MOHAWK DATA SCIENCES

# MODEL 9550

## SYSTEM 64 to SYSTEM 264

## UPGRADE PROCEDURE

**REVISION 1**

MDS CONFIDENTIAL



TD-3260
M-6290-0100

# MANUAL REVISION RECORD

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UPGRADE PROCEDURE - SYSTEM 64 TO SYSTEM 264

TABLE OF CONTENTS

## 1 EQUIPMENT CHARACTERISTICS

The MDS Qantel System 264 uses the four board Q264 CPU. Memory for the system is provided by the Memory 264A/B and has a range of 2MB to 16MB of random access memory. Four Mem 264A boards may be installed, each of which may contain two 2MB Mem 264B modules.

The System 264 does not support DMA controllers, or controllers requiring 26v (IOU-2, IOU-5, IOU-6, IOU-10, & IOU-18).

## 2 ENVIRONMENTAL CONSIDERATIONS

| | |
|---|---|
| Ambient Temperature | 50-85F (10-30C) |
| Thermal Output | 10,250 BTUs per hour (basic system)<br>18,750 BTUs per hour (with add-on disk cabinet) |
| Relative Humidity | 20-80% during operation - no condensation<br>5-95% during storage - no condensation |
| Operating Altitude | 1000 feet below to 6000 feet above sea level<br>(305 meters below to 1830 meters above sea level)<br>NOTE: A hard disk modification is required for operation above upper altitude limit. |
| Storage Altitude | 1000 feet below to 10,000 feet above sea level<br>(305 meters below to 3050 meters above sea level) |

# 3 GENERAL UPGRADE MODIFICATIONS

The components replaced in the upgrade are as follows:

DIAG Panel PWA
CPU PWAs (4)
Memory Board PWAs
Card Cage Assembly (Includes Backplane)
Filler Panel (Immediately Below Operator's Panel)

Refer to the Part List in Section 6 for part numbers. CPU and Memory Motherboards must be located in the cardcage as shown in Figure 3-1.
CAUTION: CPU Boards are NOT interchangable.

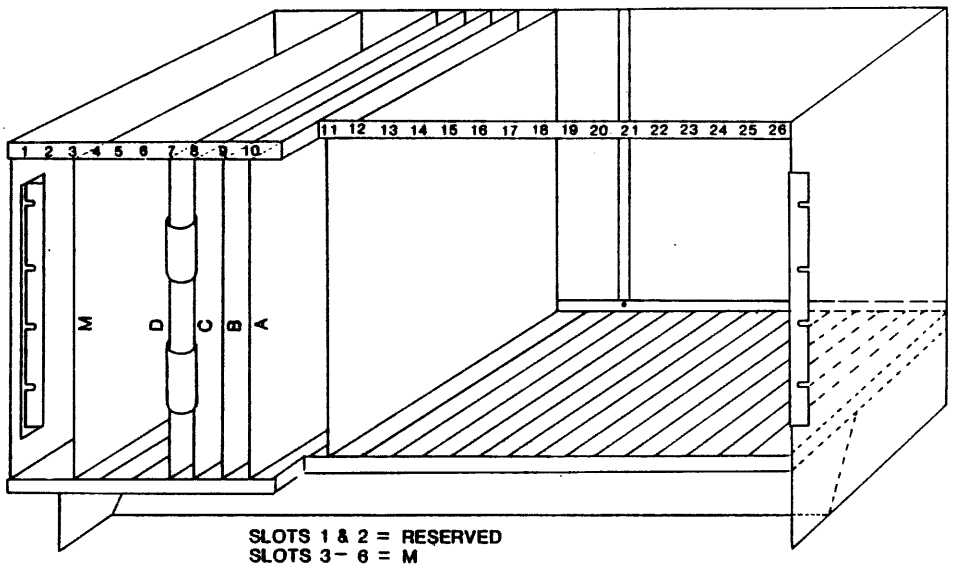


**Figure 3-1 Card Cage**

## 3.1 Replacing the Card Cage Assembly (Card cage and Backplane)

The following procedure is currently recommended to the field for replacing the card cage assembly in the System 64 (see Figure 3-1):

1. CAUTION: be sure all power is OFF.
2. Remove the rear panel and both side panels.
3. Remove the upper rear panel mounting brackets.
4. Disconnect all cables from PWAs and move them clear of the card cage and top fan assembly.
5. Remove all PWAs from the card cage.
6. Disconnect the DC Harness and other power cables from the rear of the backplane.

