## IOU-32, 42, 52 ERROR STATUS'

SEEK

$F4 - INVALID CONFIGURATION SWITCH SETTING (42, 52)
UNIT # NOT FOUND, DEVICE INOPERATIVE
SEEK ERROR (UNIT MAY HAVE DONE AN EMERGENCY RETRACT)
ERROR WHILE ALTERNATING ON A PREVIOUS WRITE OR ERROR IN A.S.M..
$94 - UNIT NOT READY OR CONDITIONAL INOP..
$74 INVALID SEEK - HEADER MISCOMPARE

READ

**NOTE: THIS IS NOT A SEEK & FILL, IT IS READ BUFFER INTO MEMORY. A SEEK & FILL OPERATION CAN RETURN STATUS' SIMILAR TO A WRITE IF STATUS IS SAMPLED PRIOR TO THE READ INSTRUCTION. A READ INSTRUCTION WILL CAUSE THE 10wt. STATUS BIT TO BE RESET PRIOR TO THE SAMPLING OF THE STATUS BYTE.
$E4 - INVALID CONFIGURATION SWITCH SETTING (42, 52)
UNIT # NOT FOUND, DEVICE INOPERATIVE
SEEK ERROR (UNIT MAY HAVE DONE AN EMERGENCY RETRACT)
ERROR READING ALTERNATE SECTOR MAP OR READING THE ALT. SECTOR.
$A4 - SECTOR SHOULD BE IN ALT. SECTOR MAP BUT IS NOT
$84 - UNIT NOT READY OR CONDITIONAL INOP..
$64 - INVALID SECTOR NUMBER
INVALID SEEK - HEADER MISCOMPARE
$44 * ATTEMPTED TO READ A MARKED SECTOR
$24 - CRC ERROR ON A "FILL BUFFER" OPERATION (AFTER 27 RETRIES)

WRITE

$F4 - INVALID COFIGURATION SWITCH SETTING (42, 52)
UNIT # NOT FOUND, DEVICE INOPERATIVE
ERROR WHILE ATTEMPTING TO ALTERNATE A SECTOR
ERROR WHILE ALTERNATING A PREVIOUS SECTOR OR ERROR IN A.S.M..
$B4 - SECTOR SHOULD BE IN ALT. SECTOR MAP BUT IS NOT
$94 - UNIT NOT READY OR CONDITIONAL INOP..
$74 - INVALID SECTOR NUMBER
INVALID SEEK, HEADER MISCOMPARE
$54 * JUST MARKED A SECTOR OR ATTEMPTED TO WRITE TO A PREVIOUSLY MARKED SECTOR
$34 * CRC ERROR ON THE READ AFTER WRITE FOLLOWING 3 ATTEMPTS TO WRITE (ATTEMPT TO MARK THE SECTOR HAS FAILED).

* THESE STATUS' SHOULD NOT OCCUR UNLESS ALTERNATE SECTORING HAS BEEN DISABLED ( EXCEPT $24 OR $34 ON AN IOU-52 ).
** ON IOU-52 ONLY: $24 or $34 may indicate a blown header. CHECK TRACE BUFFER to determine exact failure!

**********

## BEST ERROR 83 - PSEUDO DISK STATUS'

THERE ARE THREE DISK ERROR STATUS' THAT OCCUR IN BEST THAT ARE GENERATED BY THE OPERATING SYSTEM. THEY ARE NOT CONTROLLER STATUS'. DEPENDING UPON THE RELEASE LEVEL, THE STATUS FIELD WILL BE EITHER TWO OR FOUR DIGITS. THE ONLY TIME ALL FOUR DIGITS ARE VALID IS IF THE FAILURE OCCURED ON A FLOPPY DRIVE, OTHERWISE, ONLY THE TWO RIGHT-MOST DIGITS ARE VALID. FOR FLOPPY ERRORS SEE IOU-38.

STATUS 60 - INVALID SECTOR NUMBER. AN EXAMPLE OF THIS ERROR MIGHT BE IF A PROGRAM ENCOUNTERS A KEYED SECTOR NUMBER THAT IS BEYOND NORMAL LIMITS.
Program Problems
STATUS 63 - A PROGRAM HAS ENCOUNTERED AN INCORRECT FORWARD LINK.
STATUS 64 - SHORT DISC READ. LESS THAN 768 BYTES OF DATA WERE MOVED FROM THE CONTROLLER TO MAIN MEMORY. THIS DENOTES A DEFINITE HARDWARE FAILURE AND WILL BUMP *SCOUNT BY 1000.

MDS QANTEL

# FIELD SERVICE GUIDE FOR THE IOU 52 DISC DRIVE CONTROLLER

THIS EDITION WAS CREATED ON 03/08/83

09:53:57:00

Equipment Characteristics
Installation
Field Service Level Parts Breakdown

TD-7006

# IOU 52 EQUIPMENT CHARACTERISTICS

## 1.1 GENERAL

The IOU 52 disc controller is a high performance version of the IOU 42. The IOU 52 improves the I/O speed of a disc drive over the IOU 42 in two ways: (1) The internal speed of the controller is doubled. (2) At the time of format, the IOU 52 will be instructed to vary its sector interleave pattern according to the processor being used. A disc formatted by an IOU 52 on a Q30 system will have a tighter sector interleave pattern than if it were formatted on a Q29 system.

The preliminary production release of the IOU 52 is a modified IOU 42 controller. An IOU 52 can be recognized easily by the 8 MHz oscillator in place of the IOU 42's 4 MHz oscillator, and by the fact that the IOU 52 has only two ROMs (in sockets 7A and 8A) instead of four ROMs (in sockets 5A,6A,7A and 8A). The final release of the IOU 52 PWA uses a custom designed PCB.

