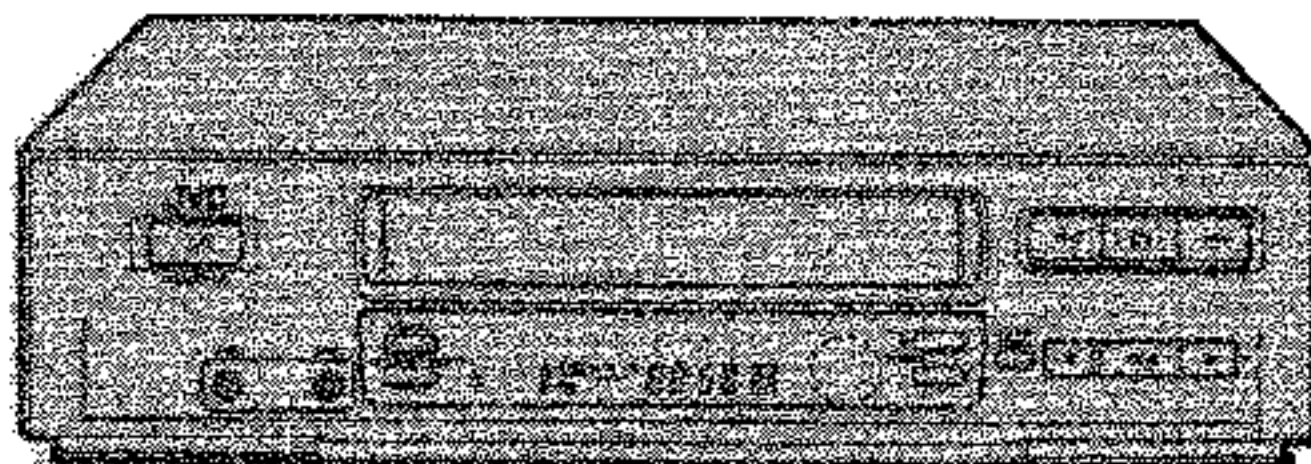




# SERVICE MANUAL

## VIDEO CASSETTE RECORDER

### HR-J441MS/J448EE



SHOWVIEW



#### SPECIFICATIONS *(The specifications shown pertain specifically to the model HR-J448EE)*

##### GENERAL

|                        |                                                    |
|------------------------|----------------------------------------------------|
| Power requirement      |                                                    |
| Rating                 | : AC 110 – 240 V~, 50/60 Hz                        |
| Operating              | : AC 90 – 260 V~, 50/60 Hz                         |
| Power consumption      | : 18W                                              |
| Temperature            |                                                    |
| Operating              | : 5°C to 40°C                                      |
| Storage                | : -20°C to 60°C                                    |
| Operating position     | : Horizontal only                                  |
| Dimensions (WxHxD)     | : 400 x 94 x 273 mm                                |
| Weight                 | : 3.3 kg                                           |
| Format                 | : VHS standard                                     |
| Maximum recording time |                                                    |
| (SP)                   | : 240 min. with E-240 video cassette (PAL/MESECAM) |
|                        | : 160 min. with T-160 video cassette (NTSC)        |
| (LP) [J448EE only]     | : 480 min. with E-240 video cassette (PAL/MESECAM) |
| (EP) [J448EE only]     | : 480 min. with T-160 video cassette (NTSC)        |

##### VIDEO/AUDIO

|                       |                                                                          |
|-----------------------|--------------------------------------------------------------------------|
| Signal system         | : PAL-type colour signal and CCIR monochrome signal, 625 lines 50 fields |
|                       | : NTSC colour and EIA monochrome signals, 525 lines/60 fields            |
| Recording system      | : DA-4 (Double Azimuth) head helical scan system [J448EE]                |
|                       | : Rotary two-head helical scan system [J249/248/245EE]                   |
| Signal-to-noise ratio | : 45 dB                                                                  |

|                       |                                    |
|-----------------------|------------------------------------|
| Horizontal resolution | : 250 lines (PAL/MESECAM)          |
|                       | : 220 lines (NTSC)                 |
| Frequency range       | : 70 Hz to 10,000 Hz               |
| Input/Output          | : RCA connectors (IN x 2, OUT x 1) |

##### TUNER/TIMER

|                             |                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------|
| TV channel storage capacity | : 99 positions                                                                     |
|                             | : (+AUX position "AU")                                                             |
| Tuning system               | : Frequency synthesized tuner                                                      |
| Channel coverage            | : VHF (Low) 42 – 175MHz                                                            |
|                             | : (High) 175 – 470MHz                                                              |
|                             | : UHF 470 – 870MHz                                                                 |
| Aerial output               | : UHF channels (Adjustable E32 – E40)                                              |
| Memory backup time          | : Approx. 6 months.                                                                |
|                             | : Estimated figure based on supplied fresh battery; actual performance may differ. |

##### ACCESSORIES

|                      |                                 |
|----------------------|---------------------------------|
| Provided accessories | : RF cable,                     |
|                      | : Infrared remote control unit, |
|                      | : "R6/UM-3" battery x 2,        |
|                      | : Lithium battery CR2025        |

*Specifications shown are for SP mode unless otherwise specified.  
 Design and specifications subject to change without notice.*

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The following table lists the differing points between Models (HR-J441MS and HR-J448EE) in this series.

|                            | HR-J441MS | HR-J448EE |
|----------------------------|-----------|-----------|
| INTELLIGENT PICTURE        | ○         | ×         |
| FRONT INPUTS (AUDIO/VIDEO) | ×         | ○         |
| REMOCON (TV/MBR)           | ×         | ○         |

NOTE : ○ USED      × NOT USED

# Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

## ● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the  symbol and shaded (■) parts are critical for safety.

Replace only with specified part numbers.

**Note:** Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.

Caution for continued protection against fire hazard.

Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:

- 1) Wires covered with PVC tubing
- 2) Double insulated wires
- 3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:

- |                    |                                      |            |
|--------------------|--------------------------------------|------------|
| 1) Insulation Tape | 3) Spacers                           | 5) Barrier |
| 2) PVC tubing      | 4) Insulation sheets for transistors |            |

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

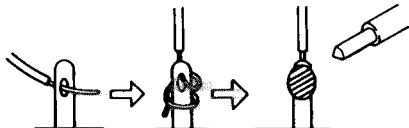


Fig. 1

7. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

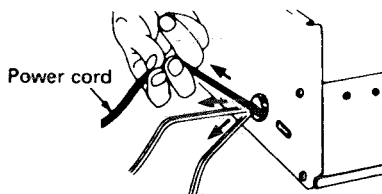


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)

In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp-type wire connector.

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1) **Connector part number :** E03830-001

2) **Required tool :** Connector crimping tool of the proper type which will not damage insulated parts.

3) **Replacement procedure**

(1) Remove the old connector by cutting the wires at a point close to the connector.

Important : Do not reuse a connector (discard it).



Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

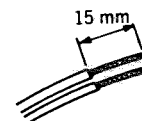


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

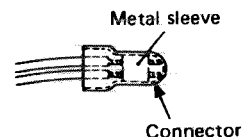


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

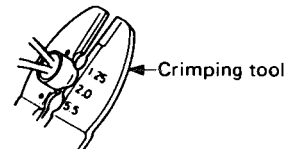


Fig. 6

(5) Check the four points noted in Fig. 7.

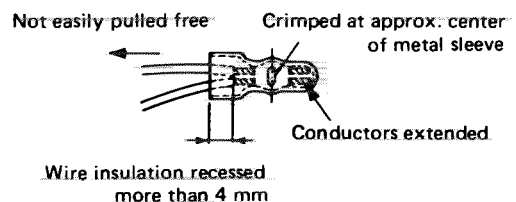


Fig. 7

## ● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

### 1. Insulation resistance test

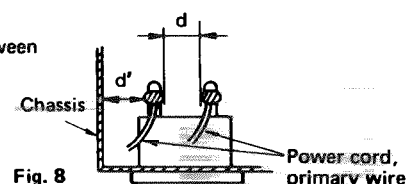
Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

### 2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

### 3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

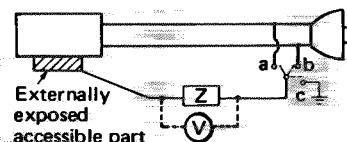


### 4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

**Measuring Method:** (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

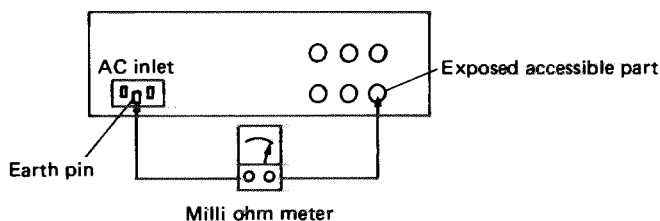


### 5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

**Measuring Method:**

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.



#### Grounding Specifications

| Region             | Grounding Impedance (Z)  |
|--------------------|--------------------------|
| USA & Canada       | $Z \leq 0.1 \text{ ohm}$ |
| Europe & Australia | $Z \leq 0.5 \text{ ohm}$ |

| AC Line Voltage | Region             | Insulation Resistance (R)                      | Dielectric Strength          | Clearance Distance (d), (d')                                                 |
|-----------------|--------------------|------------------------------------------------|------------------------------|------------------------------------------------------------------------------|
| 100 V           | Japan              | $R \geq 1 \text{ M}\Omega / 500 \text{ V DC}$  | AC 1 kV 1 minute             | $d, d' \geq 3 \text{ mm}$                                                    |
| 100 to 240 V    |                    |                                                | AC 1.5 kV 1 minute           | $d, d' \geq 4 \text{ mm}$                                                    |
| 110 to 130 V    | USA & Canada       | —                                              | AC 1 kV 1 minute             | $d, d' \geq 3.2 \text{ mm}$                                                  |
| 110 to 130 V    | Europe & Australia | $R \geq 10 \text{ M}\Omega / 500 \text{ V DC}$ | AC 3 kV 1 minute (Class II)  | $d \geq 4 \text{ mm}$                                                        |
| 200 to 240 V    |                    |                                                | AC 1.5 kV 1 minute (Class I) | $d' \geq 8 \text{ mm (Power cord)}$<br>$d' \geq 6 \text{ mm (Primary wire)}$ |

Table 1 Specifications for each region

| AC Line Voltage | Region             | Load Z                                                            | Leakage Current (i)                                      | a, b, c                  |
|-----------------|--------------------|-------------------------------------------------------------------|----------------------------------------------------------|--------------------------|
| 100 V           | Japan              | $1 \text{ k}\Omega$                                               | $i \leq 1 \text{ mA rms}$                                | Exposed accessible parts |
| 110 to 130 V    | USA & Canada       | $0.15 \mu\text{F}$ capacitor in series with $1.5 \text{ k}\Omega$ | $i \leq 0.5 \text{ mA rms}$                              | Exposed accessible parts |
| 110 to 130 V    | Europe & Australia | $2 \text{ k}\Omega$                                               | $i \leq 0.7 \text{ mA peak}$<br>$i \leq 2 \text{ mA dc}$ | Antenna earth terminals  |
| 220 to 240 V    |                    | $50 \text{ k}\Omega$                                              | $i \leq 0.7 \text{ mA peak}$<br>$i \leq 2 \text{ mA dc}$ | Other terminals          |

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

## Safety Precautions

The rating plate and the safety caution are on the rear of the unit.

**WARNING: DANGEROUS VOLTAGE INSIDE**

**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.**

### CAUTION

- When you are not using the recorder for a long period of time, it is recommended that you disconnect the power cord from the mains outlet.
- Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the mains outlet prior to connecting or disconnecting any signal lead or aerial.

### ATTENTION

1. This recorder can also receive SECAM colour television signals for recording and playback.
2. Recordings made of SECAM television signals produce monochrome pictures if played back on another video recorder of SECAM standard, or do not produce normal colour pictures if played back on another video recorder of PAL standard.
3. SECAM pre-recorded cassettes or recordings made with a SECAM video recorder produce monochrome pictures when played back with this recorder.

### POWER SYSTEM

This set operates on voltage of AC110 - 240 V~ (Rating), AC90 - 260 V~ (Operating), 50/60 Hz with automatic switching.

### Warning on lithium battery

The battery used in this device may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble, heat above 100°C or incinerate. Replace battery with Panasonic (Matsushita Electric), Sanyo, Sony or Maxell CR2025; use of another battery may present a risk of fire or explosion.

- Dispose of used battery promptly.
- Keep away from children.
- Do not disassemble and do not dispose of in fire.



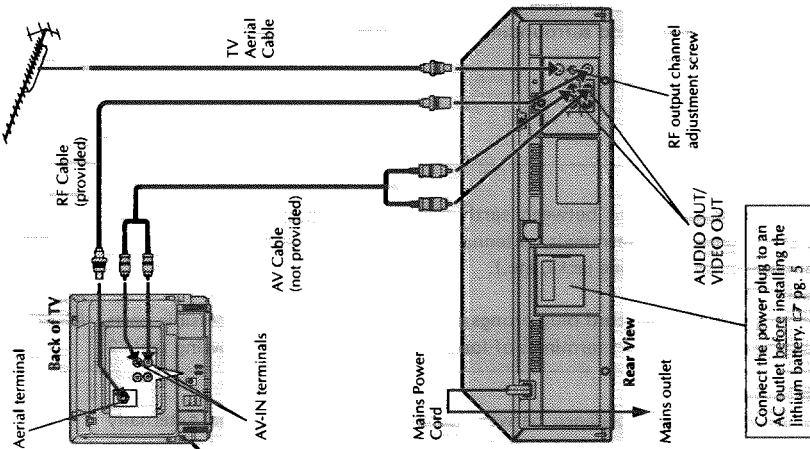
- Only cassettes marked "VHS" can be used with this videorecorder.
- HQ VHS is compatible with existing VHS equipment.



(HR-J249EE only)

- ShowView is a registered trademark of Gemstar Development Corporation. The ShowView system is manufactured under licence from Gemstar Development Corporation.

## Basic Connections



### IMPORTANT

- Please read the various precautions on this page before installing or operating the recorder.
- It should be noted that it may be unlawful to re-record pre-recorded tapes, records, or discs without the consent of the owner of copyright in the sound or video recording, broadcast or cable programme and in any literary, dramatic, musical, or artistic work embodied therein.

The **STANDBY/ON**  $\oslash$ /I button does not completely shut off mains power from the unit, but switches operating current on and off. "  $\oslash$  " shows electrical power standby and " I " shows ON.

### HR-J448EE:

Video tapes recorded with this video recorder in the LP (Long Play) or EP (Extended Play) mode cannot be played back on a single-speed video recorder.  
**HR-J249/248/245EE:**  
LP and EP mode recording and playback are not possible with this video recorder.

**Failure to heed the following precautions may result in damage to the recorder, remote control or video cassette.**

1. **DO NOT place the recorder** ...  
... in an environment prone to extreme temperatures or humidity.  
... in direct sunlight.  
... in a dusty environment.  
... in an environment where strong magnetic fields are generated.  
... on a surface that is unstable or subject to vibration.
2. **DO NOT block the recorder's ventilation openings.**
3. **DO NOT place heavy objects on the recorder or remote control.**
4. **DO NOT place anything which might spill on top of the recorder or remote control.**
5. **AVOID violent shocks to the recorder during transport.**

### MOISTURE CONDENSATION

Moisture in the air will condense on the recorder when you move it from a cold place to a warm place, or under extremely humid conditions—just as water droplets form in the surface of a glass filled with cold liquid. Moisture condensation on the head drum will cause damage to the tape. In conditions where condensation may occur, keep the recorder turned on for a few hours to let the moisture dry.

### ABOUT HEAD CLEANING

Accumulation of dirt and other particles on the video heads may cause the playback picture to become blurred or interrupted. Be sure to contact your nearest JVC dealer if such troubles occur.

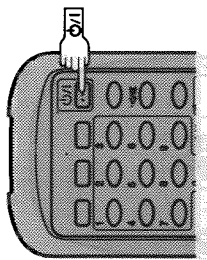
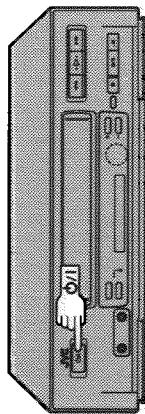
It's essential that your video recorder be properly connected. Follow these steps carefully. THESE STEPS MUST BE COMPLETED BEFORE ANY VIDEO OPERATION CAN BE PERFORMED.

- 1 **CHECK CONTENTS**  
Make sure the package contains all of the accessories listed in "Specifications" (27 pg. 41).
- 2 **SITUATE RECORDER**  
Place the recorder on a stable, horizontal surface.
- 3 **CONNECT RECORDER TO TV**  
The connection method you use depends on the type of TV you have.  
**RF CONNECTION**
  - To Connect To A TV With NO AV Input Terminals ...
    - a- Disconnect the TV aerial cable from the TV.
    - b- Connect the TV aerial cable to the ANT. IN jack on the rear panel of the recorder.
    - c- Connect the provided RF cable between the RF OUT jack on the rear panel of the recorder and the TV's aerial terminal.**Before operating the recorder, make sure the TV's channel is set to the VIDEO channel (27 pg. 5).**  
**AV CONNECTION**
  - To Connect To A TV With AV Input Terminals ...
    - a- Connect the aerial, recorder and TV as per "RF CONNECTION".
    - b- Connect an optional AV cable between the AUDIO OUT and VIDEO OUT connectors on the rear panel of the recorder and the TV's AV-IN terminals.**Before operating the recorder, make sure the TV is set to the VIDEO (or AV) mode.**
- 4 **CONNECT RECORDER TO MAINS**  
Plug the end of the mains power cord into a mains outlet.

After you plug the mains power cord into a mains outlet, the Auto Set Up display appears on the TV screen and/or on the recorder's front display panel when the  $\oslash$ /I button on the recorder/remote control is pressed for the first time to power on the recorder (27 pg. 4).

# Auto Set Up

## Auto Channel Set



### ATTENTION

Once you have performed Auto Set Up, even if the recorder's memory backup has expired, all the stored stations remain in the recorder's memory and the recorder will not perform Auto Set Up again. If you have moved to a different area or a new station starts broadcasting in your area, perform tuner setting. **EP** pg. 30

When the **Q/1** button on the recorder's remote control is pressed for the first time to power on the recorder after you plug the mains power cord into a mains outlet, the Auto Set Up function sets the tuner channels automatically. You can refer to the front display panel and/or the on-screen display to perform this procedure.

Before starting, make sure of the following:

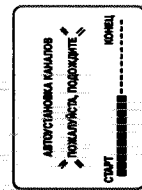
- The TV aerial cable should be connected to the recorder.
- The recorder's mains power cord should be connected to a mains outlet. **EP** pg. 3
- If you want to use the on-screen display, the TV should be set to its AV mode (with AV connection **EP** pg. 3) or UHF channel 36 (with RF connection **EP** pg. 3).

## START AUTO SET UP

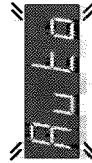
Press **Q/1**.

- The Auto Set Up function scans all the channels that are receivable by your recorder. It then automatically assigns each receivable channel to the **TV PROG** buttons. It skips non-receivable channels.
- As Auto Set Up progresses, the "■" mark on the screen moves from left to right.
- After you perform Auto Set Up, if the tuner channels have not been set properly or if "CH -" is displayed on the front display panel, make sure that the aerial cable is connected to the recorder properly and turn off the recorder power once, and turn the power back on to try Auto Set Up again.
- If there is a power cut, or if you press **Q/1** or **MENU** while Auto Set Up is in progress, Auto Set Up will be interrupted; be sure to turn off the recorder power once and try again.

DO NOT press any button on the recorder or remote control while Auto Set Up is in progress.



On-Screen Display



Front Display Panel

When Auto Set Up is completed, the lowest position number will appear on the front display panel.

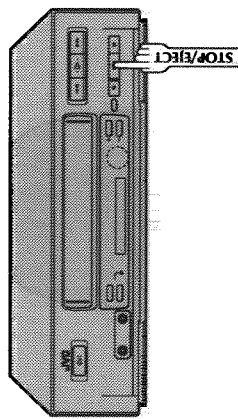


### NOTES:

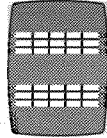
- If you want to set the tuner manually such as to add or skip channels, to swap channel positions, or to fine-tune channels, **EP** pg. 31.
- If no sound accompanies the picture on some channels that have been stored by Auto Set Up, the TV system setting for those channels may be incorrect. Select the appropriate TV system for those channels. **EP** "TV System Selection - When you see the picture but hear no audio" on page 33.

# Video Channel Set

Video Channel (RF Output Channel) is the channel on which your TV receives picture and sound signals from the video recorder through the RF cable.



### TEST SIGNAL



The channel on which the screen to the left appears clearly in step 3 is your Video Channel.

To view picture signals from the video recorder, set your TV to the Video Channel.

The video recorder is designed to send picture and sound signals via the connected RF cable to your TV on UHF channel 36.

After you have turned on the recorder, set your TV to UHF channel 36, fine-tune as necessary, and check if picture and sound being received from the recorder come out clearly or not: if clear enough you don't have to perform the following steps. Go to "Installing/Removing the lithium battery" on this page.

- If not UHF channel 36 or neighbouring channels may be occupied by local stations. Perform the following steps to change the Video Channel to another channel between 32 - 40.

- Before starting, make sure of the following:
  - The recorder's power should be off.
  - No cassette should be inserted in the recorder.
  - The connected TV's power should be on.

## SET TV CHANNEL

Set your TV to a channel between 32 and 40 that you want to use as the Video Channel on the TV.

## BRING TEST SIGNAL ON SCREEN

Hold down the recorder's **STOP/EJECT** button for more than 5 seconds.

- "OUT" appears on the display panel.

## TUNE YOUR RECORDER

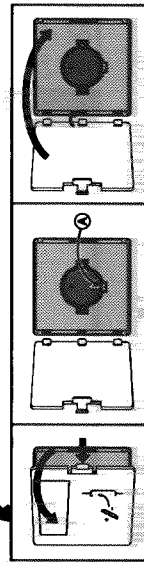
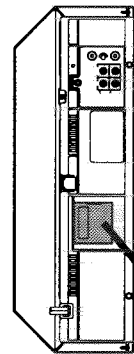
Turn the RF output channel adjustment screw on the rear panel of the recorder by using a screwdriver until the two vertical bars become as clear as they can be.

## EXIT VIDEO CHANNEL SET MODE

Press the recorder's **STOP/EJECT** button again to finish the setting.

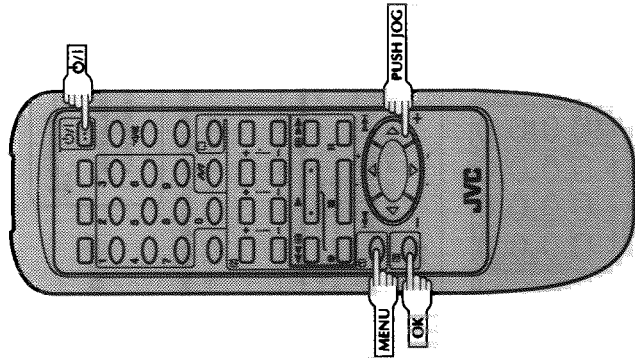
### Installing/Removing the lithium battery

- 1 Make sure that the power plug is connected to an AC outlet and turn off the VCR power.
- 2 Open the battery cover while pressing the release tab as illustrated.
- 3 Insert a lithium battery with the plus (+) side up and push it in.
- To remove the lithium battery, press the latch **ⓐ** downward using a pointed non-metallic object, then pull out the lithium battery.
- 4 Close the battery cover until it clicks in place.



# Select Language

Turn on the TV and select the VIDEO channel (or AV mode).



## TURN ON THE RECORDER

Press  $\psi$ /I.

## ACCESS MAIN MENU SCREEN

Press MENU twice.

## ACCESS INITIAL SET SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "YCTAHOBKA (INITIAL SET)", then press OK.

ГЛАВНОЕ МЕНЮ  
YCTAHOBKA BbIKJIH  
YCTAHOBKA TOHEPA  
[ $\Delta$ / $\nabla$ ]  $\rightarrow$  GB  
[MENU] : EXIT

## ACCESS LANGUAGE SELECT SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "BbIBOP P3bBIKA (LANGUAGE SELECT)", then press OK.

HAHJIAHHA YCTAHOBKA  
YCTAHOBKA JIYCOB  
YCTAHOBKA P3bBIKA  
BbIBOP P3bBIKA  
BbIBOP OTCJIEHHTA ITS  
YCTAHOBKA SHOWVIEW  
[ $\Delta$ / $\nabla$ ]  $\rightarrow$  GB  
[MENU] : EXIT

• "YCTAHOBKA SHOWVIEW SET-Up" will appear with HRJ249EE only.

## SELECT LANGUAGE

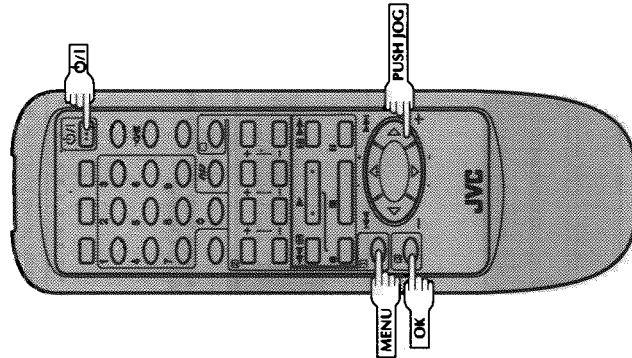
Place the pointer next to the language of your choice (English or Russian) by pressing PUSH JOG  $\Delta$ / $\nabla$ , then press OK.

## RETURN TO NORMAL SCREEN

Press MENU.

# Select Television System

Turn on the TV and select the VIDEO channel (or AV mode).



## TURN ON THE RECORDER

Press  $\psi$ /I.

## ACCESS MAIN MENU SCREEN

Press MENU twice.

## ACCESS INITIAL SET SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "INITIAL SET", then press OK.

MAIN MENU  
FUNCTION SET  
TUNER SET  
[ $\Delta$ / $\nabla$ ]  $\rightarrow$  GB  
[MENU] : EXIT

## ACCESS TV SYSTEM SELECT SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "TV SYSTEM SELECT", then press OK.

INITIAL SET  
CLOCK SET  
LANGUAGE SELECT  
TV SYSTEM SELECT  
SHOWVIEW SET-UP  
[ $\Delta$ / $\nabla$ ]  $\rightarrow$  GB  
[MENU] : EXIT

• "SHOWVIEW SET-Up" will appear with HRJ249EE only.

## SELECT TELEVISION SYSTEM

Place the pointer next to the appropriate TV system that matches the system of TV being used (refer to the table to the left). Then press OK.

TV SYSTEM SELECT  
[ $\Delta$ / $\nabla$ ]  $\rightarrow$  B/G  
[MENU] : EXIT

## RETURN TO NORMAL SCREEN

Press MENU.

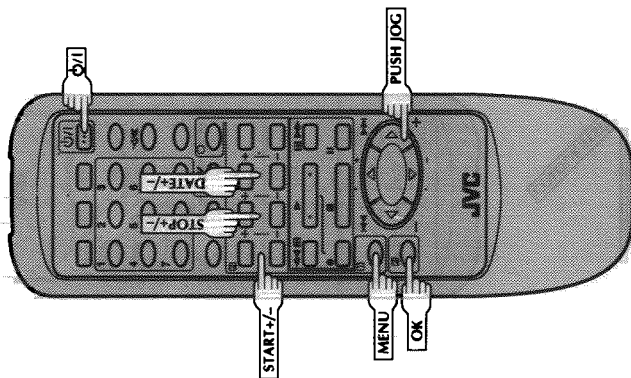
| Major Countries                                                                               | TV System |
|-----------------------------------------------------------------------------------------------|-----------|
| Austria, Denmark, Finland, Holland, Italy, Norway, Spain, Switzerland, Sweden, Germany, Egypt | B/G       |
| China, Mongolia, Rumania, Bulgaria, Czech Rep., Slovakia, Hungary, Poland, Russia             | D/K       |
| Hong Kong                                                                                     | I         |

### NOTES:

- If no colours appear on the screen when using a multi-system television with its system select switch set to AUTO, change the TV system setting of the recorder.
- For more information on multi-system compatibility, see p.28

# Clock Set

Turn on the TV and select the VIDEO channel (or AV mode).



## NOTE:

If the year digits are automatically cleared, it is possible that you have input 29th February for a non-leap year. Input the correct data.

## 1 TURN THE RECORDER ON

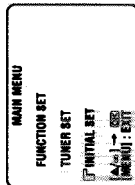
Press  $\psi$ /I.

## 2 ACCESS MAIN MENU SCREEN

Press MENU twice.

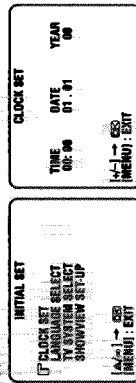
## 3 ACCESS INITIAL SET SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "INITIAL SET", then press OK.



## 4 ACCESS CLOCK SET SCREEN

Press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "CLOCK SET", then press OK. The Clock Set screen appears.



• "SHOWVIEW SET-UP" will appear with HR-J249EE only.

## 5 SET TIME

Press START +/- to set the time.

• Press and hold either button to delay or advance the time by 30 minutes.

## 6 SET DATE

Press STOP +/- to set the date.

• Press and hold either button to change the date by 15 days.

## 7 SET YEAR

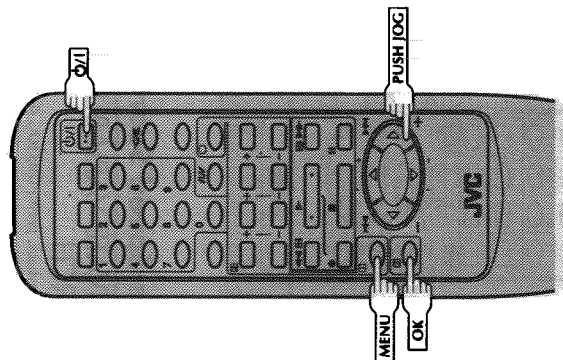
Press DATE +/- to set the year.

## 8 START CLOCK OPERATION

Press MENU.

# On-Screen Displays

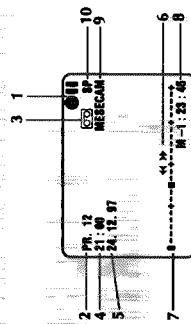
Turn on the TV and select the VIDEO channel (or AV mode).



## NOTES:

- When you use this recorder as the player for editing, be sure to set "O.S.D." to "OFF" before starting.
- During playback, the operation mode indicators may be disturbed depending on the type of tape being used.

The superimposed indication on the TV screen tells you what the recorder is doing.



## 1 TURN ON THE RECORDER

Press  $\psi$ /I.

## 2 ACCESS MAIN MENU SCREEN

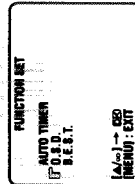
Press MENU twice.

## 3 ACCESS FUNCTION SET SCREEN

Place the pointer next to "FUNCTION SET" by pressing PUSH JOG  $\Delta$ / $\nabla$ , then press OK.

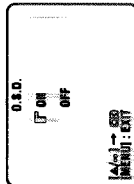
## 4 ACCESS O.S.D. SCREEN

Place the pointer next to "O.S.D." by pressing PUSH JOG  $\Delta$ / $\nabla$ , then press OK.



## 5 ENABLE/DISABLE ON-SCREEN DISPLAY

The default setting is "ON", so if you want on-screen displays, leave the setting as it is and go to step 6. If you don't want the displays to appear, press PUSH JOG  $\Delta$ / $\nabla$  to place the pointer next to "OFF", then press OK.



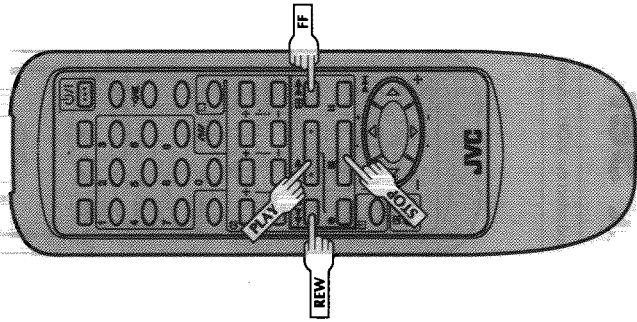
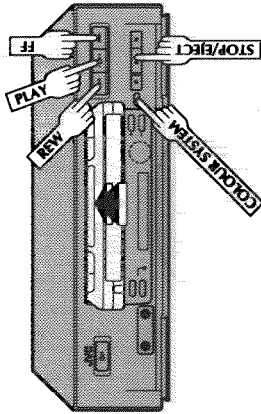
## 6 RETURN TO NORMAL

Press MENU.

- 1- Operation mode indicators
- 2- Channel position number/Aux. indicator (AUX)
- 3- Cassette loaded mark
- 4- Clock display
- 5- Current day/month/year
- 6- Tape position indicator (pg. 13)
- 7- Counter display (including Counter Memory indicator)
- 8- Colour system indicator (pg. 28)
- 9- Tape speed SP/LP/EP

# Basic Playback

Turn on the TV and select the VIDEO channel (or AV mode).



The easiest, most basic operation possible with your video recorder is tape playback. Already-recorded signals on a video tape are read by your video recorder and displayed on your TV just like a TV programme.

## 1 LOAD A CASSETTE

Make sure the window side is up, the rear label side is facing you and the arrow on the front of the Cassette is pointing toward the recorder. Don't apply too much pressure when inserting.

- The recorder power comes on automatically and the counter is reset to 00:00:00.
- Select the appropriate colour system by pressing the **COLOUR SYSTEM** button (27 pg. 28).
- If the record safety tab has been removed, playback begins automatically.

## 2 FIND PROGRAMME START POINT

If the tape is advanced past the start point, press **REW**. To go forward, press **FF**.

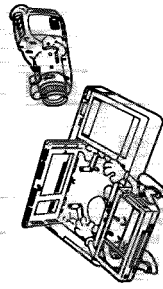
## 3 START PLAYBACK

Press **PLAY**. "BEST" appears blinking in the recorder's display panel during automatic tracking. (27 pg. 16)

## 4 STOP PLAYBACK

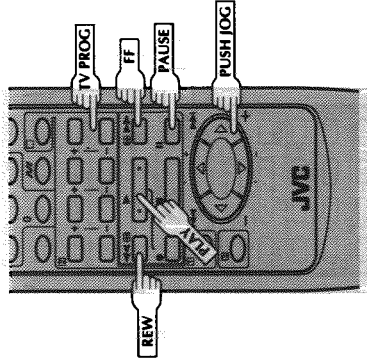
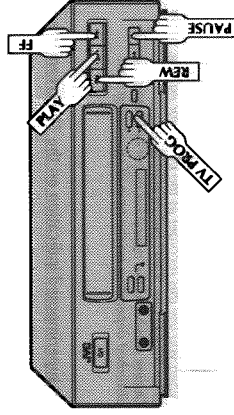
Press **STOP** on the remote or **STOP/EJECT** on the recorder's front panel. Then press **STOP/EJECT** to remove the cassette.

### Usable cassettes



- Compact VHS camcorder recordings can be played on this video recorder. Simply place the recorded cassette into a VHS Cassette Adapter and it can be used just like any full-sized VHS cassette.
- This video recorder can record on regular VHS and Super VHS cassettes. However, it will record and play back regular VHS signals only. It is not possible to play back a recorded Super VHS tape.

# Playback Features



## Variable-Speed Search

### 1 ACTIVATE VARIABLE-SPEED SEARCH

During playback, press **PUSH JOG** ◀ or ▶.

- The more times you press, the faster the playback picture moves.
- To decrease speed, press the button for the opposite direction.

To resume normal playback, press **PLAY**.

Take advantage of special functions possible with the recorder's controls or the remote control.

## High-Speed Search

### 1 ACTIVATE HIGH-SPEED SEARCH

During playback or still, press **FF** for forward high-speed search, or **REW** for reverse high-speed search.

To resume normal playback, press **PLAY**.

## Still Picture/Frame-By-Frame Playback

### 1 PAUSE DURING PLAYBACK

Press **PAUSE**. If there is vertical jitter, use the **TV PROG** buttons to correct the picture.

### 2 ACTIVATE FRAME-BY-FRAME PLAYBACK

Press **PAUSE**.

OR

Press **PUSH JOG** ◀ or ▶.

To resume normal playback, press **PLAY**.

## Slow Motion

### 1 ACTIVATE SLOW-MOTION PLAYBACK

During still picture, press and hold **PAUSE** for 2 seconds, then release. Press and release again to return to still picture.

OR

During still picture, press and hold **PUSH JOG** ◀ or ▶. Release to return to still picture.

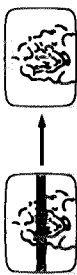
To resume normal playback, press **PLAY**.

## NOTES:

- For short searches, press and hold **FF** or **REW** for over 2 seconds. When released, normal playback resumes.
- In the search, still, or frame by frame playback mode, the picture may be distorted, and there may be a loss of colour.

## Manual Tracking

Your video recorder is equipped with automatic tracking control. During playback, you can override this and adjust the tracking manually by pressing the TV PROG buttons.



### 1 OVERRIDE AUTOMATIC TRACKING

Press the recorder's TV PROG + and - buttons simultaneously to engage manual tracking.

### 2 ADJUST TRACKING MANUALLY

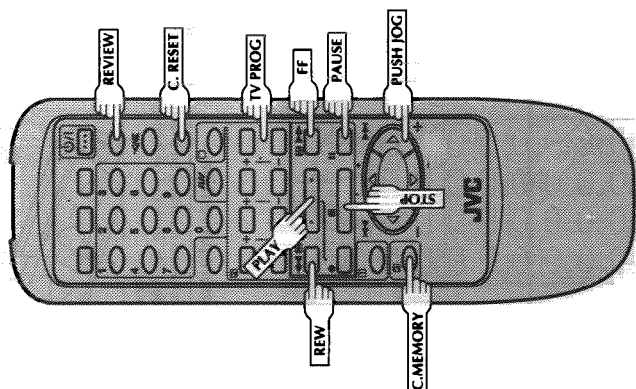
Press TV PROG + or - to adjust tracking.

### 3 RETURN TO AUTOMATIC TRACKING

Press the recorder's TV PROG + and - buttons simultaneously to re-engage automatic tracking.

## NOTE:

When a new tape is inserted, the recorder enters the automatic tracking mode automatically.



## Repeat Playback

Your video recorder can automatically play back the whole tape 20 times repeatedly.



### 1 START PLAYBACK

Press **PLAY**.

### 2 ACTIVATE REPEAT PLAYBACK

Press **PLAY** and hold for over 5 seconds, then release.

- The Play indicator (▶) on the display panel blinks slowly.
- The tape plays 20 times automatically, and then stops.

### 3 STOP PLAYBACK

Press **STOP** at any time to stop playback.

## NOTE:

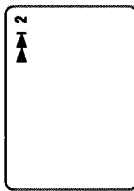
Pressing **PLAY**, **REW**, **FF** or **PAUSE** also stops Repeat Playback.

## Index Search

Your recorder automatically marks index codes at the beginning of each recording. This function gives you quick access to any one of 9 index codes in either direction.

## NOTE:

Before starting, make sure the recorder is in the Stop mode.



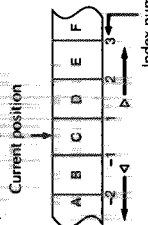
### 1 ACTIVATE INDEX SEARCH

Press **PUSH JOG** ◀ or ▶ (◀◀ or ▶▶) on the remote control. "1" or "2" is displayed on screen and search begins in the corresponding direction.

- To access index codes 2 through 9, press **PUSH JOG** ◀ or ▶ repeatedly until the correct index number is displayed.

Ex.: To locate the beginning of B from the current position, press **PUSH JOG** ◀ twice.

To locate the beginning of D from the current position, press **PUSH JOG** ▶ once.



- When the specified index code is located, playback begins automatically.

## Instant ReView

Simply by pressing a single button, the recorder power comes on, rewinds, and begins playback of the last timer-recorded programme. If you have several programmes recorded, you can easily access any of them.

## NOTE:

Before starting, make sure that the recorder is off and that the Timer mode is disengaged.

### 1 ACTIVATE INSTANT REVIEW

Press **REVIEW**. The recorder power comes on and the recorder searches for the index code indicating the start of the last timer-recorded programme. Once it's found, playback begins automatically.

The front display panel tells you how many programmes have been recorded. If you have, for example, 3 programmes, "REVIEW" and "3" appear and blink. To watch the first of the 3 programmes, press **REVIEW** three times. The recorder searches and begins playback automatically. You can access a programme as far as 9 index codes away from the current tape position.

## NOTE:

Instant Review is not possible while the recorder is in the Timer mode.

## Next Function Memory

You can set your recorder's power to go off automatically after the tape is fully rewound. Before starting, make sure the recorder is in the Stop mode.

For Automatic Power Off After Tape Rewind... press **REW**, then press ◀ within 2 seconds.

## NOTE:

If you want the power to be turned off automatically when the counter reads "0:00:00" (instead of at the beginning of the tape), press **C. MEMORY** so that the "M" mark appears before pressing **REW**.

## Counter Memory

Returns to the counter reading of "0:00:00" to conveniently find a specific place on the tape automatically.

### 1 SET COUNTER MEMORY

Press **C. RESET** during playback at a point you wish to locate later. The counter reads "0:00:00". Then press **C. MEMORY**, and "M" appears in front of the counter digits.

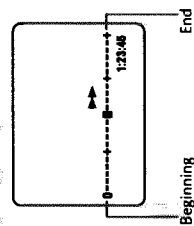
### 2 ACTIVATE COUNTER MEMORY

When you wish to return to the designated point, press **STOP** and then **REW** or **FF**.

- The tape rewinds or fast-forwards and stops at about 0:00:00 automatically.
- To cancel Counter Memory, press **C. MEMORY** again.

## Tape Position Indicator

The tape position indicator appears on screen when, from the Stop mode, you press **FF**, **REW** or perform an Index Search. The position of "■" in relation to "0" (beginning) or "4" (end) shows you where you are on the tape. "O.S.D." (pg. 9) must be set to "ON", or the indicator will not appear.

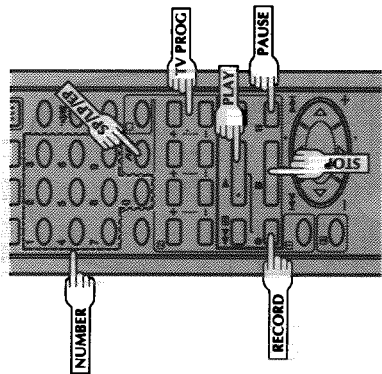
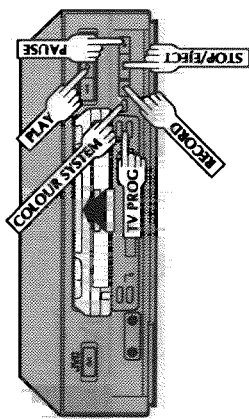


## NOTE:

Depending on the type of tape used, there may be times when the indication is not correct.

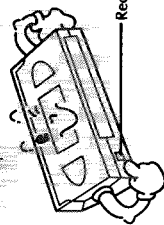
# Basic Recording

- Turn on the TV and select the VIDEO channel (or AV mode).
- Press VCR on the remote control to select the VCR mode.



## Accidental erasure prevention

- To prevent accidental recording on a recorded cassette, remove its safety tab. To record on it later, cover the hole with adhesive tape.



Record safety tab

TV signals being received by the recorder's built-in tuner can be recorded onto a video tape. You can "capture" a TV programme using your video recorder.

## 1 LOAD A CASSETTE

Insert a cassette with the record safety tab intact.

- The counter is reset to 0:00:00 and the recorder power comes on automatically.
- Select the appropriate colour system by pressing the COLOUR SYSTEM button. (27 pg. 28)

## 2 CHOOSE A PROGRAMME

Press TV PROG +/- or the NUMBER keys to select the channel you wish to record.

## 3 SET TAPE SPEED (HR-J448EEONLY)

Press **III** (SP/LP/EP). Check the SP/LP/EP indicator on the recorder display panel to confirm the selected tape speed.

