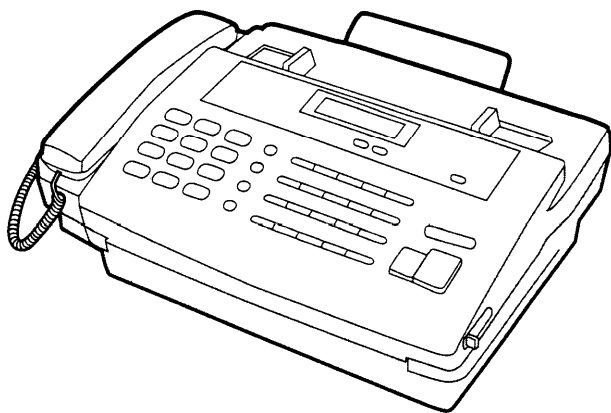


# SHARP SERVICE MANUAL

CODE: 00ZFO145A/SME



## FACSIMILE

## MODEL FO-145

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#### PARTS GUIDE

Parts marked with "△" is important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

## SHARP CORPORATION

This document has been published to be used for after-sales service only.  
The contents are subject to change without notice.

**CAUTION FOR BATTERY REPLACEMENT**

- (Danish)                      ADVARSEL !  
Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.  
Udskiftning må kun ske med batteri af samme fabrikat og type.  
Levér det brugte batteri tilbage til leverandoren.
- (English)                      Caution !  
Danger of explosion if battery is incorrectly replaced.  
Replace only with the same or equivalent type  
recommended by the equipment manufacturer.  
Discard used batteries according to manufacturer's  
instructions.
- (Finnish)                      VAROITUS  
Paristo voi räjähtää, jos se on virheellisesti asennettu.  
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan  
tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden  
mukaisesti.
- (French)                      ATTENTION  
Il y a danger d'explosion s' il y a remplacement incorrect  
de la batterie. Remplacer uniquement avec une batterie du  
même type ou d'un type recommandé par le constructeur.  
Mettre au rebut les batteries usagées conformément aux  
instructions du fabricant.
- (Swedish)                      VARNING  
Explosionsfare vid felaktigt batteribyte.  
Använd samma batterityp eller en ekvivalent  
typ som rekommenderas av apparattillverkaren.  
Kassera använt batteri enligt fabrikantens  
instruktion.

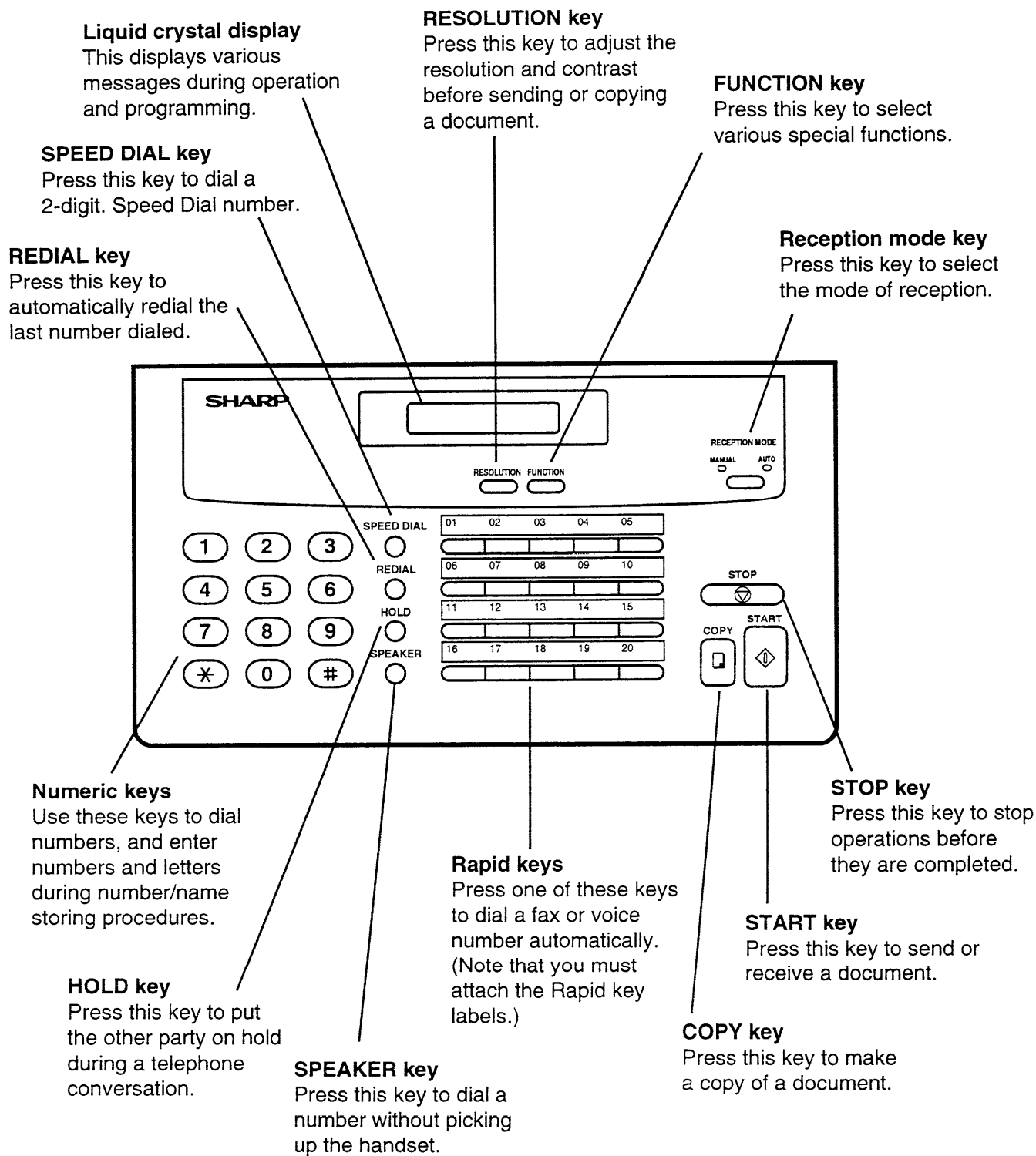
# CHAPTER 1. GENERAL DESCRIPTION

## [1] SPECIFICATIONS

|                                   |                                                                                                                                              |                                                                                                                                                           |                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Applicable telephone line:</b> | Public switched telephone network                                                                                                            | <b>Effective scanning width:</b>                                                                                                                          | 210 mm, max.                                                                           |
| <b>Compatibility:</b>             | ITU-T (CCITT) G3 mode                                                                                                                        | <b>Automatic document feeder:</b>                                                                                                                         | 18 sheets max.                                                                         |
| <b>Configuration:</b>             | Half-duplex, desktop transceiver                                                                                                             | <b>Halftone (gray scale):</b>                                                                                                                             | 32 levels                                                                              |
| <b>Compression scheme:</b>        | Modified Huffman and Sharp special mode                                                                                                      | <b>Contrast control:</b>                                                                                                                                  | Automatic/Dark selectable                                                              |
| <b>Scanning method:</b>           | Flat-bed, solid-state CCD                                                                                                                    | <b>Copy function:</b>                                                                                                                                     | Standard                                                                               |
| <b>Resolution:</b>                | Horizontal:<br>8 lines/mm<br>Vertical:<br>Standard — 3.85 lines/mm<br>Fine/Halftone — 7.7 lines/mm                                           | <b>Telephone function:</b>                                                                                                                                | Standard<br>(cannot be used if power fails)                                            |
| <b>Recording system:</b>          | Thermal recording                                                                                                                            | <b>Power requirements:</b>                                                                                                                                | 230–240 V AC, 50 Hz                                                                    |
| <b>Display:</b>                   | 7 x 5 dots, 1 line by 16-digit display                                                                                                       | <b>Operating temperature:</b>                                                                                                                             | 5 to 35°C                                                                              |
| <b>Reception modes:</b>           | Auto/Manual/Answering machine                                                                                                                | <b>Power consumption:</b>                                                                                                                                 | Stand-by: 7 W<br>Transmission: 15 W<br>Reception: 22 W<br>Copy: 25 W<br>maximum: 120 W |
| <b>Modem speed:</b>               | 9600 bps with automatic fallback to 7200, 4800, or 2400 bps                                                                                  | <b>Dimensions:</b>                                                                                                                                        | Width: 353 mm<br>Depth: 259 mm<br>Height: 122 mm                                       |
| <b>Transmission time* :</b>       | Approx. 15 seconds<br>(Sharp special mode)                                                                                                   | <b>Weight:</b>                                                                                                                                            | Approx. 3.7 kg                                                                         |
| <b>Effective recording width:</b> | 210 mm, max.                                                                                                                                 | * Based on ITU-T (CCITT) Test Chart #1 at standard resolution in Sharp special mode, excluding time for protocol signals (i.e., ITU-T phase C time only). |                                                                                        |
| <b>Input document size:</b>       | Automatic feeding:<br>Width — 148 to 216 mm<br>Length — 128 to 297 mm<br>Manual feeding:<br>Width — 148 to 216 mm<br>Length — 128 to 1000 mm |                                                                                                                                                           |                                                                                        |
|                                   |                                                                                                                                              |                                                                                                                                                           |                                                                                        |
|                                   |                                                                                                                                              |                                                                                                                                                           |                                                                                        |

As a part of our policy of continuous improvement, SHARP reserves the right to make design and specification changes for product improvement without prior notice. The performance specifications figures indicated are nominal values of production units. There may be some deviation from these values in individual units.

## [2] Operation Panel

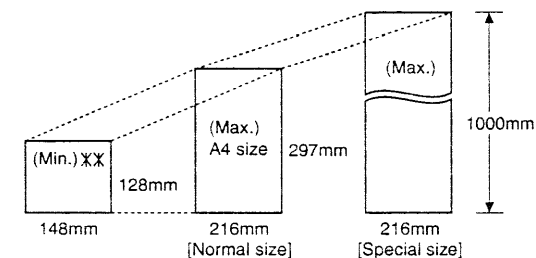




### [3] Transmittable Documents

#### 1. Document Sizes

|             |        |              |
|-------------|--------|--------------|
| Normal size | Width  | 148 – 216 mm |
|             | Length | 128 – 297 mm |



×× Use document carrier sheet for smaller documents.

- With special sizes, only one sheet can be fed into the machine at a time. Insert next page into feeder as current page is being scanned.

#### 2. Paper Thickness & Weight

|              |               |           |                                       |
|--------------|---------------|-----------|---------------------------------------|
| Normal size  | ADF 10 sheets | Thickness | 0.06–0.12 mm                          |
|              |               | Weight    | 52–104g/m <sup>2</sup><br>(14–28lbs)  |
|              | ADF 18 sheets | Thickness | 0.06–0.09 mm                          |
|              |               | Weight    | 52–74.3g/m <sup>2</sup><br>(14–20lbs) |
| Special size | Thickness     |           | 0.12–0.20 mm                          |
|              | Weight        |           | 52–157 g/m <sup>2</sup>               |

#### 3. Document Types

- Normal paper  
Documents handwritten in pencil (No. 2 lead or softer), fountain pen, ball-point pen, or felt-tipped pen can be transmitted.  
Documents of normal contrast duplicated by a copying machine can also be transmitted.
- Diazo copy (blue print)  
Diazo copy documents of a normal contrast may be transmitted.
- Carbon copy  
A carbon copy may be transmitted if its contrast is normal.

#### 4. Cautions on Transmitting Documents

- Documents written in yellow, greenish yellow, or light blue ink cannot be transmitted.
- Ink, glue, and correcting fluid on documents must be dry before the documents can be transmitted.
- All clips, staples and pins must be removed from documents before transmission.
- Patched (taped) documents should be copied first on a copier and then the copies used for transmission.
- All documents should be fanned before insertion into the feeder to prevent possible double feeds.

#### 5. Automatic Document Feeder Capacity

Number of pages that can be placed into the feeder at anytime is as follows:

Normal size: max. ADF 18 sheets

Special size: single sheet only (manual feed)

- NOTES:
- When you need to send or copy more pages than the feeder limit, place additional pages in feeder when last page in feeder is being scanned.
  - Place additional pages carefully and gently in feeder.  
If force is used, double-feeding or a document jam may result.

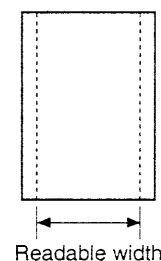
#### 6. Readable Width & Length

The readable width and length of a document are slightly smaller than the actual document size.

Note that characters or graphics outside the effective document scanning range will not be read.

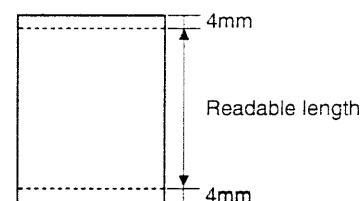
##### • Readable width

210 mm, max.



##### • Readable length

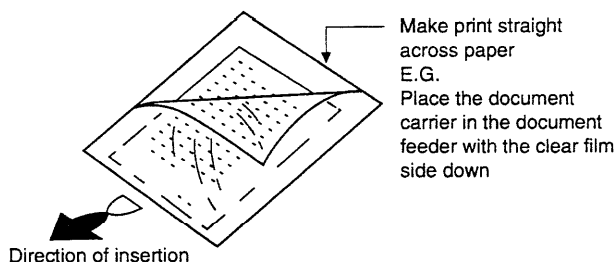
This is the length of the document sent minus 4 mm from the top and bottom edges.



## 7. Use of Document Carrier Sheet

A document carrier sheet must be used for the following documents.

- Those with tears.
- Those smaller than size 148 mm (W) x 128 mm (L).
- Carbon-backed documents



**NOTE:** To transmit a carbon-backed document, insert a white sheet of paper between the carbon back of the document and the document carrier.

- Those containing an easily separable writing substance (e.g., tracing paper written on with a soft, heavy lead pencil).

**NOTES:**

- When using the document carrier, carefully read the instructions written on the back.
- If the document carrier is dirty, clean it with a soft, moist cloth, and then dry it before using for transmission.
- Do not place more than one document in the carrier at a time.

## [4] Installation

### 1. Site selection

Take the following points into consideration when selecting a site for this model.

#### ENVIRONMENT

- The machine must be installed on a level surface.
- Keep the machine away from air conditioners, heaters, direct sunlight, and dust.
- Provide easy access to the front, back, and sides of the machine.  
In particular, keep the area in front of the machine clear, or the original document may jam as it comes out after scanning.
- The temperature should be between 5° and 35°C.
- The humidity should be between 30% and 85% (without condensation).

#### ELECTRICITY

230–240V, 50 Hz, grounded AC outlet is required.

#### Caution!

- Connection to a power source other than that specified will cause damage to the equipment and is not covered under the warranty.
- If your area experiences a high incidence of lightning or power surges, we recommend that you install a surge protector for the power and telephone lines. Surge protectors can be purchased at most telephone specialty stores.

#### If the machine is moved from a cold to a warm place...

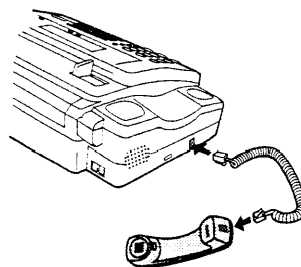
If the machine is moved from a cold to a warm place, it is possible that the reading glass may fog up, preventing proper scanning of documents for transmission. To remove the fog, turn on the power and wait approximately 2 hours before using the machine.

### 2. Assembly and connections

- ① Connect the handset cord to the handset and the machine as shown.

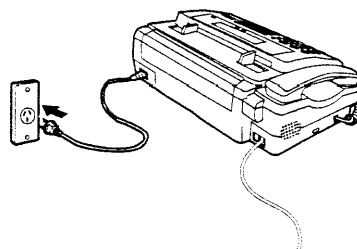
- The ends of the hand set cord are identical, so they will go into either jack.

Place the handset on the handset rest.

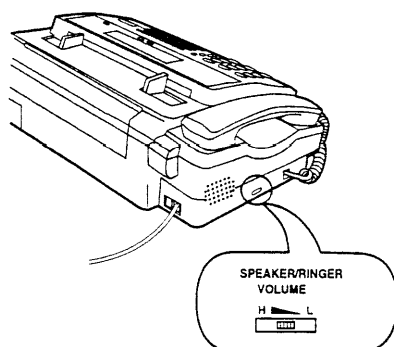


- ② Plug the power lead into a 230–240 V, 50 Hz, grounded (3-prong) AC outlet.

- The fax does not have a power on/off switch, so the power is turned on and off by simply plugging in or unplugging the power lead.

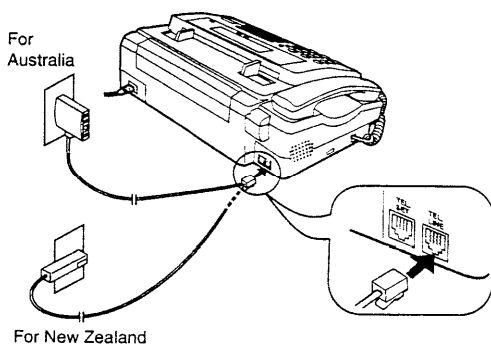


- ③ The **SPEAKER/RINGER VOLUME** switch controls the volume of the speaker and the ringer. Adjust it from high (H) to low (L) as desired.



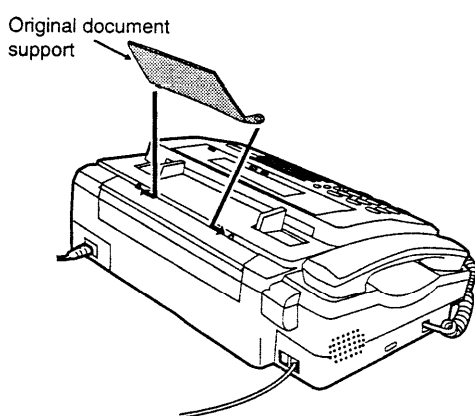
- ④ Insert the small modular plug which terminates the FO80TP adaptor line cord into the socket on the back of the fax marked "TEL. LINE". Plug the FO80TP adaptor into the telephone socket on the wall.

- Be sure to plug the line cord into the **TEL. LINE** socket on the fax. **Do not** plug it into the **TEL. SET** socket.
- Your fax is designed to operate on a tone dial (DMTF) line only.



- ⑤ Attach the original document support.

- Insert the tabs of each into the holes at the rear of the fax as shown.

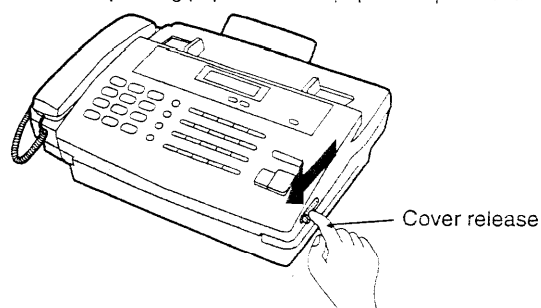


## 4. Loading the recording paper

- ① Pull the cover release on the right side of the fax forward, and open the cover.

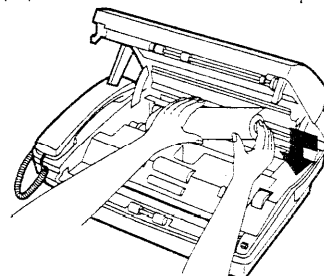
- The fax will beep.

Remove the packing paper from the paper compartment.



- ② Unwrap the roll of fax paper and insert it in the compartment.

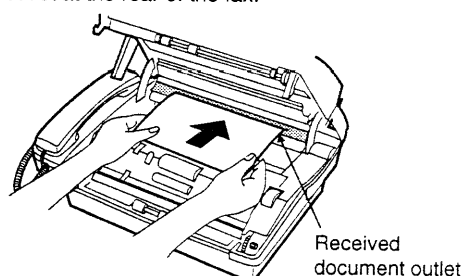
- Make sure the hubs on each side of the compartment fit into the ends of the roll. The hub on the left side is mounted on a spring to allow for insertion.
- **Important:** The roll must be placed so that the leading edge of the paper feeds out from over the top of the roll. (The paper is only coated on one side for printing. If the roll is placed upside down, the paper will come out blank after printing.)



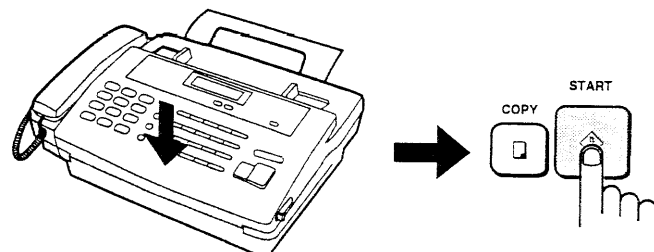
Note: The paper roll provided is only a sample roll which is approximately 49 ft. (15 m) long. The FO-145 uses a standard 98.4 ft. (30 m) roll.

**THERMAL PAPER (98.4ft. roll): FO-20PRw**

- ③ Pass the leading edge of the paper through the received document outlet at the rear of the fax.



- ④ Close the cover by pushing down gently on the center, and then press the **START** key. A short length of the fax paper will feed out. Grasp the paper by the edge and pull upward to tear it off.



## [5] Quick reference guide

Use this guide as a convenient reminder for operating the machine after you have read the detailed instructions for each procedure in the manual.

### Note:

- Steps which are optional are enclosed in a dotted frame:

### Transmitting documents

|                              |                                                                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Normal Dialing</b>        | Load document →  → Lift handset or press <b>SPEAKER</b> → Dial (press numeric keys) → Wait for reception tone →  → Hang up                                |
| <b>Direct Keypad Dialing</b> | Load document →  → Dial (press numeric keys) →                                                                                                            |
| <b>Rapid Key Dialing</b>     | Load document →  → Press Rapid key                                                                                                                                                                                                         |
| <b>Speed Dialing</b>         | Load document →  →  → Enter Speed Dial number (press 2 numeric keys) →  |
| <b>Redialing</b>             | Load document →  →  → Wait for reception tone →                         |

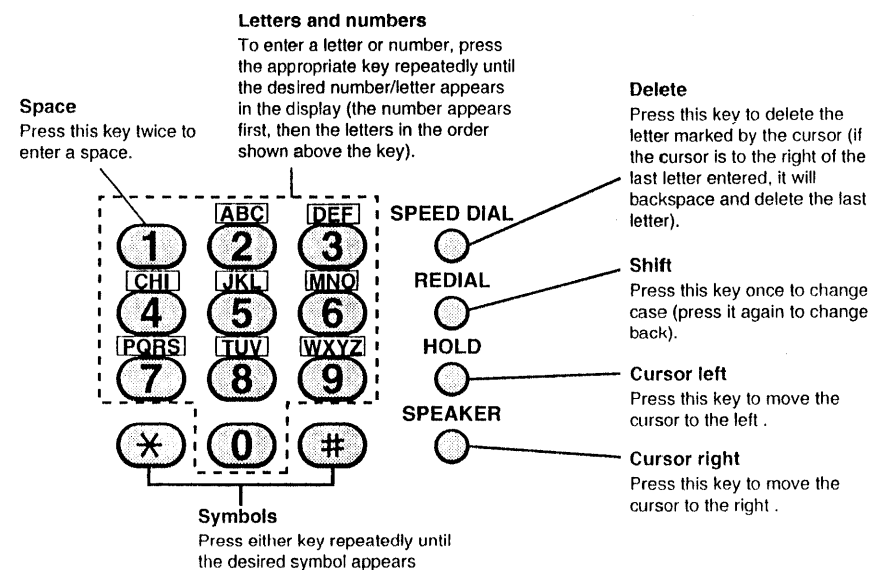
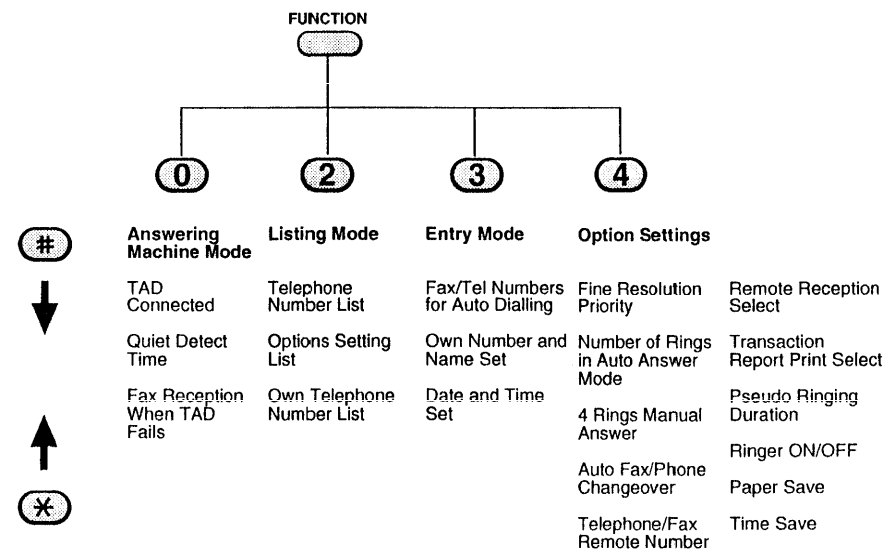
### Making voice calls

|                          |                                                                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Normal Dialing</b>    | Lift handset or press <b>SPEAKER</b> → Dial (press numeric keys) → Lift handset if you pressed <b>SPEAKER</b>                                                                                                          |
| <b>Rapid Key Dialing</b> | Lift handset or press <b>SPEAKER</b> → Press Rapid key → Lift handset if you pressed <b>SPEAKER</b>                                                                                                                    |
| <b>Speed Dialing</b>     | Lift handset or press <b>SPEAKER</b> →  → Enter Speed Dial number (press 2 numeric keys) → Lift handset if you press <b>SPEAKER</b> |
| <b>Redialing</b>         | Lift handset or press <b>SPEAKER</b> →  → Lift handset if you press <b>SPEAKER</b>                                                  |

## Operations using the FUNCTION key

The following chart shows the layout of the functions and settings accessed by pressing the **FUNCTION** key. First press the **FUNCTION** key, the appropriate unnumeric key as shown, and then "#" or "×" until the desired item appears.

Instructions for making each setting appear in the display. If you have any difficulty, refer to the detailed instructions on the page shown below the setting.



# CHAPTER 2. ADJUSTMENTS

## [1] Adjustments

### General

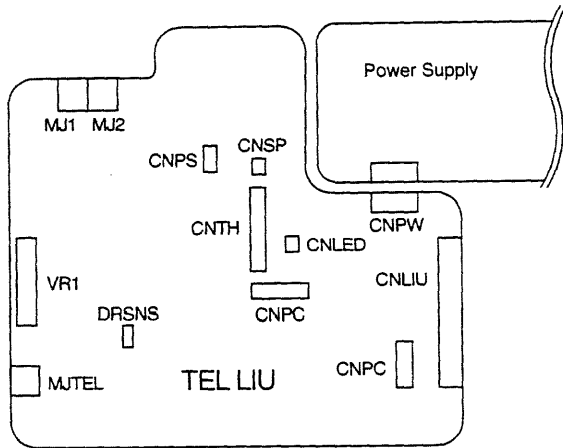
Since the following adjustments and settings are provided for this model, make adjustments and/or setup as necessary.

### 1. Adjustments

#### Adjustments of output voltage (FACTORY ONLY)

1. Install the power supply unit in the machine.
2. Set the recording paper and document.
3. When the document is loaded, power is supplied to the output lines. Confirm that outputs are within the limits below.

#### Output voltage settings



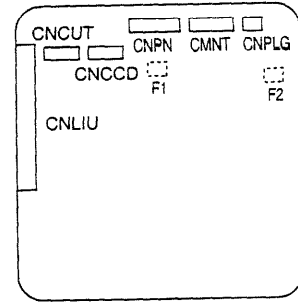
| Output    | Voltage limits |
|-----------|----------------|
| +12V      | 11.4V ~ 12.6V  |
| +5V       | 4.85V ~ 5.15V  |
| VM (+24V) | 23.3V ~ 24.7V  |

| Connector No. | CNPW |
|---------------|------|
| Pin No.       |      |
| 1             | MG   |
| 2             | MG   |
| 3             | VM   |
| 4             | VM   |
| 5             | DG   |
| 6             | +5V  |
| 7             | AG   |
| 8             | +12V |

## 2. IC protectors replacement

ICPs (IC Protectors) are installed to protect the motor driver circuit and the plunger drive circuit. ICPs protect various ICs and electronic circuits from an overcurrent condition.

The location of ICPs are shown below:



- (1) F1 (ICP-S0.7) is installed in order to protect IC's from an overcurrent generated in the motor drive circuit. If F1 is open, replace it with a new one.
- (2) F2 (ICP-S0.5) is installed in order to protect IC's from an overcurrent generated in the plunger drive circuit. If F2 is open, replace it with a new one.

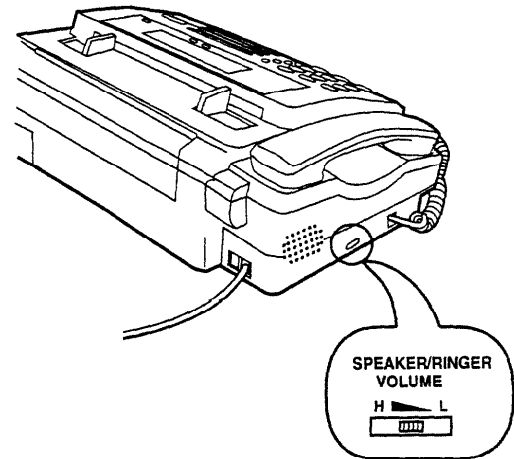
In addition to the replacement of F1 and F2, the factor causing F1 and F2 to open must also be repaired. If not, F1 and F2 will open again.

## 3. Settings

### (1) Volume switch setting

#### a) SPEAKER/RINGER VOLUME

This switch controls the volume of the ringer and the speaker.



Adjust it from high (H) to low (L) as desired.

## [2] Diagnostics and service soft switch

### 1. Operating procedure

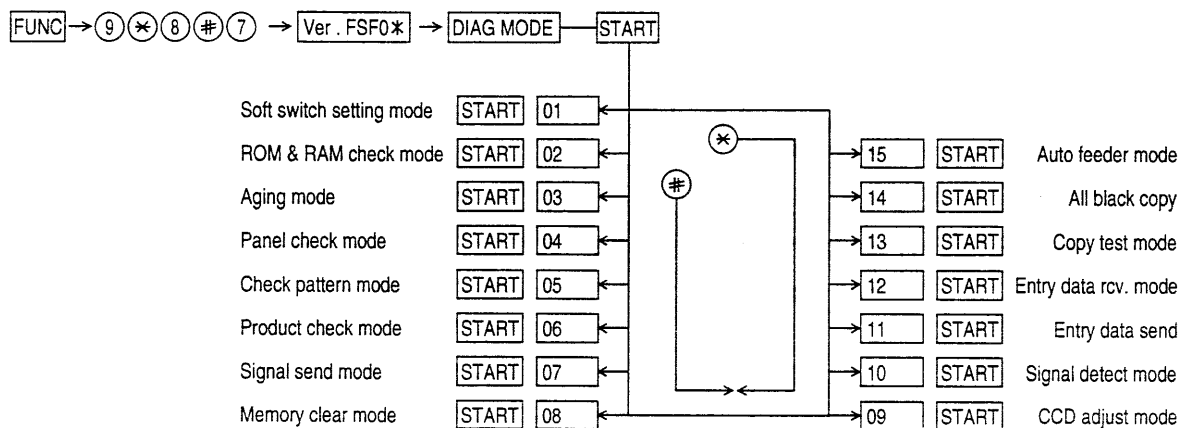
#### (1) Entering the diagnostic mode

Press **FUNC** → **9** → **\*** → **8** → **#** → **7**, and the following display will appear.

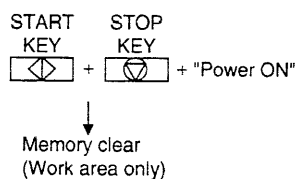
**ROM Ver. FSF0\*** After 2 sec: **DIAG MODE**

Then press the **START** key. Select the desired item with the **\*** key or the **#** key or select with the rapid key. Enter the mode with the **START** key.

(Diag•specifications)



If the dial mode cannot be set, repeat the dial mode operation, performing the following operation.



### 2. Diagnostic items

| ITEM No. | RAPID key | Contents                 | Function                                                                                                                                                                                 |
|----------|-----------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | 01        | Soft switch setting mode | Display soft SW contents, and changes the setting.                                                                                                                                       |
| 2        | 02        | ROM & RAM check mode     | Checks program ROM (128KByte) and work RAM (8KByte+2KByte).                                                                                                                              |
| 3        | 03        | Aging mode               | Prints the check pattern at the speed of 1 sheet/5 minutes.                                                                                                                              |
| 4        | 04        | Panel check mode         | Displays the name of key depressed on the operation panel.                                                                                                                               |
| 5        | 05        | Check pattern mode       | Prints 2 sheets of check pattern.                                                                                                                                                        |
| 6        | 06        | Product check mode       | Executes No. 6, No. 3 and No. 7 continuously.                                                                                                                                            |
| 7        | 07        | Signal send mode         | Sends modem signals sequentially.                                                                                                                                                        |
| 8        | 08        | Memory clear mode        | Clears the backup memory contents to reset it to the initial state.                                                                                                                      |
| 9        | 09        | CCD adjust mode          | Used for CCD adjustment. Executes copy operation. When the STOP key is pressed, the unit goes into the wait state. When the START key is pressed again, the unit starts operation again. |
| 10       | 10        | Signal detect mode       | Detecting CNG signal, quiet and DTMF signals.                                                                                                                                            |
| 11       | 11        | Entry data send          | Sends telephone list, passcode list and option set list contents in DTMF signal.                                                                                                         |
| 12       | 12        | Entry data rcv. mode     | Receives telephone list, passcode list and option set list contents.                                                                                                                     |
| 13       | 13        | Copy test mode           | Checks the copy operation.                                                                                                                                                               |
| 14       | 14        | All black copy           | Performs all-dot printing (2m). (Check thermal head operation)                                                                                                                           |
| 15       | 15        | Auto feeder mode         | Feeds the original documents.                                                                                                                                                            |



**Rapid key 12: Entry data rcv. mode**

This mode is used to receive the registered data which is sent from the remote machine and to register the received data in the machine. When this mode is used to receive the information, the remote machine must be set to the entry data send mode (Rapid key 11).

After completion of reception, the telephone number list, passcode list, option set list, and soft switch list are printed.

**Caution**

Unless the time mode is set, the list print is not performed, "NO DATA" appears on the display.

**Rapid key 13: Copy test mode**

This mode is used to check the copy operation and picture quality.

Before using this mode, set the original. If there is no original, the recording paper is cut.

The first page is copied in condition of FINE/AUTO the second and the subsequent pages are copied in condition of H-TONE/DARK.

**Rapid key 14: All back copy**

This mode is used to check the print head.

All-dot print is executed unconditionally until 2(m) is obtained except when any trouble occurs (recording paper has run out, recording paper jam, thermal protect).

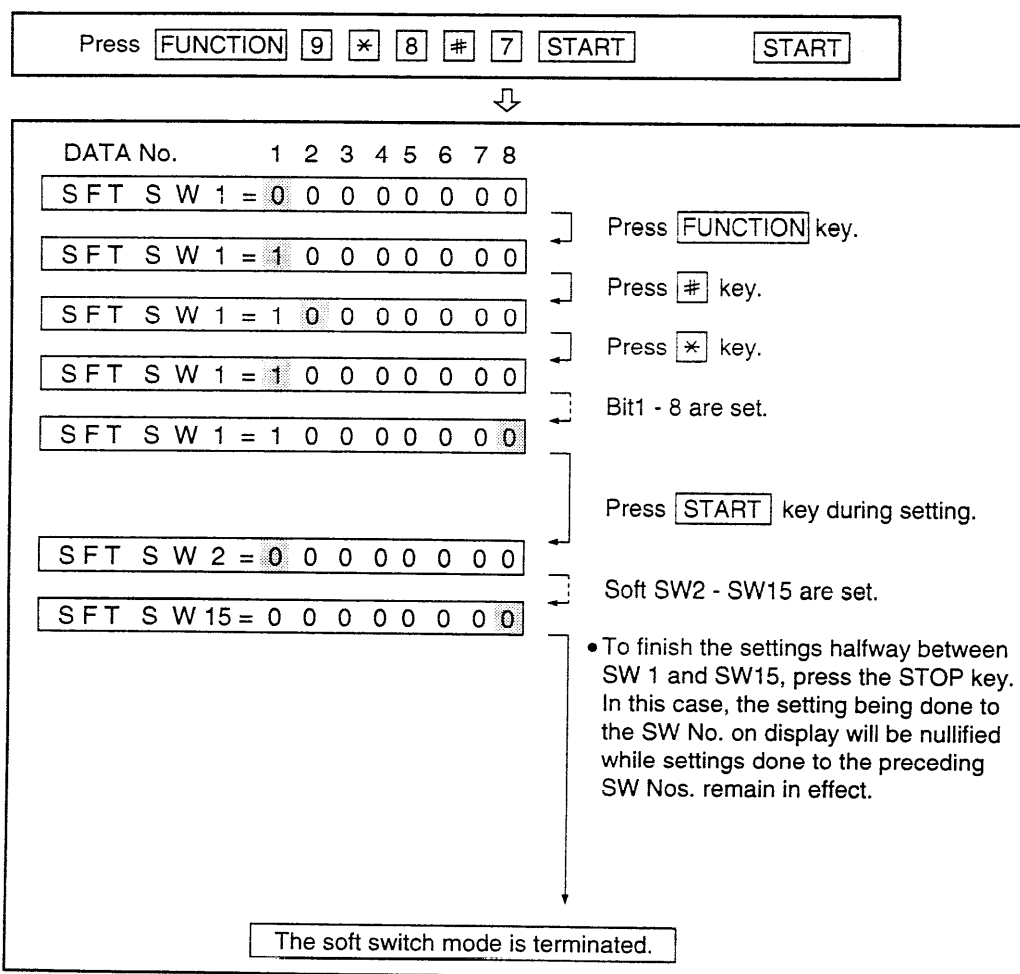
**Rapid key 15: Auto feeder mode**

In this mode, a document is inserted and discharged to check the auto feed function.

After this mode is started, set a document, and the document feed will be automatically tested.

**4. How to make soft switch setting**

To enter the soft switch mode, make the following key entries in sequence.





## 5. Soft switch description

### • Soft switch list

Soft switch list

| SW NO. | DATA NO.                                            | ITEM                                                               | Soft SW setting and function |                                        |                                          |               |             | Initial setting | Remarks |
|--------|-----------------------------------------------------|--------------------------------------------------------------------|------------------------------|----------------------------------------|------------------------------------------|---------------|-------------|-----------------|---------|
|        |                                                     |                                                                    | 1                            |                                        | 0                                        |               |             |                 |         |
| S W 1  | 1                                                   | Line density choice                                                | Fine                         |                                        | Standard                                 |               |             | 0               | OPTION  |
|        | 2                                                   | Reserved                                                           |                              |                                        |                                          |               |             | 0               |         |
|        | 3<br>4                                              | Communication result printout<br>(transaction report print select) |                              | Only in error                          | Only in sending                          | Allways print | Not printed | 0               | OPTION  |
|        |                                                     |                                                                    | NO. 3                        | 0                                      | 0                                        | 1             | 1           |                 |         |
|        |                                                     |                                                                    | NO. 4                        | 0                                      | 1                                        | 0             | 1           |                 |         |
|        | 5                                                   | Automatic switching from manual to auto receive mode               | Reception after 4 rings      |                                        | No reception                             |               |             | 0               | OPTION  |
|        | 6                                                   | Automatic switching mode                                           | TEL/FAX auto switch          |                                        | Switch to FAX                            |               |             | 0               | OPTION  |
|        | 7                                                   | End buzzer                                                         | NO                           |                                        | YES                                      |               |             | 0               |         |
| 8      | Fax switching when answering machine recording full | YES                                                                |                              | NO                                     |                                          |               | 0           | OPTION          |         |
| S W 2  | 1                                                   | 300 BPS frame check time                                           | 6 sec                        |                                        | 3 sec                                    |               |             | 1               |         |
|        | 2                                                   | Forced 4800 BPS reception                                          | YES                          |                                        | NO                                       |               |             | 0               |         |
|        | 3                                                   | Reserved                                                           |                              |                                        |                                          |               |             | 0               |         |
|        | 4                                                   | CED tone-signal interval                                           | 500msec                      |                                        | 75msec                                   |               |             | 0               |         |
|        | 5                                                   | Reserved                                                           |                              |                                        |                                          |               |             | 0               |         |
|        | 6                                                   | Digital line equalization setting                                  | ON                           |                                        | OFF                                      |               |             | 1               |         |
|        | 7<br>8                                              | Modem speed                                                        |                              | 9600BPS                                | 7200BPS                                  | 4800BPS       | 2400BPS     | 1               |         |
|        |                                                     |                                                                    | NO. 7                        | 1                                      | 1                                        | 0             | 0           |                 |         |
| S W 3  | 1                                                   | Maximum copy, transmission, reception page length                  | No limit                     |                                        | Copy/transmission: 1m<br>Reception: 1.5m |               |             | 0               |         |
|        |                                                     |                                                                    | YES                          |                                        | NO                                       |               |             | 0               |         |
|        | 2                                                   | Footer print                                                       | YES                          |                                        | NO                                       |               |             | 0               |         |
|        | 3                                                   | Sender's phone number registration                                 | Change inhibited             |                                        | Change allowed                           |               |             | 0               |         |
|        | 4                                                   | CSI transmission                                                   | Not transmitted              |                                        | Transmitted                              |               |             | 0               |         |
|        | 5                                                   | Quiet Detect Start Time                                            | Binary input                 | 8                                      | 4                                        | 2             | 1           | 0               |         |
|        | no.                                                 |                                                                    | 5                            | 6                                      | 7                                        | 8             | 1           |                 |         |
|        | 0                                                   |                                                                    | 1                            | 0                                      | 1                                        | 0             |             |                 |         |
| S W 4  | 1                                                   | Reserved                                                           |                              |                                        |                                          |               |             | 0               |         |
|        |                                                     |                                                                    | 4 sec                        |                                        | 2 sec                                    |               |             | 0               |         |
|        | 2                                                   | Dial pause (sec/pause)                                             | 4 sec                        |                                        | 2 sec                                    |               |             | 0               |         |
|        | 3                                                   | Reserved                                                           |                              |                                        |                                          |               |             | 0               |         |
|        | 4                                                   | DIS receive acknowledgment during G3 transmission                  | Twice                        |                                        | NSF signal: Once<br>DIS signal: Twice    |               |             | 0               |         |
|        | 5                                                   | Non-modulated carrier detection for V29 modem                      | YES                          |                                        | NO                                       |               |             | 0               |         |
|        | 6                                                   | EOL (End of Line) detect timer                                     | 25 sec                       |                                        | 5 sec                                    |               |             | 0               |         |
|        | 7                                                   | Protocol monitor                                                   | YES                          |                                        | NO                                       |               |             | 0               |         |
| S W 5  | 1                                                   | Signal transmission level                                          | Binary input                 | 8                                      | 4                                        | 2             | 1           | 1               |         |
|        |                                                     |                                                                    | no.                          | 1                                      | 2                                        | 3             | 4           | 1               |         |
|        | 3<br>4                                              |                                                                    |                              | 1                                      | 1                                        | 1             | 0           | 1               |         |
|        |                                                     |                                                                    |                              | Factory setting: -14dBm (Modem output) |                                          |               |             |                 | 0       |
|        | 5                                                   | Sender's information transmit                                      | NO                           |                                        | YES                                      |               |             | 0               |         |
|        | 6                                                   | H2 mode                                                            | NO                           |                                        | YES                                      |               |             | 0               |         |
|        | 7<br>8                                              | Reading slice (Binary)                                             |                              | Factory setting                        | Light                                    | Dark          | Lighter     | 0               |         |
|        |                                                     |                                                                    | NO. 7                        | 0                                      | 1                                        | 0             | 1           |                 |         |
| NO. 8  |                                                     |                                                                    | 0                            | 0                                      | 1                                        | 1             |             |                 |         |

| SW NO. | DATA NO.                                         | ITEM                                                       | Soft SW setting and function |          |          |                     |           | Initial setting | Remarks |        |
|--------|--------------------------------------------------|------------------------------------------------------------|------------------------------|----------|----------|---------------------|-----------|-----------------|---------|--------|
|        |                                                  |                                                            | 1                            |          | 0        |                     |           |                 |         |        |
| S W 6  | 1<br>2                                           | Reading slice (halftone)                                   |                              | Factory  | Light    | Dark                | Lighter   | 0               |         |        |
|        |                                                  |                                                            | NO. 1                        | 0        | 1        | 0                   | 1         |                 |         |        |
|        |                                                  |                                                            | NO. 2                        | 0        | 0        | 1                   | 1         |                 |         |        |
|        | 3                                                | Character detection sensitivity setting in halftone mode   | Strong                       |          |          | Weak                |           |                 | 0       |        |
|        | 4                                                | Into DIAG mode by SPEED key                                | YES                          |          |          | NO                  |           |                 | 0       |        |
|        | 5                                                | Communication error treatment (reception) in RTN sending   | Not communication error      |          |          | Communication error |           |                 | 0       |        |
|        | 6<br>7                                           | DTMF detection time                                        |                              | 50ms     | 80ms     | 100ms               | 120ms     | 0               |         |        |
|        |                                                  |                                                            | NO. 6                        | 0        | 0        | 1                   | 1         |                 |         |        |
| NO. 7  |                                                  |                                                            | 0                            | 1        | 0        | 1                   |           |                 |         |        |
| 8      | Protection of remote reception (5, ✕, ✕ ) detect | YES                                                        |                              |          | NO       |                     |           | 0               | OPTION  |        |
| S W 7  | 1                                                | Auto dial mode<br>Delay timer of before-line connect       | 3 sec                        |          |          | 0 sec               |           |                 | 1       |        |
|        | 2<br>3                                           | Auto dial mode<br>Delay timer of after-line connect        |                              | 1.7 sec  | 3 sec    | 3.6 sec             | 3.6 sec   | 0               |         |        |
|        |                                                  |                                                            | NO. 2                        | 0        | 0        | 1                   | 1         |                 |         |        |
|        |                                                  |                                                            | NO. 3                        | 0        | 1        | 0                   | 1         |                 |         |        |
|        | 4                                                | Reserved                                                   |                              |          |          |                     |           |                 | 0       |        |
|        | 5                                                | CNG transmission                                           | NO                           |          |          | YES                 |           |                 | 0       |        |
|        | 6                                                | Remote reception (corresponding to TEL made by GE)         | Compatible                   |          |          | Not Compatible      |           |                 | 1       |        |
|        | 7                                                | Auto gain control (MODEM)                                  | Enable                       |          |          | Disable             |           |                 | 1       |        |
| 8      | Reserved                                         |                                                            |                              |          |          |                     |           | 0               |         |        |
| S W 8  | 1                                                | Recall interval                                            | Binary input                 | 8        | 4        | 2                   | 1         | 0               |         |        |
|        | no.                                              |                                                            | 1                            | 2        | 3        | 4                   | 1         |                 |         |        |
|        |                                                  |                                                            | 0                            | 1        | 0        | 1                   | 0         |                 |         |        |
|        | Factory setting: 5 minutes                       |                                                            |                              |          |          | 1                   |           |                 |         |        |
|        | 5                                                | Recall times                                               | Binary input                 | 8        | 4        | 2                   | 1         | 0               |         |        |
|        | no.                                              |                                                            | 5                            | 6        | 7        | 8                   | 0         |                 |         |        |
|        |                                                  |                                                            | 0                            | 0        | 1        | 0                   | 1         |                 |         |        |
|        | Factory setting: Twice                           |                                                            |                              |          |          | 0                   |           |                 |         |        |
| S W 9  | 1                                                | Number of rings for auto answer mode                       | Binary input                 | 8        | 4        | 2                   | 1         | 0               | OPTION  |        |
|        | no.                                              |                                                            | 1                            | 2        | 3        | 4                   | 0         |                 |         |        |
|        |                                                  |                                                            | 0                            | 0        | 0        | 1                   | 0         |                 |         |        |
|        | Factory setting: 1 times                         |                                                            |                              |          |          | 1                   |           |                 |         |        |
|        | 5                                                | Remote operation code figures by external TEL (0~9)        | Binary input                 | 8        | 4        | 2                   | 1         | 0               | OPTION  |        |
|        | no.                                              |                                                            | 5                            | 6        | 7        | 8                   | 1         |                 |         |        |
|        |                                                  |                                                            | 0                            | 1        | 0        | 1                   | 0         |                 |         |        |
|        | Factory setting: 5                               |                                                            |                              |          |          | 1                   |           |                 |         |        |
| S W 10 | 1                                                | Ringer switch                                              | OFF                          |          |          | ON                  |           |                 | 0       | OPTION |
|        | 2                                                | Busy tone detection continuous sound detect time           | 10 sec                       |          |          | 5 sec               |           |                 | 0       |        |
|        | 3<br>4                                           | Number of busy tone detection pulse                        |                              | 2 pulses | 4 pulses | 6 pulses            | 10 pulses | 0               |         |        |
|        |                                                  |                                                            | NO. 3                        | 0        | 0        | 1                   | 1         |                 |         |        |
|        |                                                  |                                                            | NO. 4                        | 0        | 1        | 0                   | 1         |                 |         |        |
|        | 5                                                | Ci off detection timer (Distinctive ring setting off only) | 350 msec                     |          |          | 700 msec            |           |                 | 0       |        |
|        | 6                                                | Reserved                                                   |                              |          |          |                     |           |                 | 0       |        |
|        | 7                                                | Reserved                                                   |                              |          |          |                     |           |                 | 0       |        |
| 8      | Reserved                                         |                                                            |                              |          |          |                     |           | 0               |         |        |

| SW NO. | DATA NO. | ITEM                                                      | Soft SW setting and function |              |             |             |          | Initial setting | Remarks |
|--------|----------|-----------------------------------------------------------|------------------------------|--------------|-------------|-------------|----------|-----------------|---------|
|        |          |                                                           | 1                            |              | 0           |             |          |                 |         |
| S W 11 | 1        | Busy tone detection ON/OFF time (Lower limit)             | 350ms                        |              | 150ms       |             |          | 0               |         |
|        | 2        | Busy tone detection ON/OFF time (Upper limit)             | 650ms                        |              | 900ms       |             |          | 0               |         |
|        | 3        | TAD connected                                             | YES                          |              | NO          |             |          | 0               | OPTION  |
|        | 4        | Busy tone detection intermittent sound detection          | NO                           |              | YES         |             |          | 0               |         |
|        | 5        | Number of CNG signal detection in T.A.D. mode.            |                              | 1            | 2           | 3           | 4        | 0               |         |
|        | 6        |                                                           | NO. 5                        | 0            | 0           | 1           | 1        |                 |         |
|        | 6        |                                                           | NO. 6                        | 0            | 1           | 0           | 1        |                 |         |
|        | 7        | Reserved                                                  |                              |              |             |             |          | 0               |         |
| 8      | Reserved |                                                           |                              |              |             |             | 0        |                 |         |
| S W 12 | 1        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 2        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 3        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 4        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 5        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 6        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 7        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 8        | Reserved                                                  |                              |              |             |             |          | 0               |         |
| S W 13 | 1        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 2        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 3        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 4        | Quiet detect time                                         | Binary input 16 8 4 2 1      |              |             |             |          | 0               | OPTION  |
|        | 5        |                                                           | no. 4 5 6 7 8                |              |             |             |          | 0               |         |
|        | 6        |                                                           | 0 0 1 0 0                    |              |             |             |          | 1               |         |
|        | 7        |                                                           | Factory setting: 4 sec       |              |             |             |          | 0               |         |
|        | 8        |                                                           |                              |              |             |             |          | 0               |         |
| S W 14 | 1        | Pseudo ringing time at Phone/Fax automatic switching mode |                              | 15s          | 30s         | 60s         | 120s     | 0               | OPTION  |
|        | 2        |                                                           | NO. 1                        | 0            | 1           | 0           | 1        |                 |         |
|        | 2        |                                                           | NO. 2                        | 0            | 0           | 1           | 1        |                 |         |
|        | 3        | Equalization freeze control                               | ON                           |              | OFF         |             |          | 0               |         |
|        | 4        | Equalization freeze 7200BPS only                          | NO                           |              | YES         |             |          | 1               |         |
|        | 5        | Pseudo ringing sound volume (TEL/FAX selection)           |                              | -10dB Normal | -15dB Lower | -5dB Louder | 0dB Loud | 0               |         |
|        | 6        |                                                           | NO. 5                        | 0            | 1           | 0           | 1        |                 |         |
|        | 6        |                                                           | NO. 6                        | 0            | 0           | 1           | 1        |                 |         |
| 7      | Reserved |                                                           |                              |              |             |             | 0        |                 |         |
| 8      | Reserved |                                                           |                              |              |             |             | 0        |                 |         |
| S W 15 | 1        | Section time of quiet detection                           |                              | 30sec        | 40sec       | 50sec       | 60sec    | 0               |         |
|        | 2        |                                                           | NO. 1                        | 0            | 0           | 1           | 1        |                 |         |
|        | 2        |                                                           | NO. 2                        | 0            | 1           | 0           | 1        |                 |         |
|        | 3        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 4        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 5        | Post answer tone                                          | Disable                      |              | Enable      |             |          | 0               |         |
|        | 6        | Reserved                                                  |                              |              |             |             |          | 0               |         |
|        | 7        | Reserved                                                  |                              |              |             |             |          | 0               |         |
| 8      | Reserved |                                                           |                              |              |             |             | 0        |                 |         |

## • Soft switch functional description

### SW1 No. 1 Line density choice

Used to set the transmission mode which is automatically selected when the Resolution key is not pressed. In the copy mode, however, the fine mode is automatically selected unless the Resolution key is manually set to another mode.

