CARTRIDGE TAPE DRIVES
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Preface

This Service Handbook gives concise information to assist customer engineers in rapid information retrieval for the majority of Cartridge Tape Drive Model 2229, 2529, and 6529 service needs at customer sites.

First Edition (January 1986)

Original Issue.

CUSTOMER ENGINEERING
SERVICE HANDBOOK

CARTRIDGE TAPE DRIVES

MODELS: 2229
2529
6529

COMPANY PROPRIETARY STATEMENT

19-25 front pages

~~ORIGINAL~~
copy 1

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1501

CUSTOMER ENGINEERING SERVICE HANDBOOK

CARTRIDGE TAPE DRIVES

MODELS: 2229
2529
6529

COMPANY CONFIDENTIAL

741-xxxx

Irvin Wentworth
volunteer to service
for training

MODEL DIFFERENCES

All Models

Model	WLI No.	Description
2229	177-3503	Parallel Version of 30/70-ips, 6400-bpi Kennedy Model 6455 (4-Track) 1/4 in. 'Serpentine' Tape Transport (Wang Archiving Cartridge Tape Drive). Uses Mother/Daughter PCB located in System CPU for interfacing to 2200 Systems.
2529	177-7195	Serial Version of Model 2229 4-Track 6400 BPI Tape Drive. Includes data link logic in Tape Transport case for interfacing to VS Systems.
6529	177-9429	Serial Version of Model 2229 4-Track 6400 BPI Tape Drive. Includes data link logic in Tape Transport case for interfacing to OIS Systems.
6529-9	177-94299	Serial Version of Model 2229 4-Track 6400 BPI Tape Drive. Includes data link logic in Tape Transport case for interfacing to OIS Systems. Has additional ????? for etc.
6529-9C	177-94299C	Serial Version of Model 2229 4-Track 6400 BPI Tape Drive. Includes data link logic in Tape Transport case for interfacing to OIS Systems. Has additional ????? for SMO-WP Plus etc.
6529C	177-9429C	Serial Version of Model 2229 4-Track 6400 BPI Tape Drive. Includes data link logic in Tape Transport case for interfacing to OIS Systems. Has additional ????? for SMO-WP Plus etc.

OIS-100 Alliance

OIS-40, 50, 60

?

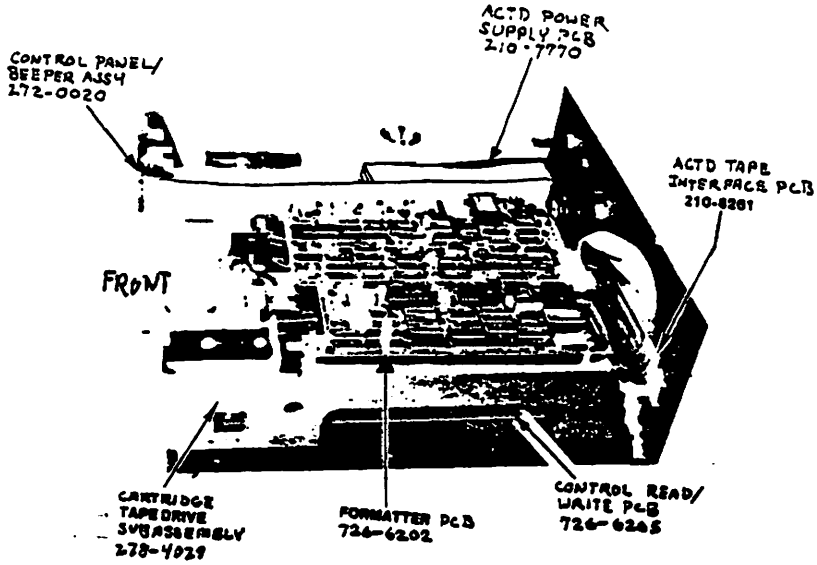
?

?

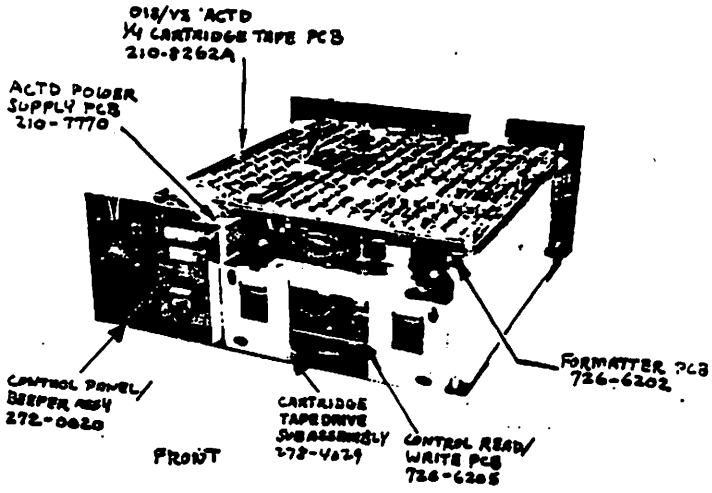
PCB COMPLEMENTS

All Models

Model 2229



Models 2529, 6529

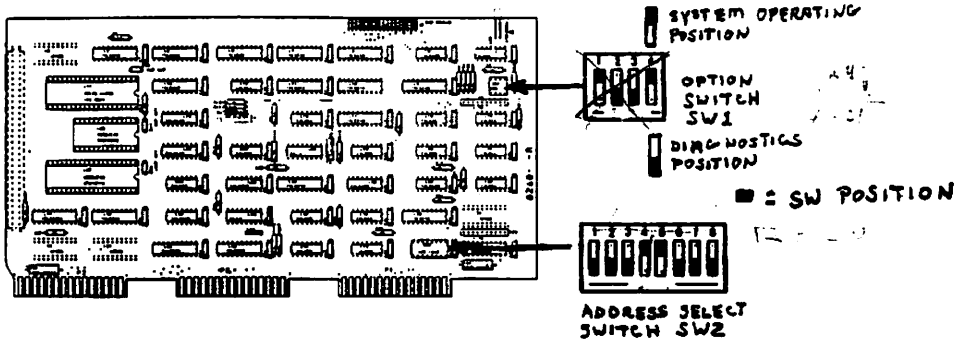


SWITCH SETTINGS/JUMPERS

All Models

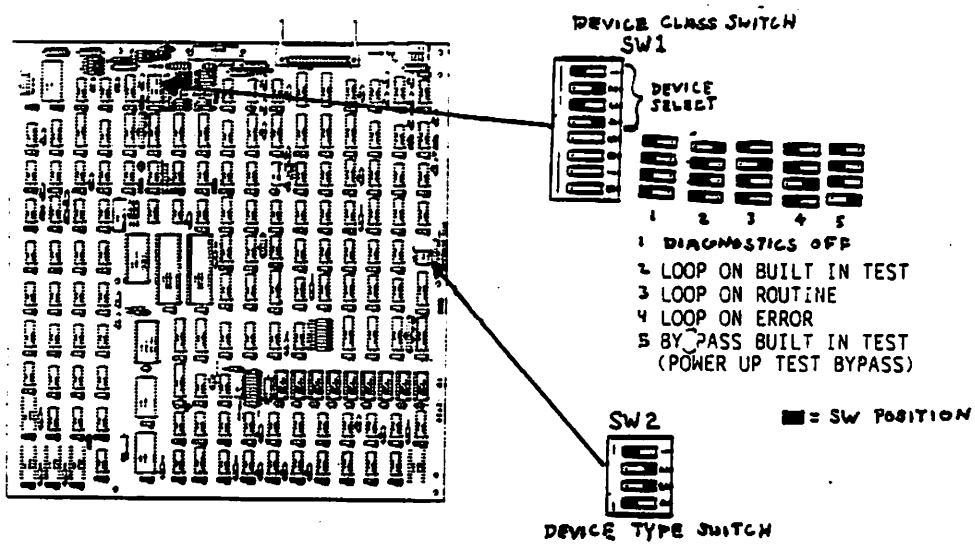
Model 2229

1/4 TAPE CONTROLLER MOTHERBOARD PCB (P/O 8260-A/8259-A 1/4 TAPE CONTROLLER ASSY, 212-3037)(1)
WLI NO. 210-8260



Models 2529, 6529

OIS/VS ACTD 1/4 CARTRIDGE TAPE PCB
WLI NO. 210-8262A

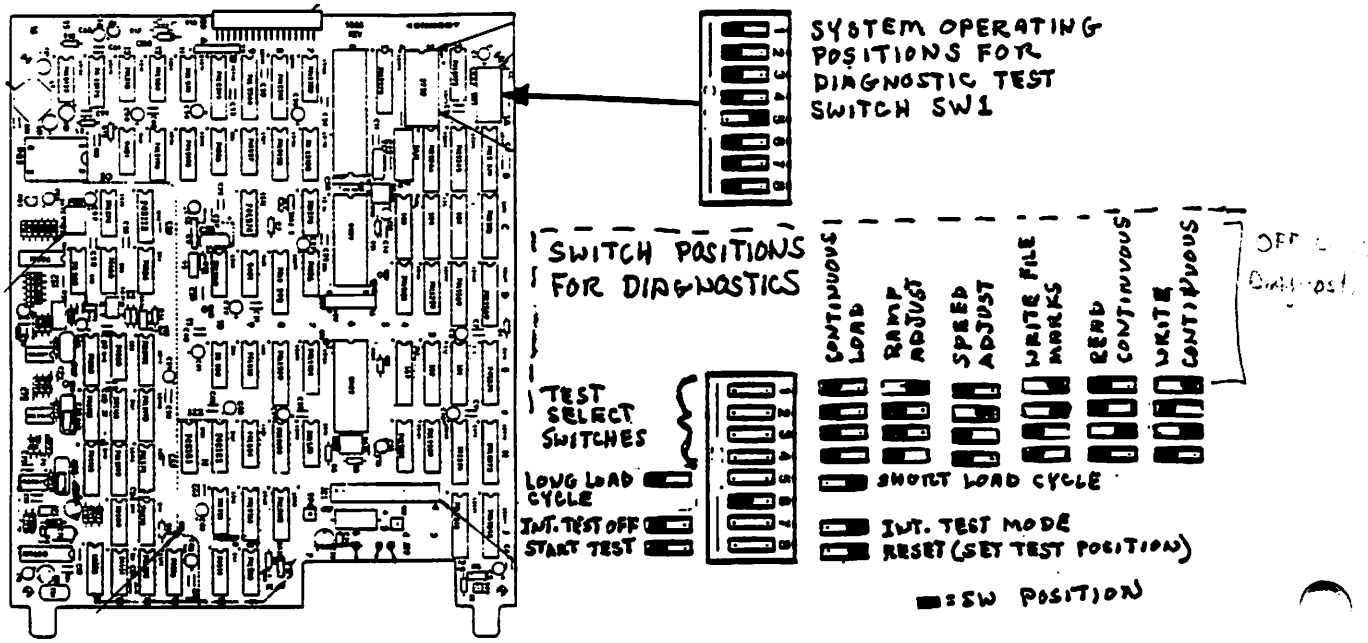


(1)Located in system master.

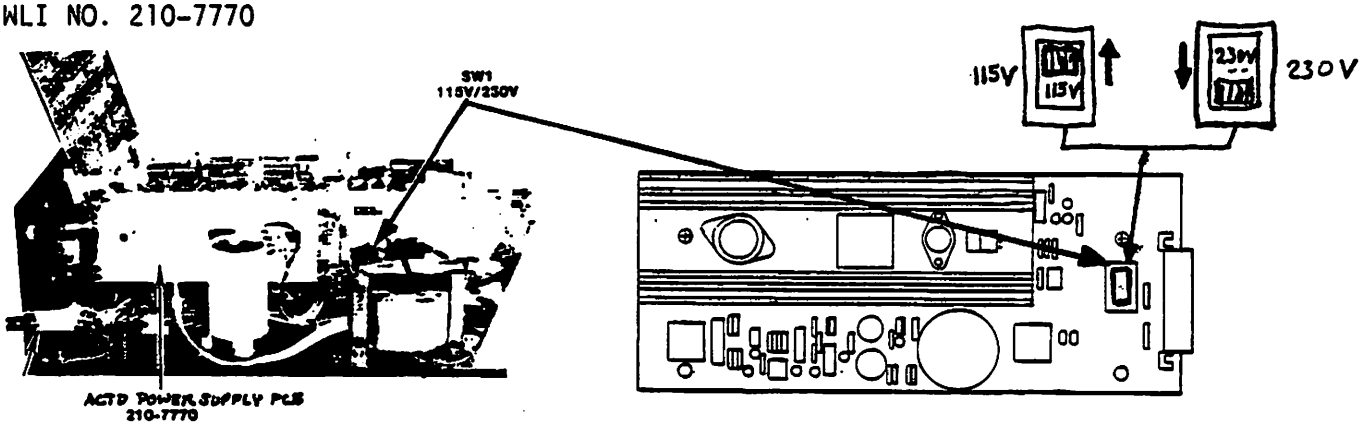
SWITCH SETTINGS/JUMPERS

All Models

FORMATTER PCB
WLI NO. 726-6205



ACTD POWER SUPPLY PCB
WLI NO. 210-7770

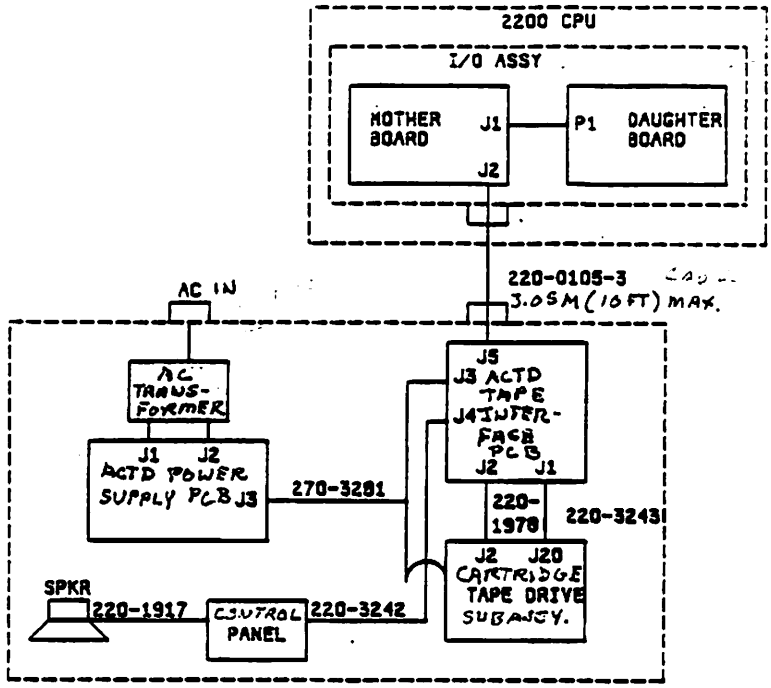


Not intended to be used in the application of this - OFF - Diagnostics.

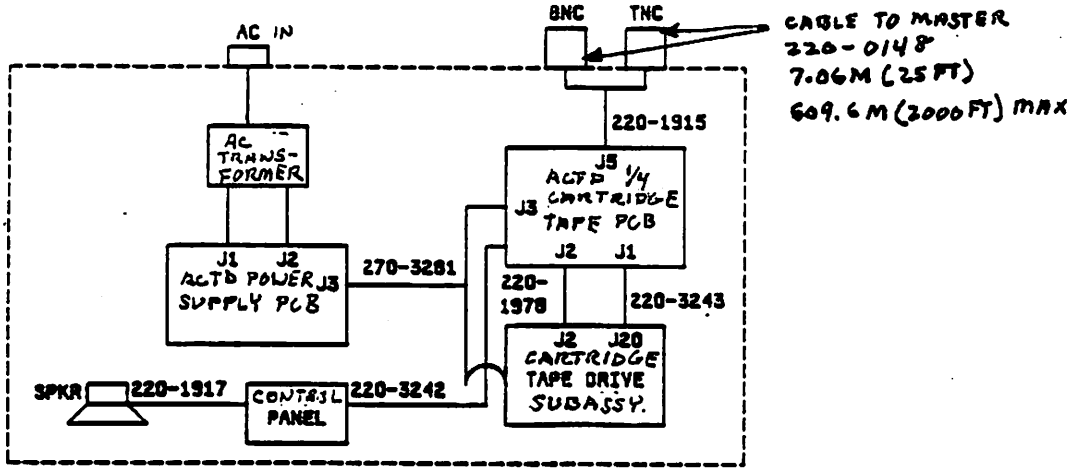
CABLING

All Models

- Model 2229



Models 2529, 6529



ERROR CODES

All Models

POWER UP DIAGNOSTICS

Front Panel LEDS

LED Code	Description
Power on indicator flashing	Software running
On line indicator lights	Tape drive on line with master
Fault indicator lights	Hardware fault
Tape loaded indicator lights	Tape properly loaded

ACTD Power Supply PCB LED's

LED Code	Description
+5V LED on	+5V present
-5V LED on	-5V present
+23V LED on	+23V present

Speaker Tone

Code	Description
Single tone	Internal power up diagnostics passed
Multiple tones	Internal power up diagnostics failed

ERROR CODES

All Models

MODEL 2229 1/4 TAPE CONTROLLER MOTHERBOARD PCB LED (P/O 8260-A/8259-A 1/4 TAPE CONTROLLER ASSY, 212-3037)[1]

LED Code	Description
LED 1 on	Tape controller assembly or interface cable defective.
LED 1 off	If problem exists and ACTD power supply ok, then probable tape drive subassembly problem.

MODEL 2529 AND MODEL 6529 OIS/VS ACTD 1/4 CARTRIDGE TAPE PCB LEDS[2]

LED Code[3] D2(LED3)	D3(LED2)	D4(LED1)	D5(LED0)	Description
-	-	-	X	Probable failing unit at L91
-	-	X	-	Probable failing unit at L101
-	-	X	X	Probable failing unit at L110
-	X	-	-	Probable failing unit at L111
-	X	-	X	Probable failing unit at L121
-	X	X	-	Probable failing unit at L131
-	X	X	X	Probable failing unit at L132
X	-	-	-	Probable failing unit at L142
X	-	-	X	Probable failing unit at L152
X	-	X	-	Probable failing unit at L54
X	-	X	X	Loop back circuitry fault
X	X	-	-	Probable failing unit at L47
X	X	-	X	Probable failing unit at L54
X	X	X	-	Probable failing unit at L47
X	X	X	X	Probable failure in interface circuitry or interconnecting cables

[1] Located in system master.
[2] See page KC-9 for component locations
[3] X means LED is on, - means LED is off.

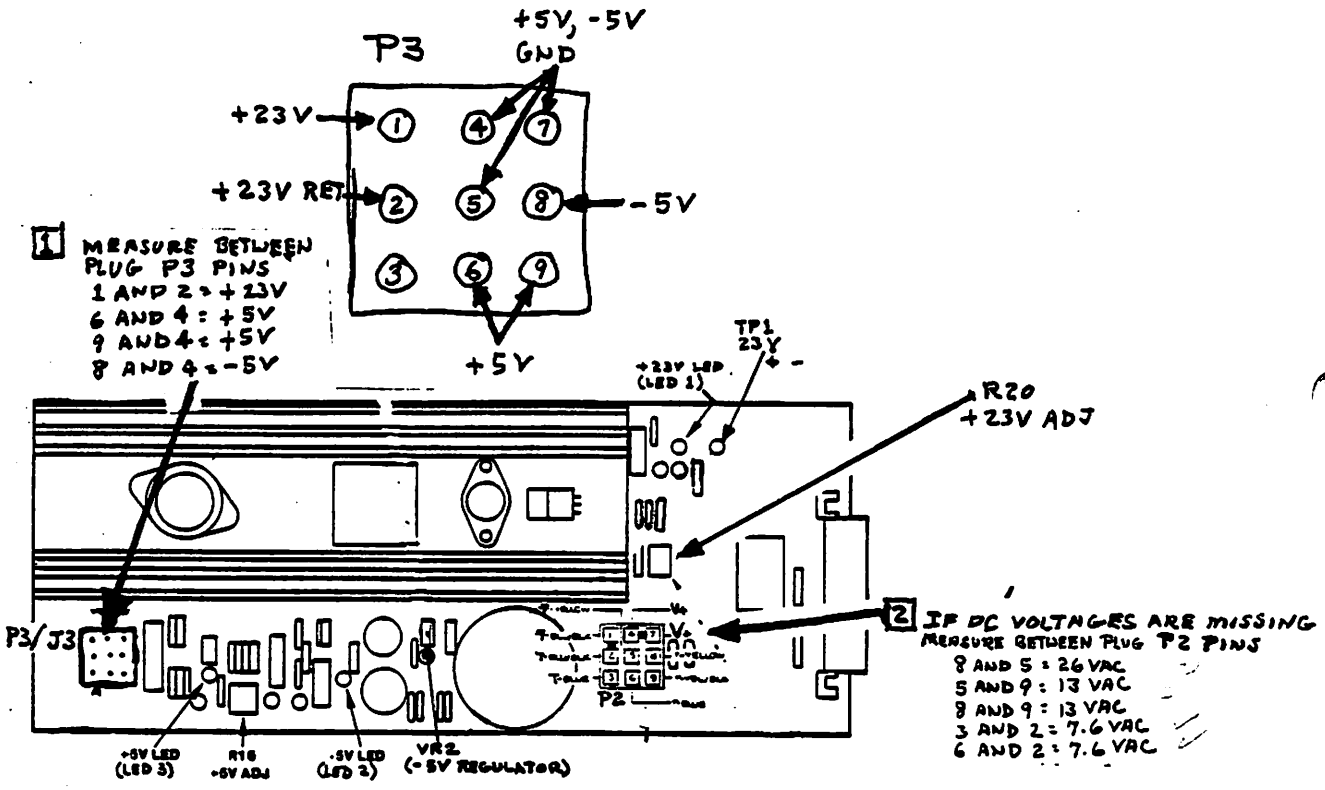
ADJUSTMENTS/TEST POINTS

All Models

POWER SUPPLY

- Make dc measurements on ACTD power supply PCB (210-7770) plug P3. Adjust +23V and +5V supplies using proper controls as required.