## 4 START RECORDING

Press and hold **RECORD** and **PLAY** on the remote control, or press **RECORD** on the recorder.

### With HR-J448EE:

B.E.S.T. takes place at the beginning of both the first SP and the first LP (or EP) recording after inserting the cassette (27 pg. 16).

### With HR-J249/248/245EE:

B.E.S.T. takes place at the beginning of the first recording after inserting the cassette (27 pg. 16).

## 5 PAUSE/RESUME RECORDING

Press **PAUSE**. Press **PLAY** to resume recording.

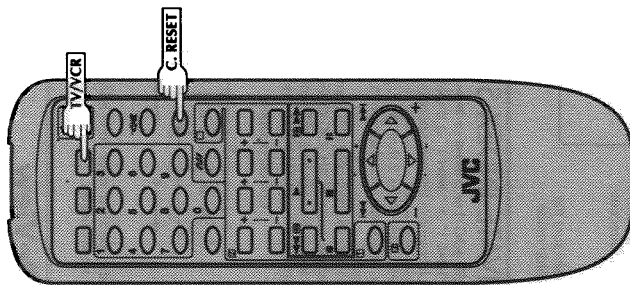
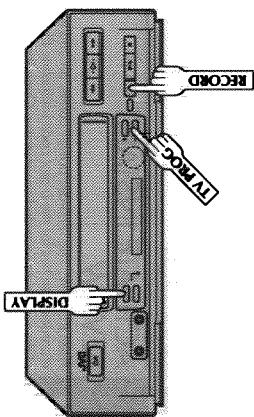
## 6 STOP RECORDING

Press **STOP** on the remote control or **STOP/EJECT** on the recorder. Then press **STOP/EJECT** to remove the cassette.

## Recording Resume Function

If there is a power outage during recording (or Instant Timer Recording or timer recording), the recording will resume automatically when power is restored to the recorder unless the recorder's memory backup has expired.

# Recording Features



## Record One Programme While Watching Another

### 1 SELECT CHANNEL TO WATCH

Once recording is in progress, all you need to do is to set the channel controls on the TV for the station you wish to view.

- The programme selected with the TV's channel controls appears on the TV screen while the one selected with the recorder's TV PROG buttons is recorded on the tape.

## Elapsed Recording Time Indication

You can check the exact time of a recording.

### 1 SET COUNTER DISPLAY

Press **DISPLAY** until a counter reading appears on the display panel.

- By pressing the **DISPLAY** button, you can change the display to show the counter reading, channel position\* or clock time.
- \* channel position is not displayed during playback.

### 2 RESET COUNTER

Press **C. RESET** before starting recording or playback.

- The counter is reset to "0:00:00" and shows the exact elapsed time as the tape runs.

## Instant Timer Recording (ITR)

This easy method lets you record for from 30 minutes to 6 hours (selectable in 30-min. increments), and shuts the recorder off after recording is finished.

### 1 START RECORDING

Press **RECORD** on the recorder.

### 2 ENGAGE ITR MODE

Press **RECORD** again. "O" blinks and 0:30 appears on the front display panel.

### 3 SET RECORDING DURATION

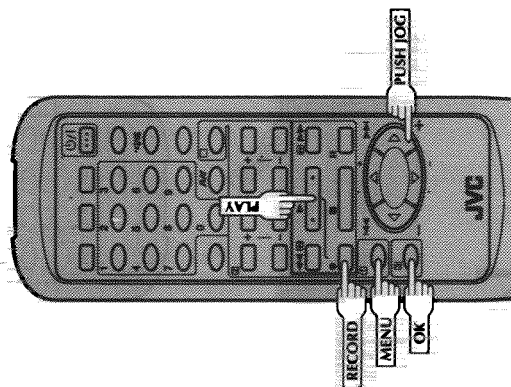
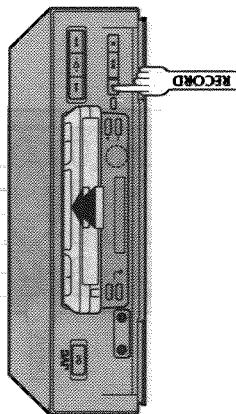
If you want to record for more than 30 minutes, press **RECORD** to extend the time. Each press extends recording time by 30 minutes.

## NOTE:

You can only perform ITR using the **RECORD** button on the recorder's front panel.

# B.E.S.T. Picture System

Turn on the TV and select the VIDEO channel (or AV mode).



## Display Panel Indication



As the tape check progresses, the "..." marks on the display panel increase upward. Once the "BEST" indicator starts blinking, the check is complete.

The B.E.S.T. (Biconditional Equalised Signal Tracking) system checks the condition of the tape in use during recording and playback, and compensates to provide the highest-possible recording and playback pictures. The default setting for both recording and playback is "ON".

## Recording

### 1 LOAD A CASSETTE

Insert a cassette with the record safety tab intact.

- The recorder power comes on automatically.

### 2 ACCESS MAIN MENU SCREEN

Press MENU twice.

### 3 ACCESS FUNCTION SET SCREEN

Place the pointer next to "FUNCTION SET" by pressing PUSH JOG Δ∇, then press OK.

MAIN MENU  
[F] FUNCTION SET  
TUNER SET  
INITIAL SET  
[A/L] → OSD  
[MENU] : EXIT

### 4 ACCESS B.E.S.T. SCREEN

Place the pointer next to "B.E.S.T." by pressing PUSH JOG Δ∇, then press OK.

FUNCTION SET  
AUTO TIMER  
[F] B.E.S.T.  
[A/L] → OSD  
[MENU] : EXIT

### 5 SELECT MODE

Place the pointer next to "ON" by pressing PUSH JOG Δ∇, then press OK.

B.E.S.T.  
[F] ON  
OFF  
[A/L] → OSD  
[MENU] : EXIT

### 6 RETURN TO NORMAL SCREEN

Press MENU.

### 7 START RECORDING

Press and hold RECORD and PLAY on the remote, or press RECORD on the recorder.

- The recorder spends approximately 7 seconds assessing the condition of the tape, then begins recording.
- When the "BEST" indicator begins blinking, that means adjustment is complete.
- Pressing the recorder's RECORD button while "BEST" is displayed does not start Instant Timer Recording. (See pg. 15).

## NOTES:

- With HR-J44BE:

The B.E.S.T. system works for both SP and LP (or EP) modes only after a tape has been inserted and the Record mode is first initiated. It does not work during recording.

- With HR-J249/248/245EE:

The B.E.S.T. system works only after a tape has been inserted and the Record mode is first initiated. It does not work during recording.

- In the case of timer recording, the B.E.S.T. system works before recording is initiated.

- Once the cassette is ejected, the B.E.S.T. data is cancelled. The next time the cassette is used for recording, B.E.S.T. is re-performed.

## ATTENTION:

Since the B.E.S.T. system works before recording actually starts, there is a delay of approximately 7 seconds after RECORD and PLAY on the remote are pressed, or RECORD on the recorder is pressed. To make sure you record the desired scene or programme in its entirety, first perform the following steps:

- 1) Press and hold PAUSE and RECORD to engage the RECORD PAUSE mode.
  - The recorder then automatically checks the condition of the tape and, after approximately 7 seconds, re-enters RECORD PAUSE.
- 2) Press PLAY to start recording.
  - If you want to bypass the B.E.S.T. system and begin recording immediately, set "B.E.S.T." to "OFF" in step 5 on page 16.

## Playback

The recorder assesses the quality of the tape once you initiate playback.

When watching a tape recorded with "B.E.S.T." set to "ON", it is recommended that you leave B.E.S.T. on during playback as well.

## START PLAYBACK

Press PLAY.

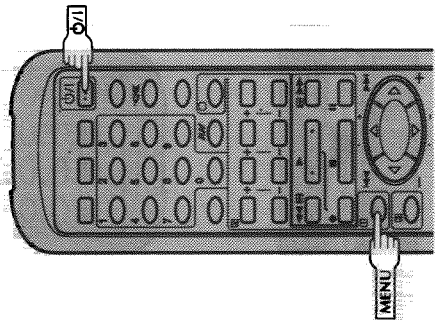
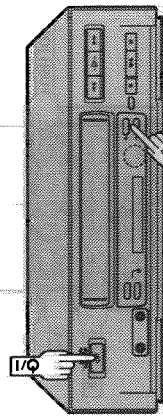


- The recorder adjusts the playback picture quality based on the quality of the tape in use.
- B.E.S.T. is active during Auto Tracking. "BEST" appears blinking on the recorder's display panel.

## NOTES:

- When watching a rental tape or one recorded on another video recorder, or when using this recorder as the player for editing, set B.E.S.T. to your preference by performing steps 2 through 6 on page 16.
- "BEST" only appears at the beginning of automatic tracking. Even though it doesn't appear after that, the B.E.S.T. function is operative.

# SHOWVIEW Setup [HR-J249EE only]



## ATTENTION

For a list of Guide Prog. Numbers for Poland, Czech Republic, Hungary, and Russia, refer to page 21 of the instruction manual printed in the corresponding language.

The ShowView timer programming system eliminates the need to input channel, date, start and stop time data when setting the timer record function. Simply key in the ShowView number for the TV program you wish to record (found in most TV listings) and the recorder's timer is automatically programmed.

You have to set "Guide Prog." numbers, which are assigned to each station for purposes of ShowView timer programming, for all the stations stored in your recorder's memory to get proper results. If you know the Guide Prog. numbers, perform the following steps. If not, go to "Guide Prog. Number Set" on page 19.

Before ShowView setup you must have performed the following procedures.

- Tuner setting (p. 4, 30)
- Clock setting (p. 7, 8)

## IMPORTANT

Perform the following procedure after Auto Set Up on page 4 and/or the channel setting steps on pages 30 - 33. After setting the Guide Program Numbers, channel positions may be incorrect if you stored or skipped channels. In this case, re-perform Guide Program Number setting.

## Guide Program Number Set

MAKE LIST OF STORED  
STATION NAMES,  
CHANNEL POSITIONS  
AND GUIDE PROG NO.

(Ex.)

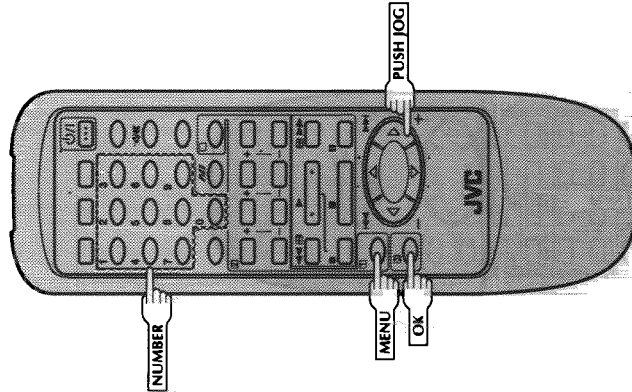
| A Channel position | B Station name | C Guide Prog. No. |
|--------------------|----------------|-------------------|
| 1                  | ORT            | 1                 |
| 2                  | RTR            | 2                 |
|                    |                |                   |
|                    |                |                   |
|                    |                |                   |

## TURN ON THE RECORDER

Press  $\Delta/\nabla$ .

## ACCESS MAIN MENU SCREEN

Press MENU twice.



## Guide Prog. Number Set (if not readily available)

- 1- Make a list of the stored station names/channel positions numbers, referring to step 1 on page 18.
- 2- Press MENU.
- 3- Press the NUMBER keys to enter the ShowView number (found in your TV listings of magazine, newspaper, etc.) for a TV programme scheduled to be broadcast of each station on the list you have made in item 1.

Press OK.

• "ERROR=GUIDE PROC" will be displayed on the screen, then the following screen will appear.

Guide Prog. No.

- 5- Press the NUMBER keys or PUSH JOG  $\Delta/\nabla$  to enter the channel position your recorder receives that station on (A column in your list).
- 6- Press MENU.

- Repeat items 2 - 6 for all the stored stations.

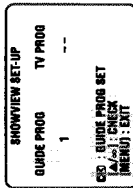
## ACCESS INITIAL SET SCREEN

Press PUSH JOG  $\Delta/\nabla$  to place the pointer next to "INITIAL SET", then press OK.

## ACCESS SHOWVIEW SETUP SCREEN

Press PUSH JOG  $\Delta/\nabla$  to place the pointer next to "SHOWVIEW SET-UP", then press OK.

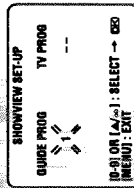
- The screen to the right appears.



## START SETTING

Press OK.

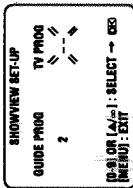
- The GUIDE PROG. number starts blinking.



## INPUT GUIDE PROG. NUMBER

Press NUMBER keys or PUSH JOG  $\Delta/\nabla$  to input the Guide Prog. number (A column in your list), then press OK.

- The TV PROG. number starts blinking.



## INPUT RECEIVING CHAN- NEL (TV PROG) NUMBER

Press NUMBER keys or PUSH JOG  $\Delta/\nabla$  to input the TV Prog. number (A column in your list), then press OK.

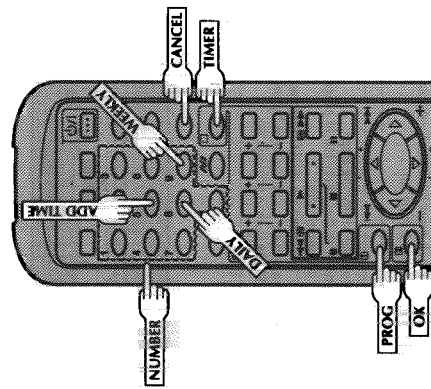
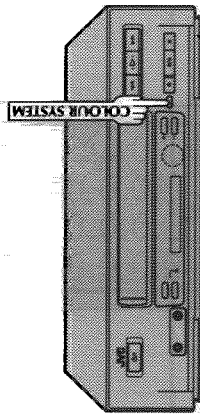
- Repeat steps 6 - 8 as necessary.

## RETURN TO NORMAL SCREEN

Press MENU.

# ShowView Timer Programming [HR-J249EE only]

Before performing ShowView timer recording, be sure to read "ShowView Setup" (p. 18).



To Delay The Stop Time ...  
... press **ADD TIME** after pressing **OK** in step 3. Each time you press, the Stop time is delayed by 5 minutes (meaning that 5 minutes of recording time is added). You can easily compensate for anticipated programme schedule delays this way.  
To Timer-Record Weekly Or Daily Serials ...  
... after pressing **OK** in step 3, press **WEEKLY** (NUMBER key "9") for weekly serials or **DAILY** (NUMBER key "8") for daily serials (Monday-Friday).

## TIMER RECORDING (cont.)

Before performing the following steps:

- Insert a cassette with the safety tab in place. The recorder will come on automatically.
- Turn on the TV and select the VIDEO channel (or AV mode).
- Select the appropriate colour system by pressing the **COLOUR SYSTEM** button. (p. 28)

### 1 ACCESS TIMER PROGRAMMING SCREEN

Press **PROG.**



### 2 ENTER SHOWVIEW NUMBER

Press the appropriate **NUMBER** keys to enter the ShowView number.

- If you made a mistake, press **CANCEL** and enter the correct ShowView number.



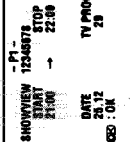
### 3 CHECK INPUT DATA

Press **OK** on the remote control. The ShowView Programming screen appears.

- If the ShowView number you entered is incorrect, "ERROR" will be displayed on the screen. Press **CANCEL** and enter the correct ShowView number.

If you want to cancel the programme even though "ERROR" is NOT displayed on the screen, press **OK** and then go to "Check And Cancel Programmes" on page 24.

- If "ERROR=GUIDE PROG" appears on the screen, see "ATTENTION - Regarding Guide Program Number Set" on page 21.



### 4 RETURN TO NORMAL SCREEN

Press **OK**.

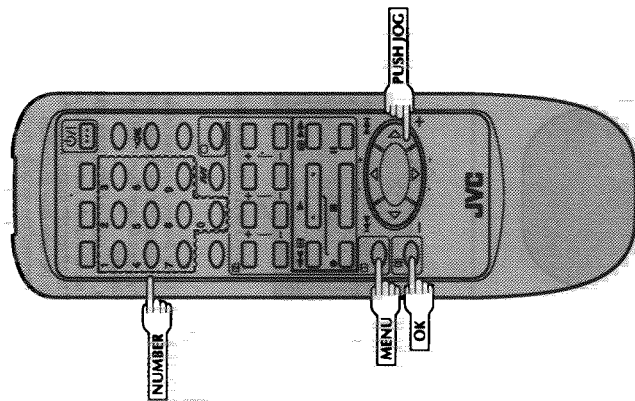
- Repeat steps 1-4 for each additional programmes.

### 5 ENGAGE TIMER MODE

Press **TIMER**.

## NOTES:

- You can programme this recorder to timer-record as many as 8 programmes. If you try to programme the recorder to record a ninth, "PROGRAM FULL" appears on screen. To record the extra programme, you must first cancel any unnecessary programmes (p. 24, "Check And Cancel Programmes").
- In case of a power failure after programming, the recorder's memory backup keeps your selections (if the lithium battery is not exhausted).



## ATTENTION

### Regarding Guide Program Number Set

- "ERROR=GUIDE PROG" appears after performing step 3 on the previous page if the Guide Program number for the ShowView number you entered has not been set.
- If the recorder is in the stop or rewind or fast-forward mode, the following screen will appear with "..." under "TV PROG" blinking.
- Press the **NUMBER** keys or **PUSH JOG**  $\Delta$  to input the channel position number you recorder receives that station on, then press **OK**.



(Ex.) To timer-record a RTR programme with ShowView

- If your recorder receives RTR on the channel position 2, press **OK** after entering "2".

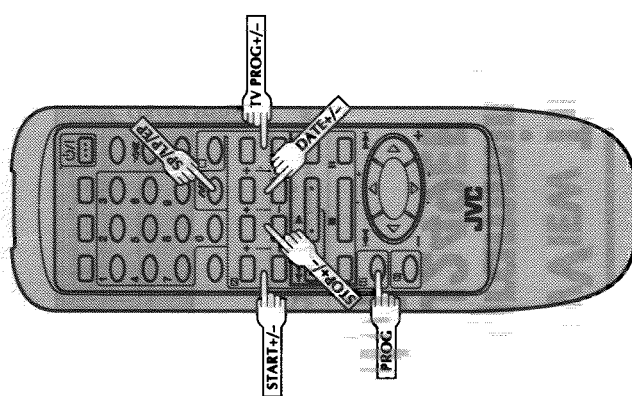
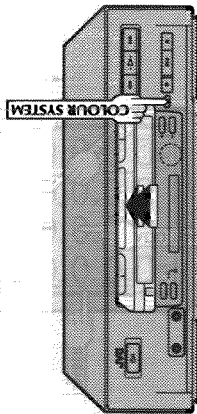
- Press **MENU**, then try again from step 1.
- If the recorder is in a mode other than the above mentioned modes, press **MENU** first and input the correct Guide Program number for that ShowView number (p. 18, "ShowView Setup"), then try again from step 1.

# Regular Timer Programming

Remember, the clock must be set before you can programme the timer (cf. pg. 8).

Before performing the following steps:

- Insert a cassette with the safety tab in place. The recorder will come on automatically.
- Turn on the TV and select the VIDEO channel (or AV mode).
- Select the appropriate colour system by pressing the COLOUR SYSTEM button (cf. pg. 28).



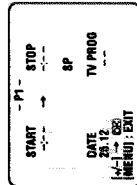
## ACCESS TIMER

### PROGRAMMING SCREEN

Press PROG.

## ACCESS PROGRAMME SCREEN

Press START +/- (If you're just starting out, "P1" appears.)



## ENTER PROGRAMME START TIME

Press START +/- to enter the time you want recording to start.

- Press and hold START +/- to move in 30-minute increments, or press and release repeatedly to move 1 minute at a time.



## ENTER PROGRAMME STOP TIME

Press STOP +/- to enter the time you want recording to stop.

## ENTER PROGRAMME DATE

Press DATE +/- (The current date appears on screen.)

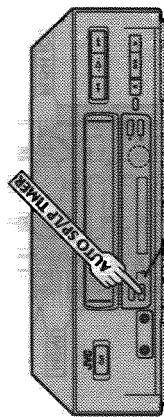
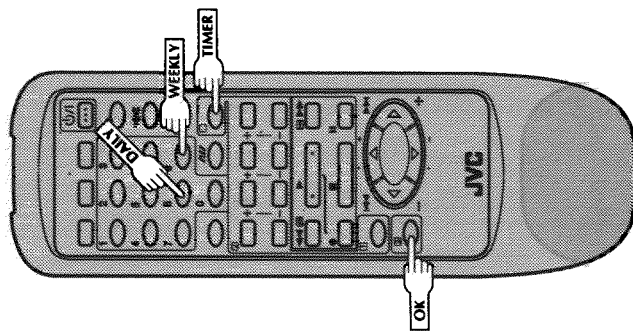
## ENTER CHANNEL POSITION

Press TV PROG +/-.



## SET TAPE SPEED (HR-J448EE ONLY)

Press **III** (SP/LP/EP) to set the tape speed.



AUTO SP/LP TIMER Indicator

### NOTES:

- The Auto SP/LP Timer feature is not available during ITR (Instant Timer Recording), and the feature will not work properly with any tapes longer than E-180 as well as some tapes of shorter lengths.
- Even if, in step 1, you press **AUTO SP/LP TIMER** and it lights up, that doesn't mean that the recorder will automatically change from SP to LP (or EP) mode during the course of the recording. Watch the tape later to confirm.
- If you have programmed the recorder to time-record 2 or more programs, the second programme and those thereafter may not fit on the tape if you engage the Auto SP/LP Timer mode. In this case, make sure the mode is not engaged, then set the tape speed manually during timer programming.
- There may be some noise at the point on the tape where the recorder switches from SP to LP (or EP) mode.

## RETURN TO NORMAL SCREEN

After confirming all information is correct, press **OK** and the normal screen appears.

- Repeat steps 1-8 for each additional programme.

## ENGAGE RECORDER'S TIMER MODE

Press **TIMER**. The recorder turns off automatically.

To Time-Record Weekly Or Daily Serials . . .  
... anytime during steps 2 through 8, press **WEEKLY (NUMBER key "9")** for weekly serials or **DAILY (NUMBER key "8")** for daily serials (Monday-Friday). Either "WEEKLY" or "DAILY" appears on the screen. Pressing the button again makes the corresponding indication disappear.

### NOTES:

- You can programme this recorder to time-record as many as 8 programmes. If you try to programme the recorder to record a ninth, "PROGRAM FULL" appears on screen. To record the extra programme, you must first cancel any unnecessary programmes (cf. pg. 24).
- In case of a power failure after programming, the recorder's memory backup keeps your selections (if the lithium battery is not exhausted).

## Auto SP/LP Timer (HR-J448EE only)

If, when recording in SP mode, there is not enough tape to record the entire programme, the recorder automatically switches to LP mode (with PAL broadcasts) or EP mode (with NTSC broadcasts) to allow complete recording.

## ENGAGE AUTO SP/LP TIMER

Press **AUTO SP/LP TIMER** on the recorder front panel. The AUTO SP/LP TIMER indicator lights up.

For Example . . .

Recording a PAL-broadcast program of 210 minutes in length onto a 180-minute tape

Approximately 150 minutes

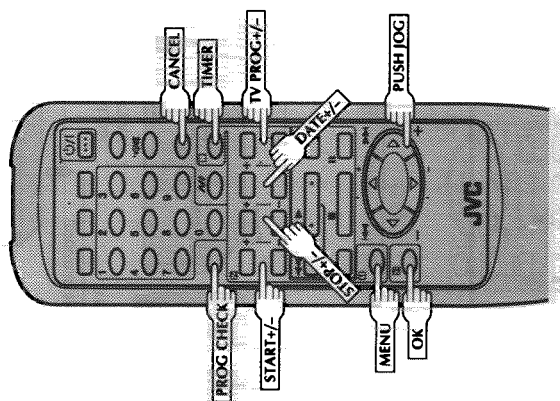
Approximately 60 minutes

Total 210 minutes

After the recorder's Timer mode is engaged, make sure the AUTO TIMER SP/LP indicator is still lit; if not, press **AUTO TIMER SP/LP** so that the indicator lights.

## Auto Timer

When the Auto Timer is set to "ON" the timer is automatically engaged when the recorder power is turned off and automatically disengaged when the recorder is powered back on.



## Check And Cancel Programmes

### ACCESS PROGRAMME SCREEN

Press **PROG CHECK**.

- If the recorder is turned on and the TV is set to its VIDEO channel or AV mode, you can check program information on screen.
- Each time you press **PROG CHECK**, the next programme's information appears.
- If All Information Is Correct ...
  - ... programming is completed.
  - If You Wish To Revise Data ...
    - ... with the recorder's power turned on, go to step 2.
  - If You Wish To Cancel A Program ...
    - ... with the recorder's power turned on, press **CANCEL**.
    - All information you input is deleted.

### REVISE PROGRAMME INFORMATION

Input the appropriate data using the **START +/-**, **STOP +/-**, **DATE +/-** and **TV PROG +/-** buttons on the remote control.

### ACCESS MAIN MENU SCREEN

Press **MENU** twice.

### ACCESS FUNCTION SET SCREEN

Press **PUSH JOG Δ∇** to place the pointer next to "FUNCTION SET", then press **OK**.

**MAIN MENU**  
☐ FUNCTION SET  
 TUNER SET  
 INITIAL SET  
☐ [A/C] → **END**  
 [MENU] : EXIT

### ACCESS AUTO TIMER SCREEN

Press **PUSH JOG Δ∇** to place the pointer next to "AUTO TIMER", then press **OK**.

**FUNCTION SET**  
☐ AUTO TIMER  
 G.S.T.  
 S.E.T.  
☐ [A/C] → **END**  
 [MENU] : EXIT

### SELECT MODE

Press **PUSH JOG Δ∇** to select either "ON" or "OFF".

**AUTO TIMER**  
 ON  
☐ OFF  
☐ [A/C] → **END**  
 [MENU] : EXIT

### RETURN TO NORMAL SCREEN

Press **MENU**.

## NOTE:

For safety, when Auto timer is set to "OFF", all other recorder functions are disabled while the Timer mode is engaged. To disengage the timer, press **TIMER**.

## Control Two JVC VCRs

The remote control is capable of controlling two JVC VCRs independently; one set to respond to your remote control's A code control signals and another set to respond to B code control signals. The remote control is preset to send A code signals because your VCR is initially set to respond to A code signals. You can easily modify your VCR to respond to B code signals.

### 1 UNPLUG VCR'S POWER CORD

Unplug from the AC outlet.

### 2 SET REMOTE CONTROL CODE

While holding down **VCR** on the remote control, press the **NUMBER** key "2" and then press **STOP**.

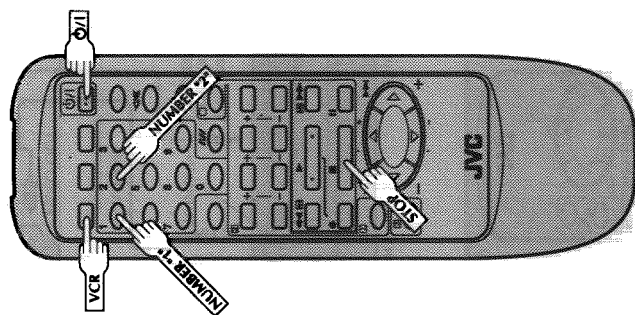
### 3 PLUG IN POWER CORD

Plug back in to the AC outlet.

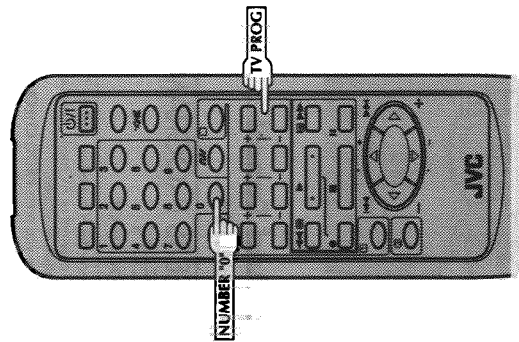
### 4 TURN VCR POWER ON

Press **ON** on the remote.

The VCR will now respond only to B-code commands. To set the VCR back to respond to A code signals, repeat the same procedure as shown above except pressing **NUMBER** key "1" instead of "2" in step 2. You can control two VCRs with the same remote control by switching the remote's code between A and B.



# Edit To Or From Another Video Recorder



You can use your video recorder as the source player or the recording deck.

## 1 MAKE CONNECTIONS

Connect the player's AUDIO/VIDEO OUT connector to the recorder's AUDIO/VIDEO IN connector.

## 2 SET RECORDING DECK'S INPUT MODE

Set to AUX. With this video recorder, press **NUMBER** Key "0" or **TV PROG.** "AU" will appear instead of a channel number.

## 3 START SOURCE PLAYER

Engage its Play mode.

## 4 START RECORDING DECK

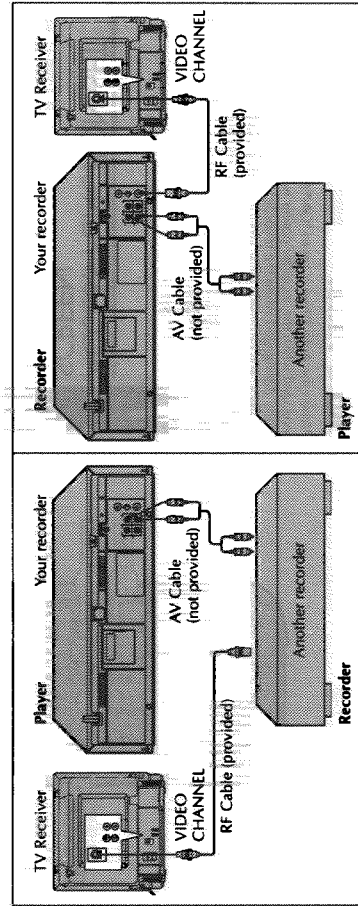
Engage its Record mode.

### NOTES:

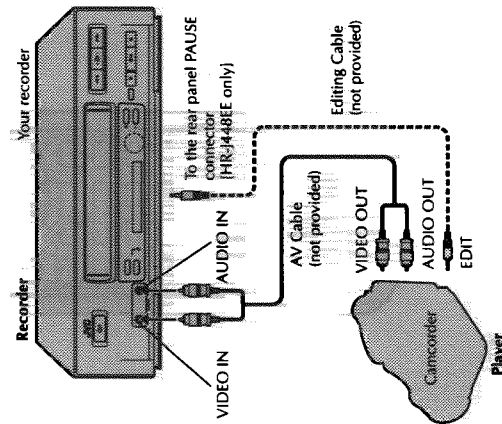
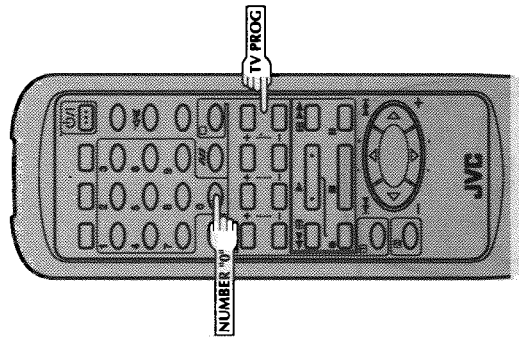
- All necessary cables can be obtained from your dealer.
- NTSC tapes being played back in the NTSC → PAL mode (p. 29) cannot be dubbed to another recorder.
- When you dub an NTSC tape using your recorder as the playback deck, select NTSC 3.58 (or NTSC 4.43) with the **COLOUR SYSTEM** button. (p. 28)

### IMPORTANT:

- To edit, both the player and the recorder must be of the same colour system. Press your recorder's **COLOUR SYSTEM** button to select the appropriate colour system.
- For more information on multi-system compatibility, p. 28.



# Edit From A Camcorder



You can use a camcorder as the source player and your video recorder as the recorder.

## 1 MAKE CONNECTIONS

Connect the camcorder's AUDIO/VIDEO OUT connectors to the recorder's front panel AUDIO/VIDEO input connectors.

### For HR-J448EE Owners:

- When a Master Edit Control-equipped JVC camcorder is used, the camcorder is capable of controlling the recorder. Refer to the camcorder's instruction manual for operating procedure.

## 2 SET RECORDER'S INPUT MODE

Press **NUMBER** key "0" and/or **TV PROG** so that "AU" appears on the display panel.

## 3 START CAMCORDER

Engage its Play mode.

## 4 START RECORDER

Engage its Record mode.

### NOTE:

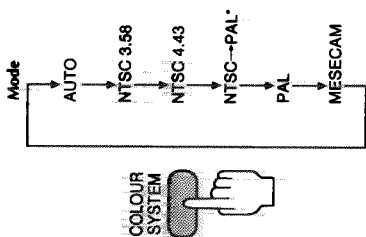
Connections made to the front panel AUDIO/VIDEO input connectors automatically override those made to the rear panel AUDIO/VIDEO input connectors.

### IMPORTANT:

- To edit, both the player and the recorder must be of the same colour system. Press your recorder's **COLOUR SYSTEM** button to select the appropriate colour system.
- PAL and SECAM camcorders can be used as a player for editing.
- For more information on multi-system compatibility, p. 28.

## Setting Of The Colour System Select Buttons

Use the COLOUR SYSTEM button on the recorder's front panel to select the colour system. Pressing this button changes the mode as illustrated on the left. The On-Screen display will show which mode is selected.



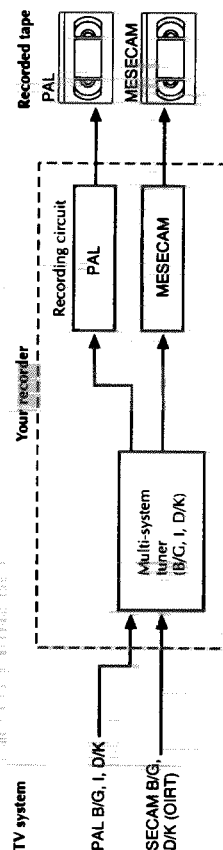
\*NTSC→PAL\* appears during playback only.

### NOTES:

- In the AUTO mode, NTSC signals will be automatically recorded as NTSC 3.58.
- In the AUTO mode, NTSC tapes will be played back as NTSC 3.58.
- SECAM signals will always be recorded as MESECAM. Select the AUTO or the MESECAM mode when recording SECAM signals.
- When playing back a SECAM tape, select the AUTO or the MESECAM mode. The playback picture will always be monochrome.
- In the NTSC 4.43 mode, with some TVs, on-screen displays (Program screen etc.) may roll up or down and there may be a loss of colour. When this happens, select the AUTO mode.

## Off-Air Recording

The built-in multi-system tuner is capable of receiving PAL B/G, I and D/K, and SECAM B/G and D/K broadcasts.

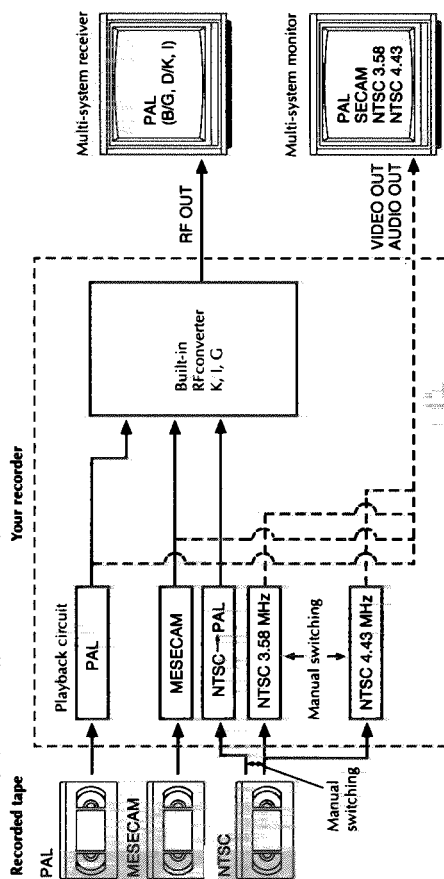


### NOTE:

This model does not operate in BRAZIL (PAL-M) or ARGENTINA (PAL-N).

## Playback

This recorder can play back all 3 types of recorded tape.



### NOTES:

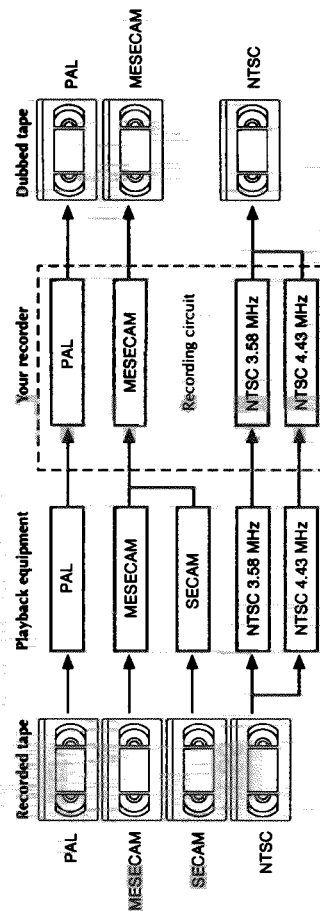
- When viewing NTSC tapes on a PAL TV set:
  - The picture may shrink vertically with black bars appearing at the top and bottom of the screen. This is not a malfunction on the part of the video recorder nor the TV.
  - The picture may roll up or down. This can be corrected using the V-HOLD control found on some TVs. (This cannot be corrected if the TV does not have a V-HOLD control.)
  - During search, still, or frame-by-frame playback, the picture will be distorted, and there may be a loss of colour.

### ATTENTION:

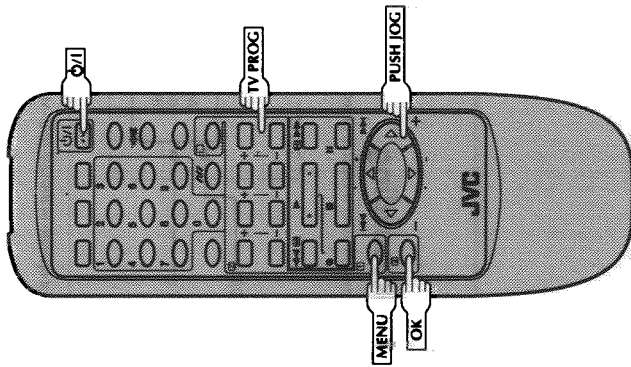
When this recorder is connected to a multi-system TV, the audio signal may not be heard or may be noisy if the colour system select switch of the TV is adjusted to the AUTO position. In such a case, set the TV's colour system select switch to the appropriate position which corresponds to the TV system you have selected at the TV System Select screen.

## Tape-To-Tape Editing

There are 4 different types of recorded tape, depending on the signal recorded.



Turn on the TV and select the VIDEO channel (or AV mode).



#### IMPORTANT

Perform the following steps only if auto channel set has not been set correctly by Auto Set Up function (27 pg. 4) or if you have moved to a different area or if a new station starts broadcasting in your area.

Your recorder needs to memorise all necessary stations in channel positions in order to record TV programmes. Auto Channel Set automatically assigns all receivable stations in your area so that you can call them up with the TV PROG buttons without going through any vacant channels.

### Auto Channel Set

#### TURN ON THE RECORDER

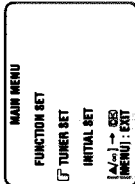
Press **TV**.

#### ACCESS MAIN MENU SCREEN

Press **MENU** twice.

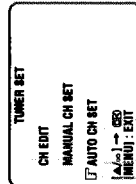
#### ACCESS TUNER SET SCREEN

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "TUNER SET", then press **OK**.



#### SELECT AUTO CH SET MODE

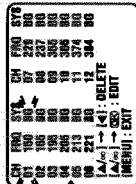
Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "AUTO CH SET", then press **OK**.



#### SELECT TV SYSTEM

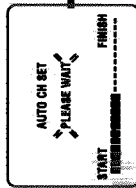
Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to the appropriate TV system, then press **OK**.

- Auto Channel Set will start.



#### RETURN TO NORMAL SCREEN

Press **MENU**.



#### IMPORTANT

Since your video recorder memorizes all detected stations even if the reception condition is poor, some of those stored stations may produce a noisy picture. To delete those stations, 27 "Delete A Channel" on page 32.

### Manual Channel Set

Store channels that were not stored during Auto Set Up (27 pg. 4) or Auto Channel Set (27 pg. 30).

#### ACCESS TUNER SET SCREEN

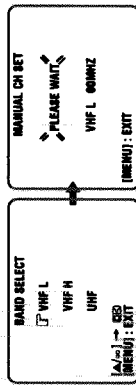
Perform steps 1 - 3 of "Auto Channel Set" on page 30.

#### ACCESS MANUAL CH SET SCREEN

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "MANUAL CH SET", then press **OK**.

#### SELECT BAND

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to the band of your choice, then press **OK** to initiate Manual Channel Set.



#### SET DESIRED STATION

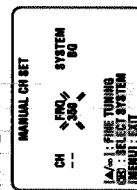
The screen to the right appears when a station is detected. To store the detected station, place the pointer next to "STORE" by pressing **PUSH JOG**  $\Delta$   $\nabla$ , then press **OK**. If you do not want to store the station, press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "CONTINUE", then press **OK**. Channel search will resume.

- The blueback screen and the TV picture currently being broadcast appear alternately for 8 seconds each.

#### PERFORM TUNING

For fine tuning adjustment, press **PUSH JOG**  $\Delta$   $\nabla$  until the picture becomes clearer, then press **OK**.

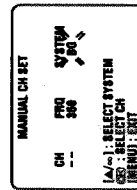
- The SYSTEM section will blink.



#### SELECT TV SYSTEM

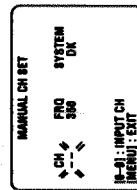
If you can see the picture but hear no audio, set "SYSTEM" to the appropriate TV system (6C or DK or I) by pressing **PUSH JOG**  $\Delta$   $\nabla$ , then press **OK**.

- The CH section will blink.



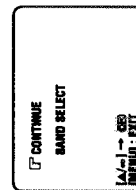
#### SELECT POSITION

Press **NUMBER** keys to input an open channel position in which you want to store the detected station (for a one-digit number, enter "0" first). Then press **OK**.



• To continue channel search, press **PUSH JOG**  $\Delta$   $\nabla$  to select "CONTINUE", then press **OK**. Repeat steps 4 - 7 as necessary.

- To set channels for other bands, press **PUSH JOG**  $\Delta$   $\nabla$  to select "BAND SELECT", then press **OK** to go back to the Band Select screen. Repeat steps 3 - 7.



#### RETURN TO NORMAL SCREEN

Press **MENU**.



## Delete A Channel

### ACCESS TUNER SET SCREEN

Perform steps 1 – 3 of "Auto Channel Set" on page 30.

### ACCESS CHANNEL LIST

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "CH EDIT", then press **OK**.

### SELECT CHANNEL

Press **PUSH JOG**  $\Delta$   $\nabla$  to until the channel you want to delete begins blinking.

| CH            | FREQ | SYN | CH | FREQ | SYN |
|---------------|------|-----|----|------|-----|
| 01            | 100  | 00  | 07 | 220  | 00  |
| 02            | 105  | 00  | 08 | 237  | 00  |
| 03            | 106  | 00  | 09 | 250  | 00  |
| 04            | 186  | 00  | 10 | 300  | 00  |
| 05            | 213  | 00  | 11 | 374  | 00  |
| 06            | 221  | 00  | 12 | 384  | 00  |
| [F4] : DELETE |      |     |    |      |     |
| [F5] : EDIT   |      |     |    |      |     |
| [MENU] : EXIT |      |     |    |      |     |

### DELETE CHANNEL

Press **<**.

- To re-store it, simply press **>**.
- Repeat steps 3 – 4 as necessary.

| CH | FREQ | SYN | CH | FREQ | SYN |
|----|------|-----|----|------|-----|
| 01 | 100  | 00  | 07 | 220  | 00  |
| 02 | 105  | 00  | 08 | 237  | 00  |
| 03 | 106  | 00  | 09 | 250  | 00  |
| 04 | 186  | 00  | 10 | 300  | 00  |
| 05 | 213  | 00  | 11 | 374  | 00  |
| 06 | 221  | 00  | 12 | 384  | 00  |

[F4] : ADD  
[F5] : EDIT  
[MENU] : EXIT

### RETURN TO NORMAL SCREEN

Press **MENU**.