## 1.2 SPECIFICATIONS

Power Requirements:

+5vdc±0.25v, Max. Noise Level 400mv pp., 5.5A Nominal
+12vdc±0.6v, Max. Noise Level 400mv pp., 17mA
-12vdc±0.6v, Max. Noise Level 400mv pp., 92mA
Frame ground at disc drive shall NOT be connected to logic ground.

Operating Temperature Range: 7C - 35C (45F - 95F)

# IOU 52 INSTALLATION

## 2.1 SWITCH SETTINGS

The controller is usually set to address D, but it can be set to any address that is not being used by another device.

The setting of the configuration switches (see Figures 2-1 and 2-2) depends upon the disc drive being used with the IOU 52. Use the following table to set the configuration switches:

```
MISC52 830714 Q30

CONTROLLER OD HAS LEVEL B ROMS DATED 830706.

DISK OD IS CONFIGURED AS A  75 MEGA-BYTE  MEMOREX WITH 350
CYLINDERS, 12 HEADS, 22 SECTORS/TRACK AND INTERLACE 04.

********** READ/DISPLAY ALTERNATE SECTOR MAP      **********

ALTERNATE SECTOR MAP FOR DISK OD (INTERLACE :04)

    BAD PHYSICAL      IOU42    BAD

CYLINDER HEAD SECTOR   LSA  LOGICAL ALTERNATE

  006     09     02    (04)  001634    091949
  020     09     02    (04)  005330    091883

END OF ALTERNATE SECTOR MAP.
```

Misc 52 Options

| | | |
|---|---|---|
| $94 | Fujitsu | 168 MB |
| $92 | Fujitsu | 84 MB |
| $83 | Memorex | 75 MB |
| $81 | Memorex | 25 MB |
| $03 | Marksman | 40 MB |
| $02 | Marksman | 20 MB |
| $01 | Marksman | 10 MB |

## 2.2 CABLING

The IOU 52 is connected to the disc drive by two ribbon cables. The radial cable, which is connected to P5 on the IOU 52, has 26 conductors. The buss cable, which is connected to P4 on the IOU 52, has 60 conductors.

The red stripe must face up whenever a cable is connected to the IOU 52. The red stripe must also correspond to Pin 1 on the disc drive's interface connector (Pin 1 is often marked by an arrowhead on the interface connector or a pin number near the connector).

2 Alt. sector maps

byte 769 = Tic Byte

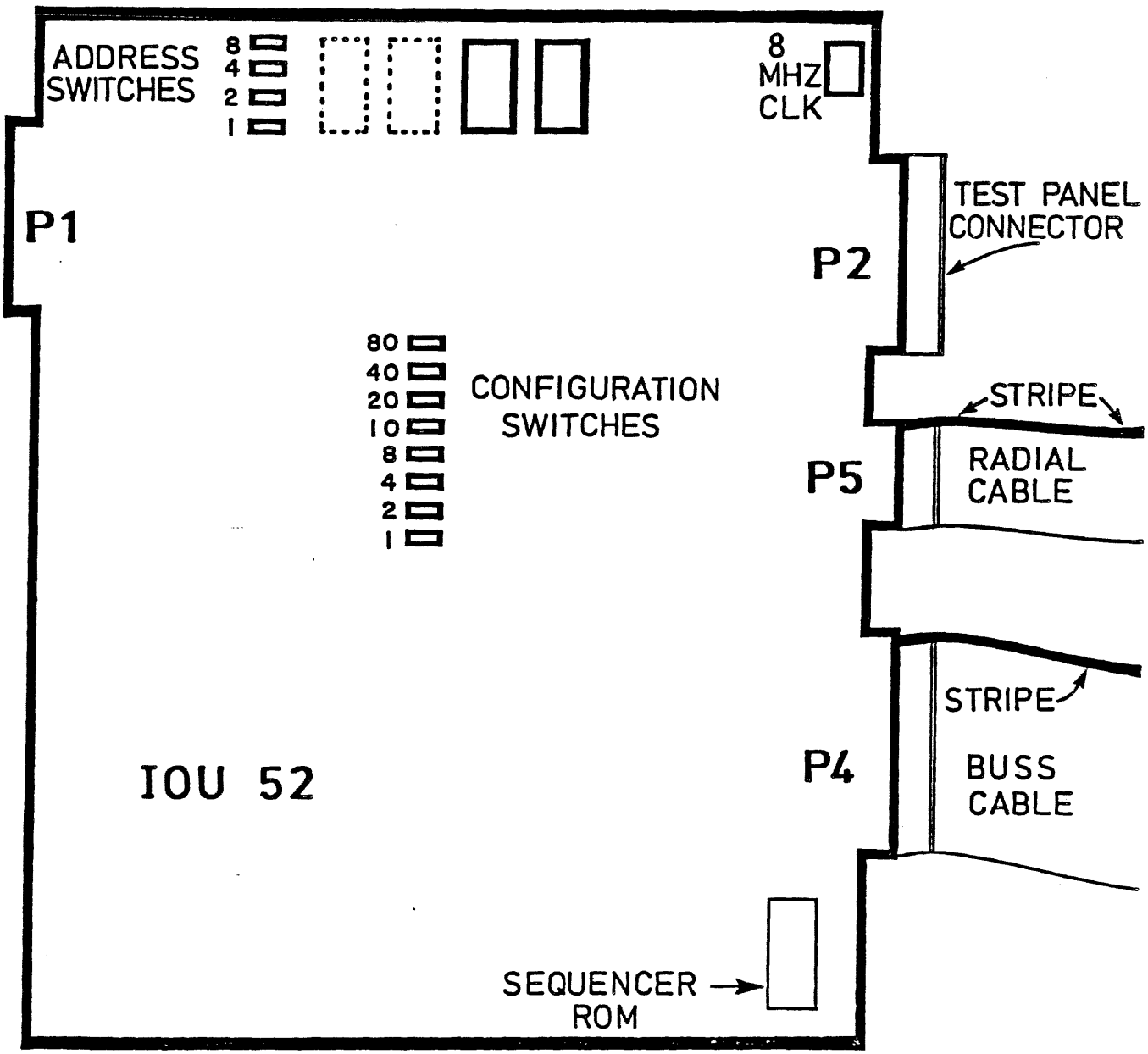

ADDRESS SWITCHES
8
4
2
1
8 MHZ CLK
P1
P2
TEST PANEL CONNECTOR
80
40
20
10
8
4
2
1
CONFIGURATION SWITCHES
STRIPE
P5
RADIAL CABLE
STRIPE
P4
BUSS CABLE
IOU 52
SEQUENCER ROM

