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6.1. Introduction

This chapter describes troubleshooting procedures against printer troubles. To start troubleshooting, we recommend that General Flow Chart in section 6.3. is followed first of all. It will help locating an appropriate troubleshooting approach to be taken as explained below.

Before starting troubleshooting, ensure that the printer is installed in an environment meeting the conditions described in section 6.2.1.

6.1.1. Using the flow charts

The following flow charts provides guidance to the problems categorized as follows:

Power problems. Malfunctions caused by defects in the power supply.

Front panel problems. Malfunctions concerning the display and operator panel.

Problems indicated by an error message. Malfunctions detected by the internal microprocessors and messaged on the front panel.

Paper feed problems. Defects in the paper feed path.

Print quality problems. Defects of print quality.

Host interface problems. Malfunctions in the interfaces (a parallel and an option).

Refer to the appropriate subsection in section 6.4. *Troubleshooting Procedures*. This section describes the troubleshooting procedures for each problem as categorized in section 6.3.

6.2. Environmental Requirements

Examine first the compliance of the specific location of the printer to the requirements below before proceeding with troubleshooting.

The use of the printer in a location which does not satisfy these requirements may cause subsequent troubles and may shorten its service life. If the printer appears to be used in an adverse condition, advise the user to use it in a proper environment.

6.2.1. Environment conditions

Temperature: 10°C to 32.5°C (50°F to 90.5°F)

Humidity: 20% to 80% RH

Optimum condition: 20°C, 65% RH

Altitude: Maximum 2000 m (6500 feet)

Power source: The tolerance of the power voltage should be less than $\pm 10\%$ and the frequency $\pm 1\text{Hz}$ for all countries.

Placement: The printer should be placed on a firm, stable base.

Others: Away from heat sources, steam, humidized air, etc.; Away from generation of ammonium gas, etc.

6.3. General Flow Chart

Figure 6.1. General Troubleshooting Flow

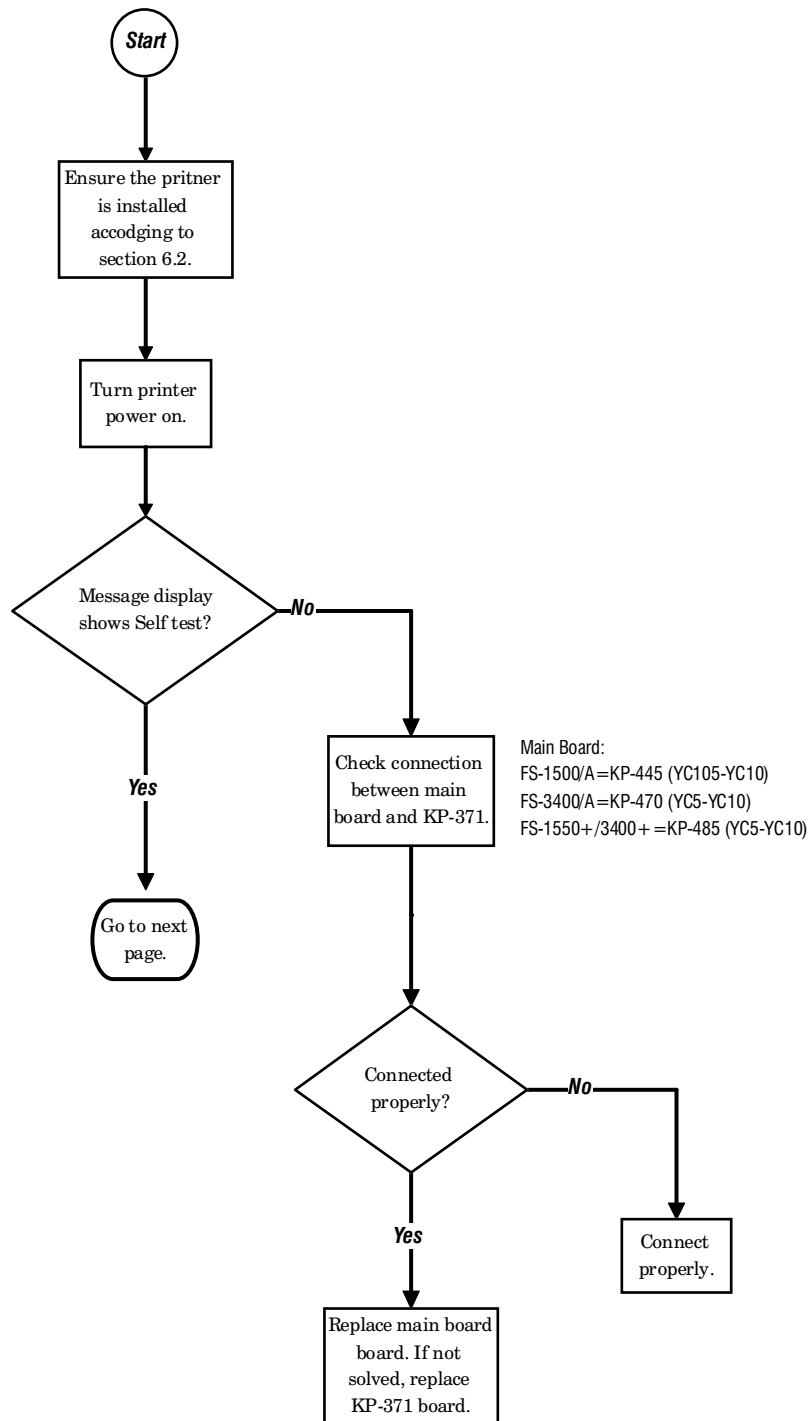
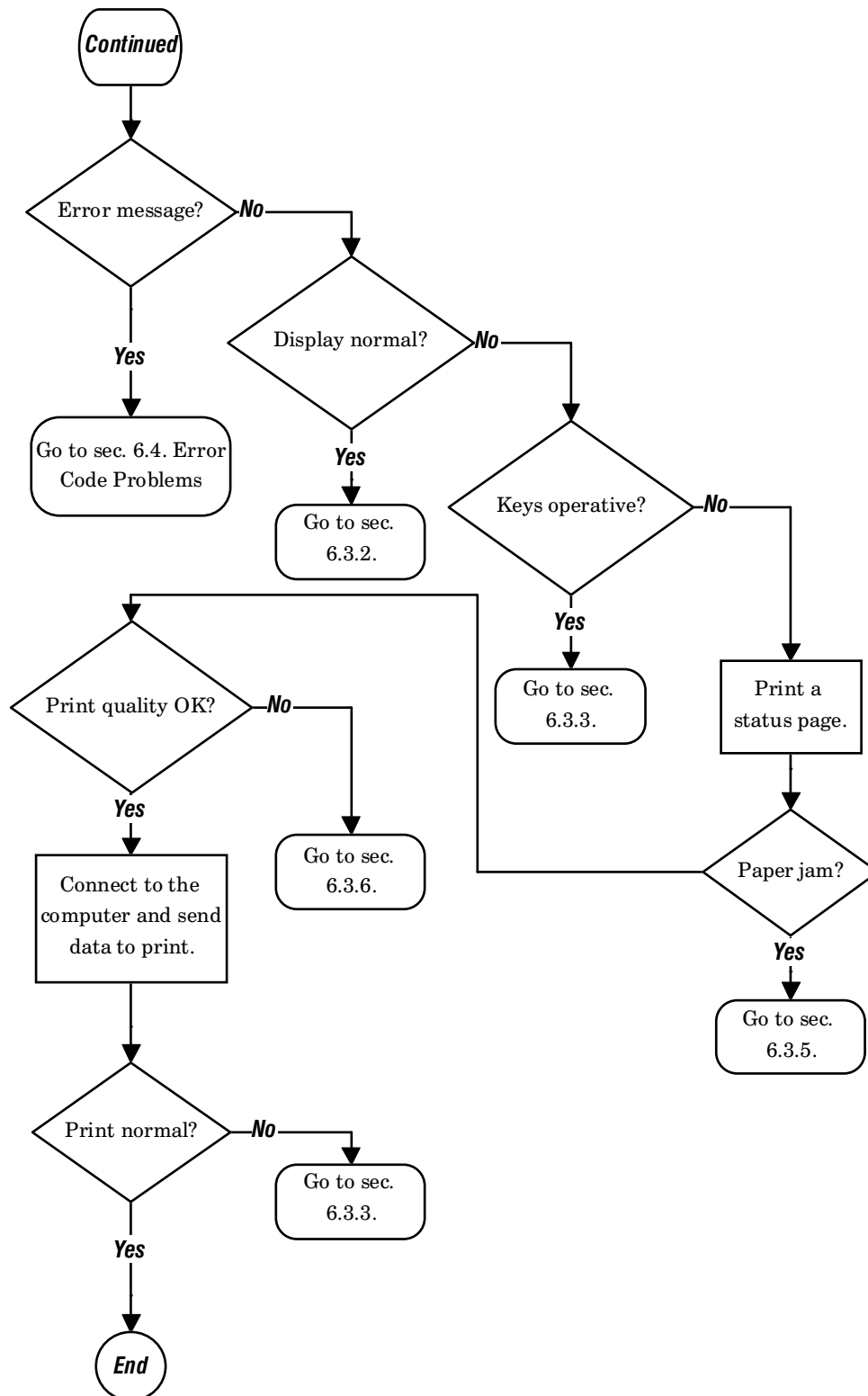


Figure 6.2. General Troubleshooting Flow



6.3.1. Power/front panel problems

A failed power supply and a failed operator panel may cause similar symptoms of defect. The following procedure helps determining whether the problem is caused by the front panel or the power supply.

Start with checking whether +5V line is active.

