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TMFXIV SERIES
TECHNICAL DOCUMENT
(ELECTRICAL PARTS)

(9912)

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FOREWORD

TMFXIV Series has some different electrical parts from those for TMFXII/II-C and TMFXIII/III-C Series and has similar composition of electrical parts rather to TMLH Series and TMCE (Multi-head) Series.

We will be very pleased if you understand the composition of the cards and other parts, used for the TMFXIV Series, and functions and voltage measuring method, referring to this document, so that you can make good use for your service or other activities after sale.

CONTENTS

1. Controller

Controller takes charge of all the embroidery machine operations and controls embroidery machine.

(1) CPU Card

CPU card takes charge of all the machine controls in principle.

Major specifications and functions

1) System memory 256K byte

Design data memory 256K byte (128,000 stitches)

[Note] Total memory capacity will be 640,000 stitches, including the built-in memory on Extension card, 1024K byte (512,000stitches).

2) A P-ROM is installed for installation of system program.

3) Takes charge of interface with Extension card

(Controls ATH card and Head card through Extension card and IF card.)

4) Controls Color change motor through Extension card.

5) Reads from and write to floppy disks and controls Floppy disk drive

6) Interface with FIP (Indicator) and Switch card.

7) Controls PTR and Serial interface (RS-232C) communication

8) Controls Power supply/driver box (Main shaft, X-axis, Y-axis) through Joint card

9) Inputs Main shaft encoder signal through Joint card

10) Inputs UTC signal through Joint card

11) Inputs Beam sensor signal through Joint card

12) Inputs Frame limit switch signal through Joint card

13) Inputs Bar switch signal through Joint card

(2) Extension card

Extension card controls communication with ATH card and Head card, drives Color change motor, detects color change and ATH position through I/F card.

Major specifications and functions

1) Design data memory: 1024K (1M) byte (512,000 stitches)
2) Controls communication with ATH card and Head card through I/F card.
3) Drives Color change motor.
4) Converts color change position signal from analog to digital.
5) Interface with CPU card

(3) How to check voltage

- The power supply voltage to be checked on the cards are as listed below:
- Please apply a tester to check voltage in principle.
- Measuring points are shown with the Nos. of Connector Pins.

[Note] Do not press Connector pins (crimp style terminals) with tester rods too much when you attempt measuring. Too much force may distort Connector pins and causes poor contact.

1) CPU Card (MP131-4)

Voltage	Application	Measured points		Normal range	Measuring range
		Plus side	Minus side		
+5V	To control cards To drive FDD To drive FIP	CN2-1	CN2-2	+4.9 to +5.3V	DC
+12V	To control cards	CN2-3	CN2-4	+11.4 to +12.6V	DC
+24V	To drive PTR	CN2-5	CN2-6	+25.5+26.4V	DC
-5V	To control cards	CN2-7	CN2-2	-4.75 to -5.25V	DC