3.1 Replacing the Card Cage Assembly (Continued)

7. Remove the top fan assembly wiring harness from the cable clamps along the frame.

8. Remove the mounting screws that secure the top fan assembly.

9. Pull the top fan assembly clear of the mounting rails. Turn the fan assembly on its back, and rotate it 90 degrees counter-clockwise so that wires face cabinet.

10. Pass top fan assembly over the top of the card cage to right side of the cabinet and place it on the floor beside the cabinet.

11. Remove the eight card cage mounting screws. Hold card cage in place while removing the last screw.

12. Raise the card cage straight up until the air scoop clears the bottom fan assembly then pull it straight out of the cabinet.

Reverse the procedure with the 264 card cage assembly. Note: do not reinstall the side and rear panels until the following procedures are completed.

3.2 Replacing the Diagnostic Panel

1. Unfasten the Diagnostic Panel PWA, which is held to the frame by four screws, from inside the cabinet.

2. Cut the tie wrap that secures the Operator's Control Panel Harness to the Diag Panel's J2.

3. Disconnect the B Board Ribbon Cable from the Diag Panel's J1, and disconnect the Operator's Control Panel Harness from the Diag Panel's J2.

4. The ribbon cable connected to J1 on the Diagnostic Panel must be shielded. If it is not, replace it at this time. The shielded ribbon cable connects to J1 (red stripe to pin 1) on the B Board in the Card Cage.

To install the replacement unit:

1. Reconnect the B Board Ribbon Cable to the Diagnostic Panel's J1 (red stripe to pin 1).

2. Reconnect the Operator's Panel Harness to the Diag Panel's J2 (red wire to pin 1) and secure the connector with a tie wrap.

3. Reinstall the Diagnostic Panel PWA into the cabinet.

4. Drape the shielded ribbon cable over the card cage and connect it to J1 (red stripe to pin 1) on the B Board.

5. Route the shielded ribbon cable through the cable clamp at the center of the ceiling of the cabinet.

## 3.3 Replacing the Filler Panel

There is a Filler Panel immediately below the Operator's Control Panel which must be replaced (see Figure 3-2).

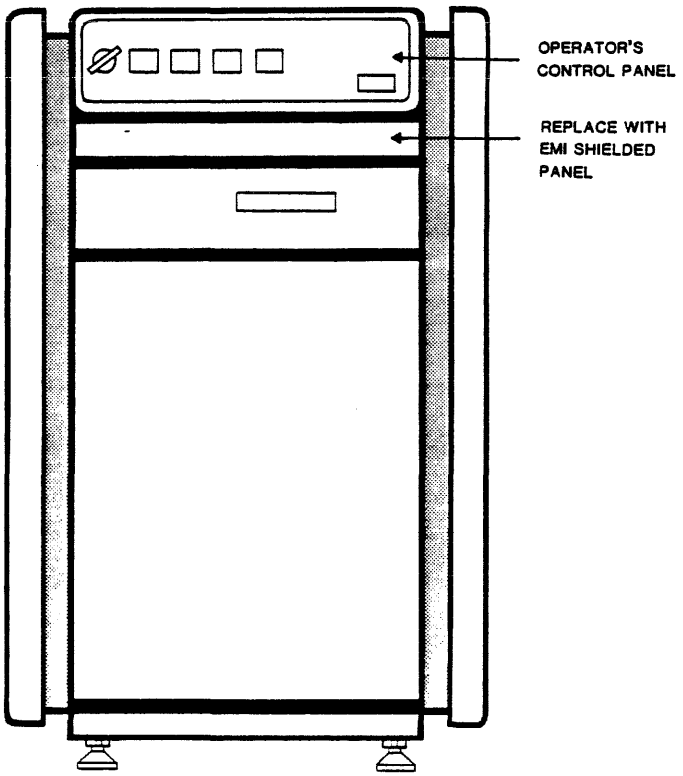


**Figure 3-2 Front of Cabinet Showing Filler Panel**

1. Unfasten the two nuts on each side of the old Filler Panel. Place the EMI shielded Filler Panel where it can be reached from the front of the main cabinet.

