

IBM® Model 70 Hardware Maintenance Service Summary

December 4, 1989

This pamphlet contains procedures for isolating problems to a FRU, a Symptom-to-FRU Index, and a partial parts listing for the IBM Personal System/2[®] Model 70 (Type 8570).

This pamphlet is intended to be used with the IBM Personal System/2 *Hardware Maintenance Reference* manual (Part Number 68X2221, Form Number S68X-2221) and the IBM Personal System/2 *Hardware Maintenance Service* manual (Part Number 68X2222, Form Number S68X-2222).

Part Number 15F2167

Form Number S15F-2167-00

Safety Information

Refer to the *Hardware Maintenance Service* manual for the following safety information:

- General Safety during Work
- Safety with Electricity
- Safety Inspection Guide.

Second Edition (December 1989)

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General Checkout

The advanced diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

IMPORTANT:

- The system board for the 25-MHz Model 70 (80386 and 80486) consists of two FRUs. If you are instructed to replace this system board, replace the system-board FRU first. If that does not correct the problem, reinstall the original system-board FRU, then replace the processor-board FRU.
- If more than one error code is displayed, diagnose the first error code first. The cause of the first error code can produce false error codes.
- If an adapter or device consists of more than one FRU, an error code may be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change.

001

- Power-off the system.
- Check all cables and power cords for damage and proper connection.
- Insert your Reference Diskette.
- Power-on the system and check for the following responses:
 1. Memory test counts to 896KB minimum.
 2. One or two short beeps.
 3. IBM Logo Screen appears.

Are all three responses correct?

Yes No

002

Go to the "Symptom-to-FRU Index."

– or –

If that does not correct the problem, go to "Undetermined Problem."

003

- Advance to the Main Menu.
- Press Ctrl-A and run System Checkout.

Notes:

1. If you get incorrect keyboard responses, go to "Keyboard."
2. If the display has problems such as jittering, rolling, shifting or out of focus, go to "Display Self-Test."

Is the installed devices list correct?

Yes **No**

004

Go to "Installed Devices List."

005

- Run the diagnostic tests.

Did the tests identify a failure?

Note: If the test stops and you cannot continue, replace the last device being tested.

Yes **No**

006

You may have an intermittent problem.

- Check for damaged cables and connectors.
- Power-off, then reset all adapters, drives, and modules.
- Check the system unit fan for proper operation.
- Start an error log and run the tests multiple times.

If that does not correct the problem, go to "Undetermined Problem."

007

Follow the instructions on the screen. If that does not correct the problem go to the Symptom-to-FRU Index.

Power-On Password

To service a system with an active, unknown, power-on password do one of the following, depending on which battery and speaker assembly is installed.

- On the type with two pins on the side of the speaker assembly, short the pins together.
- On the type with no pins, insert a meter lead into the connector (protruding from under the battery) and short the other end of the lead to frame ground.

Power-on the system and leave the assembly shorted until completion of POST. This deactivates the password.

Undetermined Problem

1. Power-off the system.
2. Remove or disconnect one of the following adapters or devices.
 - Non-IBM devices
 - External modem, printer, or mouse
 - Math Coprocessor option (Model 70 386 only)
 - Any adapter
 - Fixed disk drive
 - Memory module kit
 - Diskette drive.
3. Power-on the system.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If all adapters and devices have been removed and the problem persists, check the power supply voltages. If the voltages are correct, replace the system board.

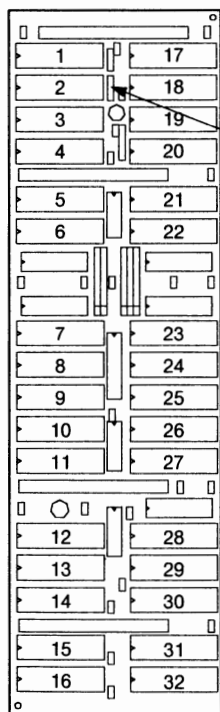
Display Self-Test

1. Power-off the system unit and display.
2. Disconnect the display signal cable.
3. Power-on the display.
4. Turn the contrast to its maximum position.
5. Turn the brightness control to the center detent position.

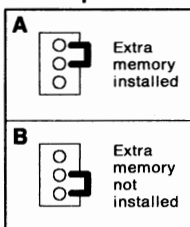
The screen should be white with a black margin, as described below (some shading may occur near the edges). If the screen differs, replace the display. If the display passes the test, replace the system board.

- **8503, 8512, 8513, 8514:** 2 – 20 mm (0.08 – 0.79 in.) wide on one or both sides.
- **8507:** 2 – 20 mm (0.08 – 0.79 in.) wide on the top, or bottom, or both.

