PAL & NTSC standard
Recording:	Rotary two-head helical scan azimuth recording
Head:	Double azimuth 4 video heads 2 for SP 2 for LP/EP 2 Hi-Fi audio heads
Tape Speed:	PAL/MESECAM: 23.39mm/sec(SP), 11.7mm/sec(LP)
	NTSC: 33.35mm/sec(SP), 16.67mm/sec(LP)(playback only), 11.12mm/sec(EP)
Tape Width:	12.7mm
Operation Temperature:	5℃ to 40℃
Video:	PAL & MESECAM colour & CCIR monochrome signal 625 lines
	Standard(3.58MHz) and modified(4.43MHz) NTSC colour & EIA standard 525 lines
Recording Time:	480min.(using E-240 cassette)(PAL/MESECAM LP mode)
	480min.(using T-160 cassette)(NTSC EP mode)
Aerial Input:	PAL mode: VHF 2 - 12, UHF: 21 - 69, CATV: X- S41
	American NTSC mode: VHF: 2 - 13, UHF: 14 - 69, CATV: A-6 - W+84
	Japan NTSC mode: VHF: 1 - 12, UHF: 13 - 62, CATV: C13 - C63
RF Output	PAL mode: UHF channel 38(32 - 42 adjustable) ... System I,G and K
	American NTSC mode: UHF channel 35 or 36(29 - 42 adjustable) ... System M
	Japan NTSC mode: UHF channel 34 or 35(28 - 41 adjustable) ... System M
Video Input:	0.5 to 1.5Vp-p 75ohm unbalanced
Video Output:	1Vp-p 75ohm unbalanced
S/N Ratio(Video):	43dB
Audio (Linear):	S/N Ratio: 43dB
	Frequency Range: 70Hz to 12kHz
Hi-Fi Audio:	Frequency Range: 20Hz to 20kHz
	Dynamic Range: More than 90dB
	Wow and Flutter: Less than 0.005% WRMS
Horizontal Resolution:	Colour 260 lines
Audio Input:	-7.8dBm 50Kohm
Audio Output:	-7.8dBm 1Kohm
Fast Forward/Rewind time:	About 2 minutes(with E-180/T-120 cassette)
Power:	AC110 - 240V, 50/60Hz
Power Consumption:	25W (including timer)
Timer:	24 hour digital indication
Cabinet Size:	435mm(W) × 99mm(H) × 282mm(D)
Weight:	4.0kg
Accessories Included:	1-Aerial cable
	1-PAL/NTSC aerial cable (For JU)
	1-Infrared remote control unit
	2-Batteries
	1-Audio/Video cable
	1-Power socket adaptor (For SWNA, JU)
	1-Aerial plug adaptor (For JU)

Design and specifications subject to change without notice.

Comparison with Previous Model

	ITEM	VT-F99EM(SWNA, HKN, JU)	VT-F90EM(SWN, HKN, JU)
General	VIDEO HEADS	DA4 Heads + Hi-Fi SP: 48μm LP: 24μm AUDIO: 28μm	DA4 Heads + Hi-Fi SP: 48μm LP: 24μm AUDIO: 28μm
	BASIC CHASSIS TYPE	US	ACE
	CAPSTAN DRIVE	DIRECT DRIVE	DIRECT DRIVE
	CYLINDER MOTOR	THREE-PHASE OUTER ROTOR: 360Hz	THREE-PHASE OUTER ROTOR: 300Hz
Video	PAL COLOUR	B/G, D/K, I, M	B/G, D/K, I, M
	VIDEO	PAL/MESECAM/PAL60(PB only) 3.58NTSC/4.43NTSC	PAL/SECAM/MESECAM/PAL60 (PB only) 3.58NTSC/4.43NTSC
	DYNAMIC PICTUIRE ENHANCE	YES	NO
	G-CORD	YES (SWNA, HKN)	YES (SWN, HKN)
Tuner	TUNING SYSTEM	F.S TUNING	F.S TUNING
	CATV	YES	YES
	CHANNEL PRESET No.	49CH	49CH
	RF CONVERTER	G/I/K, M-AUTO	I, G, K, M-AUTO
	RF CONV. CHANNEL (32-42)	38	37
	A2	YES (SWNA)	NO
	NICAM	YES (SWNA, HKN)	YES (SWN, HKN)
	MPX AUDIO	YES (JU)	YES (JU)
Timer	REC. PROGRAMME	8 PROG./1 YEAR	8 PROG./1 YEAR
	DIMMER	YES	YES
	IRT	LENGTH Only	LENGTH Only
	BACK-UP TIME	ABOUT 30 MIN.	ABOUT 30 MIN.
	EASY EDIT	NO	NO
	VISS	YES	YES
	TV/VCR CONTROL	NO	NO
	SUPER QUICK PROGRAMMING	YES (JU)	NO
Other features	AUTO HEAD CLEANING	YES	YES
	MANUAL HEAD CLEANING	YES	YES
	EDIT IN/OUT JACK	NO	NO
	TAPE SPEED	SP/LP(PAL), SP/LP(play only)/EP (NTSC)	SP/LP(PAL), SP/LP(play only)/EP (NTSC)
	VIDEO/AUDIO DUB	NO	NO
	SLOW/REV.SLOW PLAY	YES/YES	YES/YES
	F.ADV PLAY/REV.F.ADV PLAY	YES/YES	YES/YES
	LP SPECIAL EFFECT	NO	NO
	SHUTTLE RING/JOG	YES/YES	NO/NO
Auto features	FRONT A/V INPUT JACK	YES	NO
	COUNTER GO-TO	NO	YES
	AUTO TRACKING	YES	YES
	AUTO OPERATE ON	YES	YES
	AUTO PLAY	YES	YES
	AUTO EJECT	YES	YES
	AUTO REWIND	YES	YES
	AUTO REW.SHUT OFF	YES	YES
	AUTO TAPE CANCELLER	YES	YES
Remote	INSTANT PLAYBACK TIMER	NO	NO
	PROGRAMME SETTING	OSD	LCD
	CLOCK SETTING	OSD	LCD
	VCR1/VCR2/TV	YES	YES
	PROGRAMME MEMORY	NO	YES
	VIDEO PLUS	NO	NO

Main Control ICs Table

Item	Function	VT-F99E(SWNA, HKN, JU)	
VIDEO	Y/CHROMA SIGNAL PROCESSING	HA118203F/AF	(IC201)
	CCD 1H DELAY	MSM7470-70MS-KR1	(IC202)
	FM SIGNAL PROCESSING/EQ	INCLUDED IN IC201	
AUDIO	LINEAR AUDIO PROCESS	INCLUDED IN IC201	
	FM AUDIO PROCESS	AN3964FB	(IC501)
PREAMP	VIDEO HEAD AMP	HA118198F	(IC1101)
	AUDIO HEAD AMP	LA7256	(IC1102)
OSD	OSD CONTROL/SYNC SEPARATOR/AFC	INCLUDED IN MAIN μP	
SERVO	SERVO CONTROL	INCLUDED IN MAIN μP	
	FG/TACH AMP	INCLUDED IN MAIN μP	
SYSTEM CONTROL	MAIN μP (SYSTEM CONTROL μP)	HD6433977SB03F	(IC901)
	VCR-EEPROM	ST24C02 6	(IC903)
	LOADING MOTOR DRIVE	BA6209	(IC904)
TIMER	TIMER μP	INCLUDED IN MAIN μP	
	DISPLAY DRIVER	BU9716K	(IC1701)
POWER SUPPLY	5V REGULATOR	M5278L05	(IC905)
NICAM (SWNA, HKN)	NICAM DEMODE	SAA7283GP	(IC1801)
	DUAL OPE. AMP	NJM4558M	(IC1802)
	ST/DUAL SOUND PROCESSOR	TDA9840	(IC1851)
	FM DEMODULATOR	TDA9821	(IC1852)
MPX AUDIO (JU)	MTS DECODER (USA)	HTS7337A	(IC1801)
	MPS DECODER (JAPAN)	CXA2020S	(IC1802)
	USA/JAPAN SELECTOR	BA3129	(IC1803)

Tips for Servicing

Trouble Display Function

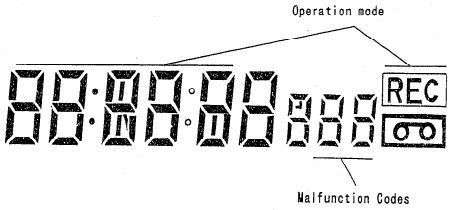
This VCR has a function which displays mechanism malfunctions, etc. in the LCD display. Use this function to analyze the cause when the power is shut off due to a malfunction, etc. in the mechanism.
Two types of information are displayed, ① The operation mode when the malfunction occurred, ② Malfunction Codes.

Procedure to display a malfunction

Press the "CHANNEL ▼" button on the VCR when the power is turned off and hold it; the malfunction code is displayed while the button is held depressed.

The details of the malfunction are displayed as follows.

LCD DISPLAY



[Display of Details of Malfunction]

Displayed No.	Item	Details
"00"	No malfunction	
"01"	FL mechanism lock	Malfunction in insertion/ejection of cassette
"02"	Capstan lock	Malfunction of capstan motor drive during tape unloading
"04"	Reel lock	Reel rotation trouble when tape is running
"05"	Cylinder lock	Cylinder rotation malfunction
"07"	Loading mechanism lock	Malfunction in shifting mechanism mode
"16"	Servo lock	Shorting of 5V detected

[Mode Display when Malfunction Has Occurred]

Mode	Display	Mode	Display
Stop	No display	Playback	PLAY
Fast forward	FF	Reverse playback	-PLAY
Rewind	REW	Forward search	SRCH
Recording	REC	Reverse search	-SRCH
Recording pause	REC (flashes)	Slow motion play	SLOW
Hight speed fast forward	S : FF	Reverse motion slow play	-SLOW
Hight speed rewind	S : REW	Still motion play	STILL

No symbols are displayed if the malfunction occurred when a cassette was inserted or ejected, or the power was switched on from off, and off from on.

How to Remove the Cassette when a Malfunction Has Occurred in the Mechanism

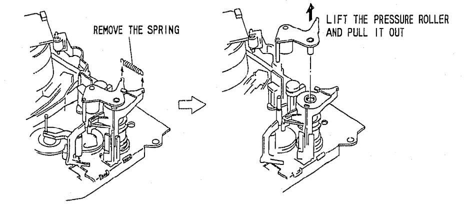
If a cassette is caught in the mechanism because of a malfunction in the mechanism, remove it by the following procedure.

[Work Procedure]

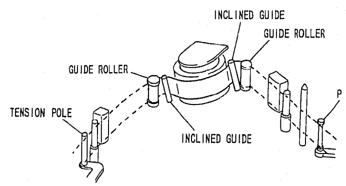
1. Remove the top cover.
2. Remove the front panel.

If the tape is wound round the cylinder in the loading state	If the cassette does not come out from the FL mechanism in the unloading state.

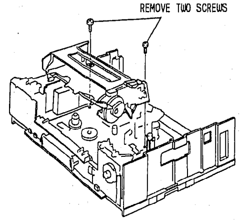
Remove the spring and lift the pressure roller to pull it out.



1) Slacken the tape and release it from the tension pole, guide rollers, inclined guides and P out arm.



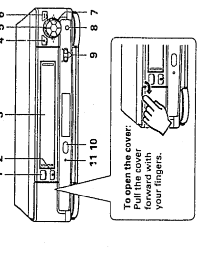
1) Remove two screws holding the FL mechanism.
2) Hold the cassette lid with your fingers so the tape is not damaged and remove the FL mechanism.
3) Remove the slack tape and eject the cassette.



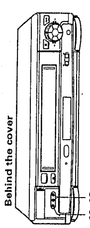
Instructions on Use and Description of New Functions

The following are extracts from the instruction manual.

CONTROLS AND FUNCTIONS

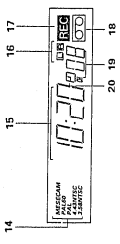


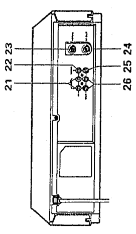
Behind the cover



1. **OPERATE button**
   Turn the system power on and off.
2. **EJECT button**
   The cassette is ejected when this button is pressed in the STOP mode.
   NOTE: Power may be on or off when removing the cassette.
3. **Cassette compartment**
   Insert a cassette through the door, and loading will be completed automatically.
   NOTE: Power is turned on automatically when a cassette is loaded.
4. **STOP button**
   If this button is pressed while the VCR is operating, the running of tape stops and all operating modes are cancelled (except for timer recording).
5. **Shuttle ring**
   During play or still play, turn this ring to speed up or slow down the playback speed at a smooth variable tape motion, for everything from slow motion to visual search. Releasing the ring returns to play or still play. If the shuttle ring is operated in the stop mode, the VCR enters the fast forward or rewind mode.
6. **PLAY/STILL button**
   Press to start play.
   Press to view a still picture during playback.
   Press again to release.
   NOTE: When a cassette with its safety tab removed is loaded, playback starts automatically.
7. **Jog dial**
   Every time the jog dial is turned to a click position during play or still play, the tape moves forward or backwards one frame at a time.
8. **REC/IRT button**
   Press the REC/IRT button once to start recording.
   Pressing again lets you select a recording time within 4 hours. After recording for the preset time, the VCR will automatically shut off. This is convenient when you go out during recording.
9. **CHANNEL buttons**
   Select the TV programmes you wish to view or record by pressing these buttons.
10. **Infrared ray receiving section**
    Receives infrared rays from the remote control unit.
11. **REC(record) indicator**
    Lights in the record mode.
12. **AUDIO IN L(MONO), R**
    Receives audio signals from a camera, external sound equipment or from another VCR.
13. **VIDEO IN**
    Receives video signals from a camera, or another VCR.

CONTROLS AND FUNCTIONS

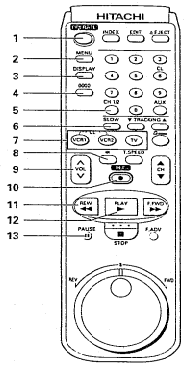




14. **Colour system indicators**
    Indicates the system corresponding to the colour system which is being recorded or played back.
    NOTE: The colour system indicator flashes when the mode display (on-screen display) appears.
    All the colour system indicators flash when a tape on which no video signal is recorded is played back or the video signal is not received.
15. **Clock display**
    This displays the current time when the power is off. When power is turned on, you can switch the display between the clock and linear time counter by pressing the DISPLAY button on the remote control.
    Mode indicators
    When the VCR operation mode is changed, the following mode indicators will appear.
    - "PLAY" appears during the playback mode.
    - "REW" appears during the rewind mode.
      "SREW" appears during the high speed rewind mode.
    - "FF" appears during the fast forward mode.
      "SFF" appears during the high speed fast forward mode.
    - "STILL" appears during the play pause mode and the frame advance mode.
    - "SLOW" appears during the slow motion playback mode.
    - "-PLAY" appears during the reverse playback mode.
    - "SRCH" appears during the forward visual search mode.
    - "-SRCH" appears during the reverse visual search mode.
    - "-SLOW" appears during the reverse slow motion playback mode.
16. **Audio indicator**
    Shows the audio channel during recording and playback.
17. **REC (record) indicator**
    Lights in the record mode. Flashes during the record/pause mode.
18. **Tape indicator**
    Lights when cassette is loaded in the compartment.
19. **TV programme number display**
    This shows the TV programme number corresponding to the TV programme selected.
    The "L1" or "L2" indicator appears when you select the AUX position by pressing the AUX button on the remote control. "L1" or "L2" position is used to record or watch the programme input at the AUDIO IN/VIDEO IN jacks.
20. **Timer indicator**
    Lights when turning power off after programming.
    If you turn the VCR off to stand by for timer recording while a cassette is not loaded, this indicator flashes.
21 **AUDIO IN (L), (R)**
    Receives audio signals from a camera, external sound equipment or from another VCR.
22. **VIDEO IN**
    Receives video signals from a camera, or another VCR.
23. **AERIAL input socket**
    Connect an external aerial.
24. **RF OUT socket**
    Connect to TV aerial input.
25. **VIDEO OUT**
    Permits video connection of your unit to a monitor or another VCR.
26. **AUDIO OUT (L), (R)**
    Permits audio connection of your unit to a monitor or another VCR.

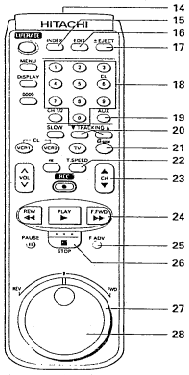
REMOTE OPERATION [For SWNA, HKN]

Controls and functions



1. **OPERATE button:** Same as OPERATE on the VCR (turn the system power on and off).
2. **MENU button:** Press this button, the menu will be displayed on the TV screen. The menu is used for most programming and setting operations.
3. **DISPLAY button:**
   1st press...Calls up the mode display (On-Screen display) on the TV screen.
   2nd press...On-screen display changes from the tape remaining to counter display. VCR's display changes from clock to counter display.
4. **0000 button:** Used for counter reset button when the linear time counter is displayed in the VCR's display. Also used for On-Screen programming and setting.
5. **CH1/2 button:** Select the desired audio channel while playing a tape.
6. **SLOW button:** Used for slow motion play.
7. **VCR 1/VCR 2/TV button**
   - Press TV to control the TV.
   - Press VCR 1 or VCR 2 to control two VCR units.
8. **(mute) button:** Turns off the TV sound until you press this button again.
9. **VOL (volume) button:** Increases or decreases the TV volume.
10. **REC button:** Same as on the VCR.
11. **REW (rewind) button:** Press to start rewind. Press this button during playback and reverse playback picture can be viewed at high speed. This is also used for super rewind.
12. **PLAY button:** Press to start play.
    NOTE: When a cassette (with its safety tab removed) is loaded, playback starts automatically.
13. **PAUSE button:** Press to pause during recording.
    Press to view a still picture during playback. Press again to release.

Controls and functions

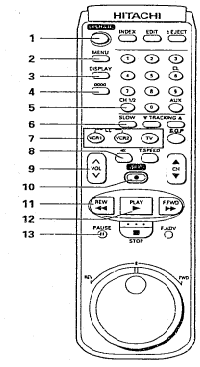


14. **Transmission window:** Transmits commands to the VCR.
15. **INDEX button:** Used for INDEX function. See page 24 for complete information.
16. **EDIT button:** Used for tape dubbing. You can use this button to control the two VCRs simultaneously. See page 31 for details.
17. **EJECT button:** Press to eject a cassette.
18. **10-KEY button**
    - Press two numbers to select a TV programme.
    - Also use for setting the clock and programming the timer.
19. **AUX button:** Used to select line input to record or view the programme through the VIDEO and AUDIO input jacks.
20. **TRACKING button:** Press one of these buttons to minimize noise in the picture manually during playback.
21. **G-CODE button:** Used for programming the timer.
22. **T. SPEED button:** Select the tape speed for recording. The playback speed is automatically set to the speed used in recording.
23. **CH (channel) button:** Same as on the VCR.
24. **F.FWD (fast forward) button:** Press to activate fast forward.
    Press this button during playback and forward playback picture can be viewed at high speed. This is also used for super fast forward.
25. **F.ADV button:** Advance the picture by one frame during still playback. See page 24 for details.
26. **STOP button:** If this button is pressed while the VCR is operating, the running of tape stops and all operating modes are cancelled (except for timer recording).
27. **Shuttle ring:** During play or still play, turn this ring to speed up or slow down the playback speed at a smooth variable tape motion, for everything from slow motion to visual search. Releasing the ring returns to play or still play. If the shuttle ring is operated in the stop mode, the VCR enters the fast forward or rewind mode.
28. **Jog dial:** Every time the jog dial is turned to a click position during play or still play, the tape moves forward or backwards one frame at a time.

NOTE: The infrared rays will bounce off the walls and eventually reach the receiver on the VCR, but for best results transmit the rays directly to the receiver.

REMOTE OPERATION [For JU]

Controls and functions



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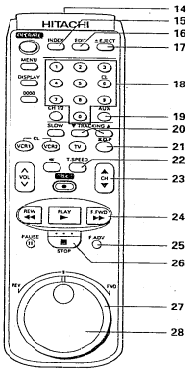
Controls and functions



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21. **S.G.P (Super Quick Programming) button:** Used for programming the timer.
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SERVICE MANUAL ABBREVIATION LIST

A	
ACC	Automatic Color Control
ACK	Automatic Color Killer
ADC B-Y	Analog to Digital Converted B-Y Signal
ADC R-Y	Analog to Digital Converted R-Y Signal
ADC Y	Analog to Digital Converted Luminance
ADD	Adder
ADRS	Address
A.DUB	Audio Dubbing
AF	Autofocus
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGC KILLER	AGC Killer Voltage
ALC	Automatic Level Control
AIC	Automatic Iris Control
AM	Amplitude Modulation
AMP	Amplifier
APC	Automatic Phase Control
ASBL	Assemble (Phase Matching)
AUD.	Audio
AUX	Auxiliary
A5V	Always 5V B+ Source

B	
B (BLU)	Color Signal BLUE
BATT.	Battery
BF	Burst Flag
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BH	Power Supply for Selecting VHF High Band
BL	Power Supply for Selecting VHF Low Band
BLK	Blanking
BM	Power Supply for Selecting VHF Mid Band
BPF	Bandpass Filter
BS	Power Supply for Selecting VHF Super Band
BU	Power Supply for Selecting UHF Band
BU	Back-up
BUF.	Buffer Amplifier
B-VL	Battery

C	
C	Chroma
C (CHROMA)	Chrominance Signal
CAPST.	Capstan
CAS	Column Address Strobe
CARRI.	Carrier
CATV	Cable TV
C.BLANK	Chroma Blanking
C.BLK	Composite Blanking
CCD	Charge Coupled Device
CG	Character Generator
C.FG/CFG	Capstan Frequency Generater
C.FREE RUN	Chapstan Free Run
CH	Channel
CHD	Camera Horizontal Drive Pulse
CHAR.	Character
CHROMA	Chrominance
C.MEMORY	Counter Memory
CNR	Chroma Noise Reducer
COM.	Common
COM.	Composite
COMPA	Comparator
COMPE	Compensator
COMPO	Composite
COMP-EXP	Compressor-Expander
CONV.	Converter
CONT	Control
CORR.	Correlation
COUNT.	Counter
CP	Clamp Pulse
C.PAUSE	Camera Pause
C/R	Capacitor/Resistor
C.RESET	Counter Reset
C.REVERSE	Count Reverse
CST	Cassette

C	
C.SYNC	Composite Synchronizing Signal
CTL	Control Track Pulse (Control)
CYL	Cylinder
CY (CYAN)	Color Signal CYAN

D	
DA	Double Azimuth
D/A	Digital to Analog Converter
D-D	Direct Drive
DEEMPHA.	Deemphasis
DEF	Deflection
DEMOD.	Demodulator
DEMPX	Demultiplexer
DET	Detector
DIFF. AMP	Differential Amplifier
DISCRI.	Discriminator
DISP.	Display
DL	Delay Line
DN	Down
DO	Dropout
DOC	Dropout Compensator
DRAM	Dynamic Random Access Memory
D.REF 25/30	Delayed Reference 25/30Hz
D.SW 25/30	Delayed Switching 25/30Hz
DSP	Digital Signal Processor
DT/OE	Data Transfer/Output Enable
D/W	Dark/White
DWC	Delayed Write Clock

E	
EA-ROM	Electrically Alterable Read Only Memory
E-E	Electronic-to-Electronic
EMPHA.	Emphasis
EQ	Equalizer
EVF	Electronic Viewfinder
EXT.	External

F	
F.ADV	Frame Advance
F/V	Frequency-to-Voltage Converter
FB	Feed Back
FF	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FREQ.	Frequency
FRAME ADV	Frame Advance
Fsc	Color Sub Carrier Frequency
FWD	Forward

G	
GEN	Generator
GND	Ground

H	
H	Horizontal
HBF	Horizontal Burst Flag
HD	Horizontal Drive
Hi-Fi	High Fidelity
HLT	Halt
HPF	High-pass Filter
HPL	High-pass Limiter
HSS	Horizontal Sync. Separator

I	
IF	Intermediate Frequency
INC	Row Counter Increment
INDI.	Indicator
INT.	Internal
INV.	Inverter
I/O	In/Out (Input/Output)
IR	Infrared Rays
IRIS DET	Iris Detection
IRT	Instant Recording Timer

L	
LCD	Liquid Crystal Display
LIN.	Linear
LM	Loading Motor

L	
LNC	Line Noise Canceller
LOG	Logarithm
LP	Long Play
LP (H)	Long Play Signal (Active High)
LPF	Low-pass Filter
LUMA	Luminance
L/R	Left/Right

M	
MAN	Manual
M.BRAKE	Main Brake
M.CUT	Monitor Cut
MEM.	Memory
MEM ON	Memory ON
MEM SW	Memory Switch
MEM VIDEO	Memorized Video
MIX	Mixer
MMV	Monostable Multivibrator
MOD.	Modulator
MPX	Multiplex
MPX VIDEO	Multiplexed Video
M.STATE	Mechanism State
M.STOP	Memory Stop
MTS	Multi Channel Television Sound

N	
NEG	Negative
NFB	Negative Feed Back
NORM. or NOR.	Normal
NR	Noise Reduction

O	
OB	Optical Black
O/E	Odd/Even Field
OSC	Oscillator
OSD	On-Screen Display

P	
PB/PLAY	Playback
P.CONT	Power Control
PIF	Picture Intermediate Frequency
PG	Pulse Generator
P IN P	Picture in Picture
PIX MOVE	Picture Move
PLL	Phase Locked Loop
POS.	Positive
POWER CONT.	Power Control
PROG.	Program
PROTECT.	Protector
PWM	Pulse Width Modulation

R	
R (RED)	Color Signal RED
RAM	Random Access Memory
RAS	Row Address Strobe
RC	Reading Clock
RCC	Reading Clock Clear
RCR	Row Counter Reset
REC	Record
RECT.	Rectifier
REF	Reference
REF 25/30	Reference 25/30Hz from servo circuit
REG	Regulator
REL	Refresh Control
REW	Rewind
REV	Reverse
RF	Radio Frequency
RM	Reel Motor
ROM	Read Only Memory
R-YL	Color Difference Signal R-YL

S	
SAP	Second Audio Program
SAW	Sawtooth
SC	Serial Control
SC1 (0°)	3.58MHz Subcarrier Signal 1 (0-degree Phase Shifted)
SC2 (90°)	3.58MHz Subcarrier Signal 2 (90-degree Phase Shifted)
SEP.	Separator
SG	Signal Generator
S/H	Sample and Hold
SIF	Sound Intermediate Frequency
SOL	Solenoid
SP	Standard Play
SP/LP	Standard Play/Long Play
S.REEL	Supply Reel Sensor
SRCH	Search
SRV	Servo
STABI.	Stabilizer
S.TRACK	Slow Tracking
STBY	Standby Mode
S-VHS	Super VHS
SW 15Hz	15Hz Head Switching Pulse
SW 25/30Hz	25/30Hz Head Switching Pulse
SYNC	Synchronizing signal
SYS.CON	System Control

T	
T (TELE)	Telephoto Angle
T.BRAKE	Take-up Brake
T/L	Tuner/Line
TP	Test Point
T.REEL	Take-up Reel Sensor
T.RESET	Timer Reset
TRS	Transfor
TμP	Timer Microprocessor
TU-μP	Tuning Microprocessor

U	
U/D	Up/Down
UNI.	Unified

V	
V (VERT)	Vertical
VAR	Variable
V.AGC	AGC Voltage
VCA	Voltage Controlled Amplitier
VCO	Voltage Controlled Oscillator
V.DRV	Vertical Drive Pulse
V.DUB	Video Dubbing
V/F	Voltage to Frequency Converter
VHS	Video Home System
VF	Focus Voltage
VOL.	Volume
V-REF	Voltage Reference
VP	Vertical Pulse
VSS	Vertical Sync. Separator
Vss	Voltage Super Source
VT	Tuning Voltage
VT-U	Tuning Voltage-UHF
VT-V	Tuning Voltage-VHF
VCXO	Voltage Controlled Crystal Oscillator

W	
WC	Write Clock
WCC	Write Clock Clear
WE	Weighting
WHT	Color Signal WHITE
WIDE	Wide Angle
WHD	Wide Horizontal Drive
WHT BAL CONT.	White Balance Control

Y	
Y	Luminance Signal
Y/C	Luminance/Chrominance
YE (YEL)	Color Singal YELLOW
YL	Luminance Signal (Low Component)

ANOTHER	
μP	Microprocessor
5V	ON 5V B+ Source
9V	ON 9V B+ Source

LEADLESS (CHIP) COMPONENT IDENTIFICATION

1. Leadless Transistor

The part name of a leadless transistor is indicated by a code on its surface, using one letter, one letter and one numeral, two letters, two letters and one numeral, two numerals, two numerals and one letter, three letters, or four letters.

Note: There are transistors with the same code but different part names, or with the same part name but different codes. Refer to the parts lists to finally identify a transistor.

CODE	PART NAME	CODE	PART NAME
Leadless (Chip) Transistor			
3925	2SC3925	BR	2SC2412K
1CQ	2SB902	BR	2SC4617
1D	2SC3127	BS	2SC2412K
1DS	2SD1328S	C-7	2SA811
1DT	2SD1328	C1G	KSC1623
1R	2SB970TX	CB	2SC3646
2BQ	2SK374PQ	CC	2SA1122C
2BR	2SK374QR	CC	2SC3647T
2Y	2SC3757	CC	2SC3647
2YQ	2SC4691	CD	2SA1122D
3N	2SK62D	CE	2SA1122E
4N	XN5601	CK	2SD999
4Q	XN1B301	CP	2SC4097
4R	XN1C301	CQ	2SC2411K
5C	XN4601	CR	2SB710
5C	XP4601	CR	2SC2411
5H	XP4501	CR	2SB1219
5H	XN4501	D16	2SC1622A
5K	XP4401	D17	2SC1622A
5K	XN4401	D18	2SC1622A
5L	XN5501	DB	2SD1766
5N	XN6501	DE	2SC2463
5O	XN6401	DF	2SD1623
5R	XP1501	DF	2SD1898
5R	XN1501	DG	2SD1624
5S	XN1504	DK	2SB798
5V	XN1401	EC	2SA1022
5W	XN2501	F-2	2SC1009F2
5X	XN4504	F-3	2SC1009F3
7R	XN2401	F-4	2SC1009F4
7S	XN1601	FC	2SC2619
AA	2SD1757K	FR	2SA1774
AKQ	2SA1738	FR	2SA1037K
AKQ	2SA1806	FR	2SA1576R
AL	2SA1791	FS	2SA1037K
AM	2SC4656	GC	2SC2734
AO	2SB709AQR	GM	3SD1615
AQ	2SB709AQ	HQ	2SA1036K
AQ	2SB766	IC	2SC3016
AR	2SB1462	IRD	2SA1484
AR	2SB766	IS	2SB792S
AR	2SB709ARS	IT	2SB792T
AR	ASB1218R	L-4	2SC1623L4
AS	2SB766	L-5	2SC1623L5
AS	2SB709AS	L-6	2SC1623L6
B3	2SC1621B3	L-6	2SC2812L6
B4	2SC1621B4	L-7	2SC2812L7
BC	2SB1188	L5	MMBC1623L5
BD	2SB1121	L6	MMBC1623L6
BE	2SB1260	LB	2SC2462B
BF	2SB1123	LC	2SC2462C
BF	2SB1308	LD	2SC2462D
BG	2SB1124	LR	2SC2412KLN
BH	2SB1001	M-5	2SA812
BQ	2SB709A	M-6	2SA1179
BR	2SC4081R	MC	2SA1052MC

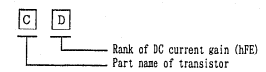
CODE	PART NAME	CODE	PART NAME
Leadless (Chip) Transistor			
MD	2SA1052MC-D	2S	2SD874S
N3	2SC1653	VR	2SD968A
ND	2SD1306ND	W1	FMW1
NE	2SD1306NE	W10	FMW10
PD	2SA1171D	W2	FMW2
PS	2SD814	W3	FMW3
QB	2SC2620QB	WR	2SD602
QC	2SC2620QC	X1	UMX1
QO	2SC2714	X1	IMX1
R22	2SC4226	X2	IMX2
R22	2SC3356	Y1	FMY1
R32	2SC4227	Y12	2SA1464
R34	2SC3583	Y25	NTM3906
R42	2SC3585	Y3	FMY3
RB	2SC2618RB	YCD	2SK197
RC	2SC2618RC	YI	2SA1666
RK	2SC3357	YQ	2SD601YQ
S1	FMS1	YR	2SD601YR
S2	FMS2	YR	2SD1819R
SC	2SA1121	YR	2SD2216
SO	2SA1162	YS	2SD601YS
SP	2SC3082K	Z1	IMZ1
T1	IMT1	Z2	IMZ2
T1	UMT1	ZO	2SD874T
T2	IMT2	ZQ	2SD601A
UD	2SC2404	ZR	2SD874R
Digital Transistor			
3	DTC143TK	6C	UN9113
4	DTC114TK	6S	XP4113
6	DTC144TK	8B	UN5212
13	DTA143EK	8C	UN9213
14	DTA144EK	8C	UN2213
15	DTA124K	8S	XP4213
15	DTA124EU	9L	XP1213
16	DTA144EU	9L	XN1213
16	XDA144FK	A1	FMA1
16	DTA144EE	A1	UMA1
23	DTC143EK	A2	FMA2
24	DTC114EU	B2	UMB2
24	DTC144EK	B2	IMB2
25	DTC124EU	C2	FMC2
25	DTC124K	C5	FMC5
26	DTC144EE	D2	IMD2
26	DTC144EU	F52	DTB123
26	XDC144EK	G1	FMG1
33	DTA143XK	G2	FMG2
43	DTC143XK	G21	DTD113ZK
52	DTA123YK	G5	FMG5
60	UN511F	HO3	DTC343TK
64	DTC114YK	H2	IMH2
80	UN521F	H2	UNH2
4P	XN1A312T	H27	DTC363EK
6B	UN5112	RO4	KSR1104
6C	UN2113	R31	FP1L2Q
FET			
30	2SK621	WS	2SK322T
1FQ	2SK321FQ	WT	2SK322T
1FR	2SK321FQR	X15	2SK425
1KP	2SK316	X4	2SK94
2BQ	2SK663	XAF	2SK980FG
DY	2SK1579	YC	2SK197YC
JO	2SK208	YD	2SK197YD
K	3SK166	YE	2SK197YE
K4	2SK160K4	ZD	2SK2172D
K5	2SK160K5	ZE	2SK2172E
KB	2SK323		

(1) Identification with two letters

Use this code and the following chart for transistor identification.

