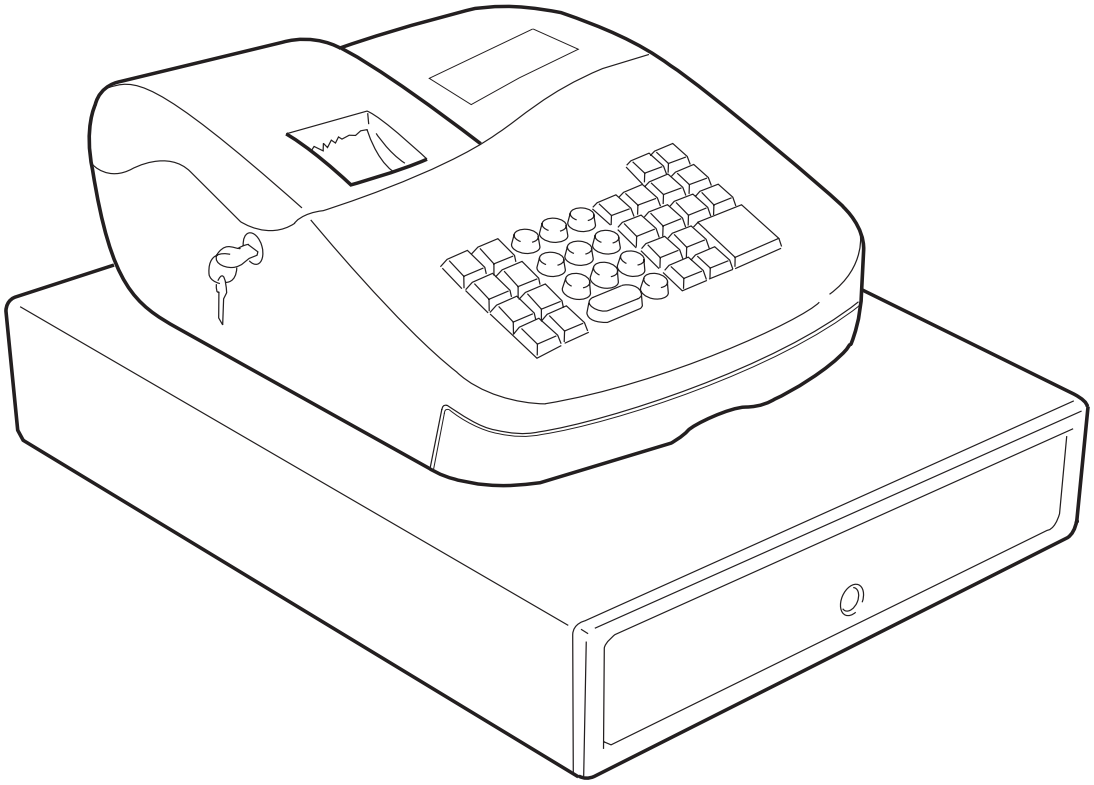
Cash Register

CMS 140 B

SERVICE MANUAL



olivetti

PUBLICATION ISSUED BY:

Olivetti Lexikon, S.p.A.
Documentazione
77, Via Jervis - 10015 Ivrea (Italy)

PREFACE

This manual is addressed to the field engineers who will install and service the CMS 140B cash register.
It provides all the information needed for a correct product maintenance.

SUMMARY

This manual is divided into seven chapters.
The first three chapters describe the operating, functional checks, and maintenance and repair procedures.
Chapter 4 describes the disassembly and adjustment procedures. Chapters 5, 6 and 7 describe the electronic circuitry, schematics and diagram and assembly construction.

PREREQUISITES

The topics described in this manual require knowledge of similar products.

REFERENCE DOCUMENTATION

Instruction Manual - (provided with the product)
Spare Parts Catalogue

DISTRIBUTION: General

FIRST EDITION: December 1998

CONTENTS

1. OVERVIEW

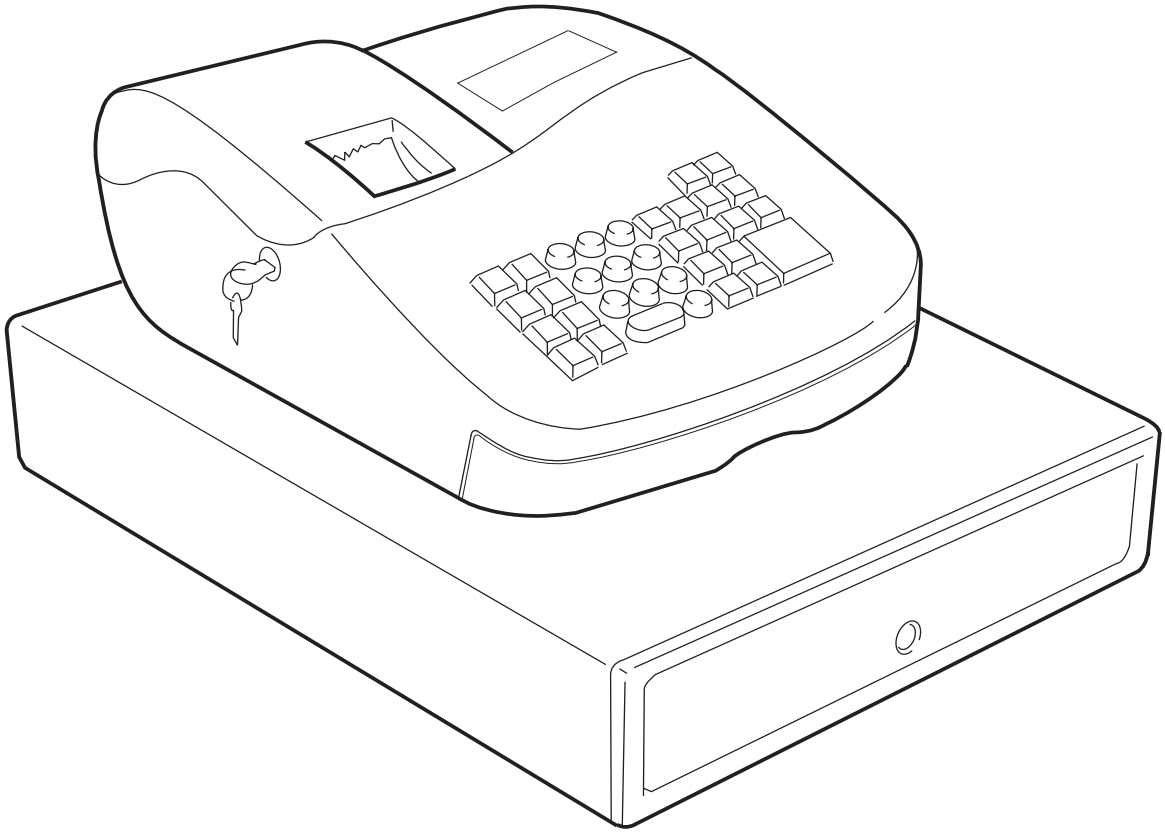


Fig. 1-1 Overall View of the Cash Register

1.1 TECHNICAL SPECIFICATIONS

Type:	Electronic cash register with 8 departments
Display:	Bright double display with 16x6 mm numbers, error symbol, change, subtotal, minus, total and quantity
Display capacity:	9 digits
Printer:	ECR exclusive serial printer
Paper supply:	57 mm wide wood-free single ply tape
Memory protection:	Approx. 3 months after power interruption with 4 1.5 V Mignon batteries
Technology:	CMOS RAM
Power supply:	AC Adapter Internal Battery
Line voltage:	220 V
Power consumption:	Stand-by 2.2 W; operating 4 W
Operating temperature:	0° to 40° C
Dimensions:	Depth 425 mm, Width 325 mm, Height 210 mm
Weight:	Approx. 6 Kg

■

2. SPECIFICATIONS AND OPERATING PRINCIPLES

2.1 SPECIFICATIONS

2.1.1 FEATURES

The Micro Printer is designed for use with calculators. It offers the following features:

- Ultra-compact and lightweight design.
- Movable type for sharp printing quality.
- High printing speed using a mechanism that can return the carriage from any column position.
- Silent printing.
- Quick feeding and paper free functions.
- Can run on size AAA manganese batteries (low-power drive).
- Uses ordinary paper.
- Requires no motor speed control.

2.1.2 SPECIFICATIONS

The main printer specifications are listed below.

Print method

Serial printing with movable type

Carriage width

Maximum of 13 printable columns (including 2 symbol columns)

Character position

On symbol column side: 12 positions + 2 empty positions

On numeric column side: 14 positions

Character size

1.6 (W) x 2.8 (H) mm

Intercharacter intervals

Between numerics: 2.1 mm

Between a numeric and a symbol: 2.6 mm

Line spacing

4.6 mm

Print speed

Average printing speed at 6.0 VDC, 13-column printing:

Typically 0.7 l/s

6-column printing: Typically 1.4 l/s

Paper (supplied by the user)

Type: Regular paper roll

Size: Width 57.5 mm ± 0.5 mm

Roll diameter: 80 mm or less

Thickness: 0.06 ~ 0.085 mm

Average weight: 47 g/m^2 ~ 64 g/m^2 (40 ~ 55 kg/ 1000 sheets/1091 x 788 mm)

Paper feeding

Typically 4.3 lps. Fast paper feeding is also possible, and a paper release mechanism is provided.

Inking

Ink roller method

Ink roller life: 700,000 characters

Standard: IR-30 (IR-40 is also applicable)

Motor

Terminal voltage: $6.0^{+0.5}_{-2.0}$ VDC

Average current: Approximately 0.14 A (during 13-column, 7-character shift printing at 6.0 VDC, 25°C/77°F)

Sensor

Mechanical point of contact

Reset signal R, Timing signal T, and Sub-timing signal t

Trigger coil (electromagnet)

Terminal voltage: $6.0^{+0.5}_{-2.0}$ VDC

D.C. resistance: 16.7 Ω (at 25°C/77°F)

Connection method

Jumper wire on printer side

Guaranteed operating temperature

0° - 40°C / 32° - 104°F
(guaranteed printing temperature:
5° - 40°C/41° - 104°F)

Reliability

MCBF: 300,000 columns

External dimensions

86 (W) x 58.4 (D) x 19 (H) mm
(3.39 (W) x 2.30 (D) x 0.75 (H) inch)

Weight

Approximately 80 g (0.21lb)

2.1.3 MECHANISMS

This printer consist of two print wheels, a hammer, and a carriage equipped with an ink roll. It is a serial printer with movable type, and it prints by sequentially moving the carriage across from the lowest-order column.

When the motor is activated, the gear trains rotate and cause the print wheels and detection wheel to rotate. When the trigger coil charged by a signal (corresponding a character) output from the sensor, a character is selected, the print wheel stops, the print gear is rotated by the action of the planet gear, and a character is printed.

The carriage then shifts to the next column (column-shift operation). When charge to the trigger coil is extended during character selection at the end of a line, printing is performed and the carriage is returned to the initial column. The paper is then fed forward to complete the printing of one line.

This printer consist of five mechanism: the transmission and select, defection, print, inking, and paper feeding.

Fig. 2-1 shows an external view of the Micro serial Printer. For details on the operating principles and handling of each mechanism, see Subsection 2.2 *Operating Principles*, and Chapter 3 *Handling and Maintenance*.

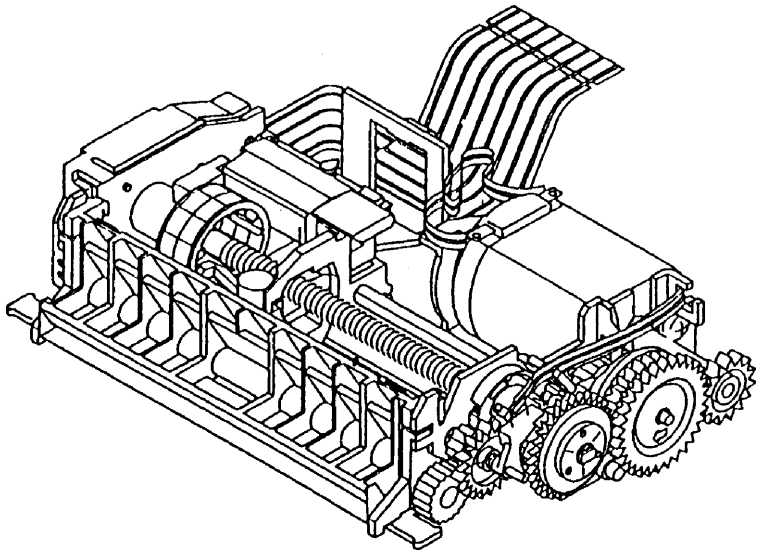


Fig. 2-1 Exterior View

2.2 OPERATING PRINCIPLES

2.2.1 TRANSMISSION/SELECT MECHANISM

As shown in Fig. 2-2, this mechanism consists of the reduction gear train, and paper feed gear train.

