TECHINCAL MANUAL
QX-10
ALL BUSINESS COMPUTER SYSTEM

This Technical Manual provides technical information on the structure, principles of operation of the QX-10. Major techincal modifications, if made in the future, will be notified through Service Bulletins, and the Technical Manual should be revised accordingly. The details of the Manual are subject to change without notice.

All the information given in the Manual concerns the QX-10, and we are not responsible for any troubles with the industrial copyright of a third party that might arise from your application of the Manual to other products or from the connection of the QX-10 to others.

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CHAPTER 1
GENERAL

CONTENTS

1.1 General

The QX-10 is an all business computer system. It consists of a Z80A-compatible CPU, a memory of 256 KB maximum, two floppy disk drives of double-sided, double-density, 5-1/4" disks, and a 12" full-graphic CRT display with a resolution of 640 by 400 dots.

The standard configuration includes a programmable timer, Centronics-compatible printer interface, RS-232C interface, C-MOS RAM backed up by battery, clock and calendar, and separate keyboard. It has five card slots which permit installation of optional cards as required.

Optional cards available include character generators of varying fonts, GP-IB interface, optical fiber interface, color CRT interface, and pulse transformer interface.

1.2 Hardware configuration

1.2.1 General

The QX-10 is composed of three units: the main system unit, the keyboard unit, and the monitor unit.

The main system unit, the heart of the QX-10 system, includes the main circuit board, sub circuit board, power supply, two 5-1/4" floppy disk drives developed by Epson, and five slots permitting installation of optional cards.

The keyboard unit is connected to the main system unit with a curled cord through which signals may be transmitted in any direction.

The standard monitor unit is a 12" high resolution green monitor capable of displaying bit images.

1.2.2 Hardware

Main system

CPU	μPD780AC-1 (Z80A compatible, 4 MHz)
Memory	RAM : 256 KB (maximum on main board)
	VIDEO RAM : 128 KB (maximum on CRT board)
	C-MOS RAM : 2 KB (standard, backed up by battery)
	EPROM : 2/4/8 KB (for IPL)
Clock	C-MOS real-time clock (backed up by battery)
Speaker	Permanent magnet speaker
Interfaces	Printer interface (Centronics-compatible)
	RS-232C communications interface
DMA	7 channels
Interrupt levels	15
Counter/timer	6 channels
FDD	5-1/4" FDD × 2
	320 KB × 2 drives
	48 TPI, double sided & double density
Card slots	5
Monitor	12" green monitor
	640 × 400 dots
Keyboard	ASCII, HASCI

1.3 Specifications

1.3.1 External Dimensions and Weight

(1) External dimensions

		(W)		(D)		(H)
Main system unit	ca.	508	×	340	×	103 (mm)
Green monitor unit	ca.	312	×	340	×	270 (mm)
Keyboard unit	ca.	508 (510)	×	224	×	48 (mm)
Optional card		280	×	80		(mm)

(2) Weight: approx. 18kg

1.3.2 Environmental Conditions

(1) Temperature	during operation	:	5°C to 40°C
	storage	:	–30°C to 70°C
(2) Humidity.....	during operation	:	10 – 80% (no condensation)
	storage	:	10 – 90% (no condensation)
(3) Resistance to shock	during operation	:	max. 1 G, 1 msec
	storage	:	max. 5 G, 1 msec
(4) Resistance to vibration....	during operation	:	max. 0.25 G, 5-50 Hz
	storage	:	max. 3 G, 5-50Hz