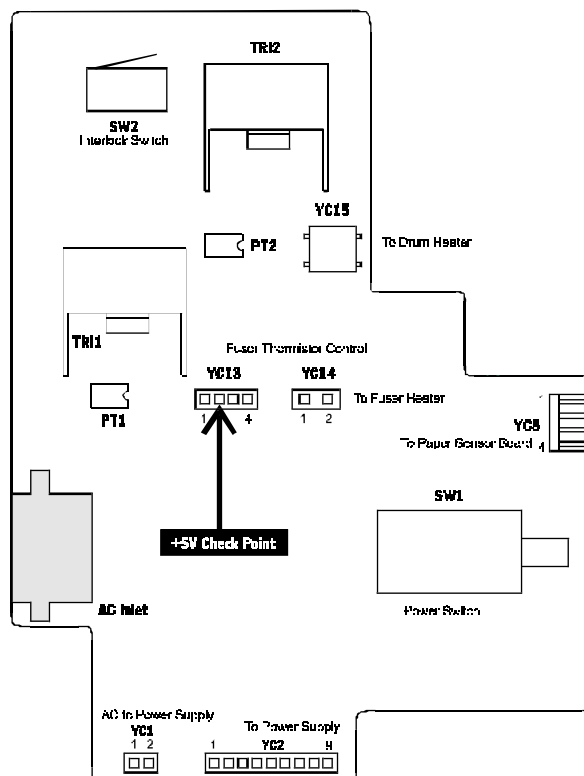
6.3.2. +5V DC Check

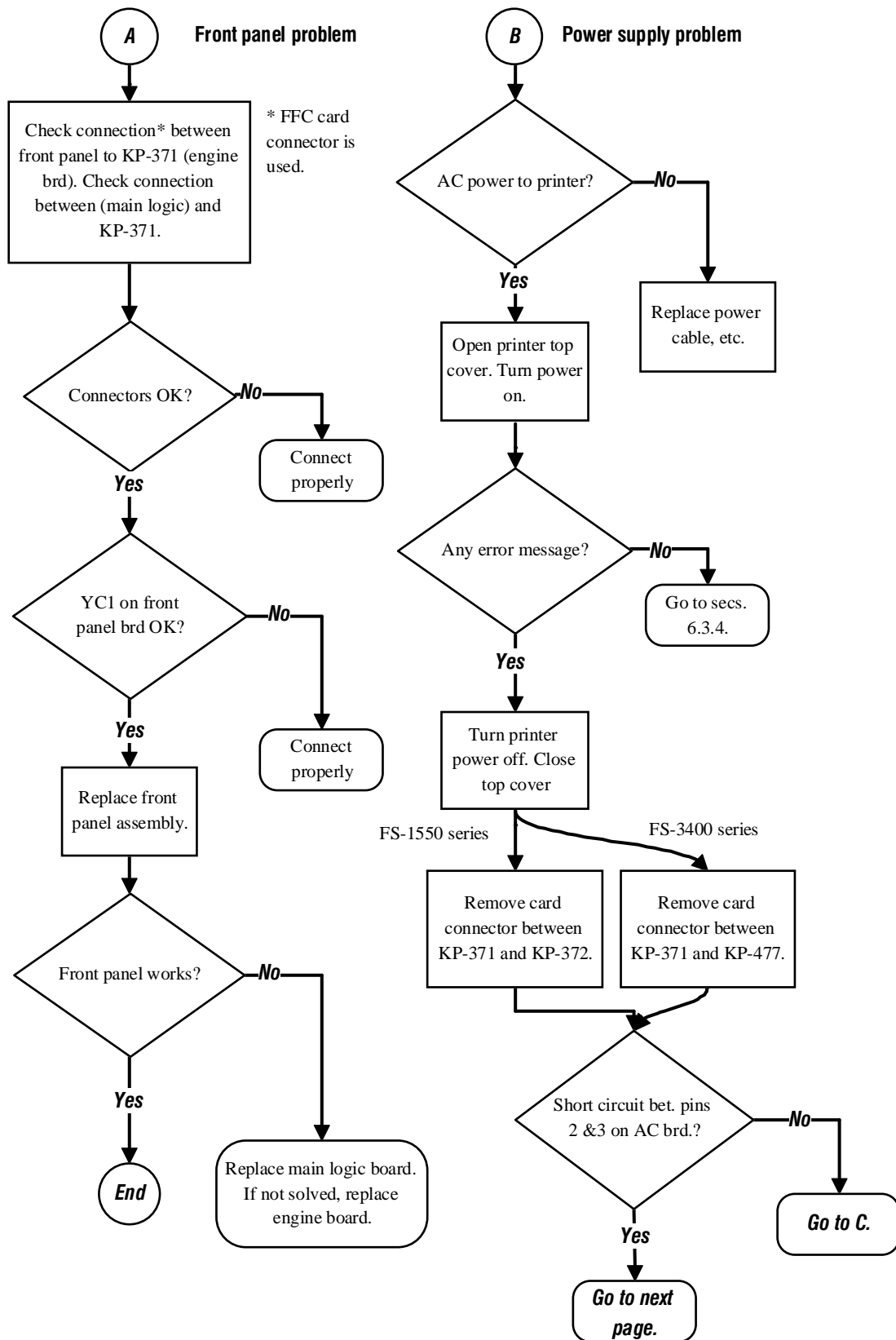
Check if +5V line is active at “+5V Check Point” in Figure 6.3. below.

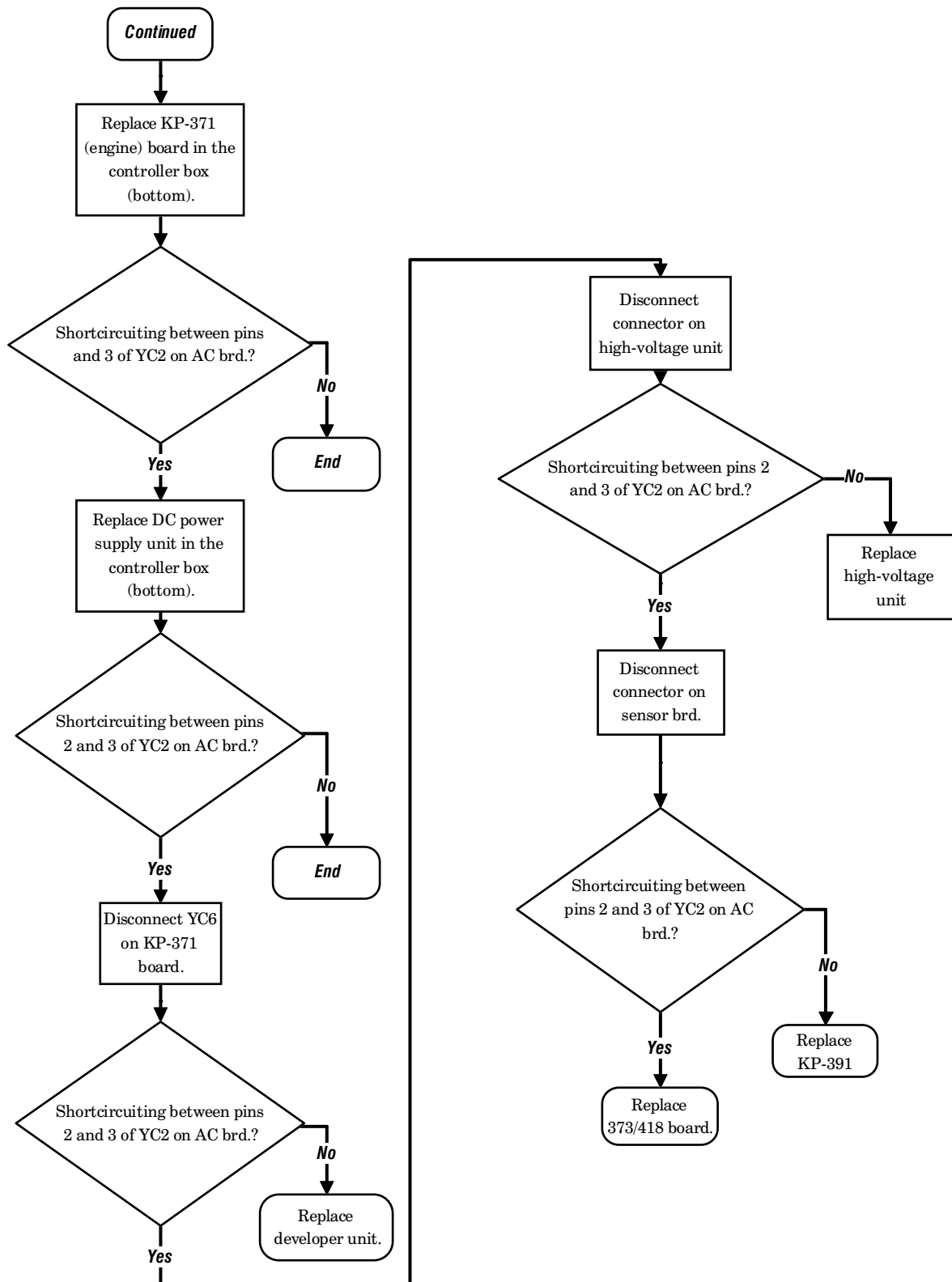
If yes, the front panel may be defective: Go to flowchart A on the next page.

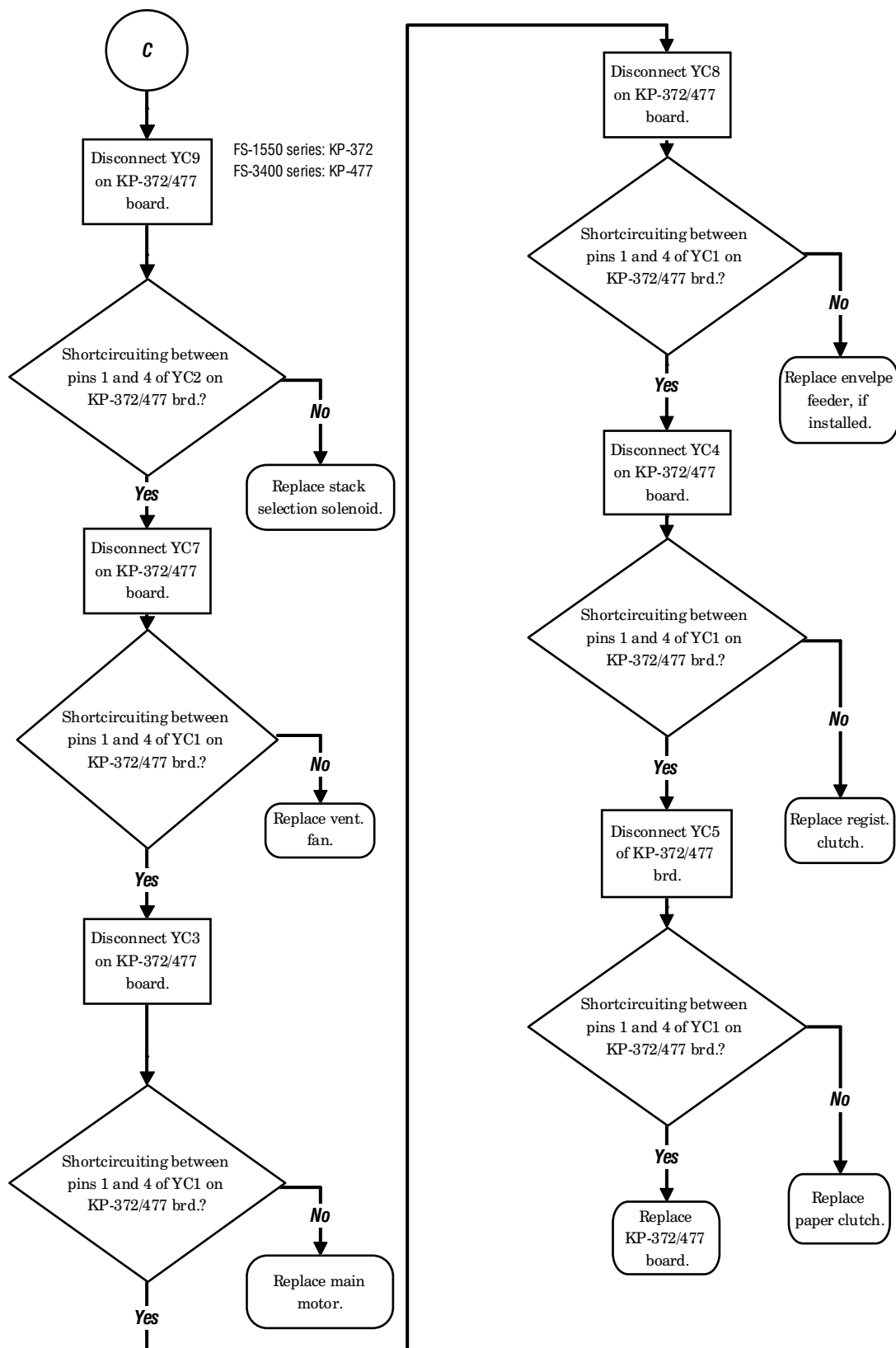
If no, the power supply may be defective: Go to flowchart B on the next page.