Example:

Code	Part name
CD	2SA1122D
LD	2SC2462D

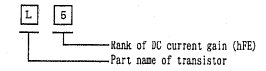


(2) Identification with one letter and one numeral

Use this code and the following chart for transistor identification.

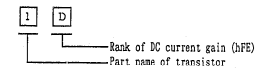
Example:

Code	Part name
L5	2SC1623(5)
L6	2SC1623(6)



Example:

Code	Part name
1D	2SC3127D



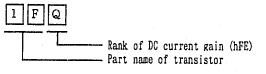
Note: Codes S1, S2, T1, W1, W2, W3, X1, Y1, Y3, Z1 and Z2 encode only the part names.

(3) Identification with one numeral and two letters

Use this code and the following chart for tarnsistor identification.

Example:

Code	Part name
1FQ	2SK321Q

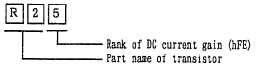


(4) Identification with one letter and two numerals

Use this code and the following chart for transistor identificaion.

Example:

Code	Part name
R25	25C3356

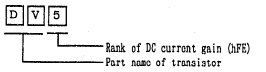


(5) Identification with to letters and one numeral

Use this code and the following chart for transistor identification.

Example:

Code	Part name
DV5	2SD596

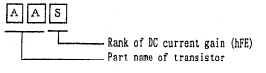


(6) Identification with three letters

Use this code and the following chart for transistor identification.

Example:

Code	Part name
AAS	2SD1757KS



2. Leadless Diode

The part name of a leadless diode is indicated by a code on the surface, using one letter and one numeral, two letters, two letters and one numeral, two numerals and one letter, or three numerals. Use this code and the following table to identify the part name of a diode.

Note: Refer to the parts lists to finally identify a diode.

CODE	PART NAME	CODE	PART NAME
Diode			
0	HVU300A	3D	RB715F
1.0	1SV201	3.0L	MA3030L
2.0	MA3020	3.6L	MA3036L
5.1	MA3051L	3.9L	MA3039L
5.1	MA3051M	4.3H	MA3043H
6.8	MA3068	4.3L	MA3043L
6.8	MA3068M	4.3M	MA3043M
7.5	MA3075L	4.7L	MA3047L
8.2	MA3082M	4.7M	MA3047M
9.1	MA3091	5.1H	MA3051H
20	HZM6	5.1L	MA3051L
24	1SV221	5.1M	MA3051M
27	RD2.7M B	5.6M	MA3056M
30	RD3.0M B	6.2L	MA3062L
51	RD5.1M B2	6.2M	MA3062M
56	RD5.6M B	6.8H	MA3068H
91	RD9.1M B	6.8L	MA3068L
102	RD10M B2	6.8M	MA3068M
122	RD12M B2	6.8M	MA3068
163	RD16M B3	7.5H	MA3075H
182	RD10M B2	7.5L	MA3075L
271	RD2.7M B	8A	UN221D
272	D2.7M B2	8.2H	MA3082H
301	RD3.0M B	8.2M	MA3082M
362	D3.6M B2	9.1M	MA3091M
391	D3.9M B1	9.1M	MA3091
512	RD5.1M B2	10L	MA3100L
561	RD5.6M B	10M	MA3100M
621	RD6.2M B1	11L	MA3110L
681	RD6.8M	12M	MA3120M
683	RD6.8M B3	13H	MA3130H
911	RD9.1M B	18M	MA3180M
2.7H	MA3027H	36M	MA3360
Zener Diode			
1A	MA110	M3A	MA199
A3	1S2835	MC	MA153
A4	HSM2836C	MC	MA143
A5	1S2837	MH	MA141K
A6	HSM2838C	MH	MA151K

CODE	PART NAME	CODE	PART NAME
	Zener Diode		
B	SR0505CP	MH	MA152K
B64	SFPB64	MI	MA132K
B74	SFPB74	MN	MA141WA
BE	1SV172	MN	MA152WK
C1	HSM88S	MN	MA151WA
C2	HSM278S	MO	MA132WA
C3	1SS226	MO	MA152WA
C4	HSM88WK	MP	MA133
F7	KV1470	MT	MA151WK
H5	HVM14	MT	MA141WK
J	SR07-03C	MU	MA132WK
K	DA221	MU	MA151WA
M1A	MA159	N	DAN222
M1C	MA158	N	DAN202T
M1M	MA721	NU	MA152WK
M1N	MA713DAT	P	DAP202T
M1P	MA714	S4	D1FS4
M2A	MA122	SA	SR10-06P
M2B	MA123	Z	DA106K

3. Leadless Resistor

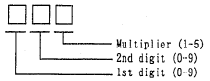
The resistor value is indicated on its surface, using three numerals, or one letter and one numeral.

(1) Identification with three numerals

Read this code following the same procedure as when reading the color code on discrete resistors.

Example:

code	value
330	33 x 10^0 = 33 ohms
561	56 x 10^1 = 560 ohms
123	12 x 10^3 = 12K ohms
1R2	1 + 0.2 = 1.2 ohms (R: Decimal point)



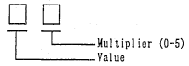
(2) Identification with one letter and one numeral

Use this code and the following chart for resisitor identification.

Letter	Value	Letter	Value	Letter	Value
A	1	J	2.2	S	4.7
C	1.2	L	2.7	U	5.6
E	1.5	N	3.3	W	6.8
G	1.8	Q	3.9	Y	8.2

Example:

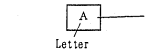
code	value
A1	1 x 10^1 = 10 ohms
G2	1.8 x 10^2 = 180 ohms
L3	2.7 x 10^3 = 2700 ohms
S4	4.7 x 10^4 = 47K ohms
W5	6.8 x 10^5 = 680K ohms



4. Leadless Capacitors

The capacitor value is indicated on its surface, using body color and one letter, or one letter and one numeral.

(1) Identification with body color and one letter



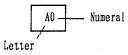
Body Color	Letter	Value	Body Color	Letter	Value
Red	A	1(PF)	Blue	A	100(PF)
	C	2		C	120
	E	3		E	150
	G	4		G	180
	J	5		J	220
	L	6		L	270
	N	7		N	330
	Q	8		Q	390
	S	9		S	470
Black	A	10(PF)		U	560
	C	12		W	680
	E	15		Y	820
	G	18	White	A	0.001(μF)
	J	22		E	0.0015
	L	27		J	0.0022
	N	33		L	0.0027
	Q	39		N	0.0033
	S	47		S	0.0047
	U	56		W	0.0068
	W	68	Green	A	0.01(μF)
	Y	82		E	0.015
				J	0.022
				N	0.033
				S	0.047
				U	0.056
				W	0.068
				Y	0.082
			Yellow	A	0.1(μF)

Example: Color — Letter — Value

Red — A — 1PF

Black — A — 10PF

(2) Identification with one letter and one numeral



Letter/Numeral	Value	Letter/Numeral	Value
A0	1(PF)	A2	100(PF)
H0	2	C2	120
M0	3	E2	150
d0	4	G2	180
f0	5	J2	220
m0	6	L2	270
n0	7	N2	330
t0	8	Q2	390
y0	9	S2	470
A1	10(PF)	U2	560
C1	12	W2	680
E1	15	Y2	820
G1	18	A3	0.001(μF)
J1	22	E3	0.0015
L1	27	J3	0.0022
N1	33	N3	0.0033
Q1	39	S3	0.0047
S1	47	W3	0.0068
U1	56	A4	0.01(μF)
W1	68	E4	0.015
Y1	82	J4	0.022
		N4	0.033
		S4	0.047
		U4	0.056
		W4	0.068
		A5	0.1

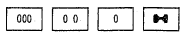
Example:

Letter/Numeral	Value
A0	1PF
A1	10PF

5. Leadless Jumper

The leadless jumper is indicated as shown below.

(1) (2) (3) (4)



CHAPTER 2 DISASSEMBLY

1. Before Starting Disassembly

1) Unplug the power cord from the AC outlet.
2) [Removal procedure]
   If a special procedure is required when dismantling any component, it is indicated using numbers. Follow the numbers (①, ②, ③ ...) shown in the illustrations.
   [Reinstallation procedure]
   Reinstall each component in the reverse order to removal when otherwise not specified.
3) Insert card connectors securely all the way as they are of the direct insertion type.

Identifications of Circuit Boards

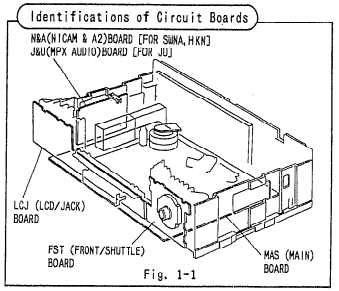


Fig. 1-1

2. Disassembly Method

When replacing defective parts, first refer to the "parts hierarchy chart" shown below. This chart shows the procedure for parts removal when replacing defective parts.

[How to use the parts hierarchy chart]
(1) Locate the part to be replaced.
(2) Check the parts in the ranks above the part to be replaced and start dismantling.
(3) Replace the defective part and reinstall the parts in the reverse order to that shown in the parts hierarchy chart.

Parts Hierarchy Chart

Note: Dismantle parts in the eject state.

Parts to remove	Item	Parts to remove	Item
Top cover	2-1		
Front Panel	2-1	Buttons	2-2
		Cassette door	2-2
Rear panel	2-1		
Bottom cover	2-1		
US-FL mechanism	2-1		
Front piece	2-3	LCJ, FST board	2-3
N&A, J&U board	2-4		
US mechanism/ MAS board assembly	2-5	US mechanism	2-6

Disassembly Procedure Diagrams

Item	Parts to remove
2-1	Top cover, front panel, rear panel, bottem cover and US-FL mechanism

◆ Caution when reinstalling the US-FL mechanism
Reinstall the US-FL mechanism in the state that the cassette holder is pulled forward.
(Otherwise, the switch arm could damage the FL switch on the MAS board.)

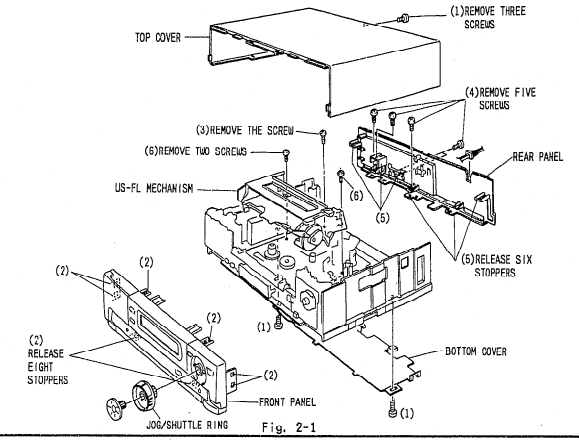


Fig. 2-1

2-2	Cassette door and buttons

◆ Caution when reinstalling the front panel
Reinstall the front panel in the state that the cassette door is pushed so the boss of the door arm comes to the front of the boss support of the cassette door.

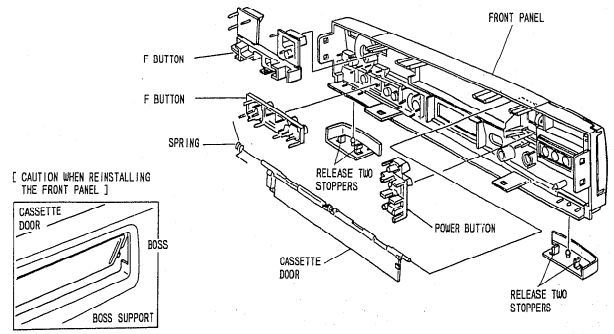


Fig. 2-2

Item	Parts to remove
2-3	Front piece, LCJ and FST board

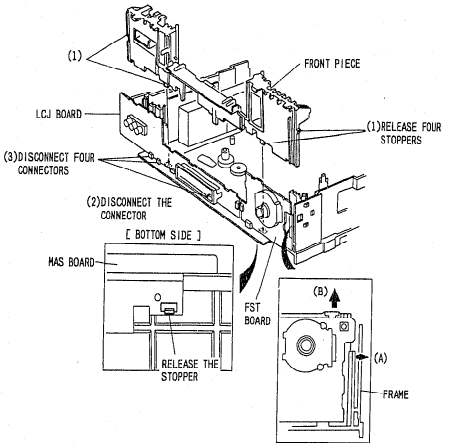


Fig. 2-3

2-4	N&A and J&U board

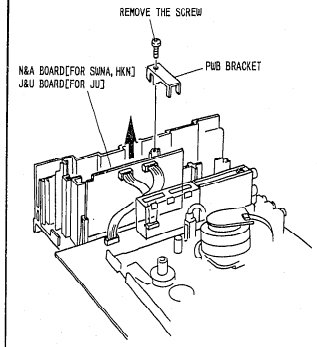


Fig. 2-4

2-5	US mechanism and MAS board assembly

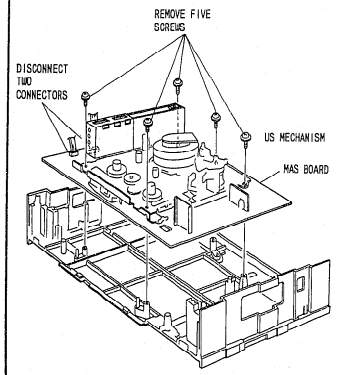


Fig. 2-5

Item	Parts to remove
2-6	Separation of MAS board from US mechanism

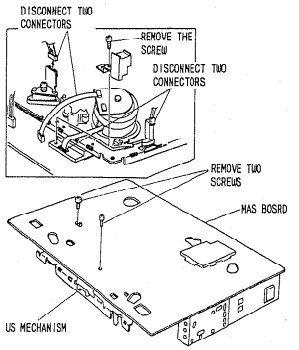


Fig. 2-6

Procedure to remove only the US mechanism

With this VCR the US mechanism can be removed without removing the MAS board. This is done by a different method from the normal disassembly method.

Parts to remove	Item
Top cover, Front panel and Rear panel	2-1
⇩	
US-FL mechanism	2-1
⇩	
Remove two screws on the bottom of the VCR.	2-7
⇩	
Remove five screws holding the US mechanism.	2-7
⇩	
Disconnect the connectors on the US mechanism and list the mechanism.	

2-7 Procedure to remove only the US mechanism

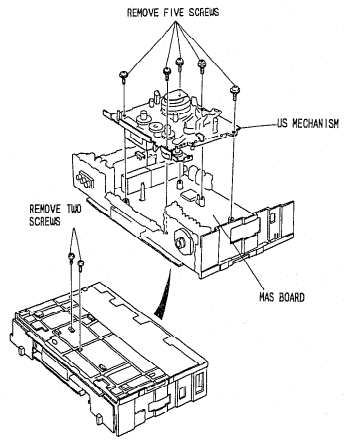


Fig. 2-7

3. Cautions When Reinstalling the US Mechanism

This VCR has mechanism sensors on the MAS board and the capstan and loading motors are connected via direct connectors. Therefore, when reinstalling the US mechanism, observe the following cautions.

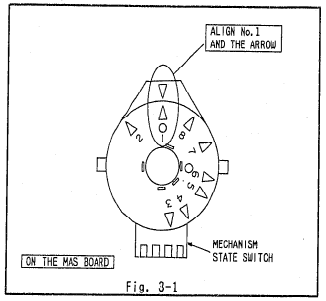


Fig. 3-1

(1) Align the ▽ mark and mode no. 1 of the mechanism state switch on the MAS board. (Mode no. 1 of the mechanism state switch has a click position.)

(2) Check that mode no. 1 on the P drive gear in the mechanism and the ▽ mark of the spring hook are aligned. If they are not aligned, turn the loading motor pulley to align them.

(3) Pass the end LED through the hole in the mechanism and install the mechanism from immediately above using the installation position holes as reference. Check that the boss of the mechanism state switch and the hole in the cam gear are aligned.

(4) Push the terminal sections (shaded sections ▨) of the capstan and loading motors and check that they are inserted securely.

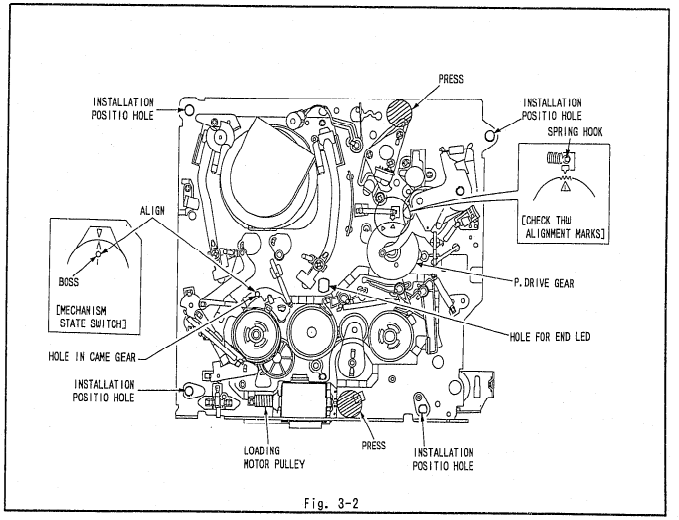


Fig. 3-2

CHAPTER 3 ELECTRIC CIRCUIT ADJUSTMENT

Servicing Positions

1. Servicing position during electrical adjustment

Perform electric adjustments of this VCR after removing the top cover, front panel and rear panel.

When the shield cover of the connector between the cylinder motor and MAS circuit boards is removed, noise appears in the played back picture.
Attach the shield cover when checking the picture on the screen.

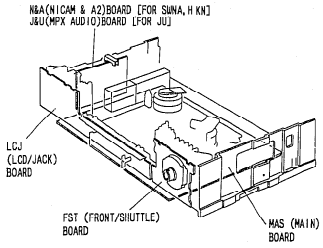


Fig. 1

2. Servicing positions when repairing and checking circuits

2-1. Procedure to set the LCJ, FST, N&A and J&U boards to the servicing positions (Fig. 2)

1) Remove the top cover, front panel and rear panel.
2) Remove the US-FL mechanism.
3) Remove the front piece and open each board as shown in the diagram biagram below and perform check from the patterm side(indicated by the arrow).

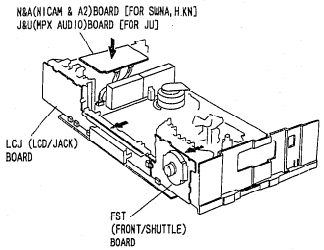


Fig. 2

2-2. Procedure to set the MAS board to the servicing position (Fig. 3)

1) Remove the top cover, front panel and rear panel.
2) Remove the US-FL mechanism and front piece.
3) Remove the MAS board, with each board and the US mechanism assembled on it, from the frame.
4) Turn over the MAS board and perform checks from the pattern side (indicated by the arrow).
   Take care of the following at this time.
   - Lay the insulation sheet under the boards.
   - Attach the US-FL mechanism when loading a tape.

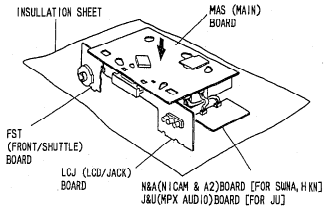


Fig. 3

3. Be careful of electric shocks

The power supply block on the right of the VCR has a heat sink which generates a high voltage. "HIGH VOLTAGE" is printed on the heat sink.
Take great care when handling this heat sink when the power is turned on during servicing.

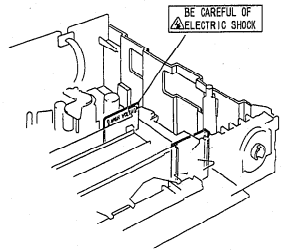


Fig. 4

Electrical Circuit Adjustment

1. Test equipment/jigs necessary for adjustment

1) Dual-trace oscilloscope
2) Color bar generator
3) Voltmeter
4) Monitor TV (with A/V jacks)
5) Alignment tapes:
   - MH-2 : Part No. 7099052
   - 24HMAF-2 : Part No. 7099175 (Hi-Fi alignment tape)
6) Blank tape
7) C/R oscillator

2. Cautions on adjustment

1) The following conditions apply when otherwise not specified.
   - Probe of oscilloscope: 10:1
   - Synchronization of oscilloscope: Internal sync
   - Ground of test equipment: PG2508 pin 6 (on MAS board)
2) When performing more than one adjustment, follow the specified order.

3. Tips for adjustment

3-1. Procedure to resot the main microprocessor

The main microprocessor is not reset even when the power cord is unplugged from the AC outlet because its power is backed up by a backup circuit. Press S1719 on the MAS board to reset the entire microprocessor.
Do not press the reset switch with the power cord unplugged from the AC outlet as the slow tracking preset value could drift.
If the preset value drifts, plug the power cord into an AC outlet and press the reset switch again with the power turned on.
It is recommended that you press the reset switch after reinstalling the front panel.

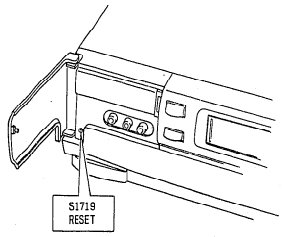


Fig. 5

3-2. Procedure to switch off the blue background function

1) Press the "GUIDE" button of the remote control to display the menu on the monitor TV screen.
2) Press 2 to select the VCR setup screen.
3) Press 1 to specify blue background off.

3-3. Procedure to obtain the EP head playback mode (X-value adjustment test mode)

Press the TRACKING UP(▲) and DOWN(▼) buttons of the remote control provided simultaneously when an alignment tape is being played and hold them, then press the "CHANNEL ▽" button on the VCR: The VCR enters the EP head playback mode (X-value adjustment test mode).

4. Connections of test equipment

- Connect the test equipment as follows when otherwise not specified.

1) Connect a color bar generator to the video input 1 jack of the VCR.
2) Connect a monitor TV to the video output 1 jack of the VCR.
3) Connect a monitor TV (able to handle a stereo signal) to the audio output 1 jack.
4) Connect an antenna to the antenna jack and receive a TV broadcast (only for sound multiplex adjustment).

Test Points and Adjustment Points

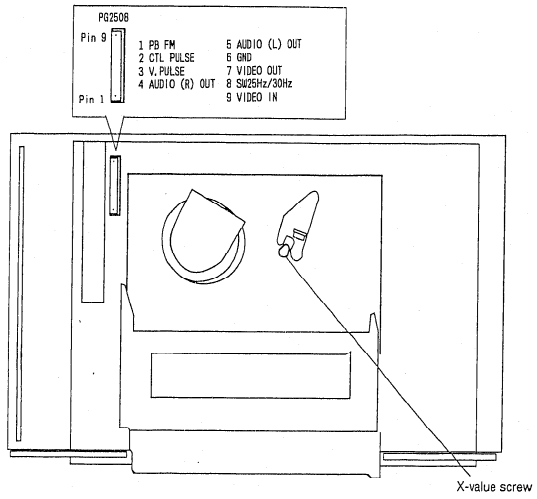


Fig. 6 MAS (Main) Circuit Board [Components Side]

5. Servo Circuit Adjustments

5-1. Switching point adjustment (Fig. 6)

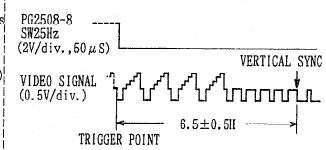
Purpose:	Fault due to incomplete adjustment:
To set the switching point of the video heads during playback to the center where the CH-1 and CH-2 envelopes overlap each other.	· Vertical sync signal is degraded and vertical jitter occurs. · Switching noise appears across the bottom of the screen.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Oscilloscope · Alignment tape (MH-2)	· CH-1: Video out jack · CH-2: PG2508-8(SW25Hz)	1) Play the alignment tape 2) Set to the X-value adjustment test mode.	· F.FWD button (S702) · REW button (S703)

Adjustment Procedure

1) Play the alignment tape.
2) Press the tracking up (▲) and down (▼) buttons of the remote control provided simultaneously and hold them, then press the "CHANNEL ▽" (S707) button of the VCR to set the VCR to the test mode. (SP is switched to LP in the display.)
3) Press the "F.FWD" and "REW" buttons of the remote control so the phase from the vertical sync to the trailing edge (trigger position) of the SW25Hz pulse is set to 6.5H±0.5H.
4) Press the STOP button to release the test mode.

Waveforms



<Conditions of oscilloscope>
· Trigger with CH-2.
· Set the sync slope to "-".

5-2. X-value adjustment (Fig. 6)

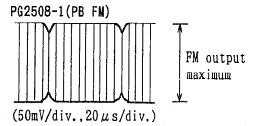
Purpose:	Fault due to incomplete adjustment:
To ensure compatibility with other VCRs.	· When a tape recorded by another VCR is played back, the tracking is not optimized and noise appears on the screen.

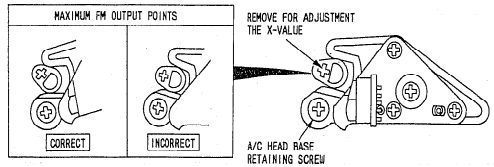
Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Oscilloscope · Alignment tape (MH-2)	· CH-1: PG2508-1 (PB FM) · CH-2: PG2508-8 (SW25Hz)	1) Play the alignment tape. 2) Set to the X-value adjustment test mode.	· Groove for adjustment the X-value

Adjustment procedure

1) Play the alignment tape.
2) Press the tracking up (▲) and down (▼) buttons of the remote control provided simultaneously and hold them, then press the "CHANNEL ▽" (S707) button of the VCR to set the VCR to the test mode. (SP is switched to LP in the display.)
3) Loosen the screw holding the A/C head base (do not loosen it excessively).
4) Insert a screwdriver into the groove for adjusting the X-value and adjust so the FM output is maximum. There are two maximum FM output points when the groove for adjusting the X-value is turned. Adjust the FM output to a maximum when the groove is at the correct position as shown in the figure below.
5) Press the STOP button to release the test mode.

Waveforms





5-3. Vertical jitter adjustment

Purpose:	Fault due to incomplete adjustment:
· To suppress vertical jitter during slow and still play.	· Vertical jitter appears in the picture during slow and still play.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Monitor TV · Color bar generator · Blank tape	· Video output jack · Video input jack	· Record a color bar signal and play it using the same VCR.	· TRACKING UP (▲) (Remote conyrol) · TRACKING DOWN (▼) (Remote conyrol)

Adjustment procedure

<EP vertical jitter correction>: Record in the EP mode and play it back using the same VCR.
1) Press the PAUSE button to set the VCR to the still play mode.
2) Use the tracking up or down buttons of the remote control to suppress vertical jitter of the picture.

<SP vertical jitter correction>: Record in the SP mode and play it back using the same VCR.
1) Press the PAUSE button to set the VCR to the still play mode.
2) Use the tracking up or down uttons of the remote control to suppress vertical jitter in the picture.

5-4. Forward slow tracking preset adjustment

Purpose:	Fault due to incomplete adjustment:
To adjust the timing with which the brake pulse of the capstan motor is generated during slow play so that noise is minimum.	· Noise appears during slow play and the picture is not clear.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Monitor TV · Color bar generator · Blank tape (T-120)	· Video output jack · Video input jack	· Slow tracking: Unplug the power cord to set the slow tracking to the center.	· TRACKING UP (▲) (Remote conyrol) · TRACKING DOWN (▼) (Remote conyrol)

Adjustment procedure

1) Record a signal on the middle of a T-120 blank tape in the EP mode and play it back using the same VCR.
2) Press the tracking up (▲) and down (▼) buttons of the remote control (provided) simultaneously during playback and hold them, then press the "PLAY" button (S701) to set the VCR to the forward test slow mode.
3) Press the tracking up or down buttons so the slow feed noise appears across the bottom of the monitor screen and then it is driven out from the bottom of the screen.
4) Check that no noise appears on the monitor screen.
5) Press the "PLAY" button to return the VCR to the playback mode (the preset data is written to the EEPROM).
6) Perform the same procedure to perform slow tracking preset adjustment in the SP mode. Do not press the reset switch after adjustment when the power is not turned on as the preset value could drift. If the preset value drifts, turn the power on and press the reset switch again for recovery.

5-5. Reverse slow tracking preset adjustment

Purpose:	Fault due to incomplete adjustment:
To adjust the timing with which the brake pulse of the capstan motor is generated during reverse slow play so that noise is minimum.	· Noise appears during reverse slow play and the picture is not clear.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Monitor TV · Color bar generator · Blank tape (T-120)	· Video output jack · Video input jack	· Slow tracking: Unplug the power cord to set slow tracking to the center.	· TRACKING UP (▲) (Remote conyrol) · TRACKING DOWN (▼) (Remote conyrol)

Adjustment procedure

1) Record a signal on the middle of a T-120 blank tape in the EP mode and play it back using the same VCR.
2) Press the tracking up (▲) and down (▼) buttons of the remote control (provided) simultaneously during still play and hold them, then press the "PLAY" button (S701) to set the VCR to the reverse test slow mode.
3) Press the tracking up or down buttons so the slow feed noise appears across the bottom of the monitor screen and then it is driven out from the bottom of the screen.
4) Check that no noise appears on the monitor screen.
5) Press the "PLAY" button to return the VCR to the playback mode (the preset data is written to the EEPROM).
6) Perform the same procedure to perform reverse slow tracking preset adjustment in the SP mode. Do not press the reset switch after adjustment when the power is not turned on as the preset value could drift. If the preset value drifts, turn the power on and press the reset switch again for recovery.

6. Audio Circuit Adjustments

6-1. Hi-Fi audio playback level check

Purpose:	Fault due to incomplete adjustment:
To set the playback level of the Hi-Fi audio signal to the specified value.	· The appropriate volume cannot be obtained during playback.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Voltmeter · Hi-Fi alignment tape (24HMAF-2)	· When checking L-CH: PG2508-5 · When checking R-CH: PG2508-4	· Play Hi-Fi alignment tape.	———

Adjustment procedure

Use the same checking procedure for both the L and R channels.
Check that the voltmeter reads -7.8dBs±3.0dBs.
If it cannot be confirmed, check the playback signal system.

6-2. E-E audio level check

Purpose:	Fault due to incomplete adjustment:
To check the audio level in the E-E mode.	· To sound is abnormal in the E-E mode.

Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· C/R oscillator · Voltmeter	· Audio in jack (L-CH) · Audio in jack (R-CH) · Audio out jack (L-CH) · Audio out jack (R-CH)	· E-E mode	———

Adjustment procedure

1) Apply a 1kHz,-7.8dBs sinewave signal to the audio input 1 (L-CH and R-CH).
2) Check that the voltmeter reads -6.8dBs±2.0dBs.
3) If the above cannot be confirmed, check the E-E audio line.

7. MPX Audio Circuit Adjustments (For JU)

7-1. MPX separation adjustment

Purpose: To set the playback level of the Hi-Fi audio signal to the specified value.		Fault due to incomplete adjustment: · The appropriate volume cannot be obtained during playback.	
Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· Voltmeter	· When checking L-CH: Audio output (L) jack	· Play Hi-Fi alignment tape.	· RT1802
· Hi-Fi alignment tape (24HMAF-2)	· When checking R-CH: Audio output (R) jack		
Adjustment procedure Use the same checking procedure for both the L and R channels. Check that the voltmeter reads -7.8dBs±3.0dBs. If it cannot be confirmed, check the playback signal system.			

7-2. MTS input level adjustment

Purpose: To set the level of the MTS signal supplied to the MTS processor in IC1801 from the tuner/IF to the specified level.		Fault due to incomplete adjustment: · The S/N deteriorates or distortion becomes conspicuous. · Stereo separation deteriorates.	
Test Equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Point
· MTS sound signal generator	· IN FORM ANT	· E-E mode	· RT1801
· Voltmeter	· TP1801		
Adjustment procedure 1) RT1801: Set the reading of the voltmeter to -20.0dBs±0.5dBs. Notes: MTS sound signal generator settings: · Audio frequency: 300Hz · Modulation signal: L+R Monitor TV settings: · Press the "GUIDE" button of the remote control to display the menu on the monitor TV screen. · Press 2 of the remote control. · Press 6 of the remote control to select the SAP option and switch it from OFF to ON.			

List of Data in EEPROMs and Initial Settings

This VCR uses two EEPROMs. The table below lists the data stored in each ROM. It also shows the data set by shipment mode initialization, when the tape navigation map data is initialized and when the trouble display is cleared.

Information	Data memory ROMs		List of initial data	Remarks
	IC903 EEPROM	Shipment mode initial data	Clearing of trouble display	
Channel memory	○	○		
VCR mode select data	○	○		
Trouble display data	○	○	○	
Slow tracking data	○	× (set by adj.)		
Artificial V sync data	○	× (set by adj.)		
Switching point data	○	× (set by adj.)		

List of Hidden Commands

The following tables list the mode setting commands during adjustment and EEPROM initial setting commands.

1. Mode setting commands during adjustment

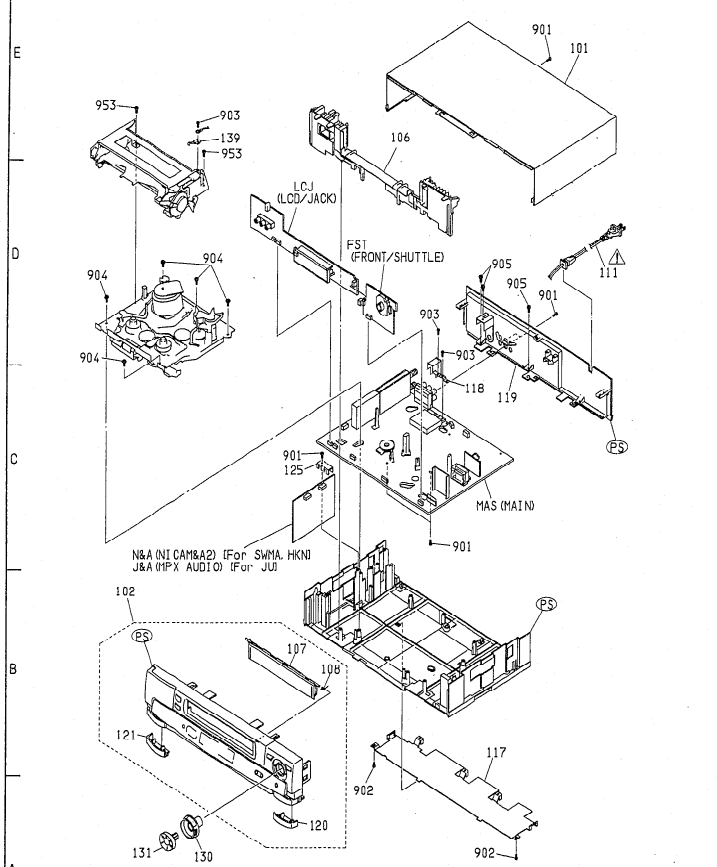
Item	Mode in which command is accepted	Operation	Remarks
Tracking center	Play	Press the tracking up (▲) and down (▼) buttons of the remote control simultaneously.	
X-value adjustment test mode	Play	Press the tracking up (▲) and down (▼) buttons of the remote control simultaneously and press the "CHANNEL ▽ " button on the VCR.	
Forward test slow mode	Play	Press the tracking up (▲) and down (▼) buttons of the remote control simultaneously and press the "PLAY" button on the VCR.	
Reverse test slow mode	Still play	Press the tracking up (▲) and down (▼) buttons of the remote control simultaneously and press the "PLAY" button on the VCR.	

2. EEPROM initialization commands

Item	Mode in which command is accepted	Operation	Remarks
Shipment mode initial setting	EJECT	Press the "REC" button on the VCR and hold it, then press the "RESET" button used to initialize the microprocessor.	Hold the "REC" button depressed and release it after the display lights.
Clearing of trouble display	——	Press the "PLAY" button on the VCR and hold it, then press the "RESET" button used to initialize the microprocessor.	Hold the "PLAY" button depressed and release it after the display lights.

CHAPTER 4 EXPLODED VIEWS

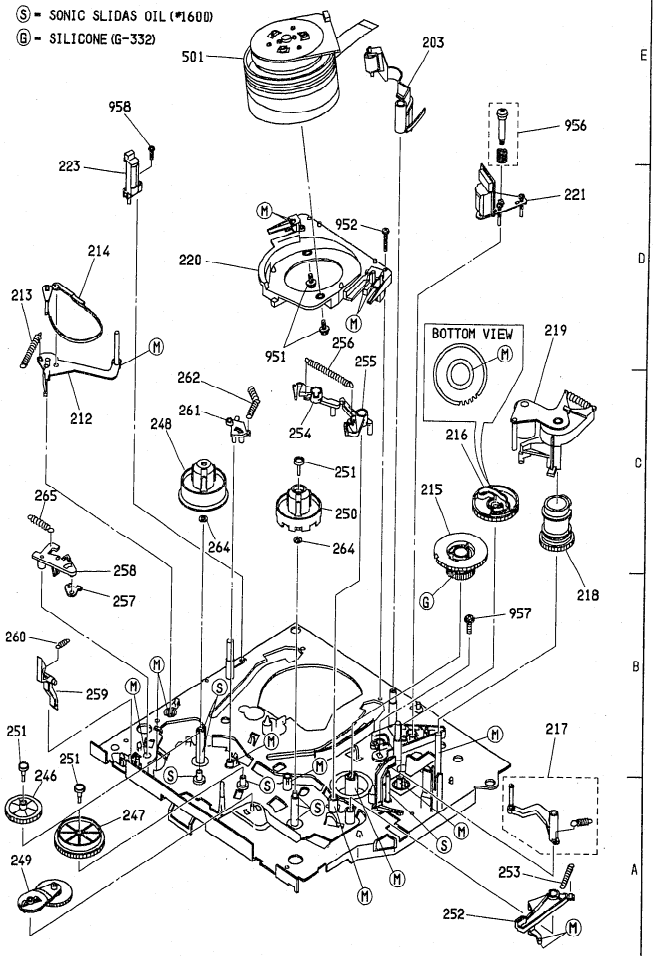
1. CABINET SECTION



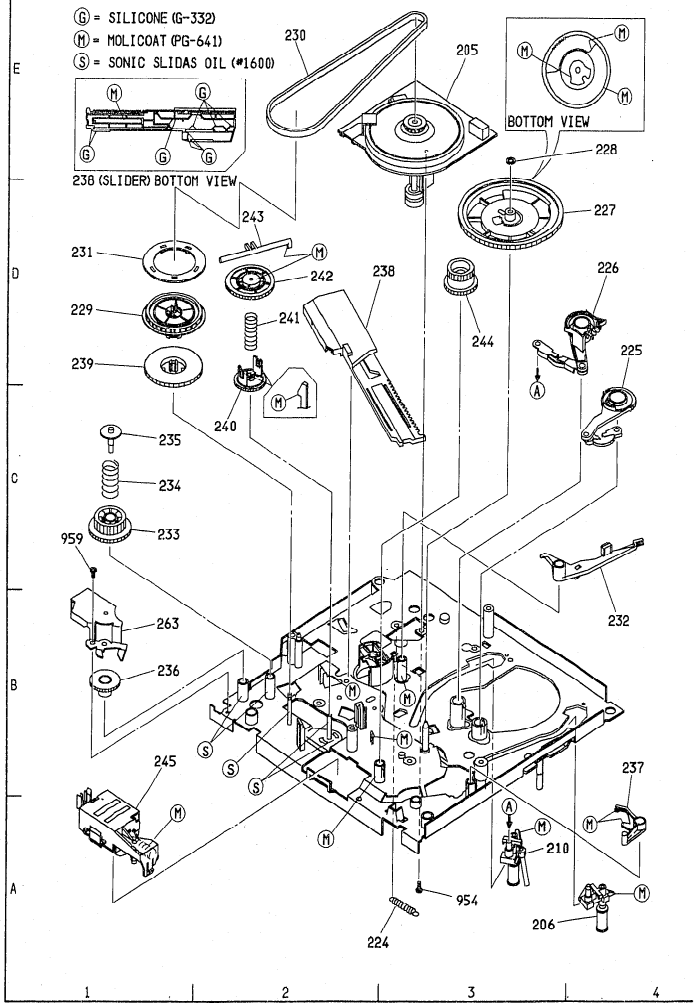
NOTE: The synthetic resin members that can be dismantled are shown by abbreviations using letters.

2. US-MECHANISM (TOP VIEW) SECTION

Ⓜ = MOLICOAT (PG-641)
Ⓢ = SONIC SLIDAS OIL (#1600)
Ⓖ = SILICONE (G-332)



3. US-MECHANISM (BOTTOM VIEW) SECTION



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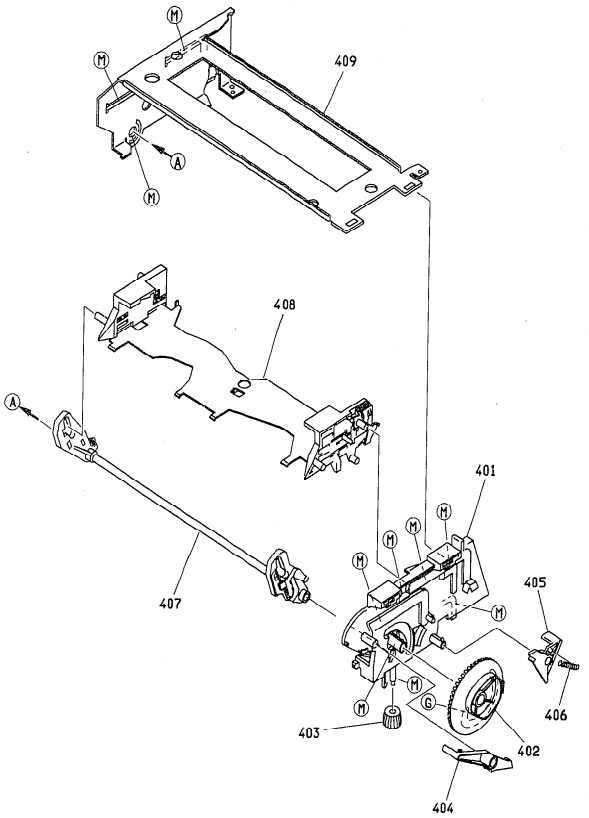
4. US-FL MECHANISM SECTION



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CHAPTER 5 REPLACEMENT PARTS LIST

1. MECHANICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION	
		FOR FINAL ASSEMBLY	
101	0A11514	COVER, TOP	
102	PH14531	PANEL, FRONT	[SWNA]
102	PH14532	PANEL, FRONT	[HKN]
102	PH14533	PANEL, FRONT	[JU]
106	NT10732	PIECE, FRONT	
107	PH15311	DOOR, CASSETTE	[SWNA]
107	PH15312	DOOR, CASSETTE	[HKN]
107	PH15313	DOOR, CASSETTE	[JU]
108	KL11522	SPRING, DOOR (HEPM)	
⚠111	5852747	CORD, POWER	[HKN]
⚠111	5852853	CORD, POWER	[SWNA, JU]
117	0A11521	COVER, BOTTOM (HEPM)	
118	MD11281	COVER, CBA	
119	PH14343	PANEL, REAR	
120	0X12471	INSULATOR, R	
121	0X12481	INSULATOR, L	
125	NA13982	BRACKET, CBA	
130	PC12562	RING, SHUTTLE	
131	PC12572	DIAL, JOG	
139	4826834	SPRING, EARTH	
203	KX11662	HEAD CLEANING MECHA	
205	GP10252	MOTOR, CAPSTAN	
206	KX12294	BASE, GUIDE ROLLER (I)	
210	KX12302	BASE, GUIDE ROLLER(O)	
212	KX11531	ARM, TENSION	
213	KL10662	SPRING	
214	KX11631	BAND, TENSION	
215	KF10641	GEAR, DRIVE	
216	KF10701	GEAR, IDLER	
217	KX12661	ARM, OUT	
218	KX11581	GEAR, SPIRAL	
219	KX11553	ARM, PINCH ROLLER	
220	KX11451	BASE, CYLINDER	
221	KX11941	AC HEAD	
223	5423082	FE HEAD	
224	KL10711	SPRING	
225	KX11591	GEAR, LOADING(L)	
226	KX11611	GEAR, LOADING(R)	
227	KF10673	GEAR, CAM	
228	4344643	WASHER	
229	KX11443	PULLEY	
230	KX11522	BELT	
231	KF10631	FLANGE	
232	KX12031	BRAKE	
233	KF10571	GEAR, CHANGE	
234	KL10771	SPRING	
235	KX12001	STOPPER, SPRING	
236	KF10561	GEAR, IDLER	
237	KX11831	ARM, OPERATION	
238	KX11362	SLIDER	
239	KF10551	GEAR, TRANS	
240	KF10501	GEAR, DRIVE	
241	KL10773	SPRING	
242	KF10513	GEAR, CHANGE	
243	KX11411	ARM, CHANGE	
244	KX11371	GEAR	
245	KX11892	MOTOR, LOADING	
246	KF10521	GEAR, IDLER 1	
247	KF10532	GEAR, IDLER 2	
248	KH10152	REEL, TABLE(S)	
249	KX11423	ARM	
250	KH10161	REEL, TABLE(T)	

SYMBOL-NO	P-NO	DESCRIPTION	
251	KX11991	STOPPER	
252	KX11861	BRAKE	
253	KL10782	SPRING, BRAKE	
254	KX11875	BRAKE, L	
255	KX11883	BRAKE, R	
256	KL10792	SPRING, BRAKE	
257	KF10542	GEAR, JOG	
258	KX13132	ARM, JOG	
259	KX11841	ARM, REC	
260	6542482	SPRING	
261	KX11811	BRAKE, SUB	
262	KL10903	SPRING, SUB	
263	KX12461	BRACKET, BASE	
264	MN11571	WASHER	
265	KL11062	SPRING, JOG	
401	KX11772	BRACKET (R)	
402	KF10682	GEAR 1	
403	KF10691	GEAR 2	
404	KX11751	ARM, DOOR	
405	KX11761	ARM, SWITCH	
406	6323723	SPRING	
407	KX11931	ARM, DRIVE	
408	KX11922	HOLDER, CASSETTE	
409	KX11741	BRACKET(L)	
501	HX10292	CYLINDER ASSY (CY-UGS1)	
901	8699410	SCREW(3X10)	
902	MK10271	SCREW(3X12DT)	
903	8671306	SCREW(2.6X6)	
904	7781132	BT SCREW	
905	7784323	SCREW(3X8)	
951	8652408	SCREW (PSW3X8)	
952	0671310	DT SCREW-2.6MMDX10MM	
953	0671306	DT SCREW 2.6MMDX6MM	
954	8691306	BT SCREW 2.6MM	
956	KX12443	SCREW	
957	MJ10341	SCREW(M2.6)	
958	0671308	DT SCREW-2.6MMDX8MM	
959	0671305	DT SCREW-2.6MMDX5MM	
		FOR ACCESSORIES	
802	5861281	MINI CONNECTOR	[JU]
803	5856361	CABLE, ANTENNA	
804	HL10602	REMOTE HAND SET (VT-RM80EG)	[HKN, SWNA]
804	HL10603	REMOTE HAND SET (VT-RM80E)	[JU]
805	5699421	SOCKT	[SWNA, JU]
806	5856023	CORD	

2. ELECTRICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C0201	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0202	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0203	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0204	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0205	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0206	0893059	CERAMIC CHIP 0.47UF+80-20% 16V
C0207	0209945	CERAMIC DISC 180PF+-5% 50V
C0208	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0209	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0211	0800138	ELECTROLYTIC 47UF 6.3V
C0212	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0213	0254458	ELECTROLYTIC 3.3UF+-20% 50V
C0214	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0215	0800177	ELECTROLYTIC 3.3UF 50V
C0216	0209947	CERAMIC DISC 270PF+-5% 50V
C0218	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0219	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0220	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0221	0800112	ELECTROLYTIC 2.2UF 50V
C0222	0890039	CERAMIC DISC 4700PF+-20% 16V
C0223	0800118	ELECTROLYTIC 4.7UF 35V
C0224	0209936	CERAMIC CHIP 33PF+-5% 50V
C0225	0209944	CERAMIC CHIP 150PF+-5% 50V
C0226	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0227	0800107	ELECTROLYTIC 0.47UF 50V
C0228	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0230	0893002	CERAMIC CHIP 0.033UF+-10% 16V
C0233	0800179	ELECTROLYTIC 10UF 16V
C0234	0800185	ELECTROLYTIC 47UF 6.3V
C0235	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0236	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0237	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0238	0800178	ELECTROLYTIC 4.7UF 35V
C0239	0800179	ELECTROLYTIC 10UF 16V
C0240	0207446	CERAMIC CHIP 100PF+-20% 16V
C0241	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0242	0800178	ELECTROLYTIC 4.7UF 35V
C0243	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0244	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0245	0800007	ELECTROLYTIC 3.3UF 50V
C0246	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0249	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0250	0209937	CERAMIC CHIP 39PF+-5% 50V
C0251	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0252	0209943	CERAMIC DISC 120PF+-5% 50V
C0253	0800176	ELECTROLYTIC 2.2UF 50V
C0254	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0255	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0257	0209929	CERAMIC CHIP 9.0PF+-0.5% 50V
C0258	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C0262	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0263	0209935	CERAMIC CHIP 27PF+-5% 50V
C0265	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0270	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0273	0209934	CERAMIC CHIP 22PF+-5% 50V
C0274	0890012	CERAMIC DISC 18PF+-5% 50V
C0275	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0276	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0277	0209935	CERAMIC CHIP 27PF+-5% 50V
C0278	0209936	CERAMIC CHIP 33PF+-5% 50V
C0279	0209929	CERAMIC CHIP 9.0PF+-0.5% 50V
C0292	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0293	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0294	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0295	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0296	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0297	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0298	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0299	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0402	0800117	ELECTROLYTIC 4.7UF 25V
C0403	0893002	CERAMIC CHIP 0.033UF+-10% 16V
C0404	0880044	POLYESTER FILM 0.01UF+-10% 50V
C0405	0800117	ELECTROLYTIC 4.7UF 25V
C0406	0893037	CERAMIC CHIP 3300PF+-10% 50V
C0407	0800122	ELECTROLYTIC 10UF 16V
C0408	0800122	ELECTROLYTIC 10UF 16V
C0409	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0410	0893046	CERAMIC CHIP 0.015UF+-10% 50V
C0411	0800175	ELECTROLYTIC 1.0UF 50V
C0412	0800101	ELECTROLYTIC 0.1UF 50V
C0413	0800171	ELECTROLYTIC 0.1UF 50V
C0414	0800175	ELECTROLYTIC 1.0UF 50V
C0419	0800117	ELECTROLYTIC 4.7UF 25V
C0420	ANI0332R	CAPACITOR 0.027UF+-5% 100V
C0421	0890026	CERAMIC DISC 220PF+-10% 50V
C0422	0800032	ELECTROLYTIC 33UF 16V
C0424	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0427	0893037	CERAMIC CHIP 3300PF+-10% 50V
C0428	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0429	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0431	0893042	CERAMIC CHIP 6800PF+-10% 50V
C0436	0890036	CERAMIC DISC 150PF+-20% 16V
C0437	0800011	ELECTROLYTIC 4.7UF 35V
C0501	0800022	ELECTROLYTIC 22UF 10V
C0502	0800011	ELECTROLYTIC 4.7UF 35V
C0503	0800118	ELECTROLYTIC 4.7UF 35V
C0504	0800118	ELECTROLYTIC 4.7UF 35V
C0506	0800135	ELECTROLYTIC 33UF 16V
C0507	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0508	0800112	ELECTROLYTIC 2.2UF 50V
C0509	0800143	ELECTROLYTIC 100UF 6.3V
C0510	0893046	CERAMIC CHIP 0.015UF+-10% 50V
C0511	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0512	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0513	0800139	ELECTROLYTIC 47UF 10V
C0514	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0517	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0518	0893046	CERAMIC CHIP 0.015UF+-10% 50V
C0519	0800143	ELECTROLYTIC 100UF 6.3V
C0520	0800112	ELECTROLYTIC 2.2UF 50V
C0521	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0522	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0524	0800118	ELECTROLYTIC 4.7UF 35V
C0525	0800118	ELECTROLYTIC 4.7UF 35V
C0526	0800118	ELECTROLYTIC 4.7UF 35V
C0527	0800118	ELECTROLYTIC 4.7UF 35V [HKN, SWNA]
C0528	0800101	ELECTROLYTIC 0.1UF 50V
C0529	0800122	ELECTROLYTIC 10UF 16V
C0530	0800015	ELECTROLYTIC 10UF 16V
C0531	0800015	ELECTROLYTIC 10UF 16V
C0532	0800041	ELECTROLYTIC 47UF 16V
C0533	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0534	0800135	ELECTROLYTIC 33UF 16V
C0535	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0536	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0601	0207453	ELECTROLYTIC 2.2UF 50V
C0602	0893013	CERAMIC CHIP 0.22UF+-10% 16V

SYMBOL-NO	P-NO	DESCRIPTION
C0604	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0605	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0606	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0607	0209938	CERAMIC CHIP 47PF+-5% 50V
C0608	0209943	CERAMIC DISC 120PF+-5% 50V
C0609	0800179	ELECTROLYTIC 10UF 16V
C0611	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0612	0800128	ELECTROLYTIC 22UF 16V
C0614	0893031	CERAMIC CHIP 1000PF+-10% 50V
C0615	0800042	ELECTROLYTIC 47UF 25V
C0621	0893037	CERAMIC CHIP 3300PF+-10% 50V
C0623	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0624	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0701	0893053	CERAMIC CHIP 0.047UF+-10% 50V
⚠C0851	AN10201S	FILM CAPACITOR 0.1UF+-20% 250V
⚠C0852	AN10201S	FILM CAPACITOR 0.1UF+-20% 250V
⚠C0853	AJ10293	CERAMIC CAPACITOR 2200PF+-20% 125V
⚠C0855	0235993	CERAMIC CHIP 220PF+-20% 250V
⚠C0856	AJ10293	CERAMIC CAPACITOR 2200PF+-20% 125V
⚠C0858	AJ10293	CERAMIC CAPACITOR 2200PF+-20% 125V
⚠C0860	0235993	CERAMIC CHIP 220PF+-20% 250V
⚠C0861	AJ10293	CERAMIC CAPACITOR 2200PF+-20% 125V
C0862	0254241	ELECTROLYTIC 82UF 400V
C0863	0890035	CERAMIC DISC 1000PF+-10% 50V
C0864	1143004	CERAMIC CHIP 150PF+-5% 1KV
C0865	0204284	ELECTROLYTIC 0.047UF 250V
C0866	0880053	POLYESTER FILM 0.047UF+-10% 50V
C0867	0880039	POLYESTER FILM 0.0047UF+-10% 50V
C0868	0880035	POLYESTER FILM 0.0022UF+-10% 50V
C0869	1143002	CERAMIC DISC 100PF 500V
C0870	0254403	CAPACITOR 22UF+-20% 50V
C0871	0254405	CAPACITOR 1000UF+-20% 25V
C0872	0800354	ELECTROLYTIC 470UF 25V
C0873	0254406	CAPACITOR 3300UF+-20% 10V
C0874	0800354	ELECTROLYTIC 470UF 25V
C0875	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0876	0800135	ELECTROLYTIC 33UF 16V
C0878	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0890	0800015	ELECTROLYTIC 10UF 16V
C0891	0800009	ELECTROLYTIC 4.7UF 25V
C0901	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C0902	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0903	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0904	0217516	CAPACITOR 0.047UF+80-20% 5.5V
C0905	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0907	0209927	CERAMIC CHIP 7.0PF+-0.5% 50V
C0908	0209927	CERAMIC CHIP 7.0PF+-0.5% 50V
C0909	0209932	CERAMIC CHIP 15PF+-5% 50V
C0910	0209932	CERAMIC CHIP 15PF+-5% 50V
C0912	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0913	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0914	0800184	ELECTROLYTIC 33UF 25V
C0915	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0916	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C0917	0800182	ELECTROLYTIC 22UF 16V
C0919	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C0922	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0923	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C0924	0209938	CERAMIC CHIP 47PF+-5% 50V
C0925	0209938	CERAMIC CHIP 47PF+-5% 50V
C0926	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C0940	0209938	CERAMIC CHIP 47PF+-5% 50V
C0941	0893062	CERAMIC CHIP 1UF+80-20% 16V
C0942	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0943	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0945	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C0946	0890026	CERAMIC DISC 220PF+-10% 50V
C1102	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1103	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1104	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1105	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1106	0800185	ELECTROLYTIC 47UF 6.3V
C1107	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1108	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1110	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1111	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1112	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1114	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1115	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1116	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1117	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1118	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1119	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1120	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1121	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1122	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1123	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1124	0893031	CERAMIC CHIP 1000PF+-10% 50V
C1125	0800185	ELECTROLYTIC 47UF 6.3V
C1126	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1127	0893013	CERAMIC CHIP 0.22UF+-10% 16V
C1128	0800185	ELECTROLYTIC 47UF 6.3V
C1129	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1131	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1132	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1133	0893031	CERAMIC CHIP 1000PF+-10% 50V
C1134	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C1135	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C1136	0209930	CERAMIC CHIP 10PF+-0.5% 50V
C1137	0209938	CERAMIC CHIP 47PF+-5% 50V
C1138	0209942	CERAMIC CHIP 100PF+-5% 50V
C1139	0209934	CERAMIC CHIP 22PF+-5% 50V
C1140	0209938	CERAMIC CHIP 47PF+-5% 50V
C1142	0209935	CERAMIC CHIP 27PF+-5% 50V
C1143	0209935	CERAMIC CHIP 27PF+-5% 50V
C1403	0800178	ELECTROLYTIC 4.7UF 35V
C1404	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1405	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C1409	0209937	CERAMIC CHIP 39PF+-5% 50V
C1410	0209937	CERAMIC CHIP 39PF+-5% 50V
C1411	0209945	CERAMIC DISC 180PF+-5% 50V
C1412	0800141	ELECTROLYTIC 47UF 16V
C1413	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C1414	0800179	ELECTROLYTIC 10UF 16V
C1415	0800178	ELECTROLYTIC 4.7UF 35V
C1416	0209939	CERAMIC CHIP 56PF+-5% 50V
C1419	0209931	CERAMIC CHIP 12PF+-5% 50V
C1420	0800141	ELECTROLYTIC 47UF 16V
C1421	0209937	CERAMIC CHIP 39PF+-5% 50V
C1422	0209943	CERAMIC DISC 120PF+-5% 50V
C1423	0800141	ELECTROLYTIC 47UF 16V
C1424	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C1425	0890009	CERAMIC DISC 12PF+-5% 50V
C1426	0893062	CERAMIC CHIP 1UF+80-20% 16V
C1442	0209944	CERAMIC CHIP 150PF+-5% 50V
C1444	0209931	CERAMIC CHIP 12PF+-5% 50V
C1445	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1446	0209944	CERAMIC CHIP 150PF+-5% 50V
C1447	0893091	CERAMIC CHIP 0.022UF+-10% 16V
C1449	0209932	CERAMIC CHIP 15PF+-5% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C1450	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C1701	0800185	ELECTROLYTIC 47UF 6.3V
C1702	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C1703	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C1704	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C1705	0890035	CERAMIC DISC 1000PF+-10% 50V
C1706	0800185	ELECTROLYTIC 47UF 6.3V
C1707	0800176	ELECTROLYTIC 2.2UF 50V
C1708	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C2101	0893031	CERAMIC CHIP 1000PF+-10% 50V
C2102	0893031	CERAMIC CHIP 1000PF+-10% 50V
C2501	0893037	CERAMIC CHIP 3300PF+-10% 50V
C2502	0893037	CERAMIC CHIP 3300PF+-10% 50V
C2503	0800351	ELECTROLYTIC 470UF 6.3V
C2504	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2505	0800015	ELECTROLYTIC 10UF 16V
C2506	0800015	ELECTROLYTIC 10UF 16V
C2507	0800011	ELECTROLYTIC 4.7UF 35V
C2508	0893037	CERAMIC CHIP 3300PF+-10% 50V
C2509	0800041	ELECTROLYTIC 47UF 16V
C2511	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2512	0800041	ELECTROLYTIC 47UF 16V
C2513	0800041	ELECTROLYTIC 47UF 16V
C2514	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2517	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2518	0800044	ELECTROLYTIC 47UF 50V
C2519	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2520	0800353	ELECTROLYTIC 470UF 16V
C2521	0800041	ELECTROLYTIC 47UF 16V
C2522	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2523	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C2524	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2525	0800186	ELECTROLYTIC 47UF 16V
C2526	0800041	ELECTROLYTIC 47UF 16V
C2527	0893044	CERAMIC CHIP 0.01UF+-10% 50V
C2531	0893008	CERAMIC CHIP 0.1UF +-10% 16V
C2534	020745B	ELECTROLYTIC 10UF 25V [HKN,SWNA]
C2544	0893053	CERAMIC CHIP 0.047UF+-10% 50V
C2546	0893091	CERAMIC CHIP 0.022UF+-10% 16V[HKN,SWNA]
C2570	0800115	ELECTROLYTIC 3.3UF 50V
C2701	AJ10241R	CERAMIC CAPACITOR 100PF+-10% 50V
C2702	AJ10241R	CERAMIC CAPACITOR 100PF+-10% 50V
C2703	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C2704	0890044	CERAMIC DISC 0.022UF+80-20% 25V

RESISTORS

R0201	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R0205	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R0206	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R0207	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0208	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R0212	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0213	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0215	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
RU216	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0217	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R0227	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0228	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0229	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0231	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0238	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R0239	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R0240	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0241	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R0243	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0245	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R0249	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R0250	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0253	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R0254	0103873	CHIP RESISTOR 330KOHM+-5% 0.1W
R0256	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0258	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0261	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0263	0101391	CARBON FILM 2.2MOHM+-5% 1/8W
R0264	0105515	CHIP RESISTOR 4.7MOHM+-5% 1/10W
R0265	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R0266	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0267	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R0268	0103859	CHIP RESISTOR 18KOHM+-5% 0.1W
R0269	0103834	CHIP RESISTOR 180 OHM+-5% 0.1W
R0402	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R0403	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0404	0103838	RESISTOR CHIP 390 OHM+-5% 0.1W
R0407	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R0408	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0409	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R0410	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R0413	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0414	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0418	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0419	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0420	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0421	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R0422	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R0423	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0424	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R0425	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R0429	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0430	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0431	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0432	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0434	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R0437	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0440	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0446	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0501	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0502	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W [HKN,SWNA]
R0502	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W [JU]
R0503	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0504	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0505	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0506	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0509	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0510	0104252	CHIP RESISTOR 510 OHM+-5% 1/10W
R0511	AD10296R	CHIP RESISTOR 15KOHM+-0.1% 1/10W
R0512	AD10295R	CHIP RESISTOR 11KOHM+-0.1% 1/10W
R0516	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0517	0104252	CHIP RESISTOR 510 OHM+-5% 1/10W
R0520	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0521	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0522	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0523	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0524	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0525	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W [HKN,SWNA]
R0525	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W [JU]
R0526	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R0527	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R0528	0700058	CARBON FILM 22KOHM+-5% 1/8W [HKN,SWNA]
R0529	0700063	CARBON FILM 47KOHM+-5% 1/8W [HKN,SWNA]