CHAPTER 2
HARDWARE CONFIGURATION

CONTENTS

2.1 Hardware Configuration

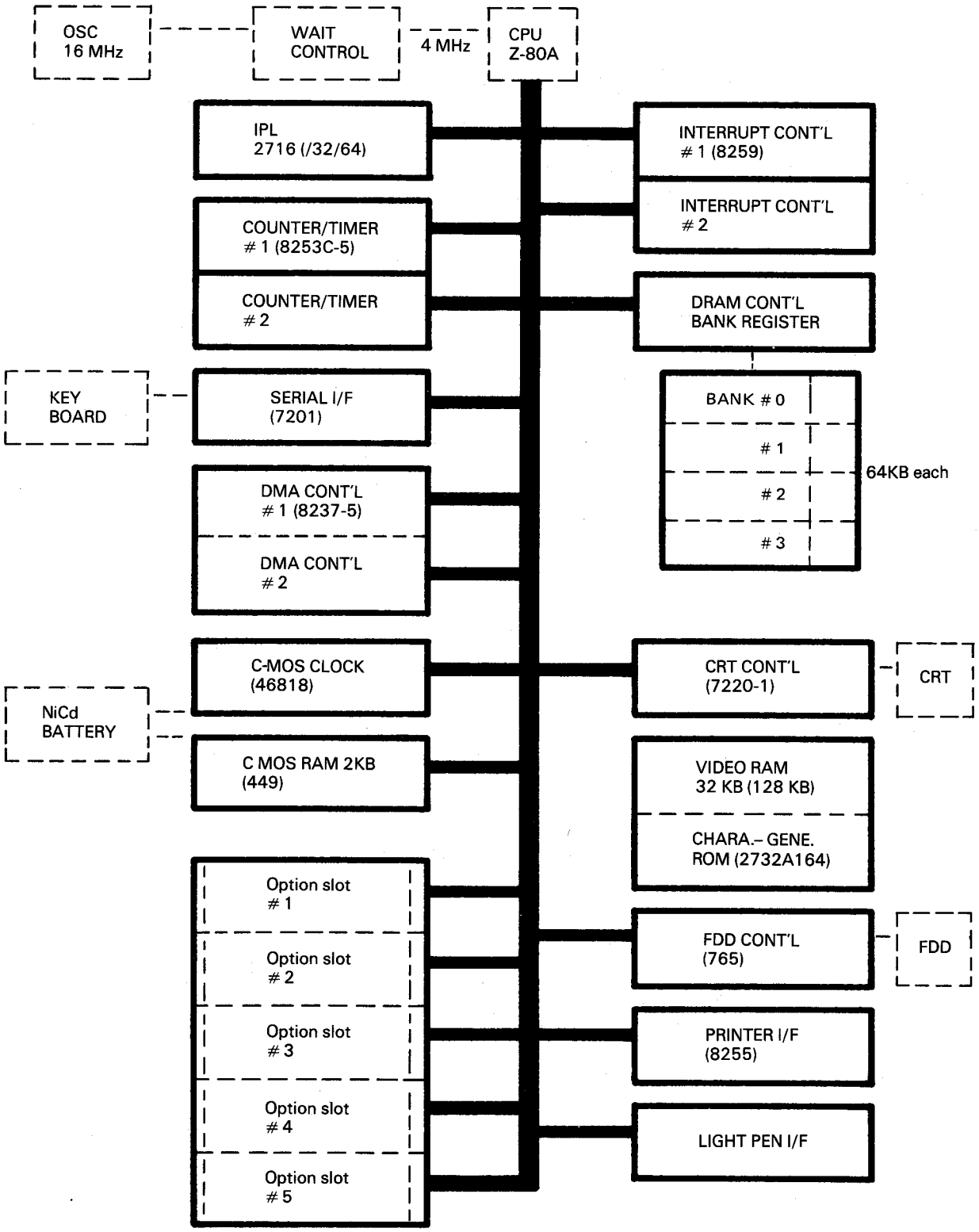


Fig. 2-1

2.2 Interfaces

2.2.1 Connector Locations

The QX-10's main circuit board (Q10SYM board) is provided with 19 connectors (including five connectors for option card slots) which connect to other circuit boards or peripheral devices through cables as shown in QX-10 system layout.

The connectors of the Q10SYM board are summarized below. (Table 2-1)

Connector	Pins	Connected to:
CN1	8	Keyboard
CN2	25	RS-232C
CN3	36	Printer (Centronics type)
CN4	8	CRT unit
CN5	5	Light pen
CN6	34	FDD control signals
CN7	10	FDD power
CN8	13	Power (from Q10PS board)
CN9	22	Control signals (to Q10GMS board)
CN10	22	Control signals (to Q10GMS board)
CN11	6	Power check terminals
CN12	3	NiCd battery
CN13	2	Fan motor power
CN14	2	PWD signal for option cards
Option slots #1 – #5	60	Option card control signals and power

Table 2-1

2.2.2 connector CN1 (connector to the keyboard)

(a) Use : connection to keyboard control signal lines

(b) Type: DIN 8-pin, TCS4490

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	RXD	OUT	Received data
2	CLK	OUT	Clock
3	+12	OUT	+12V
4	TXD	IN	Transmitted data
5	GL	–	Ground
6	GL	–	Ground
7	GL	–	Ground
8	GL	–	Ground

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-2

2.2.3 Connector CN2 (RS-232C interface)

(a) Use : for interface to a coupler or development unit

(b) Type: 25-pin, cannon, female, GMM-25HUFDA

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	FG	–	Frame ground
2	TXD	OUT	Transmitted data
3	RXD	IN	Received data
4	RTS	OUT	Request to send
5	CTS	IN	Clear to send
6	DSR	IN	Data set ready
7	GL	–	Signal ground
8	DCD	IN	Carrier detect
9-10	–	–	NC (unused)
11	REV	OUT	Reverse channel
12-14	–	–	NC (unused)
15	DB	IN	Transmitter signal element timing
16, 18-23	–	–	NC (unused)
17	RXC	IN	Receiver clock
18-20	DTR	OUT	Data terminal ready
24	TXC	OUT	Transmitter clock

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-3

2.2.4 Connector CN3 (printer interface)

(a) Use : for interface to a Centronics-type printer

(b) Type: 36 pins, HONDA ADS-36BLFD

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	$\overline{STB}$	OUT	Strobe
2	DB0	OUT	Data line 0
3	DB1	OUT	Data line 1
4	DB2	OUT	Data line 2
5	DB3	OUT	Data line 3
6	DB4	OUT	Data line 4
7	DB5	OUT	Data line 5
8	DB6	OUT	Data line 6
9	DB7	OUT	Data line 7
10	$\overline{ACK}$	IN	Acknowledge
11	$\overline{RDY}$	IN	Ready
12	$\overline{NPA}$	IN	No paper
13	$\overline{SLO}$	IN	Select out
14	$\overline{ALF}$	OUT	Auto line feed
15	–	–	NC (unused)
16	GL	–	Signal ground
17	FG	–	Frame ground
18	–	–	NC (unused)
19-30	GL	–	Signal ground
31	$\overline{RST}$	OUT	Reset
32	$\overline{ERR}$	IN	Error
33	GL	–	Signal ground
34	–	–	NC (unused)
35	$\overline{PWF}$	IN	Power failure
36	–	–	NC (unused)

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-4

2.2.5 Connector CN4 (CRT drive unit interface)

(a) Use : for interface between the Q10SYM board and the CRT drive unit

(b) Type: DIN, 8 pins, TCS4480

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	+12C	–	+12V
2	GP	–	Ground
3	–	–	NC (unused)
4	H. SYNC	OUT	Horizontal sync
5	V. SYNC	OUT	Vertical sync
6	GL1	–	Ground
7	GL2	–	Ground
8	VIDEO	OUT	Video signal
E	FG	–	Frame ground

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-5

2.2.6 Connector CN5 (light pen interface)

(a) Use : for interface to a light pen

(b) Type: DIN, 5 pins TCS4420.