2. Remove the two screws that hold the Operator's Control Panel in place. Hold the Operator's Control Panel to keep it from falling and straining the wiring harnesses.

3. Pull the Operator's Control Panel out of the way of the Filler Panel.

4. Pull the Filler Panel free and insert the EMI shielded Filler Panel in place of the old panel.

5. Put the Operator's Control Panel back in place and secure it with the two screws.

6. Secure the EMI shielded Filler Panel with the four nuts.

The side panels and the rear panel should be replaced at this time. Be sure to tighten all screws and fasteners.

## 3.4 Jumper Settings

CPU Logic Board A: JMP 1 - all off for 19.2 Kbaud. Jumper position 4 for 1200 baud.

JMP 2 - jumper pins 1 to 2 to read JMP 1

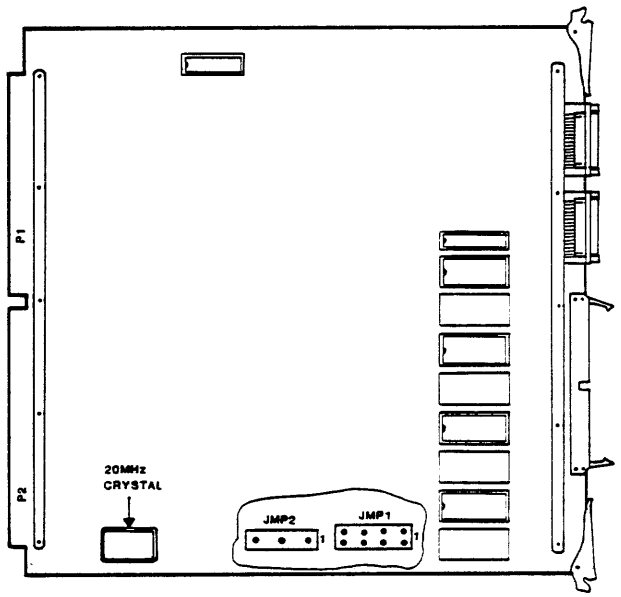


**Figure 3-3 CPU Logic Board A**

Logic Board(s) M: (Memory Mother-board)

JMPs 1-6 - jumper pins 2 to 3 for 256K RAMs

JMP 7 - Memory Board Address Jumper - 1st board - pin pair 1
2nd board - pin pair 2
3rd board - pin pair 3
4th board - pin pair 4