NOTE
The -5V supply is used on OIS/VS 1/4 cartridge tape PCB only. This supply cannot be adjusted.



- If ac voltages are ok at P2 and dc voltages are missing at P3, or PCB voltages cannot be adjusted to tolerance; replace ACTD power supply PCB (210-7770).

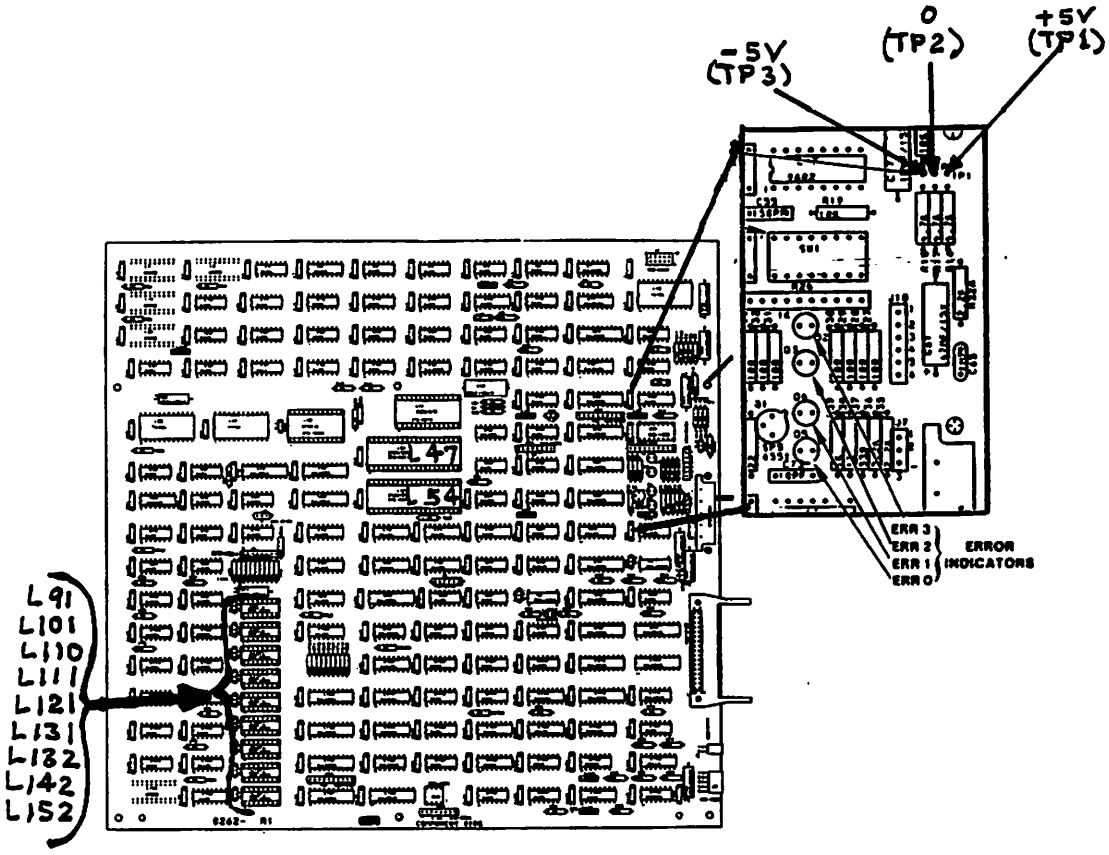
Can measurements be made at P2 + P3 ?

ADJUSTMENTS/TEST POINTS

2529, 6529

OIS/VS ACTD CARTRIDGE TAPE PCB VOLTAGE MEASUREMENT

- Make voltage measurements on OIS/VS ACTD 1/4 cartridge tape PCB (210-8262A). Connect DMM common lead to TP2.



- If voltages are not correct, check voltages on ACTD power supply PCB (210-7770)(see previous page). If ok, check connections between PCB's.

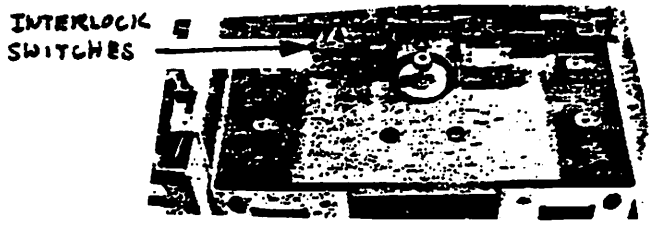
Is TP2 common point for volts measure?

ADJUSTMENTS/TEST POINTS

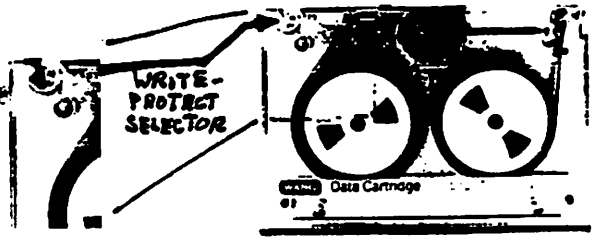
All Models

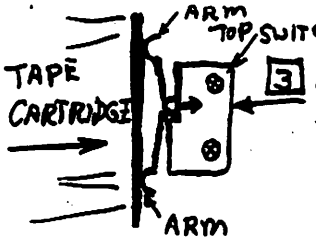
INTERLOCK SWITCHES

- Perform to adjust switches if play (backward or forward) is noted in microswitch levers (arms).



1. SELECT SCRATCH TAPE CARTRIDGE. PUT WRITE PROTECT SELECTOR IN WRITE POSITION.
2. GENTLY PRESS INTO TAPE ASSEMBLY UNTIL CARTRIDGE ENGAGES LATCHING MECHANISM

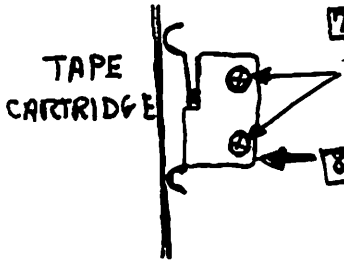




3. CONTACTS ON EACH SWITCH SHOULD MOVE INTO SWITCH BODY.
4. CONTINUE TO PRESS CARTRIDGE IN UNTIL LOCKED IN PLACE

5. CONTACT ON EACH SWITCH IS MOVED INTO SWITCH BODY. ~~CLICK IS HEARD~~ AS EACH SWITCH IS ACTIVATED.
6. PRESS SWITCH LEVERS TOWARDS SWITCH BODY. SLIGHT MOVEMENT IS OK IF CLICKS WERE HEARD IN PREVIOUS STEP.

Procedure ok??



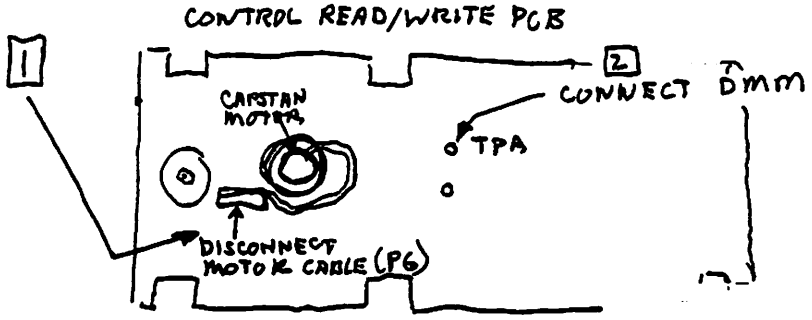
7. IF CLICKS ARE NOT HEARD IN PREVIOUS STEP LOOSEN SWITCH SCREWS
8. PRESS BOTH SWITCHES TOWARDS TAPE CARTRIDGE UNTIL SWITCH LEVERS CAUSE SWITCHES TO ACTIVATE (CLICK).
9. TIGHTEN SCREWS AND REPEAT PROCEDURE TO CHECK SWITCH OPERATION

ADJUSTMENTS/TEST POINTS

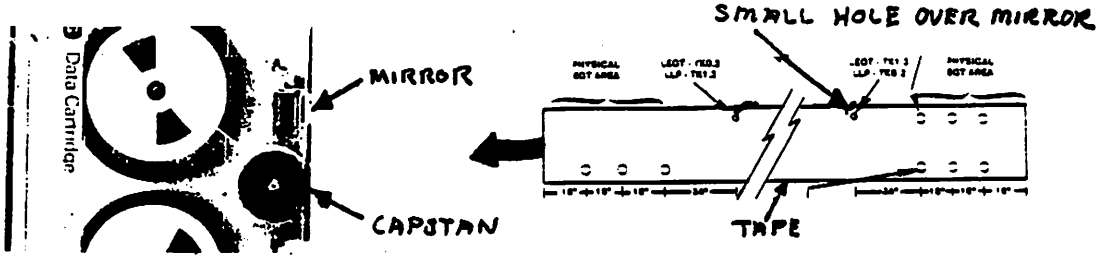
All Models

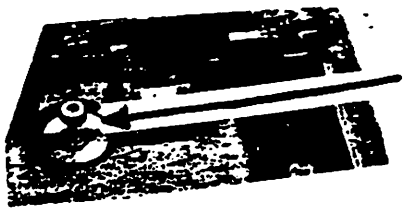
PHOTOSENSOR ADJUST

- If EOT and BOT are not properly detected, perform the following procedure.



3 TURN SCRATCH TAPE CARTRIDGE CAPSTAN BY HAND UNTIL SMALL HOLE IS DIRECTLY OVER CARTRIDGE MIRROR.



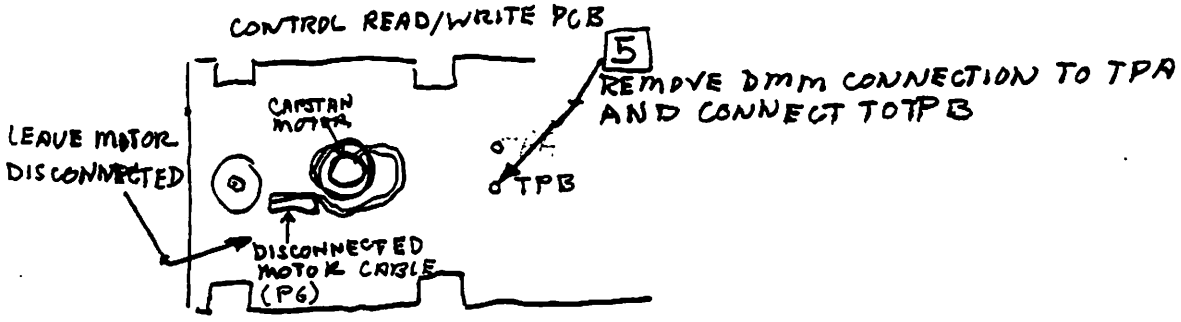


4 INSERT SCRATCH TAPE CARTRIDGE INTO TAPE DRIVE ASSEMBLY AND ADJUST TAPE DRIVE CAPSTAN BY HAND FOR MAXIMUM VOLTS. IF NOT APPROXIMATELY 4 VOLTS REPLACE DRIVE SUBASSEMBLY.

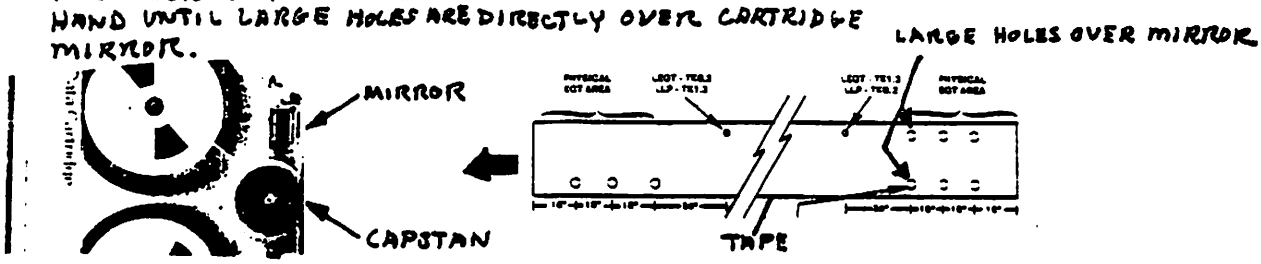
ADJUSTMENTS/TEST POINTS

All Models

PHOTOSENSOR ADJUST (CONT)



6 REMOVE TAPE CARTRIDGE FROM TAPE DRIVE TURN SCRATCH TAPE CARTRIDGE CAPSTAN BY HAND UNTIL LARGE HOLES ARE DIRECTLY OVER CARTRIDGE MIRROR.



7 INSERT TAPE CARTRIDGE INTO TAPE DRIVE ASSEMBLY AND ADJUST TAPE DRIVE CAPSTAN BY HAND FOR MAXIMUM VOLTS. IF NOT APPROXIMATELY 5 VOLTS REPLACE DRIVE SUBASSEMBLY

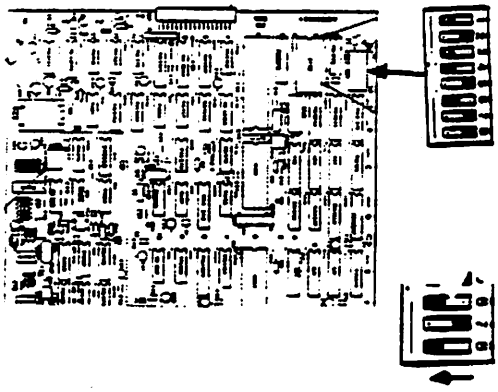
o Reconnect P6 to jack on control read/write PCB.

ADJUSTMENTS/TEST POINTS

All Models

SPEED ADJUST

NOTE
Check adjustment screws of pots. at edges of control read/write PCB. If facing outward towards edge of PCB, drive subassembly must be removed. Also if Model 2529 or 6529, OIS/VS ACTD 1/4 cartridge tape PCB must be removed.



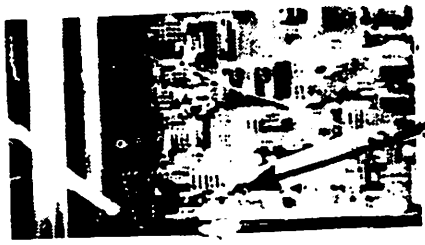
1 SET FORMATTER PCB SWITCH SW1 AS SHOWN. THEN INSERT SCRATCH TAPE CARTRIDGE AND POWER UP TAPE DRIVE.

■ = SW POSITION

2 BEGIN TEST BY SWITCHING SW1 SWITCH 8 OFF.

■ = SW POSITION

3 TAPE DRIVE SHOULD SHUTTLE TAPE BACK AND FORTH INDICATING SPEED IS OK.



4 IF TAPE CREEPS OR RUNS IN ONE DIRECTION, ADJUST CONTROL READ/WRITE PCB POT. R144 FOR MINIMUM CREEP IN EITHER DIRECTION.

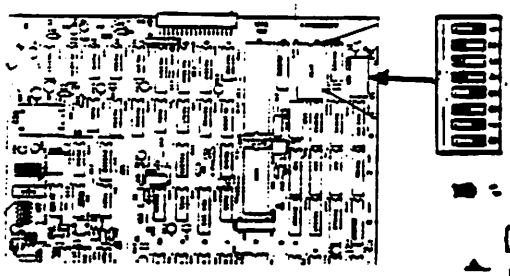
ADJUSTMENTS/TEST POINTS

All Models

RAMP TIME ADJUST

NOTE

Check adjustment screws of pots. at edges of control read/write PCB. If facing outward towards edge of PCB, drive subassembly must be removed. Also if Model 2529 or 6529, OIS/VS ACTD 1/4 cartridge tape PCB must be removed.



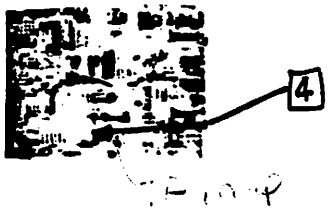
1. SET FORMATTER PCB SWITCH SW1 AS SHOWN. THEN INSERT SCRATCH TAPE CARTRIDGE AND POWER UP TAPE DRIVE.

■ = SW POSITION

2. BEGIN TEST BY SWITCHING SW1 SWITCH 8 OFF.

■ = SW POSITION

3. TAPE DRIVE SHOULD SHUTTLE BACK AND FORTH WHICH INDICATES RAMP TIME IS OK.



4. IF TAPE CREEPS OR RUNS IN ONE DIRECTION, ADJUST CONTROL READ/WRITE PCB POT. R145 FOR MINIMUM CREEP IN EITHER DIRECTION.

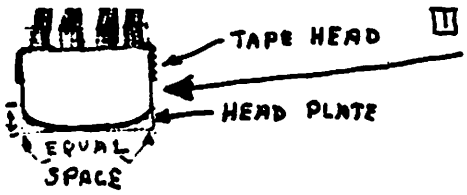
5. REPEAT PREVIOUS TEST (SPEED TEST) AND THEN THIS TEST (RAMP TIME) UNTIL TAPE DOES NOT CREEP.

ADJUSTMENTS/TEST POINTS

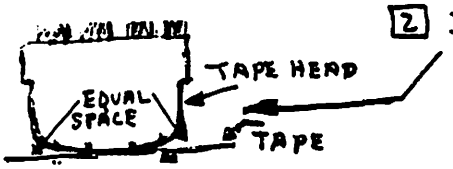
All Models

READ LEVEL ADJUSTMENT

NOTE
Check adjustment screws of pots. at edges of control read/write PCB. If facing outward towards edge of PCB, drive subassembly must be removed. Also if Model 2529 or 6529, OIS/VS ACTD 1/4 cartridge tape PCB must be removed.

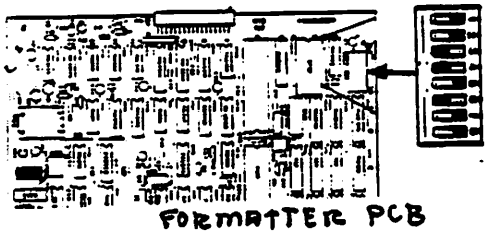


1 FIRST CHECK MAGNETIC TAPE HEAD ALIGNMENT. HEAD SHOULD BE POSITIONED ON HEAD PLATE AS SHOWN.



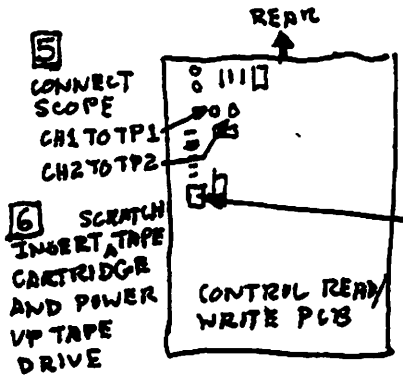
2 INSERT A SCRATCH TAPE CARTRIDGE AND CHECK TAPE HEAD/TAPE INTERFACE.