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	+5V	–	+5V
2	SIG	IN	Light pen signal
3	+12C	–	+12V
4	SW	IN	Light pen switch
5	GP	–	Ground
E	FG	–	Frame ground

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-6

2.2.7 Connector CN6 (FDD interface)

(a) Use : connection to FDD control signal lines

(b) Type: 34 pins, male, 3M P/N 3463-0001 or equivalent

Pin No.	Signal Symbol	Signal Direction	Description of Signal
2	–	–	NC (unused)
4	HLD	OUT	Head load
6	US3	OUT	Drive select 3
8	INDX	IN	Index
10	US0	OUT	Drive select 0
12	US1	OUT	Drive select 1
14	US2	OUT	Drive select 2
16	MT	OUT	Motor on
18	DIR	OUT	Direction
20	STP	OUT	Step
22	WD	OUT	Write data
24	WG	OUT	Write gate
26	T0	IN	Track 00
28	WRT	IN	Write protect
30	RD	IN	Read data
32	HDS	OUT	Side select
34	RDY	IN	Ready

Note: 1. All odd number pins (1-33) are "ground".

2. The direction of signal is as viewed from the Q10SYM board.

Table 2-7

2.2.8 Connector CN7 (connector to the FDD power suppiy)

(a) Use : connection to the FDD power supply

(b) Type: 10 pins, male, AMP P/N 1-480424-0 or equivalent

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	LED	–	Power (+5V) of power indicator LED
2	GL	–	Signal ground
3	GP	–	Signal ground
4	GP	–	Signal ground
5	+12F	–	+12V
6	+12F	–	+12V
7	GL	–	Signal ground
8	GL	–	Signal ground
9	+5	–	+5V
10	+5	–	+5V

Table 2-8

2.2.9 Connector CN8 (power lines connector)

(a) Use : connection of power lines from the Q10PS board

(b) Type: 13 pins, male, 5271-6A

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	PWD	–	For power failure detection
2	GND	–	Ground of +5V
3	GND	–	Ground of –12V
4	GND	–	Ground of +12L
5	GP	–	Ground of +12V
6	GP	–	Ground of +12V
7	+5V	–	+5V for logics
8	+5V	–	+5V for logics
9	+5V	–	+5V for logics
10	–12V	–	–12V
11	+12L	–	+12V for logics
12	+12F	–	+12V for FDD
13	+12D	–	+12V for CRT

Table 2-9

2.2.10 Connector CN9 (Q10GMS interface)

(a) Use : connection of the data bus and power lines to the Q10GMS board

(b) Type: 22 pins, male, HKP-22FD2-2 (HONDA)

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	–12V	–	–12V
2	–12V	–	–12V
3 – 4	–	–	NC (unused)
5	+12L	–	+12V
6	+12L	–	+12V
7	+5V	–	+5V
8	+12L	–	+12V
9	+5	–	+5V
10	+5V	–	+5V
11	D0	IN/OUT	Data line 0
12	D1	IN/OUT	Data line 1
13	D2	IN/OUT	Data line 2
14	D3	IN/OUT	Data line 3
15	D4	IN/OUT	Data line 4
16	D5	IN/OUT	Data line 5
17	D6	IN/OUT	Data line 6
18	D7	IN/OUT	Data line 7
19	GL	–	GND
20	GL	–	GND
21	GL	–	GND
22	GL	–	GND

Table 2-10

2.2.11 Connector CN10 (Q10GMS interface)

(a) Use : connection of the control signal lines to the Q10GMS board

(b) Type: 22 pins, male, HKP-22FD 2-2 (HONDA)

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	GL	–	Ground
2	GL1	–	Ground
3	$\overline{\text{DACK2}}$	IN	DMA acknowledge
4	GL2	–	Ground
5	–	–	–
6	VIDEO	IN	Video signal
7	V. SYNC	IN	Vertical sync
8	–	–	–
9	$\overline{\text{IORD}}$	OUT	Read data
10	A0	OUT	Address line 0
11	SIG	OUT	Light pen signal
12	$\overline{\text{IOWR}}$	OUT	Write data strobe
13	$\overline{\text{CSCCR}}$	OUT	CRT drive board select
14	$\overline{\text{DREQ2}}$	OUT	DMA transfer request
15	$\overline{\text{RESET}}$	OUT	Reset
16	$\overline{\text{INTCR}}$	IN	Light pen interrupt request
17	SW	OUT	Light pen switch
18	H. SYNC	IN	Horizontal sync
19	–	–	NC (unused)
20	–	–	NC (unused)
21	A1	OUT	Address line 1
22	$\overline{\text{CSCRT}}$	OUT	CRT drive board select

Note: The direction of signal is as viewed from the Q10SYM board.

Table 2-11

2.2.12 Connector CN11 (supply voltage checkpoint terminals)

(a) Use : for checking supply voltages

(b) Type: 6 pins, 3022-7A

Pin No.	Signal Symbol	Signal Direction	Description of Signal
–	5V GL	–	Ground of +5V
–	GP	–	Ground of +12V
–	12C	–	+12V for CRT
–	12L	–	+12V for logics
–	12F	–	+12V for FDD
–	–12V	–	–12V

Table 2-12

2.2.13 Connector CN12 (connector to NiCd battery)

(a) Use : for supplying C-MOS ICs with backup power

(b) Type: 3 pins, ADS-36 BLFDR1

Pin No.	Signal Symbol	Signal Direction	Description of Signal
A	–	–	Ground
B	–	–	Voltage for charging NiCd battery
C	–	–	+3.6V

Table 2-13

2.2.14 Connector CN13 (fan motor power lines connector)

(a) Use : connection of the cooling fan motor power lines

(b) Type: 2 pins, 5045-3A

Pin No.	Signal Symbol	Signal Direction	Description of Signal
–	+12	–	+12V
–	G	–	Ground

Table 2-14

2.2.15 Connector CN14 (PWD signal for option card)

(a) Use: : for supplying PWD signal to external device

(b) Type: 2 pins, 5045-2A

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1	PWD	OUT	Power Down signal
2	–	–	–