### SW1 No. 2 Reserved

Set to "0".

### SW1 No. 3, No. 4 Communication result printout (transaction report Print select)

It is possible to obtain transaction results after each communication. Normally, the switch is set (No. 3:0, No. 4:0) so that the transaction report is produced only when a communication error is encountered. If No. 3 was set to 1 and No. 4 to 0, the transaction report will be produced every time a communication is done, even if the communication was successful.

Setting No. 3 to 1 and No. 4 to 1 will disable this function. No transaction report printed.

No. 3:0 No. 4:1=TX ONLY Report Print

### SW1 No. 5 Automatic switching from manual to auto receive mode

This soft switch is used to select whether the machine should switch to the auto receive mode after 4 rings in the manual receive mode or remain in the manual mode. When the soft switch is set to "1", the machine operates in the same way as SW9 No. 1 ~ No. 4.

### SW1 No. 6 Automatic switching mode

This soft switch is used to set the auto tel/fax select mode or to set the normal fax mode.

### SW1 No. 7 End buzzer

Setting this bit to "1" will disable the end buzzer (including the error buzzer/on-hook buzzer).

### SW1 No. 8 Fax switching when answering recording full

Used to disable or enable the function of OFF-HOOK hold. If the answering machine's memory (tape) is full and there is no response, the machine automatically switches to Fax reception. The OFF HOOK hold time (Answering machine operating time) is set by normal operation.

### SW2 No. 1 300 BPS frame check time

Communication command wait time setting (Used by technical engineers. For the market, fixed to 6S.) Default setting: 6S

### SW2 No. 2 Forced 4800 BPS reception

When line conditions warrant that receptions take place at 4800 BPS repeatedly. It may improve the success of receptions by starting at 4800 BPS. This improves the receiving document quality and reduces handshake time due to fallback during training.

### SW2 No. 3 Reserved

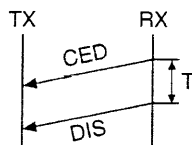
Set to "0".

### SW2 No. 4 CED tone-signal interval

For international communication, the 2100Hz CED tone may act as an echo suppression switch, causing a communication problem. Though this soft switch is normally set to "0", it should be set to "1" so as to change the timer between the CED tone and DIS signal from 75ms to 500ms to eliminate the communication problem caused by echo.

"0" set: T=75ms

"1" set: T=500ms



### SW2 No. 5 Reserved

Set to "0".

### SW2 No. 6 Digital line equalization setting

Line equalization is to be set according to the line characteristics. Setting should be made according to the distance between the telephone and the telephone company central switching station.

### SW2 No. 7, No. 8 Modem speed

Used to determine the initial modem speed. The default is 9600bps. It may be necessary to program it to a slower speed when frequent line fallback is encountered, in order to save the time required for fallback procedure.

### SW3 No. 1 Maximum copy, transmission, reception page length

Used to set the maximum page length.

To avoid possible paper jam, the page length is normally limited to 1 meter for copy or transmission, and 1.5 meters for reception.

It is possible to set it to "No limit" to transmit a long document, such as a computer print form, etc. (In this case, the receiver must also be set to no limit.)

### SW3 No. 2 Footer print

When set to "1", the date of reception, the sender machine No., and the page No. are automatically recorded at the end of reception.

### SW3 No. 3 Sender's phone number registration

Used to make a choice of whether the registered sender's phone number can be changed or not. If the switch is set to "1", new registration of the sender's phone number is disabled to prevent accidental wrong input.

### SW3 No. 4 CSI transmission

(CSI TRANSMISSION) is a switch to set whether the machine sends or does not send the signal (CSI signal) informing its own telephone No. to the remote fax machine when information is received. When "nonsending" is set, the telephone No. is not output on the remote transmitting machine if the remote transmitting machine has the function to display or print the telephone No. of receiving machine, using this CSI signal.

### SW3 No. 5 ~ No. 8 Quiet detect start time

Inserts a pause before commencing quiet detection.

### SW4 No. 1 Reserved

Set to "0".

### SW4 No. 2 Dialing pause

Pauses can be inserted between telephone numbers of direct dial connection. Selection of 4 sec or 2 sec pause is available.

### SW4 No. 3 Reserved

Set to "0".

### SW4 No. 4 DIS receive acknowledgment during G3 transmission

Used to make a choice of whether reception of DIS (NSF) is acknowledged after receiving two DISs (NSFs) or receiving one DIS (two NSF).

It may be useful for overseas communication to avoid an echo suppression problem, if set to 1.

### SW4 No. 5 Non-modulated carrier detection for V29 modem

Though transmission of a non-modulated carrier is not required for transmission by the V29 modem according to the ITU-T (CCITT) Recommendation, it may be permitted to send non-modulated carrier before the image signal to avoid an echo suppression problem.

It may be useful for overseas communication to avoid an echo suppression problem, if set to 1.

### SW4 No. 6 EOL (End Of Line) detect timer

Used to make a choice of whether to use the 25-second or 5-second timer for detection of EOL.

This is effective to override communication failures with some facsimile models that have longer EOL detection.

**SW4 No. 7 Protocol monitor**

Normally set to "0". If set to "1", communication can be checked, in case of troubles, without using a G3 tester or other tools.

When communication FSK data transmission or reception is made, the data is taken into the buffer. When communication is finished, the data is analyzed and printed out. When data is received with the line monitor (SW4-No. 8) set to "1", the reception level is also printed out.

**SW4 No. 8 Line monitor**

Normally set to "0". If set to "1", the transmission speed and the reception level are displayed on the LCD. Used for line tests.

**SW5 No. 1 ~ No. 4 Signal transmission level**

Used to control the signal transmission level in the range of -0dB to -15dB.

The factory setting is at -14dB (Modem output).

**SW5 No. 5 Sender's information transmit**

(SENDER'S INFORMATION TRANSMISSION) is a switch to set the function to print the content of HEADER PRINT described in the passcode list at the front end of receiver's original when original is sent to the remote machine.

If this switch is set to "NO", the HEADER PRINT is not output at the receiving machine.

**SW5 No. 6 H2 mode (SHARP special mode)**

Used to determine reception of H2 mode (15 sec transmission mode). When set to OFF, H2 mode reception is inhibited even though the transmitting machine has H2 mode function.

**SW5 No. 7, No. 8 Reading slice (binary)**

Used to determine the set value of reading density in standard/fine mode. The standard setting is "00". (Factory setting is "00".)

**SW6 No. 1, No. 2 Reading slice (halftone)**

Used to determine the set value of reading density in halftone mode. The standard setting is "00" (Factory setting is "00").

**SW6 No. 3 Character detection sensitivity setting in halftone mode**

In the halftone mode, image area is separated from character area and processed separately to eliminate unclear character transmission. This switch is used to change the criteria of judgement of separation. When "Strong" (=1) is selected, more area is judged as character area, providing clearer characters. On the contrary, however, edges of image area may be emphasized.

It is advisable to restrict the use of this function only when clear characters must be transmitted, and to use the function of "Weak" (=0) for general use.

**SW6 No. 4 Into DIAG mode by SPEED key**

A bit which is used in the production process only. When the "SPEED" key is pressed, the switch is changed from the stand-by state to the DIAG mode.

**SW6 No. 5 Communication error treatment (reception) in RTN sending**

Used to determine communication error treatment when RTN is sent by occurrence of a received image error in G3 reception. When it is set to "1", communication error is judged as no error.

**SW6 No. 6, No. 7 DTMF detection time**

Used to set detection time of DTMF (Dual Tone Multi Frequency) used in remote reception (5, ✕, ✕).

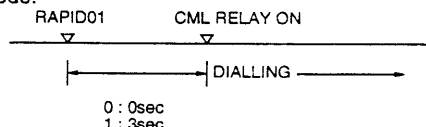
The longer the detection time is, the less the error detections are caused by noises.

**SW6 No. 8 Remote reception (5, ✕, ✕) detect**

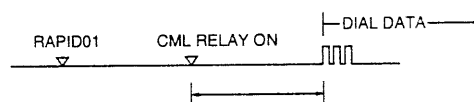
Used to set the function of remote reception (5, ✕, ✕). When set to "1", the remote reception function is disabled.

**SW7 No. 1 Auto dial mode Delay timer of before-line connect**

Delay time between the dial key input and line connection under the auto dial mode.

**SW7 No. 2, No. 3 Auto dial mode Delay timer of after-line connect**

Delay time between the line connection and dial data output under the auto dial mode.

**SW7 No. 4 Reserved**

Set to "0".

**SW7 No. 5 CNG transmission**

When set to "0", this model allows CNG transmission by pressing the start key in the key pad dialing mode. When set to "1", CNG transmission in the key pad dialing mode cannot be performed. In either case, CNG transmission can be performed in the auto dial mode.

**SW7 No. 6 Remote reception**

(Corresponding to TEL made by GE) P.B.X.

"1" : Compatible with TEL made by GE

"0" : Not compatible

- When sending (5, ✕, ✕) for remote reception with a GE manufactured telephone, remote reception may not take place because of special specifications in their DTMF.

To overcome this, a soft SW is provided to change the modem setting to allow for remote reception.

- If this soft SW is set to "1", other telephone sets may be adversely affected.

**SW7 No. 7 Auto gain control (MODEM)**

When this mode is enabled, if the reception signal level is under 31dBm. The modem itself controls the signal gain automatically.

**SW7 No. 8 Reserved**

Set to "0".

**SW8 No. 1 ~ No. 4 Recall interval**

Choice is made for a redial interval for speed and rapid dial calls. Use a binary number to program this. If set to 0 accidentally, 1 will be assumed. If a number above 5 was entered, it will be set to 5. In this case, it has to be corrected.

**SW8 No. 5 ~ No. 8 Recall times**

Choice is made as to how many redials should be made. Use a binary number to program it. If set to 0 or 1 by accident, the redial number will be set to 2. If a number above 9 was entered, it will be set to 9.

**SW9 No. 1 ~ No. 4 Number of rings for auto answer mode**

When the machine is set in the auto receive mode, the number of rings before answering can be selected. It may be set from one to nine rings using a binary number. Since the facsimile telephone could be used as an ordinary telephone if the handset is taken off the hook, it should be programmed to the user's choice. If the soft switch was set to 1, direct connection is made to the facsimile. If a facsimile calling beep was heard when the handset is taken off the hook, press the START key and put the handset on the hook to have the facsimile start receiving. If it was set to 0 accidentally, receive ring is set to 1. If it was above 9, receive rings are set to 9.

NOTE: If the machine is set to answer after a large number of rings, it may not be able to receive faxes successfully. If you have difficulty receiving faxes, reduce the number of rings to a maximum of 4.

**SW9 No.5 ~ No.8 Remote operation code figures by external TEL**

Remote operation codes can be changed from 0 through 9. If set to greater than 9, it defaults to 9. The "✕" is not changed and the new function becomes, number programmed plus ✕.

Ex - 7 ✕ ✕ (Default: "5" "✕" "✕" "✕".)

**SW10 No. 1: Ringer switch**

If this switch is set to "OFF", the ringer of fax does not ring when a call from a party is received.

**SW10 No. 2 Busy tone detection continuous sound detect time**

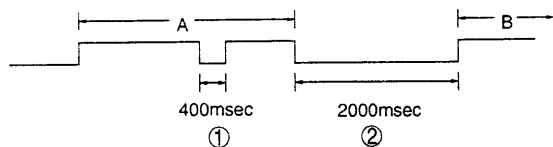
Selects detection of the continuous sound of 440Hz (SW11 No. 8) for 10 sec or 5 sec.

**SW10 No. 3, No. 4 Number of busy tone detection pulses**

Used to set detection of busy tone continuous sounds.

**SW10 No. 5 CI off detection timer****(Distinctive ring setting off only)**

Sets the minimum time period of CI signal interruption which affords to be judged as a CI OFF section.



SFTSW10-5 = 0:700 msec (CI interruption > 700 msec: Judged as a CI OFF section)

The section ① is not judged as a CI OFF section, the CI signal A is counted as one signal.

The section ② is judged as a CI OFF section, the CI signal B is considered as the second signal.

SFTSW10-5 = 1:350 msec (CI interruption > 350 msec: Judged as a CI OFF section)

The section ① is judged as a CI OFF section, and the CI signal A is counted as two signals.

The section ② is judged as a CI OFF section, and the CI signal B is considered as the third signal.

**SW10 No. 6 ~ No. 8 Reserved**

Set to "0".

**SW11 No. 1 Busy tone detection ON/OFF time (Lower limit)**

The initial value of detection is set according to electric condition.

The set value is changed according to the local switch board. (Erroneous detection of sound is reduced.)

Normally, the upper limit is set to 900ms, and the lower limit to 150ms.

If erroneous detection is caused by sound, etc, adjust the detection range.

The lower limit can be set in the range of 350ms to 150ms.

**SW11 No. 2 Busy tone detection ON/OFF time (Upper limit)**

Similarly to SW11 No. 1, the set value can be varied.

The upper limit can be set in the range of 650ms to 900ms.

| SW11 No. 1 | SW11 No. 2 | Detection range |
|------------|------------|-----------------|
| 0          | 0          | 150ms – 900ms   |
| 0          | 1          | 150ms – 650ms   |
| 1          | 0          | 350ms – 900ms   |
| 1          | 1          | 350ms – 650ms   |

**SW11 No. 3 TAD CONNECTED**

When connecting the answering machine to the extension telephone jack, set to "1".

**SW11 No. 4 Busy tone detection intermittent sound detection**

Line off detection YES/NO is set.

**SW11 No. 5, No. 6 Number of CNG signal detection in T.A.D. mode**

Used for detection of CNG in 1 ~ 4 pulses in T.A.D. mode.

**SW11 No. 7, No. 8 Reserved**

Set to "0".

**SW12 No. 1 ~ No. 8 Reserved**

Set to "0".

**SW13 No. 1 ~ No. 3 Reserved**

Set to "0".

**SW13 No. 4 ~ No. 8 Quiet detect time****(Used in answering machine mode)**

When an answering machine is connected, if a no sound state is detected for a certain period of time, the machine judges it as a transmission from a facsimile machine and automatically switches to the Fax mode.

**SW14 No. 1, No. 2 Pseudo ringing time at Phone/Fax automatic switching mode**

Choice is made to as how long to rumble the dummy ringer on TEL/FAX automatic switching mode.

**SW14 No. 3 Equalization freeze control**

This switch is used to perform reception operation by fixing the equalizer control of modem for the line which is always in unfavorable state and picture cannot be received.

\* Usually, the control is executed according to the state of line where the equalizer setting is always changed.

**SW14 No. 4 Equalization freeze 7200BPS only**

Setting which specifies SW14, No. 3 control only in condition of 7200BPS modem speed.

**SW14 No. 5, No. 6 Pseudo-ringer sound volume (on selecting TEL/FAX)**

Used to adjust sound volume of pseudo-ringer (ring back tone) generated on selecting TEL/FAX. Setting can be altered.

**SW14 No. 7, No. 8 Reserved**

Set to "0".

**SW15 No. 1, No. 2 Section time of quiet detection**

The switch which sets the time from the start of quiet detection function to the end of the function.

**SW15 No. 3 ~ No. 5 Reserved**

Set to "0".

**SW15 No. 6 Post answer tone**

This switch is used to send tones of RA (880Hz), SI (988Hz), and DO (1046Hz) in the TEL/FAX auto select mode.

**SW15 No. 7, No. 8 Reserved**

Set to "0".

### [3] Troubleshooting

Refer to the following actions to troubleshoot any of problems mentioned in 1-4.

- [1] A communication error occurs.
- [2] Image distortion produced.
- [3] Unable to do overseas communication.
- [4] Communication speed slow due to FALLBACK.
  - Increase the transmission level SOFT SWITCH 5-1 2 3 4.  
May be used in case [1] [2] [3].
  - Decrease the transmission level SOFT SWITCH 5-1 2 3 4.  
May be used in case [3].

- Apply line equalization SOFT SWITCH 2-6.  
May be used in case [1] [2] [3] [4].
- Slow down the transmission speed SOFT SWITCH 2-7, 8.  
May be used in case [2] [3].
- Replace the LIU PWB.  
May be used in all cases.
- Replace the control PWB.  
May be used in all cases.

\* If transmission problems still exist on the machine, use the following format and check the related matters.

TO: \_\_\_\_\_ ATT: \_\_\_\_\_ Ref.No.: \_\_\_\_\_  
 CC: \_\_\_\_\_ ATT: \_\_\_\_\_ Date: \_\_\_\_\_  
 FM: \_\_\_\_\_ Dept: \_\_\_\_\_  
 Sign: \_\_\_\_\_

|                                                                     |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------|---------------------------------------------|--------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|--|--|--|--|
| ***** Facsimile communication problem *****                         |                                             |                    |                                        | Ref.No.: _____                                                                                                                                                                                                                                                                                                 |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| From: Mr. _____                                                     |                                             | Fax Tel No.: _____ |                                        | Date: _____                                                                                                                                                                                                                                                                                                    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Our customer                                                        | Name                                        | _____              |                                        | Tel No. _____                                                                                                                                                                                                                                                                                                  |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Address                                     | _____              |                                        | Fax No. _____                                                                                                                                                                                                                                                                                                  |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Contact person                              | _____              |                                        | Model name _____                                                                                                                                                                                                                                                                                               |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Other party                                                         | Name                                        | _____              |                                        | Tel No. _____                                                                                                                                                                                                                                                                                                  |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Address                                     | _____              |                                        | Fax No. _____                                                                                                                                                                                                                                                                                                  |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Contact person                              | _____              |                                        | Model name _____                                                                                                                                                                                                                                                                                               |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Problem mode                                                        | Line: Domestic / international              |                    | Model: G3                              | Phase: A, B, C, D.                                                                                                                                                                                                                                                                                             |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Reception / Transmission                    |                    | Automatic reception / Manual reception |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     | Automatic dialing / Manual dialing / Others |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Frequency: _____ %                                                  |                                             |                    | ROM version: _____                     |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Confirmation item                                                   |                                             |                    |                                        | Please mark problem with an X.<br>No problem is: 0.                                                                                                                                                                                                                                                            |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     |                                             |                    |                                        | <table border="1" style="width: 100%; text-align: center;"> <tr> <td>A1</td><td>A2</td><td>B1</td><td>B2</td><td>C1</td><td>C2</td><td>D1</td><td>D2</td><td>E1</td><td>E2</td> </tr> <tr> <td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td> </tr> </table> |    | A1 | A2 | B1 | B2 | C1 | C2 | D1 | D2 | E1 | E2 |  |  |  |  |  |  |  |  |  |  |
|                                                                     |                                             |                    |                                        | A1                                                                                                                                                                                                                                                                                                             | A2 | B1 | B2 | C1 | C2 | D1 | D2 | E1 | E2 |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
|                                                                     |                                             |                    |                                        | Transmission level setting is (     ) dB at our customer                                                                                                                                                                                                                                                       |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Transmission level (     ) dBm                                      |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Reception level (     ) dBm<br>By level meter at B1 and B2          |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Comment                                                             |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| Countermeasure                                                      |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |
| **** Please attach the G3 data and activity report on problem. **** |                                             |                    |                                        |                                                                                                                                                                                                                                                                                                                |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |

\* Please complete this report before calling the "TAC" hotline if problem still occurs.

**[4] Error code table****G3 Transmission**

| Code | Final received signal   | Error Condition (Receiver side)                                                                                   |
|------|-------------------------|-------------------------------------------------------------------------------------------------------------------|
| 0    | Incomplete signal frame | Cannot recognize bit stream after flag                                                                            |
| 1    | NSF, DIS                | Cannot recognize DCS signal<br>Cannot recognize NSS signal                                                        |
| 2    | CFR                     | Disconnects line during reception                                                                                 |
| 3    | FTT                     | Disconnects line by fallback                                                                                      |
| 4    | MCF                     | Disconnects line during reception of multi-page<br>Cannot recognize NSS, DCS signal in the case of mode change    |
| 5    | PIP or PIN              | No response in receiver side to picture signal after no response in transmitter side to receive TALK mode request |
| 6    | RTN or RTP              | Cannot recognize NSS, DCS signal after transmitting RTN or RTP signal.                                            |
| 7    | No signal or DCN        | No response in receiver side or DCN signal received*                                                              |

**G3 Reception**

| Code | Final received signal   | Error Condition (Transmitter side)                                               |
|------|-------------------------|----------------------------------------------------------------------------------|
| 0    | Incomplete signal frame | Cannot recognize bit stream after flag                                           |
| 1    | NSS, DCS                | Cannot recognize CFR or FTT signal<br>Disconnects line during transmission       |
| 2    | NSC, DTC                | Cannot recognize NSS signal                                                      |
| 3    | EOP                     | Cannot recognize MCF, PIP, PIN, RTN, RTP signal                                  |
| 4    | EOM                     | Cannot recognize MCF, PIP, PIN, RTN, RTP signal in the case of mode change       |
| 5    | MPS                     | Cannot recognize MCF, PIP, PIN, RTN, RTP signal in the case of multi-page        |
| 6    | PR1-Q                   | Cannot recognize PIP, PIN signal in the case of TALK request                     |
| 7    | No signal or DCN        | No response in transmitter (cannot recognize DIS signal) or DCN signal received* |



## CHAPTER 3. MECHANISM BLOCKS

### [1] General description

#### 1. Document feed block and diagram

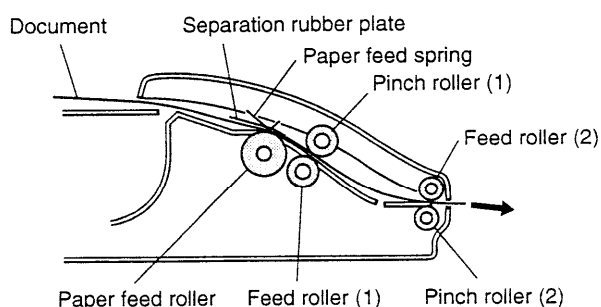


Fig. 1

#### 2. Document feed operation

- 1) The document placed in the hopper actuates the document sensor. After one second, the pulse motor starts to drive the paper feed roller. The document is automatically taken up into the machine, and stopped at the document sensor.
- 2) When a specified number of pulses are received from the document sensor after the document lead edge is sensed, scanning is started.
- 3) When a specified number of pulses are received from the document sensor after the document rear edge is sensed, scanning is terminated and the document is fed through.
- 4) If the document sensor is active (i.e., another document is in the hopper), when the preceding document scanning is completed and it is fed out, the next document is taken up into the machine. If the document sensor is not active (i.e., there is no document in the hopper), when the document is fed out, the operation is terminated.

#### 3. Hopper mechanism

##### 3-1. General view

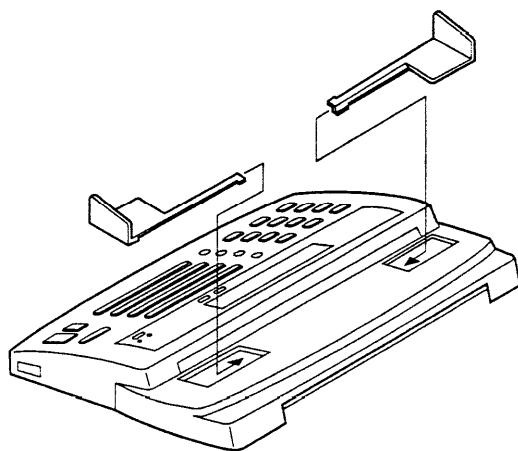


Fig. 2

The hopper is used to align documents with the document guides adjusted to the paper width.

NOTE: Adjust the document guides before and after inserting the document.

##### 3-2. Automatic document feed

- 1) Use of the paper feed roller and separation rubber plate ensures error-free transport and separation of documents. The plate spring presses the document to the paper feed roller to assure smooth feeding of the document.
- 2) Document separation method: Separation rubber plate

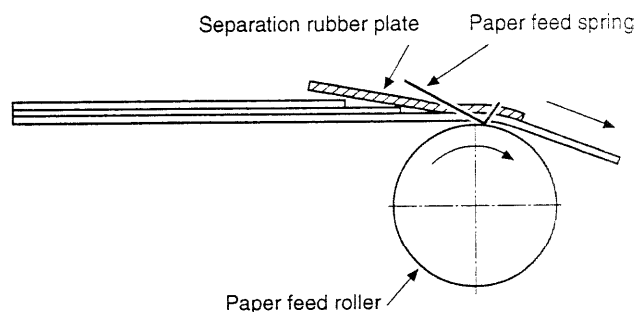


Fig. 3

##### 3-3. Documents applicable for automatic feed

|                        | 4x6 series<br>(788mm x 1091mm x<br>1000mm sheets)                  |         | Square<br>meter series |                      |
|------------------------|--------------------------------------------------------------------|---------|------------------------|----------------------|
|                        | Minimum                                                            | Maximum | Minimum                | Maximum              |
| Feeder capacity        | 18 sheets, max.                                                    |         |                        |                      |
| Paper weight           | 45kg                                                               | 64.3kg  | 52g/m <sup>2</sup>     | 74.3g/m <sup>2</sup> |
| Paper thickness (ref.) | 0.06mm                                                             | 0.09mm  | 0.06mm                 | 0.09mm               |
| Paper size             | B6 (128mm x 182mm) ~<br>A4 (210mm x 297mm), Letter (216mm x 279mm) |         |                        |                      |
| Feeder capacity        | 10 sheets, max.                                                    |         |                        |                      |
| Paper weight           | 45kg                                                               | 90kg    | 52g/m <sup>2</sup>     | 104g/m <sup>2</sup>  |
| Paper thickness (ref.) | 0.06mm                                                             | 0.12mm  | 0.06mm                 | 0.12mm               |
| Paper size             | B6 (128mm x 182mm) ~<br>A4 (210mm x 297mm), Letter (216mm x 279mm) |         |                        |                      |
| Paper quality          | High quality paper or equivalent                                   |         |                        |                      |

NOTE: Double-side coated documents and documents on facsimile recording paper should be inserted manually. The document feed quantity may be changed according to the document thickness.

Documents corresponding to a paper weight heavier than 64.3kg (74.3g/m<sup>2</sup>) and lighter than 135kg (157g/m<sup>2</sup>) are acceptable for manual feed.

Documents heavier than 135kg in terms of the paper weight must be duplicated on a copier to make it operative in the facsimile.

##### 3-4. Loading the documents

- 1) Make sure that the documents are of suitable size and thickness, and free from creases, folds, curls, wet glue, wet ink, clips, staples and pins.
- 2) Place documents face down in the hopper.
  - i) Adjust the document guides to the document size.
  - ii) Align the top edge of documents and gently place them into the hopper. The first page under the stack will be taken up by the feed roller to get ready for transmission.

NOTES: 1) Curled edge of documents, if any, must be straightened out.

2) Do not load the documents of different sizes and/or thicknesses together.

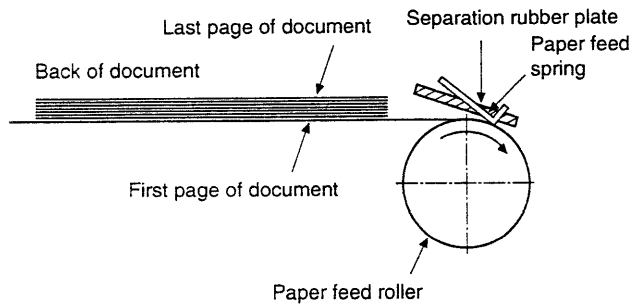


Fig. 4

### 3-5. Documents requiring use of document carrier

- 1) Documents smaller than B6 (128mm x 182mm).
- 2) Documents thinner than the thickness of 0.06mm.
- 3) Documents containing creases, folds, or curls, especially those whose surface is curled (maximum allowable curl is 5mm).
- 4) Documents containing tears.
- 5) Carbon-backed documents. (Insert a white sheet of paper between the carbon back and the document carrier to avoid transfer of carbon to the carrier.)
- 6) Documents containing an easily separable writing material (e.g., those written with a lead pencil).
- 7) Transparent documents.
- 8) Folded or glued documents.

Document in document carrier should be inserted manually into the feeder.

## 4. Document release

### 4-1. Cross section view

(RIGHT SIDE)

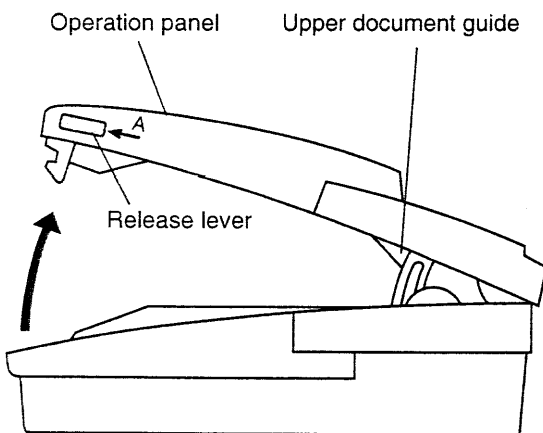


Fig. 5

### 4-2. General

When the release lever is pulled by hand in the direction of arrow A, the latch is released and the upper document guide moves on its axis in the direction of the arrow. The feed rollers, the separation rubber plate, and the pinch rollers become free to make it possible to remove the document.

## 5. Optical system

### (1) General view

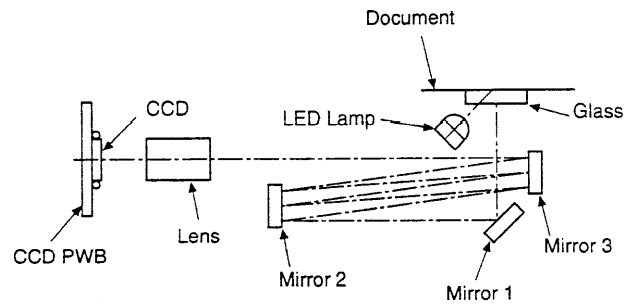


Fig. 6

### (2) Composition

The optical system is composed of the document feed mechanism, the lamp, the reflecting mirrors, the focusing lens, the CCD sensor, and the read process circuit.

#### 5-1. LED Lamp

The LED lamp is used to expose the document.

#### 5-2. Lens

The lens is used to focus the light reflected from the document on the CCD elements.

#### 5-3. CCD

The CCD (charge coupled device) image sensor consists of a photodiode array which converts the intensity of light reflected from the document surface into series of analog voltages which are then stored in an analog shift register. The series of analog voltages are then converted into a digital equivalent by a black/white binary logic circuit.

(Example) Scan signal output waveform

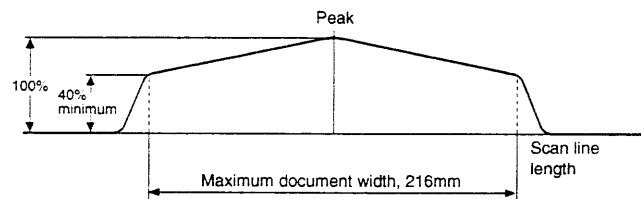


Fig. 7

- 1) The minimum output from the CCD at the maximum scan width of document (216mm) must be more than 40% of the peak value.
- 2) The peak output must be about 200mV under room temperature to avoid CCD saturation.

## 6. Recording block

### (1) General view

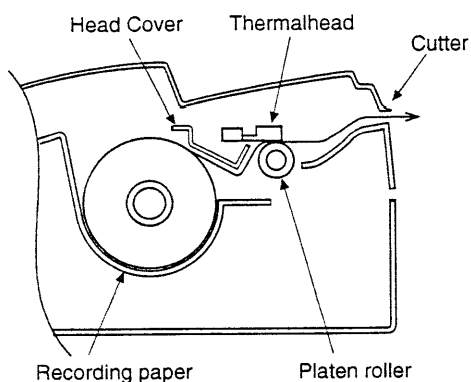


Fig. 8

#### 6-1. Driving

Via the pulse motor gear shaft, the reduction gear, and the recording paper feed gear, rotation of the pulse motor is conveyed to the recording paper feed roller to feed the recording paper.

#### 6-2. Recording

Use of a thermal head permits easier maintenance and low operating costs.

##### 1) Thermal head

The thermal head consists of 1728-dot heat elements arranged in a single row and has the resolution of 8 dots/mm. The maximum recording speed is 10ms/line. The thermal head also incorporates a 1728-dot shift register latch and an output control driver circuit. Low power consumption is achieved by dividing the head into nine segments.

##### 2) Structure of the recording mechanism

Recording is accomplished by pressing the thermal head on the recording paper against the platen roller.

The main scan (horizontal) is electronically achieved, while the sub-scan (vertical) is achieved by moving the recording paper by the recording platen roller.

Usually, the cause for uneven print tone is caused by misalignment of the thermal head or uneven contact with the roller.

It can be checked in the following manner.

- 1) Check if the thermal head power and signal cables are properly routed.
- 2) Check that the thermal head pivot moves smoothly up and down.
- 3) Check that the thermal head support bracket is secured without any play.
- 4) Check to see that the recording platen roller has proper concentricity, in the case of a print tone variation evenly repeated down the page.
- 5) Replace the thermal head with a new one and check to see if the same trouble occurs.

## [2] Disassembly and assembly procedures

- This chapter mainly describes the disassembly procedures. For the assembly procedures, reverse the disassembly procedures.
- Easy and simple disassembly/assembly procedures of some parts and units are omitted. For disassembly and assembly of such parts and units, refer to the Parts List.
- The numbers in the illustration, the parts list and the flowchart in a same section are common to each other.
- To assure reliability of the product, the disassembly and the assembly procedures should be performed carefully and deliberately.

### 1 Rear cover, handset holder ass'y

a. Remove the rear cover and the handset holder ass'y.

<Note 1> How to remove handset holder ass'y ⑤.

Push and remove pawl ⑧ on the right side in the arrow direction shown in the enlarged view. Then push and remove pawl ⑧ on the left side.

Parts list (Fig. 1)

| No. | Part name            | Q'ty |
|-----|----------------------|------|
| 1   | Lower cabinet        | 1    |
| 2   | Screw (3×10, black)  | 2    |
| 3   | Rear cover           | 1    |
| 4   | Screw (3×10, black)  | 4    |
| 5   | Handset holder ass'y | 1    |
| 6   | Hook switch lever    | 1    |
| 7   | Screw                | 1    |
| 8   | Spool                | 1    |
| 9   | Spool spring         | 1    |

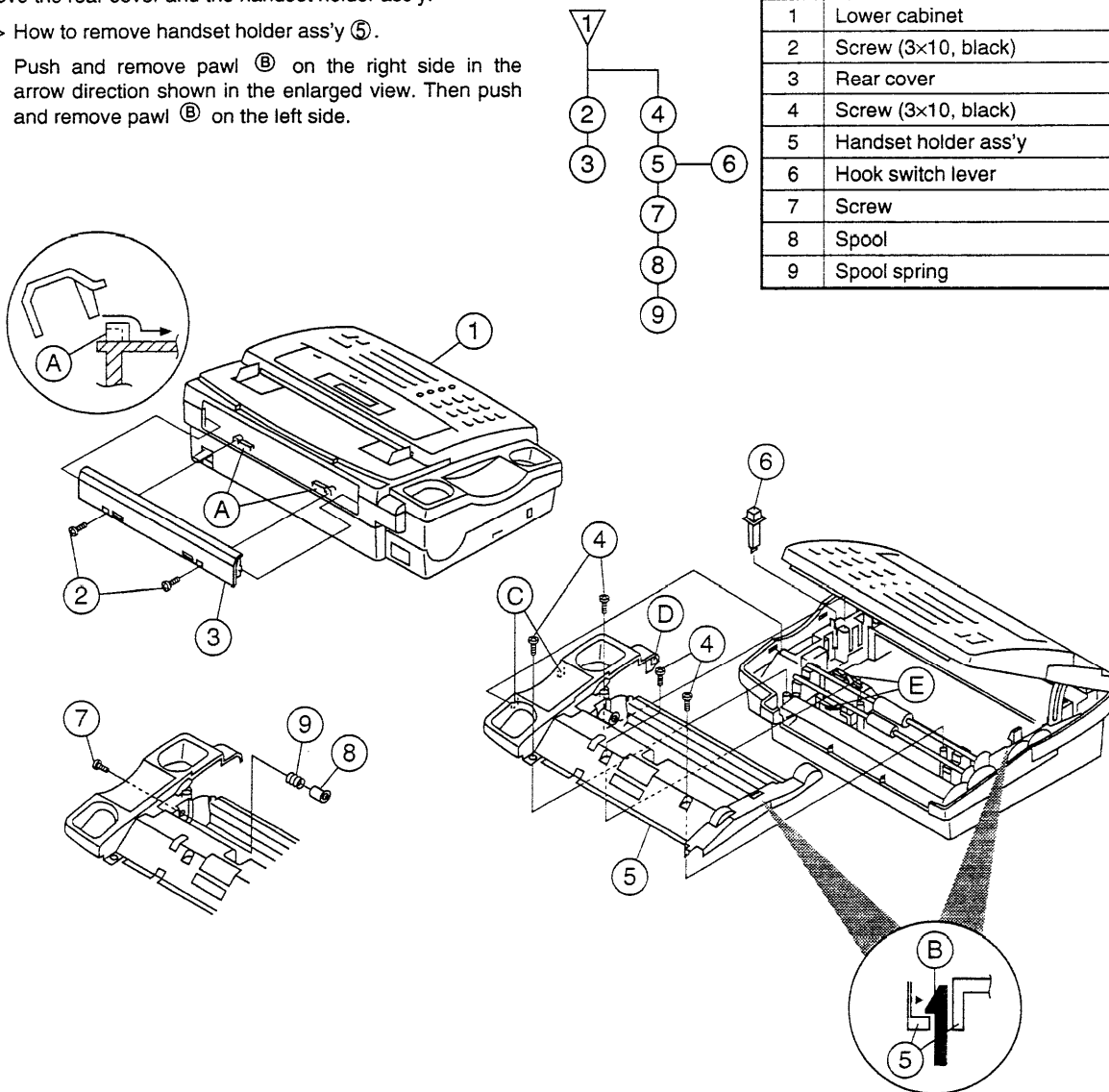


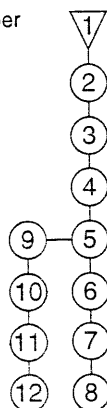
Fig. 1

#### [Note for assembly]

- When assembling handset holder ass'y ⑤ in Fig. 1, note the following items.
  - Insert two pawls ③ and ④ in Fig. 1 into the groove in the lower cabinet.
  - Put the right edge of the handset holder cabinet inside the lower cabinet.
  - Lock two pawls ③ in Fig. 1 securely.
  - Check that three sensor levers ⑤ in Fig. 1 move smoothly.

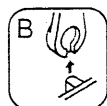
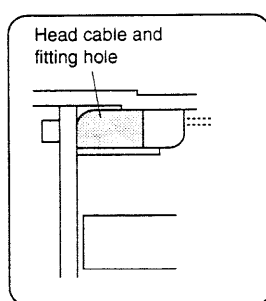
## 2 Head unit, etc.

- Remove the rear cover and the handset holder ass'y from the mechanism unit according to procedure 1-a.
- Disconnect the connectors and grounding wire from the upper cabinet ass'y.
- Remove the upper cabinet ass'y.
- Remove the head unit.



Parts list (Fig. 2)

| No. | Part name                                       | Q'ty |
|-----|-------------------------------------------------|------|
| 1   | Lower cabinet                                   | 1    |
| 2   | Upper cabinet ass'y (with original upper ass'y) | 1    |
| 3   | Screw (3×6)                                     | 2    |
| 4   | Head cover                                      | 1    |
| 5   | Head unit ass'y                                 | 1    |
| 6   | Screw (3×6)                                     | 1    |
| 7   | Head Grounding cable                            | 1    |
| 8   | Head pressure spring                            | 3    |
| 9   | Head cable                                      | 1    |
| 10  | Screw (3×6)                                     | 2    |
| 11  | Head holder                                     | 2    |
| 12  | Thermal head                                    | 1    |



Engage the guide lever gear with the teeth of brake gear in the position shown in the figure

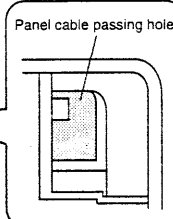
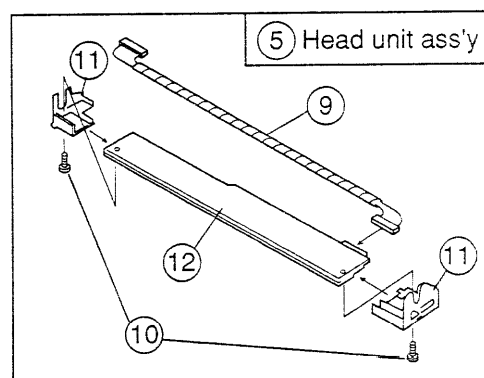
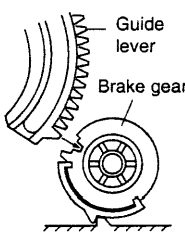


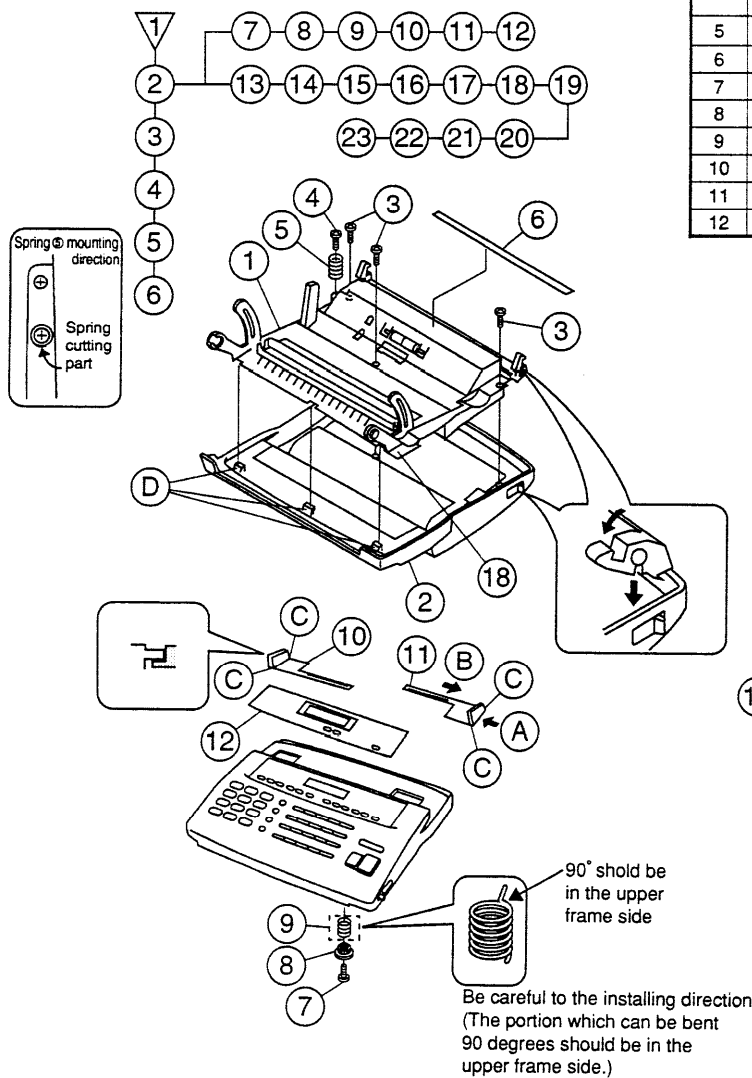
Fig. 2

### [Note for assembly]

- When removing and fitting the connector from and to the thermal head, do not apply undue force to the connector.
- Lay the head cable between ribs, and arrange the head cable so that it is not caught by the head cover ④.
- After installing the bearing of A, install the bearing (having a notch) of B.
  - The wire arrangement and guide lever are shown in the figure.

### 3 Upper cabinet ass'y

- Remove the upper cabinet ass'y from the original guide upper ass'y.
- Disassemble the upper cabinet ass'y.



Parts list (Fig. 3)

| No. | Part name                  | Q'ty | No. | Part name                  | Q'ty |
|-----|----------------------------|------|-----|----------------------------|------|
| 1   | Original guide upper ass'y | 1    | 13  | Upper panel                | 1    |
| 2   | Upper cabinet ass'y        | 1    | 14  | Original guide upper panel | 1    |
| 3   | Screw (3x8, black)         | 3    | 15  | Screw (2x6)                | 10   |
| 4   | Screw                      | 1    | 16  | PWB protection sheet       | 1    |
| 5   | Spring                     | 1    | 17  | Panel PWB                  | 1    |
| 6   | Rear sheet                 | 1    | 18  | Connector (Panel)          | 1    |
| 7   | Screw                      | 1    | 19  | 12 key                     | 1    |
| 8   | Pinion                     | 1    | 20  | Direct key                 | 1    |
| 9   | Hopper sprig               | 1    | 21  | Start key                  | 1    |
| 10  | Hopper guide L             | 1    | 22  | Stop key                   | 1    |
| 11  | Hopper guide R             | 1    | 23  | Mode key                   | 1    |
| 12  | Decoration panel           | 1    |     |                            |      |

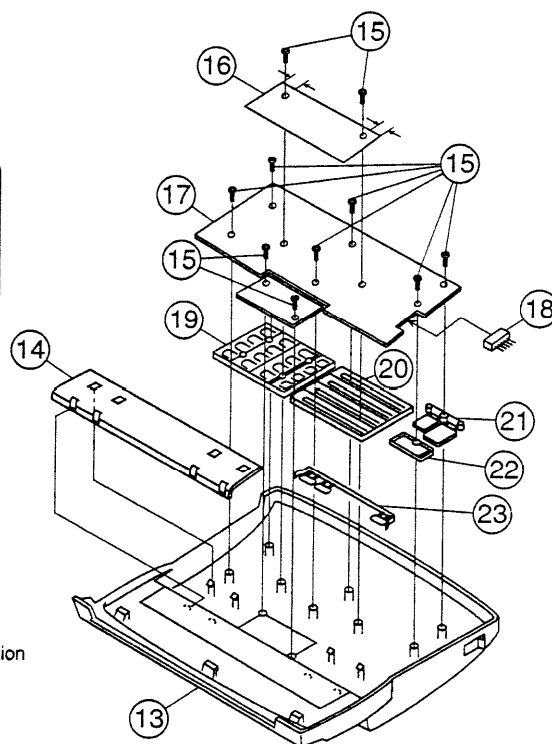


Fig. 3

#### [Note for assembly]

- When replacing the decoration panel ⑫ in Fig. 3, note the following items.
  - Remove oil from the attachment surface on the upper cabinet with alcohol.
  - Check that the display window is free from dirt and scratches.
  - Attach properly to the attachment region on the upper cabinet.
- When assembling hopper guides L ⑩ and R ⑪, note the following items.
  - Put two ribs ③ of each of hopper guides ⑩ and ⑪ under the upper cabinet. (Refer to the enlarged view.)
  - When inserting pinion ⑧, move the hopper guides ⑩ and ⑪ to the inside, insert pinion ⑧ and fix it with screw ⑦.

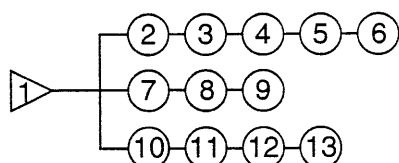
#### <Check>

- Check that the right and left hoppers are in position and are opened and closed smoothly.
  - Move hopper guide R ⑪ at the rate of about 10mm/sec in the direction of arrows ④ and ⑤ by using a tension gauge to check that the load is in the range of 500g to 150g.
- When assembling panel PWB ⑰ in Fig. 3, note the following items.
    - When assembling PWB protection sheet ⑮ in Fig. 3, place the longer margin on the right side.
    - When fixing 10 screws ⑮, first fix four screws in the sequence of [1] to [4] shown in the figure, then fix the six remaining screws.
  - When assembling upper cabinet ass'y ② in Fig. 3, insert three ribs ③ under the original guide upper ass'y.

## 4

## Original guide upper ass'y

- a. Remove the upper cabinet ass'y from the original guide upper ass'y according to procedure 3-a.
- b. Remove the release lever, the transport roller, and the pinch roller.



Parts list (Fig. 4)

| No. | Part name                  | Q'ty |
|-----|----------------------------|------|
| 1   | Original guide upper       | 1    |
| 2   | Release lever              | 1    |
| 3   | Release lever spring       | 1    |
| 4   | Bearing                    | 2    |
| 5   | Transport gear             | 1    |
| 6   | Transport roller           | 1    |
| 7   | Pinch roller shaft         | 1    |
| 8   | Pinch roller               | 2    |
| 9   | Pinch pressure spring      | 2    |
| 10  | Spring                     | 1    |
| 11  | Separation pressure plate  | 1    |
| 12  | Separation rubber          | 1    |
| 13  | Separation pressure spring | 1    |

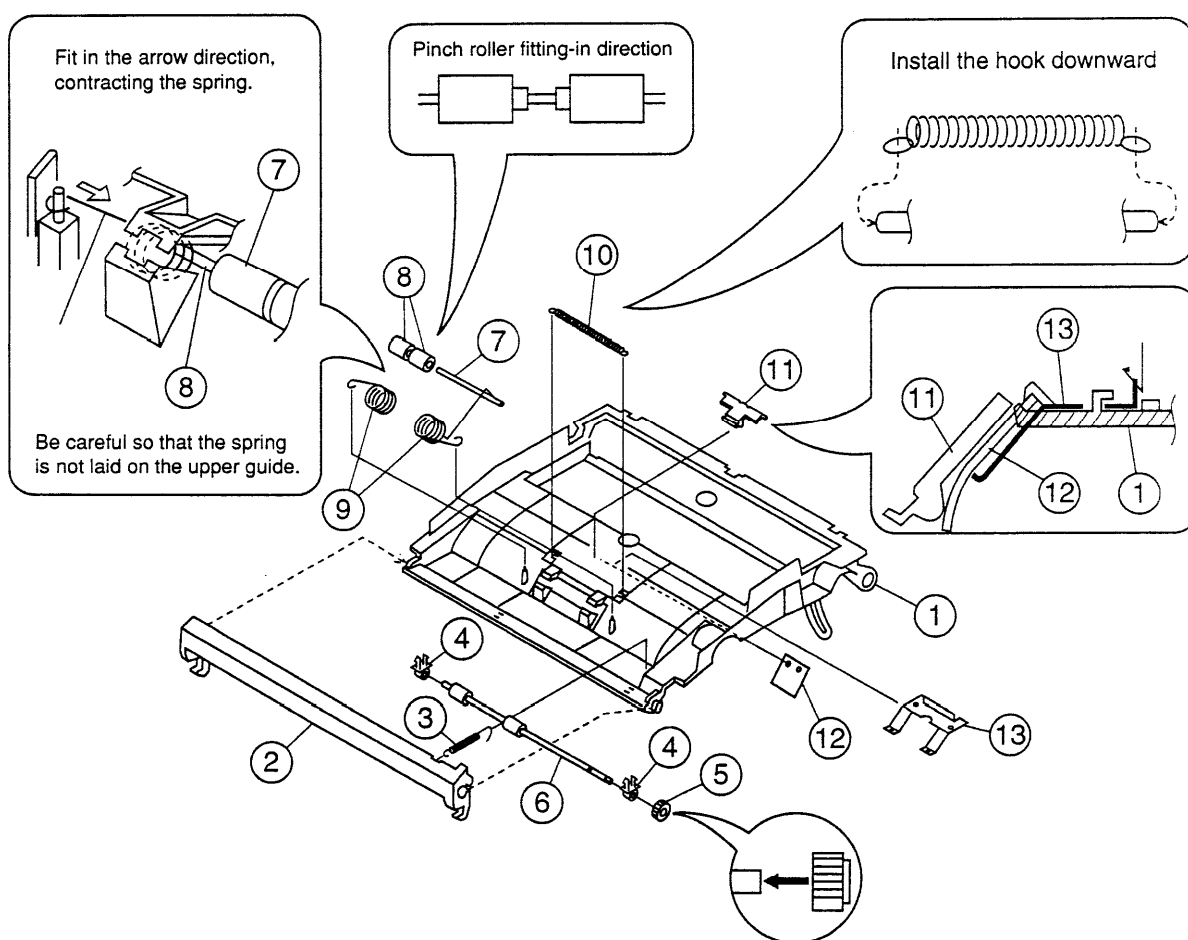


Fig. 4

## [Note for assembly]

1. Fit the pinch pressure springs ⑨ simultaneously at the left and right sides.
2. When fitting the release lever spring, engage it from above.