Figure 2-1

# IOU52 CONFIGURATION SWITCH SETTINGS

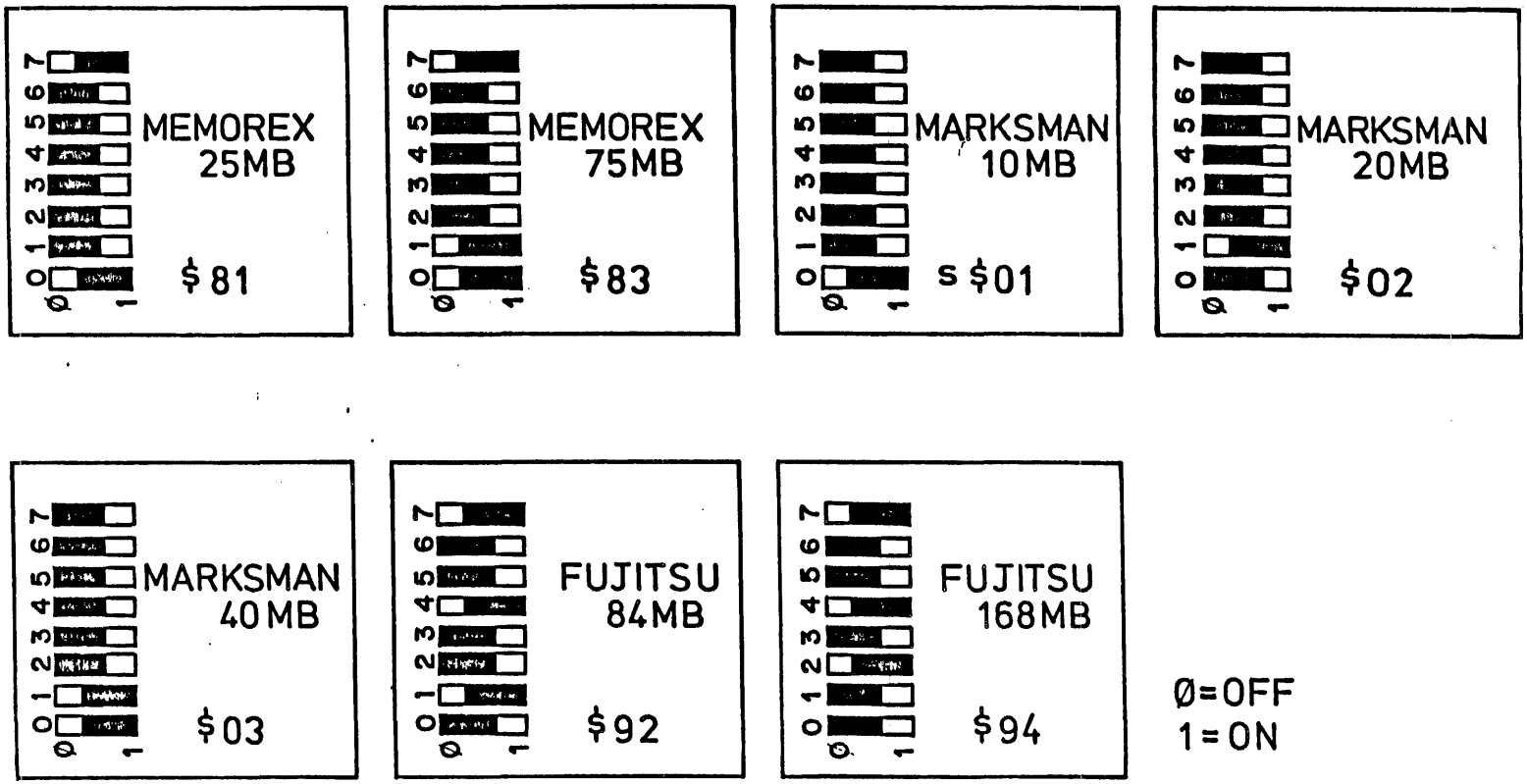



Figure 2-2

| Sequencer ROM | Memorex | Fujitsu & Marksman |
|---|---|---|
| Label | 42 MEM(y) | 42 MRK(y) |
| MDS PART NUMBER | 041 405 301 | 041 405 401 |

y = Rev level

Figure 2-3

## 2.3 WRITE CONTROL INSTRUCTIONS

Device controls are issued to the controller in the following format:

1dyy9D where d=controller address and yy=control byte

| CONTROL BYTE | INSTRUCTION |
|---|---|
| $01 | Allow Access to F.E. and Reserved Sectors |
| $02 | Inhibit Read After Write |
| $03 | Set Memory I/O Mode |
| $04 | Reset Memory I/O Mode |
| $05 | Start User Mode (Jump to Memory Location $4200) |
| $08 | Seek Using a Physical Sector Address |
| $09 | Verify Instead of Write |
| $10 | Disable Termination Interrupt |
| $14 | Enable Termination Interrupt |
| $20 | Reset Error Counters |
| $21 | Read Error Counters |
| $30 | Disable Read Retries |
| $31 | Enable Read Retries |
| $41 | Clear Tick on Each Read/Write Sector Operation |
| $42 | Set Tick on Each Read/Write Sector or Enter Disc I/O Mode |
| $60 | Disable Alternate Sectoring |
| $70 | Enable Alternate Sectoring |
| $71 | Alternate Next Sector |
| $72 | Start Read Map Mode |
| $73 | Return to Disc I/O Mode from Read Map Mode |
| $75 | Start Disc Format Mode |
| $7F | Read Identification String |
| $99 | Read Next Sequential Logical Sector |
| $9A | Initiate Automatic Read of the Next Sector |
| $A0 | Move ROM Version Number to Status 0 |
| $A1 | Read Controller Parameters |
| $A2 | Start Set Drive Characteristics Mode |
| $A3 | Read Status Buffer |
| $A4 | Read Trace Buffer |
| $B0 | Reset Status 0 to $04 |
| $nD | Set Logical Sector Address Ext. (n=100,000's LSA digit) |

## USING THE TRACE BUFFER

Some disk controllers (see individual controller sections to determine if applicable) are equipped with a trace buffer that allows the C.E. to determine the exact nature of a disk failure. By seeking to and reading from a sector, then displaying the trace buffer, it is possible to determine if a disk is doing retries or if that 34 status is a CRC error or a blown header. Check the Trace Code Table for the type of controller you are using to see the activities that can be traced.

The Trace Buffer may be dumped by using FRODO from DISC52 or DISC54. A second method is Write Control ldA49D. Listed below are examples of each method.

```
Q0020
004080 0300F210000d ldA49D 0096F220000d 0096F32000B0 0020A8 Q0040
0d3x3x3x3x3x
```

Use ldnD9D in front of the Seek and Fill for sectors ≥ 100,000.

```
ES1 SK1 RD TR (F2 XMIT)
xxxxxx = desired sector number
```

### TRACE BUFFER DECODE FOR THE IOU-52 AND 54

The trace buffer contains information about the last disk operation. It can be from 0 to 150 bytes in length. In its most basic form, it will contain only a single trace code in Byte 0 followed by the hex Logical Sector Address in bytes 1, 2, and 3.

| BYTE # | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| | nn | CC | SS | SS | SS |

The FIRST BYTE (nn) will appear ONLY if Macro Instructions were used to dump the buffer contents. The hex value in this byte will be the number of the last valid byte of the buffer. When FRODO is used to dump the buffer, this byte will NOT appear. However, FRODO uses it to determine how many bytes to display.

BYTE 0: Will contain a Trace Code that can be looked up in the IOU-52 or 54 sections.

BYTES 1, 2, & 3: Are the hex value for the Logical Sector Address of that disk access.

In longer traces, the buffer can take on one of TWO different forms. Below are short examples of each form.

| BYTE # | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|---|
| | nn | CC | SS | SS | SS | CC | SS | SS | SS |..etc.

In this example, it was possible to decode Byte 4 directly from a Trace Code Table. This indicates that the next 3 bytes (5, 6, 7) will be a new LSA. This pattern may be repeated many times.

If doesn't decode, -80

| BYTE # | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|---|
| nn | CC | SS | SS | SS | XX | XX | XX | XX | ..etc. |

The above is an example of several operations that were done on the same LSA. The key lies in Byte 4. In this example, the value in Byte 4 will NOT decode directly from the Trace Buffer Table. It will first be necessary to subtract $80 and then look up the code. This is the indicator that the next three bytes (5, 6, 7) are NOT a new LSA but are more trace codes for the previous LSA. It will be necessary to subtract $80 from each byte thereafter, to determine its meaning. If a byte is encountered that will decode prior to subtracting $80, then the pattern reverts back to the first example.

# TRACE BUFFER EXAMPLES

## 0448888662C3

B4 Status

## 04800066291

Trace codes are like a superstatus and they are read from the IOU 52 Trace Buffer by using the 1dA49D Write Control instruction (Note that IPL clears the Trace Buffer). The trace codes are shown below:

| CODE | DEFINITION |
|---|---|
| $01 | On-Cylinder Immediately After Seek Initiation |
| $02 | Fault, Seek Error, or Power Failure After Seek Initiaiation |
| $04 | Timeout Waiting for On-Cylinder |
| $05 | Fault, Seek Error, or Power Failure After On-Cylinder |
| $06 | Fault After Sequence Command |
| $07 | CRC Error After "Normal" Read |
| $0A | User Requested Invalid Sector Address |
| $0C | Data Does Not Compare on Varify |
| $0D | Unable to Assign New Alternate |
| $0E | Valid Header After Indexed Read but Wrong Cylinder |
| $11 | LSA not in Alternate Sector Map |
| $12 | Fault After Head Select |
| $13 | Unable to Read Alternate Map |
| $14 | Error Using Alternate Sector |
| $16 | Cannot Match Header |
| $17 | Valid Header After Indexed Read but Wrong Head |
| $18 | Unable to Select Drive |
| $19 | Fault or Power Fail Condition |
| $1A | Unable to Clear Fault |
| $1B | Drive Not Ready |
| $1C | Unable to Restore Drive |
| $1E | Invalid Request |
| $1F | Error in Microcode |
| $20 | Invalid Interlace Parameter |
| $21 | Insufficient RAM for Drive Tables |
| $22 | Unable to Write Sequence Tables |
| $23 | Spurious Entry into Format Logic |
| $24 | Write Instruction Expected from User |
| $25 | Unable to Read any Header on Requested Track |
| $27 | Two Consecutive Control Errors |
| $28 | Unable to Write to Reserved Sectors |
| $29 | Controller is Down |
| $30 | Retry Error, "Normal" Read |
| $31 | Retry Error, "In" Read |
| $32 | Retry Error, "Out" Read |
| $33 | Retry Error, "Early Normal" Read |
| $34 | Retry Error, "Early In" Read |
| $35 | Retry Error, "Early Out" Read |
| $36 | Retry Error, "Late In" Read |
| $37 | Retry Error, "Late Out" Read |
| $38 | Retry Error, "Late Normal" Read |
| $41 | Retry Operation |
| $42 | Read from Index |
| $43 | Alternate Map Search |
| $44 | Assigning New Alternate |
| $47 | Rewriting Header and Data |
| $48 | Sector is Marked |
| $49 | Retry after Header Match, but Compare Error |
| $50 | Clearing Tick |