Table 2-15

2.2.16 Connector CN15 (option card slots #1 ~ #5)

(a) Use : option cards connector

(b) Type: 60 pins, female, DDK 225D-10030C2-23

Pin No.	Signal Symbol	Signal Direction	Description of Signal
1 – 2	GND	–	Ground
3 – 10	DTB0 – 7	IN/OUT	Data bus
11 – 12	–12V	–	–12V
13 – 28	ADR0 – 15	OUT	Address bus
29 – 30	GND	–	Ground
31	CLK	OUT	system clock
32	GND	–	Ground
33	$\overline{\text{BSAK}}$	OUT	Bus acknowledge
34	$\overline{\text{MEMX}}$	OUT	External memory select
35	$\overline{\text{IRD}}$	OUT	I/O read
36	$\overline{\text{IWR}}$	OUT	I/O write
37	$\overline{\text{MRD}}$	OUT	Memory read
38	$\overline{\text{MWR}}$	OUT	Memory write
39	$\overline{\text{RSIN}}$	IN	Reset input
40	INT(H)1	IN	High-priority external interrupt
41	INT(H)2	IN	High-priority external interrupt
42	INT(L)	IN	Low-priority external interrupt
43	+5V	–	+5V
44	$\overline{\text{RSET}}$	OUT	Reset output
45 – 46	+5V	–	+5V
47	$\overline{\text{DRQ(F)}}$	IN	DMA request
48	$\overline{\text{DRQ(S)}}$	IN	DMA request
49	$\overline{\text{RDY(F)}}$	IN	DMA ready
50	$\overline{\text{RDY(S)}}$	IN	DMA ready
51	$\overline{\text{WAIT}}$	IN	Wait
52	$\overline{\text{IWS}}$	OUT	I/O write short
53	$\overline{\text{DAK(F)}}$	OUT	DMA acknowledge
54	$\overline{\text{DAK(S)}}$	OUT	DMA acknowledge
55	$\overline{\text{EOP(F)}}$	OUT	End of process
56	$\overline{\text{EOP(S)}}$	OUT	End of process
57 – 58	+12V	–	+12V
59 – 60	GND	–	Ground

Table 2-16

CHAPTER 3
POWER SUPPLY UNIT

CONTENTS

3.1 General

The power supply is mounted in Q10PS board. It supplies power to the logic keyboard, FDD and CRT. The block diagram is shown in Fig. 3-1. It shows the voltage multiplying rectifier which can be switched to input voltage range 100/115V AC and 220/240V AC. The internal jump wire is used for voltage switching.

The primary control circuits are simplified using hybrid ICs, and amplify oscillation pulses of about 30 kHz to drive the primary side of the transformer (T1).

The voltage taken from the secondary side of the transformer is rectified, smoothed and regulated to provide necessary DC power. Voltage stabilization is achieved by monitoring +5V by IC and controlled by varying the duty of the oscillation frequency. Excess voltage/current inhibitor protects the load side elements from destruction.

Another feature is the PWD signal circuit, which detects sudden AC voltage drop and causes an interruption in the main circuit CPU.

3.2 Specifications of Q10 PS board (Power Supply Unit)

(1) Input voltage: 100V channel 100V – 10% ~ 120V + 10%
200V channel 220V – 10% ~ 240V + 10%

(2) Frequency: 50/60 Hz

(3) Power consumption: Approx. 75W

(4) Input serge current: 30A for 20ms maximum

(5) Leak current: 1 mA maximum

(6) Insulation strength: 100V channel Can withstand 1 kV applied between AC power supply and case for 1 minute.
200V channel Can withstand 1.25 kV applied between AC power supply and case for 1 minute.

(7) Output Voltage:

output voltage	limits of output voltage	standard current	ripple voltage (mV p-p)
+5	5.0 ~ 5.1V	3.6A	100 mA
+12(C)	11.6 ~ 12.4V	0.9A	50 mA
+12(F)	11.4 ~ 12.6V	1.2A	200 mA
+12(L)	11 ~ 13V	0.45A	200 mA
–12	–11 ~ –13V	0.02A	200 mA

(8) Insulation resistance: 10 MΩ for 500V DC minimum.