## 5 Paper feed roller, etc.

- Remove the rear cover and the handset holder ass'y from the mechanism unit according to procedure 1-a.
- Disconnect the connectors and grounding wire from the upper cabinet ass'y.
- Remove the upper cabinet and the original guide upper ass'y from the lower cabinet according to the procedure of 2-c.
- Remove the platen roller and the cutter unit according to the flowchart.

Parts list (Fig. 5)

| No. | Part name             | Q'ty | No. | Part name              | Q'ty |
|-----|-----------------------|------|-----|------------------------|------|
| 1   | Lower cabinet         | 1    | 11  | Bearing                | 4    |
| 2   | Original sensor lever | 1    | 12  | Transport roller gear  | 1    |
| 3   | Lever return spring   | 1    | 13  | Transport roller       | 1    |
| 4   | Front sensor lever    | 1    | 14  | Paper feed roller gear | 1    |
| 5   | Lever return spring   | 1    | 15  | Paper feed roller      | 1    |
| 6   | Speaker               | 1    | 16  | Platen roller gear     | 1    |
| 7   | Brake spring          | 1    | 17  | Bearing                | 2    |
| 8   | Brake gear            | 1    | 18  | Platen roller          | 1    |
| 9   | Paper sensor level    | 1    | 19  | Brake spring           | 1    |
| 10  | Lever return spring   | 1    |     |                        |      |

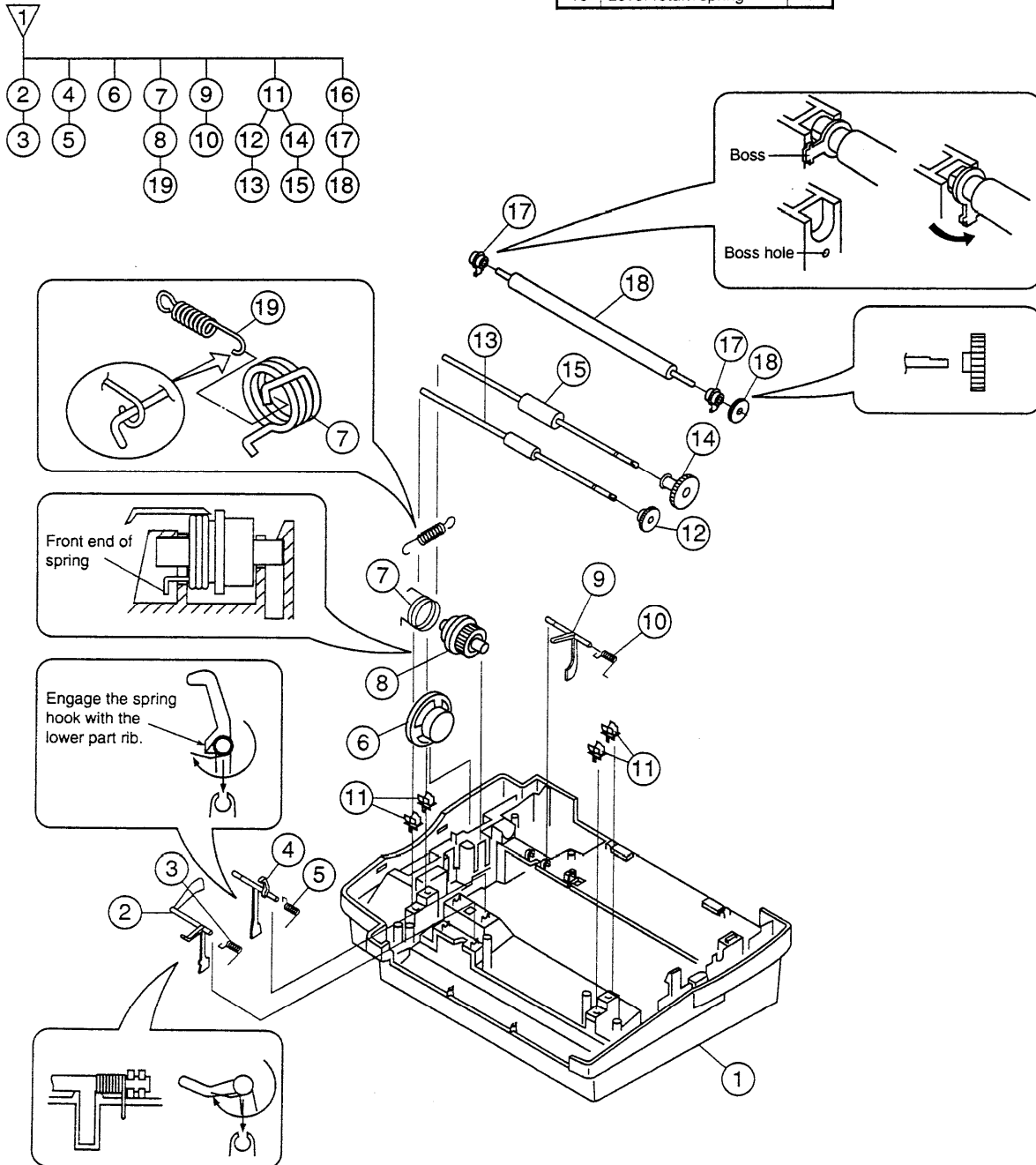


Fig. 5

### [Note for assembly]

- Fit in the speaker until a contact is felt. The speaker cable is directed toward the rib. Fit the cable to the rib.

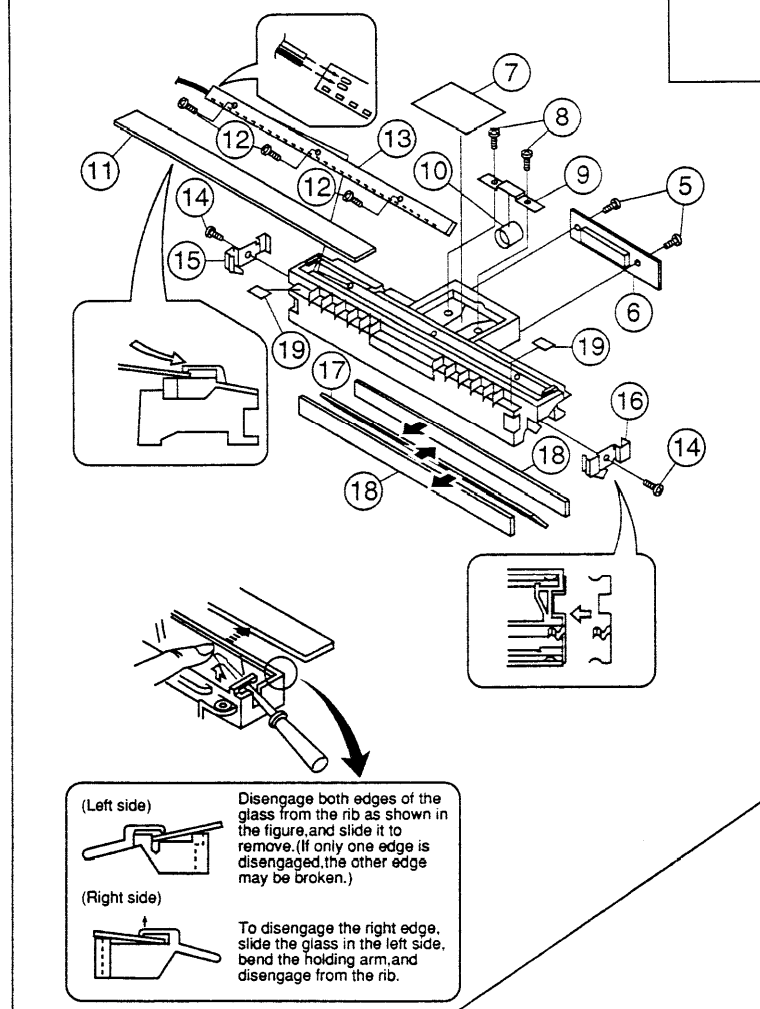


## 6

## Optical system unit

- Remove the rear cover and the handset holder ass'y from the mechanism unit according to procedure 1-a.
- Remove the optical system unit from the lower cabinet.
- Disassemble the optical system unit.

<Note> Never remove the CCD PWB, the lens, and the lens holding spring except when replacing or adjusting the optical system. If they are removed, adjustments of the optical system is required.



Parts list (Fig. 6)

| No. | Part name             | Q'ty | No. | Part name                     | Q'ty |
|-----|-----------------------|------|-----|-------------------------------|------|
| 1   | Lower cabinet         | 1    | 11  | Scanning glass                | 1    |
| 2   | Connector (CCD)       | 1    | 12  | Screw (2×6)                   | 3    |
| 3   | Connector (LED)       | 1    | 13  | LED                           | 1    |
| 4   | Optical system unit   | 1    | 14  | Screw (3×4)                   | 2    |
| 5   | Screw (M3 red)        | 2    | 15  | Mirror holding spring (left)  | 1    |
| 6   | CCD PWB               | 1    | 16  | Mirror holding spring (right) | 1    |
| 7   | Light shielding sheet | 1    | 17  | Mirror (1)                    | 1    |
| 8   | Screw (3×6)           | 2    | 18  | Mirror (2)                    | 2    |
| 9   | Lens holding spring   | 1    | 19  | Sheet                         | 2    |
| 10  | Lens                  | 1    |     |                               |      |

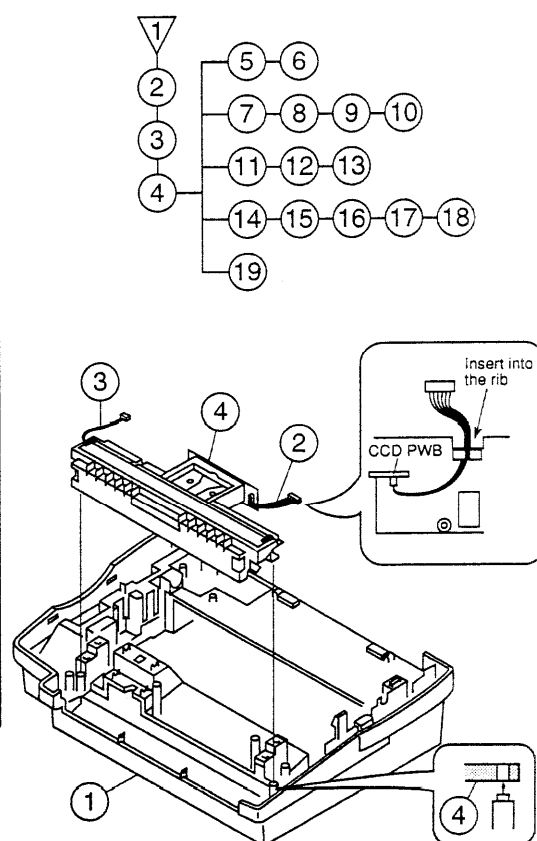


Fig. 6

## [Note for assembly]

- When assembling ① mirrors ⑬ and in Fig. 6, note the following items:
  - Check that the mirrors are free from dust, finger prints, and dirt. The mirror surface (vaporized surface) should face in the arrow direction in Fig. 6.
  - Insert the mirror spring securely.
- Insert mirror holding springs ⑮ and ⑯ securely, and apply screw lock to positions ④ (each two positions on the right and the left).
- When assembling scanning glass ⑪ in Fig. 6, note the following items:
  - Check that the scanning glass is free from dust, finger prints, and dirt. The inside cannot be cleaned after assembling. Be careful not to smear it when assembling.
  - When assembling, be careful not to apply an excessive force in the arrow direction.

## 7 LIU PWB, control PWB, power PWB

- Remove the rear cover and the handset holder ass'y from the mechanism unit according to procedure 1-a.
- Disconnect the connectors and the grounding cable from the bottom plate ass'y (with PWBs).

<Note> When disassembling bottom plate ass'y (4), be careful not to damage the two knobs (A) of the volume.

- Remove the LIU PWB, the control PWB, and the power PWB according to the flowchart.

Parts list (Fig. 7)

| No. | Part name                      | Q'ty |
|-----|--------------------------------|------|
| 1   | Lower cabinet                  | 1    |
| 2   | Screw (3×8, with SW)           | 1    |
| 3   | Screw (3×8)                    | 7    |
| 4   | Bottom plate ass'y (with PWBs) | 1    |
| 5   | Screw (4×6, with SW)           | 1    |
| 6   | AC cord ass'y                  | 1    |
| 7   | Screw (3×6, with SW)           | 5    |
| 8   | Screw (3×5)                    | 1    |
| 9   | Power unit                     | 1    |
| 10  | Control PWB                    | 1    |
| 11  | LIU PWB                        | 1    |
| 12  | Bottom plate                   | 1    |
| 13  | Rubber leg                     | 1    |

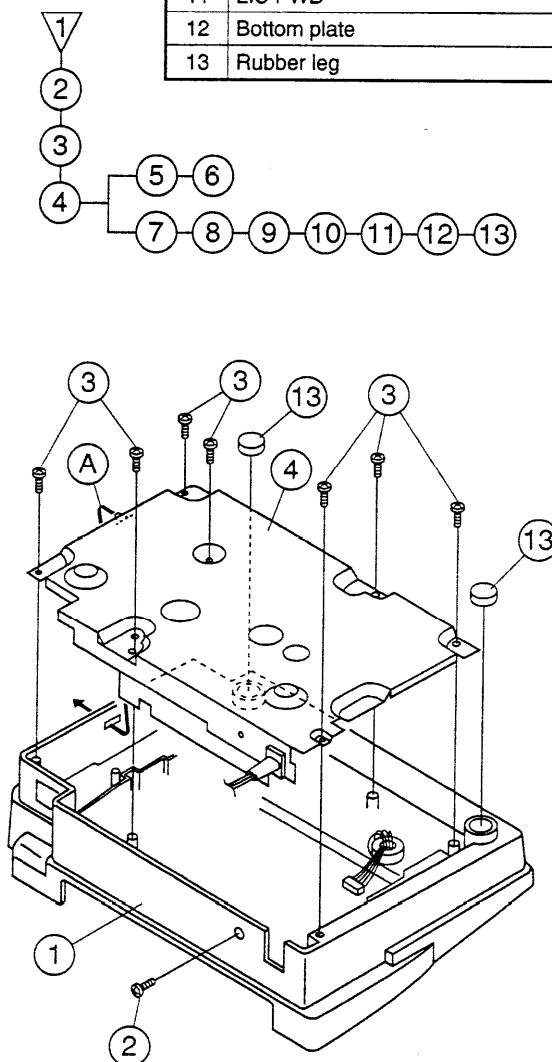
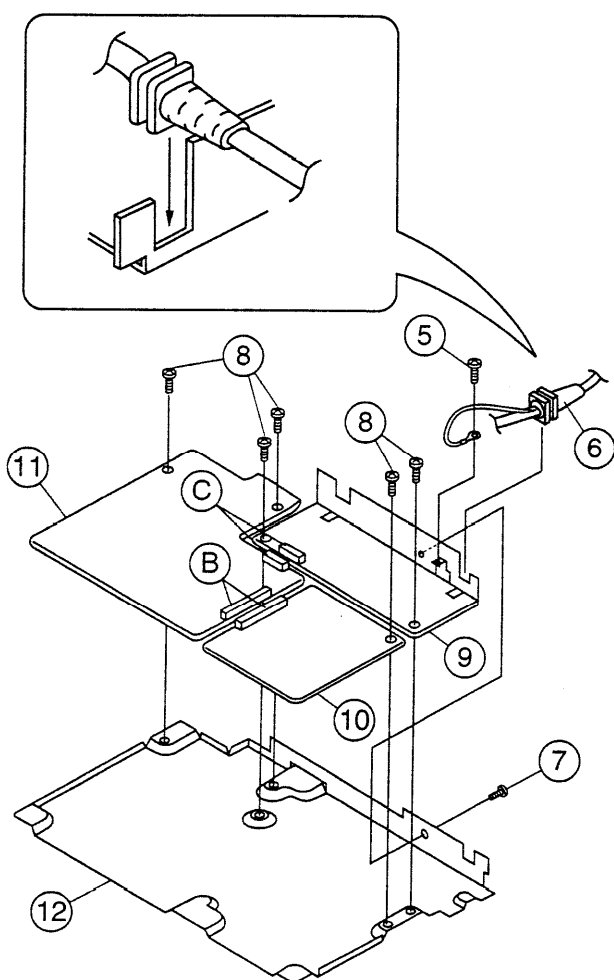
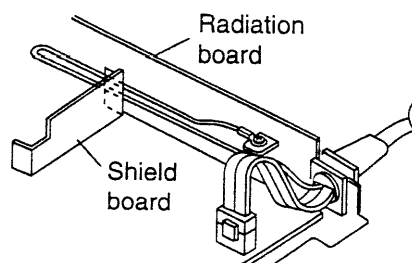


Fig. 7

### [Note for assembly]

- When connecting LIU PWB ⑪ and control PWB ⑩ in Fig. 7, insert connector ⑧ securely.
- When connecting LIU PWB ⑪ and power PWB ⑨ in Fig. 7, insert connector ⑨ securely.
- When assembling AC cord ass'y ⑥ to bottom plate ⑫ in Fig. 7, be careful the inserting direction. (Refer to the enlarged view of Fig. 7.)
- When assembling bottom plate ass'y ④ (with PWBs) in Fig. 7, insert two knobs ④ of the volume into the square hole in the cabinet. Be careful not to pinch the cable.

- Arrange the AC cord as shown below.



## 8

## Drive system unit

- Remove the rear cover and the handset holder ass'y from the mechanism unit according to procedure 1-a.
- Remove the platen roller from the lower cabinet.
- Remove the drive system unit from the lower cabinet.
- Disassemble the drive system unit.

**Note for disassembly**

When planetary gear ass'y ⑪ is removed, gear ⑰ may be set free and disassembled. Be careful not to lose it.

Parts list (Fig. 8)

| No. | Part name               | Q'ty | No. | Part name                         | Q'ty |
|-----|-------------------------|------|-----|-----------------------------------|------|
| 1   | Lower cabinet           | 1    | 15  | Planetary gear mounting plate (2) | 1    |
| 2   | Connector (Solenoid)    | 1    | 16  | Planetary gear mounting plate (1) | 1    |
| 3   | Connector (Motor)       | 1    | 17  | Planetary gear                    | 1    |
| 4   | Screw (3x10)            | 2    | 18  | Idler gear (1)                    | 2    |
| 5   | Drive system unit       | 1    | 19  | Reduction gear (1)                | 1    |
| 6   | Lock pawl return spring | 1    | 20  | Idler gear (5)                    | 1    |
| 7   | Lock pawl               | 1    | 21  | Idler gear (4)                    | 1    |
| 8   | Lock pawl return spring | 1    | 22  | Idler gear (6)                    | 1    |
| 9   | Lock pawl (2)           | 1    | 23  | Reduction gear (2)                | 1    |
| 10  | Washer (motor gear)     | 1    | 24  | Screw (3x8)                       | 2    |
| 11  | Planetary gear ass'y    | 1    | 25  | Drive motor                       | 1    |
| 12  | Washer (Planetary gear) | 2    | 26  | Heat radiating plate              | 1    |
| 13  | Planetary gear          | 2    | 27  | Solenoid                          | 1    |
| 14  | Pressure spring         | 2    | 28  | Washer                            | 1    |

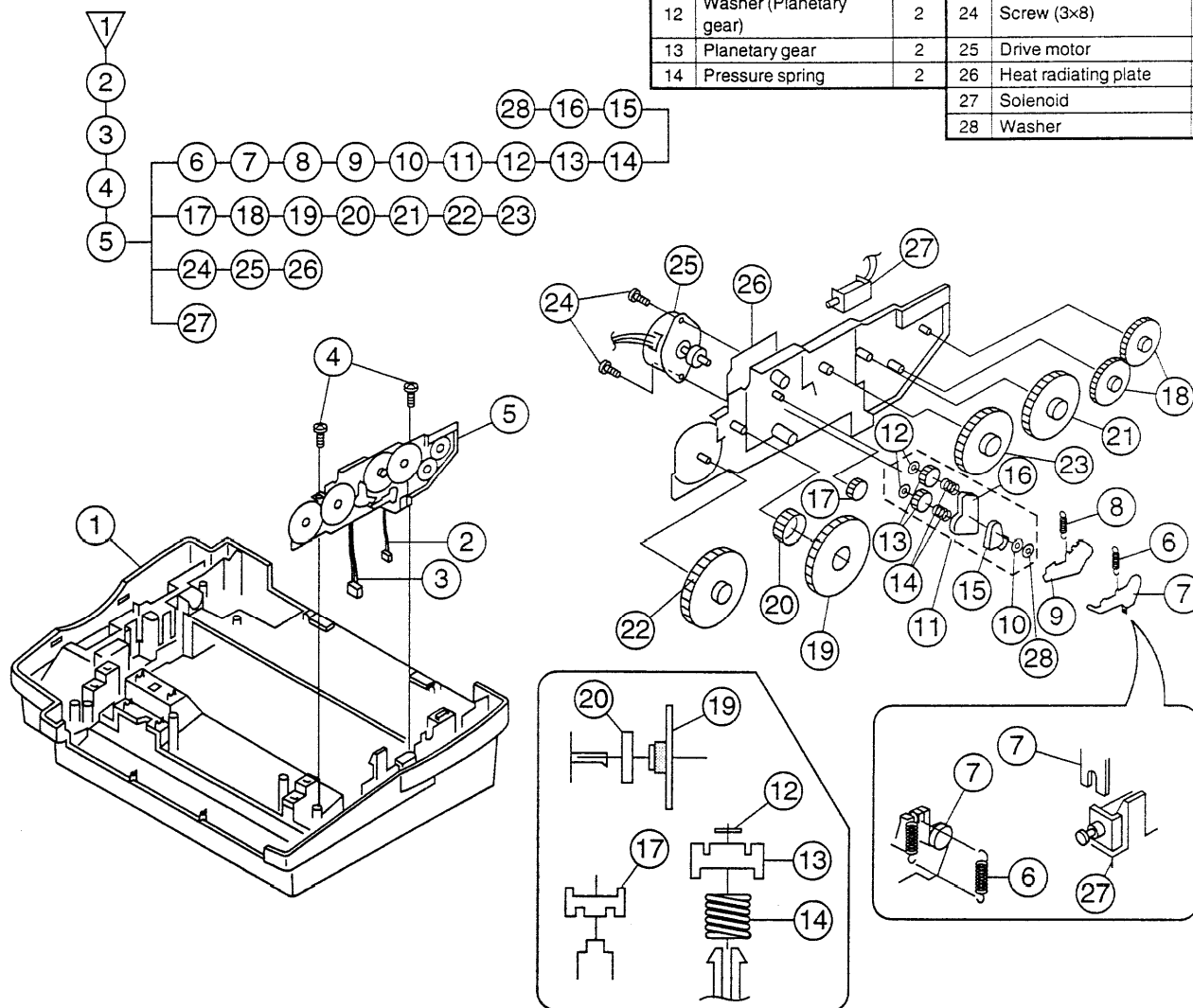


Fig. 8

**[Note for assembly]**

- When assembling drive motor ②⑤ in Fig. 8, be careful not to install it upside down. Place the cable port toward the upper side. (Refer to Fig. 8.)
- Note and check the following items when assembling the gears.
  - For insertion direction of the gear, refer to the enlarged view of Fig. 8.
  - Apply grease (Molykote) to the shaded portion of gears ⑬ and ⑰. (Refer to the enlarged view.)
  - Engage gears ⑱, ⑲, ⑳, and ㉔ securely with the shaft pawl.
- Insert lock pawl ⑦ in Fig. 8 into the dented portion of the solenoid shaft. (Refer to the enlarged view.)
- For inserting direction of lock pawl return spring in ⑥ Fig. 8, refer to the enlarged view.
- Engage drive system unit ⑤ in Fig. 8 with two positioning bosses and fix with a screw.

<Check> Check that the planetary gear and the lock pawl operate smoothly without disengagement of the pawl section after assembly.

## 9 Wire treatment

- Perform wire treatment carefully and deliberately.
- For wire treatment procedures which are not described in this section, refer to the section for that portion of the unit.

Parts list (Fig. 9)

| No. | Part name          | Q'ty |
|-----|--------------------|------|
| 1   | Cable band         | 2    |
| 2   | Core (TRA31×19×10) | 1    |
| 3   | Screw (M3×5)       | 1    |

Panel cable

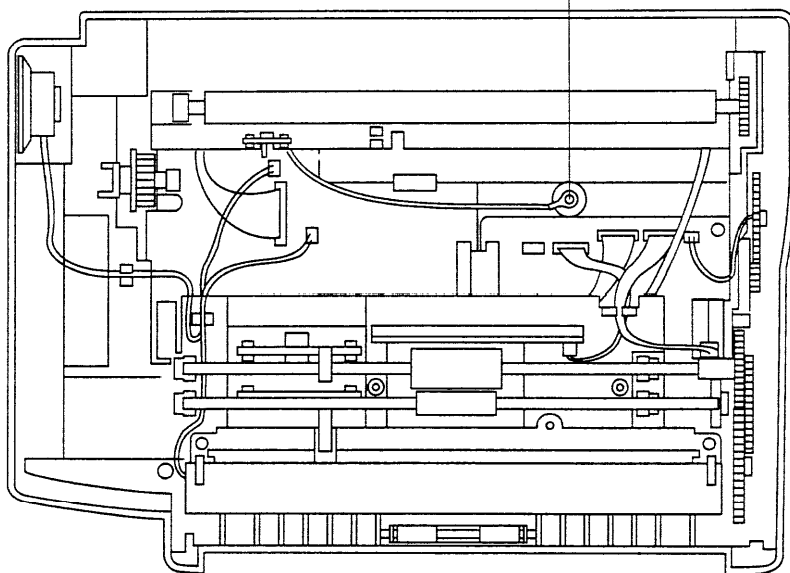
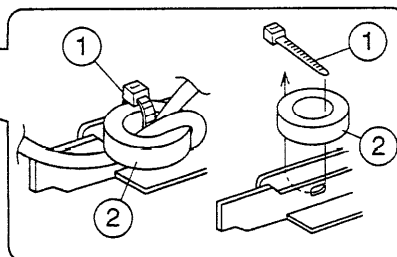
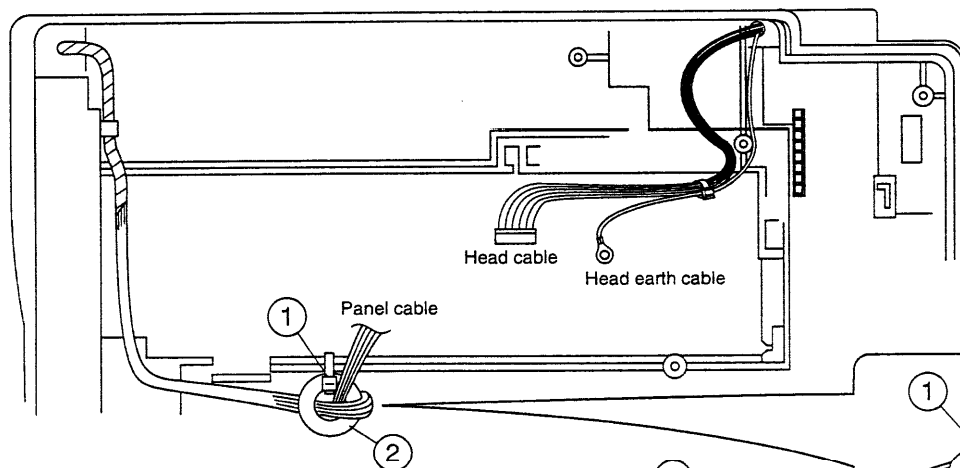
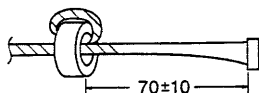
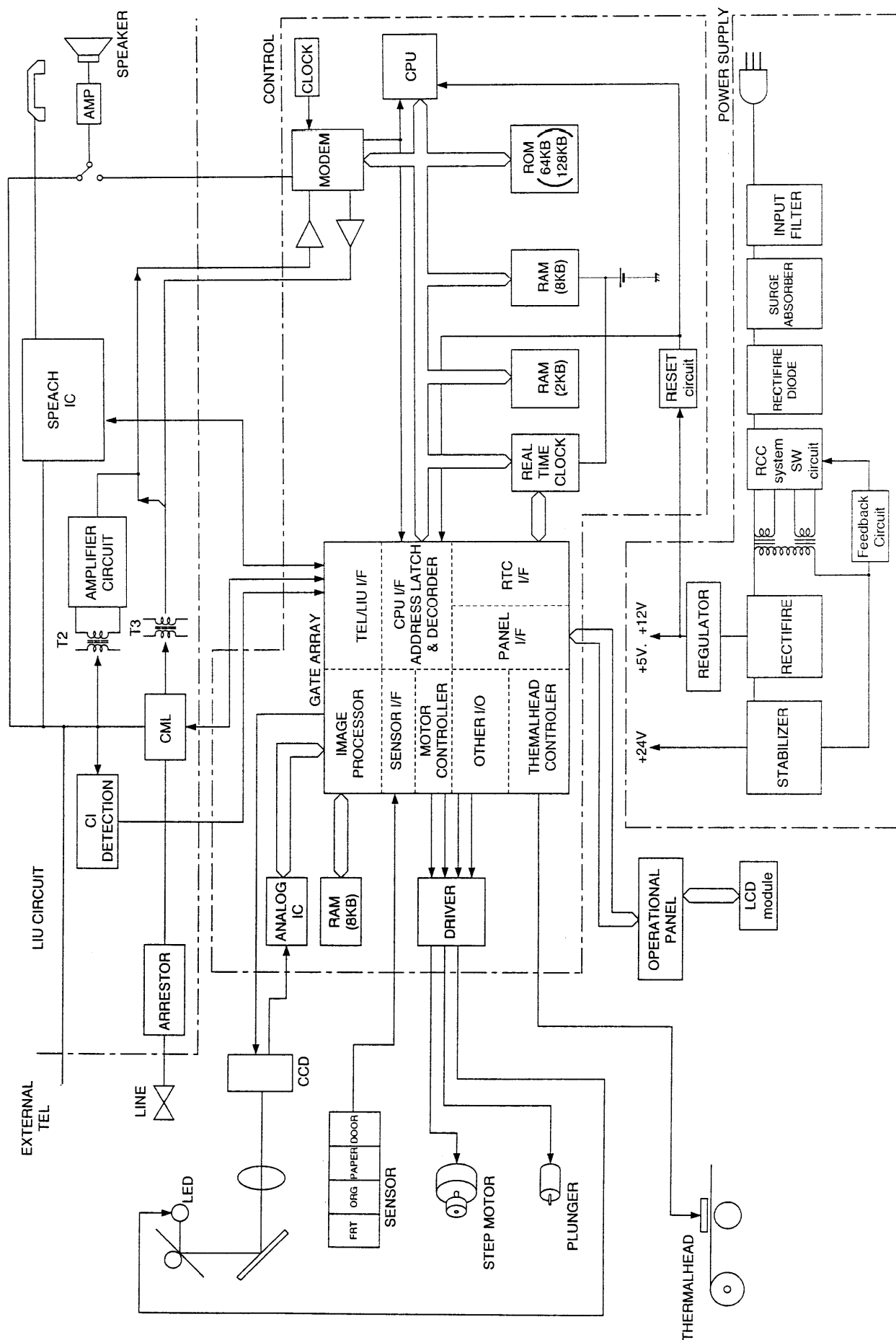


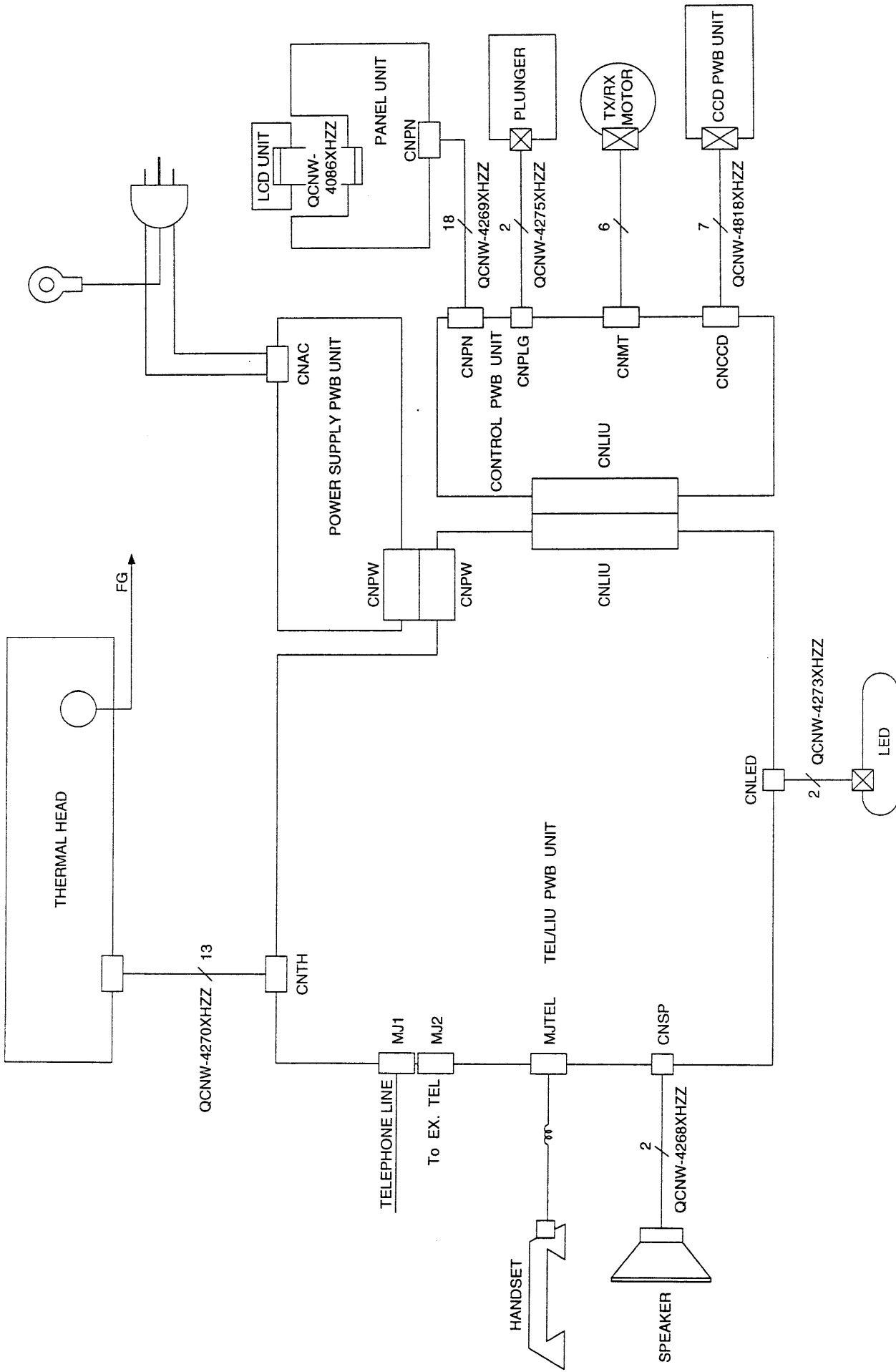
Fig. 9

## CHAPTER 4. DIAGRAMS

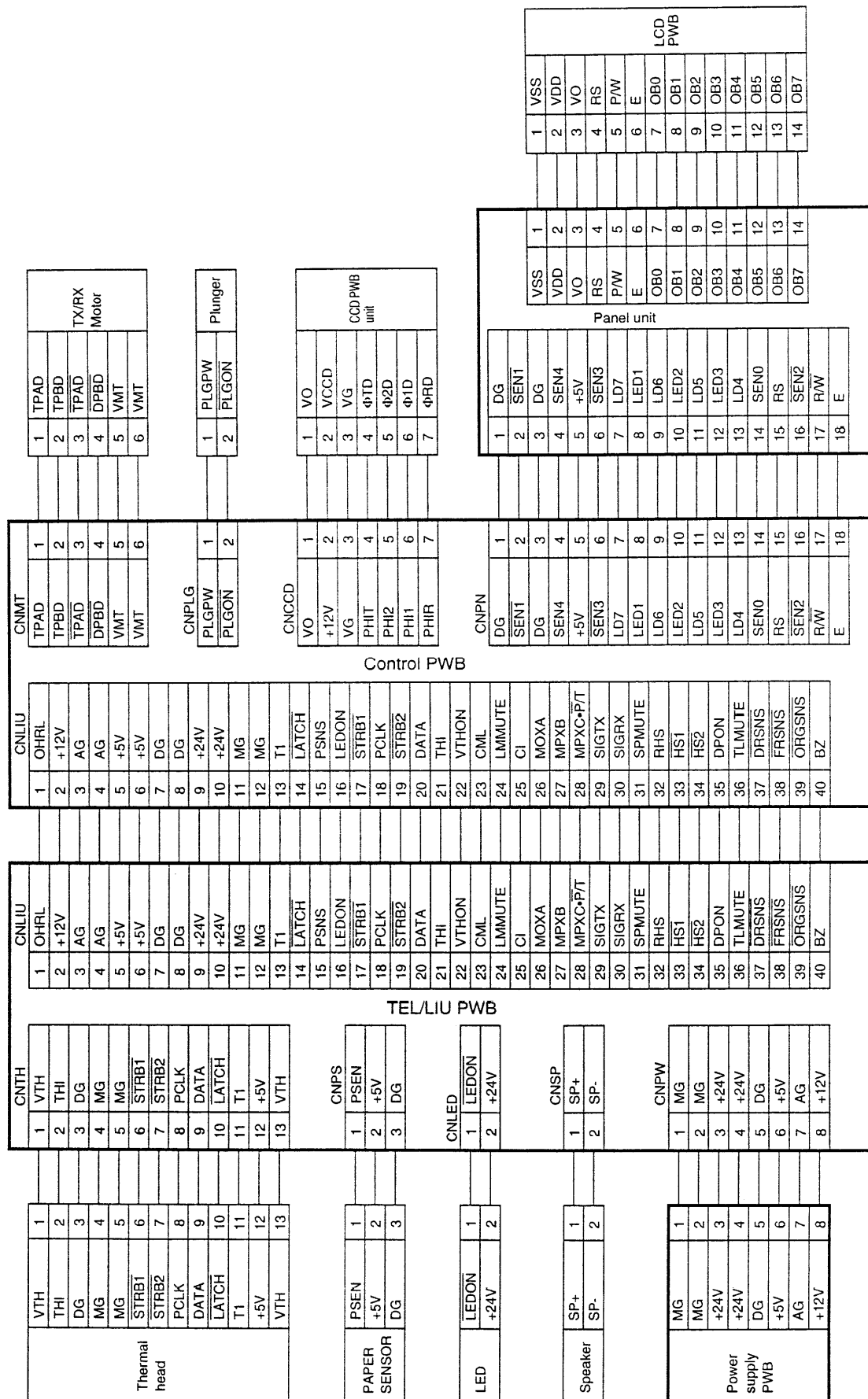
[1] Block diagram



[2] Wiring diagram



[3] Point-to-point diagram



## CHAPTER 5. CIRCUIT DESCRIPTION

### [1] Circuit description

#### 1. General description

The compact design of the control PWB is obtained by using gate arrays in the main control section and high density printing of surface mounting parts. Each PWB is independent according to its function as shown in Fig. 1.

#### 2. PWB configuration

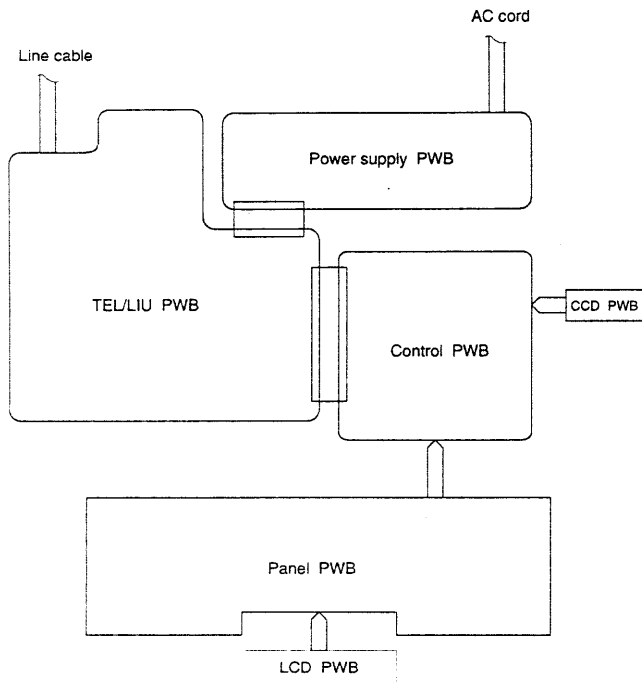


Fig. 1

#### 1) Control PWB

The control PWB controls peripheral PWBs, mechanical parts, transmission, and performs overall control of the unit.

This machine employs a 1-chip modem (R96SHF) which is installed on the control PWB.

#### 2) TEL/LIU PWB

This PWB controls connection of the telephone line to the unit.

#### 3) Power supply PWB

This PWB provides voltages of +5V, +12V, and +24V to the another PWB.

#### 4) Panel PWB

The panel PWB allows input of the operation keys.

#### 5) CCD PWB

This PWB controls the pickup optical device.

#### 6) LCD PWB

This PWB controls the LCD display.

### 3. Operational description

Operational descriptions are given below:

- Transmission operation

When a document is loaded in standby mode, the state of the document sensor is sensed via the main controller gate array. If the sensor signal was on, the motor is started to bring the document into the standby position. With depression of the START key in the off-hook state, transmission takes place.

Then, the procedure is sent out from the modem and the motor is rotated to move the document down to the scan line. In the scan processor, the signal scanned by the CCD is sent to the internal image processor and the AD converter to convert the analog signal into binary data. This binary data is transferred from the scan processor to the image buffer within the RAM and encoded and stored in the transmit buffer of the RAM. The data is then converted from parallel to serial form by the modem where the serial data is modulated and sent onto the line.

- Receive operation

There are two ways of starting reception, manual and automatic. Depression of the START key in the off-hook mode in the case of manual receive mode, or CI signal detection by the LIU in the automatic receive mode.

First, the CPU controls the procedure signals from the modem to be ready to receive data. When the program goes into phase C, the serial data from the modem is converted to parallel form in the modem interface of the main control gate array which is stored in the receive buffer of the RAM. The data in the receive buffer is decoded software-wise to reproduce it as binary image data in the image buffer. The data is DMA transferred to the recording processor within the main control gate array which is then converted from parallel to serial form to be sent to the thermal head. The data is printed line by line by the CPU which is assigned to control the motor rotation and strobe signal.

- Copy operation

To make a copy on this facsimile, the COPY key is pressed when the machine is in stand-by with a document on the document table and the telephone set is in the on-hook state.

First, depression of the COPY key advances the document to the scan line. Similar to the transmitting operation, the image signal from the CCD is converted to a binary signal in the DMA mode via the main control gate array which is then sent to the image buffer of the RAM. Next, the data is transferred to the recording processor in the DMA mode to send the image data to the thermal head which is printed line by line. The copying takes place as the operation is repeated.



## [2] Circuit description of control PWB

### 1. General description

Fig. 2 shows the functional blocks of the control PWB, which is composed of 5 blocks.

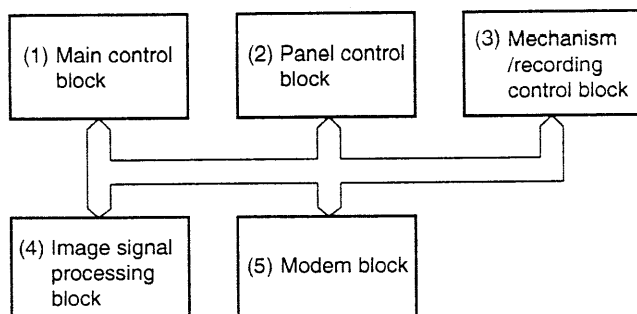


Fig. 2 Control PWB functional block diagram

### 2. Description of each block

#### (1) Main control block

The main control block is composed of an 8-bit microprocessor Z80180, ROM (128KByte), and RAM (8KByte+2KByte). Devices are connected to the bus to control the whole unit.

##### 1) Z80180 (IC2) ... pin-80 QFP (CPU)

This is a CMOS 8-bit microprocessor. A high-speed CPU (compatible with Z80 upper class models) and peripheral functions are incorporated in one chip.

This system allows the following functions.

- Memory Management Unit (MMU)
- DMA controller (2 channels); Channel 0: For read, Channel 1: For write.
- Timer
- Interruption; As external interrupt.

$\overline{\text{INT0}}$ : Modem interrupt

$\overline{\text{INT1}}$ : Not used

$\overline{\text{INT2}}$ : Mechanism control section/RTC detection interrupt.

Operating speed is 6MHz.

In addition, 12MHz clock is supplied from external clock input pin 76 as the basic clock of the modem (IC1).

For reset when power is turned on, a LOW signal of about 200msec is supplied to RESET terminal.

##### 2) 27C010 (IC9): pin-32 DIP (ROM)

EPROM of 1Mbit equipped with software for the main CPU.

##### 3) LH5160 (IC4): pin-28, SOP (RAM)

Line memory for the main CPU system RAM area and coding/decoding process. Used as the transmission buffer.

Memory of recorded data such as daily report and auto dials. When the power is turned off, this memory is backed up by the lithium battery.

##### 4) LH5116 (IC6): Pin-24 SOP (RAM)

Work area for main program.

This IC is not backed up by the lithium battery.

##### 5) LZ9FJ11 (IC5): pin-160, QFP (Gate Array)

The following functions are incorporated to support the CPU.

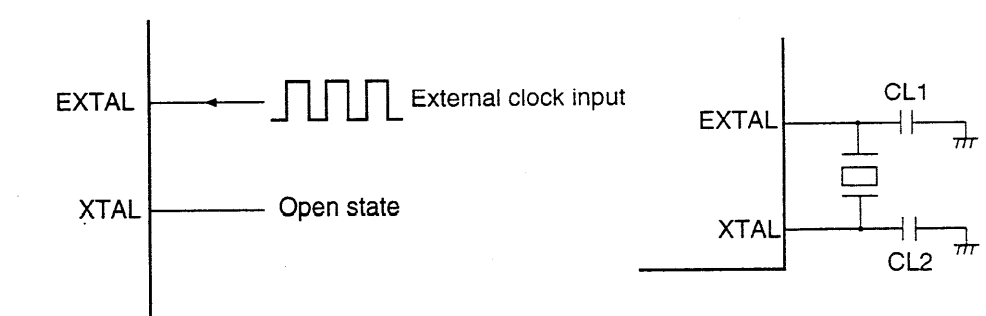
- CPU I/F and register
- I/O port
- CPU timer
- Read system control
- Memory mapping
- Mechanism/recording control block
- Modem I/F (RTC detection)
- Cutter control
- Real time clock I/F

##### 6) NJU6355E (IC101): pin-8, SOP

The following functions are incorporated to support the CPU (IC2).