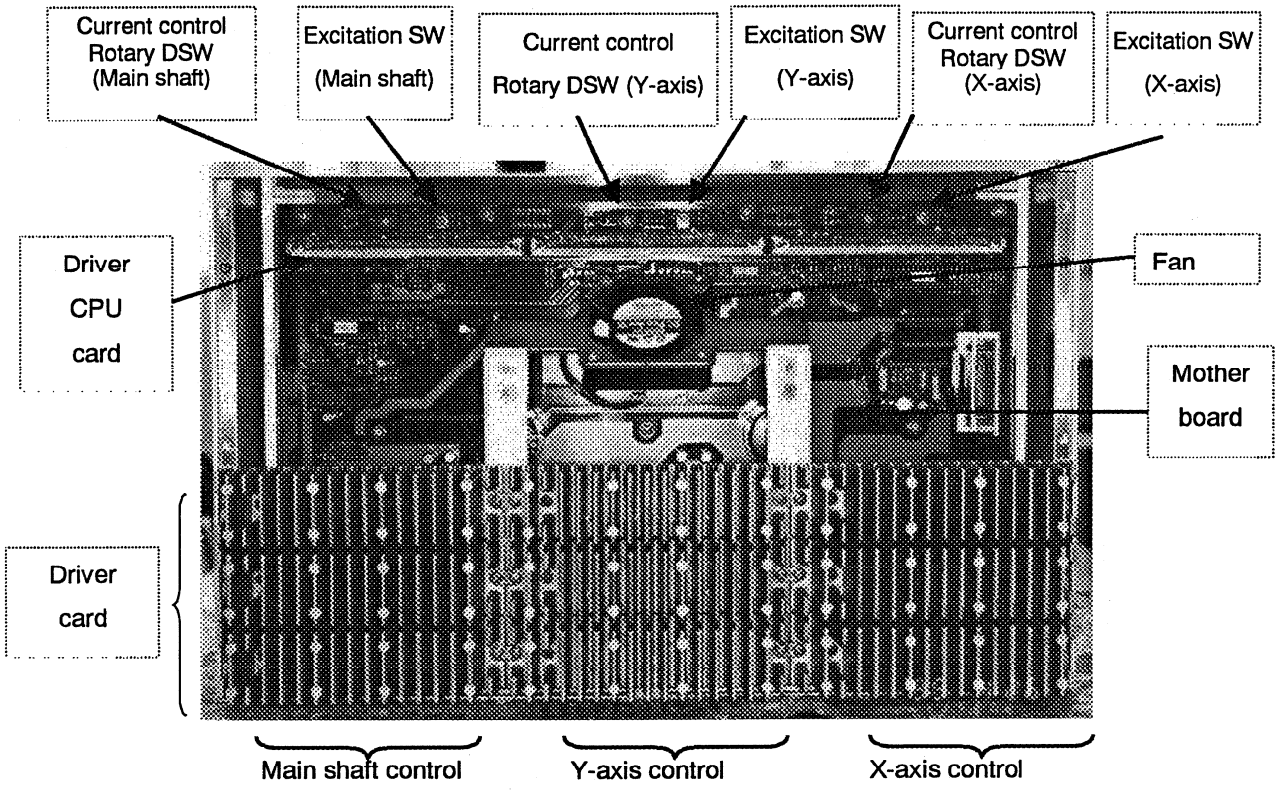
2) Extension card (MP228-2B)

Voltage	Application	Measured points		Normal range	Measuring range
		Plus side	Minus side		
+5V	To control cards	CN2-4	CN2-3	+4.9 to +5.3V	DC
	Power supply for Potentiometer	CN7-4	CN7-3		
+24V	To drive Color change motor	CN4-1	CN4-2	+25.5 to +26.4V	DC

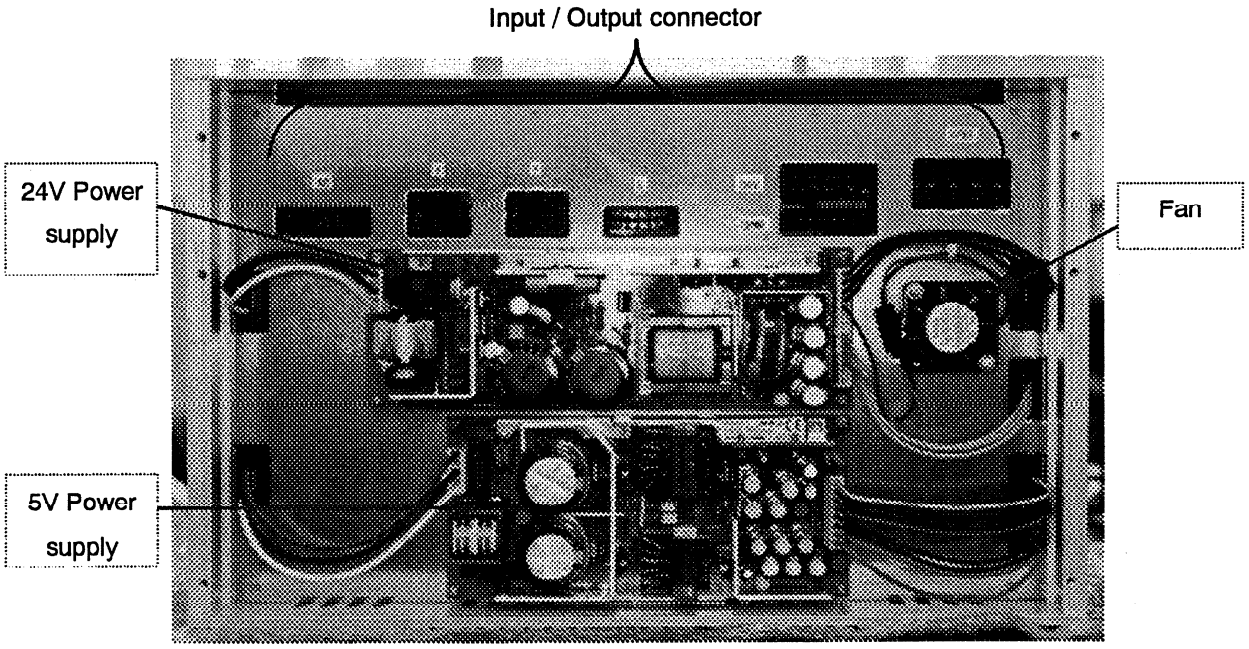
2. Power supply box

Power supply box contains Driver card, Driver CPU card, Mother board (inside Power supply box) and controls Main shaft motor, X/Y-axis motors.