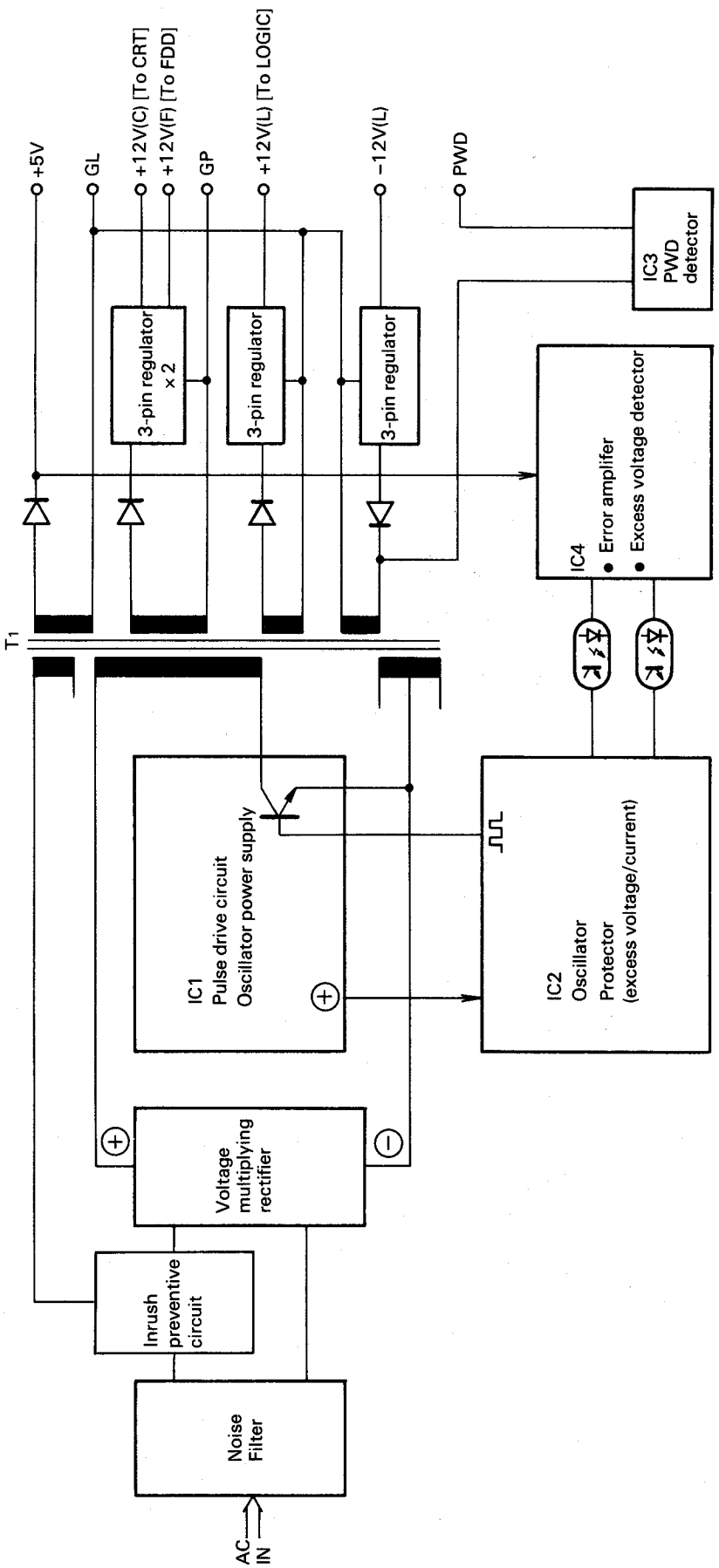


Fig. 3-1 Power Supply Block Diagram (Q10PS)

3.3 Noise Filter

(C17, M1, C18, L4, L5, C20, C21, M2, C19, C22 and C23)

- The noise filter prevents a malfunction due to input surge voltage and input feedback noise (noise generated inside is not transferred to the AC line).

3.4 Inrush Preventive Circuit

(TY1, R2, R9, D5 and R7)

- This circuit prevents parts such as DB1 from being damaged by the large current which flows in C1 and C2 when the power is turned on.

(1) Functions

- R2 limits the current flow when the power is turned on.
- When the oscillator operates normally, the voltage of T1 turns on TY1 (triode AC switch) to allow the current to flow.
  If R2 is abnormally heated, the inrush protective circuit is not operating normally.

3.5 Voltage Multiplying Rectifier

(DB1, C1, C2 and J1)

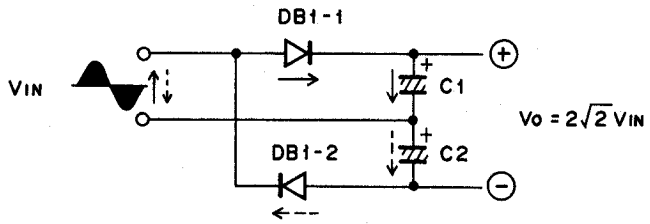


Fig. 3-2 Basic Circuit

In Fig. 3-2, DB1-1 conducts first, and C1 is charged with the maximum AC voltage Vm. In the next half cycle, DB1-2 conducts, the C1 charging voltage and supply voltage are applied in the same direction, and double voltage appears.

- When J1 is connected.....100V AC input channel
  The voltage of 100V AC input channel (Japan, U.S.A. and Canada) is multiplied and rectified to match the 200V channel (Europe).
- When J1 is not connected.....200V AC input channel
  The voltage of 200V AC channel is normally bridge rectified.