## Swap Channel Positions

Example: To swap CH03 and CH09.

### ACCESS TUNER SET SCREEN

Perform steps 1 – 3 of "Auto Channel Set" on page 30.

### ACCESS CHANNEL LIST

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "CH EDIT", then press **OK**.

### SELECT POSITION (e.g. 03)

Press **PUSH JOG**  $\Delta$   $\nabla$  until the section of CH "03" begins blinking, then press **OK**.

- Only "03" will blink.

| CH | FREQ | SVS | CH | FREQ | SVS |
|----|------|-----|----|------|-----|
| 01 | 100  | 00  | 07 | 220  | 00  |
| 02 | 105  | 00  | 08 | 237  | 00  |
| 03 | 106  | 00  | 09 | 305  | 00  |
| 04 | 205  | 00  | 10 | 300  | 00  |
| 05 | 213  | 00  | 11 | 374  | 00  |
| 06 | 221  | 00  | 12 | 304  | 00  |

10-9: INPUT CH  
F5: FINE TUNING  
[MENU]: EXIT

### SELECT POSITION (e.g. 09)

Press **NUMBER** keys to input "0" and "9".

- The two selected channels will be swapped.
- To cancel the channel swapping, press **<**.

| CH | FREQ | SYN | CH | FREQ | SYN |
|----|------|-----|----|------|-----|
| 01 | 100  | 00  | 07 | 220  | 00  |
| 02 | 105  | 00  | 08 | 237  | 00  |
| 03 | 106  | 00  | 09 | 250  | 00  |
| 04 | 186  | 00  | 10 | 300  | 00  |
| 05 | 213  | 00  | 11 | 374  | 00  |
| 06 | 221  | 00  | 12 | 384  | 00  |

[F4]: CANCEL  
[F5]: FINE TUNING  
[MENU]: EXIT

### STORE NEW POSITIONS

Press **OK**.

- Repeat steps 3 – 5 as necessary.

### RETURN TO NORMAL SCREEN

Press **MENU**.

## Fine-Tuning Channels

### ACCESS TUNER SET SCREEN

Perform steps 1 – 3 of "Auto Channel Set" on page 30.

### ACCESS CHANNEL LIST

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "CH EDIT", then press **OK**.

### SELECT CHANNEL TO FINE-TUNE

Press **PUSH JOG**  $\Delta$   $\nabla$  until the channel you want to tune begins blinking, then press **OK** twice.

- The "FQ" number for that channel starts blinking.

| CH | FREQ | SYN | CH | FREQ | SYN |
|----|------|-----|----|------|-----|
| 01 | 100  | 00  | 07 | 220  | 00  |
| 02 | 105  | 00  | 08 | 237  | 00  |
| 03 | 106  | 00  | 09 | 250  | 00  |
| 04 | 186  | 00  | 10 | 300  | 00  |
| 05 | 213  | 00  | 11 | 374  | 00  |
| 06 | 221  | 00  | 12 | 384  | 00  |

[F4] : FINE TUNING  
[F5] : SELECT SYSTEM  
[MENU] : EXIT

### PERFORM TUNING

Press **PUSH JOG**  $\Delta$   $\nabla$  until the picture becomes clearer, then press **OK**.

- Repeat steps 3 and 4.

### RETURN TO NORMAL SCREEN

Press **MENU**.

## TV System Selection – When you see the picture but hear no audio

### ACCESS TUNER SET SCREEN

Perform steps 1 – 3 of "Auto Channel Set" on page 30.

### ACCESS CHANNEL LIST

Press **PUSH JOG**  $\Delta$   $\nabla$  to place the pointer next to "CH EDIT", then press **OK**.

### SELECT CHANNEL

Press **PUSH JOG**  $\Delta$   $\nabla$  until the channel you want to change its TV system begins blinking, then press **OK** three times.

- The "SYS" display for that channel starts blinking.

| CH                   | FREQ | SYN | CH | FREQ | SYN |
|----------------------|------|-----|----|------|-----|
| 01                   | 100  | 00  | 07 | 220  | 00  |
| 02                   | 105  | 00  | 08 | 237  | 00  |
| 03                   | 106  | 00  | 09 | 250  | 00  |
| 04                   | 186  | 00  | 10 | 300  | 00  |
| 05                   | 213  | 00  | 11 | 374  | 00  |
| 06                   | 221  | 00  | 12 | 384  | 00  |
| [F4] : SELECT SYSTEM |      |     |    |      |     |
| [F5] : EDIT          |      |     |    |      |     |
| [MENU] : EXIT        |      |     |    |      |     |

### SELECT TV SYSTEM

Press **PUSH JOG**  $\Delta$   $\nabla$  to select the appropriate TV system (BG  $\rightarrow$  DK  $\rightarrow$  I). Then press **OK**.

- Repeat steps 3 and 4 as necessary.

### RETURN TO NORMAL SCREEN

Press **MENU**.

## QUESTIONS AND ANSWERS



### RECORDING

**Q.** When I pause and then resume a recording, the end of the recording before the pause is overlapped by the beginning of the continuation of recording. Why does this happen?

**Q.** When I pause and then resume a recording, the end of the recording before the pause is overlapped by the beginning of the continuation of recording. Why does this happen?

**A.** This is normal. It reduces distortion at the pause and resume points.

**Q. What happens if the end of the tape is reached during playback or search?**

**Q. Q. Can the video recorder indefinitely remain in the still mode?**

**A.** No. It stops automatically after 5 minutes to protect the heads.

**Q2. During search, slow, still and frame-by-frame playback, I can't hear any audio. What's the problem?**

A. This is normal.

**Q. When returning from multi-speed search to normal playback, the picture is disturbed. Should I be concerned about this?**

**Q2. Noise bars appear during multi-speed search. What's the problem?**  
This is normal.

**Q. Other than preventing further recording, what effect does removing the Record Safety tab have?**

TV broadcast

**Q.** "O" and "E" remain lit on the display panel. Is there a problem?

**A.** No. This is a normal condition for a timer recording in progress.

**Q. Can I program the timer while I'm watching a tape or a TV broadcast?**  
**A.** You won't see the picture as it is replaced by the on-screen menu, but the audio from the program or tape you're viewing can be heard.

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**A.** You won't see the picture as it is replaced by the on-screen menu, but the audio from the program or tape you're viewing can be heard.

**ATTENTION:** This recorder contains microcomputers. External electronic noise or interference could cause malfunctioning. In such cases, switch the recorder off and unplug the mains power cord. Then plug it in again and turn the recorder on. Take out the cassette. After checking the cassette, operate the unit as usual.

Before requesting service for a problem, use this chart and see if you can repair the trouble yourself. Small problems are often easily corrected, and this can save you the trouble of sending your video recorder off for repair.

| POWER                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYMPTOM                                                                          | POSSIBLE CAUSE                                                                                                                                                                                                                                                                                                                                                                                        | CORRECTIVE ACTION                                                                                                                                                                                                                                                          |
| 1. No power is applied to the recorder.                                          | <ul style="list-style-type: none"> <li>The mains power cord is disconnected.</li> </ul>                                                                                                                                                                                                                                                                                                               | Connect the mains power cord.                                                                                                                                                                                                                                              |
| 2. The clock is functioning properly, but the recorder cannot be powered.        | <ul style="list-style-type: none"> <li>"D" is displayed on the display panel with Auto Timer set to "Off".</li> </ul>                                                                                                                                                                                                                                                                                 | Press the <b>TIMER</b> button to turn the "D" indicator off.                                                                                                                                                                                                               |
| 3. The remote control won't function.                                            | <ul style="list-style-type: none"> <li>The batteries are discharged.</li> <li>The remote control is set to the wrong code.</li> <li>The remote control is set to the wrong operating mode.</li> </ul>                                                                                                                                                                                                 | Replace the dead batteries with new ones. (c27 pg. 25).<br>Press the appropriate button (TV or VCR) depending on the unit you want to operate. (c27 pg. 34).                                                                                                               |
| TAPE TRANSPORT                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                            |
| SYMPTOM                                                                          | POSSIBLE CAUSE                                                                                                                                                                                                                                                                                                                                                                                        | CORRECTIVE ACTION                                                                                                                                                                                                                                                          |
| 1. The tape does not run during recording.                                       | <ul style="list-style-type: none"> <li>"00" is displayed on the display panel.</li> </ul>                                                                                                                                                                                                                                                                                                             | Press <b>PLAY</b> to turn the "00" indicator off.                                                                                                                                                                                                                          |
| 2. The tape stops during rewind or fast-forward.                                 | <ul style="list-style-type: none"> <li>"M" is displayed on the display panel.</li> </ul>                                                                                                                                                                                                                                                                                                              | Press <b>C.MEMORY</b> to deactivate the Counter Memory function and turn the "M" indicator off.                                                                                                                                                                            |
| 3. The tape will not rewind or fast-forward.                                     | <ul style="list-style-type: none"> <li>The tape is already fully rewound or fast-forwarded.</li> </ul>                                                                                                                                                                                                                                                                                                | Check the cassette.                                                                                                                                                                                                                                                        |
| PLAYBACK                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                            |
| SYMPTOM                                                                          | POSSIBLE CAUSE                                                                                                                                                                                                                                                                                                                                                                                        | CORRECTIVE ACTION                                                                                                                                                                                                                                                          |
| 1. The playback picture does not appear while the tape is running.               | <ul style="list-style-type: none"> <li>If you're using the RF OUT connection ...               <ul style="list-style-type: none"> <li>... set the TV receiver's channel selector to not set to the VIDEO channel.</li> <li>... the recorder's VIDEO channel has not been correctly set.</li> </ul> </li> <li>If you're using the AV connection, the TV receiver is not set to the AV mode.</li> </ul> | If you are using the RF OUT connection ... <ul style="list-style-type: none"> <li>... set the TV receiver to the VIDEO channel. (c27 pg. 5)</li> <li>... Perform "Video Channel Set" (c27 pg. 5)</li> </ul> If you are using the AV connection, set the TV to its AV mode. |
| 2. Noise appears during visual search.                                           | <ul style="list-style-type: none"> <li>This is normal.</li> </ul>                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                            |
| 3. Noise appears during normal playback.                                         | <ul style="list-style-type: none"> <li>The automatic tracking mode is engaged.</li> </ul>                                                                                                                                                                                                                                                                                                             | Try manual tracking. (c27 pg. 12)                                                                                                                                                                                                                                          |
| 4. Noise appears during slow-motion playback.                                    | <ul style="list-style-type: none"> <li>The automatic tracking mode is engaged.</li> </ul>                                                                                                                                                                                                                                                                                                             | Try manual tracking. (c27 pg. 12)                                                                                                                                                                                                                                          |
| 5. Noise appears during still playback.                                          | <ul style="list-style-type: none"> <li>The video heads may be dirty.</li> </ul>                                                                                                                                                                                                                                                                                                                       | Press <b>TV PROG</b> + or - a few times to remove the noise bars from the screen. Consult your JVC dealer.                                                                                                                                                                 |
| 6. The playback picture is blurred or interrupted while TV broadcasts are clear. | <ul style="list-style-type: none"> <li>The wrong colour system is selected for the tape being played back.</li> </ul>                                                                                                                                                                                                                                                                                 | Select the correct colour system by pressing the <b>COLOUR SYSTEM</b> button. (c27 pg. 28)                                                                                                                                                                                 |
| 7. Playback picture has a loss of colour.                                        | <ul style="list-style-type: none"> <li>The wrong colour system was selected during recording.</li> </ul>                                                                                                                                                                                                                                                                                              | Once recorded, the signal cannot be corrected. Be sure to choose the correct setting before recording.                                                                                                                                                                     |
| 8. No sound accompanies the playback picture.                                    | <ul style="list-style-type: none"> <li>The TV system you have selected at the TV System Select screen is incorrect.</li> </ul>                                                                                                                                                                                                                                                                        | Set it to the correct position for the TV broadcast system used in your area. (c27 pg. 7)                                                                                                                                                                                  |

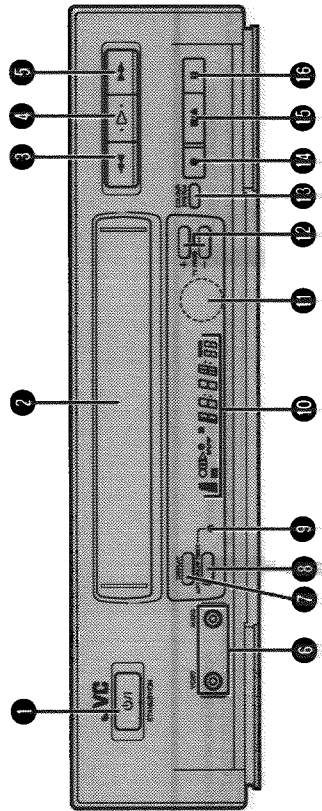
| RECORDING                                                                                            |                                                                                                                                                                                                                                          |                                                                                                                                                |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| SYMPTOM                                                                                              | POSSIBLE CAUSE                                                                                                                                                                                                                           | CORRECTIVE ACTION                                                                                                                              |
| 1. Recording cannot be started.                                                                      | <ul style="list-style-type: none"> <li>There is no cassette loaded, or the cassette loaded has had its Record Safety tab removed.</li> </ul>                                                                                             | Insert a cassette, or using adhesive tape, reseat the slot where the tab was removed.                                                          |
| 2. TV broadcasts cannot be recorded.                                                                 | <ul style="list-style-type: none"> <li>"AU" has been selected as the input mode.</li> </ul>                                                                                                                                              | Set to the desired channel.                                                                                                                    |
| 3. Tape-to-tape editing is not possible.                                                             | <ul style="list-style-type: none"> <li>The source (another video recorder, camcorder) has not been properly connected.</li> <li>All necessary power switches have not been turned on.</li> <li>The input mode is not correct.</li> </ul> | Confirm that the source is properly connected.<br>Confirm that all units' power switches are turned on.<br>Set the input mode to "AU".         |
| 4. Camcorder recording is not possible.                                                              | <ul style="list-style-type: none"> <li>The camcorder has not been properly connected.</li> <li>The input mode is not correct.</li> </ul>                                                                                                 | Confirm that the camcorder is properly connected.<br>Set the input mode to "AU".                                                               |
| TIMER RECORDING                                                                                      |                                                                                                                                                                                                                                          |                                                                                                                                                |
| SYMPTOM                                                                                              | POSSIBLE CAUSE                                                                                                                                                                                                                           | CORRECTIVE ACTION                                                                                                                              |
| 1. Timer recording won't work.                                                                       | <ul style="list-style-type: none"> <li>The clock and/or the timer have been set incorrectly.</li> <li>The timer is not engaged.</li> </ul>                                                                                               | Re-perform the clock and/or timer settings.<br>Press <b>TIMER</b> and confirm that "D" is displayed on the display panel.                      |
| 2. On-screen timer programming is not possible.                                                      | <ul style="list-style-type: none"> <li>Timer recording is in progress.</li> </ul>                                                                                                                                                        | Timer programming can't be performed while a timer recording is in progress. Wait until it finishes.                                           |
| 3. "D" and "00" on the display panel won't stop blinking.                                            | <ul style="list-style-type: none"> <li>The timer is engaged but there's no cassette loaded.</li> </ul>                                                                                                                                   | Load a cassette with the Record Safety tab intact, or cover the hole using adhesive tape.                                                      |
| 4. The cassette is automatically ejected, and "D" and "00" on the display panel won't stop blinking. | <ul style="list-style-type: none"> <li>The loaded cassette has had its Record Safety tab removed.</li> </ul>                                                                                                                             | Remove the cassette and cover the hole with adhesive tape, or insert a cassette with the Record Safety tab intact.                             |
| 5. "D" blinks for 10 seconds and the Timer mode is disengaged.                                       | <ul style="list-style-type: none"> <li>TIMER has been pressed when there are no programs in memory, or the timer record information has been programmed incorrectly.</li> </ul>                                                          | Check the programmed data and re-program as necessary, then press <b>TIMER</b> again.                                                          |
| 6. The cassette is automatically ejected, the power shuts off and "D" and "00" won't stop blinking.  | <ul style="list-style-type: none"> <li>The end of the tape was reached during timer recording.</li> </ul>                                                                                                                                | The programme may not have been recorded in its entirety. Next time make sure you have enough time on the tape to record the entire programme. |
| 7. (HR-1249EE only) ShowView does not timer-record properly.                                         | <ul style="list-style-type: none"> <li>The recorder's channel positions have been set incorrectly.</li> </ul>                                                                                                                            | Refer to "ShowView Setup" and re-perform the procedure (c27 pg. 16).                                                                           |

## OTHER PROBLEMS

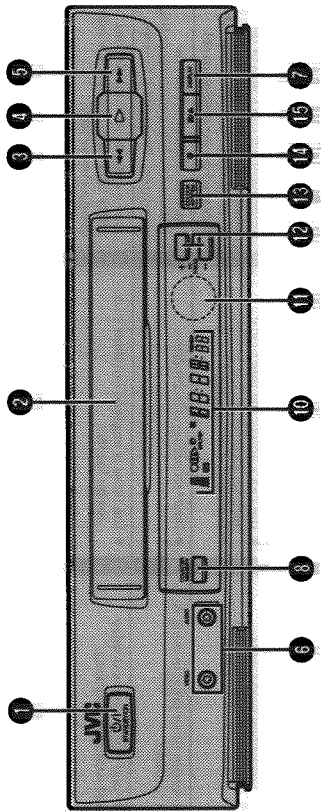
| SYMPTOM                                                                          | POSSIBLE CAUSE                                                                                                                             | CORRECTIVE ACTION                                                                                                                                                                         |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Whistling or howling is heard from the TV during camcorder recording.         | <ul style="list-style-type: none"> <li>The camcorder's microphone is too close to the TV.</li> <li>The TV's volume is too high.</li> </ul> | Position the camcorder so its microphone is away from the TV. Turn the TV's volume down.                                                                                                  |
| 2. When scanning channels, some of them are skipped over.                        | <ul style="list-style-type: none"> <li>Those channels have been designated to be skipped.</li> </ul>                                       | If you need the skipped channels, restore them (⇨ pg. 31).                                                                                                                                |
| 3. The channel cannot be changed.                                                | <ul style="list-style-type: none"> <li>Recording is in progress.</li> </ul>                                                                | Press <b>PAUSE</b> to pause the recording, change channel, then press <b>PLAY</b> to resume recording.<br>Perform manual setting again.                                                   |
| 4. Channel settings that were made manually seem to have changed or disappeared. | <ul style="list-style-type: none"> <li>After the manual settings were made, Auto Channel Set was performed.</li> </ul>                     |                                                                                                                                                                                           |
| 5. No channels are stored in the recorder's memory.                              | <ul style="list-style-type: none"> <li>The TV aerial cable was not connected to the recorder when Auto Set Up was performed.</li> </ul>    | Connect the TV aerial cable to the recorder properly and turn off the recorder power once, then turn the recorder power back on again. The recorder will try Auto Set Up again (⇨ pg. 4). |
| 6. "E" is displayed on the front display panel after a power outage.             | <ul style="list-style-type: none"> <li>The lithium battery is exhausted.</li> </ul>                                                        | Replace the lithium battery with a new one. (⇨ pg. 5)                                                                                                                                     |

FRONT VIEW  
[J448/249/248EE]

(J448EE shown)



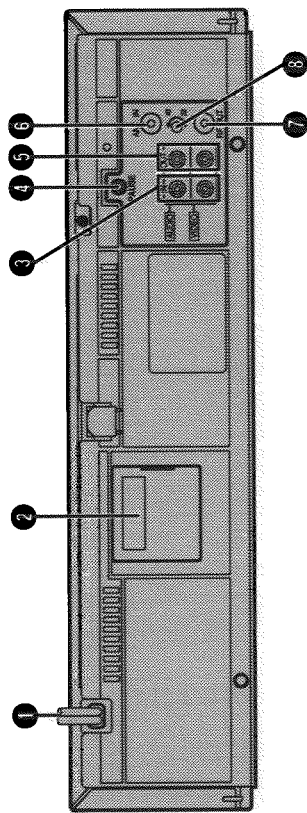
## [J245EE]



- 1. STANDBY/ON  $\psi$ /I Button ⇨ pg. 4
- 2. Cassette Loading Slot
- 3. Rewind [REW] Button ⇨ pg. 10
- 4. PLAY Button ⇨ pg. 10
- 5. Fast Forward [FF] Button ⇨ pg. 10
- 6. VIDEO/AUDIO Input Connectors ⇨ pg. 27
- 7. DISPLAY Button ⇨ pg. 15
- 8. AUTO SP/LP TIMER Button ⇨ pg. 23 [HR-J448EE]
- 9. COUNTER MEMORY Button ⇨ pg. 13 [HR-J249/248/245EE]

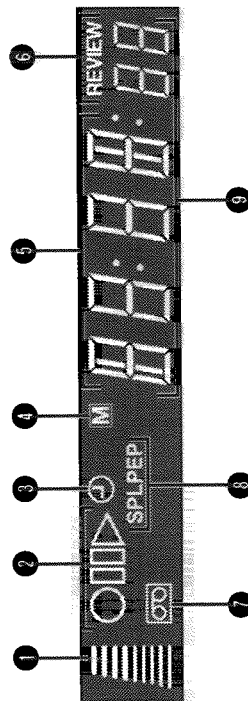
- 10. AUTO SP/LP TIMER Indicator ⇨ pg. 23 [HR-J448EE only]
- 11. Display Panel ⇨ pg. 40
- 12. Infrared Beam Receiving Window
- 13. TV PROG +/- Buttons ⇨ pg. 14
- 14. COLOUR SYSTEM Button ⇨ pg. 28
- 15. RECORD Button ⇨ pg. 14
- 16. STOP/EJECT Button ⇨ pg. 10
- 17. PAUSE Button ⇨ pg. 11 [HR-J448/249/248EE only]

## REAR VIEW



- 1 Mains Power Cord [pg. 3](#)
- 2 Lithium Battery Compartment [pg. 5](#)
- 3 VIDEO/AUDIO Input Connectors [pg. 26, 27](#)
- 4 VIDEO/AUDIO Output Connectors [pg. 3, 26](#)
- 5 ANT. IN Connector [pg. 3](#)
- 6 RF OUT Connector [pg. 3](#)
- 7 Remote PAUSE Connector [pg. 27](#)
- 8 RF Output Channel Adjustment Screw [pg. 5](#)  
(HR-1448EE only)

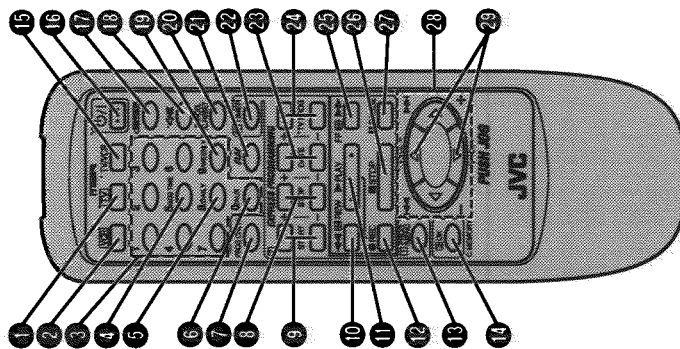
## DISPLAY PANEL



- 1 B.E.S.T. Picture System Display [pg. 16](#)
- 2 Symbolic Mode Indicators
- 3 Channel/Mode Display [pg. 14](#)  
\*Channel position 1 will be displayed as "CH 1".
- 4 Clock Display [pg. 8](#)
- 5 Instant REVIEW Indicator [pg. 13](#)
- 6 "Cassette Loaded" Mark
- 7 Tape Speed Indicators [pg. 14](#)
- 8 Counter Display [pg. 15](#)
- 9 "Timer" Indicator [pg. 23](#)
- Counter Memory Indicator [pg. 13](#)

|                                             |                 |                          |
|---------------------------------------------|-----------------|--------------------------|
| PLAY:<br>FF/REW VARIABLE<br>SHUTTLE SEARCH: | STILL:<br>SLOW: | RECORD:<br>RECORD PAUSE: |
| ▶                                           | ▶               | ▶                        |

## REMOTE CONTROL



- 1 TV Button [pg. 34](#)
- 2 VCR Button [pg. 14](#)
- 3 NUMBER Keys [pg. 14](#)
- 4 ADD TIME Button [pg. 20](#)
- 5 DAILY Button [pg. 23](#)
- 6 AUX Button [pg. 26](#)
- 7 PROG CHECK Button [pg. 24](#)
- 8 STOP +/- Button [pg. 22](#)
- 9 START +/- Button [pg. 22](#)
- 10 Rewind [REW] Button [pg. 10](#)
- 11 Play Button [pg. 10](#)
- 12 Record Button [pg. 14](#)
- 13 PROG/MENU Button [pg. 6, 22](#)
- 14 OK Button [pg. 8](#)
- 15 C. MEMORY Button [pg. 13](#)
- 16 TV/VCR Button [pg. 34](#)
- 17 POWER  $\psi$ /i Button [pg. 4](#)
- 18 REVIEW Button [pg. 13](#)
- 19  $\triangleleft$ /MUTE (TV Mute) Button [pg. 34](#)
- 20 WEEKLY Button [pg. 23](#)
- 21 CANCEL Button [pg. 24](#)
- 22 C. RESET Button [pg. 13](#)
- 23 SP/EP Button [pg. 14](#)
- 24 TIMER Button [pg. 23](#)
- 25 DATE +/- Button [pg. 22](#)
- 26 TV PROG +/- Button [pg. 14](#)
- 27 Fast Forward [FF] Button [pg. 10](#)
- 28 Stop Button [pg. 10](#)
- 29 Pause Button [pg. 11](#)
- 30 PUSH JOG  $\Delta$   $\nabla$   $\triangleleft$   $\triangleright$  Button [pg. 6](#)
- 31 PUSH JOG  $\triangleleft$   $\triangleright$  Button [pg. 11, 13](#)
- 32 TV VOL  $\Delta$   $\nabla$  Button [pg. 34](#)

## How To Use

The remote control can operate most of your video recorder's functions, as well as basic functions of JVC sets of JVC and other brands ([pg. 34](#)).

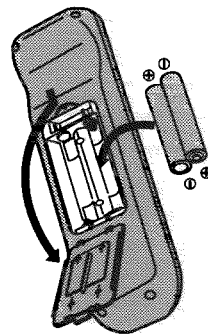
- Point the remote control toward the sensor window.
- The maximum operating distance of the remote control is about 8 m.

## NOTE:

If the remote control doesn't work properly, remove its batteries, wait a short time, replace the batteries and then try again.

## Installing Batteries

- 1 Open the battery compartment cover.
- 2 Insert 2 "RG/UM-3"-size batteries (provided) in the correct directions.
- 3 Replace the cover.



**GENERAL**

|                             |                                                    |
|-----------------------------|----------------------------------------------------|
| Power requirement           | : AC 110 – 240 V~, 50/60 Hz                        |
| Rating                      | : AC 90 – 260 V~, 50/60 Hz                         |
| Power consumption           | : 18W                                              |
| Temperature                 | : 5°C to 40°C                                      |
| Operating                   | : -20°C to 60°C                                    |
| Storage                     | : Horizontal only                                  |
| Operating position          | : 400 x 94 x 273 mm                                |
| Dimensions (WxHxD)          | : 400 x 94 x 276 mm                                |
| J245EE                      | : 3.3 kg                                           |
| Weight                      | : VHS standard                                     |
| Format                      | : 240 min. with E-240 video cassette (PAL/MESECAM) |
| Maximum recording time (SP) | : 160 min. with T-160 video cassette (NTSC)        |
| (LP) [J448EE only]          | : 480 min. with E-240 video cassette (PAL/MESECAM) |
| (EP) [J448EE only]          | : 480 min. with T-160 video cassette (NTSC)        |

**VIDEO/AUDIO**

|                       |                                                                          |
|-----------------------|--------------------------------------------------------------------------|
| Signal system         | : PAL-type colour signal and CCIR monochrome signal, 625 lines 50 fields |
|                       | : NTSC colour and EIA monochrome signals, 525 lines/60 fields            |
| Recording system      | : DA-4 (Double Azimuth) head helical scan system [J448EE]                |
|                       | : Rotary two-head helical scan system [J249/248/245EE]                   |
| Signal-to-noise ratio | : 45 dB                                                                  |
| Horizontal resolution | : 250 lines (PAL/MESECAM)                                                |
|                       | : 220 lines (NTSC)                                                       |
| Frequency range       | : 70 Hz to 10,000 Hz                                                     |
| Input/Output          | : RCA connectors (IN x 2, OUT x 1)                                       |

**TUNER/TIMER**

|                             |                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------|
| TV channel storage capacity | : 99 positions (+AUX position "AU")                                                                  |
| Tuning system               | : Frequency synthesized tuner                                                                        |
| Channel coverage            | : VHF (Low) 42 – 175MHz (High) 175 – 470MHz                                                          |
| Aerial output               | : UHF 470 – 870MHz                                                                                   |
| Memory backup time          | : UHF channels (Adjustable E32 – E40)                                                                |
|                             | : Approx. 6 months. Estimated figure based on supplied fresh battery; actual performance may differ. |

**ACCESSORIES**

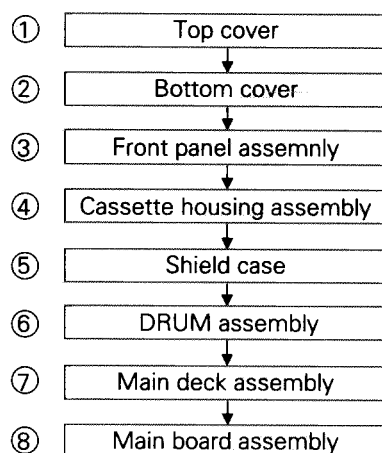
|                      |                                                                                         |
|----------------------|-----------------------------------------------------------------------------------------|
| Provided accessories | : RF cable, Infrared remote control unit, "R6/UM-3" battery x 2, Lithium battery CR2025 |
|----------------------|-----------------------------------------------------------------------------------------|

Specifications shown are for SP mode unless otherwise specified.  
Design and specifications subject to change without notice.

# SECTION 1 DISASSEMBLY

## 1.1 DISASSEMBLY FLOW CHART

This flowchart lists the disassembling steps for the cabinet parts and P.C. boards in order to gain access to item(s) to be serviced. When reassembling, perform the step(s) in reverse order. Bend, route and dress the flat cables as they were originally laid.



## 1.2 HOW TO READ THE DISASSEMBLY AND ASSEMBLY

| STEP /LOC NO. | PART NAME                 | FIG. NO. | POINT                           | NOTE     |
|---------------|---------------------------|----------|---------------------------------|----------|
| ①             | TOP COVER                 | D1       | 3(S1)                           |          |
| ②             | BOTTOM COVER              | D2       | 2(L1),3(L2),7(L3)               | <NOTE 1> |
| ③             | FRONT PANEL ASSEMBLY      | D3       | 7(L4)                           | <NOTE 2> |
| ④             | CASSETTE HOUSING ASSEMBLY | D4       | 2(S2),2(S3)                     | <NOTE 3> |
| ⑤             | SHIELD CASE               | D5       | 2(S4), *CN1                     |          |
| ⑥             | DRUM ASSEMBLY             | D6       | 3(S5),WR1,(L5), HEAD CLEANER    | <NOTE 4> |
| ⑦             | MAIN DECK ASSEMBLY        | D7       | 2(S6),WR2,WR3, WR4(CN703),2(L6) | <NOTE 5> |
| ⑧             | MAIN BOARD ASSEMBLY       | D8       | 4(L7), 4(S7), *CN706            |          |

- (1) Order of steps in Procedure  
When reassembling, perform the step(s) in the reverse order. These numbers are also used as the identification (location) NO. of parts Figures.
- (2) Part name to be removed or installed.
- (3) Fig.No. showing procedure or part location
- (4) Identification of part to be removed,unhooked,unlocked, released,unplugged,unclamped or unsoldered. P = Spring, W = Washer, S = Screw, L = Locking tab, \* = Unhook,unlock, release,unplug or unsolder.
- (5) Adjustment information for installation

## 1.3 DISASSEMBLY/ASSEMBLY METHOD

| STEP /LOC NO. | PART NAME                 | FIG. NO. | POINT                           | NOTE    |
|---------------|---------------------------|----------|---------------------------------|---------|
| ①             | TOP COVER                 | D1       | 3(S1)                           |         |
| ②             | BOTTOM COVER              | D2       | 2(L1),3(L2),7(L3)               | <NOTE1> |
| ③             | FRONT PANEL ASSEMBLY      | D3       | 7(L4), *CN1201                  | <NOTE2> |
| ④             | CASSETTE HOUSING ASSEMBLY | D4       | 2(S2), 2(S3)                    | <NOTE3> |
| ⑤             | SHIELD CASE               | D5       | 2(S4), *CN1                     |         |
| ⑥             | DRUM ASSEMBLY             | D6       | 3(S5),WR1,(L5) HEAD CLEANER     | <NOTE4> |
| ⑦             | MAIN DECK ASSEMBLY        | D7       | 2(S6),WR2,WR3, WR4,*CN703,2(L6) | <NOTE5> |
| ⑧             | MAIN BOARD ASSEMBLY       | D8       | 3(L7), 4(S7), *CN706            |         |

<NOTE1>

Loosen the 3 screws (Mark : ) first, then remove the bottom cover.

<NOTE2>

When reattaching the front panel assembly, make sure that the door opener of the cassette housing assembly is lowered in position prior to the reinstallation.

<NOTE3>

When reattaching the cassette housing assembly, pay careful attention to the switch lever not to make it touch the REC switch knob of the MAIN board assembly from the upside. (If the REC switch knob of the MAIN board assembly is damaged, cassette loading is impossible.)

<NOTE4>

When plugging the connector in, check that the flat wire is inserted properly and fully.

<NOTE5>

- When removing the Main deck assembly only, unhook the two spacers connecting it with the Main board assembly with pliers from the back side of the Main board assembly first, and then remove the Main deck assembly.
- When reattaching the Main deck assembly to the Main board assembly, make sure to set the spacers into the retaining slots respectively.

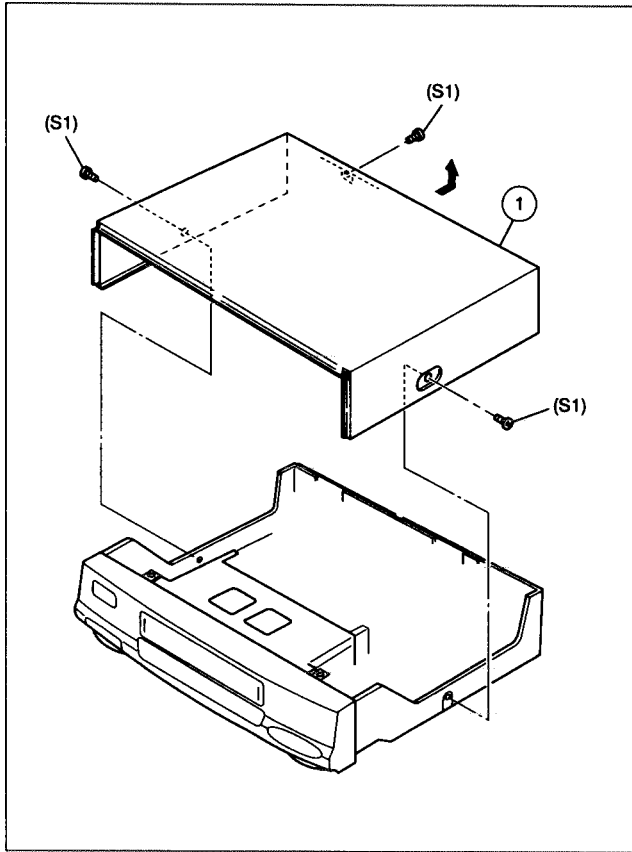


Fig. D1

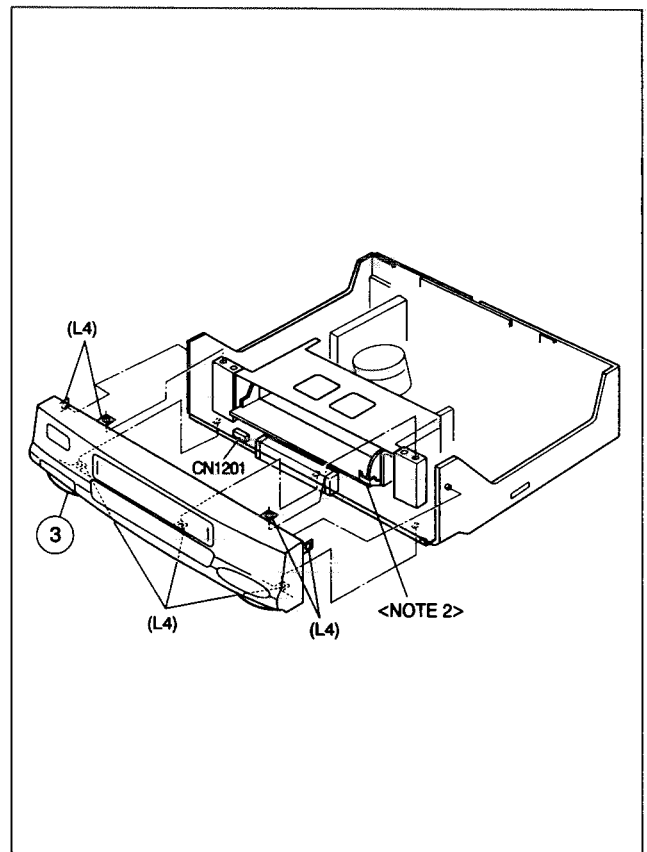


Fig. D3

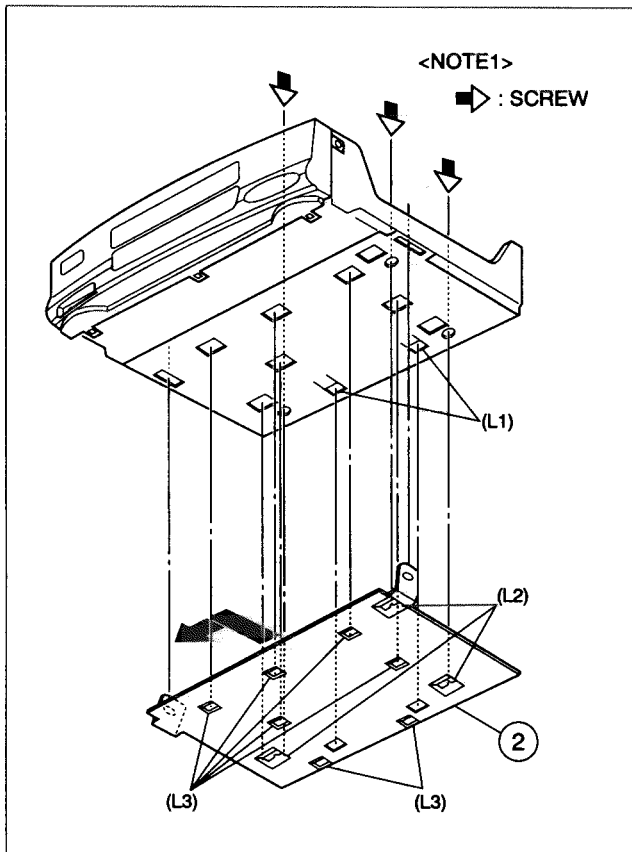


Fig. D2

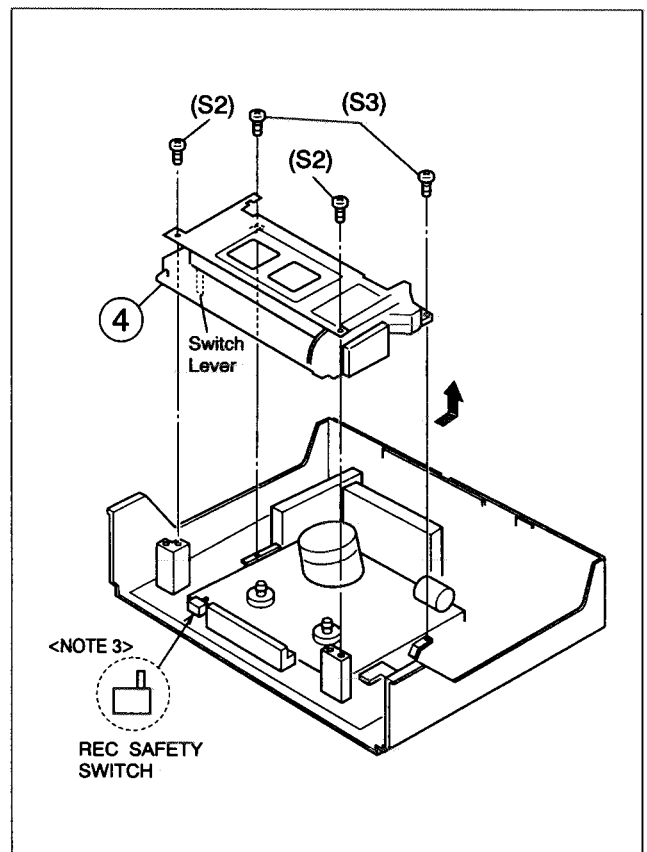


Fig. D4

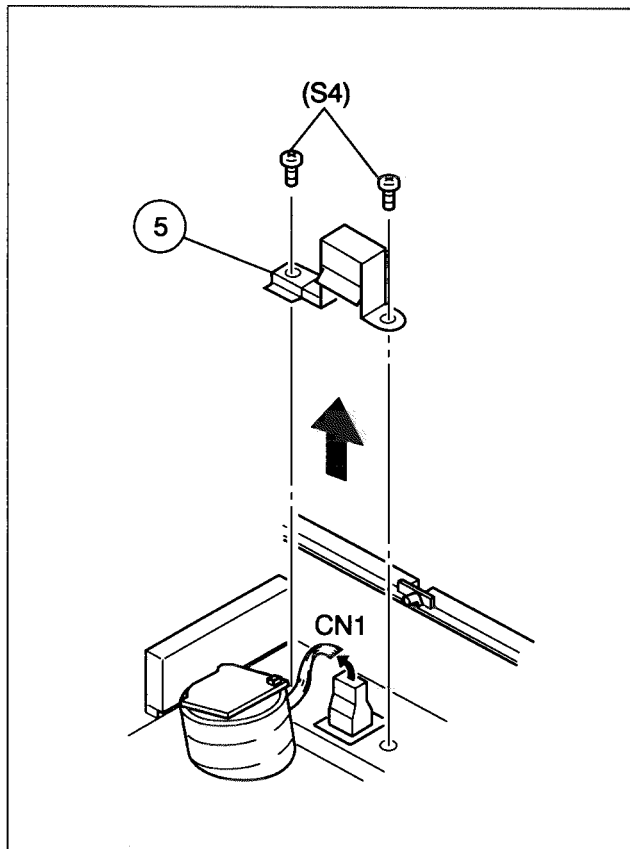


Fig. D5

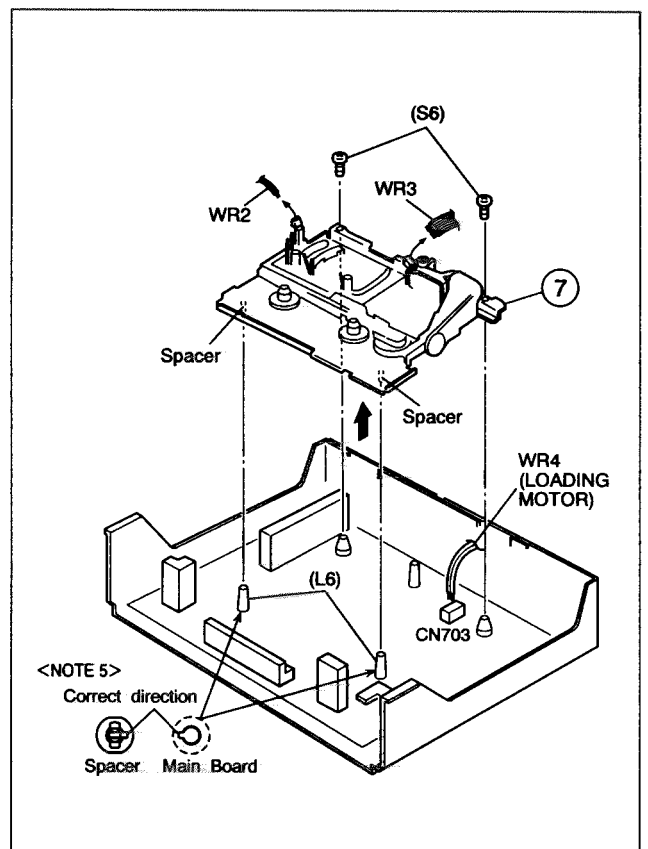


Fig. D7

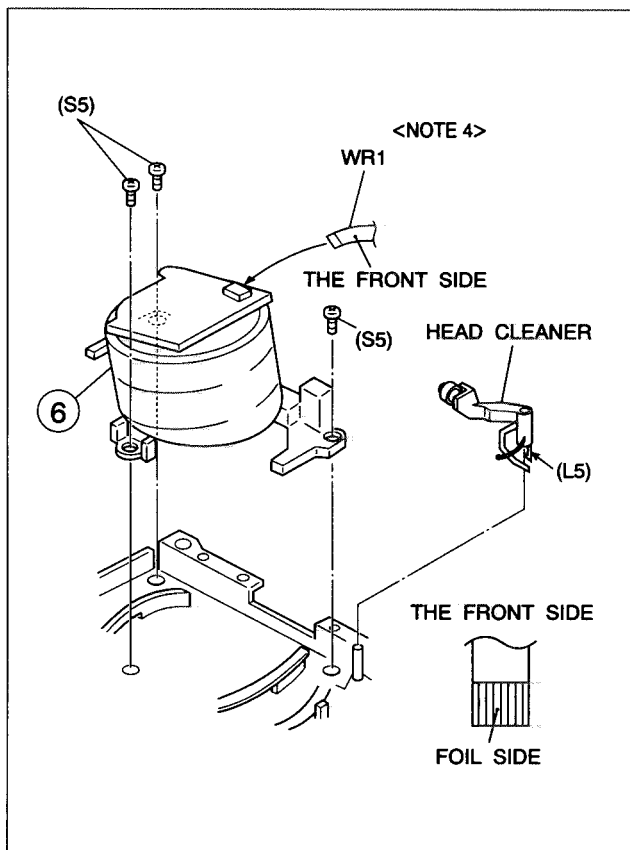


Fig. D6

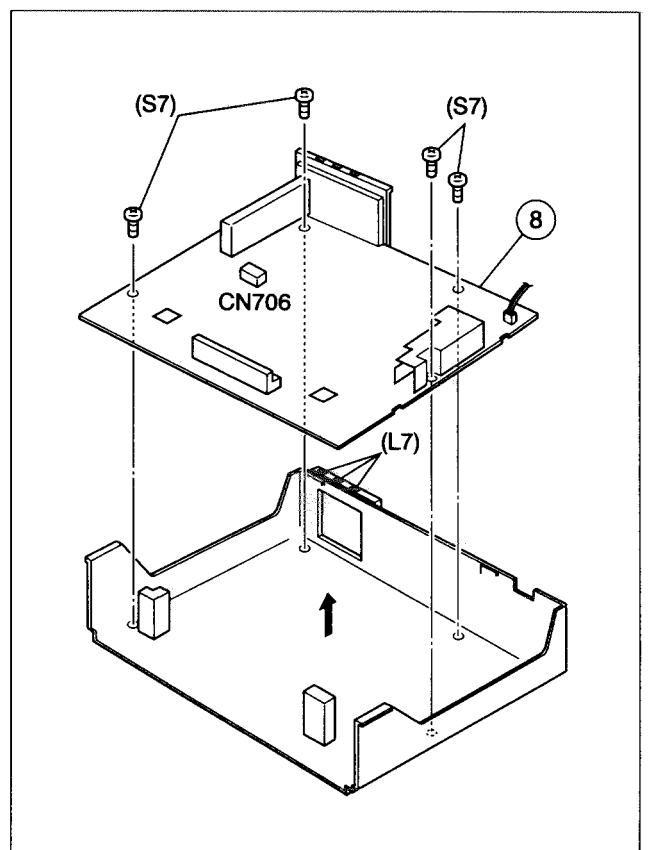


Fig. D8

## 1.4 CASSETTE HOUSING INSTALLATION

**NOTE:** Observe the mechanical phase and position (see figure) when installing the cassette housing assembly. If these are incorrect, the system will not operate properly even when tape is inserted.

