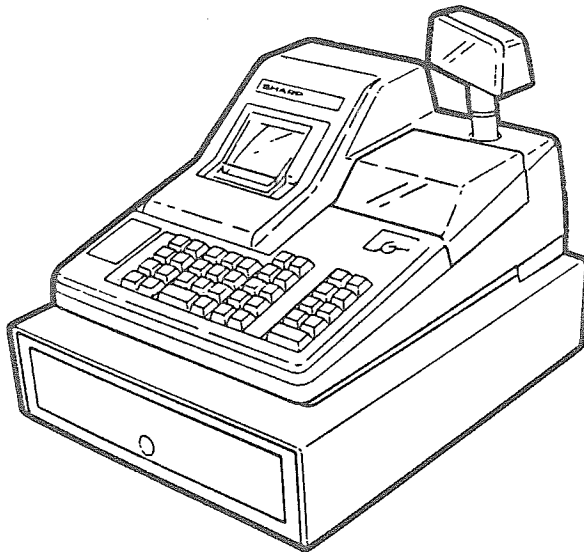


SHARP SERVICE MANUAL

CODE:00ZER1566SM-E



**ELECTRONIC
CASH REGISTER**

MODEL ER-1566

PRINTER:M-445

SRV Key:LKGIM7113RCZZ

CONTENTS

1. REFERENCE DOCUMENTS	1
2. OPTIONS and SUPPLIES	1
3. OUTLINE OF FUNCTIONS	1
4. SPECIFICATIONS	1
5. SERVICE (SRV) MODE	5
6. PROGRAM (PGM) MODE	7
7. READING (X) AND RESETTING (Z) MODE	10
8. CIRCUIT BLOCK DIAGRAM	12
9. μ PD75208 TERMINAL SIGNALS	13
10. CIRCUIT DESCRIPTIONS	14
11. CIRCUIT DIAGRAMS AND PWB LAYOUT	19

1. REFERENCE DOCUMENTS

1. Printer M-445 service manual (00ZM445//SM-E)
2. Cash register basic manual
3. Operation manual (TINSK7129RCZZ)

2. OPTIONS and SUPPLIES

- 1) Waterproof key cover
Service parts code : GCOVB6930RCZZ
Price Rank : AY
- 2) Ink ribbon
Parts code : URBNT9511RCZZ
Price rank : AF
- 3) Stamp ink
Parts code : UINK-1001CCZZ
Price rank : AK

3. OUTLINE OF FUNCTIONS

1. 8 departments standard.
2. 1sheet type printer (Receipt/Journal selection type)
3. Paper width 58mm
4. 1 line operator display and 1 line customer display (Pop-up type)
5. Drawer 4 bills and 5 coins
6. Multiplication and repeat.
7. Paid out Key (PO) and Received on account key (RA).
8. % key
9. Cash and check tendering, and charge finalizing
10. Void key and void mode
11. No sale
12. Refund key
13. 100 PLUs (Price Lock Up)
14. Minus (discount)
15. Non-add code entry
16. Automatic time and date recording
17. Auto TAX calculation (2 rates)

4. SPECIFICATIONS

4-1. Rating

1. Size :
405 (W) x 425 (D) x 279.5 (H) (mm)
2. Weight : 9.1kg
3. Power : AC120V $\pm$ 10%60Hz
4. Power consumption:
Stand-by 6W
Operating 15W (max.)
5. Working temperature.
0 $^{\circ}$ C $\sim$ 40 $^{\circ}$ C
6. Built-in battery
Ni-cd rechargeable battery
Memory holding time:
Approx. 1 month after recharged fully.

4-2. Keyboard.

ER-1566 Mode switch.

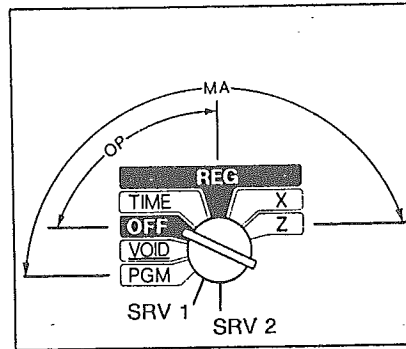


Fig. 4-2

Master key (MA)

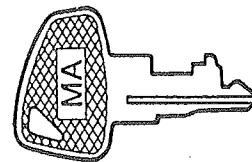


Fig. 4-3

Operator key (OP)

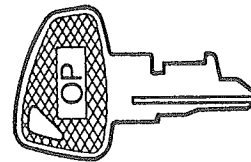


Fig. 4-4

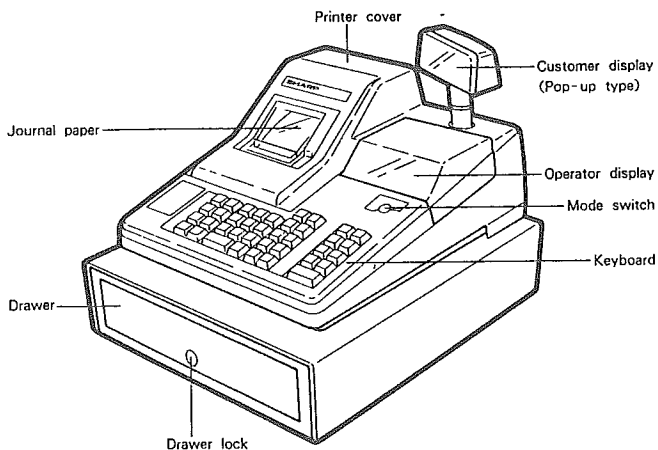
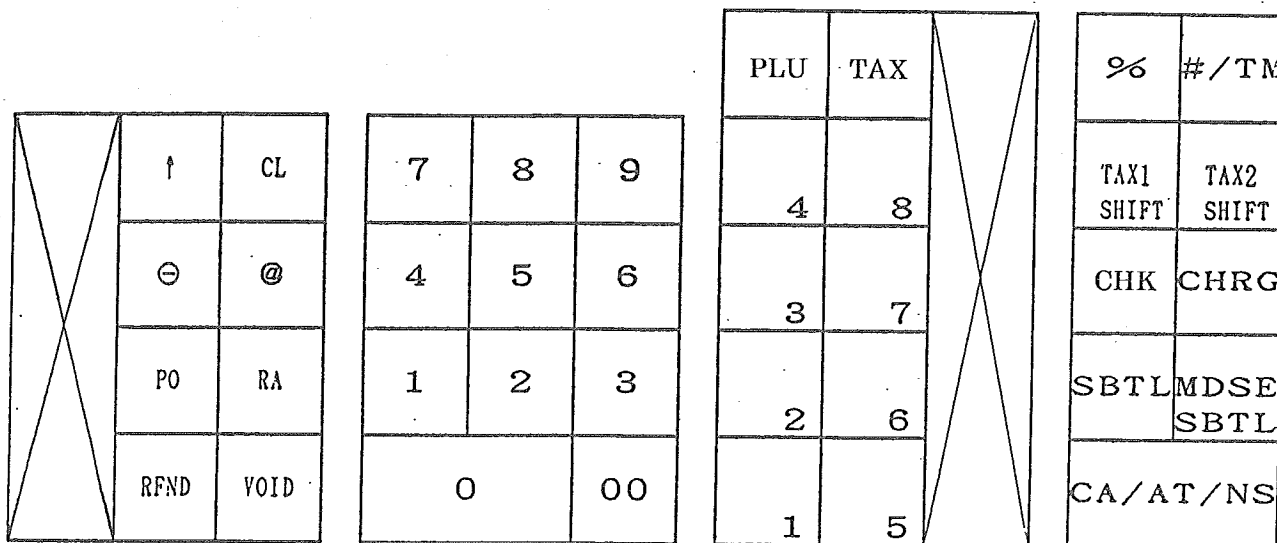


Fig. 4-1

Key Board Layout

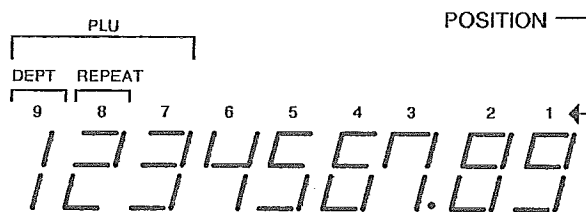


↑ : Paper feed key.
 CL : Clear key.
 ⊖ : Minus key.
 @ : Multiplication key.
 PO : Paid out key.
 RA : Received on account key.
 RFND : Refund key.
 Void : Void key.
 0~9,00 : Numeric Key.
 1~8 : Department key.