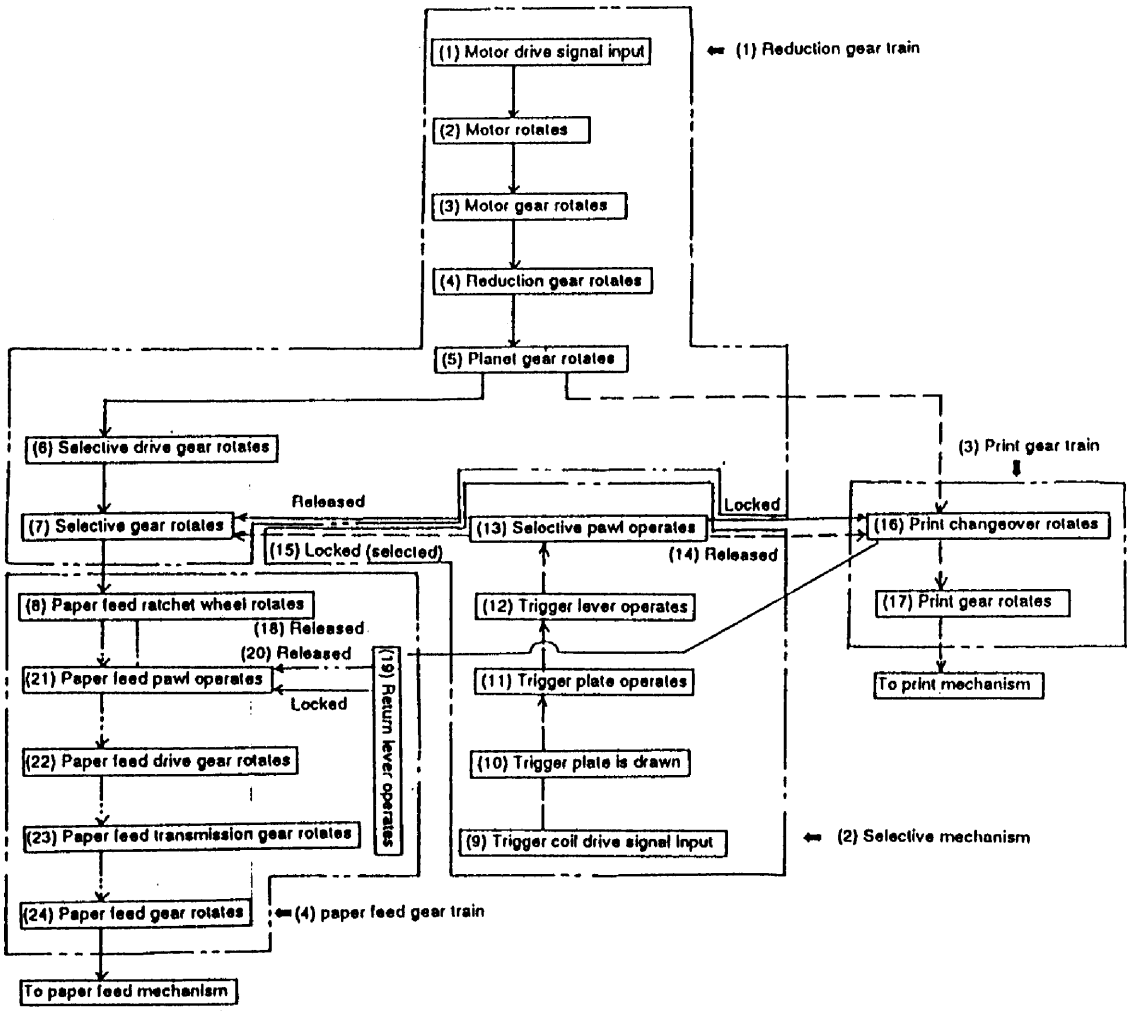


Fig. 2-2 Transmission/Select Mechanism

Reduction gear series

(See Fig. 2-2 and 2-3)

The reduction gear train consists of the motor gear, reduction gear, planet gear, selective drive gear, selective gear assembly, selective pawl, and print changeover cam. When the motor rotates (2), the rotational force is sequentially reduced from the motor gear (3) on the same shaft through the gear train to the selective gear assembly (7).

The rotation of the print changeover cam is locked by the action of the selective pawl, so the paper feed ratchet wheel (8) on the same shaft as the selective gear assembly, the print wheel, and the detection wheel also rotate at the same time.

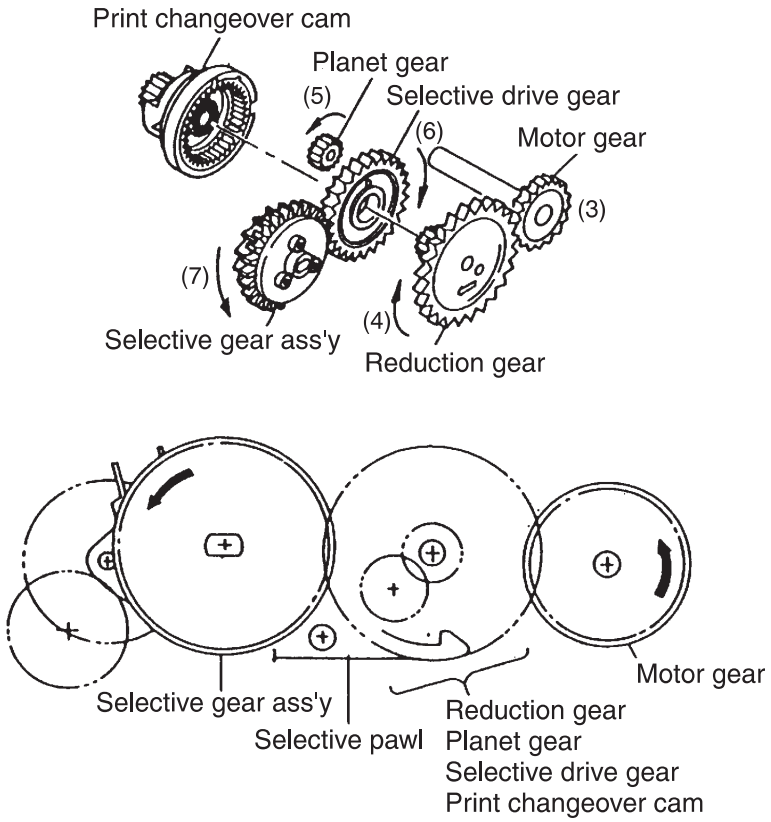


Fig. 2-3 Reduction Gear Series

Select mechanism

(See Fig. 2-2 and 2-4)

As shown in Fig. 1-4, the select mechanism consists of the selective gear assembly, trigger coil, trigger plate, trigger lever, and selective pawl. The select mechanism operates during rotation of the reduction gear series. When a drive signal is input (9) to the trigger coil in conformance with the timing signal output from the sensor, the trigger plate is drawn (10) to the yoke fixed on the selective gear assembly so that the trigger plate (11), trigger lever (12), and selective pawl (13) rotate together with the selective gear assembly. At the same time as the print changeover cam is unlocked, the selective pawl locks (15) the tooth section corresponding to the character of the selective gear assembly. When the selective gear assembly is stopped, the print wheel mounted on the same shaft also is stopped, and the character selected.

Print gear series

(See Fig. 2-2 and 2-4)

The print gear series consists of the print changeover cam and the print gear. When the selective gear assembly is stopped by the select mechanism, the interlocked selective drive gear is also stopped. At the same time, the unlocked (14) print changeover cam is coupled and is rotated (16) by the planet gear of the totalling reduction gear series. The print gear thus rotates (17) and transmits its movement to the printing mechanism.

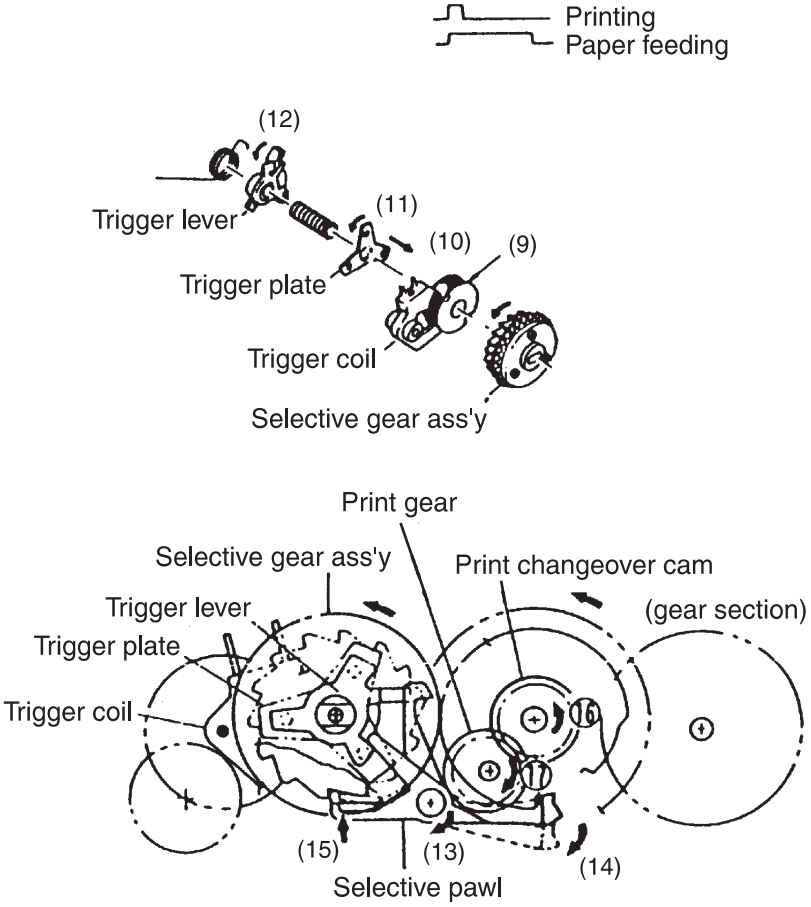


Fig. 2-4 Select Mechanism and Print Gear Series

Paper feeding gear series

(See Fig. 2-2 and 2-5)

As shown in Fig. 2-5, the paper feeding gear series consists of the paper feed ratchet wheel, paper feed ratchet, paper feed drive gear assembly, paper feed transmission gear, and paper feed gear.

During column selection or consecutive paper feeding, the select mechanism and printing gear series operate by extending the trigger coil drive signal at the first column during space selection. However, the return lever and trigger lever are unlocked (18) to maintain the operation of the trigger plate and trigger lever. When the print changeover cam rotates, the cam controlling the return lever reaches a notched section. The return lever is thereby released and beings operating (19) due to spring force, and its interlocking with the paper feed ratchet is cancelled (20).

The paper feed ratchet on the paper feed drive gear assembly operates (21) due to spring force and meshes with the teeth of the paper feed ratchet wheel on the same shaft as the selective gear.

When printing operation is completed, the print changeover cam causes the selective pawl to return to its pre-selection status, and the print changeover cam is stopped. When the selection gear begins rotation, the paper feed drive gear assembly (22), paper feed transmission gear (23), and paper feed gear (24) all rotate together with the paper feed ratchet wheel. This movement is then transmitted to the paper feeding mechanism.

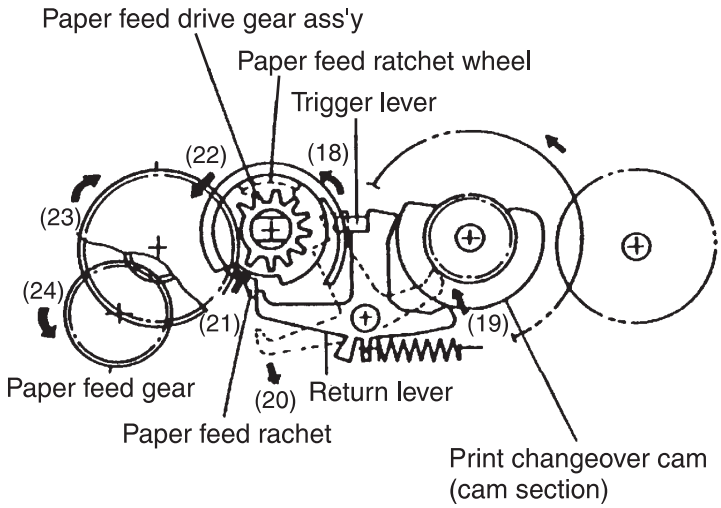


Fig. 2-5 Paper Feeding Gear Series

2.2.2 SENSOR MECHANISM

(See Fig. 2-6)

The sensor mechanism consists of the sensor assembly and the sensor gear. The sensor employs a mechanical contact-point system and generates a timing signal T and a sub-timing signal t in correspondence to each character position on the print wheel.

The sensor also generates a reset signal at each rotation of the print wheel. Waveform rectification of these signals should be performed by the user, as timing or reset pulses.

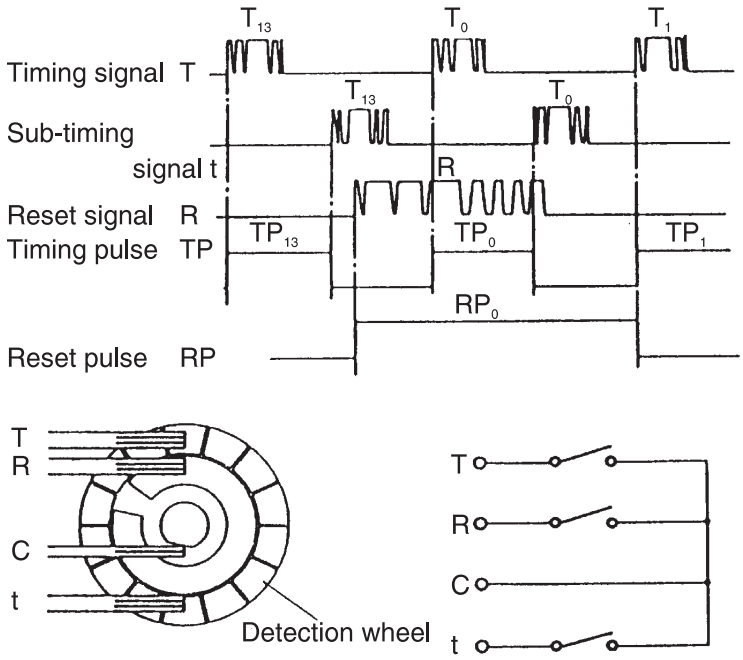


Fig. 2-6 Sensor Mechanism

2.2.3 PRINTING MECHANISM

The printing mechanism performs two operations: printing and carriage movement.

Printing operation

(See Fig. 2-7)

When the print gear series (see Subsection 2.2.1, *Transmission/Select Mechanism)* causes the print shaft and print cam to rotate in the direction of a arrows (1) and (2), the hammer rotates in the direction of ➡ arrow (3).

Thus, the print wheel is pressed in the direction of ➡ arrow (4) by the hammer, and printing is performed.

The print wheel, similar to the print changeover cam, rotates once with each printing operation, and printing is performed during the first half of the print shaft rotation.

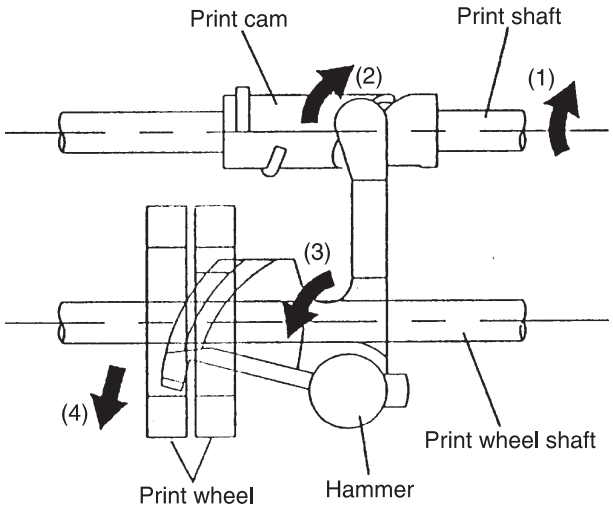


Fig. 2-7 Printing Operation

Carrying operation

(See Fig. 2-8)

Carrying is performed after printing, during the second half of the print shaft rotation. As soon as the positioning plate begins rotating the print gear, the cam section of the print gear unlock its meshing the return lever, and the print gear meshes with the print cam.