## USING THE STATUS BUFFER

Some disk controllers (see individual controller sections to determine if applicable) are equipped with a Status Buffer that is designed to give information about the last disk access that goes far beyond the basic Read Status 0. It is possible to determine the mode of the controller, user selected options, additional status', error counts and the Logical AND PHYSICAL SECTOR ADDRESS of any allowable sector on the disk by dumping and decoding this buffer.

Because of the complicated sector interlace pattern that has been incorporated into the new disk controllers, the old method of translating logical to physical sector numbers is NO LONGER VALID. Since it is often necessary to decode logical sector numbers when troubleshooting, the Status Buffer supplies us with a method for easy translation.

The Status Buffer may be dumped by using FRODO from DISC52 or DISC54. A second method is Write Control ldA39D. Examples are listed below.

```
Q0020
004080 0300F210000d ldA39D 0012F220000d 0012F32000B0 0020A8 Q0040
0d3X3X3X3X3X
```

Use ldnD9D in front of the Seek And Fill for sectors ≥ 100,000.

```
ES1 SK1 RD PE (F2 XMIT)
xxxxxx = desired sector number
```

DECODING THE STATUS BUFFER

The status buffer is 18 bytes long and will always appear in the same format. Each controller section contains a byte-by-byte decode table that should be used in conjunction with the breakdown shown below.

| BYTE # | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0m | uo | uo | ss | re | re | we | we | ls | ls | ls | ps | ps | ps | ps | ss | ip | 00 |

BYTE 0: Upper nibble will always be 0, lower nibble will be between 1 and 7.

BYTES 1 & 2: Will be HEX VALUES that must be broken down into powers of 2.

Example:

| BYTE # | 1 | 2 |
|---|---|---|
| | 00 | A4 |

Byte 1 contains only reserved bits that are not defined.

| Byte 2 | 2**7 | 2**6 | 2**5 | 2**4 | 2**3 | 2**2 | 2**1 | 2**0 |
|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| | | | A | | | | 4 | |

2**7 Assign Alternate On Write Error
2**5 Search Alternate Map If Marked Sector/Read Error
2**2 Retry On Error

BYTE 3: Must be broken down into binary for decoding. Only the upper three bits of the upper nibble have been defined.

BYTES 4 & 5: Hex error count for the last read operation.

BYTES 6 & 7: Hex error count for the last write operation.

BYTES 8-10: The Logical Sector Address of the last operation IN HEX.

BYTES 11 & 12: The cylinder number (in hex) of the last operation.

BYTE 13: The head number of the last operation (hex).

BYTE 14: The rotational sector number of the last operation (hex).

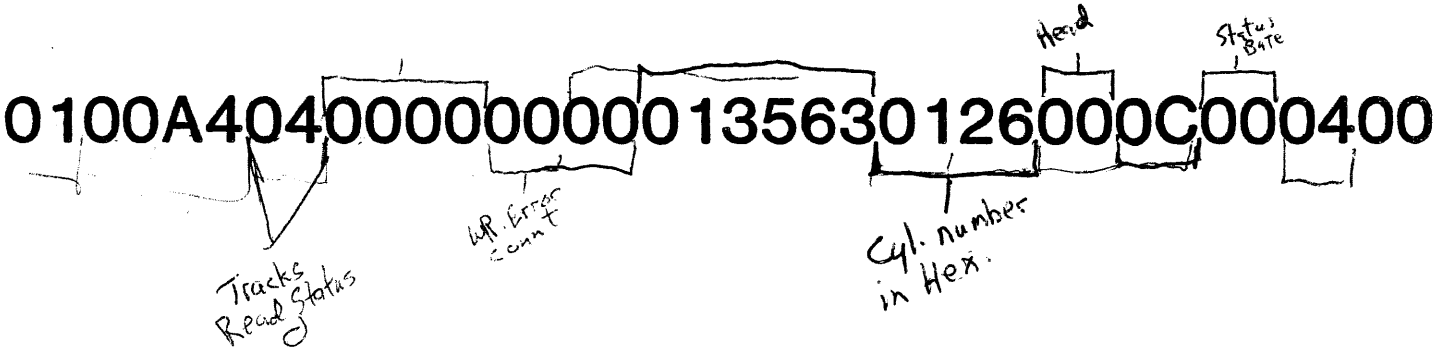
BYTE 15: This hex number must be broken down in the same fashion as the example of BYTE 2.

BYTE 16: Is the Interlace Pattern. Example: 04 on an IOU-52 indicates that the drive was formatted on a Q30 processor.
05 = Q29 03 = Q64

On an IOU-54 (EAGLE ONLY) the interlace patterns are; Q64 = 4, Q30 = 10, Q29 = not currently supported.

BYTE 17: Currently always 00.

# STATUS BUFFER EXAMPLES




0100A4040000000000662000609020000400

D = I/O mode

0100040400000000000662000609020000400

## 2.4 STATUS CODES

### 2.4.1 Status In

The format for Status In (Read Status 0) is:

4dyy9D where d=controller address, yy=test byte value

| STATUS BYTE | STATUS CODE |
|---|---|
| $01 | Read Busy |
| $02 | Write Busy |
| $04 | End |
| $08 | Service Request |
| $10 | Flag 1, Seek or Write Terminated (Successful) |

The following completion codes are designated by the three highest status bits as shown below:

000 - Successful
001 - Unrecoverable Error (Read, Write, or Verify)
010 - Marked Sector
011 - Invalid Sector Number
100 - Write Attempt While Drive Write Protected or Not Ready
101 - Alternate Sector Not Found in Map
110 - Drive Not Formatted
111 - Serious Drive Problem - see Trace & Status Buffers

### 2.4.2 Status 2

Status 2 is always $FD.