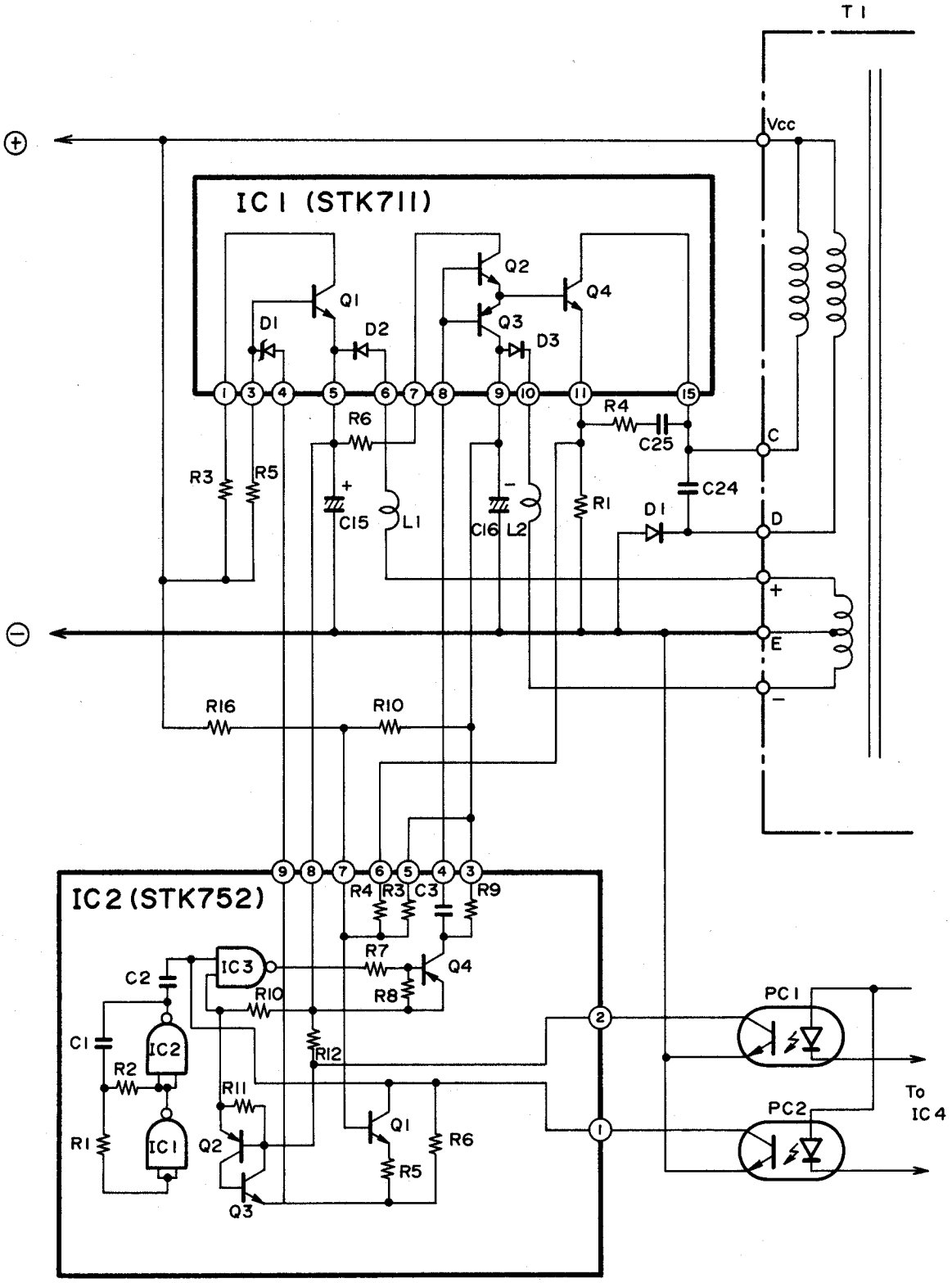


Fig. 3-3 Main Control Circuit

3.6 Oscillator Power Supply and Pulse Drive Circuit

(IC1 and peripheral parts)

a. Oscillator power supply

(R3, R5, C15, L1, (D1), (D2) and (Q1)) Parts in ( ) contained in IC1.

a-1 When not oscillating (at starting or through failure)

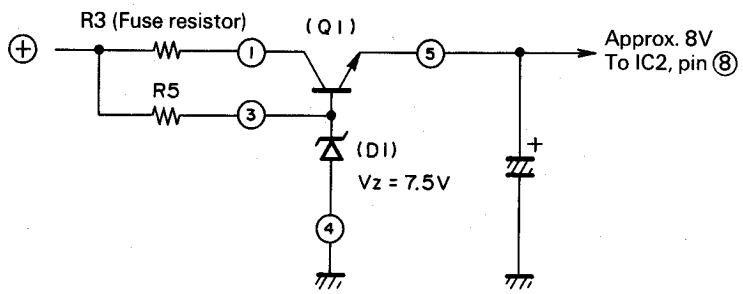


Fig. 3-4

About 8V is produced by the ordinary dropper and applied to pin 8 of IC2 (oscillator power supply) to make oscillation.

a-2 When oscillating

The pulse generated in IC2 is applied to IC1 to drive T1 inside. Then, the voltage generated by T1 is stabilized by L1 (D2), and about 9V is applied to pin 8 of IC2 (switched from the operation of Q1 in a-1) to continue oscillation.

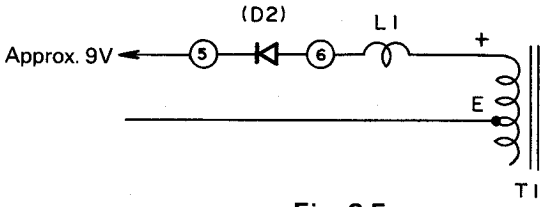


Fig. 3-5

a-3 Action for fault

When oscillation stops for any reason (not switched to the operation of a-2), R3 (fuse resistor) blows to stop power (for about 2 minutes or longer after stop of oscillation).

b. Pulse Drive Circuit

((Q2), (Q3), (Q4), (D3), L2 and C16) Parts in ( ) are contained in IC1.

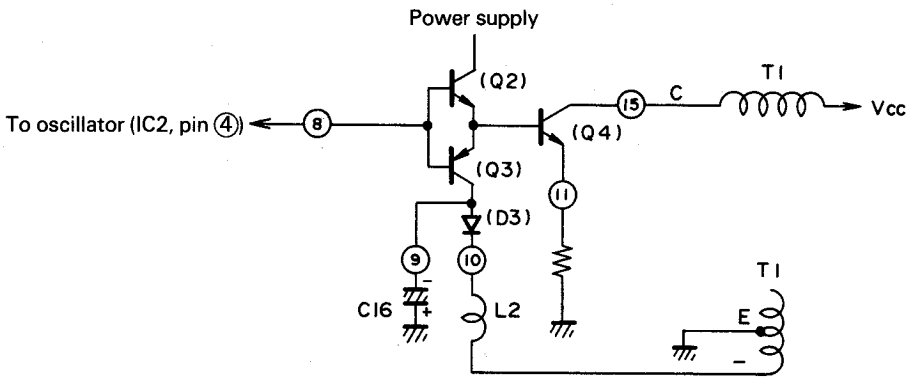


Fig. 3-6

The pulse from the generator is amplified by (Q2) and (Q3) to turn (Q4) on and off, thereby driving T1. Negative power supply (approx. 9V) is obtained by the voltage of T1 through L2, (D3) and C16. R4, C25, C24 and D1 near the D-terminal of T1 coil form a counter electromotive force preventive circuit.

3.7 Oscillator and Protector

(IC2 and peripheral parts)

a. Oscillator

((IC-1), (IC-2), (R1), (R2), (C1) and (C2)) Parts in ( ) are contained in IC2.

An oscillator of about 30 kHz.

b. Excess voltage protector

((Q2), (Q3), (R10), (R11), (IC-3) and PC1) Parts in ( ) are contained in IC2.