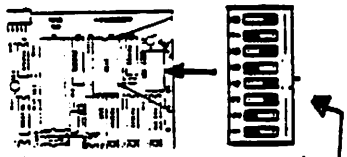
3 THEN, TO ADJUST READ LEVEL, SET SW1



■ = SW POSITION

4 SET SCOPE (USE X10 PROBE)
CH1 + CH2 = 0.5V/DIV
INVERT CH2 AND ADD CH1 + CH2
TIME BASE = 1 μSEC/DIV.





7 CHANGE SW1 SWITCH 8 TO BEGIN TEST

8 ADJUST R16 FOR 3V P-P ON SCOPE. IF VOLTS VERY HIGH OR POT. NEEDS MORE THAN ONE TURN TO DISPLAY PROPER VOLTS, REPLACE TAPE DRIVE SUBASSEMBLY

Does it make sense to do steps 1 + 2? Is info correct?
How high volts + how much adjust. is permitted in step 8 ??

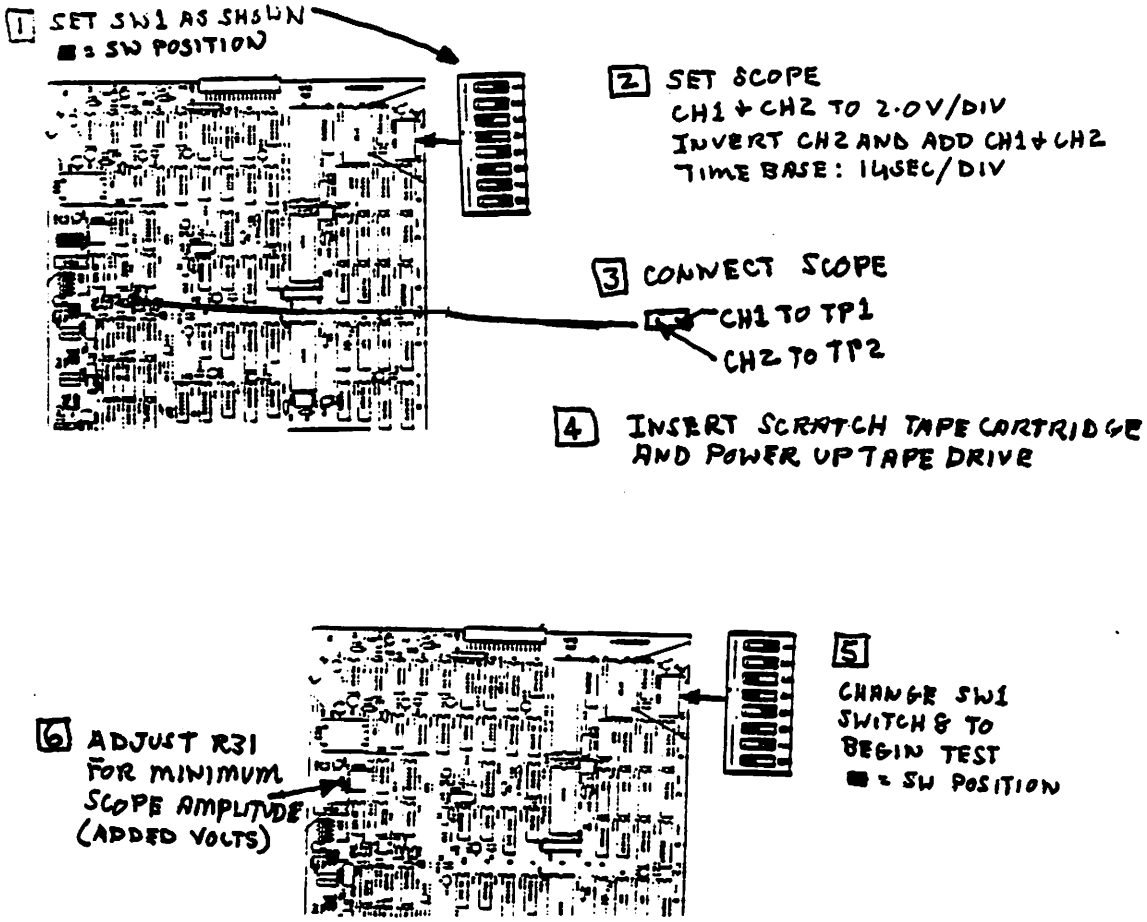
ADJUSTMENTS/TEST POINTS

All Models

FORMATTER INTEGRATOR OFFSET ADJUST

NOTE
If Model 2529 or 6529, OIS/VS ACTD 1/4 cartridge tape PCB must be removed.

o Perform following to adjust integrator offset.



use x10 probe in step 2 ??

WANG LABORATORIES, INC., 19 CROSBY DRIVE, BEDFORD MA 01730 • TEL 617/275-5730

WANG

Bill A
Mike B
Jim D
FYI
Ron C

M-E-M-O-R-A-N-D-U-M

TO: D.T.S.M.'s

FROM: John Forbes

DATE: June 8, 1984

SUBJECT: 2229 Tape Drive Error Codes

Attached is information concerning the 2229 Tape Drive used on the 2200 Product Line. Please distribute this information to the appropriate field personnel in your District.

Thanks to Al Cohen, D.T.S. from Upstate New York, for sending me this information.

Regards,

John Forbes
Area Technical Specialist

cc: Al Cohen

Attachment:

JF:0100L

TO: 2200 Customer Engineers

FROM: Allen Cohen

DATE: June 4, 1984

SUBJECT: 2229 Tape Drive Error Codes

We have been installing the new 2229 cartridge tape drive for several months now on 2200 MVP/LVP Systems. Recently, some problems have developed in troubleshooting the units due to lack of information to field personnel on software error codes being reported by the tape backup program.

Through the 2200 Software Support Group I have acquired the attached information which should clear up this problem and be of great help to all technicians involved with this product. The attached memo gives $GIO commands, status byte and fault byte code interpretation, along with all other status information provided by the tape backup/restore utility during an error condition.

Please refer to this ducument when troubleshooting the 2229 Tape Drive on 2200. This document, along with the 2229 product maintenance manual (729-1184A) should provide the basic reference material needed to diagnose and repair 2229 tape drive problems.

Regards,

Allen Cohen (sdm)

Allen Cohen
District Technical Specialist
Upstate New York

AMC/sdm/0279S
cc: John Forbes
All ATSs

2229 Documentation Summary
May 09, 1983
Scott Tagen x7197 ms1489

ECO 26767 Release of Bootstrap PROM

PROM # 378-9037
Board 210-8259 Location L6
Note: PROM is 2732A-20 (200 nSec)

ECO 27471 Initial Release of 2200 Software

WLI#	CONTENTS	DESCRIPTION	VERSION
195-2548-3		2229 Cartridge Tape Utilities	01.01.00
	701-2741	Diskette 1 of 1	
	700-7716	Interim Manual	
195-2548-5		2229 Cartridge Tape Utilities	01.01.00
	731-0072	Diskette 1 of 1	
	700-7716	Interim Manual	

DMA Controller should be 377-0435 (8237A-5)

A document detailing the $GIO commands and responses is available from me. This is for internal use only.

WANG LABORATORIES, INC., ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TELEPHONE (617) 459 5000 TWX 710 343-6769, TELEX 94 7421

WANG

TO: Distribution

FROM: Scott Tagen

SUBJ: $GIO commands for 1/4" Cartridge Tape Controller

DATE: 01/11/82

This document represents the final $GIO commands for the 2229 cartridge tape drive.

Distribution:

Neeraj Sen
Pete Seymour
Max Blomme
Bruce Patterson
Jerry Sevigny

2229 $GIO commands

COMMAND	hex code	
Hard Reset	01	
Board status	02	
Rewind	03	
Load	04	
Unload	05	
Erase to end of track	07	
Space IBG	08	
Space reverse IBG	09	
Space File Mark	0A	
Space rev File Mark	0B	
Read	0C	
Write	0D	
Write File Mark	0F	
Erase IBG	12	
Endwrite	20	
Soft reset	30	
Error status	31	
Change write current	32	
Download	40	See note below
End download	41	

Any other commands will return ILLEGAL result (return code = hex(01))

NOTE: Download and end download function only when operating out of PROM. Soft reset, hard reset and board status function out of both PROM and RAM. All other commands function out of RAM only.

The default address for the 2229 is 018.
All response codes are in hex unless otherwise indicated.

HARDWARE RESET

This command functions identical to a power on sequence. The microcode will have to be downloaded after the powerup diagnostics complete (see DOWNLOAD).

CBS 01

Note that the CBS command does NOT wait for ready. The controller will go busy until the powerup diagnostics are complete.

$GIO/018 (4501)

BOARD STATUS:

WR/CBS x'02'

WR/IBS xx # of status bytes to follow (not counting this one)

WR/IBS	Controller PROM rev	2 ASCII
	Controller software rev	2 ASCII
	Tape drive PROM rev	1 hex
	Controller switches	1 hex (low 4 bits valid)
	Last TAPE STATUS 1	1 hex
	Last TAPE STATUS 2	1 hex
	Code execution	1 hex
	Fault byte	1 hex
	Powerup diagnostic list	6 hex

```
DIM S$30,R$16

$GIO/018 (4402 8701 1800 C340,R$)STR(S$,1,VAL(STR(R$,1,1)))
```

Explanation of Board Status bytes:

Controller PROM rev	This is the revision of the 2732A PROM mounted on the tape controller daughter board (L6 on 8259 board). It contains the powerup diagnostics, the bootstrap for downloading, as well as most of the board repair diagnostics.
Controller software rev	If the controller microcode has been loaded, this will reflect the current revision.
Tape drive PROM rev	This is the revision of the 2732 PROM located on the formatter board of the Kennedy tape drive.

Controller switches — Status of 4 bit switch on daughter board (SW1 on 8260 board).

Switch 4 is on for normal use, off for diagnostic use.
Switch 1 is on for a 4 track drive, off for 7 track drive
Switches 2 and 3 are not normally used at this time.

Last TAPE STATUS bytes — These 2 status bytes are from the tape drive, and represent the results of the last tape operation.

Status Byte 1

Bit	Meaning
80	Not ready
40	Drive fault
20	No cartridge
10	Formatter error
08	Command error
04	Parity error
02	Length error
01	Data error

Status Byte 2

Bit	Meaning
80	Logical load point
40	Logical end of tape
20	File mark detected
10	Write protected
08	End of tape
04	Track bit 2
02	Track bit 1
01	Track bit 0

Code execution — 00 = prom, 01 = ram

Fault byte

If the controller response to a command is Drive/controller fault, hex (08), this byte can be checked to see what caused the fault.

DRIVE/CONTROLLER FAULTS:

decimal code	error description
11	CBSY true when no command executing
12	Control Request timeout (Cable not connected)
13	CBSY not set true after command strobe
14	Tape drive received command from controller with bad parity
15	Track status incorrect on track select command
16	Track select command failed
17	Track status incorrect on track select command
18	Track select command failed
19	Tape status byte 1 shows fault before LOAD or REWIND command
20	LOAD command failed
21	LOAD command did not bring tape to LLP
22	UNLOAD command failed
23	UNLOAD command did not bring tape to EOT
24	REWIND command failed
25	REWIND command did not bring tape to LLP
26	ERASE TRACK command did not bring tape to LEOT
27	ERASE TRACK command failed
28	SKIP FILE MARK command failed
29	SKIP FILE MARK REVERSE command failed
30	SKIP FILE MARK REVERSE command failed
31	SPACE IBG command failed
32	SPACE IBG REVERSE command failed
33	WRITE FILE MARK command did not detect File Mark
34	WRITE FILE MARK command failed
35	ERASE GAP command failed
36	Overflow of Kennedy parity errors
37	Repositioning error during write error recovery
38	Read error while repositioning tape
39	Error on read (not Data Error)

Powerup diagnostic list	6 bytes of error information, only valid if Fault byte is x'0A' (dec 10)

NOTE: Ram parity error will flash all lamps on drive and lamp on controller. This condition can be cleared only by resetting the controller.

REWIND:

WR/CBS x'03'

WR/IBS	00	Operation OK
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

$GIO/018 (4403 8701,R$)

Rewind will position tape at Logical Load Point on the first track, clear all caches, and wait for a new command. Note that a LOAD command is not required after a rewind.

LOAD:

WR/CBS x'04'

WR/IBS	00	Operation OK
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

$GIO/018 (4404 8701,R$)

LOAD causes the tape formatter to perform a self-test, followed by a tape tensioning procedure. No other commands (except STATUS, RESET and ERROR STATUS) can be executed until a LOAD is successful.

UNLOAD:

WR/CBS x'05'

WR/IBS	00	Operation OK
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

$GIO/018 (4405 8701,R$)

UNLOAD causes a fast forward to the end of tape, after which the tape cartridge can be removed.

ERASE to end of track:

WR/CBS x'07'

WR/IBS	00	Operation OK
	02	Out of tape
	03	Drive not ready
	04	Write protected
	05	Write results pending
	08	Drive/controller fault

$GIO/018 (4407 8701,R$)

The tape is erased from the present position to the end of the track.

SPACE IBG:

WR/CBS x'08'

WR/IBS	00	Operation OK
	02	Out of tape
	03	Drive not ready
	05	Write results pending
	07	File mark detected
	08	Drive/controller fault

$GIO/018 (4408 8701,R$)

The tape will position itself to the next Inter-Block Gap. If a File Mark or End of Tape is encountered, it will be reported.

SPACE REVERSE IBG:

WR/CBS x'09'

WR/IBS	00	Operation OK
	02	Out of tape
	03	Drive not ready
	05	Write results pending
	07	File mark detected
	08	Drive/controller fault

$GIO/018 (4409 8701,R$)

This command is same as SPACE IBG, except that tape moves in reverse direction.

SPACE FILE MARK:

WR/CBS x'0A'

WR/IBS	00	File mark found
	02	End of Tape
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

$GIO/018 (440A 8701,R$)

This command will advance to tape to the next File Mark, or end of tape, whichever comes first.

SPACE FILE MARK REVERSE:

WR/CBS x'0B'

WR/IBS	00	File mark found
	02	Out of tape (at beginning of tape)
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

This command is same as Space File Mark, except tape moves in reverse direction.

$GIO/018 (440B 8701,R$)

READ RECORD:

WR/CBS x'0C'

WR/IBS	00	Read successful
	02	Out of Tape
	03	Drive not ready
	05	Write results pending
	06	Data error
	07	File Mark detected
	08	Drive/controller fault

(Operation continues only if previous byte was 00)

WR/IBS High byte of byte count
WR/IBS Low byte of byte count

WR/IBS data block

NOTE: Read data array must allow for maximum record length that is written on tape

```
$GIO/018 (4400 8701,R$)        If STR(R$,1,1) = hex (00) then continue

$GIO/018 (87C2 8703,R$)        Get record byte count

$GIO/018 (1800 C340,R$) STR(A$(),1,VAL(STR(R$,2,2),2))
```

WRITE:

WR/CBS x'01'

WR/OBS High byte of block count
WR/OBS Low byte of block count

WR/IBS
00	OK
01	Illegal length
02	End of Tape
03	Drive not ready
04	Write protected
05	Write results pending
08	Drive/controller fault

Operation continues only if previous byte was 00

WR/OBS Data Block

Write tells the controller to accept a new block of data. The tape controller can cache two blocks of data in order to allow overlap of disk reads and tape writes. Write commands will be accepted continuously until either an error occurs or the end of tape is reached. The block length can be from 2 bytes to 16386 bytes. Any other length will generate an ILLEGAL response.

```
B = length of record (2 to 16386 bytes)
STR(R$,2,2) = BIN(B,2)                    convert byte count to hex
$GIO/018 (4401 4220 4230 8701,R$)         operation continues if STR(R$,1,1)
                                          = hex (00)

$GIO/018 (130C A000,R$)STR(A$(),1,VAL(STR(R$,2,2),2)) transfer data
```

NOTE: The last write command must be followed by an ENDWRITE command. Also, if the response byte is 05 (results pending), the next command MUST be an ENDWRITE command.

WRITE FILE MARK:

```
WR/CBS   x'0F'

WR/IBS   00   OK
         02   End of Tape
         03   Drive not ready
         04   Write protected
         05   Write results pending
         06   Data error
         08   Drive/controller fault

$GIO/018 (440F 8701,R$)
```

ERASE IBG:

```
WR/CBS   x'12'

WR/IBS   00   OK
         02   End of Tape
         03   Drive not ready
         04   Write protected
         05   Write results pending
         08   Drive/controller fault

$GIO/018 (4412 8701,R$)
```

ENDWRITE:

Endwrite terminates a sequence of 1 or more write commands by requesting the final results as well as any blocks unwritten (in the case of an error condition). Once a write command has been accepted, no other commands except additional writes or a reset will be accepted until an endwrite is performed.

```
WR/CBS   x'20'

WR/IBS   00        All writes successful
         02        End of tape
         03        Drive not ready
         06        Data error
         08        Drive/controller fault

WR/IBS   xx        Number of blocks unwritten

$GIO/018 (4420 8701 8702,R$)
B = VAL(STR(R$,2,1))    B = number of blocks not written
```

SOFTWARE RESET

The software reset will terminate any operations in progress, clear all caches, and clear the tape formatter. This is identical to the HARDWARE RESET except that the microcode in the controller is not cleared. Note that if the 2200 RESET key is pressed in the middle of communication to the tape controller, a HARDWARE RESET may be the only way to re-establish communications.

WR/CBS 30 $GIO/xyz (4530,R$)

The controller will respond by going busy until all the above operations are complete.

ERROR STATUS:

WR/CBS x'31'

WR/IBS xx # of status bytes to follow (not including this one)

WR/IBS	Write retries (last write)	1 hex
	Read retries (last read)	1 hex
	Accumulated write retries	2 hex
	Accumulated read retries	2 hex
	Tape to Controller parity errors	1 hex
	Controller to tape parity errors	1 hex

All error information is cleared after taking error status.

CHANGE WRITE CURRENT:

WR/CBS x'32'

WR/IBS	00	Command complete
	03	Drive not ready
	05	Write results pending
	08	Drive/controller fault

The currently available tape cartridges are DC300 (300') and DC300XL (450'). If and when 600 foot cartridges are available, the write current will be different. The tape drive defaults to the 'normal' current for 300 and 450 foot tapes. Executing the CHANGE WRITE CURRENT command will allow 600 foot tapes to be used. A SOFT RESET or HARD RESET will change the current back to 'normal'.

These 2 commands only function when the controller is operating out of PROM. The controller can always be brought back to the PROM code by executing a HARD RESET.

DOWNLOAD:

WR/CBS x'40'

WR/OBS Address of data (high byte, low byte)

WR/OBS # of bytes

WR/OBS data block

The download sequence will repeat for all sectors of the microcode data file.

END DOWNLOAD:

WR/CBS x'41'

This command terminates the download routine and starts code execution at the start of ram (x'1000').

SUGGESTED DOWNLOADING PROCEDURE:

Controller status should be read to insure that the power up diagnostics passed (see BOARD STATUS command)

```
10 DIM R$16,X$2,X1$3,X$(4)60,D$3
20 LINPUT "Disk Address ",D$              get disk address
30 SELECT#1 [D$]                          select disk
40 LIMITS T#1, "@2229",A,B,C,D            check that microcode file is on disk
50 IF A =2THEN60                          else error
60 DATALOAD DC OPEN T#1, "@2229"          open data file
70 DATALOAD DC #1, X$,X1$,X$()            read data
80 IF END THEN 150                        jump if end of file
90 IF STR (X$,1,1) = HEX(01) THEN 120     jump if data
100 REM else record is comment - X$() can be printed if desired
110 GO TO 70
120 STR(R$,1,2)=X1$                       starting address
130 STR(R$,3,1)=STR(X1$,3)                byte count
140 $GIO/018 (4440 4210 4220 4230 1800 1300 A000,R$)
    STR(X$(),1,VAL(STR(X1$,3))):GO TO 70    send data

150 $GIO/018 (4441,R$)                    send 'end download'
```

Board status should then be read to check if code is now executing out of RAM.

SELECT TRACK: NOTE THIS COMMAND FOR INTERNAL USE ONLY!!

Track select byte is made up as follows:

Bit	80	1 = end of track, 0 = beginning of track
	40	always 1
	20	always 0
	10	always 0
	08	always 0
	04	always 0
	02	track address bit 1
	01	track address bit 0

WR/CBS track select byte

WR/IBS 00 OK

NOTE: This command returns hex(00) regardless of result. It is for internal use only.

To select Logical End of tape track 2:

$GIO/018 (44C2 8701,R$)

Memorandum

To: John McEvoy
RTM, Capitol Area

From: Sheila D. Mitchell
Section Manager, VS Value Added/2200 Support

Date: February 5, 1986

Re: 2229 Tape Problems at Standard Federal Savings Bank

cc: Mary Bowker
Wayne Justason
Mary Sedivec
Cheryl Williams

Attached is an analysis of the tapes that were sent to us from Steve Brudi at the RSC for Standard Federal Savings Bank. These tapes were shipped to us in response to TAC # H5352000. These tapes were for the Error 8 conditions that were appearing on the system in Maryland. R&D also received some screen dumps from other locations of the bank. These are noted in the attached document.