When the print shaft rotates in the direction of ➡ arrow (1), the meshing between the teeth of the print cam and the teeth of the positioning plate causes the print shaft to slide in the direction of ➡ arrow (2) while rotating in the direction of ➡ arrow (3). The simultaneously with this carriage unit is carried sliding action (➡ arrow (4))

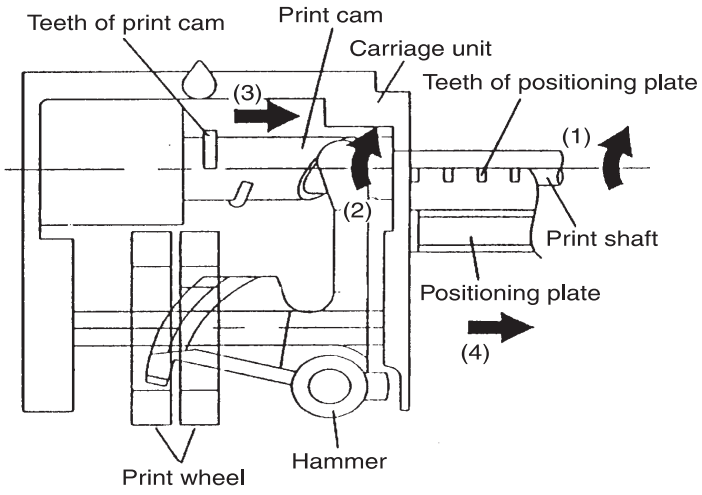


Fig. 2-8 Carrying Operation

2.2.4 INKING MECHANISM

(See Fig. 2-9)

The ink roller is held lightly against the other periphery of the print wheel by the force of the ink roller spring.

When the print wheel rotates, the ink roller also rotates and supplies ink to the wheel.

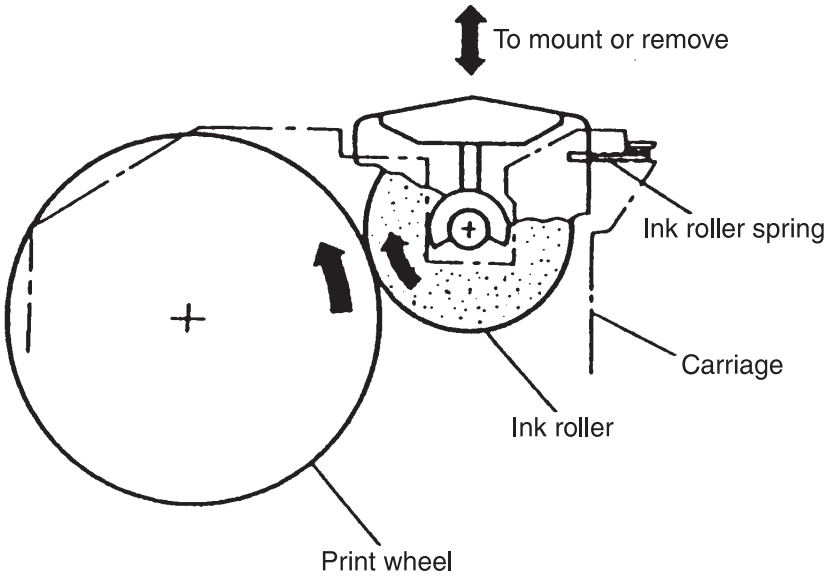


Fig. 2-9 Inking Mechanism

2.2.5 PAPER FEEDING MECHANISM

The paper feeding mechanism performs two operations: carriage return and paper feeding.

Carriage return operation

(See Fig. 2-10)

The paper feeding gear series (see Subsection 2.2.1, *Transmission/Select Mechanism*) causes the return lever to drop into the cam section of the print changeover cam so that it meshes with the positioning plate (➡ arrow (1) and (2)).

The rotation of the print changeover cam restores the return lever to its original position (➡ arrow (3)) and rotates the positioning plate with which it is meshed (➡ arrow (4)).

As a result, the teeth of the positioning plate and print cam are disengaged (5), and the force of the print wheel spring and carriage spring returns the carriage (➡ arrow (6)).

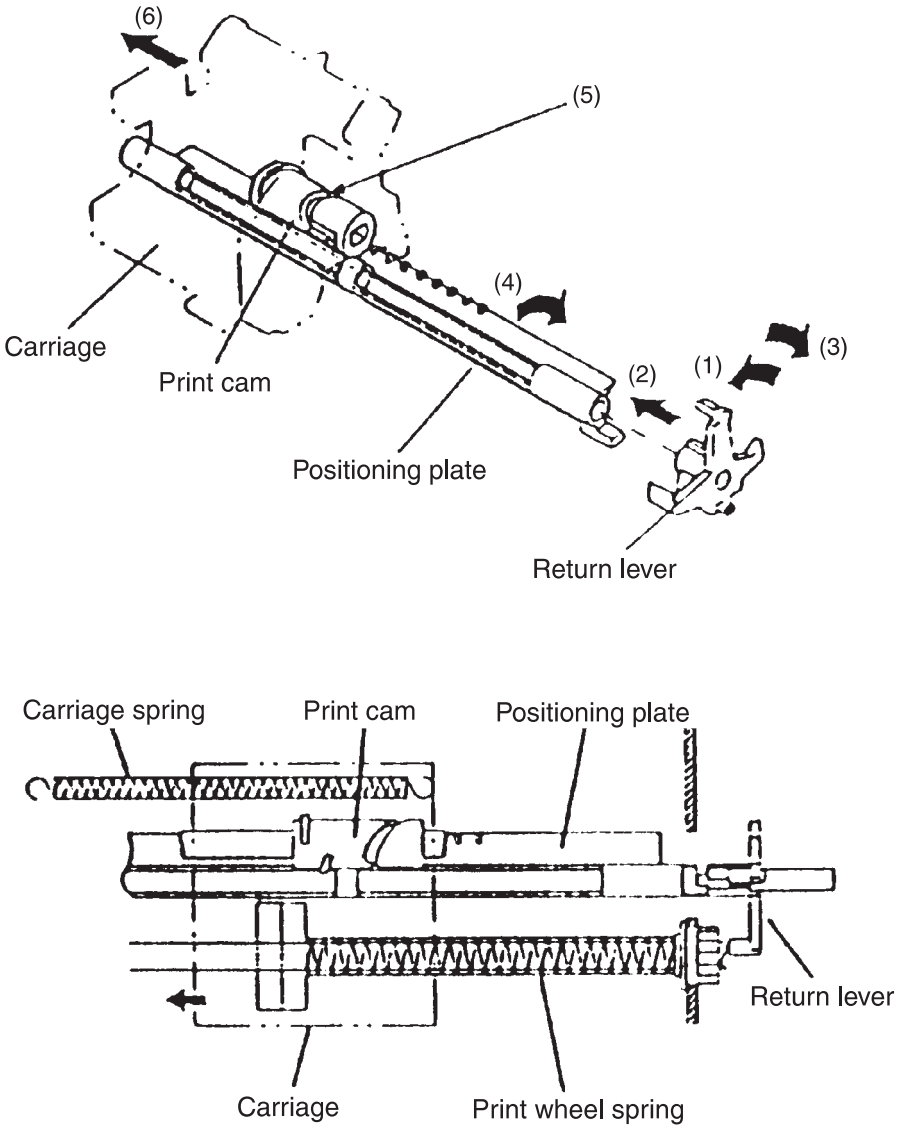


Fig. 2-10 Carriage Return Operation

Paper feeding operation

(See Fig. 2-11)

Paper is feed while the paper feed drive gear assembly performs one rotation. When the paper feeding gear series (see Subsection 2.2.1, *Transmission/ Select Mechanism*) causes the paper feed gear to rotate in the direction of ➡ arrow (1), the paper feed roller within the platen also rotates in the direction of ➡ arrow (2), and the paper is fed by friction between the paper hold roller and the paper feed roller.

When the paper feed ratchet within the paper feed drive gear assembly strikes the return lever, it disengages from the paper feed ratchet wheel, the rotation of the paper feed drive gear assembly stops, and paper feeding terminates.

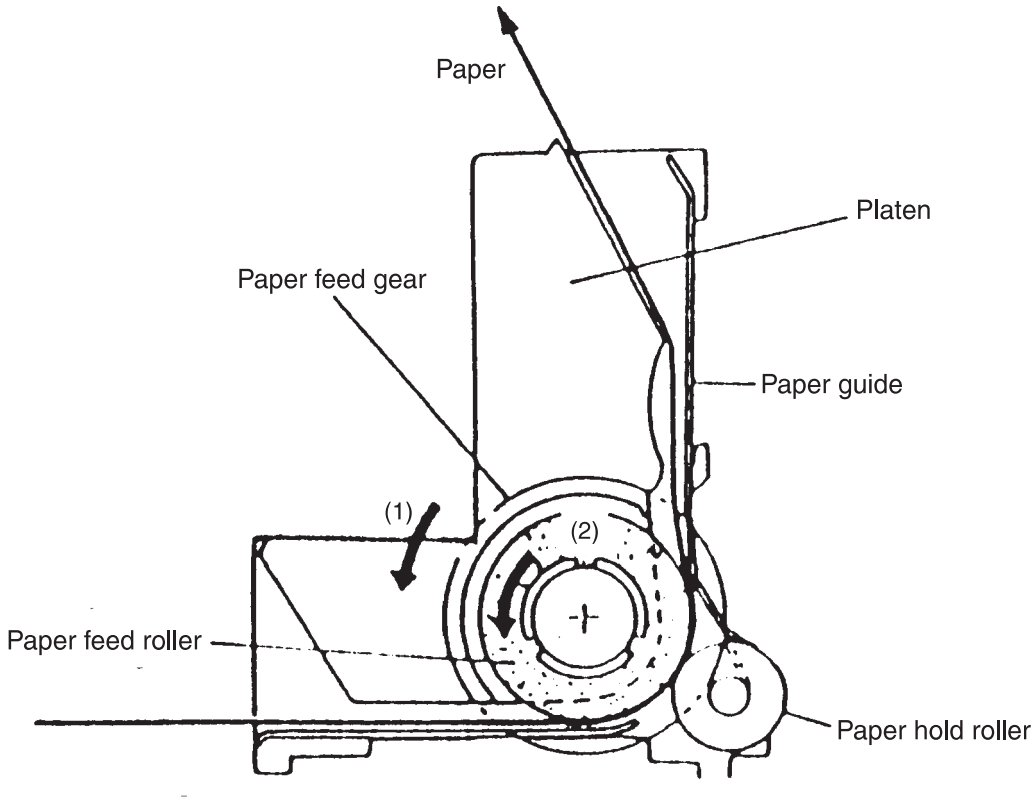


Fig. 2-11 Paper Feeding Operation

2.2.6 PRINT CYCLE INITIALIZATION

To confirm that carriage is in stand-by status (at the first column), initialization must be performed prior to printing and paper feeding. Initialization is completed by performing a line feed. The following paragraphs describe printer timing operations for printing and paper feeding.

Printing of the first line

1) The Timing pulses TP are counted after the motor drive signal is applied and the motor is activated. The reset pulse RP appearing after eight timing pulses is regarded as RPo, and the first timing pulse TP after RPo rises is regarded as TPo.
2) Character selection (first column)

   The trigger coil drive pulse is applied to the trigger coil during the interval from timing pulse TPn to TPn + 1 which corresponds to the desired character. At that time, the timing pulse interval (TPn to TPn +1) is measured to obtain TW1. Following character selection, the print wheel stops (the timing pulse retains the TPn + 1 status). Printing and carrying are then automatically executed.
3) Character selection (second column and onward)

   The print wheel starts rotating again and the first timing pulse is TPn +2. Character selection can be performed from next timing pulse TPn + 3. The rest of the character selection operation is identical to that described in step 2) above.
4) Carriage return and paper feeding

   During character selection for the highest-order column of a line of print, printing, carriage return, and paper feeding are performed by adding: [the width of the drive pulse to the trigger coil] + [the timing pulse interval TW2 (TPn to TPn + 1) at that time] + [(the TP interval TW1 measured during the selection of the first column) x 6].
5) Motor off

   After completing the highest order printing in one line, the print wheel begins to rotate and timing pulse TP is generated. Counting from this initial rising pulse, the motor drive signal is cut off at the rise of the 14th timing pulse TP.

NOTE:

- The first timing pulse generated after the print column-shift process (TPn + 2) cannot be used for character selection.

Consecutive printing

1) The process for printing the initial line similar to that for “Printing the first line” above.
2) Printing of second and later lines begins as follows:

   After printing the first line, the following pulses TP are counted with the motor still driven. Printing of the first column of the second line then begins at the rise of the 14th timing pulse in cases where the number of columns in the first line is 7 or less, otherwise, printing begins at the 21st timing pulse. The same procedures as those in steps 2) to 4) of “Printing the first line” above are then performed.
3) Consecutive printing is performed by repeating step 2) above.
4) Motor off

   Step 5) of “Printing the first line” above is performed.

Paper feeding for the first line

1) The timing pulses TP are counted after the motor drive signal is applied and the motor is activated. The reset pulse RP appearing after eight timing pulses is regarded as RPo, and the first timing pulse TP after RPo rises is regarded as TPo.
2) Paper feeding

   The empty character TP10 is selected. At that time, the timing pulse interval TP10 to TP11 is measured to obtain TW1. When the width of the trigger coil drive pulse equals the measured TW1 plus six times TW1, the empty character on the print wheel is selected and the paper is fed.
3) Motor off

   After the paper is fed for one line, the print wheel begins to rotate. Counting from the initial rising timing pulse, the motor drive signal is cut off at the rise of the 14th timing pulse TP.