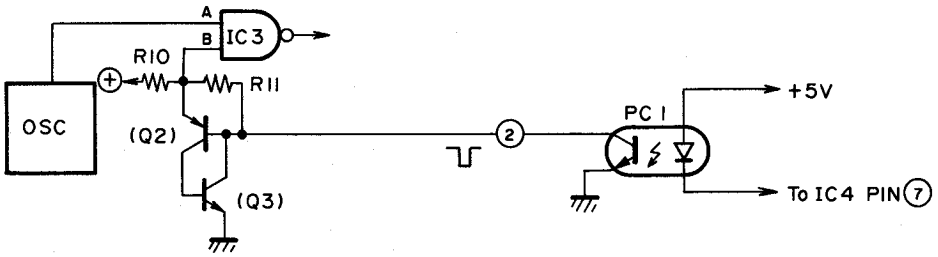


Fig. 3-7

The output voltage of +5V rises to something over 8V, IC4 controls to light up the light emitting diode of PC1, and the photo-transistor turns on. since (Q2) and (Q3) in IC2 are made in thyristor connection, when PC1 works even once, they turn off the gate (B) of (IC-3), preventing oscillation output until the power is turned on again.

c. Voltage stabilizer

(PC2, (R6) and (IC-3)) Parts in ( ) are contained in IC2.

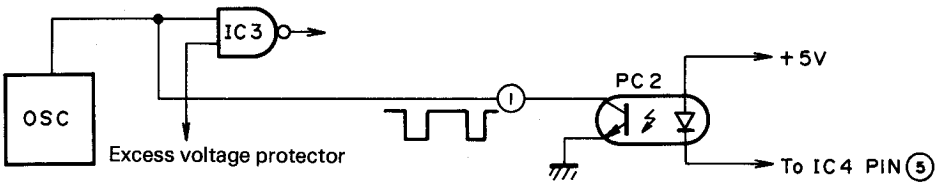


Fig. 3-8

The voltage of the +5V line is detected by the error amplifier in IC4. When the voltage rises, exceeding the reference value, PC2 works to lower the voltage at the pin ① of IC2. By setting the gate of (IC-3) to high and low, the oscillation duty is varied to keep the voltage at a constant level.

d. Excess current protector

(R1, R10, R16, (R3), (R4), (R5) and (Q1)) Parts in ( ) are contained in IC2.

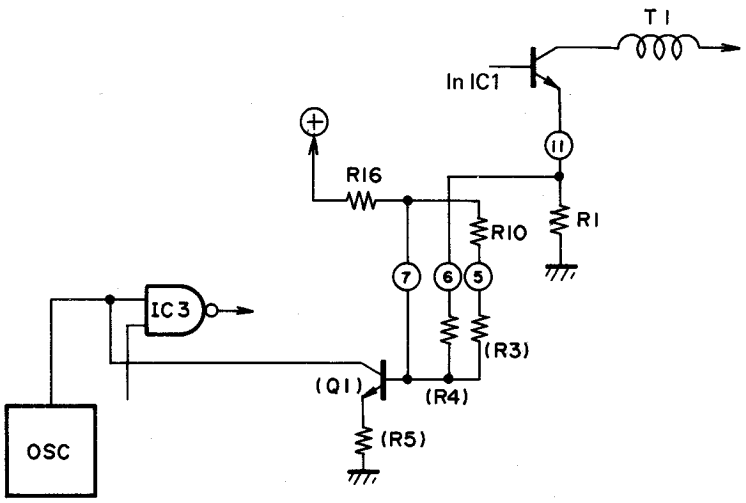


Fig. 3-9

The voltages at both ends of R1 are detected by (Q1) of IC2. When the output is overloaded, the gate of (IC-3) is set to low and the oscillation output is stopped.

* Operates when overloaded at full load.

+5V..... 7A
+12C..... 2A
+12F..... 2A
+12L..... 0.5A
−12..... 0.5A

} Operates at +α

Does not operate when overloaded only at +5V.

3.8 Error Amplifier and Excess Voltage Detector (IC-4)

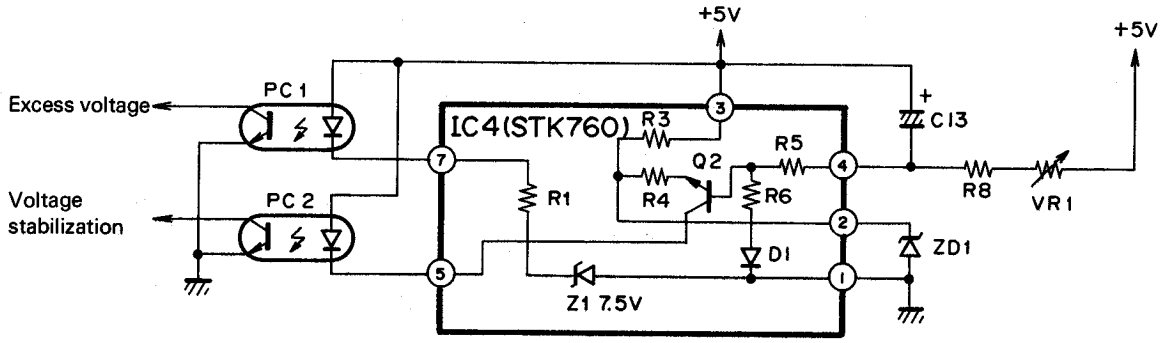


Fig. 3-10 IC Circuit

a. Error amplifier

(PC1, C13, R8, VR1, ZD1, (R3), (R4), (R5), (R6), (D1) and (Q2)) Parts in ( ) are contained in IC4.