### 2.4.3 Status Buffer

The Status Buffer contains more detail than what is normally shown by the Status instruction. The Status Buffer is read by using the 1dA39D Write Control instruction (Note that IPL clears the Status Buffer). There are 18 bytes (numbered 0 through 17) in the Status Buffer, designated as shown below:

Byte 0 - Controller Mode:
- 01 - Disc I/O Mode
- 02 - Tick-Scan Mode
- 03 - Memory I/O Mode
- 04 - User Mode
- 05 - Format Drive Mode
- 06 - Read Map Mode
- 07 - Set Drive Characteristics Mode

Byte 1 - User Selected Options:
Bit 2**7 - Generate Completion Interrupt
Bit 2**6 - Clear Tick on Read and Write
Bit 2**5 - Verify instead of Write
Bit 2**4 - Initiate Automatic Incremental Reads
(Remaining Bits are Reserved)

Byte 2 - User Selected Options:
Bit 2**7 - Assign Alternate on Write Error
Bit 2**6 - Assign Alternate on Next Write
Bit 2**5 - Search Alternate Map if Marked Sector/Read Error
Bit 2**4 - Bypass Verify After Write
Bit 2**3 - Allow Access to Reserved Sectors
Bit 2**2 - Retry on Error
(Remaining Bits are Reserved)

Byte 3 - Completion Status (Upper Three Bits Only):
000 - Successful
001 - Unrecoverable Error (Read, Write or Verify)
010 - Marked Sector
011 - Invalid Sector Number
100 - Write Attempt while Drive Write Protected or Not Ready
101 - Alternated Sector Not Found in Map
110 - Drive Not Formatted
111 - Serious Drive Problem

Bytes 4-5 - Read Error Counter
Bytes 6-7 - Write Error Counter
Bytes 8-10 - Logical Sector Address of Last Operation
Bytes 11-14 - Physical Sector Address of Last Operation

Byte 15 - Status Byte A (Additional Status):
Bit 2**7 - Reserved
Bit 2**6 - CRC Error or Compare Error
Bit 2**5 - Sector Marked
Bit 2**4 - Sector Found in Alternate Sector Map
Bit 2**3 - New Alternate Entry Made
Bit 2**2 - Invalid Sector Number
Bit 2**1 - Control Error
Bit 2**0 - Header Mismatch

Bytes 16-17 - Interface Parameter

RED LIGHT ALERT NO: 547

EFFECTIVITY: PWA, IOU52 WITH REV "A" PROMS

EXPLANATION: MDS QANTEL ECM 3978

PROBLEM:

1) CONTROLLER CONTINUES TO SEND COMPLETION INTERRUPTS AFTER RECEIVING A COMMAND TO DISABLE THEM.

2) CONTROLLER DOES NOT ALLOW MORE THAN 255 ALTERNATE SECTORS.

3) CONTROLLER DOES NOT RESTORE THE DISK UPON SYSTEM IPL.

SOLUTION:

ON NEXT PM, REPLACE PROMS WITH REV "B" PROMS. THE PART NUMBERS ARE:

IC, PROM IOU52 7A - 042633501
IC, PROM IOU52 8A - 042633601

SPECIAL CONSIDERATIONS:

THIS IS A MANDATORY CHANGE. RETURN REV. "A" PROMS (SAME PART NUMBERS AS ABOVE) TO HAYWARD FOR REPROGRAMMING.

CONCLUSIONS:

THIS RLA WILL BE SUPERSEDED BY A CSB. IF THE PROMS CHANGE, THEN THE CSB REV. WILL CHANGE ALSO.

TOM COATES
MDS QANTEL

APPROVED: TS QC ENG TFO

## 2.5 IOU 42 TO IOU 52 CONVERSION

This procedure requires full cooperation from the customer, and could take up to 16 hours to complete. Under no circumstances should a Field Engineer attempt to handle any of the customer's software or data.

* 1. Check the customer's system for minimum requirements:
   a) CPU: Q30 any Rev., or Q29 minimum Rev. L
   b) Tape Controller: IOU 21A minimum Rev. G
      IOU 21B minimum Rev. GA
   c) Minimum Operating System: X05

2. The customer must have at least two and preferably three backup sets. One backup must be absolutely current.

   If the customer is not adaquately backed up, the CUSTOMER OR PROGRAMMER must run *BACKUP to back up the disc or discs.

3. The CUSTOMER OR PROGRAMMER must check to be sure the backup tapes are readable.

4. The CUSTOMER OR PROGRAMMER must print out the current configuration by running CFIG.

5. The CUSTOMER OR PROGRAMMER must run *FILCHEK. If there are any errors, the conversion must not continue. The cause of all errors must be corrected before continuation.

6. The CUSTOMER OR PROGRAMMER must release X07-2

7. The CUSTOMER OR PROGRAMMER must reconfigure the system to match the original configuration. Insure that there is sufficient memory to support X07 before reformatting the disc.

8. The CUSTOMER OR PROGRAMMER should backup the entire system at this time.

* 9. Print out a listing of alternated sectors by running ALTRD42 from the ATP Tape

* 10. Power down the system and replace the IOU 42 with the IOU 52.

* 11. Use MISC52 from the ATP tape to reformat the disc(s).