Fast paper feeding

1) The process for feeding the initial line is similar to that for “Paper feeding for the first line” above.
2) Paper feeding for the second and later lines begins as follows: after completing the paper feeding for the first line, with the motor remaining driven, the following timing pulses TP are counted. From the rise of the 21st timing pulse, selection of the empty character TP10 becomes possible. Step 2) of “Paper feeding for the first line” above is then performed.
3) Fast paper feeding is performed by repeating step 2) above.
4) Motor off

   Step 3) of “Paper feeding for the first line” above is performed.

■

3. HANDLING, MAINTENANCE

3.1 HANDLING THE PRINTER

3.1.1 PRECAUTIONS ON PRINTER HANDLING

Transport precautions

(See Fig. 3-1)

1) When transporting the printer, never carry it by the jumper lead only.
2) Avoid impact to the printer by dropping, striking it, or collision with another printer.

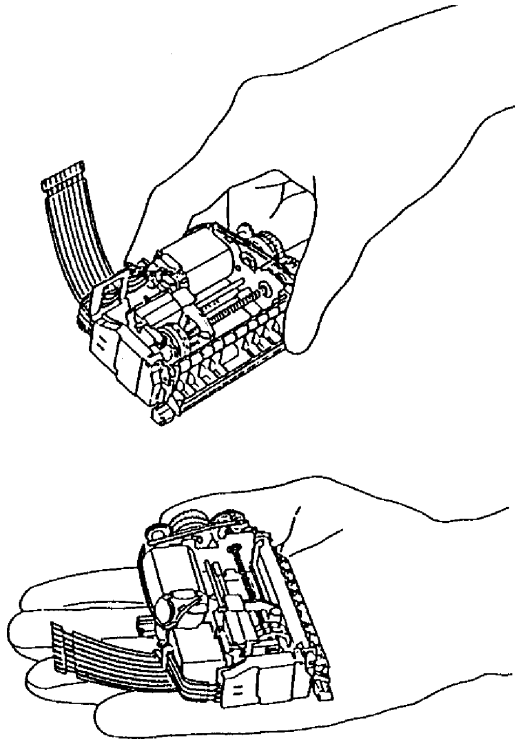


Fig. 3-1 Proper Handling of Printer

Storage precautions

- Avoid storage in locations exposed to excessive dirt, dust, moisture, or in direct sunlight.
- For long-term storage (over one month), place the printer in a polyethylene bag after wrapping it in anti-rust (VPI) paper, then store it in a dry location.

Use precaution

- Since the printer employs a permanent magnet (in the motor section), avoid using it in locations exposed to excessive iron filings, dirt, dust, or other foreign particles.
- Never use the printer without the paper and ink roller installed.
- Make sure to use only the specified paper and ink roller.
- The ink roller is a disposable part; do not attempt to refill its ink supply.

3.1.2 PAPER INSTALLATION

Loading the Paper

When loading the paper into the printer, make sure to heed the following points.

Paper insertion

Insertion the paper into the printer with the paper roll positioned as shown in Fig. 3-2.

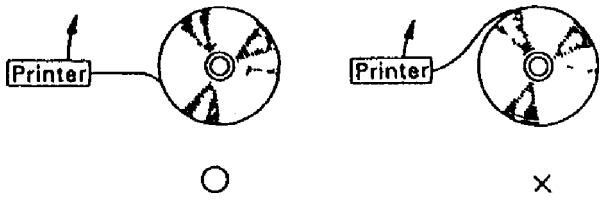


Fig. 3-2 Paper Insertion

Leading edge of the paper roll

The leading edge of the paper from the paper roll should be cut straight as shown in Fig. 3-3.

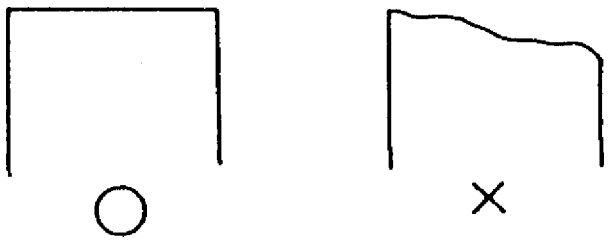


Fig. 3-3 Leading Edge of the Paper Roll

Paper insertion precautions

- Insert the paper straight into the paper entrance. Never insert paper having an uneven leading edge; never insert paper at a slant.
- Push the paper in the feeding direction to make insertion easier.

Removing the paper

Remove the paper by following one of the two methods below:

- Perform paper feed using an electrical operation: Switch on the printer, press the Paper Feed button, and remove the paper.
- The paper release mechanism in stand-by status allows the paper to be freely removed by pulling it out the printer. **Pulling out the leading edge of the paper at a slant may cause jamming**.

3.1.3 INK ROLLER INSTALLATION

Mounting the Ink roller

(See Fig. 3-4)

- Place the ink roller in the cutout sections of the carriage, then press down gently until it clicks into place.

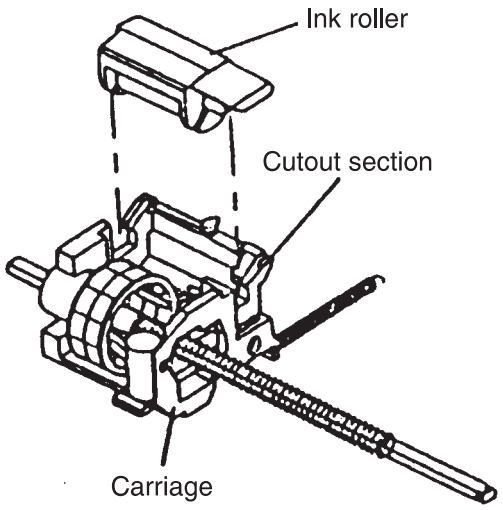


Fig. 3-4 Ink Roller Installation

Replacing the ink roller

(See Fig. 3-5)

- Press the knob of the ink roller in the direction of the ➡ arrow, then lift the ink roller up and out of the carriage.

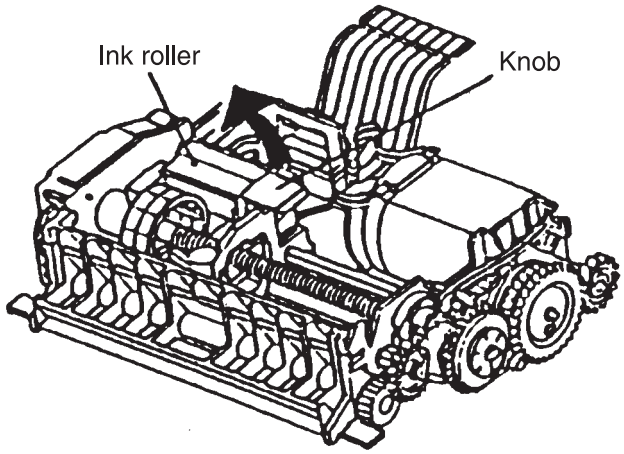


Fig. 3-5 Ink Roller Replacement

3.2 MAINTENANCE

To prevent potential trouble, make sure cleaning and inspection is carried out according to the points described in the following subsections, depending on the environment in which the printer is used.

3.2.1 CLEANING

Eliminating dirt or stains

Wipe off soiled areas using alcohol or benzene.

Eliminating dust, scraps, and other foreign particles

Use a vacuum cleaner to carefully draw out all foreign particles from every area of the printer.

NOTES:

Never use thinner, tricholyene, or ketone solvent as they may deteriorate or damage plastic parts. Check the lubricant remaining in each cleaned area and perform lubrication as required (see Subsection 3.3.2, *Lubrication Points*).

3.2.2 INSPECTION

Check the printer to see if it is being operated properly and if it is being maintained in optimum condition. If any unsatisfactory points are discovered, they should be remedied. In particular:

- Make sure that the ink roller is securely installed in the carriage.
- Make sure that the ink roller in use conforms to the specifications. Check the ink roller for damage, and replace it if it is affecting print quality.

3.3 LUBRICATION

3.3.1 LUBRICANT TYPES

The types of oil used greatly influence the performance and durability of the printer, especially at low temperatures.

3.3.2 LUBRICATION POINTS

No.	Lubrication Point	Oil Type
(1)	Contact point between selective gear assembly and trigger plate	O-3
(2)	Contact point between print shaft and frame (2 points)	O-3
(3)	Outer surface of print shaft	O-3
(4)	Outer surface of print wheel shaft	O-3
(5)	Contact point between print cam and hammer spring	O-3
(6)	Contact point between print cam and the positioning plate	O-3
(7)	Contact point between positioning shaft, frame, and return lever (3 points)	O-3
(8)	Contact point between reduction gear and the E-ring	O-3
(9)	contact point between selective drive gear and reduction gear	O-3
(10)	Contact point between selective pawl and print changeover cam	O-3

3.3.3 LIST OF LUBRICANTS

Item	Designation	Volume
Oil	O-3	40 gm
Grease	G-34	40 gm

3.4 PROBLEM RESOLUTION

In general, the printer should be replaced when problems arise. Depending on the particular problem, however, the printer may be easily repaired. Therefore, take necessary corrective actions according to the following table. In the case of problems for which no corrective actions exist in this table, the printer should be replaced.

Problem	Cause	Checkpoint	Repair Method
Motor doesn't rotate during printing or its rotation is locked.	(1) Defective power input to motor.	• Check the input voltage between the motor terminals using a multimater or oscilloscope.	• Repair the power supply circuit.
	(2) Defective jumper wire.	• Check the conductivity between the motor terminals.	• Resolder of replace the printer.
	(3) Adhesion of foreign matter to the rotating mechanism.	• Manually rotate the motor gear counter-clockwise and check for the adhesion of foreign matter.	• Remove any foreign matter.
	(4) Defective motor.	• Check above causes 1) to 3) to see if they are applicable.	• Replace the printer.
Motor rotates normally, but printing is not performed.	(1) Defective conductivity of jumper wire.	• Check the conductivity between the terminals of the detector assembly and trigger coil.	• Resolder of replace the printer.
	(2) Abnormal charge pulses to the trigger coil.	• Check whether the charge pulse widths are within the rated values.	• Check the control board side and replace it.
Top, bottom, or sides of printed characters are missing.	(1) Adhesion of foreign particles to positioning plate.	• Check the column-shift teeth of the positioning plate for wear and for the adhesion of foreign matter.	• Remove any foreign matter.
	(2) Adhesion of foreign particles to print wheel assembly.	• Check for foreign matter adhered to the front of the print wheel.	• Remove any foreign matter.
	(3) Stretched print wheel assembly or worn characters.	• Check for wear at the frame or typeface of the print wheel.	• Replace the printer.

Problem	Cause	Checkpoint	Repair Method
Smudged or faint printing.	(1) Improper position of ink roller	• See *Ink Roller Installation* in Chapter 3 and check.	• Remount the ink roller.
	(2) Use of improper ink roller	• Check whether the specified ink roller is being used.	• Remount the ink roller using only the specified.
	(3) No ink supply	• Check the ink supply status.	• Replace the ink roller.
	(4) Adhesion of foreign matter to the print wheel or platen assemblies.	• Check for the adherence of in clumps, paper dust, dirt, etc.	• Remove any foreign matter.
The line spacing pitch of the printed characters is uneven.	(1) Use of improper paper.	• Check for the specified paper. Standard: see Subsection 2.1.2, *Specifications.*	• Use the specified paper.
	(2) Defective paper supply.	• Check the paper supply path for obstructions and exerted load.	• Remove the obstructions and correct the load.
The carriage does not move.	(1) Abnormal input pulse to the trigger coil.	• Check the circuit to see if the pulse width of the carrying charge is normal.	• Check the control board side and replace it.
	(2) Malfunction of the positioning plate.	• With the positioning plate unlocked, check for stretching of the return lever spring and for foreign matter between the positioning shaft and positioning plate.	• Remove any foreign matter.
The carriage does not return.	(1) Abnormal input pulse to the trigger coil.	• Check the circuit to see if the pulse width of the return charge is normal.	• Check the control board side and replace it.
	(2) Malfunction of the positioning plate	• Check for dirt between the carriage and the print wheel	• Remove any dirt.

3.5 PRINTER PIN ASSIGNMENTS

Fig. 3-6 illustrates the pin assignments of the printer circuitry.

NOTE:
The printer sensor side is regarded as “1”.