As you will note from the analysis of the tapes from R&D, the majority of the problems seem to stem from the controller boards. It is my understanding that new boards are in the process of being installed at the customer sites.

R&D has written a tool that will diagnose whether or not bad data is being written to a tape, therefore helping to eliminate any possibilities of the customer restoring the tape at a later date and having corrupted data. This tool should be out to the field by end of February. R&D is currently testing it and we will be receiving it from them next week. A new release of the 2229 Tape Utilities will also include enhancements for verification purposes as well as the diagnostic tool. This release will probably be out in two-three months.

In the meantime, it is recommended that all existing 2200 customers using these tape drives be upgraded with the new controller boards once the FCO is cut and to use caution if they have to restore a backup tape to disk since the data may already be corrupted.

If you should have any questions, please call me at (617)656-0848.

Regards,

Sheila D. Mitchell

Sheila D. Mitchell

0212U:VS1001

TO: Sheila Mitchell

cc: Skip Allen
Terry Harrington

FROM: Scott Tagen

SUBJ: Analysis of 2229 screen dumps and tapes

DATE: 01/27/86

The screen dumps from Standard Federal Savings indicate the following poss ble problem areas:

PROBLEM: Error 6 - DATA ERROR (on 'Backup Files to Tape') (screen dump 1)

This is a data error on a Write operation. Usually, this is the result of one of the following, in the most likely order:

1 A worn (or 'Brand X') tape cartridge.
2. Dirty tape drive heads, or bad tape drive.

It is unlikely that the controller would give this problem. The customer should attempt to identify if only certain tapes give this problem, which would obviously point to the tapes. Otherwise, I suggest that the tape drive itself be replaced.

There were a number of screen dumps with this problem, some of which say 'Miami' at the top. If they all come from the same site, I strongly suggest they replace the tape drive.

PROBLEM: Error 8 (screen dump 2)

Tape drive status byte 1 contains a '01', which indicates a write error. This is the same as the previous problem, and the solution should be the same.

PROBLEM: Error 8 (screen dumps 3 & 4)

Tape drive status byte 1 containing a 'C' in the high nibble indicates that the tape drive is in a fault mode - the exact wording from the Kennedy manual says "A physical or electrical fault has occurred in the formatter/tape drive system or a broken tape condition exists". Note that the formatter is one of the PC boards that is actually part of the tape drive. The tape drive reports this fault condition to the tape controller (the controller plugs into the 2200), which in turn reports the fault to the 2229 utilities.

This could be caused by the tape cartridge not being completely inserted into the tape drive. However, the most likely suspect in this case is the tape drive itself, since it has diagnosed itself as being in an error condition. This may be due to the PROM revision of the tape drive. The two screen dumps (numbers 3 and 4) both indicate revision 11. The lastest revision that I know of is 16. Referencing the attached Product Change Notice from Kennedy, (for version 11 to 13), it is likely that screen dump 3 is related to software change 'a'. I suggest that all tape drive PROM revisions be checked when the new controllers are installed at the customers sites.

PROBLEM: Error 8 (screen dump 5)

Tape drive status byte 1 having a '02' indicates a write length error. The tape drive returns this error if the controller attempts to write a record longer than the maximum allowed.

This is a known problem with the controller. A series of hardware ECOs were cut (26521D, 28779, and 33994 - all attached) to fix this problem. The problem was that the incorrect DMA chip was used in the drive. Using a 5 MHz DMA (such as an 8237A-5) would correct the problem.

This ECO will be superceded with the new hardware changes to the controller, which modify the circuitry around the PIO and DMA. The new ECO also mandates a changes back to the original 4 MHz DMA controller. It appears at this point that the original 'fix' did not completely correct the original problem, but rather masked it.

Also note that the screen dump shows that the tape drive also has an old PROM.

PROBLEM: Error 8 (screen dump 6)

All screen dumps indicating status byte 1 equal to 08, with status byte 2 equal to 4x, can be lumped together. Status 1 of 08 indicates a command error - that the controller sent an illegal command to the tape drive. A '4' in the high nibble of status byte 2 indicates LEOT (logical end of tape). The Kennedy change notice (items b and d) are very likely responsible for this problem. My recollections of problems during software development are that Kennedy had some problems in this area which were finally rectified in PROM version 15. (I have seen some screen dumps indicating that the tape drive has version 16 PROMS) Again, all PROMS should be updated with the correct version.

PROBLEM: Error 8 (screen dumps 7 & 8)

These errors also indicated a drive/controller fault of 11 and 12 (refer to the attached sheet listing the possible faults). The problem could be almost anything, but should be investigated in the following order:

1. Loose or bad cable between controller and tape drive (Walter Jackson talked to me at some point about the 2229 cable being replaced with another which caused problems. Perhaps someone can look into this further).

2. Replace the tape drive

3. Replace the controller.

PROBLEM: Error 8 (screen dumps 9 & 10)

Number 9 has a note that it happened twice until the tape drive was powered off and on, after which it worked OK. The tape drive would be suspect in this case.

I can find no explaination for number 10. After the controller is brought up to date with the new ECO, it should be monitored for any similar problems.

PROBLEM: Error 8 (screen dump 11)

Tape status byte 1 indicates a formatter error (bit 10) with tape not ready (bit 80). The Kennedy manual states "The formatter has failed the self test which is done during the execution of the load sequence, or noise was detected in the gap region during a write...". This solution would be to replace the tape drive (since the formatter is part of the tape drive.

PROBLEM: File trailer block count incorrect (screen dump 12)

I looked at the tapes which accompanied the screen dumps. The first two tape tracks are OK, and there is one tape record at the start of the third track. The rest of the track is completely empty. The records continue at the start of track 4, and go all the way to the end of the tape. There are about 240 records missing from the third track. I know of no explaination for this. The tape verification program that will be on the next release of the 2229 utilities will catch this problem if it occurs again, hopefully before the customer needs the data. I would like to know if there are any other instances of this type of problem. I would hazard a guess that it may be a side effect of the older (version 11) tape drive PROMS, since the missing blocks are in close proximity to the end of a tape track.

RECOMMENDATIONS:

The following action plan should be put into place ASAP:

1. Replace ALL controllers in the field with the updated controller.

2. Ensure that the tape drive PROMS are up to date.

3. Check into the possible cable problem (see Walter Jackson).

4. Distribute my 2229 diagnostic to give the customer some confidence in his backups.

5. Notify all 2229 users that their current tape backups MAY have some problems.

6. Distribute (when ready) the new 2229 utilities, which will include the 2229 diagnostic and a tape backup verification program. The new utilities also will fix all known (and some unknown) bugs.

7. While I have talked to your people on many occassions concerning various problems, (not necessarily on the 2229), it appears that communications from other RSCs to R&D could be improved. This may be due to the fact that other RSCs don't know who to call when they have a problem. Some of the screen dumps which were sent directly to me from Standard Federal Savings are over one year old.

MIAMI 5/23/85

BACKUP FILES TO TAPE

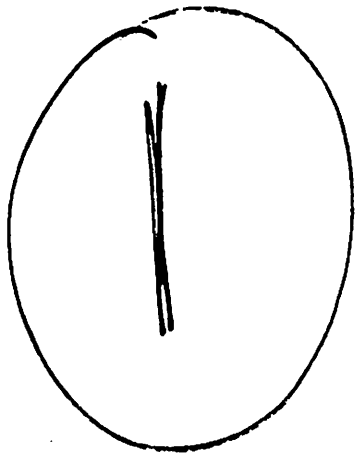
Reference file name D12 BKUP
Reference file address D12
Tape Volume Name D12 TUE

Number of files 6
Files located on D12

Tape sequence number 1

File number 1
FMSC1200
Error 6 - DATA ERROR

STOP
:



NORFOLK
W'Sale

BACKUP FILES TO TAPE

ce file name D12 BKUP
rence file address D12
Volume Name D12 TUE

Number of files 7
Files located on D12

sequence number 1

r 8 - Drive/Controller fault
number 3
roller PROM rev 00
ware rev 00
drive PROM rev 0
roller device switch 09
drive STATUS 1 01
drive STATUS 2 01
e/controller fault 0

DATA ERROR, TK 1

No fault light

DATA ERROR ON WRITE

2

Source Platter 011
Tape Volume Name 011 MEDS
Tape sequence number 1
Error 8 - Drive/Controller fault
Controller PROM rev 01
Software rev 00
Tape drive PROM rev 11
Controller device switch 09
Tape drive STATUS 1 00
Tape drive STATUS 2 43
Drive/controller fault 22
STOP
:

~~HELP~~
5/1/85

DRIVE FAULT

UNLOAD FAILED

3

.BACKUP PLATTER TO TAPE

```
Source Platter          DI1
Tape Volume Name        DI1 HEDS
Tape sequence number    1
Error 8 - Drive/Controller fault
Controller PROM rev     00      00
Software rev            00      0C
Tape drive PROM rev     11      11
Controller device switch 09     09
Tape drive STATUS 1     C8      02
Tape drive STATUS 2     00      02
Drive/controller fault   0      0
STOP
.
```

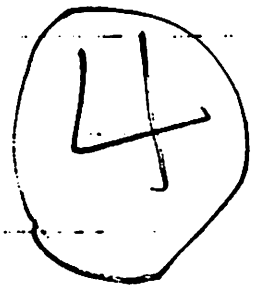
→ PROM

DRIVE FAULT (C8)

TC11 - TU

20, 21

Future Use.



BACKUP FILES TO TAPE

```
Reference file name     D11 BKUP                Number of files      880
Reference file address  D11                     Files located on     D11
Tape Volume Name        D11
Tape sequence number    1
Error 8 - Drive/Controller fault
File number  168
Controller PROM rev          00
Software rev                 00
Tape drive PROM rev          11
Controller device switch     09
Tape drive STATUS 1          02
Tape drive STATUS 2          00
Drive/controller fault        0
STOP
:
```

7/18

BACKUP FILES TO TAPE

Reference file name	D12 BKUP	Number of files	6
Reference file address	D12	Files located on	D12
Tape Volume Name	D12 THUR		

Tape sequence number 1

Error 8 - Drive/Controller fault
File number 1

Controller PROM rev	00
Software rev	00
Tape drive PROM rev	11
Controller device switch	09
Tape drive STATUS 1	08
Tape drive STATUS 2	40
Drive/controller fault	0

CRC Error

LEOT

6

STOP
:

Reference file name D11 BKUP Number of files 993
Reference file address D11 Files located on D11
Tape Volume Name D11 MON

Error 8 - Drive/Controller fault

Controller PROM rev	00
Software rev	00
Tape drive PROM rev	0
Controller device switch	09
Tape drive STATUS 1	00
Tape drive STATUS 2	01
Drive/controller fault	12

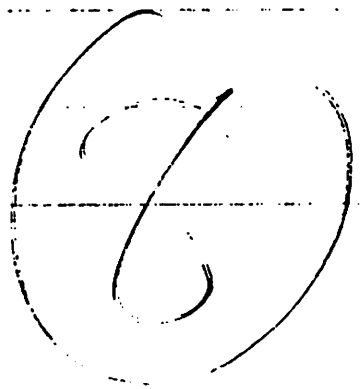
STOP
:

BACKUP FILES TO TAPE

```
Reference file name     D11 BKUP          Number of files    767
Reference file address  D11               Files located on   D11
Tape Volume Name        D11 FRI

Tape sequence number    1


Error 8 - Drive/Controller fault
File number  451
Controller PROM rev          00
Software rev                 00
Tape drive PROM rev          11
Controller device switch     09
Tape drive STATUS 1          00
Tape drive STATUS 2          01
Drive/controller fault       11

STOP
:
```

OLD - PROM

CBSY true while no command executing



1/27/85

BACKUP FILES TO TAPE

Reference file name D11 BKUP
Reference file address D11
Tape Volume Name D11 MON

Number of files 993
Files located on D11

Tape sequence number 1

Error 8 - Drive/Controller fault

Controller PROM rev 00
Software rev 00
Tape drive PROM rev 0
Controller device switch 09
Tape drive STATUS 1 00
Tape drive STATUS 2 01
Drive/controller fault 0

STOP
:

9

This happened twice then I turned off the drive and began again. This time it went OK

Jay

NORFOLK

11/10/00
THURSDAY

BACKUP PLATTER TO TAPE

urce Platter D11
pe Volume Name WANGTEST
pe sequence number 1

Happened in the presence of David Amini from Wang

or 8 - Drive/Controller fault

troller PROM rev 00
tware rev 00
e drive PROM rev 16
troller device switch 09
e drive STATUS 1 00
e drive STATUS 2 01
ve/controller fault 0

NO ERROR, TRACK 1

Sector # 21824 to 218-24+64
64
06016187 88 21887

1-800-822-1122

210

32

FF
00
9F

New Console. 11-11-85

BACKUP PLATTER TO TAPE

urce Platter	D11
pe Volume Name	D11 TUE
pe sequence number	1

ror 8 - Drive/Controller fault

ntroller PROM rev	00
ftware rev	00
pe drive PROM rev	11
ntroller device switch	09
pe drive STATUS 1	90
pe drive STATUS 2	00
ve/controller fault	20

OP

11

18J #C

1/14/86
15:27

RECOVER PLATTER FROM TAPE

ination platter address D12

e volume name D11 TUE
e sequence number 1

NEW CONTROLLER

le trailer block count incorrect

P
INT S
57e0

12

① Recovering D11 platter backup onto D12

② This is second try, same thing happened on 1st try.

③ The two tapes of D11 backup sent to Steve with a copy of this page.

1-12-85

BACKUP PLATTER TO TAPE

9:20

Source Platter [11
Tape Volume Name TEST
Tape sequence number 1

NEW CONTROLLER
PLATTER
DURING A BACKUP

Error 8 - Drive/Controller fault

Controller PROM rev	00
Software rev	00
Tape drive PROM rev	11
Controller device switch	0F
Tape drive STATUS 1	08
Tape drive STATUS 2	10
Drive/controller fault	0

TOP

12.

CD - Embedded block count = 245

Log sector of block. C(1) = 15620 C(2) = 15616 C(3) = 15552 C(3) = 15488

WANG FIELD CHANGE ORDER

FCO NO. 1069

Equipment Affected: Archiving Cartridge Tape Drive Models 2229,2529V, 6529

Class: Problem Only | FCO Kit #: 728-0085 | Page 1 of 3

Org. Code: 3202 | FCO Doc. #: 729-1408 | Approval Date:

Est. Install. Time: 15 minutes | Ref. ECO #: Kennedy ECN No's: 11281, 11448, 11478, 11819, 11900

1. REASON FOR CHANGE

The firmware in the EPROM at location A3 has been updated from configuration 10 to configuration C16. The new program upgrades the unit to work with the 6.11 operating system.

Program changes include:

A. Changed ramp adjustment to check margins to 5%.

B. Changed speed adjustment to check margins to 2.4%.

C. Added drive fault test to diagnostics so that if drive fault occurs the drive will halt.

D. Added Diagnostic Routine (Switches 2 & 4 on) to generate all one's tape.

E. Fixed Space Reverse and Space Reverse Filemark Routines so that they handle LEOT properly. This fixed positioning problems found if data was located after the LEOT hole.

F. Changed write delay routine so that if LEOT is seen during the write delay time, then the Data Error bit will be set. This was done so that the block would be erased and then written on the next track. This ensures that data is not located behind LEOT of tracks 0, 1, & 2.

G. Corrected Space Reverse Filemark Routine to eliminate falsely setting the filemark bit if LLP was reached without finding a filemark.

H. Revised fixed 3" erase command to erase from LEOT to PEOT if the command is given just prior to LEOT of tracks 0, 1, & 2.

I. Fixed write delay routine to allow retries past LEOT of track #3.

Tech Ops	Logistics	Originator	FCO Coordinator
12/14/83	12/21/83	Mary Keady 12/14/83	12/20/83

J. Added code to support the use of new 3M Cartridges which have larger "A" holes.

K. Add a routine which will erase the area around LLP during a write from LLP. This routine is optional and can be selected by setting switch #4 to the "ON" position.

2. DESCRIPTION OF CHANGE

The EPROM at A3 is replaced on the F650 Formatter PCA (WLI# 726-6202; OEM# 190-5663-001).

3. DOCUMENTATION AFFECTED

N/A

4. PREREQUISITE (S)

This change is required only on units with a 6.11 Operating System.

5. INSTALLATION PROCEDURE

A. Power off. Remove A.C. plug at wall.

B. Remove cabinet cover as described on Section 5.2.1.1 of "Archiving Cartridge Tape Drive, Models: 2229, 2529V and 6529," 729-1184. (Henceforth referred to as the "manual").

C. Replace EPROM at A3 with new EPROM (726-6338) on the F650 Formatter PCA shown in Figure 5-2 of the manual.
726-6202

D. Replace cabinet cover by reversing the procedures referrenced in Step B above

E. Replace A.C. plug at wall. Power on.

F. Perform Check-Out Procedure described in Section 6 below.

G. Document installation of FCO by completing a Call Report or Activity Report.

6. CHECK-OUT PROCEDURE

Refer to "Tape Utility" section of the manual. Run the appropriate system utility for the 2229, 2529V or 6529 drive. Observe normal operation.

7. FCO KIT PARTS LISTING

KIT #728-0085

Item	Qty	Item Description
729-1408	1	FCO Document 1069
726-6338	1	EPROM

8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0085 will be available January 3, 1983. To obtain it, place a routine order through the Logistics Order Processing System.

9. REMOVED PARTS DISPOSITION

Recycle the removed EPROM through your FSC.

10. MISCELLANEOUS

The 6.11 operating system is used in VS systems with models 2229 and 2529V. Model 6529, used in OIS systems, is being upgraded to ensure interchangeability with VS systems.

WANG

ECO

ECO NO. 391.

SHEET 1 OF 8

ORIGINATOR	Bruce Dorson	M/S	1439	EXT.	70391	DATE	12/10/85
WRITTEN BY	Jeannine Roy	M/S	1218B	EXT.	76930	DATE	01/06/86

PART NO. 510/209-8260	DESCRIPTION 1/4 In Tape Contr M/B
DWG NO. 8260	
MODEL NO. 2200 ACTD	PEP # PEP# H0097A
CLASS (I) II III	

DESCRIPTION OF CHANGE

Change artwork, assembly drawing, fabrication drawing, schematic, parts list and sample board per attached prints and as follows:

See attached sheet for Rework.

Change 210-8260-A parts list as follows:
Change L14 from IC 8237A-5 Prgrm DMA Cntlr (377-0435)
to IC 9517A-4 Multimode DMA Cntlr (377-0411)

Change 209-8260 parts list as follows:
Add L47 IC 74LS74 Dual D-Type Positive (376-0155)
Add L48 IC 74LS00 (376-0207)
Add Res 10K Fixed Metal 1/4w 5% (330-4011) & change qty from 9 to 10
Add Res 4.7K Fixed Metal 1/4w 5% (330-3048) & change qty from 11 to 12

NOTE TO EDD: Create a 510 and 210 History Sheet for this board.

Continued on next page

COMPANY CONFIDENTIAL

REASON/SYMPTOM FOR CHANGE

To modify DMA timing to enable controller to work more reliable with a 4MHZ DMA and any vendor P10.

RECEIVED
FEB 13 1986
PRINT ROOM

80

DOCUMENTS

DOCUMENTS	REVISIONS FROM	TO
HISTORY SHT. 510	See below	
HISTORY SHT. 210	See below	
ARTWORK		
E-REV.	0	1
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
S.P.I.		
SPECIFICATION		

CONFORMING AREA	C.E.	REMFG.	DIST.	FINAL ASSY. AREA	SUB ASSY. AREA	NEXT ORDER	INFO ONLY
	X	X	See effect sheet		X	X	

CONFORMANCE DATE 2/14/86

APPROVALS

		DATE
ECO CHAIRPERSON	[signature]	2/12
DES. ENGRG.	Louis V. Comau	1/15/86
CUST. ENGRG.	[signature]	2/12/86
MFG.	W. Menasutti	2-12-86
MTO	John W. [signature]	2/12/86
PP&M		
F.C.C.	Michael Bianco	1/22/86
PROD. SAFETY	[signature]	1/24/86
SECURE SYS.		
ORIGINATOR	Bruce [signature]	1/15/86
OTHER		

WANG

ENGINEERING CHANGE ORDER
CONTINUATION SHEET

DOCUMENT NO.	OLD REV	NEW REV

DOCUMENT TITLE:	THIS ECO SHT, WHEN ATTACHED TO DOCUMENT OF PREVIOUS REV CONSTITUTES THE LATEST DOC.	ECO NO. 39188	SHT 2	OF 9

DESCRIPTION OF CHANGE:

Continued from page one

Change BOM 210-8260-A as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE		QTY	QTY TYPE
DELETE	377-0435	IC 8237A-5 Prgrm DMA Cnt	EA	1		1	1
ADD	377-0411	IC 9517A-4 Multimode DMA	EA	1		1	1

Change BOM 209-8260 as follows;

	WLI#	DESCRIPTION	UM	COMP TYPE		QTY	QTY TYPE
ADD	376-0207	IC 74LS00	EA	1		1	1
CHANGE	376-0155	IC 74LS74 Dual D-Type	EA	1	From:	5	1
					To;	6	
	330-4011	Res 10K Fixed 1/4w 5%	EA	1	From:	9	1
					To:	10	
	330-3048	Res 4.7K Fixed 1/4w 5%	EA	1	From:	11	1
					To:	12	

WANG

ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET

ECO NO. 39188
SHEET 3 OF 9

PART NO./ASSY NO.