PLU : PLU key.
 % : Percent key.
 #/TM : Non-add/Time display key.
 TAX1 SHIFT : TAX1 SHIFT key.
 TAX2 SHIFT : TAX2 SHIFT key.
 TAX : TAX key.
 CHK : CHECK key.
 CHRG : Charge sale key.
 SBTL : Sub-Total key.
 MDSE SBTL : Merchandise subtotal key.
 CA/AT/NS : CASH/Amount Tendered/No-sale Key.

4-3. Display.

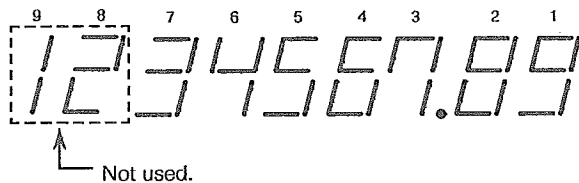
1. Front display. (Operator display)
 (Display device)
 9 digits, 7segment type. (Green color)
 Letter size : 7.4mm(H) × 5.5mm(W)



	Position	Description
AMOUNT	1~7	Pattern 「1234567.89」
DEPT	9	
PLU	7~9	No Zero-suppressed.
Repeat	8	Endless count, starting from 2.
Decimal point	3	TAB
Time display	3~9	EX. 「A 10-25」

	Position	Description
PGM Mode	9	[P]
Error	9	[E]
Minus sign	4~8	[-] floating.
Subtotal or short tender	9	[Σ]
CA/AT/NS	9	[F] Lights up when a registration is finalized directly by depressing CA/AT/NS, CHK or CHRG KEY.
Total	9	[Σ] Lights up whenever the change due amount appears in the display.

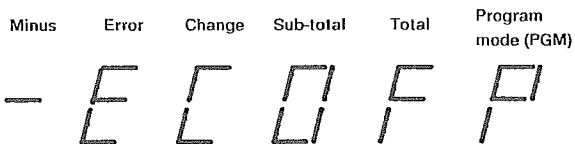
2. Rear display.(Customer display [Pop-up type])
The same device is used for the customer display as operator display.



3. Display type and capacity.
1) Type : 7-segment type green fluorescent display.
2) Amount, code : Max 7 digits, Dept : 1 digit, Repeat: 1 digit.
3) Figure



4) Symbol



- 5) Repeat counter : Incrementing counter, starts from 2.

4-4. Printer.

- (1) Overview of the printer. [Printer Model M-445]
- Printing system : Print wheel selective type. 1sheet.
 - Print columns : 12
 - Dimension of printing character : 2.8(H)×1.6(W)mm
 - Spacing Between char. : 2.8mm
 - Between lines : 5.2mm
 - Printing speed : 3 lines/sec.
 - Paper feed speed : 3 lines/sec.
 - Reliability : MCBF 1 million lines.

Paper

- 57.5 ± 0.5mm(W)
- 80mm (max.Diameter)
- 0.06~0.085mm (Thickness)

Ink ribbon

- Size : 13mm(W)×6m(L)
- Color : Purple

Stamp

- Stamp color : Purple
- Max. printable size : 30(W)×9(H)mm
- Stamp pattern
- Ink : UINK-1001CCZZ

(2) PRINTING WHEEL LAYOUT.

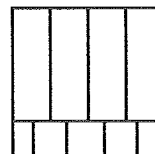
	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	∞	CA	Q
1	1	1	1	1	1	1	1	1	1	∞	CH	×
2	2	2	2	2	2	2	2	2	2	VD	←	ST
3	3	3	3	3	3	3	3	3	3	VD	→	TL
4	4	4	4	4	4	4	4	4	4	—	TX	GT
5	5	5	5	5	5	5	5	5	5	@	AT	NT
6	6	6	6	6	6	6	6	6	6	RFCG	1	
7	7	7	7	7	7	7	7	7	7	◀	NS	2
8	8	8	8	8	8	8	8	8	8	▶	CR	1/2
9	9	9	9	9	9	9	9	9	9	RACK	X	
A	#	—	—	#	.	.	.	.	1/2	PO	V	Z
B	★	★	★	★	★	★	★	★	No	%	P	◇

Parts Code : 00BM456002100

Price Rank : BB

4-5. Drawer (GBOXD6987RCZZ) (For CANADA)

- The till and drawer are made of plastics and are integral with each other. (The till is not detachable from the drawer.)
- Manual open lever is provided on the bottom of the drawer cabinet.
- Drawer bell is provided.
- Compartment layout.



4 Bills / 5 coins

- Color : OA GRAY (Drawer and till)

- Lock :

Lock = 90°clockwise
Unlock = 90°counter clockwise

4-6. Memories

ITEM	TOTALIZER	COUNTER	PRESET	NOTE
GT	12d×1			
Z counter		4d×1		
DEPARTMENT	7d×8S	4d×8S	5d×8 1d×8 1d×8 1d×8 1d×8	UNIT PRICE. HALO. +/-. TAXABLE. SICS.
DEPT. TTL	7d×1S			CALCULATED AMOUNT.
PLU		4d×100S	5d×100 1d×100	UNIT PRICE(or HALO amount) Dept. number
NET	7d×1S			CALCULATED AMOUNT.
VOID	7d×1			
VOID MODE	7d×1			
REFUND	7d×1S			
P/O	7d×1S		1d×1	HALO.
R/A	7d×1S		1d×1	HALO.
TAX TTL	7d×3S		56steps×2 6d×2 1d×1	[1/2]Table(s). % TAX. HALO for MANUAL TAX.
(-)	7d×1S		5d×1 1d×1 1d×1 1d×1 1d×1	UNIT PRICE. HALO. - ONLY. TAXABLE. SICS.
%	7d×2S		4d×1 1d×1 1d×1	% RATE. +/-. TAXABLE.
CASH SALE	7d×1S			
CHARGE SALE	7d×1S		1d×1	HALO.
CHECK SALE	7d×1S		1d×1	HALO.
CUSTOMER		4d×1S		
CID	7d×1S			
CONSECUTIVE		4d×1		
MACHINE No.			3d×1	

※ THE GT IS CALCULATED AS FOLLOWS.

$$\begin{aligned} \text{CURRENT GT} = & \text{OLD GT} + \text{IDEPT.1I} + \text{IDEPT.2I} + \text{IDEPT.3I} + \text{IDEPT.4I} + \text{IDEPT.5I} + \text{IDEPT.6I} \\ & + \text{IDEPT.7I} + \text{IDEPT.8I} + \text{IMINUSI} + \text{ISBTL\%I} + \text{ITAXI} + \text{IVOIDI} + \text{IREFUNDI} \end{aligned}$$

4-7. Power Failure Mark(★★★★★★★No.)

- 1) Power failure while waiting or operating: the sequence at power fail will be completed.
- 2) Power failure while printing: the printing is started again after printing "★★★★★★★No."

4-8. Printer motor Lock

In the ER-1566, the motor will automatically turn off when a premature halting of the timing signals occurs due to a paper misfeed, ribbon jam, intrusion of alien object, etc. When the motor stops, an intermittent beeping will occur, with no indication in the display.

<How to reset the motor lock >

- 1) Turn power off and remove the cause.
- 2) Turn power on.
- 3) Depress the **CL** key to return the ER-1566 to the point where the cause happened. The power failure symbols will be printed after a line feed.

5. SERVICE (SRV) MODE

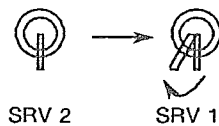
5-1. Machine resetting

(1) Program reset (Program loop reset)

The operation resets the program to the key halt condition if the machine dose not operate normally. Ues this program reset operation first to clear problems.