Display Adapter 8514/A



Jumper Link



Error Code	Module No.	Error Code	Module No.
007440XX	31	007460XX	16
007441XX	30	007461XX	27
007442XX	29	007462XX	26
007443XX	28	007463XX	25
007444XX	22	007464XX	24
007445XX	21	007465XX	23
007446XX	18	007466XX	20
007447XX	17	007467XX	19
007448XX	32	007468XX	15
007449XX	14	007469XX	11
007450XX	13	007470XX	10
007451XX	12	007471XX	9
007452XX	6	007472XX	8
007453XX	5	007473XX	7
007454XX	2	007474XX	4
007455XX	1	007475XX	3

Installed Devices List

If an adapter or device is missing from the installed devices list, you may have one of the following conditions:

- Your Reference Diskette does not contain the module of code required to support that device.
- The missing device is a 5.25-Inch 360KB External Diskette Drive Adapter or another unrecognizable adapter.
- The missing device is defective.

If an incorrect number of drives is shown on the list, an error can occur during the diagnostic tests.

Restart the system and verify that the drive information on the Set Configuration menu is set correctly, then continue with the diagnostic tests.

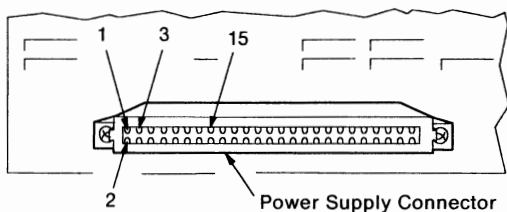
System Unit Fan

An inoperative fan can cause heat to build up resulting in intermittent problems. If the fan is not running, replace the power supply.

Power Supply Voltages

Power-off the system. Remove the power supply and place it with the connector facing up. Power-on the power supply and check for the voltages listed below. If the voltages are not correct, check the power cord for continuity. If the power cord is good, replace the power supply.

Vdc Minimum	Vdc Maximum	Ground (-) Pin	Positive (+) Pin
-9.0	-15.0	2	1
+9.0	+15.0	2	3
+3.7	+6.2	2	15

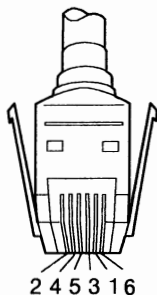


Keyboard

001

- Power-off the system.
- Disconnect the keyboard cable from the keyboard.
- Power-on the system and check the keyboard cable connector for the voltages shown. All voltages are $\pm 5\%$.

Pin	Voltage (Vdc)
1	+ 5.0
2	0 (Not Used)
3	Ground
4	+ 5.0
5	+ 5.0
6	0 (Not Used)



ARE THE VOLTAGES CORRECT?

Yes No

002

Possible failing FRUs are:

1. Keyboard cable
2. System board.

003

Replace the keyboard.

*MOUSE with Keyboard
Same*

Printer

1. Make sure the printer is properly connected and powered-on.
2. Run the printer self-test.

If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self-test runs correctly, install a wrap plug on the parallel port and run the advanced diagnostic tests to determine which of the following FRUs is failing:

- System board
- Parallel adapter
- Printer cable.

Memory

Power-off the system before removing or replacing parts.

A 00011000 error code indicates a system board parity check error.

Remove all memory module kits except the one in position 1. (The system board memory positions for the reduced size system board, from left to right, are 3, 2, 1. For all others, the system board memory positions, from left to right, are 1, 2, 3, and, for the 80386 and 80486, 25-MHz systems, 4.) If the problem remains, replace the kit in position 1. If the kit does not solve the problem, replace the system board.

If the problem disappears after removing the memory module kits (you should still have a kit in position 1), install the kits, one at a time, until the problem returns. Replace the kit that caused the problem to return. If the kit does not solve the problem, replace the system board.

A 00011100 error code indicates a memory expansion adapter parity check error.

Remove the memory expansion adapters from the expansion slots one at a time until you no longer get a 111 error. (If all of the adapters have been removed and you still have a 111 error, replace the system board.)

Remove the memory expansion kits from the adapter that was removed last. Install the kits one at a time until the failure returns. Replace the kit that caused the error to return; if that does not solve the problem, replace the adapter.

A 00020000, 00021500, or 00021600 error code indicates a failing system board memory module kit.

If the error message does not indicate the location of the failing kit, follow the procedure for a 000110 error, described above.