12. Use MISC52 to force alternate sectoring to match the alternate sector list from Step 9.

13. Run DISC52 to verify the correct operation of the IOU 52 and the disc(s).

14. The CUSTOMER OR PROGRAMMER must restore the disc using the XO7 BACKUP tape, which was generated in Step 8.

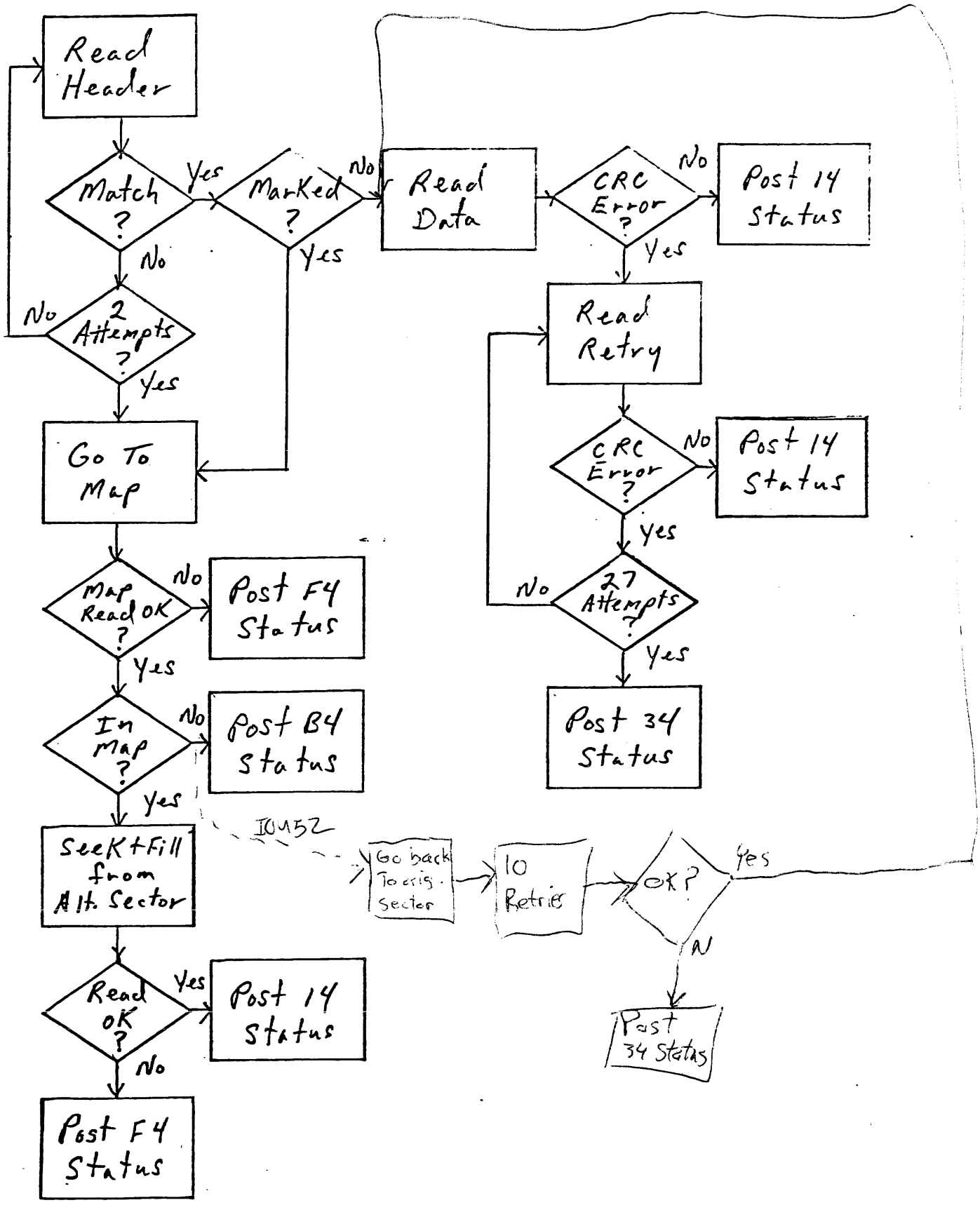
# F.E. PARTLIST FOR THE IOU 52

| DESCRIPTION | PART No. |
|---|---|
| CABLE, MEMOREX BUSS & RADIAL ASSY, 12 FOOT ..... | 041794301 |
| CABLE, RADIAL DISC, 4 FOOT ..... | 041406501 |
| IC, PROM IOU 52 (7A) ..... | 042633501 |
| IC, PROM IOU 52 (8A) ..... | 042633601 |
| PWA, IOU 52 ..... | 042621201 |
| PWA, IOU 52 W/ROMS FOR MARKSMAN AND FUJITSU ..... | 042633801 |
| PWA, IOU 52 W/ROMS FOR MEMOREX ..... | 042633701 |