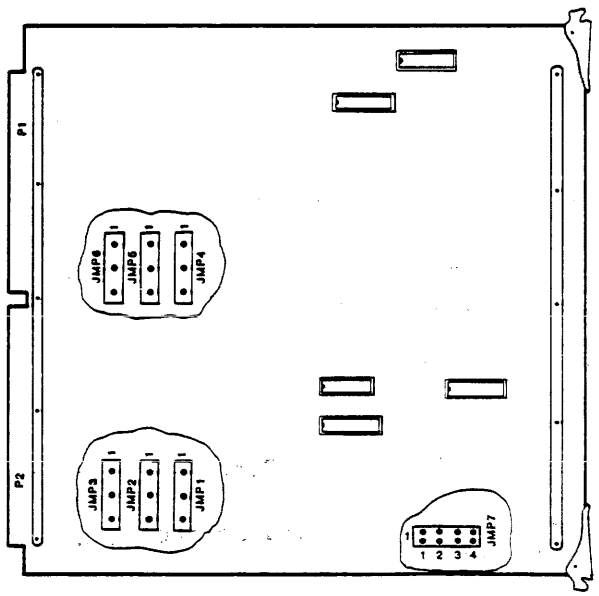


**Figure 3-4 Memory Motherboard (M-Board)**

## 3.4 Jumper Settings (Continued)

Diag Panel: JMP 1-3 - jumper pins 1 to 2 for 264 configuration

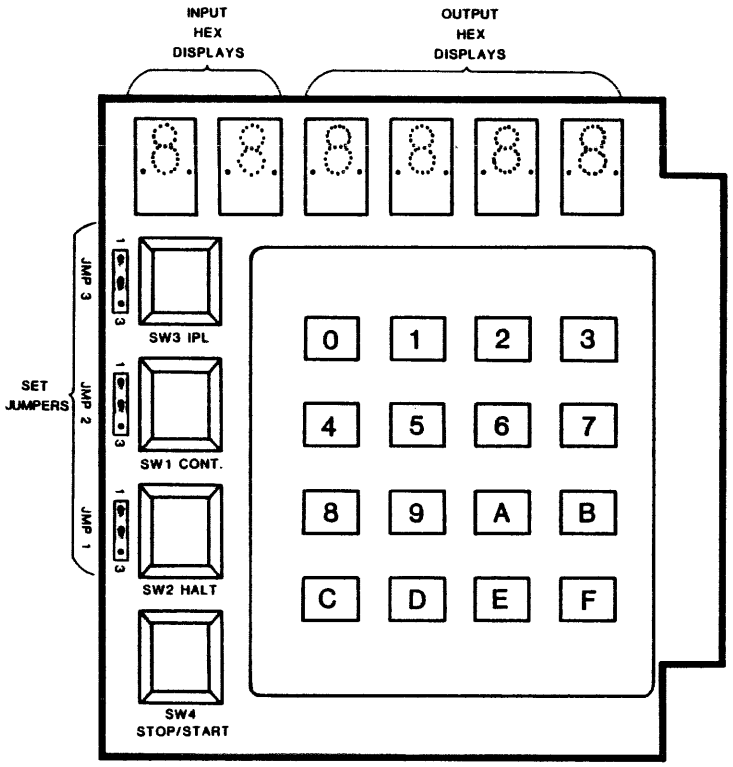


Figure 3-5 Diag Panel

## 3.5 Ribbon Connectors

Connect the C Board to the D Board as follows: C Board J3 to D Board J3

C Board J4 to D Board J4

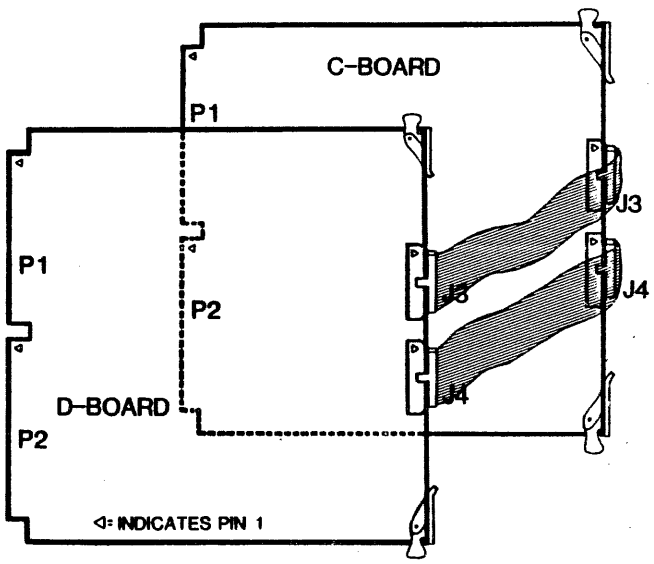


Figure 3-6 Connection of C and D Boards

# 4 USING THE DIAGNOSTIC PANEL

Upon an Initial Program Load (IPL) a microcode diagnostic routine located at memory location $0000 will automatically run. The diagnostic will check the following:

Next Address Logic
2910 CPU Registers and Functions
Base Register Memory
Reserved Memory (Addresses $0000 - $1000)
Data Paths
Fetch Register
Fetcher State Machine

If there are no diagnostic errors at the completion of test, the Diagnostic Panel will display $7F. If there is an error, the Diagnostic Panel will display the number of the test that failed ORed with the $80-weight bit.