- Timer
- Calendar
- Battery backup for power off

## Z80180 (IC2) terminal descriptions

| Classification                 | Code                                                                                                                                                  | Terminal No.<br>(FP-80)                | Input/<br>Output        | Name and pin function                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power GND                      | VCC                                                                                                                                                   | 32                                     | Input                   | Power supply: Connected to the power source. (+5V)                                                                                                                                                                                                                                                                      |
|                                | VSS                                                                                                                                                   | 12, 34, 72, 73                         | Input                   | Ground: Connected to the power source. (Ground)                                                                                                                                                                                                                                                                         |
| XTAL clock                     | XTAL                                                                                                                                                  | 74                                     | Input                   | Connected to a crystal oscillator. Frequency must be two times as great as $\phi$ clock frequency.<br>When inputting an external clock to EXTAL pin, open XTAL pin.                                                                                                                                                     |
|                                | EXTAL                                                                                                                                                 | 76                                     | Input                   | Connected to a crystal oscillator. Also used as an external clock input pin. The external clock input frequency must be two times as great as $\phi$ clock frequency.                                                                                                                                                   |
|                                |  <p>Recommended circuit configuration with a crystal oscillator</p> |                                        |                         |                                                                                                                                                                                                                                                                                                                         |
|                                | $\phi$                                                                                                                                                | 71                                     | Output                  | System clock: Provides system clock to the peripheral devices.                                                                                                                                                                                                                                                          |
| Reset                          | $\overline{\text{RESET}}$                                                                                                                             | 80                                     | Input                   | Reset: LOW when the LSI is reset state.                                                                                                                                                                                                                                                                                 |
| Address bus                    | A <sub>0</sub> –A <sub>18</sub><br>A <sub>0</sub> –A <sub>19</sub><br>(HD64180R1;<br>FP-80, CP-68)<br>(A18 is commonly<br>used with TOUT.)            | 8–11<br>13<br>15–21<br>24–29<br>31, 33 | Output<br>(Three-state) | Address bus: The address to make access to the memory space. HIGH only in the following cases:<br>(a) Reset<br>(b) Bus control is transmitted to another device. (When BUSACK = "0" by BUSREQ = "0")<br>A18 is multiplexed with TOUT. The timer control register TOC0 and TOC1 bits determine which output to take.     |
| Data bus                       | D0–D7                                                                                                                                                 | 35–41, 44                              | Input/Output            | Data bus: 8-bit bidirectional data bus                                                                                                                                                                                                                                                                                  |
| Memory I/O<br>interface signal | $\overline{\text{RD}}$                                                                                                                                | 70                                     | Output<br>(Three-state) | Read: Shows that the LSI is in read cycle. At that time, the data bus is in output mode.                                                                                                                                                                                                                                |
|                                | $\overline{\text{WR}}$                                                                                                                                | 69                                     | Output<br>(Three-state) | Write: Shows that the LSI is in write cycle. At that time, the data bus is in output mode.                                                                                                                                                                                                                              |
|                                | $\overline{\text{ME}}$<br>( $\overline{\text{MREQ}}$ )                                                                                                | 66                                     | Output<br>(Three-state) | Memory enable: Shows that read/write operation of the memory is being executed. LOW in the following cases:<br>(a) Command fetch, operand read<br>(b) Memory access in DMA cycle<br>(c) Refresh cycle                                                                                                                   |
|                                | $\overline{\text{IOE}}$<br>( $\overline{\text{IORQ}}$ )                                                                                               | 65                                     | Output<br>(Three-state) | I/O enable: Shows that I/O read/write operation is being executed. LOW in the following cases:<br>(a) Read/write of data in executing an I/O command<br>(b) I/O access in DMA cycle<br>(c) $\overline{\text{INT}}_0$ acknowledge cycle                                                                                  |
|                                | $\overline{\text{WAIT}}$                                                                                                                              | 77                                     | Input                   | Wait: Used to extend read/write cycle of I/O or the memory. When this input is LOW at the falling edge of T2, TW state is inserted next to T2. When it is LOW at the falling edge of TW, another TW is inserted again next to the preceding one.                                                                        |
|                                | E                                                                                                                                                     | 67                                     | Output                  | Enable: Synchronizing clock for peripheral LSIs of the 6800 system.                                                                                                                                                                                                                                                     |
| System control<br>signal       | $\overline{\text{BUSREQ}}$                                                                                                                            | 79                                     | Input                   | Bus request: Used for other devices to request bus free to this LSI. When driven LOW, the CPU stops execution of commands and drives some parts ( $\overline{\text{RD}}$ , $\overline{\text{WR}}$ , $\overline{\text{ME}}$ , $\overline{\text{IOE}}$ ) of the address bus, data bus, and memory interface signals HIGH. |
|                                | BUSACK                                                                                                                                                | 78                                     | Output                  | Bus acknowledge: Shows that the CPU received $\overline{\text{BUSREQ}}$ signal and freed the bus.<br>When a device which outputted $\overline{\text{BUSREQ}}$ signal receives BUSACK signal, it acknowledges that it has gained bus control.                                                                            |

| Classification        | Code                                    | Terminal No. | Input/Output                                                                      | Name and pin function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|-----------------------|-----------------------------------------|--------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------|-----|--------------------------------------|---|-----------------------------------------|---|--------------------------------------------------|---|---|---|-----------------------------------------------------------|---|---|---|---------------------------------------------------------------------|---|------------|---|---------------|---|---|---|-----------|---|---|---|
| System control signal | HALT                                    | 61           | Output                                                                            | HALT: LOW when the CPU executes HALT or SLP command, and shows to the outside that the CPU is in HALT mode, SLEEP mode, or SYSTEM STOP mode. Used with ST signal and LIR signal to show the operation status such as the internal DMA operation and the CPU operation mode.                                                                                                                                                                                                                                                                                                                                                  |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | LIR (M1)                                | 68           | Output                                                                            | Load instruction register: Shows that the cycle which is under operation is the operation code fetch cycle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | ST                                      | 7            | Output                                                                            | Status: Shows the operation status.<br>Do not connect with a pull-down resistor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       |                                         |              |                                                                                   | <table><tr><th>ST</th><th>HALT</th><th>LIR</th><th>Operation status</th></tr><tr><td>0</td><td>1</td><td>0</td><td>CPU operation (First operation code fetch cycle)</td></tr><tr><td>1</td><td>1</td><td>0</td><td>CPU operation (Second, third operation code fetch cycles)</td></tr><tr><td>1</td><td>1</td><td>1</td><td>CPU operation (Machine cycle other than operation code fetch cycle)</td></tr><tr><td>1</td><td>Not fixed.</td><td>0</td><td>DMA operation</td></tr><tr><td>0</td><td>0</td><td>0</td><td>HALT mode</td></tr><tr><td>1</td><td>0</td><td>1</td><td>SLEEP mode, SYSTEM STOP mode</td></tr></table> | ST             | HALT    | LIR | Operation status                     | 0 | 1                                       | 0 | CPU operation (First operation code fetch cycle) | 1 | 1 | 0 | CPU operation (Second, third operation code fetch cycles) | 1 | 1 | 1 | CPU operation (Machine cycle other than operation code fetch cycle) | 1 | Not fixed. | 0 | DMA operation | 0 | 0 | 0 | HALT mode | 1 | 0 | 1 |
| ST                    | HALT                                    | LIR          | Operation status                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 0                     | 1                                       | 0            | CPU operation (First operation code fetch cycle)                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 1                     | 1                                       | 0            | CPU operation (Second, third operation code fetch cycles)                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 1                     | 1                                       | 1            | CPU operation (Machine cycle other than operation code fetch cycle)               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 1                     | Not fixed.                              | 0            | DMA operation                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 0                     | 0                                       | 0            | HALT mode                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 1                     | 0                                       | 1            | SLEEP mode, SYSTEM STOP mode                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| System control signal | REF                                     | 64           | Output                                                                            | Refresh: When LOW, shows that the CPU is in DRAM refresh cycle. When LOW, refresh addresses are outputted to the lower 8 bits of the address bus (A0~A7). Refresh interval is programmable in a state of 10, 20, 40 or 80.                                                                                                                                                                                                                                                                                                                                                                                                   |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| Interrupt signal      | NM1                                     | 1            | Input                                                                             | Non-maskable interrupt: This is the non-maskable interrupt request terminal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | INT0                                    | 4            | Input                                                                             | Interrupt 0: Maskable interrupt level 0 request terminal. In level 0, there are three operation modes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       |                                         |              |                                                                                   | <table><tr><th>Operation mode</th><th>Content</th></tr><tr><td>0</td><td>Command on the data bus is executed.</td></tr><tr><td>1</td><td>Command is executed from address 0038H.</td></tr><tr><td>2</td><td>Vector system</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                  | Operation mode | Content | 0   | Command on the data bus is executed. | 1 | Command is executed from address 0038H. | 2 | Vector system                                    |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | Operation mode                          | Content      |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 0                     | Command on the data bus is executed.    |              |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 1                     | Command is executed from address 0038H. |              |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| 2                     | Vector system                           |              |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| INT1                  | 5                                       | Input        | Interrupt 1, 2: Maskable interrupt level 1 and 2 request terminals. Vector system |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| INT2                  | 6                                       | Input        |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
| DMA signal            | DREQ0 (Commonly used with CKA0.)        | 50           | Input                                                                             | DMA request for channel 0: Internal DMAC transfer (to channel 0) request terminal. With this signal, the internal DMAC can operate in synchronization with the external I/O devices. The internal DMAC channel 0 supports the following transfer types:<br>(a) Between memories<br>(b) Between memory and I/O<br>(c) Between memory and memory map I/O<br>This terminal is multiplexed with CKA0 terminal. When DMA channel 0 transfer mode is set to "Between memory and I/O (including memory map I/O)", DREQ0 terminal serves as an input terminal.                                                                       |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | TEND0                                   | 55           | Output                                                                            | Transfer end for channel 0: Internal DMAC channel 0 transfer sent signal. Driven LOW in synchronization with the last data transfer write cycle. This terminal is multiplexed with CKA1 terminal. When ASCI control register A channel 1 is set to "1", it serves as TEND0 terminal.                                                                                                                                                                                                                                                                                                                                         |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |
|                       | DREQ1                                   | 59           | Input                                                                             | DMA request for channel 1: Internal DMAC transfer (to channel 1) request terminal. Channel 1 supports only transfer between memory and I/O.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |         |     |                                      |   |                                         |   |                                                  |   |   |   |                                                           |   |   |   |                                                                     |   |            |   |               |   |   |   |           |   |   |   |

**Z80180 (IC2)**

| Classification                     | Code                                                               | Terminal No. | Input/Output | Name and pin function                                                                                                                                                                                                                                                                                                         |
|------------------------------------|--------------------------------------------------------------------|--------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DMA signal                         | $\overline{\text{TEND}}_1$                                         | 60           | Output       | Transfer end for channel 1: Internal DMAC transfer (to channel 1) end signal. Driven LOW in synchronization with the last data transfer write cycle.                                                                                                                                                                          |
| Serial I/O signal (ASCI channel 0) | $\text{TXA}_0$                                                     | 48           | Output       | Transfer data for asynchronous SCI channel 0: ASCI channel 0 transfer data terminal.                                                                                                                                                                                                                                          |
|                                    | $\text{RXA}_0$                                                     | 49           | Input        | Receive data for asynchronous SCI channel 0: ASCI channel 0 receive data terminal.                                                                                                                                                                                                                                            |
|                                    | $\text{CKA}_0$<br>(Commonly used with $\text{DREQ}_0$ )            | 50           | Input/Output | Clock for asynchronous SCI channel 0: ASCI channel 0 clock input/output terminal.<br>This terminal is multiplexed with transfer request signal $\text{DREQ}_0$ for internal DMAC channel 0. When DMA channel 0 is operated in the transfer mode of "Between memory and I/O", it cannot be used as a clock output terminal.    |
|                                    | $\overline{\text{RTS}}_0$                                          | 45           | Output       | Request to send for asynchronous SCI channel 0: One of the ASCI channel 0 modem control signals. The output can be controlled to LOW and HIGH by the program.                                                                                                                                                                 |
|                                    | $\overline{\text{CTS}}_0$                                          | 46           | Input        | Clear to send for asynchronous SCI channel 0: One of the ASCI channel 0 modem control signals. With this input, transmission can be controlled.                                                                                                                                                                               |
| Serial I/O signal (ASCI channel 0) | $\overline{\text{DCD}}_0$                                          | 47           | Input        | Data carrier detect for asynchronous SCI channel 0: One of the ASCI channel 0 modem control signals. With this input, the operation of the receiver section can be reset.                                                                                                                                                     |
| Serial I/O signal (ASCI channel 1) | $\text{TXA}_1$                                                     | 52           | Output       | Transfer data for asynchronous SCI channel 1: ASCI channel 1 transfer data terminal.                                                                                                                                                                                                                                          |
|                                    | $\text{RXA}_1$                                                     | 54           | Input        | Receive data for asynchronous SCI channel 1: ASCI channel 1 receive data terminal.                                                                                                                                                                                                                                            |
|                                    | $\text{CKA}_1$<br>(Commonly used with $\overline{\text{TEND}}_0$ ) | 55           | Input/Output | Clock for asynchronous SCI channel 1: ASCI channel 1 clock input/output terminal. This terminal is multiplexed with internal DMAC channel 0 transfer end signal $\overline{\text{TEND}}_0$ . When $\text{CKA1D}$ bit of the ASCI control register A channel 1 is set to "0", it can be used as a clock input/output terminal. |
|                                    | $\overline{\text{CTS}}_1$<br>(Commonly used with $\text{RXS}$ .)   | 57           | Input        | Clear to send for asynchronous SCI channel 1: ASCI channel 1 modem control signal. With this input, transmission can be controlled. This terminal is multiplexed with $\text{RXS}$ signal described below. ASCI status register channel 1 $\text{CTS1E}$ bit is used to select this terminal.                                 |
| Serial I/O signal (CSI/O)          | $\text{TXS}$                                                       | 56           | Output       | Transfer data for serial I/O port: CSI/O serial output terminal.                                                                                                                                                                                                                                                              |
|                                    | $\text{RXS}$<br>(Commonly used with $\text{CTS1}$ .)               | 57           | Input        | Receive data for serial I/O port: CSI/O serial input terminal. This terminal is multiplexed with $\text{CTS1}$ , and selection is made by the program.                                                                                                                                                                        |
|                                    | $\text{CKS}$                                                       | 58           | Input/Output | Clock for serial I/O port: Used as CSI/O clock input/output terminal.                                                                                                                                                                                                                                                         |
| Timer                              | $\text{TOUT}$<br>(Commonly used with A18.)                         | 31           | Output       | Timer out: Timer output terminal of timer 1. Multiplexed with A18. Selection is made with $\text{TOC0}$ and $\text{TOC1}$ bits of the timer control register.                                                                                                                                                                 |

**Common terminal descriptions Z80180 (IC2)**

| Code                                    | Terminal No. | Selection method                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A18/ $\text{TOUT}$                      | 31           | A18 is selected immediately after resetting. When either one or both of $\text{TOC1}$ bit and $\text{TOC0}$ bit is/are set to "1", $\text{TOUT}$ is selected. When the both bits are set to "0", A18 is selected again.                                                                                                        |
| $\text{CKA}_0/\overline{\text{DREQ}}_0$ | 50           | $\text{CKA}_0$ is selected immediately after resetting. Either one of $\text{DM1}$ bit or $\text{SM1}$ bit of DMAC DMA mode register is set to "1", $\text{CKA}_0$ is compulsorily changed to an input terminal though it is set as an output terminal, and $\text{CKA}_0$ can be used as $\overline{\text{DREQ}}_0$ terminal. |
| $\text{CKA}_1/\overline{\text{TEND}}_0$ | 55           | $\text{CKA}_1$ terminal is selected immediately after resetting. When $\text{CKA1D}$ bit of the ASCI control register A channel 1 is set to "1", it can be used as $\overline{\text{TEND}}_0$ terminal. When the bit is reset to "0", the terminal returns to $\text{CKA}_1$ .                                                 |
| $\text{RXS}/\overline{\text{CTS}}_1$    | 57           | $\text{RXS}$ terminal is selected immediately after resetting. When $\text{CTS1E}$ bit of ASCI status register channel 1 is set to "1", it can be used as $\overline{\text{CTS}}_1$ terminal. In this case, however, the function of $\text{RXS}$ input terminal is not prohibited.                                            |

**LZ9FJ11 (IC5) Pin Assignment (G. A.)**

OBF ⇄ CMOS level unless otherwise specified.

IBF ⇄ TTL level

(However, RWE input is at CMOS level.)

| Pin No. | Name   | I/O BUF | Remark                     |
|---------|--------|---------|----------------------------|
| 1       | XME    | IBF     | Memory Enable Signal       |
| 2       | XIOE   | IBF     | IO Enable Signal           |
| 3       | XRD    | IBF     | Read Control Signal        |
| 4       | XWR    | IBF     | Write Control Signal       |
| 5       | XIORD  | OBF     | IO Read Signal             |
| 6       | XIOWR  | OBF     | IO Write Signal            |
| 7       | XMRD   | OBF     | Memory Read Signal         |
| 8       | XMWR   | OBF     | Memory Write Signal        |
| 9       | XDREQ0 | OBF     | DMA CH0 Request Signal     |
| 10      | XDREQ1 | OBF     | DMA CH1 Request Signal     |
| 11      | XINT2  | OBF     | Interrupt Request Signal   |
| 12      | D7     | IOBF    | CPU Data Bus               |
| 13      | D6     | IOBF    | CPU Data Bus               |
| 14      | D5     | IOBF    | CPU Data Bus               |
| 15      | D4     | IOBF    | CPU Data Bus               |
| 16      | D3     | IOBF    | CPU Data Bus               |
| 17      | D2     | IOBF    | CPU Data Bus               |
| 18      | D1     | IOBF    | CPU Data Bus               |
| 19      | D0     | IOBF    | CPU Data Bus               |
| 20      | VDD    | —       | Power Supply               |
| 21      | GND    | —       | GROUND                     |
| 22      | A18    | IBF     | CPU Address Bus            |
| 23      | A17    | IBF     | CPU Address Bus            |
| 24      | A16    | IBF     | CPU Address Bus            |
| 25      | A15    | IBF     | CPU Address Bus            |
| 26      | A14    | IBF     | CPU Address Bus            |
| 27      | A13    | IBF     | CPU Address Bus            |
| 28      | A7     | IBF     | CPU Address Bus            |
| 29      | A6     | IBF     | CPU Address Bus            |
| 30      | A5     | IBF     | CPU Address Bus            |
| 31      | A4     | IBF     | CPU Address Bus            |
| 32      | A3     | IBF     | CPU Address Bus            |
| 33      | A2     | IBF     | CPU Address Bus            |
| 34      | A1     | IBF     | CPU Address Bus            |
| 35      | A0     | IBF     | CPU Address Bus            |
| 36      | XROMCS | OBF     | RAM Chip Select Signal     |
| 37      | XRAMCS | OBF     | RAM0 Chip Select Signal    |
| 38      | XRAMS  | OBF     | RAM1 Chip Select Signal    |
| 39      | CLK12M | IBFS    | Fundamental Clock          |
| 40      | GND    | —       | GROUND                     |
| 41      | XRESET | —       | Reset Signal               |
| 42      | B7     | IBF     | Data of A/D Converted      |
| 43      | B6     | IBF     | Data of A/D Converted      |
| 44      | B5     | IOBFXO  | Data of A/D Converted      |
| 45      | B4     | IOBFXO  | Data of A/D Converted      |
| 46      | B3     | IOBFXO  | Data of A/D Converted      |
| 47      | B2     | IOBFXO  | Data of A/D Converted      |
| 48      | B1     | IOBFXO  | Data of A/D Converted      |
| 49      | B0     | IOBFXO  | Data of A/D Converted      |
| 50      | ADCK   | IOBFC   | Clock for A/D Converter    |
| 51      | TEST   | IOBFD   | Test Pin                   |
| 52      | RAD7   | IOBF2M  | Image process RAM Data Bus |
| 53      | RAD6   | IOBF2M  | Image process RAM Data Bus |

| Pin No. | Name   | I/O BUF | Remark                                      |
|---------|--------|---------|---------------------------------------------|
| 54      | RAD5   | IOBF2M  | Image process RAM Data Bus                  |
| 55      | RAD4   | IOBF2M  | Image process RAM Data Bus                  |
| 56      | RAD3   | IOBF2M  | Image process RAM Data Bus                  |
| 57      | RAD2   | IOBF2M  | Image process RAM Data Bus                  |
| 58      | RAD1   | IOBF2M  | Image process RAM Data Bus                  |
| 59      | RAD0   | IOBF2M  | Image process RAM Data Bus                  |
| 60      | GND    | —       | GROUND                                      |
| 61      | VDD    | —       | Power Supply                                |
| 62      | XRWE   | IOBFC   | Image process RAM Read Signal               |
| 63      | XROE   | OBF2M   | Image process RAM Write Signal              |
| 64      | RA12   | OBF2M   | Image process RAM Address Bus               |
| 65      | RA11   | OBF2M   | Image process RAM Address Bus               |
| 66      | RA10   | OBF2M   | Image process RAM Address Bus               |
| 67      | RA9    | OBF2M   | Image process RAM Address Bus               |
| 68      | RA8    | OBF2M   | Image process RAM Address Bus               |
| 69      | RA7    | OBF2M   | Image process RAM Address Bus               |
| 70      | RA6    | OBF2M   | Image process RAM Address Bus               |
| 71      | RA5    | OBF2M   | Image process RAM Address Bus               |
| 72      | GND    | —       | GROUND                                      |
| 73      | RA4    | OBF2M   | Image process RAM Address Bus               |
| 74      | RA3    | OBF2M   | Image process RAM Address Bus               |
| 75      | RA2    | OBF2M   | Image process RAM Address Bus               |
| 76      | RA1    | OBF2M   | Image process RAM Address Bus               |
| 77      | RA0    | OBF2M   | Image process RAM Address Bus               |
| 78      | XPHIT  | OBF6M   | Synchronous Signal of CCD                   |
| 79      | XPHIBL | OBF     | Clamp Signal                                |
| 80      | GND    | —       | GROUND                                      |
| 81      | XPHISH | OBF6M   | Sample Hold Signal                          |
| 82      | XPHIR  | OBF6M   | CCD out put Charge Reset Signal             |
| 83      | PHIA   | OBF6M   | CCD Data Transmission Clock o1              |
| 84      | PHIB   | OBF6M   | CCD Data Transmission Clock o2              |
| 85      | XGTW   | OBF2M   | Video Signal Peak Detection Area Signal     |
| 86      | HTEN   | OBF2M   | Binary Halftone Select Signal               |
| 87      | XPGST  | OBF2M   | Automatic Contrast Peak Hold Initialization |
| 88      | RTCIO  | OBF2M   | Select of Input/Output for RTC-iC           |
| 89      | RTCCE  | TOBF2M  | RTC-IC Chip Select Signal                   |
| 90      | AUTO   | OBF18M  | LED ON/OFF Control Signal                   |
| 91      | GND    | —       | GROUND                                      |
| 92      | RTCK   | OBF2M   | Transmission Clock for RTC-IC               |
| 93      | RTCDT  | IOBF2M  | Data of RTC-IC                              |
| 94      | XSEN4  | IOBFXI  | Key Sense Signal                            |
| 95      | XSEN3  | IOBFXI  | Key Sense Signal                            |
| 96      | XSEN2  | IOBFXI  | Key Sense Signal                            |
| 97      | MAN    | OBF18M  | LED ON/OFF Control Signal                   |
| 98      | XSEN1  | IOBFXI  | Key Sense Signal                            |
| 99      | XSEN0  | IOBFXI  | Key Sense Signal                            |
| 100     | VDD    | —       | Power Supply                                |
| 101     | GND    | —       | GROUND                                      |
| 102     | LD7    | IOBF    | Data Bus for LCD Driver                     |
| 103     | LD6    | IOBF    | Data Bus for LCD Driver                     |
| 104     | AM     | OBF18M  | LED ON/OFF Control Signal                   |
| 105     | LD5    | IOBF    | Data Bus for LCD Driver                     |
| 106     | LD4    | IOBF    | Data Bus for LCD Driver                     |
| 107     | RS     | IOBF    | Register Select for LCD Driver              |
| 108     | RW     | IOBF    | R/W Select for LCD Driver                   |

| Pin No. | Name    | I/O BUF | Remark                                 |
|---------|---------|---------|----------------------------------------|
| 109     | E       | IOBF    | Enable for LCD Driver                  |
| 110     | XTPB    | IOBFXI  | Step Motor Excitement Pulse            |
| 111     | XTPA    | IOBFXI  | Step Motor Excitement Pulse            |
| 112     | TPB     | IOBFXI  | Step Motor Excitement Pulse            |
| 113     | TPA     | IOBFXI  | Step Motor Excitement Pulse            |
| 114     | XRPB    | IOBF    | Step Motor Excitement Pulse (Reserved) |
| 115     | XRPA    | TOBF    | Step Motor Excitement Pulse (Reserved) |
| 116     | RPB     | TOBF    | Step Motor Excitement Pulse (Reserved) |
| 117     | RPA     | TOBF    | Step Motor Excitement Pulse (Reserved) |
| 118     | CUTS    | IOBFU   | Sense of Cutter Sensor                 |
| 119     | CUTC    | TOBFR   | Cutter Motor Control                   |
| 120     | GND     | —       | GROUND                                 |
| 121     | ADRSL   | IBF     | Select of IO Mapping Type              |
| 122     | PLGON   | TOBF    | Plunger Control                        |
| 123     | LEDON   | TOBF    | LED Array ON/OFF Control               |
| 124     | XSTRB4  | OBFR    | Thermal HEAD Strobe Signal             |
| 125     | XSTRB3  | OBFR    | Thermal HEAD Strobe Signal             |
| 126     | XSTRB2  | OBFR    | Thermal HEAD Strobe Signal             |
| 127     | XSTRB1  | OBFR    | Thermal HEAD Strobe Signal             |
| 128     | PCLK    | OBFR    | Thermal HEAD Transfer Clock            |
| 129     | PDATA   | OBFR    | Thermal HEAD Data Signal               |
| 130     | LATCH   | OBF     | Thermal HEAD Latch Signal              |
| 131     | THDT    | IBFU    | Thermistor Data Signal                 |
| 132     | STC     | OBFR    | Thermistor Data Conversion Signal      |
| 133     | PON     | TOBFR   | Power Supply of Thermal Head Control   |
| 134     | XMDMRST | OBFR    | Modem Reset Signal                     |
| 135     | SDT     | IOBFUXO | Secondary Dial Tone Detect Signal      |
| 136     | MTOUT   | IOBFUXO | Input Port (reserved)                  |
| 137     | DPON    | IOBF18M | Dial Pulse Control Signal              |
| 138     | XDRSNS  | IOBFUXO | Door Sensor Detect Signal              |
| 139     | XPSNS   | IOBFUXO | Paper Sensor Detect Signal             |
| 140     | VDD     | —       | Power Supply                           |
| 141     | GND     | —       | GROUND                                 |
| 142     | XORGSNS | IOBFUXO | Document Sensor Detect Signal          |
| 143     | XFRSNS  | IOBFUXO | Front Sensor Detect Signal             |
| 144     | XRHS    | IOBFUXO | Hook Detect Signal of Handset          |
| 145     | XCI     | IOBFUXO | CI Detect Signal                       |
| 146     | XHS2    | IOBFUXO | Polarity Reversion Detect Signal 2     |
| 147     | XHS1    | IOBFUXO | Polarity Reversion Detect Signal 1     |
| 148     | MPXA    | TOBFR   | MPXA Control Signal                    |
| 149     | MPXB    | TOBFR   | MPXB Control Signal                    |
| 150     | MPXC    | TOBFR   | MPXC Control Signal                    |
| 151     | CML     | TOBFR   | CML Relay Control Signal               |
| 152     | RCVMUTE | TOBFR   | Receiver Mute                          |
| 153     | SPMUTE  | TOBFR   | Speaker Mute Control Signal            |
| 154     | XEXHS2  | IBFU    | Input Port (reserved)                  |
| 155     | XEXHS1  | IBFU    | Input Port (reserved)                  |
| 156     | DTMF    | IOBFUXO | Input Port (reserved)                  |
| 157     | BZ      | OBFR    | Buzzer Clock Output                    |
| 158     | LMMUTE  | TOBFR   | Line Monitor Mute                      |
| 159     | XEXIO   | OBF     | Extra IO Device Select Signal          |
| 160     | XMDMS   | OBF     | MODEM Select Signal                    |

IBF : Input buffer  
 IBFD : Input buffer with pull-down  
 IBFU : Input buffer with pull-up  
 IBFS : Input buffer with summit level  
 OBF : Output buffer  
 OBF2M : Output buffer (2mA)  
 OBF6M : Output buffer (6mA)  
 OBFR : Output buffer with through rate control  
 IOBFUXI : I/O buffer (test input)  
 TOBF : Tri-state output buffer  
 TOBF2M : Tri-state output buffer (2mA)  
 TOBF18M : Tri-state output buffer (18mA)  
 TOBFR : Tri-state output buffer with through rate control  
 IOBF : I/O buffer  
 IOBF2M : I/O buffer (2mA)  
 IOBFC : I/O buffer (CMOS I/O)  
 IOBFXO : I/O buffer (test output)

## (2) Panel control block

The following controls are performed through G.A. according to commands from the main CPU.

- Operation panel key scanning
- Operation panel LCD display

## (3) Mechanism/recording control block

- Recording control block diagram (1)

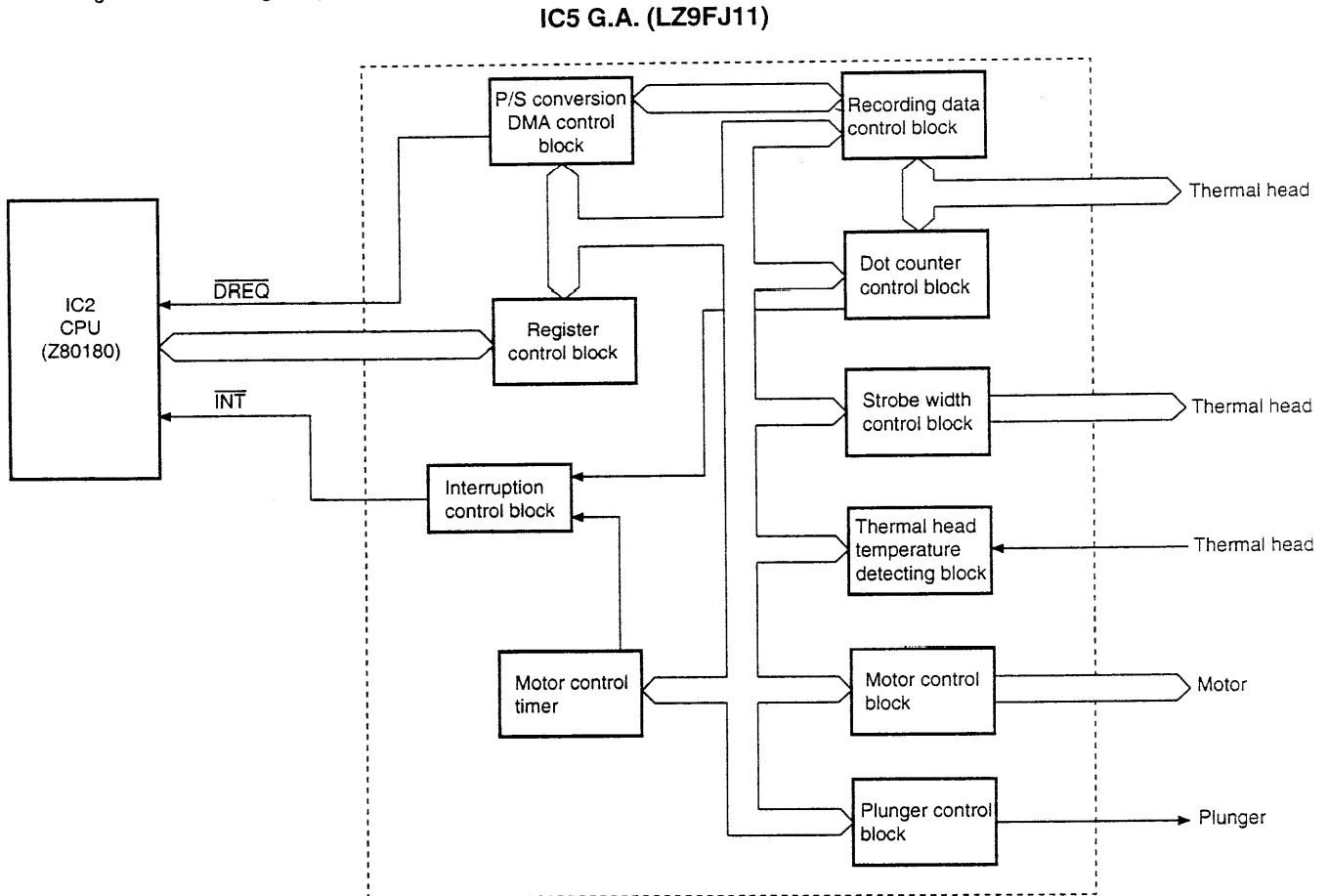


Fig. 4

The recording control block is composed as shown above. The descriptions are given below:

- P/S conversion block, DMA control block, recording data control block

The recording data is transferred to the thermal head by these blocks. First, the G.A. sends  $\overline{DREQ}$  to the CPU. The CPU transfers the recording data to the P/S conversion block by means of DMA. The transferred data is converted into serial data and sent through the recording data control block to the thermal head together with a clock.

- Strobe width control block

This block controls strobe width which determines the printing density of recording by the thermal head. Parameters of printing frequency and temperature are inputted to the CPU to set an appropriate strobe width according to an algorithm. The printing density is maintained at a constant level in this manner.

- Dot counter control block

This block counts the number of black dots in the transferred printing data for correction of printing density.

- Motor control block

This block supplies phase output for control of the TX and RX motors. With register setting, it controls phase switching timing of the motor.

- Thermal head temperature detecting block

This block converts the thermal head thermistor value into a digital value by conversion of voltage pulse width for correction of printing density. (Fig.5)

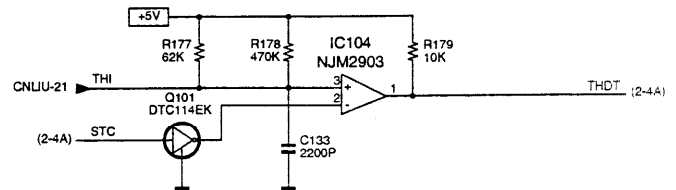


Fig. 5

This signal is to monitor the data of the thermistor (inside the thermalhead) to protect the thermalhead.

#### (4) Image signal processing block

The image signal processing block is composed of the following:

- ① CCD sensor drive block (LZ9FJ11 (IC5)).
- ② A/D converter block (TLS1019 (IC3)).
- ③ Binary coding processing block
  - LZ9FJ11
  - W2465S-70LL (IC7)

Descriptions on each block are given below:

##### 1) CCD drive block

The clock necessary for CCD drive is generated in LZ9FJ11.

- $\phi 1$  (Transmission clock)
- $\phi 2 (= \overline{\phi 1})$  (Transmission clock)
- $\phi R$  (Output buffer reset clock)
- $\phi T$  (Line synchronizing signal)

##### 2) A/D Converter

A 6-bit, high-speed A/D converter TLS1019 (IC3: 30-pin SSOP) is used to supply A/D-converted digital video signals to the binary coding processing block according to the clock signal from LZ9FJ11.

##### 3) Binary coding processing block

Digital video signals inputted in 6-bit accuracy by gate array LZ9FJ11 (IC5) which incorporates various algorithms required for binary coding, and RAM (IC7) which stores data necessary for processing are converted into binary data, and P/S-converted, and DMA-transmitted to the line memory of the main CPU.

The algorithms for binary coding in the processing block are as follows:

- Shading correction
- OR process (in the standard mode)
- Focus correction
- Auto contrast process
- Intermediate halftone expression process

#### (5) Modem (R96SHF) block

##### INTRODUCTION

The Rockwell R96SHF MONOFAX modem is a synchronous 9600 bits per second (bps) half-duplex modem with error detection and DTMF reception. It has low power consumption and requires only a single +5V DC power supply. The modem is housed in a single VLSI device package.

The modem can operate over the public switched telephone network (PSTN) through line terminations provided by a data access arrangement (DAA).

The R96SHF is designed for use in Group 3 facsimile machines. The modem satisfies the requirements specified in CCITT recommendations V.29, V.27 ter, V.21 Channel 2 and T.4, and meets the binary signaling requirements of T.30.

The modem can operate at 9600, 7200, 4800, 2400, or 300 bps, and also includes the V.27 ter short training sequence option.

The modem can also perform HDLC framing according to T.30 at 9600, 7200, 4800, 2400, or 300 bps.

The modem features a programmable DTMF receiver and three programmable tone detectors which operate concurrently with the V.21 channel 2 receiver.

The voice mode allows the host computer to efficiently transmit and receive audio signals and messages.

The modem is available in either a 100-pin plastic quad flat pack (PQFP) or a 64-pin quad in-line package (QUIP).

General purpose input/output (GPIO) pins are available for host assignment in the 100-pin PQFP.

The modem's small size, single voltage supply, and low power consumption allow the design of compact system enclosures for use in both office and home environments.

MONOFAX is a registered trademark of Rockwell International.

#### FEATURES

- Group 3 facsimile transmission/reception
  - CCITT V.29, V.27 ter, T.30, V.21 Channel 2, T.4
  - HDLC Framing at all speeds
- V.27 ter short train
- Concurrent DTMF, FSK, and tone reception
- Voice mode transmission/reception
- Half-duplex (2-wire)
- Programmable maximum transmit level:
  - 0 dBm to -15 dBm
- Programmable transmit analog attenuation:
  - 0 dB to 14 dB in 2 dB steps
- Receive dynamic range: 0 dBm to -43 dBm
- Programmable dual tone generation
- Programmable tone detection
- Programmable turn-on and turn-off thresholds
- Programmable interface memory interrupt
- Diagnostic capability
  - Allows telephone line quality monitoring
- Equalization
  - Automatic adaptive equalizer
  - Fixed digital compromise equalizer
- DTE interface: two alternate ports
  - Selectable microprocessor bus (6500 or 8085)
  - CCITT V.24 (EIA-232-D compatible) interface
- TTL and CMOS compatible
- Low power consumption: 275 mW (typical)
- Single Package
  - 100-pin PQFP
  - 64-pin QUIP
- Single +5VDC power supply
- Software compatible with R96MFX, R96EFX, R96DFX, and R96VFX modems



**R96SHF (IC1) Hardware Interface Signals****Pin Signals – 100-Pin PQFP**

| Pin No. | Signal Name | I/O Type |
|---------|-------------|----------|
| 1       | GP03        | IA/OB    |
| 2       | GP04        | IA/OB    |
| 3       | GP05        | IA/OB    |
| 4       | GP06        | IA/OB    |
| 5       | GP07        | IA/OB    |
| 6       | 0VD2        | GND      |
| 7       | 0VD2        | GND      |
| 8       | D7          | IA/OB    |
| 9       | D6          | IA/OB    |
| 10      | D5          | IA/OB    |
| 11      | D4          | IA/OB    |
| 12      | D3          | IA/OB    |
| 13      | D2          | IA/OB    |
| 14      | D1          | IA/OB    |
| 15      | D0          | IA/OB    |
| 16      | 0VD2        | GND      |
| 17      | 0VA         | GND      |
| 18      | RAMPIN      | R        |
| 19      | NC          |          |
| 20      | NC          |          |
| 21      | 0VA         | GND      |
| 22      | +5VD2       | PWR      |
| 23      | 0VD1        | GND      |
| 24      | SWGAINI     | R        |
| 25      | ECLKIN1     | R        |
| 26      | SYNCIN1     | R        |
| 27      | NC          |          |
| 28      | NC          |          |
| 29      | NC          |          |
| 30      | 0VA         | GND      |
| 31      | NC          |          |
| 32      | NC          |          |
| 33      | NC          |          |
| 34      | DAIN        | R        |
| 35      | ADOUT       | R        |
| 36      | BYPASS      | IC       |
| 37      | RCVI        | R        |
| 38      | TXLOSS3     | IC       |
| 39      | TXLOSS2     | IC       |
| 40      | TXLOSS1     | IC       |
| 41      | NC          |          |
| 42      | NC          |          |
| 43      | 0VA         | GND      |
| 44      | TXOUT       | AA       |
| 45      | RXIN        | AB       |
| 46      | +5VA        | PWR      |
| 47      | 0VA         | GND      |
| 48      | AGD         | R        |
| 49      | AOUT        | R        |
| 50      | 0VD1        | GND      |
| 51      | NC          |          |
| 52      | IRQ         | OC       |
| 53      | WRITE-RW    | IA       |
| 54      | CS          | IA       |
| 55      | READ-φ2     | IA       |
| 56      | RS4         | IA       |
| 57      | RS3         | IA       |
| 58      | RS2         | IA       |
| 59      | RS1         | IA       |

| Pin No. | Signal Name | I/O Type |
|---------|-------------|----------|
| 60      | RS0         | IA       |
| 61      | GP13        | IA/OB    |
| 62      | NC          |          |
| 63      | GP11        | IA/OB    |
| 64      | RTS         | IA       |
| 65      | EN85        | R        |
| 66      | 0VD2        | GND      |
| 67      | POR1        | ID       |
| 68      | XTLI        | R        |
| 69      | XTLO        | R        |
| 70      | XCLK        | OD       |
| 71      | YCLK        | OD       |
| 72      | +5VD1       | PWR      |
| 73      | DCLKI       | R        |
| 74      | SYNCIN2     | R        |
| 75      | GP16        | IA/OB    |
| 76      | GP17        | IA/OB    |
| 77      | 0VD2        | GND      |
| 78      | CTS         | OA       |
| 79      | TXD         | IA       |
| 80      | 0VD2        | GND      |
| 81      | 0VD2        | GND      |
| 82      | DCLK        | OA       |
| 83      | EYESYNC     | OA       |
| 84      | EYECLKX     | OA       |
| 85      | EYECLK      | OA       |
| 86      | EYEX        | OA       |
| 87      | ADIN        | R        |
| 88      | DAOUT       | R        |
| 89      | 0VD2        | GND      |
| 90      | EYEX        | OA       |
| 91      | GP21        | IA/OB    |
| 92      | 0VD2        | GND      |
| 93      | GP20        | IA/OB    |
| 94      | GP19        | IA/OB    |
| 95      | RXD         | OA       |
| 96      | RLSD        | OA       |
| 97      | 0VD2        | GND      |
| 98      | RCVO        | R        |
| 99      | SWGAINO     | R        |
| 100     | GP02        | IA/OB    |

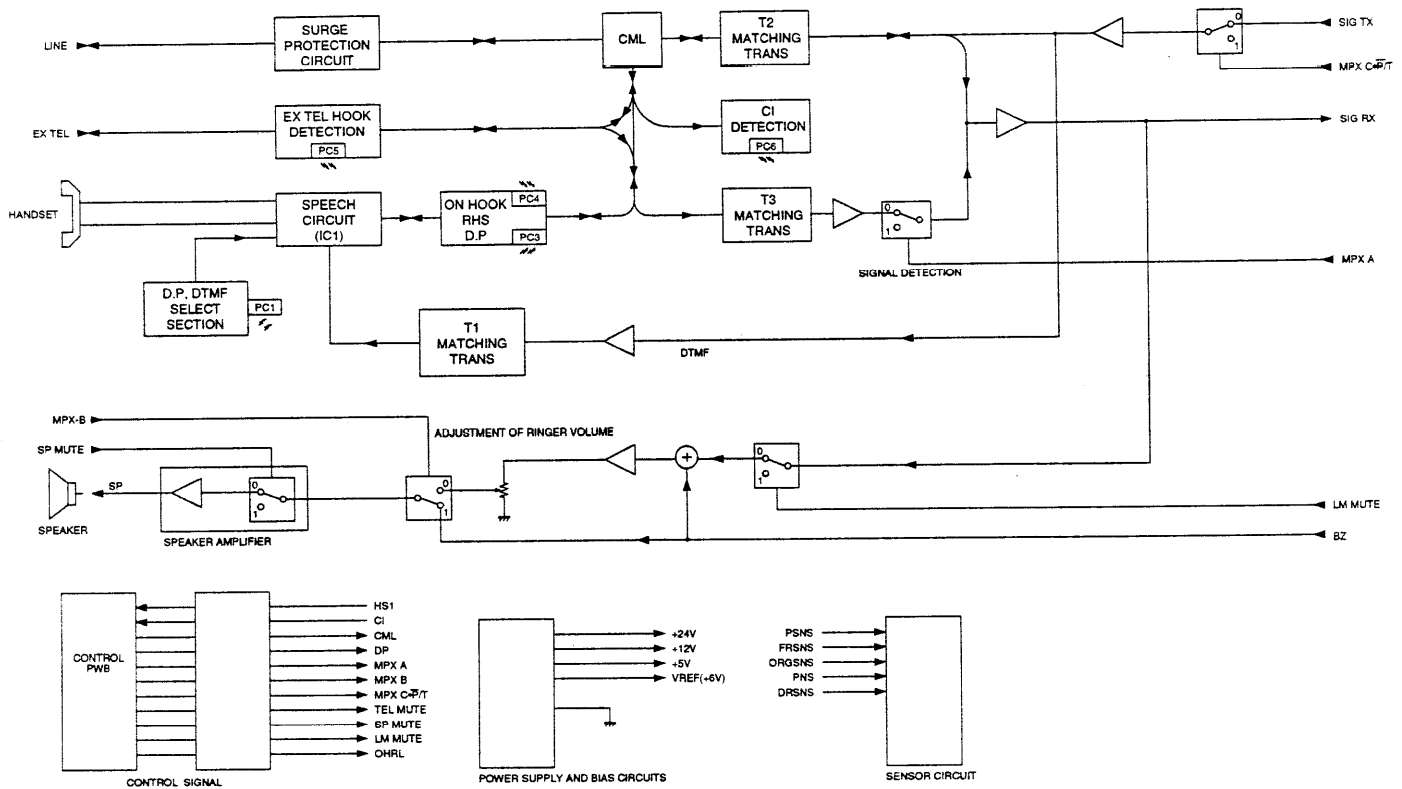
**Notes:**

1. NC = No connection; leave pin disconnected (open).
2. I/O Type: Digital signals: see Table 9;  
Analog signals: see Table 10.
3. R = Required modern inter-connection; no connection to host equipment.

### [3] Circuit description of TEL/LIU PWB

#### (1) TEL/LIU block operational description

##### 1) Block diagram



#### 2) Circuit description

The TEL/LIU PWB is composed of the following 15 blocks.

1. Surge protection circuit
2. On-hook status detection circuit
3. Dial pulse generation circuit
4. CML relay
5. CI detection
6. Control signal
7. Speaker amplifier
8. Adjustment of ringer volume
9. Speech circuit
10. Signal detection
11. Sensor circuit
12. Matching transformer (T2)
13. DTMF Pseudo-ringer
14. Power supply and bias circuits
15. Signal selection

### 3) Block description

#### 1. Surge protection circuit

This circuit protects the circuits from the surge voltage occurring on the telephone line.

- The AR1 protects the circuits from the 400V or higher line surge voltages.
- The VA2 and VA3 protect the circuits from the 470V or higher vertical surge voltages.
- The ZD2 and ZD3 control the voltages generated on the secondary side of matching transformer to 3V.

#### 2. Hook status detection circuit

The hook status detection circuit detects the Status of hook switch (RHS) of Built-in telephone, and the status of hook of telephone externally connected.

- The status of on-hook switch (RHS) is determined from the logical level of  $\overline{RHS}$  signal.

$\overline{RHS}$  LOW: ON HOOK

$\overline{RHS}$  HIGH: OFF HOOK

- External telephone hook status detection circuit ( $\overline{HS1}$ )

This circuit comprises the photo-coupler PC1, resistors R53 and R60, Zener diodes ZD6 and ZD7.

When an external telephone is connected and enters the on-hook mode, the LED of photo-coupler PC1 emits light and the light receiving element turns on. The status signal  $\overline{HS1}$  is input to the pin 147 of gate array (IC5: control PWB).

$\overline{HS1}$  LOW: EXT. TEL OFF HOOK

$\overline{HS1}$  HIGH: EXT. TEL ON HOOK

#### 3. Dial pulse generation circuit

The pulse dial generation circuit comprises the photo-coupler PC2, polarity guard REC1, and resistor R61.

The photo-coupler PC2 shunts the line current using the DP signal before transmitting the dial signal, then turns off the CML relay.

After the pulse dial signal is transmitted by turning on/off the DP signal, the CML relay is turned on again.

#### 4. CML relay

The CML relay switches over connection to the matching transformer T1 while the FAX or built-in telephone is being used.

#### 5. CI detection

The CI detection circuit detects the CI signals of 15.3 Hz to 68 Hz. A CI signal, which is provided to the photocoupler PC3 through the C51 (0.82  $\mu$ F), R54 (22 K), and ZD11 when the ring signal is inputted from the telephone line, is filtered by the R47 and C45, and then transmitted to the control PWB through the IC4 (ULN2003).

#### 6. Control signal

- SPMUTE which controls the speaker amplifier IC mute is directly connected to the CPU output port.
- DP which controls the dial pulse is connected through IC4 to the gate array output port.
- TELMUTE which controls speech IC (IC1) mute is connected through IC4 to the gate array output port.
- OHRL which controls on-hook photo coupler (PC4) is connected through IC4 to the gate array output port.
- LEDON which controls is connected through IC5 to the gate array output port.
- CML which controls the line selection relay (CML) is connected through IC5 to the gate array output port.
- VTHON which controls the thermalhead power relay (THL) is connected through IC5 to the gate array output port.

- CI which drives the CI detection photo coupler (PC6) is connected through IC6 to the gate array input port.
- $P/\overline{T}$  which judges dial pulse or DTMF signal is connected through IC5 to the gate array input port.
- HSI which detects hook of external TEL is connected through PC5 to the gate array input port.

All are controlled by the CPU.

#### 7. Speaker amplifier

The speaker amplifier monitors the line under the on-hook mode, outputs the buzzer sound generated from the gate array (IC: control PWB), ringer sound, DTMF generated from the modem, and line sound.

The buzzer volume is fixed. However, the volume of other sounds can be continuously adjusted using the volume control VR1.

#### 8. Adjustment of ringer volume

The ringer volume can be continuously adjusted using the volume control VR1.

#### 9. Speech circuit

The speech circuit is composed of transmission amplifier, reception amplifier, IC (IC1 MC34114) including side sound control and capacitors and resistors.

The speech IC (IC1) has the loop length equalizing function. The gain of the loop current is converted to AGC.

The range of loop current for AGC operation is set by R1 (43 $\Omega$  1W) and R102 (13 $\Omega$ ). It largely affects the DC characteristics of this circuit.

The microphone amplifier receives balance differential input to reduce RFI problem. The transmission gain is set by R103 (47K $\Omega$ ). The input impedance is 20K $\Omega$ .

The reception gain of the reception amplifier is set by R106. A receiver of 150 $\Omega$  ~ 200 $\Omega$  can be connected.

In addition, DTMF signals for dialing and pseudo-ringer signals generated in TEL/FAX auto selection are formed in this circuit.

The process is: Signals sent from the Modem (IC1: control PWB) are passed through the matching transformer (T1) to R105 (20K $\Omega$ ), where they are gain-controlled. Then they are inputted to IC1 pin 10, corrected and delivered to the TEL line.

At that time, the CML relay turns on the photo coupler PC4 (PC851) in the TEL side to supply power to the speech IC.

The kind of dialing (DTMF or pulse) is selected with PC1 (HIGH for pulse, LOW for DTMF)

This information is recognized by the CPU through photo coupler (PC1) and gate array (IC5: control PWB).

#### 10. Signal detection

##### 10-1. CI signal detection section

The CI signal detection section detects the CI signal (16Hz) for automatic reception.

When Ring signal is inputted from the TEL line, its DC component is removed by C49 (1.8 $\mu$ F/250V) and its AC component only is passed. Light emitting element of photo coupler (PC4) is transmitted to the light reception side. CI signal is amplified and reversed by IC6 and outputted and the CPU judges whether it is CI or not.

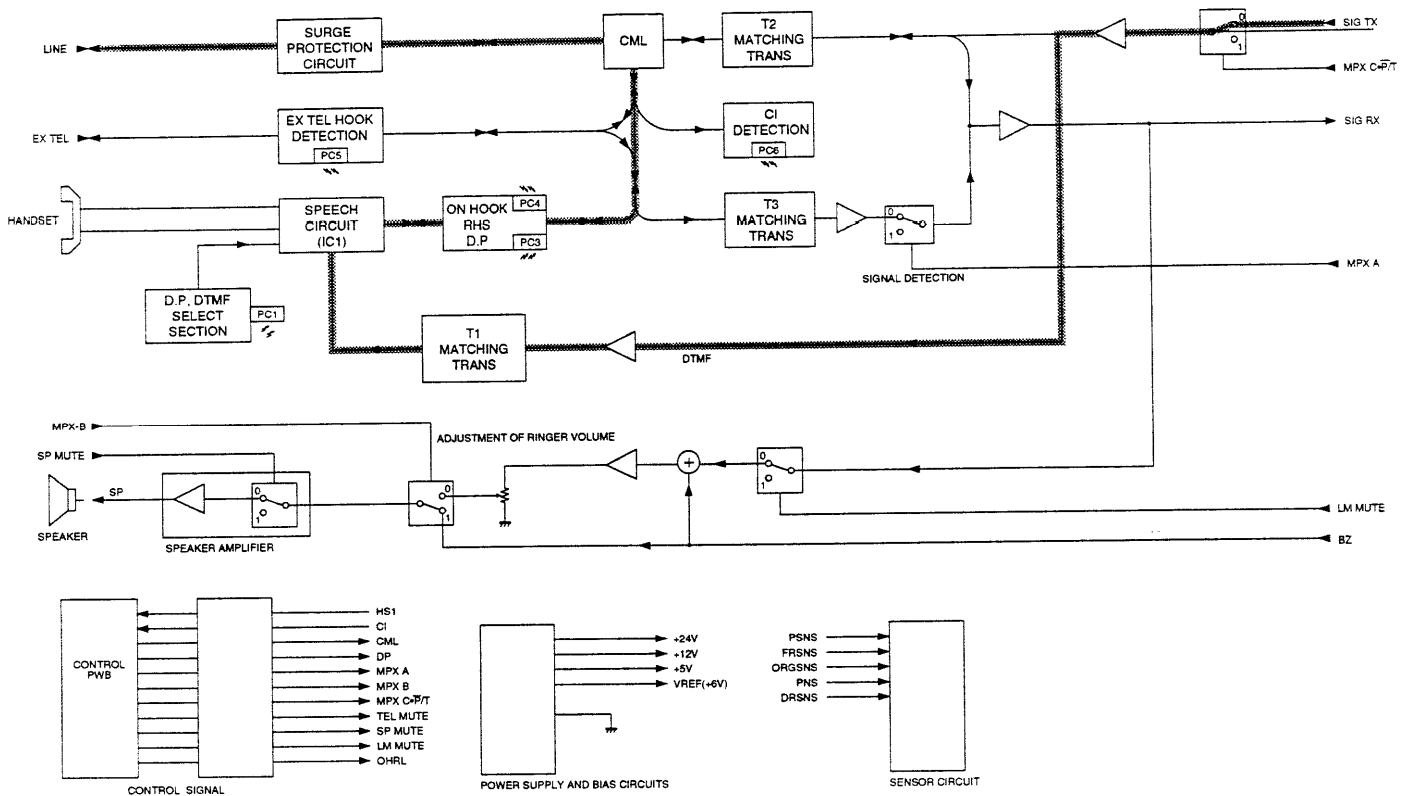
##### 10-2. External TEL hook detection circuit

This circuit is composed of photo coupler (PC5), R60, R61, C54, ZD6, and ZD7. When an external TEL is connected, its hook state is detected by the CPU with this circuit. When the external TEL is in off-hook state, LED of PC5 lights up to turn on the light receiving side, and signal amplified and reversed by IC6 (ULN2003) is inputted to gate array (IC5: control PWB) pin 147.

##### 10-3. Remote signal (DTMF)

External TEL switches to automatic reception mode (5,  $\times$ ,  $\times$ ).

The remote signal is detected through the following route by the mode.



#### 11. Sensor circuit

The recording paper sensor (PSNS) which senses the presence of recording paper uses a reflection type sensor. The original sensor (ORGSNS) which senses the presence of an original, and the front sensor (FRSNS) which senses the lead edge of an original use transmission type photointerrupters. The door sensor (DRSNS) which senses open/close of the door uses a micro-switch. The outputs are connected to the gate array input port to be sent to the CPU.

When there is no original, the actuators of the front sensor (FRSNS) and the original sensor (ORGSNS) interrupt the light path of the photointerrupter to turn off the phototransistor in the light receiving side. The detection levels become HIGH.

When there is an original, the actuators come away off from the light path to turn on the phototransistor in the light receiving side. The detection level becomes LOW.

For the recording paper sensor (PSNS), when there is recording paper, the phototransistor in the light receiving side is ON and the detection level is LOW. When there is no recording paper, the phototransistor in the light receiving side is OFF and the detection level is HIGH.

The door switch (DRSNS) is at HIGH level when the recording paper cover is open, and at a LOW level when the recording paper cover is closed.

#### 12. Matching transformer (T2)

The matching transformer performs electrical insulation from the telephone line and impedance matching for transmitting the TEL/FAX signal.

#### 13. DTMF/pseudo-ringer

The signal is formed in the Modem, amplified by IC1 (control PWB), and inputted through matching transformer T1 to the speech IC (IC1) pin 10 R105 (20K) connected to pin 10 is the input gain adjustment resistance.

The signal is then rectified by IC1 and outputted to the line.

#### 14. Power supply and bias circuits

The voltages of +24V, +12V, and +5V are supplied from the power unit through the connector CNPW. The IC2 of operational amplifier generates 6V bias voltage and supplies it to the IC3, IC6.