SYMBOL-NO	P-NO	DESCRIPTION
R0530	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0531	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0532	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R0533	0700066	CARBON FILM 82KOHM+-5% 1/8W
R0534	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0602	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0605	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0615	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0616	0700072	CARBON FILM 220KOHM+-5% 1/8W
R0621	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0622	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0623	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0624	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0625	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0626	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0627	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0628	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0629	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R0630	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R0631	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R0632	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0633	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0634	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0635	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0636	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0637	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R0703	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
△R0852	AT10211M	CHIP RESISTOR 1MOHM 1/2W
R0853	0700074	CARBON FILM 330KOHM+-5% 1/8W
R0854	0700074	CARBON FILM 330KOHM+-5% 1/8W
R0855	0700074	CARBON FILM 330KOHM+-5% 1/8W
R0856	AT10246S	RESISTOR 0.33 OHM+-5% 1W
R0857	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0858	0116673	RESISTOR 330 OHM+-5% 2W
R0860	0116671	RESISTOR 100KOHM+-5% 3w
R0861	0116671	RESISTOR 100KOHM+-5% 3w
R0862	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R0863	0700055	CARBON FILM 12KOHM+-5% 1/8W
R0864	0700033	CARBON FILM 270 OHM+-5% 1/8W
R0865	0700039	CARBON FILM 820 OHM+-5% 1/8W
R0866	0700034	CARBON FILM 330 OHM+-5% 1/8W
R0867	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R0868	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0869	0104114	CHIP RESISTOR 3.3KOHM+-1% 0.1W
R0871	0105572	METAL FILM RESISTOR 2.7KOHM+-1% 1/10
R0872	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0873	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0874	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0875	0700035	CARBON FILM 390 OHM+-5% 1/8W
R0878	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0879	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R0885	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R0886	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R0887	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R0888	0700062	CARBON FILM 39KOHM+-5% 1/8W
R0892	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0893	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0896	0700059	CARBON FILM 22KOHM+-5% 1/8W
R0897	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R0904	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0906	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0907	0700036	CARBON FILM 470 OHM+-5% 1/8W [JU]
R0907	0700055	CARBON FILM 12KOHM+-5% 1/8W [SMNA]
R0908	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0909	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R0910	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0911	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0913	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0914	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0915	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0916	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0917	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0918	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0919	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0920	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0921	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0922	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0923	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0924	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R0925	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R0926	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R0928	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0929	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0931	0700063	CARBON FILM 47KOHM+-5% 1/8W [JU]
R0934	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0935	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R0936	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0937	0700029	CARBON FILM 150 OHM+-5% 1/8W
R0938	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R0939	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0940	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R0943	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0944	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0945	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0946	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0947	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0948	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0949	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0952	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0957	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R0967	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0968	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R0969	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0970	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0974	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R0975	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R0976	0101725	CHIP RESISTOR 2.2 OHM+-5% 1/4W
R0977	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R0978	0101765	RESISTOR 10KOHM+-1% 1/8W
R0979	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R0980	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R0981	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0982	0893008	CERAMIC CHIP 0.1UF +-10% 16V
R0983	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0984	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R0985	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R0986	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0987	0700063	CARBON FILM 47KOHM+-5% 1/8W [HKN,SMNA]
R0988	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W [JU]
R0990	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0993	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R0994	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R0995	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W [HKN,SMNA]
R0996	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R0997	0700037	CARBON FILM 560 OHM+-5% 1/8W
R0998	0700037	CARBON FILM 560 OHM+-5% 1/8W
R0999	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1101	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R1102	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1104	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R1107	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R1108	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R1109	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1110	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1112	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1113	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1115	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R1116	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1117	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1118	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1119	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R1120	0103836	CHIP RESISTOR 270 OHM+-5% 0.1W
R1121	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1122	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1409	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1410	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R1412	0700076	CARBON FILM 470KOHM+-5% 1/8W
R1414	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1416	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1417	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1418	0700027	CARBON FILM 100 OHM+-5% 1/8W
R1419	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1421	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1423	0700035	CARBON FILM 390 OHM+-5% 1/8W
R1425	0700039	CARBON FILM 820 OHM+-5% 1/8W
R1427	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1428	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R1429	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1430	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1431	0103839	CHIP RESISTOR 470 OHM+-5% 0.1W
R1432	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1442	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1444	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1445	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R1446	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1447	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1448	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R1449	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1701	0700036	CARBON FILM 470 OHM+-5% 1/8W
R1702	0700036	CARBON FILM 470 OHM+-5% 1/8W
R1703	0700038	CARBON FILM 680 OHM+-5% 1/8W
R1704	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1705	0700057	CARBON FILM 100KOHM+-5% 1/8W
R1715	0700062	CARBON FILM 39KOHM+-5% 1/8W
R1716	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R1717	0700057	CARBON FILM 18KOHM+-5% 1/8W
R1718	0700038	CARBON FILM 680 OHM+-5% 1/8W
R1719	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1720	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R1721	0700039	CARBON FILM 820 OHM+-5% 1/8W
R1722	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R1723	0700037	CARBON FILM 560 OHM+-5% 1/8W
R1724	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R1725	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1726	0700035	CARBON FILM 390 OHM+-5% 1/8W
R1727	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R1728	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1729	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1730	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1731	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R1732	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1733	0700033	CARBON FILM 270 OHM+-5% 1/8W
R2101	0700059	CARBON FILM 27KOHM+-5% 1/8W
R2102	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2103	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2104	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2105	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2106	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2107	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2108	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2109	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R2110	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R2111	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2112	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2113	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2114	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2115	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2116	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2117	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2501	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2502	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2503	0101400	CARBON FILM 75 OHM+-5% 1/8W
R2504	0103826	CHIP RESISTOR 39 OHM+-5% 0.1W
R2507	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2508	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2509	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2510	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2511	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2512	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2513	0101841	CARBON FILM 4.7KOHM+-5% 1/4W
R2514	0101841	CARBON FILM 4.7KOHM+-5% 1/4W
R2515	0700075	CARBON FILM 39KOHM+-5% 1/8W
R2517	0700073	CARBON FILM 27KOHM+-5% 1/8W
R2518	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2530	0103826	CHIP RESISTOR 39 OHM+-5% 0.1W
R2531	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2532	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2533	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2534	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2535	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2536	0103824	CHIP RESISTOR 27 OHM+-5% 0.1W
R2537	0700019	CARBON FILM 27 OHM+-5% 1/8W
R2538	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2540	0103829	CHIP RESISTOR 680HM+-5% 0.1W
R2542	0700027	CARBON FILM 100 OHM+-5% 1/8W
R2701	0700057	CARBON FILM 18KOHM+-5% 1/8W
R2702	0700054	CARBON FILM 10KOHM+-5% 1/8W
R2703	0700057	CARBON FILM 18KOHM+-5% 1/8W
R2704	0700054	CARBON FILM 10KOHM+-5% 1/8W
R2706	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2707	0700039	CARBON FILM 820 OHM+-5% 1/8W
R2708	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2709	0700027	CARBON FILM 100 OHM+-5% 1/8W
R2710	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2711	0700032	CARBON FILM 220 OHM+-5% 1/8W
R2712	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2713	0700029	CARBON FILM 150 OHM+-5% 1/8W
R2714	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R2715	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R2716	0700067	CARBON FILM 100KOHM+-5% 1/8W
R2717	0700067	CARBON FILM 100KOHM+-5% 1/8W
R2718	0700067	CARBON FILM 100KOHM+-5% 1/8W
R2719	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2720	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R2721	0700067	CARBON FILM 100KOHM+-5% 1/8W
R2722	0700054	CARBON FILM 10KOHM+-5% 1/8W
R2723	0700054	CARBON FILM 10KOHM+-5% 1/8W
R2724	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R2725	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R2727	0700063	CARBON FILM 47KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R2728	0700063	CARBON FILM 47KOHM+-5% 1/8W
		SEMI-CONDUCTORS
D0203	5339141	DIODE 1SS270
D0204	5339141	DIODE 1SS270
D0401	5339141	DIODE 1SS270
D0603	5339231	DIODE 1SR35-100A
D0604	5339231	DIODE 1SR35-100A
⚠D0851	5336552	DIODE S1WBA60
D0852	CH10191M	DIODE EG01C-T
D0853	CH10481M	DIODE AG01Z
D0855	5339141	DIODE 1SS270
D0856	5339522	DIODE DINL40
D0857	CH10462S	DIODE S3L20U
D0858	CH10641S	DIODE D3S6M
D0859	CH10641S	DIODE D3S6M
D0860	5339551	DIODE S1J4
D0861	5339551	DIODE S1J4
D0862	5339141	DIODE 1SS270
D0901	5339551	DIODE S1J4
D0906	5339141	DIODE 1SS270
D0907	5339141	DIODE 1SS270
D0910	5339231	DIODE 1SR35-100A
D0911	5339231	DIODE 1SR35-100A
D1101	5339141	DIODE 1SS270
D1102	5328322	DIODE MA151K
D1401	5339141	DIODE 1SS270
D1402	5339141	DIODE 1SS270
D1403	5339141	DIODE 1SS270
D1701	5339141	DIODE 1SS270
D1702	5339551	DIODE S1J4
D2502	5339141	DIODE 1SS270
D2503	5339141	DIODE 1SS270
D2504	5339141	DIODE 1SS270
D2505	5339141	DIODE 1SS270
D2507	5339141	DIODE 1SS270
D2508	5339141	DIODE 1SS270
IC0201	CK14411	IC HA118203F
IC0202	CK13572R	IC M5M7470-70MS-KR1
IC0501	CK14421	IC AN3964FB
IC0851	1360452	IC TL431CLP
IC0901	CK16732	IC HD6433977SB03F
IC0902	CP10312R	IC PST9129
IC0903	CP10915	IC ST24C02FB6
IC0904	CP10294	IC XLA6209-V3
IC0905	CP11361R	IC M5278L05
IC1101	CK14481	IC HA119198FP
IC1102	CP11191	IC LA7256
IC1701	CZ10181	IC BU9716K
IC2101	CJ10212	PHOTO INTERLAPTER SG-236
IC2102	CJ10222	PHOTO INTERLAPTER SG-237
IC2501	CK13501R	IC NJM2533M
IC2701	CK12311	IC UPD71036S-752
IR1701	CJ10261	MODULE PIC-12043TE2 (HEPM)
LD1701	CH10781R	DIODE SLP3117E
LD1702	CH10781R	DIODE SLP3117E
LD1703	CH10781R	DIODE SLP3117E
LD1704	CH10781R	DIODE SLP3117E
LD1705	CH10781R	DIODE SLP3117E
LD1706	CH10433	LED SLR-342VR3F
LD2101	CH10542	DIODE GL451L1
Q0201	5328793	TRANSISTOR DTC144EK
Q0202	5328793	TRANSISTOR DTC144EK
Q0210	5328793	TRANSISTOR DTC144EK

SYMBOL-NO	P-NO	DESCRIPTION
Q0215	5328793	TRANSISTOR DTC144EK
Q0219	5328793	TRANSISTOR DTC144EK
Q0222	5328793	TRANSISTOR DTC144EK
Q0226	5328972	TRANSISTOR 2SC2412K-BRT
Q0227	5328793	TRANSISTOR DTC144EK
Q0228	5328793	TRANSISTOR DTC144EK
Q0230	5328793	TRANSISTOR DTC144EK
Q0231	5328795	TRANSISTOR DTA144EK-16
Q0232	5328793	TRANSISTOR DTC144EK
Q0403	5328972	TRANSISTOR 2SC2412K-BRT
Q0405	5328962	TRANSISTOR 2SA1037K
Q0406	5323172	TRANSISTOR 2SC1214CD
Q0410	5328793	TRANSISTOR DTC144EK
Q0411	5328962	TRANSISTOR 2SA1037K
Q0412	5328972	TRANSISTOR 2SC2412K-BRT
Q0413	5328972	TRANSISTOR 2SC2412K-BRT
Q0414	5328793	TRANSISTOR DTC144EK
Q0415	5328795	TRANSISTOR DTA144EK-16
Q0416	5328793	TRANSISTOR DTC144EK
Q0417	5328793	TRANSISTOR DTC144EK
Q0851	CF10021	TRANSISTOR FS3KM-10A
Q0852	CF10451R	TRANSISTOR 2SC3246
Q0853	CF10311	TRANSISTOR 2SD2398
Q0854	5327262	TRANSISTOR 2SB1326
Q0855	5328972	TRANSISTOR 2SC2412K-BRT
Q0858	5327262	TRANSISTOR 2SB1326
Q0859	5328972	TRANSISTOR 2SC2412K-BRT
Q0864	CF10311	TRANSISTOR 2SD2398
Q0901	5327261	TRANSISTOR 2SB1326(Q)
Q0902	5328793	TRANSISTOR DTC144EK
Q0905	5328962	TRANSISTOR 2SA1037K
Q0906	5328962	TRANSISTOR 2SA1037K
Q0907	5328962	TRANSISTOR 2SA1037K
Q0909	5328793	TRANSISTOR DTC144EK
Q0913	5328972	TRANSISTOR 2SC2412K-BRT
Q0914	5328793	TRANSISTOR DTC144EK
Q1101	5328972	TRANSISTOR 2SC2412K-BRT
Q1102	5328962	TRANSISTOR 2SA1037K
Q1103	5328793	TRANSISTOR DTC144EK
Q1104	5328793	TRANSISTOR DTC144EK
Q1404	5328962	TRANSISTOR 2SA1037K
Q1405	5328793	TRANSISTOR DTC144EK
Q1406	5328972	TRANSISTOR 2SC2412K-BRT
Q1407	5328962	TRANSISTOR 2SA1037K
Q1408	5328962	TRANSISTOR 2SA1037K
Q1409	5328793	TRANSISTOR DTC144EK
Q1410	5328962	TRANSISTOR 2SA1037K
Q1411	5328972	TRANSISTOR 2SC2412K-BRT
Q1412	5328972	TRANSISTOR 2SC2412K-BRT
Q1413	5328972	TRANSISTOR 2SC2412K-BRT
Q1414	5328972	TRANSISTOR 2SC2412K-BRT
Q1415	5328795	TRANSISTOR DTA144EK-16
Q1416	5328795	TRANSISTOR DTA144EK-16
Q1417	5328793	TRANSISTOR DTC144EK
Q1702	5327063	TRANSISTOR 2SC1740S
Q1703	5327071	TRANSISTOR DTC124ES
Q1704	5327071	TRANSISTOR DTC124ES
Q2101	CF10372	TRANSISTOR PT493FL1
Q2102	CF10372	TRANSISTOR PT493FL1
Q2103	5328793	TRANSISTOR DTC144EK
Q2104	5328793	TRANSISTOR DTC144EK
Q2501	5328972	TRANSISTOR 2SC2412K-BRT
Q2502	5328972	TRANSISTOR 2SC2412K-BRT
Q2503	5328972	TRANSISTOR 2SC2412K-BRT
Q2505	5328793	TRANSISTOR DTC144EK

SYMBOL-NO	P-NO	DESCRIPTION
02506	5327021	TRANSISTOR 2SA844CD
02507	5328795	TRANSISTOR DTA144EK-16
02508	5328972	TRANSISTOR 2SC2412K-BRT
02509	5328793	TRANSISTOR DTC144EK [HKN,SWNA]
02701	5327073	TRANSISTOR DTC144ES
02702	5327073	TRANSISTOR DTC144ES
⚠PC0851	CP10431G	PHOTO COUPLER PC123FY
⚠QF0851	5721945	IC PROTECTOR, ICP-N38
⚠QF0852	5721946	PROTECTOR, ICP-N15
⚠QF0853	5721944	IC PROTECTOR, ICP-N25
ZD0851	5339251	DIODE HZS2-C3
ZD0861	5336811	DIODE MA2180A
ZD0862	5339468	DIODE HZS11B3
ZD0864	5339482	DIODE HZS15-2
ZD0901	5339275	DIODE HZS7-B2
ZD0903	5339297	DIODE HZS5C3
ZD2501	5339288	DIODE HZS30-3
ZD2502	5339474	DIODE HZS12C1
		TRANSFORMERS
T0401	BT10251	TRANSFORMER, POWER
⚠T0051	BT10282	TRANSFORMER, POWER (HEPM)
		COILS
L0201	5121296	COIL 220UH
L0202	5121611	COIL 100UH
L0203	5159142	CHOKE COIL 12UH
L0204	5121287	COIL 10UH
L0205	5121611	COIL 100UH
L0207	51591S3	CHOKE COIL 82UH
L0208	5121611	COIL 100UH
L0209	5159142	CHOKE COIL 12UH
L0210	5159146	CHOKE COIL 27UH
L0401	5159114	COIL 15MH
L0403	0770057	CHOKE COIL 100UH+-5%
L0501	0770048	CHOKE COIL 22UH+-5%
⚠L0851	5220242	COIL 18MH
⚠L0852	5220242	COIL 18MH
L0853	BH00201R	COIL 10UH
L0854	DH00205R	COIL 22UH
L0901	0770057	CHOKE COIL 100UH+-5%
L0902	5121611	COIL 100UH
L1101	5121611	COIL 100UH
L1102	5121611	COIL 100UH
L1103	5121611	COIL 100UH
L1105	5121296	COIL 220UH
L1106	5121296	COIL 220UH
L1402	5121288	COIL 15UH
L1403	5121289	COIL 22UH
L1405	5121287	COIL 10UH
L1701	0770057	CHOKE COIL 100UH+-5%
L2501	0770063	CHOKE COIL 47UH+-5%
L2502	0770057	CHOKE COIL 100UH+-5%
L2504	0770052	COIL,CHOKE 39UH+-5%
L2505	0770057	CHOKE COIL 100UH+-5%
L2506	0770052	COIL,CHOKE 39UH+-5%
L2507	0770053	CHOKE COIL 47UH+-5%
		CRYSTALS
X0201	BP10531	CRYSTAL
X0202	BP10541	CRYSTAL (HEPM)
X0901	BP10571	CRYSTAL

SYMBOL-NO	P-NO	DESCRIPTION
X0902	BP10251	CRYSTAL
X1401	BP10572	CRYSTAL
X1402	BP10573	CRYSTAL (HEPM)
X2701	BP10451G	CRYSTAL
		MISCELLANEOUS
BL0603	5272378	LC FILTER
BL0604	5272378	LC FILTER
BL0851	5272379	COIL
BL0852	5272379	COIL
BL0853	5272379	COIL
BL0854	5272379	COIL
BL0855	5272379	COIL
⚠F0851	5721061	FUSE 1.6A
FE2501	HC10184	TUNER IF UNIT
⚠FH0851	5722411	HOLDER,FUSE
⚠FH0852	5722411	HOLDER,FUSE
JK2501	ES10343	JACK
JK2503	E010163	JACK
LCD1701	DB103/3	DISPLAY,FLOURESENT
LMP1701	5763357	LAMP
LMP1702	5763357	LAMP
LMP1703	5763357	LAMP
LMP1704	5763357	LAMP
S1714	5634884	SWITCH
S1715	5634884	SWITCH
S1719	FE10211R	SWITCH
S2101	FD10211	SWITCH,MODE
S2102	5635631	SWITCH
S2103	5635631	SWITCH
S2701	5634884	SWITCH
S2704	5634884	SWITCH
S2707	5634884	SWITCH
S2708	5634884	SWITCH
S2709	5634884	SWITCH
S2721	FH10231	SWITCH

N&A CIRCUIT BOARD SECTION [HKN,SWNA]

		CAPACITORS
C1801	0800103	ELECTROLYTIC 0.22UF 50V
C1802	0890019	CERAMIC DISC 68PF+-50% 50V
C1803	0800039	ELECTROLYTIC 47UF 10V
C1804	0800038	ELECTROLYTIC 47UF 6.3V
C1805	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1806	0800039	ELECTROLYTIC 47UF 10V
C1807	0890019	CERAMIC DISC 68PF+-50% 50V
C1808	0800103	ELECTROLYTIC 0.22UF 50V
C1810	0880053	POLYESTER FILM 0.047UF+-10% 50V
C1811	0800015	ELECTROLYTIC 10UF 16V
C1812	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1813	0800039	ELECTROLYTIC 47UF 10V
C1814	0890008	CERAMIC DISC 10PF+-5% 50V
C1815	0800015	ELECTROLYTIC 10UF 16V
C1816	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1817	0800015	ELECTROLYTIC 10UF 16V
C1818	0890026	CERAMIC DISC 220PF+-10% 50V
C1819	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1820	0800015	ELECTROLYTIC 10UF 16V
C1821	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1822	0800003	ELECTROLYTIC 1UF 50V
C1823	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1824	0800039	ELECTROLYTIC 47UF 10V

SYMBOL-NO	P-NO	DESCRIPTION	
C1825	0880048	MYLAR 0.022UF+-10% 50V	
C1826	0880019	POLYESTER FILM 0.33UF+-10% 50V	
C1828	0890021	CERAMIC DISC 82PF+-10% 50V	
C1829	0890021	CERAMIC DISC 82PF+-10% 50V	
C1830	0890046	CERAMIC DISC 0.1UF+80-20% 50V	
C1831	0890045	CERAMIC DISC 0.047UF+80-20% 50V	
C1833	0800001	ELECTROLYTIC 0.47UF 50V	
C1834	0890046	CERAMIC DISC 0.1UF+80-20% 50V	
C1835	0890046	CERAMIC DISC 0.1UF+80-20% 50V	
C1836	0800039	ELECTROLYTIC 47UF 10V	
C1837L	0800015	ELECTROLYTIC 10UF 16V	
C1837R	0800015	ELECTROLYTIC 10UF 16V	
C1838L	0800015	ELECTROLYTIC 10UF 16V	
C1838R	0800015	ELECTROLYTIC 10UF 16V	
C1839L	0890039	CERAMIC DISC 4700PF+-20% 16V	
C1839R	0890039	CERAMIC DISC 4700PF+-20% 16V	
C1841	0890046	CERAMIC DISC 0.1UF+80-20% 50V	
C1842	0890046	CERAMIC DISC 0.1UF+80-20% 50V	
C1851	0800176	ELECTROLYTIC 2.2UF 50V	[SWNA]
C1852	0800176	ELECTROLYTIC 2.2UF 50V	[SWNA]
C1853	0890108	CERAMIC DISC 5.0PF+-0.25% 50V	[SWNA]
C1854	0890043	CERAMIC DISC 0.01UF+-20% 16V	[SWNA]
C1856	0890043	CERAMIC DISC 0.01UF+-20% 16V	[SWNA]
C1857	0800185	ELECTROLYTIC 47UF 6.3V	[SWNA]
C1858	0890043	CERAMIC DISC 0.01UF+-20% 16V	[SWNA]
C1859	0800176	ELECTROLYTIC 2.2UF 50V	[SWNA]
C1860	0800176	ELECTROLYTIC 2.2UF 50V	[SWNA]
C1861	0800176	ELECTROLYTIC 2.2UF 50V	[SWNA]
C1862	0800178	ELECTROLYTIC 4.7UF 35V	[SWNA]
C1863	0800178	ELECTROLYTIC 4.7UF 35V	[SWNA]
C1864	0800015	ELECTROLYTIC 10UF 16V	[SWNA]
C1865	0800179	ELECTROLYTIC 10UF 16V	[SWNA]
C1866	0800103	ELECTROLYTIC 0.22UF 50V	[SWNA]
C1867	0800103	ELECTROLYTIC 0.22UF 50V	[SWNA]
C1881	0890029	CERAMIC DISC 390PF+-10% 50V	
C1882	0890045	CERAMIC DISC 0.047UF+80-20% 50V	
C1890	0890043	CERAMIC DISC 0.01UF+-20% 16V	[SWNA]
C1891	0890043	CERAMIC DISC 0.01UF+-20% 16V	[SWNA]
C1895	0890025	CERAMIC DISC 180PF+-10% 50V	[SWNA]
C1896	0800187	ELECTROLYTIC 100UF 6.3V	[SWNA]
C1897	0890036	CERAMIC DISC 1500PF+-20% 16V	[SWNA]
C1898	0800179	ELECTROLYTIC 10UF 16V	[SWNA]
C1899	0890046	CERAMIC DISC 0.1UF+80-20% 50V	[SWNA]
		RESISTORS	
R1801	0700054	CARBON FILM 10KOHM+-5% 1/8W	
R1802	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	
R1803	0700054	CARBON FILM 10KOHM+-5% 1/8W	
R1804	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	
R1805	0700044	CARBON FILM 1.8KOHM+-5% 1/8W	
R1807	0700061	CARBON FILM 33KOHM+-5% 1/8W	
R1808	0700041	CARBON FILM 1.0KOHM+-5% 1/8W	
R1809	0700027	CARBON FILM 100 OHM+-5% 1/8W	
R1810	0700041	CARBON FILM 1.0KOHM+-5% 1/8W	
R1811	0700054	CARBON FILM 10KOHM+-5% 1/8W	
R1812	0700059	CARBON FILM 22KOHM+-5% 1/8W	
R1813	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	
R1814	0700034	CARBON FILM 330 OHM+-5% 1/8W	
R1815	0700078	CARBON FILM 680KOHM+-5% 1/8W	
R1816L	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	[SWNA]
R1816R	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	[SWNA]
R1817L	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	
R1817R	0700081	CARBON FILM 1.0MOHM+-5% 1/8W	
R1830L	0700067	CARBON FILM 100KOHM+-5% 1/8W	

SYMBOL-NO	P-NO	DESCRIPTION	
R1830R	0700067	CARBON FILM 100KOHM+-5% 1/8W	
R1831L	0700068	CARBON FILM 120KOHM+-5% 1/8W	
R1831R	0700068	CARBON FILM 120KOHM+-5% 1/8W	
R1832L	0700061	CARBON FILM 33KOHM+-5% 1/8W	
R1832R	0700061	CARBON FILM 33KOHM+-5% 1/8W	
R1833L	0700062	CARBON FILM 39KOHM+-5% 1/8W	
R1833R	0700062	CARBON FILM 39KOHM+-5% 1/8W	
R1834L	0700042	CARBON FILM 1.2KOHM+-5% 1/8W	
R1834R	0700042	CARBON FILM 1.2KOHM+-5% 1/8W	
R1851	0700037	CARBON FILM 560 OHM+-5% 1/8	[SWNA]
R1852	0700031	CARBON FILM 180 OHM+-5% 1/8W	[SWNA]
R1853	0700049	CARBON FILM 4.7KOHM+-5% 1/8W	[SWNA]
R1854	0700037	CARBON FILM 560 OHM+-5% 1/8W	[SWNA]
R1855	0700028	CARBON FILM 120 OHM+-5% 1/8W	[SWNA]
R1856	0700028	CARBON FILM 120 OHM+-5% 1/8W	[SWNA]
R1857	0700049	CARBON FILM 4.7KOHM+-5% 1/8W	[SWNA]
R1858	0700059	CARBON FILM 27KOHM+-5% 1/8W	[SWNA]
R1860	0700043	CARBON FILM 1.5KOHM+-5% 1/8W	[SWNA]
R1861	0700045	CARBON FILM 2.2KOHM+-5% 1/8W	[SWNA]
R1862	0700043	CARBON FILM 1.5KOHM+-5% 1/8W	[SWNA]
R1863	0700045	CARBON FILM 2.2KOHM+-5% 1/8W	[SWNA]
R1864	0700034	CARBON FILM 330 OHM+-5% 1/8W	[SWNA]
R1865	0700034	CARBON FILM 330 OHM+-5% 1/8W	[SWNA]
R1870	0700038	CARBON FILM 680 OHM+-5% 1/8W	[SWNA]
R1899	0700059	CARBON FILM 27KOHM+-5% 1/8W	[SWNA]
		SEMI-CONDUCTORS	
D1801	5336301	DIODE 1SV111	
D1802	5339141	DIODE 1SS270	
IC1801	CK12201	IC SAA7283GP	
IC1802	5352714	IC NJM4558M	
IC1851	CK14551	IC TDA9840T	[SWNA]
IC1852	1346191	IC TDA9821	[SWNA]
		COILS	
L1801	5121286	COIL 68UH	
L1802	0770057	CHOKE COIL 100UH+-5%	
L1803	0770057	CHOKE COIL 100UH+-5%	
L1804	0770057	CHOKE COIL 100UH+-5%	[SWNA]
L1805	0770048	CHOKE COIL 22UH+-5%	
L1806	5159111	CHOKE COIL 560UH	[SWNA]
L1807	0770057	CHOKE COIL 100UH+-5%	
L1808L	5159113	COIL,CHOKE 8.2MH	
L1808R	5159113	COIL,CHOKE 8.2MH	
		CRYSTALS	
X1801	BP10471	CRYSTAL (HCPUK)	
X1851	BP10571	CRYSTAL	[SWNA]
		MISCELLANEOUS	
BL1801	5272378	LC FILTER	
BL1802	5272378	LC FILTER	
BL1803	5272376	FILTER	
CF1851	5160561	FILTER	[SWNA]
CF1852	5160562	FILTER	[SWNA]
		J&U CIRCUIT BOARD SECTION [JU]	
		CAPACITORS	
C1801	0800041	ELECTROLYTIC 47UF 16V	

SYMBOL-NO	P-NO	DESCRIPTION
C1802	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1803	0800103	ELECTROLYTIC 0.22UF 50V
C1804	0800015	ELECTROLYTIC 10UF 16V
C1805	0800015	ELECTROLYTIC 10UF 16V
C1806	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1807	0800015	ELECTROLYTIC 10UF 16V
C1808	0800015	ELECTROLYTIC 10UF 16V
C1809	0800015	ELECTROLYTIC 10UF 16V
C1810	0800015	ELECTROLYTIC 10UF 16V
C1811	0800015	ELECTROLYTIC 10UF 16V
C1812	0800015	ELECTROLYTIC 10UF 16V
C1813	0890043	CERAMIC DISC 0.01UF+-20% 16V
		RESISTORS
R1801	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R1802	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R1803	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1804	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R1806	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1807	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1808	0700038	CARBON FILM 680 OHM+-5% 1/8W
R1809	0700036	CARBON FILM 470 OHM+-5% 1/8W
R1810	0700061	CARBON FILM 33KOHM+-5% 1/8W
R1811	0700064	CARBON FILM 56KOHM+-5% 1/8W
R1812	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1814	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1815	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1816	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1817	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1818	0700063	CARBON FILM 47KOHM+-5% 1/8W
R1819	0700059	CARBON FILM 22KOHM+-5% 1/8W
R1820	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1821	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R1822	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R1823	0700063	CARBON FILM 47KOHM+-5% 1/8W
RT1801	5030088	TRIMMER 22KOHM
RT1802	5030088	TRIMMER 22KOHM
		SEMI-CONDUCTORS
D1801	5339141	DIODE 1SS270
D1802	5339141	DIODE 1SS270
D1803	5339141	DIODE 1SS270
D1804	5339141	DIODE 1SS270
D1805	5339141	DIODE 1SS270
D1806	5339141	DIODE 1SS270
IC1801	CS10352	MODULE HTS7337A
IC1802	CP11302	IC CXA2020S
IC1803	1345961	IC BA3129D
Q1801	5327073	TRANSISTOR DTC144ES
Q1802	5327074	TRANSISTOR DTA144ES-T
		COIL
L1801	0770057	CHOKE COIL 100UH+-5%

SYMBOL-NO	P-NO	DESCRIPTION

CHAPTER 6 SCHEMATIC AND CIRCUIT BOARD DIAGRAMS

Applied Models: VT-F99EM(SWNA)
VT-F99EM(HKN)
VT-F99EM(JU)

Cautions when using schematic diagrams

Caution for safety
The parts marked ⚠ are critical for safety. Be sure to use the specified parts to ensure safety when replacing them.