Operation procedure:

- 1) Turn the mode switch to SRV 2 position.
- 2) Turn the mode switch from SRV 2 position to SRV 1 position.



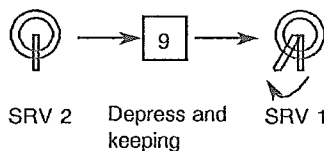
(2) All memories clear (Master reset)

The memories are all cleared to return the program to initial state.

Date and the time are changed respectively to Jan. 1, 00 and AM. 12:00.

Operating procedure:

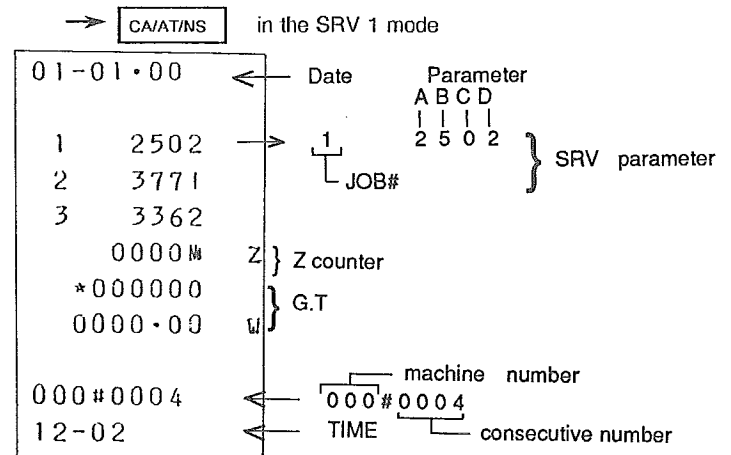
- 1) Turn the mode switch to SRV 2 position.
- 2) Depress keeping numeric **9** Keys.
- 3) While holding the **9** Key down, turn the mode switch from SRV 2 position to SRV 1 position.



5-2. Service mode programming

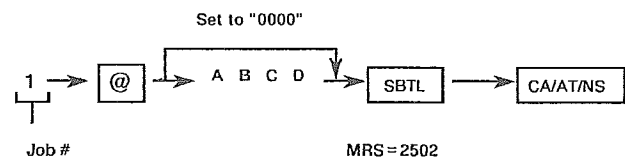
5-2-1. Service program reading

Key operation :



5-2-2. Job # 1 programming

Mode Switch : SRV 1



★ MRS means Master reset which is the default preset after a SRV mode initialization. (★ : Default)

#1-A : Number of departments

No. of DEPTS	A
4 DEPTS	1
8 DEPTS	2

★

#1-B : Fractoinal treatment

Fractinal treatment	B
Round down	0
Round off	5
Round up	9

★

#1-C : Not used Fixed to 0.

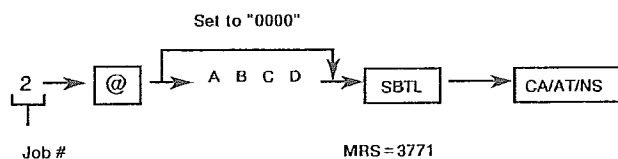
#1-D : TAB position

TAB	D
TAB 0 (0.)	0
TAB 1 (0.0)	1
TAB 2 (0.00)	2
TAB 3 (0.000)	3

★

5-2-3. Job # 2 programming

Mode Switch : SRV 1



#2-A : - Error beep selection
- Key catch sound selection

Error beep	Key catch sound	A
Miss operate	Non	0
	Yes	1
All lock error	Non	2
	Yes	3

★

#2-B : Void mode Exists/Not Exists
Indirect void function Enable/Disable

Void mode	Indirect void	B
Not Exists	Disable	4
	Enable	5
Exists	Disable	6
	Enable	7

★

#2-C : - Negative subtotal Enable/Disable
- No sale after non-add code printing
- Non-add code entry Enable/Disable

Negative subtotal	NS after non-add entry	Non-add code	C
Disable	Disable	Disable	0
		Enable	1
	Enable	Disable	2
		Enable	3
Enable	Disable	Disable	4
		Enable	5
	Enable	Disable	6
		Enable	7

★

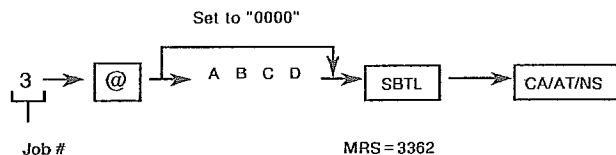
#2-D : Time 24 hour/12 hour
Date format Y : Year/M : Month/D : Day

Time	Date format	D
12H	Y/M/D	0
	M/D/Y	1
	D/M/Y	2
24H	Y/M/D	4
	M/D/Y	5
	D/M/Y	6

★

5-2-4. Job # 3 programming

Mode Switch : SRV 1



#3-A : Printing when the MDSE
SBTL key is depressed
Print/Non Print

Sub total print	Refund Check sale	Enable/Disable	A
Non print	Disable	Disable	0
		Enable	1
	Enable	Disable	2
		Enable	3
Print	Disable	Disable	4
		Enable	5
	Enable	Disable	6
		Enable	7

★

#3-B : Number of digits of percentage (%)
Paid out (PO) Enable/Disable
Received on account (RA) Enable/Disable

(%)	PO	RA	B
2 digits integer + 2 digits decimal	Disable	Disable	0
		Enable	1
	Enable	Disable	2
		Enable	3
2 digits integer	Disable	Disable	4
		Enable	5
	Enable	Disable	6
		Enable	7

★

#3-C : Tax delete function in the automatic taxation
Enable/Disable

Tax delete	Manual tax	C
Disable	Disable	0
	Enable	2
Enable	Disable	4
	Enable	6

★

#3-D : GT resetting after Z report printing

Enable/Disable
GT print on Z report Print/Non print
X/Z report Zero skipping Yes/No

GT resets	GT print	X/Z report	D
Disable	Non print	No zero skip	0
		Zero skip	1
	Print	No zero skip	2
		Zero skip	3
Enable	Non print	No zero skip	4
		Zero skip	5
	Print	No zero skip	6
		Zero skip	7

★

NK : 1~99999
UNIT PRICE : Max. 5digits.
TAXABLE : TAXABLE 1 / TAXABLE 2 /
TAXABLE 1&2 / NON TAXABLE

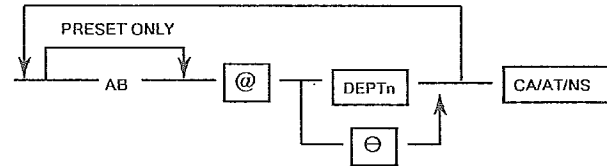
SIGN : +/-

※ EVEN IF THE PLUS (+) SIGN IS PROGRAMMED FOR
ΘKEY, DATA ENTRY BY A ΘKEY OPERATION IS
ALWAYS A MINUS (-) SIGN.

MRS=DEPT. : +0.00, NON TAXABLE.

Θ : -0.00, NON TAXABLE.

6-2. Dept. & Θ function programming.



A : SICS/NORMAL = 1/0

B : LIMITATION = 0~6

SICS : SICS/NORMAL

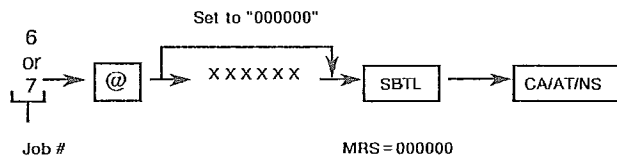
LIMITATION : 0~6 (HALO) 0 : OPEN PRICE
REGISTRATION
INHIBIT.

※ SICS PROGRAMMING FOR Θ KEY IS VALID.

MRS = NORMAL, 6digits.