# Alternate Sectoring

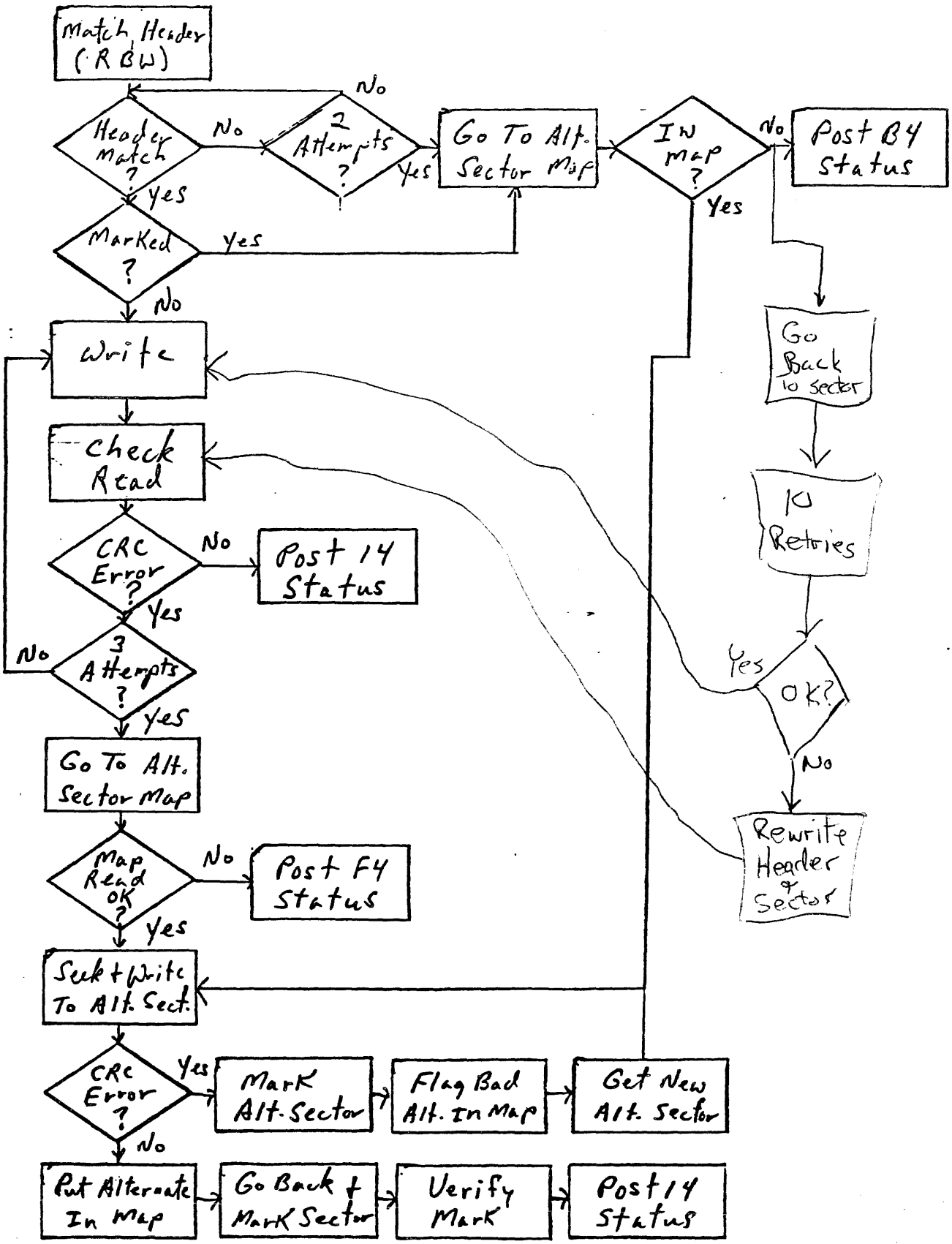
## Seek + Fill

IOU-32 + IOU-42



# Alternate Sectoring IOU-32 +42

## Write



Bad Headers

As mentioned before, upon encountering an unreadable header the IOU42 returns a "marked sector" status (whereas the IOU52 returns a "header error" status). I believe that this status is not only inappropriate, but it's the cause of problems in the field that have, in turn, required a special program (Micro FRODO) to rewrite the headers.

On the IOU42, a header media defect that develops after the disk is formatted is interpreted as a marked sector. Since no entry has been made in the alternate sector table, the controller then returns "header marked but not in table". Any attempt to write to this sector will return the same status. At this point, the field serviceperson must invoke a special downloadable program to either rewrite the header or alternate it.

However, the IOU52 distinguishes between a bad header and a marked header. When the IOU52 encounters a bad header during a normal write, it automatically rewrites the header. If the header is still not readable, the IOU52 automatically alternates the sector. Thus, there is no need for a Micro FRODO for this purpose on the IOU52; the field serviceperson need only rewrite the sector.

# INTEROFFICE MEMO

DATE 07-21-83
TO Distribution
FROM Susan Wong, Test Engineering
SUBJECT Changes in IOU52 ATPs

A study has been made on the time-consuming process of formatting/verifying a 150MB IOU52 disk on a Q29 system. It was found that the amount of time available for processing between 2 logical sequential sectors is approx. 4 msec. It takes approx. 3 msec for the controller to transfer 768 bytes to the processor and approx. 850 micro-seconds for the head to read a Qantel sector. It is obvious that there is not enough time to do any other processing. Therefore, the format/verify operation performed by MISC52 is not able to utilize the interlace set for a Q29 processor, which is 5.

However, a method has been implemented that takes less time for transfer of data between the controller and the processor. Short writes of 16 bytes of data instead of the regular 768 bytes are used for writing and verifying with the assumption that the controller firmware will not alter the contents of the rest of the sector buffer when only 16 bytes are written each time. Experiments have shown that the entire sector buffer gets written to each sector even when only 16 bytes are sent to the controller. Also, this method has improved the format/verify operation time from 2.5 hours to 0.6 hour. Because of this tremendous improvement, I am adopting the method in MISC52 pending any strong objection.

The DISC52 program has been revised to perform a different procedure when an unrecoverable status is detected after reading a sector. The following steps are taken in sequence unless specified otherwise by the program upon the receipt of the $24 status:

1. Re-read sector and check status. If no error, increment soft error count and return.

2. Increment hard error count. If sector was written with verify, skip to step 5.

3. Re-write sector with verify and print "SECTOR REWRITTEN WITH VERIFY."

4. Search alternate map for sector. If found, print "SECTOR HAS BEEN ASSIGNED AN ALTERNATE." and return.

5. Force alternate sector.

6. Search alternate map for sector. If found, print "SECTOR HAS BEEN ASSIGNED AN ALTERNATE." If not found, print "FAIL TO ALTERNATE SECTOR."

The new version date for both MISC52 and DISC52 is 830720. A copy of these 2 object programs will be passed around shortly to the people involved in the evaluation of ATPs.