#### 15. Signal selection

The following signals are used to control the transmission line of TEL/FAX signal. For details, refer to the signal selector matrix table. (See page 5-14)

- TL MUTE: Controls the mute of handset voice transmission signal.
- LM MUTE: Mutes the voice reception signal while the ringer is sounding.
- SP MUTE: Controls the mute of speaker amplifier.
- MPX A: Switches over the gain of reception amplifier.  
L: Amplifier gain decreased  
H: Amplifier gain increased
- MPX B: Switches over the speaker amplifier input signal.  
H: Buzzer selected  
L: Voice reception signal or ringer selected
- MPX C: Mutes the transmission drive amplifier.  
H: Selected when the telephone is being used or when the FAX signal is being transmitted  
L: Selected when the FAX signal is being received

Signal selector matrix table

|                        |                  | CML | MPX A  | MPX B  | MPX C       | TL MUTE | SP MUTE | OHRL | LM MUTE |
|------------------------|------------------|-----|--------|--------|-------------|---------|---------|------|---------|
| Fax signal sending     |                  | 1   | 0 (X1) | 0 (Y1) | 1 (Z0)      | 1       | 1       | 0    | 0       |
| Fax signal receiving   |                  | 1   | 0 (X1) | 0 (Y1) | 0 (Z1)      | 1       | 1       | 0    | 0       |
| Off hook dial          | before and after | 0   | 0 (X1) | 1 (Y0) | 1 (Z0)      | 0       | 1       | 0    | 1       |
|                        | during DP dial   | 0   | 0 (X1) | 1 (Y0) | 0 (Z1)      | 0       | 1       | 0    | 1       |
|                        | during PB dial   | 0   | 0 (X1) | 1 (Y0) | 1 (Z0)      | 1       | 1       | 0    | 1       |
| On hook dial           | before and after | 0   | 1 (X0) | 0 (Y1) | D.P 0 (Z1)  | 1       | 0       | 1    | 0       |
|                        |                  |     |        |        | DTMF 1 (Z0) |         |         |      |         |
|                        | during DP dial   | 0   | 1 (X0) | 0 (Y1) | 0 (Z1)      | 1       | 0       | 1    | 0       |
|                        | during PB dial   | 0   | 0 (X1) | 0 (Y1) | 1 (Z0)      | 1       | 0       | 1    | 0       |
| Auto dial              | before/after     | 0   | 0 (X1) | 1 (Y0) | D.P 0 (Z1)  | 1       | 1       | 1    | 1       |
|                        |                  |     |        |        | DTMF 1 (Z0) |         |         |      |         |
|                        | 300bps check     | 1   | 0 (X1) | 1 (Y0) | 0 (Z1)      | 1       | 1       | 0    | 1       |
|                        | during DP dial   | 0   | 0 (X1) | 1 (Y0) | 0 (Z1)      | 1       | 1       | 1    | 1       |
|                        | during PB dial   | 0   | 0 (X1) | 1 (Y0) | 1 (Z0)      | 1       | 1       | 1    | 1       |
| Ringer sound           |                  | 0   | 0 (X1) | 0 (Y1) | 0 (Z1)      | 1       | 0       | 0    | 1       |
| Buzzer/Key sound       |                  | 0   | 1 (X0) | 1 (Y0) | 0 (Z1)      | 1       | 0       | 0    | 1       |
| Hold                   |                  | 1   | 0 (X1) | 0 (Y1) | 0 (Z1)      | 1       | 0       | 0    | 0       |
| Answering machine mode |                  | 0   | 1 (X0) | 1 (Y0) | 0 (Z1)      | 1       | 1       | 0    | 1       |
| Line monitor           | Sending          | 1   | 0 (X1) | 0 (Y1) | 1 (Z0)      | 1       | 0       | 0    | 0       |
|                        | Receiving        | 1   | 0 (X1) | 0 (Y1) | 0 (Z1)      | 1       | 0       | 0    | 0       |
| Stand-by               |                  | 0   | 1 (X0) | 1 (Y0) | 0 (Z1)      | 1       | 1       | 0    | 1       |
| Off hook/Key buzzer    |                  | 0   | 0 (X1) | 1 (Y0) | 1 (Z0)      | 0       | 0       | 0    | 1       |
| On hook/Key buzzer     |                  | 0   | 1 (X0) | 1 (Y0) | 0 (Z1)      | 1       | 0       | 1    | 0       |
| CNG detection          |                  | 0   | 1 (X0) | 1 (Y0) | 0 (Z1)      | 1       | 1       | 1    | 1       |
| Pseudo ringer          |                  | 0   | 0 (X1) | 0 (Y1) | 1 (Z0)      | 1       | 0       | 1    | 0       |
| CNG sending            |                  | 1   | 0 (X1) | 1 (Y0) | 1 (Z0)      | 1       | 1       | 0    | 1       |

## [4] Circuit description of power supply PWB

### 1. Block diagram

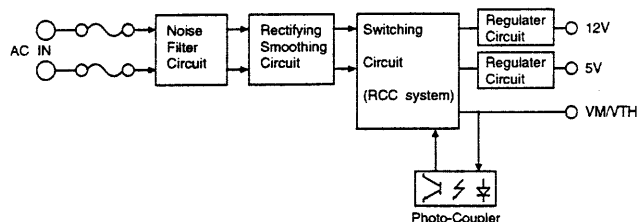


Fig. 1. Block diagram

### 2. General description

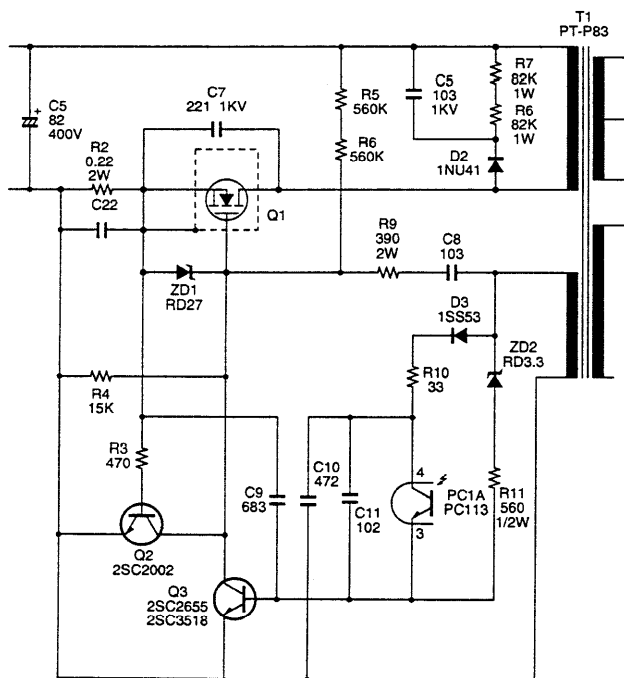
The input voltage is 187V AC - 276V AC conforming to UL standards. The outputs are +24V(VM), +5V, +12V. The overvoltage protection function for protection of the load in case of power abnormality and the overcurrent protection function for protection of the power supply itself from overload are added.

### 3. Operational description

When 230 V/AC power is supplied, it is passed through a noise filter to the rectifier section where it is smoothed to about 300V then supplied to the inverter section. The inverter section employs one-transistor ON/OFF self-excited inverter (R.C.C. system) and a stable DC voltage is supplied to the secondary side.

The operation of each section is described below:

#### 3.1. Inverter section



When the voltage across R4 reaches the gate ON voltage through R5, R6, and R4, Q1 begins to turn ON, flowing a current from pin1 of T1 primary winding to pin3. Then a voltage is generated from pin5 of auxiliary winding to pin4, turning Q1 gate ON completely. The drain current increases linearly to store energy in the primary winding. However, voltage across R3 turns ON Q2 through R9 when the drain current reaches a certain level. As a result, Q1 gate voltage falls below the threshold voltage (about 4V) of the gate and Q1 turns off. Simultaneously when Q1 turns off, the energy stored in the primary winding is induced in the secondary winding to bias the rectifier diodes D4, D5, and D6 forwardly, smoothing each output capacitor. Thus a DC voltage is obtained.

#### 3.2. Control section

##### (1) +24V (VM) control

A voltage is generated in the secondary side by repeated operations of 3.1, and the output in the secondary side is divided by R14, VR1, and R15 to be inputted to Q4. The divided voltage is adjusted to about 6.2V by VR1. Q4 always monitors the divided output voltage. When the output voltage exceeds +24V, the divided voltage also exceeds 6.2V and Q4 judges it as an increase in the output voltage. Then photocoupler PC1 is lit through R13 to turn on the transistor in the light receiving side, supplying a current to the base of Q3, turning off Q1. (The current which is to be passed through the additional line, R9, and C8 to R4 is bypassed by Q3). Resultantly, ON time of Q1 is shortened and the energy stored in the primary winding is decreased, limiting the increase in the output voltage. When the output voltage begins to decrease, the light quantity of PC1 is decreased to lengthen the ON time to Q1. As a result the energy in the primary winding is increased to compensate for the decrease in the output voltage.

The negative feedback control is repeated to stabilize the output voltage.

##### (2) +5V, +12V control

The outputs of +5V and +12V are stabilized by the three-terminal regulator ICs (IC1 and IC2). The overcurrent protection function protects the regulator ICs themselves.

#### 3.3. Overcurrent protection function

When the output current in the secondary side increases to become an overcurrent or short R2/R4 detects the drain current to turn on Q2. The gate voltage of Q1 is controlled to shorten ON time of Q1 to protect the circuit from the overcurrent.

#### 3.4. Overvoltage protection function

When the output voltage is abnormally increased and ZD3 zener voltage exceeds about 30V, ZD3 is shorted to operate the same procedure as the overcurrent protection function. To reset, turn off the AC switch, remove the cause, and replace ZD3 with a new one.

#### 3.5. High temperature protection circuit

Thermal fuse F3 included in the power circuit is blown when the surface temperature of rectifier D1 exceeds about 115 degrees Centigrade. (about 239°F)

### 3.6 Rush current limiting circuit

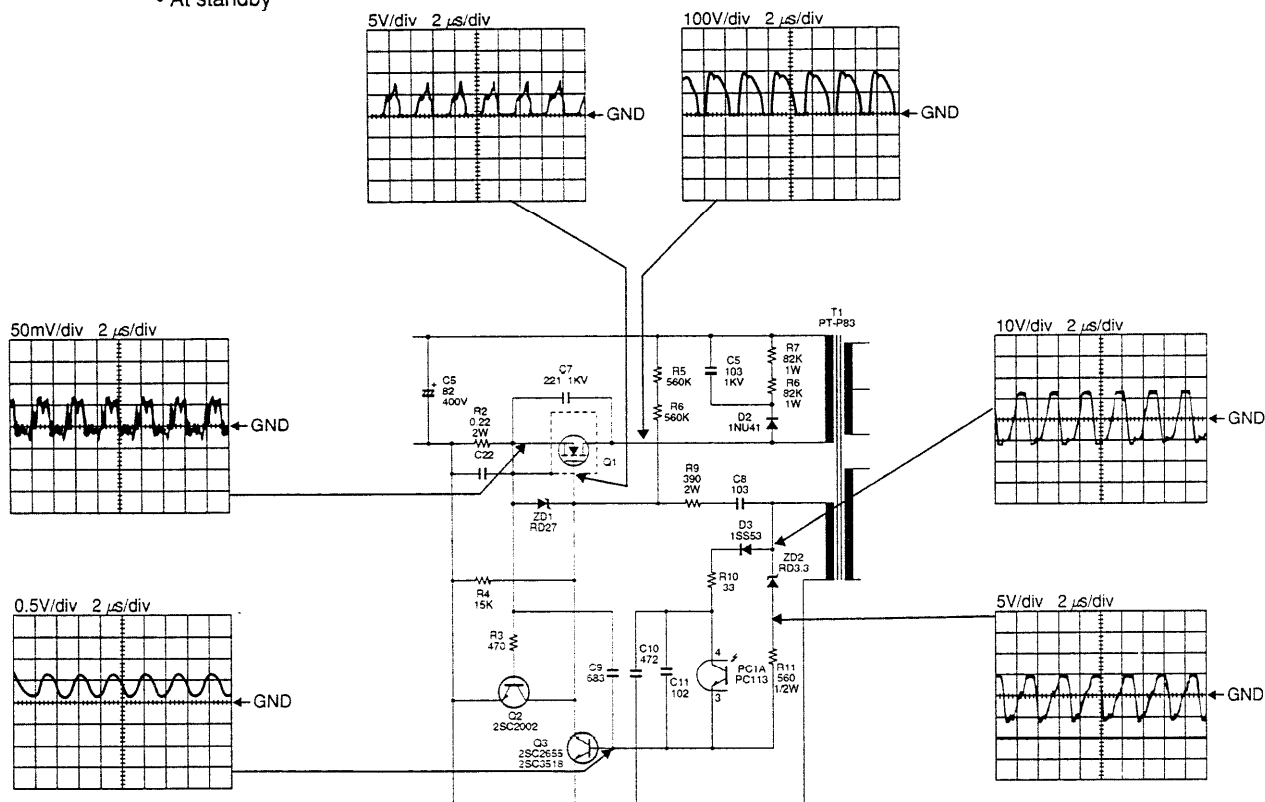
When AC power is supplied, a rush current flowing through capacitor C5 may blow fuse F1 and damage the circuit. To prevent this, the power thermistor TH1 is provided to limit the rush current.

### 3.7. Line filter

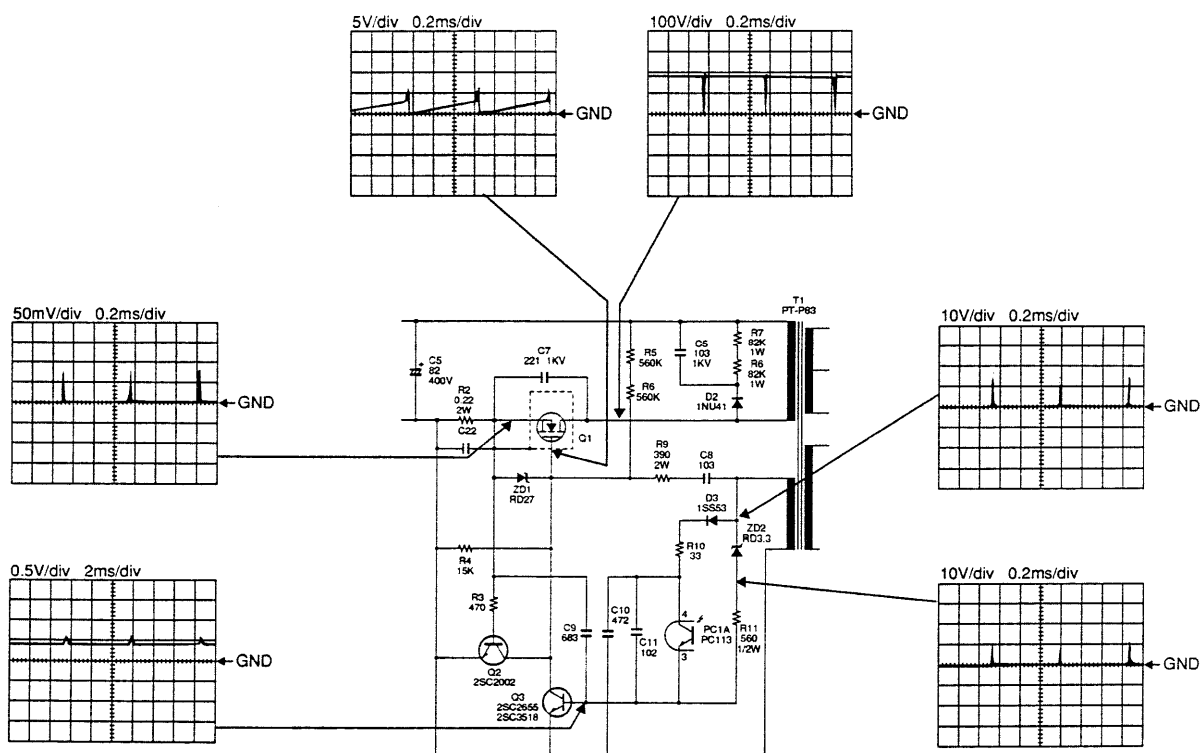
To protect against external noises and noises generated in the power circuit, the line filter is composed of L1, L2, C1, C2, C3, and C4 to reduce noises.

(Waveform)

• At standby



• When the overcurrent protection circuit works



## [5] Circuit description of CCD PWB

The CCD board picks up optical information from the document, converts it into an electrical (analog) signal and transfers it to the control board.

### (1) Block diagram

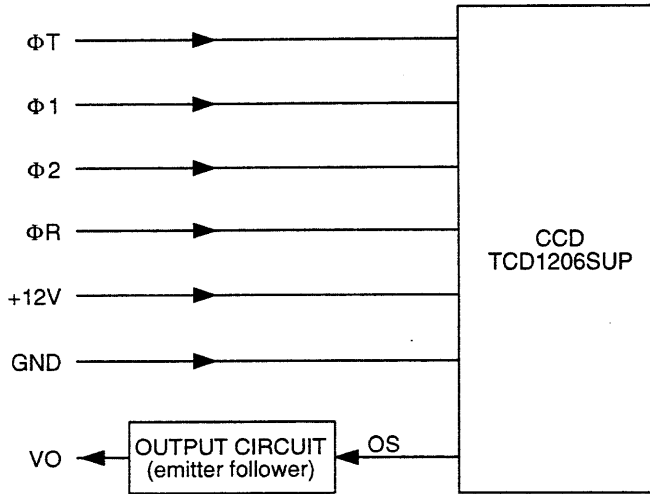


Fig. 8

### (2) Description of blocks

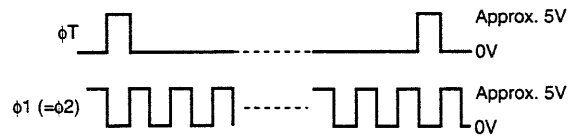
#### 1. CCD

The TCD1206SUP is a highly sensitive charged coupled image sensor that consists of 2160 picture elements.

Receiving four drive signals ( $\phi T$ ,  $\phi 2$ ,  $\phi 1$ , and  $\phi R$ ) from the control board, the transferred photoelectric analog signal OS is impedance converted, and the signal VO is supplied to the control board.

#### 2. Waveforms

##### 1. $\phi 1$ , $\phi 2$ ( $=\overline{\phi 1}$ ) signals within the control board



##### 2. OS $\phi$

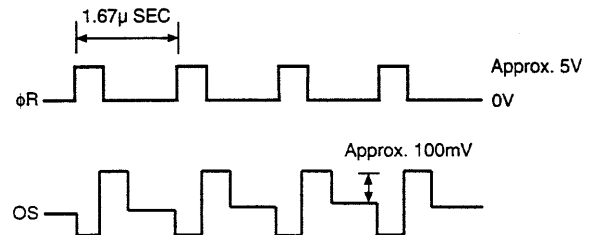
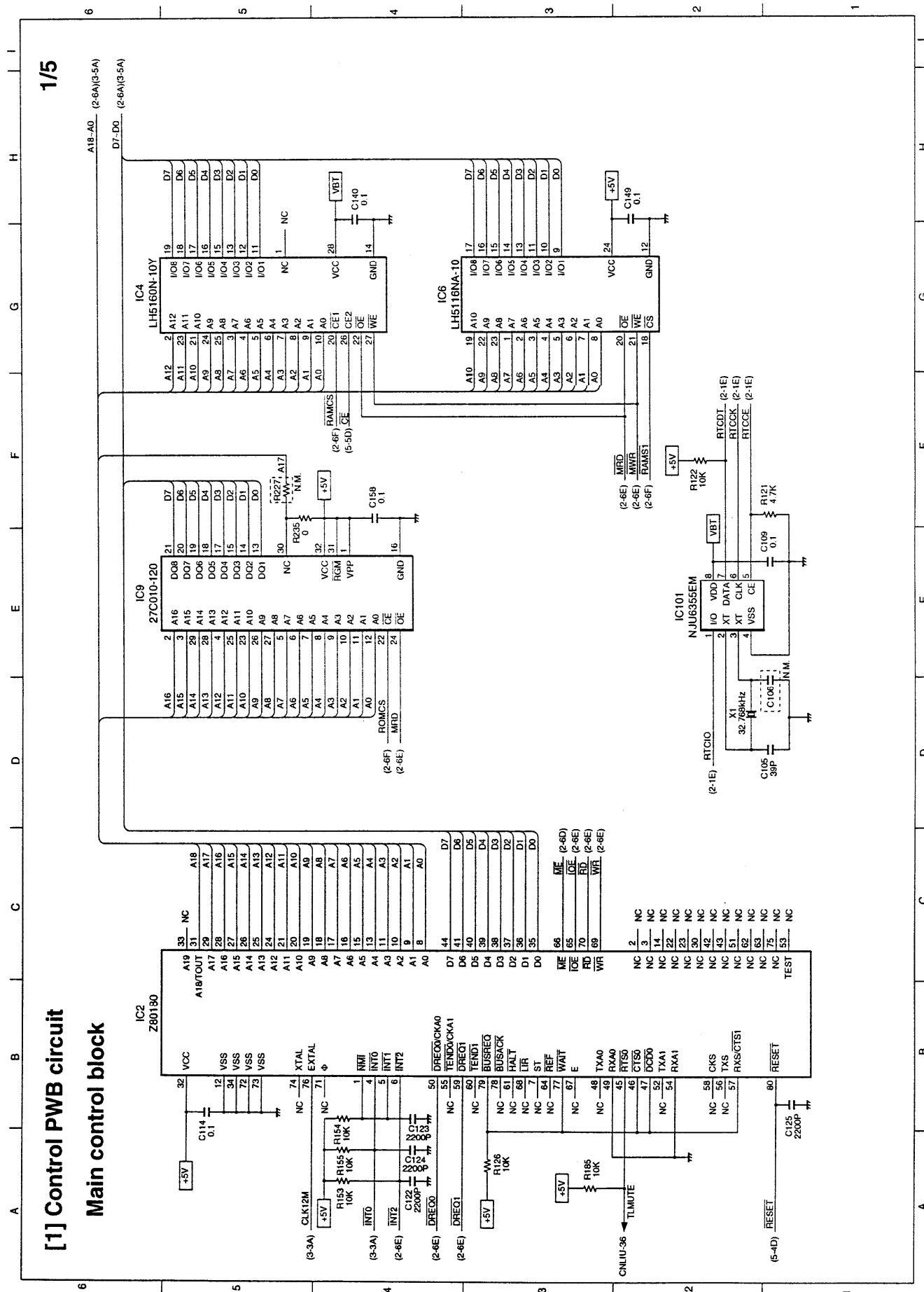


Fig. 9



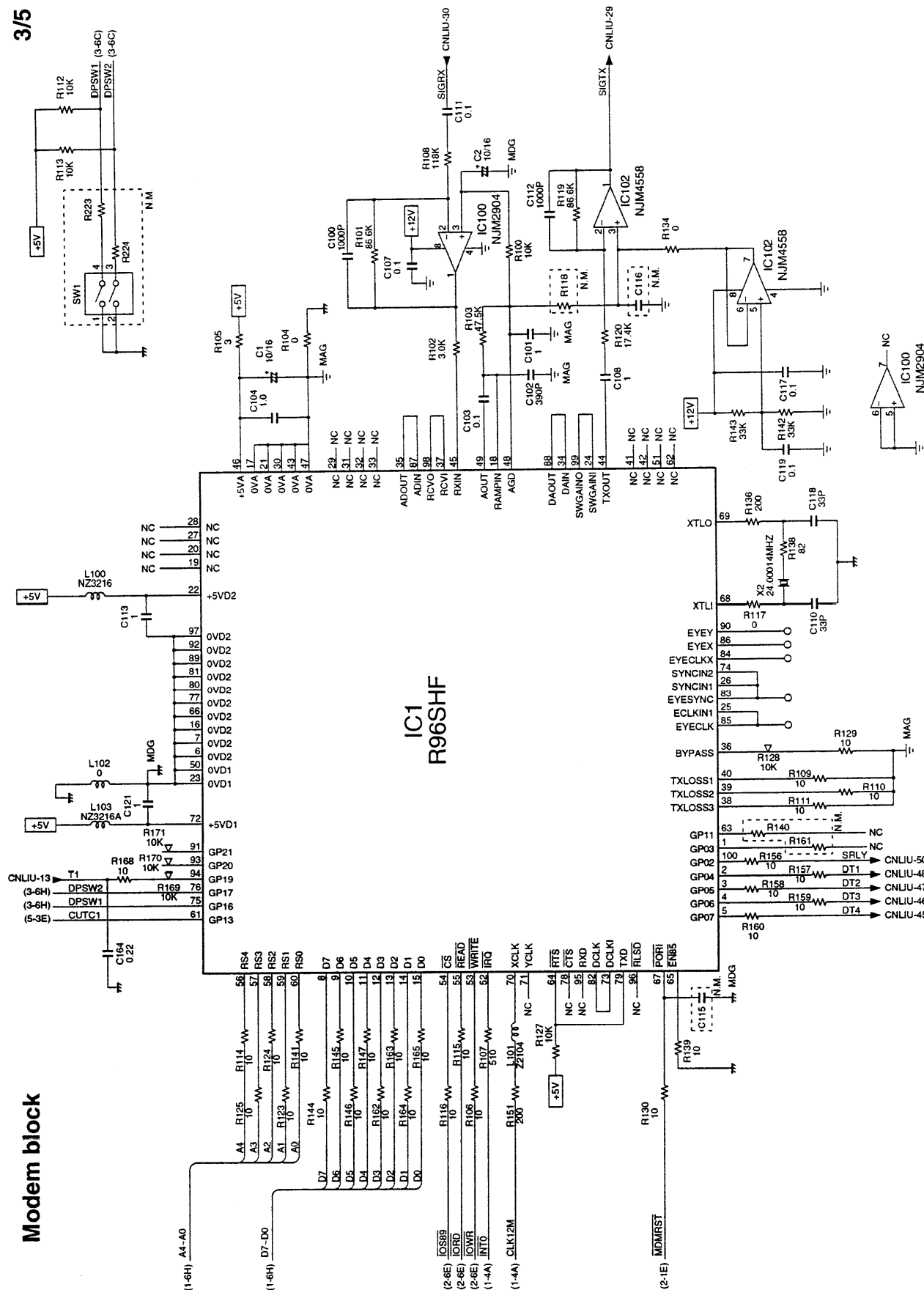
## CHAPTER 6. CIRCUIT SCHEMATICS AND PARTS LAYOUT





## Modem block

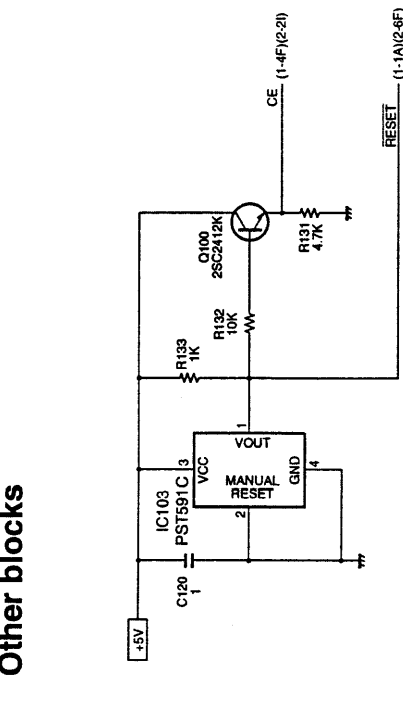
3/5



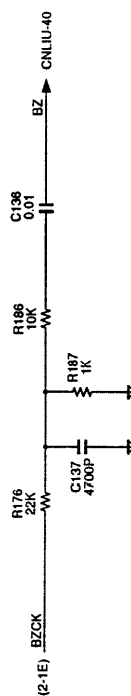


5/5

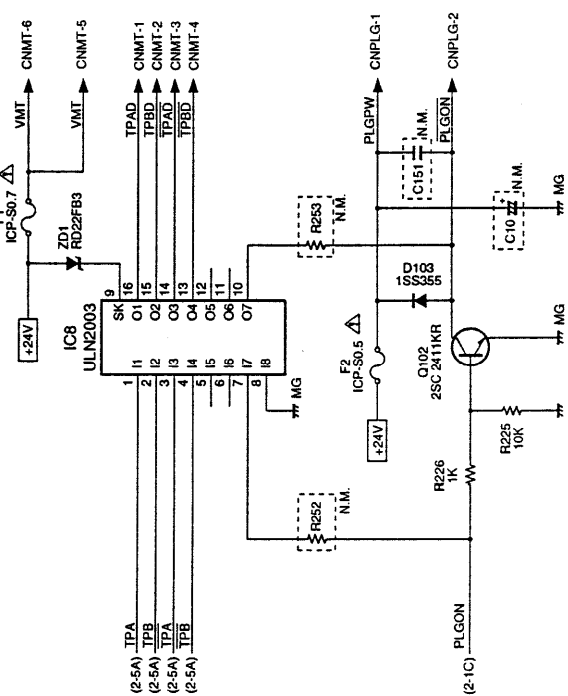
## Other blocks



## RESET BLOCK

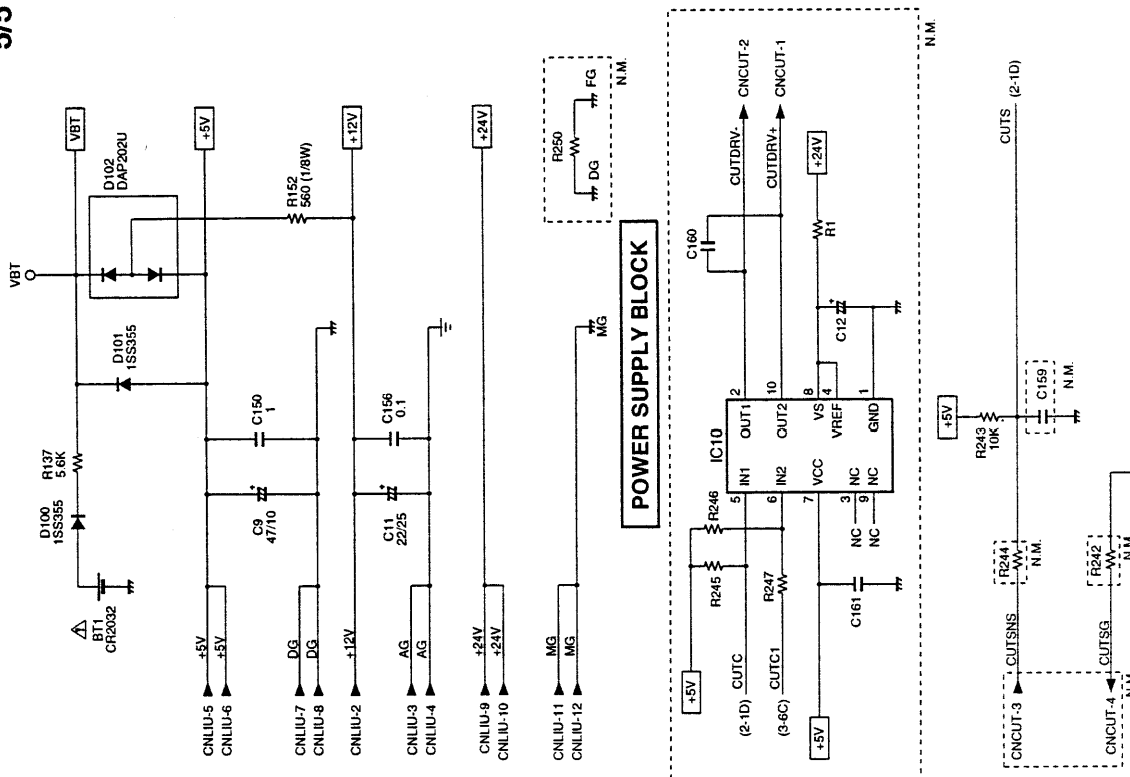


## BUZZER and MOTOR and SOLENOID BLOCK

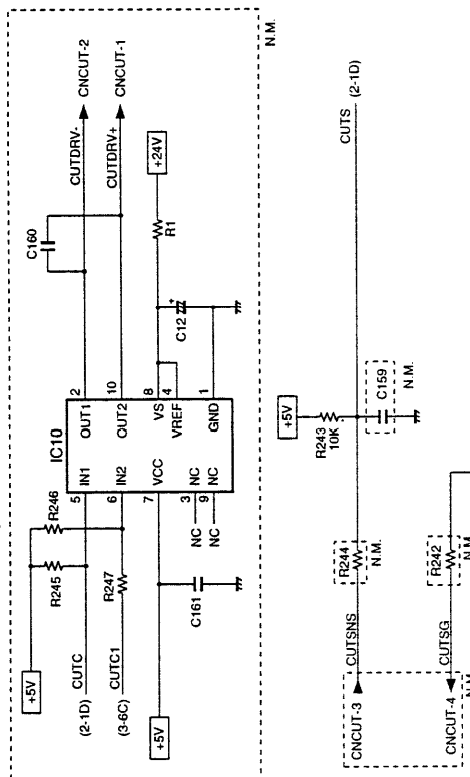


NOTE:  
 △ These marks are all safety-critical parts.

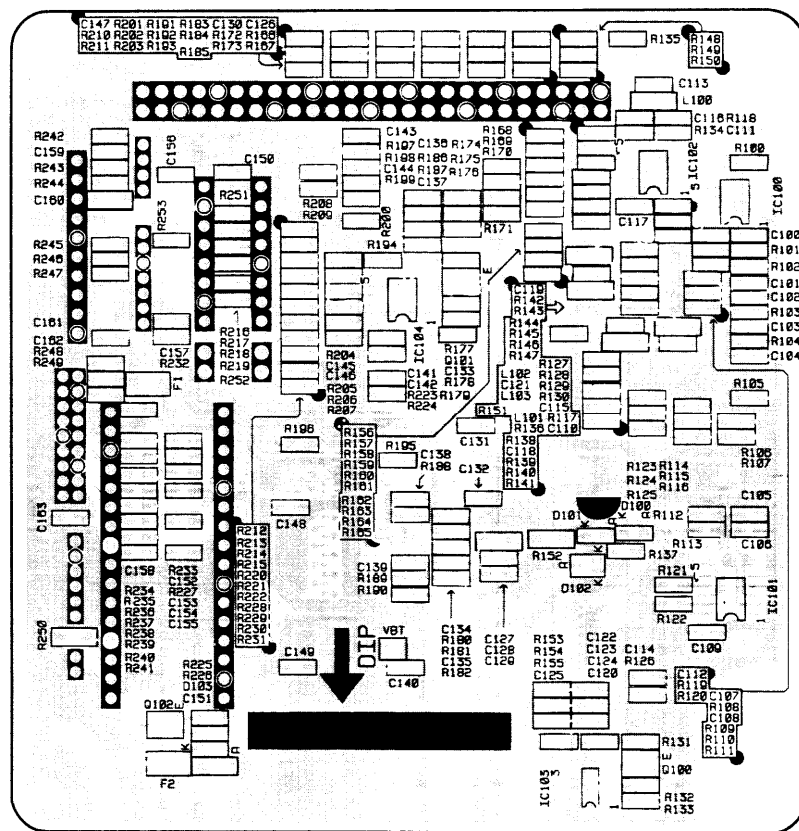
## CUTTER DRIVE BLOCK



## POWER SUPPLY BLOCK



### Control PWB parts layout (Bottom side)

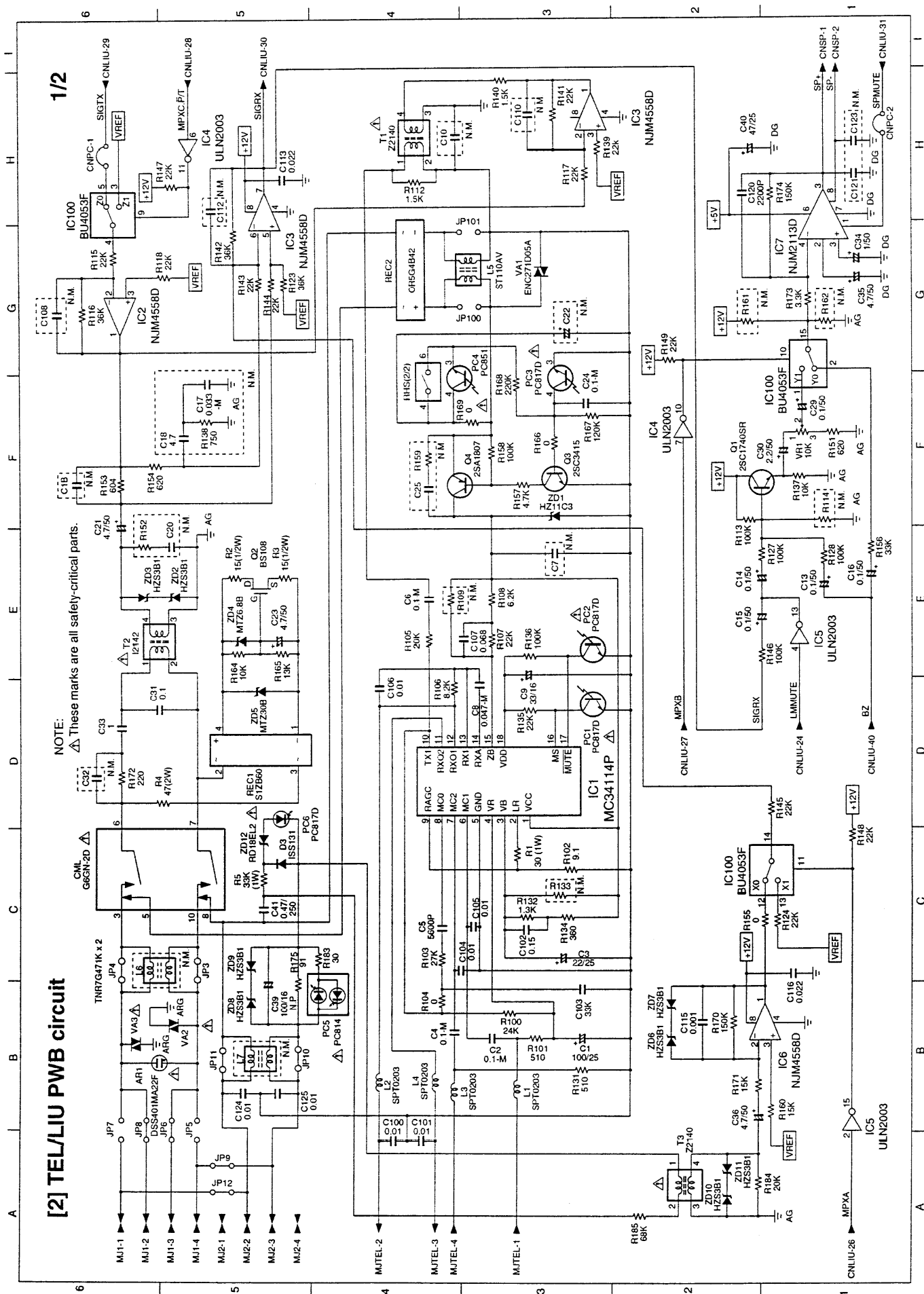


## [2] TEL/LIU PWB circuit

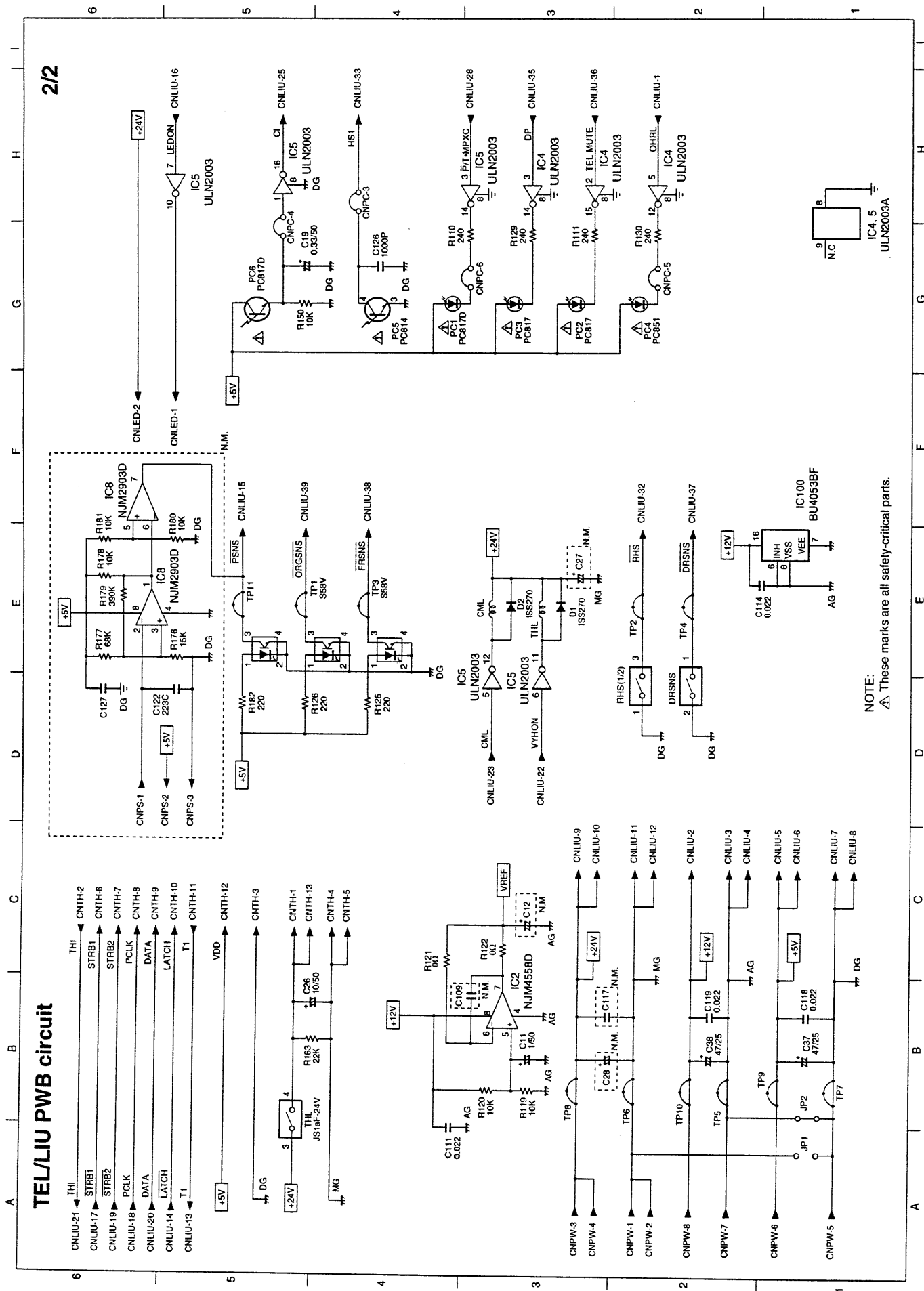
NOTE:

△ These marks are all safety-critical parts.

1/2



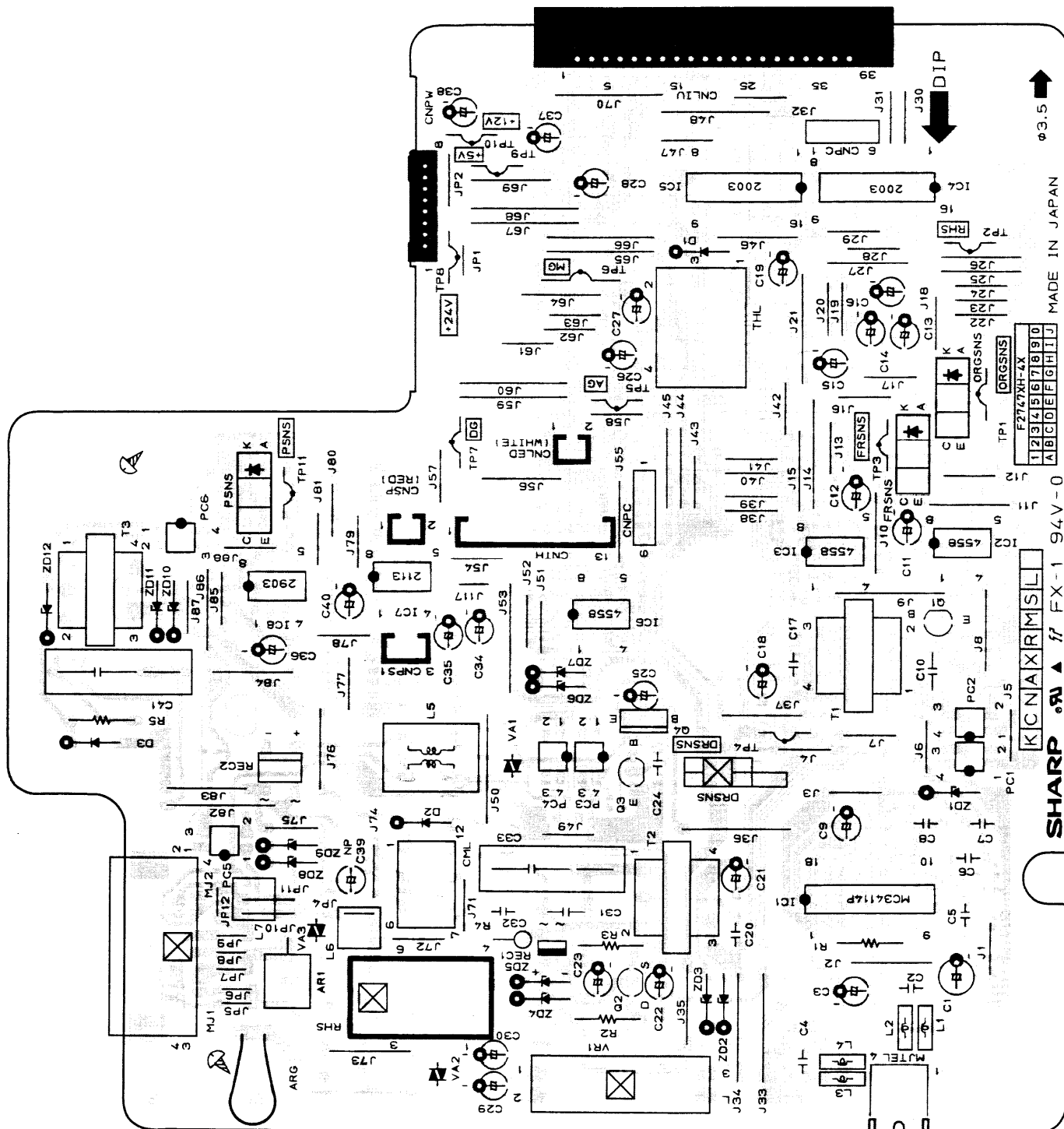
## TEL/LIU PWB circuit



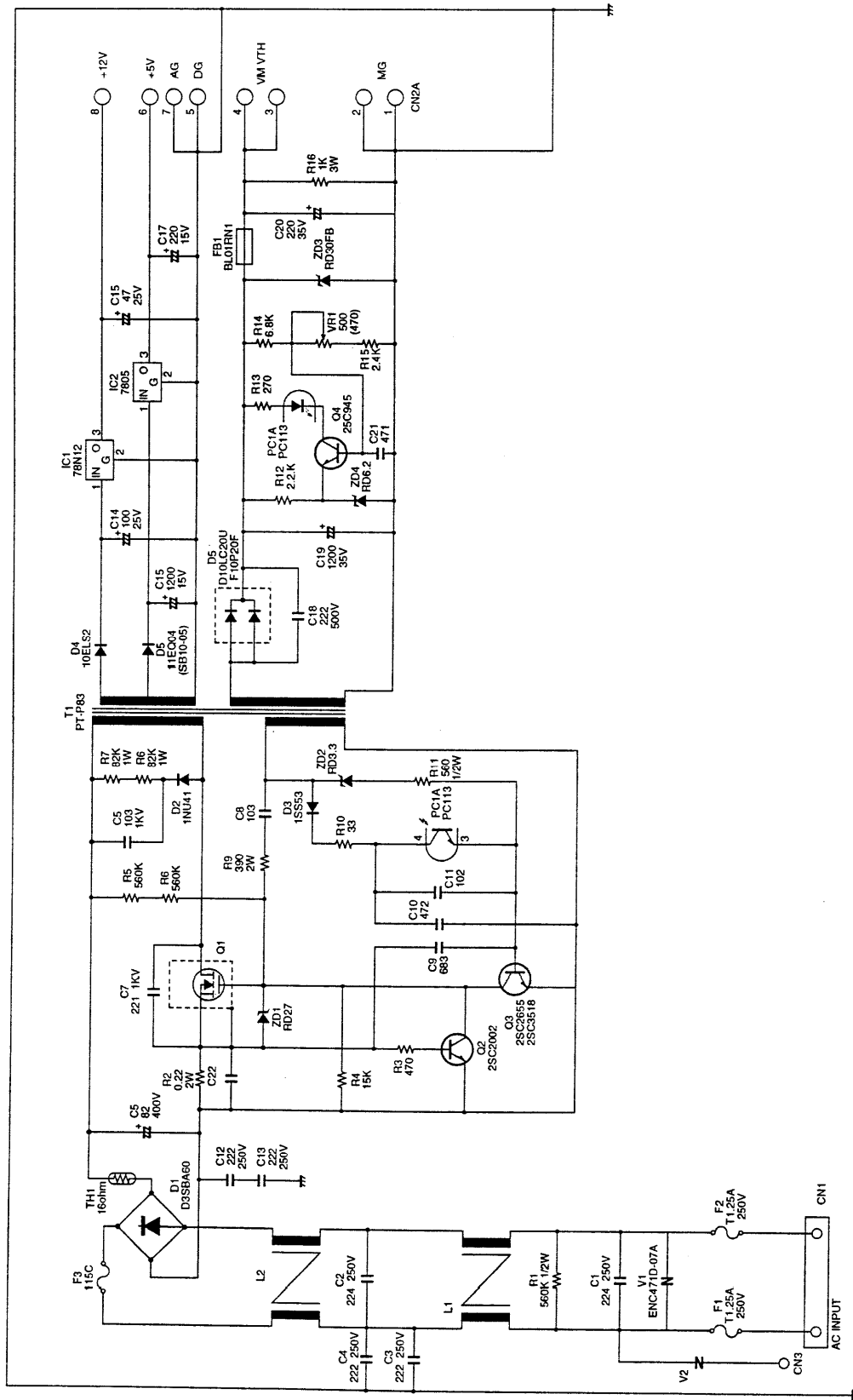
**NOTE:**  
 ⚠ These marks are all safety-critical parts.