5-2-5. Job # 6, 7 GT programming

Mode Switch : SRV 1



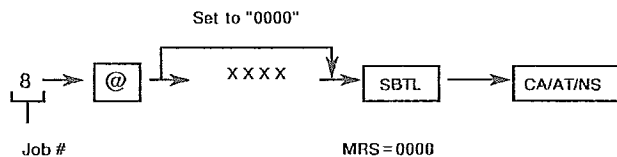
MRS = 000000

Job # 6 : GT lower 6 digits setting (0~999999)

Job # 7 : GT upper 6 digits setting (0~999999)

5-2-6. Job # 8 Z counter programming

Mode Switch : SRV 1



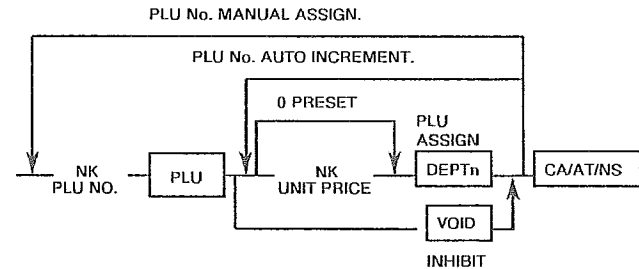
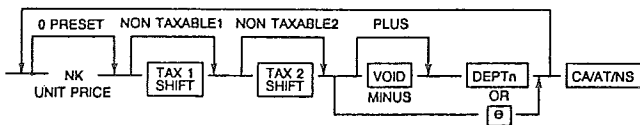
MRS = 0000

Job # 8 : Z counter (0~9999)

6. PROGRAM (PGM) MODE

· Turn the mode switch to the "PGM" position.

6-1. Price & modify programming for dept. & Θ keys.



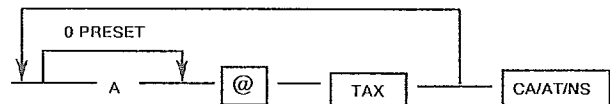
PLU NO. : 1~100

UNIT PRICE : Max. 5digits.

PLU ASSIGN : DEPT.1~DEPT.8

MRS = INHIBIT.

6-4. Limitation programming for manual tax

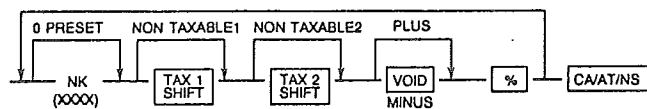


A : LIMITATION 1~6

LIMITATION : 0~6 (HALO) 0 : MANUAL TAX
REGISTRATION
INHIBIT.

MRS = 6digits.

6-5. Programming for %key.



NK : %RATE 4digits (1~9999)

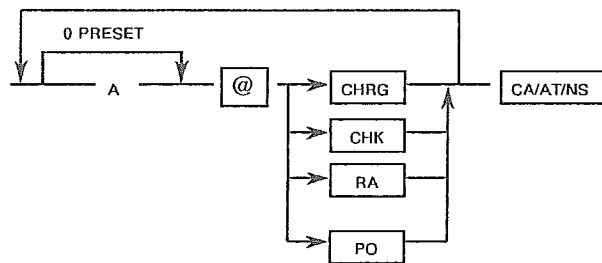
PRESET RATE : 0.01%~99.99%

TAXABLE : TAXABLE 1 / TAXABLE 2 /
TAXABLE 1&2 / NON TAXABLE

SIGN : +/-

MRS = +0.00%, NON TAXABLE.

6-6. Programming for media keys & function keys.

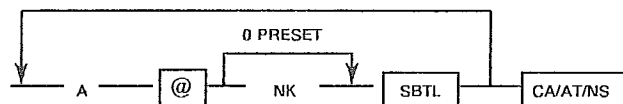


A : LIMITATION 1~7

LIMITATION : 0~7(HALO) 0 : FUNCTION INHIBIT.

MRS = 7digits.

6-7. Date, time, machine no., consecutive no., print format programming.



A : JOB_No.

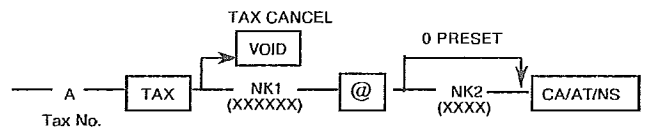
NK : PROGRAMMING DATA.

JOB No.	CONTENTS	DATA	MRS
1.	MACHINE No.	Max. 3digit	000
2.	CONSECUTIVE No.	Max. 4digits	0000
3.	PRINT FORMAT	Max. 3digits.	111
4.	DATE	Max. 6digits.	01 01 00
5.	TIME	Max. 4digits.	A.M.12:00

DATA PROGRAMMED BY JOB#3 PROGRAMMING IS AS FOLLOWS.

NK :	ABC	
A :	PRINT FORMAT	RECEIPT/JOURNAL = 1/0
B :	CONTENTS OF RECEIPT	DETAIL/TOTAL = 1/0
C :	TIME PRINT	PRINT/NOT PRINT = 1/0

6-8. % tax rate programming.



A : DECLARATION OF TAX(1 or 2)

NK1 : TAX RATE

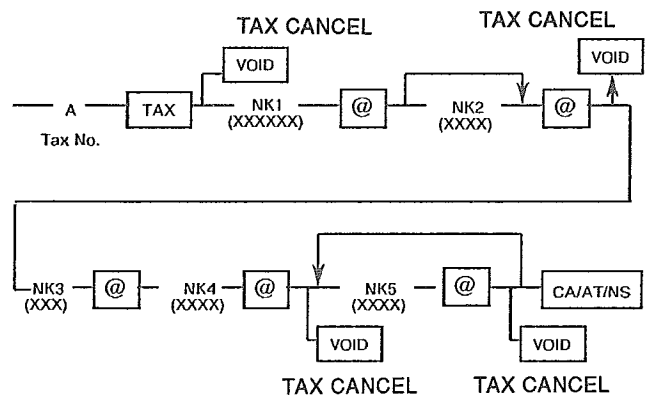
NK2 : MINIMUM TAXABLE AMOUNT

TAX RATE : 0.0001%~99.9999%

MINIMUM TAXABLE AMOUNT : 0.00~99.99

MRS = TAX DON'T EXIST.

6-9. Table tax programming.



A : DECLARATION OF TAX (1 or 2)

NK1 : TAX RATE (Max. 6digits.)

NK2 : CYCLE (Max. 4digits.)

NK3 : INITIAL TAX (Max. 3digits.)

NK4 : MINIMUM TAXABLE AMOUNT (Max. 4digits.)

NK5 : BREAK POINT (Max. 4digits.)

TAX RATE : 0.0001%~99.9999%

CYCLE : 0.01~99.99

INITIAL TAX : 0.01~9.99

MINIMUM TAXABLE AMOUNT : 0.01~99.99

BREAK POINT : 0.01~99.99

MRS = TAX TABLES DON'T EXIST.

6-10. Programming reading

Reading of programmed items for departments and functions

Accomplished by depressing the CA/AT/NS key directly.

07-10-89		
1	16	Single-item cash sale
	3.50 II 1	
2	03	Limit on the number of entry digits
-	1.50	Unit price
3	04	Tax status
	5.00 II 2	
8	05	Department number
	1.50 II 1	
	06	
-	0.50 -	Minus key
	10.00 % II 1	Percentage
#	101	Printing format/time printing
	4 II	Limit on the number of entry digits for the manual tax
	7 II	Limit on the number of entry digits for the check
	6 II	Limit on the number of entry digits for the charge
	7 II	Limit on the number of entry digits for the RA
	4 II	Limit on the number of entry digits for the PO
	6.0000 % II 1	
	1.00	
001	0.11	
002	0.23	
003	0.39	
004	0.57	
005	0.73	
006	0.89	
007	1.11	
	6.0000 % II 2	Percentage tax rate
	1.00	
	012#1016	Machine number
	6-08 *	Consecutive number
		Time printing

II II 1

Reading of programmed item for PLUs

Accomplished by depressing the PLU key directly.

07-10-89	
001#1	PLU number
2.00	Associated department
002#1	Unit price
1.20	
099#7	
8.00	
100#7	
5.30	
012#1010	Machine number
5-45 *	Consecutive number
	Time printing

7. READING (X) and RESETTING (Z) MODE

7-1. Reading of sales

The printer prints all the register totals, reflecting the activity up to that point.