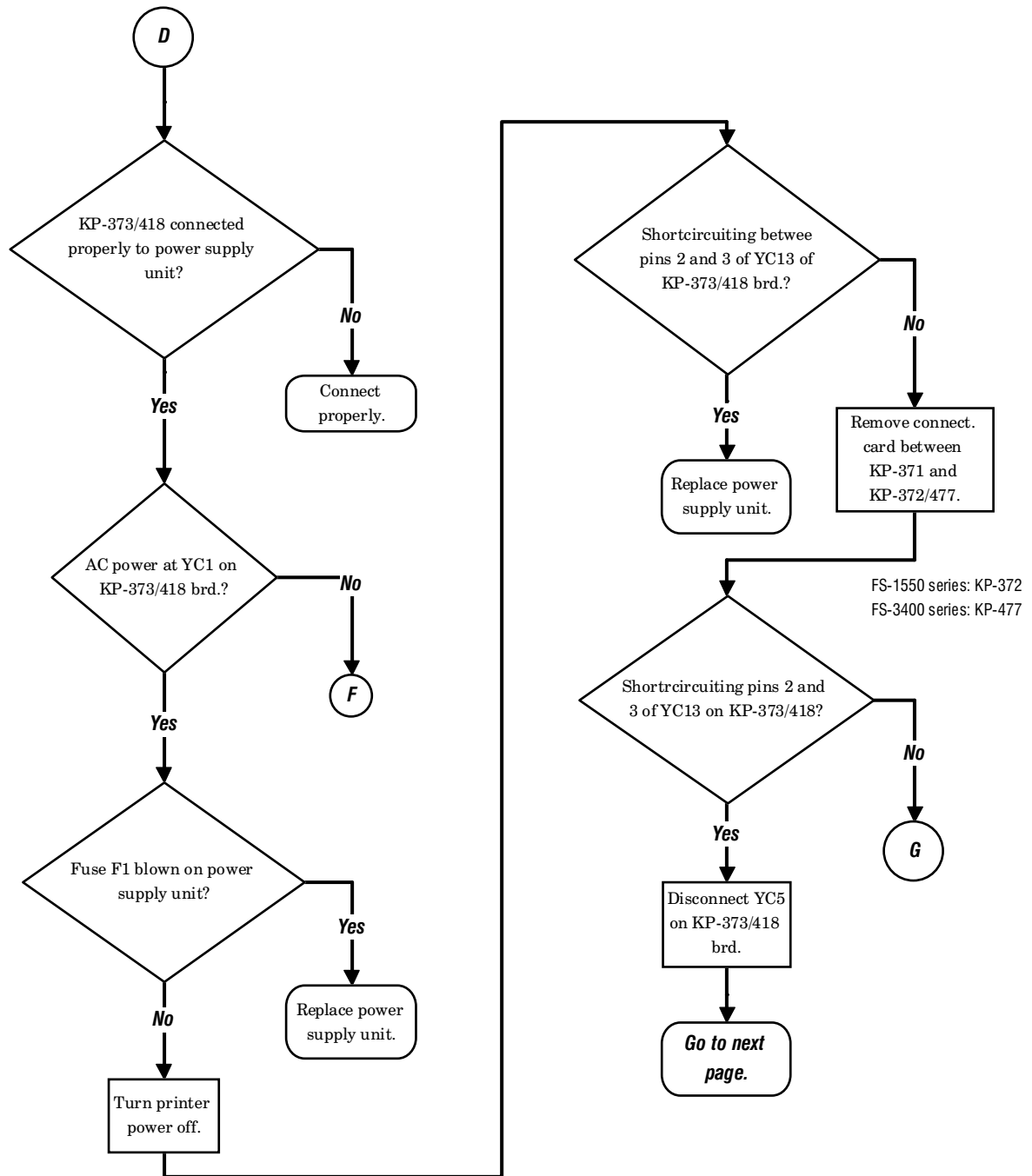
Figure 6.3. +5V check point

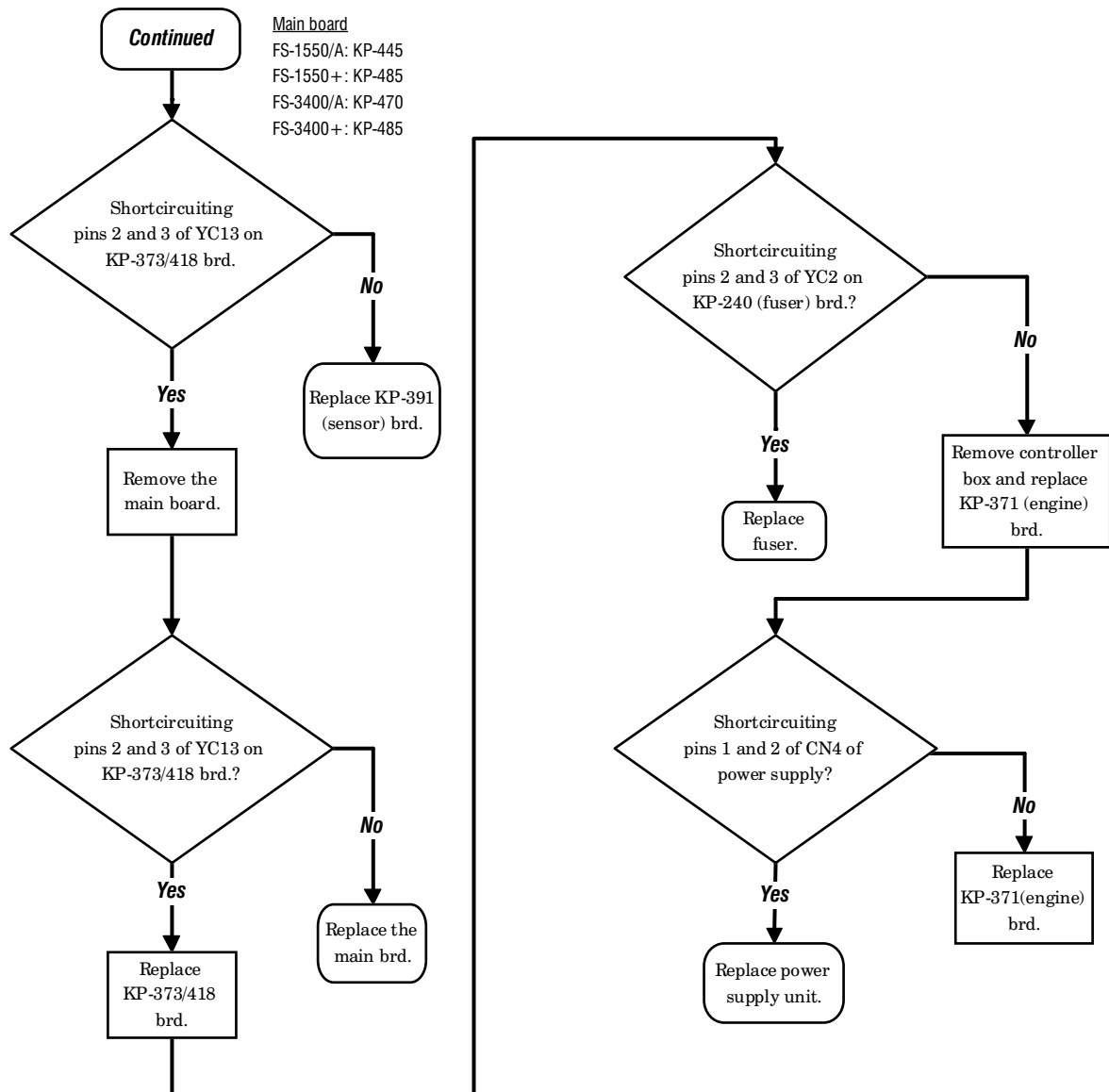


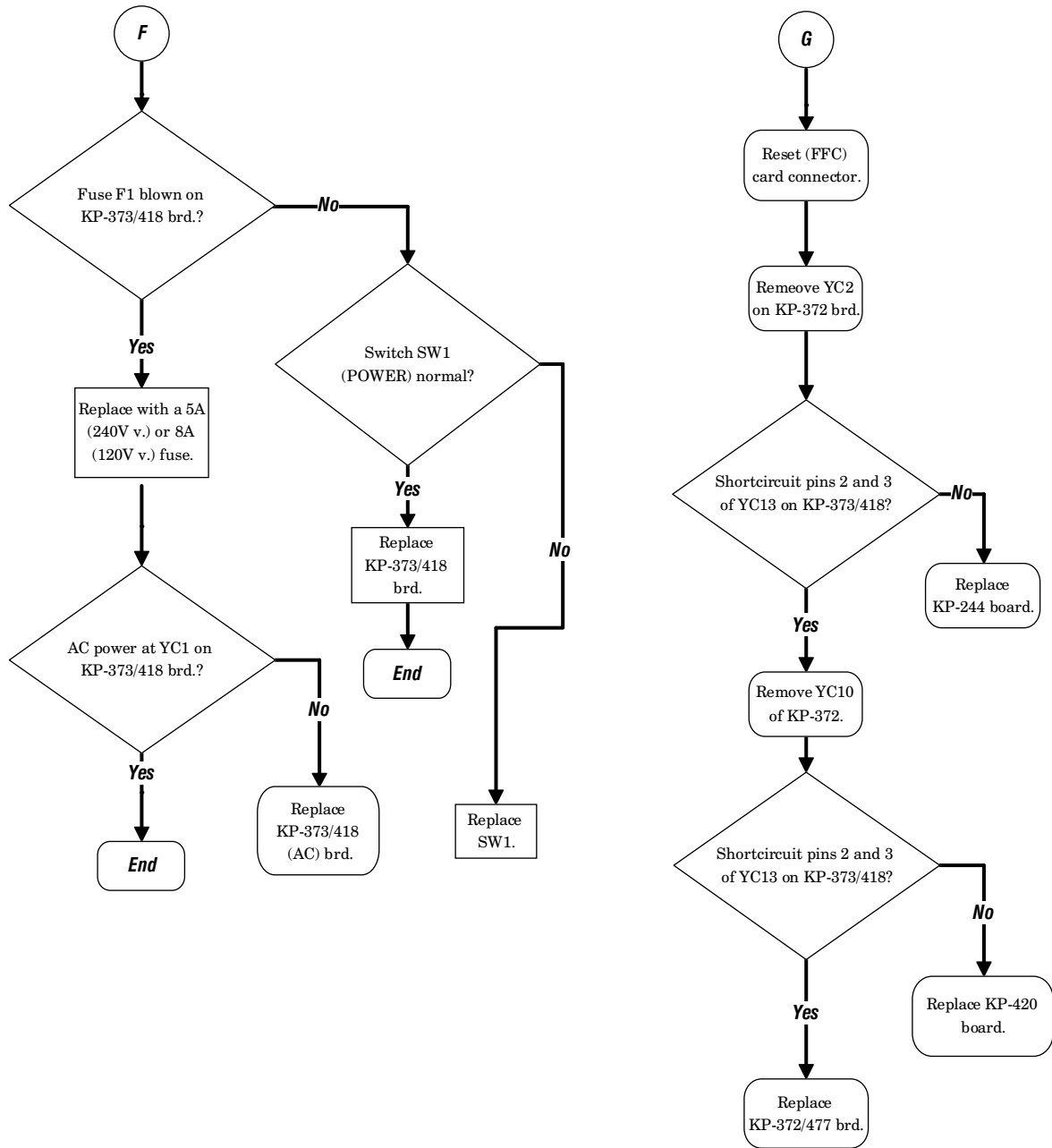




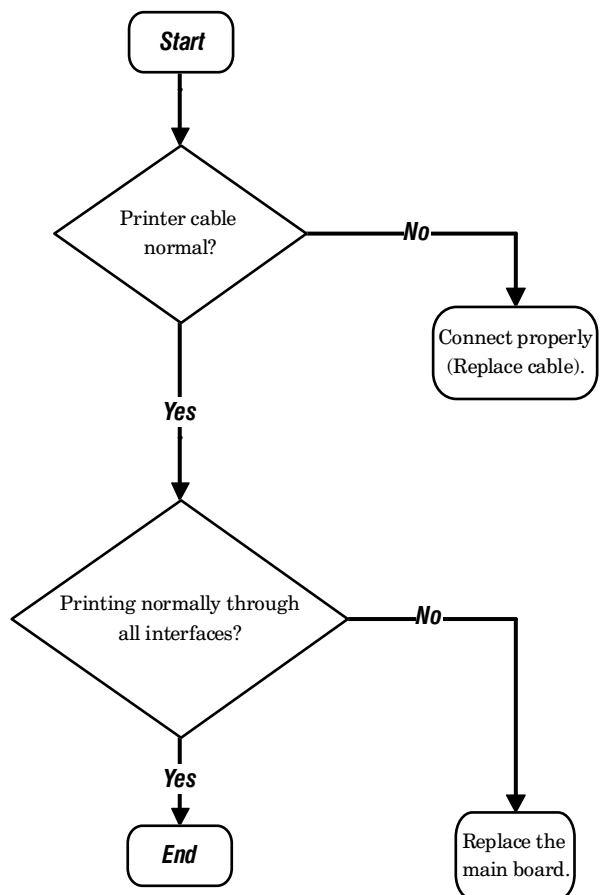








6.3.3. Host interface problem



6.3.4. Error messages

The following table indicates the printer's messages shown on the control panel and how to respond to each of these messages.