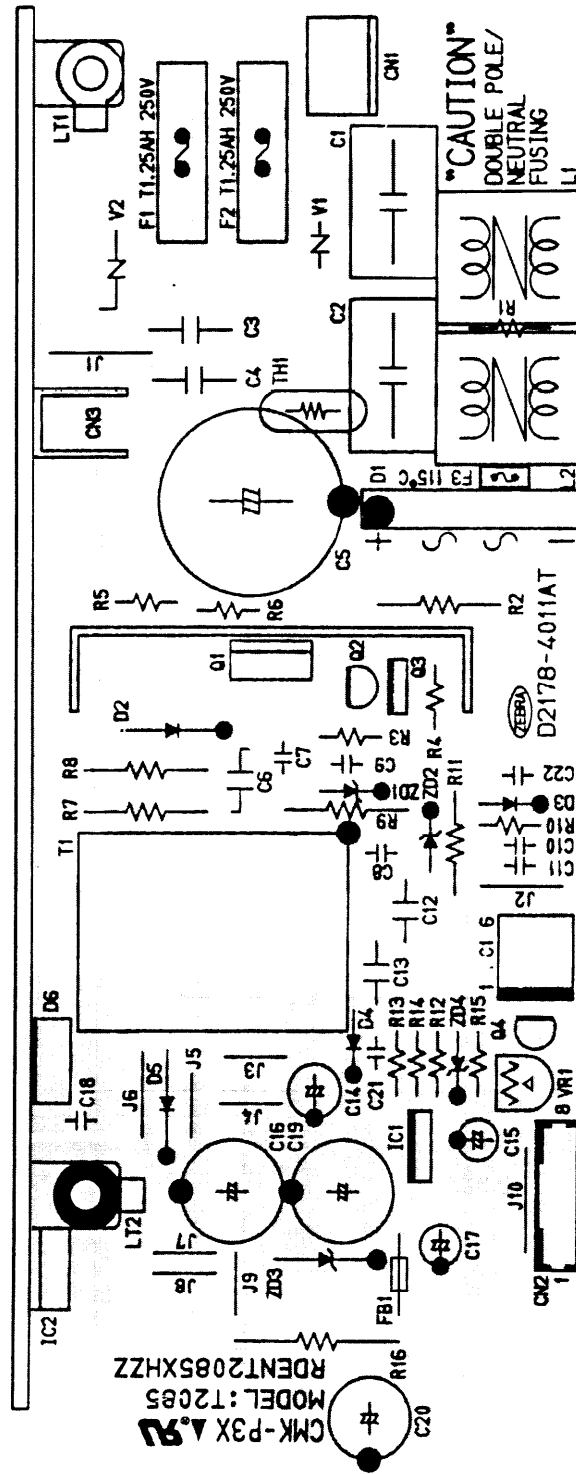
# TEL/LIU PWB parts layout



### [3] Power supply PWB circuit

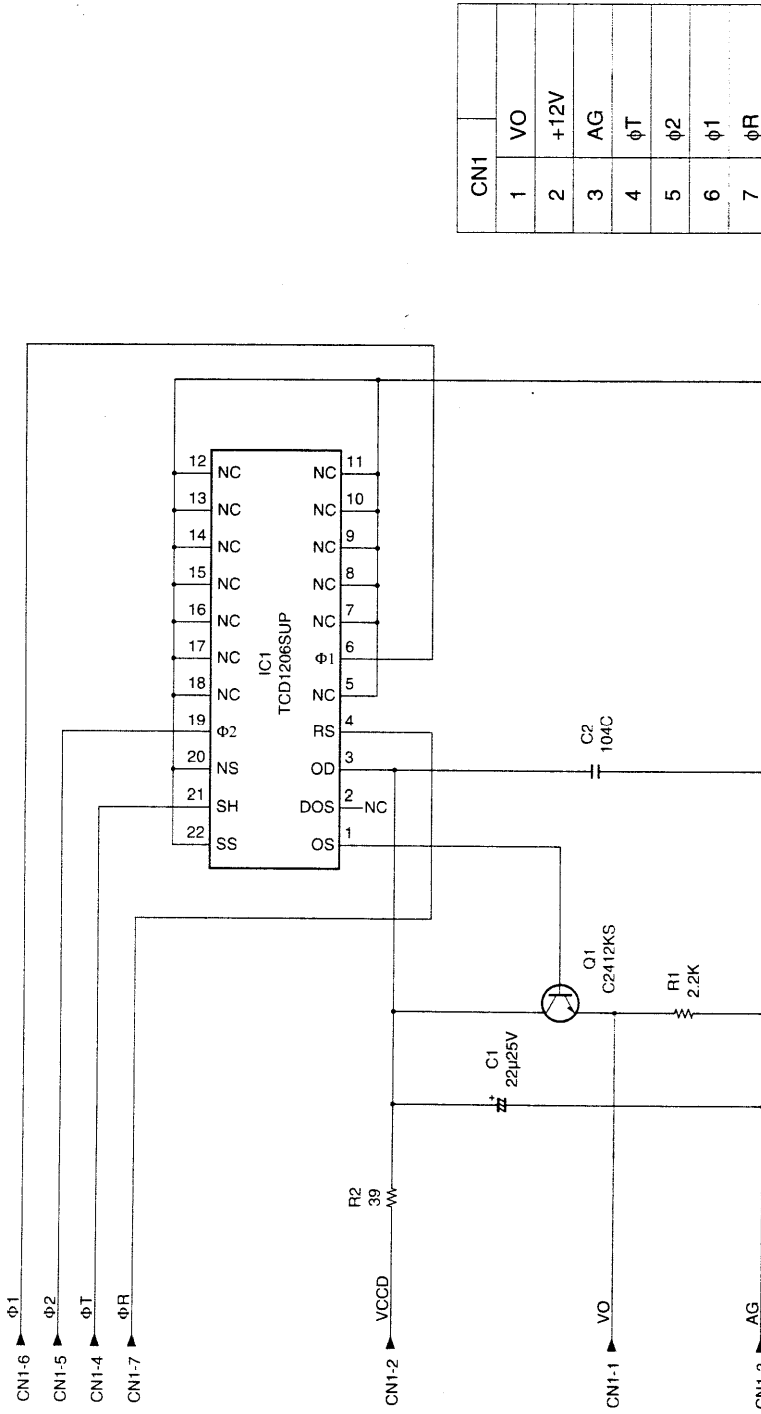


Power supply PWB parts layout

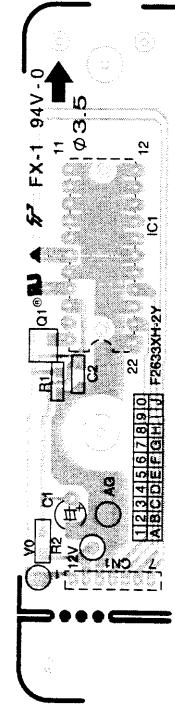


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## [4] CCD PWB circuit



## CCD PWB parts layout

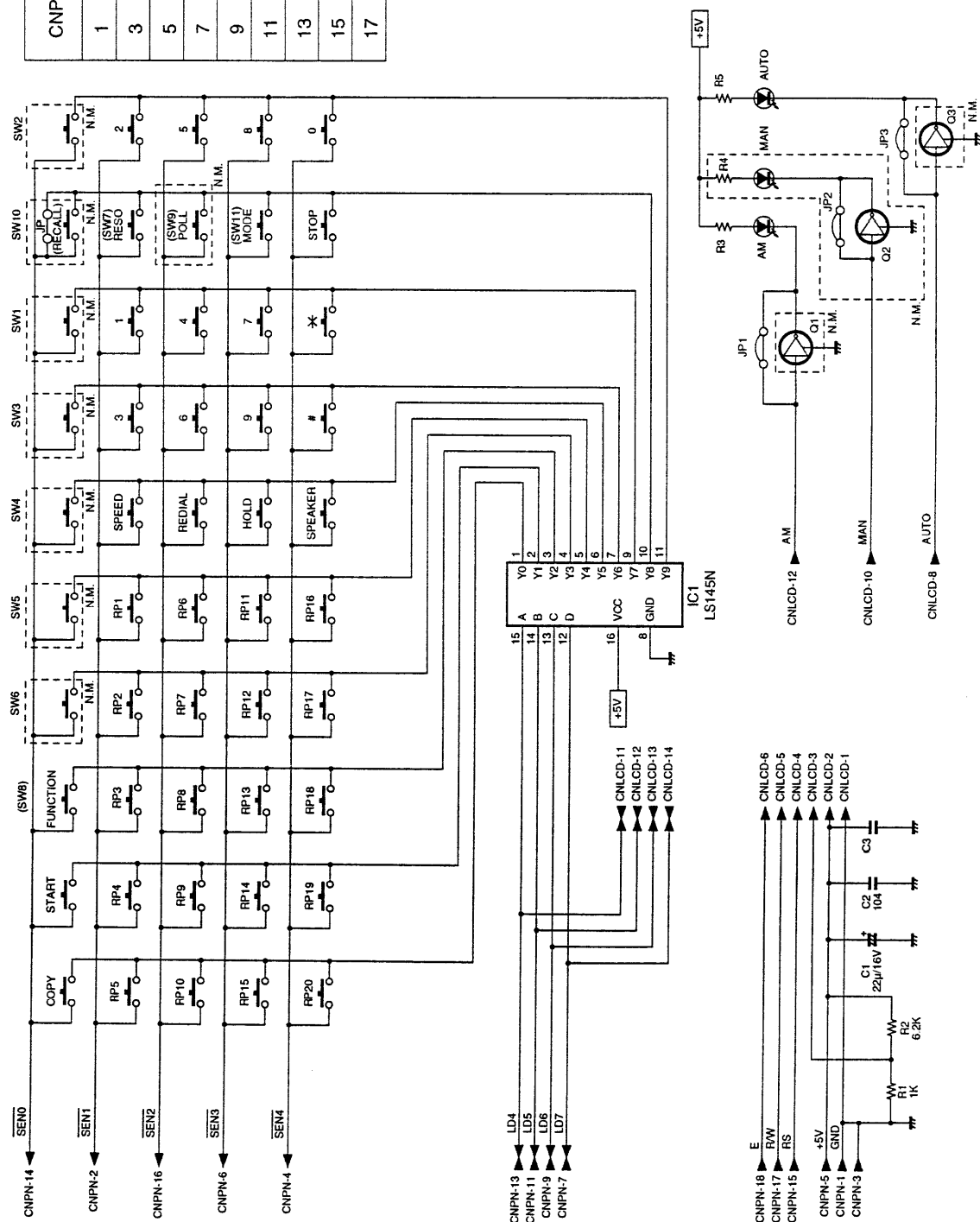


## [5] Operation panel PWB circuit

1/1

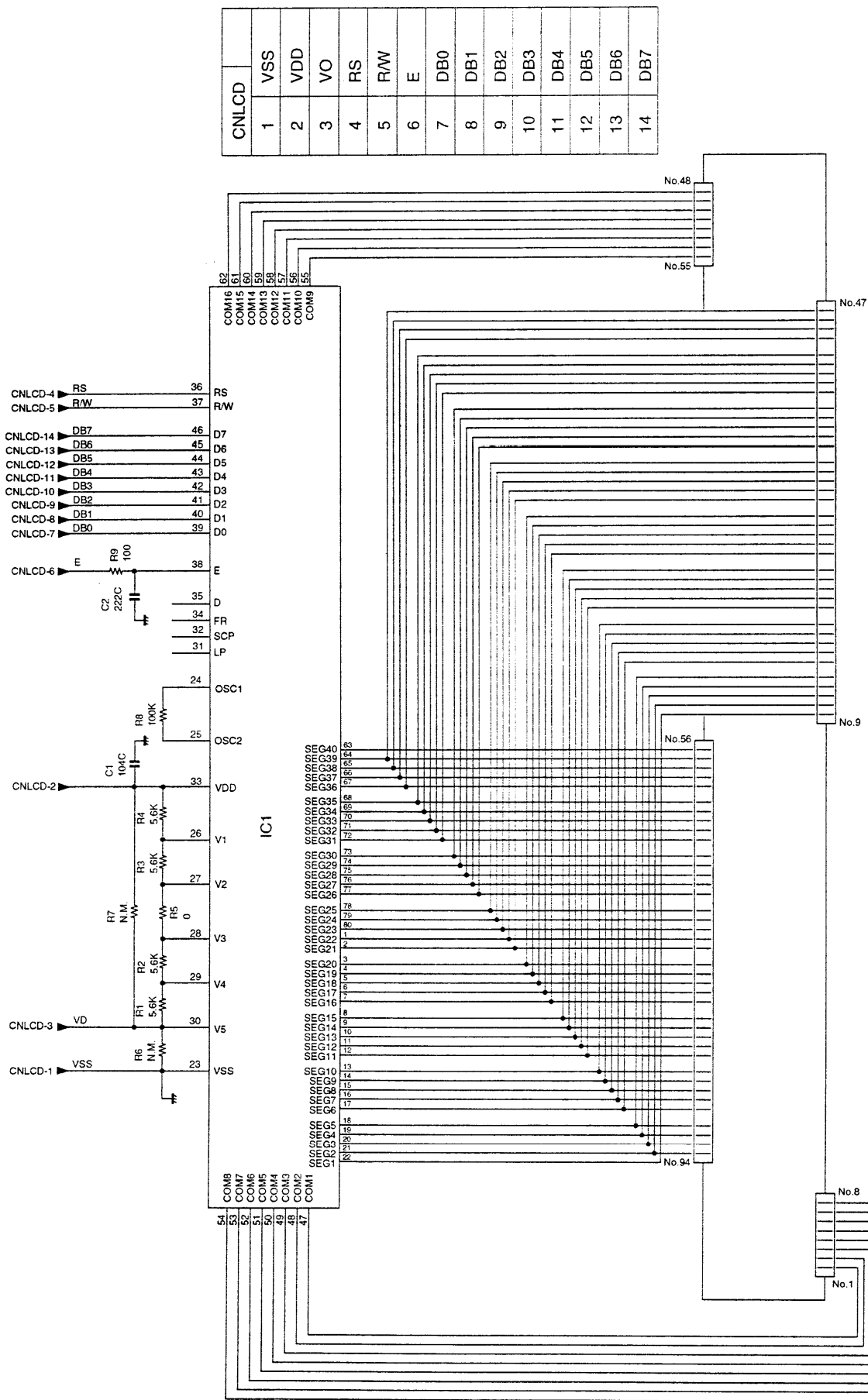
| CNPN |     | DF11-18DP-2DS<br>B18B-PHDSS-B |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------|-----|-------------------------------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 1    | GND | 2                             | SEN1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3    | GND | 4                             | SEN4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5    | +5V | 6                             | SEN3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7    | LD7 | 8                             | LED1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9    | LD6 | 10                            | LED2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 11   | LD5 | 12                            | LED3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 13   | LD4 | 14                            | SEN0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15   | RS  | 16                            | SEN2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17   | RAW | 18                            | E    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| CNLC | CD  |
|------|-----|
| 1    | GND |
| 2    | +5V |
| 3    | VO  |
| 4    | RS  |
| 5    | R/W |
| 6    | E   |
| 7    | N.C |
| 8    | N.C |
| 9    | N.C |
| 10   | N.C |
| 11   | LD4 |
| 12   | LD5 |
| 13   | LD6 |
| 14   | LD7 |



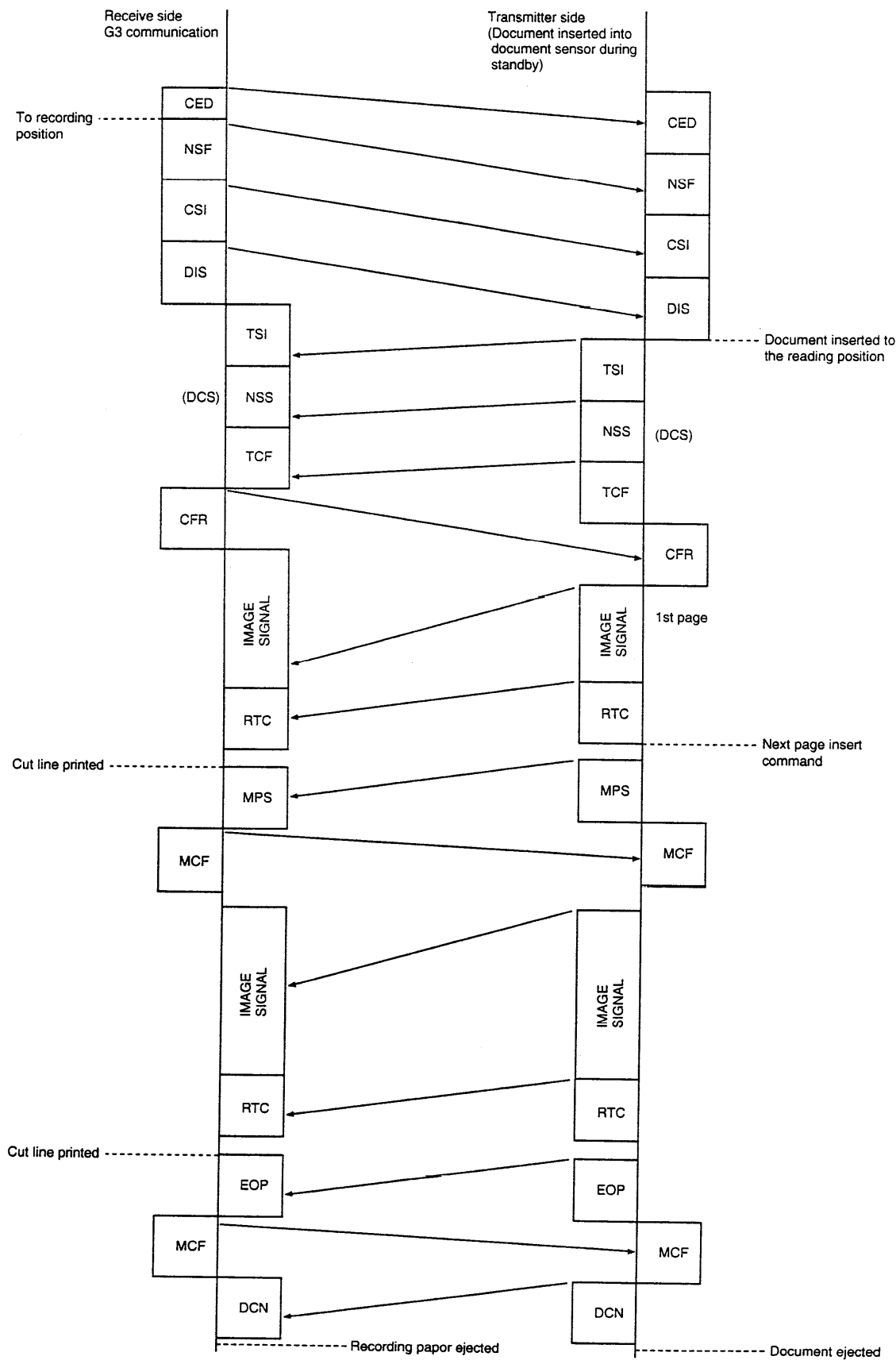
1/1

## [6] LCD PWB circuit

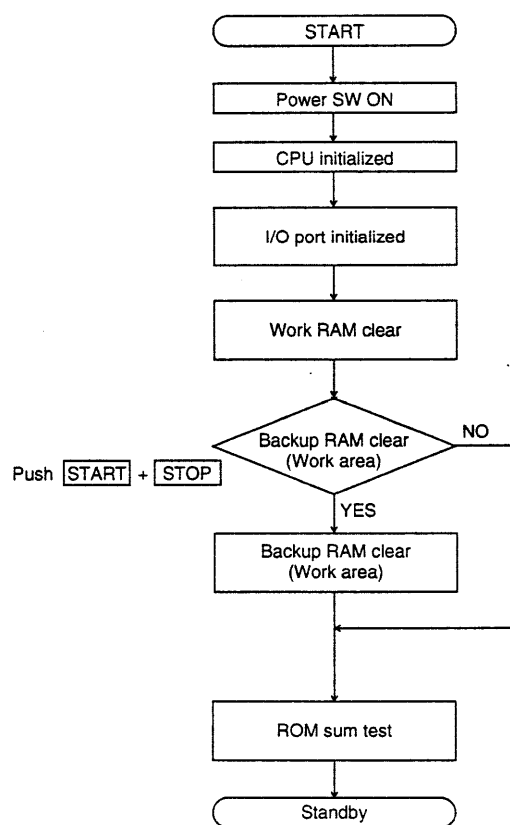


# CHAPTER 7. OPERATION FLOWCHART

## [1] Protocol



## [2] Power on sequence





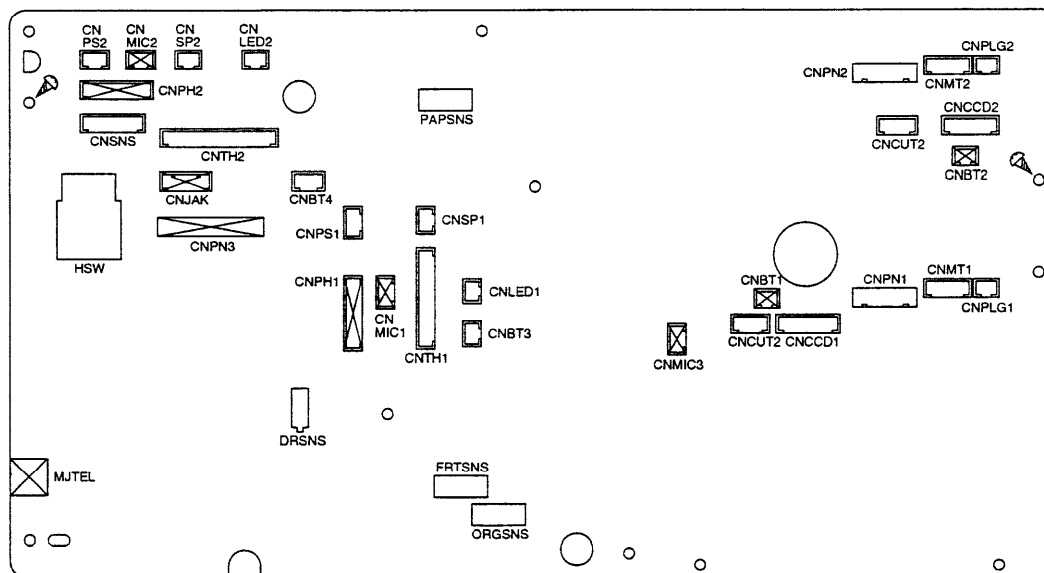
## CHAPTER 8. OTHERS

### [1] Service tools

#### 1. List

| NO. | PARTS CODE    | DESCRIPTION            | Q'TY | PRICE RANK |
|-----|---------------|------------------------|------|------------|
| 1   | CPWBS2715SC01 | Extension board unit   | 1    | BZ         |
| 2   | UKOGM2028SCZZ | Optical adjustment jig | 1    | BE         |

#### Extension board unit

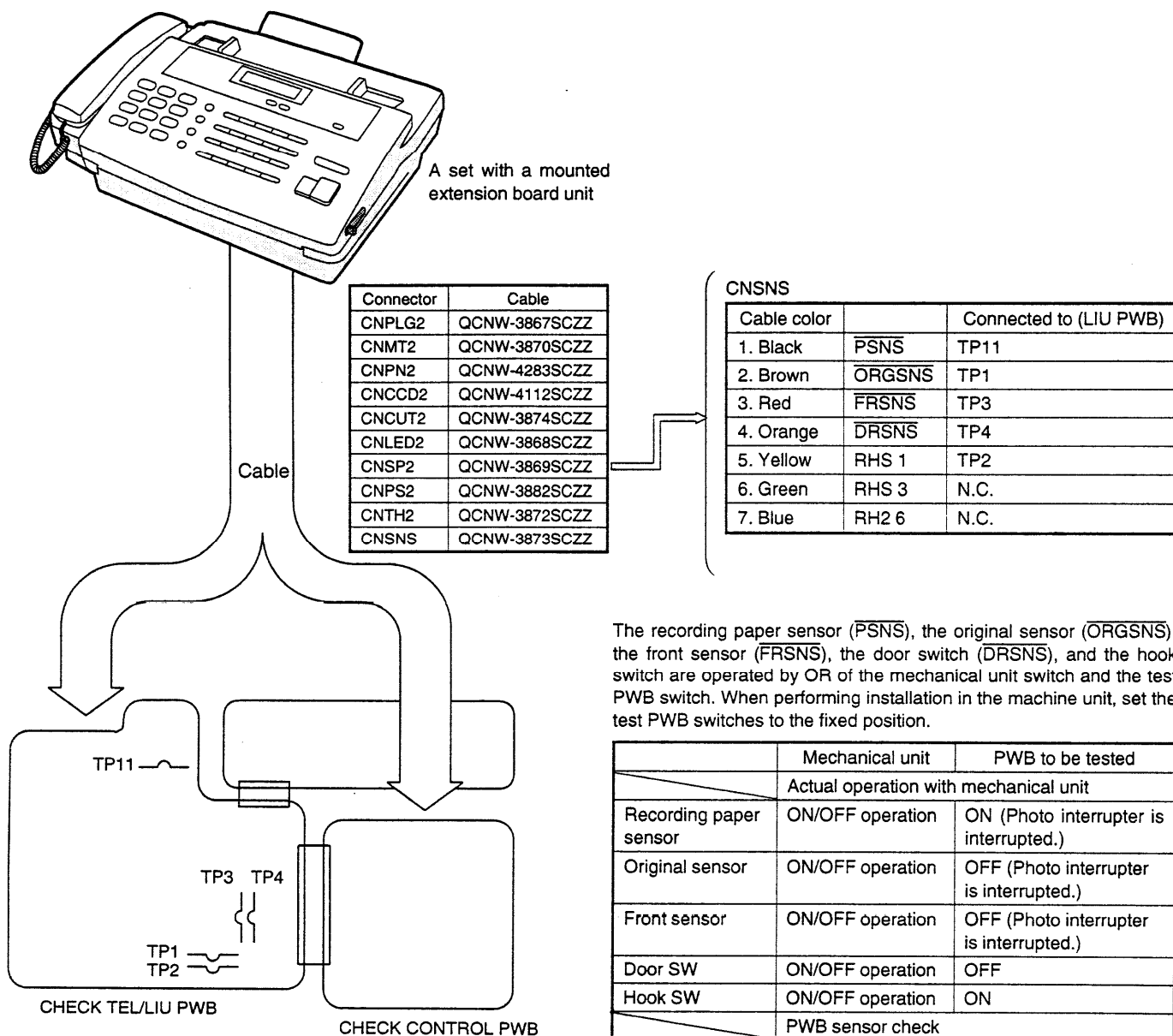


| NO. | PARTS CODE    | DESCRIPTION                                   | Q'TY | PRICE RANK |
|-----|---------------|-----------------------------------------------|------|------------|
| 1   | QCNW-4283SCZZ | CABLE (CNPN2)                                 | 1    | AS         |
| 2   | QCNW-3867SCZZ | CABLE (CNPLG2)                                | 1    | AE         |
| 3   | QCNW-3868SCZZ | CABLE (CNLED2)                                | 1    | AE         |
| 4   | QCNW-3869SCZZ | CABLE (CNSP2)                                 | 1    | AE         |
| 5   | QCNW-3870SCZZ | CABLE (CNMT2)                                 | 1    | AH         |
| 6   | QCNW-4112SCZZ | CABLE (CNCCD2)                                | 1    | AG         |
| 7   | QCNW-3872SCZZ | CABLE (CNTH2)                                 | 1    | AP         |
| 8   | QCNW-3873SCZZ | CABLE (CNSNS)                                 | 1    | AZ         |
| 9   | QCNW-3874SCZZ | CABLE (CNCUT2)                                | 1    | AG         |
| 10  | QCNW-3882SCZZ | CABLE (CNPS2)                                 | 1    | AF         |
| 11  | QCNCM2389SC1H | CONNECTOR 18 pin (CNPN1, CNPN2)               | 2    | AE         |
| 12  | QCNCM2401SC0B | CONNECTOR 2 pin (CNSP1, CNSP2)                | 2    | AA         |
| 13  | QCNCM7014SC0B | CONNECTOR 2 pin (CNLED1, CNLED2 CNPL1, CNPL2) | 4    | AD         |
| 14  | QCNCM7014SC0C | CONNECTOR 3 pin (CNPS1, CNPS2)                | 2    | AA         |
| 15  | QCNCM7014SC0D | CONNECTOR 4 pin (CNCUT1, CNCUT2)              | 2    | AB         |
| 16  | QCNCM7014SC0F | CONNECTOR 6 pin (CNMT1, CNMT2)                | 2    | AB         |
| 17  | QCNCM7014SC0G | CONNECTOR 7 pin (CNSNS)                       | 1    | AB         |
| 18  | QCNCM7014SC0G | CONNECTOR 7 pin (CNCCD1, CNCCD2)              | 2    | AB         |
| 19  | QCNCM7014SC1C | CONNECTOR 13 pin (CNTH1, CNTH2)               | 2    | AC         |
| 20  | QPWBS2715SCZZ | EXTENSION BOARD (WITHOUT PARTS)               | 1    | BV         |
| 21  | QSW-M2184SCZZ | Cover switch (DRSNS)                          | 1    | AD         |
| 22  | QSW-Z2206SCZZ | Hook switch (HSW)                             | 1    | AE         |
| 23  | VHPSG206///-1 | (PSNS, FRSNS, ORGSNS)                         | 3    | AE         |
| 24  | VRD-RC2EY221J | RESISTOR (1/4W 220Ω ±5%) (R1, R2, R3)         | 3    | AA         |
| 25  | XHBSD30P05000 | Screw                                         | 3    | AA         |
| 26  | LPLTM2704XHZZ | Bottom plate                                  | 1    | AY         |

## 2. Description

### 2-1. Extension board unit

1. Remove the TEL/LIU PWB, control PWB and Power Supply PWB from this unit, and mount the extension board unit instead.
  - Before connecting the wiring to the extension board unit, set the test PWB switches to the fixed position.
2. The setting is as follows.



The recording paper sensor (PSNS), the original sensor (ORGSNS), the front sensor (FRSNS), the door switch (DRSNS), and the hook switch are operated by OR of the mechanical unit switch and the test PWB switch. When performing installation in the machine unit, set the test PWB switches to the fixed position.

|                        | Mechanical unit                       | PWB to be tested                        |
|------------------------|---------------------------------------|-----------------------------------------|
|                        | Actual operation with mechanical unit |                                         |
| Recording paper sensor | ON/OFF operation                      | ON (Photo interrupter is interrupted.)  |
| Original sensor        | ON/OFF operation                      | OFF (Photo interrupter is interrupted.) |
| Front sensor           | ON/OFF operation                      | OFF (Photo interrupter is interrupted.) |
| Door SW                | ON/OFF operation                      | OFF                                     |
| Hook SW                | ON/OFF operation                      | ON                                      |
|                        | PWB sensor check                      |                                         |
| Recording paper sensor | ON                                    | ON/OFF operation                        |
| Original sensor        | OFF                                   | ON/OFF operation                        |
| Front sensor           | OFF                                   | ON/OFF operation                        |
| Door SW                | OFF                                   | ON/OFF operation                        |
| Hook SW                | ON                                    | ON/OFF operation                        |

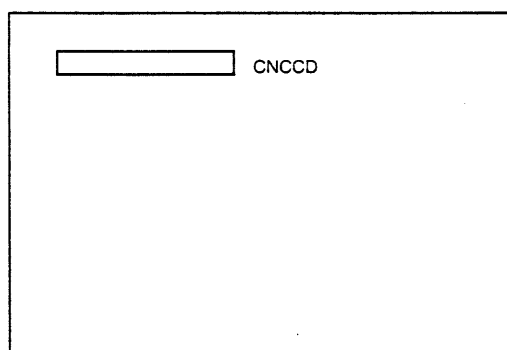
## 2-2. Scan optical system adjustment

### (1) Outline

The adjustment procedures of the scan optical system are described below:

### (2) Adjustment procedures

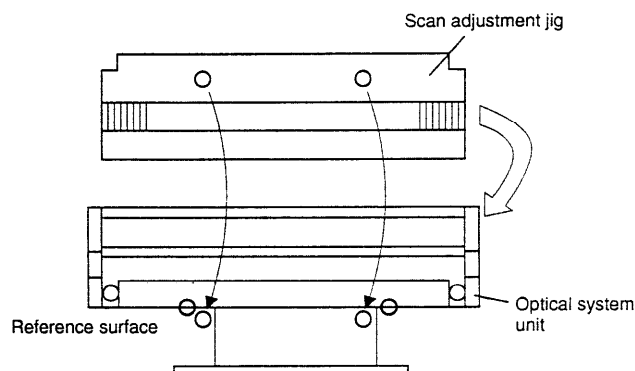
- ① Switch off the machine and disconnect the AC power cable from the wall socket.
- ② Fully open the upper cabinet, remove the fixing screws of the recording paper tray and remove the recording paper tray. In order to perform a focus adjustment, remove the optical system unit from the frame.
- ③ Disconnect the main pwb from the TEL/LIU pwb.
- ④ Connect your oscilloscope channel 1 to the VID signal (Refer Pin 1 of Connector CNCCD on the main pwb) and channel 2 of your oscilloscope to  $\phi T$  signal (Refer Pin 4 of connector CNCCD on the main pwb). Connect the earth clips of either probe to AG ground as shown. Set the trigger to channel 2.



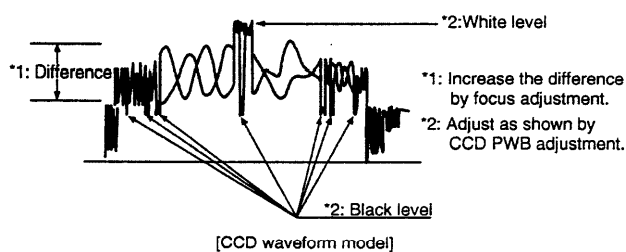
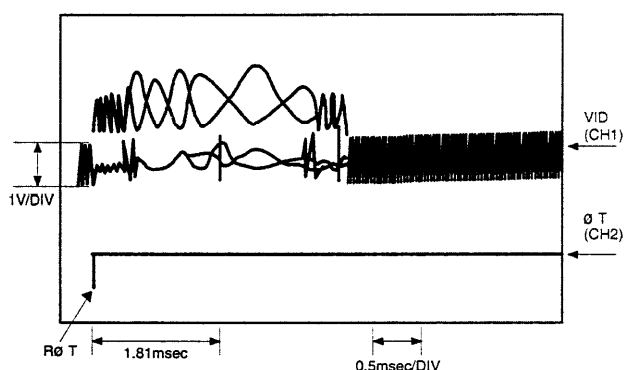
VID CNCCD-1  
 $\phi T$  CNCCD-4  
 VG CNCCD-3

- ⑤ Re-connect the main pwb to the TEL/LIU pwb and connect these circuit boards to the connectors on the chassis.
- ⑥ Re-assemble up to and including the recording paper tray to the main chassis and close upper cabinet.
- ⑦ Plug the AC power cable into the wall outlet and turn the fax machine on.
- ⑧ Insert a test chart in the document hopper and execute the CCD Adjust Mode diagnostic. Press the START key to enable local copy until approximately one fifth of the page has been copied, then press the STOP key to enable the CPU wait state.
- ⑨ Fully open the upper cabinet and remove the recording paper tray.
- ⑩ Install the scan adjustment jig to the optical system unit, so that the pattern surface is on the lower side.
- ⑪ Fit the pins of the scan adjustment jig to the holes of the optical system frame.

- ⑫ Lightly loosen the red screws of the CCD pwb and obtain the VID signal waveform in synchronization with  $\phi T$  signal waveform. Adjust the CCD pwb positioning to obtain the waveform as shown below.



CCD waveform



- ⑬ After completing the CCD adjustment, tighten the two red screws on the CCD pwb and apply screw locking material to prevent the CCD pwb from moving.
- ⑭ Assemble the recording paper tray and fixing screws.

[2] IC signal name

CONTROL P.W.B. UNIT

IC1: VHiR96SHF/-1 (R96SHF)

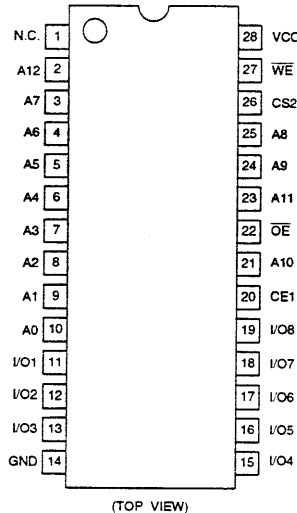
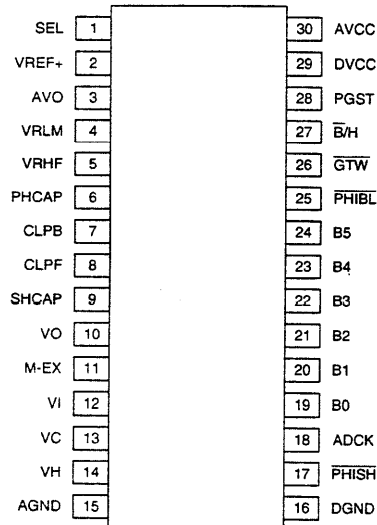
Refer to the table on p. 5-10.

IC3: VHiTLS1019/-1 (TLS1019)

IC2: VHiZ80180FSC6 (Z80180)

Refer to the tables on p. 5-3 through 5-5.

IC4: VHiLH5160N10Y (LH5160N-10Y)



| Pin name  | Signal        |
|-----------|---------------|
| A0-A12    | Address input |
| CE1/CE2   | Chip enable   |
| WE        | Write enable  |
| OE        | Write enable  |
| I/O1-I/O8 | Data I/O      |
| VCC       | Power source  |
| GND       | Ground        |
| N.C.      | No connection |

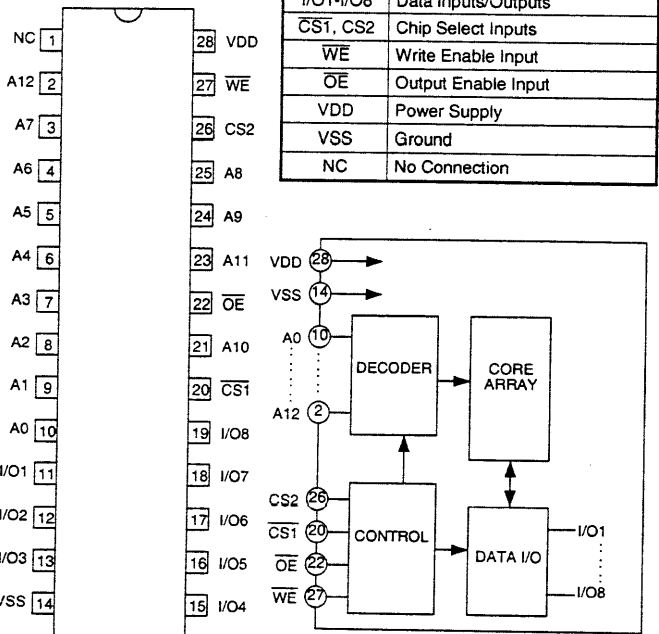
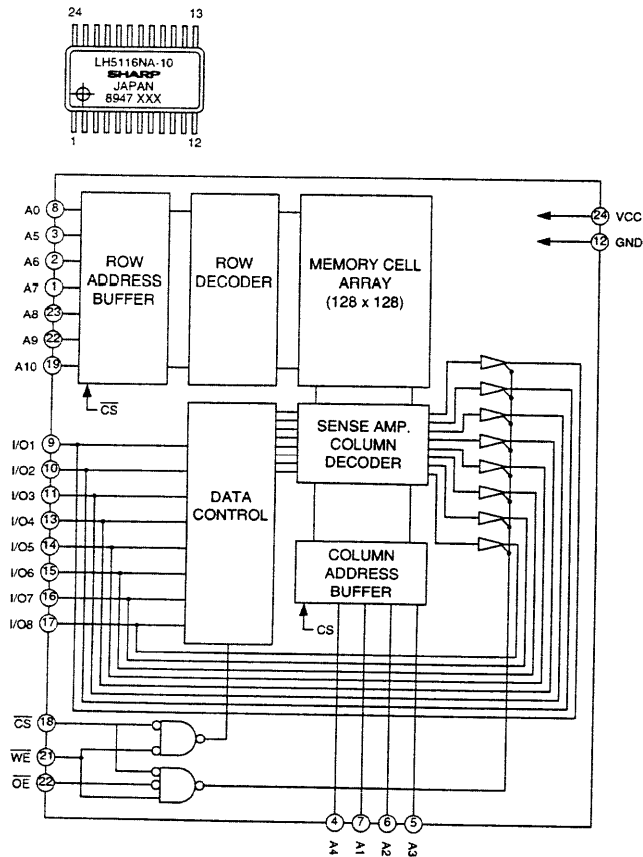
IC5: VHiLZ9F11/-1 (LZ9FJ11)

Refer to the tables on p. 5-6 and 5-7.

IC6: VHiLH5116NA10 (LH5116NA-10)

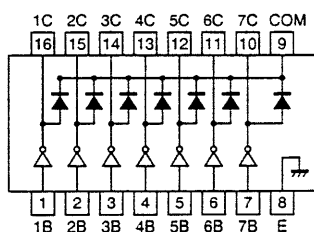
IC7: VHiW2465S70LL (W2465S-7LL)

VHiLH5268TH10 (LH5268TH-10)

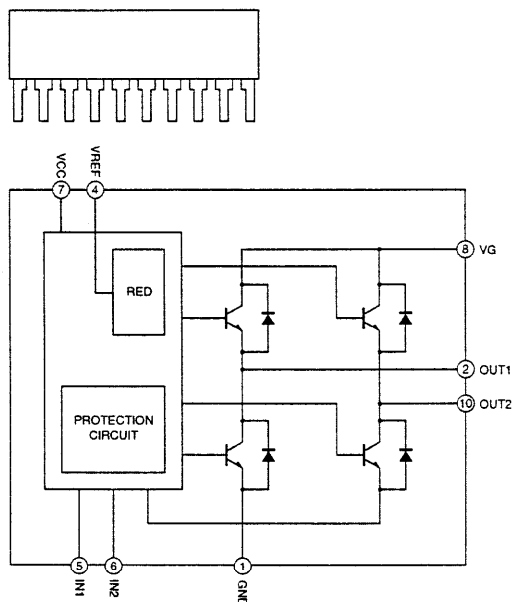


| SYMBOL    | DESCRIPTION         |
|-----------|---------------------|
| A0-A12    | Address inputs      |
| I/O1-I/O8 | Data Inputs/Outputs |
| CS1, CS2  | Chip Select Inputs  |
| WE        | Write Enable Input  |
| OE        | Output Enable Input |
| VDD       | Power Supply        |
| VSS       | Ground              |
| NC        | No Connection       |

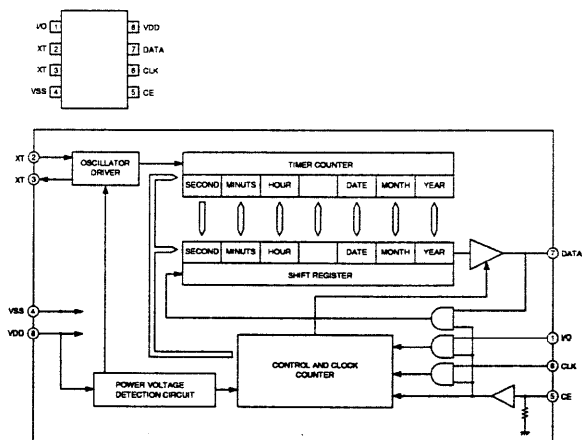
## IC8: VHiULN2003ANS (ULN2003)



## IC10: VHiTA7291PV-1 (TA7291PV)



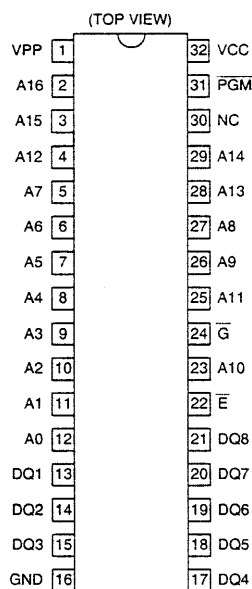
## IC101: VHiNJU6355E-1-(NJU6355EM)



| No. | Function | Description                                                                                                                                                                                                                                                                                                                                       |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
|-----|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|----------|---|---|-------|---|---|--------|---|---|----------------|---|---|----------------|
| 1   | I/O      | DATA pin I/O select pin "H" : Data input<br>"L" : Data output<br>When, however, CE pin is in "L", DATA pin is in high impedance.                                                                                                                                                                                                                  |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 2   | XT       | Crystal oscillator connection pin (f=32.768KHz)                                                                                                                                                                                                                                                                                                   |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 3   | XT       | For the capacity of Cg and Cd, refer to the series composition table.                                                                                                                                                                                                                                                                             |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 5   | CE       | Chip enable input pin (built-in pull-down resistor)<br>"H" : DATA pin allows data input/output.<br>"L" : DATA pin is in high impedance.                                                                                                                                                                                                           |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 6   | CLK      | Clock input pin: Data are input or output in synchronization with this clock.<br>When, however, CE pin in "L", DATA pin is in high impedance.                                                                                                                                                                                                     |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 7   | DATA     | Serial timer data I/O pin <table border="1"> <thead> <tr> <th>I/O</th><th>CE</th><th>DATA pin</th></tr> </thead> <tbody> <tr> <td>H</td><td>H</td><td>Input</td></tr> <tr> <td>L</td><td>H</td><td>Output</td></tr> <tr> <td>H</td><td>L</td><td>High impedance</td></tr> <tr> <td>L</td><td>L</td><td>High impedance</td></tr> </tbody> </table> | I/O | CE | DATA pin | H | H | Input | L | H | Output | H | L | High impedance | L | L | High impedance |
| I/O | CE       | DATA pin                                                                                                                                                                                                                                                                                                                                          |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| H   | H        | Input                                                                                                                                                                                                                                                                                                                                             |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| L   | H        | Output                                                                                                                                                                                                                                                                                                                                            |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| H   | L        | High impedance                                                                                                                                                                                                                                                                                                                                    |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| L   | L        | High impedance                                                                                                                                                                                                                                                                                                                                    |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 8   | VDD      | Power pin +5V                                                                                                                                                                                                                                                                                                                                     |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |
| 4   | VSS      | Power pin GND                                                                                                                                                                                                                                                                                                                                     |     |    |          |   |   |       |   |   |        |   |   |                |   |   |                |

## IC9: VHi27C01012TI (TMS27C010)

## EP-ROM



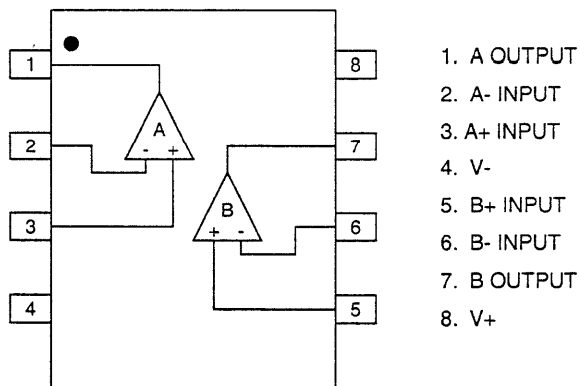
| Pin name  | Signal                      |
|-----------|-----------------------------|
| A0-A16    | Address input               |
| $\bar{E}$ | Chip enable                 |
| $\bar{G}$ | Output enable               |
| GND       | Ground                      |
| NC        | No connection               |
| PGM       | Program                     |
| DQ1-DQ8   | Data output (Program input) |
| VCC       | +5V power                   |
| VPP       | +12.5V power (*)            |

(\*) Only in the program mode

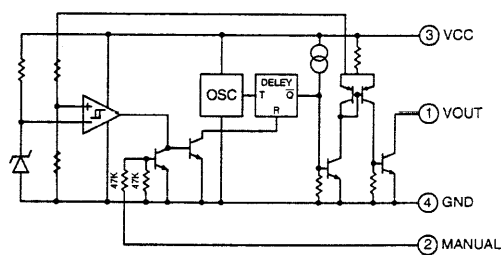
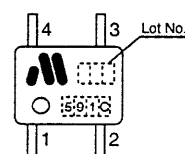
## IC100: VHiNJM2904M-1 (NJM 2904M)

## IC102: VHiNJM4558MF-(NJM4558M)

## IC104: VHiNJM2903M/-(NJM2903M)



## IC103: VHiPST591CMT1-(PST591C)

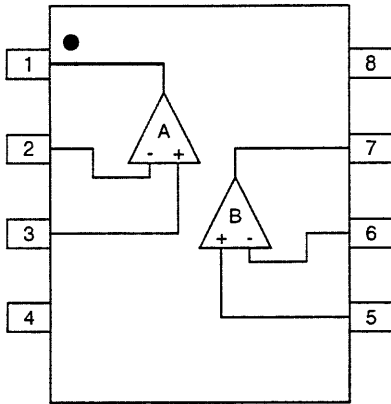


TEL/LIU P.W.B. UNIT

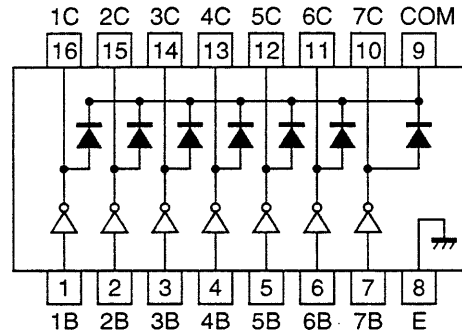
IC5: VHiULN2003ANS (ULN2003A)

IC1~IC4: VHiNJM4558D-1 (NJM4558D)

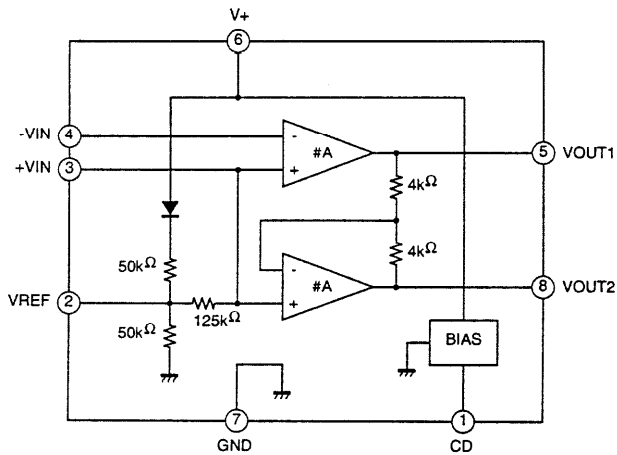
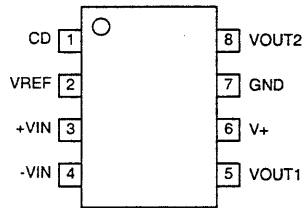
IC7: VHiNJM2903D-1 (NJM2903D)



1. A OUTPUT
2. A- INPUT
3. A+ INPUT
4. V-
5. B+ INPUT
6. B- INPUT
7. B OUTPUT
8. V+



IC6: VHiNJM2113D-1 (NJM2113D)



# SHARP PARTS GUIDE

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## MODEL FO-145

### CONTENTS

- |                                  |                         |
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| 1 Cabinet, etc.                  | 7 Control PWB unit      |
| 2 Upper cabinet                  | 8 TEL-Liu PWB unit      |
| 3 Document guide upper           | 9 Power supply PWB unit |
| 4 Drive unit                     | 10 CCD PWB unit         |
| 5 Optical unit                   | 50 Hardware parts       |
| 6 Packing material & Accessories | ■ Index                 |

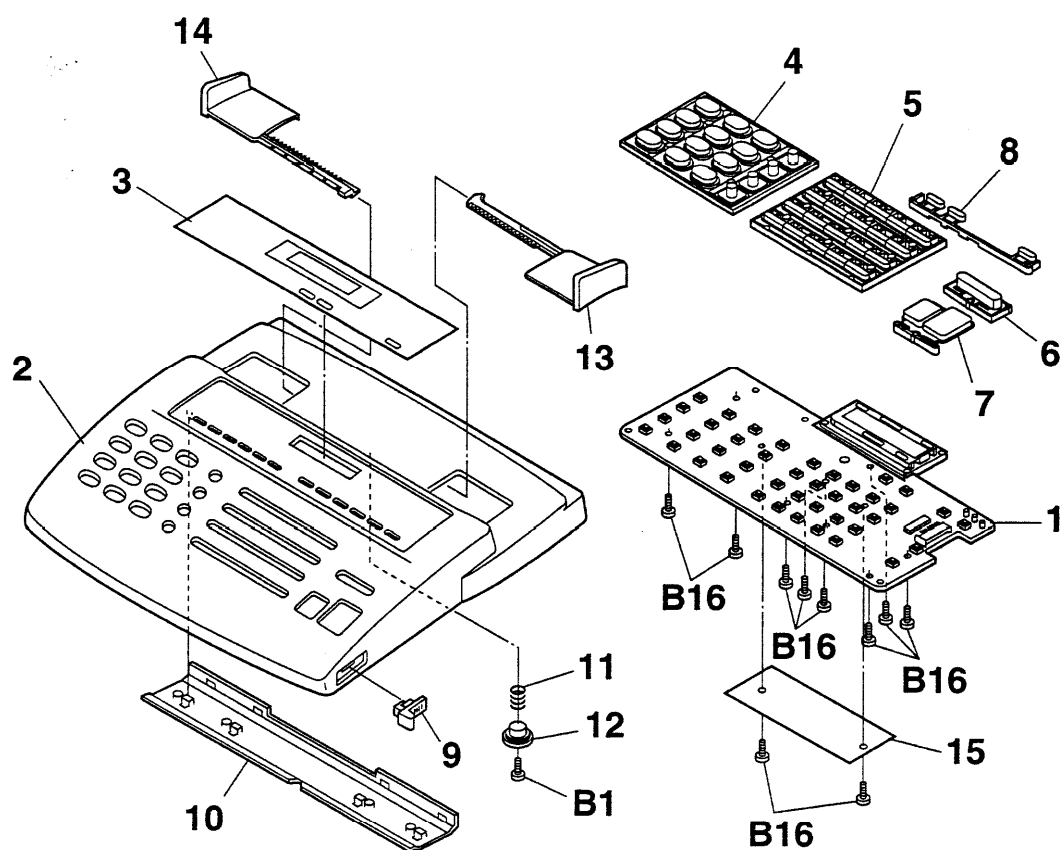
Because parts marked with “” is indispensable for the machine safety maintenance and operation, it must be replaced with the parts specific to the product specification.