## 4.1 Self Test Error Codes

Note: If the system errors on a test, subtract $80 from the display to obtain the error code shown below:

| Code | Description | Boards Affected | Code | Description | Boards Affected |
|---|---|---|---|---|---|
| 00 | Diagnostic Started | A,B | 10 | -- | |
| 01 | CPU Flag Test | A,B | 11 | -- | |
| 02 | Shift Test 0 | A,B | 12 | PIT Buffer Test | A,C |
| 03 | Shift Test 1 | A,B | 13 | PIT Counting Test | A,C |
| 04 | Shift Test 2 | A,B | 14 | Branch Register Lower Test | A |
| 05 | Shift Test 3 | A,B | 15 | Branch Register Upper Test | A |
| 06 | GPC Test A | A | 16 | Y Branch Lower Test | A |
| 07 | GPC Test B | A | 17 | -- | |
| 08 | GPC Test C | A | 18 | Branch Reg 256-way Branch Test | A |
| 09 | GPC Test D | A | 19 | Y 256-way Branch Test | A |
| 0A | GPC Test E | A | 1A | BCD Zone Test | A |
| 0B | GPC Test F | A | 1B | BCD Adder Test | A |
| 0C | GPC Test G | A | 1C | BCD Subtract Test | A |
| 0D | GPC Test H | A | 1D | Global Interrupt Test | A |
| 0E | FFFF Test | A | 1E | REAL Flag Test | C |
| 0F | Swap Register Test | A | 1F | Base Register Data Test | C,D |
| 20 | Base RAM Test | C,D | 30 | MEM Test Via LARP | C,D,MEM |
| 21 | LARA Test | C | 31 | A Plus 1 Adder Test | D,MEM |
| 22 | LARB Test | C | 32 | Barrel Shifter Test | C |
| 23 | LARP Test | C | 33 | LARA Inc/Dec Test | D,MEM |
| 24 | RAR (perrl) Test | C,D | 34 | LARB Inc/Dec Test | D,MEM |
| 25 | RAR (perrh) Test | C,D | 35 | LARP Inc/Dec Test | D,MEM |
| 26 | PARP Test | C,D | 36 | Hazard Test | A,D |
| 27 | PARA Test | C,D | 37 | Cascade Test | C |
| 28 | PARB Test | C,D | 38 | Memory Test 1 | C |
| 29 | Fetch Register Test | C | 39 | Fetcher Branch Test | C,D |
| 2A | LARA/Base Register Test | C | 3A | Indirect Overflow Test | C,D |
| 2B | Memory Cell Test | C,D,MEM | 3B | P Hazard Test 1 | C,D |
| 2C | Memory Bit Test | C,D,MEM | 3C | P Hazard Test 2 | C,D |
| 2D | Extensive Memory Bit Test | C,D,MEM | 3D | -- | |
| 2E | MEM Test Via LARA | C,D,MEM | 3E | Fetcher Test 0 | C,D |
| 2F | MEM Test Via LARB | C,D,MEM | 3F | Fetcher Test 1 | C,D |
| 40 | Fetcher Test 2 | C,D | | | |
| 41 | Fetcher Test 3 | C,D | | | |
| 42 | Fetcher Test 4 | C,D | | | |
| 43 | Fetcher Test 5 | C,D | | | |
| 44 | Fetcher Test 6 | C,D | | | |
| 45 | Fetcher Test 7 | C,D | | | |
| 46 | Fetcher Test 8 | C,D | | | |
| 47 | Fetcher Test 9 | C,D | | | |
| 48 | Fetcher Test 10 | C,D | | | |
| 49 | Fetcher Test 11 | C,D | | | |
| 4A | Fetcher Test 12 | C,D | | | |
| 4B | Fetcher Test 13 | C,D | | | |
| 4C | $F -> LARB Test | C,D,MEM | | | |
| 4D | -- | | | | |
| 4E | Memory Test* | MEM | | | |
| 7E | Fatal Stack Error | A,B | | | |
| 7F | Diagnostic Tests Passed | | | | |
| FF | Fatal Error During Kernal Test | A,B | | | |

* 4E cannot be accessed unless $CE has been entered on the test panel.