Message	Meaning	Corrective action
Call service person E0	Engine communication error. The engine controller won't respond to the command sent by the system via the dual port RAM in approx. 1.2 seconds.	Verify if the engine ROM is inserted into its socket properly or replace KP-371 (engine) board.
Call service person E1	Main Motor Error. The pulse signal is not detected.	Refer to section 6.4.2.
Call service person EE/EF	Drum Heater Error/Total Page Counter Error.	Refer to section 6.4.3.
Call service person E4	Fuser Heater Error.	Refer to section 6.4.4.
Call service person E5	Eraser Error. The eraser current is less than 15 mA (normally 65 mA).	Refer to section 6.4.5.
Call service person E6	Engine ROM check sum error.	Verify if the engine ROM is inserted into its socket properly or replace KP-371 (engine) board.
Call service person E9	Toner Motor Error. The toner motor current is 120 mA or more for one second (normally 30 mA).	Refer to section 6.4.6.
Call service person F1	System Checksum Error. An error is detected in the controller. The Ready-symbol and ON LINE indicators go off; and ATTENTION lights. The printer does not operate when this message is displayed.	Replace the main logic board.
Call service person F2	Main RAM Error.	Replace the main logic board.
Paper feed unit open	The cassette is open in the option paper feeder.	Open the cassette, then close perfectly.
Top cover Open	Interlock (SW2 on KP-373/418 [AC] board) is open.	Open the upper unit, then close tightly.
Opt. feeder 1 (2) rear cover Open	The rear cover of the first (second) option feeder is open.	Open the rear cover, then close tightly.
Developer unit connection error	The developer connector is loose or not connected.	Connect the developer connector to the mating printer connector properly.
Replace Toner kit TK-12	Toner in the developer has been exhausted and the toner concentration in the developing powder is not restorable. The printer does not operate when this message is displayed.	Replace toner container using a new toner kit (Ecotone TK-12).
Missing Toner container	Toner container is not installed.	Install a toner container.
Paper jam	Paper is jammed inside the printer. Depending on the part of the printer at which jam has occurred, one of the feed or stack indicators flashes; Ready indicator flashes; and ATTENTION lights. After the jam is removed, the printer automatically prints the same page again unless the paper was caught before or in the fuser unit.	Open the printer and correct the paper jam according to the printer's User's Manual.

Message	Meaning	Corrective action
Remove manual feed paper	Paper exists on the manual feed tray while the paper source is envelope feeder.	Remove the paper on the manual feed tray. The printer automatically feeds envelope in the envelope feeder.
IC-CARD error insert again	The IC card is accidentally removed while rereading.	Insert the IC card in the printer's slot again.
Insert the same IC CARD	The wrong IC card was inserted, following the IC-CARD error/insert again message.	Remove the IC card from the printer's slot and insert the correct card.
Memory overflow .. Press ON LINE	The total amount of the data received by the printer exceeds the printer's internal memory.	Press ON LINE or CANCEL to abandon printing. Try adding more memory (expansion RAM).
Print overrun .. Press ON LINE	The data transferred to the printer was too complex to print on a page.	Press ON LINE or CANCEL to abandon printing.
Add paper	The paper cassette is empty or not mounted, or manual feed mode is activated but no paper is present in the manual feed tray.	Add paper in the cassette; insert the cassette; or place a sheet of paper in the manual feed tray.
Warning low toner TK-12	The toner supply in the developer is being exhausted. The printer will stop printing after several ten pages of printing.	Replenish the toner supply using a new toner kit at the earliest convenience.
Warning Short memory	The printer's internal memory is running out due to too many macros and fonts downloaded.	Delete unnecessary fonts and macros.

6.3.5. Paper feed problems

The message display displays “Paper jam” when paper becomes stuck in the paper transport system, the paper feed timing is incorrect, or paper fails to feed at all.

General suggestions for clearing paper jam

- * Replace paper with another ream of paper.
- * Use another type of paper.
- * Check/replace the main PWB (which may be causing incorrect paper feeding timing).
- * Use power line filter (Noise in power line may cause malfunction of CPU which subsequently will develop paper jam).
- * Check for proper operation on all rollers.

If paper jams occur frequently, try using a different type of paper, replace with paper from another ream, turn the stack of paper over, or turn the paper the other way around. Also, read information in Chapter 1.

Depending on the indicator of the printer symbol on the front panel that is flashing, check the following.

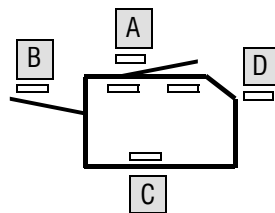


Figure 6.4 Printer Symbol Indicators

Symbol indicator	Suggested jam location	Corrective action
A	Check the face-down output tray.	If paper is partially fed out into the tray, pull the paper out the rest of the way by hand, then open and close the printer's top cover or the paper feed unit.
	Check the fuser unit and the face-down paper tray.	Open the printer's top cover. Draw out the paper feed unit. Pull the paper as shown in Figure 6.7. Close the printer's top cover.
B	Check the face-up output tray.	Refer to A above.
C	Check the paper feed cassette.	If paper is stacked in the paper cassette, not reaching the registration rollers, remove the paper cassette and draw out the paper feed unit. Remove the paper as shown in Figure 6.5. Close the paper feed unit and install the paper cassette.
	Check the registration rollers.	if the paper is caught by the registration rollers, draw out the paper feed unit half way out and remove the paper as shown in Figure 6.5.
D	Check the manual feed tray.	If the paper is stuck in the manual feed tray, remove the paper by pulling it out.

Figure 6.5. Removing Paper Jam at Fuser

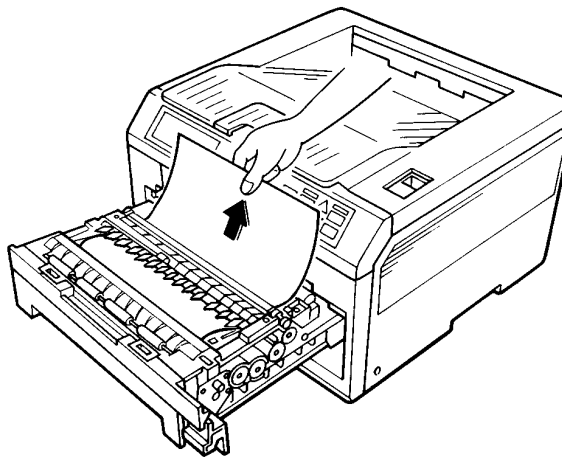


Figure 6.6. Removing Paper Jam at Paper Feed Unit

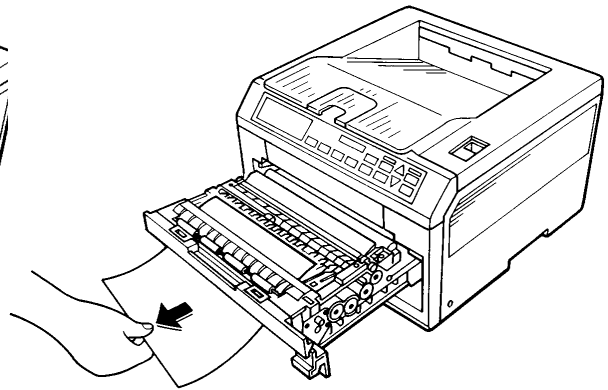
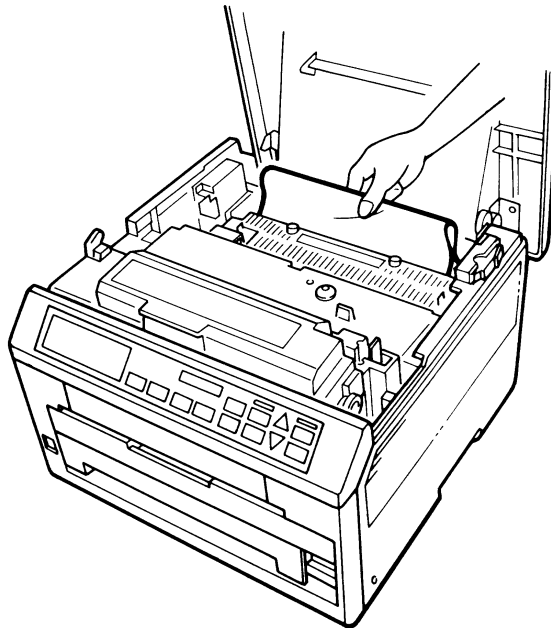


Figure 6.7. Removing Paper Jam at Registration Roller

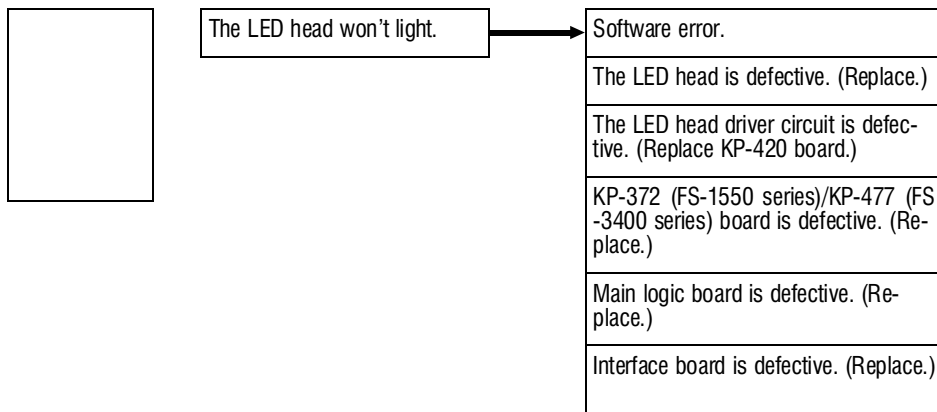


6.3.6. Print quality problems

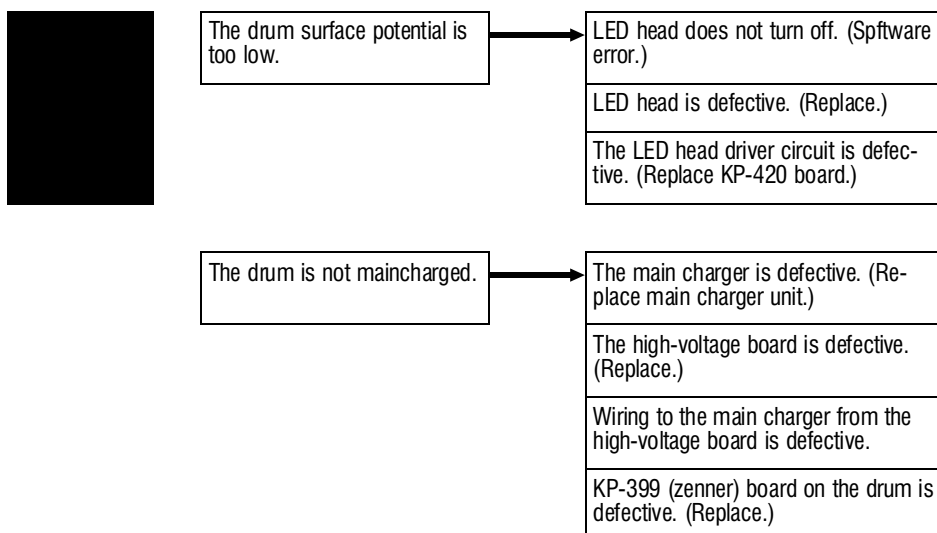
Print quality problems range from uneven tone to completely blank output. The troubleshooting procedure for each type of problem is given on the following pages.