Power supply box – External view (with covers removed):



Power supply box, front side



Power supply box, rear side

(1) Mother board

Mother board is a card, located in the center of Power supply/driver box.

Major specifications and functions:

1) Adjusts motor current with Rotary Dip Switch.

Setting range is in 16 steps from 0 to F.

Motor current is increased when setting value is increased.

Default setting of motor current (Main shaft, X/Y-axes)	
Main shaft	9
Y-axis	A
X-axis	A

2) Switches ON/OFF of motor drive with Excitation switch.

(1 switch for Main shaft, X-axis and Y-axis respectively)

3) Generates DC Power supply for Motor drive (to convert AC to DC).

(2) Driver CPU card

Major specifications and functions:

1) Displays status of Main shaft driver, using LED.

2) Displays driver status, using LED.

LED display	Status
Green	Normal
Orange	Excitation is switched OFF by Excitation switch or system program
Red	Driver error

3) Drives Main shaft motor and X/Y-axis motor.

4) Takes charge of feed back control (current adjustment) by detecting motor current.

(3) 24 V Power supply

Major specifications and functions:

1) Supplies drive power (mainly related to small type pulse motors).

2) Inputs AC200 to 240V and outputs DC+24V.

Application: Jump motor, Thread holding motor, Thread trimming motor, Color change motor, ATH knife retract sensor, Picker solenoid, Fan, PTR Drive Power supply

(4) 5V Power supply

Major specifications and functions:

1) Supplies power to control the machine.

2) Inputs AC200 to 240V and outputs DC+5V, +15V, -15V.

Application:

+5V is a control power supply for the cards and sensors (potentiometer, encoder)

+15V is power supply for UTC sensor and Beam sensor, and control power supply for CPU card (to watch power supply).

-15V is converted to - 5V on Mother board and used to control cards.

(5) How to check voltage

1) Power supply box 〔Driver card (MP221-1), Driver CPU card (MP172-2), Mother board (MP223-2)

Voltage	Application	Measuring points		Normal range	Measuring range
		Plus side	Minus side		
+5V	To control cards	CPWR-1	CPWR-2	+4.9 to +5.3V	DC
-5V		CPWR-7	CPWR-6	-4.75 to -5.25V	DC
+15V	Pre Amplifier Power supply	CPWR-3	CPWR-4	+14.25 to +15.75V	DC
AC200 to 240V	To drive motors for Main shaft, X/Y-axes	AC-1	AC-4	AC180 to 264V	AC

Note 1) [CPWR] is indicated with a symbol [CN17] on Mother board.

Note 2) [AC] is indicated with a symbol [CN13] on Mother board.

2) 24V Power supply [LDA150W-24-H-Y/-Y (A)]

Voltage	Measuring points		Normal range	Measuring range
	Plus side	Minus side		
+24V	CN2-1 to 6	CN3-1 to 7	+25.5 to +26.4V	DC

3) 5V Power supply [LDC60F-2-Y/-Y(A)]

Voltage	Measuring points		Normal range	Measuring range
	Plus side	Minus side		
+5V	CN2-7,8	CN2-5, 6	+4.9 to +5.3V	DC
+15V	CN2-4	CN2-2, 3	+14.25 to +15.75V	DC
-15V	CN2-1	CN2-2, 3	-14.25 to -15.75V	DC

3. ATH card

ATH card drives Thread trimming motor and Picker solenoid, inputs signal from ATH knife retract sensor and controls communication with Extension card through I/F card.

(1) Major specifications and functions of ATH card:

1) Communication with Extension card through I/F card.
2) Drives Thread trimming motor and Picker solenoid.
3) Inputs signal from ATH knife retract sensor.

(2) How to check ATH card (MP219-1-A)

Voltage	Application	Measuring points		Normal range	Measuring range
		Plus side	Minus side		
+24V	ATH motor Picker solenoid	CN4-A1	CN4-A2	+25.5 to +26.4V	DC

4. Head card

Head card drives the motors at the heads (Jump motors, Thread holding motors), takes charge of interface with Tension base cards, and controls communication with Extension card (through I/F card).