- (1) Check that the hole of the control cam are aligned to the deck hole. If necessary, turn the loading motor belt by hand to adjust the position.

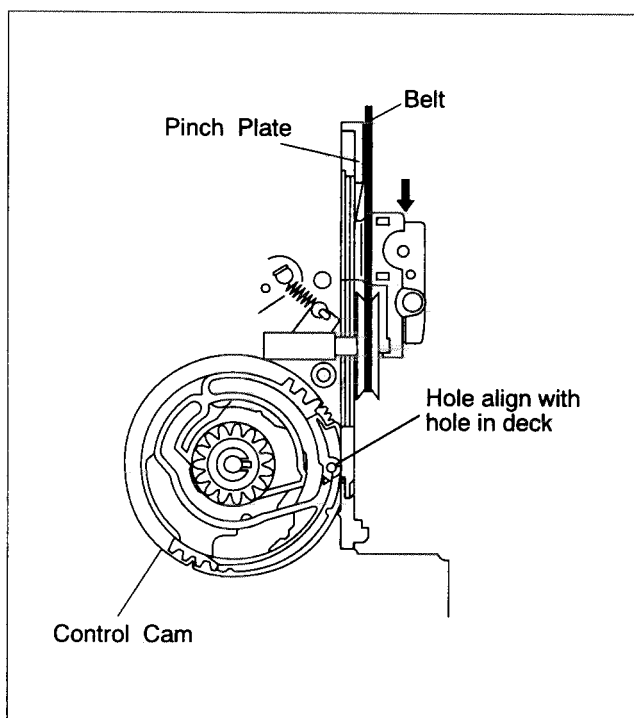


Fig. 1-4-1

## 1.5 SERVICE POSITION

### 1.5.1 How to take out the Mechanism and Main board assemblies.

- (1) Remove the Top cover and Front panel assembly.
- (2) Take out 2 screws (B) and 2 screws (C) as shown in Fig.1-5-1.

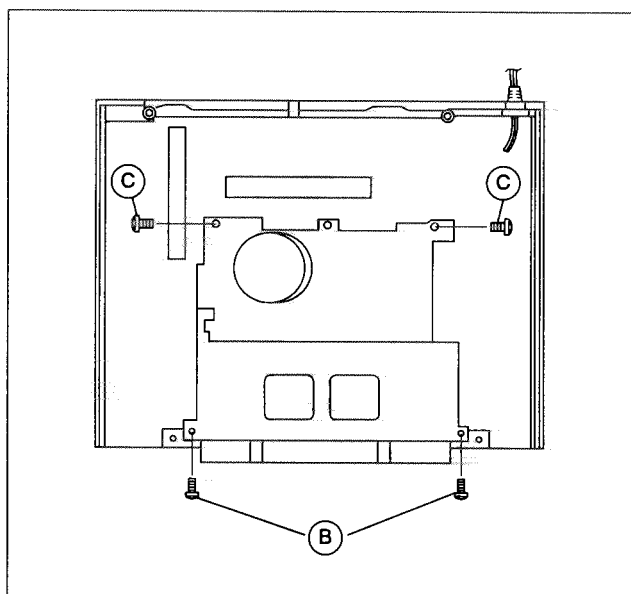


Fig. 1-5-1

- (3) Take out 4 screws (A).
- (4) Remove the Mechanism assembly (including Cassette housing) and Main board assembly out of the chassis as shown in Fig. 1-5-2.

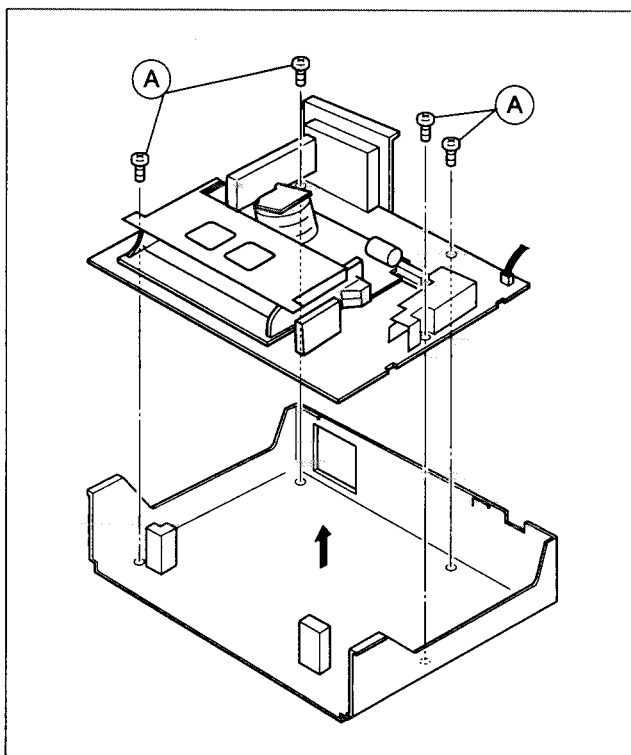


Fig. 1-5-2

- (5) Turn over the Mechanism assembly and Main board assembly.
- (6) Carry out checks & repairs as necessary as shown in Fig.1-5-3.

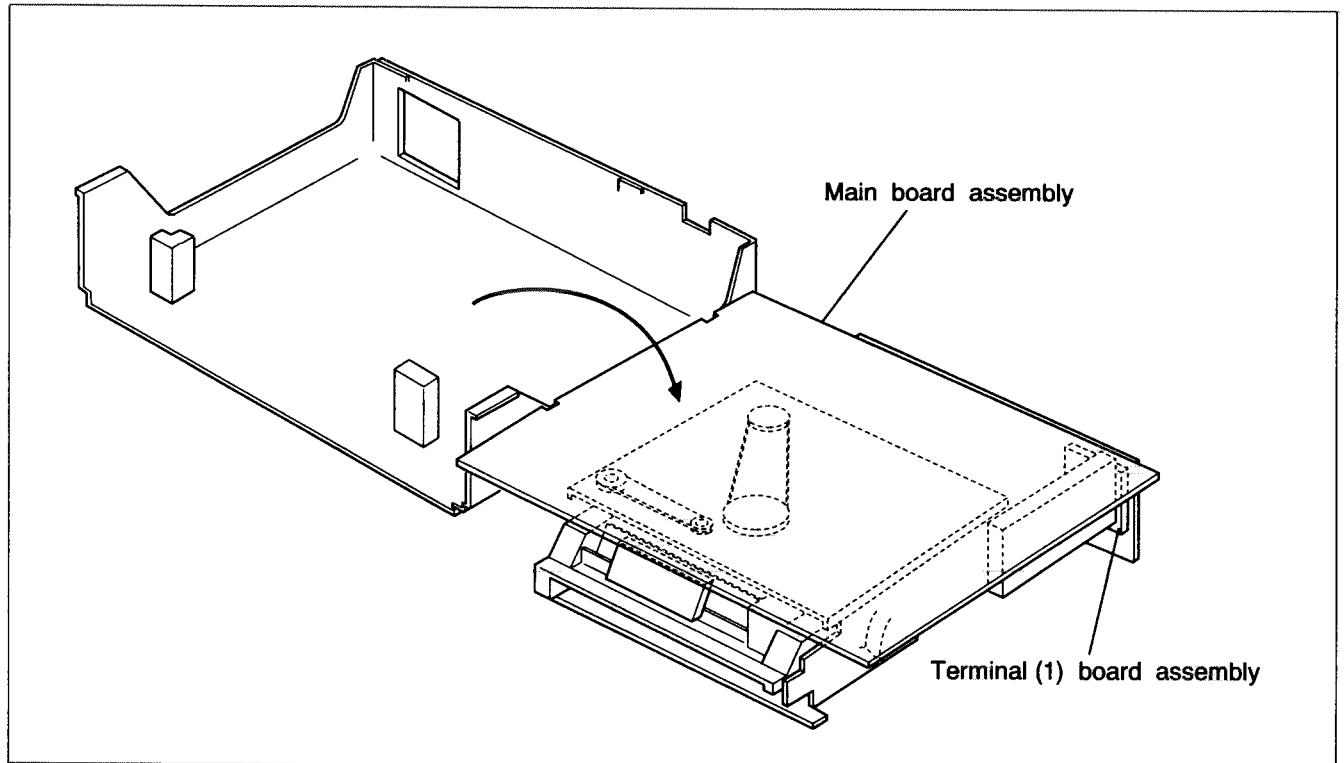


Fig. 1-5-3

### 1.5.2 Opening on the chassis.

The chassis assembly has openings for easy access to the checkpoints and connector pins as shown in Fig.1-5-4.

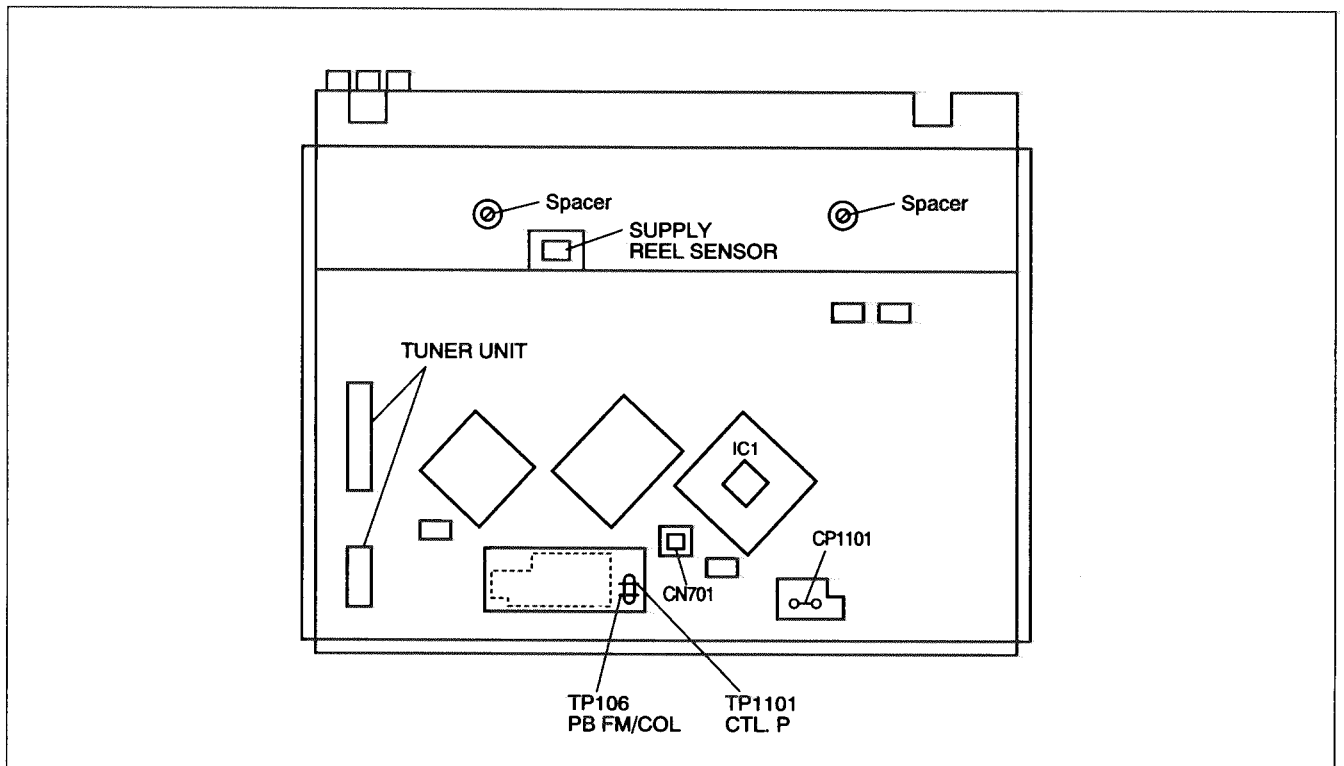


Fig. 1-5-4

## 1.6 MECHANISM SERVICE MODE

This model has a unique function to enter the mechanism into every operation mode without loading of any cassette tape. This function is called the "MECHANISM SERVICE MODE".

### 1.6.1 How to set the "MECHANISM SERVICE MODE"

- (1) Disconnect VCR from AC.
- (2) Remove the Top cover, Front panel assembly and cassette housing assembly. (See Page 1-2, 1-3)

- (3) Connect TP1202 (GND) and TP1201 (TEST) on the Main board assembly with a jump wire.
- (4) Connect VCR to AC.
- (5) Press the POWER button.
- (6) Select the desired operation modes with the operation buttons or remote controller.

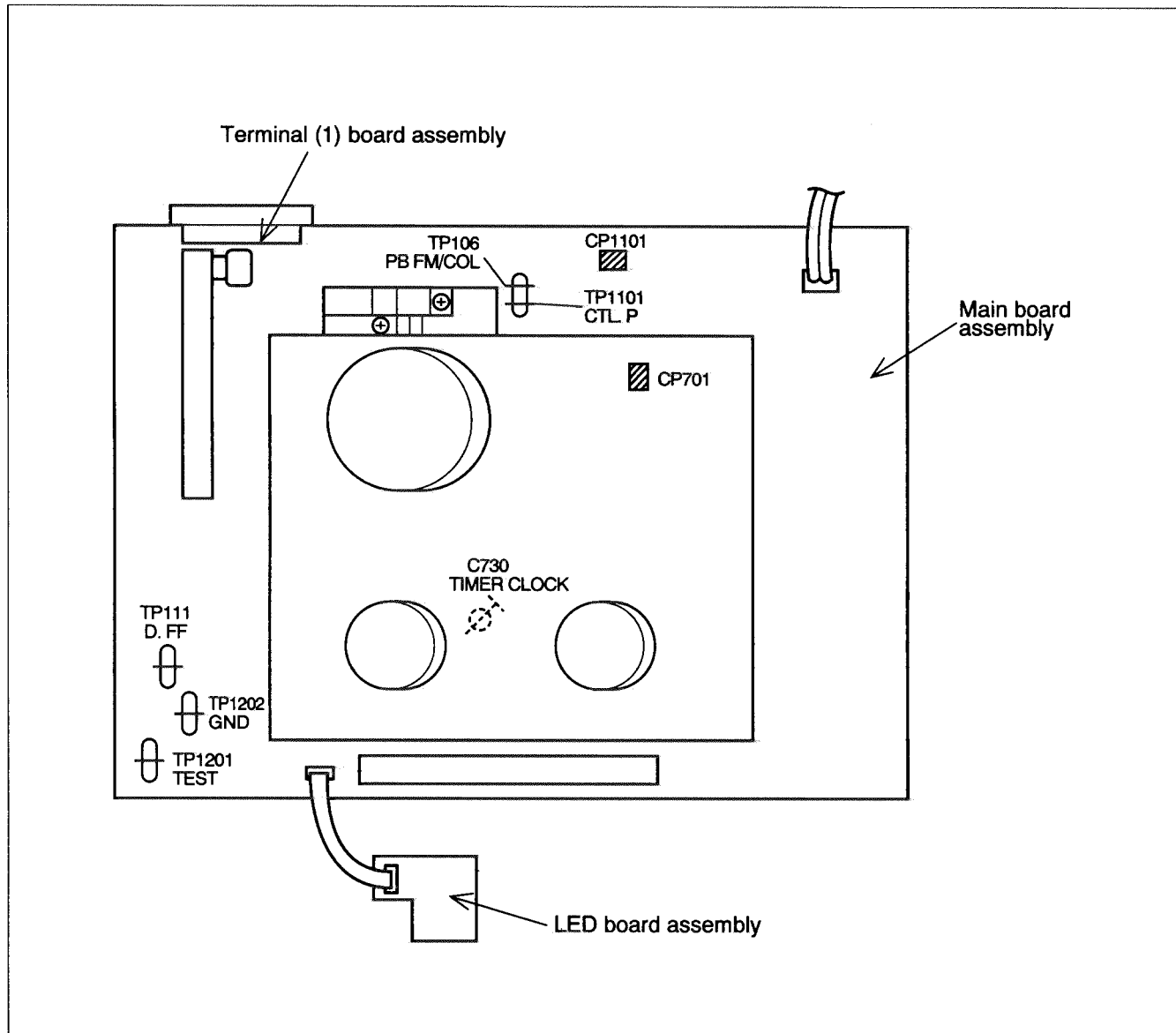


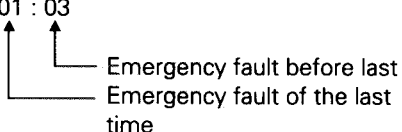
Fig. 1-6-1

## 1.7 EMERGENCY DISPLAY FUNCTION

This product has the function to store the last two previous emergency faults which can be displayed in the FDP when servicing.

### 1.7.1 How to display record of an emergency faults

- (1) Press 'N' button of the presetting unit more than 2 seconds, and the two previous emergency faults are shown in the FDP.
- (2) Press 'N' button of the presetting unit again when return the normal mode.

[Example] E : 01 : 03  


[Example] E : — : — : — ← No record of emergency

### 1.7.3 How to clear emergency record

Press the COUNTER RESET button on the remote controller in the emergency record display mode, and the record of the emergency fault(s) is cleared.

### 1.7.2 Detail of emergency faults

| FDP    | Symptom                                                               | Detect mode                             | Resulting mode   |
|--------|-----------------------------------------------------------------------|-----------------------------------------|------------------|
| E : 01 | Loading motor rotates for more than 4 Sec without shift to next mode. | Loading                                 | POWER OFF        |
| E : 02 | Loading motor rotates for more than 4 Sec without shift to next mode. | Unloading                               | POWER OFF        |
| E : 03 | SUP/TU REEL FG input is absent (for more 4 Sec)                       | REC/PLAY/FF/REW<br>SEARCH FF/SEARCH REW | STOP → POWER OFF |
| E : 04 | DRUM FF input is absent(for more 3 Sec)                               | REC/PLAY/FF/REW<br>SEARCH FF/SEARCH REW | STOP             |
| E : 05 | (NOT USED)                                                            | —                                       | —                |
| E : 06 | CAPSTAN FG input is absent(for more 1 Sec)                            | REC/PLAY/FF/REW<br>SEARCH FF/SEARCH REW | STOP → POWER OFF |
| E : 07 | No SWD5V/12V                                                          | POWER ON                                | POWER OFF        |

Table 1-7-1 EMERGENCY FAULTS

## **SECTION 2**

### **MECHANISM ADJUSTMENT**

PMC 0011A-E or PMC 0011A-M is used in these model.

For the MECHANISM ADJUSTMENT and PARTS LIST, please refer to the MECHANISM ASSEMBLY of the Service Manual (No. 82595).

## SECTION 3 ELECTRICAL ADJUSTMENT

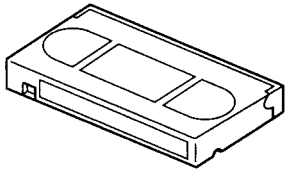
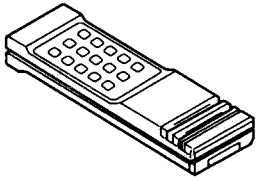
### 3.1 PRECAUTION

Electrical adjustment are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also do not attempt these adjustments unless the proper equipments is available.

#### 3.1.1 Required test equipment

- ① Colour television or monitor
- ② Oscilloscope: wide-band,dual-trace,triggered delayed sweep
- ③ Frequency counter
- ④ Digital voltmeter
- ⑤ Signal generator: RF/IF sweep/maker
- ⑥ Signal generator: PAL colour bar, stairstep
- ⑦ Recording tape
- ⑧ Numeric remote controller(provided)

#### 3.1.2 Required adjustment tools

|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Alignment tape<br>(SP,stairstep)<br>MHPE                                            | Presetting unit<br>PTU940008                                                        |
|  |  |

#### 3.1.3 Colour bar signal, colour bar pattern

##### ● Colour bar signal

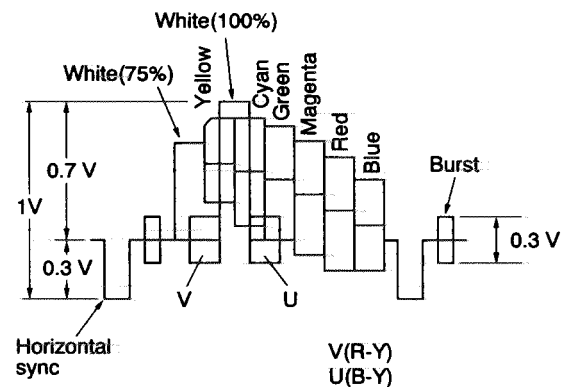


Fig.3-1-1 Colour bar signal waveform

##### ● Colour bar pattern

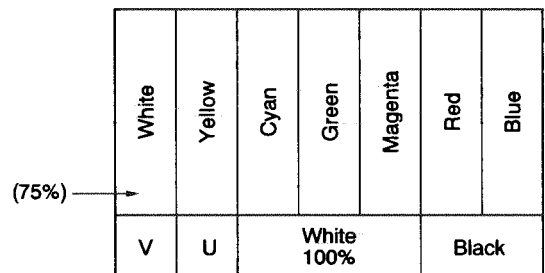


Fig.3-1-2 Colour bar pattern

### 3.2 SERVO CIRCUIT

**Notes:**

- Unless otherwise specified, all measurement point and adjustment parts are located on the MAIN BOARD.
- Set VCR to the mode A by remote controller.
- Use only buttons "O", depressing other buttons during adjustment may cause adjustment errors.

#### 3.2.1 PB switching point

|                   |                                    |
|-------------------|------------------------------------|
| Signal            | • Alignment tape [MHPE], Stairstep |
| Mode              | • PB                               |
| Equipment         | • Oscilloscope                     |
| Measurement point | • VIDEO OUT TERMINAL               |
| Trigger slope (-) | • TP111 (DRUM FF)                  |
| Adjustment tool   | • Presetting unit [PTU94008]       |
| Specification     | • $6.5 \pm 0.5H$                   |

- (1) Connect an oscilloscope to VIDEO OUT TERMINAL and external trigger from TP111 (negative slope).
- (2) Playback the stairstep signal of the alignment tape.
- (3) Press the "O" button of the presetting unit.
- (4) The adjustment is performed automatically.  
Once the adjustment is performed, the VCR will go into the STOP mode.

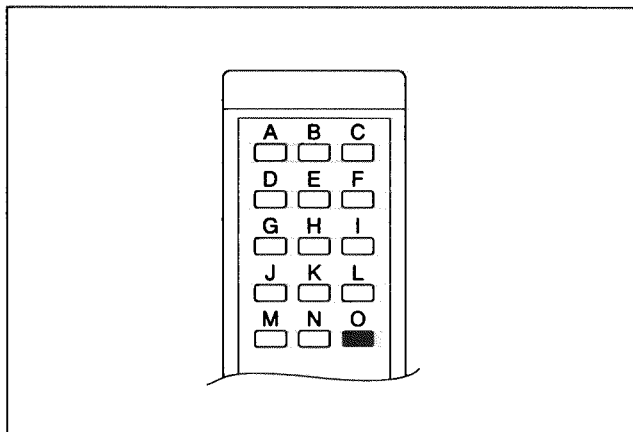


Fig.3-2-1 Presetting unit

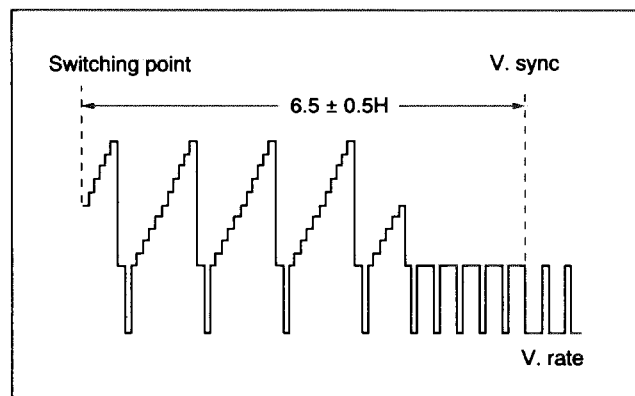


Fig.3-2-2 PB switching point

#### 3.2.2 Slow tracking preset

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| Signal          | • Tuner or colour bar                               |
| Mode            | • SP/LP : PAL<br>• SP/EP : NTSC<br>• REC → PB(SLOW) |
| Equipment       | • TV-Monitor                                        |
| Adjustment tool | • Presetting unit [PTU94008]                        |
| Specification   | • Minimum noise                                     |

**Note :** Set VCR to the mode A by remote controller.  
Use only buttons "B" and "C", depressing other buttons during adjustment may cause adjustment errors.

- (1) Record a PAL colour bar signal in the SP mode.
- (2) Playback recorded signal on the FWD slow mode.
- (3) Observe the display on the TV monitor and adjust for optimum noise condition (best tracking) by depressing "B" or "C" buttons of the presetting unit.
- (4) Depress the STOP button.
- (5) Confirm that the bar noise is not visible on the TV monitor in the slow mode.
- (6) Repeat steps (2) to (5) in the LP mode.
- (7) Repeat steps (1) to (6) in the NTSC mode.

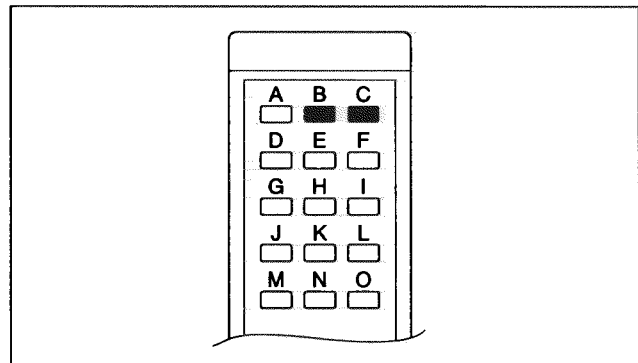


Fig.3-2-3 Presetting unit

### 3.3 VIDEO CIRCUIT

**Notes:**

- Unless otherwise specified, all measurement point and adjustment parts are located on the MAIN BOARD.
- Set VCR to the mode A by remote controller.

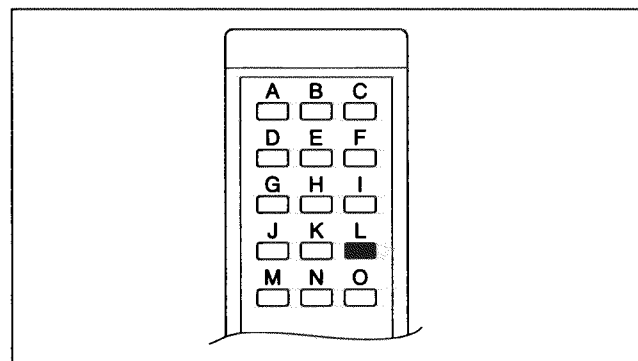


Fig.3-3-1 Presetting unit

### 3.3.1 Auto picture

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
| Signal          | • Monoscope                                                      |
| Mode            | • BEST : OFF<br>• REC then PB<br>• SP/LP : PAL<br>• SP/EP : NTSC |
| Adjustment tool | • Presetting unit[PTU94008]                                      |
| Specification   | • STOP mode                                                      |

- (1) Set the B.E.S.T feature to OFF on MENU screen.
- (2) Record a monoscope signal in the SP mode.
- (3) Playback the recorded signal.
- (4) Press the "L" button of the presetting unit during playback.
- (5) Confirm that VCR will go into the STOP mode.
- (6) Repeat steps (2) to (5) in the LP mode.
- (7) Repeat steps (2) to (6) in the NTSC mode.

### 3.4 SYSCON CIRCUIT

**Notes:**

- Unless otherwise specified, all measurement point and adjustment parts are located on the MAIN BOARD.
- When perform this adjustment, remove the MECHANISM assembly.

#### 3.4.1 Timer clock

|                   |                                                        |
|-------------------|--------------------------------------------------------|
| Signal            | • No signal                                            |
| Mode              | • EE                                                   |
| Equipment         | • Frequency counter                                    |
| Measurement point | • TP702 round(SYS.CLK)                                 |
| Adjustment part   | • C730 (TIMER CLOCK)                                   |
| Specification     | • 8192.057 ~ 8192.075 Hz<br>[122.0692 ~ 122.0695 usec] |

- (1) Connect the frequency counter to TP702 round and GND.
- (2) Connect the short wire between TP701 round and Vcc(5V).
- (3) Short the leads of capacitor C709 once in order to reset IC701.
- (4) Disconnect the short wire then connect it again quickly.
- (5) Adjust C730 for 8192.057 ~ 8192.075 Hz.  
(122.0692 ~ 122.0695 usec)

## SECTION 4 CHARTS AND DIAGRAMS

### NOTES OF SCHEMATIC DIAGRAM

#### Safety precautions

The Components identified by the symbol  are critical for safety. For continued safety, replace safety critical components only with manufacturer's recommended parts.

#### 1. Units of components on the schematic diagram

Unless otherwise specified.

- 1) All resistance values are in ohm, 1/6 W, 1/8 W (refer to parts list).  
Chip resistors are 1/16 W.  
K: K $\Omega$  (1000 $\Omega$ ), M: M $\Omega$  (1000K $\Omega$ )
- 2) All capacitance values are in  $\mu$ F, (P: PF).
- 3) All inductance values are in  $\mu$ H, (m: mH).
- 4) All diodes are 1SS133, MA165 or IN4148M (refer to parts list).

#### 2. Indications of control voltage

AUX : Active only at high

AUX or AUX(L) : Active at low

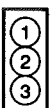
#### 3. Interpreting Connector Indications



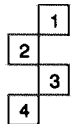
Removable connector



Wire soldered directly on board



Non-removable Board connector



Board to Board



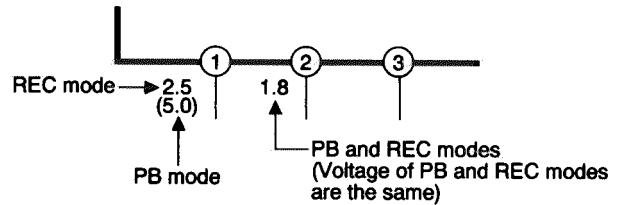
Connected pattern on board

#### 4. Voltage measurement

- 1) Video circuits  
REC : Colour bar signal in SP mode, normal VHS mode  
PB : Alignment tape, colour bar SP mode, normal VHS mode  
— : Unmeasurable or unnecessary to measure
- 2) Audio circuits  
REC : 1KHz, -8 dBs sine wave signal in SP mode, Normal VHS mode  
PB : REC then playback it
- 3) Movie Camera circuits  
Measured using a correctly illuminated gray scale or colour bar test charts in the E-E mode

#### 4) Indication on schematic diagram

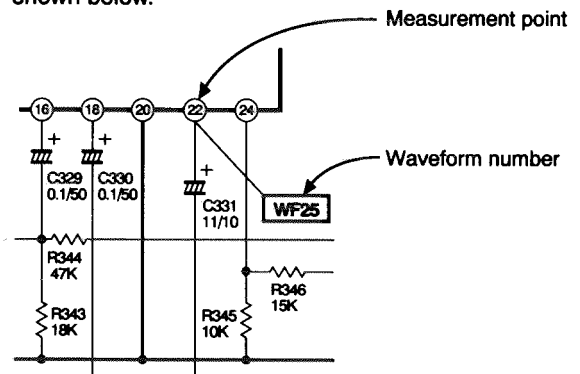
Voltage Indications for REC and PB mode on the schematic diagram are as shown below.



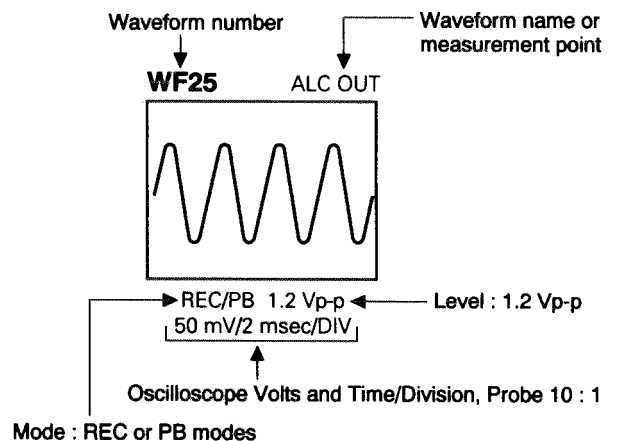
**Note:** If the voltages are not indicated on the schematic diagram, refer to the voltage charts.

#### 5. Waveform measurement

- 1) Video circuits  
REC : Colour bar signal in SP mode, normal VHS mode  
PB : Alignment tape, colour bar SP mode, normal VHS mode
- 2) Audio circuits  
REC : 1KHz, -8 dBs sine wave signal in SP mode, normal VHS mode  
PB : REC then playback it
- 3) Movie Camera circuits  
Measured using a correctly illuminated gray scale or colour bar test charts in the E-E mode
- 4) Indication on schematic diagram  
Waveform indications on the schematic diagram are as shown below.



#### 5) Waveform indications



## 6. Signal path Symbols

The arrows indicate the signal path as follows.

-  Playback signal path
-  Playback and recording signal path
-  Recording signal path (including E-E signal path)
-  Capstan servo path
-  Drum servo path

(Example)

-  R-Y Playback R-Y signal path
-  Y Recording Y signal path

## 7. Indication of the parts for adjustments

The parts for the adjustments are surrounded with the circle as shown below.



## 8. Indication of the parts not mounted on the circuit board

"OPEN" is indicated by the parts not mounted on the circuit board.



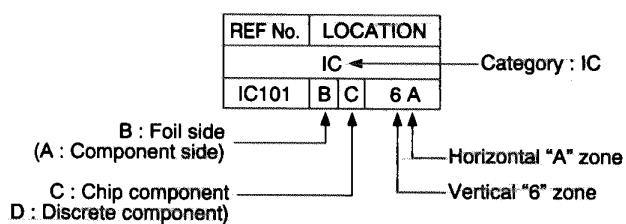
## CIRCUIT BOARD NOTES

### 1. Foil and Component sides

- 1) Foil side (B side) :  
Parts on the foil side seen from foil face (pattern face) are indicated.
- 2) Component side (A side) :  
Parts on the component side seen from component face (parts face) indicated.

### 2. Parts location guides

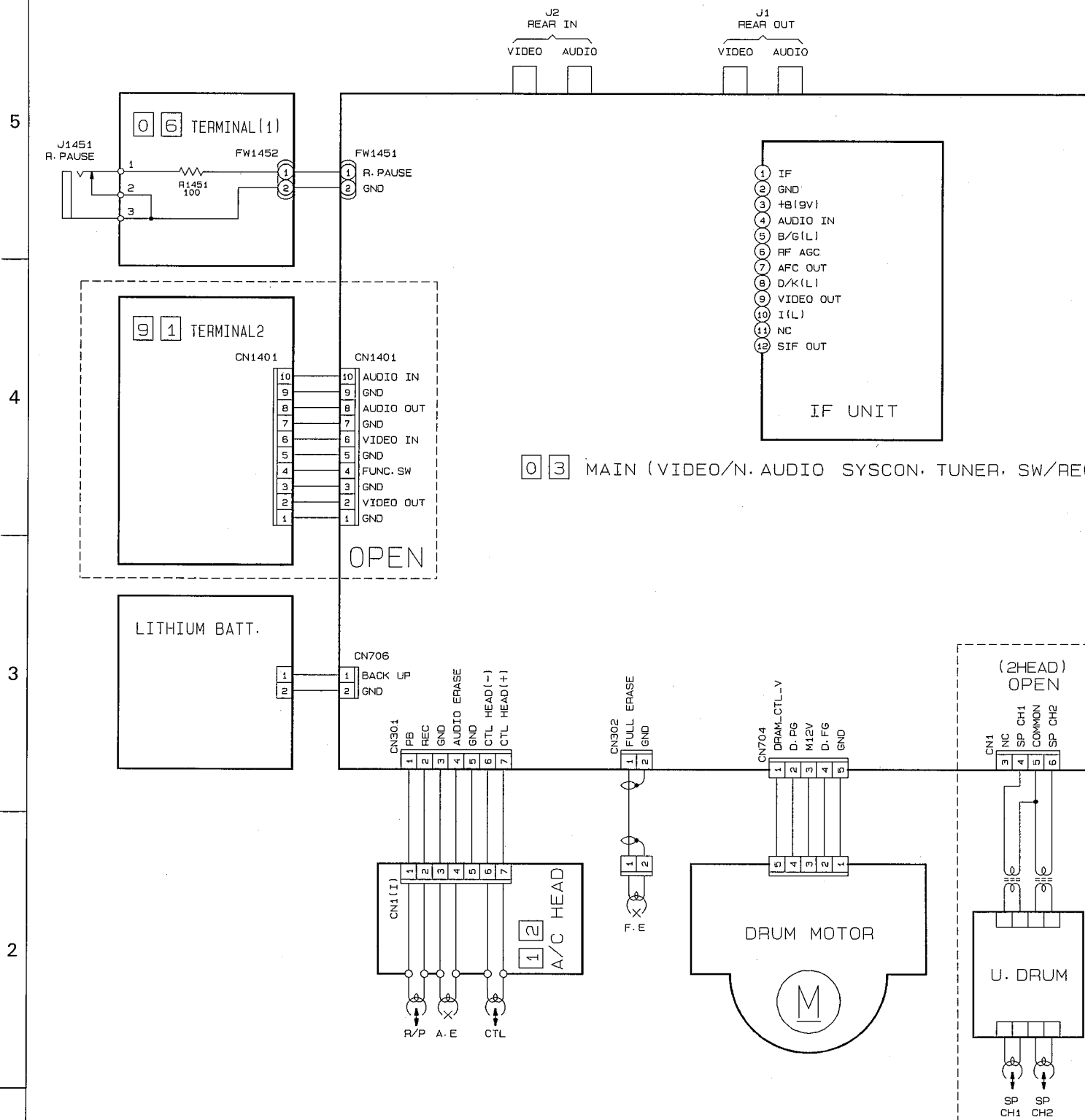
Parts location are indicated by guide scale on the circuit board.



### Note:

For general information in service manual, please refer to the Service Manual of GENERAL INFORMATION Edition 4 No. 82054D (January 1994).