NOTE: For all print quality problems, clean the main charger wire and other various parts in the paper path before proceeding.

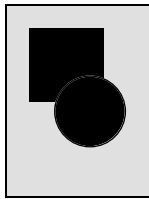
Blank Printout



All-black Printout



Grey Background



The drum surface potential is less than approx. 420V.

See All black printout section above.

The developer is defective.

The toner concentration in the developer is too low. (Replace KP-371 board.)

The developer bias is too low. (Replace high-voltage board.)

Connection between high-voltage board and main charger unit is defective.

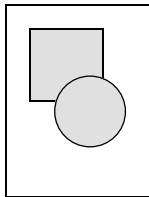
The drum temperature (should be approx. 45°C) is incorrect.

The drum heater is defective. (Replace drum.)

KP-391 (drum controller) board is defective. (Replace.)

KP-371 (engine) board is defective. (Replace.)

Light Printing



Toner concentration is too low in the developer.

Toner is exhausting. (Replace toner container if Warning low toner message is shown.)

The developer is defective. (Replace the developer unit.)

Developer bias is incorrect.

The bias board is defective. (Replace KP-392 board.)

Replace the developer unit.

Carrier is lost in the developer unit.

Replace the developer unit.

The drum surface potential is too high (more than approx. 420V).

The main charger unit is defective. (Replace the main charger unit.)

The drum is not grounded properly.

The eraser is defective. (Replace the drum unit.)

Replace KP-371 (engine) board.

Replace high-voltage board.

Replace KP-399 (zenner) board.

The LED head output is too low.

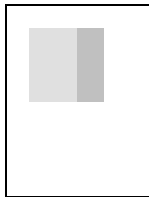
The engine board is defective. (Replace.)

KP-420 (LED drive) board is defective. (Replace.)

Wiring around the LED head is defective.

LED head driver ICs are defective. (Replace the LED head.)

Non-uniform Printing



Same as Light Printing.

Refer to the previous page.

The transfer system is defective.

The high-voltage board is defective. (Replace.)

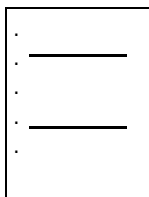
The transfer roller is defective. (Replace.)

The transfer roller axle is defective. (Replace.)

The engine board is defective. (Replace.)

Wiring between the high-voltage and the transfer roller is defective.

Dropouts and Streaks



The transfer roller is defective.

If the streaks occur at regular intervals of 60.6 mm (2.4 inches), the transfer roller is damaged. (Replace.)

The drum or the fuser roller is defective.

If the streaks occur at regular intervals of 94 mm (3.7 inches), the drum or the fuser roller is damaged. (Replace.)

6.4. Error Codes

This section provides information on how to respond to the Call Service person messages given on the printer's message display. The messages are followed by a code beginning with E or F. Codes beginning with E implies mechanical problems which are detected by the engine system, while codes beginning with F indicate errors occurred in the main logic controller.

The instructions in this section pertain mainly to troubleshooting for the engine errors ("*E*" errors). The main logic controller unit should be replaced if an "*F*" error is indicated.

6.4.1. Engine self-diagnostics at power up

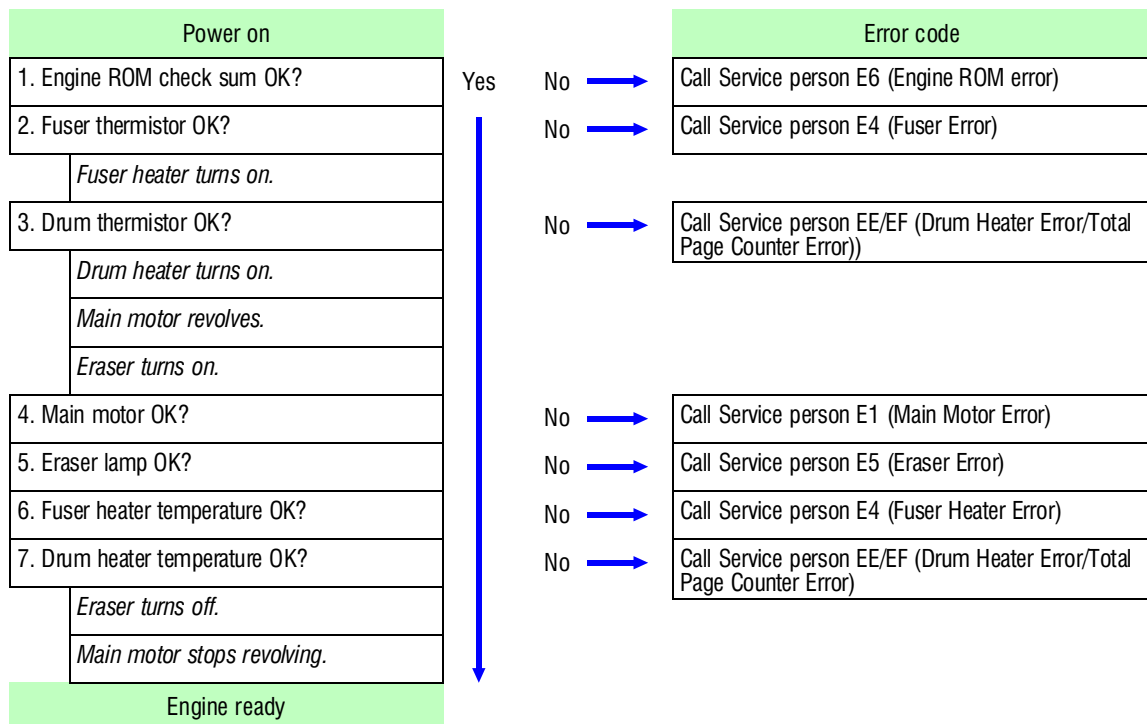
The printer thoroughly monitors its internal condition at power up. When it needs operator's attention to a component, it lets an error code to show on the front panel message display.

Figure 6.8. shows the items and the sequence of the diagnostics made at power -up and the relavant E or F error codes. Figure 6.9. on next page shows the main logic controller diagnostics sequence diagram.

Engine diagnostics sequence

Diagnostics is canceled if the top cover is opened during this sequence is under way.

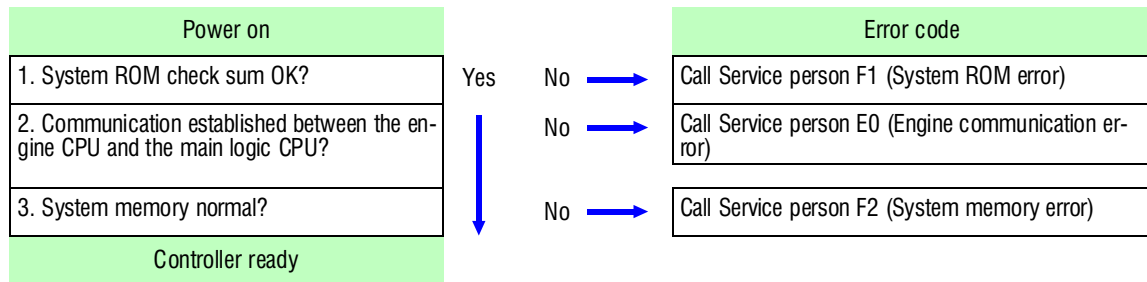
Figure 6.8. Engine Self-diagnostics Squence (E Code)



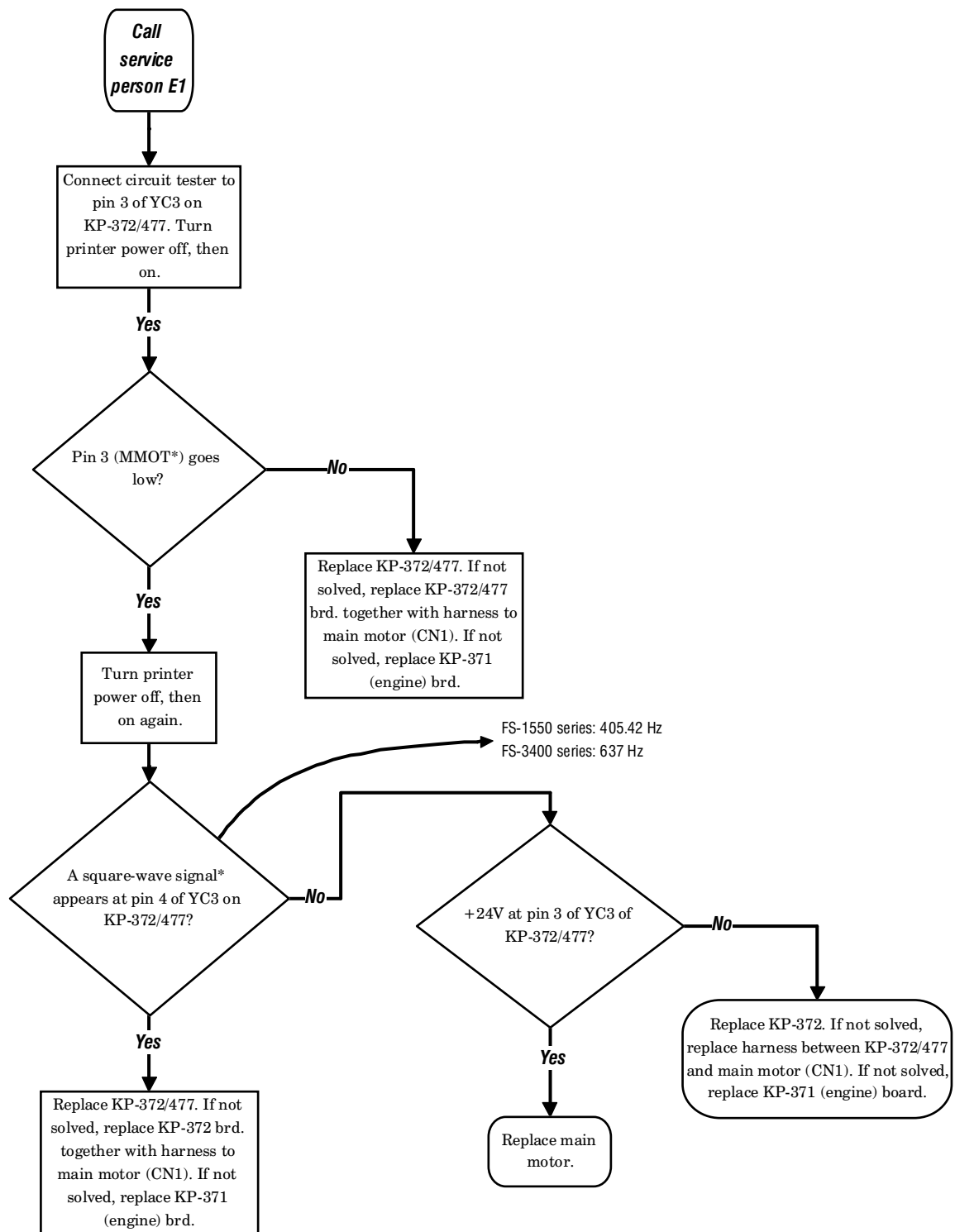
Main logic controller diagnostics sequence

Diagnostics on the main logic controller is done only when the printer is turned on, along with the engine check sequence. Should an error be recognized, the engine CPU lets the front panel message display to show a Call Service person F code and stops operating.