(1) Major specifications and functions of Head card

1) Controls communication with Extension card (through I/F card).
2) Drives motors at the heads.
3) Inputs thread breakage signal and Tension base switch signal from Tension base cards
4) Outputs Needle bar information to Tension base cards and outputs information on head operating status (Working / Stopped / Thread broken).

(2) How to check Head card voltage (MP219-1)

Voltage	Application	Measuring points		Normal range	Measuring range
		Plus side	Minus side		
+24V	Thread holding motor Jump motor	CN4-A1	CN4-A2	+25.5 to +26.4V	DC

5. I/F card

Relays communication signal with Extension card, Head cards and ATH cards.

(1) Major functions of I/F card:

Isolates communication signal with Extension card and Head cards / ATH cards electrically to increase resistance to noise.

(2) How to check I/F card (MP220-2A)

Voltage	Application	Measuring points		Normal range	Measuring range
		Plus side	Minus side		
+5V	To drive cards	CN1-4	CN1-3	+4.9 to +5.3V	DC

6. Tension base card

Tension base card inputs Upper thread breakage detection signal.

(1) Major functions of Tension base card:

1) Outputs Thread take-up spring signal of current Needle bar to head card.

2) Switches head operating status (working or stopped) with Tension base switch and outputs to head card

3) Inputs head operation status (working or stopped) and thread breakage information from head card and displays it with LED.

LED display	Status
Green	Head working
Lit in red	Upper thread broken
Blinking in red	Lower thread broken
Not lit	Head stopped

(2) How to check Tension base card voltage (MP203-3B)

Voltage	Application	Measuring points		Normal range	Measuring range
		Plus side	Minus side		
+5V	To control cards	CN2-8	CN1-13,14	+4.9 to + 5.3V	DC

7. Joint card

(1) Major functions of Joint card (MP143-2):

Relays signal and power with CPU card.

Contents of signals / power to be relayed:

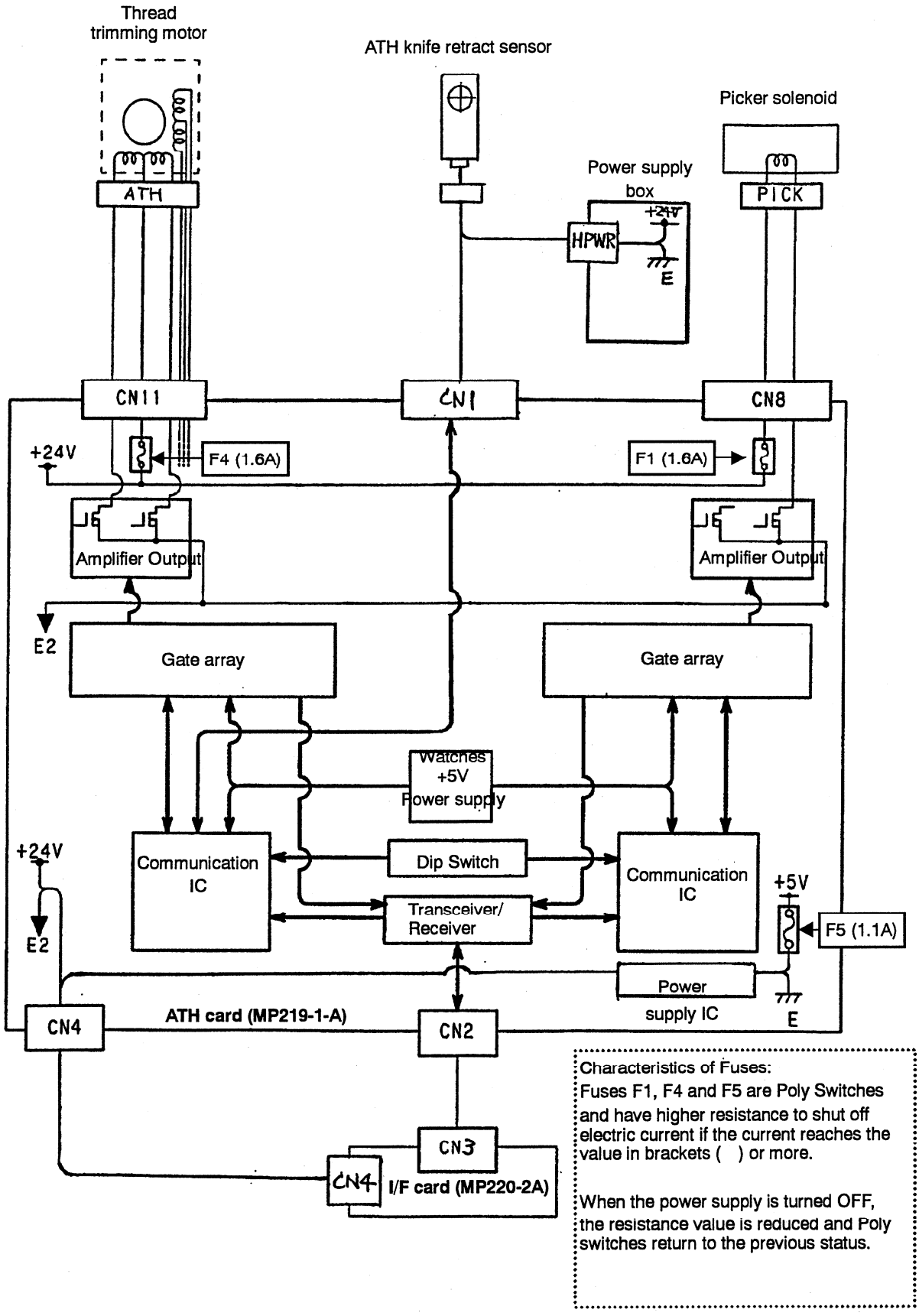
Joint card does not take charge of signal conversion or other processing.