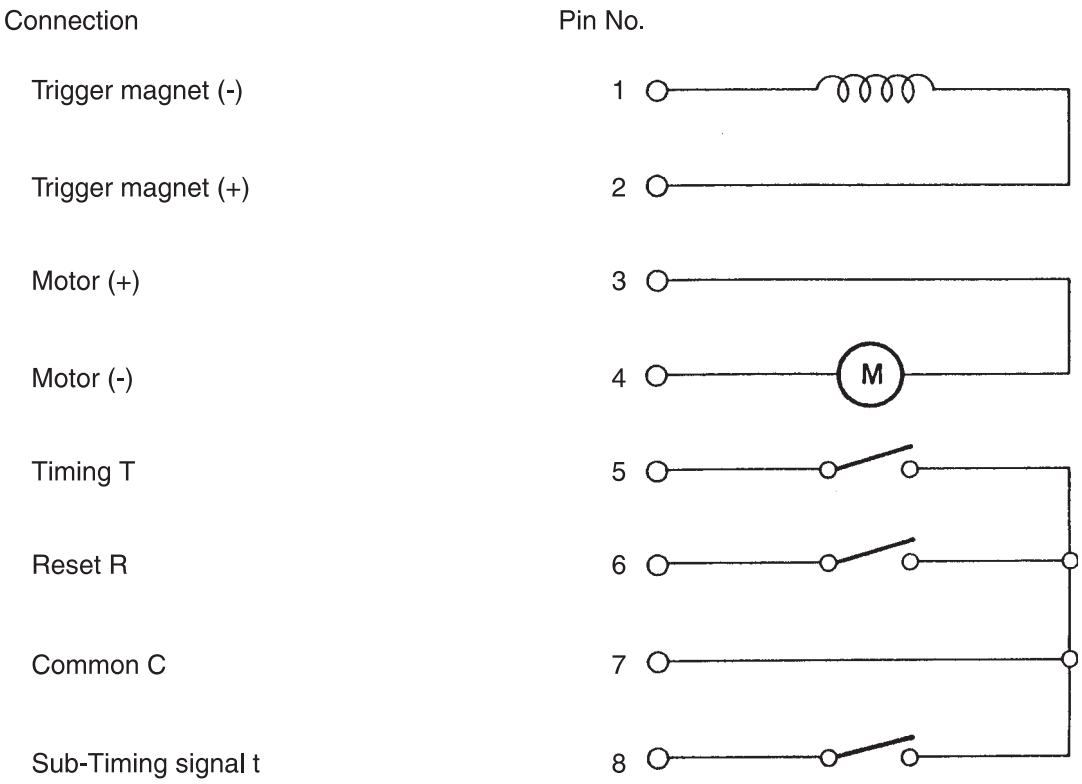


Fig. 3-6 Pin Assignment Diagram

3.6 TIMING CHART

(1) 1 Line printing

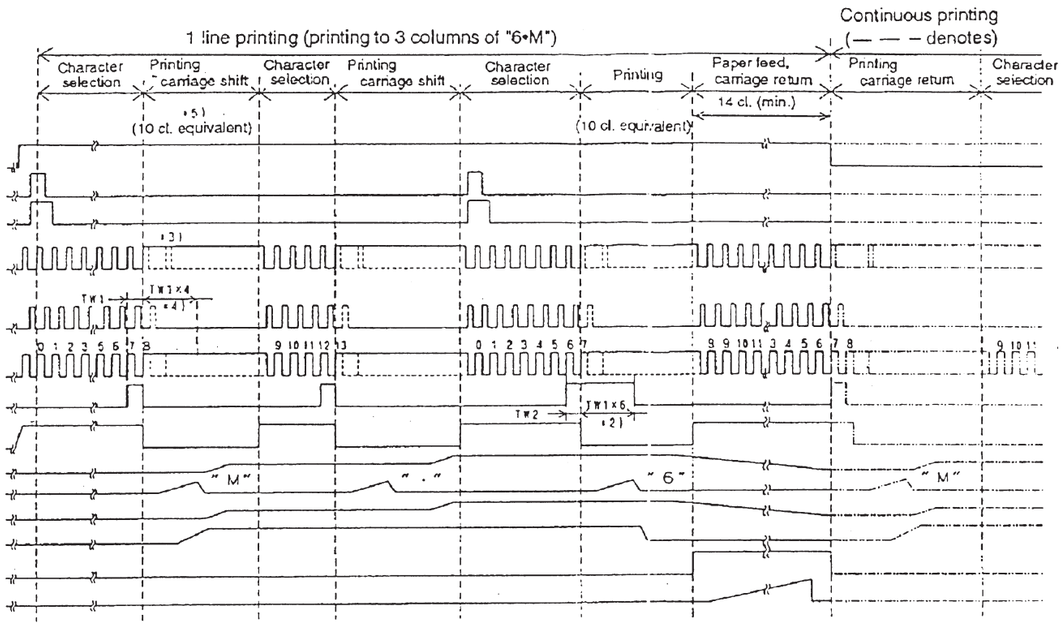
Process

*1) Motor drive signal
Reset signal
*1) Reset pulse RP
Timing signal T

Timing sub-signal t

*1) Timing pulse TP
*1) Trigger solenoid drive signal

Character wheel rotation
Lateral movement of character wheel
Hammer movement
Carriage movement
Positioning plate movement
Paper feed clutch
Paper feed



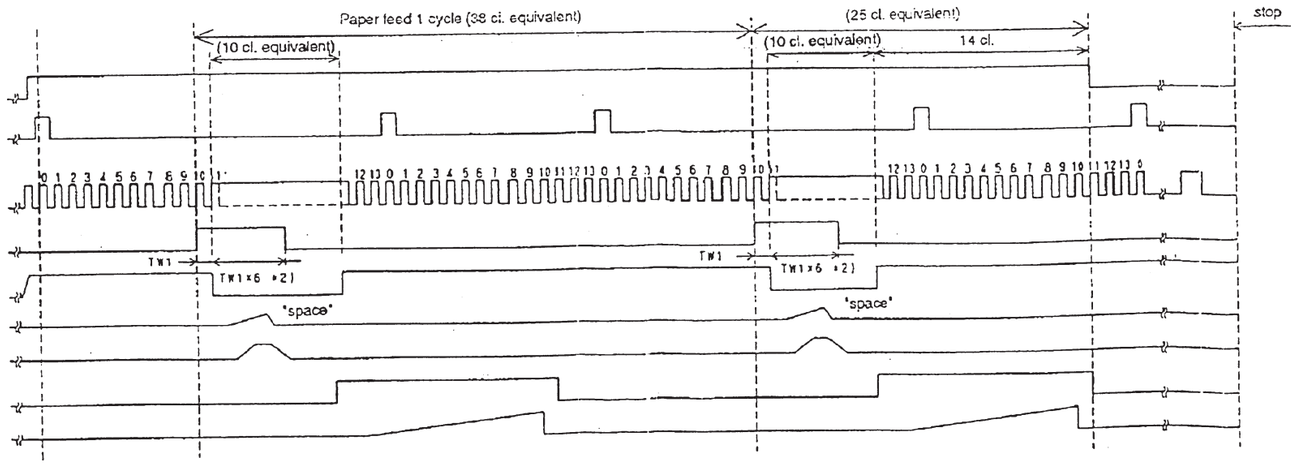
(2) Paper feed (2 lines)

*1) Motor drive signal
*1) Reset pulse RP

*1) Timing pulse TP

*1) Trigger solenoid drive signal

Character wheel rotation
Hammer movement
Positioning plate movement
Paper feed clutch
Paper feed



Note:

*1) ☐ denotes the signal and the pulse to be generated by the customers.

*2) Trigger solenoid drive pulse width for the last column of a line to be printed in is gained in such a manner that 6 ± 1 times of the timing pulse interval at a character selection for the first column is added to the timing pulse interval TW2 at the selection for the last column. At the paper feed time, TW1 x 6 ± 1 times is added to TW1 (timing pulse interval at the selection of the space position.)

*3) Timing signal T at printing and shift of carriage having character wheels there on sometimes changes as shown by a broken line.

*4) Timing signal T8 and timing sub signal t8 "make" or "break" irregularly within 4 times the timing pulse interval TW1. In this case, when timing sub-signal t8 "makes" timing signal T8 may "make" until the end of the 4 x TW1 period, or may not "make" until the end of carriage shift.

After printing and carriage shift, the first timing sub-signal t is t8. The timing signal T generated immediately before the timing sub-signal t8 is T8.

The timing signal T generated immediately after the timing sub-signal t8 is T9.

When printing and paper feeding, after applying the trigger solenoid drive pulse, the timing signal T and the timing sub-signal t are generated as describe condition. (Counting is different depending on selected characters.)

*5) cl. is a abbreviated form of clock which means timing pulse interval.

■

4. DISASSEMBLY PROCEDURE/HOW TO LOCATE THE ASSEMBLIES

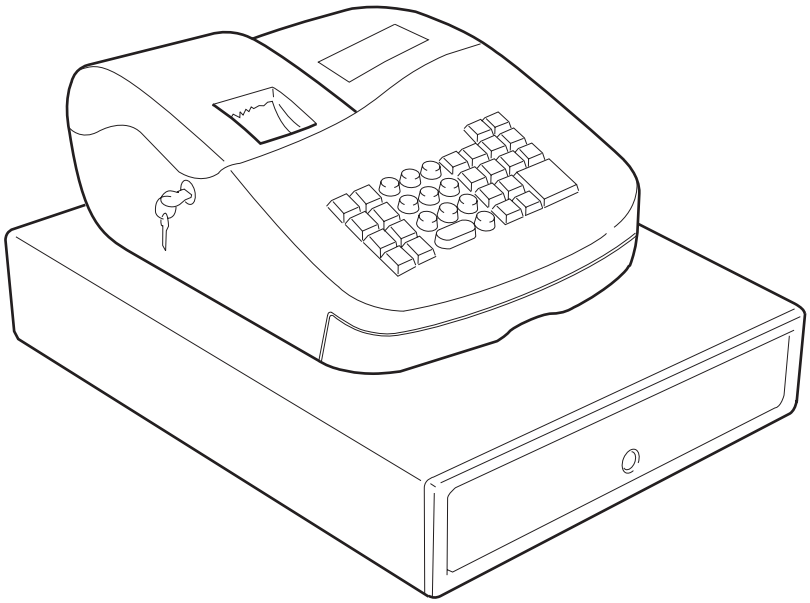


Fig. 4-1 Cash Register Front View

4.1 HOW TO LOCATE THE POWER ASSEMBLY

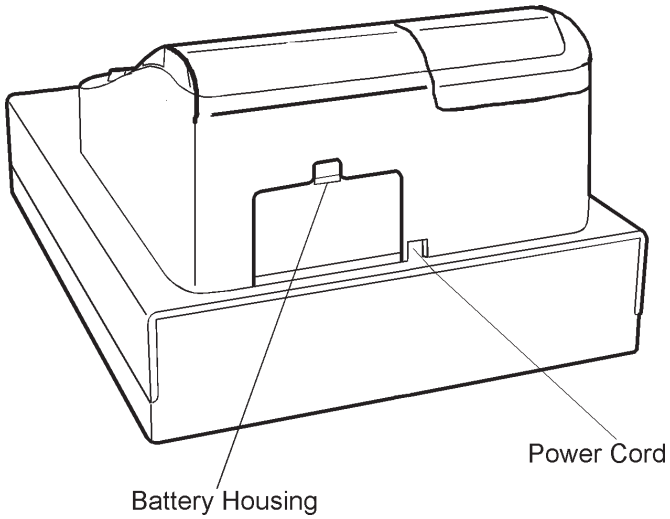


Fig. 4-2 Cash Register Rear View

4.2 THE REMOTE BATTERIES/ LOCATION OF ON/OFF SWITCH

- Remove the cover (1).
- Remove the paper roll and roll holder.
- Remove the battery housing cover (2) in the direction of the arrow.

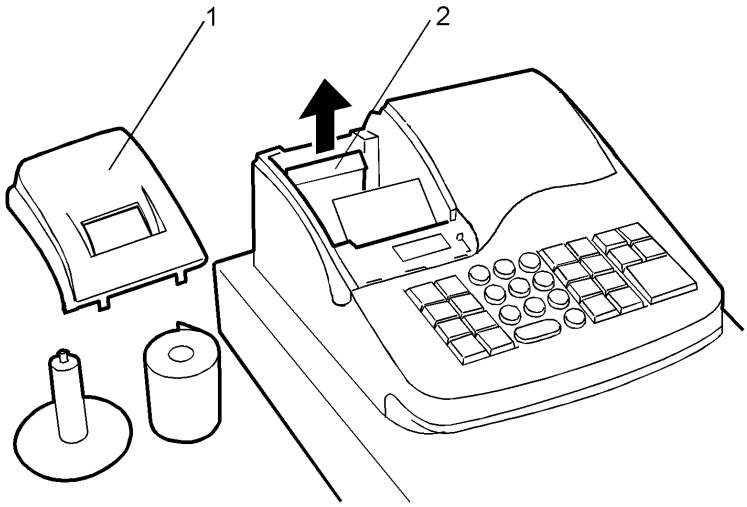


Fig. 4-3 Locating the Battery Compartment and Printer Cover

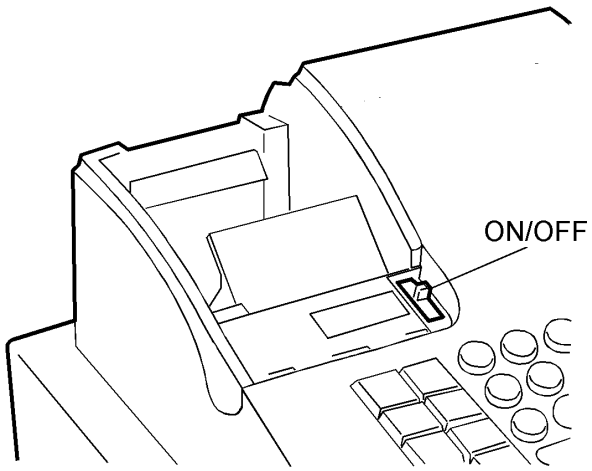


Fig. 4-4 Locating the ON/OFF Switch

4.3 MACHINE DISASSEMBLY - REASSEMBLY

4.3.1 MACHINE CASE

Disassembly

- Unplug the machine power cord from the electrical wall outlet.
- Loosen screw (1)
- Push the case of the machine (2) in the direction of the arrow (3).
- Remove the case (2) by lifting it the direction of arrow (4).

Reassembly

- Correctly position the case on the machine.
- Push the case (1) in the direction of arrow (5).
- Tighten screw (1).
- Plug the machine power cord into the electrical wall outlet.

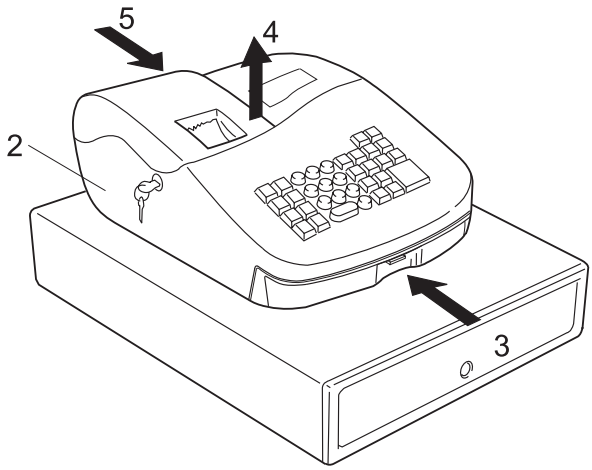


Fig. 4-5 Machine Case Disassembly/Reassembly

4.3.2 PRINTER UNIT

Disassembly

- Remove the printer compartment cover (1).
- Remove the machine case (2).
- Disconnect connector (3).
- Using a screwdriver, remove screw (4) that secures the paper support (5) and remove this support.
- Remove the printer (6) in the direction of the arrow shown being careful to avoid damaging the connection cables.

Reassembly

- Correctly position the printer (6) as shown in the figure.
- Correctly position the paper support (5) and tighten its related securing screw (4).
- Reattach the connector (3).
- Refit the case of the machine (2) and the printer compartment cover (1).