## 4.2 Special CPU State Indications

| Code | Description |
|---|---|
| E0 | No Device 0 |
| E1 | Power Fail Warning |
| E2 | IPL Warning |
| E3 | Seek To a Non Disk Device |
| E4 | Parity Error |
| E5 | Indirect Overflow |
| E6 | Illegal Instruction |
| E7 | Hardware Error |
| E8 | Fetcher Error |
| E9 | Fetcher Died |
| EA | Breakpoint Error |
| B0 | Serial Port In Use |
| B1 | Serial Port Was Used |
| BB | Serial Port Breakpoint In Effect (System will be slowed by this) |

## 4.3 Fatal Error Conditions

The following error conditions are generated either by software or firmware and are handled by the firmware. In cases such as those shown below the firmware writes a diagnostic message to Terminal 0:

| Message | Explanation |
|---|---|
| ILLEGAL @ aaaa hh:mm | Illegal macro instruction at address aaaa at time hh:mm (value of real time clock) |
| FETCHER DIED @ aaaa hh:mm | Illegal fetcher state at address aaaa |
| INDIRECT @ aaaa hh:mm | Indirect overflow at address aaaa |
| HARDWARE ERROR @ aaaa hh:mm | Illegal hardware state at address aaaa |
| BRKPNT ERROR @ aaaa hh:mm | Illegal breakpoint signal occurred at aaaa |
| FETCHER ERROR @ aaaa hh:mm | Decode error by the fetcher at aaaa |
| PARITY ERROR @ aaaa hh:mm | Parity error occurred at physical address aaaa |

## 4.4 Diagnostic Panel Keypad

The state of the System 264 may be examined during a CPU Stop condition, or after a fatal error occurs. The table below shows the keystrokes and the the corresponding registers that can be examined or tests that can be invoked:

| Keystroke | Display |
|---|---|
| 1y | The high byte is Status 2 of device y; the low byte is Status 0 of device y. |
| 2y | Contents of Register y |
| 3y | The high 16 bits of Base Register y |
| 4y | The low 8 bits of Base Register y |
| 50 | Reserved |
| 51 | LARP |
| 52 | LARP0 |
| 53 | LARA |
| 54 | LARB |
| 55 | PERRL |
| 56 | PERRH |
| 57 | RWORD |
| 58 | RWORD2 |
| 59 | RWORD3 |
| 5A | RWORD4 |
| 5B | QFLAGS |
| 5C | IENREG |
| 5D | UDATA |
| 5E | BCDRES |
| 5F | Reserved |
| CE | Micro Memory Tests (run from Terminal 0 |
| 70 | Inhibit Self Test During IPL |

# 5 CHECKOUT PROCEDURES

The System 64 can be tested with these two ATPs: CPU64 (minimum version date 850121) and MEM64 (minimum version date 850422).

## 6 PART LIST

| DESCRIPTION | PART No. |
|---|---|
| CABLE, SHIELDED RIBBON - DIAG PANEL Q264 ..... | 043075501 |
| CARD CAGE ASSEMBLY, Q264 ..... | 043075001* |
| PANEL, FILLER Q264 ..... | 043075101* |
| PWA, BP Q264 ..... | 043037801 |
| PWA, CPU A Q264 ..... | 043037502* |
| PWA, CPU B Q264 ..... | 043037302* |
| PWA, CPU C Q264 ..... | 043037402* |
| PWA, CPU D Q264 ..... | 043037602* |
| PWA, DISPLAY W/KEYPAD Q64/264 (DIAG. PANEL) ..... | 043055501* |
| PWA, MEM A Q264 (MOTHER BOARD) ..... | 043037702* |
| PWA, MEM B Q264 2MB (DAUGHTER BOARD) ..... | 043062701* |

*Item is included in the Upgrade Kit - Qantel Model No. 9550