1. Values in schematic diagrams
The values, dielectric strength (power capacitance) and tolerances of the resistors (excluding variable resistors) and capacitors are indicated in the schematic diagrams using abbreviations.

[Resistors]

Item	Indication
Value	No indication ····· Ω K ····· kΩ M ····· MΩ
Tolerance	No indication ····· ±5% (All tolerances other than ±5% are indicated in the schematic diagrams)
Power capacitance	No indication ····· 1/8W (1/16W for leadless resistors without indication) All capacitances other than the above are indicated in the schematic diagrams.

[Capacitors]

Item	Indication
Value	No indication ····· μF P ····· pF
Dielectric strengh	No indication ····· 50V (All dielectric strengths other than 50V are indicated in the schematic diagrams.)

[Coils]

Item	Indication
Value	μ ····· μH m ····· mH

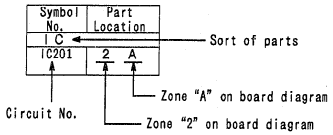
2. Markings in schematic diagrams
(1) Parts marked "■" with circuit numbers in the schematic diagrams are discrete parts.
(2) Parts marked "●" with circuit numbers in the schematic diagrams are leadless parts.

Cautions when using circuit board diagrams

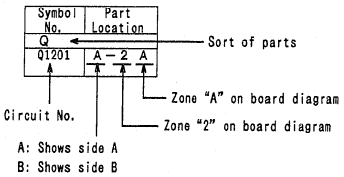
1. Identifications of sides A/B in circuit board diagrams
(1) Board having a pattern on one side and parts on both sides.
Side A: Shows discrete parts, viewed from the pattern side.
Side B: Shows leadless parts, viewed from the pattern side.
(2) Board having patterns on both sides and parts on both sides.
Side A: Shows parts and patterns which can be seen when the case is opened.
Side B: Shows parts and the pattern on the back of side A.

2. Table for indexing locations of parts
This table shows locations of each part on the circuit board diagrams. The locations are indicated using the guide scales on the external lines of diagrams.

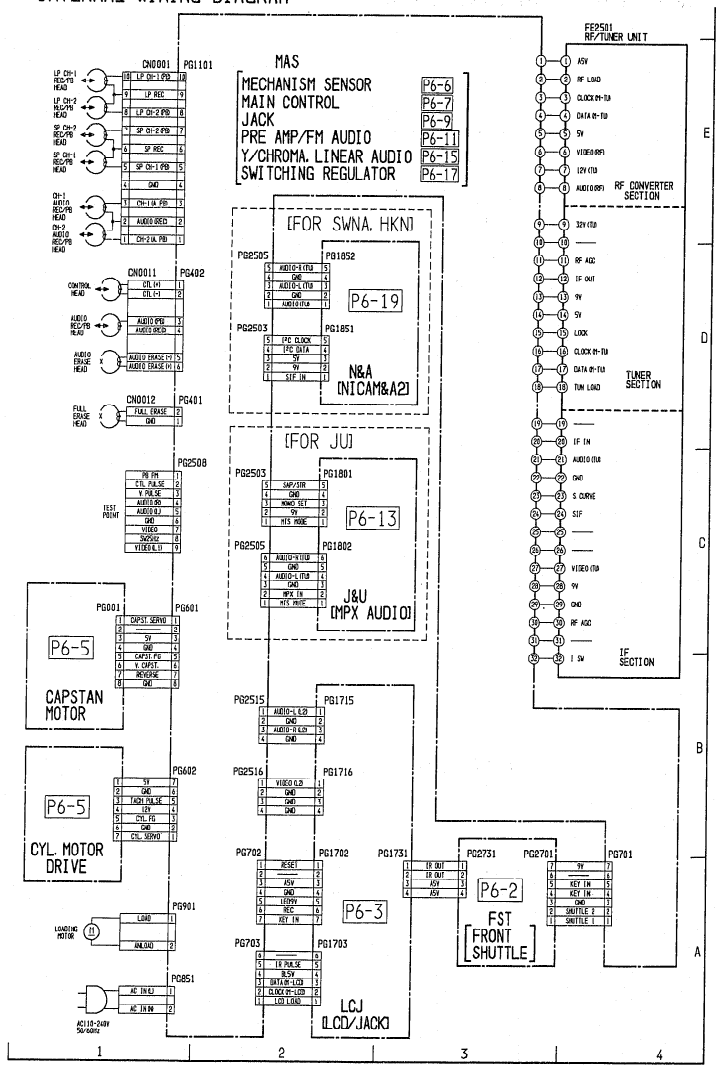
(1) In case of one-layer board



(2) In case of side A/B indication board

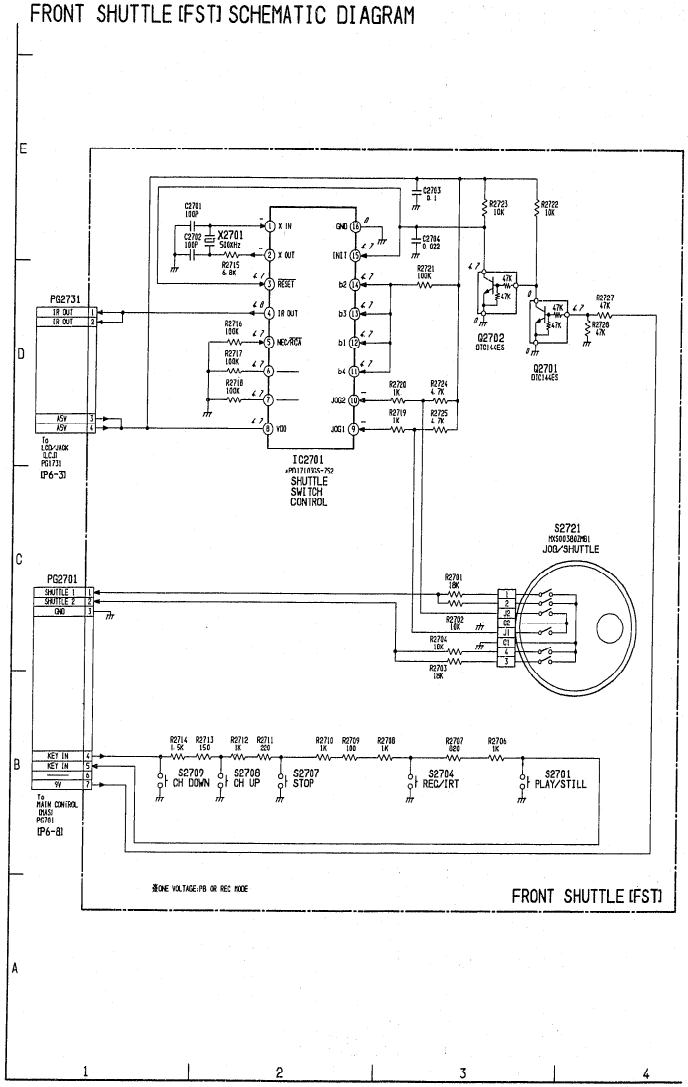


INTERNAL WIRING DIAGRAM



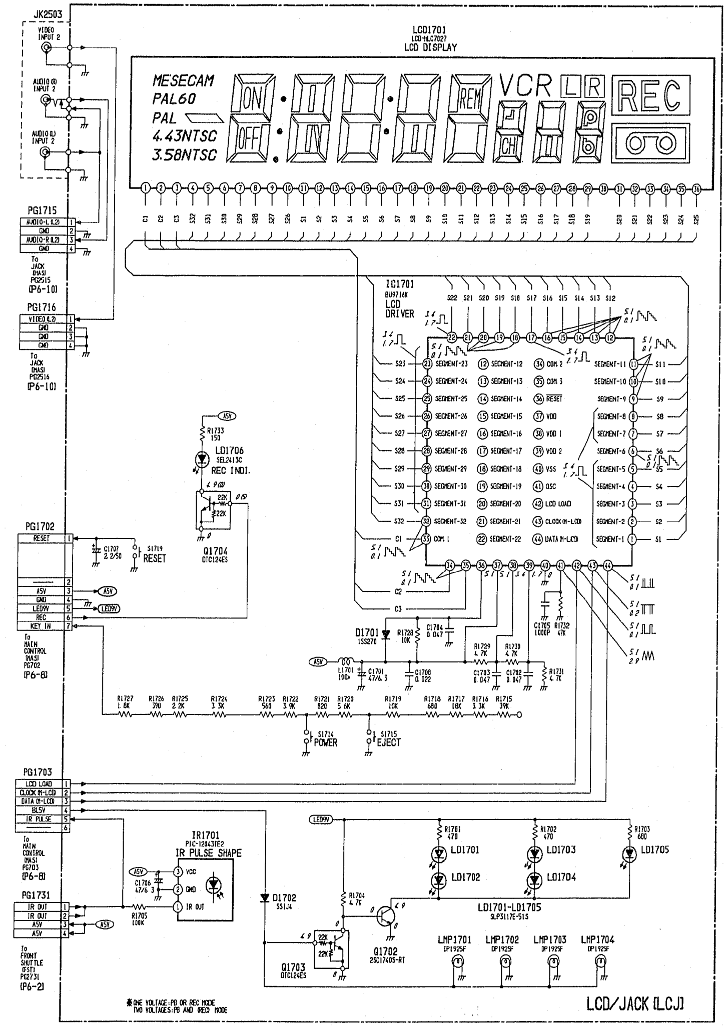
INTERNAL WIRING DIAGRAM 6-1

FRONT SHUTTLE (FST) SCHEMATIC DIAGRAM

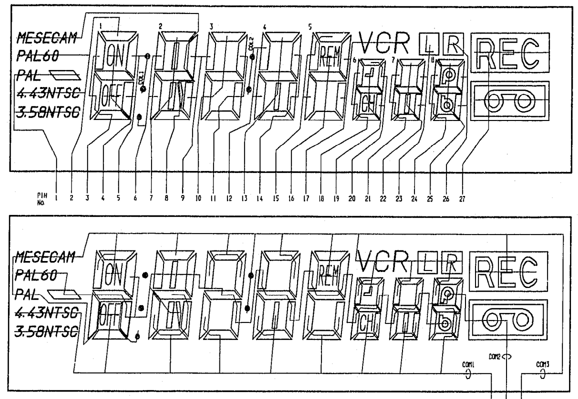


6-2 FRONT SHUTTLE

LCD/JACK [LCJ] SCHEMATIC DIAGRAM

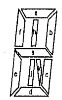


LCD GRID TABLE

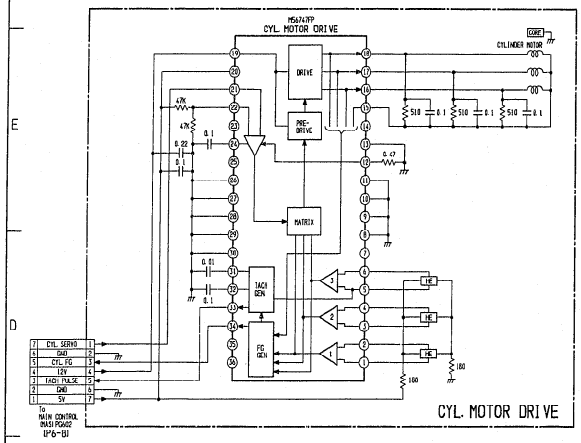


PIN No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COM1	4.43 NTSC	3.58 NTSC	1d	OFF	1c	2e	2g	2d	2c	3e	3d	4e	4i	4d	5e
COM2	▱	PAL 60	1e	1g	1b	3f	2hj	2k	2b	3g	3c	4f	4g	4c	5f
COM3	PAL	1a	1f	ON	COL1	DOT	2a	ME-SECAM	3f	3a	3b	COL2	4a	4b	5a

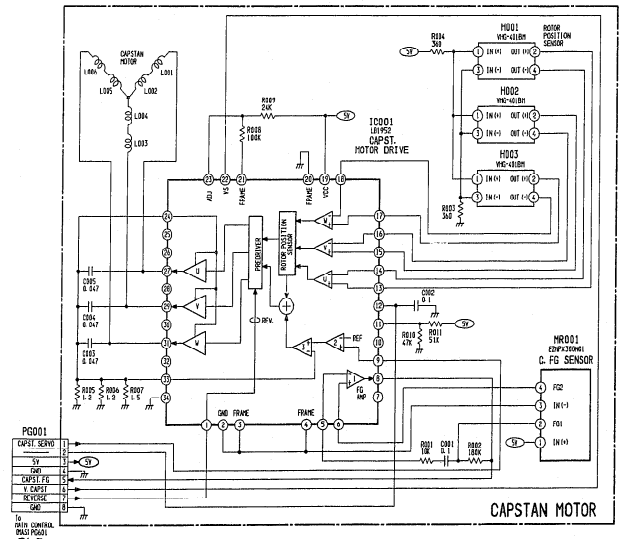
PIN No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
COM1	5d	5c	6d	CH	6c	7d	7j	7c	8d	8g	8c	—	COM	—	—
COM2	5g	5b	6e	6g	6b	7e	7g	7b	8e	P b	8b	[cassette]	—	COM	—
COM3	REM	VCR	6f	⏌	6a	7f	7a	[L]	8f	8a	[R]	[REC]	—	—	COM



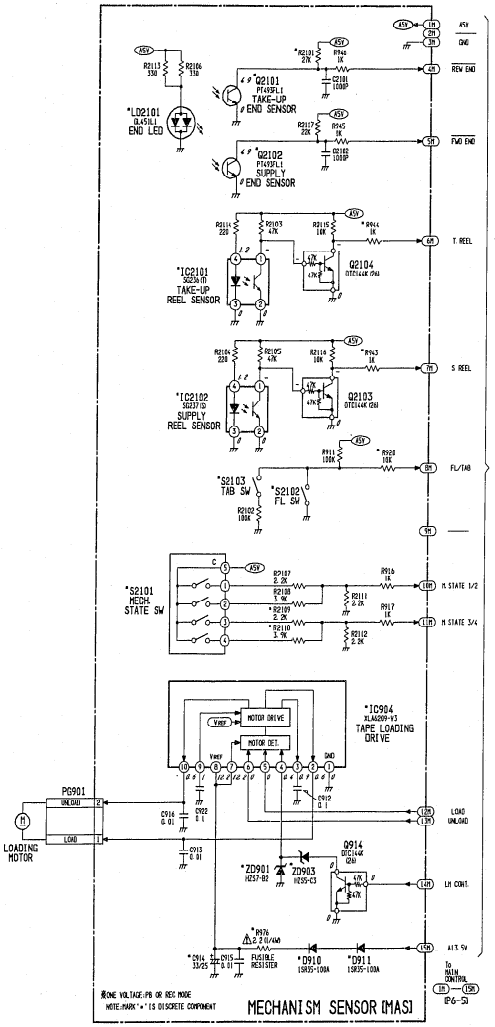
CYL. MOTOR DRIVE SCHEMATIC DIAGRAM



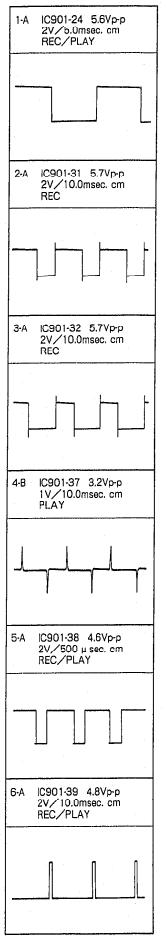
CAPSTAN MOTOR SCHEMATIC DIAGRAM



MECHANISM SENSOR [MAS] SCHEMATIC DIAGRAM

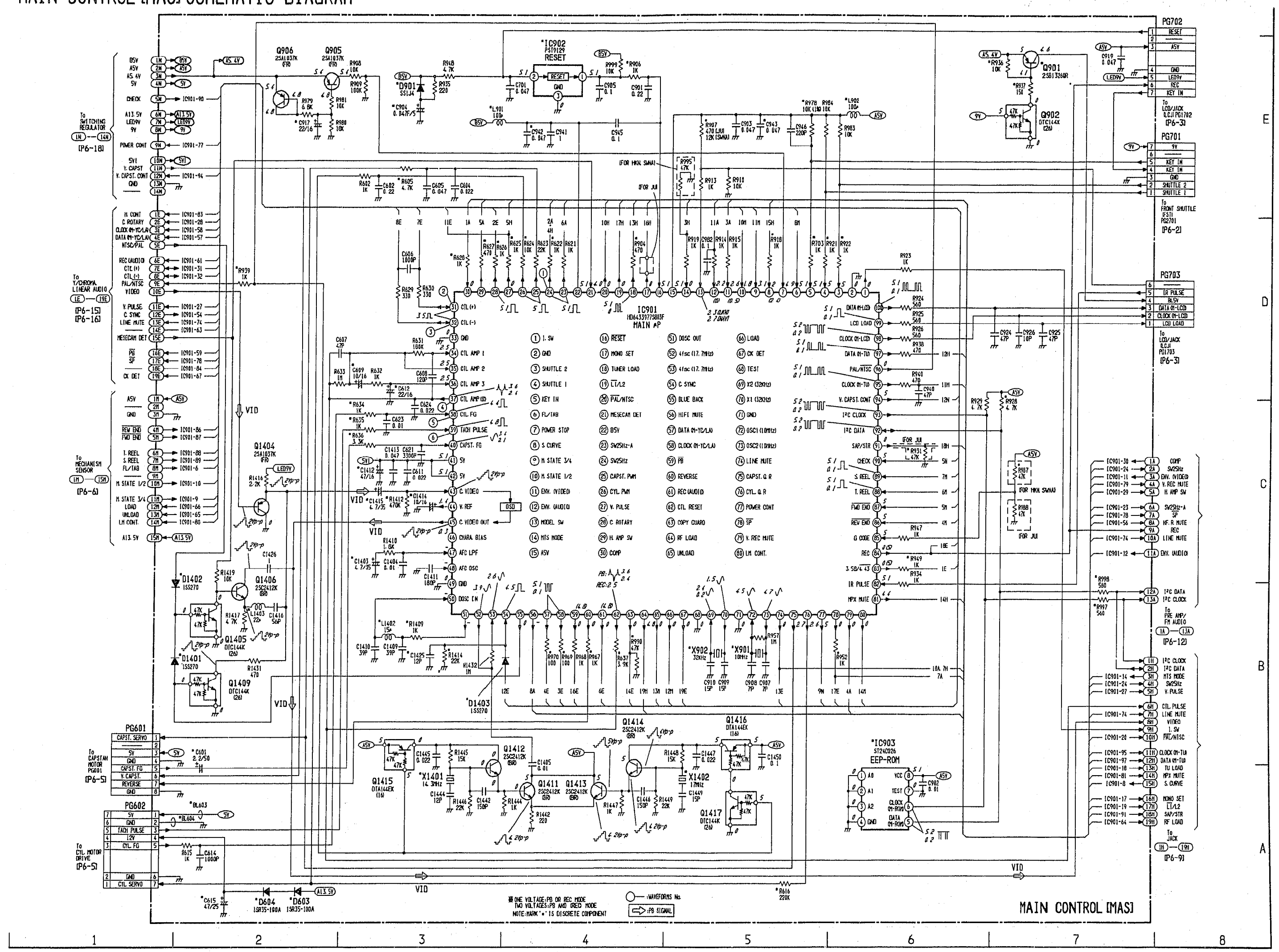


SERVO WAVEFORMS

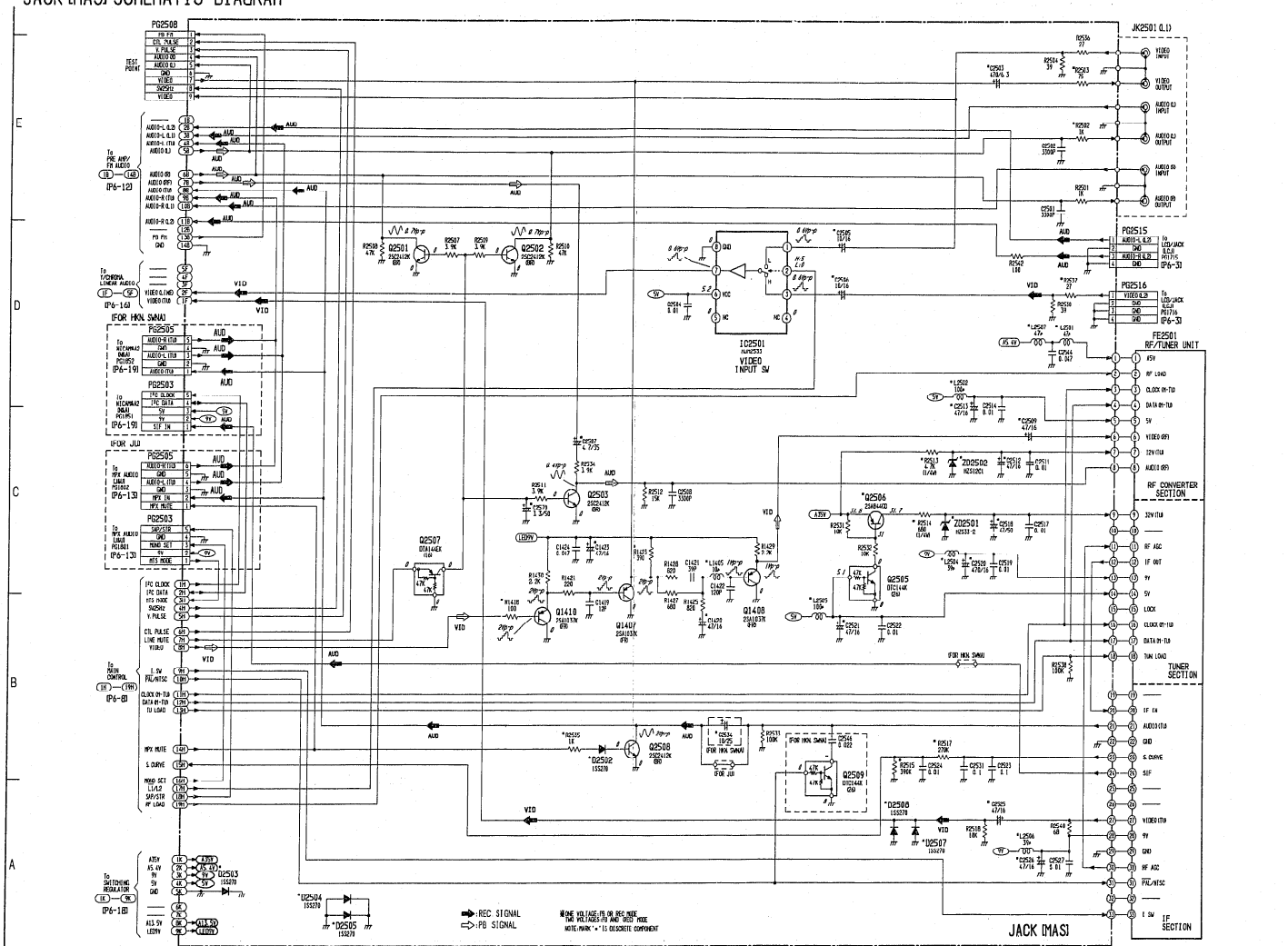


CYL. MOTOR DRIVE, CAPSTAN MOTOR 6-5 6-6 MECHANISM SENSOR, SERVO WAVEFORMS

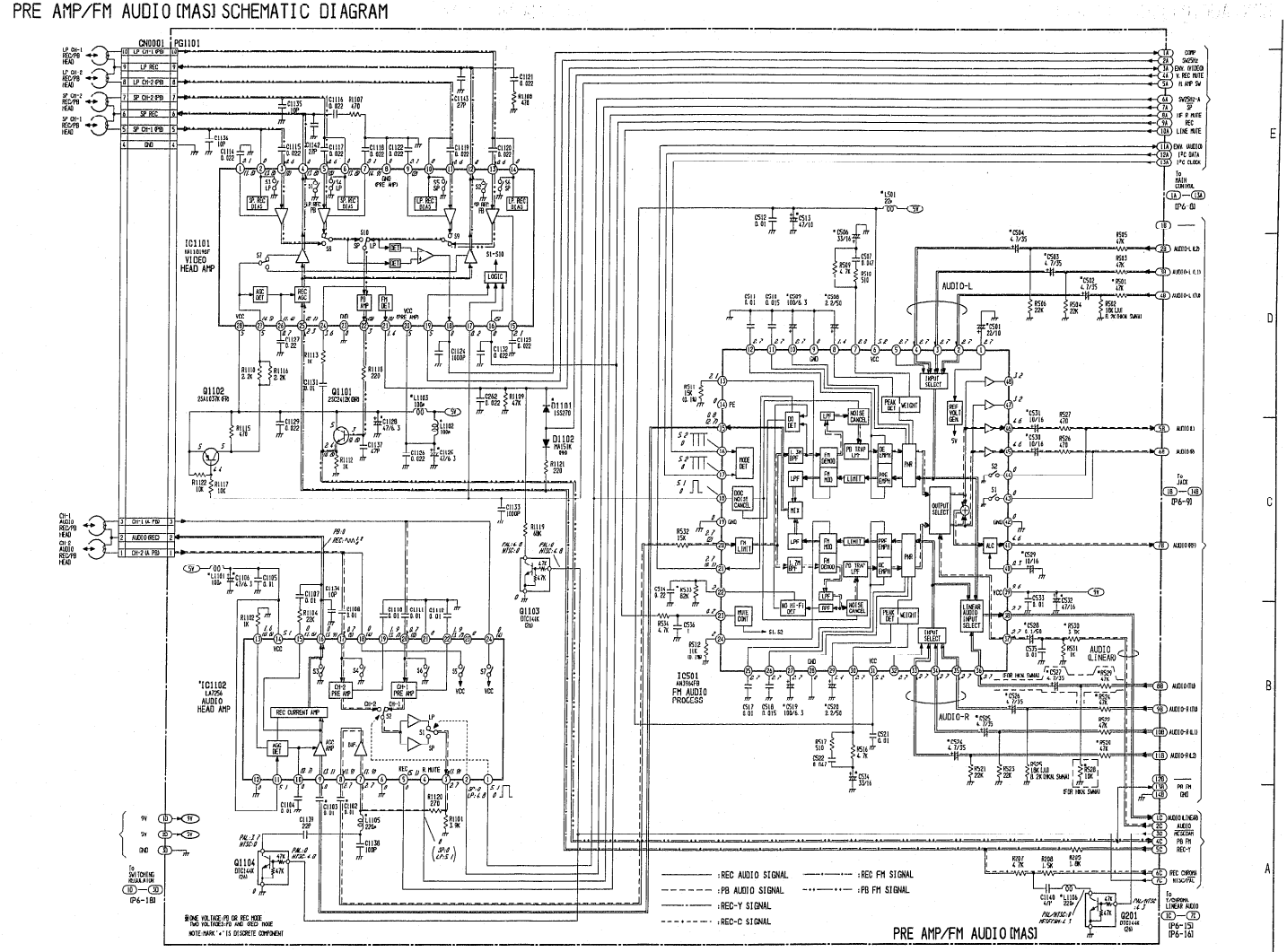
MAIN CONTROL [MAS] SCHEMATIC DIAGRAM



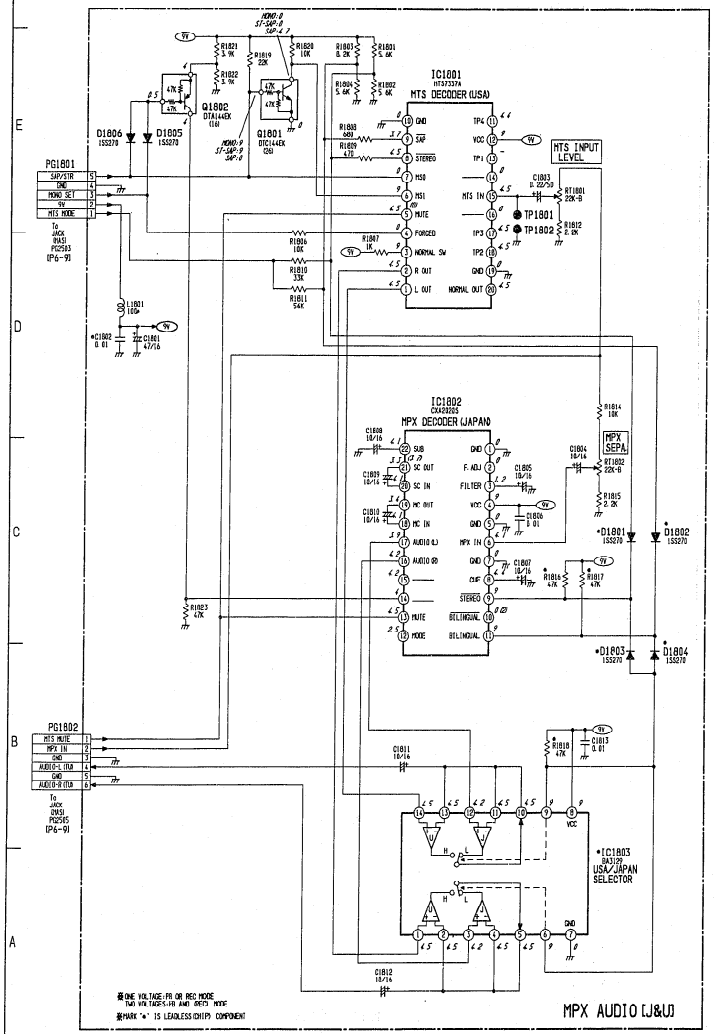
JACK [MAS] SCHEMATIC DIAGRAM



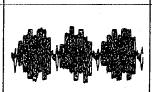
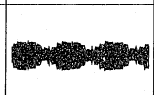
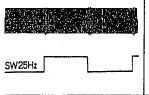
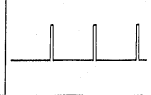
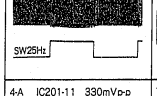
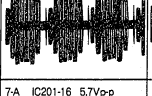
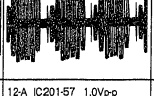
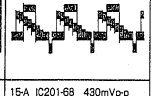
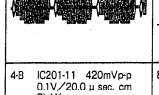
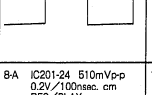
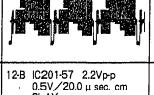
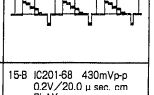
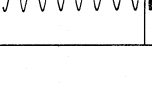
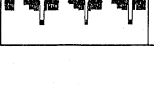
PRE AMP/FM AUDIO [MAS] SCHEMATIC DIAGRAM