MATERIAL DISPOSITION	QUANTITY	DISP	COST
PARTS ON HAND			
PARTS ON ORDER			
ASSEMBLIES IN PROCESS			
FINISHED SUB ASSEMBLIES			
ASSEMBLIES IN UNITS			
PREPARATION, IMPLEMENTATION COSTS			

DISPOSITION

1. USE AS IS
2. REWORK
3. SCRAP/SALVAGE
4. NEXT ORDER
5. SEE REMARKS

AFFECTED SITES

TEWKS ☐	BOS ☐	HONG ☐
PKWD ☐	IR ☐	MEX ☐
METH ☐	PR ☐	_____ ☐
LOW ☐	SCOT ☐	_____ ☐
HLOK ☐	AUST ☐	_____ ☐
PT BLVD ☐	TW ☐	_____ ☐

COST OF INCORPORATION

PRODUCT COST CHANGE PER UNIT PRODUCTION QUANTITY FROM MPP IN WKS ____ WKS		
PRODUCT COST CHANGE (EXTENDED)		
TOTAL COST (OR COST SAVINGS) OF ECO		

APPROVALS

ECO ADMIN	
MFG ENG	W. Marisette 2/12/86
QUALITY	
MATERIALS	E Schaaland 1/29/86
PROD. CONTROL	Dave Sousa 1/31/86
FINANCE	
RE-MFG	
OTHER	

REMARKS

5108260

194 O.H. (B/O 129)
3750.0. (R)
175 PPO

26 wk demand = 889

-- 210 WIP - 276
Q3 BUILD - 440
210 INV. - 50

*See attached TMD TK-050 for Final & Distribution's conformance instructions. Sub-Assy to conform on or before 2/13.

SMS EFFECTIVITY DATE 2/14/86

CE spares shipped after 2/14/86 will conform

DOCUMENTATION ONLY ☐

WANG

ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING IMPACT SHEET

FCO NO 39188
SHEET 4 OF 8

ALL UNITS	☒
PROB ONLY	☐
INFO	☐
FCO REQUIRED	☐
IMMED ☐	NEXT CALL ☐
IS A MUB REQUIRED FOR FSC REWORK	☒

IMPACT COMMENTS

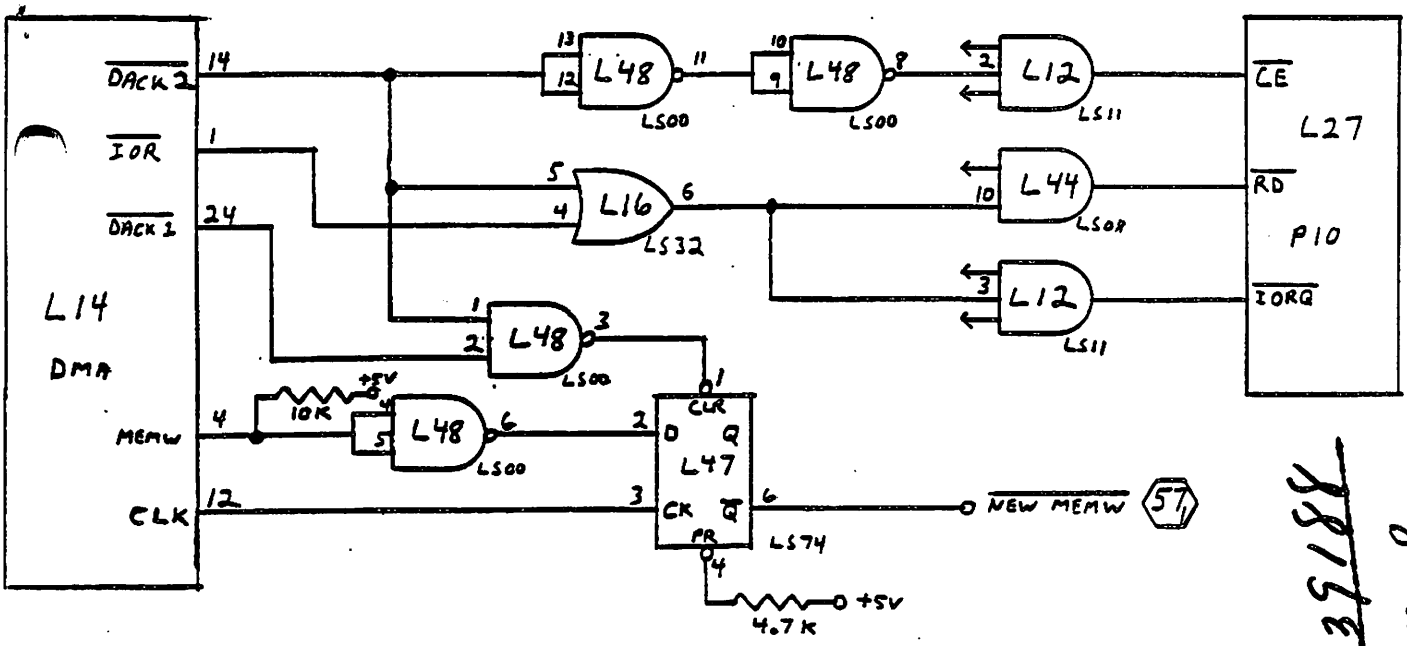
MUB for Repair
Purge

	DOMESTIC	INTERNATIONAL
EST UNIT POP	691	304
EST SPARE POP	207	83
TOTAL	898	387

EST. COST IMPACT		APPROVALS	DATE
MATERIAL	$7,769.00	TECH OPS	2/3/86
LABOR	$21,845.00	LOGISTICS	2/3/86
TOTAL	$29,614.00	FSC SUPPORT	
IMPLEMENTATION PERIOD	4.0 YRS	FINAL	2/3/86
ANNUAL COST	$5531.00	OTHER	

GENERAL COMMENTS

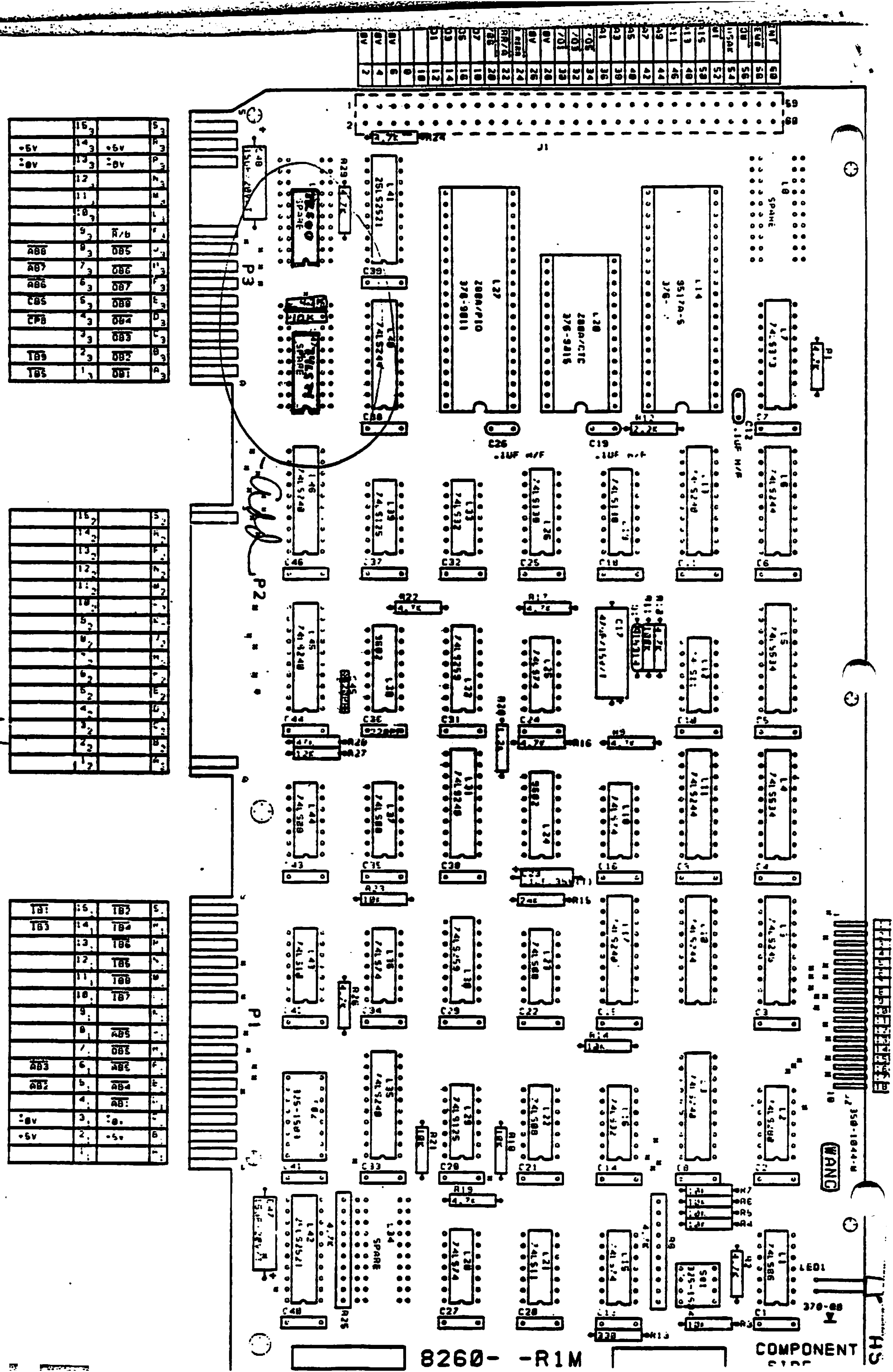
212-3037 is the repairable assembly.



ECO NO 35188
SHT 5 OF 8

Rework

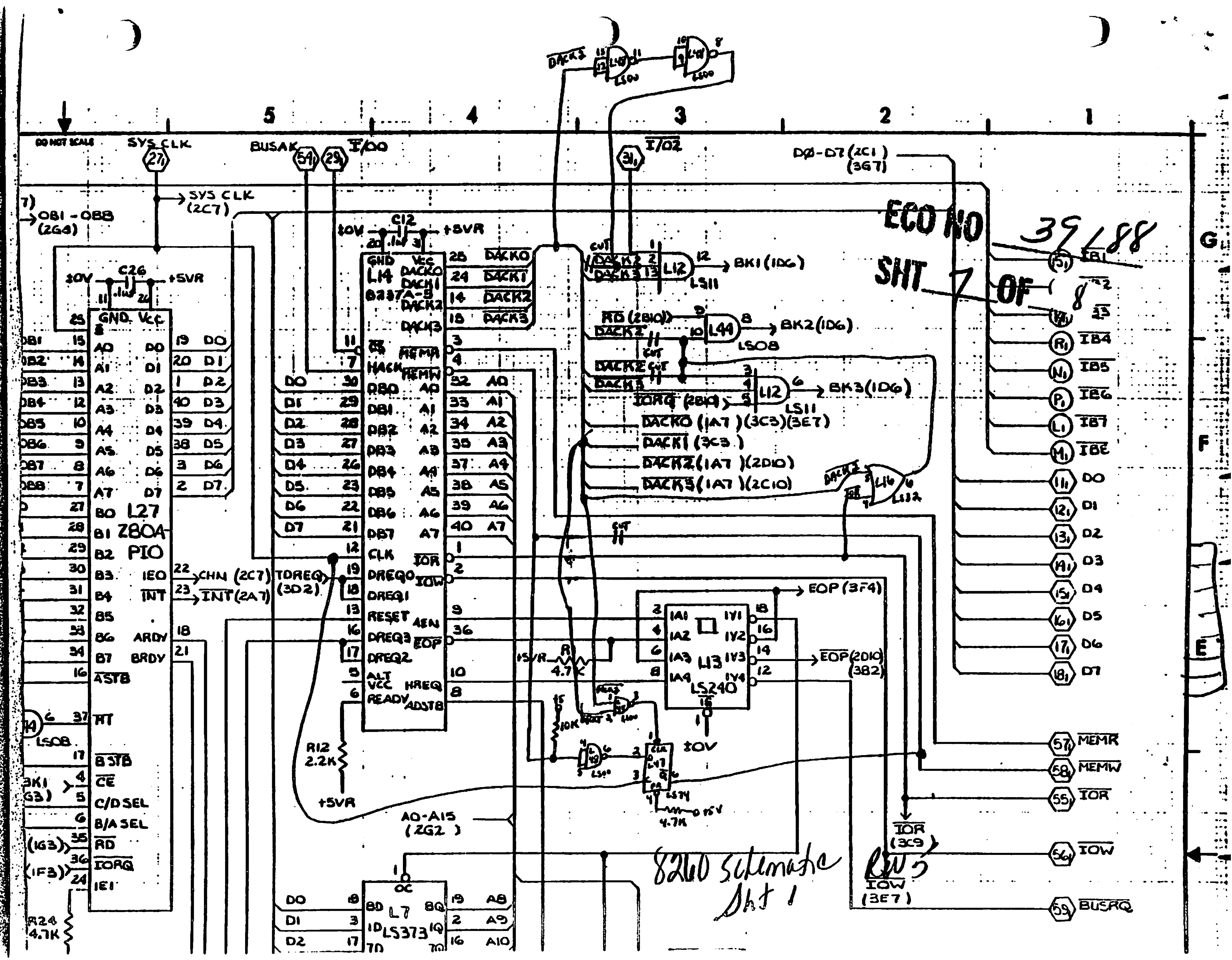
1. Cut run from L-14 pin 4 to feed through.(component side)(Zone 1F3)
2. Cut and lift L-12 pin 2.(Zone 1G3)
3. Cut and lift L-12 pin 3.(Zone 1F3)
4. Cut and lift L-44 pin 10.(Zone 1G3)
5. Install 74LS74 (376-0155) at L-47.(Zone 1E3)
6. Install 74LS00 (376-0207) at L-48.(Zone 1E3)
7. Install 10k resistor (330-4011) at L-47.(Zone 1D3)
8. Install 4.7k resistor (330-3048) at L-47.(Zone 1D3)
9. Replace L-14 9517A-5PC (377-0435) with 9517A-4PC (377-0411).
10. Jumper L-46 pin 10 to L-47 pin 7 to L-48 pin 7.
11. Jumper L-46 pin 20 to L-47 pin 14 to 10k resistor to 4.7k resistor to L-48 pin 14.
12. Jumper L-14 pin 14 to L-48 pins 1,12,+13 to L-16 pin 5.(Zone 1E4)
13. Jumper L-14 pin 24 to L-48 pin 2.(Zone 1F4)
14. Jumper L-14 pin 4 to L-48 pins 4+5 to 10k resistor.(Zone 1E4)
15. Jumper L-14 pin 12 to L-47 pin 3.(Zone 1D4)
16. Jumper L-14 pin 1 to L-16 pin 4.(Zone 1E2)
17. Jumper L-48 pin 6 to L-47 pin 2.(Zone 1E4)
18. Jumper L-48 pin 3 to L-47 pin 1.(Zone 1E3)
19. Jumper L-48 pin 11 to L-48 pins 9+10.(Zone 1G3)
20. Jumper L-48 pin 8 to L-12 pin 2. (Zone 1G3)
21. Jumper L-47 pin 4 to 4.7k resistor.(Zone 1D3)
22. Jumper L-47 pin 6 to feed through on etch that was cut from L-14 pin 4.(Zone 1D2)
23. Jumper L-16 pin 6 to L-44 pin 10 to L-12 pin 3.(Zone 1F3)



9260 assembly Rev 3

ECO NO 37/88

6 of 8



ECO NO 39188
SHT 7 OF 8
8260 Schematic Sht 1
SYS CLK
BUSAK
I/O0
I/O2
DØ-D7 (2C1) (3G7)
OB1 - OB8 (2G4)
SYS CLK (2C7)
L27 Z80A PIO
L14 8237A-5
L13 LS240
L7 LS373
BK1 (1D6)
BK2 (1D6)
BK3 (1D6)
RD (2B10)
IORQ (2B10)
DACK0 (1A7) (3C3) (3E7)
DACK1 (3C3)
DACK2 (1A7) (2D10)
DACK3 (1A7) (2C10)
CHN (2C7)
INT (2A7)
TDREQ (3D2)
EOP (3F4)
EOP (2D10) (3B2)
A0-A15 (2G2)
IOR (3C9)
IOW (3E7)
MEMR
MEMW
IOR
IOW
BUSRQ
R12 2.2K
R24 4.7K
C12
C26
DO NOT SCALE

WANG

SHEET 1 OF 1

TEMPORARY MANUFACTURING DEVIATION	TMD TK0150	ISSUE 1
PART. NO. 209-8260	DESCRIPTION 2200 TAPE DRIVE CONTROLLER	MODEL 2229

DESCRIPTION OF CHANGE

ECO 39188 WAS SUBMITTED SEVERAL WEEKS AGO TO CORRECT A TIMING PROBLEM ON THE 8260 PCB. WITHOUT THE ECO, ONLY MOSTEK PIO'S WOULD WORK ON THE BOARD. ALL OTHER VENDORS FAILED (AMD, SHARP & Z1280). IN THE INTERIM, FINAL LINES HAS BEEN INSERTING MOSTEK AT THEIR TEST STATION. THE FIELD IS AWARE OF THE SITUATION.

IN ORDER TO ELIMINATE THE EXTRA WORK AND STOCK CONTROL PROBLEMS, ALL 8260 PCB'S SHOULD BE BUILT WITHOUT THE ECO NO. CHIP AT LOCATION U27. WE HAVE 350 MOSTEK DEVICES WHICH WE CAN LOAD AT THE FINAL TEST STATION. THE ECO SHOULD BE IMPLEMENTED AS SOON AS POSSIBLE. IF THERE ARE ANY QUESTIONS, PLEASE CALL JACK MANION X86796.

SWO #	264503	10	POST ASSY	2 ATWC
SWO #	264403	1	POST ASSY	
SWO #	261923	1	ATWC	
SWO #	263693	2	ATWC	

1/29

ECO 39188	EFFECTIVITY 1-29-86	APPROVAL		DATE
	EXPIRATION 2-14-86	ORIG.	JManion	1-29-86
REASON FOR CHANGE/NOTES		MFG. ENG.		1-29-86
ECO IN PROCESS.		Q.C. ENG.		1-29-86
		INV. CON.		1-29-86
		PRO. CON.		1-29-86
		MFG.		1/29/86

(WANG) FIELD CHANGE ORDER

FCO NO.
1174

Equipment Affected 2229/6529

FCO Class All Units, Next Call — FCO Kit No. 728-0190 — Page 1 of 4

Documentation Class Code 3202 — FCO Doc. No. 729-1606 — Approval Date:

Est. Install Time 20 Minutes — Ref. ECO No. 35945 — OCT 09 1985

1. REASON FOR CHANGE

   To prevent glitches that can cause phantom errors by tying the CPU and the tape drive to the same ground point.

2. DESCRIPTION OF CHANGE

   A wire and lug assembly is added between the capacitor in the power supply and chassis ground.

3. DOCUMENTATION AFFECTED

   N/A

4. PREREQUISITE (S)

   A. Hardware

      N/A

   B. Software

      N/A

5. INSTALLATION PROCEDURE

   A. Power off. Remove AC from unit.

   B. Remove the cover of the unit by removing the four screws at rear of unit. (Retain screws.) Slide the cover forward a few inches and lift off.

Field Support Ops	Logistics	Originator 10/4/85	ECO Support Mgr.
Steve [signature]	[signature] 10/8/85	[signature] McMullen	John [signature] 10/9/85

C. Add the wire and lug assembly between the capacitor and chassis ground as follows: (Figure 1)

1. Remove the screw on the negative post of the cap. (The negative post is not marked, but it has black wires and a blue wire with a black stripe attached.)