1) Signals / power from CPU card to Mother board (Driver card, Driver CPU card)

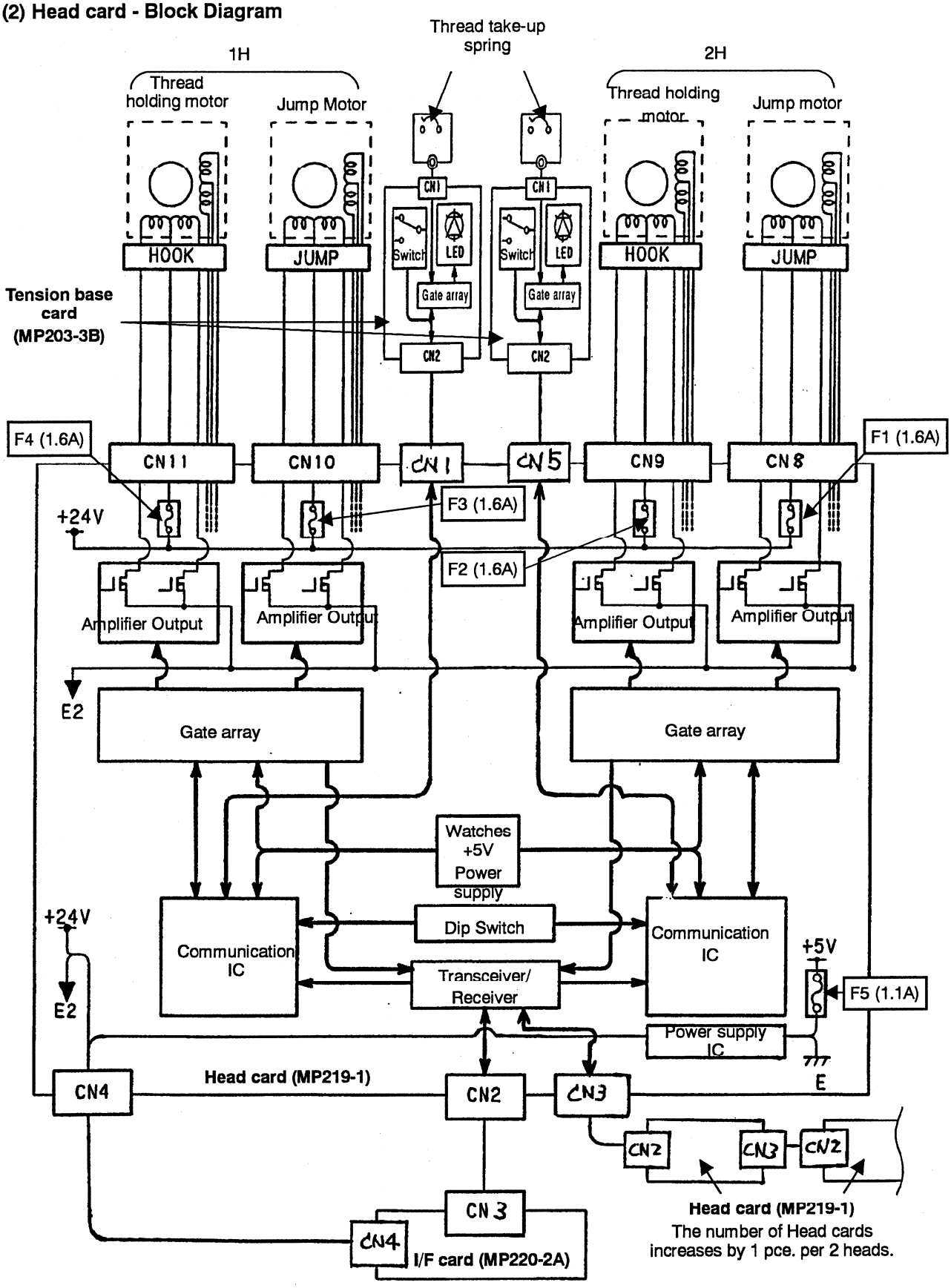
2) Signals / power from Main shaft encoder, UTC-GS-2, Frame limit switch and Beam sensor to CPU card