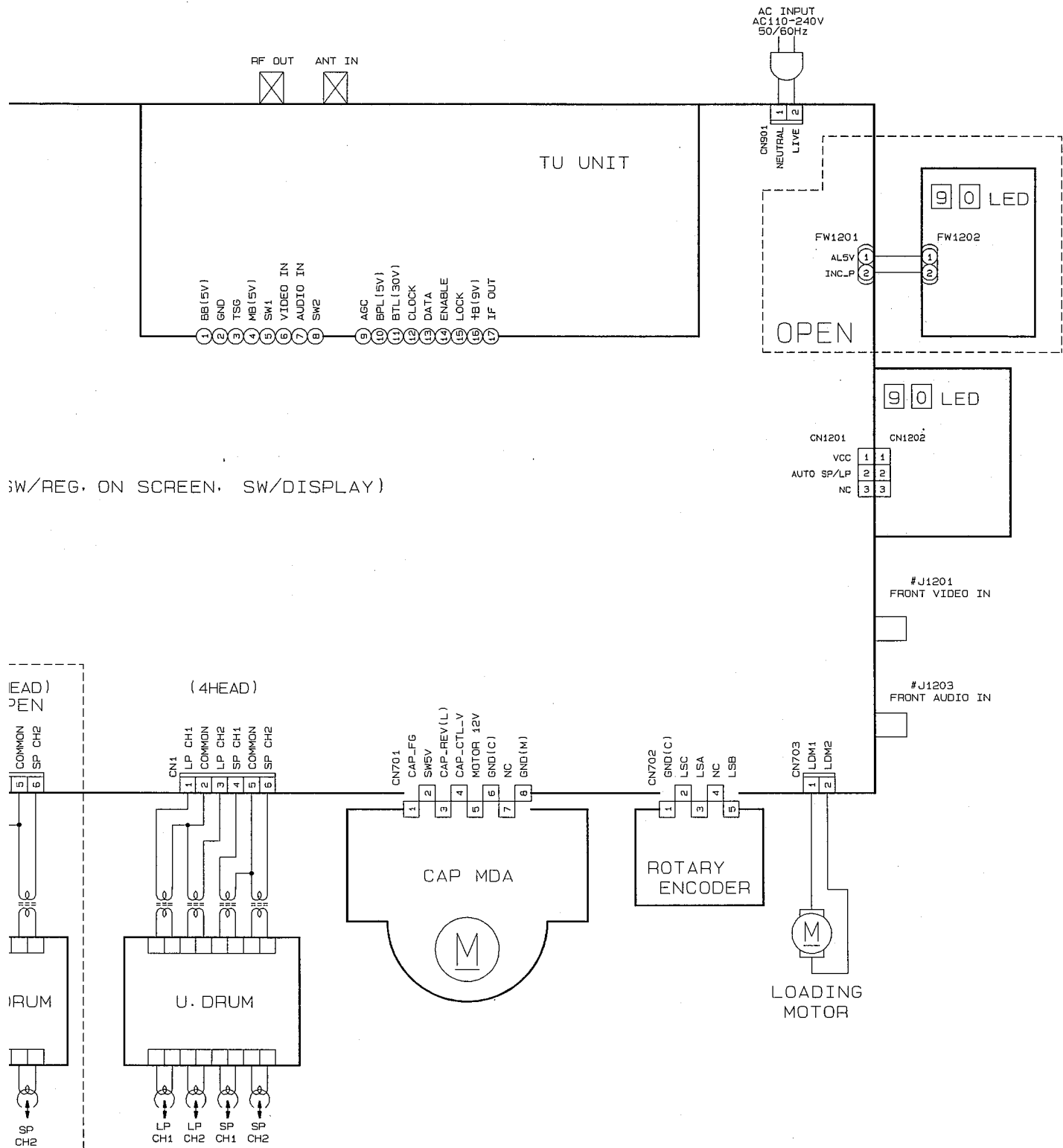
## 4.1 BOARD INTERCONNECTIONS



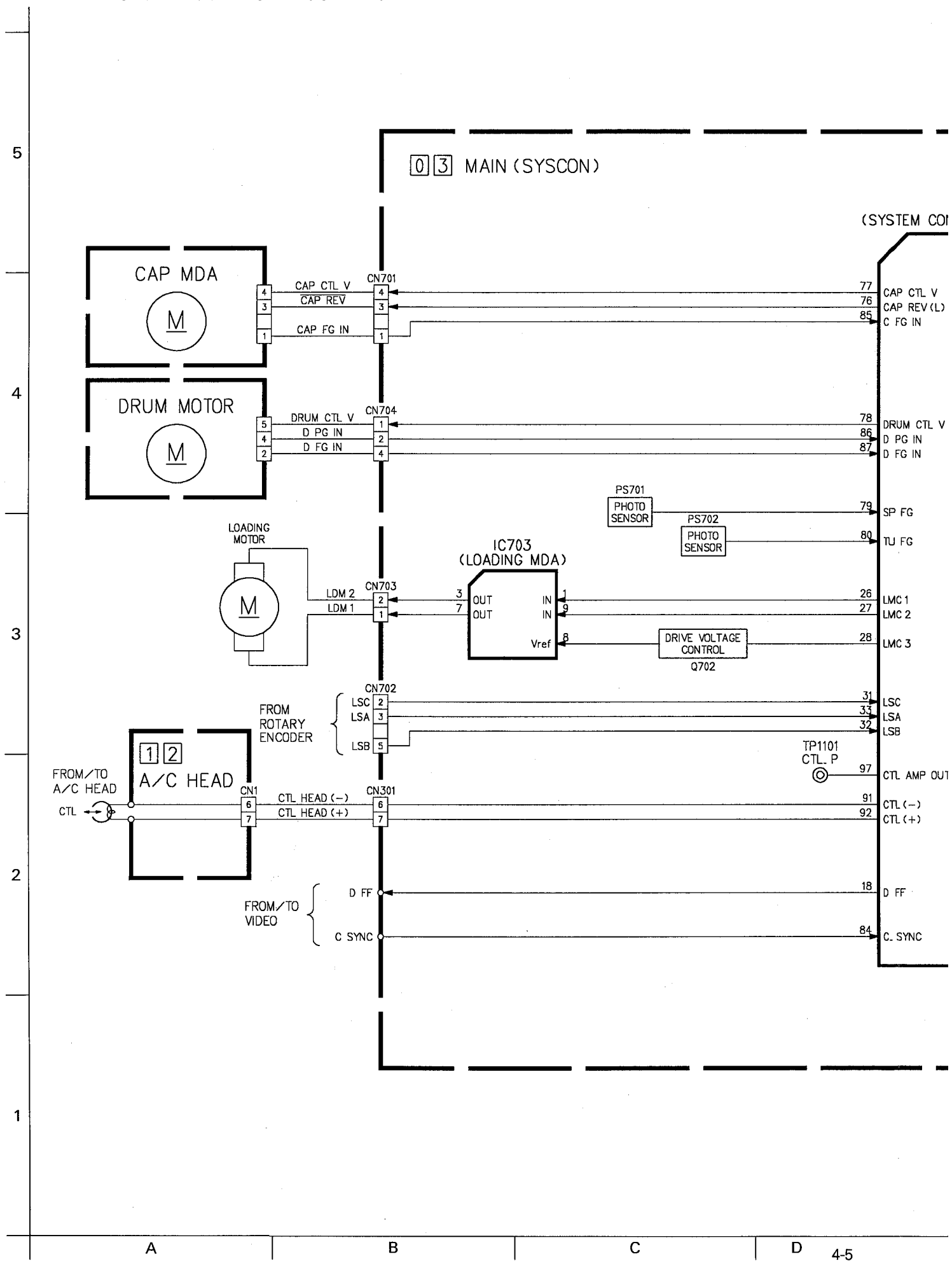
NOTE : COMPARISON CHART OF MODELS & MARKS( # )

|     |          |
|-----|----------|
| 9 0 | LED      |
| 1 2 | A/C HEAD |
| 0 6 | TERMINAL |
| 0 3 | MAIN     |
| NO  | NAME     |

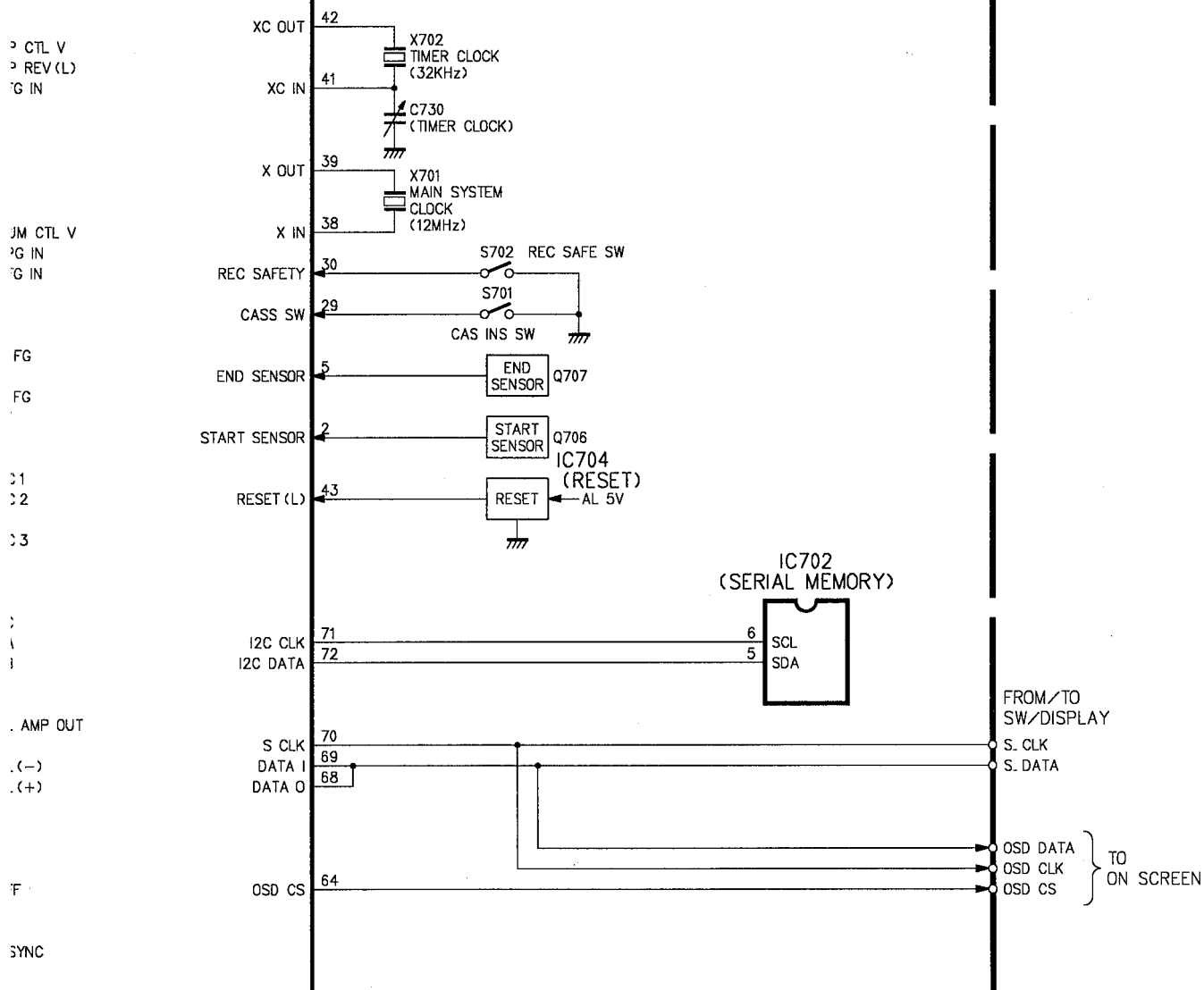
| MODEL (PHILIPS) | FRONT A/V |
|-----------------|-----------|
| HR-J441MS       | J1201     |
| J441MS/S        | J1203     |
| HR-J44BEE       | NOT USED  |
|                 | USED      |



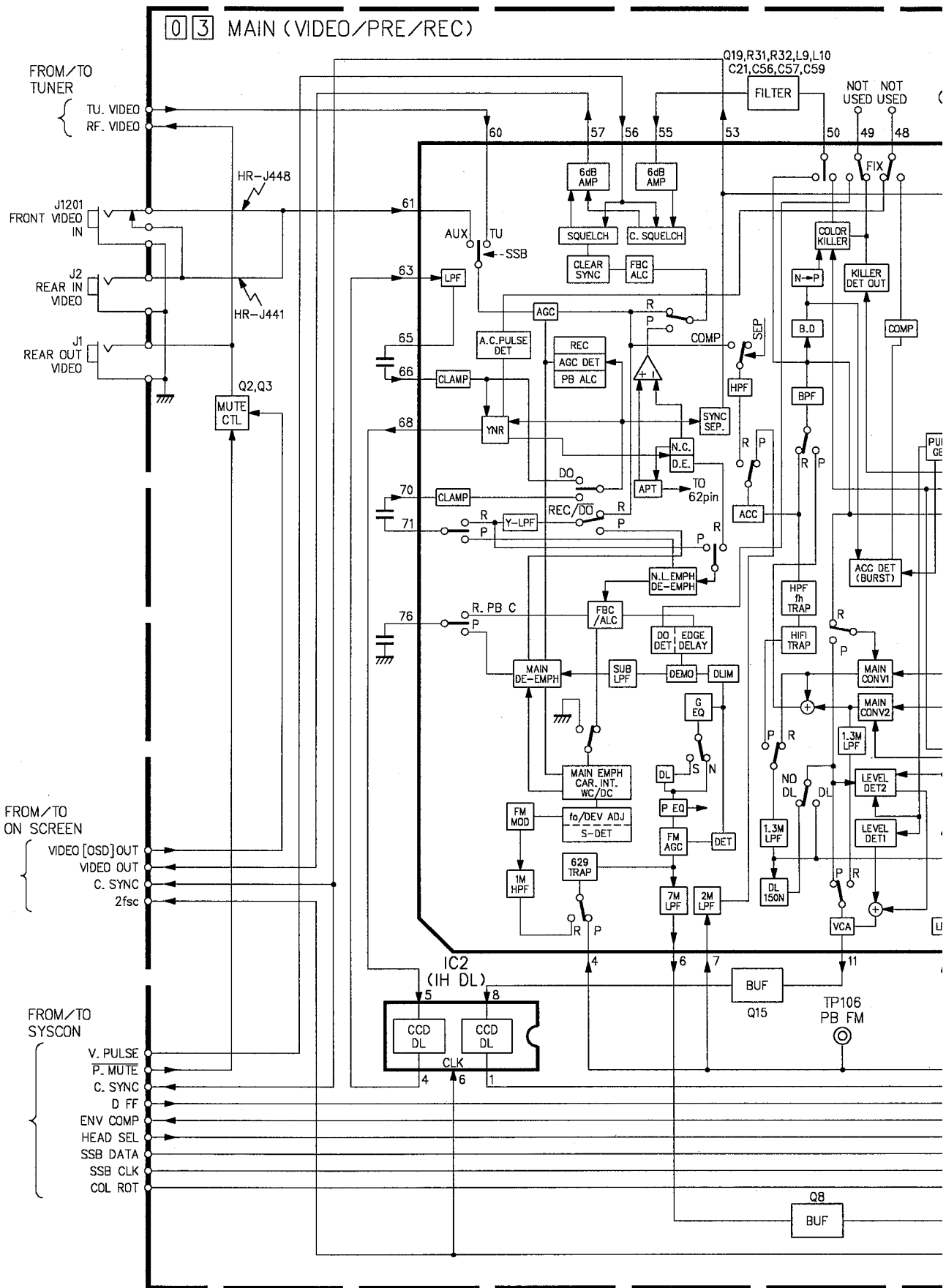
## 4.2 SYSTEM CONTROL BLOCK DIAGRAM

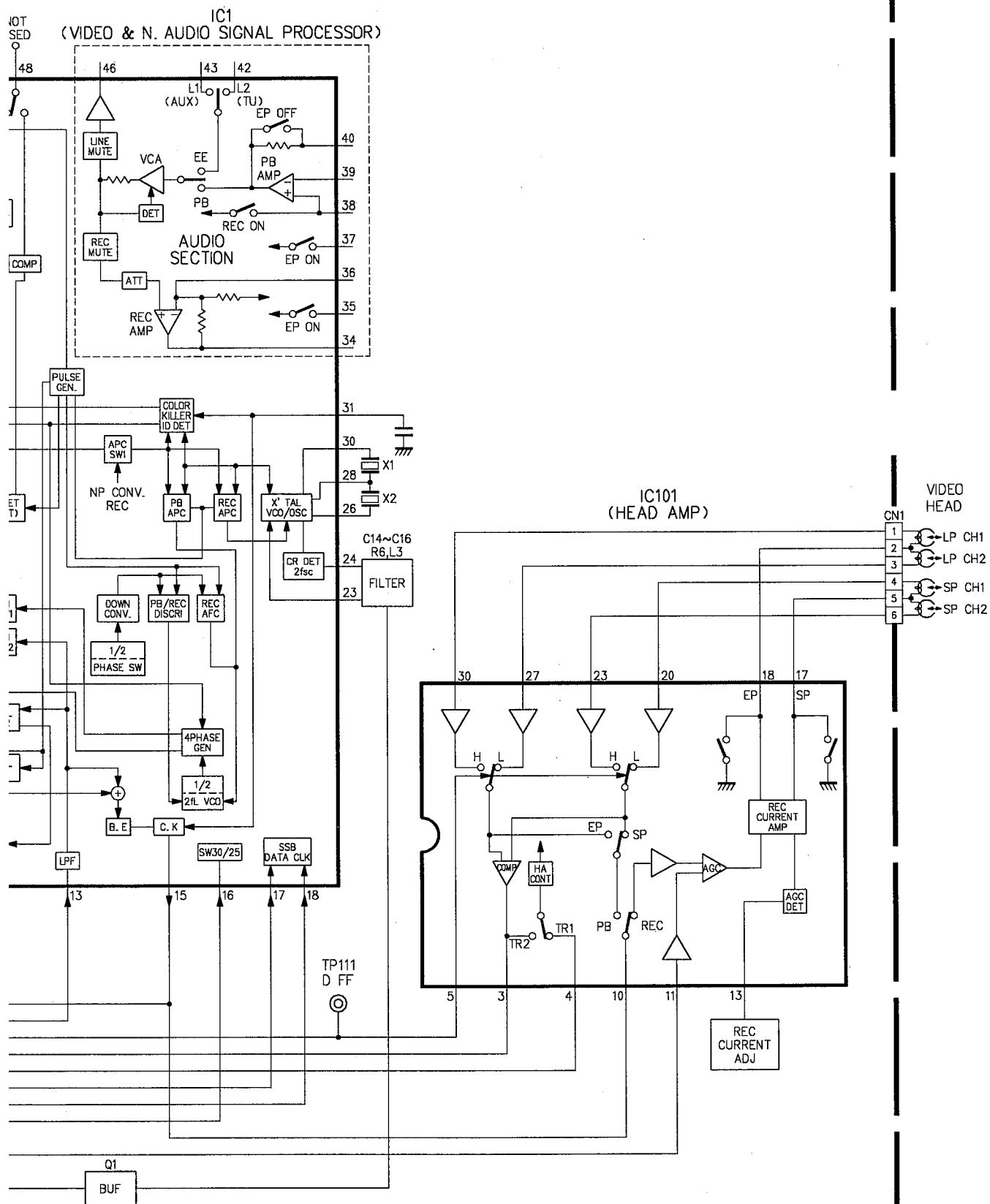


IC701  
(TEM CONTROL MICRO PROCESSOR)

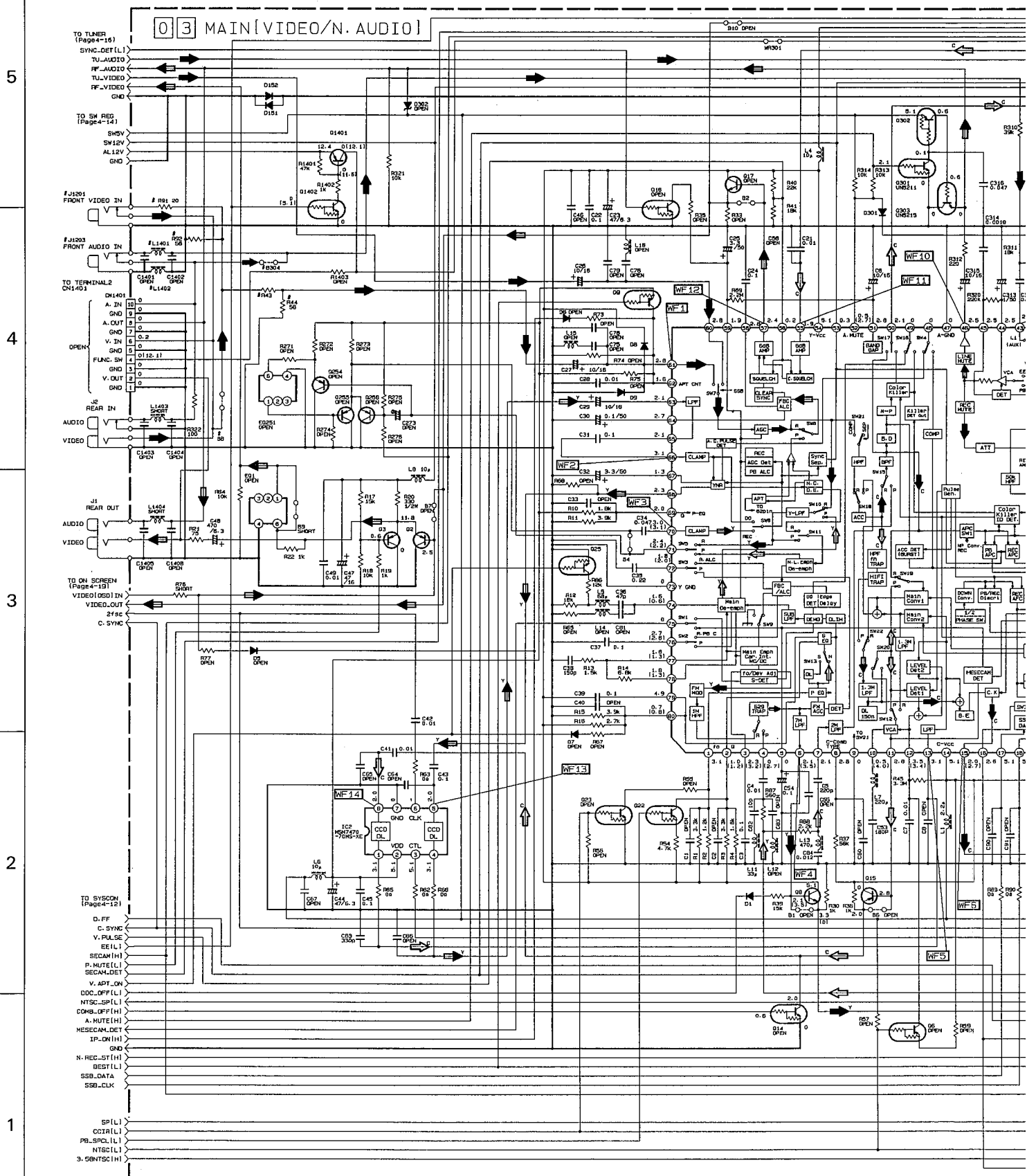


### 4.3 VIDEO BLOCK DIAGRAM



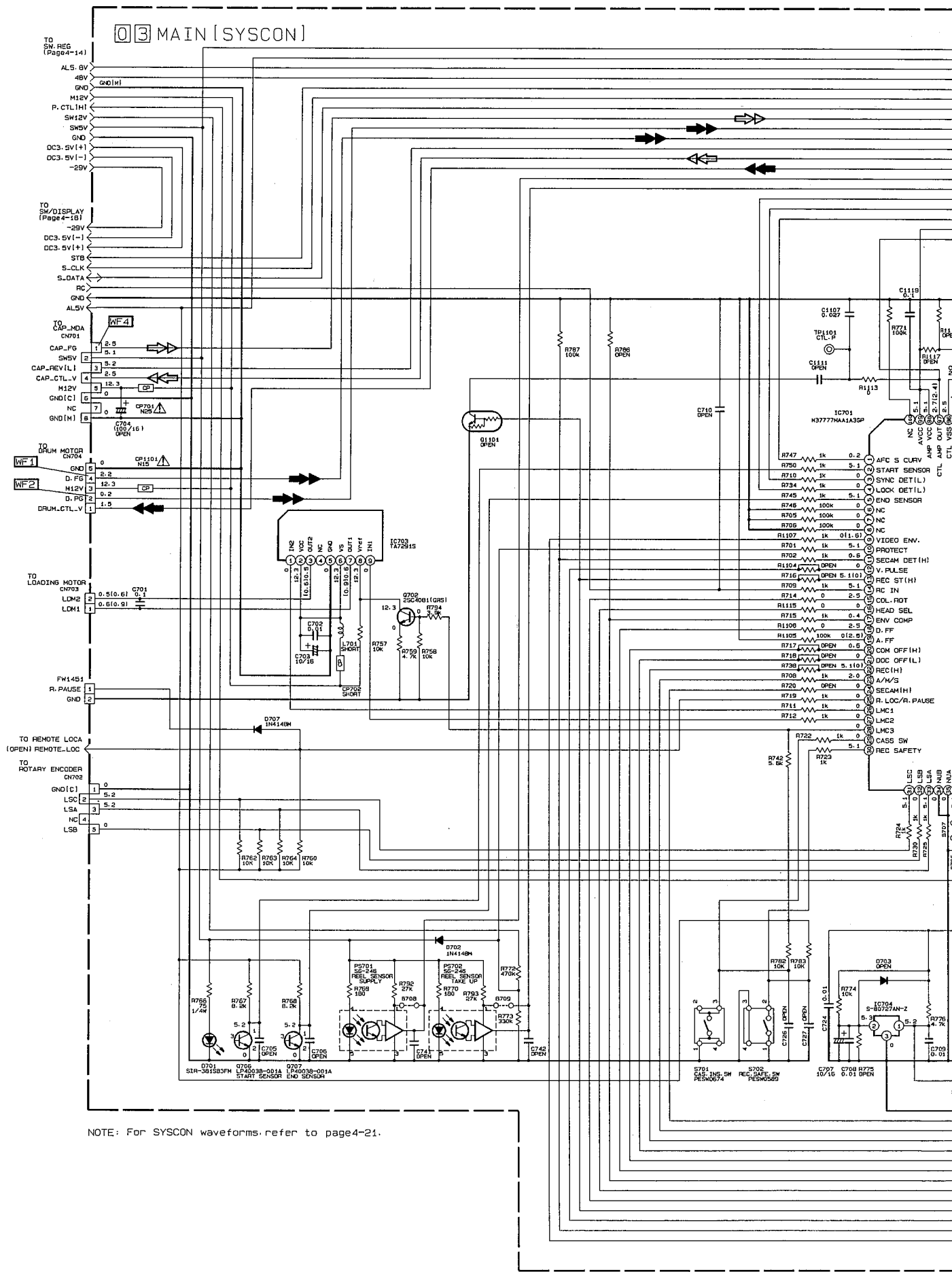


# 4.4 VIDEO, PRE/REC AND N. AUDIO SCHEMATIC DIAGRAM



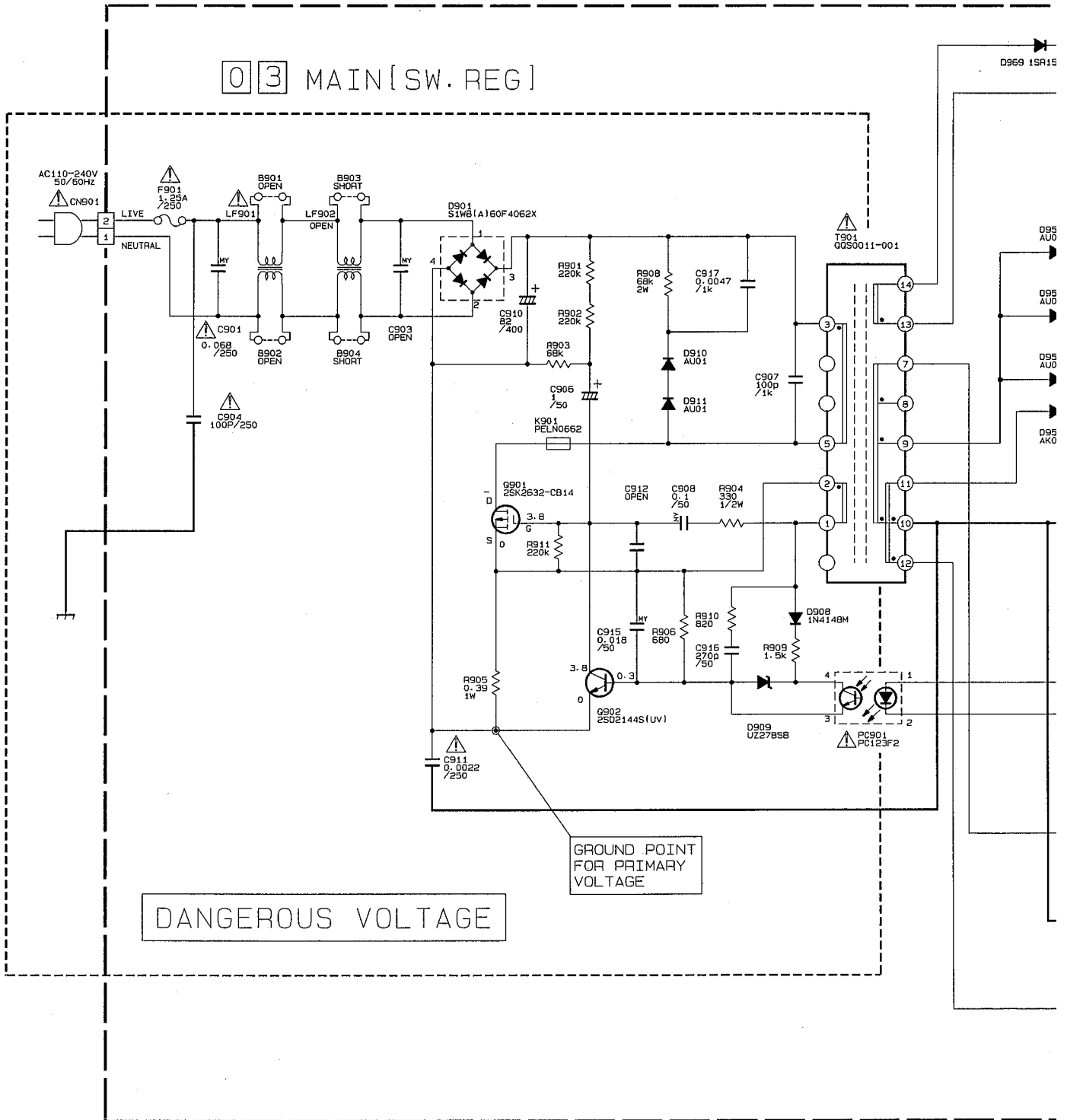


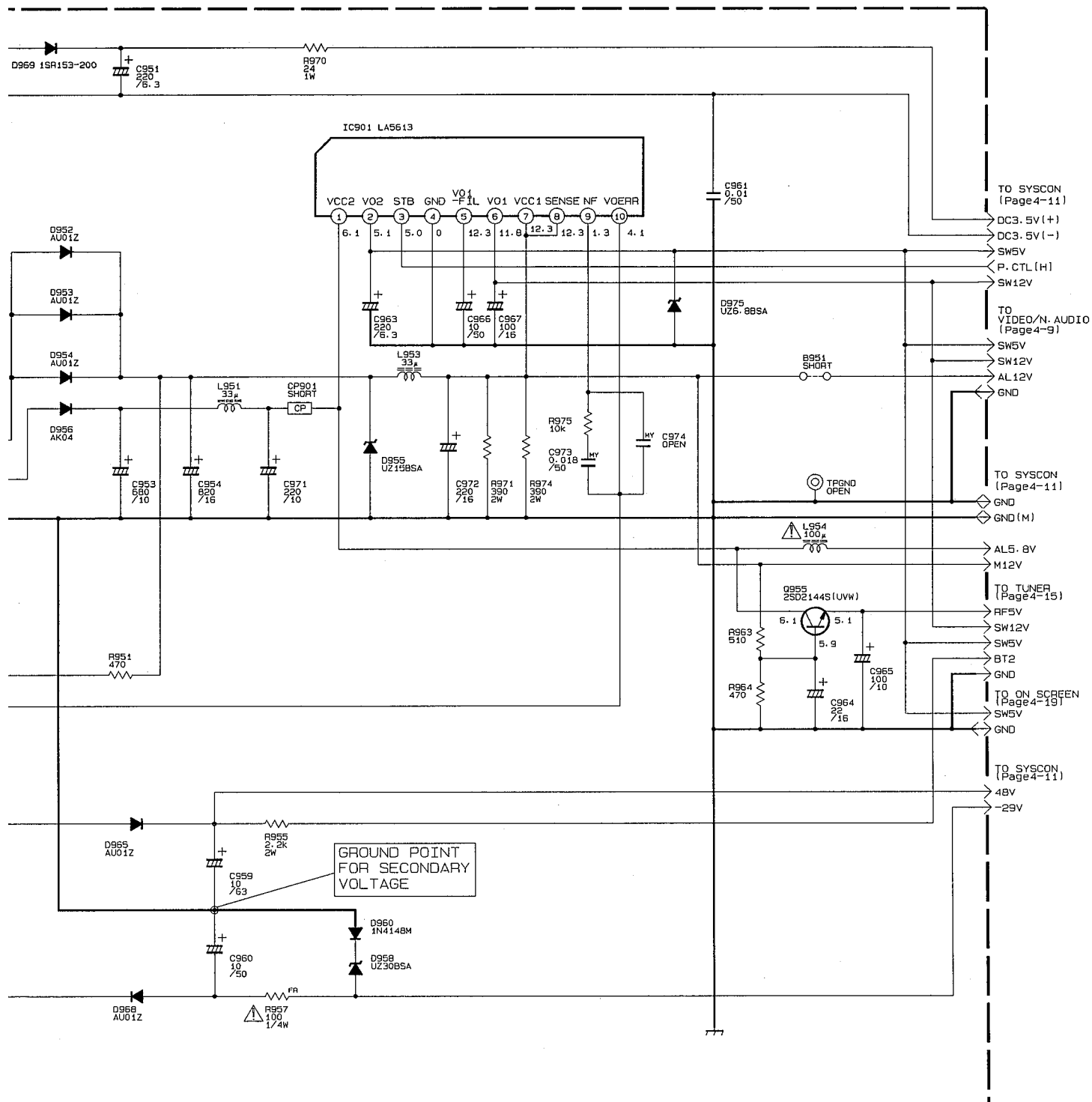
#### 4.5 SYSTEM CONTROL SCHEMATIC DIAGRAM



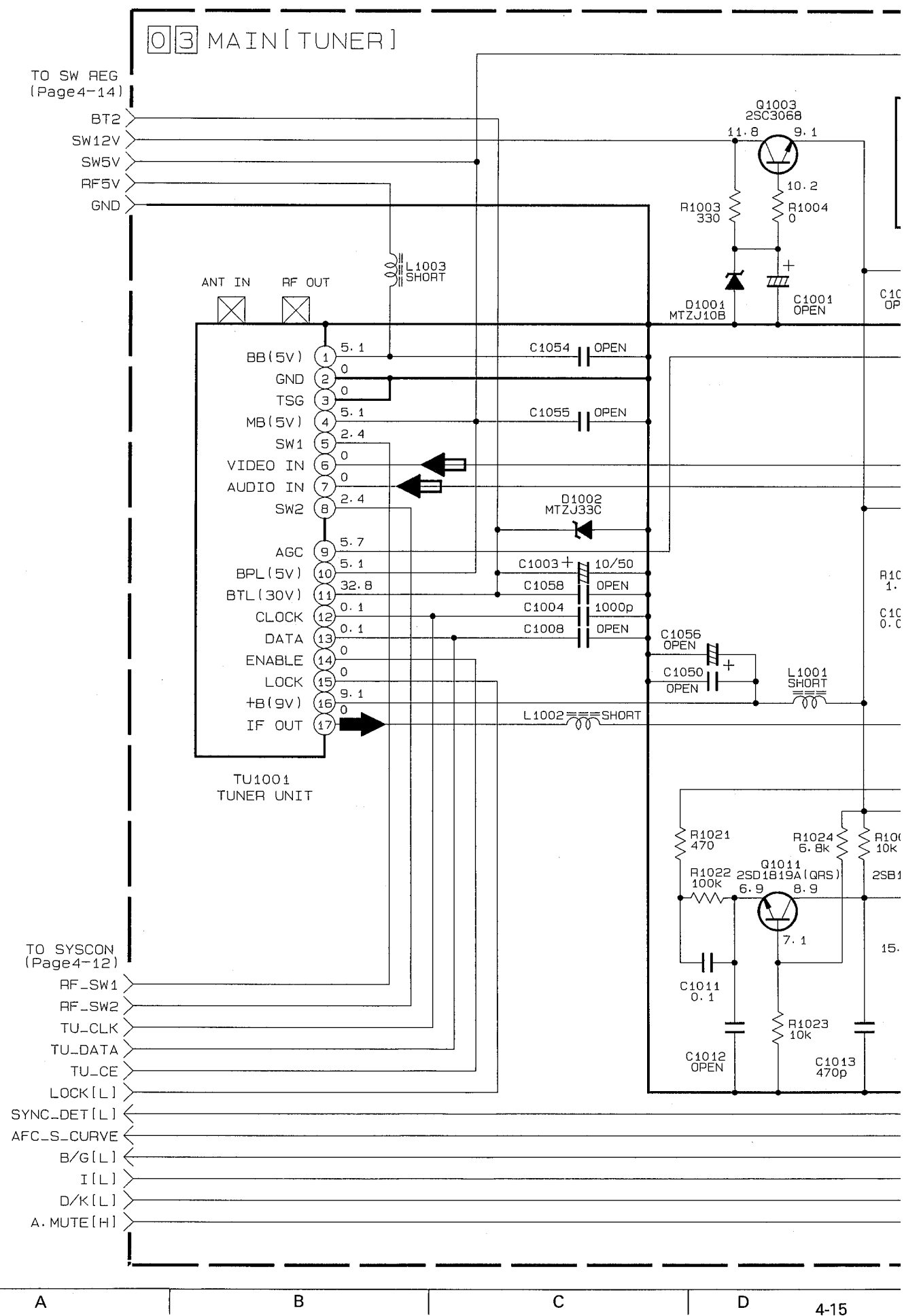


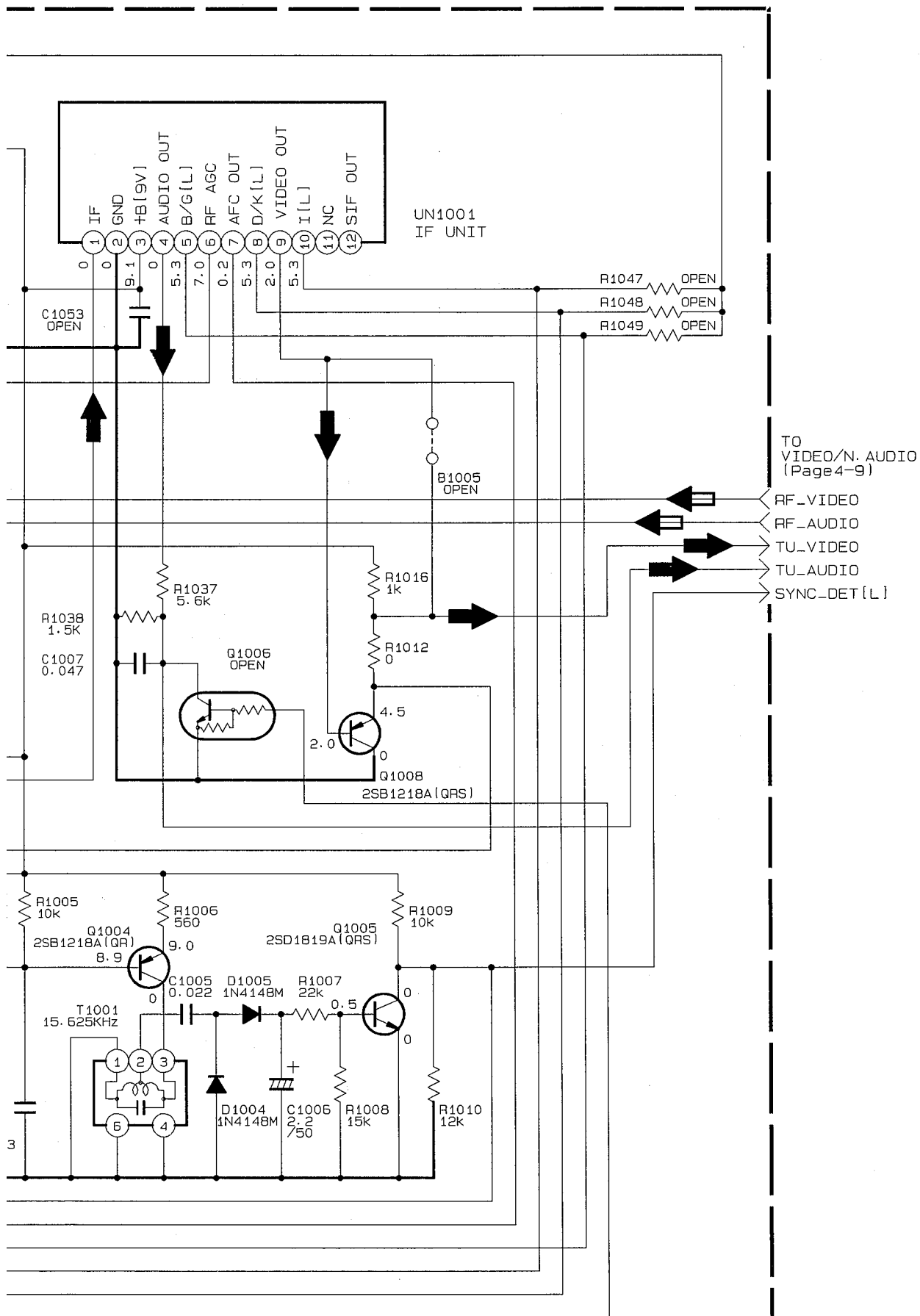
## 4.6 SWITCHING REGULATOR SCHEMATIC DIAGRAM