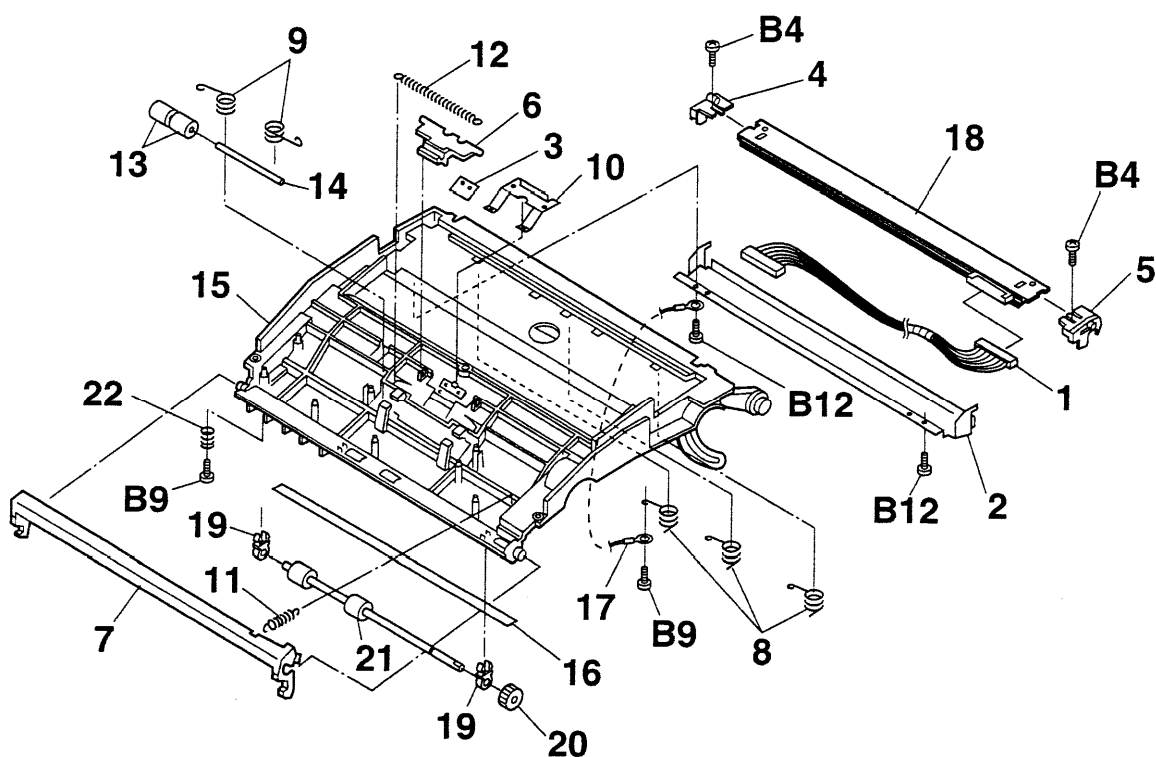




**2** Upper cabinet



**3** Document guide upper



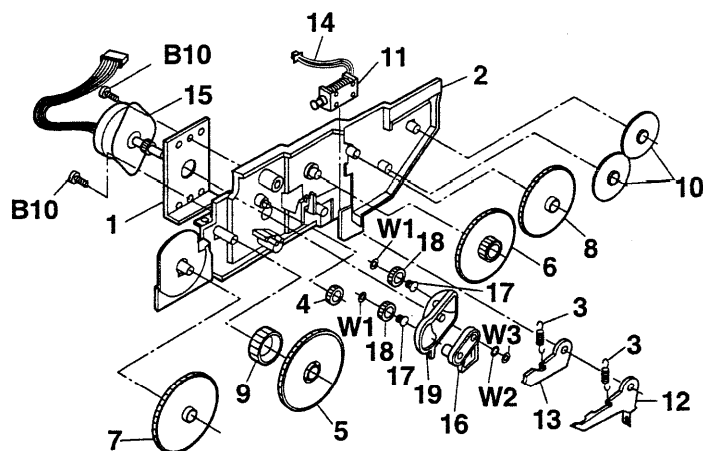
2 Upper cabinet

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                 |
|-----|---------------|------------|----------|-----------|-----------------------------|
| 1   | DCEKP363AXH02 | BG         | N        | E         | Panel PWB unit              |
| 2   | GCABA2245XHZE | AZ         | N        | D         | Upper cabinet               |
| 3   | HPNLH2350XHZE | AC         |          | D         | Decoration panel            |
| 4   | JBTN-2085XHZA | AR         |          | C         | 12 key                      |
| 5   | JBTN-2086XHZA | AQ         |          | C         | Direct key                  |
| 6   | JBTN-2088XHZA | AP         |          | C         | Stop key                    |
| 7   | JBTN-2127XHZA | AF         |          | C         | Start key                   |
| 8   | JBTN-2128XHZA | AD         |          | C         | Mode key                    |
| 9   | JKNBP2065XHZA | AC         |          | C         | Release knob                |
| 10  | LPLTP2699XHZZ | AC         |          | C         | Plate, document guide upper |
| 11  | MSPRC2641XHZZ | AB         |          | C         | Hopper spring               |
| 12  | NGERP2206XHZZ | AE         |          | C         | Pinion gear                 |
| 13  | PGIDP2404XHZA | AX         |          | C         | Hopper guide, right         |
| 14  | PGIDP2405XHZA | AX         |          | C         | Hopper guide, left          |
| 15  | PSHEZ3034XHZZ | AC         |          | C         | Protect sheet               |
|     | (Unit)        |            |          |           |                             |
| 901 | CPNLH2350XH10 | BM         | N        | D         | Upper cabinet ass'y         |
|     |               |            |          |           |                             |
|     |               |            |          |           |                             |
|     |               |            |          |           |                             |

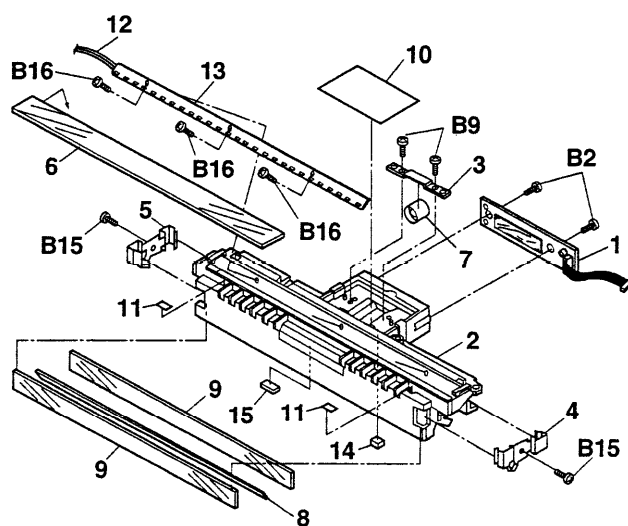
3 Document guide upper

[illegible]

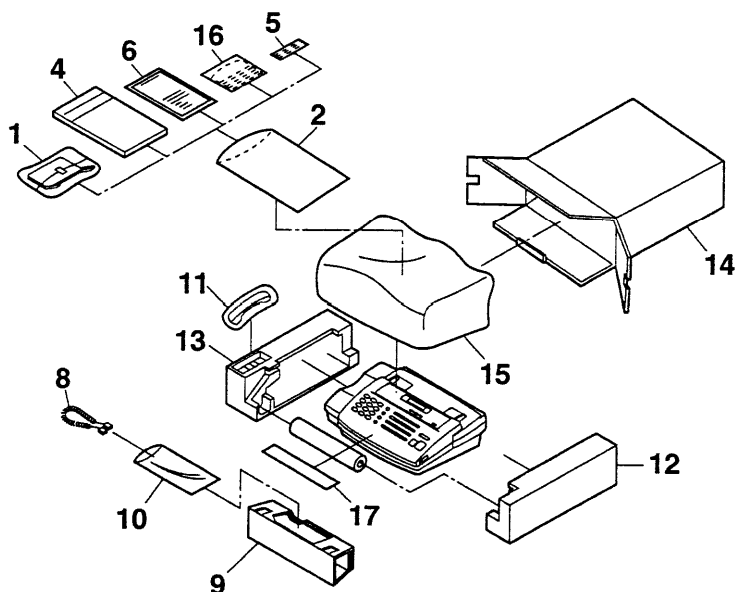
4 Drive unit



5 Optical unit



6 Packing material & Accessories



#### 4 Drive unit

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                |
|-----|---------------|------------|----------|-----------|----------------------------|
| 1   | LPLTM2665XHZZ | AM         |          | C         | Heat sink                  |
| 2   | LPLTP2655XHZA | AM         |          | C         | Motor plate                |
| 3   | MSPRC2536XHZZ | AC         |          | C         | Return spring locking pawl |
| 4   | NGERH2163XHZZ | AK         |          | C         | Gear                       |
| 5   | NGERH2197XHZZ | AF         |          | C         | Reduction gear 1           |
| 6   | NGERH2198XHZA | AG         | N        | C         | Reduction gear 2           |
| 7   | NGERH2199XHZA | AH         | N        | C         | Idler gear 1               |
| 8   | NGERH2201XHZA | AG         | N        | C         | Idler gear 4               |
| 9   | NGERH2202XHZZ | AE         |          | C         | Reduction gear 3           |
| 10  | NGERH2210XHZA | AC         | N        | C         | Idler gear 1               |
| 11  | PMAGE2054XHZZ | AK         |          | B         | Solenoid                   |
| 12  | PTME-2038XHZA | AK         |          | C         | Locking pawl 1             |
| 13  | PTME-2040XHZZ | AK         |          | C         | Locking pawl 2             |
| 14  | QCNW-4275XHZZ | AE         |          | C         | Solenoid cable             |
| 15  | RMOTZ2104SCZZ | AX         |          | B         | Motor                      |
| 16  | LPLTP2650XHZA | AK         |          | C         | Gear plate 1               |
| 17  | MSPRC2537XHZA | AB         |          | C         | Pressure spring 1          |
| 18  | NGERH2163XHZZ | AK         |          | C         | Gear                       |
| 19  | LPLTP2651XHZA | AH         |          | C         | Gear plate 2               |
|     |               |            |          |           |                            |
|     |               |            |          |           |                            |
|     |               |            |          |           |                            |

5 Optical unit

| NO. | PARTS CODE            | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION      |
|-----|-----------------------|------------|----------|-----------|------------------|
| 1   | DCEKD 2 8 1 A X H 0 2 | B V        |          | E         | CCD PWB unit     |
| 2   | LFRM-2 1 4 7 X H Y A  | A V        | N        | C         | Optical frame    |
| 3   | MSPRP 2 5 1 2 X H Z Z | A K        |          | C         | Lens spring      |
| 4   | MSPRP 2 6 1 8 X H Z Z | A D        |          | C         | Mirror spring 1  |
| 5   | MSPRP 2 6 1 9 X H Z Z | A D        |          | C         | Mirror spring 2  |
| 6   | PGLSP 2 0 4 3 X H Z Z | A K        |          | C         | Reader glass     |
| 7   | PLNS-2 0 4 3 X H Z Z  | A U        |          | B         | Lens             |
| 8   | PMiR-2 0 6 1 X H Z Z  | A H        |          | C         | Mirror 1         |
| 9   | PMiR-2 0 6 2 X H Z Z  | A M        |          | C         | Mirror 2         |
| 10  | PSHEZ 2 8 7 9 X H Z Z | A K        |          | C         | Shading sheet    |
| 11  | PSHEZ 2 9 1 5 X H Z Z | A Y        |          | C         | Dustproof sheet  |
| 12  | QCNW-4 2 7 3 X H Z Z  | A E        |          | C         | LED cable        |
| 13  | VHPSNK 0 8 A 2 4 - 1  | A Z        |          | B         | Photo transistor |
| 14  | PCUSS 2 0 7 5 X H Z Z | A A        | N        | C         | Cushion 1        |
| 15  | PCUSS 2 0 7 6 X H Z Z | A A        | N        | C         | Cushion 2        |
|     |                       |            |          |           |                  |
|     |                       |            |          |           |                  |
|     |                       |            |          |           |                  |
|     |                       |            |          |           |                  |

### **[6] Packing material & Accessories**

[illegible]

## FO-145A

## 7 Control PWB

| NO. | PARTS CODE      | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                    |         |
|-----|-----------------|------------|----------|-----------|--------------------------------|---------|
| 1   | UBATL2033SCZZ   | AK         |          | B         | Battery (CR2032-H03)           | [BT1]   |
| 2   | RC-EZ2032SCZZ   | AB         |          | C         | Capacitor (16WV 10 $\mu$ F)    | [C1]    |
| 3   | RC-EZ2032SCZZ   | AB         |          | C         | Capacitor (16WV 10 $\mu$ F)    | [C2]    |
| 4   | VCEAEA1HW225M   | AA         |          | C         | Capacitor (50WV 2.2 $\mu$ F)   | [C3]    |
| 5   | VCEAEA1EW475M   | AA         |          | C         | Capacitor (25WV 4.7 $\mu$ F)   | [C4]    |
| 6   | VCEAEA1CW106M   | AC         |          | C         | Capacitor (16WV 10 $\mu$ F)    | [C5]    |
| 7   | VCEAEA1CW106M   | AC         |          | C         | Capacitor (16WV 10 $\mu$ F)    | [C6]    |
| 8   | VCEAEA1CW336M   | AB         |          | C         | Capacitor (16WV 33 $\mu$ F)    | [C7]    |
| 9   | VCEAEA1EW226M   | AA         |          | C         | Capacitor (25WV 22 $\mu$ F)    | [C8]    |
| 10  | VCEAEA1AW476M   | AB         |          | C         | Capacitor (10WV 47 $\mu$ F)    | [C9]    |
| 11  | VCEAEA1EW226M   | AA         |          | C         | Capacitor (25WV 22 $\mu$ F)    | [C11]   |
| 12  | VCCSTV1HL102J   | AA         |          | C         | Capacitor (50WV 1000PF)        | [C100]  |
| 13  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C101]  |
| 14  | VCCSTV1HL391J   | AA         |          | C         | Capacitor (50WV 390PF)         | [C102]  |
| 15  | VCKYTV1EB104K   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C103]  |
| 16  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C104]  |
| 17  | VCCCTV1HH390J   | AA         |          | C         | Capacitor (50WV 39PF)          | [C105]  |
| 19  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C107]  |
| 20  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C108]  |
| 21  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C109]  |
| 22  | VCCCTV1HH330J   | AA         |          | C         | Capacitor (50WV 33PF)          | [C110]  |
| 23  | VCKYTV1EB104K   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C111]  |
| 24  | VCCSTV1HL102J   | AA         |          | C         | Capacitor (50WV 1000PF)        | [C112]  |
| 25  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C113]  |
| 26  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C114]  |
| 28  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C117]  |
| 29  | VCCCTV1HH330J   | AA         |          | C         | Capacitor (50WV 33PF)          | [C118]  |
| 30  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C119]  |
| 31  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C120]  |
| 32  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C121]  |
| 33  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C122]  |
| 34  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C123]  |
| 35  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C124]  |
| 36  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C125]  |
| 37  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C126]  |
| 38  | VCKYTQ1CF225Z   | AC         |          | C         | Capacitor (16WV 2.2 $\mu$ F)   | [C127]  |
| 39  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C128]  |
| 40  | VCCSTV1HL102J   | AA         |          | C         | Capacitor (50WV 1000PF)        | [C129]  |
| 41  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C130]  |
| 42  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C131]  |
| 43  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C132]  |
| 44  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C133]  |
| 45  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C134]  |
| 46  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C135]  |
| 47  | VCKYTV1HB103K   | AB         |          | C         | Capacitor (50WV 0.010 $\mu$ F) | [C136]  |
| 48  | VCKYTV1HB472K   | AA         |          | C         | Capacitor (50WV 4700PF)        | [C137]  |
| 49  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C138]  |
| 50  | VCCCTV1HH180J   | AA         |          | C         | Capacitor (50WV 18PF)          | [C139]  |
| 51  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C140]  |
| 52  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C141]  |
| 53  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C142]  |
| 54  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C145]  |
| 55  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C146]  |
| 56  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C147]  |
| 57  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C148]  |
| 58  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C149]  |
| 59  | VCKYTV1CF105Z   | AB         |          | C         | Capacitor (16WV 1.0 $\mu$ F)   | [C150]  |
| 60  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C152]  |
| 61  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C153]  |
| 62  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C154]  |
| 63  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C155]  |
| 64  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C156]  |
| 65  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C157]  |
| 66  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C158]  |
| 70  | VCKYTV1HB222K   | AA         |          | C         | Capacitor (50WV 2200PF)        | [C162]  |
| 71  | VCKYTV1EF104Z   | AA         |          | C         | Capacitor (25WV 0.10 $\mu$ F)  | [C163]  |
| 72  | VCKYTV1HF223Z   | AA         |          | C         | Capacitor (50WV 0.22 $\mu$ F)  | [C164]  |
| 73  | QCNCM7014SC0G   | AB         |          | C         | Connector (7pin)               | [CNCCD] |
| 74  | QCNCM2436SC4J   | AH         |          | C         | Connector (40pin)              | [CNLIU] |
| 75  | QCNCM7014SC0F   | AB         |          | C         | Connector (6pin)               | [CNMT]  |
| 76  | QCNCM7014SC0B   | AD         |          | C         | Connector (2pin)               | [CNPLG] |
| 77  | QCNCM2482SC1H   | AE         |          | C         | Connector (18pin)              | [CNPNL] |
| 78  | VHD1SS355//--1  | AB         |          | B         | Diode (1SS355)                 | [D100]  |
| 79  | VHD1SS355//--1  | AB         |          | B         | Diode (1SS355)                 | [D101]  |
| 80  | VHDDAP202U//--1 | AB         |          | B         | Diode (DAP202U)                | [D102]  |
| 81  | VHD1SS355//--1  | AB         |          | B         | Diode (1SS355)                 | [D103]  |
| 82  | VHVICPS07//--1  | AA         |          | B         | IC protector (ICP-S0.7)        | [F1]    |
| 83  | VHVICPS05//--1  | AA         |          | B         | IC protector (ICP-S0.5)        | [F2]    |
| 84  | VHIR96SHF//--1  | BD         |          | B         | IC (R96SHF)                    | [IC1]   |
| 85  | VHIZ80180FSC6   | AX         |          | B         | IC (Z80180)                    | [IC2]   |

## 7 Control PWB

| NO. | PARTS CODE     | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                 |         |
|-----|----------------|------------|----------|-----------|-----------------------------|---------|
| 86  | VHITLS1019/-1  | AU         |          | B         | IC (TLS1019)                | [IC3]   |
| 87  | VHILH5160N10Y  | AR         |          | B         | IC (LH5160N-10Y)            | [IC4]   |
| 88  | VHILZ9FJ11/-1  | AY         |          | B         | IC (LZ9FJ11)                | [IC5]   |
| 89  | VHILH5116NA10  | AL         |          | B         | IC (LH5116NA-10)            | [IC6]   |
| 90  | VHIW2465S70LL  | AW         |          | B         | IC (W2465S-70LL)            | [IC7]   |
| 91  | VHIULN2003ANS  | AE         |          | B         | IC (ULN2003)                | [IC8]   |
| 92  | QSOCCZ2051SC32 | AC         |          | C         | IC socket (32pin)           | [IC9]   |
|     | VH27010FSF0C   | BM         | N        | B         | IC ROM (27010FSF0C)         | [IC9]   |
| 95  | VHINJM2904M-1  | AE         |          | B         | IC (NJM2904M)               | [IC100] |
| 96  | VHINJU6355E-1  | AM         |          | B         | IC (NJU6355EM)              | [IC101] |
| 97  | VHINJM4558F-1  | AD         |          | B         | IC (NJM4558MF)              | [IC102] |
| 98  | VHIPST591CMT1  | AE         |          | B         | IC (PST591C)                | [IC103] |
| 99  | VHINJM2903M/-  | AD         |          | B         | IC (NJM2903M)               | [IC104] |
| 100 | RCILZ1044CCZZ  | AC         |          | C         | Coil (NZ3216A)              | [L100]  |
| 101 | RCILZ2104SCZZ  | AK         |          | C         | Coil (MMZ2104S301A)         | [L101]  |
| 102 | VRS-TP2BD000J  | AA         |          | C         | Resistor (1/8W 0Ω ±5%)      | [L102]  |
| 103 | RCILZ1044CCZZ  | AC         |          | C         | Coil (NZ3216A)              | [L103]  |
| 104 | VS2SC2412KS-1  | AB         |          | B         | Transistor (2SC2412KS)      | [Q100]  |
| 105 | VSDTC114EK/-1  | AB         |          | B         | Transistor (DTC114EK)       | [Q101]  |
| 106 | VS2SC2411KR-1  | AC         |          | B         | Transistor (2SC2411KR)      | [Q102]  |
| 108 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R100]  |
| 109 | VRSTS2AD8662F  | AA         |          | C         | Resistor (1/10W 86.6KΩ ±1%) | [R101]  |
| 110 | VRS-TS2AD302J  | AA         |          | C         | Resistor (1/10W 3.0KΩ ±5%)  | [R102]  |
| 111 | VRSTS2AD4752F  | AA         |          | C         | Resistor (1/10W 47.5KΩ ±1%) | [R103]  |
| 112 | VRS-TS2AD000J  | AA         |          | C         | Resistor (1/10W 0Ω ±5%)     | [R104]  |
| 113 | VRS-TS2AD3R0J  | AA         |          | C         | Resistor (1/10W 3.0Ω ±5%)   | [R105]  |
| 114 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R106]  |
| 115 | VRS-TS2AD511J  | AA         |          | C         | Resistor (1/10W 510Ω ±5%)   | [R107]  |
| 116 | VRSTS2AD1183F  | AA         |          | C         | Resistor (1/10W 118KΩ ±1%)  | [R108]  |
| 117 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R109]  |
| 118 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R110]  |
| 119 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R111]  |
| 120 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R112]  |
| 121 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R113]  |
| 122 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R114]  |
| 123 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R115]  |
| 124 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R116]  |
| 125 | VRS-TP2BD000J  | AA         |          | C         | Resistor (1/8W 0Ω ±5%)      | [R117]  |
| 126 | VRSTS2AD8662F  | AA         |          | C         | Resistor (1/10W 86.6KΩ ±1%) | [R119]  |
| 127 | VRSTS2AD1742F  | AA         |          | C         | Resistor (1/10W 17.4KΩ ±1%) | [R120]  |
| 128 | VRS-TS2AD472J  | AA         |          | C         | Resistor (1/10W 4.7KΩ ±5%)  | [R121]  |
| 129 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R122]  |
| 130 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R123]  |
| 131 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R124]  |
| 132 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R125]  |
| 133 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R126]  |
| 134 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R127]  |
| 135 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R128]  |
| 136 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R129]  |
| 137 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R130]  |
| 138 | VRS-TS2AD472J  | AA         |          | C         | Resistor (1/10W 4.7KΩ ±5%)  | [R131]  |
| 139 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R132]  |
| 140 | VRS-TS2AD102J  | AA         |          | C         | Resistor (1/10W 1.0KΩ ±5%)  | [R133]  |
| 141 | VRS-TS2AD000J  | AA         |          | C         | Resistor (1/10W 0Ω ±5%)     | [R134]  |
| 142 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R135]  |
| 143 | VRS-TP2BD201J  | AA         |          | C         | Resistor (1/8W 200Ω ±5%)    | [R136]  |
| 144 | VRS-TS2AD562J  | AA         |          | C         | Resistor (1/10W 5.6KΩ ±5%)  | [R137]  |
| 145 | VRS-TS2AD820J  | AA         |          | C         | Resistor (1/10W 82Ω ±5%)    | [R138]  |
| 146 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R139]  |
| 147 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R141]  |
| 148 | VRS-TS2AD333J  | AA         |          | C         | Resistor (1/10W 33KΩ ±5%)   | [R142]  |
| 149 | VRS-TS2AD333J  | AA         |          | C         | Resistor (1/10W 33KΩ ±5%)   | [R143]  |
| 150 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R144]  |
| 151 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R145]  |
| 152 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R146]  |
| 153 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R147]  |
| 154 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R148]  |
| 155 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R149]  |
| 156 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R150]  |
| 157 | VRS-TS2AD201J  | AG         |          | C         | Resistor (1/10W 200Ω ±5%)   | [R151]  |
| 158 | VRS-TP2BD561J  | AA         |          | C         | Resistor (1/8W 560Ω ±5%)    | [R152]  |
| 159 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R153]  |
| 160 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R154]  |
| 161 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)   | [R155]  |
| 162 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R156]  |
| 163 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R157]  |
| 164 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R158]  |
| 165 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R159]  |
| 166 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R160]  |
| 167 | VRS-TS2AD100J  | AA         |          | C         | Resistor (1/10W 10Ω ±5%)    | [R162]  |

## 7 Control PWB

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                |        |
|-----|---------------|------------|----------|-----------|----------------------------|--------|
| 168 | VRS-TS2AD100J | AA         |          | C         | Resistor (1/10W 10Ω ±5%)   | [R163] |
| 169 | VRS-TS2AD100J | AA         |          | C         | Resistor (1/10W 10Ω ±5%)   | [R164] |
| 170 | VRS-TS2AD100J | AA         |          | C         | Resistor (1/10W 10Ω ±5%)   | [R165] |
| 171 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R166] |
| 172 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R167] |
| 173 | VRS-TS2AD100J | AA         |          | C         | Resistor (1/10W 10Ω ±5%)   | [R168] |
| 174 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R169] |
| 175 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R170] |
| 176 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R171] |
| 177 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R172] |
| 178 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R173] |
| 179 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R174] |
| 180 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R175] |
| 181 | VRS-TS2AD223J | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R176] |
| 182 | VRS-TS2AD623J | AA         |          | C         | Resistor (1/10W 62KΩ ±5%)  | [R177] |
| 183 | VRS-TS2AD474J | AA         |          | C         | Resistor (1/10W 470KΩ ±5%) | [R178] |
| 184 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R179] |
| 185 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R180] |
| 186 | VRS-TS2AD622J | AA         |          | C         | Resistor (1/10W 6.2KΩ ±5%) | [R181] |
| 187 | VRS-TS2AD000J | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R182] |
| 188 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R183] |
| 189 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R184] |
| 190 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R185] |
| 191 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R186] |
| 192 | VRS-TS2AD102J | AA         |          | C         | Resistor (1/10W 1.0KΩ ±5%) | [R187] |
| 193 | VRS-TS2AD3R0J | AA         |          | C         | Resistor (1/10W 3.0Ω ±5%)  | [R188] |
| 194 | VRS-TS2AD153J | AA         |          | C         | Resistor (1/10W 15KΩ ±5%)  | [R189] |
| 195 | VRS-TS2AD512J | AA         |          | C         | Resistor (1/10W 5.1KΩ ±5%) | [R190] |
| 196 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R191] |
| 197 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R192] |
| 198 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R193] |
| 199 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R194] |
| 200 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R195] |
| 201 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R196] |
| 202 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R197] |
| 203 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R198] |
| 204 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R199] |
| 206 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R201] |
| 207 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R202] |
| 208 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R203] |
| 209 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R204] |
| 210 | VRS-TS2AD332J | AA         |          | C         | Resistor (1/10W 3.3KΩ ±5%) | [R205] |
| 211 | VRS-TS2AD562J | AA         |          | C         | Resistor (1/10W 5.6KΩ ±5%) | [R206] |
| 212 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R207] |
| 213 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R208] |
| 214 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R209] |
| 215 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R210] |
| 216 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R211] |
| 217 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R212] |
| 218 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R213] |
| 219 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R214] |
| 220 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R215] |
| 221 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R216] |
| 222 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R217] |
| 223 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R218] |
| 224 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R219] |
| 225 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R220] |
| 226 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R221] |
| 227 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R222] |
| 228 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R225] |
| 229 | VRS-TS2AD102J | AA         |          | C         | Resistor (1/10W 1.0KΩ ±5%) | [R226] |
| 230 | VRS-TS2AD271J | AA         |          | C         | Resistor (1/10W 270Ω ±5%)  | [R228] |
| 231 | VRS-TS2AD820J | AA         |          | C         | Resistor (1/10W 82Ω ±5%)   | [R229] |
| 232 | VRS-TS2AD820J | AA         |          | C         | Resistor (1/10W 82Ω ±5%)   | [R230] |
| 233 | VRS-TS2AD511J | AA         |          | C         | Resistor (1/10W 510Ω ±5%)  | [R231] |
| 234 | VRS-TS2AD000J | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R232] |
| 235 | VRS-TS2AD471J | AA         |          | C         | Resistor (1/10W 470Ω ±5%)  | [R233] |
| 236 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R234] |
| 237 | VRS-TS2AD000J | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R235] |
| 238 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R236] |
| 239 | VRS-TS2AD471J | AA         |          | C         | Resistor (1/10W 470Ω ±5%)  | [R237] |
| 240 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R238] |
| 241 | VRS-TS2AD471J | AA         |          | C         | Resistor (1/10W 470Ω ±5%)  | [R239] |
| 242 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R240] |
| 243 | VRS-TS2AD471J | AA         |          | C         | Resistor (1/10W 470Ω ±5%)  | [R241] |
| 245 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R243] |
| 250 | VRS-TS2AD471J | AA         |          | C         | Resistor (1/10W 470Ω ±5%)  | [R248] |
| 251 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R249] |
| 252 | VRS-TS2AD103J | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R251] |
| 253 | RCRSB0297AFZZ | AD         |          | B         | Crystal (32.768KHz)        | [X1]   |



## 7 Control PWB

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                 |
|-----|---------------|------------|----------|-----------|-----------------------------|
| 254 | RCRSP2080SCZZ | AF         |          | B         | Crystal (24.00014MHz) [X2]  |
| 255 | VHERD22FB3/-1 | AC         |          | B         | Zener diode (RD22FB3) [ZD1] |
| 256 | TLABP3078SCZZ | AA         |          | D         | Shading label (for EP-ROM)  |
|     | (Unit)        |            |          |           |                             |
| 901 | DCEKC289GXHZZ | CA         | N        | E         | Control PWB unit            |
|     |               |            |          |           |                             |
|     |               |            |          |           |                             |
|     |               |            |          |           |                             |

## 8 TEL-Liu PWB unit

| NO. | PARTS CODE     | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                      |
|-----|----------------|------------|----------|-----------|----------------------------------|
| 1   | VHVDSS401M/-1  | AG         |          | B         | Varistor (DSS401M) [AR1]         |
| 2   | QTANZ2042SCZZ  | AB         |          | C         | Terminal (M1902-A) [ARG]         |
| 3   | VCEAEA1EW107M  | AB         |          | C         | Capacitor (25WV 100.0μF) [C1]    |
| 4   | VCQYNA1HM104K  | AB         |          | C         | Capacitor (50WV 0.10μF) [C2]     |
| 5   | VCEAEA1EW226M  | AA         |          | C         | Capacitor (25WV 22μF) [C3]       |
| 6   | VCQYNA1HM104K  | AB         |          | C         | Capacitor (50WV 0.10μF) [C4]     |
| 7   | VCQYNA1HM562K  | AC         |          | C         | Capacitor (50WV 5600PF) [C5]     |
| 8   | VCQYNA1HM104K  | AB         |          | C         | Capacitor (50WV 0.10μF) [C6]     |
| 9   | VCQYNA1HM473K  | AA         |          | C         | Capacitor (50WV 0.047μF) [C8]    |
| 10  | VCEAEA1CW336M  | AB         |          | C         | Capacitor (16WV 33μF) [C9]       |
| 11  | VCEAEA1HW105M  | AC         |          | C         | Capacitor (50WV 1.0μF) [C11]     |
| 12  | VCEAEA1HW104M  | AB         |          | C         | Capacitor (50WV 0.10μF) [C13]    |
| 13  | VCEAEA1HW104M  | AB         |          | C         | Capacitor (50WV 0.10μF) [C14]    |
| 14  | VCEAEA1HW104M  | AB         |          | C         | Capacitor (50WV 0.10μF) [C15]    |
| 15  | VCEAEA1HW104M  | AB         |          | C         | Capacitor (50WV 0.10μF) [C16]    |
| 16  | VCEAEA1HW334M  | AA         |          | C         | Capacitor (50WV 0.33μF) [C19]    |
| 17  | VCEAEA1HW475M  | AA         |          | C         | Capacitor (50WV 4.7μF) [C21]     |
| 18  | VCEAEA1HW475M  | AA         |          | C         | Capacitor (50WV 4.7μF) [C23]     |
| 19  | VCQYNA1HM104K  | AB         |          | C         | Capacitor (50WV 0.10μF) [C24]    |
| 20  | VCEAEA1HW106M  | AA         |          | C         | Capacitor (50WV 10.0μF) [C26]    |
| 21  | VCEAEA1HW104M  | AB         |          | C         | Capacitor (50WV 0.10μF) [C29]    |
| 22  | VCEAEA1HW225M  | AA         |          | C         | Capacitor (50WV 2.2μF) [C30]     |
| 23  | VCIFYJU2EA104K | AC         |          | C         | Capacitor (250WV 0.1μF) [C31]    |
| 24  | VCIFYJU2EA105K | AE         |          | C         | Capacitor (250WV 1.0μF) [C33]    |
| 25  | VCEAEA1HW105M  | AC         |          | C         | Capacitor (50WV 1.0μF) [C34]     |
| 26  | VCEAEA1HW475M  | AA         |          | C         | Capacitor (50WV 4.7μF) [C35]     |
| 27  | VCEAEA1HW475M  | AA         |          | C         | Capacitor (50WV 4.7μF) [C36]     |
| 28  | VCEAEA1EW476M  | AB         |          | C         | Capacitor (25WV 47μF) [C37]      |
| 29  | VCEAEA1EW476M  | AB         |          | C         | Capacitor (25WV 47μF) [C38]      |
| 30  | RC-EZ107VSC1C  | AC         |          | C         | Capacitor (16WV 100.0μF) [C39]   |
| 31  | VCEAEA1EW476M  | AB         |          | C         | Capacitor (25WV 47μF) [C40]      |
| 32  | VCIFYJU2EA474K | AD         |          | C         | Capacitor (250WV 0.47μF) [C41]   |
| 33  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C100]  |
| 34  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C101]  |
| 35  | VCKYTV1HF154Z  | AB         |          | C         | Capacitor (50WV 0.15μF) [C102]   |
| 36  | VCKYTV1HB333K  | AA         |          | C         | Capacitor (50WV 0.033μF) [C103]  |
| 37  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C104]  |
| 38  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C105]  |
| 39  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.01μF) [C106]   |
| 40  | VCKYTV1HB682K  | AA         |          | C         | Capacitor (50WV 6800PF) [C107]   |
| 41  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C111]  |
| 42  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C113]  |
| 43  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C114]  |
| 44  | VCKYTV1HB102K  | AA         |          | C         | Capacitor (50WV 0.0010μF) [C115] |
| 45  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C116]  |
| 46  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C118]  |
| 47  | VCKYTV1HF223Z  | AA         |          | C         | Capacitor (50WV 0.022μF) [C119]  |
| 48  | VCKYTV1HB222K  | AA         |          | C         | Capacitor (50WV 2200μF) [C120]   |
| 49  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C124]  |
| 50  | VCKYTV1HB103K  | AB         |          | C         | Capacitor (50WV 0.010μF) [C125]  |
| 51  | VCKYTV1HB102K  | AA         |          | C         | Capacitor (50WV 0.0010μF) [C126] |
| 52  | RRLYZ3420SCZZ  | AR         |          | B         | Relay (G6GN-2D) [CML]            |
| 53  | QCNCM7014SC0B  | AD         |          | C         | Connector (2pin) [CNLED]         |
| 54  | QCNCW2436SC4J  | AH         |          | C         | Connector (40pin) [CNLIU]        |
| 55  | QCNCW-4222XHZZ | AM         |          | C         | Jumper [CNPC]                    |
| 56  | QCNCM886HAFZZ  | AC         |          | C         | Connector (8pin) [CNPW]          |
| 57  | QCNCM2401SC0B  | AA         |          | C         | Connector (2pin) [CNSP]          |
| 58  | QCNCM7014SC1C  | AC         |          | C         | Connector (13pin) [CNTH]         |
| 59  | VHDDSS133///-1 | AA         |          | B         | Diode (DSS133) [D1]              |
| 60  | VHDDSS133///-1 | AA         |          | B         | Diode (DSS133) [D2]              |
| 61  | VHDDSS131///-1 | AA         |          | B         | Diode (DSS131) [D3]              |
| 62  | QSW-M2184SCZZ  | AD         |          | B         | Door-switch (MSS-10A-6) [DRSNS]  |
| 63  | VHPSG206///-1  | AE         |          | B         | Photo transistor (SG206) [FRSNS] |
| 64  | VHiMC34114/-1  | AK         |          | B         | IC (MC34114P) [IC1]              |
| 65  | VHiNJM4558D-1  | AN         |          | B         | IC (NJM4558D) [IC2]              |
| 66  | VHiNJM4558D-1  | AN         |          | B         | IC (NJM4558D) [IC3]              |
| 67  | VHiULN2003ANS  | AE         |          | B         | IC (ULN2003AN) [IC4]             |

## 8 TEL-Liu PWB unit

| NO. | PARTS CODE      | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                |           |
|-----|-----------------|------------|----------|-----------|----------------------------|-----------|
| 68  | VH i ULN2003ANS | AE         |          | B         | IC (ULN2003AN)             | [IC5]     |
| 69  | VH i NJM4558D-1 | AN         |          | B         | IC (NJM4558D)              | [IC6]     |
| 70  | VH i NJM2113D-1 | AF         |          | B         | IC (NJM2113D)              | [IC7]     |
| 71  | VH i BU4053BCF1 | AE         |          | B         | IC (BU4053BCF)             | [IC100]   |
| 72  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J100]    |
| 73  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J101]    |
| 74  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J102]    |
| 75  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J103]    |
| 76  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J104]    |
| 77  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J105]    |
| 78  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J106]    |
| 79  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J107]    |
| 80  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J108]    |
| 81  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J109]    |
| 82  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J110]    |
| 83  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J111]    |
| 84  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J112]    |
| 85  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J113]    |
| 86  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J114]    |
| 87  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J115]    |
| 88  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [J116]    |
| 89  | VRS-TP2BD000J   | AA         |          | C         | Resistor (1/8W 0Ω ±5%)     | [JP102]   |
| 90  | RC i LZ2096SCZZ | AB         |          | C         | Coil (SPT0203)             | [L1]      |
| 91  | RC i LZ2096SCZZ | AB         |          | C         | Coil (SPT0203)             | [L2]      |
| 92  | RC i LZ2096SCZZ | AB         |          | C         | Coil (SPT0203)             | [L3]      |
| 93  | RC i LZ2096SCZZ | AB         |          | C         | Coil (SPT0203)             | [L4]      |
| 94  | RC i LZ2096SCZZ | AB         |          | C         | Coil (SPT0203)             | [L5]      |
| 95  | QJAKZ2046SCBB   | AH         |          | C         | Jack                       | [MJ1/MJ2] |
| 96  | QJAKZ2046SCDB   | AH         |          | C         | Jack                       | [MJ1/MJ2] |
| 97  | QJAKZ2047SC0D   | AG         |          | C         | Jack                       | [MJTEL]   |
| 98  | VHPSG206///-1   | AE         |          | B         | Photo transistor (SG206)   | [ORGSNS]  |
| 99  | VHPPC817D///-1  | AD         |          | B         | Photo transistor (PC817D)  | [PC1]     |
| 100 | VHPPC817D///-1  | AD         |          | B         | Photo transistor (PC817D)  | [PC2]     |
| 101 | VHPPC817D///-1  | AD         |          | B         | Photo transistor (PC817D)  | [PC3]     |
| 102 | VHPPC851///-1   | AF         |          | B         | Photo transistor (PC851)   | [PC4]     |
| 103 | VHPPC814///-1   | AE         |          | B         | Photo transistor (PC814)   | [PC5]     |
| 104 | VHPPC817D///-1  | AD         |          | B         | Photo transistor (PC817D)  | [PC6]     |
| 105 | VHPSG206///-1   | AE         |          | B         | Photo transistor (SG206)   | [PSNS]    |
| 106 | VS2SC1740SR-1   | AB         |          | B         | Transistor (2SC1740SR)     | [Q1]      |
| 107 | VSBS108///-1    | AE         |          | B         | Transistor (BS108)         | [Q2]      |
| 108 | VS2SC3415-P-1   | AP         |          | B         | Transistor (2SC3415)       | [Q3]      |
| 109 | VS2SA1807-P-1   | AE         |          | B         | Transistor (2SA1807)       | [Q4]      |
| 110 | VRS-HT3AA300J   | AC         |          | C         | Resistor (1W 30Ω ±5%)      | [R1]      |
| 111 | VRD-HT2HY150J   | AA         |          | C         | Resistor (1/2W 15Ω ±5%)    | [R2]      |
| 112 | VRD-HT2HY150J   | AA         |          | C         | Resistor (1/2W 15Ω ±5%)    | [R3]      |
| 113 | VRS-HT3DA470J   | AA         |          | C         | Resistor (2W 47Ω ±5%)      | [R4]      |
| 114 | VRS-HT3AA333J   | AA         |          | C         | Resistor (1W 33KΩ ±5%)     | [R5]      |
| 115 | VRS-TS2AD243J   | AA         |          | C         | Resistor (1/10W 24KΩ ±5%)  | [R100]    |
| 116 | VRS-TS2AD511J   | AA         |          | C         | Resistor (1/10W 510Ω ±5%)  | [R101]    |
| 117 | VRS-TS2AD9R1J   | AA         | N        | C         | Resistor (1/10W 9.1Ω ±5%)  | [R102]    |
| 118 | VRS-TS2AD273J   | AA         |          | C         | Resistor (1/10W 27KΩ ±5%)  | [R103]    |
| 119 | VRS-TS2AD000J   | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R104]    |
| 120 | VRS-TS2AD203J   | AA         |          | C         | Resistor (1/10W 20KΩ ±5%)  | [R105]    |
| 121 | VRS-TS2AD822J   | AA         |          | C         | Resistor (1/10W 8.2KΩ ±5%) | [R106]    |
| 122 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R107]    |
| 123 | VRS-TS2AD622J   | AA         |          | C         | Resistor (1/10W 6.2KΩ ±5%) | [R108]    |
| 124 | VRS-TS2AD241J   | AA         |          | C         | Resistor (1/10W 240Ω ±5%)  | [R110]    |
| 125 | VRS-TS2AD241J   | AA         |          | C         | Resistor (1/10W 240Ω ±5%)  | [R111]    |
| 126 | VRS-TS2AD152J   | AA         |          | C         | Resistor (1/10W 1.5KΩ ±5%) | [R112]    |
| 127 | VRS-TS2AD104J   | AA         |          | C         | Resistor (1/10W 100KΩ ±5%) | [R113]    |
| 128 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R115]    |
| 129 | VRS-TS2AD363J   | AA         |          | C         | Resistor (1/10W 36KΩ ±5%)  | [R116]    |
| 130 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R117]    |
| 131 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R118]    |
| 132 | VRS-TS2AD103J   | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R119]    |
| 133 | VRS-TS2AD103J   | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)  | [R120]    |
| 134 | VRS-TS2AD000J   | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R121]    |
| 135 | VRS-TS2AD000J   | AA         |          | C         | Resistor (1/10W 0Ω ±5%)    | [R122]    |
| 136 | VRS-TS2AD363J   | AA         |          | C         | Resistor (1/10W 36KΩ ±5%)  | [R123]    |
| 137 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R124]    |
| 138 | VRS-TS2AD221J   | AA         |          | C         | Resistor (1/10W 220Ω ±5%)  | [R125]    |
| 139 | VRS-TS2AD221J   | AA         |          | C         | Resistor (1/10W 220Ω ±5%)  | [R126]    |
| 140 | VRS-TS2AD104J   | AA         |          | C         | Resistor (1/10W 100KΩ ±5%) | [R127]    |
| 141 | VRS-TS2AD104J   | AA         |          | C         | Resistor (1/10W 100KΩ ±5%) | [R128]    |
| 142 | VRS-TS2AD241J   | AA         |          | C         | Resistor (1/10W 240Ω ±5%)  | [R129]    |
| 143 | VRS-TS2AD241J   | AA         |          | C         | Resistor (1/10W 240Ω ±5%)  | [R130]    |
| 144 | VRS-TS2AD511J   | AA         |          | C         | Resistor (1/10W 510Ω ±5%)  | [R131]    |
| 145 | VRS-TS2AD132J   | AA         |          | C         | (1/10W 1.3KΩ ±5%)          | [R132]    |
| 146 | VRS-TS2AD361J   | AA         |          | C         | Resistor (1/10W 360Ω ±5%)  | [R134]    |
| 147 | VRS-TS2AD223J   | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)  | [R135]    |

## 8 TEL-Liu PWB unit

| NO. | PARTS CODE     | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                   |        |
|-----|----------------|------------|----------|-----------|-------------------------------|--------|
| 148 | VRS-TS2AD104J  | AA         |          | C         | Resistor (1/10W 100KΩ ±5%)    | [R136] |
| 149 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)     | [R137] |
| 150 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R139] |
| 151 | VRS-TS2AD152J  | AA         |          | C         | Resistor (1/10W 1.5KΩ ±5%)    | [R140] |
| 152 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R141] |
| 153 | VRS-TS2AD363J  | AA         |          | C         | Resistor (1/10W 36KΩ ±5%)     | [R142] |
| 154 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R143] |
| 155 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R144] |
| 156 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R145] |
| 157 | VRS-TS2AD104J  | AA         |          | C         | Resistor (1/10W 100KΩ ±5%)    | [R146] |
| 158 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R147] |
| 159 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R148] |
| 160 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R149] |
| 161 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)     | [R150] |
| 162 | VRS-TS2AD621J  | AA         |          | C         | Resistor (1/10W 620Ω ±5%)     | [R151] |
| 163 | VRS-TS2AD6040F | AA         |          | C         | Resistor (1/10W 604Ω ±5%)     | [R153] |
| 164 | VRS-TS2AD621J  | AA         |          | C         | Resistor (1/10W 620Ω ±5%)     | [R154] |
| 165 | VRS-TS2AD000J  | AA         |          | C         | Resistor (1/10W 0Ω ±5%)       | [R155] |
| 166 | VRS-TS2AD333J  | AA         |          | C         | Resistor (1/10W 33KΩ ±5%)     | [R156] |
| 167 | VRS-TS2AD472J  | AA         |          | C         | Resistor (1/10W 4.7KΩ ±5%)    | [R157] |
| 168 | VRS-TS2AD104J  | AA         |          | C         | Resistor (1/10W 100KΩ ±5%)    | [R158] |
| 169 | VRS-TS2AD153J  | AA         |          | C         | Resistor (1/10W 15KΩ ±5%)     | [R160] |
| 170 | VRS-TS2AD223J  | AA         |          | C         | Resistor (1/10W 22KΩ ±5%)     | [R163] |
| 171 | VRS-TS2AD103J  | AA         |          | C         | Resistor (1/10W 10KΩ ±5%)     | [R164] |
| 172 | VRS-TS2AD133J  | AA         |          | C         | Resistor (1/10W 13KΩ ±5%)     | [R165] |
| 173 | VRS-TS2AD000J  | AA         |          | C         | Resistor (1/10W 0Ω ±5%)       | [R166] |
| 174 | VRS-TS2AD124J  | AA         |          | C         | Resistor (1/10W 120KΩ ±5%)    | [R167] |
| 175 | VRS-TS2AD224J  | AA         |          | C         | Resistor (1/10W 220KΩ ±5%)    | [R168] |
| 176 | VRS-TS2AD000J  | AA         |          | C         | Resistor (1/10W 0Ω ±5%)       | [R169] |
| 177 | VRS-TS2AD154J  | AA         |          | C         | Resistor (1/10W 150KΩ ±5%)    | [R170] |
| 178 | VRS-TS2AD153J  | AA         |          | C         | Resistor (1/10W 15KΩ ±5%)     | [R171] |
| 179 | VRS-TS2AD221J  | AA         |          | C         | Resistor (1/10W 220Ω ±5%)     | [R172] |
| 180 | VRS-TS2AD332J  | AA         |          | C         | Resistor (1/10W 3.3KΩ ±5%)    | [R173] |
| 181 | VRS-TS2AD154J  | AA         |          | C         | Resistor (1/10W 150KΩ ±5%)    | [R174] |
| 182 | VRS-TS2AD910J  | AA         |          | C         | Resistor (1/10W 91Ω ±5%)      | [R175] |
| 183 | VRS-TS2AD221J  | AA         |          | C         | Resistor (1/10W 220Ω ±5%)     | [R182] |
| 184 | VRS-TS2AD300J  | AA         |          | C         | Resistor (1/10W 30Ω ±5%)      | [R183] |
| 185 | VRS-TS2AD203J  | AA         |          | C         | Resistor (1/10W 20KΩ ±5%)     | [R184] |
| 186 | VRS-TS2AD683J  | AA         |          | C         | Resistor (1/10W 68KΩ ±5%)     | [R185] |
| 187 | VHDS1ZB60-1    | AC         |          | B         | Diode bridge (S1ZB60)         | [REC1] |
| 188 | VHD0R5G4B42-1  | AF         | N        | B         | Diode bridge (0R5G4B42)       | [REC2] |
| 189 | QSW-Z2214SCZZ  | AH         |          | B         | Hook switch                   | [RHS]  |
| 190 | RTRNZ2140XHZZ  | AN         |          | B         | Transformer                   | [T1]   |
| 191 | RTRNZ2142XHZZ  | AR         |          | B         | Transformer (600Ω)            | [T2]   |
| 192 | RTRNZ2140XHZZ  | AN         |          | B         | Transformer                   | [T3]   |
| 193 | RRLYD3127QCZZ  | AH         |          | B         | Relay (JS1AF-24V)             | [THL]  |
| 194 | VRD-HT2EY000J  | AA         |          | C         | Resistor (1/4W 0Ω ±5%)        | [TP1]  |
| 195 | VRD-HT2EY000J  | AA         |          | C         | Resistor (1/4W 0Ω ±5%)        | [TP2]  |
| 196 | VRD-HT2EY000J  | AA         |          | C         | Resistor (1/4W 0Ω ±5%)        | [TP3]  |
| 197 | VRD-HT2EY000J  | AA         |          | C         | Resistor (1/4W 0Ω ±5%)        | [TP4]  |
| 198 | VRD-HT2EY000J  | AA         |          | C         | Resistor (1/4W 0Ω ±5%)        | [TP11] |
| 199 | VHVENC271D05A  | AB         |          | B         | Varistor (ENC271D05A)         | [VA1]  |
| 200 | VHVTN07G471-1  | AB         |          | B         | Varistor (TNR7G471KT2)        | [VA2]  |
| 201 | VHVTN07G471-1  | AB         |          | B         | Varistor (TNR7G471KT2)        | [VA3]  |
| 202 | RVR-Q1402QCZZ  | AD         |          | B         | Variable resistor (RS10M11AJ) | [VR1]  |
| 203 | VHEHZ11C3-1    | AB         |          | B         | Zener diode (HZ11C3)          | [ZD1]  |
| 204 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD2]  |
| 205 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD3]  |
| 206 | VHEMTZ6R8B-1   | AB         |          | B         | Zener diode (MTZ6R8B)         | [ZD4]  |
| 207 | VHEMTZJ300B-1  | AA         |          | B         | Zener diode (MTZ30)           | [ZD5]  |
| 208 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD6]  |
| 209 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD7]  |
| 210 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD8]  |
| 211 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD9]  |
| 212 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD10] |
| 213 | VHEHZS3B1-1    | AC         |          | B         | Zener diode (HZS3B1)          | [ZD11] |
| 214 | VHERD18EL2-1   | AA         |          | B         | Zener diode (RD18EL2)         | [ZD12] |
|     | (Unit)         |            |          |           |                               |        |
| 901 | DCEKL419AXH04  | BT         |          | E         | TEL-Liu PWB unit              |        |

## 9 Power supply PWB unit

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                               |      |
|-----|---------------|------------|----------|-----------|-------------------------------------------|------|
| 1   | 0CBUGFM224HG/ | AG         |          | C         | Film capacitor (QEX2E224KTP2CS)           | [C1] |
| 2   | 0CBUGFM224HG/ | AG         |          | C         | Film capacitor (QEX2E224KTP2CS)           | [C2] |
| 3   | 0CBUGCZ222CK/ | AF         |          | C         | Ceramic capacitor (DE1410-1E222MACT4K-KD) | [C3] |