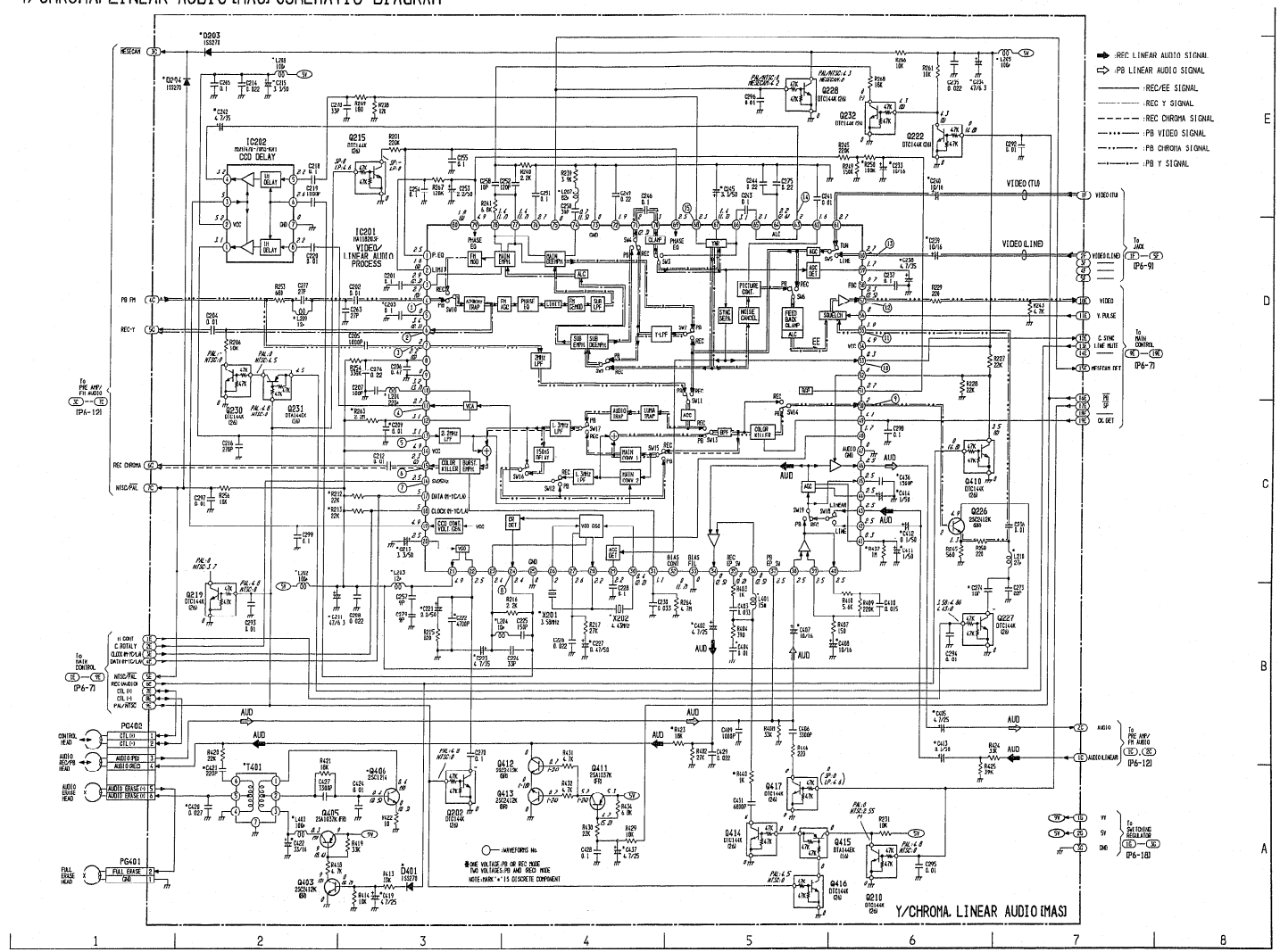
MPX AUDIO [J&U] SCHEMATIC DIAGRAM



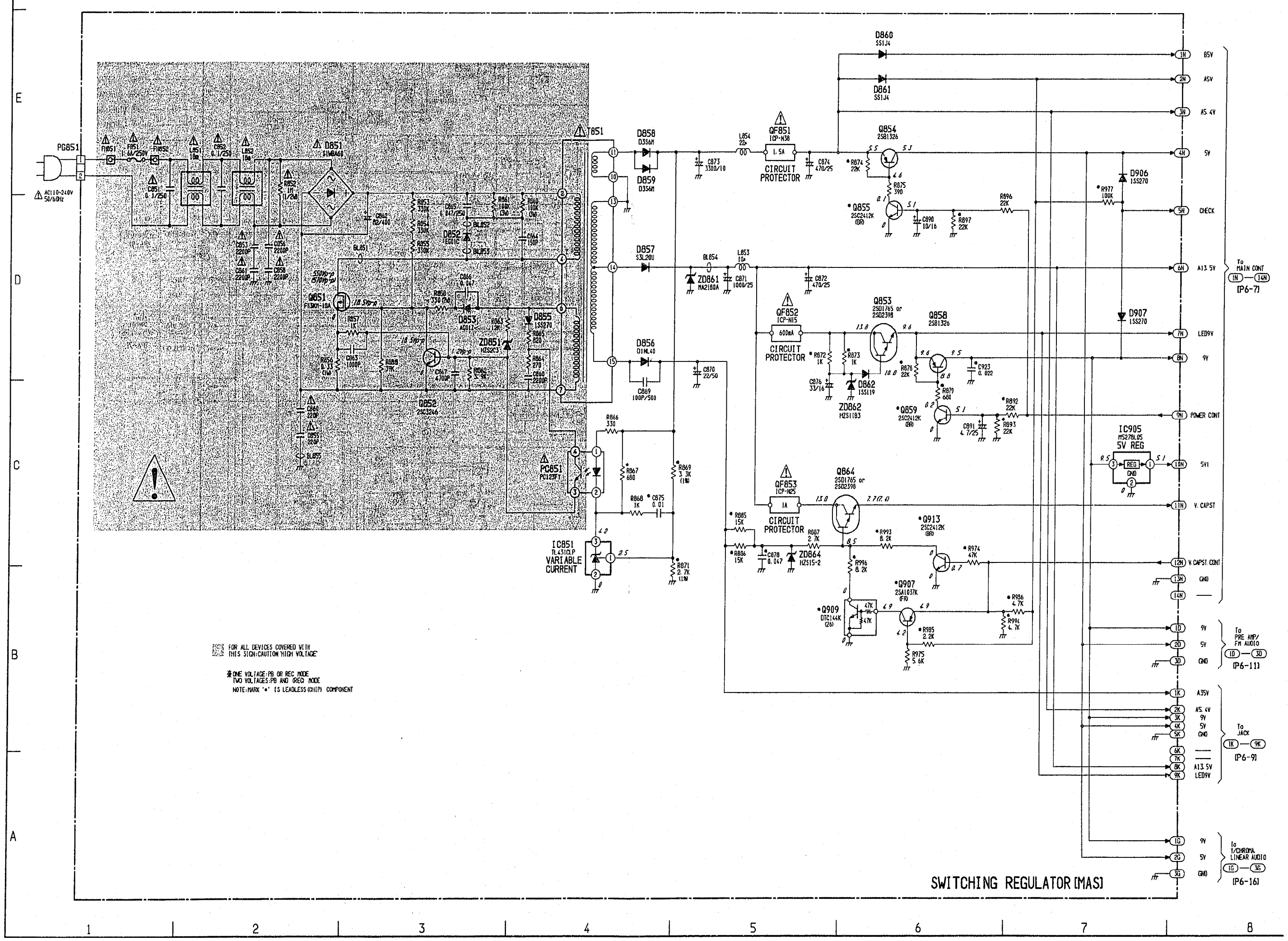
Y/CHROMA WAVEFORMS

1-B IC201-4 1.0Vp-p 0.5V/5.0msec. cm PLAY	5-A IC201-13 530mVp-p 0.2V/20.0 μ sec. cm REC	9-B IC201-50 540mVp-p 0.2V/20.0 μ sec. cm PLAY	13-A IC201-60 1.0Vp-p 0.5V/20.0 μ sec. cm REC
			
2-A IC201-6 400mVp-p 0.2V/5.0msec. cm REC	5-B IC201-13 640mVp-p 0.2V/20.0 μ sec. cm PLAY	10-A IC201-53 5.0Vp-p 2V/20.0 μ sec. cm REC/PLAY	14-A IC201-63 680mVp-p 0.2V/20.0 μ sec. cm REC
			
3-B IC201-7 670mVp-p 0.2V/5.0msec. cm PLAY	6-A IC201-15 400mVp-p 0.1V/20.0 μ sec. cm REC	11-B IC201-55 500mVp-p 0.1V/20.0 μ sec. cm PLAY	14-B IC201-63 680mVp-p 0.2V/20.0 μ sec. cm PLAY
			
4-A IC201-11 330mVp-p 0.1V/20.0 μ sec. cm REC	7-A IC201-16 5.7Vp-p 2V/5.0msec. cm REC/PLAY	12-A IC201-57 1.0Vp-p 0.5V/20.0 μ sec. cm REC	15-A IC201-68 430mVp-p 0.2V/20.0 μ sec. cm REC
			
4-B IC201-11 420mVp-p 0.1V/20.0 μ sec. cm PLAY	8-A IC201-24 510mVp-p 0.2V/100msec. cm REC/PLAY	12-B IC201-57 2.2Vp-p 0.5V/20.0 μ sec. cm PLAY	15-B IC201-68 430mVp-p 0.2V/20.0 μ sec. cm PLAY
			

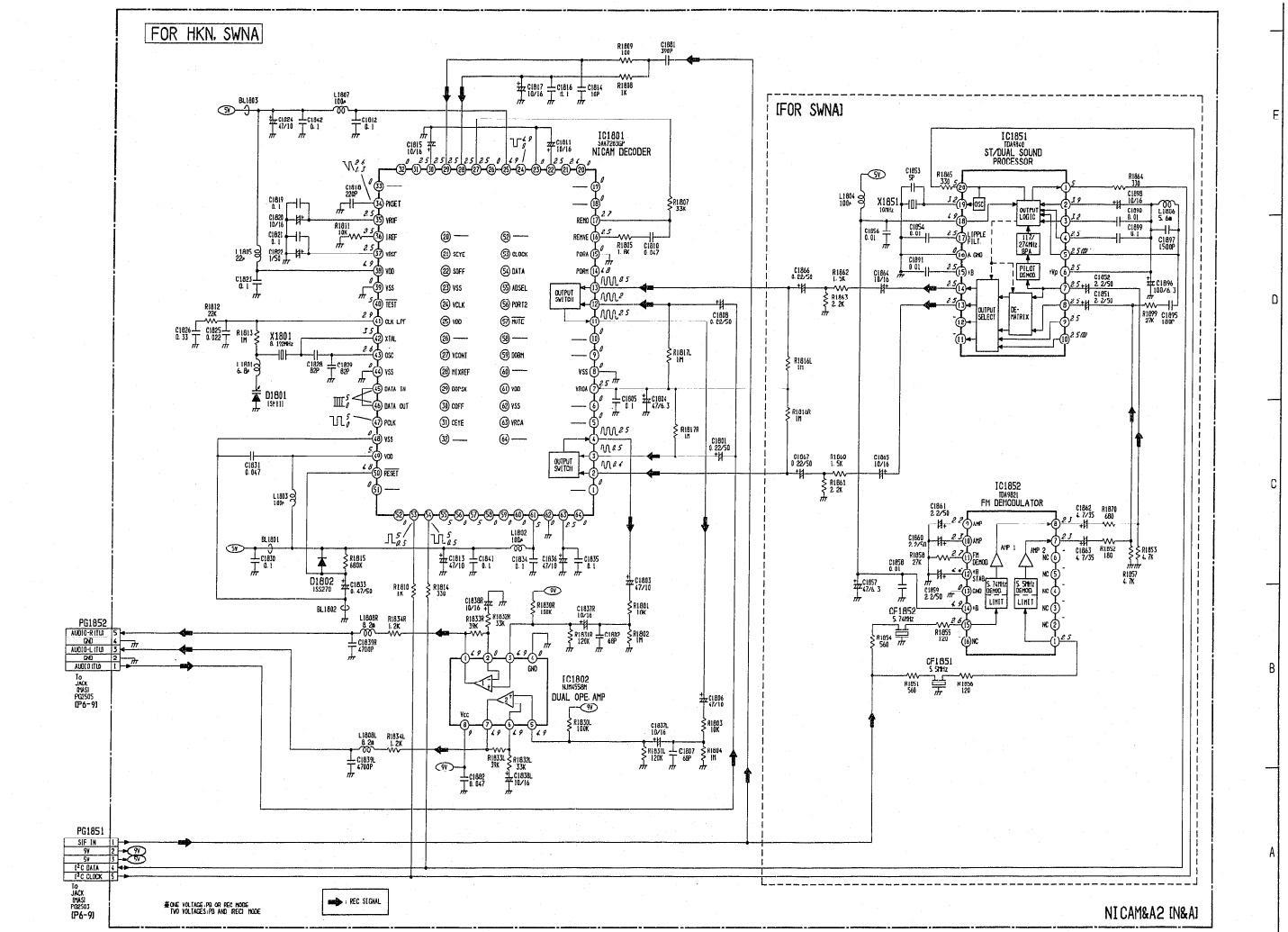
Y/CHROMA. LINEAR AUDIO (MAS) SCHEMATIC DIAGRAM



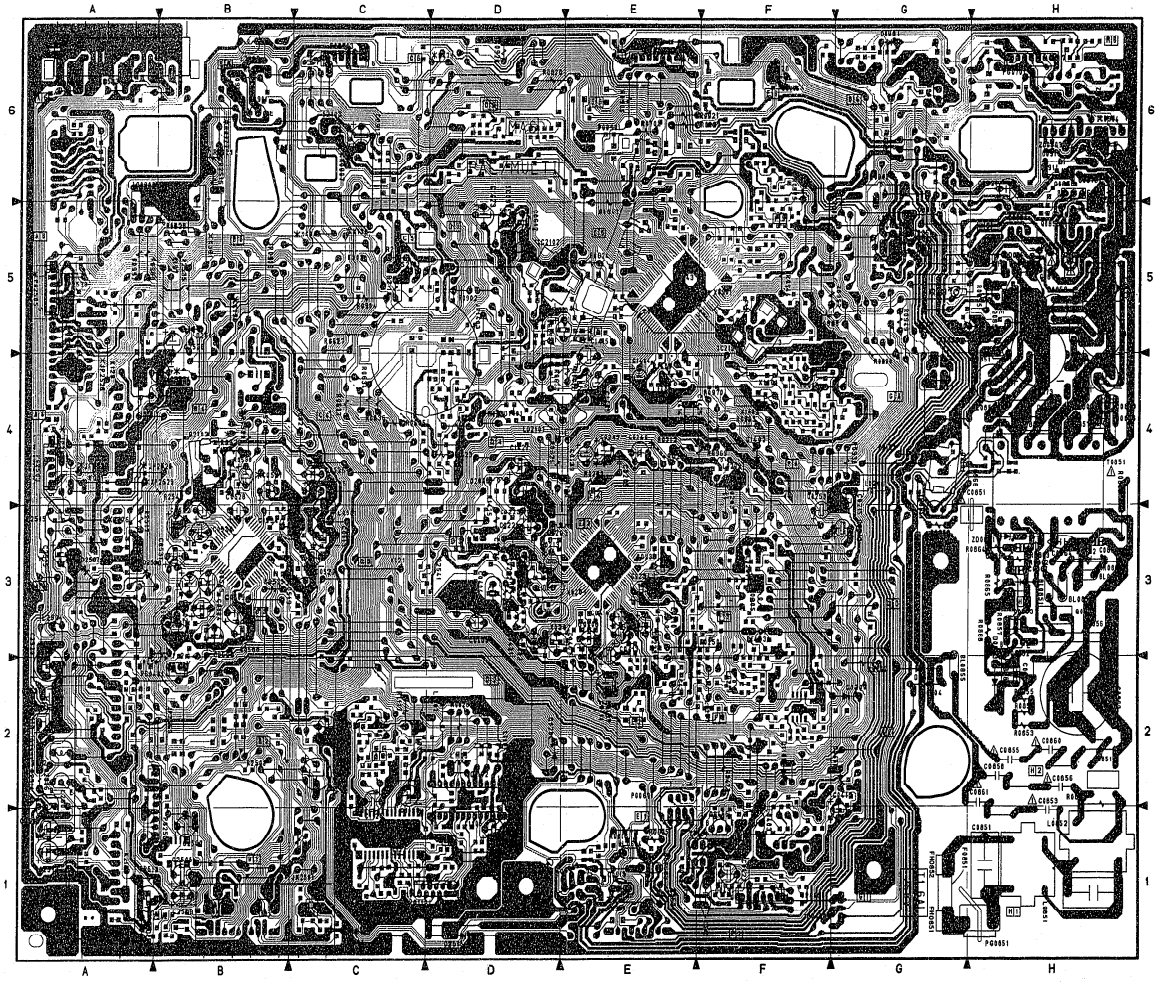
SWITCHING REGULATOR [MAS] SCHEMATIC DIAGRAM



NICAM&A2 [N&A] SCHEMATIC DIAGRAM



MAS CIRCUIT BOARD[SIDE A]



MAS[MAIN] -SIDE A-
[PATTERN No.JA1266-8]

DIFFERENCE TABLE
MAS[MAIN] – SIDE A –

NOTE: This table listes the different components marked with asterisks(＊) in the circuit board diagrams.

SYMBOL No.	JU	SWNA	HKN
C0527	×	○	○
C2534	JUMPER	○	○
JP2523	×	○	○
JP2525	○	×	×
JP2526	○	×	×
JP2528	×	○	○
JP2529	×	○	○
K076	×	○	○
K176	○	×	×
K298	○	×	×
K381	○	×	×
K471	○	×	×
K474	○	×	×
PG2505	6P	5P	5P
R0528	×	○	○
R0529	×	○	○
R0907	○	○	×
R0927	JUMPER	×	×
R0931	○	×	×
R0987	×	○	○

IDENTIFICATION OF PARTS LOCATION
MAS [MAIN]

Symbol No.	Parts Location
BL	
BL0603	A-1E
BL0604	A-1E
BL0851	A-3H
BL0852	A-3H
BL0853	A-3H
BL0854	A-5H
BL0855	A-2G
C	
C0201	B-4F
C0202	B-2F
C0203	A-4F
C0204	B-2D
C0205	B-2F
C0206	B-2F
C0207	B-3F
C0208	B-4D
C0209	A-4E
C0211	A-4D
C0212	B-3F
C0213	A-3D
C0214	B-2F
C0215	A-4G
C0216	B-2F
C0218	B-2F
C0219	B-4D
C0220	B-2F
C0221	A-3D
C0222	A-3D
C0223	A-3D
C0224	B-3D
C0225	B-3D
C0226	B-3D
C0227	A-3D
C0228	B-3D
C0230	B-3D
C0233	A-3E
C0234	A-3E
C0235	B-3E
C0236	B-3E
C0237	B-3E
C0238	A-3E
C0239	A-4E
C0240	A-4E
C0241	B-3E
C0242	A-3G
C0243	B-3E
C0244	B-3E
C0245	A-4E
C0246	B-3E
C0249	B-3E
C0250	B-2F
C0251	B-3E
C0252	B-3F
C0253	A-3F
C0254	B-2E
C0255	B-3F
C0257	B-3D
C0258	B-3F
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C0263	B-2F
C0265	B-2F
C0270	A-3D
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C0274	A-2E
C0275	B-3E
C0276	B-2F
C0277	B-2F
C0278	B-2F
C0279	B-3D
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C0413	A-3E
C0414	A-3E
C0419	A-1G
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C0421	A-1E
C0422	A-1F
C0424	B-1F
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C0428	B-1F
C0429	B-3D
C0431	B-3D
C0436	A-3D
C0437	A-1F
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C0865	A-3H
C0866	A-2H
C0867	A-3H
C0868	A-3H
C0869	A-4H
C0870	A-4H
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C0872	A-5H
C0873	A-4H
C0874	A-5H
C0875	B-4H
C0876	A-6H
C0878	B-5H
C0890	A-5H
C0891	A-6H
C0901	B-5E
C0902	B-5A
C0903	B-6D
C0904	A-5B
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C0907	B-5F
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C0909	B-4F
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C0982	B-6C
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C1103	A-2D
C1104	B-2D
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C1422	B-3D
C1423	A-5D
C1424	B-4C
C1425	A-4E
C1426	B-4D
C1442	B-4F
C1444	B-4F
C1445	B-4G
C1446	B-4F
C1447	B-4F
C1449	B-4F
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D0204	A-2D
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D0857	A-4H
D0858	A-4H
D0859	A-4H
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D0861	A-5G
D0862	A-5H
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D0906	A-5G
D0907	A-5G
D0910	A-6H
D0911	A-6H
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FH0852	A-1G
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Q1415	B-4F
Q1416	B-4G
Q1417	B-4D
Q2101	A-4G
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Q2103	B-6D
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Q2503	B-1A
Q2505	B-2A
Q2506	A-2A
Q2507	B-2C
Q2508	B-5A
Q2509	B-4A
QF	
QF0851	A-5H
QF0852	A-5H
QF0853	A-5H
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R0239	B-2F
R0240	B-3F
R0241	B-3E
R0243	B-4D
R0245	B-3F
R0249	B-2E
R0250	A-3E
R0253	B-2F
R0254	B-3F
R0256	B-3F
R0258	B-3E
R0261	B-3F
R0263	A-4E
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R0531	B-4B
R0532	B-2C
R0533	A-3B
R0534	B-3C
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R0605	A-1E
R0615	B-1E
R0616	A-1E
R0621	B-5C
R0622	A-4C
R0623	B-5E
R0624	A-5E
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R0636	A-4C
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R0946	B-5F
R0947	B-5F
R0948	B-6G
R0949	A-5G
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R1118	B-2C
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R1122	B-2C
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R2115	B-5F
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R2117	B-6D
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R2542	A-4B
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S2102	A-4G
S2103	A-6C
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T0851	A-4H
X	
X0201	A-3D
X0202	A-3D
X0901	A-5F
X0902	A-4F
X1401	A-4F
X1402	A-4F
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ZB0097	B-6C
ZB0135	B-5F
ZD	
ZD0851	A-3H
ZD0861	A-4H
ZD0862	A-5H
ZD0864	A-5H
ZD0901	A-6H
ZD0903	A-6H
ZD2501	A-2A
ZD2502	A-1A

IDENTIFICATION OF PARTS LOCATION

MAS [MAIN] 1/2

Symbol No.	Parts Location
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BL0604	A-1E
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BL0853	A-3H
BL0854	A-5H
BL0855	A-2G
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C0202	B-2F
C0203	A-4F
C0204	B-2D
C0205	B-2F
C0206	B-2F
C0207	B-3F
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C0209	A-4E
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C0212	B-3F
C0213	A-3D
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C0861	A-2H
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C1422	B-3D
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D0604	A-2G
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D0852	A-3H
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D0857	A-4H
D0858	A-4H
D0859	A-4H
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D0861	A-5G
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D0901	A-6G
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IC0904	A-6H
IC0905	A-5D
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IC2102	A-5D
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JP2585	B-4A
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K0474	A-5C
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Q0222	B-3F
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Q0854	A-5H
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Q0859	B-6H
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R0530	A-4B
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R0534	B-3C
R0602	B-1E
R0605	A-1E
R0615	B-1E
R0616	A-1E
R0621	B-5C
R0622	A-4C
R0623	B-5E
R0624	A-5E
R0625	A-5B
R0626	A-4D
R0627	A-5C
R0628	A-2D
R0629	B-5E
R0630	B-5E
R0631	B-5D
R0632	B-5D
R0633	B-5E
R0634	A-4C
R0635	A-4C
R0636	A-4C
R0637	A-4D
R0703	A-6E
R0852	A-2H
R0853	A-2H
R0854	A-2H
R0855	A-2H
R0856	A-3H
R0857	A-3H
R0858	A-2H
R0860	A-3H
R0861	A-3H
R0862	A-3H
R0863	A-3H
R0864	A-3H
R0865	A-3H
R0866	A-3G
R0867	B-4C
R0868	A-4G
R0869	B-4H
R0871	B-4H
R0872	B-5H
R0873	B-5H
R0874	B-5H
R0875	A-5H
R0878	B-5H
R0879	B-5H
R0885	B-5H
R0886	B-5H
R0887	A-5H
R0888	A-3H
R0892	B-6G
R0893	B-6H
R0896	A-5H
R0897	B-5H
R0904	A-5C
R0905	B-6D
R0906	A-6E
R0907	A-6C
R0908	B-6D
R0909	B-6D
R0910	B-6D
R0911	B-6C
R0913	B-6D
R0914	B-6D
R0915	B-6D
R0916	B-6D
R0917	B-6D
R0918	A-6C
R0919	B-6D
R0920	A-6D
R0921	A-6E
R0922	A-6E
R0923	B-6E
R0924	B-5E
R0925	B-5E
R0926	B-6E
R0927	A-6B
R0928	A-6D
R0929	B-6D
R0931	A-6B
R0934	B-5F
R0935	B-6G
R0936	A-6B
R0937	A-6B
R0938	B-6E
R0939	A-4G
R0940	B-6E
R0943	A-5E
R0944	A-5F
R0945	B-5F
R0946	B-5F
R0947	B-5F
R0948	B-6G
R0949	A-5G
R0952	A-5F
R0957	B-5F
R0967	A-2G
R0968	A-4F
R0969	A-4F
R0970	A-4F
R0974	B-5F
R0975	A-6F
R0976	A-6H
R0977	B-6G
R0978	A-6F
R0979	B-6D
R0980	B-6D
R0981	B-6D
R0983	B-6F
R0984	B-6F
R0985	B-5F
R0986	B-5F
R0987	A-5G
R0988	B-6F
R0990	A-4G
R0993	B-5F
R0994	B-5F
R0995	B-6D
R0996	B-5F
R0997	A-5A
R0998	A-5A
R0999	B-6G
R1101	B-2D
R1102	B-1D
R1104	B-1D
R1107	B-1C
R1108	B-1C
R1109	B-2C
R1110	B-2C
R1112	B-2C
R1113	B-2C
R1115	B-2C
R1116	B-2C
R1117	A-2C
R1118	B-2C
R1119	B-2F
R1120	B-2D
R1121	B-2C
R1122	B-2C
R1409	A-4E
R1410	B-4E
R1412	A-4E
R1414	A-4E
R1416	B-4D
R1417	B-4D
R1418	A-4D
R1419	B-4D
R1421	B-4D
R1423	A-4D
R1425	A-3D
R1427	B-3D
R1428	B-3D
R1429	B-4C
R1430	B-5D
R1431	B-4D
R1432	B-4E
R1442	B-4F
R1444	B-4F
R1445	B-4F
R1446	B-4F
R1447	B-4F
R1448	B-4F
R1449	B-4F
R2101	A-4G
R2102	B-6C
R2103	B-5F
R2104	B-5D
R2105	B-6D
R2106	B-5D
R2107	B-5C
R2108	B-5C
R2109	A-5C
R2110	A-5C
R2111	B-5D
R2112	B-5D
R2113	B-5D
R2114	B-5F
R2115	B-5F
R2116	B-6D
R2117	B-6D
R2501	B-1C
R2502	A-1C
R2503	A-2B
R2504	B-1B
R2507	B-1C
R2508	B-1C
R2509	B-1B
R2510	B-1B
R2511	B-1B
R2512	B-1A
R2513	A-1A
R2514	A-2A
R2515	A-6B
R2517	A-3A
R2518	B-3A
R2523	A-5B
R2530	B-6A
R2531	B-2A
R2532	B-2A
R2533	B-3A
R2534	B-1B
R2536	B-1B
R2537	A-6A
R2538	B-3A
R2540	B-4A
R2542	A-4B
S	
S2101	A-5C
S2102	A-4G
S2103	A-6C
T	
T0401	A-1F
T0851	A-4H
X	
X0201	A-3D
X0202	A-3D
X0901	A-5F
X0902	A-4F
X1401	A-4F
X1402	A-4F
ZB	
ZB0042	B-4A
ZB0097	B-6C
ZB0135	B-5F
ZD	
ZD0851	A-3H
ZD0861	A-4H
ZD0862	A-5H
ZD0864	A-5H
ZD0901	A-6H
ZD0903	A-5H
ZD2501	A-2A
ZD2502	A-1A

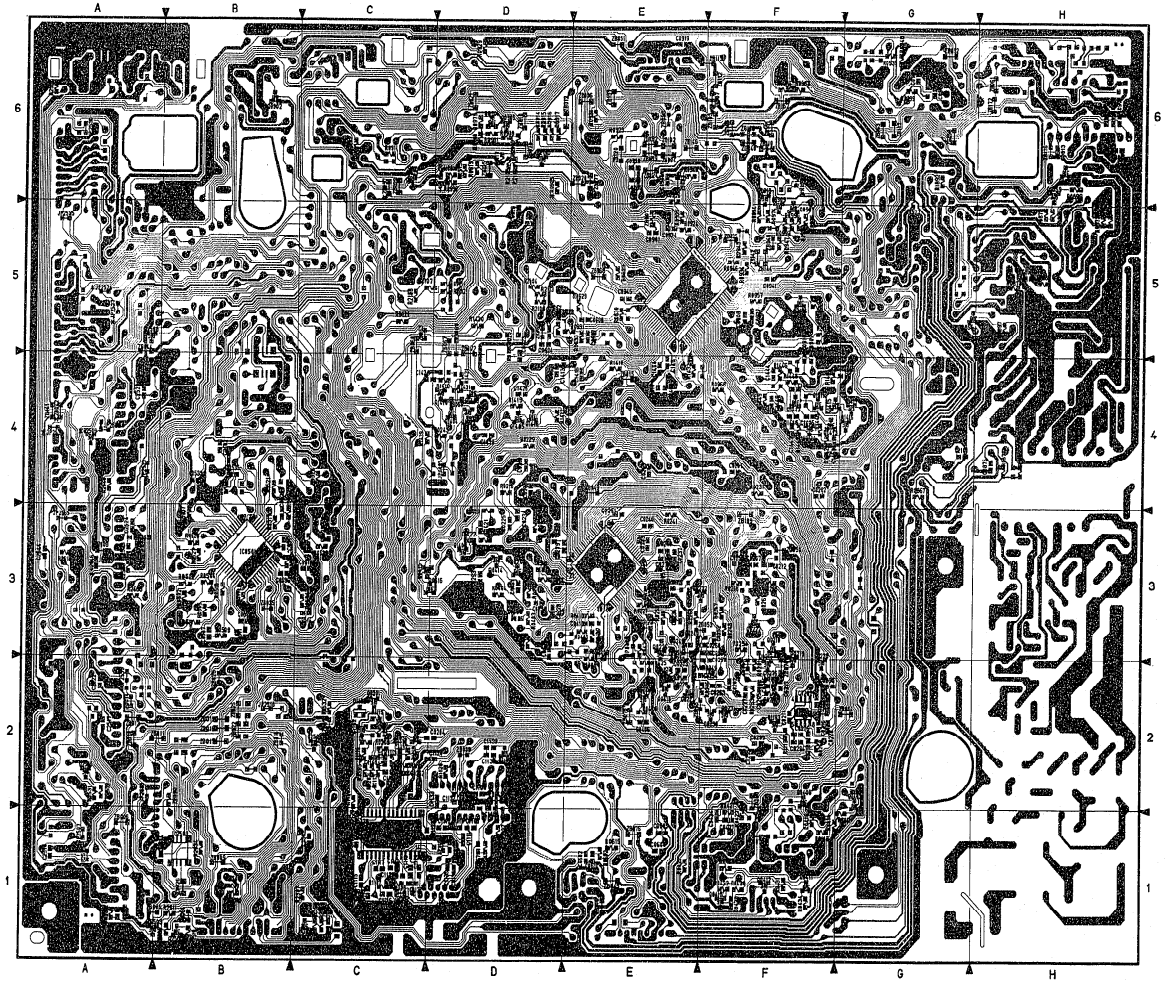
DIFFERENCE TABLE

MAS[MAIN] – SIDE B –

NOTE: This table listes the different components marked with asterisks(*) in the circuit board diagrams.