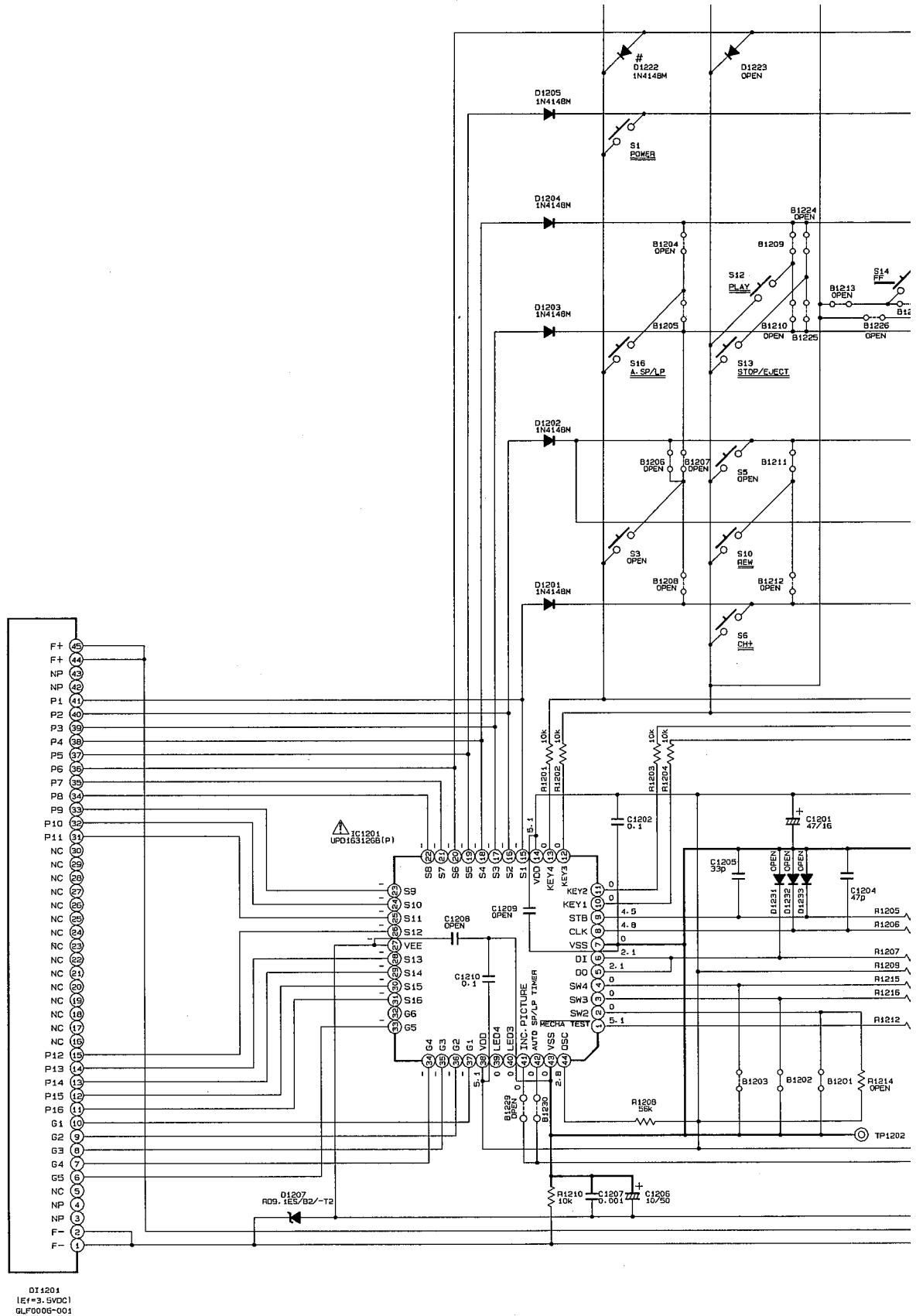
## 4.7 TUNER SCHEMATIC DIAGRAM

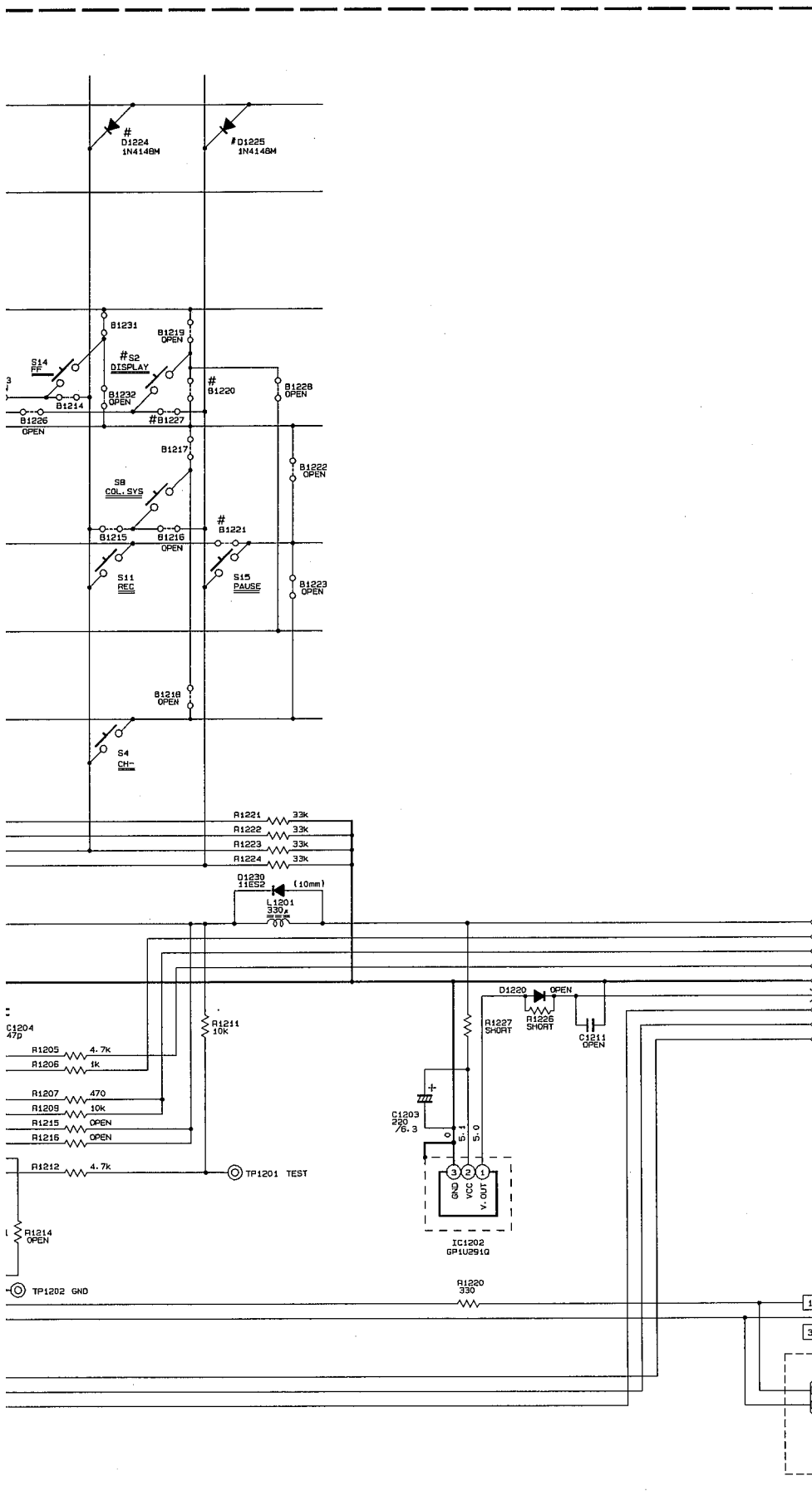




# 4.8 SW/DISPLAY SCHEMATIC DIAGRAM

03 MAIN(SW/DISPLAY)





NOTE : COMPARISON CHART OF MODELS & MARKS(1#)

| REF. NO | MODELS    |            |
|---------|-----------|------------|
|         | HR-J441MS | HR-J448EE  |
| D1210   | J441MS/S  | SLR-342M3F |
| D1222   | OPEN      | USED       |
| D1224   | OPEN      | USED       |
| D1225   | USED      | OPEN       |
| S2      | OPEN      | USED       |
| B1220   | OPEN      | SHORT      |
| B1227   | OPEN      | SHORT      |

TO SYSCON  
(Page 4-11)

AL5V  
S\_CLK  
S\_DATA  
STB  
GND  
RC  
DC3.5V(-)  
DC3.5V(+)  
-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

GND

RC

DC3.5V(-)

DC3.5V(+)

-29V

AL5V

S\_CLK

S\_DATA

STB

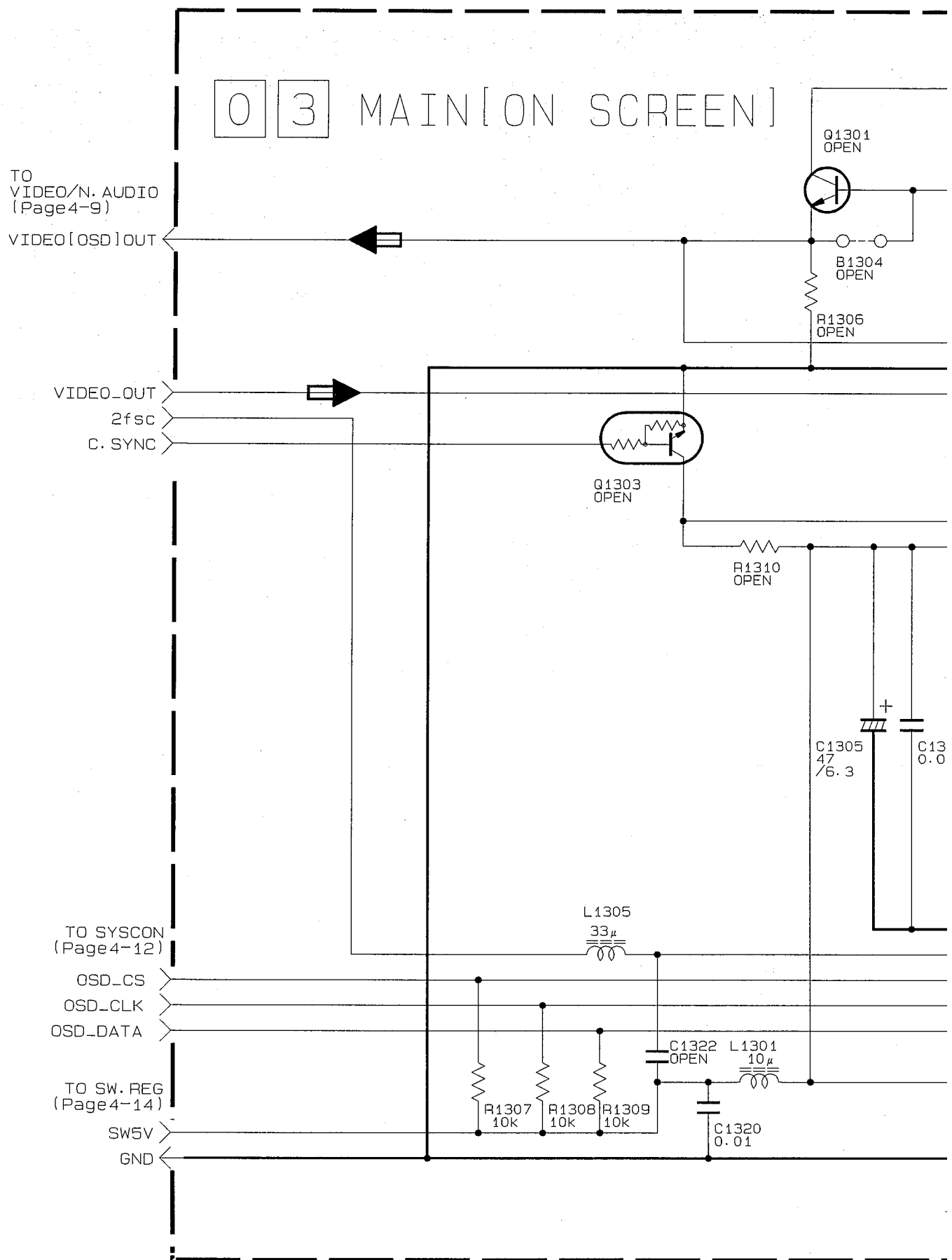
GND

RC

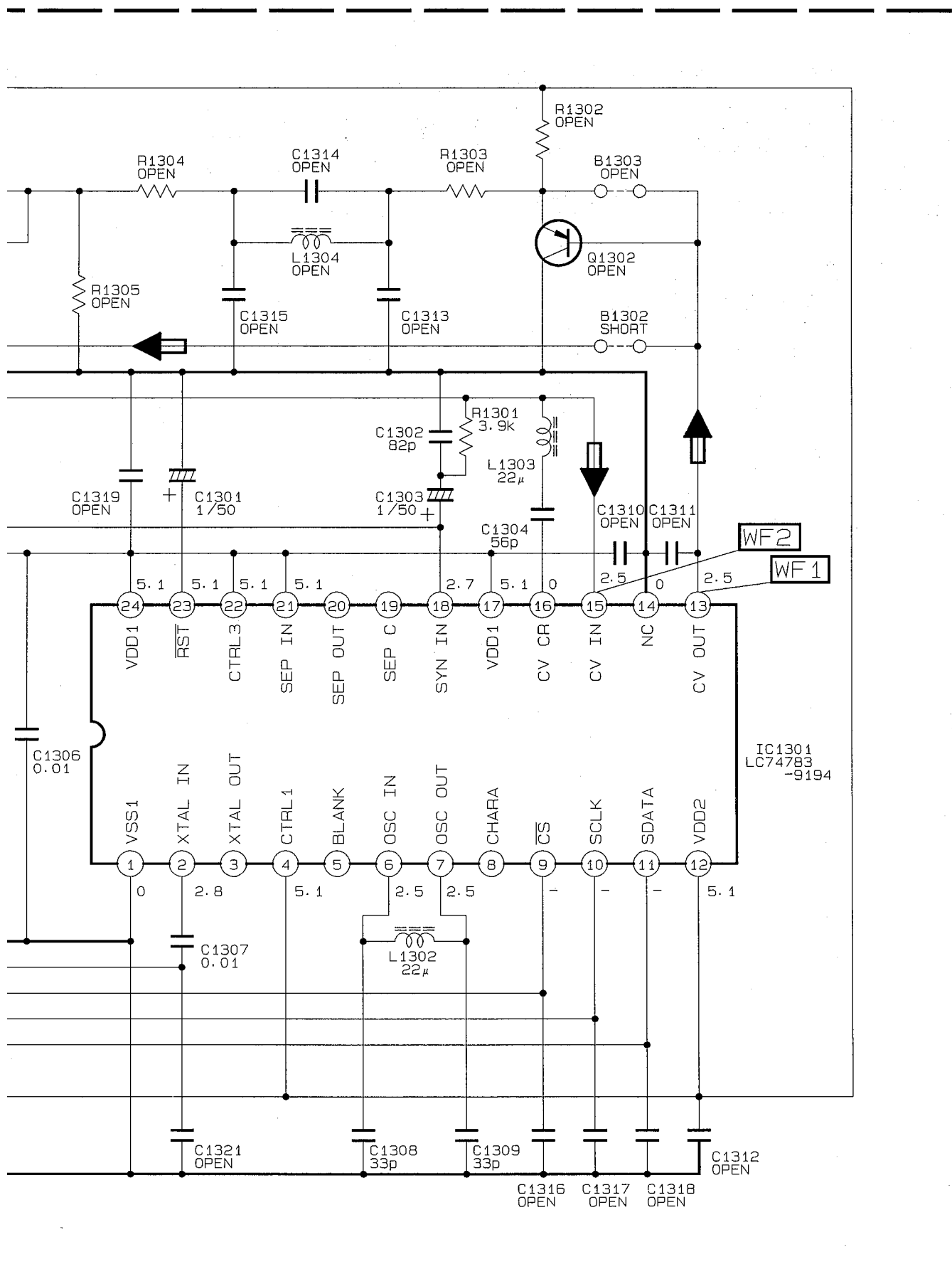
DC3.5V(-)

DC3.5V(+)

#### 4.9 ON SCREEN SCHEMATIC DIAGRAM



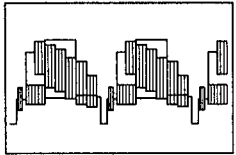
NOTE : For ON SCREEN waveforms, refer to page 4-



## WAVEFORMS

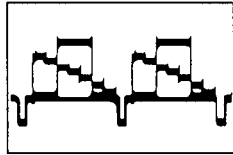
### — VIDEO/N. AUDIO —

WF1 IC1-61



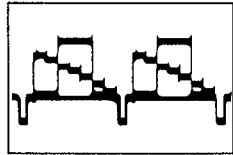
REC 1.0Vp-p  
50mV/20μsec/DIV

WF2 IC1-66



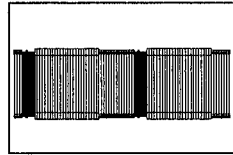
PB 0.68Vp-p  
20mV/20μsec/DIV

WF3 IC1-70



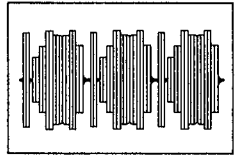
REC/PB 0.68Vp-p  
20mV/20μsec/DIV

WF4 IC1-6



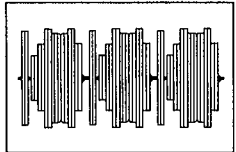
REC 0.51Vp-p  
20mV/5msec/DIV

WF5 IC1-13



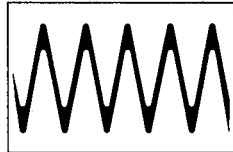
PB 0.54Vp-p  
20mV/20μsec/DIV

WF6 IC1-15



REC 0.52Vp-p  
20mV/20μsec/DIV

WF7 IC1-34



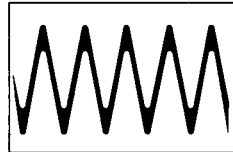
REC 2.3Vp-p  
50mV/1msec/DIV

WF8 IC1-38



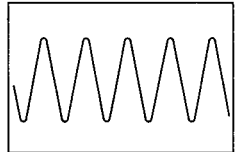
PB 0.02Vp-p  
0.5mV/5msec/DIV

WF9 IC1-43



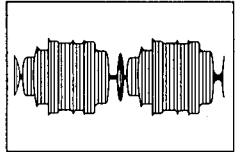
REC 0.3Vp-p  
10mV/1msec/DIV

WF10 IC1-46



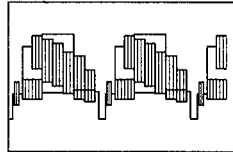
PB 1.6Vp-p  
50mV/1msec/DIV

WF11 IC1-55



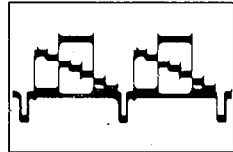
PB 0.63Vp-p  
20mV/20μsec/DIV

WF12 IC1-57



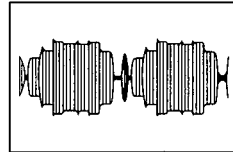
REC/PB 2.8Vp-p  
0.1V/20μsec/DIV

WF13 IC2-5



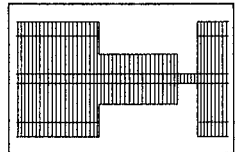
PB 0.55Vp-p  
20mV/20μsec/DIV

WF14 IC2-8



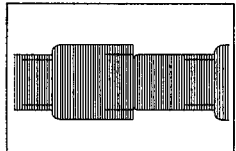
PB 0.5Vp-p  
20mV/20μsec/DIV

WF15-1 IC101-10



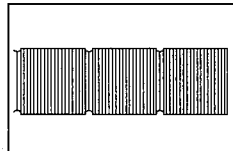
REC 0.3Vp-p  
20mV/5msec/DIV

WF15-2 IC101-10



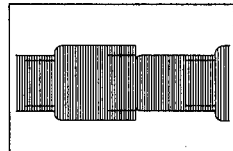
PB 0.5Vp-p  
20mV/5msec/DIV

WF16 IC101-17



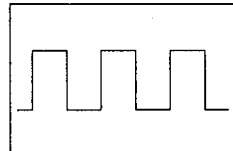
REC 2.6Vp-p  
0.1V/5msec/DIV

WF17 TP106  
PB FM/COLOR



PB 0.6Vp-p  
20mV/5msec/DIV

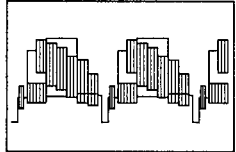
WF18 TP111  
D.FF



REC/PB 5.8Vp-p  
0.2V/10msec/DIV

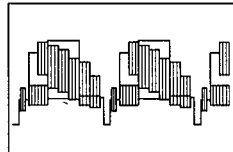
### — ON SCREEN —

WF1 IC1301-13



REC/PB 2.6Vp-p  
0.1V/20μsec/DIV

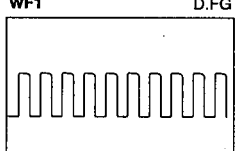
WF2 IC1301-15



REC/PB 2.6Vp-p  
0.1V/20μsec/DIV

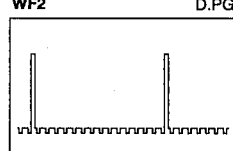
### — SYSCON —

WF1 CN704-4  
D.FG



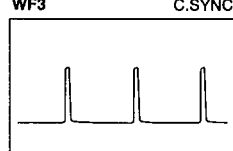
REC/PB 4.8Vp-p  
0.2V/1msec/DIV

WF2 CN704-2  
D.PG



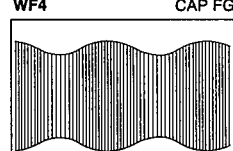
REC/PB 5.1Vp-p  
0.2V/5msec/DIV

WF3 IC701-84  
C.SYNC



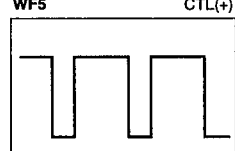
REC 5.2Vp-p  
0.2V/20μsec/DIV

WF4 CN701-1  
CAP FG



REC/PB 2.1Vp-p  
0.1V/10msec/DIV

WF5 IC701-92  
CTL(+)

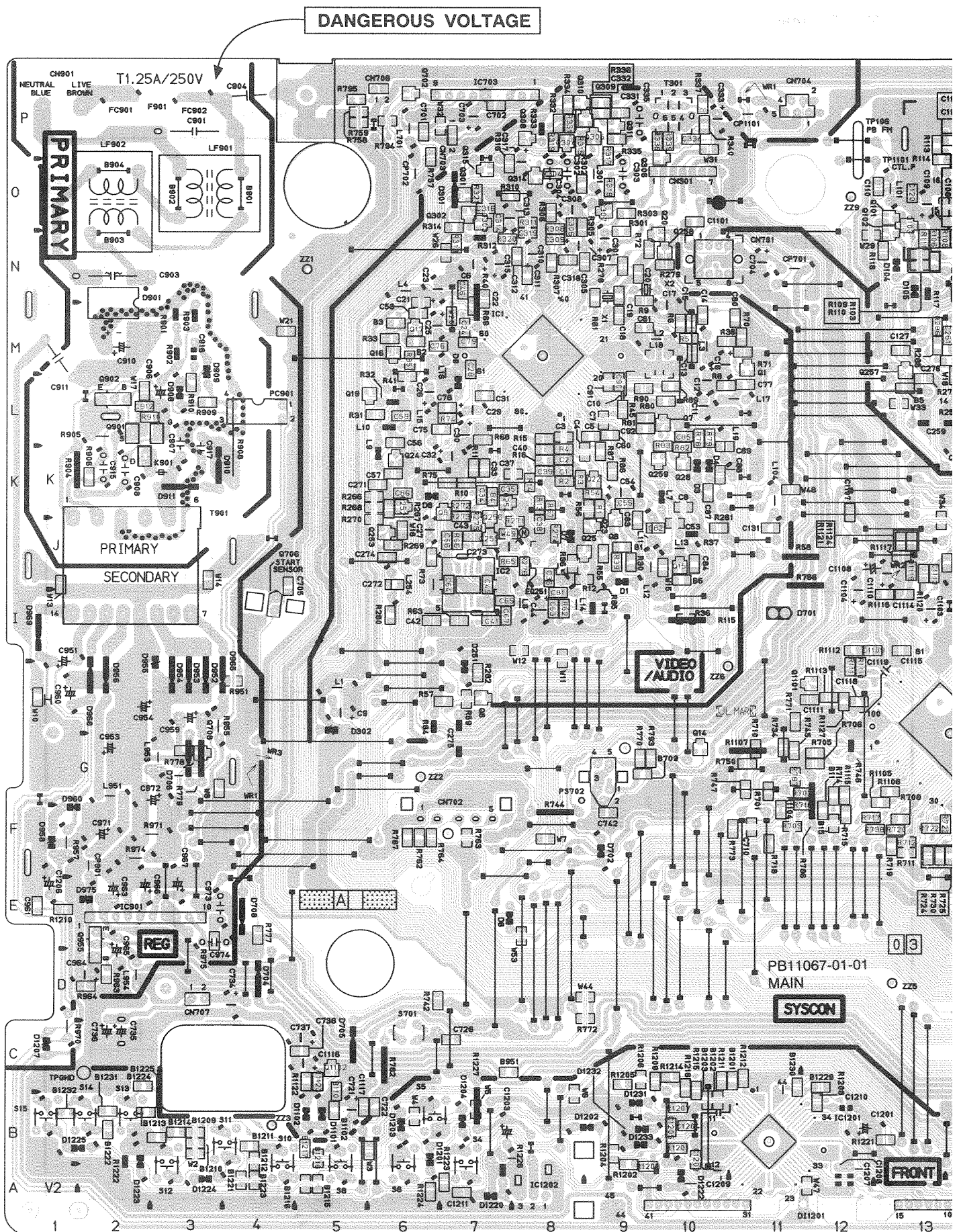


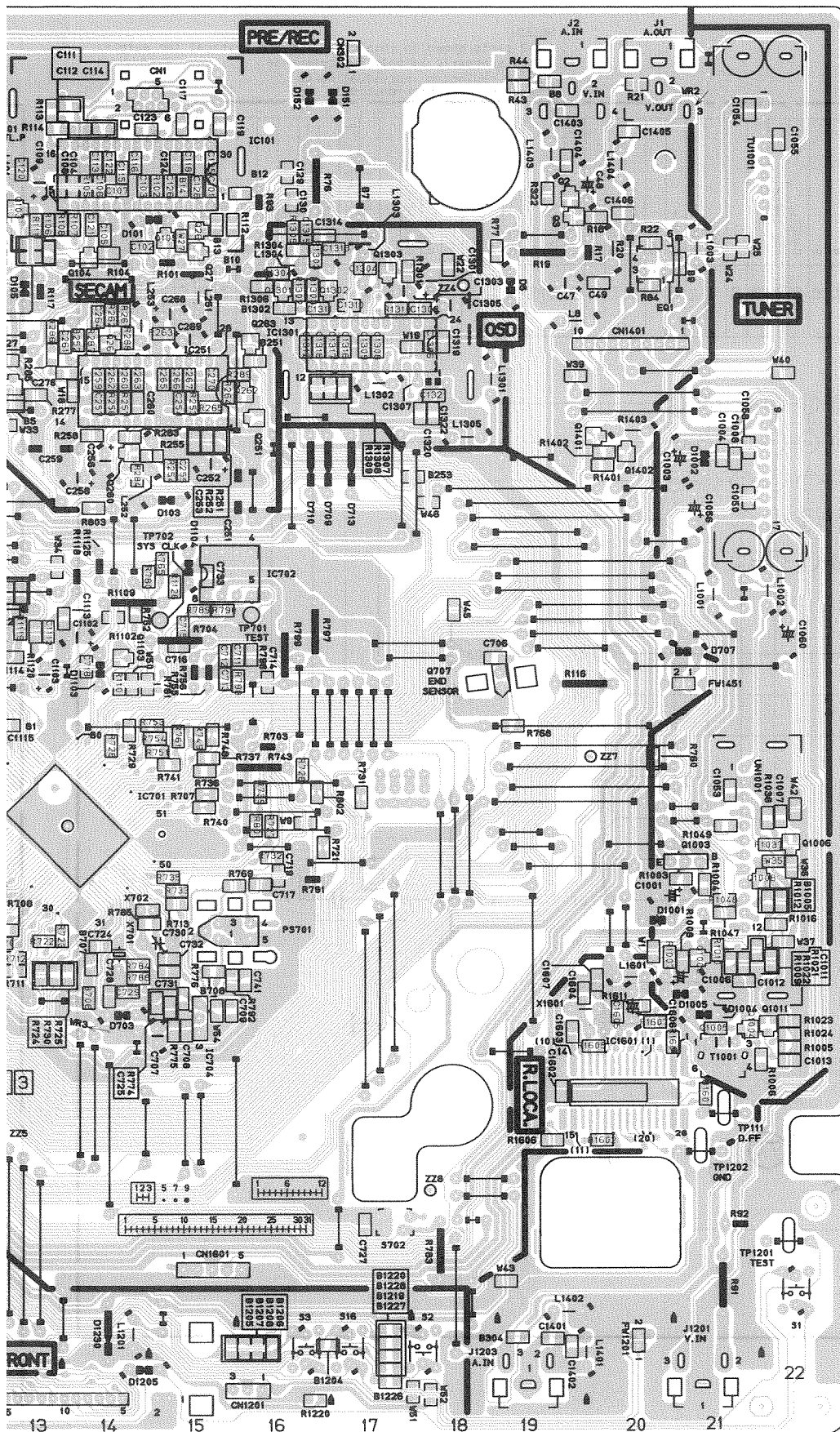
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# COMPONENT PARTS LOCATION GUIDE

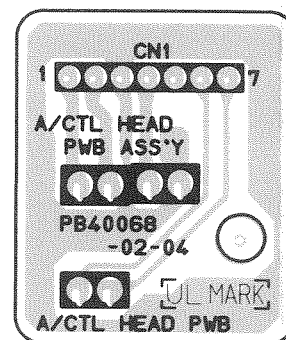
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|------------------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|
| <b>CAPACITOR</b> |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |
| C1               | 8K       | C259    | 14L      | C1058   | 21L      | D911    | 3K       | Q22     | 9K       | R79     | 10L      | R720    | 13F      | R1102   | 14J      |
| C2               | 8K       | C260    | 14L      | C1060   | 22J      | D952    | 3K       | Q23     | 9K       | R80     | 10L      | R721    | 13F      | R1104   | 11F      |
| C3               | 8K       | C261    | 14M      | C1101   | 100      | D953    | 3K       | Q24     | 6K       | R81     | 9L       | R722    | 13F      | R1105   | 13G      |
| C4               | 8K       | C262    | 14M      | C1102   | 14J      | D954    | 3K       | Q25     | 6K       | R82     | 10K      | R723    | 14F      | R1106   | 13G      |
| C5               | 8K       | C263    | 14M      | C1103   | 13I      | D955    | 3K       | Q26     | 15N      | R83     | 10L      | R724    | 13F      | R1107   | 10G      |
| C6               | 8K       | C264    | 14M      | C1104   | 12I      | D956    | 3K       | Q27     | 15N      | R84     | 20N      | R725    | 14F      | R1108   | 15J      |
| C7               | 7N       | C265    | 15M      | C1107   | 12K      | D958    | 3K       | Q28     | 10K      | R85     | 9J       | R726    | 16H      | R1110   | 12H      |
| C8               | 7N       | C266    | 15M      | C1108   | 13I      | D960    | 3K       | Q29     | 13O      | R86     | 8J       | R727    | 16H      | R1111   | 12H      |
| C9               | 7N       | C267    | 15M      | C1110   | 13J      | D965    | 3K       | Q102    | 13N      | R87     | 9K       | R728    | 14H      | R1112   | 12I      |
| C10              | 10K      | C268    | 15M      | C1111   | 12H      | D968    | 3K       | Q103    | 13O      | R88     | 9K       | R729    | 14I      | R1113   | 12H      |
| C11              | 5H       | C269    | 15M      | C1112   | 13J      | D969    | 3K       | Q104    | 14N      | R89     | 10L      | R730    | 13F      | R1115   | 12G      |
| C12              | 9L       | C270    | 15M      | C1113   | 14J      | D975    | 3K       | Q105    | 15N      | R90     | 9L       | R731    | 17H      | R1116   | 13J      |
| C13              | 10L      | C271    | 6K       | C1114   | 13I      | D1001   | 20F      | Q251    | 16L      | R91     | 21B      | R732    | 16G      | R1117   | 13J      |
| C14              | 10M      | C272    | 6J       | C1115   | 13I      | D1002   | 21L      | Q252    | 6K       | R92     | 21C      | R733    | 15G      | R1118   | 14J      |
| C15              | 10M      | C273    | 7J       | C1116   | 5C       | D1004   | 21L      | Q253    | 6J       | R93     | 16N      | R734    | 11G      | R1119   | 13J      |
| C16              | 10M      | C274    | 6G       | C1117   | 5B       | D1005   | 21F      | Q254    | 7K       | R101    | 15N      | R735    | 15G      | R1120   | 13J      |
| C17              | 10M      | C275    | 7G       | C1118   | 12H      | D1101   | 5B       | Q255    | 7J       | R102    | 15O      | R736    | 15H      | R1121   | 13J      |
| C18              | 10M      | C276    | 14M      | C1119   | 12H      | D1102   | 5B       | Q256    | 7J       | R103    | 13N      | R737    | 15H      | R1122   | 5C       |
| C19              | 9M       | C301    | 9N       | C1201   | 12B      | D1103   | 14I      | Q257    | 13M      | R104    | 14N      | R738    | 13F      | R1123   | 5C       |
| C20              | 9N       | C302    | 80       | C1202   | 10B      | D1104   | 15K      | Q258    | 10N      | R105    | 14O      | R739    | 16H      | R1124   | 14J      |
| C21              | 9N       | C303    | 80       | C1203   | 7B       | D1201   | 6B       | Q259    | 10K      | R106    | 13N      | R740    | 15H      | R1125   | 14J      |
| C22              | 9N       | C304    | 80       | C1204   | 10B      | D1202   | 9B       | Q260    | 14L      | R107    | 14N      | R741    | 15H      | R1126   | 15J      |
| C23              | 9N       | C305    | 80       | C1205   | 10B      | D1203   | 6B       | Q261    | 14M      | R108    | 14N      | R742    | 6D       | R1127   | 12H      |
| C24              | 9N       | C306    | 80       | C1206   | 1F       | D1204   | 7B       | Q262    | 16L      | R109    | 13N      | R743    | 16H      | R1201   | 10B      |
| C25              | 9N       | C307    | 80       | C1207   | 12A      | D1205   | 14A      | Q263    | 16M      | R110    | 13N      | R744    | 9F       | R1202   | 9A       |
| C26              | 9N       | C308    | 80       | C1208   | 12A      | D1207   | 1C       | Q301    | 7O       | R111    | 13N      | R745    | 11G      | R1203   | 9A       |
| C27              | 9N       | C309    | 80       | C1209   | 10A      | D1210   | 20C      | Q302    | 7O       | R112    | 15N      | R746    | 12G      | R1204   | 9B       |
| C28              | 9N       | C310    | 80       | C1210   | 12B      | D1211   | 20C      | Q303    | 7O       | R113    | 13P      | R747    | 11G      | R1205   | 9C       |
| C29              | 9N       | C311    | 80       | C1211   | 7A       | D1220   | 7A       | Q304    | 8P       | R114    | 13P      | R748    | 15I      | R1206   | 9C       |
| C30              | 9N       | C312    | 80       | C1301   | 18N      | D1222   | 10A      | Q305    | 9P       | R115    | 10I      | R749    | 15I      | R1207   | 10B      |
| C31              | 9N       | C313    | 70       | C1302   | 18M      | D1223   | 2A       | Q306    | 10P      | R116    | 20I      | R750    | 11G      | R1208   | 12B      |
| C32              | 9N       | C314    | 70       | C1303   | 17N      | D1224   | 3A       | Q307    | 9O       | R117    | 13M      | R751    | 15H      | R1209   | 9C       |
| C33              | 9N       | C315    | 70       | C1304   | 17N      | D1225   | 2B       | Q308    | 8P       | R118    | 13N      | R752    | 14J      | R1210   | 1E       |
| C34              | 9N       | C316    | 70       | C1305   | 18M      | D1230   | 14B      | Q309    | 9P       | R251    | 15L      | R753    | 15I      | R1211   | 10C      |
| C35              | 9N       | C317    | 70       | C1306   | 18M      | D1231   | 9B       | Q310    | 9P       | R252    | 15L      | R754    | 15I      | R1212   | 10C      |
| C36              | 9N       | C318    | 70       | C1307   | 18M      | D1232   | 9B       | Q311    | 9P       | R253    | 15L      | R755    | 15I      | R1213   | 10C      |
| C37              | 9N       | C319    | 70       | C1308   | 18M      | D1233   | 9B       | Q312    | 9P       | R254    | 15L      | R756    | 15I      | R1214   | 10C      |
| C38              | 9N       | C320    | 70       | C1309   | 17M      | D1234   | 9B       | Q313    | 9P       | R255    | 15L      | R757    | 15I      | R1215   | 10C      |
| C39              | 9N       | C321    | 70       | C1310   | 17M      | D1235   | 9B       | Q314    | 9P       | R256    | 15L      | R758    | 15I      | R1216   | 10C      |
| C40              | 9N       | C322    | 70       | C1311   | 16M      | D1236   | 9B       | Q315    | 9P       | R257    | 14L      | R759    | 5P       | R1217   | 16A      |
| C41              | 9N       | C323    | 70       | C1312   | 16M      | D1237   | 9B       | Q316    | 9P       | R258    | 14L      | R760    | 20H      | R1218   | 13B      |
| C42              | 9N       | C324    | 70       | C1313   | 16M      | D1238   | 9B       | Q317    | 9P       | R259    | 14M      | R761    | 15I      | R1219   | 2A       |
| C43              | 9N       | C325    | 70       | C1314   | 16M      | D1239   | 9B       | Q318    | 9P       | R260    | 14M      | R762    | 15I      | R1220   | 7A       |
| C44              | 9N       | C326    | 70       | C1315   | 16M      | D1240   | 9B       | Q319    | 9P       | R261    | 14M      | R763    | 15I      | R1221   | 6A       |
| C45              | 9N       | C327    | 70       | C1316   | 16M      | D1241   | 9B       | Q320    | 9P       | R262    | 14M      | R764    | 6F       | R1222   | 7B       |
| C46              | 9N       | C328    | 70       | C1317   | 16M      | D1242   | 9B       | Q321    | 9P       | R263    | 14M      | R765    | 6F       | R1223   | 7B       |
| C47              | 9N       | C329    | 70       | C1318   | 16M      | D1243   | 9B       | Q322    | 9P       | R264    | 15M      | R766    | 15K      | R1301   | 17N      |
| C48              | 9N       | C330    | 70       | C1319   | 18M      | D1244   | 9B       | Q323    | 9P       | R265    | 15L      | R767    | 12J      | R1302   | 16N      |
| C49              | 9N       | C331    | 70       | C1320   | 18M      | D1245   | 9B       | Q324    | 9P       | R266    | 15L      | R768    | 6F       | R1303   | 16N      |
| C50              | 9N       | C332    | 70       | C1321   | 18M      | D1246   | 9B       | Q325    | 9P       | R267    | 6K       | R769    | 19I      | R1304   | 16N      |
| C51              | 9N       | C333    | 70       | C1322   | 18M      | D1247   | 9B       | Q326    | 9P       | R268    | 6K       | R770    | 15G      | R1305   | 16N      |
| C52              | 9N       | C334    | 70       | C1323   | 18M      | D1248   | 9B       | Q327    | 9P       | R269    | 6K       | R771    | 9G       | R1306   | 16N      |
| C53              | 9N       | C335    | 70       | C1324   | 18M      | D1249   | 9B       | Q328    | 9P       | R270    | 6J       | R772    | 11H      | R1307   | 17M      |
| C54              | 9N       | C336    | 70       | C1325   | 18M      | D1250   | 9B       | Q329    | 9P       | R271    | 6J       | R773    | 9D       | R1308   | 17M      |
| C55              | 9N       | C337    | 70       | C1326   | 18M      | D1251   | 9B       | Q330    | 9P       | R272    | 6J       | R774    | 11F      | R1309   | 16M      |
| C56              | 9N       | C338    | 70       | C1327   | 18M      | D1252   | 9B       | Q331    | 9P       | R273    | 7K       | R775    | 15E      | R1310   | 17M      |
| C57              | 9N       | C339    | 70       | C1328   | 18M      | D1253   | 9B       | Q332    | 9P       | R274    | 8J       | R776    | 15F      | R1401   | 20L      |
| C58              | 9N       | C340    | 70       | C1329   | 18M      | D1254   | 9B       | Q333    | 9P       | R275    | 7J       | R777    | 4E       | R1402   | 20L      |
| C59              | 9N       | C341    | 70       | C1330   | 18M      | D1255   | 9B       | Q334    | 9P       | R276    | 8J       | R778    | 3G       | R1403   | 20L      |
| C60              | 9N       | C342    | 70       | C1331   | 18M      | D1256   | 9B       | Q335    | 9P       | R277    | 13L      | R779    | 3G       | R1601   | 21E      |
| C61              | 9N       | C343    | 70       | C1332   | 18M      | D1257   | 9B       | Q336    | 9P       | R278    | 9N       | R780    | 14I      | R1605   | 20E      |
| C62              | 9N       | C344    | 70       | C1333   | 18M      | D1258   | 9B       | Q337    | 9P       | R279    | 10N      | R781    | 14I      | R1606   | 19D      |
| C63              | 9N       | C345    | 70       | C1334   | 18M      | D1259   | 9B       | Q338    | 9P       | R280    | 8C       | R782    | 6C       | R1607   | 20E      |
| C64              | 9N       | C346    | 70       | C1335   | 18M      | D1260   | 9B       | Q339    | 9P       | R281    | 10J      | R783    | 18B      | R1611   | 20E      |
| C65              | 9N       | C347    | 70       | C1336   | 18M      | D1261   | 9B       | Q340    | 9P       | R282    | 7H       | R784    | 14F      |         |          |
| C66              | 9N       | C348    | 70       | C1337   | 18M      | D1262   | 9B       | Q341    | 9P       | R283    | 14L      | R785    | 15F      |         |          |
| C67              | 9N       | C349    | 70       | C1338   | 18M      | D1263   | 9B       | Q342    | 9P       | R284    | 14L      | R786    | 12F      |         |          |
| C68              | 9N       | C350    | 70       | C1339   | 18M      | D1264   | 9B       | Q343    | 9P       | R285    | 13M      | R787    | 11G      | S1      | 22B      |
| C69              | 9N       | C351    | 70       | C1340   | 18M      | D1265   | 9B       | Q344    | 9P       | R286    | 13M      | R788    | 14F      | S2      | 18B      |
| C70              | 9N       | C352    | 70       | C1341   | 18M      | D1266   | 9B       | Q345    | 9P       | R287    | 14M      | R789    | 15J      | S3      | 16B      |
| C71              | 9N       | C353    | 70       | C1342   | 18M      | D1267   | 9B       | Q346    | 9P       | R288    | 14M      | R790    | 15J      | S4      | 7B       |
| C72              | 9N       | C354    | 70       | C1343   | 18M      | D1268   | 9B       | Q347    | 9P       | R289    | 16M      | R791    | 15J      | S5      | 6B       |
| C73              | 9N       | C355    | 70       | C1344   | 18M      | D1269   | 9B       | Q348    | 9P       | R290    | 16M      | R792    | 15J      | S6      | 6B       |
| C74              | 9N       | C356    | 70       | C1345   | 18M      | D1270   | 9B       | Q349    | 9P       | R291    | 9O       | R793    | 15J      | S7      | 5B       |
| C75              | 9N       | C357    | 70       | C1346   | 18M      | D1271   | 9B       | Q350    | 9P       | R292    | 8O       | R794    | 15J      | S8      | 4B       |
| C76              | 9N       | C358    | 70       | C1347   | 18M      | D1272   | 9B       | Q351    | 9P       | R293    | 8O       | R795    | 15J      | S9      | 4B       |
| C77              | 9N       | C359    | 70       | C1348   | 18M      | D1273   | 9B       | Q352    | 9P       | R294    | 8O       | R796    | 15J      | S10     | 4B       |
| C78              | 9N       | C360    | 70       | C1349   | 18M      | D1274   | 9B       | Q353    | 9P       | R295    | 8O       | R797    | 15J      | S11     | 4B       |
| C79              | 9N       | C361    | 70       | C1350   | 18M      | D1275   | 9B       | Q354    | 9P       | R296    | 8O       | R798    | 15J      | S12     | 4B       |
| C80              | 9N       | C362    | 70       | C1351   | 18M      | D1276   | 9B       | Q355    | 9P       | R297    | 8O       | R799    | 15J      | S13     | 2B       |
| C81              | 9N       | C363    | 70       | C1352   | 18M      | D1277   | 9B       | Q356    | 9P       | R298    | 8O       | R800    | 15J      | S14     | 2B       |
| C82              | 9N       | C364    | 70       | C1353   | 18M      | D1278   | 9B       | Q357    | 9P       | R299    | 8O       | R801    | 15J      | S15     | 1B       |
| C83              | 9N       | C365    | 70       | C1354   | 18M      | D1279   | 9B       | Q358    | 9P       | R300    | 8O       | R802    | 15J      | S16     | 1B       |
| C84              | 9N       | C366    | 70       | C1355   | 18M      | D1280   | 9B       | Q359    | 9P       | R301    | 8O       | R803    | 15J      | S17     | 1B       |
| C85              | 9N       | C367    | 70       | C1356   | 18M      | D1281   | 9B       | Q360    | 9P       | R302    | 8O       | R804    | 15J      | S18     | 1B       |
| C86              | 9N       | C368    | 70       | C1357   | 18M      | D1282   | 9B       | Q361    | 9P       | R303    | 8O       | R805    | 15J      | S19     | 1B       |
| C87              | 9N       | C369    | 70       | C1358   | 18M      | D1283   | 9B       | Q362    | 9P       | R304    | 8O       | R806    | 15J      | S20     | 1B       |
| C88              | 9N       | C370    | 70       | C1359   | 18M      | D1284   | 9B       | Q363    | 9P       | R305    | 8O       | R807    | 15J      | S21     | 1B       |
| C89              | 9N       | C371    | 70       | C1360   | 18M      | D1285   | 9B       | Q364    | 9P       | R306    | 8O       | R808    | 15J      | S22     | 1B       |
| C90              | 9N       | C372    | 70       | C1361   | 18M      | D1286   | 9B       | Q365    | 9P       | R307    | 8O       | R809    | 15J      | S23     | 1B       |
| C91              | 9N       | C373    | 70       | C1362   | 18M      | D1287   | 9B       | Q366    | 9P       | R308    | 8O       | R810    | 15J      | S24     | 1B       |
| C92              | 9N       | C374    | 70       | C1363   | 18M      | D1288   | 9B       | Q367    | 9P       | R309    | 8O       | R811    | 15J      | S25     |          |

#### 4.10 MAIN AND A/C HEAD CIRCUIT BOARDS





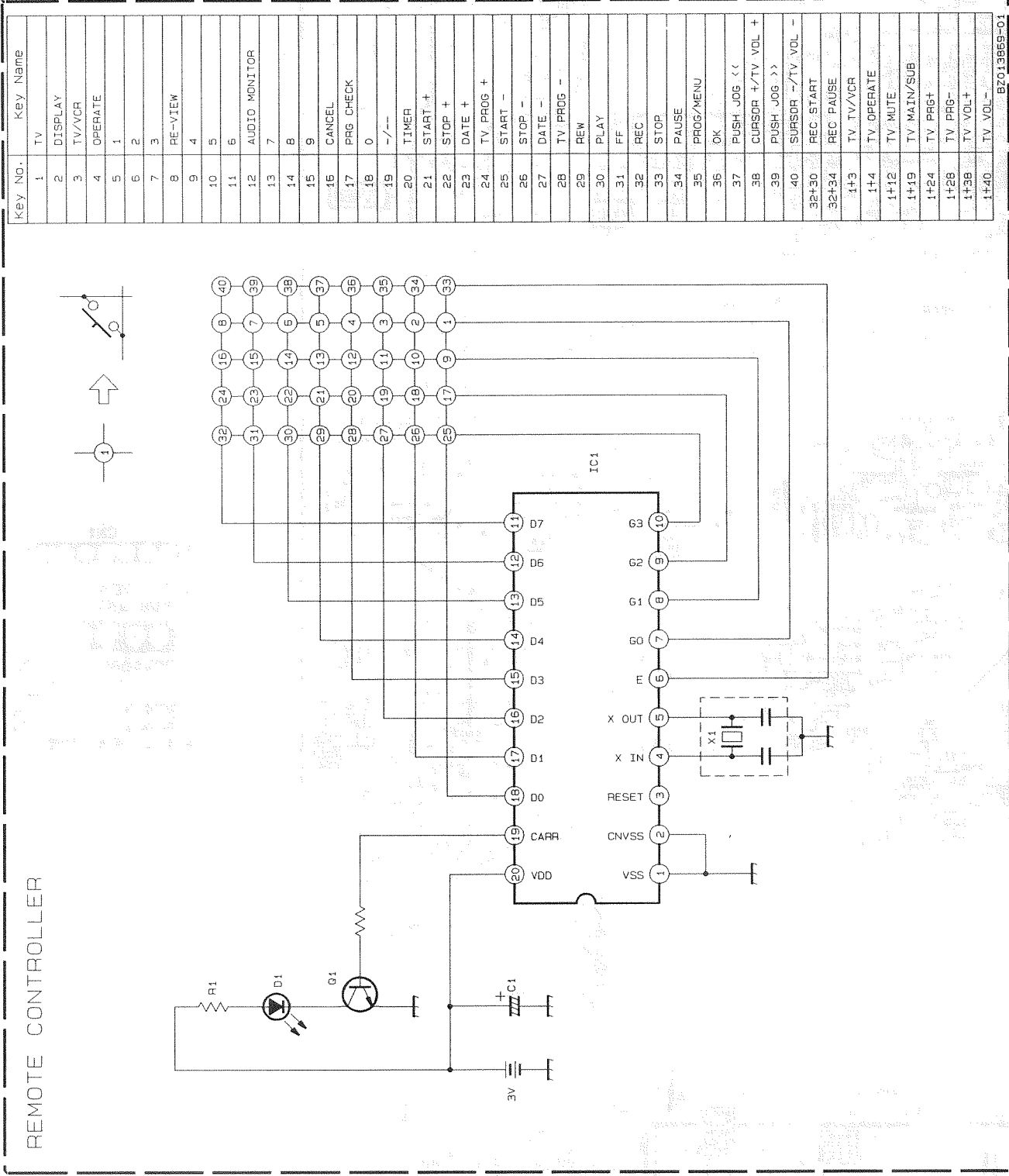
— A/C HEAD —



4.11 REMOTE CONTROL SCHEMATIC DIAGRAMS

— FOR HR-J441MS/J441MS/S —

NOTES:  
1.All parts shown in this schematic are critical for safety.  
2.This schematic is only for reference.  
Avoid replacing individual parts.  
Replace the entire unit only.