(The memory is retained.)

The reading can be taken any number of times.

Turn the mode switch to the "X" position and depress the CA/AT/NS or PLU Key

X/Z REPORT. (GENERAL)

→ CA/AT/NS

General report

The following is an example of a "Z" position printout.

07-10-89	Date
00034 Z	Reset symbol (Z)
*000000	Reset count (4 digits)
1310-58 (1)	Grand total (max. 12 digits)
1 00084	Q'ty
*50-08	Amount
2 00014	
- *3-80	
8 00044	
*14-00	
*555-13 (1)	Gross total
- *1-25	Minus total
*1-41% (1)	Total of percent calculation for merchandise subtotal
*555-29 (1)	Net total
*0-85%	Total of percent calculation for department amount
*8-26 (1) 1	Tax 1 total
*3-84 (1) 2	Tax 2 total
*0-20 (1)	Manual tax total
*15-00 (1)	Void total
*5-09 (1)	Total of amount registered in "VOID" mode
*3-50 (1)	Refund total
*30-00 (1)	Received-on-account total
*20-00 (1)	Paid-out total
*551-65 (1)	Cash sale total
*7-58 (1)	Check sale total
*8-36 (1)	Charge sale total
0010 (1)	Count of customers
*561-65 (1)	Cash in drawer
	Machine number
012#1150	Consecutive number
4-58 *	Time printing

7-2. Reading and Resetting of sales

The operations shown below are performed when you want to reset the sales figures after the close of daily business.

The printer then prints out the totals for the day's activity.

All totals are cleared except the non-resettable grand total.

Turn the mode switch to the "Z" position and depress the CA/AT/NS or PLU key.

Note : 1. The reset count and non-resettable grand total are not printed for read only (X) reports.
The read symbol "X" is printed instead.

2. When the amount in a totalizer exceeds 7 digits, the memory overflow mark (for positive ;
"***", for negative ; "*-") is printed beside the total.

3. The GT is calculated as follows.

Current GT = Old GT (i.e. from previous Z report)

+ | Dept. 1 | * + | Dept. 2 | + + | Dept. 8 | + | Minus | + | SBT % |

+ | Tax | + | Void | + | Refund |

* The symbol | | means absolute value.

X/Z REPORT. (PLU)

→ PLU

PLU report

07-10-89 Z 001# 0007# 3-80@ *26-60 002# 0021# 1-50@ *31-50	_____Date _____Reset symbol (Z) _____Q'ty _____Unit price _____Amount
--	--

100#

0006#

6-80@

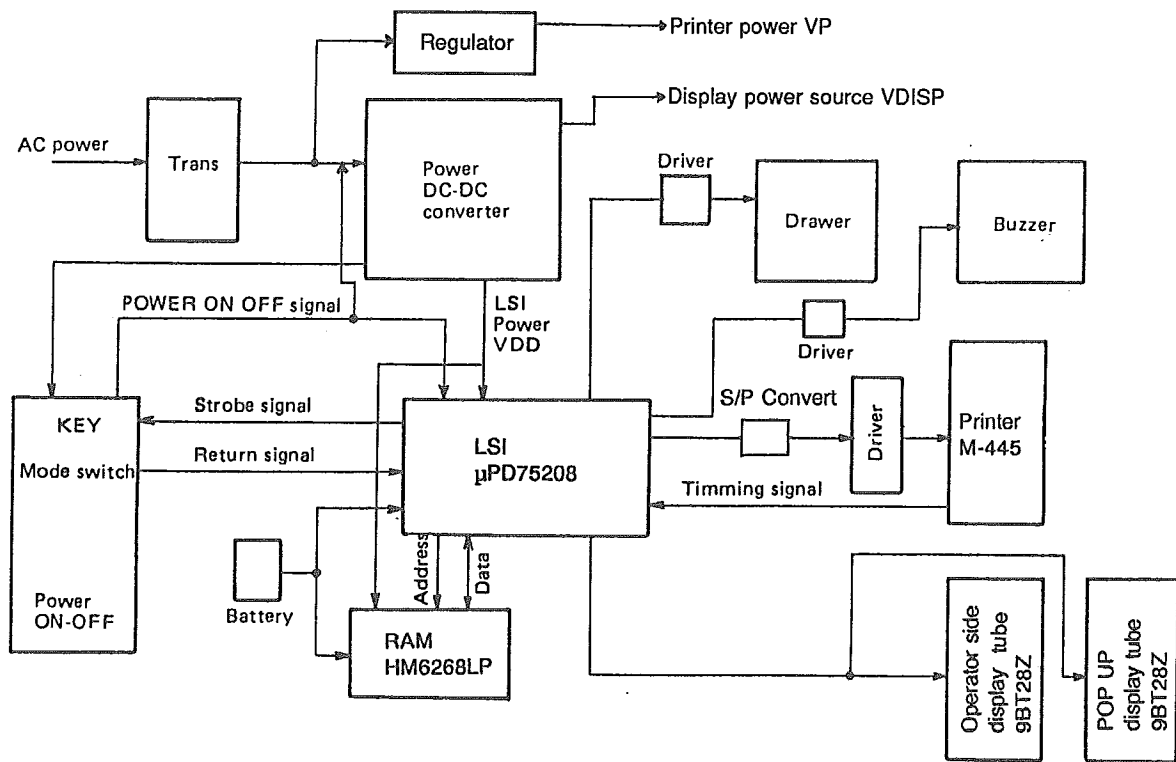
*40-80

012#1130

4-37 *

Note : For read only (X) report, the read symbol "X" is printed instead of "Z".

8. CIRCUIT BLOCK DIAGRAM



9. μ PD75208 TERMINAL SIGNALS

No.	Name	Description	I/O
1	S3	Key scan/Display tube segment signal (d)	out
2	S2	Key scan/Display tube segment signal (c)	out
3	S1	Key scan/Display tube segment signal (b)	out
4	S0	Key scan/Display tube segment signal (a)	out
5	P00	Key return signal	in
6	P01	Key return signal	in
7	P02	Key return signal	in
8	P03	Key return signal	in
9	INT0	P-off signal input	in
10	INT1	Printer timing signal input TS	in
11	P12	Mode switch / Drawer open sw return	in
12	P13	Key return signal	in
13	D0	RAM Data bus D0	i/o
14	D1	RAM Data bus D1	i/o
15	D2	RAM Data bus D2	i/o
16	D3	RAM Data bus D3	i/o
17	A0	RAM Address bus A0	out
18	A1	RAM Address bus A1	out
19	A2	RAM Address bus A2	out
20	A3	RAM Address bus A3	out
21	CS	RAM chip select signal	out
22	WE	RAM write signal	out
23	P62	Key return signal	in
24	P63	Motor ON signal	out
25	A4	RAM Address A4	out
26	A5	RAM Address A5	out
27	A6	RAM Address A6	out
28	A7	RAM Address A7	out
29	PP0	Buzzer signal	out
30	X1	X'tal terminal	in
31	X2	X'tal terminal	in
32	VSS	GND	in
33	XT1	Timer X'tal terminal	in
34	XT2	Timer X'tal terminal	in
35	A8	RAM Address A8	out
36	A9	RAM Address A9	out
37	A10	RAM Address A10	out
38	A11	RAM Address A11	out
39	RESET	Reset signal input	in
40	T0	Display tube 1st digit drive signal	out
41	T1	Display tube 2nd digit drive signal	out
42	T2	Display tube 3rd digit drive signal	out
43	T3	Display tube 4th digit drive signal	out
44	T4	Display tube 5th digit drive signal	out
45	T5	Display tube 6th digit drive signal	out
46	T6	Display tube 7th digit drive signal	out
47	T7	Display tube 8th digit drive signal	out
48	T8	Display tube 9th digit drive signal	out
49	T9	NU	—
50	PH3	Printer magnet data output enable signal	out
51	PH2	Printer magnet data strobe signal	out
52	PH1	Print data shift clock	out
53	PH0	Print data output	out
54	T14	Drawer open signal	out
55	S10	Stamp signal	out
56	Vload	Power (-30V) for display	in
57	Vpre	Power (-3.5V) for display	in
58	S9	NU	—
59	S8	Drawer open sw scan signal	out
60	S7	Key scan/Display tube segment (DP) signal	out
61	S6	Key scan/Display tube segment signal (g)	out
62	S5	Key scan/Display tube segment signal (f)	out
63	S4	Key scan/Display tube segment signal (e)	out
64	VDD	Power (+5V)	in