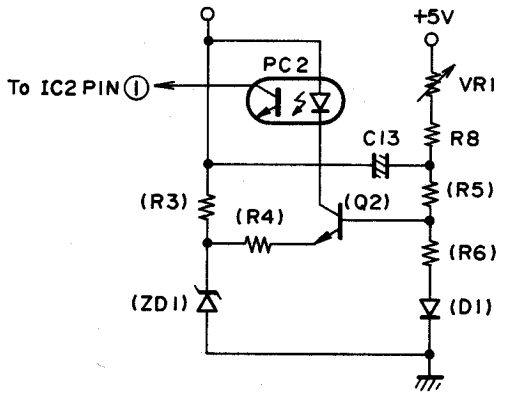


Fig. 3-11

The voltage on the +5V line is detected and when it is lower than the reference voltage, PC2 works to set the pin ① of IC2 to low, and the oscillation duty is changed to stabilize the voltage. VR1 adjusts +5V when full load is connected.

b. Excess voltage detector

(PC1, (R1) and (Z1)) Parts in ( )are contained in IC4.

+5V is checked by Z1 (Vz = 7.5V) and when it is found to be over 8V, oscillation is stopped through PC1.

3.9 PWD (Power Down) Detector (IC-3)

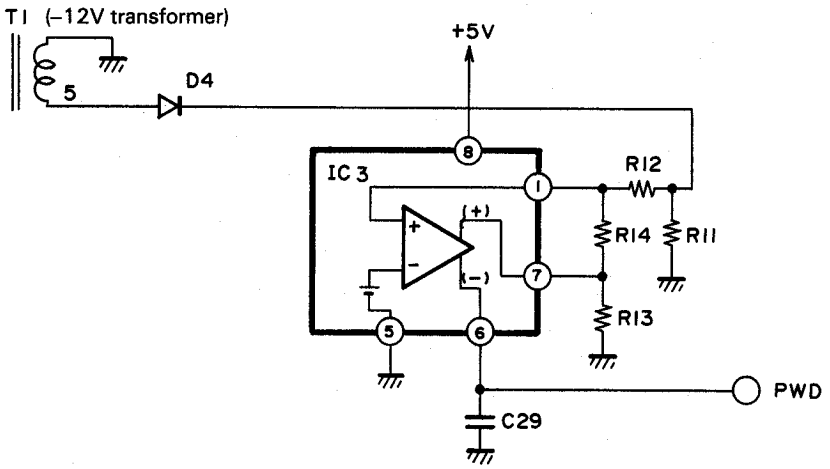


Fig. 3-12

The voltage rectifying the pin ⑤ of T1 indirectly monitors the input voltage by utilizing its characteristic proportional to the input voltage of the AC line. PWD signal is output immediately before the output voltage goes unstable due to power failure or momentary power loss, causing an interrupt of highest priority in CPU.

100V AC channel ..... The PWD signal goes high at about 80V AC.

200V AC channel ..... The PWD signal goes high at about 160V AC.

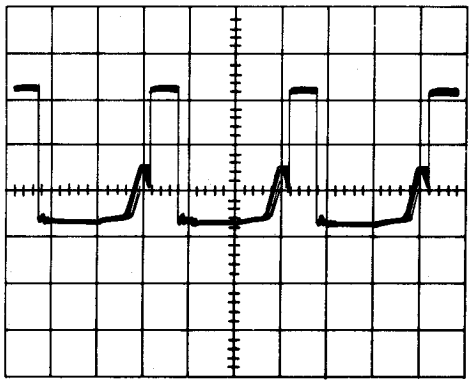
3.10 Voltage Output Circuit

a. +5V output circuit

The voltage output from T1 is rectified by diode DB2. L3 functions to take a spike.

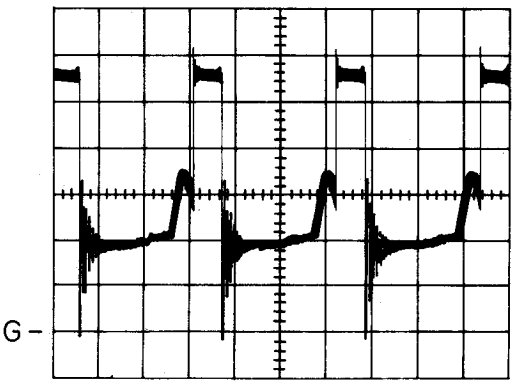
b. +12(C)/+12(F)/+12(L)/–12V output circuit

Each voltage output from T1 is rectified by the diode and regulated to desired voltage by the 3-pin regulator. The regulator has a protective function against excess current.



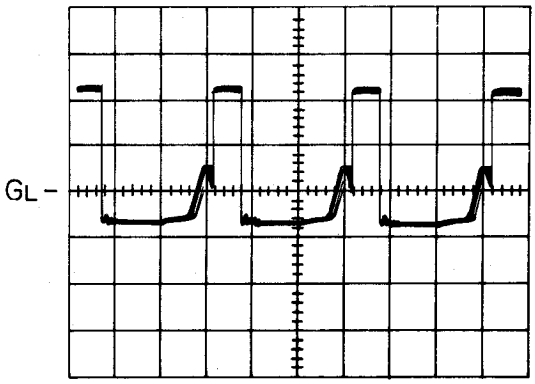
T1 (Transformer)
pin 5
20 V/DIV
10 μS/DIV

Fig. 3-21



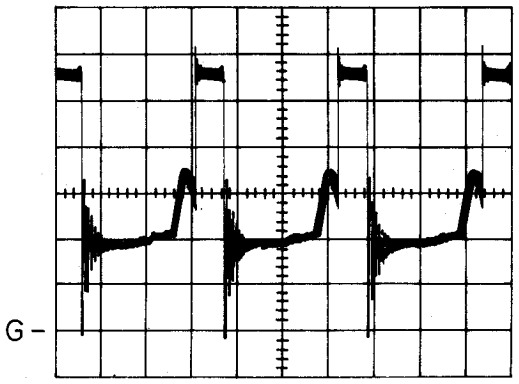
T1 (Transformer)
pin 9
100 V/DIV
10 μS/DIV

Fig. 3-22



T1 (Transformer)
pin 5
20 V/DIV
10 μS/DIV

Fig. 3-21



T1 (Transformer)
pin 9
100 V/DIV
10 μS/DIV

Fig. 3-22