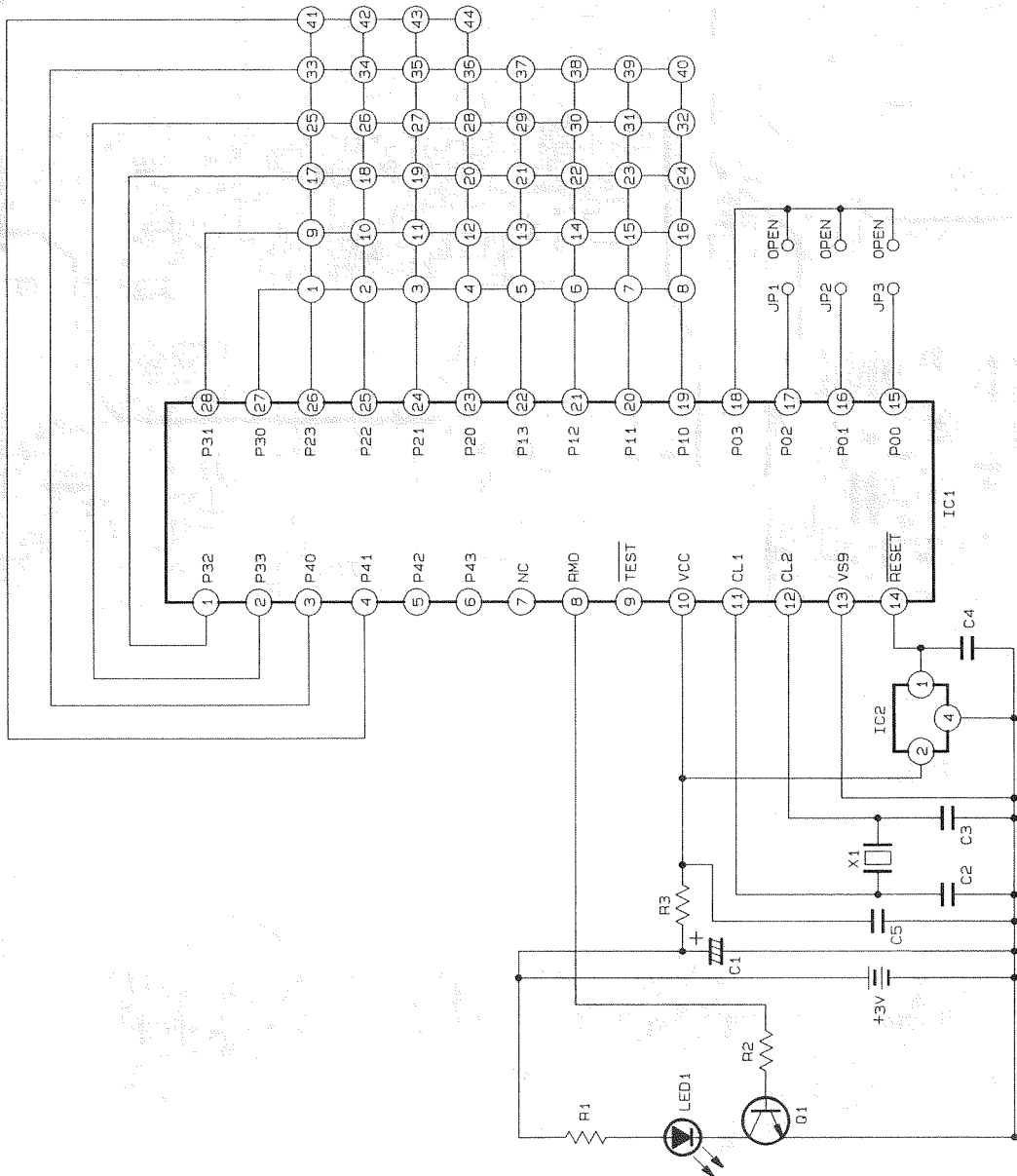
NOTES:

1. All parts shown in this schematic are critical for safety.
  2. This schematic is only for reference.
- Avoid replacing individual parts.  
Replace the entire unit only.

| Key No. | Key Name         |
|---------|------------------|
| 1       | OK               |
| 2       | --               |
| 3       | TV VOL-/CURSOR ▽ |
| 4       | ---              |
| 5       | PROG CHECK       |
| 6       | 0                |
| 7       | -/--             |
| 8       | TIMER            |
| 9       | PROG/MENU        |
| 10      | PUSH JOG <<      |
| 11      | TV VOL+/CURSOR △ |
| 12      | PUSH JOG >>      |
| 13      | 7                |
| 14      | 8                |
| 15      | 9                |
| 16      | CANSEL/C. RESET  |
| 17      | REC              |
| 18      | STOP             |
| 19      | ---              |
| 20      | PAUSE/STILL      |
| 21      | 4                |
| 22      | 5                |
| 23      | 6                |
| 24      | AUDIO MONITOR    |
| 25      | REW              |
| 26      | --               |
| 27      | PLAY             |
| 28      | FF               |
| 29      | 1                |
| 30      | 2                |
| 31      | 3                |
| 32      | RE-VIEW          |
| 33      | START-           |
| 34      | STOP-            |
| 35      | DATE-            |
| 36      | TV CH-           |
| 37      | VCR              |
| 38      | TV               |
| 39      | TV/VCR           |
| 40      | POWER            |
| 41      | START+           |
| 42      | STOP+            |
| 43      | DATE+            |
| 44      | TV CH+           |

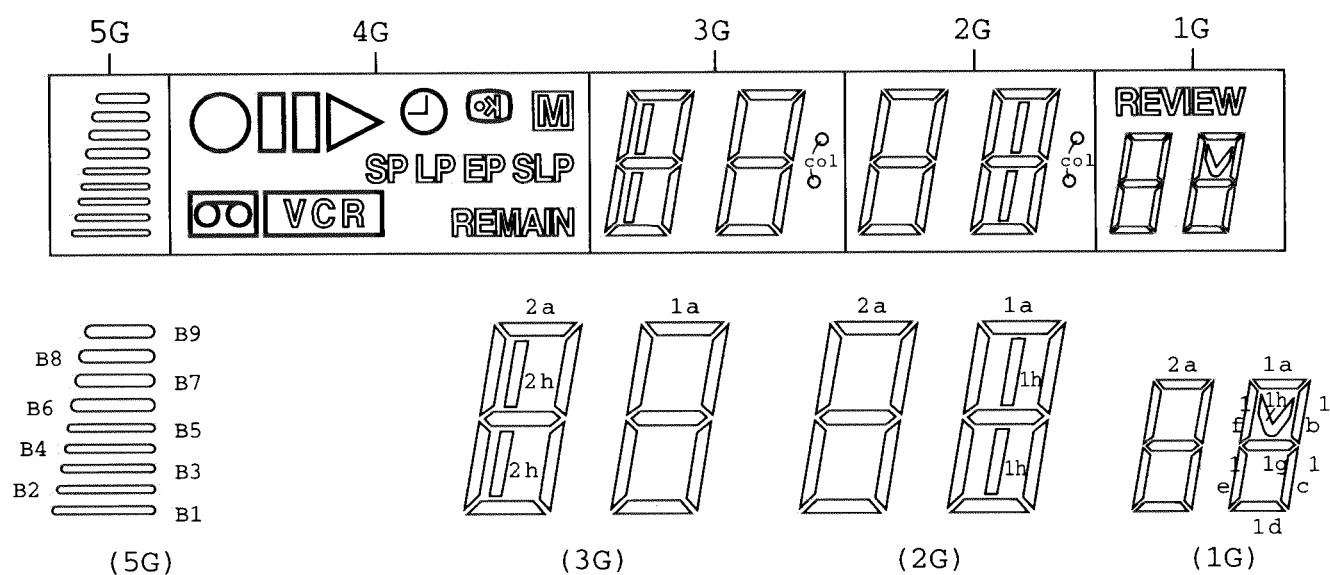
B7013980-01

REMOTE CONTROLLER



#### 4.12 FDP GRID ASSIGNMENT AND ANODE CONNECTION

## GRID ASSIGNMENT



## ANODE CONNECTION

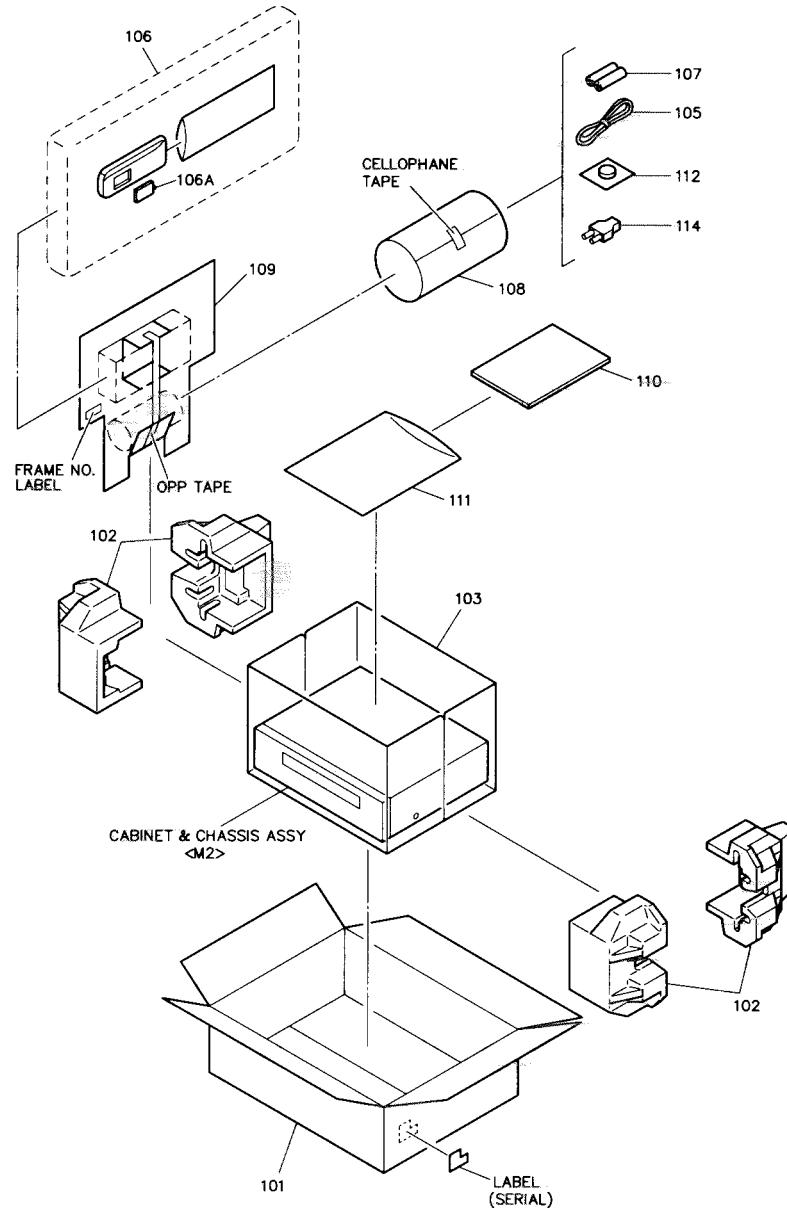
|     | 5G | 4G                                                                                  | 3G  | 2G  | 1G     |
|-----|----|-------------------------------------------------------------------------------------|-----|-----|--------|
| P1  |    |  | 1a  | 1a  | 1a     |
| P2  |    |  | 1b  | 1b  | 1b     |
| P3  |    |  | 1f  | 1f  | 1f     |
| P4  |    |  | 1g  | 1g  | 1g     |
| P5  |    |  | 1c  | 1c  | 1c     |
| P6  |    |  | 1e  | 1e  | 1e     |
| P7  |    |  | 1d  | 1d  | 1d     |
| P8  | B9 |  | col | 1h  | 1h     |
| P9  | B8 | SP                                                                                  | 2a  | 2a  | 2a     |
| P10 | B7 | LP                                                                                  | 2b  | 2b  | 2b     |
| P11 | B6 | EP                                                                                  | 2f  | 2f  | 2f     |
| P12 | B5 | SLP                                                                                 | 2g  | 2g  | 2g     |
| P13 | B4 | REMAIN                                                                              | 2c  | 2c  | 2c     |
| P14 | B3 |                                                                                     | 2e  | 2e  | 2e     |
| P15 | B2 |                                                                                     | 2d  | 2d  | 2d     |
| P16 | B1 |                                                                                     | 2h  | col | REVIEW |

## SECTION 5 PARTS LIST

### SAFETY PRECAUTION

Parts identified by the  $\triangle$  symbol are critical for safety. Replace only with specified part numbers.

#### 5.1 PACKING AND ACCESSORY ASSEMBLY <M1>



| #     | $\triangle$ | REF No. | PART No. | PART NAME, DESCRIPTION |
|-------|-------------|---------|----------|------------------------|
| ***** |             |         |          |                        |

#### PACKING AND ACCESSORY ASSEMBLY <M1>

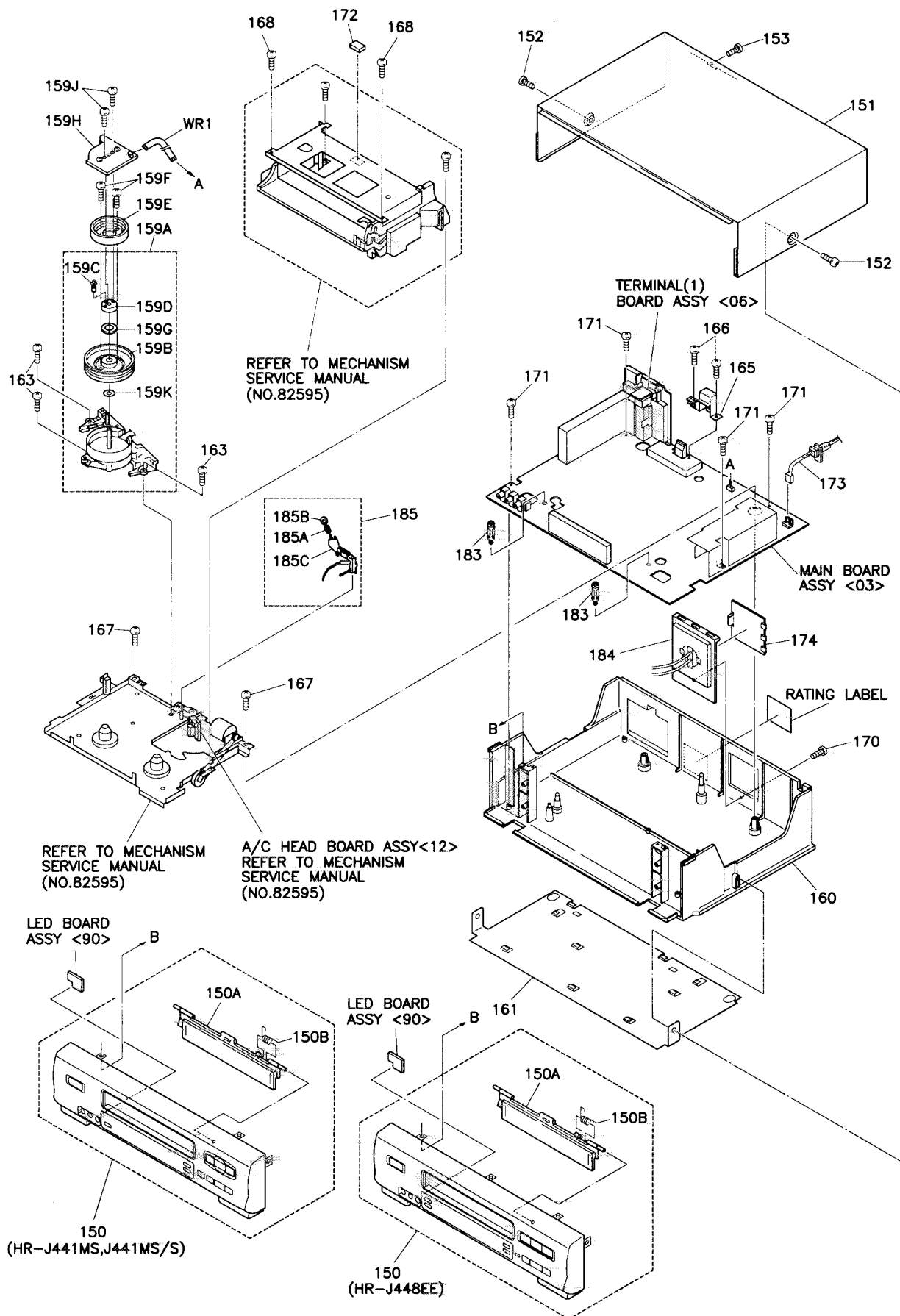
|     |  |              |                                 |
|-----|--|--------------|---------------------------------|
| 101 |  | LP30164-033A | PACKING CASE,448EE              |
|     |  | LP30164-041A | PACKING CASE,441MS 441MS/S      |
| 102 |  | LP30115-001B | CUSHION ASSY,448EE              |
|     |  | LP30130-001A | CUSHION ASSY,441MS 441MS/S      |
| 103 |  | PQM30021-93  | POLY BAG                        |
| 105 |  | PU59168-7    | RF CABLE                        |
| 106 |  | LP20106-004A | REMOTE CONTROLLER,448EE         |
|     |  | LP20106-002C | REMOTE CONTROLLER,441MS 441MS/S |

| # | $\triangle$ | REF No. | PART No.     | PART NAME, DESCRIPTION     |
|---|-------------|---------|--------------|----------------------------|
|   |             | 106A    | LP40074-001A | BATTERY CASE               |
|   |             | 107     | R6PRPA-2ST   | BATTERY,X2                 |
|   |             | 108     | QPC02202215P | POLY BAG                   |
|   |             | 109     | PQ35575-1-1  | SHEET,REMOTE CONTROLLER    |
|   | $\triangle$ | 110     | LPT0002-0G7A | INSTRUCTIONS,448EE         |
|   | $\triangle$ |         | LPT0002-0G6B | INSTRUCTIONS,448EE         |
|   | $\triangle$ |         | LPT0002-0H2B | INSTRUCTIONS,441MS 441MS/S |
|   | $\triangle$ |         | LPT0002-0H3B | INSTRUCTIONS,441MS 441MS/S |
|   | $\triangle$ |         | LPT0002-0L1A | INSTRUCTIONS,448EE         |
|   |             | 111     | QPC02503515P | POLY BAG                   |
|   | $\triangle$ | 112     | PECA0903     | LI BATTERY                 |
|   | $\triangle$ | 114     | PEMC1012     | CONVERSION PLUG,441MS/S    |

## 5.2 CABINET AND CHASSIS ASSEMBLY <M2>

## BEWARE OF BOGUS PARTS

***Parts that do not meet specifications may cause trouble in regard to safety and performance. We recommend that genuine JVC parts be used.***



| #     | △ REF No. | PART No. | PART NAME, DESCRIPTION |
|-------|-----------|----------|------------------------|
| ***** |           |          |                        |

### CABINET AND CHASSIS ASSEMBLY <M2>

|   |      |                |                                |
|---|------|----------------|--------------------------------|
|   | 150  | LP10017-011A   | FRONT PANEL ASSY,448EE         |
|   |      | LP10020-018A   | FRONT PANEL ASSY,441MS 441MS/S |
|   | 150A | PQ21884-55     | CASSETTE DOOR,448EE            |
|   |      | PQ21884-68     | CASSETTE DOOR,441MS 441MS/S    |
|   | 150B | PQ46448        | TORSION SPRING                 |
| △ | 151  | LP10013-001A   | TOP COVER                      |
|   | 152  | SDSF3010M      | SCREW,X2 TOP COVER(SIDE)       |
|   | 153  | SDSF3010M      | SCREW,TOP COVER(REAR)          |
|   | 159A | LP20083-006A   | DRUM SUB ASSY                  |
|   | 159B | LP20084-006A   | UPPER DRUM ASSY                |
|   | 159C | LP40025-001A   | BRUSH ASSEMBLY                 |
|   | 159D | LP40028-001A   | COLLAR ASSEMBLY                |
|   | 159E | QAR0002-001    | ROTOR ASSY                     |
|   | 159F | SPSP3006Z      | SCREW,X2                       |
|   | 159G | PDM4439        | CAP                            |
|   | 159H | QAR0003-003    | STATOR ASSY                    |
|   | 159J | SPSP2606Z      | SCREW,X2                       |
|   | 159K | PDM4444-19-2   | WASHER                         |
| △ | 160  | LP10012-003A   | BOTTOM CHASSIS                 |
| △ | 161  | LP10014-001A   | BOTTOM COVER                   |
|   | 163  | SPST2608Z      | SCREW,X3 DRUM                  |
|   | 165  | LP30131-001A   | SHIELD COVER,PRE               |
|   | 166  | SDST2606Z      | SCREW,X2 PRE                   |
|   | 167  | SDSF4012Z      | SCREW,X2 MECHANISM             |
|   | 168  | SDSF3010Z      | SCREW,X2 CASSETTE HOUSING      |
|   | 170  | SDSF3010M      | SCREW,TERMINAL                 |
|   | 171  | DPSF3010Z      | SCREW,X4 MAIN                  |
|   | 172  | PQM30029-73    | SPACER                         |
| △ | 173  | QMP4A10-170J5  | POWER CORD,441MS 448EE         |
| △ |      | QMP73J0-170    | POWER CORD,441MS/S             |
|   | 174  | LP30191-001B   | CAP,TERMINAL                   |
|   | 183  | PEME0947-01-01 | SPACER,X2                      |
|   | 184  | LP30195-001A   | TERMIANL ASSEMBLY              |
|   | 185  | PQ46436A-1     | CLEANER ASSEMBLY               |
|   | 185A | PQ46418-1-2    | CLEANER ROLLER                 |
|   | 185B | PQ46419-1-2    | CLEANER                        |
|   | 185C | PQ35159-1-1    | CLEANER ARM                    |
|   | WR1  | PW30803-0512   | FFC WIRE,DRUM                  |

| # | △ REF No. | PART No. | PART NAME, DESCRIPTION |
|---|-----------|----------|------------------------|
|---|-----------|----------|------------------------|

For the MECHANISM ASSY and CASSETTE HOUSING ASSY parts list, Please refer to the MECHANISM ASSEMBLY of the service manual (No. 82595)

### 5.3 ELECTRICAL PARTS LIST

# △ REF No. PART No. PART NAME, DESCRIPTION  
 \*\*\*\*\*

#### MAIN BOARD ASSEMBLY <03>

|          |                   |                               |
|----------|-------------------|-------------------------------|
| PW1      | PB11067L1         | MAIN BOARD ASSY,441MS 441MS/S |
|          | PB11067M1         | MAIN BOARD ASSY,448EE         |
| IC1      | HA118203AF        | IC                            |
| IC2      | MSM7470-70MS-XE   | IC                            |
| IC101    | LA7416            | IC                            |
| IC701    | M37777MAA1A3GP    | IC                            |
| IC702    | X24C04P           | IC                            |
|          | or 24LC04B/P      | IC                            |
|          | or AT24C04-10PC   | IC                            |
| IC703    | TA7291S           | IC                            |
| IC704    | S-80727AN-Z       | IC                            |
| IC901    | LA5613            | IC                            |
| △ IC1201 | UPD16312GB(P)     | IC                            |
| △        | or UPD16312GB(M)  | IC                            |
| IC1202   | GP1U291Q          | IR DETECT UNIT                |
|          | or PIC-21143LJ    | IR DETECT UNIT                |
|          | or PNA4652M00YC   | IR DETECT UNIT                |
| IC1301   | LC74783-9194      | IC (OSD)                      |
| Q1       | 2SD1819A(QRS)     | TRANSISTOR                    |
|          | or 2SC4081(QRS)   | TRANSISTOR                    |
|          | or 2PC4081/R/-X   | TRANSISTOR                    |
| Q2       | 2SB1218A(QR)      | TRANSISTOR                    |
|          | or 2PA1576/R/-X   | TRANSISTOR                    |
|          | or 2SA1576A/QR/-X | TRANSISTOR                    |
| Q3       | 2SB1218A(QR)      | TRANSISTOR                    |
|          | or 2PA1576/R/-X   | TRANSISTOR                    |
|          | or 2SA1576A/QR/-X | TRANSISTOR                    |
| Q7       | 2SD1819A(QRS)     | TRANSISTOR                    |
|          | or 2SC4081(QRS)   | TRANSISTOR                    |
|          | or 2PC4081/R/-X   | TRANSISTOR                    |
| Q8       | 2SD1819A(QRS)     | TRANSISTOR                    |
|          | or 2SC4081(QRS)   | TRANSISTOR                    |
|          | or 2PC4081/R/-X   | TRANSISTOR                    |
| Q9       | UN511E            | TRANSISTOR                    |
|          | or RN2309         | TRANSISTOR                    |
|          | or DTA144WU       | TRANSISTOR                    |
| Q15      | 2SB1218A(QR)      | TRANSISTOR                    |
|          | or 2PA1576/R/-X   | TRANSISTOR                    |
|          | or 2SA1576A/QR/-X | TRANSISTOR                    |
| Q19      | 2SD1819A(QRS)     | TRANSISTOR                    |
|          | or 2SC4081(QRS)   | TRANSISTOR                    |
|          | or 2PC4081/R/-X   | TRANSISTOR                    |
| Q20      | UN511E            | TRANSISTOR                    |
|          | or RN2309         | TRANSISTOR                    |
|          | or DTA144WU       | TRANSISTOR                    |
| Q22      | UN511E            | TRANSISTOR                    |
|          | or DTA144WU       | TRANSISTOR                    |
|          | or RN2309         | TRANSISTOR                    |
| Q24      | UN521E            | TRANSISTOR                    |
|          | or DTC144WU       | TRANSISTOR                    |
|          | or RN1309         | TRANSISTOR                    |
| Q25      | UN521E            | TRANSISTOR                    |
|          | or RN1309         | TRANSISTOR                    |
|          | or DTC144WU       | TRANSISTOR                    |
| Q26      | UN511E            | TRANSISTOR                    |
|          | or RN2309         | TRANSISTOR                    |
|          | or DTA144WU       | TRANSISTOR                    |

# △ REF No. PART No. PART NAME, DESCRIPTION

|      |                   |               |
|------|-------------------|---------------|
| Q27  | UN511E            | TRANSISTOR    |
|      | or RN2309         | TRANSISTOR    |
|      | or DTA144WU       | TRANSISTOR    |
| Q28  | UN521E            | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
| Q101 | UN521E            | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
| Q102 | UN521E            | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
| Q103 | UN521E            | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
| Q104 | UN521E            | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
| Q301 | UN5211            | TRANSISTOR    |
|      | or DTC114EU       | TRANSISTOR    |
|      | or RN1302         | TRANSISTOR    |
| Q302 | UN511E            | TRANSISTOR    |
|      | or RN2309         | TRANSISTOR    |
|      | or DTA144WU       | TRANSISTOR    |
| Q303 | UN5215            | TRANSISTOR    |
|      | or RN1311         | TRANSISTOR    |
|      | or DTC114TU       | TRANSISTOR    |
| Q305 | UN5111            | TRANSISTOR    |
|      | or DTA114EU       | TRANSISTOR    |
|      | or RN2302         | TRANSISTOR    |
| Q306 | 2SD1819A(QRS)     | TRANSISTOR    |
|      | or 2SC4081(QRS)   | TRANSISTOR    |
|      | or 2PC4081/R/-X   | TRANSISTOR    |
| Q307 | 2SD1819A(QRS)     | TRANSISTOR    |
|      | or 2SC4081(QRS)   | TRANSISTOR    |
|      | or 2PC4081/R/-X   | TRANSISTOR    |
| Q308 | UN5211            | TRANSISTOR    |
|      | or RN1302         | TRANSISTOR    |
|      | or DTC114EU       | TRANSISTOR    |
| Q309 | 2SB1218A(QR)      | TRANSISTOR    |
|      | or 2PA1576/R/-X   | TRANSISTOR    |
|      | or 2SA1576A/QR/-X | TRANSISTOR    |
| Q310 | 2SB1218A(QR)      | TRANSISTOR    |
|      | or 2PA1576/R/-X   | TRANSISTOR    |
|      | or 2SA1576A/QR/-X | TRANSISTOR    |
| Q311 | 2SD1819A(QRS)     | TRANSISTOR    |
|      | or 2PC4081/R/-X   | TRANSISTOR    |
|      | or 2SC4081(QRS)   | TRANSISTOR    |
| Q314 | UN521E            | TRANSISTOR    |
|      | or RN1309         | TRANSISTOR    |
|      | or DTC144WU       | TRANSISTOR    |
| Q315 | UN5211            | TRANSISTOR    |
|      | or DTC114EU       | TRANSISTOR    |
|      | or RN1302         | TRANSISTOR    |
| Q702 | 2SC4081(QRS)      | TRANSISTOR    |
|      | or 2SD1819A(QRS)  | TRANSISTOR    |
| Q706 | LP40038-001A      | TAPE SENSOR   |
| Q707 | LP40038-001A      | TAPE SENSOR   |
| Q708 | 2SC4081(QRS)      | TRANSISTOR    |
|      | or 2SD1819A(QRS)  | TRANSISTOR    |
| Q901 | 2SK2632-CB14      | FE TRANSISTOR |

| # | △ | REF No. | PART No.           | PART NAME, DESCRIPTION | #     | △ | REF No. | PART No.           | PART NAME, DESCRIPTION |
|---|---|---------|--------------------|------------------------|-------|---|---------|--------------------|------------------------|
|   |   |         | or 2SK2666F04      | FE TRANSISTOR          | D901  |   |         | S1WB(A)60F4062X    | BRIDGE DIODE           |
|   |   |         | or 2SK2129-LT      | FE TRANSISTOR          |       |   |         | or S1WB(A)60F4072X | BRIDGE DIODE           |
|   |   | Q902    | 2SD2144S(UV)       | TRANSISTOR             | D908  |   |         | 1N4148M            | DIODE                  |
|   |   | Q955    | 2SD2144S(UVW)      | TRANSISTOR             |       |   |         | or 1SS133          | DIODE                  |
|   |   | Q1003   | 2SC3068            | TRANSISTOR             | D909  |   |         | UZ27BSB            | ZENER DIODE            |
|   |   | Q1004   | 2SB1218A(QR)       | TRANSISTOR             |       |   |         | or MTZJ27B         | ZENER DIODE            |
|   |   |         | or 2SA1576(RS)     | TRANSISTOR             |       |   |         | or RD27ES/B2/-T2   | ZENER DIODE            |
|   |   |         | or 2PA1576/R/-X    | TRANSISTOR             | D910  |   |         | AU01               | FR DIODE               |
|   |   | Q1005   | 2SD1819A(QRS)      | TRANSISTOR             |       |   |         | or 1SR153-400-T2   | FR DIODE               |
|   |   |         | or 2SC4081(QR)     | TRANSISTOR             |       |   |         | or 10ELS4          | FR DIODE               |
|   |   |         | or 2PC4081/R/-X    | TRANSISTOR             |       |   |         | or ERA18-04-T2     | FR DIODE               |
|   |   | Q1008   | 2SB1218A(QRS)      | TRANSISTOR             | D911  |   |         | AU01               | FR DIODE               |
|   |   |         | or 2PA1576/R/-X    | TRANSISTOR             |       |   |         | or ERA18-04-T2     | FR DIODE               |
|   |   |         | or 2SA1576(RS)     | TRANSISTOR             |       |   |         | or 1SR153-400-T2   | FR DIODE               |
|   |   | Q1011   | 2SD1819A(QRS)      | TRANSISTOR             |       |   |         | or 10ELS4          | FR DIODE               |
|   |   |         | or 2SC4081(QR)     | TRANSISTOR             | D952  |   |         | AU01Z              | FR DIODE               |
|   |   |         | or 2PC4081/R/-X    | TRANSISTOR             |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   | Q1102   | 2SD1819A(QRS)      | TRANSISTOR             |       |   |         | or 1SR153-200-T2   | FR DIODE               |
|   |   |         | or 2SC4081(RS)     | TRANSISTOR             |       |   |         | or 10ELS2          | FR DIODE               |
|   |   |         | or 2PC4081/R/-X    | TRANSISTOR             | D953  |   |         | AU01Z              | FR DIODE               |
|   |   | Q1401   | 2SB1218A(QR)       | TRANSISTOR             |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   |         | or 2PA1576/R/-X    | TRANSISTOR             |       |   |         | or 1SR153-200-T2   | FR DIODE               |
|   |   |         | or 2SA1576A(QR/-X) | TRANSISTOR             |       |   |         | or 10ELS2          | FR DIODE               |
|   |   | Q1402   | UN521E             | TRANSISTOR             | D954  |   |         | AU01Z              | FR DIODE               |
|   |   |         | or DTC144WU        | TRANSISTOR             |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   |         | or RN1309          | TRANSISTOR             |       |   |         | or 1SR153-200-T2   | FR DIODE               |
|   |   | D1      | 1N4148M            | DIODE                  |       |   |         | or 10ELS2          | FR DIODE               |
|   |   |         | or 1SS133          | DIODE                  | D955  |   |         | UZ15BSA            | ZENER DIODE            |
|   |   | D4      | 1N4148M            | DIODE                  |       |   |         | or MTZJ15A         | ZENER DIODE            |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or RD15ES/B1/-T2   | ZENER DIODE            |
|   |   | D8      | 1N4148M            | DIODE                  | D956  |   |         | AK04               | DIODE                  |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 11EQS04         | SB DIODE               |
|   |   | D9      | 1N4148M            | DIODE                  | D958  |   |         | UZ30BSA            | ZENER DIODE            |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or RD30ES/B1/-T2   | ZENER DIODE            |
|   |   | D103    | RB721Q             | DIODE                  |       |   |         | or MTZJ30A         | ZENER DIODE            |
|   |   | D104    | 1N4148M            | DIODE                  | D960  |   |         | 1N4148M            | DIODE                  |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 1SS133          | DIODE                  |
|   |   | D151    | 1N4148M            | DIODE                  | D965  |   |         | AU01Z              | FR DIODE               |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   | D152    | 1N4148M            | DIODE                  |       |   |         | or 1SR153-200-T2   | FR DIODE               |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 10ELS2          | FR DIODE               |
|   |   | D301    | 1N4148M            | DIODE                  | D968  |   |         | AU01Z              | FR DIODE               |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   | D701    | SIR-381SB3FM       | LE DIODE               |       |   |         | or 1SR153-200-T2   | FR DIODE               |
|   |   |         | or SIR-381SB3FX1M  | LE DIODE               |       |   |         | or 10ELS2          | FR DIODE               |
|   |   | D702    | 1N4148M            | DIODE                  | D969  |   |         | 1SR153-200-T2      | FR DIODE               |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or ERA18-02-T2     | FR DIODE               |
|   |   | D704    | 11ES2              | DIODE                  | D975  |   |         | UZ6.8BSA           | ZENER DIODE            |
|   |   | D705    | 11ES2              | DIODE                  |       |   |         | or RD6.8ES/B1/-T2  | ZENER DIODE            |
|   |   | D706    | RD39ES/B3/-T2      | DIODE                  |       |   |         | or MTZJ6.8A        | ZENER DIODE            |
|   |   |         | or MTZJ39C         | ZENER DIODE            | D1001 |   |         | MTZJ10B            | ZENER DIODE            |
|   |   | D707    | 1N4148M            | DIODE                  | D1002 |   |         | MTZJ33C            | ZENER DIODE            |
|   |   |         | or 1SS133          | DIODE                  | D1004 |   |         | 1N4148M            | DIODE                  |
| △ |   | D708    | RB721Q             | DIODE                  |       |   |         | or 1SS133          | DIODE                  |
|   |   | D709    | 1N4148M            | DIODE                  | D1005 |   |         | 1N4148M            | DIODE                  |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 1SS133          | DIODE                  |
|   |   | D710    | 1N4148M            | DIODE                  | D1103 |   |         | 1N4148M            | DIODE                  |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 1SS133          | DIODE                  |
|   |   | D713    | 1N4148M            | DIODE                  | D1104 |   |         | 1N4148M            | DIODE                  |
|   |   |         | or 1SS133          | DIODE                  |       |   |         | or 1SS133          | DIODE                  |
|   |   |         |                    |                        | D1201 |   |         | 1N4148M            | DIODE                  |