10. CIRCUIT DESCRIPTIONS

10-1. Printer motor drive circuit

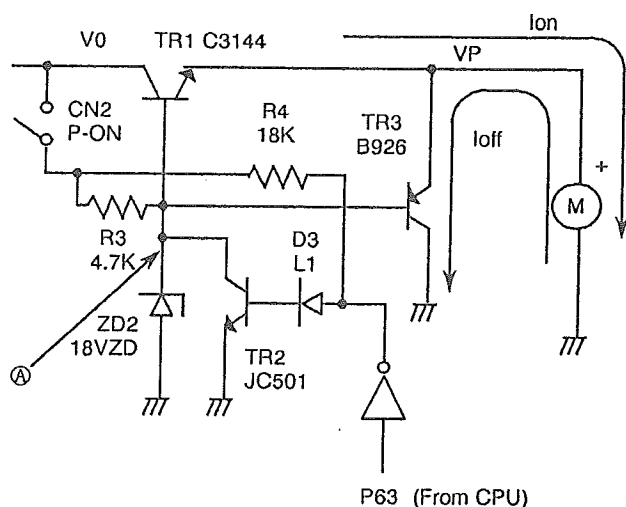


Fig. 10-1

- (1) At motor ON:
P63 goes High → point A goes high → TR1 activates → (TR3 deactivates)
VP active to drive the motor (on)
- (2) At motor OFF:
P63 goes Low → point A goes GND level → TR1 deactivates
TR3 activates → VP deactive to stop driving the motor (loff)

10-2. Battery Circuit

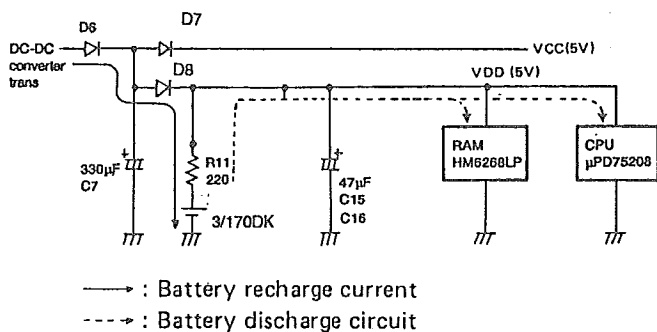


Fig. 10-2

10-3. Reset circuit

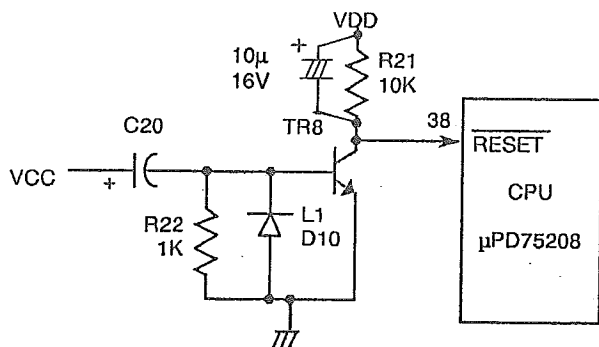
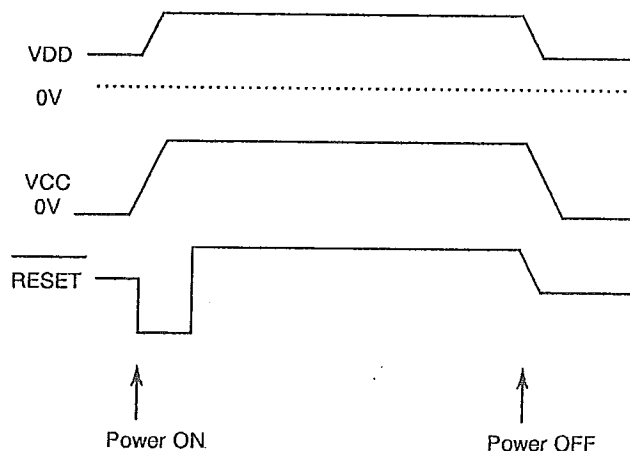


Fig. 10-3



When the power is turned on, C20 starts to charge and forward biases TR8 causing RESET to be active (low). When C20 is fully charged a low is felt on the base of TR8 turning it off causing RESET to go high.

When power is turned off TR8 discharges causing TR8 to forward bias TR8 causing RESET to go low.

10-4. P-OFF Circuit

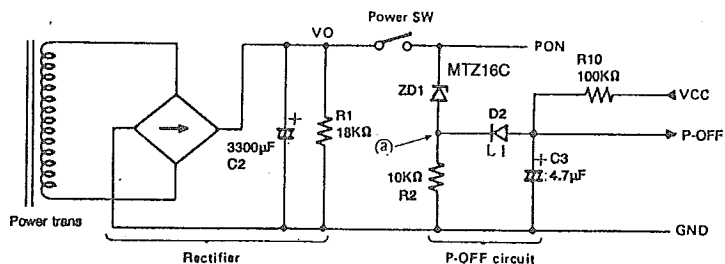


Fig. 10-3

At power on

When P-ON voltage reaches 16V, the current flows through the zener diode (ZD1: HZ15-2) so that the level at point @ goes high. The level of P-OFF rises as VCC increases. As a result, the P-OFF signal changes from low to high level.

At power off

When the power is turned off, the P-ON voltage drops under 15V causing the zener diode to stop current flow, which causes potential at point @ to drop.

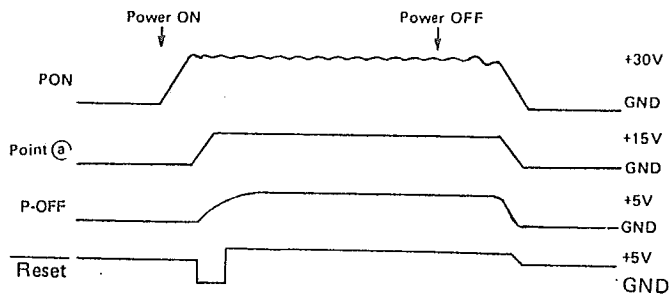
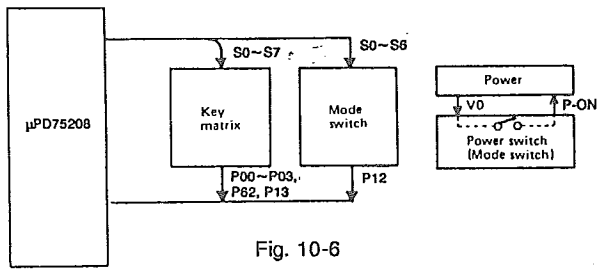


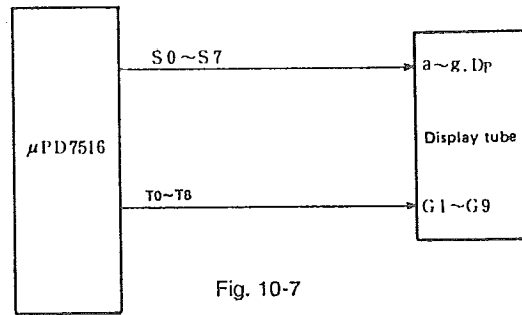
Fig. 10-5

10-5. Key and switch

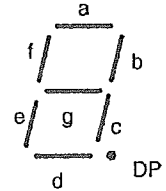


S0~S7 : Key scan signal
 P00~P03, P62, P13 : Key return signal
 V0 : Power switch
 P-ON : Mode switch
 P12 : Mode switch Return signal