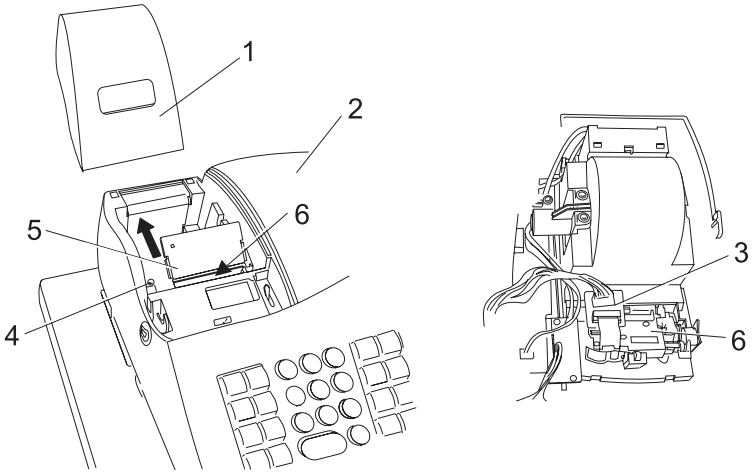


Fig. 4-6 Printer Unit Disassembly/Reassembly

4.3.3 MAIN BOARD AND DISPLAY

Disassembly

- Remove the machine case.
- Disconnect the printer connector (1).
- Disconnect the paper feed motor connector (2).
- Disconnect the keypad connectors (3).
- Disconnect the battery supply connectors (4).
- Disconnect the power supply connector (5).
- Disconnect the battery supply connector (6).
- Using a screwdriver, remove the securing screws (7).
- Remove the main board (8).

Reassembly

Perform the disassembly procedure in reverse order.

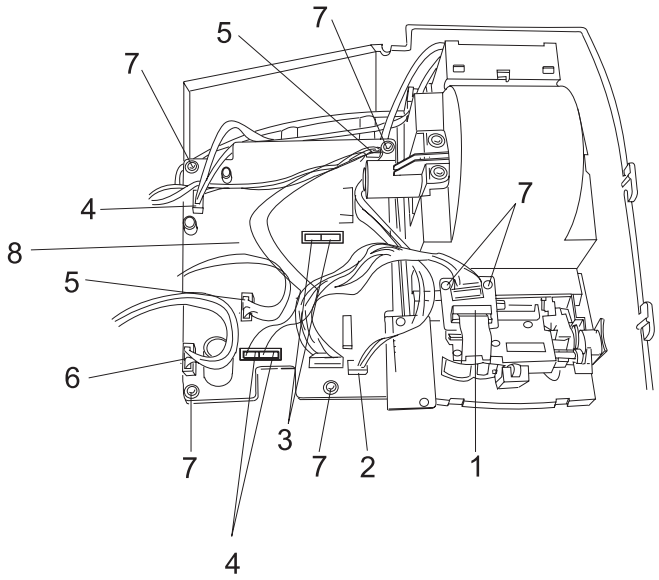


Fig. 4-7 Main Board and Display Disassembly/Reassembly

4.3.4 PAPER FEED MOTOR

Disassembly

- Remove the machine case.
- Disconnect the motor power supply connector (1).
- With a screwdriver, remove securing screws (2).
- Remove motor (3) with its related support (4).

Reassembly

- Correctly position motor (3).
- Tighten securing screws (2).
- Reconnect the motor power supply connector (1).
- Refit the machine case.

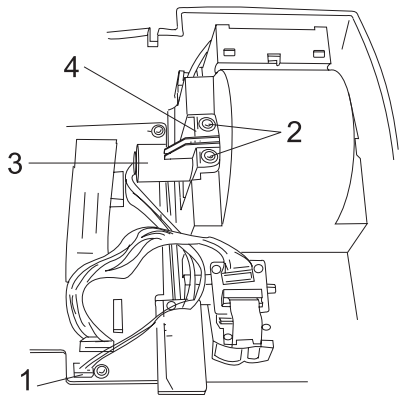


Fig. 4-8 Paper Feed Motor Disassembly/Reassembly

4.3.5 BATTERY COMPARTMENT

Disassembly
- Remove the machine case.
- Remove the securing screws (1).
- Remove the battery compartment.

Reassembly
- Perform the disassembly procedure in reverse order.

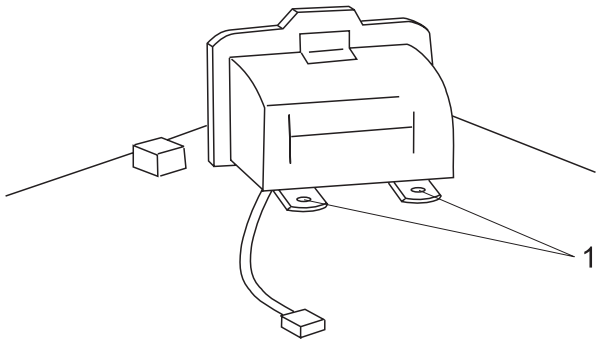


Fig. 4-9 Battery Compartment Disassembly/Reassembly

4.3.6 KEYPAD

Disassembly
- Remove the machine case.
- Disconnect the keypad - main board connectors (1).
- Using a screwdriver, remove securing screws (2).
- Remove the keypad (3) together with the machine's ON/OFF switch (4).

Reassembly
- Correctly position the keypad (3) and the ON/OFF switch (4).
- Tighten the securing screws (2).
- Restore connection (1).
- Refit the machine case.

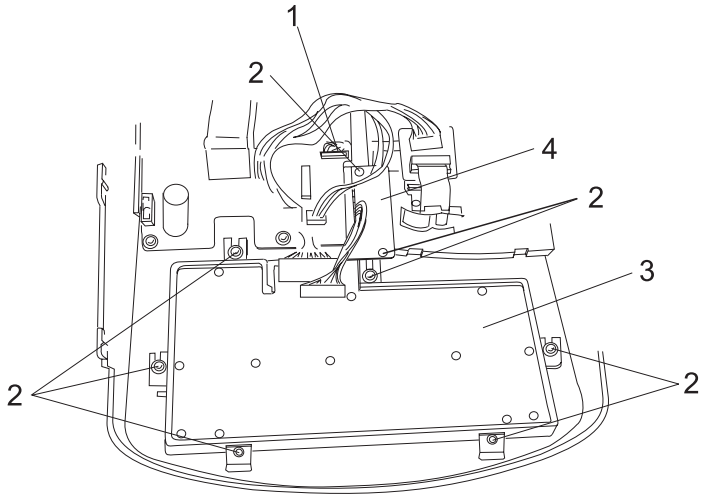


Fig. 4-10 Keypad Disassembly/Reassembly

■

5. BLOCK STRUCTURE CHART

As illustrated in the Chapter 6.

5.1 CIRCUITRY

Functions in each circuit is explained below block by block.

- **Block A: Display Control**

  LCD driver is included in the main CPU and is directly driven by ports below.

  * COM 0 - COM 1 - COM 2

  * SEG 0 - SEG 25 - SEG 32 - SEG 33

  LCDs are 1/3 duty,1/2bias.

- **Block B: Scan Signal for Key switch, Mode switch and Paper feed key:**

  Scan Signal Output Ports: from ports P07 - P12-P60 and P61 , by High-active scan output.

  Key switch: when P54 - P57 are depressed, they are accepted as return input of the key matrix.

  Mode lock switch and Feed key: P53 is read in as a return input.

  * To prevent input errors caused by chattering, data will be read twice before accomplishing key input.

- **Block E: Buzzer:**

  When Port P45 gets high, oscillating signals programmed at NAND gate make transistor 2SA2603 on/off and make the buzzer buzz.

- **Block F: Reset Circuit:**

  Reset IC works to reset main CPU.

  NOTE:

  1) Reset does not work when backup function is working.
  2) CPU needs to be reset at the first setting up, otherwise normal operation would be hindered. To secure normal operation, first install operation batteries worth OFF mode. Next turn the key to REG1 mode, then place memory backup batteries.

- **Block G: Black-Out Detection Signal:**

  Blackout signal is generated when voltage in Vcc line drops to 3.0 V. This signal gets “low” at the time of blackout and is transferred to Port 42 for CPU to dispose it. Once blackout is detected, X IN halts and only X CIN oscillates to turn the cash register for electric consumption mode. Backup currency at this time is about 10-40 uA.

- **Block H: Printer Control:**

  - Motor Drive: P51 (low active)
  - Printing Trigger: P50 (low active)
  - Timing Signal: P43
  - Reset: P44

  NOTE:

  Waveforms for timing signals and reset signals are shaped by flip-flop at NAND gate.

- **Block I: Circuitry:**

  This machine operates both by dry batteries and with use of AC adaptor. Inserting an adaptor jack automatically disconnect the battery circuit.

  Voltage at each power line is as follows (at rated voltage input).

  VBB: 6.0 V (with backup)

  Vcc: 6.0 V

  Vprm: 6.0 V (when printer is not working)

  V BB / V cc are provided via a stable circuit that uses 3-terminal regulator (S81250HG).