2. Add one end of the wire and lug assembly. Insert the screw through the two washers and three lugs and thread the screw back into the cap.

3. Remove the nut from the chassis ground screw located under the line filter at the back of the unit. Place the other end of the wire and lug assembly over the screw and replace the nut.

D. Replace the cover of the unit by reversing the procedure described in step B.

E. Perform check-out procedure described in Section 6.

F. Document installation of this FCO by completing a Call Report or Activity Report.

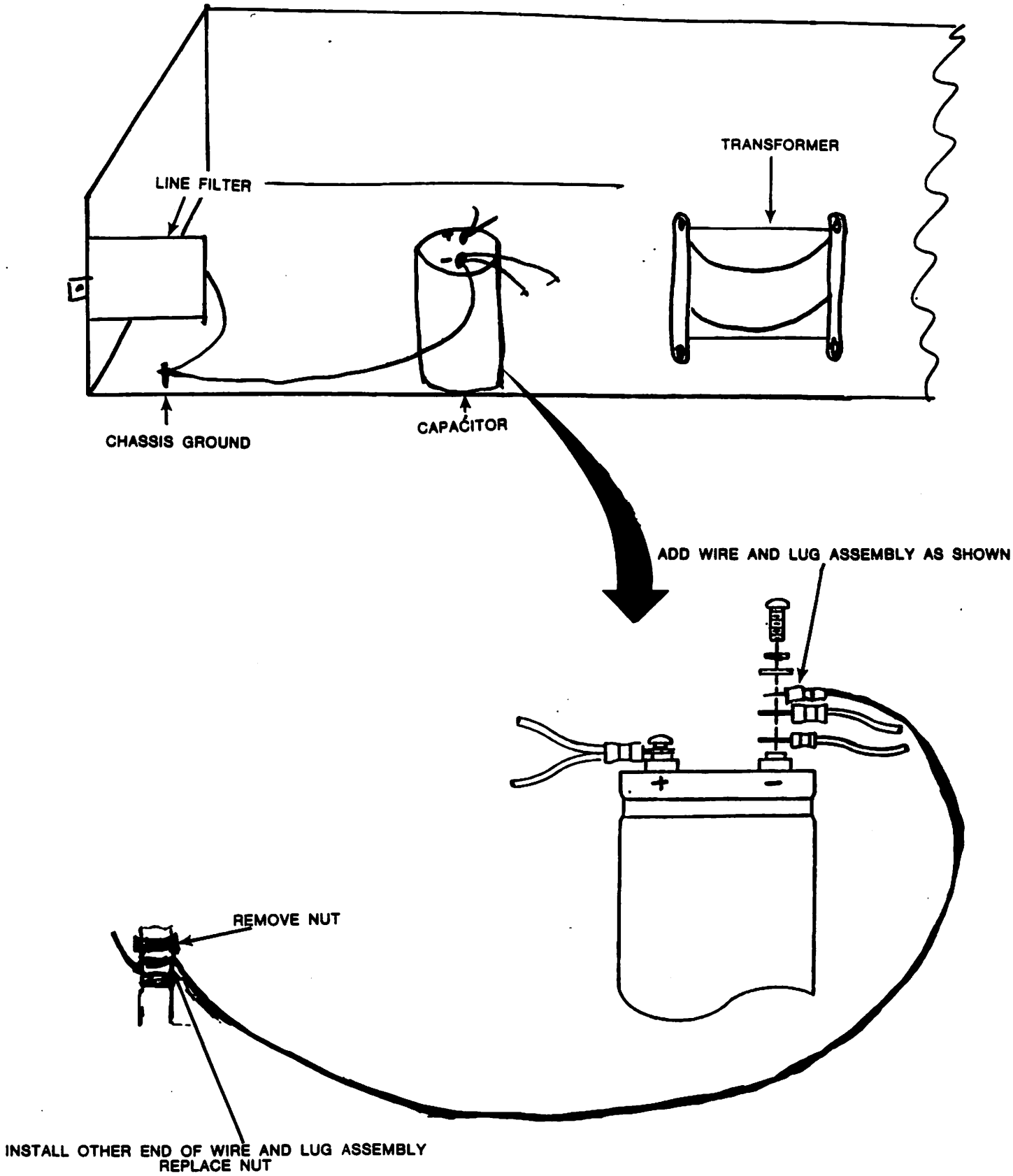


FIGURE 1: TAPE DRIVE, SIDE VIEW
WIRE AND LUG ASSEMBLY INSTALLATION

6. CHECK-OUT PROCEDURE

Power up. Observe normal operation.

7. FCO KIT PARTS LISTING

KIT #728-0190

Item	Qty	Item Description
729-1606	1	FCO Document 1174
220-1157	1	Wire and lug assembly

8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0190 will be available October 28, 1985 and can be obtained by placing a routine order through the Logistics Order Processing system.

9. REMOVED PARTS DISPOSITION

N/A

10. MISCELLANEOUS

N/A

WANG TK-0329 10/11 ECO 1019

SHEET 1 OF 2

ORIGINATOR	Darlene Ross	M/S 2434	EXT 86434	DATE 09/07/84
WRITTEN BY	Elly Gilks	M/S 12188	EXT. 73230	DATE 09/07/84

PART NO. 209-8260/377-0435	DESCRIPTION 1/4 IN TAPE CONTROLLER IC DMA CNTLR
DWG NO. 8260	
MODEL NO. 2200 ACTD	PEP # PEP# H0097A
CLASS I II (III)	TYPE ☑ HARDWARE ☐ SOFTWARE

DESCRIPTION OF CHANGE

Change assembly drawing and schematic for 210-8260-A as follows:

Change L14 from a IC 8237A-5 (377-0435)
to a IC 9517A-5 (377-0435).

Change Item Master description as follows:

WLI#		DESCRIPTION
377-0435	LINE: 1 FROM:	IC 8237A-5 PRGRM DMA CNTL
	TO:	IC 9517A-5 MULTIMODE DMA
	LINE: 2 FROM:	R 5MHZ
	TO:	CNTLR

ECO TO BE
OCT 24
REVIEWED

REASON/SYMPTOM FOR CHANGE

Changing assembly drawing and schematic to reflect correct IC.
To correct Item Master description to agree with qualified Vendor and actual component type.

DOCUMENTS	REVISIONS F	REVISIONS T
BOM		
ARTWORK		
E-REV		
SAMPLE BD		
ASSY DWG.	2	3
DRILL DWG.		
SCHEM. DWG.	4	5
MECH. DWG.		
CBL ASSY. DWG.		
S P.I.		
MECH ASSY. DWG		
COMPONENT SPEC		

EFFECTIVITY	RE-MFG.	C.E.	DIST	FINAL ASSY AREA	SUB ASSY AREA	FUTR MFG
TO CONFORM						
USE AS IS TO PREVIOUS REV						

APPROVALS	DATE
ECO MGR.	
DES. ENGRG K. V. Camara	9/24/84
CUST. ENGRG	
MFG ENGRG.	
ORIGINATOR	9/11/84
F.C.C. Michael Bunko	10/5/84

PRODUCT CHANGE NOTICE
OEM SERVICE DATA FILE

CHANGE CLASSIFICATION: For Information Only

KENNEDY ECN NO: 11478

MODELS AFFECTED: 6455 (WANG Only)

CODE NO: 34

PPCN NO: 340001

PC BOARD AFFECTED: 650 Formatter Type 5563

REASON FOR CHANGE/CHANGE DETAILS:

The revision level of the Read Only Memory, ICA3, located on the Formatter Type 5563 PC board, would be raised from C11 to C13 (level C12 was not released to production). The new ROM would include the following software changes:

a) A one second delay would be added prior to the issuance of Servo Disable to insure drive is stopped and the current limiting circuitry is not triggered prematurely.

b) The Space Reverse algorithms would be revised to insure proper operation at LEOT.

c) An 8 msec delay would be added to the load routine to provide switch debouncing.

d) The Data Error indication would be issued in the event LEOT is detected during the write delay.

ACTION ON UNITS IN SERVICE:

None.

EFFECT ON SPARES:

The new ROM would be a direct replacement for the present revision level, requiring no further hardware changes.

SERVICE/PARTS TO BE FURNISHED UNDER ASSEMBLIES WARRANTY:

Not applicable.

IDENTIFICATION OF CHANGED ASSEMBLIES:

The following revision levels would be raised:

Assembly number	from revision level	to revision level
190-5563-001	AD	AE
190-5563-100	P	R

DOCUMENTATION CHANGES:

None.

APPROVAL: R E Bartholomew for MARKETING

CUSTOMER ENGINEERING

James V. Feeney INITIATING ENGINEER

The modification proposed above will be incorporated in our general product line shortly. If your company approves of this product change, please so indicate by signing below and returning this form to us within 15 working days. Should your company disapprove of the proposed modification, please notify us by letter within 15 working days.

WANG approves of the proposed modification and will permit its inclusion in Kennedy products sold to us.

SIGNED _____

TITLE _____

CUSTOMER ENGINEERING DIVISION
ECO UPDATE BULLETIN

M.U.B Release Date.. 0 Model..2229/6529 Release #7 0

Ass'y #..210-8260 ECO #..39188 Latest Artwork.. 1

Applies To Art/Hist Sht Revs..0,1 E-Rev.. 0 To.. 1 Page 1 Of.. 7

Purpose / Symptom

TO MODIFY "DMA" TIMING TO ENABLE CONTROLLER TO WORK MORE RELIABLE WITH A "4 MHZ DMA" AND ANY VENDOR "P10".

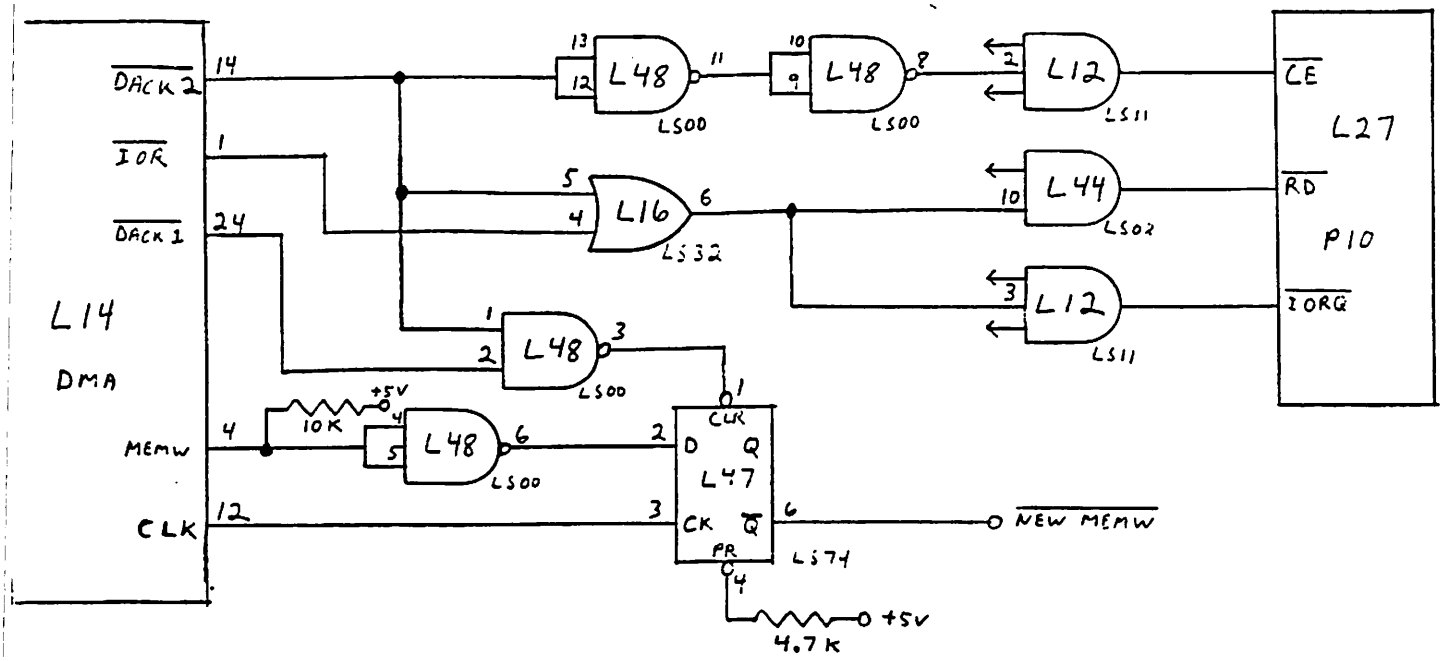
Prerequisite

Est. Comp. Time 60 Min.(s)

Procedure

NON-COMPONENT SIDE:
1. REFER TO ILLUSTRATION A FOR INSTRUCTIONS ON ETCH CUT AND JUMPER.

COMPONENT SIDE:
2. REFER TO ILLUSTRATION B FOR INSTRUCTIONS CHANGING ONE IC, ADDING TWO IC'S AND ADDING TWO RESISTORS.
3. REFER TO ILLUSTRATION C FOR INSTRUCTIONS LIFTING THREE PINS OF IC'S.
4. REFER TO ILLUSTRATION D FOR INSTRUCTIONS TO BUSS PINS AND ADD JUMPERS.
5. REFER TO ILLUSTRATIONS E AND F FOR INSTRUCTIONS ADDING ADDITIONAL JUMPERS.



1. Cut run from L-14 pin 4 to feed through.(component side)
2. Cut and lift L-12 pin 2.
3. Cut and lift L-12 pin 3.
4. Cut and lift L-44 pin 10.
5. Install 74LS74 (376-0155) at L-47.
6. Install 74LS00 (376-0207) at L-48.
7. Install 10k resistor (330-4011) at L-47.
8. Install 4.7k resistor (330-3048) at L-47.
9. Replace L-14 9517A-5PC (377-0435) with 9517A-4PC (377-0411).
10. Jumper L-46 pin 10 to L-47 pin 7 to L-48 pin 7.
11. Jumper L-46 pin 20 to L-47 pin 14 to 10k resistor to 4.7k resistor to L-48 pin 14.
12. Jumper L-14 pin 14 to L-48 pins 1,12,+13 to L-16 pin 5.
13. Jumper L-14 pin 24 to L-48 pin 2.
14. Jumper L-14 pin 4 to L-48 pins 4+5 to 10k resistor.
15. Jumper L-14 pin 12 to L-47 pin 3.
16. Jumper L-14 pin 1 to L-16 pin 4.
17. Jumper L-48 pin 6 to L-47 pin 2.
18. Jumper L-48 pin 3 to L-47 pin 1.
19. Jumper L-48 pin 11 to L-48 pins 9+10.
20. Jumper L-48 pin 8 to L-12 pin 2.
21. Jumper L-47 pin 4 to 4.7k resistor.
22. Jumper L-47 pin 6 to feed through on etch that was cut from L-14 pin 4.
23. Jumper L-16 pin 6 to L-44 pin 10 to L-12 pin 3.