10-6. Display control

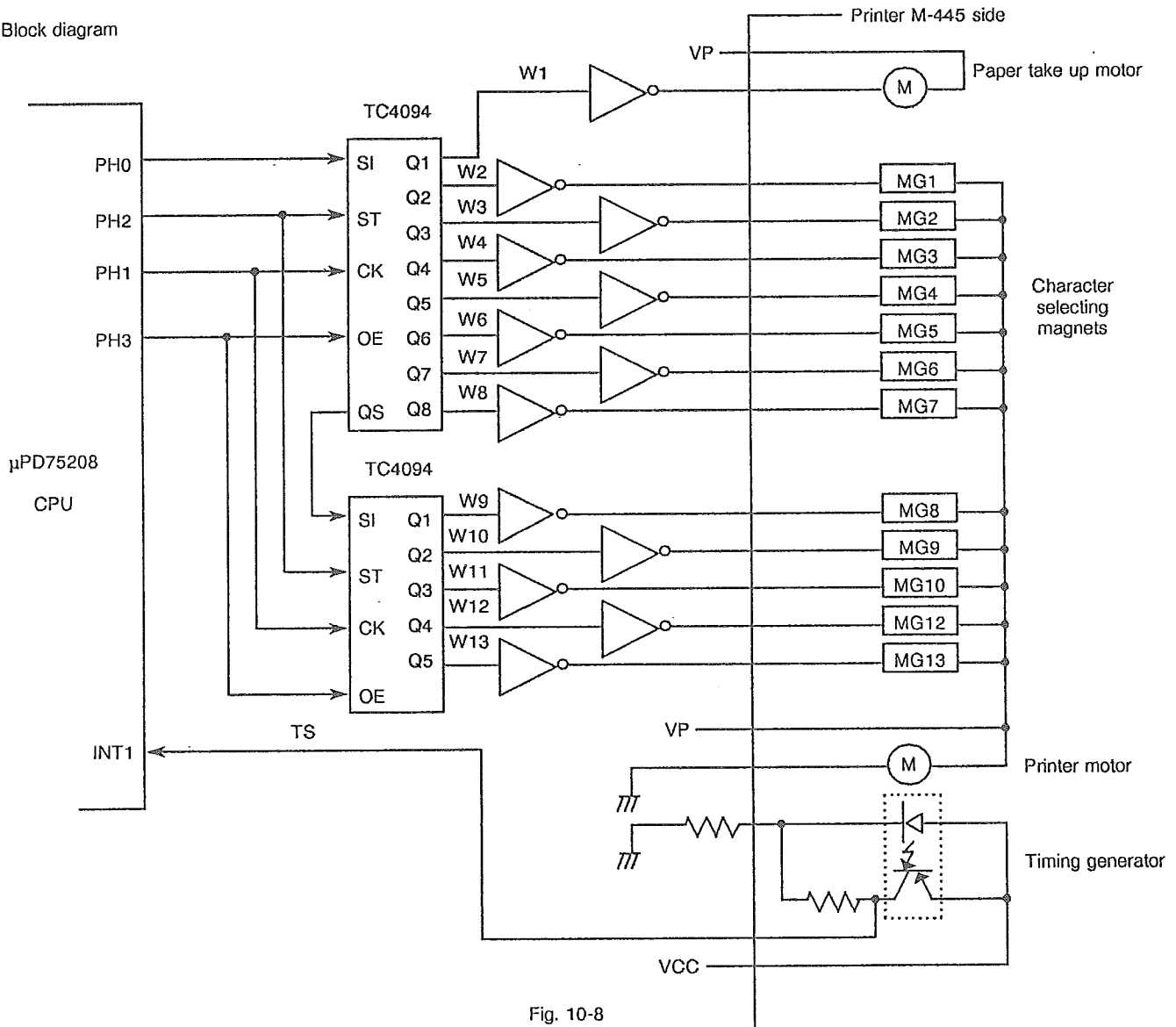


a~g : Display segment
 DP : Decimal point



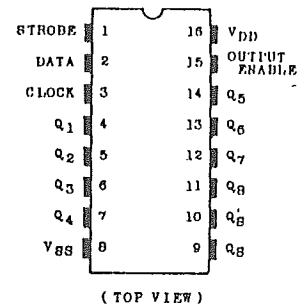
10-7. Printer control

Block diagram



PH0 : Print data output (serial out put)
 PH1 : Print data shift clock
 PH2 : Printer magnet data strobe signal
 PH3 : Printer magnet data output enable signal
 W1 : Paper take up motor drive
 W2 :
 } : Print magnet drive signal
 W13
 VP : Printer power
 TS : Printer timing signal

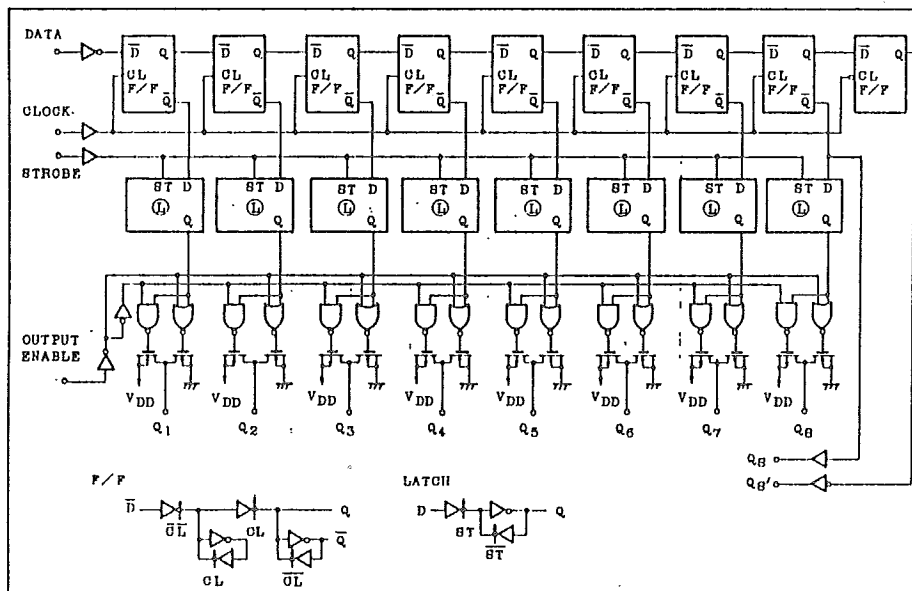
TC4094 internal circuit

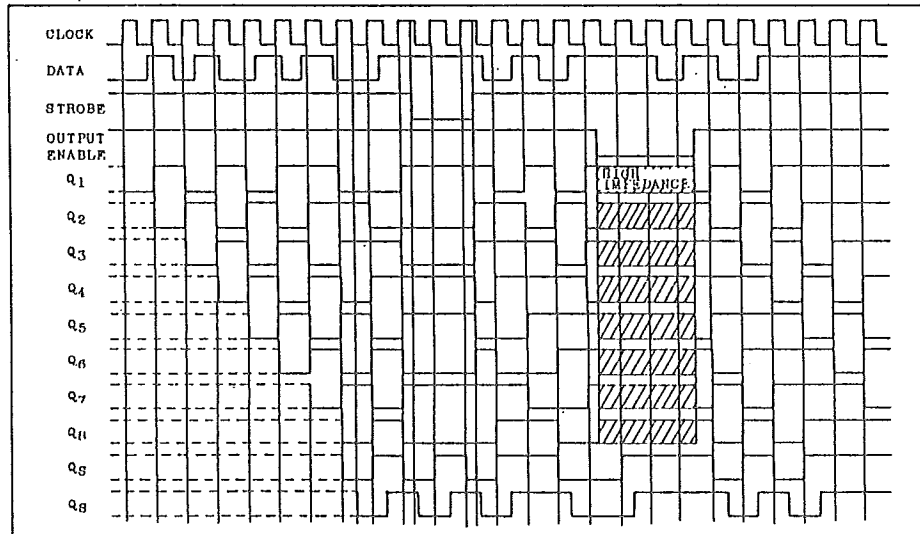


Printer control procedure

Printer M-445 is controlled mainly with CPU signals PH0~PH3, INT1 (TS), and P63.