8. Block diagram, Electrical connecting diagram

(1) ATH card - Block diagram

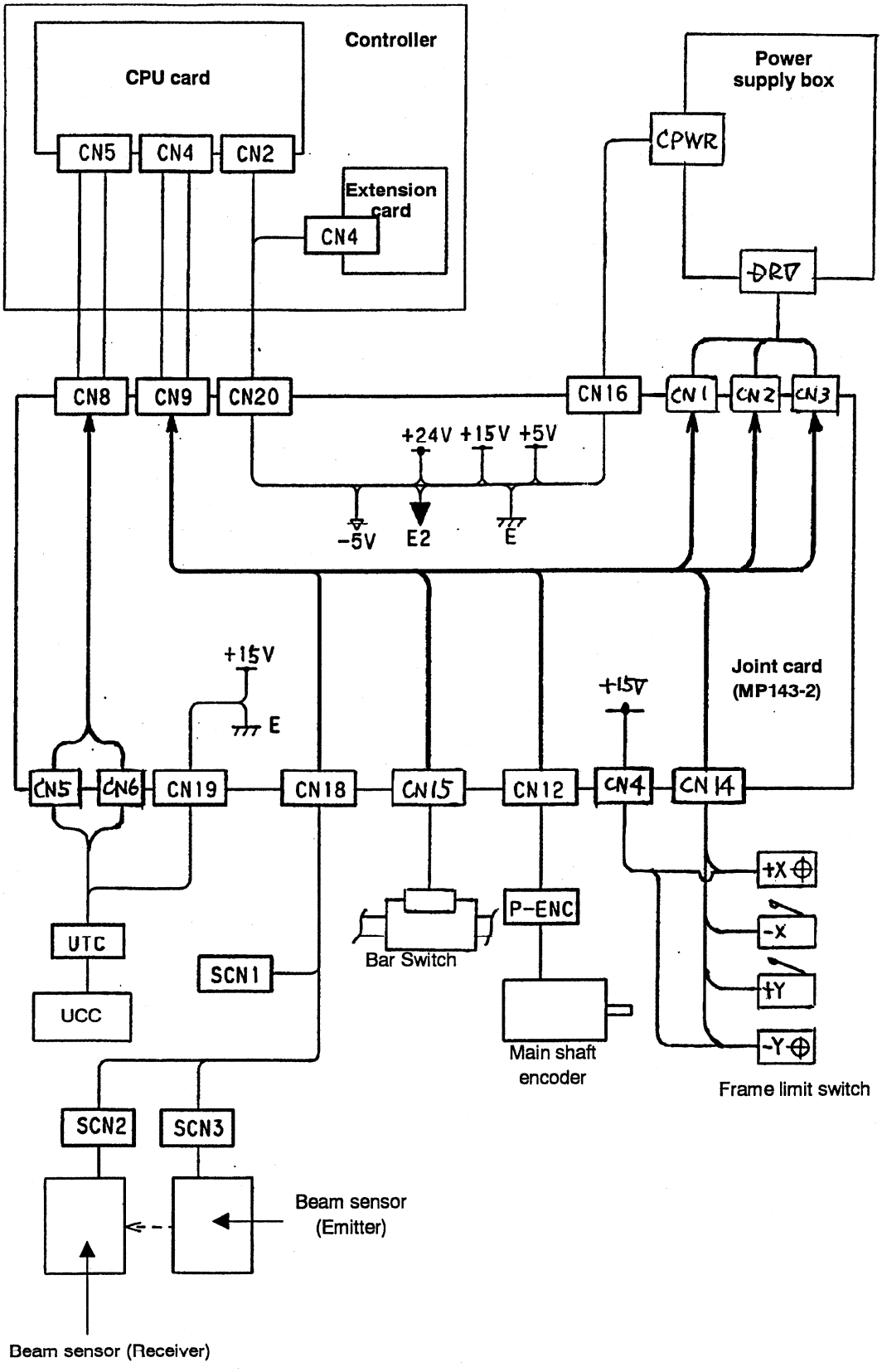


(2) Head card - Block Diagram

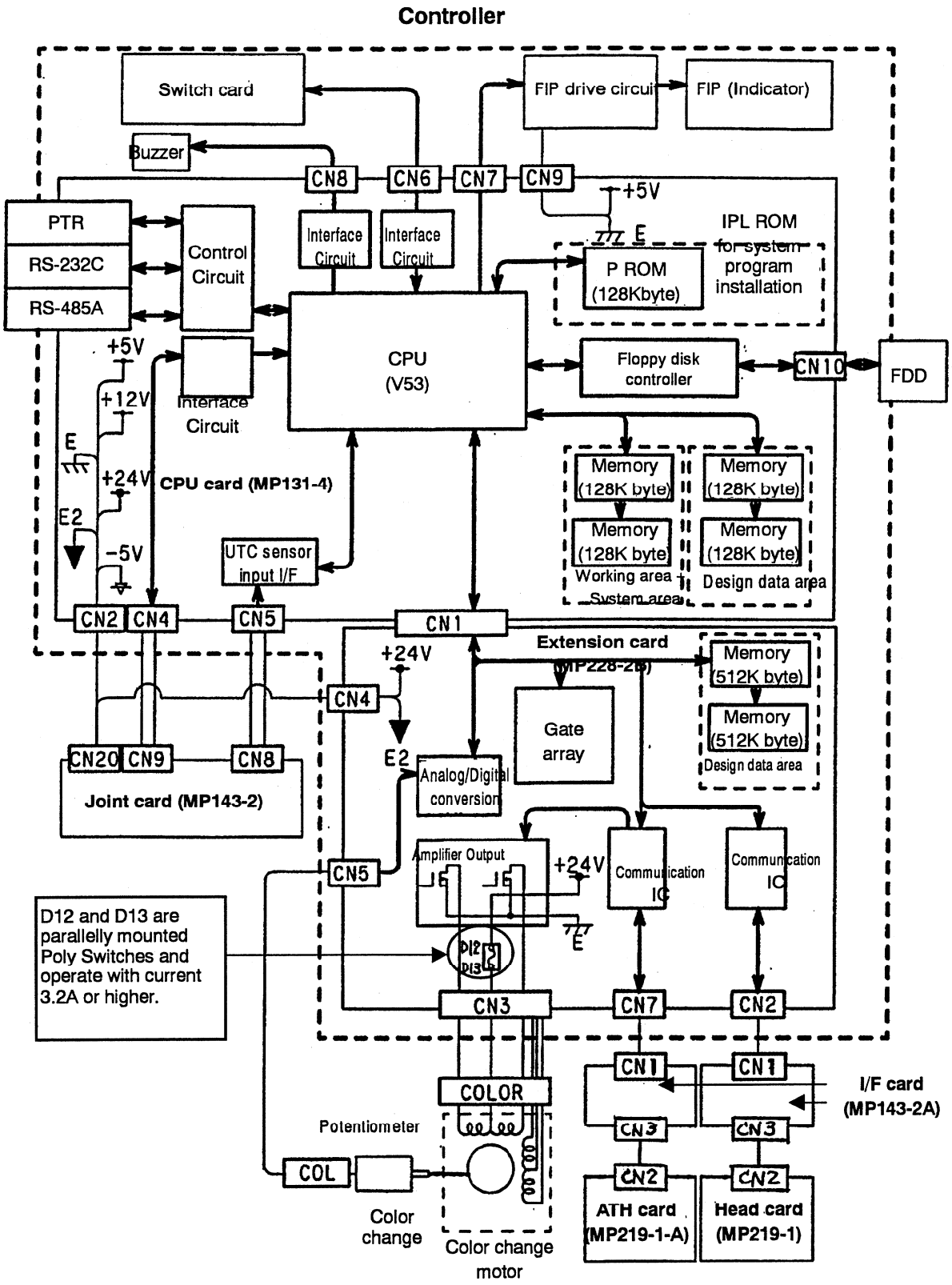


Characteristics of Fuse:
Fuses F1, F4 and F5 are Poly Switches and have higher resistance to shut off electric current if the current reaches the value brackets ( ) or more. When the power supply is turned OFF, the resistance value is reduced and Poly switches return to the previous status.