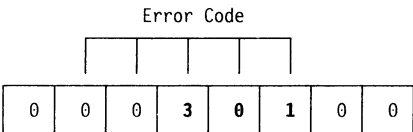
Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and the FRUs that might be responsible for the failure. The most-likely failing FRU is listed first. Use this index to help you determine which FRUs you should have available when servicing a system.

If the system displays an error message and gives an incorrect audio response, the most-likely failing FRUs are those listed for the error message. An X in an error message can be any number.

Error codes are displayed on the screen as three, four, five, or eight digits. The Symptom-to-FRU Index lists all error codes in an eight-digit format. Shorter error codes are shown in bold print within the eight-digit format.

The following example shows how a 301 error code falls within the eight-digit format.



Note: The system board for the 25-MHz Model 70 (80386 and the 80486) consists of two FRUs. If you are instructed to replace this system board, replace the system-board FRU first. If that does not correct the problem, reinstall the original system-board FRU, then replace the processor-board FRU.

Symptom	FRU
One or more keys do not work	Keyboard Keyboard Cable System Board
Changing colors	Display
No beep and the system is otherwise functional.	Speaker Assembly System Board

Symptom	FRU
No beep and nonfunctional system. (See "Undetermined Problem" before replacing any FRUs.)	System Board Power Supply
Continuous beep	Power Supply System Board
Repeating short beeps	Power Supply System Board Keyboard (stuck key)
One long and one short beep	System Board Display Option Adapter Power Supply
One long and two short beeps	System Board Power Supply
One short beep and a blank or unreadable display (See "Display Self-Test" before replacing any FRUs.)	System Board Power Supply Display
One short beep and diskette prompt or a program loads from the fixed disk drive	Diskette Drive System Board Power Supply Fixed Disk and Diskette Drive Bus Adapter
00011000 (See "Memory" before replacing any FRUs.)	System Board Memory Module Kit System Board
00011100 (See "Memory" before replacing any FRUs.)	Memory Expansion Kit Memory Expansion Adapter
00011200, 00011300	Any Adapter System Board
00016100	Battery
00016200	Any Device
00016300, 00016400, 00016500 (See "Installed Devices List" for more information.)	Set Configuration/Features System Board
00016600	Any Adapter
00019400	System Board Memory Module
0001XX00 (not listed above)	System Board

Symptom	FRU
00020000 (See "Memory" before replacing any FRUs.)	System Board Memory Module Kit System Board
00020100	System Board Memory Module Kit or Memory Expansion Adapter or Memory Expansion Kit System Board
00020X00 (slot 0)	System Board Memory Module Kit System Board
00020X00 (slot 1 - 4)	Adapter Memory Memory Adapter
00021500, 00021600, (See "Memory" before replacing any FRUs.)	System Board Memory Module Kit System Board
00022100, 00022500	System Board Memory Module Kit System Board
00030100, 00030200	Keyboard Keyboard Cable
00030300	System Board Keyboard Keyboard Cable
00030400	System Board Keyboard
00030500	Keyboard Cable
00040100	System Board
00060200	Defective Diskette
0006XX00	Diskette Drive System Board Power Supply Fixed Disk and Diskette Drive Bus Adapter
0007XX00 (80386 systems)	Math Coprocessor System Board
0007XX00 (80486 systems)	Processor Board System Board
00110700	Communications Cable System Board
0011XX00 (not listed above)	System Board
00120700	Communications Cable Dual Async Adapter/A
0012XX00 (not listed above)	Dual Async Adapter/A System Board

Symptom	FRU
0014XX00 (See "Printer" before replacing any FRUs.)	Printer System Board
00178000, 00178100, or 00178200	Fixed Disk Fixed Disk and Diskette Drive Bus Adapter System Board
00179000 or 00179100	Fixed Disk Fixed Disk and Diskette Drive Bus Adapter
0017XX00 (not listed above)	Fixed Disk Fixed Disk and Diskette Drive Bus Adapter System Board Power Supply
00240100, 00240200 (changing colors)	Display
00240100, 00240200 (no changing colors)	System Board Display
00240900	Display
00241000	System Board
00461100, 00463000	Multiport/2 Interface Board Multiport/2 Adapter
00461200, 00461300, 00464000, or 00464100	Memory Module Package Multiport/2 Adapter
00465000	Multiport Interface Cable
0046XX00	Multiport/2 Adapter Interface Board Memory Module Package
00744XXX, 00745XXX, 00746XXX, 00747XXX (See "Display Adapter 8514/A" to determine the failing module)	8514 Memory Module
0074XXXX (not listed above)	Display Adapter 8514/A system Board
00860100, 00860200	Pointing Device
00860300	System Board
00860400	System Board Pointing Device
01000700	Communications Cable Multiprotocol Adapter/A
0100XX00 (not listed above)	Multiprotocol Adapter/A System Board