- 1) Make P63 high to drive the motor with the CPU. This activates VP to rotate the printer motor.
- 2) TS (Timing Signal) from the printer allows output of the first line print data.
- 3) Print data is outputted serially from PH0 in synchronization with PH1 shift clock.
Print data from PH0 is serial-parallel converted in TC4094 and internally latched by the strobe signal of PH2.
When PH3 output enable signal is inputted. The latched data is outputted as W1~W13.
- 4) The next TS is detected and procedure 3) is repeated.





10-8. Drawer magnet drive

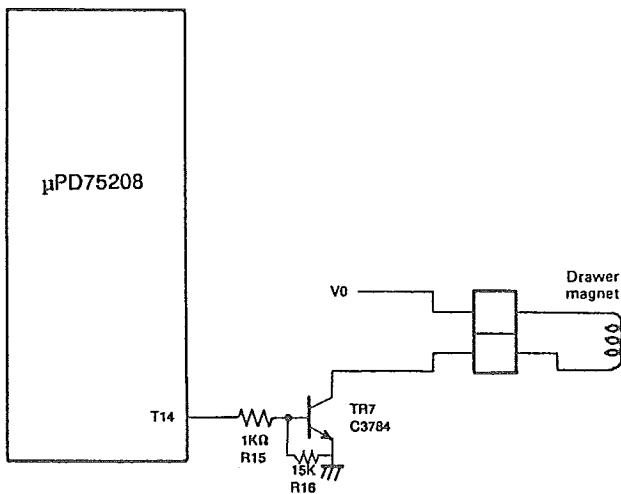


Fig. 10-9

The drawer magnet is driven when T14 of the μ PD75208 changes from low to high state.

10-9. Power circuit

(1) Block diagram

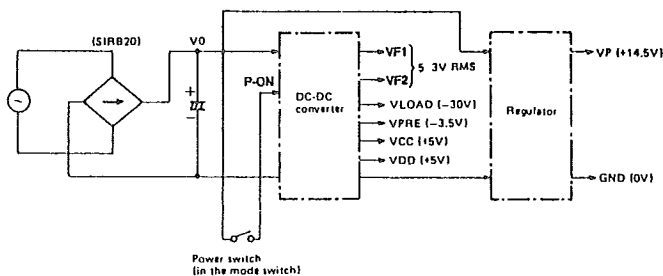


Fig. 10-10

- V0 : Power supply; stamp magnet. Drawer magnet,
DC-DC converter, and regulator
- VP : Printer operating
- VF1, VF2: Display tube heating (– 24V bias)
- VLOAD : Display operating (– 30V)
- VPRE : Display operating (– 3.5V)
- VCC : Circuit operating
- VDD : RAM and μ PD75208 power supply
- P-ON : Power on
- GND : 0V

(2) DC-DC converter

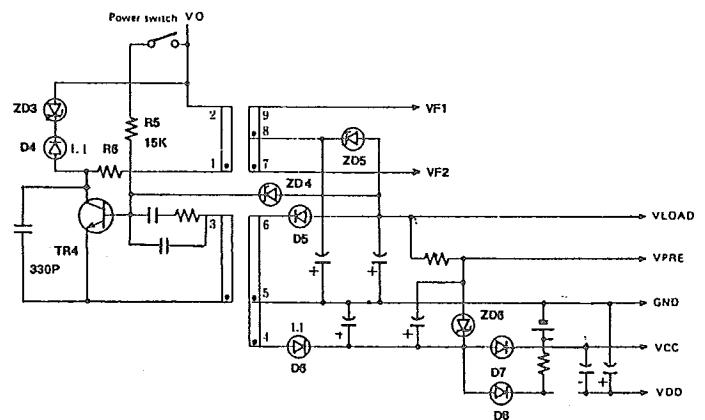
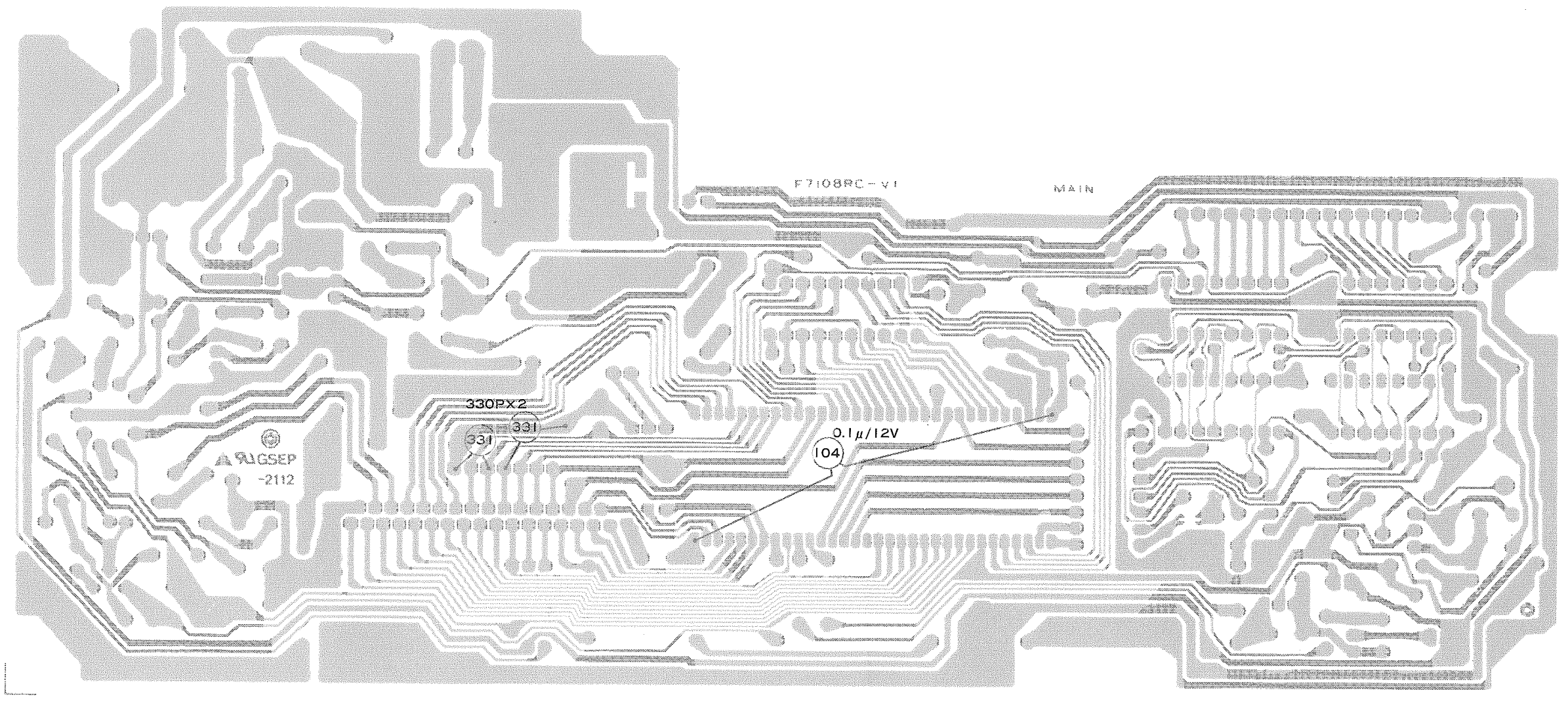


Fig. 10-11

The bias is added to the base of TR4 when the power switch is turned on, so that TR4 starts self-oscillation. VLOAD from the secondary side is fed back through the zener diode ZD4 to suppress voltage fluctuation on the secondary side.

(Solder side)



SHARP

COPYRIGHT © 1989 BY SHARP CORPORATION

All rights reserved.

Printed in Japan.

No part of this publication may be reproduced,
stored in a retrieval system, or transmitted,
in any form or by any means,
electronic, mechanical, photocopying, recording, or otherwise,
without prior written permission of the publisher.

SHARP CORPORATION

Information Systems Group

Quality & Reliability Control Center

Yamatokoriyama, Nara 639-11, Japan

Aug. 1989. Printed in Japan (B)