■

6. SCHEMATICS AND DIAGRAMS

6.1 SYSTEM BLOCK DIAGRAM

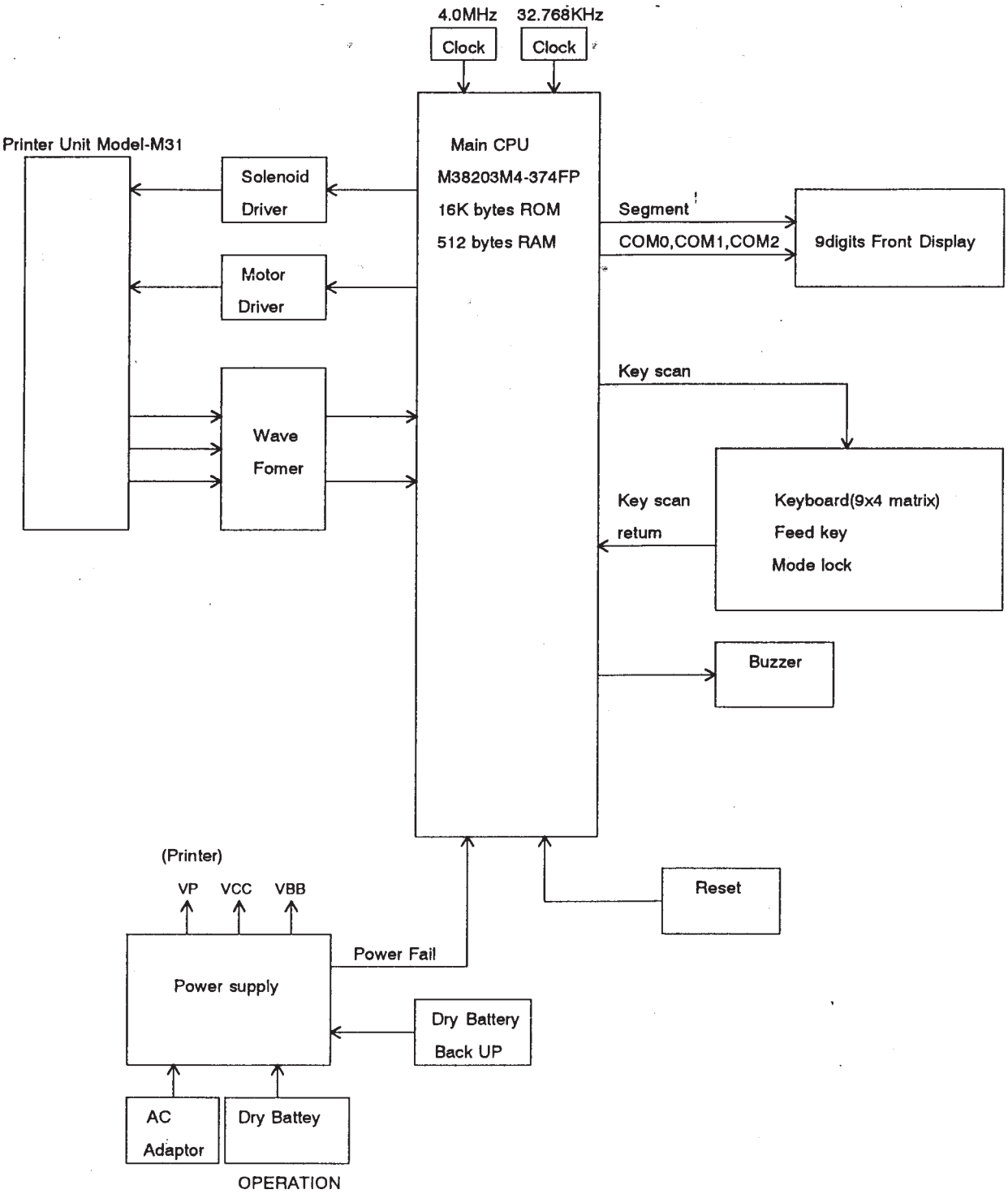


Fig. 6-1 System Block Diagram

6.2 POWER SUPPLY CIRCUIT

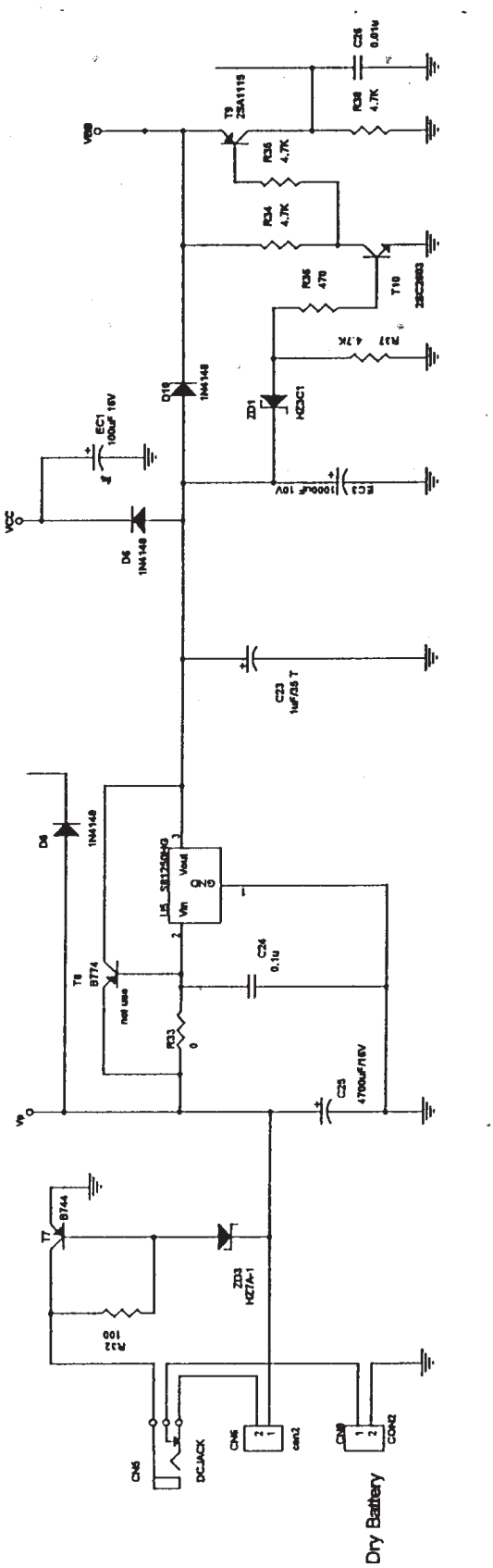


Fig. 6-2 Power Supply Circuit

6.3 RESET CIRCUIT

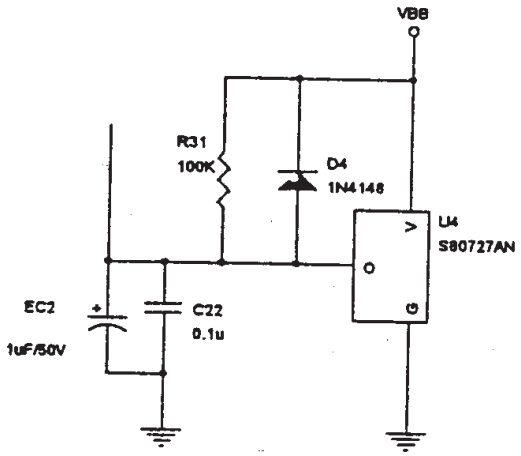


Fig. 6-3 Reset Circuit

6.4 POWER FAIL CIRCUIT

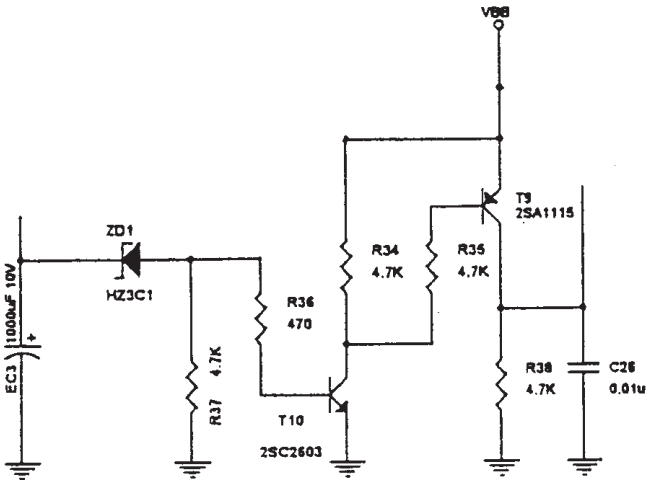


Fig. 6-4 Power Fail Circuit

6.5 DISPLAY CIRCUIT

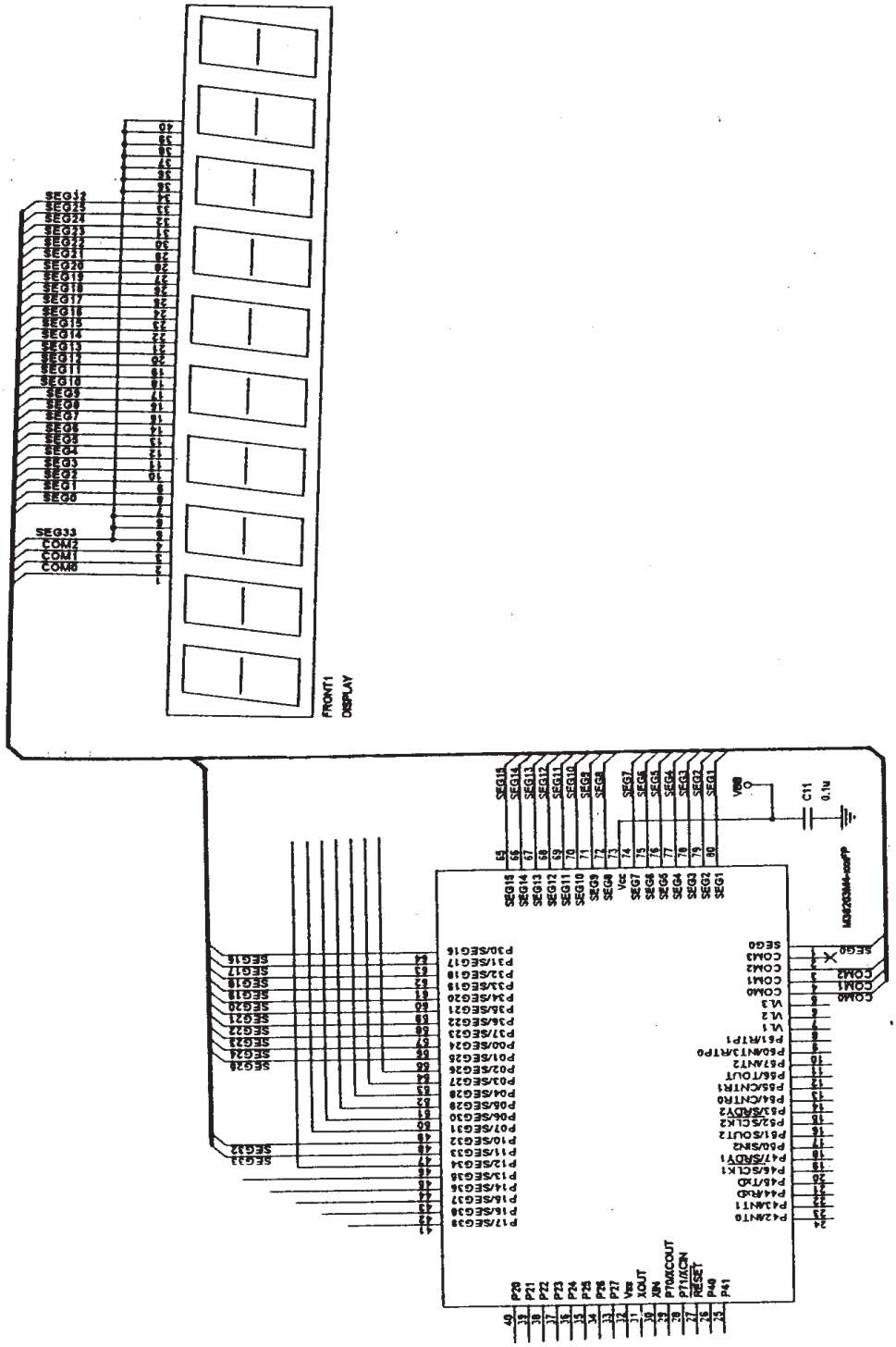


Fig. 6-5 Display Circuit

6.6 KEYBOARD CIRCUIT

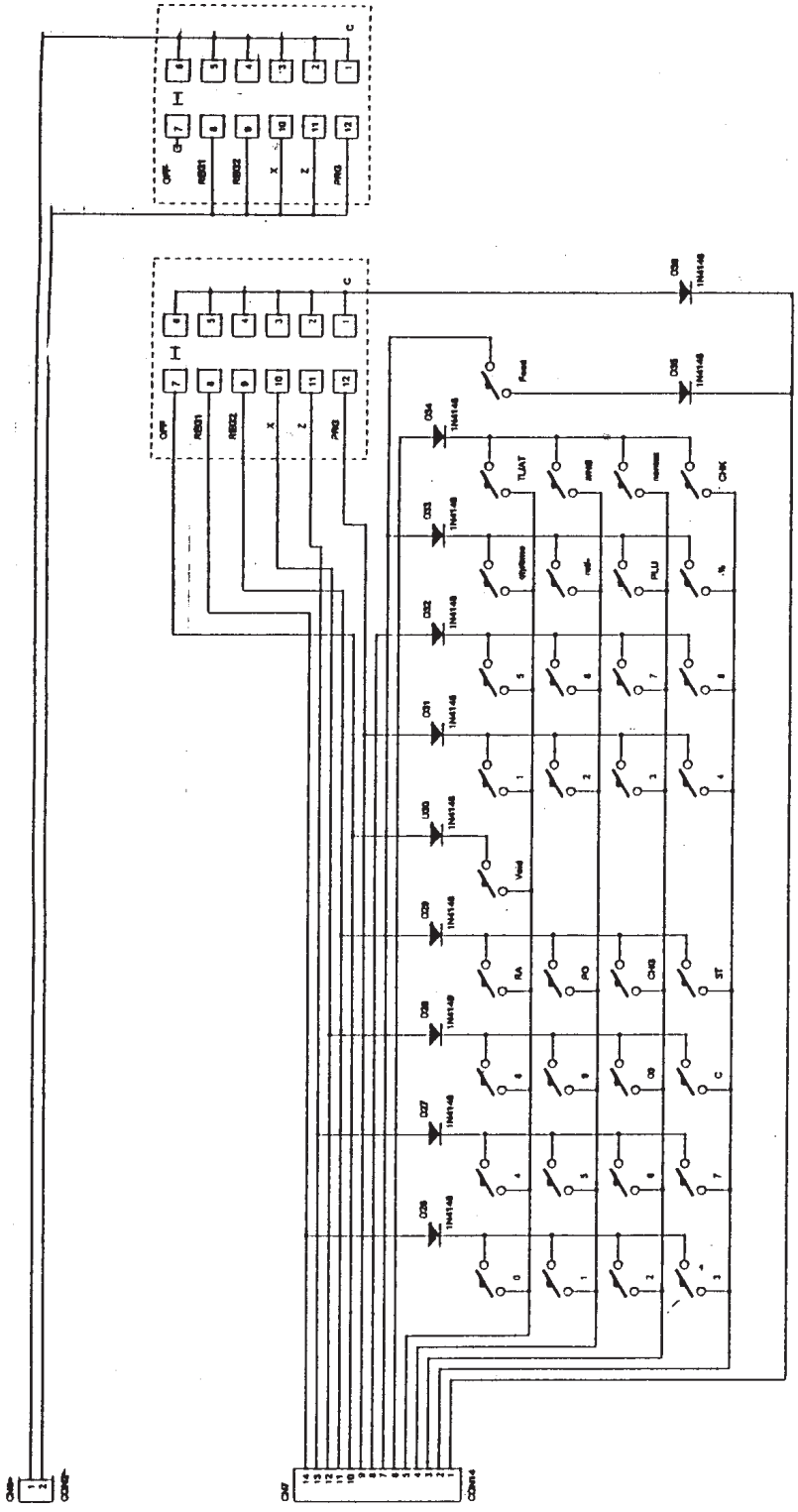


Fig. 6-6 Keyboard Circuit

6.7 BUZZER CIRCUIT

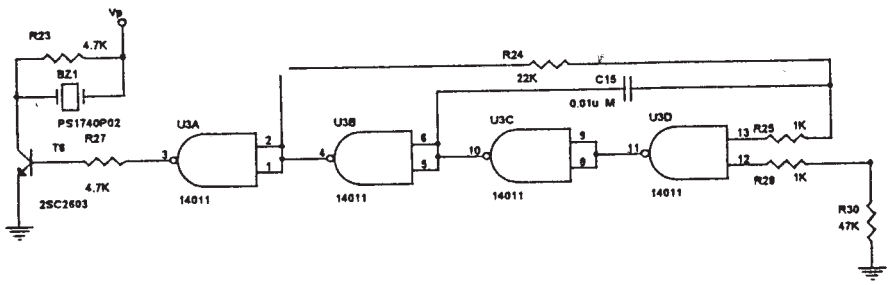


Fig. 6-7 Buzzer Circuit

6.8 BATTERY CIRCUIT

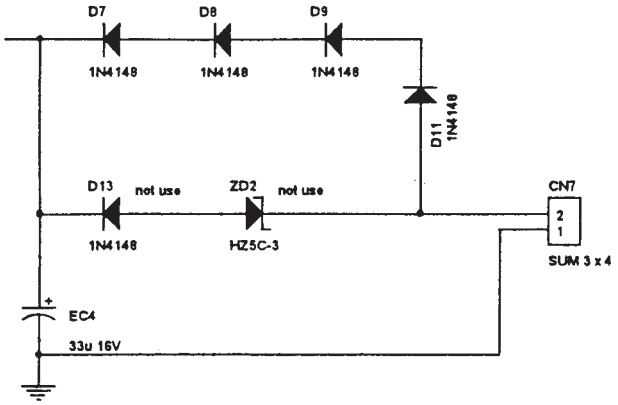


Fig. 6-8 Battery Circuit

6.9 PRINTER CIRCUIT

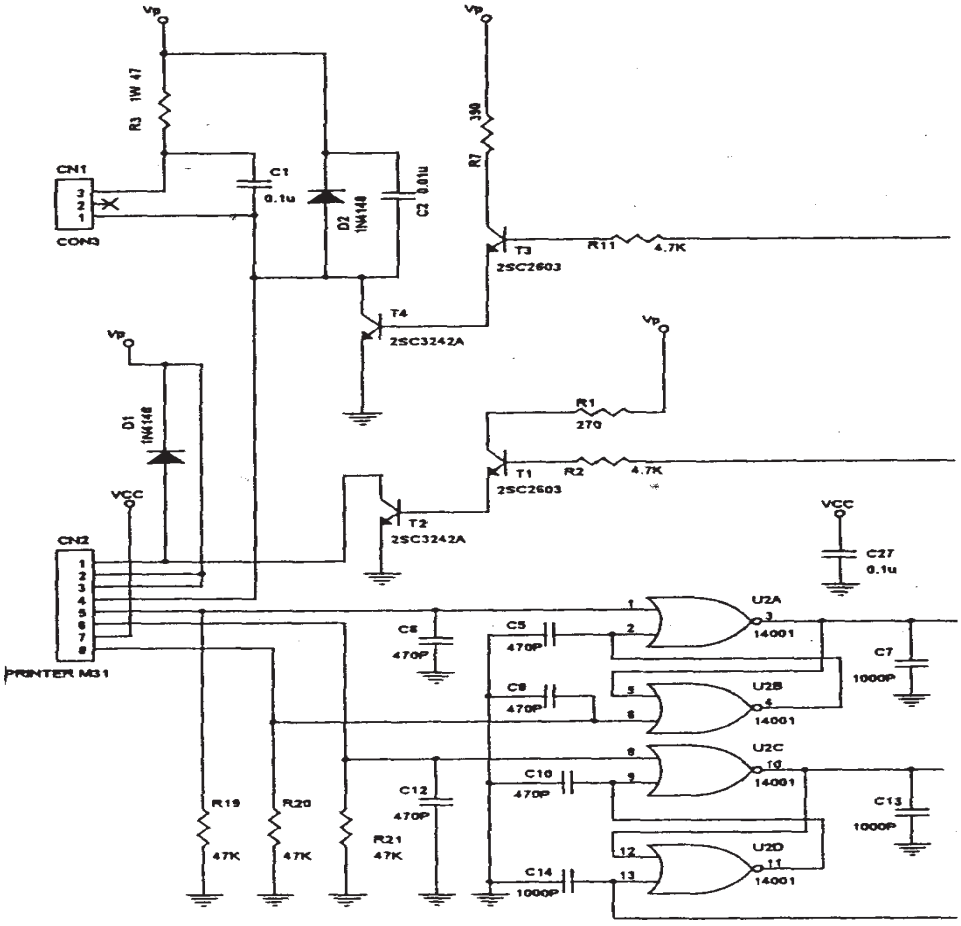
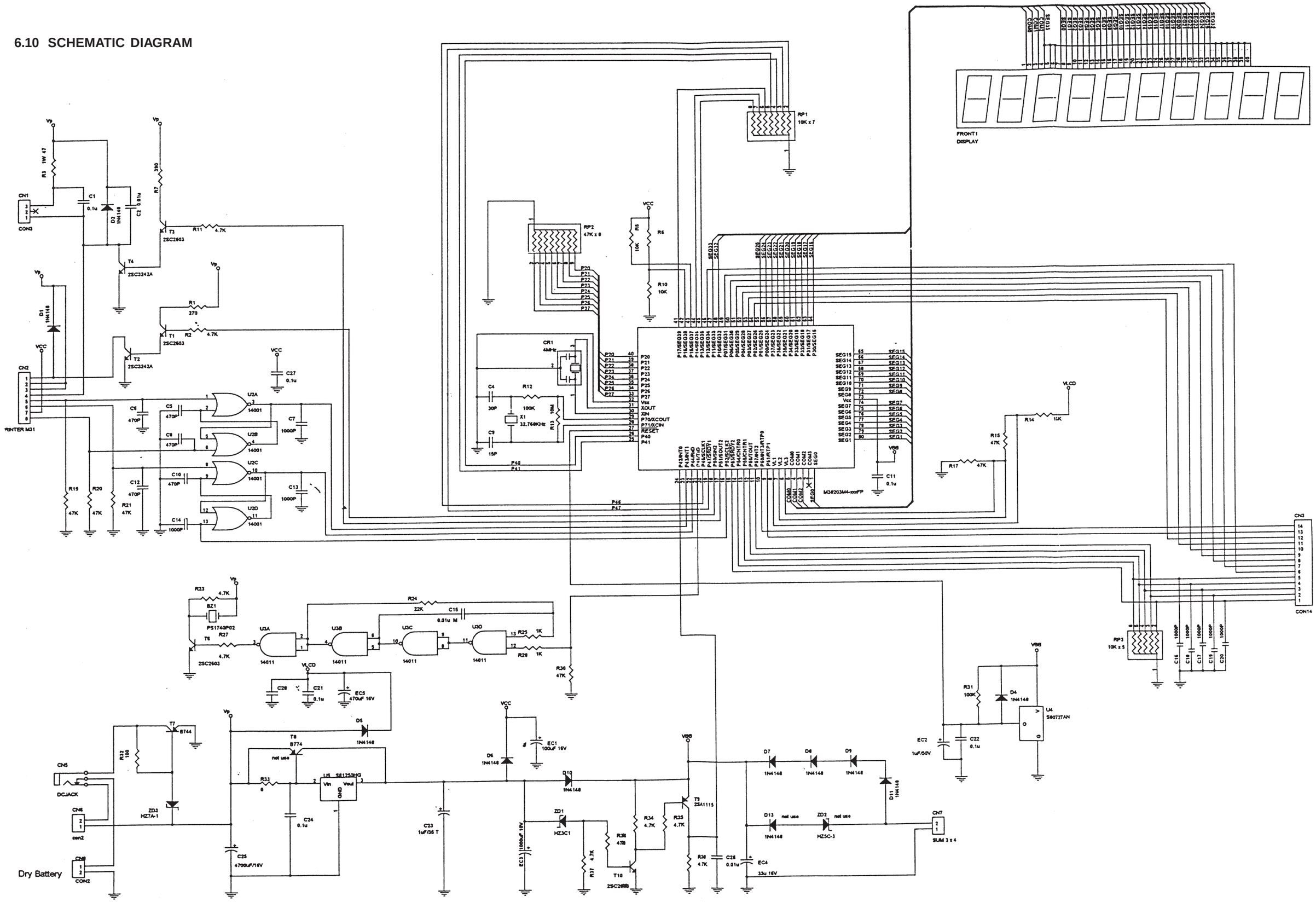
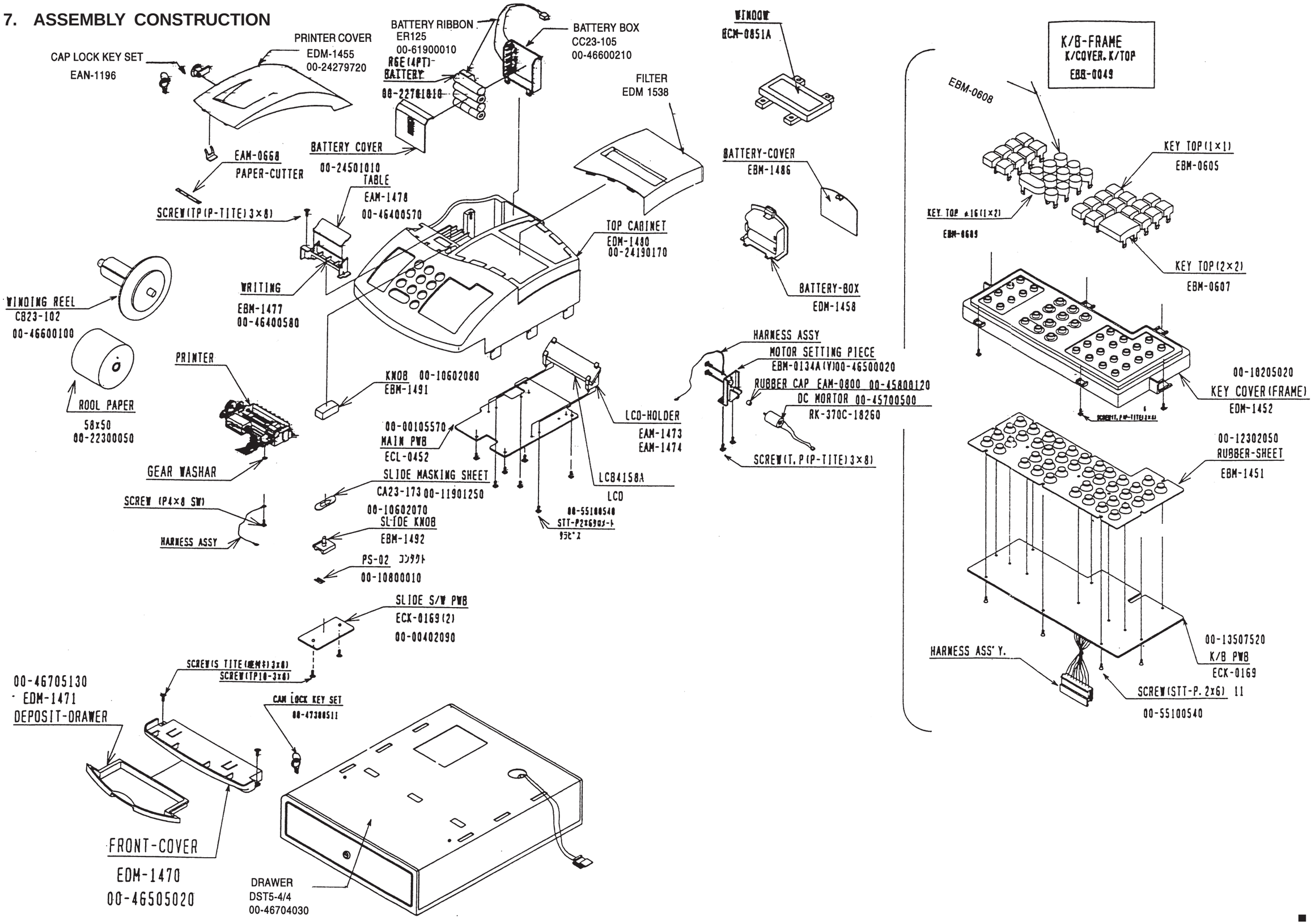


Fig. 6-9 Printer Circuit

6.10 SCHEMATIC DIAGRAM



7. ASSEMBLY CONSTRUCTION



SPARE PARTS CATALOGUE

IMPORTANT