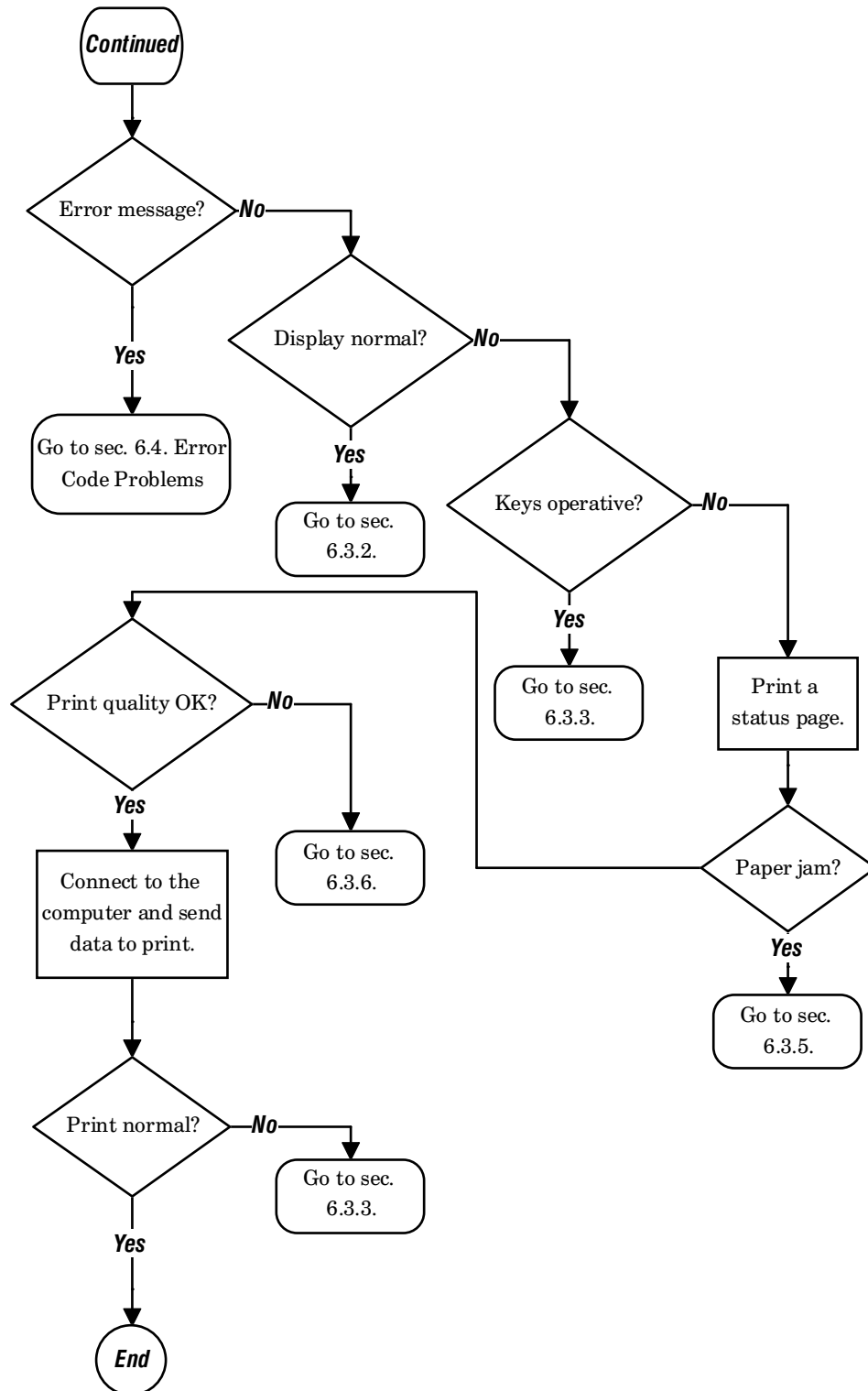
Figure 6.9. Main logic controller diagnostics