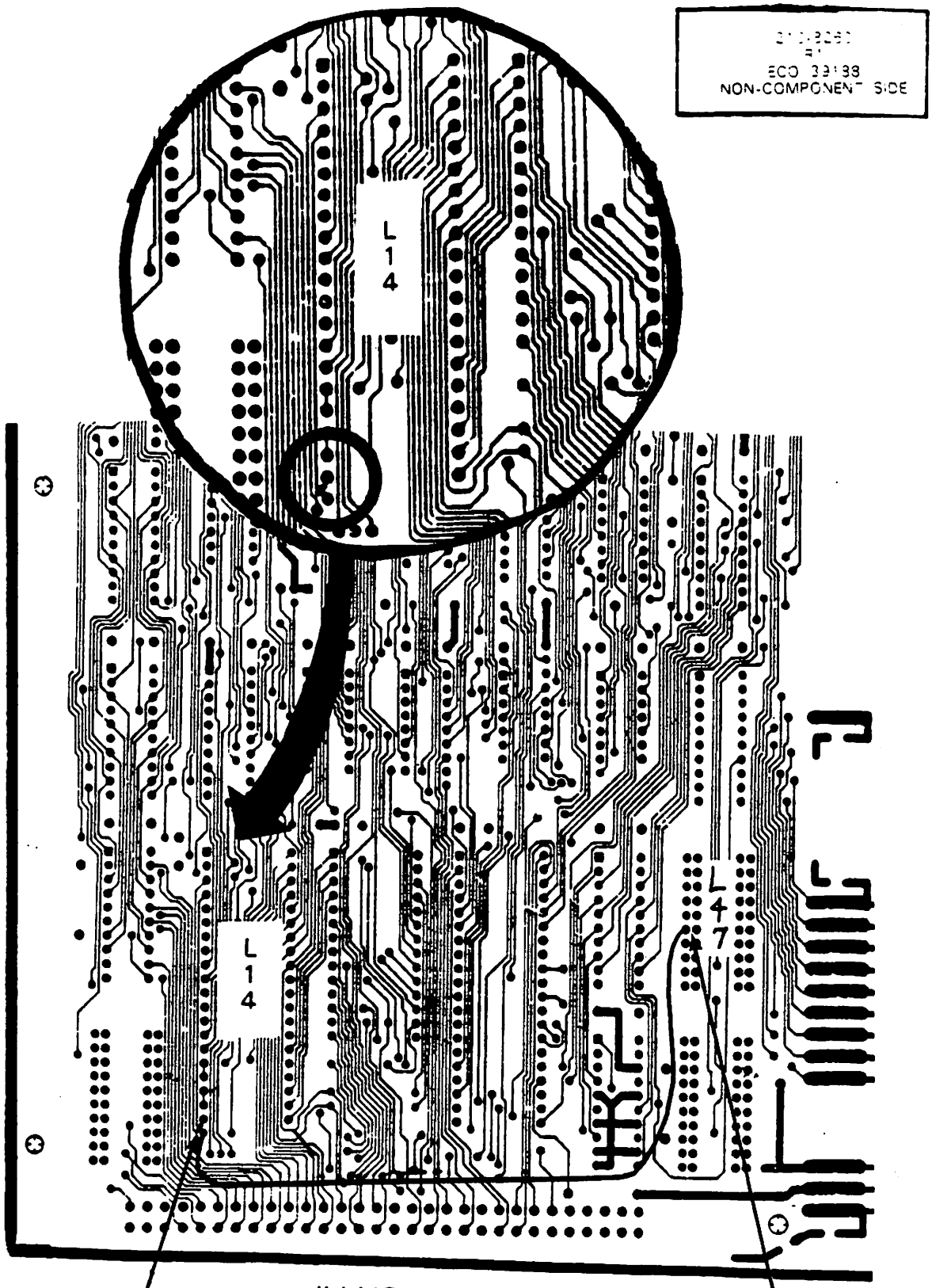


ILLUSTRATION A

CUT ETCH OF L14-4 ABOVE PLATETHRU LOCATED BELOW L14-20, AS SHOWN

JUMPER FROM L47-6 TO PLATETHRU BELOW L14-20, AS SHOWN

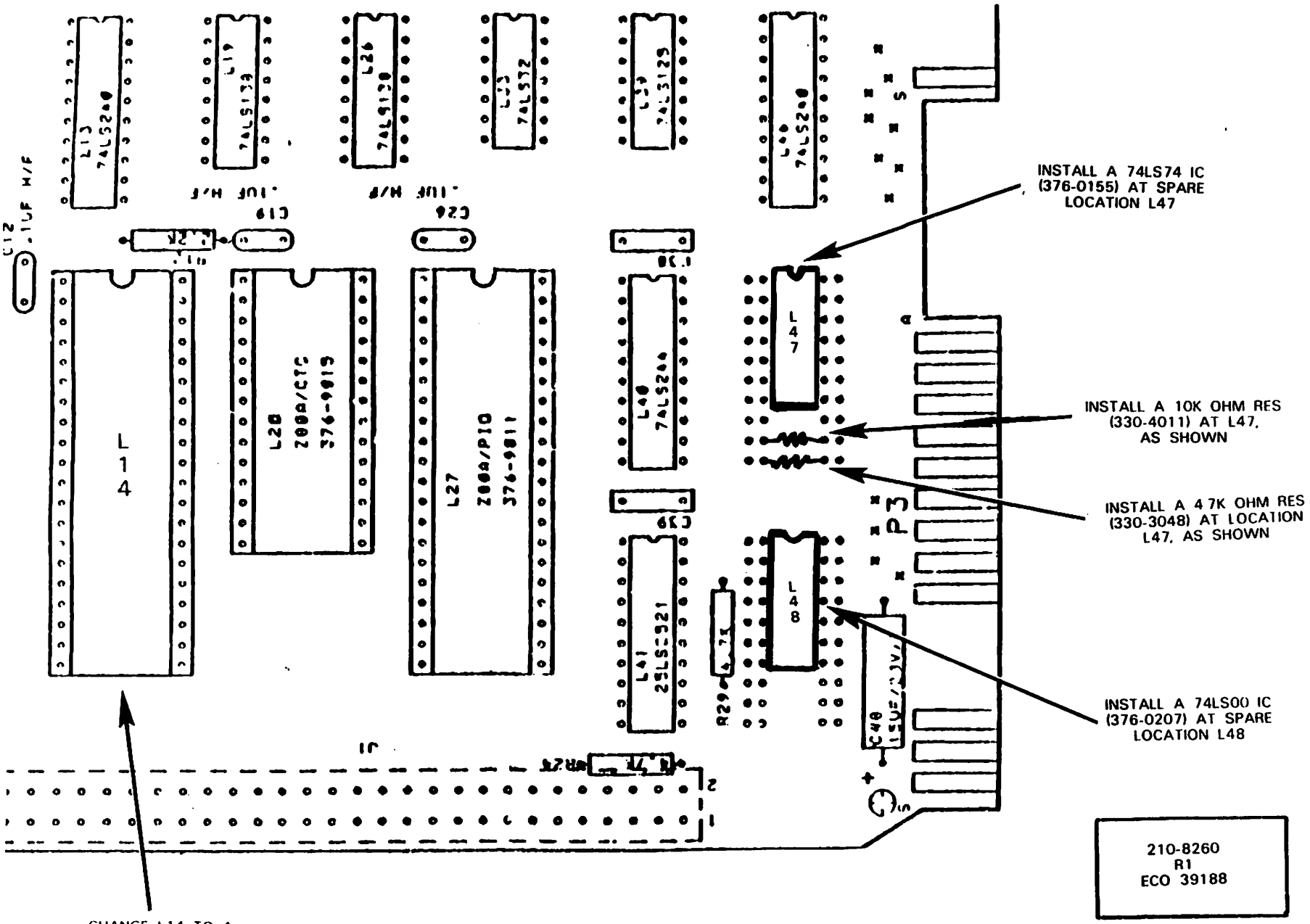


ILLUSTRATION B

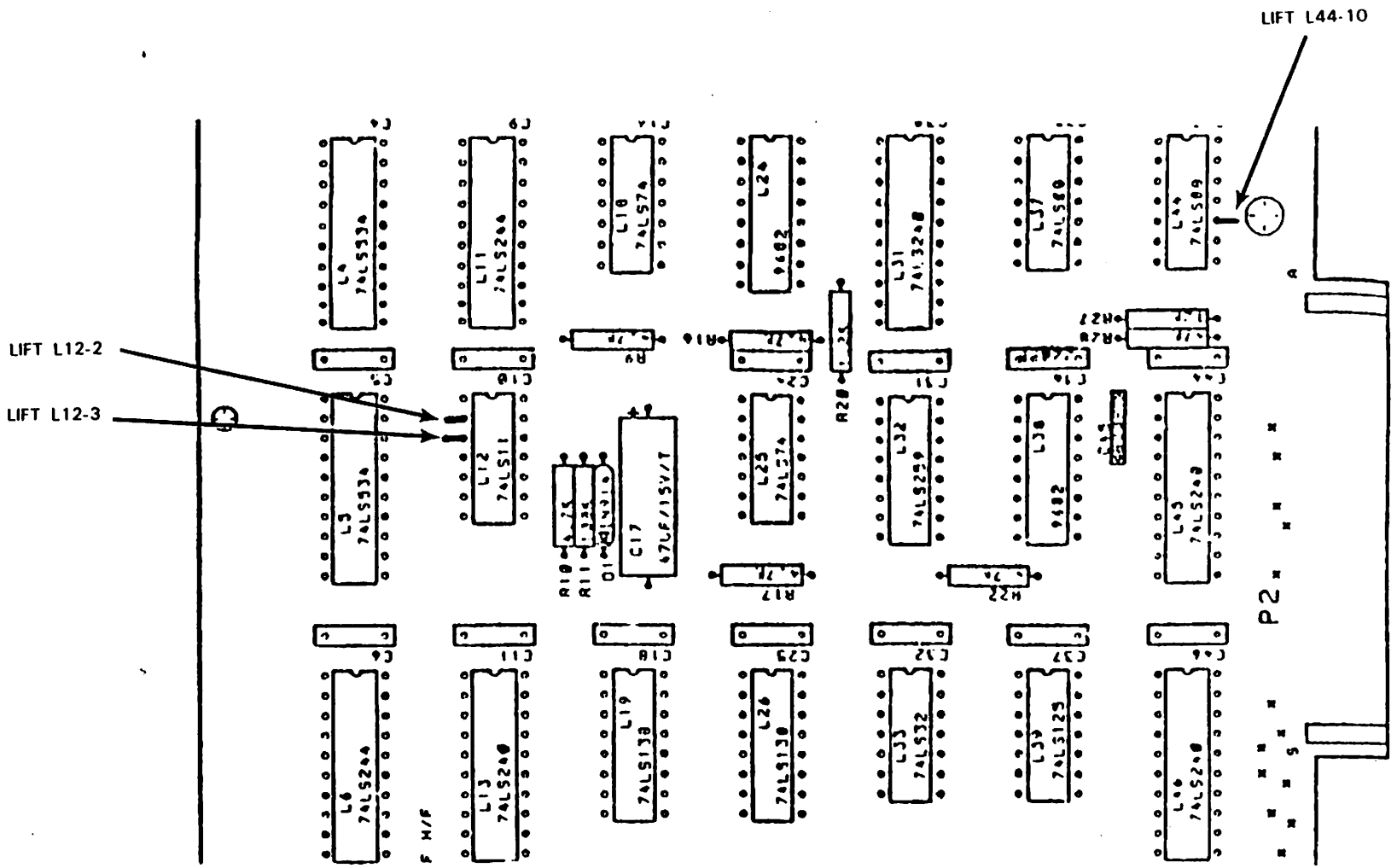
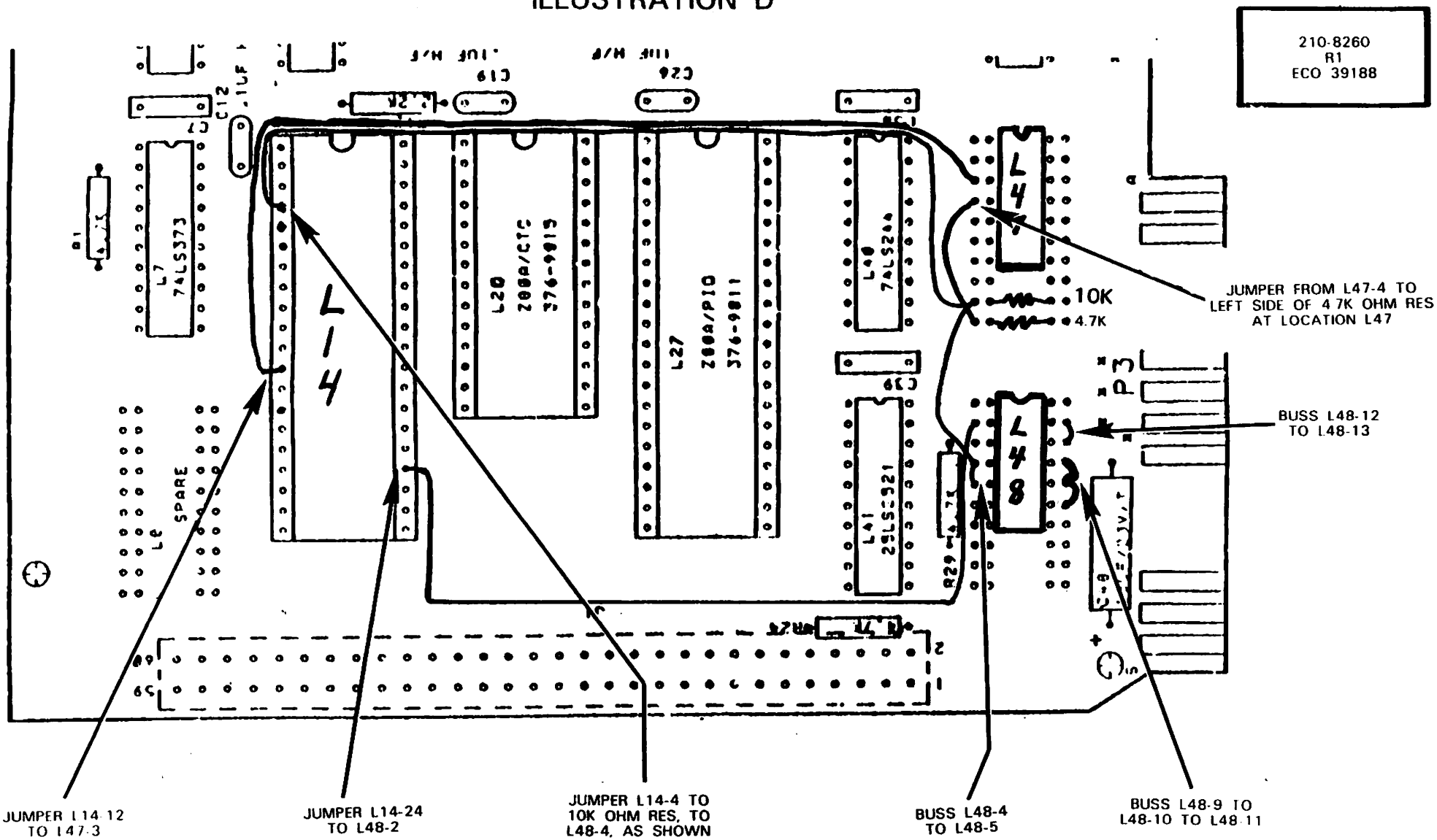
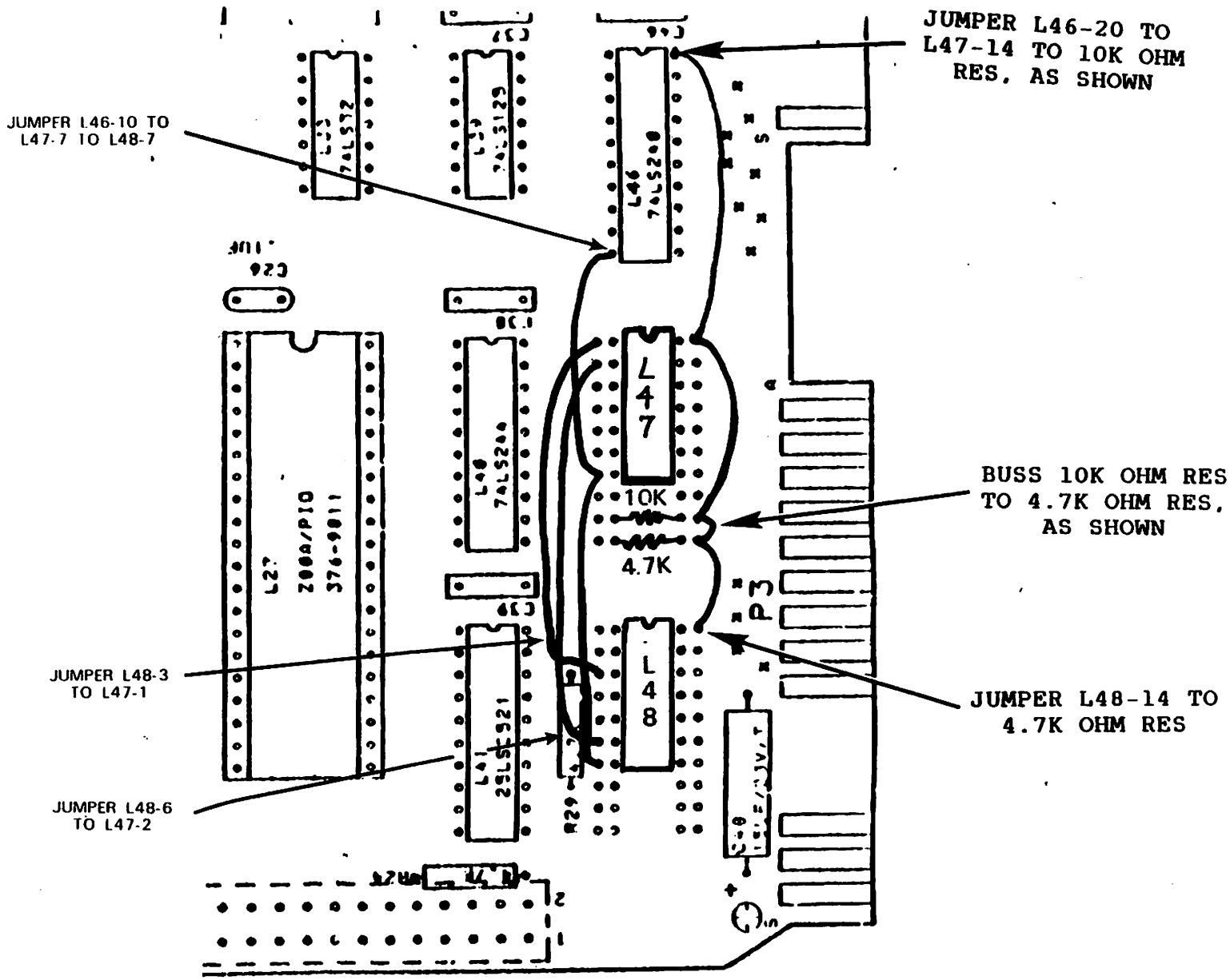


ILLUSTRATION C

210-8260
R1
ECO 39188

ILLUSTRATION D





210-8260
R1
ECO 39188

ILLUSTRATION E

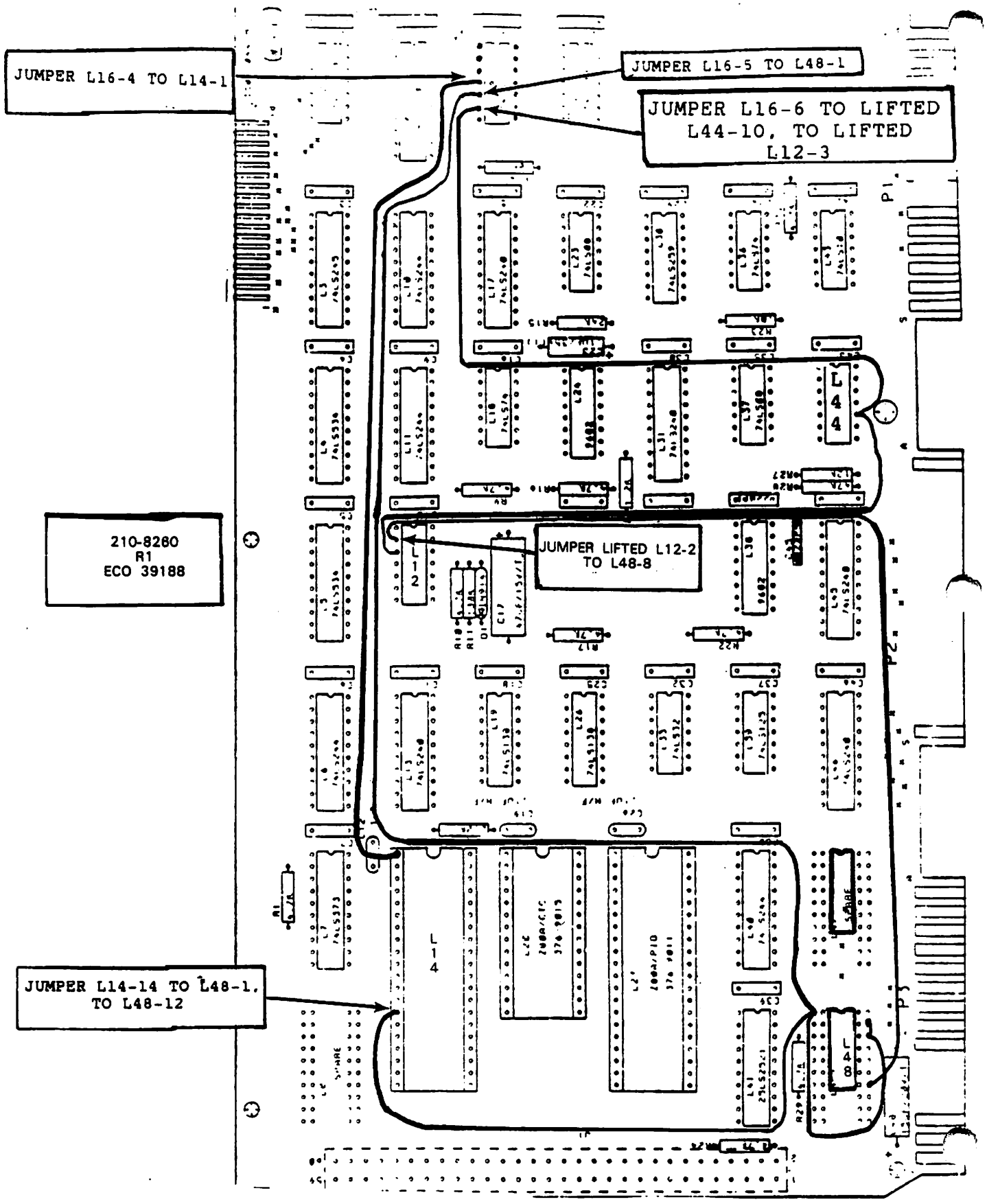


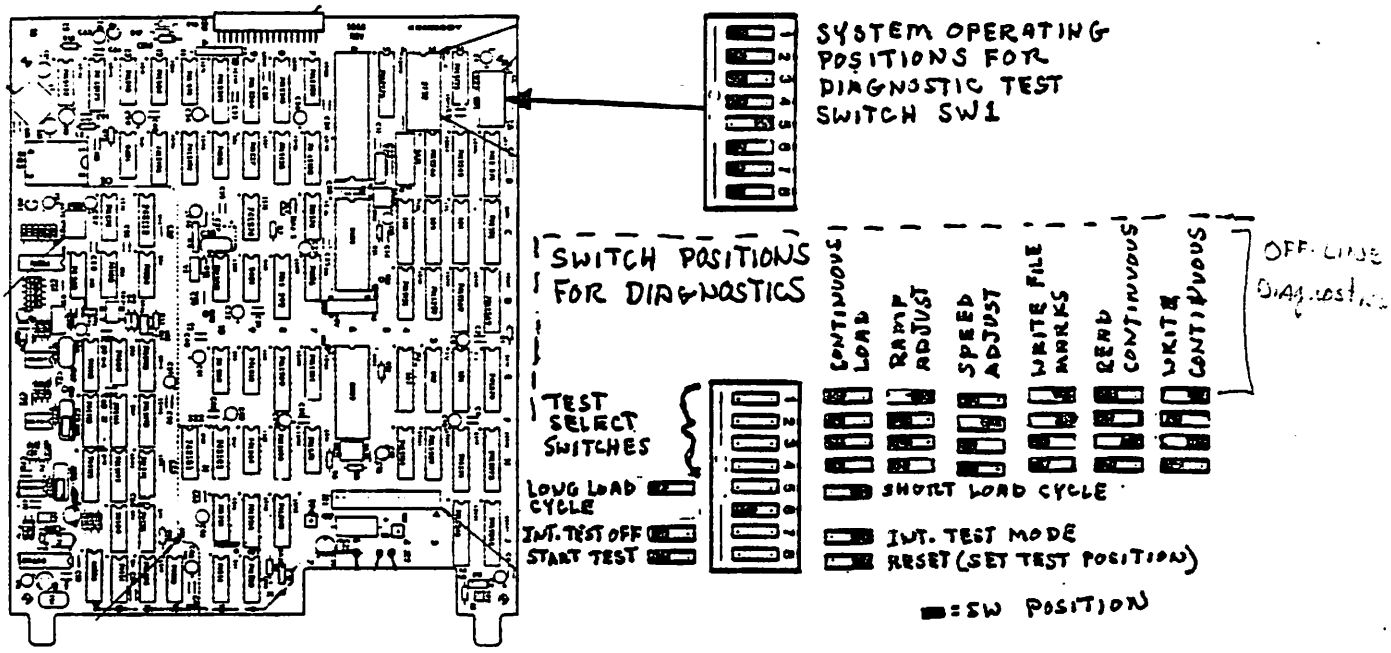
ILLUSTRATION F

SWITCH SETTINGS/JUMPERS

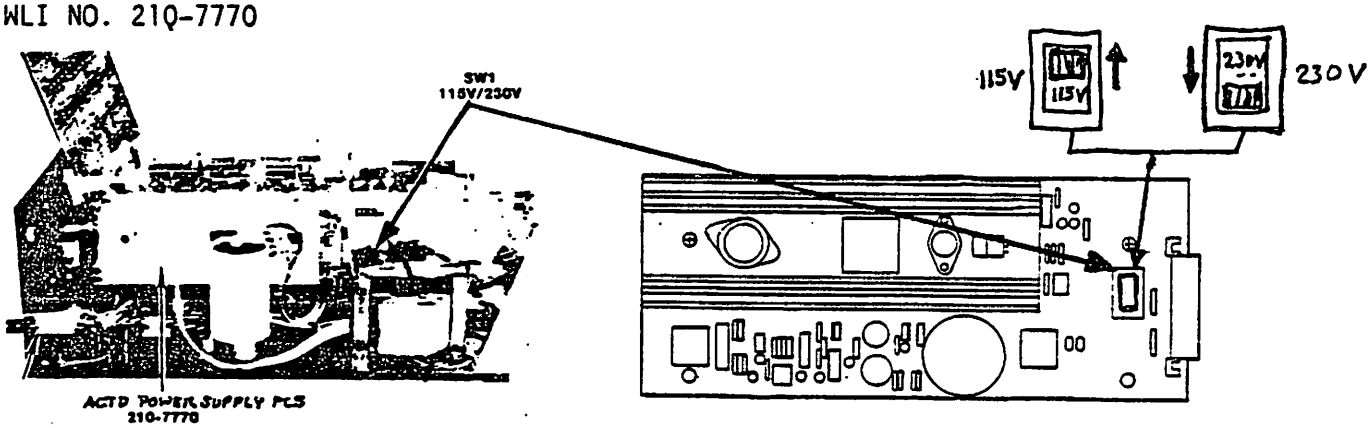
All Models

Provide Pictures and test Point "Camara Ready"

FORMATTER PCB
WLI NO. 726-6205



ACTD POWER SUPPLY PCB
WLI NO. 210-7770



More information is needed on the application of these OFF-LINE Diagnostics.