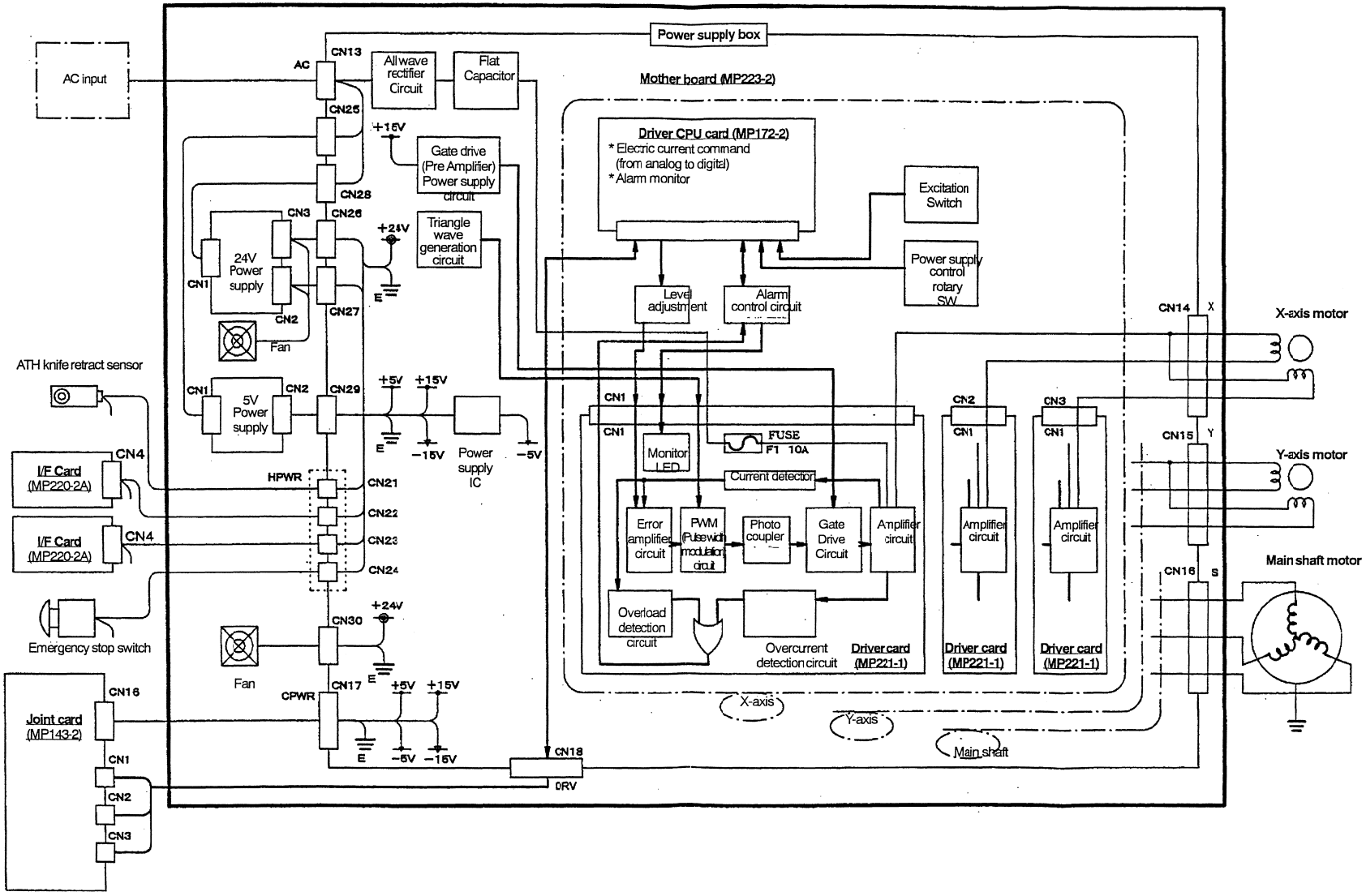
(3) Joint card - Block Diagram



(4) Controller - Block Diagram



(5) POWER SUPPLY BOX - BLOCK DIAGRAM



(6) TMFXIV - Electrical Connection Diagram