This publication is written by TA TRIUMPH-ADLER Vertriebs GmbH (Service Department). This document is the only document to which reference may be made for ordering spare parts

Spare parts should be ordered at the following address: TA Triumph-Adler Vertriebs GmbH
Service Department
Fürther Straße 212
Nuremberg

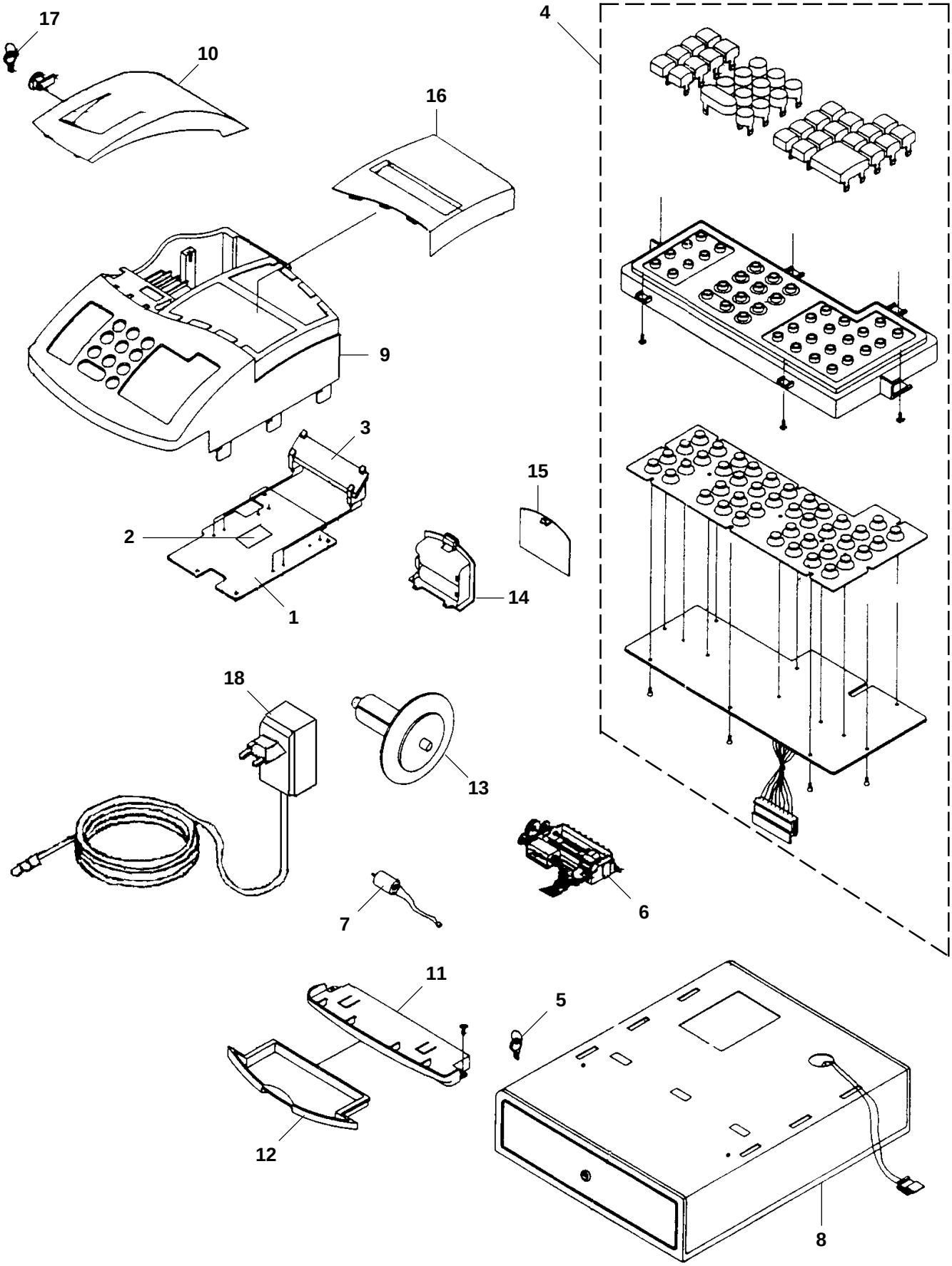
November 1998
Subject to Alterations

TA Triumph-Adler Vertriebs GmbH
Fürther Straße 212
90429 Nürnberg

EXPLODED PARTS

REF.	CODE	DESCRIPTION
1	037498 N	MAIN BOARD
2	037499 P	M38203M4-374FP
3	037500 U	DISPLAY LCO- B5180A
4	037502 J	COMPLETE KEYBOARD ASSEMBLY
5	037503 K	KEY DRAWER
6	037504 L	PRINTER M31-041
7	128710 D	MOTOR
8	037505 M	DRAWER GROUP
9	037506 N	COVER ASSEMBLY
10	037507 P	PRINTER COVER
11	037508 Y	FRONT COVER
12	037509 Z	DEPOSIT DRAWER
13	037510 M	WINDING REEL
14	037511 A	BATTERY BOX
15	037512 B	BATTERY COVER
16	037513 C	DISPLAY FILTER
17	037514 D	CAM LOCK KEYSET
18	037515 E	AC ADAPTOR

EXPLODED PARTS



STATO DI AGGIORNAMENTO
UPDATING STATUS

DATA DATE	PAGINE AGGIORNATE UPDATED PAGES	PAGINE PAGES	CODICE CODE
2/1999	1ª EDIZIONE - 1st EDITION	55	686770R-00