Symptom	FRU
0101XX00 (not listed above)	Modem Adapter/A System Board
01048000, 01048100, 01048200, or 01048300	Fixed Disk Drive System Board Fixed Disk and Diskette Drive Bus Adapter
01049000 or 01049100	Fixed Disk Drive Fixed Disk and Diskette Drive Bus Adapter
0104XX00 (not listed above)	Fixed Disk Drive System Board Fixed Disk and Diskette Drive Bus Adapter Power Supply
000107XX	5.25 inch External Diskette Drive 5.25 inch External Diskette Drive Adapter/A
01290100 or 01290200	Processor Board System Board
01650000	6157 Tape Attachment Adapter
01652000	6157 Streaming Tape Drive
01654000	6157 Streaming Tape Drive 6157 Tape Attachment Adapter
0194XX00	Memory-module package on the 2-8MB 80286 Memory Expansion Option 2-8MB 80286 Memory Expansion Option System Board

Symptom-to-FRU Supplemental Numbers:

Parts

Note: When replacing a Math Coprocessor or memory module kit, order the FRU appropriate for the system you are servicing.

System Unit

Battery	72X8498
Battery/Speaker Assembly with Detachable Cable	33F5950
Battery/Speaker Assembly Cable	72X8558
Power Supply/Fan Assembly	90X8626
1MB Memory Module Kit, 16 or 20 MHz	90X8624
2MB Memory Module Kit, 16 or 20 MHz	90X8625
2MB Memory Module Kit, 25 MHz	15F7658
80387 Coprocessor, 16 MHz	72X6673
80387 Coprocessor, 20 MHz	90X7393
80387 Coprocessor, 25 MHz (80386 only)	15F7661

16-MHz System Boards

SN 1500000 to 1999999, 2500000 to 2511499, 4000000 to 4499999, 7000000 to 7143999	90X9355
SN 2511500 to 2650000, 7144000 to 7999999, DT5500A0001 to DT5500Z9999	33F5834

20-MHz System Boards

SN 500000 to 999999, 3500000 to 3999999, 5500000 to 5505499, 8000000 to 8006999, 9000000 to 9062999	90X8623
SN 5505500 to 5605500, 8007000 to 8999999, 9063000 to 9999999, CF5500AA001 to CF5500ZZ999	33F5835

25-MHz System Boards

System Board (80386)	15F7657
Processor Board (80386)	15F7659
System Board (80486)	64F0122
Processor Board (80486)	64F0123

Fixed Disk and Diskette Drive

Fixed Disk and Diskette Drive Bus Adapter	90X9287
1.44MB Diskette Drive (includes bezel)	15F7570
5.25-Inch Diskette Drive:	
360KB External (110/120)	72X6759
360KB External (220/240)	72X6768
360KB Feature Group with Adapter	72X6758
1.2MB External (4869-002)	15F7993
1.2MB External (4869-502)	15F7994
1.2MB Adapter/A	15F7996

60MB Fixed Disk Drives*

80486 sytems; SN 4500000 to 4999999, FAAA1 to KZZZ9	6128294
All others	90X8627

120MB Fixed Disk Drives*

80486 sytems; SN 4500000 to 4999999, FAAA1 to KZZZ9	6128291
All others	90X9286

* Includes the ESDI fixed disk drive controller

Adapter

Dual Async Adapter/A	90X9229
Multiprotocol Adapter/A	90X8995
300/1200 Modem Adapter/A	72X8576
Token-Ring Network Adapter/A	83X7488
6157 Tape Adapter	92X1459
8514/A Display Adapter	1887971
Memory Module (for 1887971)	1887708
80386 Memory Expansion Adapter	72X6671
Memory Expansion Kit (for 72X6671)	72X6672
2-8MB 80386 Memory Expansion Option	90X9556
1MB Memory Module Kit (for 90X9556)	90X8624
2MB Memory Module Kit (for 90X9556)	90X8625

Keyboard / Mouse

Belgian	1392012
Canadian French	1392011
Danish	1392005
Dutch	1392013
French	1392000
German	1392001
Italian	1392002
Norwegian	1392007
Portuguese	1392008
Spanish	1392003
Spanish / Latin	1392015
Swedish	1392009
Swiss / French / German	1392010
U.K. English	1392004
U.S. English	1392090
Cable	72X8537
Mouse	61X8923

8503 Monochrome Display

110/120 Vac	68X3045
220/240 Vac (Northern Hemisphere)	68X3046
220/240 Vac (Southern Hemisphere)	72X7878
Tilt/Swivel Stand	68X3061