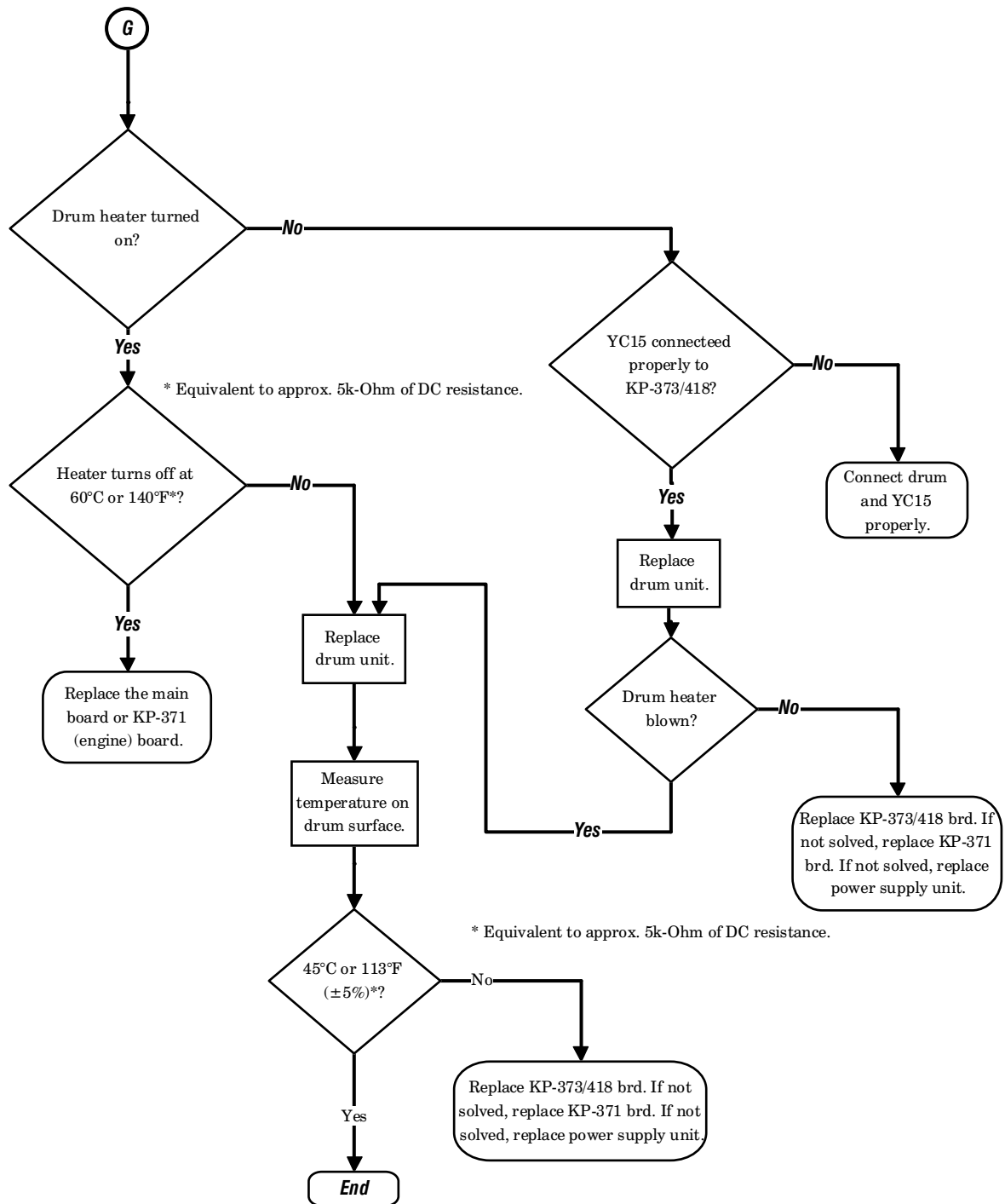


6.4.2. E1 (Main motor error)

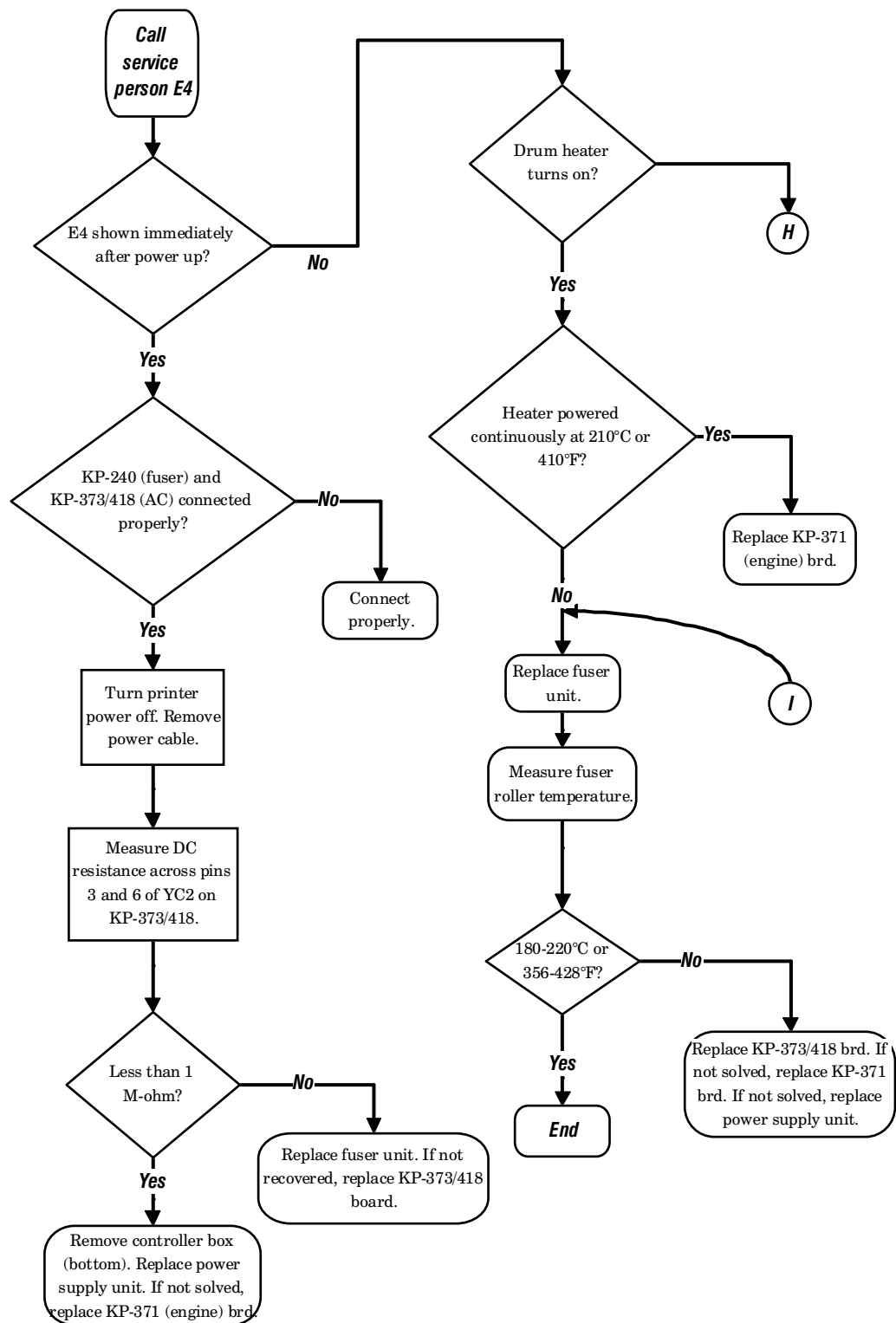


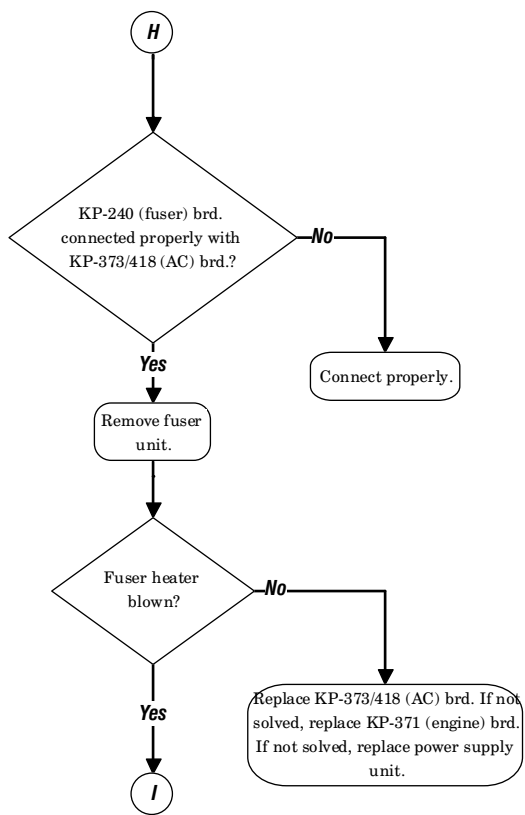
6.4.3. EE/EF (Drum heater error/Total page counter error)



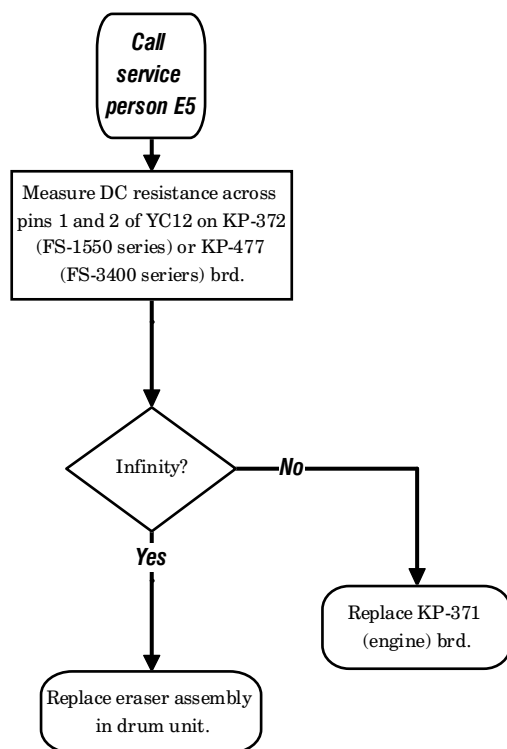


6.4.4. E4 (Fuser heater error)

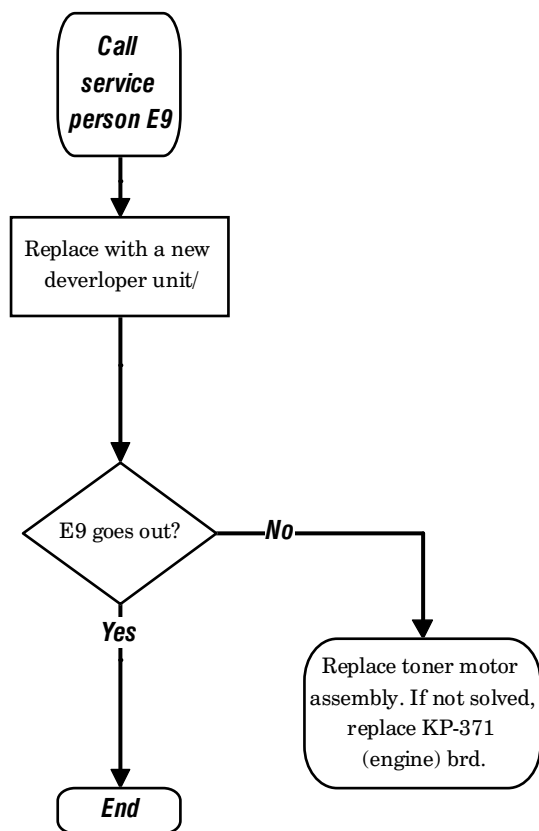




6.4.5. E5 (Eraser error)



6.4.6. E9 (Toner motor error)



6.5. Connector Configurations

6.5.1. KP-371 (Engine controller) board

Pin	Signal	Description
YC-1 (to front panel)		
1	Ground	
2	+5V	
3	FPBA5	Address signal
4	Ground	
5	FPBA6	Address signal
6	KYBD	Keyboard select signal
7	LCDRW	LCD read/write
8	LCDRS	LCD register select
9	FD0	Data bus (LSB)
10	LCDE	LCD enable
11	FD2	Data bus
12	FD1	Data bus
13	FD4	Data bus
14	FD3	Data bus
15	FD6	Data bus
16	FD5	Data bus
17	FD7	Data bus
18	Ground	
19	Ground	
20	+5V	

YC2 (to KP-421)

1	<u>VLOW</u>	Speed control
2	MON	Motor control
3	Unnamed	Face-down stack control
4	Unnamed	Face-up stack control
5	COPN	Cover open
6	<u>HSPAP</u>	Paper empty
7	UNIT	Option unit installation
8	+24V2 (P)	+24V power supply
9	Ground	

YC-3 (to KP-372 [FS-1550 series]/477 [FS-3400 series] board)

1	+5V	
2	+5V	
3	Ground	
4	Ground	
5	FAN	Fan control
6	<u>STRCLK</u>	LED head strobe
7	LEDLA	LED head data latch

Pin	Signal	Description
8	<u>FDCL2</u>	Manual-feed paper clutch
9	<u>FDCL1</u>	Paper feed clutch
10	<u>REGCL</u>	Regist clutch
11	<u>MFEED</u>	Manual-feed sensor input
12	<u>EPAPR</u>	Envelope feeder paper empty
13	<u>EVUNT</u>	Envelope feeder installation
14	<u>EMOTR</u>	Envelope feeder motor control
15	<u>ERRDY</u>	Eraser ready
16	<u>ERASE</u>	Easer control
17	<u>DRMTH</u>	Drum thermistor
18	<u>FUPSD</u>	Face-up solenoid drive
19	<u>MTCLK</u>	Motor clock (FG)
20	<u>VIDEO</u>	Video data output to LED head
21	<u>BLEDSL</u>	LED line sync.
22	<u>VCLK</u>	Video data transfer clock to LED head
23	<u>FDWSD</u>	Face-down solenoid drive
24	<u>VIDEO2</u>	Video data output (for 600 dpi ver.)
25	<u>MMOT</u>	Main motor control
26	Ground	
27	Ground	
28	Ground	
29	+24V2 (P)	+24V power supply
30	+24V2 (P)	+24V power supply
31	+24V2 (P)	+24V power supply

YC-4 (to power supply)

1	<u>HTCD</u>	Fuser heater control
2	<u>HDCL</u>	Drum heater control
3	<u>JAM</u>	Eject paper jam sensor
4	<u>THRMC</u>	Fuser thermistor input

YC-5 (to KP-391, high-voltage unit)

1	+5V	—
2	Ground	—
3	<u>REGS</u>	Registration sensor input
4	<u>PS</u>	Paper sensor input
5	<u>ILSW</u>	+24V interlock sensing
6	<u>TBSEN</u>	Toner container detect
7	<u>DRMTH</u>	Drum thermistor
8	<u>IL2H</u>	+24V power supply (for high-voltage unit)
9	<u>MMOT</u>	Main motor control
10	<u>MHVDRD</u>	Main charger control
11	<u>BIASD</u>	Bias control
12	<u>THVDRD</u>	Transfer charger control
13	Ground	

Pin	Signal	Description
YC-6 (to developer unit)		
1	Ground	—
2	T/CSN	Toner concentration sensor input
3	+24V2 (P)	+24V power supply
4	IL2H	+24V power supply for high-voltage unit
5	TNMOT	Toner motor control

YC-8 (to power supply)

1	+5V	—
2	Ground	—
3	Ground	—
4	+24V2(P)	+24V power supply

YC-9 (to option unit)

10	Ground	—
9	SOD	Serial output data
8	SID	Serial input data
7	SEL2D	Device select
6	SEL1D	Device select
5	SEL0D	Device select
4	READY	Ready
3	+5V	—
2	SCKD	Serial clock
1	+24V2 (P)	—

YC-10 (to the main controller board)

1	+5V	—
2	+5V	—
3	+5V	—
4	+5V	—
5	Ground	—
6	Ground	—
7	Ground	—
8	Ground	—
9	Ground	—
10	Ground	—
11	SRAMOE	Status RAM output enable
12	SRAMWE	Status RAM write enable
13	Not connected	—
14	LCDRS	LCD regist select
15	LCDE	LCD enable
16	Not connected	—
17	ENABLE	Data enable (to front panel)
18	DSMCS	Comm. SRAM chip select
19	DSWE	Comm. SRAM write enable
20	DSOE	Comm. SRAM output enable

Pin	Signal	Description
21	DSNRY	Comm. SRAM not-ready
22—34	ECA12—ECA0	Address bus
35	LEDLAN	LED head data latch
36	STRCLK	LED head strobe
37—44	D31—D24	Data bus
45	LCDRW	LCD read/write (LSB)
46	LEDE	LED head enable
47	RDY	Engine ready
48	EGIR	Engine interrupt
49	CNTRIR	Controller interrupt
50	VSREQ	Video sync. request
51	VSYNC	Video sync. acknowledge
52	Not connected	
53	Not connected	
54	CPRDY	Controller power ready
55	VDATA	Video data output to LED head
56	PRINT	Print request
57	LEDLS	LED line sync.
58	VCLK1	Video data transfer clock to LED head
59	KEYBD	Keyboard select signal
60	MRES	Reset

6.5.2. FS-1550/A: KP-445 (main logic board) connectors

YC-101 (to IC card drive)

1	GROUND	—
2	ICD3	IC card data
3	ICD4	IC card data
4	ICD5	IC card data
5	ICD6	IC card data
6	ICD7	IC card data
7	CE1*	IC card enable
8	ICA10	IC card address
9	OE*	Data output enable
10	ICA11	IC card address
11	ICA9	IC card address
12	ICA8	IC card address
13	ICA13	IC card address
14	ICA14	IC card address
15	WE*	Data write enable
16	—	No connection
17	+5V	—
18	+5V	—
19	ICA16	IC card address
20	ICA15	IC card address
21	ICA12	IC card address

Pin	Signal	Description
22	ICA7	IC card address
23	ICA6	IC card address
24	ICA5	IC card address
25	ICA4	IC card address
26	ICA3	IC card address
27	ICA2	IC card address
28	ICA1	IC card address
29	—	Open
30	ICD0	IC card data
31	ICD1	IC card data
32	ICD2	IC card data
33	—	No connection
34	GROUND	—
35	GROUND	—
36	CDET1	IC card detect
37	ICD11	IC card data
38	ICD12	IC card data
39	ICD13	IC card data
40	ICD14	IC card data
41	ICD15	IC card data
42	CE2*	IC card enable
43	—	No connection
44	—	No connection
45	—	No connection
46	ICA17	IC card address
47	ICA18	IC card address
48	ICA19	IC card address
49	ICA20	IC card address
50	ICA21	IC card address
51	+5V	—
52	+5V	—
53	ICA22	IC card address
54	—	—
55	GROUND	—
56	GROUND	—
57	—	No connection
58	—	No connection
59	—	No connection
60	—	No connection
61	REG*	IC card register select
62	—	No connection
63	—	No connection
64	ICD8	IC card data
65	ICD9	IC card data
66	ICD10	IC card data
67	CDET2*	IC card detect
68	GROUND	—