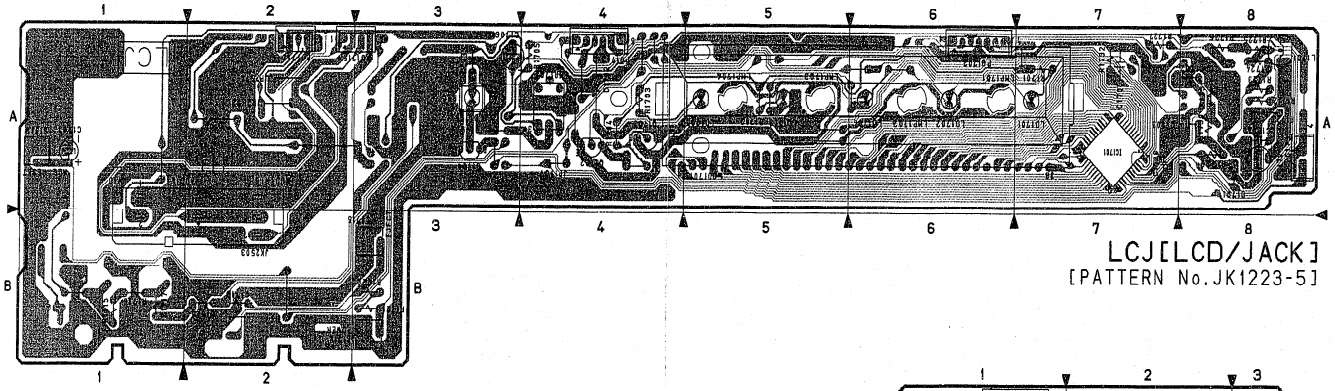
SYMBOL No.	JU	SWNA	HKN
C2546	×	○	○
JP2524	○	×	×
JP2527	×	○	○
JP2585	×	○	○
JP2530	○	×	×
Q2509	×	○	○
R0905	○	×	×
R0988	○	×	×
R0995	×	○	○
ZB042	○	×	×
ZB097	○	×	×
ZB135	○	×	×

MAS CIRCUIT BOARD[SIDE B]

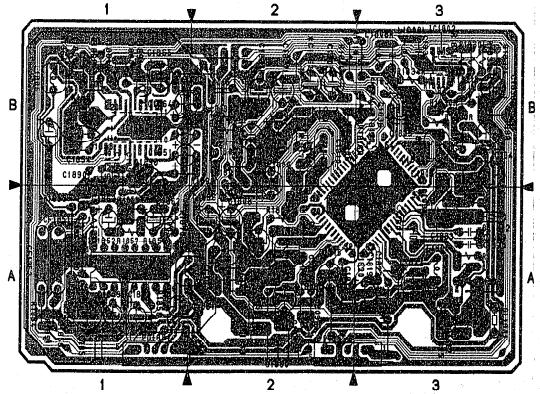


MAS[MAIN] -SIDE B-
[PATTERN No.JA1266-8]

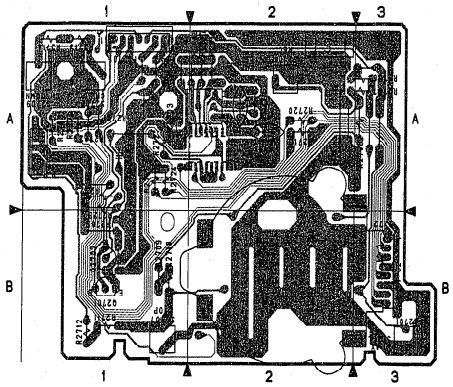
LCJ, N&A, FST CIRCUIT BOARDS



LCJ[LCD/JACK]
[PATTERN No.JK1223-5]



N&A[NICAM & A2]
[PATTERN No.JK1177-4]
(FOR SWNA,HKN)



FST[FRONT/SHUTTLE]
[PATTERN No.JK1223-5]

IDENTIFICATION OF PARTS LOCATION

LCJ [LCD/JACK]

Symbol No.	Parts Location
C	
C1701	8A
C1702	8A
C1703	8A
C1704	8A
C1705	7A
C1706	3A
C1707	1A
C1708	7A
D	
D1701	8A
D1702	4A
IC	
IC1701	7A
IR	
IR1701	4A
JK	
JK2503	2B
L	
L1701	8A
LCD	
LCD1701	5A
LD	
LD1701	7A
LD1702	6A
LD1703	5A
LD1704	6A
LD1705	5A
LD1706	3A
LMP	
LMP1701	6A
LMP1702	6A
LMP1703	5A
LMP1704	5A
PG	
PG1702	6A
PG1703	4A
PG1715	2A
PG1716	2A
PG1731	8A
Q	
Q1702	4A
Q1703	4A
Q1704	3A
R	
R1701	7A
R1702	5A
R1703	4A
R1704	4A
R1705	4A
R1715	1B
R1716	1B
R1717	1B
R1718	2B
R1719	2B
R1720	3B
R1721	3B

Symbol No.	Parts Location
R1722	8A
R1723	8A
R1724	8A
R1725	8A
R1726	8A
R1727	7A
R1728	8A
R1729	8A
R1730	8A
R1731	8A
R1732	7A
R1733	3A
S	
S1714	3B
S1715	3B
S1719	1A

FST [FRONT/SHUTTLE]

Symbol No.	Parts Location
C	
C2701	2A
C2702	2A
C2703	1A
C2704	1A
IC	
IC2701	2A
PG	
PG2701	1A
PG2731	1A
Q	
Q2701	1B
Q2702	1B
R	
R2701	1A
R2702	1A
R2703	1A
R2704	1A
R2706	3A
R2707	3A
R2708	3A
R2709	1B
R2710	1B
R2711	1B
R2712	1B
R2713	1A
R2714	1A
R2715	2A
R2716	2A
R2717	2A
R2718	2A
R2719	2A
R2720	2A
R2721	1A
R2722	1A
R2723	1A
R2724	1A
R2725	1A
R2727	1A
R2728	1A
S	
S2701	3B
S2704	2A
S2707	1B
S2708	1A
S2709	1A
S2721	3B
X	
X2701	2A

N & A [NICAM & A2]

Symbol No.	Parts Location
BL	
BL1801	3A
BL1802	3A
BL1803	2A
C	
C1801	2B
C1802	2B
C1803	2B
C1804	2B
C1805	2B
C1806	2B
C1807	2B
C1808	2A
C1810	2B
C1811	2A
C1812	2A
C1813	3B
C1814	2A
C1815	2A
C1816	2A
C1817	2A
C1818	2A
C1819	3A
C1820	3A
C1821	3A
C1822	3A
C1823	3A
C1824	2A
C1825	3A
C1826	3A
C1828	3A
C1829	3A
C1830	2A
C1831	3A
C1833	3A
C1834	3B
C1835	3B
C1836	3B
C1837L	2B
C1837R	2B
C1838L	3B
C1838R	3B
C1839L	3B
C1839R	3B
C1841	3B
C1842	2A
C1851	1B
C1852	1B
C1853	1B
C1854	1B
C1856	1B
C1857	1A
C1858	1A
C1859	1A
C1860	1A
C1861	1A
C1862	1A

Symbol No.	Parts Location
C1863	1A
C1864	1B
C1865	1B
C1866	2A
C1867	2B
C1881	2A
C1882	2A
C1890	1B
C1891	1B
C1895	1B
C1896	1B
C1897	1B
C1898	1B
C1899	1B
CF	
CF1851	1A
CF1852	1A
D	
D1801	3A
D1802	3A
IC	
IC1801	3A
IC1802	3B
IC1851	1B
IC1852	1A
K	
K0002	1A
K0004	1A
K0005	1A
K0009	1B
K0013	1B
K0014	2B
K0016	2B
L	
L1801	3A
L1802	3B
L1803	3B
L1804	1A
L1805	3A
L1806	1B
L1807	2A
L1808L	3B
L1808R	3B
PG	
PG1851	1A
PG1852	2A
R	
R1801	2B
R1802	2B
R1803	2B
R1804	2B
R1805	2B
R1807	2A
R1808	2A
R1809	2A
R1810	3B
R1811	3A

Symbol No.	Parts Location
R1812	3A
R1813	3A
R1814	2B
R1815	3A
R1816L	2B
R1816R	3B
R1817L	2B
R1817R	3B
R1830L	3B
R1830R	3B
R1831L	3B
R1831R	3B
R1832L	3B
R1832R	3B
R1833L	3B
R1833R	3B
R1834L	3B
R1834R	3B
R1851	1A
R1852	1A
R1853	1A
R1854	1A
R1855	1A
R1856	1A
R1857	1A
R1858	1A
R1860	1B
R1861	1B
R1862	1B
R1863	1B
R1864	1B
R1865	1B
R1870	1A
R1899	1B
X	
X1801	3A
X1851	1B

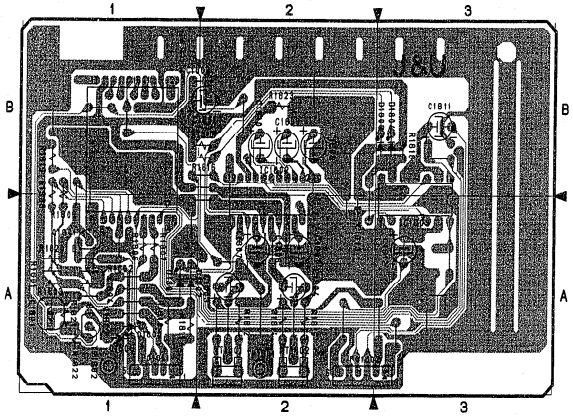
DIFFERENCE TABLE

N & A [NICAM & A2]

NOTE: This table listes the different components marked with asterisks (*) in the circuit board diagrams.

SYMBOL No.	SWNA	HKN
C1851	○	×
C1852	○	×
C1853	○	×
C1854	○	×
C1856	○	×
C1857	○	×
C1858	○	×
C1859	○	×
C1860	○	×
C1861	○	×
C1862	○	×
C1863	○	×
C1864	○	×
C1865	○	×
C1866	○	×
C1867	○	×
C1890	○	×
C1891	○	×
C1895	○	×
C1896	○	×
C1897	○	×
C1898	○	×
C1899	○	×
CF1851	○	×
CF1852	○	×
IC1851	○	×
IC1852	○	×
K002	○	×
K004	○	×
K005	○	×
K009	○	×
K013	○	×
K014	○	×
K016	○	×
L1804	○	×
L1806	○	×
R1816L	○	×
R1816R	○	×
R1851	○	×
R1852	○	×
R1853	○	×
R1854	○	×
R1855	○	×
R1856	○	×
R1857	○	×
R1858	○	×
R1860	○	×
R1861	○	×
R1862	○	×
R1863	○	×
R1864	○	×
R1865	○	×
R1870	○	×
R1899	○	×
X1851	○	×

J&U CIRCUIT BOARD



J&U[MPX AUDIO]
[PATTERN No.JK1245-2]
(FOR JU)

J & U [MPX AUDIO]

Symbol No.	Parts Location
C	
C1801	2B
C1802	2B
C1803	2A
C1804	2A
C1805	2A
C1806	2A
C1807	2A
C1808	2B
C1809	2B
C1810	2B
C1811	3B
C1812	3A
C1813	2A
D	
D1801	1A
D1802	1A
D1803	3B
D1804	3B
D1805	1A
D1806	1A

Symbol No.	Parts Location
IC	
IC1801	1B
IC1802	2A
IC1803	3A
L	
L1801	1A
PG	
PG1801	1A
PG1802	2A
Q	
Q1801	1A
Q1802	1A
R	
R1801	1A
R1802	1A
R1803	1A
R1804	1A
R1806	1A
R1807	1A
R1808	1B
R1809	1B

Symbol No.	Parts Location
R1810	1A
R1811	1A
R1812	2A
R1814	2A
R1815	2A
R1816	2B
R1817	2B
R1818	3B
R1819	1B
R1820	1A
R1821	1A
R1822	1A
R1823	2B
RT	
RT1801	2A
RT1802	2A
TP	
TP1801	2A
TP1802	1A

CHAPTER 7 TROUBLE DISPLAY, BLOCK DIAGRAMS AND MICROPROCESSOR PIN FUNCTION TABLES

1. Trouble Display Function

This VCR has a function which displays mechanism malfunctions, etc. in the LCD display. Use this function to analyze the cause when the power is shut off due to a malfunction, etc. in the mechanism.
Two types of information are displayed, ① The operation mode when the malfunction has occurred, ② Malfunction Code No.

Procedure to display a malfunction

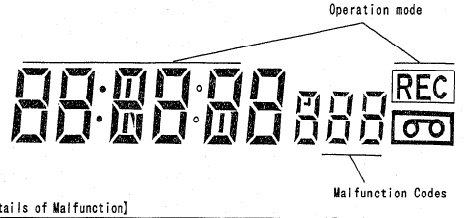
Press the "CHANNEL ▼" button on the VCR when the power is turned off and hold it; the malfunction code number is displayed while the button is held depressed.

Procedure to clear the malfuntion display

Press the "REC" button on the VCR and hold it, then press the microprocessor "RESET" button to initialize the trouble display.
REC button must be hold untill LCD display appear the --:--.

The details of the malfunction are displayed as follows.

LCD DISPLAY



[Display of Details of Malfunction]

Displayed No.	Item	Details
"00"	No malfunction	
"01"	PL mechanism lock	Malfunction in insertion/ejection of cassette
"02"	Capstan lock	Malfunction of capstan motor drive during tape unloading
"04"	Reel lock	Reel rotation trouble when tape is running
"05"	Cylinder lock	Cylinder rotation malfunction
"07"	Loading mechanism lock	Malfunction in shifting mechanism mode
"16"	Servo lock	Shorting of 5V detected

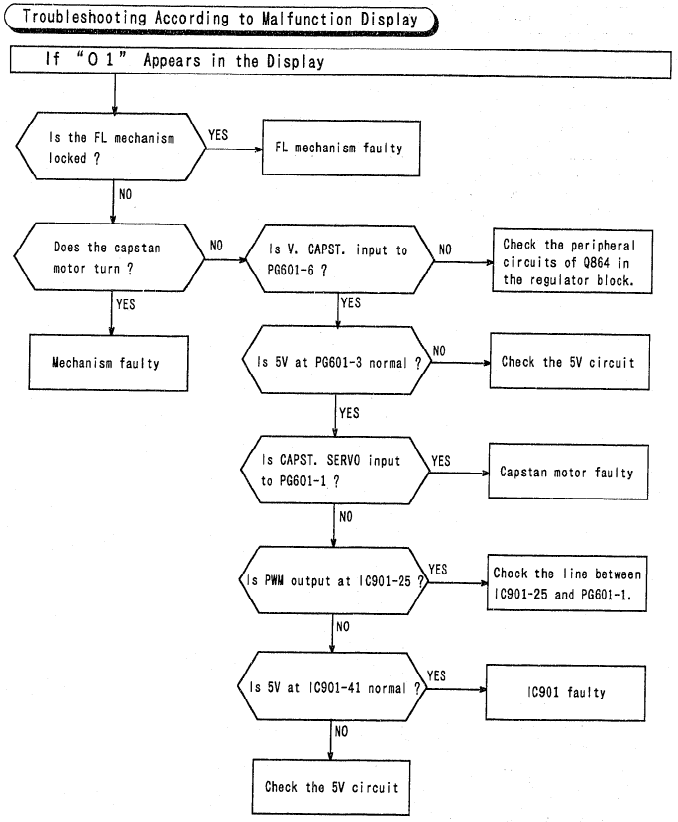
[Mode Display When Malfunction Has Occurred]

Mode	Display	Mode	Display
Stop	No display	Playback	PLAY
Fast forward	FF	Reverse playback	-PLAY
Rewind	REW	Forward search	SRCH
Recording	REC	Reverse search	-SRCH
Recording pause	REC (flashes)	Slow motion play	SLOW
Hight speed fast forward	S:FF	Reverse motion slow play	-SLOW
Hight speed rewind	S:REW	Still motion play	STILL

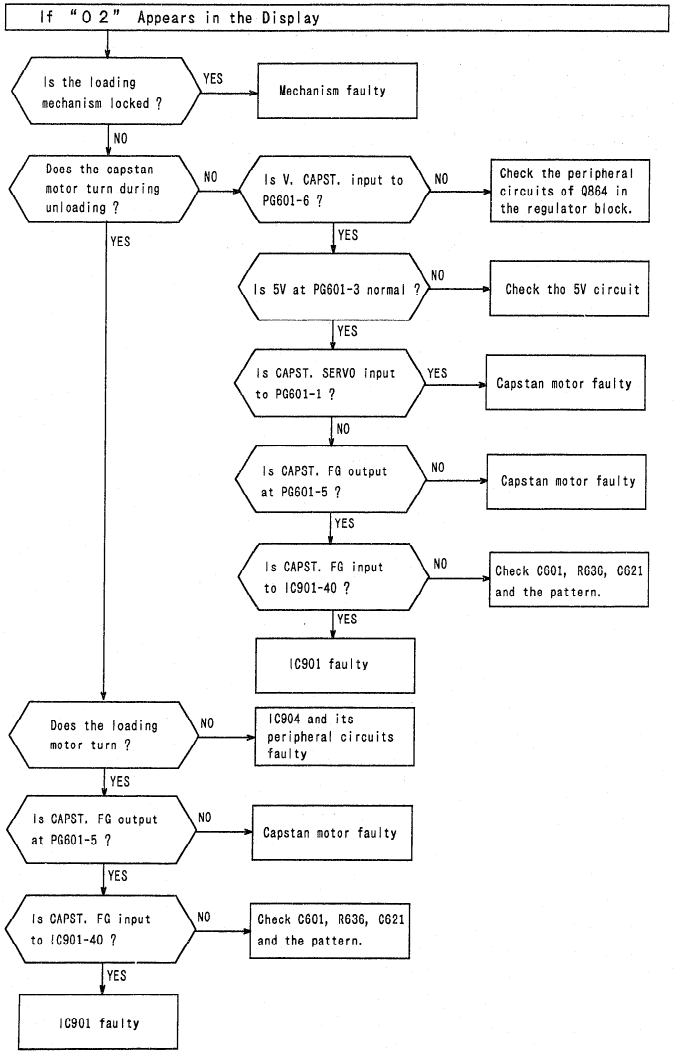
No symbols are displayed if the malfunction occurred when a cassette was inserted or ejected, or the power was switched on from off, and off from on.

Troubleshooting According to Malfunction Display

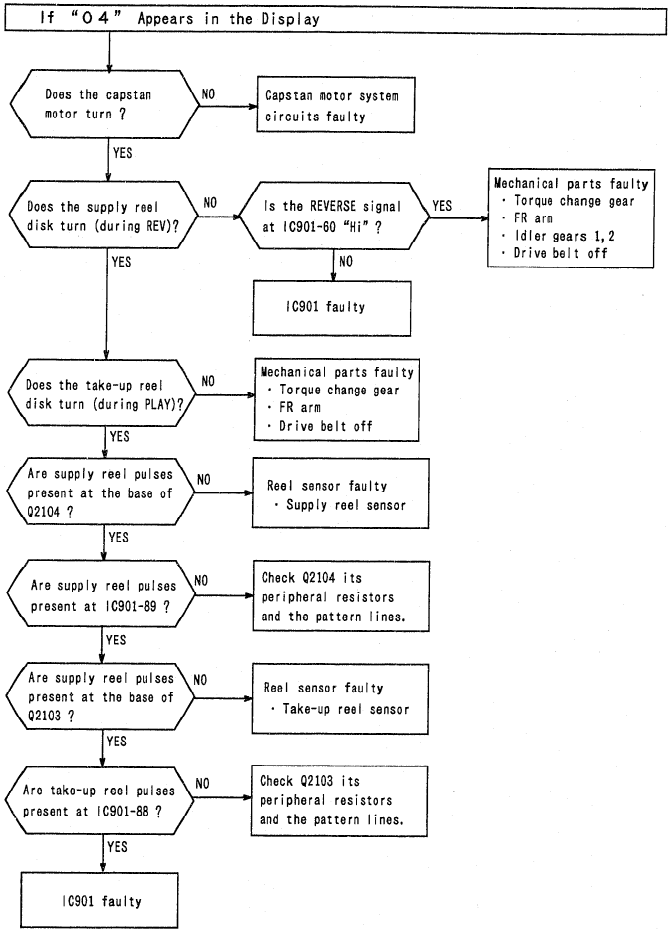
If "01" Appears in the Display



If "02" Appears in the Display

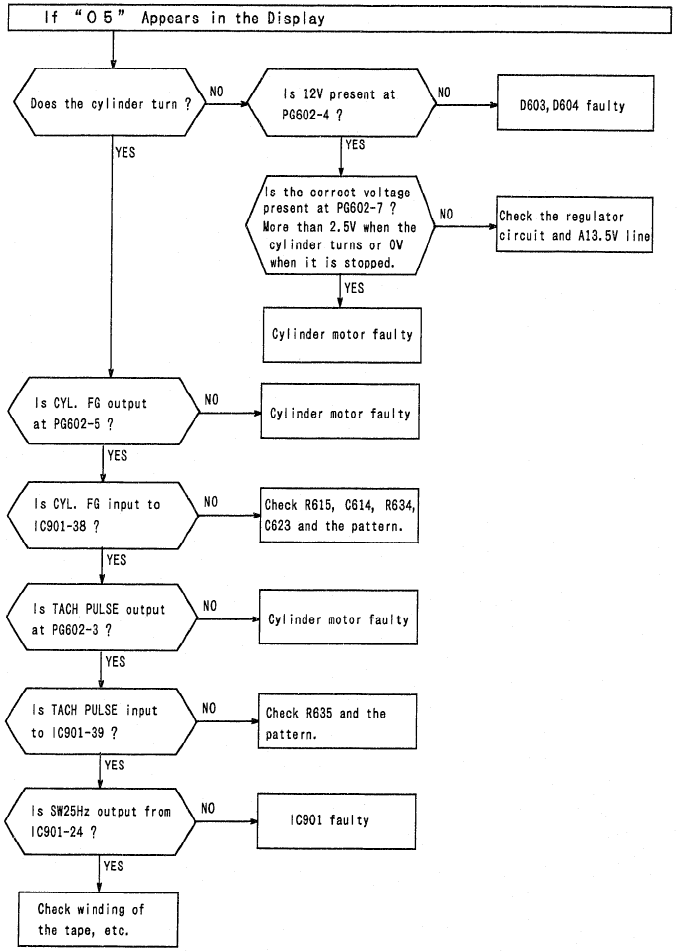


If "04" Appears in the Display

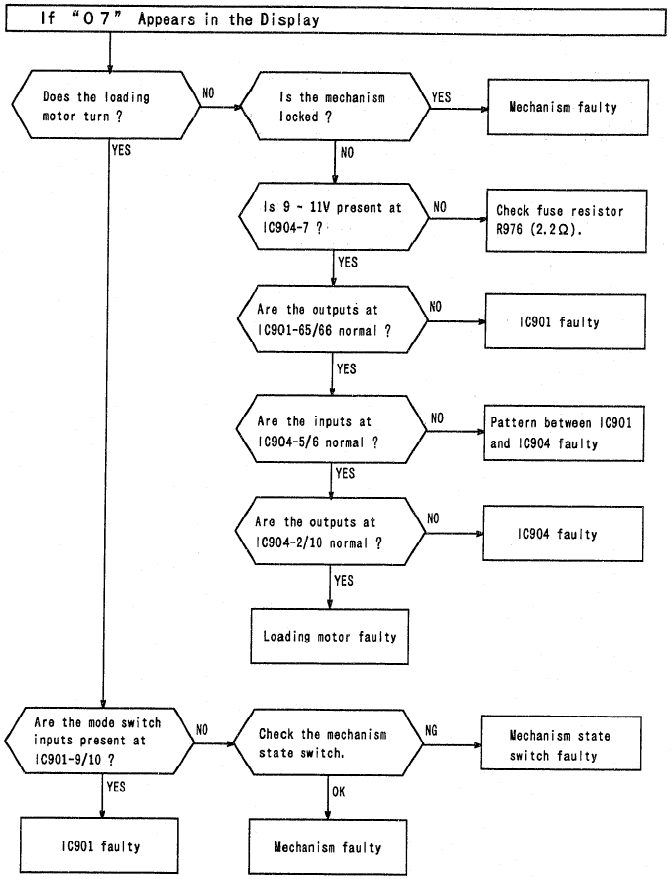


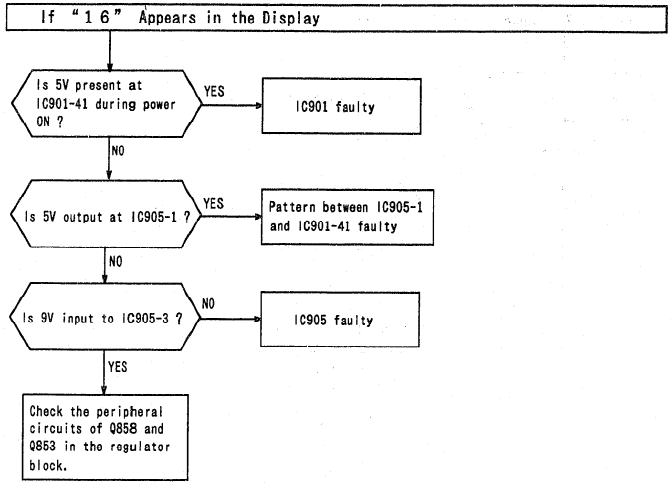
Note: The cylinder system has priority. If the cylinder motor is not driven normally, the capstan motor will not be driven.

If "05" Appears in the Display

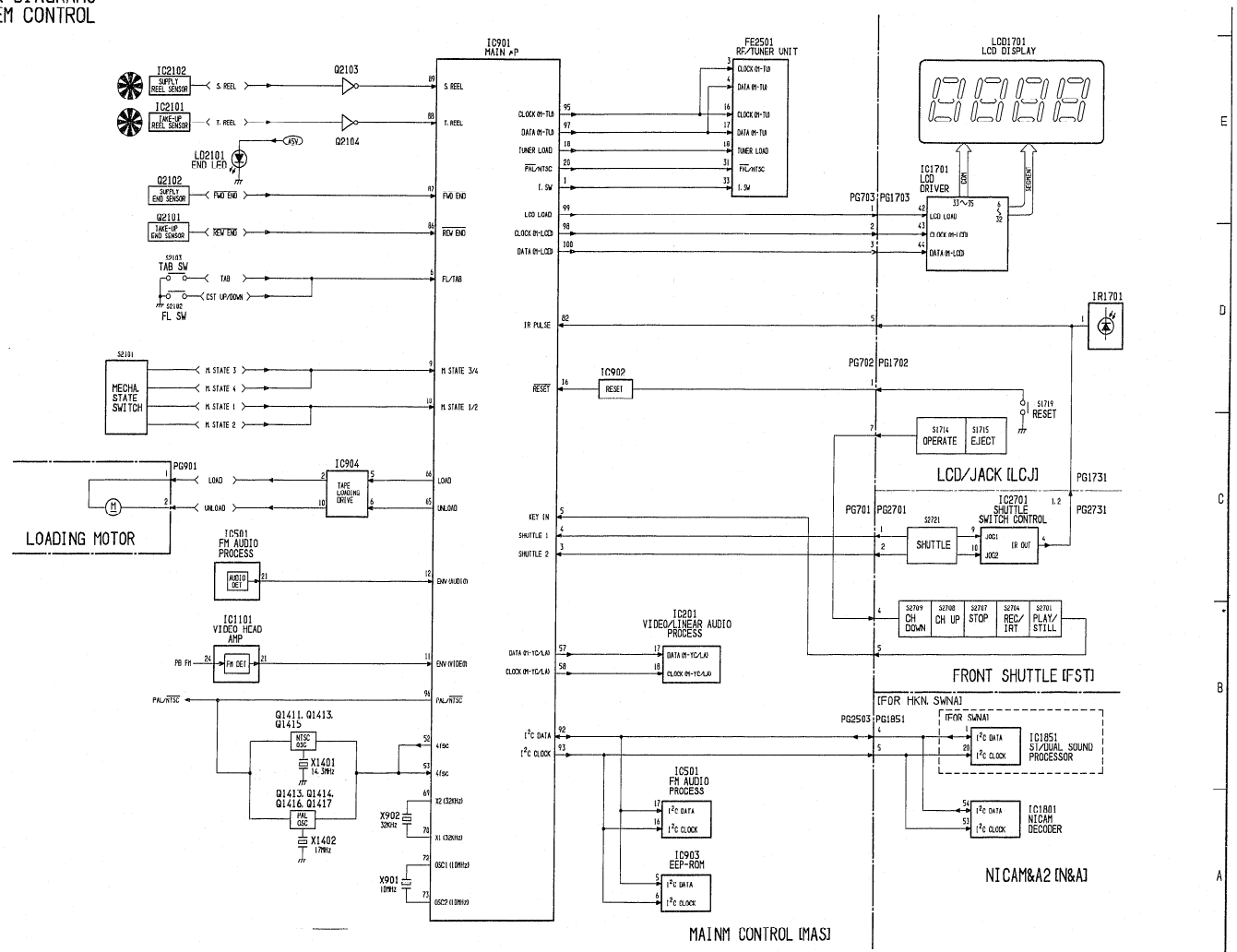


If "07" Appears in the Display

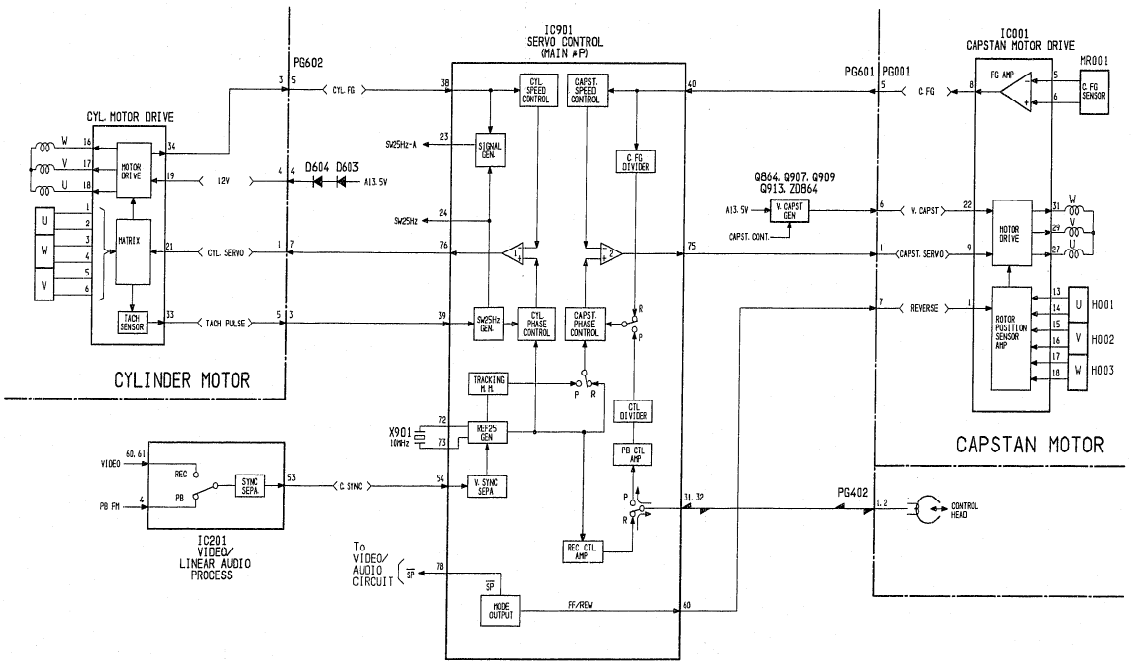



If "16" Appears in the Display
Is 5V present at IC901-41 during power ON ?
YES
IC901 faulty
NO
Is 5V output at IC905-1 ?
YES
Pattern between IC905-1 and IC901-41 faulty
NO
Is 9V input to IC905-3 ?
NO
IC905 faulty
YES
Check the peripheral circuits of Q858 and Q853 in the regulator block.