8507 Monochrome Display

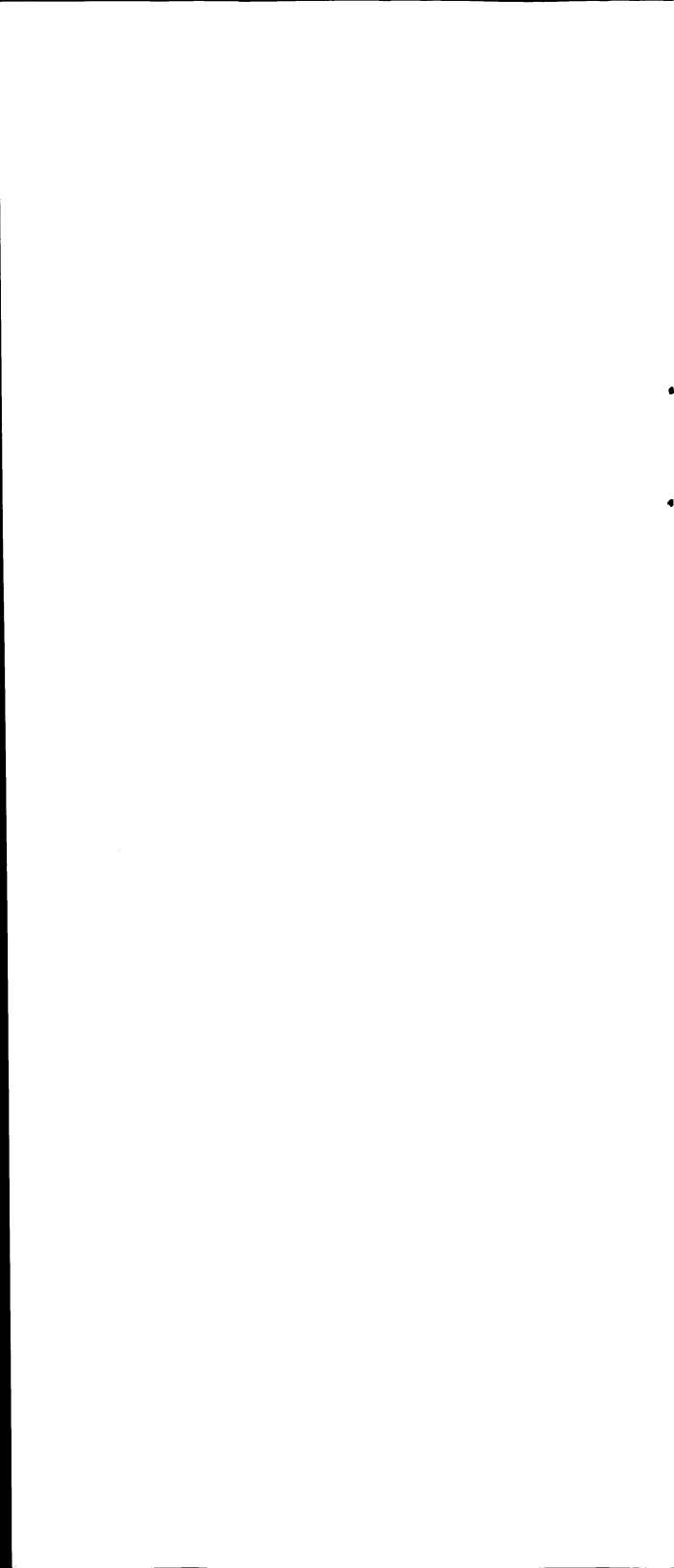
110/120 or 220/240 Vac (Universal Model)	6247808
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8512 Color Display