| #     | △ | REF No. | PART No.       | PART NAME, DESCRIPTION    |             | #    | △ | REF No. | PART No.     | PART NAME, DESCRIPTION |             |
|-------|---|---------|----------------|---------------------------|-------------|------|---|---------|--------------|------------------------|-------------|
|       |   |         | or 1SS133      | DIODE                     |             | R83  |   |         | NRSA02J-681X | MG RESISTOR            | 680Ω,1/10W  |
| D1202 |   |         | 1N4148M        | DIODE                     |             | R84  |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
|       |   |         | or 1SS133      | DIODE                     |             | R86  |   |         | NRSA02J-123X | MG RESISTOR            | 12kΩ,1/10W  |
| D1203 |   |         | 1N4148M        | DIODE                     |             | R87  |   |         | NRSA02J-561X | MG RESISTOR            | 560Ω,1/10W  |
|       |   |         | or 1SS133      | DIODE                     |             | R88  |   |         | NRSA02J-222X | MG RESISTOR            | 2.2kΩ,1/10W |
| D1204 |   |         | 1N4148M        | DIODE                     |             | R89  |   |         | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
|       |   |         | or 1SS133      | DIODE                     |             | R90  |   |         | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| D1205 |   |         | 1N4148M        | DIODE                     |             | R91  |   |         | QRE141J-200Y | RESISTOR,448EE         | 20Ω,1/4W    |
|       |   |         | or 1SS133      | DIODE                     |             | R92  |   |         | QRE141J-560Y | RESISTOR,448EE         | 56Ω,1/4W    |
| D1207 |   |         | RD9.1ES/B2/-T2 | ZENER DIODE               |             | R93  |   |         | QRE141J-103Y | RESISTOR               | 10kΩ,1/4W   |
| D1222 |   |         | 1N4148M        | DIODE,448EE               |             | R101 |   |         | QRE141J-273Y | RESISTOR               | 27kΩ,1/4W   |
|       |   |         | or 1SS133      | DIODE,448EE               |             | R102 |   |         | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| D1224 |   |         | 1N4148M        | DIODE,448EE               |             | R103 |   |         | NRSA02J-392X | MG RESISTOR            | 3.9kΩ,1/10W |
|       |   |         | or 1SS133      | DIODE,448EE               |             | R105 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| D1225 |   |         | 1N4148M        | DIODE,441MS 441MS/S       |             | R106 |   |         | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
|       |   |         | or 1SS133      | DIODE,441MS 441MS/S       |             | R107 |   |         | NRVA02D-152X | RESISTOR               | 1.5kΩ,1/10W |
| D1230 |   |         | 11ES2          | DIODE                     |             | R109 |   |         | NRSA02J-223X | MG RESISTOR            | 22kΩ,1/10W  |
| R1    |   |         | NRSA02J-332X   | MG RESISTOR               | 3.3kΩ,1/10W | R110 |   |         | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| R2    |   |         | NRSA02J-122X   | MG RESISTOR               | 1.2kΩ,1/10W | R111 |   |         | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| R3    |   |         | NRSA02J-332X   | MG RESISTOR               | 3.3kΩ,1/10W | R112 |   |         | NRSA02J-683X | MG RESISTOR            | 68kΩ,1/10W  |
| R4    |   |         | NRSA02J-182X   | MG RESISTOR               | 1.8kΩ,1/10W | R115 |   |         | QRE141J-0R0Y | RESISTOR               | 0Ω,1/4W     |
| R5    |   |         | NRSA02J-821X   | MG RESISTOR               | 820Ω,1/10W  | R116 |   |         | QRE141J-103Y | RESISTOR               | 10kΩ,1/4W   |
| R6    |   |         | NRSA02J-222X   | MG RESISTOR               | 2.2kΩ,1/10W | R117 |   |         | QRE141J-183Y | RESISTOR               | 18kΩ,1/4W   |
| R8    |   |         | NRSA02J-122X   | MG RESISTOR               | 1.2kΩ,1/10W | R301 |   |         | NRSA02J-223X | MG RESISTOR            | 22kΩ,1/10W  |
| R9    |   |         | NRSA02J-273X   | MG RESISTOR               | 27kΩ,1/10W  | R302 |   |         | NRSA02J-101X | MG RESISTOR            | 100Ω,1/10W  |
| R10   |   |         | NRSA02J-182X   | MG RESISTOR               | 1.8kΩ,1/10W | R303 |   |         | NRSA02J-101X | MG RESISTOR            | 100Ω,1/10W  |
| R11   |   |         | NRSA02J-392X   | MG RESISTOR               | 3.9kΩ,1/10W | R304 |   |         | NRSA02J-101X | MG RESISTOR            | 100Ω,1/10W  |
| R12   |   |         | NRSA02J-183X   | MG RESISTOR               | 18kΩ,1/10W  | R305 |   |         | NRSA02J-223X | MG RESISTOR            | 22kΩ,1/10W  |
| R13   |   |         | NRSA02J-152X   | MG RESISTOR               | 1.5kΩ,1/10W | R306 |   |         | NRSA02J-121X | MG RESISTOR            | 120Ω,1/10W  |
| R14   |   |         | NRSA02J-682X   | MG RESISTOR               | 6.8kΩ,1/10W | R307 |   |         | NRSA02J-682X | MG RESISTOR            | 6.8kΩ,1/10W |
| R17   |   |         | QRE141J-153Y   | RESISTOR                  | 15kΩ,1/4W   | R308 |   |         | NRSA02J-224X | MG RESISTOR            | 220kΩ,1/10W |
| R18   |   |         | NRSA02J-103X   | MG RESISTOR               | 10kΩ,1/10W  | R310 |   |         | NRSA02J-393X | MG RESISTOR            | 39kΩ,1/10W  |
| R19   |   |         | QRE141J-102Y   | RESISTOR                  | 1kΩ,1/4W    | R311 |   |         | NRSA02J-183X | MG RESISTOR            | 18kΩ,1/10W  |
| R20   |   |         | QRE123J-331X   | RESISTOR                  | 330Ω,1/2W   | R312 |   |         | QRE141J-221Y | RESISTOR               | 220Ω,1/4W   |
| R21   |   |         | NRSA02J-750X   | MG RESISTOR               | 75Ω,1/10W   | R313 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R22   |   |         | NRSA02J-102X   | MG RESISTOR               | 1kΩ,1/10W   | R314 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R30   |   |         | NRSA02J-102X   | MG RESISTOR               | 1kΩ,1/10W   | R316 |   |         | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| R31   |   |         | NRSA02J-561X   | MG RESISTOR               | 560Ω,1/10W  | R317 |   |         | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W |
| R32   |   |         | QRE141J-102Y   | RESISTOR                  | 1kΩ,1/4W    | R318 |   |         | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W |
| R36   |   |         | NRSA02J-102X   | MG RESISTOR               | 1kΩ,1/10W   | R319 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R37   |   |         | QRE141J-563Y   | RESISTOR                  | 56kΩ,1/4W   | R320 |   |         | NRSA02J-224X | MG RESISTOR            | 220kΩ,1/10W |
| R39   |   |         | NRSA02J-153X   | MG RESISTOR               | 15kΩ,1/10W  | R321 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R40   |   |         | NRSA02J-223X   | MG RESISTOR               | 22kΩ,1/10W  | R322 |   |         | NRSA02J-101X | MG RESISTOR            | 100Ω,1/10W  |
| R41   |   |         | NRSA02J-183X   | MG RESISTOR               | 18kΩ,1/10W  | R331 |   |         | NRSA02J-183X | MG RESISTOR            | 18kΩ,1/10W  |
| R43   |   |         | NRSA02J-0R0X   | MG RESISTOR,448EE         | 0Ω,1/10W    | R332 |   |         | NRSA02J-473X | MG RESISTOR            | 47kΩ,1/10W  |
|       |   |         | NRSA02J-200X   | MG RESISTOR,441MS 441MS/S | 20Ω,1/10W   | R333 |   |         | QRE141J-183Y | RESISTOR               | 18kΩ,1/4W   |
| R44   |   |         | NRSA02J-560X   | MG RESISTOR,441MS 441MS/S | 56Ω,1/10W   | R334 |   |         | NRSA02J-473X | MG RESISTOR            | 47kΩ,1/10W  |
| R45   |   |         | NRSA02J-335X   | MG RESISTOR               | 3.3MΩ,1/10W | R335 |   |         | NRSA02J-3R3X | MG RESISTOR            | 3.3Ω,1/10W  |
| R54   |   |         | NRSA02J-472X   | MG RESISTOR               | 4.7kΩ,1/10W | R336 |   |         | NRSA02J-123X | MG RESISTOR            | 12kΩ,1/10W  |
| R61   |   |         | NRSA02J-0R0X   | MG RESISTOR               | 0Ω,1/10W    | R337 |   |         | NRSA02J-820X | MG RESISTOR            | 82Ω,1/10W   |
| R62   |   |         | NRSA02J-0R0X   | MG RESISTOR               | 0Ω,1/10W    | R338 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R63   |   |         | NRSA02J-0R0X   | MG RESISTOR               | 0Ω,1/10W    | R701 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R65   |   |         | NRSA02J-0R0X   | MG RESISTOR               | 0Ω,1/10W    | R702 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R66   |   |         | NRSA02J-0R0X   | MG RESISTOR               | 0Ω,1/10W    | R703 |   |         | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    |
| R69   |   |         | QRE141J-225Y   | RESISTOR                  | 2.2MΩ,1/4W  | R704 |   |         | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    |
| R70   |   |         | NRSA02J-103X   | MG RESISTOR               | 10kΩ,1/10W  | R705 |   |         | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W |
| R71   |   |         | NRSA02J-103X   | MG RESISTOR               | 10kΩ,1/10W  | R706 |   |         | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W |
| R72   |   |         | NRSA02J-103X   | MG RESISTOR               | 10kΩ,1/10W  | R708 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R79   |   |         | NRSA02J-822X   | RESISTOR                  | 8.2kΩ,1/10W | R709 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R80   |   |         | NRSA02J-152X   | MG RESISTOR               | 1.5kΩ,1/10W | R710 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
|       |   |         |                |                           |             | R711 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |

| # ▲ REF No. | PART No.     | PART NAME, DESCRIPTION |             | # ▲ REF No. | PART No.     | PART NAME, DESCRIPTION |             |
|-------------|--------------|------------------------|-------------|-------------|--------------|------------------------|-------------|
| R712        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R790        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R713        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R792        | NRSA02J-273X | MG RESISTOR            | 27kΩ,1/10W  |
| R714        | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    | R793        | NRSA02J-273X | MG RESISTOR            | 27kΩ,1/10W  |
| R715        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R794        | NRSA02J-392X | MG RESISTOR            | 3.9kΩ,1/10W |
| R719        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | ▲ R795      | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R722        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R796        | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W |
| R723        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R799        | QRE141J-104Y | RESISTOR               | 100kΩ,1/4W  |
| R724        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R901        | QRE141J-224Y | RESISTOR               | 220kΩ,1/4W  |
| R725        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R902        | QRE141J-224Y | RESISTOR               | 220kΩ,1/4W  |
| R728        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R903        | QRE141J-683Y | RESISTOR               | 68kΩ,1/4W   |
| R729        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R904        | QRE121J-331Y | RESISTOR               | 330Ω,1/2W   |
| R730        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R905        | QRT01DJ-R39X | MF RESISTOR            | 0.39Ω,1W    |
| R732        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R906        | NRSA02J-681X | MG RESISTOR            | 680Ω,1/10W  |
| R733        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R908        | QRG02GJ-683  | OMF RESISTOR           | 68kΩ,2W     |
| R734        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R909        | NRSA02J-152X | MG RESISTOR            | 1.5kΩ,1/10W |
| R735        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R910        | NRSA02J-821X | MG RESISTOR            | 820Ω,1/10W  |
| R736        | NRSA02J-332X | MG RESISTOR            | 3.3kΩ,1/10W | R911        | NRSA02J-224X | MG RESISTOR            | 220kΩ,1/10W |
| R737        | NRSA02J-332X | MG RESISTOR            | 3.3kΩ,1/10W | R951        | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  |
| R741        | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  | R955        | QRL02DJ-222X | OMF RESISTOR           | 2.2kΩ,2W    |
| R742        | NRSA02J-562X | MG RESISTOR            | 5.6kΩ,1/10W | ▲ R957      | QRZ9005-101X | FUSI RESISTOR          |             |
| R743        | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    | R963        | NRSA02J-511X | MG RESISTOR            | 510Ω,1/10W  |
| R744        | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    | R964        | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  |
| R745        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R970        | QRL01DJ-240X | OMF RESISTOR           | 24Ω,1W      |
| R746        | QRE141J-104Y | RESISTOR               | 100kΩ,1/4W  | R971        | QRL02DJ-391X | OMF RESISTOR           | 390Ω,2W     |
| R747        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R974        | QRL02DJ-391X | OMF RESISTOR           | 390Ω,2W     |
| R750        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R975        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R751        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R1003       | NRSA02J-331X | MG RESISTOR            | 330Ω,1/10W  |
| R752        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R1004       | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| R753        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R1005       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R754        | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  | R1006       | NRSA02J-561X | MG RESISTOR            | 560Ω,1/10W  |
| R755        | QRE141J-471Y | RESISTOR               | 470Ω,1/4W   | R1007       | NRSA02J-223X | MG RESISTOR            | 22kΩ,1/10W  |
| R756        | QRE141J-471Y | RESISTOR               | 470Ω,1/4W   | R1008       | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| R757        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1009       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R758        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1010       | NRSA02J-123X | MG RESISTOR            | 12kΩ,1/10W  |
| R759        | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W | R1012       | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| R760        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1016       | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R762        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1021       | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  |
| R763        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1022       | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W |
| R764        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1023       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R765        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R1024       | NRSA02J-682X | MG RESISTOR            | 6.8kΩ,1/10W |
| R766        | QRE141J-750Y | RESISTOR               | 75Ω,1/4W    | R1037       | NRSA02J-562X | MG RESISTOR            | 5.6kΩ,1/10W |
| R767        | NRSA02J-822X | RESISTOR               | 8.2kΩ,1/10W | R1038       | NRSA02J-152X | MG RESISTOR            | 1.5kΩ,1/10W |
| R768        | NRSA02J-822X | RESISTOR               | 8.2kΩ,1/10W | R1101       | NRSA02J-222X | MG RESISTOR            | 2.2kΩ,1/10W |
| R769        | NRSA02J-181X | MG RESISTOR            | 180Ω,1/10W  | R1102       | NRSA02J-223X | MG RESISTOR            | 22kΩ,1/10W  |
| R770        | NRSA02J-181X | MG RESISTOR            | 180Ω,1/10W  | R1105       | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W |
| R771        | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W | R1106       | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| R772        | NRSA02J-474X | MG RESISTOR            | 470kΩ,1/10W | R1107       | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    |
| R773        | NRSA02J-334X | MG RESISTOR            | 330kΩ,1/10W | R1109       | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    |
| R774        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1110       | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  |
| R776        | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W | R1111       | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  |
| R777        | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W | R1112       | NRSA02J-153X | MG RESISTOR            | 15kΩ,1/10W  |
| R778        | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W | R1113       | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| R779        | QRE141J-472Y | RESISTOR               | 4.7kΩ,1/4W  | R1115       | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W    |
| R781        | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | R1118       | QRE141J-102Y | RESISTOR               | 1kΩ,1/4W    |
| R782        | QRE141J-103Y | RESISTOR               | 10kΩ,1/4W   | R1119       | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R783        | QRE141J-103Y | RESISTOR               | 10kΩ,1/4W   | R1120       | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   |
| R784        | NRSA02J-105X | MG RESISTOR            | 1MΩ,1/10W   | R1121       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R785        | NRSA02J-475X | MG RESISTOR            | 4.7MΩ,1/10W | R1122       | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W |
| R787        | NRSA02J-104X | MG RESISTOR            | 100kΩ,1/10W | R1125       | QRE141J-472Y | RESISTOR               | 4.7kΩ,1/4W  |
| R788        | NRSA02J-101X | MG RESISTOR            | 100Ω,1/10W  | R1126       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |
| R789        | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | R1201       | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  |

| #     | △ | REF No. | PART No.     | PART NAME, DESCRIPTION |             | #    | △ | REF No. | PART No.     | PART NAME, DESCRIPTION |              |
|-------|---|---------|--------------|------------------------|-------------|------|---|---------|--------------|------------------------|--------------|
| R1202 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C44  |   |         | QEKJ0JM-476  | E CAPACITOR            | 47μF,6.3V    |
| R1203 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C45  |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V    |
| R1204 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C47  |   |         | QEKJ1CM-476  | E CAPACITOR            | 47μF,16V     |
| R1205 |   |         | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W | C48  |   |         | QETC0JM-477  | E CAPACITOR            | 470μF,6.3V   |
| R1206 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | C49  |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V   |
| R1207 |   |         | NRSA02J-471X | MG RESISTOR            | 470Ω,1/10W  | C53  |   |         | NDC21HJ-181X | CAPACITOR              | 180pF,50V    |
| R1208 |   |         | NRSA02J-563X | MG RESISTOR            | 56kΩ,1/10W  | C54  |   |         | QEKJ1HM-105  | E CAPACITOR            | 1μF,50V      |
| R1209 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C56  |   |         | NDC21HJ-7R0X | CAPACITOR              | 7pF,50V      |
| R1210 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C57  |   |         | NDC21HJ-7R0X | CAPACITOR              | 7pF,50V      |
| R1211 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C59  |   |         | NDC21HJ-680X | CAPACITOR              | 68pF,50V     |
| R1212 |   |         | NRSA02J-472X | MG RESISTOR            | 4.7kΩ,1/10W | C61  |   |         | NDC21HJ-4R0X | CAPACITOR              | 4pF,50V      |
| R1220 |   |         | NRSA02J-331X | MG RESISTOR            | 330Ω,1/10W  | C63  |   |         | NCB21HK-331X | CAPACITOR              | 330pF,50V    |
| R1221 |   |         | NRSA02J-333X | MG RESISTOR            | 33kΩ,1/10W  | C80  |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V   |
| R1222 |   |         | QRE141J-333Y | RESISTOR               | 33kΩ,1/4W   | C82  |   |         | NDC21HJ-100X | CAPACITOR              | 10pF,50V     |
| R1223 |   |         | NRSA02J-333X | MG RESISTOR            | 33kΩ,1/10W  | C84  |   |         | NCB21HK-123X | CAPACITOR              | 0.012μF,50V  |
| R1224 |   |         | NRSA02J-333X | MG RESISTOR            | 33kΩ,1/10W  | C85  |   |         | NRSA02J-0R0X | MG RESISTOR            | 0Ω,1/10W     |
| R1226 |   |         | QRE141J-104Y | BUS WIRE               | 100kΩ,1/10W | C89  |   |         | NDC21HJ-560X | CAPACITOR              | 56pF,50V     |
| R1301 |   |         | NRSA02J-392X | MG RESISTOR            | 3.9kΩ,1/10W | C92  |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V   |
| R1307 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C101 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| R1308 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C103 |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V   |
| R1309 |   |         | NRSA02J-103X | MG RESISTOR            | 10kΩ,1/10W  | C104 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| R1401 |   |         | NRSA02J-473X | MG RESISTOR            | 47kΩ,1/10W  | C105 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| R1402 |   |         | NRSA02J-102X | MG RESISTOR            | 1kΩ,1/10W   | C106 |   |         | NCB21HK-272X | CAPACITOR              | 0.0027μF,50V |
| C3    |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C107 |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V    |
| C4    |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V  | C108 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C5    |   |         | NDC21HJ-221X | CAPACITOR              | 220pF,50V   | C109 |   |         | QEKJ1CM-476  | E CAPACITOR            | 47μF,16V     |
| C6    |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V    | C113 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C7    |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V  | C114 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C9    |   |         | QEKJ0JM-476  | E CAPACITOR            | 47μF,6.3V   | C115 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C10   |   |         | QCC11CJ-104  | CAPACITOR              | 0.1μF,16V   | C117 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C11   |   |         | QEKJ1HM-335  | E CAPACITOR            | 3.3μF,50V   | C118 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C12   |   |         | QEKJ1HM-225  | E CAPACITOR            | 2.2μF,50V   | C119 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C13   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C120 |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V    |
| C14   |   |         | NDC21HJ-151X | CAPACITOR              | 150pF,50V   | C121 |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V    |
| C15   |   |         | NDC21HJ-560X | CAPACITOR              | 56pF,50V    | C123 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C16   |   |         | QEKJ1HM-225  | E CAPACITOR            | 2.2μF,50V   | C126 |   |         | NDC21HJ-101X | CAPACITOR              | 100pF,50V    |
| C17   |   |         | QEKJ1HM-474  | E CAPACITOR            | 0.47μF,50V  | C128 |   |         | NDC21HJ-331X | CAPACITOR              | 330pF,50V    |
| C18   |   |         | NCB21EK-223X | CAPACITOR              | 0.022μF,25V | C301 |   |         | QEKJ1HM-105  | E CAPACITOR            | 1μF,50V      |
| C19   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C302 |   |         | QFLC1HJ-123Z | F CAPACITOR            | 0.012μF,50V  |
| C20   |   |         | NCB21EK-333X | CAPACITOR              | 0.033μF,25V | C303 |   |         | QFLC1HJ-223Z | F CAPACITOR            | 0.022μF,50V  |
| C21   |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V  | C304 |   |         | QFLC1HJ-472Z | F CAPACITOR            | 0.0047μF,50V |
| C22   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C306 |   |         | NCB21HK-222X | CAPACITOR              | 0.0022μF,50V |
| C23   |   |         | QEKJ0JM-476  | E CAPACITOR            | 47μF,6.3V   | C307 |   |         | QEKJ1EM-475  | E CAPACITOR            | 4.7μF,25V    |
| C24   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C308 |   |         | QEKJ0JM-226  | E CAPACITOR            | 2.2μF,6.3V   |
| C25   |   |         | QEKJ1HM-335  | E CAPACITOR            | 3.3μF,50V   | C309 |   |         | NCB21HK-153X | CAPACITOR              | 0.015μF,50V  |
| C26   |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V    | C310 |   |         | QEKJ1EM-475  | E CAPACITOR            | 4.7μF,25V    |
| C27   |   |         | QERF1CM-106  | E CAPACITOR            | 10μF,16V    | C311 |   |         | NCB21HK-333X | CAPACITOR              | 0.033μF,50V  |
| C28   |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V  | C312 |   |         | NCB21HK-333X | CAPACITOR              | 0.033μF,50V  |
| C29   |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V    | C313 |   |         | QEKJ1HM-105  | E CAPACITOR            | 1μF,50V      |
| C30   |   |         | QEKJ1HM-104  | E CAPACITOR            | 0.1μF,50V   | C314 |   |         | NCB21HK-182X | CAPACITOR              | 0.0018μF,50V |
| C31   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C315 |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V     |
| C32   |   |         | QEKJ1HM-335  | E CAPACITOR            | 3.3μF,50V   | C316 |   |         | NCB21CK-473X | CAPACITOR              | 0.047μF,16V  |
| C34   |   |         | NCB21EK-473X | CAPACITOR              | 0.047μF,25V | C331 |   |         | NCB21EK-223X | CAPACITOR              | 0.022μF,25V  |
| C35   |   |         | NCB21CK-224X | CAPACITOR              | 0.22μF,16V  | C332 |   |         | NCB21HK-472X | CAPACITOR              | 0.0047μF,50V |
| C36   |   |         | NDC21HJ-470X | CAPACITOR              | 47pF,50V    | C333 |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V     |
| C37   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C334 |   |         | NCB21HK-331X | CAPACITOR              | 330pF,50V    |
| C38   |   |         | NDC21HJ-151X | CAPACITOR              | 150pF,50V   | C335 |   |         | QFLC1HJ-823Z | F CAPACITOR            | 0.082μF,50V  |
| C39   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C701 |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V    |
| C41   |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V  | C702 |   |         | NCB21HK-103X | CAPACITOR              | 0.01μF,50V   |
| C42   |   |         | NCF21HZ-103X | CAPACITOR              | 0.01μF,50V  | C703 |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V     |
| C43   |   |         | NCB21EK-104X | CAPACITOR              | 0.1μF,25V   | C707 |   |         | QEKJ1CM-106  | E CAPACITOR            | 10μF,16V     |

| # | △ | REF No. | PART No.     | PART NAME, DESCRIPTION     |              | # | △ | REF No. | PART No.     | PART NAME, DESCRIPTION     |             |
|---|---|---------|--------------|----------------------------|--------------|---|---|---------|--------------|----------------------------|-------------|
|   |   | C708    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1202   | NCB21EK-104X | CAPACITOR                  | 0.1μF,25V   |
|   |   | C709    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1203   | QETC0JM-227  | E CAPACITOR                | 220μF,6.3V  |
|   |   | C718    | NCB21EK-473X | CAPACITOR                  | 0.047μF,25V  |   |   | C1204   | NDC21HJ-470X | CAPACITOR                  | 47pF,50V    |
|   |   | C721    | QEKJ0JM-227  | E CAPACITOR                | 220μF,6.3V   |   |   | C1205   | NDC21HJ-330X | CAPACITOR                  | 33pF,50V    |
|   |   | C722    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1206   | QETC1HM-106  | E CAPACITOR                | 10μF,50V    |
|   |   | C724    | NCB21EK-104X | CAPACITOR                  | 0.1μF,25V    |   |   | C1207   | QCB1HJ-102   | CAPACITOR                  | 0.001μF,50V |
|   |   | C725    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1210   | QCFB1HZ-104  | CAPACITOR                  | 0.1μF,50V   |
|   |   | C728    | NDC21HJ-180X | CAPACITOR                  | 18pF,50V     |   |   | C1301   | QEKJ1HM-105  | E CAPACITOR                | 1μF,50V     |
|   |   | C729    | NDC21HJ-100X | CAPACITOR                  | 10pF,50V     |   |   | C1302   | NDC21HJ-820X | CAPACITOR                  | 82pF,50V    |
|   |   | C730    | QAT3120-300Z | TRIM CAPACITOR,TIMER CLOCK |              |   |   | C1303   | QEKJ1HM-105  | E CAPACITOR                | 1μF,50V     |
|   |   | C732    | NDC21HJ-330X | CAPACITOR                  | 33pF,50V     |   |   | C1304   | NDC21HJ-560X | CAPACITOR                  | 56pF,50V    |
|   |   | C733    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1305   | QEKJ0JM-476  | E CAPACITOR                | 47μF,6.3V   |
|   |   | C734    | QEKJ1CM-106  | E CAPACITOR                | 10μF,16V     |   |   | C1306   | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V  |
|   |   | C736    | QETC0JM-108  | E CAPACITOR                | 1000μF,6.3V  |   |   | C1307   | QCVB1CM-103  | CAPACITOR                  | 0.01μF,16V  |
|   |   | C737    | QEKJ0JM-476  | E CAPACITOR                | 47μF,6.3V    |   |   | C1308   | NDC21HJ-330X | CAPACITOR                  | 33pF,50V    |
|   |   | C738    | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | C1309   | NDC21HJ-330X | CAPACITOR                  | 33pF,50V    |
| △ |   | C901    | QFZ9051-683  | F CAPACITOR                | 0.068μF      |   |   | C1320   | NCF21HZ-103X | CAPACITOR                  | 0.01μF,50V  |
| △ |   | C904    | QCZ9071-101  | CAPACITOR                  | 100pF        |   |   | L1      | QQL29BJ-2R2Z | COIL                       | 2.2μH       |
|   |   | C906    | QETC1HM-105  | E CAPACITOR                | 1μF,50V      |   |   | L2      | QQLZ010-120Z | COIL                       | 12μH        |
|   |   | C907    | QCZ0136-101Z | CAPACITOR                  | 100pF,1kV    |   |   | L3      | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C908    | QFV11HJ-104  | F CAPACITOR                | 0.1μF,50V    |   |   | L4      | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C910    | PECA0738-826 | E CAPACITOR                |              |   |   | L5      | QQL29BJ-680Z | COIL                       | 68μH        |
| △ |   | C911    | QCZ9071-222  | CAPACITOR                  | 0.0022μF     |   |   | L6      | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C915    | QFN31HJ-183  | F CAPACITOR                | 0.018μF,50V  |   |   | L7      | PU59152-221J | COIL                       | 220μH       |
|   |   | C916    | QCB1HJ-271   | CAPACITOR                  | 270pF,50V    |   |   | L8      | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C917    | QCZ0212-472  | CAPACITOR                  | 0.0047μF,1kV |   |   | L9      | PU59152-680J | COIL                       | 68μH        |
|   |   | C951    | QEMU0JM-227  | E CAPACITOR                | 220μF,6.3V   |   |   | L10     | PU59152-680J | COIL                       | 68μH        |
|   |   | C953    | QEMT1AM-687  | E CAPACITOR                | 680μF,10V    |   |   | L11     | QQL29BJ-330Z | COIL                       | 33μH        |
|   |   | C954    | QEMT1CM-827  | E CAPACITOR                | 820μF,16V    |   |   | L13     | QQL29BJ-471Z | COIL                       | 470μH       |
|   |   | C959    | QETC1JM-106  | E CAPACITOR                | 10μF,63V     |   |   | L19     | QQL29BJ-151Z | COIL                       | 150μH       |
|   |   | C960    | QETC1HM-106  | E CAPACITOR                | 10μF,50V     |   |   | L101    | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C961    | NCF21HZ-103X | CAPACITOR                  | 0.01μF,50V   |   |   | L301    | PU58308-123J | COIL                       | 12mH        |
|   |   | C963    | QEMU0JM-227  | E CAPACITOR                | 220μF,6.3V   |   |   | L951    | PELN1184     | COIL                       |             |
|   |   | C964    | QEKJ1CM-226  | E CAPACITOR                | 22μF,16V     |   |   | L953    | PELN1184     | COIL                       |             |
|   |   | C965    | QETC1AM-107  | E CAPACITOR                | 100μF,10V    |   |   | △ L954  | PU48530-101K | COIL                       | 100μH       |
|   |   | C966    | QETC1HM-106  | E CAPACITOR                | 10μF,50V     |   |   | L1201   | QQL29BJ-331Z | COIL                       | 330μH       |
|   |   | C967    | QETC1CM-107  | E CAPACITOR                | 100μF,16V    |   |   | L1301   | QQL29BJ-100Z | COIL                       | 10μH        |
|   |   | C971    | QETC1AM-227  | E CAPACITOR                | 220μF,10V    |   |   | L1302   | QQL29BJ-220Z | COIL                       | 22μH        |
|   |   | C972    | QETC1CM-227  | E CAPACITOR                | 220μF,16V    |   |   | L1303   | QQL29BJ-220Z | COIL                       | 22μH        |
|   |   | C973    | QFLC1HJ-183Z | F CAPACITOR                | 0.018μF,50V  |   |   | L1305   | QQL29BJ-330Z | COIL                       | 33μH        |
|   |   | C1003   | QETC1HM-106  | E CAPACITOR                | 10μF,50V     |   |   | △ LF901 | QQR0532-001  | LINE FILTER                |             |
|   |   | C1005   | NCB21EK-223X | CAPACITOR                  | 0.022μF,25V  |   |   | X1      | PEVB0679     | CRYSTAL RESONATOR          |             |
|   |   | C1006   | QETC1HM-225  | E CAPACITOR                | 2.2μF,50V    |   |   | X2      | PEVB0678     | CRYSTAL RESONATOR          |             |
|   |   | C1007   | NCB21CK-473X | CAPACITOR                  | 0.047μF,16V  |   |   | X701    | QAX0320-001  | CRYSTAL RESONATOR          |             |
|   |   | C1011   | NCB21EK-104X | CAPACITOR                  | 0.1μF,25V    |   |   | X702    | YU40141      | CRYSTAL RESONATOR          |             |
|   |   | C1013   | NDC21HJ-471X | CAPACITOR                  | 470pF,50V    |   |   | S1      | PESW0525-02Z | TACT SWITCH,POWER          |             |
|   |   | C1060   | QETC0JM-227  | E CAPACITOR                | 220μF,6.3V   |   |   | S2      | PESW0525-02Z | TACT SWITCH,DISPLAY 448EE  |             |
|   |   | C1101   | NCB21EK-104X | CAPACITOR                  | 0.1μF,25V    |   |   | S4      | PESW0525-02Z | TACT SWITCH,CH-            |             |
|   |   | C1102   | QEKJ1HM-224  | E CAPACITOR                | 0.22μF,50V   |   |   | S6      | PESW0525-02Z | TACT SWITCH,CH+            |             |
|   |   | C1104   | QERF1CM-226  | E CAPACITOR                | 22μF,16V     |   |   | S8      | PESW0525-02Z | TACT SWITCH,COL.SYS        |             |
|   |   | C1107   | NCB21EK-273X | CAPACITOR                  | 0.027μF,25V  |   |   | S10     | PESW0525-02Z | TACT SWITCH,REW            |             |
|   |   | C1108   | QERF1CM-106  | E CAPACITOR                | 10μF,16V     |   |   | S11     | PESW0525-02Z | TACT SWITCH,REC            |             |
|   |   | C1109   | NCB21HK-102X | CAPACITOR                  | 0.001μF,50V  |   |   | S12     | PESW0525-02Z | TACT SWITCH,PLAY           |             |
|   |   | C1112   | NCB21HK-563X | CAPACITOR                  | 0.056μF,50V  |   |   | S13     | PESW0525-02Z | TACT SWITCH,STOP/EJECT     |             |
|   |   | C1113   | NCB21HK-102X | CAPACITOR                  | 0.001μF,50V  |   |   | S14     | PESW0525-02Z | TACT SWITCH,FF             |             |
|   |   | C1114   | NDC21HJ-101X | CAPACITOR                  | 100pF,50V    |   |   | S15     | PESW0525-02Z | TACT SWITCH,PAUSE          |             |
|   |   | C1115   | NDC21HJ-101X | CAPACITOR                  | 100pF,50V    |   |   | S16     | PESW0525-02Z | TACT SWITCH,AUTO SP/LP     |             |
|   |   | C1116   | QEKJ0JM-476  | E CAPACITOR                | 47μF,6.3V    |   |   | S701    | PESW0674     | PUSH SWITCH,CASSETTE IN SW |             |
|   |   | C1117   | NCB21HK-103X | CAPACITOR                  | 0.01μF,50V   |   |   | S702    | PESW0589     | PUSH SWITCH,REC SAFETY SW  |             |
|   |   | C1119   | QCC11CJ-104  | CAPACITOR                  | 0.1μF,16V    |   |   | K901    | PELN0662-Z   | FERRITE BEADS              |             |
|   |   | C1201   | QETC1CM-476  | E CAPACITOR                | 47μF,16V     |   |   | △ PC901 | PC123F2      | PH COUPLER                 |             |

| # △ REF No. | PART No. | PART NAME, DESCRIPTION |                               |
|-------------|----------|------------------------|-------------------------------|
|             | PS701    | SG-246                 | IC(PHOTO SENSOR               |
|             | PS702    | SG-246                 | IC(PHOTO SENSOR               |
|             | T301     | PELN0832               | OSC TRANSFORMER               |
| △           | T901     | QQS0011-001            | SW TRANSF                     |
|             | T1001    | QQR0007-001            | LC TRAP                       |
|             | J1       | PU61149-7              | PIN JACK,AV OUT               |
|             | J2       | PEMC1065-04            | PIN JACK(SW),AV IN            |
|             | J1201    | PEMC1158               | PIN JACK(SW),448EE            |
|             | J1203    | PEMC1158               | PIN JACK(SW),448EE            |
|             | DI1201   | QLF0006-001            | FL TUBE                       |
| △           | TU1001   | QAU0009-001            | TUNER                         |
|             | UN1001   | QAU0031-001            | IF UNIT                       |
| △           | TB1      | PQ21977-14             | TERMINAL BOARD                |
|             | SD1      | LP30132-001A           | SHIELD CASE                   |
|             | SD2      | LP30133-001A           | SHIELD PLATE                  |
|             | SD3      | LP40229-001A           | PLATE                         |
|             | HD1      | PQ35479-1-4            | HOLDER(FDP)                   |
| △           | HS1      | PQ45788-1-2            | HEAT SINK,Q901                |
|             | OT2      | SDST3006Z              | SCREW,HEAT SINK               |
|             | OT707    | PEMC1120               | SHORT PIN,CN707               |
|             | FC901    | PEMC0965-Z             | FUSE CLIP                     |
|             | FC902    | PEMC0965-Z             | FUSE CLIP                     |
|             | FW1451   | PW30101-F0AA442        | PARALLEL WIRE,R.PAUSE         |
|             | CN1      | PEMC1163-006           | CONNECTOR,(1-6)DRUM           |
|             | CN301    | PW30101-C0AH4W7        | WIRE,A/C HEAD                 |
|             | CN302    | PW30101-D0AH4W2        | PARALLEL WIRE,FE HEAD         |
|             | CN701    | PEMC1077               | CONNECTOR,(1-8)CAP MDA        |
|             | CN702    | PU61434-1-1            | CONNECTOR,(1-5)ROTARY ENCODER |
|             | CN703    | PU60910-2              | CONNECTOR,(1-2)LOADING MOTOR  |
|             | CN704    | PEMC1101-005           | FFC CONNECTOR,(1-5)DRUM MDA   |
|             | CN706    | PU60910-2              | CONNECTOR,(1-2)BATTERY        |
|             | CN707    | PEMC1119-002           | PIN HEADER,(1-2)BACK UP       |
| △           | CN901    | PU60250-2              | CONNECTOR,AC IN               |
|             | CN1201   | PEMC0714-003           | CONNECTOR,(1-3)LED            |
|             | CN1202   | PEMC0713-103           | HOUSING,(1-3)MAIN             |
| △           | CP701    | ICP-N25                | CIRCUIT PROTECTOR             |
| △           | CP1101   | ICP-N15                | CIRCUIT PROTECTOR             |
| △           | F901     | QMF51E2-1R25           | FUSE                          |
|             |          |                        | T1.2A                         |

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#### TERMINAL(1) BOARD ASSY <06>

|       |              |                     |            |
|-------|--------------|---------------------|------------|
| PW3   | PB11067A2    | TERMINAL BOARD ASSY |            |
| R1451 | NRSA02J-101X | MG RESISTOR         | 100Ω,1/10W |
| J1451 | PU60612      | MINI JACK,R.PAUSE   |            |

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#### LED BOARD ASSEMBLY <90>

|        |              |                                   |  |
|--------|--------------|-----------------------------------|--|
| PW2    | PB11067B3    | LED BOARD ASSY                    |  |
| D1210  | SLR-342DU3F  | LE DIODE,AUTO SP/LP 441MS 441MS/S |  |
|        | SLR-342MG3F  | LE DIODE,AUTO SP/LP 448EE         |  |
| HD1    | PQM30038-2-2 | LED HOLDER                        |  |
| CN1202 | PEMC0713-103 | HOUSING,(1-3)MAIN                 |  |

## SECTION 6

### TECHNICAL INFORMATION

#### 6.1 SYSCON CIRCUIT

##### 6.1.1 Syscon CPU pin function (IC701) 1/2

| PIN NO. | LABEL           | IN/OUT | NOTE                                     |
|---------|-----------------|--------|------------------------------------------|
| 1       | AFC S CURV      | IN     | TUNING CHECK                             |
| 2       | START SENSOR    | IN     | LEADER TAPE DETECT (DETECT ON: L)        |
| 3       | SYNC DET (L)    | OUT    | SYNC DETECT (NO SYNC: H)                 |
| 4       | LOCK DET (L)    | IN     | TUNING LOCK CHECK                        |
| 5       | END SENSOR      | IN     | TRAILER TAPE DETECT (DETECT ON: L)       |
| 6       | NC              | -      | NC                                       |
| 7       | NC              | -      | NC                                       |
| 8       | NC              | -      | NC                                       |
| 9       | VIDEO ENV.      | IN     | VIDEO PB FM INPUT                        |
| 10      | PROTECT         | IN     | SWD 5V/12V DETECT                        |
| 11      | SECAM DET (H)   | IN     | SECAM MODE: H                            |
| 12      | V. PULSE        | OUT    | V. PULSE ADDITION TIMING CONTROL         |
| 13      | REC ST (H)      | OUT    | NORMAL AUDIO REC START: H                |
| 14      | RC IN           | IN     | REMOTE CONTROL DATA INPUT                |
| 15      | COL. ROT        | IN     | COLOUR LOTATION CONTROL INPUT            |
| 16      | HEAD SEL        | OUT    | 19u HEAD SELECT CONTROL                  |
| 17      | ENV COMP        | IN     | PB ENVELOPE COMPARATER INPUT             |
| 18      | D. FF           | OUT    | VIDEO PB FM (CH-1, CH-2) SWITCHING PULSE |
| 19      | A. FF           | -      | NC                                       |
| 20      | COM OFF (H)     | OUT    | COMB FILTER ON/OFF CONTROL (OFF: H)      |
| 21      | DOC OFF (L)     | OUT    | DOC OFF MODE: L                          |
| 22      | REC (H)         | OUT    | Hi Fi AUDIO REC MODE: H                  |
| 23      | A/M/S           | -      | NC                                       |
| 24      | SECAM (H)       | -      | NC                                       |
| 25      | R. LOCK/R. PAUS | -      | NC                                       |
| 26      | LMC1            | OUT    | LOADING MOTOR DRIVE (1)                  |
| 27      | LMC2            | OUT    | LOADING MOTOR DRIVE (2)                  |
| 28      | LMC3            | OUT    | LOADING MOTOR DRIVE (3)                  |
| 29      | CASS SW         | IN     | CASSETTE INSERT SW DETECT (SW ON: L)     |
| 30      | REC SAFETY      | IN     | REC SAFETY SWITCH DETECT (SW ON: L)      |
| 31      | LSC             | IN     | MECHANISM MODE DETECT (C)                |
| 32      | LSB             | IN     | MECHANISM MODE DETECT (B)                |
| 33      | LSA             | IN     | MECHANISM MODE DETECT (A)                |
| 34      | NUB             | -      | NC                                       |
| 35      | NUA             | -      | NC                                       |
| 36      | CLK SEL         | IN     | SYSTEM CLOCK SELECT                      |
| 37      | VCC             | -      | SYSTEM POWER                             |
| 38      | X IN            | -      | TIMER CLOCK                              |
| 39      | X OUT           | -      | TIMER CLOCK                              |
| 40      | VSS             | -      | GND                                      |
| 41      | XC IN           | -      | SYSTEM CLOCK                             |
| 42      | XC OUT          | -      | SYSTEM CLOCK                             |
| 43      | RESET           | -      | RESET AT CONNECT VCR TO AC               |
| 44      | P CTL (H)       | OUT    | POWER ON/OFF CONTROL (POWER ON: H)       |
| 45      | TU CLK          | OUT    | SERIAL DATA SHIFT CLOCK OUTPUT           |
| 46      | TU CE           | OUT    | TUNER UNIT CHIP ENABLE                   |
| 47      | TU DATA         | OUT    | TUNING CONTROL SERIAL DATA OUTPUT        |
| 48      | A MUTE (H)      | OUT    | AUDIO MUTE CONTROL (MUTE ON: H)          |
| 49      | SP (L)          | -      | NC                                       |
| 50      | NTSC (L)        | -      | NC                                       |

Table 6-1-1 SYSCON CPU pin function(1/2)

## 6.1.2 Syscon CPU pin function (IC701) 2/2

| PIN NO. | LABEL           | IN/OUT | NOTE                                                     |
|---------|-----------------|--------|----------------------------------------------------------|
| 51      | CCIR (L)        | -      | NC                                                       |
| 52      | P MUTE (L)      | OUT    | PICTURE MUTE CONTROL (MUTE ON: L)                        |
| 53      | EE (L)          | OUT    | EE MODE CONTROL (EE: L)                                  |
| 54      | NC              | -      | NC                                                       |
| 55      | NTSC SP (L)     | -      | NC                                                       |
| 56      | IP ON (H)       | -      | NC                                                       |
| 57      | VAPT ON (H)     | OUT    | VIDEO APERTURE CONTROL (APERTURE ON: H)                  |
| 58      | MESECAM DET (H) | IN     | MESECAM MODE DETECT                                      |
| 59      | RF SW2          | IN     | RF CONTROL SW (2)                                        |
| 60      | RF SW1          | IN     | RF CONTROL SW (1)                                        |
| 61      | I (L)           | OUT    | IF UNIT FREQUENCY BAND CONTROL (I: L)                    |
| 62      | D/K (L)         | OUT    | IF UNIT FREQUENCY BAND CONTROL (D/K: L)                  |
| 63      | B/G (L)         | OUT    | IF UNIT FREQUENCY BAND CONTROL (B/G: L)                  |
| 64      | OSD CS          | OUT    | ON SCREEN IC CHIP ENABLE                                 |
| 65      | SSB DATA        | OUT    | SSB SERIAL DATA OUTPUT                                   |
| 66      | FDP CS          | OUT    | FDP IC CHIP SELECT                                       |
| 67      | SSB CLK         | OUT    | SSB SERIAL DATA TRANSFER CLOCK OUTPUT                    |
| 68      | DATA O          | OUT    | SERIAL DATA OUTPUT (TO OSD IC AND FDP IC)                |
| 69      | DATA I          | IN     | SERIAL DATA INPUT (FROM FDP IC)                          |
| 70      | S CLK           | OUT    | SERIAL DATA TRANSFER CLOCK OUTPUT (TO OSD IC AND FDP IC) |
| 71      | TEST/12C CLK    | OUT    | SERIAL DATA TRANSFER CLOCK TO EEPROM IC                  |
| 72      | 12C DATA        | IN     | SERIAL DATA INPUT FROM EEPROM IC                         |
| 73      | PB SPE (L)      | OUT    | PB SPECIAL ON: L                                         |
| 74      | 3.58 NTSC (H)   | -      | NC                                                       |
| 75      | BEST (L)        | OUT    | BEST SYSTEM CONTROL (BEST: L)                            |
| 76      | CAP REV (L)     | OUT    | CAPSTAN MOTOR CONTROL (FWD: H/REV: L)                    |
| 77      | CAP CTL V       | OUT    | CAPSTAN MOTOR CONTROL                                    |
| 78      | DRUM CTL V      | OUT    | DRUM MOTOR CONTROL                                       |
| 79      | SP FG           | IN     | SUPPLY REEL ROTATION DET/TAPE REMAIN                     |
| 80      | TU FG           | IN     | TAKE-UP REEL ROTATION DET/TAPE REMAIN                    |
| 81      | BEST CTL        | OUT    | BEST SYSTEM CONTROL (BEST: L)                            |
| 82      | POWER DET       | IN     | POWER DOWN DETECT (POWER DOWN: H TO L)                   |
| 83      | C               | -      | NC                                                       |
| 84      | C. SYNC         | IN     | COMPOSITE SYNC                                           |
| 85      | C. FG IN        | IN     | CAPSTAN FG PULSE INPUT                                   |
| 86      | D. PG IN        | IN     | DRUM PICKUP PULSE INPUT (SWITCHING PULSE)                |
| 87      | D. FG IN        | IN     | DRUM FG PULSE INPUT                                      |
| 88      | AMP VSS         | -      | GND                                                      |
| 89      | AMP V REF OUT   | -      | AMP CIRCUIT REFERENCE VOLTAGE OUTPUT                     |
| 90      | AMP V REF IN    | -      | NC                                                       |
| 91      | CTL-            | IN/OUT | CTL (-) SIGNAL                                           |
| 92      | CTL+            | IN/OUT | CTL (+) SIGNAL                                           |
| 93      | CTL SW OUT      | OUT    | CTL PULSE OUTPUT                                         |
| 94      | CTL AMP IN      | IN     | CTL PULSE INPUT                                          |
| 95      | AMP C           | IN     | CAPACITOR CONNECT TERMIAL FOR CTL AMP CIRCUIT            |
| 96      | CTL VSS         | -      | CTL AMP CIRCUIT REFERENCE Vss                            |
| 97      | CTL AMP OUT     | OUT    | CTL PULSE OUTPUT                                         |
| 98      | AMP VCC         | -      | CTL AMP POWER                                            |
| 99      | AVCC            | -      | SYSTEM POWER                                             |
| 100     | NC              | -      | NC                                                       |

Table 6-1-2 SYSCON CPU pin function(2/2)

**JVC**

VICTOR COMPANY OF JAPAN, LIMITED



Printed in Japan  
9709 (Sanwa)-V10C1/C2  
HR-J441MS, MS/S, J448EE