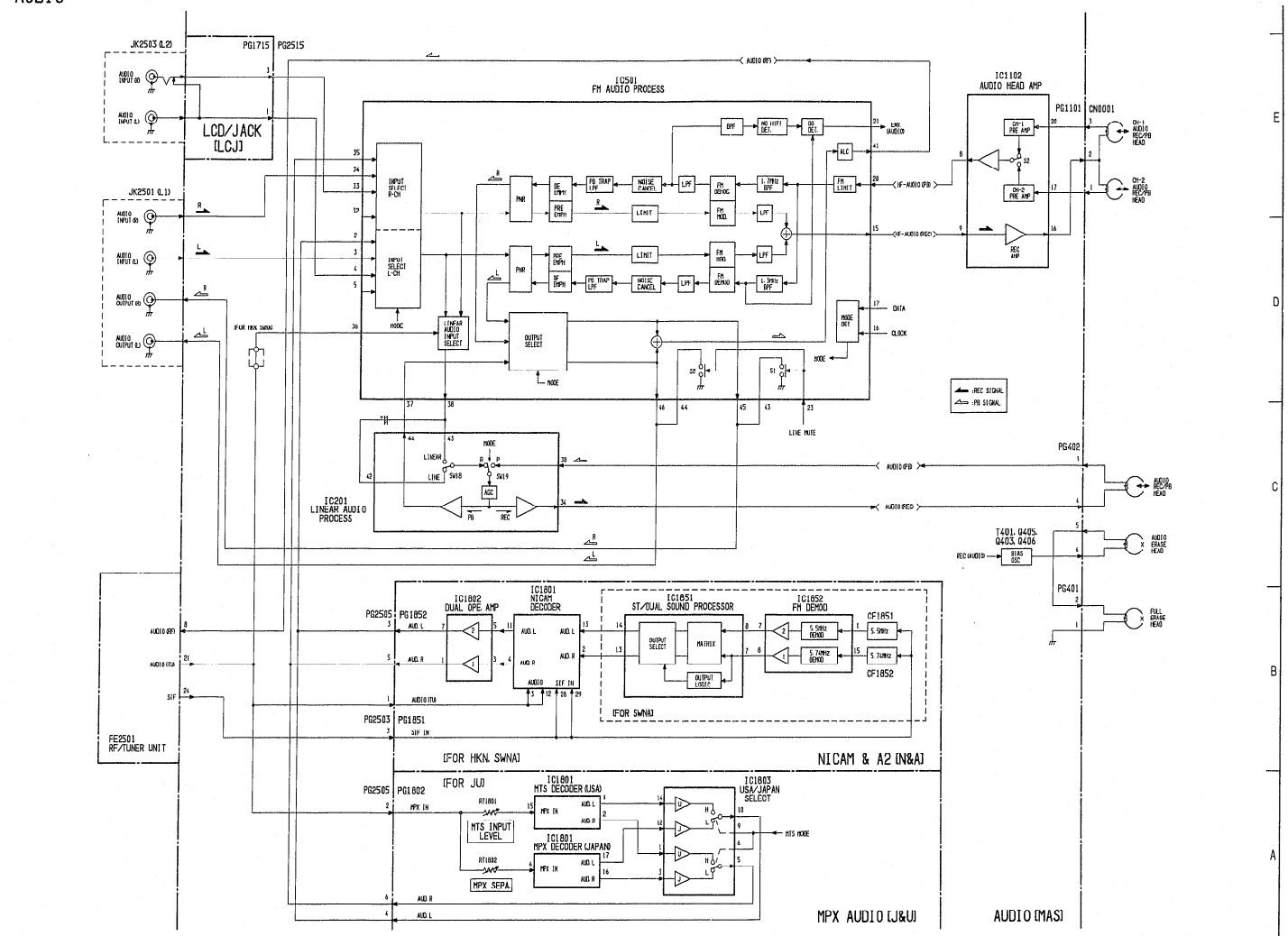
2. BLOCK DIAGRAMS
SYSTEM CONTROL



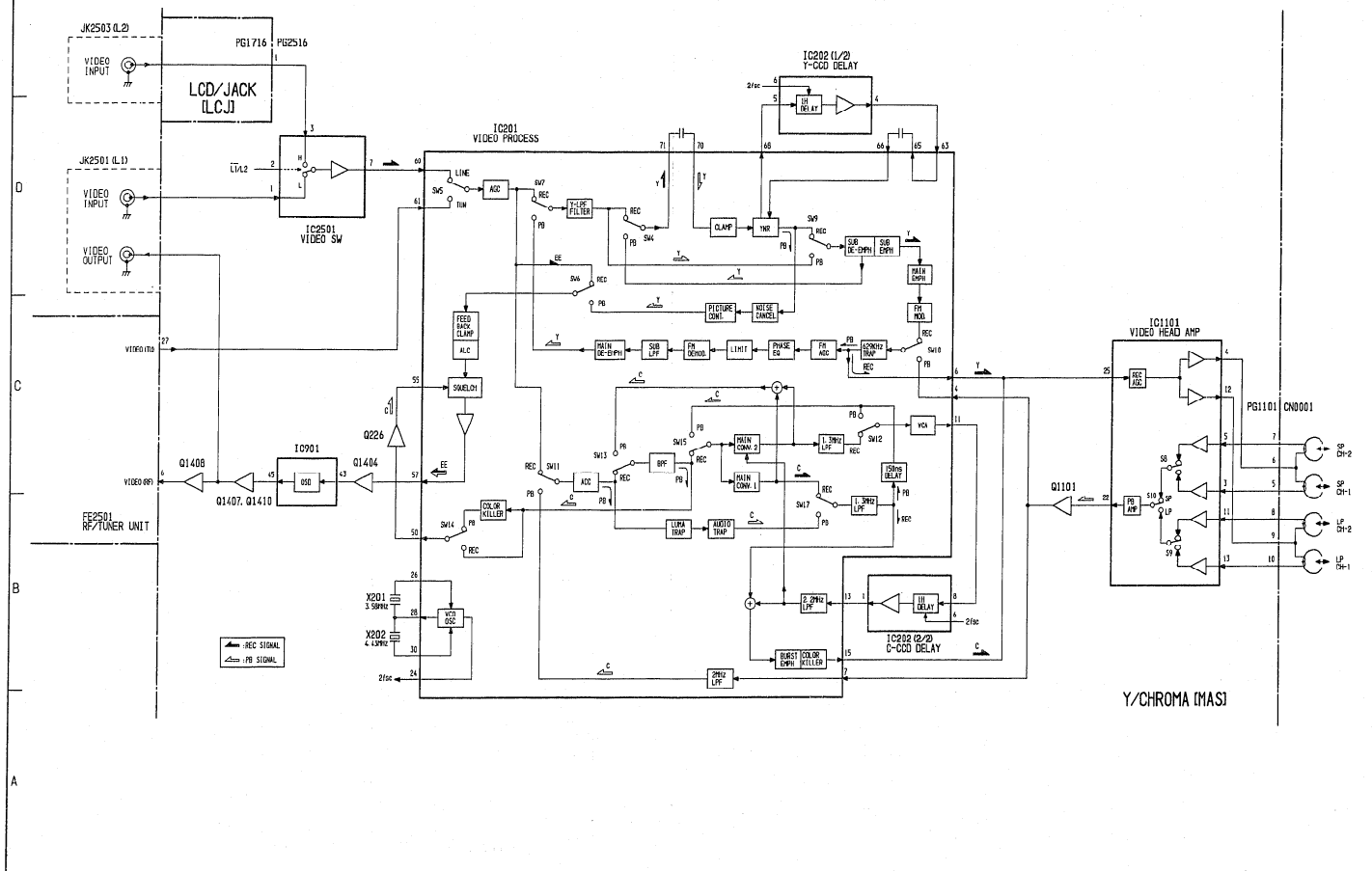
SERVO


IC901
SERVO CONTROL
(MAIN μP)
PG602
CYL. MOTOR DRIVE
CYLINDER MOTOR
CYL. FG
SW25Hz-A
SIGNAL GEN.
CYL. SPEED CONTROL
CAPST. SPEED CONTROL
C FG DIVIDER
D604 D603
12V
A13.5V
SW25Hz
CYL. SERVO
TACH PULSE
SW25Hz GEN.
CYL. PHASE CONTROL
CAPST. PHASE CONTROL
TRACKING M. M.
X901 10MHz
MULT25 GEN.
CTL DIVIDER
PG CTL AMP
REC CTL AMP
V. SYNC SEPA.
C. SYNC
SYNC SEPA.
IC201
VIDEO/
LINEAR AUDIO
PROCESS
To VIDEO/ AUDIO CIRCUIT
MODE OUTPUT
FF/REW
PG601 PG001
C. FG
Q864, Q907, Q909
Q913, ZD864
A13.5V
V. CAPST GEN.
CAPST. CONT.
V. CAPST
CAPST. SERVO
REVERSE
PG402
CONTROL HEAD
IC001
CAPSTAN MOTOR DRIVE
MR001
FG AMP
C. FG SENSOR
MOTOR DRIVE
ROTOR POSITION SENSOR AMP
H001
H002
H003
CAPSTAN MOTOR
MAIN CONTROL [MAS]

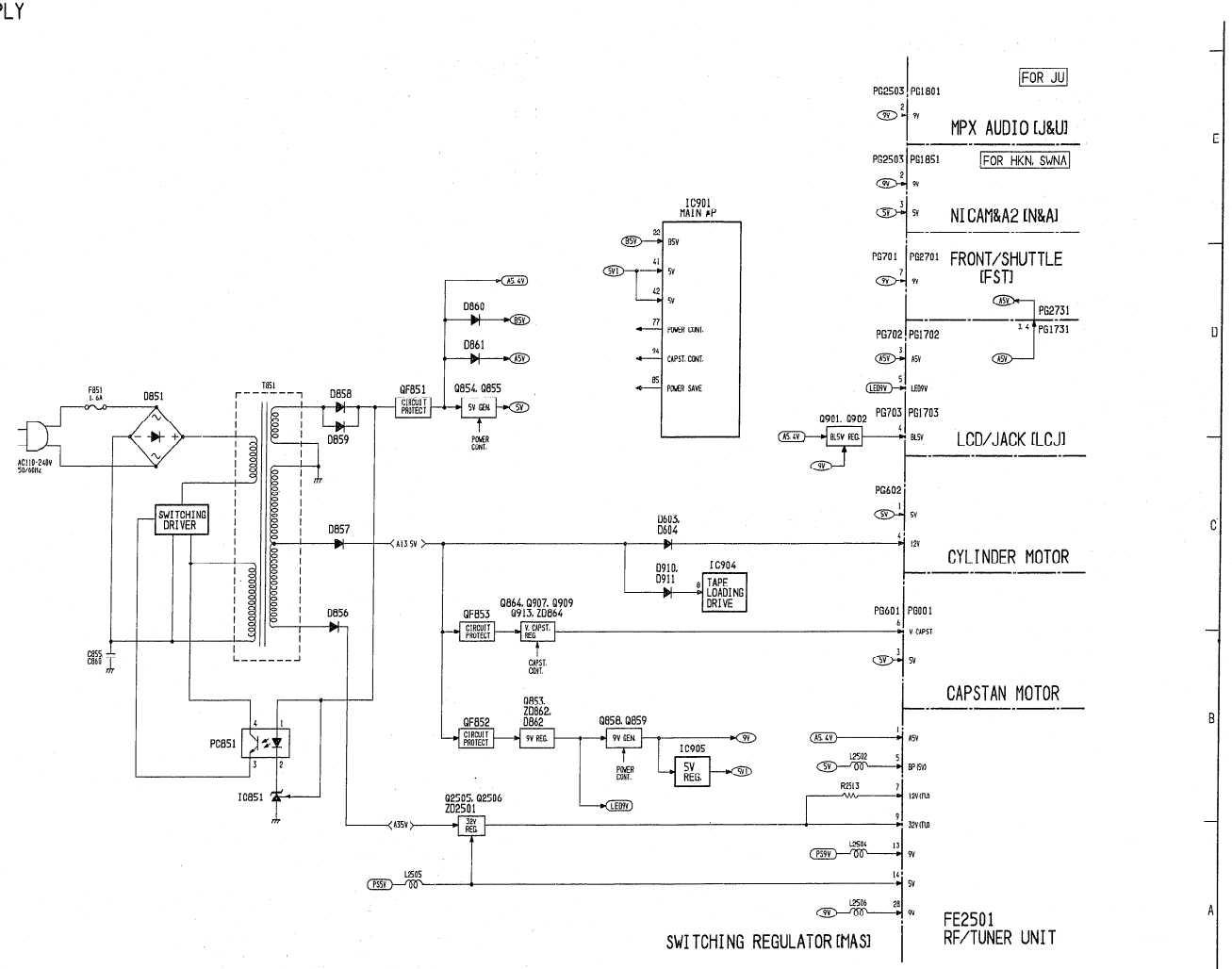
AUDIO


JK2503 (L2)
JK2501 (L1)
PG1715
PG2515
LCD/JACK (LCJ)
IC501
FM AUDIO PROCESS
IC1102
AUDIO HEAD AMP
PG1101
CN0001
IC201
LINEAR AUDIO PROCESS
PG402
PG401
T401, Q405, Q403, Q406
IC1802
DUAL OPE AMP
IC1801
NICAM DECODER
IC1851
ST/DUAL SOUND PROCESSOR
IC1852
FM DEMOD
CF1851
CF1852
PG2505
PG1852
PG2503
PG1851
FE2501
RF/TUNER UNIT
(FOR HKN, SWNA)
NICAM & A2 (N&A)
(FOR JU)
IC1801
MTS DECODER (USA)
IC1801
MPX DECODER (JAPAN)
IC1803
USA/JAPAN SELECT
MTS INPUT LEVEL
MPX SEPA.
MTS MODE
MPX AUDIO (J&U)
AUDIO (MAS)
REC SIGNAL
PB SIGNAL

VIDEO


JK2503 (L2)
VIDEO INPUT
JK2501 (L1)
VIDEO INPUT
VIDEO OUTPUT
PG1716 PG2516
LCD/JACK [LCJ]
IC2501 VIDEO SW
IC201 VIDEO PROCESS
IC202 (1/2) Y-CCD DELAY
IC202 (2/2) C-CCD DELAY
IC1101 VIDEO HEAD AMP
PG1101 CN0001
IC0901
Q1408
Q1407, Q1410
Q1404
Q226
Q1101
FE2501 RF/TUNER UNIT
X201 3.58MHz
X202 4.43MHz
:REC SIGNAL
:PB SIGNAL
Y/CHROMA [MAS]

POWER SUPPLY



3. MICROPROCESSOR PIN FUNCTION TABLE

LCD DRIVER µP (IC1701)

Pin No.	I/O	Active Level	Abbreviation	Function
1	–	–	SEGMENT (1)	Not used.
2	–	–	SEGMENT (2)	
|	|	|	|	
5	–	–	SEGMENT (5)	
6	O	Pulse	SEGMENT (6)	LCD segment control outputs.
7	O	Pulse	SEGMENT (7)	
|	|	|	|	
31	O	Pulse	SEGMENT (31)	
32	O	Pulse	SEGMENT (32)	
33	O	Pulse	COM1	LCD common (COM) control outputs.
34	O	Pulse	COM2	
35	O	Pulse	COM3	
36	I	Lo	RESET (L)	Initializes the LCD-µP when power is supplied.
37	I	Hi	VDD	A5V power input.
38	I	–	VDD 1	LCD drive bias.
39	I	–	VDD 2	LCD drive bias.
40	–	Lo	VSS	Ground.
41	I/O	–	OSC	Generates a 32kHz signal for key scanning.
42	I	Lo	LCD LOAD	LOAD signal between the LCD-µP and M-µP. "Lo" input enables chip select.
43	I	Pulse	CLOCK (M-LCD)	The data is transferred from the M-µP, synchronized with the clock signal.
44	I	Pulse	DATA (M-LCD)	

MAIN µP (IC901)

Pin No.	I/O	Active Level	Abbreviation	Function
1	O	Hi	I SW	Tuner sound mode switching (I mode/GK mode)
2	–	–	GND	Ground.
3	I	A/D	SHUTTLE 2	Inputs from the shuttle dial switches. The shuttle speed and direction are determined.
4	I	A/D	SHUTTLE 1	
5	I	A/D	KEY IN	Key matrix input.
6	I	A/D	FL/TAB	Cassette position/erase prevention tab detection input. Hi: TAB SW OFF (with tab), Mid: TAB SW ON (without tab), Lo: When cassette is being inserted/ejected. When a cassette without its erase prevention tab is inserted, recording is inhibited, and when the timer is programmed, it is ejected automatically.
7	I	Lo	POWER STOP	When A5V voltage drops and "Lo" is input, the M-µP detects that a power failure has occurred.
8	I	M	S-CURVE	Detects the AFT (S-CURVE) signal from the IF unit to fine tune to a station.
9	I	A/D	M. STATE 3/4	The signals which detect the mechanism state are input to control the loading motor.
10	I	A/D	M. STATE 1/2	

Pin	EJECT	UNLOAD	REV.	R.SLOW	SLOW	R/P	STOP2	FF/REW
9	0	2.5	1.8	2.5	3.05	3.05	2.5	0
10	1.8	3.05	0	0	0	1.8	2.5	3.05

11	I	A/D	ENV. (VIDEO)	Video envelope level inputs for autotracking.
12	I	A/D	ENV. (AUDIO)	Audio envelope level inputs for autotracking.
13	I	A/D	MTS MODE	Model switching control.
14	I	A/D	NO AUDIO	Japan/USA sound multiplex discrimination input.
15	I	–	A5V	Connected to A5V.
16	I	Lo	RESET (L)	Initializes the M-uP when power is supplied.
17	I	Hi	MONO SET	Forced monaural output when a USA sound multiplex program is received.
18	O	Hi	TUNER LOAD	A data line is provided between the M-µP and U/V tuner and the µP sets the LOAD pin to "Hi" when transferring data and holds it until transfer is completed.
19	O	Lo/Hi	L1 (L) / L2	L1 / L2 switching control signal output.
20	O	Lo/Hi	PAL/NTSC SW	Tuner video/audio output switching signal.
21	I	Hi	MESECAM DET	"Hi" is input when a MESECAM signal is detected.
22	I	–	B5V	Connected to B5V.
23	O	Pulse	SW25Hz-A	Head switching pulse output for audio circuits.
24	O	Pulse	SW25Hz	Head switching pulse output.
25	O	PWM	CAPST. PWM	Cylinder and capstan motor servo control outputs.
26	O	PWM	CYL. PWM	
27	O	Hi	V.PULSE	Artificial V sync signal for trick play.
28	O	Pulse	C. ROTARY	Chroma rotation control signal.
29	O	Hi/Lo	H. AMP SW	SP/EP head switching control signal (pulse during trick play).
30	I	Hi/Lo	COMP	SP/EP head switching control signal (pulse during trick play).
31	I/O	Pulse	CTL (+)	CTL signal input/output.
32	I/O	Pulse	CTL (–)	
33	–	–	GND	Ground.
34	I	Pulse	CTL AMP 1	CTL amp inputs.
35	I	Pulse	CTL AMP 2	
36	I	Pulse	CTL AMP 3	
37	O	Pulse	CTL AMP (O)	CTL amp output.
38	I	Pulse	CYL.FG	Cylinder FG (CYL.FG) pulse input. Controls the cylinder speed during recording and playback.
39	I	Pulse	TACH PULSE	Tach pulse input. Comparison (feedback) signal which controls the recording cylinder phase.

Pin No.	I/O	Active Level	Abbreviation	Function
40	I	Pulse	CAPST.FG	Capstan FG (CAPST.FG) pulse input. Used to control the capstan motor.
41	I	–	5V	Connected to 5V.
42	I	–	5V	Connected to 5V.
43	I	–	C.VIDEO	Video signal input.
44	O	–	V.REF	Reference bias/clamp bias voltage.
45	O	–	C.VIDEO OUT	Video signal output.
46	–	–	CHARA. BIAS	Not used.
47	–	–	AFC LPF	An LPF is attached externally for AFC.
48	–	–	AFC OSC	Oscillator for AFC.
49	–	–	GND	Ground.
50	I	Pulse	DOSC IN	OSD dot clock oscillator.
51	O	Pulse	DOSC OUT	
52	O	–	4fsc (7.16MHz)	These generate a 14.3 MHz (NTSC)/17.7 MHz (PAL) signal as the clock signal for the OSD.
53	I	–	4fsc (7.16MHz)	
54	I	Pulse	C.SYNC	Composite sync signal input. Controls the cylinder speed during recording.
55	O	Hi	BLUE BACK	Blue background control signal output.
56	O	Hi	HIFI MUTE	Hi-Fi audio muting control output during recording.
57	O	Pulse	DATA (M-YC/LA)	Common communication lines with VIDEO/LINEAR AUD. ICs; data is transferred, synchronized with the clock signal.
58	O	Pulse	CLOCK (M-YC/LA)	
59	O	Lo	PB (L)	Sets the video/audio circuits to the playback mode.
60	O	Hi	REVERSE	Sets the drive direction of the capstan motor to reverse.
61	O	Hi	REC (AUDIO)	Sets the audio circuit to the recording mode.
62	O	Pulse	CTL RESET	Applies reset pulses to the CTL amp during slow and reverse slow play.
63	I	Lo	COPY GUARD	Lo: Copy guard ON. Hi: Copy guard OFF.
64	O	Pulse	RF LOAD	RF converter enable.
65	O	Hi	UNLOAD	Loading motor drive signals which set the mechanism to the commanded mode.
66	O	Hi	LOAD	
67	I	Lo	CK DET	Video colour killer signal (Hi: Colour killer on, Lo: Colour killer off)
68	–	–	TEST	Ground.
69	I	–	X2 (32kHz)	These generate a 32.768kHz signal as the clock signal for the VCR's clock.
70	O	–	X1 (32kHz)	
71	–	–	GND	Ground.
72	I	–	OSC 1 (10MHz)	These generate a 10MHz signal as the system clock signal in modes other than back-up.
73	O	–	OSC 2 (10MHz)	
74	O	Hi	LINE MUTE	Audio output muting control.
75	O	Hi/Lo	CAPST. Q.R	Cylinder and capstan motor phase control outputs.
76	O	Hi/Lo	CYL. Q.R	
77	O	Hi	POWER CONT	Power on/off control. When the power switch is operated, a cassette is inserted or a power failure is detected, the internal power supply is switched to be on/off.
78	O	Lo	SP (L)	Tape speed output.
79	I	Hi	V. REC MUTE	Video signal record muting control. Prevents the signal from being supplied to the video heads.
80	O	Lo	LM. CONT	Loading motor drive voltage control.
81	O	Hi	MPX MUTE	Tuner audio muting control.
82	I	Pulse	IR PULSE	Receives the remote control code from the infrared receiver and sets the VCR to the specified mode. AV BUS data input.
83	O	Hi	3.58/4.43	Colour filter switching. "Hi" when a 3.58NTSC signal is input, "Lo" when a 4.43NTSC signal is input.
84	O	Hi	REC	Sets the video and audio head amp circuits to the recording mode.

Pin No.	I/O	Active Level	Abbreviation	Function
85	I	Hi	G-CODE	"Hi" is input with models which can handle G-CODE programming and "Lo" is input for the other models.
86	I	Lo	REW END (L)	When "Lo" is input from the mechanism sensor, the current mode is released. Two sensors detect the two ends of tape. When "Lo" is input from both sensors, the M-μP detects that a cassette is not loaded in the VCR.
87	I	Lo	FWD END (L)	
88	I	Pulse	T.REEL	Calculates the period of the take-up reel pulse to detect whether or not slack tape is taken up on the reel. If slack tape is not taken up, the M-μP stops the mechanism. The supply reel pulses are used with the take-up reel pulses to calculate the tape remaining time.
89	I	Pulse	S.REEL	
90	I	Lo	CHECK	Checks short-circuits in the 5V/9V power supplies. (This pin goes "Lo" normally when power is off.)
91	O	Hi	ST/SAP OUT	Output to control the MTS decoder so it is set to the SAP mode.
92	I/O	Pulse	DATA (M-ROM/HA)	Common communication lines with the ROM/Hi-Fi AUD.; data is communicated, synchronized with the clock signal.
93	O	Pulse	CLOCK (M-ROM/HA)	
94	O	Hi/Mid/Lo	V. CAPST. CONT.	This is output in the slow, still, playback, recording, fast forward and rewind modes to control the voltage applied to the capstan motor. Lo: 13.5V, Mid: 9.5V, Hi: 7.5V.
95	O	Pulse	CLOCK (M-TU)	Communication lines with the U/V TUNER; data is transferred, synchronized with the clock signal.
97	O	Pulse	DATA (M-TU)	
96	O	Hi/Lo	PAL/$\overline{\text{NTSC}}$	NTSC/PAL control signal (when an NTSC signal is detected: "Lo", when a PAL signal detected: "Hi")
98	O	Pulse	CLOCK (M-LCD)	Communication lines with the LCD DRIVER; data is transferred, synchronized with the clock signal.
100	O	Pulse	DATA (M-LCD)	
99	O	Hi	LCD LOAD	LOAD signal between the M-μP and LCD-DRIVER.

4. Troubleshooting the Switching Regulator

This section summarizes the troubleshooting of defects in the switching regulator. Perform diagnosis, taking each defective phenomenon into consideration. Even if the same defective phenomenon appears, it may be caused by other circuits, not by the switching regulator, so use this item as a reference.

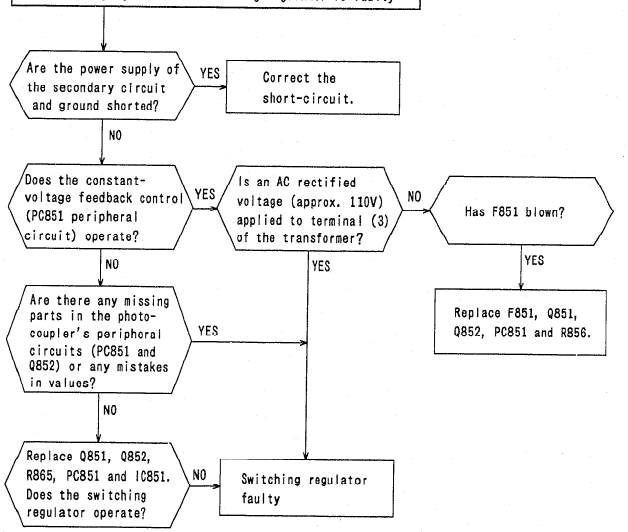
Cautions when checking and repairing the switching regulator circuit

When using test equipment to check the primary circuit (circuit No. 8XX) of the power supply, use a two-pole AC outlet for the test equipment. If a three-pole AC outlet (which is connected to ground) is used, the circuits could be broken. (Attach a conversion adapter to the test equipment plug to connect it to a three-pole outlet).

Be careful of electric shock

A heat sink which generates a high voltage is provided with Q861 in the switching regulator block. "HIGH VOLTAGE" is printed on the heat sink. Take great care of this section when servicing or handling the VCR when it is turned on.
(Supplement: The heat sinks of Q853 and Q864 do not generate a high voltage.)

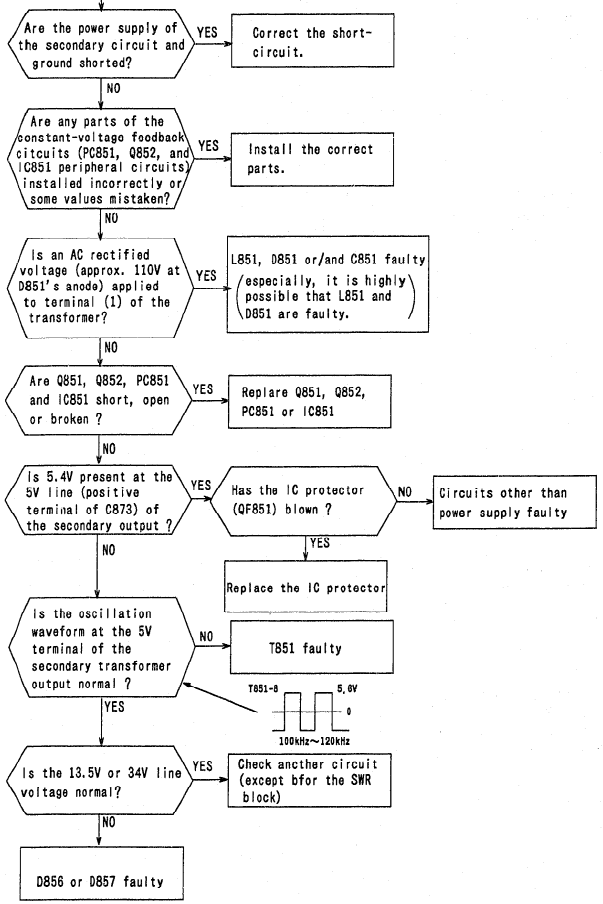
Method to judge that the switching regulator is faulty



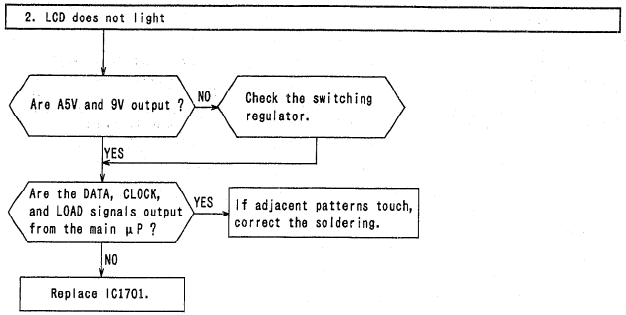
Troubleshooting by Observing Defective Phenomena

If the switching regulator is normal and there is a defect in another circuit (shorting between the power supply and ground of the secondary circuit), the protector circuit operates and the power is not turned on. If a defect occurs in the switching regulator, a phenomenon such that the VCR power is not turned on or the power fuse has blown also occurs.

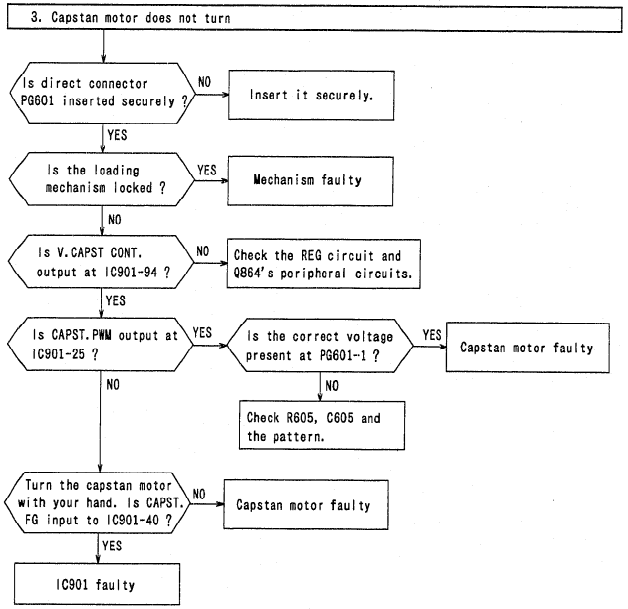
1. Power is not turned on



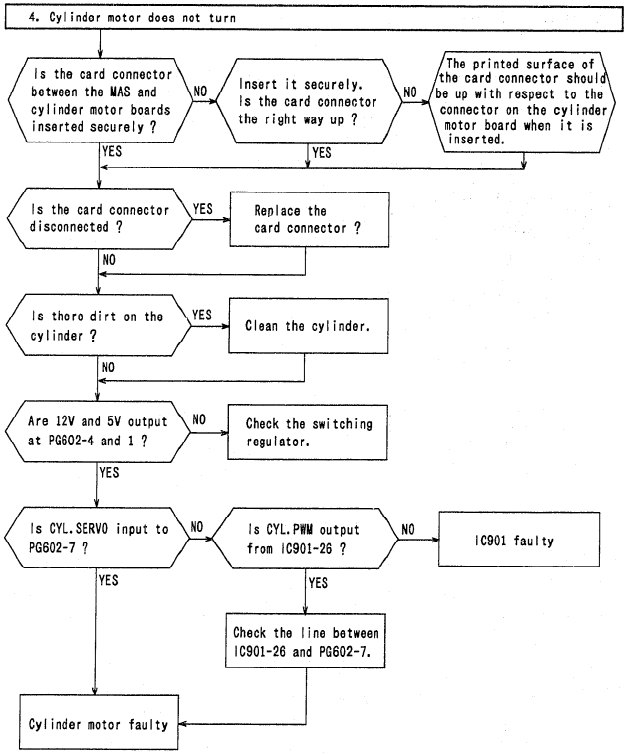
2. LCD does not light



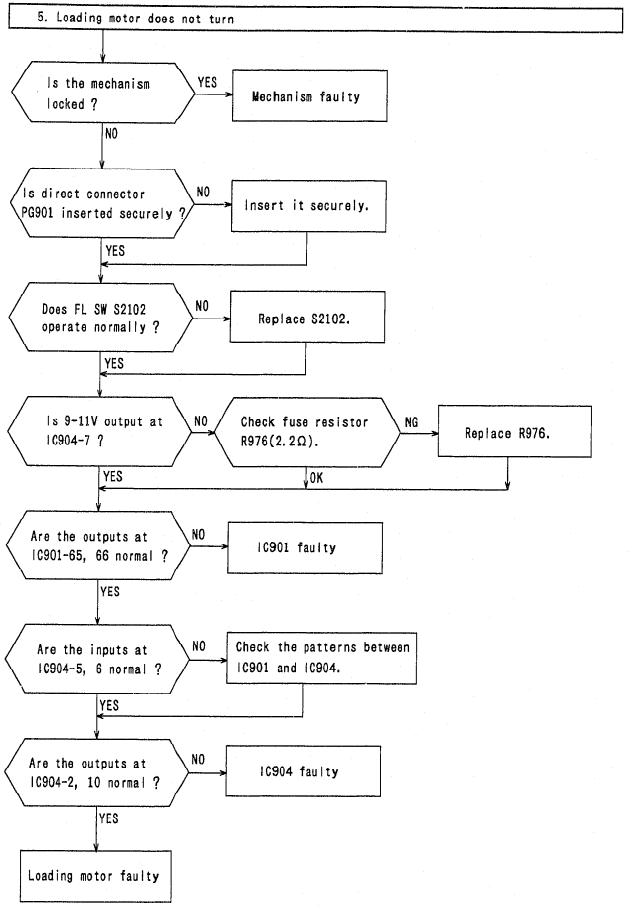
3. Capstan motor does not turn



4. Cylindor motor does not turn



5. Loading motor does not turn



HITACHI

VT-F99EM(SWNA),(HKN),(JU)

VT-F99EM(SWNA),(HKN),(JU)

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