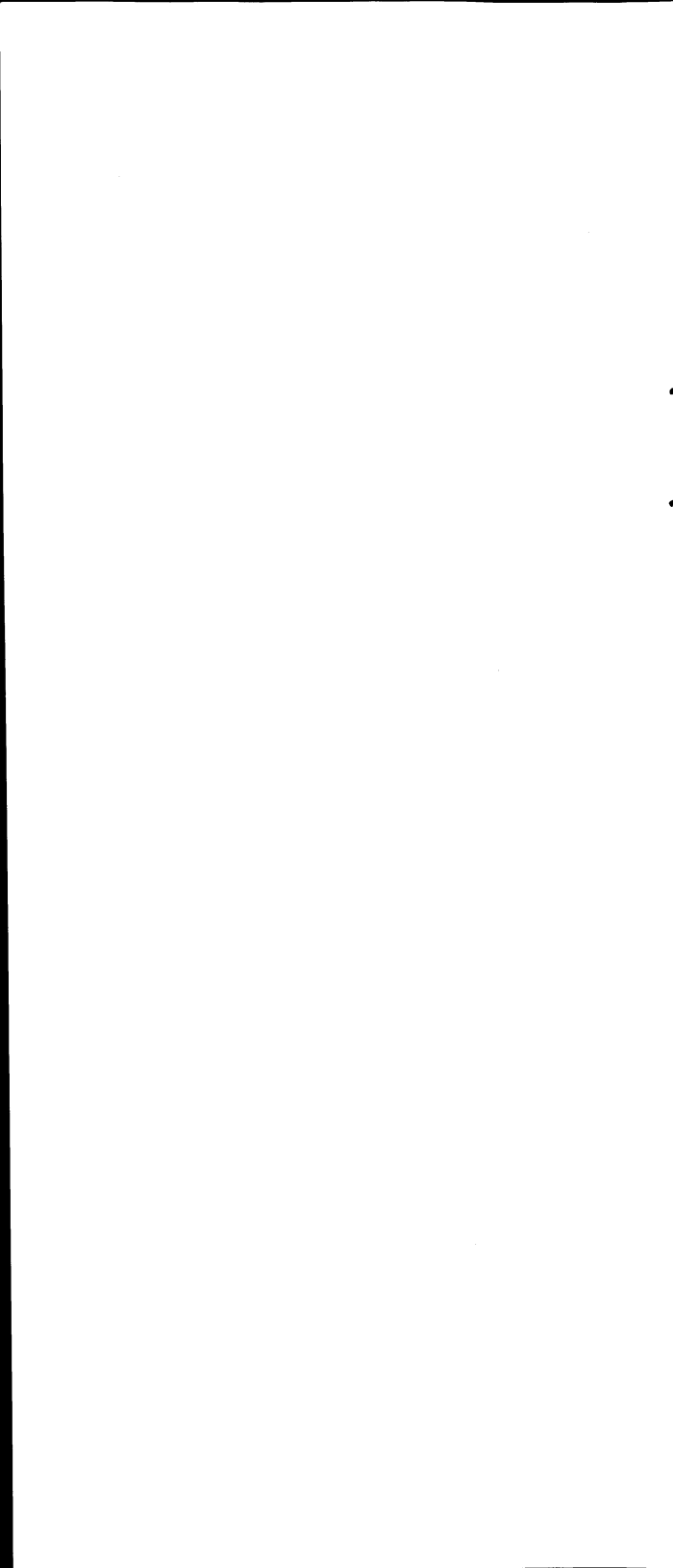
110/120 Vac	61X8924
220/240 Vac (Northern Hemisphere)	61X8928
220/240 Vac (Southern Hemisphere)	61X8927
Tilt/Swivel Stand	61X8925