Pin	Signal	Description
YC-102 (to option interface board)		
1—6	+5V	
7—11	—	No connection
12—30	BA20—BA2	Address bus
31	BA1	Address bus (LSB)
32, 33	—	No connection
34	OPIF*	Option interface select
35	OPRDY*	Option interface ready
36	ID6	ID data (MSB)
37—41	ID5—ID1	ID data
42	ID0	ID data (LSB)
43	—	No connection
44	—	No connection
45	AS*	Address strobe
46	DS*	Data strobe
47	OPDAC*	Option interface DTAC
48	RW	Read/write
49	OPIR*	Option interface interrupt
50	RESET*	Reset signal
51	D15	Data bus (MSB)
52—65	D14—D1	Data bus
66	D0	Data bus (LSB)
67	VDO%	Video (external input)
68	PLSYNC*	Video output sync signal
69	VCLK1	Video clock
70	PRINT%	Print request
71	VSREQ*	Video sync request
72	VSYNC%	Video sync acknowledge
73	RDY%	Engine ready
74	—	No connection
75—80	GROUND	

YC-103 (Expansion RAM)

1	GROUND	
2, 3	DD0	DRAM data bus
4, 5	DD1	DRAM data bus
6, 7	DD2	DRAM data bus
8, 9	DD3	DRAM data bus
10	+5V	
11	Not connected	
12—18	RA0—RA6	DRAM multiplexed address
19	Not connected	
20, 21	DD4	DRAM data bus
22, 23	DD5	DRAM data bus
24, 25	DD6	DRAM data bus
26, 27	DD7	DRAM data bus

Pin	Signal	Description
28	RA7	DRAM multiplexed address
29	Not connected	
30	+5V	
31	RA8	DRAM multiplexed address
32	RA9	DRAM muleiplexed address
33	RAS4	DRAM RAS signal (select)
34	RAS6	DRAM RAS signal (select)
35—38	Not connected	
39	Ground	
40, 41	LCAS	DRAM lower CAS signal
42, 43	UCAS	DRAM upper CAS signal
44	RAS7	DRAM RAS signal (select)
45	RAS5	DRAM RAS signal (select)
46	Not connected	
47	WE	DRAM write enable
48	Not connected	
49, 50	DD8	DRAM data bus
51, 52	DD9	DRAM data bus
53, 54	DD10	DRAM data bus
55, 56	DD11	DRAM data bus
57, 58	DD12	DRAM data bus
59	+5V	
60, 61	DD13	DRAM data bus
62, 63	DD14	DRAM data bus
64, 65	DD15	DRAM data bus
66	Not connected	
67—70	PD0—PD3	SIMM ID
71	Not connected	
72	Ground	

YC-105 (to KP-371)

1	+5V	
2	+5V	
3	+5V	
4	+5V	
5	Ground	
6	Ground	
7	Ground	
8	Ground	
9	Ground	
10	Ground	
11	BSRAMOE	Status RAM output enable
12	BSRAMWE	Status RAM write enable
13	Not connected	
14	LCDRS	LCD regist select
15	LCDE	LCD enable

Pin	Signal	Description
16	Not connected	
17	<u>ENABLE</u>	Data enable (to front panel)
18	<u>DSMCS</u>	Comm. SRAM chip select
19	<u>DSWE</u>	Comm. SRAM write enable
20	<u>DSOE</u>	Comm. SRAM output enable
21	<u>DSNRY</u>	Comm. SRAM not-ready
22—34	A13—A1	Address bus
35	<u>LEDLAN</u>	LED head data latch
36	<u>STRENB</u>	LED head strobe
37—44	D7—D0	Data bus
45	<u>LCDRW</u>	LCD read/write (LSB)
46	<u>LEDENB</u>	LED head enable
47	<u>RDY</u>	Engine ready
48	<u>EGIR</u>	Engine interrupt
49	<u>CNTRIRQ</u>	Controller interrupt
50	<u>VSREQ</u>	Video sync. request
51	<u>VSYNC</u>	Video sync. acknowledge
52	Not connected	
53	Not connected	
54	<u>CPRDY</u>	Controller power ready
55	<u>VDATAOUT</u>	Video data output to LED head
56	<u>PRINT</u>	Print request
57	<u>LEDLS</u>	LED line sync.
58	<u>LEDVCLK</u>	Video data transfer clock to LED head
59	<u>KEYBD</u>	Keyboard select signal
60	<u>RES</u>	Reset

6.5.3. FS-3400/A: KP-470 and FS-1550+/FS3400+: KP-485

YC-1 (to IC card drive)

1	GROUND	
2	ICD3	IC card data
3	ICD4	IC card data
4	ICD5	IC card data
5	ICD6	IC card data
6	ICD7	IC card data
7	ICCEL*	IC card enable
8	ICA10	IC card address
9	ICOE*	Data output enable
10	ICA11	IC card address
11	ICA9	IC card address
12	ICA8	IC card address
13	ICA13	IC card address
14	ICA14	IC card address
15	ICWE*	Data write enable
16	--	No connection

Pin	Signal	Description
17	+5V	--
18	+5V	--
19	ICA16	IC card address
20	ICA15	IC card address
21	ICA12	IC card address
22	ICA7	IC card address
23	ICA6	IC card address
24	ICA5	IC card address
25	ICA4	IC card address
26	ICA3	IC card address
27	ICA2	IC card address
28	ICA1	IC card address
29	--	Open
30	ICD0	IC card data
31	ICD1	IC card data
32	ICD2	IC card data
33	--	No connection
34	GROUND	--
35	GROUND	--
36	CDET1*	IC card detect
37	ICD11	IC card data
38	ICD12	IC card data
39	ICD13	IC card data
40	ICD14	IC card data
41	ICD15	IC card data
42	ICCEU*	IC card enable
43	--	No connection
44	--	No connection
45	--	No connection
46	ICA17	IC card address
47	ICA18	IC card address
48	ICA19	IC card address
49	ICA20	IC card address
50	ICA21	IC card address
51	+5V	--
52	+5V	--
53	ICA22	IC card address
54	--	--
55	GROUND	
56	GROUND	
57	--	No connection
58	RESCARD0	No connection
59	CD0WAIT	No connection
60	--	No connection
61	ATTRIB0*	IC card register select
62	BVD2	No connection
63	BVD1	No connection

Pin	Signal	Description
64	ICD8	IC card data
65	ICD9	IC card data
66	ICD10	IC card data
67	CDET2*	IC card detect
68	GROUND	--

YC-4 (to option interface board)

1--6	+5V	
7--13	--	No connection
14--30	A18-A2	Address bus
31	A1	Address bus (LSB)
32, 33		No connection
34	OPIF*	Option interface select
35	OPRDY*	Option interface ready
36	ID6	ID data (MSB)
37--41	ID5--ID1	ID data
42	ID0	ID data (LSB)
43	--	No connection
44	--	No connection
45	AS*	Address strobe
46	DS*	Data strobe
47	OPDSACK*	Option interface DTAC
48	R/W	Read/write
49	OPIR*	Option interface interrupt
50	RESET*	Reset signal
51	D31	Data bus (MSB)
52--65	D30-D17	Data bus
66	D16	Data bus (LSB)
67	EXTVD	Video (external input)
68	ELSYNC*	Video output sync signal
69	EVCLK	Video clock
70	EPRINT*	Print request
71	VSREQ*	Video sync request
72	EVSYSN*	Video sync acknowledge
73	ERDY*	Engine ready
74	--	No connection
75--80	Ground	

YS-1 (Expansion RAM socket)

1	GROUND	
2	DD0	DRAM data bus
3	DD16	DRAM data bus
4	DD1	DRAM data bus
5	DD17	DRAM data bus
6	DD2	DRAM data bus
7	DD18	DRAM data bus

Pin	Signal	Description
8	DD3	DRAM data bus
9	DD19	DRAM data bus
10	+5V	
11	n.c.	
12--18	RA0--RA6	DRAM multip. address
19	n.c.	
20	DD4	DRAM data bus
21	DD20	DRAM data bus
22	DD5	DRAM data bus
23	DD21	DRAM data bus
24	DD6	DRAM data bus
25	DD22	DRAM data bus
26	DD7	DRAM data bus
27	DD23	DRAM data bus
28	RA7	DRAM multiplexed addr.
29	n.c.	
30	+5V	
31	RA8	DRAM multiplexed addr.
32	RA9	DRAM muleiplexed addr.
33	RAS11*	DRAM RAS (select)
34	RAS10*	DRAM RAS (select)
35--38	n.c.	
39	Ground	
40	LCAS	DRAM lower CAS
41	CASUM*	
42	UCAS	DRAM upper CAS
43	CASLM*	
44	RAS10*	DRAM RAS (select)
45	RAS11*	DRAM RAS (select)
46	Not connected	
47	WE*	DRAM write enable
48	Not connected	
49	DD8	DRAM data bus
50	DD24	DRAM data bus
51	DD9	DRAM data bus
52	DD25	DRAM data bus
53	DD10	DRAM data bus
54	DD26	DRAM data bus
55	DD11	DRAM data bus
56	DD27	DRAM data bus
57	DD12	DRAM data bus
58	DD28	DRAM data bus
59	+5V	
60	DD29	DRAM data bus
61	DD13	DRAM data bus
62	DD30	DRAM data bus
63	DD14	DRAM data bus

Pin	Signal	Description
64	DD31	DRAM data bus
65	DD15	DRAM data bus
66	n.c.	
67--70	PD0--PD3	SIMM ID
71	n.c.	
72	Ground	

YC-5 (to KP-371)

1	+5V	
2	+5V	
3	+5V	
4	+5V	
5	Ground	
6	Ground	
7	Ground	
8	Ground	
9	Ground	
10	Ground	
11	<u>BSRAMOE</u>	Status RAM out enab.
12	<u>BSRAMWE</u>	Status RAM wr enab.
13	Not connected	
14	<u>LCDRS</u>	LCD regist select
15	<u>LCDE</u>	LCD enable
16	Not connected	
17	<u>ENABLE</u>	Data en. (to fpanel)
18	<u>DSMCS</u>	Comm. SRAM chip sel.
19	<u>DSWE</u>	Comm. SRAM w enab.
20	<u>DSOE</u>	Comm. SRAM output en.
21	<u>DSNRY</u>	Comm. SRAM not-ready
22	<u>A0</u>	Addressbus
23--34	<u>A12--A1</u>	Address bus
35	<u>LEDLAN</u>	LED head data latch
36	<u>STRCLK</u>	LED head strobe
37--44	<u>D31-D24</u>	Data bus
45	<u>LCDRW</u>	LCD read/write (LSB)
46	<u>LEDENB</u>	LED head enable
47	<u>RDY</u>	Engine ready
48	<u>EGIR</u>	Engine interrupt
49	<u>CNTRIRQ</u>	Controller interrupt
50	<u>VSREQ</u>	Video sync. request
51	<u>VSYNC</u>	Video sync. ack.
52	Not connected	
53	Not connected	
54	<u>CPRDY</u>	Controller power ready
55	<u>VDATAOUT</u>	Video out to LED head
56	<u>PRINT</u>	Print request

Pin	Signal	Description
57	LEDLS	LED line sync.
58	LEDVCLK	Video xfer clk to LED
59	KYBD	Keyboard select signal
60	RES	Reset