## 9 Power supply PWB unit

| NO.    | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                                    |
|--------|---------------|------------|----------|-----------|------------------------------------------------|
| 4      | 0CBUGCZ222CK  | AF         |          | C         | Ceramic capacitor (DE1410-1E222MACT4K-KD) [C4] |
| 5      | 0CBUGBQ820BR  | AP         |          | C         | Capacitor (LGQ2G820MHSZ) [C5]                  |
| 6      | 0CBUGCU103BC  | AD         |          | C         | Ceramic capacitor (DE1307-1E103Z1K) [C6]       |
| 7      | 0CBUGCU221BQ  | AD         | N        | C         | Ceramic capacitor (DE0705-1R221K1K-MHR) [C7]   |
| 8      | 0CBUGFF103ER  | AC         |          | C         | Film capacitor (AMZF-103K50) [C8]              |
| 9      | 0CBUGFF683ER  | AD         |          | C         | Film capacitor (AMZF-683K50) [C9]              |
| 10     | 0CBUGFF472ER  | AB         |          | C         | Film capacitor (AMZF-472K50) [C10]             |
| 11     | 0CBUGFF102ER  | AC         |          | C         | Film capacitor (AMZF-102K50) [C11]             |
| 12     | 0CBUGCQ222AQ  | AE         |          | C         | Ceramic capacitor (DE7100-1F222MVA1-KC) [C12]  |
| 13     | 0CBUGCQ222AQ  | AE         |          | C         | Ceramic capacitor (DE7100-1F222MVA1-KC) [C13]  |
| 14     | 0CBUGAD101PS  | AF         | N        | C         | Capacitor (LXF25VB100(M)FM-6.3) [C14]          |
| 15     | 0CBUGAD470NT  | AD         | N        | C         | Capacitor (KMG25VB47(M)FM) [C15]               |
| 16     | 0CBUGAC122GK  | AG         |          | C         | Capacitor (UPL1C122MHH1AA) [C16]               |
| 17     | 0CBUGAC221HD  | AC         |          | C         | Capacitor (UVZ1C221MEH1AA) [C17]               |
| 18     | 0CBUGCS222AP  | AC         |          | C         | Ceramic capacitor (DD08-63E222P500) [C18]      |
| 19     | 0CBUGAE122NS  | AH         |          | C         | Capacitor (LXF35VB1200(M)MC-12.5) [C19]        |
| 20     | 0CBUGAE221HD  | AD         |          | C         | Capacitor (UVZ1V221MPH1AA) [C20]               |
| 21     | 0CBUGFF471ER  | AC         |          | C         | Film capacitor (AMZF-471K50) [C21]             |
| 22     | 0CBPKZ0194ZZ  | AC         |          | C         | Base post ass'y (B2P3-VH) [CN1]                |
| 23     | 0CBPCZ0173ZZ  | AF         |          | C         | Connector (08R-FJ) [CN2]                       |
| 24     | 0CBPCZ0160ZZ  | AE         |          | C         | Connector (M1698(MEP1698)) [CN3-1]             |
| 25     | 0CBPZZ0739ZZ  | AE         |          | C         | Bush (M1773(MOL1773)) [CN3-2]                  |
| 26     | 0CBUBB0149DZ  | AH         |          | B         | Diode stack (D3SBA60) [D1]                     |
| 27     | 0CBUBC0220BZ  | AD         |          | B         | Diode (1NU41) [D2]                             |
| 28     | VHD1N4148-1   | AA         |          | B         | Diode (1SS55) [D3]                             |
| 29     | 0CBUBC0182BL  | AE         |          | B         | Diode (10ELS2-TA1B2) [D4]                      |
| 30     | 0CBUBC0280BZ  | AC         |          | B         | Diode (11EQ04) [D5]                            |
| 31     | 0CBUBB0166BB  | AK         |          | B         | Diode stack (F10P20F-L) [D6]                   |
| 32     | 0CBPJCCZ0037  | AG         |          | A         | Current fuse (19181 1.25A) [F1]                |
| 33     | 0CBPJCCZ0037  | AG         |          | A         | Current fuse (19181 1.25A) [F2]                |
| 34     | 0CBPJCT0153ZZ | AE         |          | A         | Thermal cutoff (EVP2BH115FF) [F3]              |
| 35     | 0CBBFZ89154Z  | AC         |          | C         | Ferrite core (BL01RN1-A62B1) [FB1]             |
| 36     | 0CBUC0013DZ   | AM         |          | B         | IC (UPC78N12H) [IC1]                           |
| 37     | 0CBUCB0112AZ  | AK         |          | B         | IC (NJM7805FA) [IC2]                           |
| 38     | 0CBUKZ0578ZZ  | AH         |          | C         | Filter (PLAA2230R4R01B1) [L1]                  |
| 39     | 0CBUKZ0578ZZ  | AH         |          | C         | Filter (PLAA2230R4R01B1) [L2]                  |
| 40     | 0CBLRH0356ZQ  | AN         | N        | C         | Heat sink (D2178-5001BT EZS) [MT1]             |
| 41     | 0CBLRH0343ZP  | AH         |          | C         | Heat sink (D2178-5002A TC) [MT2]               |
| 42     | 0CBUDC0139AZ  | AN         |          | B         | Photo coupler (PC113Y11) [PC1]                 |
| 43     | 0CBUAG0139AZ  | AQ         | N        | B         | FET (2SK2483) [Q1]                             |
| 44     | 0CBUAC0056BZ  | AD         |          | B         | Transistor (2SC2002-L) [Q2]                    |
| 45     | 0CBUAC0098EZ  | AK         |          | B         | Transistor (2SC3518-K) [Q3]                    |
| 46     | 0CBUAC0004DZ  | AC         |          | B         | Transistor (2SC945-PA) [Q4]                    |
| 47     | 0CBUEFC564BA  | AC         |          | C         | Metal film resistor (SFR25H560K) [R1]          |
| 48     | 0CBUEFER22CF  | AD         | N        | C         | Metal film resistor (SPRX2-T52-R22J) [R2]      |
| 49     | 0CBUEEB471CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-471J) [R3]          |
| 50     | 0CBUEEB183CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-183J) [R4]          |
| 51     | 0CBUEEB564CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-564J) [R5]          |
| 52     | 0CBUEEB564CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-564J) [R6]          |
| 53     | 0CBUEFE823CG  | AC         |          | C         | Metal film resistor (RSS2 823J) [R7]           |
| 54     | 0CBUEFE823CG  | AC         |          | C         | Metal film resistor (RSS2 823J) [R8]           |
| 55     | 0CBUEFE391CL  | AC         |          | C         | Metal film resistor (RSS2-L15-391J) [R9]       |
| 56     | 0CBUEEB330CW  | AC         | N        | C         | Carbon resistor (RDF16S-T26-330J) [R10]        |
| 57     | 0CBUEFD561CC  | AD         | N        | C         | Metal film resistor (RSS1-T52-561J) [R11]      |
| 58     | 0CBUEEB222CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-222J) [R12]         |
| 59     | 0CBUEEB271CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-271J) [R13]         |
| 60     | 0CBUEEB682CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-682J) [R14]         |
| 61     | 0CBUEEB242CT  | AC         | N        | C         | Carbon resistor (RD16S-T26-242J) [R15]         |
| 62     | 0CBUEFF102BG  | AC         |          | C         | Metal film resistor (RSS3 102J) [R16]          |
| 63     | 0CB829650003  | BD         | N        | B         | Transformer (PT-P83-KTT) [T1]                  |
| 64     | 0CBUDZ0052ZZ  | AG         |          | B         | Thermistor (M16007C) [TH1]                     |
| 65     | 0CBUEZ0507ZZ  | AD         | N        | B         | Varistor (ERZV07D471-CS) [V1]                  |
| 66     | 0CBUERABH911  | AE         |          | B         | Varistor (NV910D10) [V2]                       |
| 67     | 0CBUFBA501DC  | AC         |          | B         | Variable resistor (KVSF637AB501) [VR1]         |
| 68     | 0CBUBDAC270D  | AC         |          | B         | Zener diode (RD27ESAB3) [ZD1]                  |
| 69     | 0CBUBDBW3R6B  | AB         |          | B         | Zener diode (MTZJ T-72 3.6A) [ZD2]             |
| 70     | 0CBUBDAE300D  | AD         |          | B         | Zener diode (RD30FB3) [ZD3]                    |
| 71     | 0CBUBDBW6R2C  | AB         |          | B         | Zener diode (MTZJ T-72 6.2B) [ZD4]             |
| (Unit) |               |            |          |           |                                                |
| 901    | RDENT2085XHZZ | BA         | N        | E         | Power supply PWB unit                          |

## 10 CCD PWB unit

| NO. | PARTS CODE    | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION                 |
|-----|---------------|------------|----------|-----------|-----------------------------|
| 1   | VCEAJA1EW226M | AB         |          | C         | Capacitor (25WV 22μF) [C1]  |
| 2   | VCKYTQ1EF104Z | AA         |          | C         | Capacitor (25WV 0.1μF) [C2] |



## Index

| PARTS CODE    | NO.   | PRICE RANK | NEW MARK | PART RANK |
|---------------|-------|------------|----------|-----------|
| [C]           |       |            |          |           |
| CCNW-4268XH01 | 1- 36 | AE         |          | C         |
| CCNW-4270XH01 | 3- 1  | AU         |          | C         |
| CCNW-4350XH01 | 1- 1  | AA         |          | C         |
| CPNLH2350XH10 | 1- 2  | BM         | N        | D         |
| "             |       |            |          |           |
| [D]           |       |            |          |           |
| DCEKC289GXHZ  | 1- 15 | CA         |          | E         |
| "             |       |            |          |           |
| DCEKD281AXH02 | 5- 1  | BV         |          | E         |
| "             |       |            |          |           |
| DCEKL419AXH04 | 1- 16 | BT         |          | E         |
| "             |       |            |          |           |
| DCEKP363AXH02 | 2- 1  | BG         | N        | E         |
| DUNTK4925XHW2 | 6- 11 | AY         |          | E         |
| [G]           |       |            |          |           |
| GCABA2245XHZE | 2- 2  | AZ         | N        | D         |
| GCABB2247XHXA | 1- 3  | BA         |          | D         |
| GCOVA2341XHZA | 1- 44 | AK         |          | D         |
| GCOVH2348XHZZ | 3- 2  | AH         |          | C         |
| GDAI-2067XHZE | 1- 10 | AV         |          | C         |
| GLEGG2036XHZZ | 1- 18 | AA         |          | C         |
| GLEGG2058SCZA | 1- 48 | AD         |          | C         |
| [H]           |       |            |          |           |
| HPNLH2350XHZZ | 2- 3  | AC         |          | D         |
| [J]           |       |            |          |           |
| JBTN-2085XHZA | 2- 4  | AR         |          | C         |
| JBTN-2086XHZA | 2- 5  | AQ         |          | C         |
| JBTN-2088XHZA | 2- 6  | AP         |          | C         |
| JBTN-2127XHZA | 2- 7  | AF         |          | C         |
| JBTN-2128XHZA | 2- 8  | AD         |          | C         |
| JKNBP2065XHZA | 2- 9  | AC         |          | C         |
| [L]           |       |            |          |           |
| LBNDJ2006XHZZ | 1- 37 | AA         |          | C         |
| LBSHP2057XHZZ | 1- 30 | AB         |          | C         |
| LFRM-2147XHYA | 5- 2  | AV         | N        | C         |
| LPLTG2593XHZZ | 3- 3  | AG         |          | C         |
| LPLTM2665XHZZ | 4- 1  | AM         |          | C         |
| LPLTM2704XHZZ | 1- 20 | AT         |          | C         |
| LPLTP2650XHZA | 4- 16 | AK         |          | C         |
| LPLTP2651XHZA | 4- 19 | AH         |          | C         |
| LPLTP2655XHZA | 4- 2  | AM         |          | C         |
| LPLTP2699XHZZ | 2- 10 | AC         |          | C         |
| LPLTP2700XHZZ | 3- 4  | AC         |          | C         |
| LPLTP2701XHZZ | 3- 5  | AC         |          | C         |
| LPLTP2703XHZZ | 3- 6  | AC         |          | C         |
| LX-BZ2138XHZZ | 50-B1 | AB         |          | C         |
| LX-BZ2182XHZZ | 50-B2 | AB         |          | C         |
| LX-WZ2047XHZZ | 50-W1 | AK         |          | C         |
| LX-WZ2050XHZZ | 50-W3 | AK         |          | C         |
| LX-WZ2060XHZZ | 50-W2 | AB         |          | C         |
| [M]           |       |            |          |           |
| MLEVP2171XHZZ | 1- 38 | AC         |          | C         |
| MLEVP2172XHZA | 1- 8  | AC         |          | C         |
| MLEVP2173XHZZ | 1- 39 | AC         |          | C         |
| MLEVP2174XHZZ | 3- 7  | AH         |          | C         |
| MROD-2004XHZA | 1- 45 | AC         |          | C         |
| MSPRC2536XHZZ | 4- 3  | AC         |          | C         |
| MSPRC2537XHZA | 4- 17 | AB         |          | C         |
| MSPRC2544XHZZ | 1- 40 | AB         |          | C         |
| MSPRC2641XHZZ | 2- 11 | AB         |          | C         |
| MSPRC2689XHZZ | 1- 41 | AC         |          | C         |
| MSPRC2690XHZZ | 3- 22 | AB         |          | C         |
| MSPRC2691XHZZ | 3- 8  | AB         |          | C         |
| MSPRC2692XHZZ | 3- 9  | AB         |          | C         |
| MSPRC2693XHZZ | 3- 10 | AB         |          | C         |
| MSPRC2719XHZZ | 1- 12 | AA         |          | C         |
| MSPRC2725XHZZ | 3- 11 | AC         |          | C         |
| MSPRC2727XHZZ | 1- 9  | AC         |          | C         |
| MSPRP2512XHZZ | 5- 3  | AK         |          | C         |
| MSPRP2618XHZZ | 5- 4  | AD         |          | C         |
| MSPRP2619XHZZ | 5- 5  | AD         |          | C         |
| MSPRP2687XHZZ | 1- 5  | AC         |          | C         |
| MSPRP2688XHZZ | 3- 12 | AC         |          | C         |
| [N]           |       |            |          |           |
| NBRGP2138XHZZ | 1- 6  | AD         |          | C         |
| NBRGP2141XHZZ | 3- 19 | AH         |          | C         |
| NGERH2163XHZZ | 4- 4  | AK         |          | C         |
| "             |       |            |          |           |
| NGERH2197XHZZ | 4- 5  | AF         |          | C         |

| PARTS CODE     | NO.    | PRICE RANK | NEW MARK | PART RANK |
|----------------|--------|------------|----------|-----------|
| [P]            |        |            |          |           |
| NGERH2198XHZA  | 4- 6   | AG         | N        | C         |
| NGERH2199XHZA  | 4- 7   | AH         | N        | C         |
| NGERH2201XHZA  | 4- 8   | AG         | N        | C         |
| NGERH2202XHZZ  | 4- 9   | AE         |          | C         |
| NGERH2204XHZZ  | 1- 26  | AM         |          | C         |
| NGERH2205XHZA  | 1- 28  | AF         |          | C         |
| NGERH2207XHZZ  | 3- 20  | AD         |          | C         |
| NGERH2210XHZA  | 4- 10  | AC         | N        | C         |
| NGERH2259XHZA  | 1- 31  | AC         | N        | C         |
| NGERH2260XHZA  | 1- 42  | AC         | N        | C         |
| NGERP2206XHZZ  | 2- 12  | AE         |          | C         |
| NR0LP2249XHZZ  | 1- 7   | AE         |          | C         |
| NR0LP2300XHZZ  | 3- 13  | AC         |          | C         |
| NR0LR2293XHZZ  | 1- 27  | AM         |          | C         |
| NR0LR2294XHZZ  | 1- 29  | AR         |          | C         |
| NR0LR2295XHZZ  | 3- 21  | AQ         |          | C         |
| NR0LR2296XHZZ  | 1- 32  | AC         |          | C         |
| NSFTZ2228SCZZ  | 3- 14  | AC         |          | C         |
| [P]            |        |            |          |           |
| PCUSS2075XHZZ  | 5- 14  | AA         | N        | C         |
| PCUSS2076XHZZ  | 5- 15  | AA         | N        | C         |
| PGIDM2289XHZZ  | 1- 14  | AB         |          | C         |
| PGIDP2403XHZZ  | 3- 15  | BA         | N        | C         |
| PGIDP2404XHZA  | 2- 13  | AX         |          | C         |
| PGIDP2405XHZA  | 2- 14  | AX         |          | C         |
| PGLSP2043XHZZ  | 5- 6   | AK         |          | C         |
| PHOP-2080XHZZ  | 6- 1   | AF         |          | D         |
| PLNS-2043XHZZ  | 5- 7   | AU         |          | B         |
| PMAGE2054XHZZ  | 4- 11  | AK         |          | B         |
| PMIR-2061XHZZ  | 5- 8   | AH         |          | C         |
| PMIR-2062XHZZ  | 5- 9   | AM         |          | C         |
| PSHEZ2879XHZZ  | 5- 10  | AK         |          | C         |
| PSHEZ2915XHZZ  | 5- 11  | AY         |          | C         |
| PSHEZ3031XHZZ  | 1- 33  | AA         |          | C         |
| PSHEZ3032XHZA  | 3- 16  | AC         | N        | C         |
| PSHEZ3034XHZZ  | 2- 15  | AC         |          | C         |
| PSHEZ3086XHZZ  | 1- 54  | AR         |          | C         |
| PSHEZ3093XHOG  | 1- 53  | AF         |          | C         |
| PSHEZ3115XHZZ  | 1- 55  | AD         | N        | C         |
| PSPAZ2199XHZZ  | 1- 52  | AQ         |          | C         |
| PTME-2038XHZA  | 4- 12  | AK         |          | C         |
| PTME-2040XHZZ  | 4- 13  | AK         |          | C         |
| [Q]            |        |            |          |           |
| QACCL762ASCZZ  | 1- 17  | AW         |          | B         |
| QCNCM2401SC0B  | 8- 57  | AA         |          | C         |
| QCNCM2436SC4J  | 7- 74  | AH         |          | C         |
| QCNCM2482SC1H  | 7- 77  | AE         |          | C         |
| QCNCM7014SC0B  | 7- 76  | AD         |          | C         |
| "              |        |            |          |           |
| QCNCM7014SC0F  | 7- 75  | AB         |          | C         |
| QCNCM7014SC0G  | 7- 73  | AB         |          | C         |
| QCNCM7014SC1C  | 8- 58  | AC         |          | C         |
| QCNCM886HAFZZ  | 8- 56  | AC         |          | C         |
| QCNCW2436SC4J  | 8- 54  | AH         |          | C         |
| QCNCW-3976XHOG | 6- 8   | AT         |          | C         |
| QCNCW-4222XHZZ | 8- 55  | AM         |          | C         |
| QCNCW-4273XHZZ | 5- 12  | AE         |          | C         |
| QCNCW-4275XHZZ | 4- 14  | AE         |          | C         |
| QCNCW-4296XHZZ | 3- 17  | AE         |          | C         |
| QCNCW-4318XHZZ | 10- 3  | AK         |          | C         |
| QJAKZ2046SCBB  | 8- 95  | AH         |          | C         |
| QJAKZ2046SCDB  | 8- 96  | AH         |          | C         |
| QJAKZ2047SC0D  | 8- 97  | AG         |          | C         |
| QSOCZ2051SC32  | 7- 92  | AC         |          | C         |
| QSW-M2184SCZZ  | 8- 62  | AD         |          | B         |
| QSW-Z2214SCZZ  | 8- 189 | AH         |          | B         |
| QTANZ2042SCZZ  | 8- 2   | AB         |          | C         |
| [R]            |        |            |          |           |
| RC-EZ107VSC1C  | 8- 30  | AC         |          | C         |
| RC-EZ2032SCZZ  | 7- 2   | AB         |          | C         |
| "              |        |            |          |           |
| RCILZ1044CCZZ  | 7- 100 | AC         |          | C         |
| "              |        |            |          |           |
| RCILZ2096SCZZ  | 8- 90  | AB         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| "              |        |            |          |           |
| "              |        |            |          |           |
| "              |        |            |          |           |
| RCILZ2104SCZZ  | 7- 101 | AK         |          | C         |
| RCORF2064XHZZ  | 1- 47  | AF         | N        | B         |

| PARTS CODE     | NO.    | PRICE RANK | NEW MARK | PART RANK |
|----------------|--------|------------|----------|-----------|
| [S]            |        |            |          |           |
| RCSRB0297AFZZ  | 7- 253 | AD         |          | B         |
| RCSRSP2080SCZZ | 7- 254 | AF         |          | B         |
| RDENT2085XHZZ  | 1- 21  | BA         |          | E         |
| "              |        |            |          |           |
| RHEDZ2044XHZA  | 3- 18  | BK         |          | B         |
| RMOTZ2104SCZZ  | 4- 15  | AX         |          | B         |
| RRLYD3127QCZZ  | 8- 193 | AH         |          | B         |
| RRLYZ3420SCZZ  | 8- 52  | AR         |          | B         |
| RTRN12142XHZZ  | 8- 191 | AR         |          | B         |
| RTRNZ2140XHZZ  | 8- 190 | AN         |          | B         |
| "              |        |            |          |           |
| RVR-Q1402QCZZ  | 8- 202 | AD         |          | B         |
| [S]            |        |            |          |           |
| SPAKA4346XHZZ  | 6- 17  | AH         |          | D         |
| SPAKA4355XHZZ  | 6- 12  | AD         |          | D         |
| SPAKA4356XHZZ  | 6- 13  | AD         |          | D         |
| SPAKA4363XHZZ  | 6- 9   | AB         |          | D         |
| SPAKC4603XHZZ  | 6- 14  | AS         | N        | D         |
| SPAKP3385SCZZ  | 6- 15  | AG         |          | D         |
| SSAKA0003HCZZ  | 6- 2   | AA         |          | D         |
| SSAKA3001CCZZ  | 6- 10  | AA         |          | D         |
| [T]            |        |            |          |           |
| TCADZ2264XHZZ  | 6- 16  | AD         |          | D         |
| TGANE2036XHZZ  | 6- 6   | AK         |          | D         |
| TINSE3479XHZZ  | 6- 4   | AN         |          | D         |
| TLABH3463XHZA  | 6- 5   | AC         |          | D         |
| TLABP3078SCZZ  | 7- 256 | AA         |          | D         |
| TLABS3522XHZZ  | 1- 57  | AA         |          | D         |
| TLABS3523XHZZ  | 1- 56  | AA         |          | D         |
| TLABZ3418XHZZ  | 1- 58  | AA         |          | D         |
| [U]            |        |            |          |           |
| UBATL2033SCZZ  | 7- 1   | AK         |          | B         |
| [V]            |        |            |          |           |
| VCCCTV1HH180J  | 7- 50  | AA         |          | C         |
| VCCCTV1HH330J  | 7- 22  | AA         |          | C         |
| "              |        |            |          |           |
| VCCCTV1HH390J  | 7- 17  | AA         |          | C         |
| VCCSTV1HL102J  | 7- 12  | AA         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| VCCSTV1HL391J  | 7- 14  | AA         |          | C         |
| VCEAEA1AW476M  | 7- 10  | AB         |          | C         |
| VCEAEA1CW106M  | 7- 6   | AC         |          | C         |
| "              |        |            |          |           |
| VCEAEA1CW336M  | 7- 8   | AB         |          | C         |
| "              |        |            |          |           |
| VCEAEA1EW107M  | 8- 3   | AB         |          | C         |
| VCEAEA1EW226M  | 7- 9   | AA         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| VCEAEA1EW475M  | 7- 5   | AA         |          | C         |
| VCEAEA1EW476M  | 8- 28  | AB         |          | C         |
| "              |        |            |          |           |
| VCEAEA1HW104M  | 8- 12  | AB         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| VCEAEA1HW105M  | 8- 21  | AC         |          | C         |
| "              |        |            |          |           |
| VCEAEA1HW106M  | 8- 20  | AA         |          | C         |
| VCEAEA1HW225M  | 7- 4   | AA         |          | C         |
| "              |        |            |          |           |
| VCEAEA1HW334M  | 8- 16  | AA         |          | C         |
| VCEAEA1HW475M  | 8- 17  | AA         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| VCEAJA1EW226M  | 10- 1  | AB         |          | C         |
| VCFYJU2EA104K  | 8- 23  | AC         |          | C         |
| VCFYJU2EA105K  | 8- 24  | AE         |          | C         |
| VCFYJU2EA474K  | 8- 32  | AD         |          | C         |
| VCKYTQ1C7225Z  | 7- 38  | AC         |          | C         |
| VCKYTQ1EF104Z  | 10- 2  | AA         |          | C         |
| VCKYTV1CF105Z  | 7- 13  | AB         |          | C         |
| "              |        |            |          |           |
| "              |        |            |          |           |
| "              |        |            |          |           |
| "              |        |            |          |           |

| PARTS CODE    | NO.    | PRICE RANK | NEW MARK | PART RANK |
|---------------|--------|------------|----------|-----------|
| VCKYTV1CF105Z | 7- 32  | AB         |          | C         |
| "             | 7- 39  | AB         |          | C         |
| "             | 7- 59  | AB         |          | C         |
| VCKYTV1EB104K | 7- 15  | AA         |          | C         |
| "             | 7- 23  | AA         |          | C         |
| VCKYTV1EF104Z | 7- 19  | AA         |          | C         |
| "             | 7- 21  | AA         |          | C         |
| "             | 7- 26  | AA         |          | C         |
| "             | 7- 28  | AA         |          | C         |
| "             | 7- 30  | AA         |          | C         |
| "             | 7- 43  | AA         |          | C         |
| "             | 7- 45  | AA         |          | C         |
| "             | 7- 46  | AA         |          | C         |
| "             | 7- 49  | AA         |          | C         |
| "             | 7- 51  | AA         |          | C         |
| "             | 7- 52  | AA         |          | C         |
| "             | 7- 53  | AA         |          | C         |
| "             | 7- 55  | AA         |          | C         |
| "             | 7- 57  | AA         |          | C         |
| "             | 7- 58  | AA         |          | C         |
| "             | 7- 64  | AA         |          | C         |
| "             | 7- 65  | AA         |          | C         |
| "             | 7- 66  | AA         |          | C         |
| "             | 7- 71  | AA         |          | C         |
| VCKYTV1HB102K | 8- 44  | AA         |          | C         |
| "             | 8- 51  | AA         |          | C         |
| VCKYTV1HB103K | 7- 47  | AB         |          | C         |
| "             | 8- 33  | AB         |          | C         |
| "             | 8- 34  | AB         |          | C         |
| "             | 8- 37  | AB         |          | C         |
| "             | 8- 38  | AB         |          | C         |
| "             | 8- 39  | AB         |          | C         |
| "             | 8- 49  | AB         |          | C         |
| "             | 8- 50  | AB         |          | C         |
| VCKYTV1HB222K | 7- 33  | AA         |          | C         |
| "             | 7- 34  | AA         |          | C         |
| "             | 7- 35  | AA         |          | C         |
| "             | 7- 36  | AA         |          | C         |
| "             | 7- 37  | AA         |          | C         |
| "             | 7- 41  | AA         |          | C         |
| "             | 7- 42  | AA         |          | C         |
| "             | 7- 44  | AA         |          | C         |
| "             | 7- 54  | AA         |          | C         |
| "             | 7- 56  | AA         |          | C         |
| "             | 7- 60  | AA         |          | C         |
| "             | 7- 61  | AA         |          | C         |
| "             | 7- 62  | AA         |          | C         |
| "             | 7- 63  | AA         |          | C         |
| "             | 7- 70  | AA         |          | C         |
| "             | 8- 48  | AA         |          | C         |
| VCKYTV1HB333K | 8- 36  | AA         |          | C         |
| VCKYTV1HB472K | 7- 48  | AA         |          | C         |
| VCKYTV1HB682K | 8- 40  | AA         |          | C         |
| VCKYTV1HF154Z | 8- 35  | AB         |          | C         |
| VCKYTV1HF223Z | 7- 72  | AA         |          | C         |
| "             | 8- 41  | AA         |          | C         |
| "             | 8- 42  | AA         |          | C         |
| "             | 8- 43  | AA         |          | C         |
| "             | 8- 45  | AA         |          | C         |
| "             | 8- 46  | AA         |          | C         |
| "             | 8- 47  | AA         |          | C         |
| VCQYNA1HM104K | 8- 4   | AB         |          | C         |
| "             | 8- 6   | AB         |          | C         |
| "             | 8- 8   | AB         |          | C         |
| "             | 8- 19  | AB         |          | C         |
| VCQYNA1HM473K | 8- 9   | AA         |          | C         |
| VCQYNA1HM562K | 8- 7   | AC         |          | C         |
| VHDDAP202U/-1 | 7- 80  | AB         |          | B         |
| VHDDSS131/-1  | 8- 61  | AA         |          | B         |
| VHDDSS133/-1  | 8- 59  | AA         |          | B         |
| "             | 8- 60  | AA         |          | B         |
| VHDS1ZB60/-1  | 8- 187 | AC         |          | B         |
| VHD0R5G4B42-1 | 8- 188 | AF         | N        | B         |
| VHD1N4148/-1  | 9- 28  | AA         |          | B         |
| VHD1SS355/-1  | 7- 78  | AB         |          | B         |
| "             | 7- 79  | AB         |          | B         |
| "             | 7- 81  | AB         |          | B         |
| VHEHZS3B1/-1  | 8- 204 | AC         |          | B         |
| "             | 8- 205 | AC         |          | B         |
| "             | 8- 208 | AC         |          | B         |

| PARTS CODE    | NO.    | PRICE RANK | NEW MARK | PART RANK |
|---------------|--------|------------|----------|-----------|
| VHEHZS3B1/-1  | 8- 209 | AC         |          | B         |
| "             | 8- 210 | AC         |          | B         |
| "             | 8- 211 | AC         |          | B         |
| "             | 8- 212 | AC         |          | B         |
| "             | 8- 213 | AC         |          | B         |
| VHEHZ11C3/-1  | 8- 203 | AB         |          | B         |
| VHEMTZJ300B-1 | 8- 207 | AA         |          | B         |
| VHEMTZ6R8B/-1 | 8- 206 | AB         |          | B         |
| VHERD18EL2/-1 | 8- 214 | AA         |          | B         |
| VHERD22FB3/-1 | 7- 255 | AC         |          | B         |
| VHIBU4053BCF1 | 8- 71  | AE         |          | B         |
| VHILH5116NA10 | 7- 89  | AL         |          | B         |
| VHILH5160N10Y | 7- 87  | AR         |          | B         |
| VHILZ9FJ11/-1 | 7- 88  | AY         |          | B         |
| VHIMC34114/-1 | 8- 64  | AK         |          | B         |
| VHINJM2113D-1 | 8- 70  | AF         |          | B         |
| VHINJM2903M/- | 7- 99  | AD         |          | B         |
| VHINJM2904M-1 | 7- 95  | AE         |          | B         |
| VHINJM4558D-1 | 8- 65  | AN         |          | B         |
| "             | 8- 66  | AN         |          | B         |
| "             | 8- 69  | AN         |          | B         |
| VHINJM4558F-1 | 7- 97  | AD         |          | B         |
| VHINJU6355E-1 | 7- 96  | AM         |          | B         |
| VHIPST591CMT1 | 7- 98  | AE         |          | B         |
| VHIR96SHF/-1  | 7- 84  | BD         |          | B         |
| VHITCD1206UP1 | 10- 4  | AX         |          | B         |
| VHITLS1019/-1 | 7- 86  | AU         |          | B         |
| VHIULN2003ANS | 7- 91  | AE         |          | B         |
| "             | 8- 67  | AE         |          | B         |
| "             | 8- 68  | AE         |          | B         |
| VHIW2465S70LL | 7- 90  | AW         |          | B         |
| VHIZ80180FSC6 | 7- 85  | AX         |          | B         |
| VHI27010F5F0C | 7- 92  | BM         | N        | B         |
| VHPPC814///-1 | 8- 103 | AE         |          | B         |
| VHPPC817D/-1  | 8- 99  | AD         |          | B         |
| "             | 8- 100 | AD         |          | B         |
| "             | 8- 101 | AD         |          | B         |
| "             | 8- 104 | AD         |          | B         |
| VHPPC851///-1 | 8- 102 | AF         |          | B         |
| VHPSG206///-1 | 8- 63  | AE         |          | B         |
| "             | 8- 98  | AE         |          | B         |
| "             | 8- 105 | AE         |          | B         |
| VHPSNK08A24-1 | 5- 13  | AZ         |          | B         |
| VHVDSS401M/-1 | 8- 1   | AG         |          | B         |
| VHVENC271D05A | 8- 199 | AB         |          | B         |
| VHVICPS05/-1  | 7- 83  | AA         |          | B         |
| VHVICPS07/-1  | 7- 82  | AA         |          | B         |
| VHVTN07G471-1 | 8- 200 | AB         |          | B         |
| "             | 8- 201 | AB         |          | B         |
| VRD-HT2EY000J | 8- 194 | AA         |          | C         |
| "             | 8- 195 | AA         |          | C         |
| "             | 8- 196 | AA         |          | C         |
| "             | 8- 197 | AA         |          | C         |
| "             | 8- 198 | AA         |          | C         |
| VRD-HT2HY150J | 8- 111 | AA         |          | C         |
| "             | 8- 112 | AA         |          | C         |
| VRS-HT3AA300J | 8- 110 | AC         |          | C         |
| VRS-HT3AA333J | 8- 114 | AA         |          | C         |
| VRS-HT3DA470J | 8- 113 | AA         |          | C         |
| VRS-TP2BD000J | 7- 102 | AA         |          | C         |
| "             | 7- 125 | AA         |          | C         |
| "             | 8- 72  | AA         |          | C         |
| "             | 8- 73  | AA         |          | C         |
| "             | 8- 74  | AA         |          | C         |
| "             | 8- 75  | AA         |          | C         |
| "             | 8- 76  | AA         |          | C         |
| "             | 8- 77  | AA         |          | C         |
| "             | 8- 78  | AA         |          | C         |
| "             | 8- 79  | AA         |          | C         |
| "             | 8- 80  | AA         |          | C         |
| "             | 8- 81  | AA         |          | C         |
| "             | 8- 82  | AA         |          | C         |
| "             | 8- 83  | AA         |          | C         |
| "             | 8- 84  | AA         |          | C         |
| "             | 8- 85  | AA         |          | C         |
| "             | 8- 86  | AA         |          | C         |
| "             | 8- 87  | AA         |          | C         |
| "             | 8- 88  | AA         |          | C         |
| "             | 8- 89  | AA         |          | C         |
| VRS-TP2BD201J | 7- 143 | AA         |          | C         |

| PARTS CODE    | NO.    | PRICE RANK | NEW MARK | PART RANK |
|---------------|--------|------------|----------|-----------|
| VRS-TP2BD222J | 10- 6  | AA         |          | C         |
| VRS-TP2BD390J | 10- 7  | AA         |          | C         |
| VRS-TP2BD561J | 7- 158 | AA         |          | C         |
| VRS-TS2AD000J | 7- 112 | AA         |          | C         |
| "             | 7- 141 | AA         |          | C         |
| "             | 7- 187 | AA         |          | C         |
| "             | 7- 234 | AA         |          | C         |
| "             | 7- 237 | AA         |          | C         |
| "             | 8- 119 | AA         |          | C         |
| "             | 8- 134 | AA         |          | C         |
| "             | 8- 135 | AA         |          | C         |
| "             | 8- 165 | AA         |          | C         |
| "             | 8- 173 | AA         |          | C         |
| "             | 8- 176 | AA         |          | C         |
| VRS-TS2AD100J | 7- 114 | AA         |          | C         |
| "             | 7- 117 | AA         |          | C         |
| "             | 7- 118 | AA         |          | C         |
| "             | 7- 119 | AA         |          | C         |
| "             | 7- 122 | AA         |          | C         |
| "             | 7- 123 | AA         |          | C         |
| "             | 7- 124 | AA         |          | C         |
| "             | 7- 130 | AA         |          | C         |
| "             | 7- 131 | AA         |          | C         |
| "             | 7- 132 | AA         |          | C         |
| "             | 7- 136 | AA         |          | C         |
| "             | 7- 137 | AA         |          | C         |
| "             | 7- 146 | AA         |          | C         |
| "             | 7- 147 | AA         |          | C         |
| "             | 7- 150 | AA         |          | C         |
| "             | 7- 151 | AA         |          | C         |
| "             | 7- 152 | AA         |          | C         |
| "             | 7- 153 | AA         |          | C         |
| "             | 7- 162 | AA         |          | C         |
| "             | 7- 163 | AA         |          | C         |
| "             | 7- 164 | AA         |          | C         |
| "             | 7- 165 | AA         |          | C         |
| "             | 7- 166 | AA         |          | C         |
| "             | 7- 167 | AA         |          | C         |
| "             | 7- 168 | AA         |          | C         |
| "             | 7- 169 | AA         |          | C         |
| "             | 7- 170 | AA         |          | C         |
| "             | 7- 173 | AA         |          | C         |
| VRS-TS2AD102J | 7- 140 | AA         |          | C         |
| "             | 7- 192 | AA         |          | C         |
| "             | 7- 229 | AA         |          | C         |
| VRS-TS2AD103J | 7- 108 | AA         |          | C         |
| "             | 7- 120 | AA         |          | C         |
| "             | 7- 121 | AA         |          | C         |
| "             | 7- 129 | AA         |          | C         |
| "             | 7- 133 | AA         |          | C         |
| "             | 7- 134 | AA         |          | C         |
| "             | 7- 135 | AA         |          | C         |
| "             | 7- 139 | AA         |          | C         |
| "             | 7- 142 | AA         |          | C         |
| "             | 7- 154 | AA         |          | C         |
| "             | 7- 155 | AA         |          | C         |
| "             | 7- 156 | AA         |          | C         |
| "             | 7- 159 | AA         |          | C         |
| "             | 7- 160 | AA         |          | C         |
| "             | 7- 161 | AA         |          | C         |
| "             | 7- 171 | AA         |          | C         |
| "             | 7- 174 | AA         |          | C         |
| "             | 7- 175 | AA         |          | C         |
| "             | 7- 176 | AA         |          | C         |
| "             | 7- 177 | AA         |          | C         |
| "             | 7- 179 | AA         |          | C         |
| "             | 7- 180 | AA         |          | C         |
| "             | 7- 184 | AA         |          | C         |
| "             | 7- 185 | AA         |          | C         |
| "             | 7- 188 | AA         |          | C         |
| "             | 7- 189 | AA         |          | C         |
| "             | 7- 190 | AA         |          | C         |
| "             | 7- 191 | AA         |          | C         |
| "             | 7- 196 | AA         |          | C         |
| "             | 7- 197 | AA         |          | C         |
| "             | 7- 198 | AA         |          | C         |
| "             | 7- 206 | AA         |          | C         |
| "             | 7- 207 | AA         |          | C         |
| "             | 7- 208 | AA         |          | C         |
| "             | 7- 209 | AA         |          | C         |



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| PARTS CODE    | NO.    | PRICE RANK | NEW MARK | PART RANK |
|---------------|--------|------------|----------|-----------|
| VRS-TS2AD103J | 7- 212 | AA         |          | C         |
| "             | 7- 215 | AA         |          | C         |
| "             | 7- 228 | AA         |          | C         |
| "             | 7- 236 | AA         |          | C         |
| "             | 7- 238 | AA         |          | C         |
| "             | 7- 240 | AA         |          | C         |
| "             | 7- 242 | AA         |          | C         |
| "             | 7- 245 | AA         |          | C         |
| "             | 7- 251 | AA         |          | C         |
| "             | 7- 252 | AA         |          | C         |
| "             | 8- 132 | AA         |          | C         |
| "             | 8- 133 | AA         |          | C         |
| "             | 8- 149 | AA         |          | C         |
| "             | 8- 161 | AA         |          | C         |
| "             | 8- 171 | AA         |          | C         |
| VRS-TS2AD104J | 8- 127 | AA         |          | C         |
| "             | 8- 140 | AA         |          | C         |
| "             | 8- 141 | AA         |          | C         |
| "             | 8- 148 | AA         |          | C         |
| "             | 8- 157 | AA         |          | C         |
| "             | 8- 168 | AA         |          | C         |
| VRS-TS2AD124J | 8- 174 | AA         |          | C         |
| VRS-TS2AD132J | 8- 145 | AA         |          | C         |
| VRS-TS2AD133J | 8- 172 | AA         |          | C         |
| VRS-TS2AD152J | 8- 126 | AA         |          | C         |
| "             | 8- 151 | AA         |          | C         |
| VRS-TS2AD153J | 7- 194 | AA         |          | C         |
| "             | 8- 169 | AA         |          | C         |
| "             | 8- 178 | AA         |          | C         |
| VRS-TS2AD154J | 8- 177 | AA         |          | C         |
| "             | 8- 181 | AA         |          | C         |
| VRS-TS2AD201J | 7- 157 | AG         |          | C         |
| VRS-TS2AD203J | 8- 120 | AA         |          | C         |
| "             | 8- 185 | AA         |          | C         |
| VRS-TS2AD221J | 8- 138 | AA         |          | C         |
| "             | 8- 139 | AA         |          | C         |
| "             | 8- 179 | AA         |          | C         |
| "             | 8- 183 | AA         |          | C         |
| VRS-TS2AD223J | 7- 181 | AA         |          | C         |
| "             | 8- 122 | AA         |          | C         |
| "             | 8- 128 | AA         |          | C         |
| "             | 8- 130 | AA         |          | C         |
| "             | 8- 131 | AA         |          | C         |
| "             | 8- 137 | AA         |          | C         |
| "             | 8- 147 | AA         |          | C         |
| "             | 8- 150 | AA         |          | C         |
| "             | 8- 152 | AA         |          | C         |
| "             | 8- 154 | AA         |          | C         |
| "             | 8- 155 | AA         |          | C         |
| "             | 8- 156 | AA         |          | C         |
| "             | 8- 158 | AA         |          | C         |
| "             | 8- 159 | AA         |          | C         |
| "             | 8- 160 | AA         |          | C         |
| "             | 8- 170 | AA         |          | C         |
| VRS-TS2AD224J | 8- 175 | AA         |          | C         |
| VRS-TS2AD241J | 8- 124 | AA         |          | C         |
| "             | 8- 125 | AA         |          | C         |
| "             | 8- 142 | AA         |          | C         |
| "             | 8- 143 | AA         |          | C         |
| VRS-TS2AD243J | 8- 115 | AA         |          | C         |
| VRS-TS2AD271J | 7- 172 | AA         |          | C         |
| "             | 7- 178 | AA         |          | C         |
| "             | 7- 199 | AA         |          | C         |
| "             | 7- 200 | AA         |          | C         |
| "             | 7- 201 | AA         |          | C         |
| "             | 7- 202 | AA         |          | C         |
| "             | 7- 203 | AA         |          | C         |
| "             | 7- 204 | AA         |          | C         |
| "             | 7- 213 | AA         |          | C         |
| "             | 7- 214 | AA         |          | C         |
| "             | 7- 216 | AA         |          | C         |
| "             | 7- 217 | AA         |          | C         |
| "             | 7- 218 | AA         |          | C         |
| "             | 7- 219 | AA         |          | C         |
| "             | 7- 220 | AA         |          | C         |
| "             | 7- 221 | AA         |          | C         |
| "             | 7- 222 | AA         |          | C         |
| "             | 7- 223 | AA         |          | C         |
| "             | 7- 224 | AA         |          | C         |
| "             | 7- 225 | AA         |          | C         |

| PARTS CODE     | NO.    | PRICE RANK | NEW MARK | PART RANK |
|----------------|--------|------------|----------|-----------|
| VRS-TS2AD271J  | 7- 226 | AA         |          | C         |
| "              | 7- 227 | AA         |          | C         |
| "              | 7- 230 | AA         |          | C         |
| VRS-TS2AD273J  | 8- 118 | AA         |          | C         |
| VRS-TS2AD3R0J  | 7- 113 | AA         |          | C         |
| "              | 7- 193 | AA         |          | C         |
| VRS-TS2AD300J  | 8- 184 | AA         |          | C         |
| VRS-TS2AD302J  | 7- 110 | AA         |          | C         |
| VRS-TS2AD332J  | 7- 210 | AA         |          | C         |
| "              | 8- 180 | AA         |          | C         |
| VRS-TS2AD333J  | 7- 148 | AA         |          | C         |
| "              | 7- 149 | AA         |          | C         |
| "              | 8- 166 | AA         |          | C         |
| VRS-TS2AD361J  | 8- 146 | AA         |          | C         |
| VRS-TS2AD363J  | 8- 129 | AA         |          | C         |
| "              | 8- 136 | AA         |          | C         |
| "              | 8- 153 | AA         |          | C         |
| VRS-TS2AD471J  | 7- 235 | AA         |          | C         |
| "              | 7- 239 | AA         |          | C         |
| "              | 7- 241 | AA         |          | C         |
| "              | 7- 243 | AA         |          | C         |
| "              | 7- 250 | AA         |          | C         |
| VRS-TS2AD472J  | 7- 128 | AA         |          | C         |
| "              | 7- 138 | AA         |          | C         |
| "              | 8- 167 | AA         |          | C         |
| VRS-TS2AD474J  | 7- 183 | AA         |          | C         |
| VRS-TS2AD511J  | 7- 115 | AA         |          | C         |
| "              | 7- 233 | AA         |          | C         |
| "              | 8- 116 | AA         |          | C         |
| "              | 8- 144 | AA         |          | C         |
| VRS-TS2AD512J  | 7- 195 | AA         |          | C         |
| VRS-TS2AD562J  | 7- 144 | AA         |          | C         |
| "              | 7- 211 | AA         |          | C         |
| VRS-TS2AD621J  | 8- 162 | AA         |          | C         |
| "              | 8- 164 | AA         |          | C         |
| VRS-TS2AD622J  | 7- 186 | AA         |          | C         |
| "              | 8- 123 | AA         |          | C         |
| VRS-TS2AD623J  | 7- 182 | AA         |          | C         |
| VRS-TS2AD683J  | 8- 186 | AA         |          | C         |
| VRS-TS2AD820J  | 7- 145 | AA         |          | C         |
| "              | 7- 231 | AA         |          | C         |
| "              | 7- 232 | AA         |          | C         |
| VRS-TS2AD822J  | 8- 121 | AA         |          | C         |
| VRS-TS2AD9R1J  | 8- 117 | AA         | N        | C         |
| VRS-TS2AD910J  | 8- 182 | AA         |          | C         |
| VRSTS2AD1183F  | 7- 116 | AA         |          | C         |
| VRSTS2AD1742F  | 7- 127 | AA         |          | C         |
| VRSTS2AD4752F  | 7- 111 | AA         |          | C         |
| VRSTS2AD6040F  | 8- 163 | AA         |          | C         |
| VRSTS2AD8662F  | 7- 109 | AA         |          | C         |
| "              | 7- 126 | AA         |          | C         |
| VSBS108///-1   | 8- 107 | AE         |          | B         |
| VSDTC114EK/-1  | 7- 105 | AB         |          | B         |
| VS2SA1807-P-1  | 8- 109 | AE         |          | B         |
| VS2SC1740SR-1  | 8- 106 | AB         |          | B         |
| VS2SC2411KR-1  | 7- 106 | AC         |          | B         |
| VS2SC2412KS-1  | 7- 104 | AB         |          | B         |
| "              | 10- 5  | AB         |          | B         |
| VS2SC3415-P-1  | 8- 108 | AP         |          | B         |
| [X]            |        |            |          |           |
| XBBSD30P06000  | 50-B4  | AA         |          | C         |
| XBPSD30P06K00  | 50-B5  | AA         |          | C         |
| XBPSE30P08K00  | 50-B6  | AA         |          | C         |
| XBPSN40P06K00  | 50-B7  | AA         |          | C         |
| XEBSD30P06000  | 50-B9  | AA         |          | C         |
| XEBSD30P08000  | 50-B10 | AA         |          | C         |
| XEBSD30P10000  | 50-B11 | AA         |          | C         |
| XEBSE30P10000  | 50-B13 | AA         |          | C         |
| XEBSF30P08000  | 50-B12 | AA         |          | C         |
| XHBSD30P05000  | 50-B14 | AA         |          | C         |
| XJPSD30P04000  | 50-B15 | AA         |          | C         |
| XUBSD20P06000  | 50-B16 | AA         |          | C         |
| [0]            |        |            |          |           |
| 0CBBFZ89154Z/  | 9- 35  | AC         |          | C         |
| 0CBLRH0343ZP/  | 9- 41  | AH         |          | C         |
| 0CBLRH0356ZQ/  | 9- 40  | AN         | N        | C         |
| 0CBPCZ0160ZZ/  | 9- 24  | AE         |          | C         |
| 0CBPCZ0173ZZ/  | 9- 23  | AF         |          | C         |
| 0CBPJ CZZ0037/ | 9- 32  | AG         |          | A         |
| "              | 9- 33  | AG         |          | A         |

| PARTS CODE     | NO.   | PRICE RANK | NEW MARK | PART RANK |
|----------------|-------|------------|----------|-----------|
| 0CBPJ T0153ZZ/ | 9- 34 | AE         |          | A         |
| 0CBPKZ0194ZZ/  | 9- 22 | AC         |          | C         |
| 0CBPZZ0739ZZ/  | 9- 25 | AE         |          | C         |
| 0CBUAC0004DZ/  | 9- 46 | AC         |          | B         |
| 0CBUAC0056BZ/  | 9- 44 | AD         |          | B         |
| 0CBUAC0098EZ/  | 9- 45 | AK         |          | B         |
| 0CBUAG0139AZ/  | 9- 43 | AQ         | N        | B         |
| 0CBUBB0149DZ/  | 9- 26 | AH         |          | B         |
| 0CBUBB0166BB/  | 9- 31 | AK         |          | B         |
| 0CBUBC0182BL/  | 9- 29 | AE         |          | B         |
| 0CBUBC0220BZ/  | 9- 27 | AD         |          | B         |
| 0CBUBC0280BZ/  | 9- 30 | AC         |          | B         |
| 0CBUBDAC270D/  | 9- 68 | AC         |          | B         |
| 0CBUBDAE300D/  | 9- 70 | AD         |          | B         |
| 0CBUBDBW3R6B/  | 9- 69 | AB         |          | B         |
| 0CBUBDBW6R2C/  | 9- 71 | AB         |          | B         |
| 0CBUCB0112AZ/  | 9- 37 | AK         |          | B         |
| 0CBUC00013DZ/  | 9- 36 | AM         |          | B         |
| 0CBUDC0139AZ/  | 9- 42 | AN         |          | B         |
| 0CBUDZ0052ZZ/  | 9- 64 | AG         |          | B         |
| 0CBUEEB183CT/  | 9- 50 | AC         | N        | C         |
| 0CBUEEB222CT/  | 9- 58 | AC         | N        | C         |
| 0CBUEEB242CT/  | 9- 61 | AC         | N        | C         |
| 0CBUEEB271CT/  | 9- 59 | AC         | N        | C         |
| 0CBUEEB330CW/  | 9- 56 | AC         | N        | C         |
| 0CBUEEB471CT/  | 9- 49 | AC         | N        | C         |
| 0CBUEEB564CT/  | 9- 51 | AC         | N        | C         |
| "              | 9- 52 | AC         | N        | C         |
| 0CBUEEB682CT/  | 9- 60 | AC         | N        | C         |
| 0CBUEFC564BA/  | 9- 47 | AC         |          | C         |
| 0CBUEFD561CC/  | 9- 57 | AD         | N        | C         |
| 0CBUEFER22CF/  | 9- 48 | AD         | N        | C         |
| 0CBUEFE391CL/  | 9- 55 | AC         |          | C         |
| 0CBUEFE823CG/  | 9- 53 | AC         |          | C         |
| "              | 9- 54 | AC         |          | C         |
| 0CBUEFF102BG/  | 9- 62 | AC         |          | C         |
| 0CBUERABH911/  | 9- 66 | AE         |          | B         |
| 0CBUEZ0507ZZ/  | 9- 65 | AD         | N        | B         |
| 0CBUFBA501DC/  | 9- 67 | AC         |          | B         |
| 0CBUGAC122GK/  | 9- 16 | AG         |          | C         |
| 0CBUGAC221HD/  | 9- 17 | AC         |          | C         |
| 0CBUGAD101PS/  | 9- 14 | AF         | N        | C         |
| 0CBUGAD470NT/  | 9- 15 | AD         | N        | C         |
| 0CBUGAE122NS/  | 9- 19 | AH         |          | C         |
| 0CBUGAE221HD/  | 9- 20 | AD         |          | C         |
| 0CBUGBQ820BR/  | 9- 5  | AP         |          | C         |
| 0CBUGCQ222AQ/  | 9- 12 | AE         |          | C         |
| "              | 9- 13 | AE         |          | C         |
| 0CBUGCS222AP/  | 9- 18 | AC         |          | C         |
| 0CBUGCU103BC/  | 9- 6  | AD         |          | C         |
| 0CBUGCU221BQ/  | 9- 7  | AD         | N        | C         |
| 0CBUGCZ222CK/  | 9- 3  | AF         |          | C         |
| "              | 9- 4  | AF         |          | C         |
| 0CBUGFF102ER/  | 9- 11 | AC         |          | C         |
| 0CBUGFF103ER/  | 9- 8  | AC         |          | C         |
| 0CBUGFF471ER/  | 9- 21 | AC         |          | C         |
| 0CBUGFF472ER/  | 9- 10 | AB         |          | C         |
| 0CBUGFF683ER/  | 9- 9  | AD         |          | C         |
| 0CBUGFM224HG/  | 9- 1  | AG         |          | C         |
| "              | 9- 2  | AG         |          | C         |
| 0CBUKZ0578ZZ/  | 9- 38 | AH         |          | C         |
| "              | 9- 39 | AH         |          | C         |
| 0CB829650003/  | 9- 63 | BD         | N        | B         |





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