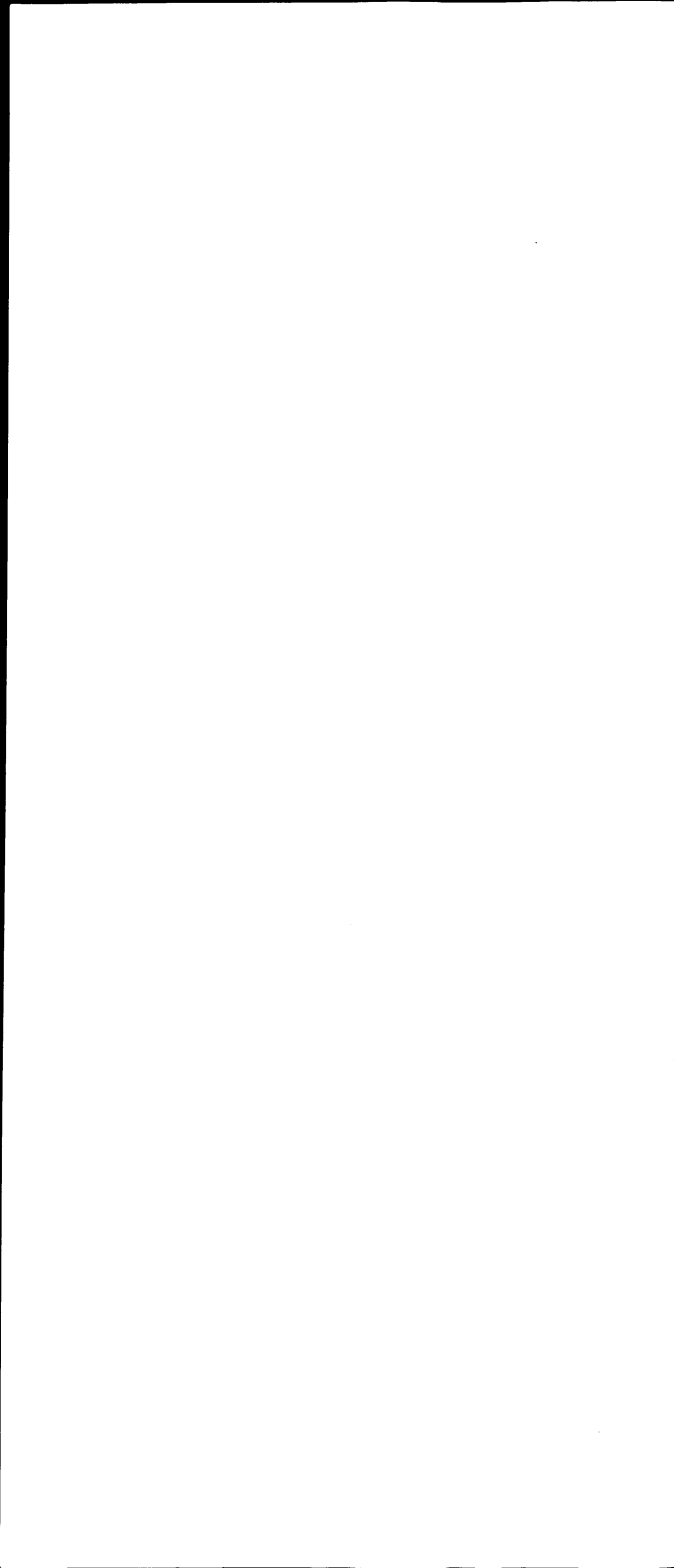
8513 Color Display

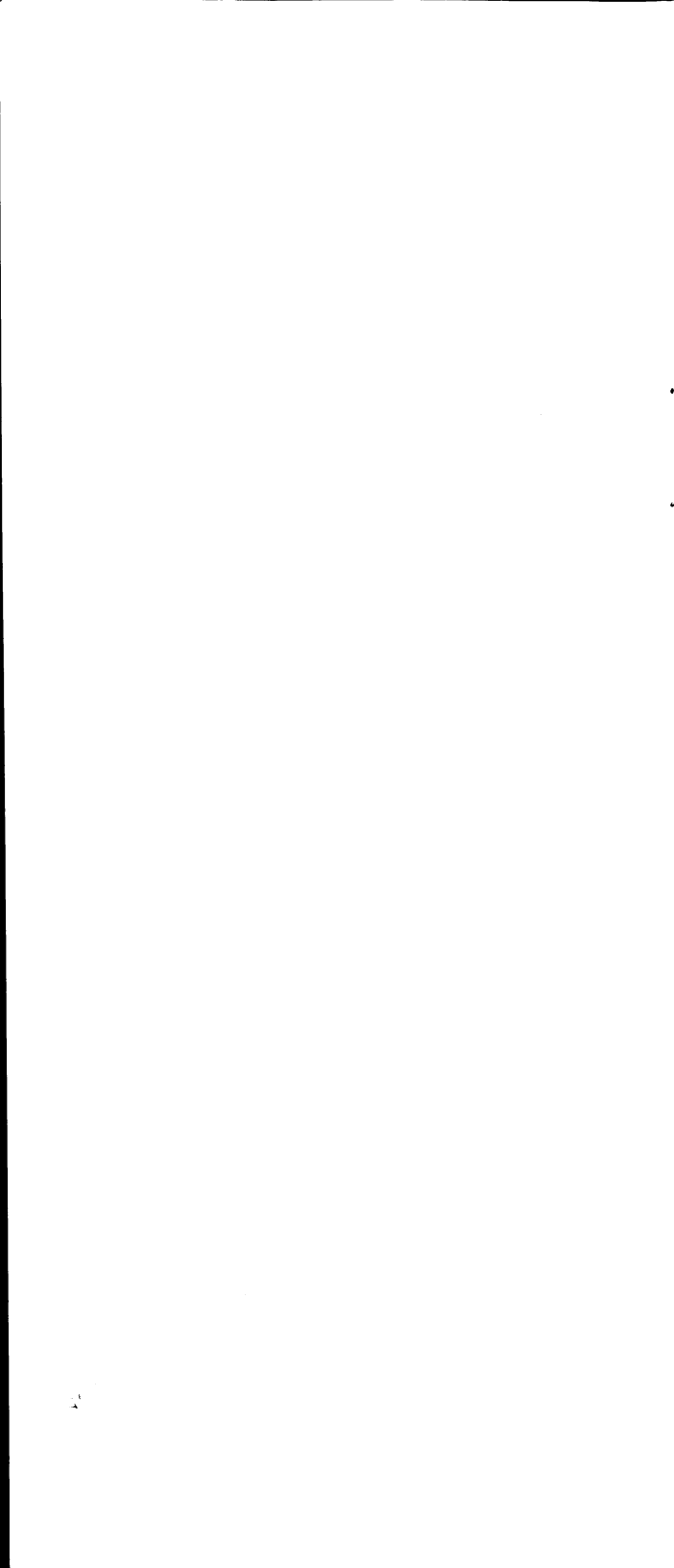
110/120 Vac	68X3088
220/240 Vac (Northern Hemisphere)	72X7870
220/240 Vac (Southern Hemisphere)	72X7877
Tilt/Swivel Stand	68X3061



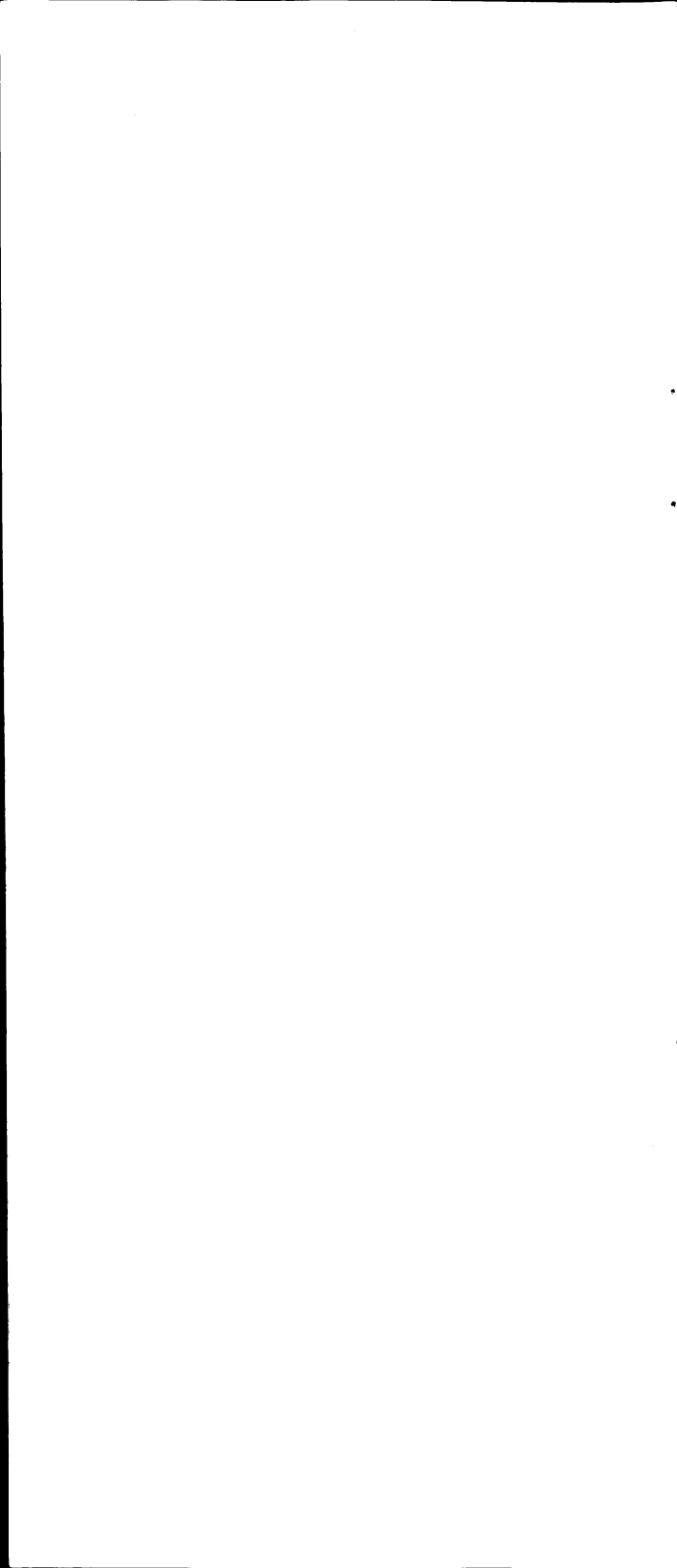














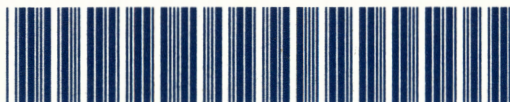


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