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare General

NUMBER: HWG 8003 REPLACES: _____ DATE: 02/16/88 PAGE 1 OF 1

MATRIX ID. 3202 PRODUCT/RELEASE# Kennedy ACTD

TITLE: Protective Head Covers for the Kennedy ACTD

PURPOSE:

To inform the field that when replacing the Cartridge Tape Sub Assembly (WPN 278-4029) in the Kennedy Archiving Cartridge Tape Drive (Wang Models 2229, 2529 and 6529), the plastic protective cover should be transferred from the new unit to the one being returned.

EXPLANATION:

Each Tape Sub Assembly received from stock has a plastic protective cover on the head assembly. When replacing this unit for whatever reason, the plastic cover should be taken from the replacement unit and installed on the head assembly of the unit being sent back R&R, thereby protecting the head during transit.

GROUP: Desktop Systems/Peripheral Support Group MAIL STOP: 001-140

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WANG

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 7109 REPLACES: _____ DATE: 05/12/87 PAGE 1 OF 2

MATRIX ID. 3202 PRODUCT/RELEASE# 2229

TITLE: IMPROPERLY WIRED 2229 TAPE CONTROLLERS

PURPOSE:

To locate all improperly wired (212-3037) TAPE CONTROLLERS that may cause data integrity problems and correct them.

EXPLANATION:

Recently a problem was identified with the 212-3037 tape controller being improperly wired for ECO # 39188. The problem resulted in a loss of data. In this particular situation the customer was backing up to the tape drive. It appeared to be backing up successfully as no errors were reported. However when the tapes were checked they were found to be blank.

Due to the possible ramifications of such a problem, all sites using the 2229 tape unit must be checked as soon as possible.

Proper wiring can be verified by the following:

Using an OHM meter verify that the 8260 board agrees with the 3 steps listed below.

1) Open between pin 4 of L14 and the platethru just below pin 20 of L14. (see picture page 2)
2) Pin 6 of L47 is shorted to the platethru just below pin 20 of L14.
3) Check for an open between pin 6 of L47 and pin 20 of L14.
   600 - 800 Ω's if Reverse Leads

The board improperly wired can be identified by the following:

1) A short from pin 6 of L47 to pin 20 of L14.

CORRECTIVE ACTION:

The controller may be incorrectly wired on either side of the 8260 board and therefore an OHM meter must be used! After the jumper has been moved to the correct location, check by using the 3 steps listed above.
Any controller not repaired on site and returned for repair, should be accompanied with a repair tag clearly stating this problem.

*** It is essential that the customer perform a backup immediately if this problem exists, as they may not have a backup otherwise.

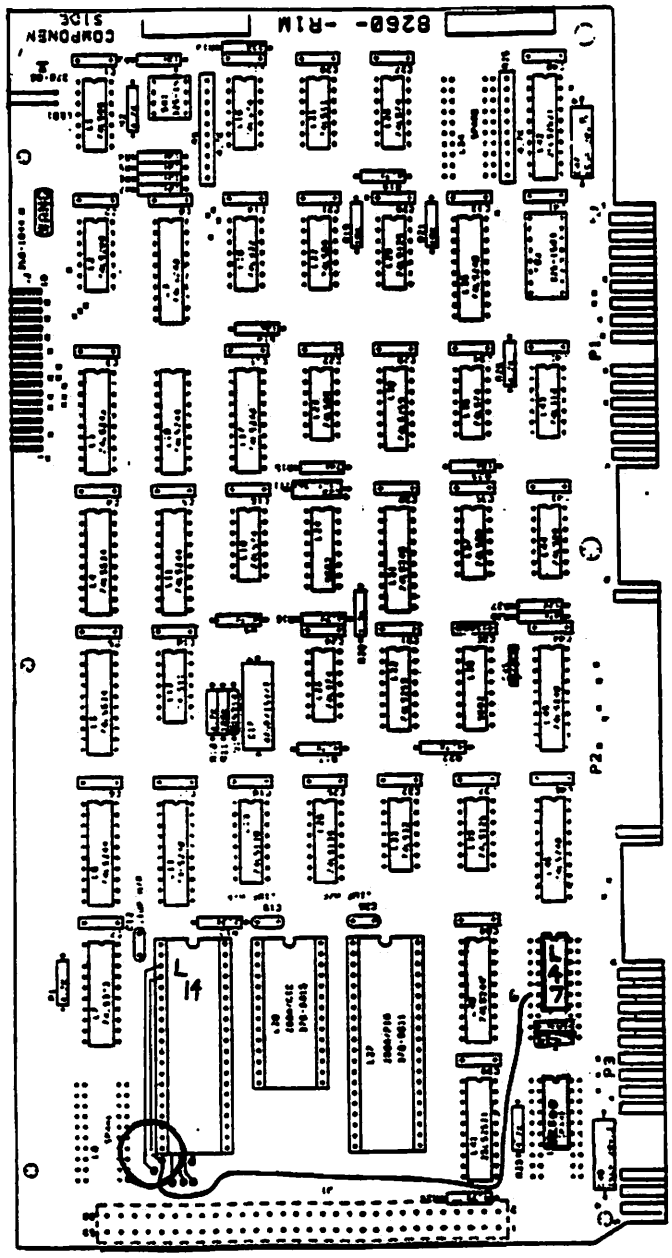
GROUP: VS On-Line Support MAIL STOP: 001-260

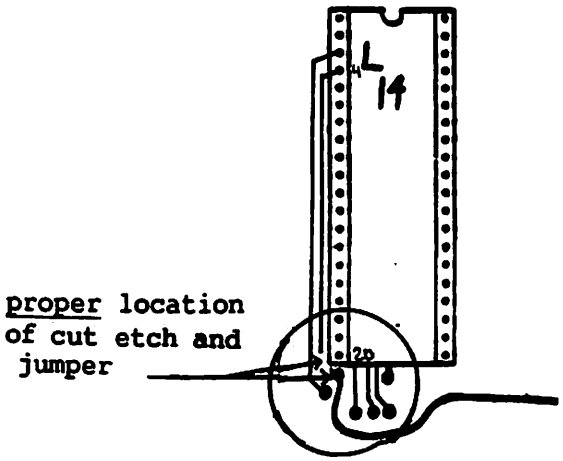
TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 7109 REPLACES: _____ DATE: 05/12/87 PAGE 2 OF 02

MATRIX ID. 3202 PRODUCT/RELEASE# 2229

TITLE: IMPROPERLY WIRED 2229 TAPE CONTROLLERS





GROUP: VS On-Line Support MAIL STOP: 001-260

COMPANY CONFIDENTIAL

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TECHNICAL SERVICE BULLETIN
SECTION: Hardware General

NUMBER: HWG 6020 REPLACES: N/A DATE: 07/22/86 PAGE 1 OF 1

MATRIX ID. 3200 PRODUCT/RELEASE # 2229/6529/2529/PC-PM038

TITLE: Tape Cartridge Head Cleaning Kit

PURPOSE:

To inform the field of the introduction of new Wang recommended Head Cleaning kits. These kits can be ordered by CE's and/or customers.

EXPLANATION:

The Kennedy cartridge drive and the Cipher Cartridge drive require periodic maintenance to assure efficient, smooth and error-free operation. Unlike other data recording devices, read/write heads on tape drives are difficult to reach without partially disassembling the drive. These kits will allow the CE's or the end user to clean the heads on the drives. They are safe and simple to use.

The following items can be ordered through Wang Direct:

DESCRIPTION	WANG PART NUMBER	SUGGESTED CLEANING SCHEDULE
QIC-II Cartridge Drive Cleaning Kit	725-1412	after 20 hours of operation
QIC-II Refill	725-1412R	

Wang Direct will be able to supply these kits to the customers by the first week of August.

GROUP: Peripheral Hardware Support Group MAIL STOP: 0125

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WANG

TECHNICAL SERVICE BULLETIN
SECTION: SoftWare Technical

NUMBER: SWT 6032 REPLACES: _____ DATE: 03/04/86 PAGE 1 OF 1

MATRIX ID. 4303 PRODUCT/RELEASE# 2200 2229 Cartridge Tape Drive

TITLE: 2229 CARTRIDGE TAPE DRIVE BACKUP/RESTORE

PURPOSE:
To inform the field of known problem with the 2229 cartridge tape drive.

EXPLANATION:
There is a known intermittent problem with the 2229 Controller board, when restoring from a backup tape. If the condition exists, then during the restore one of several errors may occur. They could be intermittent error code '8', Tape Read Error, Label is not 256 bytes, Data not on Page or any other error during system backup. When restoring from the 2229, the data will appear to be garbage even though the original backup appeared to run without a problem, but now the data has random 00's or FF's in it.

ECO has been processed, so that more boards (#210-8260A) can be updated & sent out.

210-8260A NEEDS TO BE E-REV 1 / ECO 39188.

39188

GROUP: VS/2200 Software Support MAIL STOP: 0115

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WANG

TECHNICAL SERVICE BULLETIN
SECTION: SoftWare Technical

NUMBER: SWT 5159 REPLACES: _____ DATE: 11/05/85 PAGE 1 OF 1

MATRIX ID. 1200 PRODUCT/RELEASE# WP PLUS 1.92

TITLE: WP PLUS 1.92 TAPE CASSETTE INSTALLATION

PURPOSE:

To inform the field of a problem when installing WP PLUS 1.92.

EXPLANATION:

When installing 1.92 WP PLUS, if an incorrect system volume password or no password is entered when performing a Cartridge Tape installation, the installation will fail shortly after starting with a "Tape Cassette Error, Unable to Continue Installation". THIS IS NOT A HARDWARE PROBLEM WITH THE CASSETTE DRIVE. WP PLUS does not check or verify that the System Volume password is correct, so precaution must be taken to make sure the password is entered correctly or not left blank.

If the password was entered correctly and the installation fails, the install program displays a "part" number as it completes each software package that was installed. Refer to the Software Release Notice 1.92 to determine what software package was last installed. This may help to troubleshoot why the installation failed.

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5003 REPLACES: N/A DATE: 01/08/85 PAGE 1 OF 01

MATRIX ID. 3202 PRODUCT/RELEASE# Kennedy ACTD

TITLE: Head Protector Kennedy Archiving Cartridge Tape Drive

PURPOSE:

To inform the field that the head protectors for the ACTD will be removed in Manufacturing.

Currently the ACTD (models 2229,2529 and 6529) are meant to be customer installable on some systems. In the past, because of manufacturing procedures, a felt strip and plastic cover were left in place which required CE installation. This procedure has been changed. The felt strip and plastic cover are now removed prior to assembly of the complete unit.

Some previously manufactured units will be shipped with the felt strip and plastic cover in place, however newly manufactured units can be installed by the customer when appropriate.

If CE installation is required, insure that the felt strip and plastic cover are removed if contained on the unit.

GROUP: Peripheral Hardware Support Group MAIL STOP: 0125

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#40110

3202

PERIPHERALS-TAPE DRIVES-KENNEDY 9 TRACK/ACTD

TOPIC: FCO 1069 ARCHIVING CARTRIDGE TAPE DRIVE MODELS 2229, 2529V AND 6529

FCO 1069, released in mid-December 1983, requires one EPROM change on the F650 Formatter PCA (WLI# 726-6202: OEM# 190-5663-001). The change upgrades the 2229 and 2529V to work with VS 6.11 operating systems. (The 6529, used in OIS systems, is being upgraded to insure interchangeability with VS systems). FCO 1069 documents Kennedy ECN #'s 11281, 11448, 11478, 11819 & 11900. To obtain the FCO Kit, place a routine order through the Logistics Order Processing System for WLI 728-0085.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#30510

3205
PERIPHERALS-TAPE DRIVES-ARCHIVING CARTRIDGE TAPE DRIVES

TOPIC: ARCHIVING CARTRIDGE TAPE DRIVE (MODELS 2529V & 6529) ERROR DECODING

Errors found in the power up diagnostic on the Archiving Cartridge Tape Drive (Models 6529 & 2529V) are reported via the control panel FAULT indicator and the four LEDs on the 210-8262-A controller board. Some of these errors will indicate which chip may be bad. This chip should be replaced in the field. The entire board should be replaced only if no field replaceable chip is given in the error table, or if the diagnostic does not locate the defective chip. To decode these errors, follow these instructions:

A. Determine the light pattern of the four LEDs on the 8262 board.
B. Calculate the Hex value of the pattern and match the LED pattern to the error table.
C. Find the row on the error table that exactly corresponds to the light pattern and the Hex value of the LEDs on the board.
D. Look under the column labeled "LOC #" to verify the location of the field replaceable chip.
**NOTE: If there is no "LOC #" in this column then there is no field replaceable chip.
E. Look under the column labeled "FAILING PART" to further isolate component or circuitry causing the failure.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#30510

3205
PERIPHERALS-TAPE DRIVES-ARCHIVING CARTRIDGE TAPE DRIVES

TOPIC: ARCHIVING CARTRIDGE TAPE DRIVE (MODELS 2529V & 6529)
ERROR DECODING (CONTINUED)

LED VALUE	LED3	LED2	LED1	LED0	LOC.#	PROBABLE FAILING UNIT
01				@	L91	MEM CHIP #1
02			@		L101	MEM CHIP #2
03			@	@	L110	MEM CHIP #3
04		@			L111	MEM CHIP #4
05		@		@	L121	MEM CHIP #5
06		@	@		L131	MEM CHIP #6
07		@	@	@	L132	MEM CHIP #7
08	@				L142	MEM CHIP #8
09	@			@	L152	PARITY CHIP
0A	@		@		L54	DMA CHIP
0B	@		@	@		LOOP-BACK CIRCUITRY
0C	@	@			L47	CTC CHIP
0D	@	@		@	L54	DMA CHIP (INTERRUPT)
0E	@	@	@		L47	CTC CHIP (INTERRUPT)
0F	@	@	@	@		TAPE INTERFACE CIRCUITRY

ERROR REPORTING TABLE
NOTE: "@" = LED ON

VS

2229/2529V Archiving Cartridge Tape Drive:

Compatibility Problem With VS 6.11 Operating System

FCO 1069 has been released to insure proper operation of the 2229/2529V with VS 6.11 Operating System and is only required if using that operating system. The FCO involves replacing .1 EPROM at location A3 of the F650 Formatter PCA (726-6202).

728-0085	FCO Kit 1069 (includes prom and documentation)
726-6338	EPROM

TO: DICK FISHER, FIELD SERVICE
FROM: JACK MANION, MANUFACTURING ENGINEERING, TEWKSBURY
DATE: 8 OCTOBER, 1985
SUBJ: 2229 TAPE DRIVE CTRLR

I am currently evaluating a component problem on the 2229 Tape Drive Controller (212-3037). It appears that L27 (377-0373, Z80A PIO) on the 210-8260 mother PCB functions with more reliability when it is a Mostek device. This is the information that I have been receiving from Tewksbury's tech repair center.

In checking with Purchasing, I found that Mostek stopped shipping that part for several months due to a die problem. This appears to have increased the visibility of the problems with the other vendors (Zilog, AMD, Sharp). We are seeking a solution at this time. In the interim, we have procured 1000 Mostek parts and will use those in 8260s exclusively until the problem is corrected.

cc:
John Beauregard
Steve Puzas
Vince Ramby

WANG LABORATORIES, INC.

BULLETIN

DATE: 1/30/85 ADMINISTRATIVE ____ TECHNICAL X NUMBER 328

ORIGINATOR: Dennis Ivey REVIEWED BY: Homer Ludwick

DISTRIBUTION: ATS X DSSM/DTS/DTSM/DSS DM ____ ATOM X

ALL OFFICES X HOME OFFICE X EACH EMPLOYEE ____

SUBJECT: VS SAU PAGE 1 OF 1

Operating system tape cartridges are now being created by many sources within the Area. I would like to make the field aware of a problem with installing an operating system utilizing SAU (Stand Alone Utility).

When copying a system under SAU, you must make sure that the tolerance specified on the output volume matches the tolerance on the original volume that tape cartridge was created against. If not the following problems will result.

(1) System may drop into control mode intermittently during SAU copy operation.

(2) Erroneous VTOC errors may be returned against Output Vol.

(3) System may report input tape IO errors.

Circumvention:

Assure the tolerances match before proceeding with copy operation.

CAT 6301

Intended For: This Item is In Progress
Author: Mike Bahia
Subject: Thanks

I92 ERRORS w| 2229 TAPE DRIVE.

To: Mike Bahia From: George Weeks
Subject: Thanks Date Sent: 10/13/93

Mike;
The problem with the Tape drive I talk with you on last week was a compatabilit y problem. They had a printer at 218 and the tape drive at 018. This phone line is noisy so will have to go. Thanks for the help...
George Weeks - Knoxville TN CRE

---------- Reply ----------

Glad you got it fixed. Thanks for the update.
Mike

Kevin Massie, Lexington, KY

2229 Tape Unit

Back up ok but cannot restore.

Bad I/O slot. Had replaced unit, cable, & controller but symptom did not change. When tried new I/O slot problem went away. Could reproduce by using old slot again.

Page 1 of 2 Pages

Please Type or Print Legibly

Social Time Unit

Reference or Issue Self Report

Did Unit Commander / Duty Officer Need Up Date Position Upon Completion of Task?

H E A D E R I N F O

PROBLEM NUMBER M100003221

PROBLEM NUMBER: M100003221
PRIORITY P1

PROBLEM TYPE: PRE
LINK TO PROB NO:

SYSTEM MODEL NO: CS-10D
GEN SYST MODEL: 2200 CS
O. S. VERSION: 00 07
HW MODEL NUMBER:
SW MODEL NUMBER: CS-10D
SW VERSION: 00 07

ALL INFO. AVAILABLE: Y

SERIAL NUMBER:

CALL TRKG DATE: 00/00/00 00:00
CALL TRKG NO:

STATUS DATE: 04/08/93
STATUS CODE: S C 595
STATUS ABBREV: PERM FIX
STATUS DESC: PERMANENT FIX - GENERAL RELEASE

CUST NAME:
CUST NUMBER:

CUST CONTACT:
CUST CONT PHONE: - - -
CUST ADDRESS 1:
CUST ADDRESS 2:
CUST ADDRESS 3:
CUST CITY:
CUST ST/PROV:
CUST ZIP: - CUST RDB:
CUST COUNTRY:

RDB ASSIGNED: 8760
PERSON ASSIGNED: BAHIA MICHAEL E
ORIG NAME: RILEY J MICHAEL
ORIG EMPL NO: 00-42654
ORIG PHONE: - - -
ORIG RDB: 8760

DATE ENTER PTR: 04/12/89
RES DEPLOYED:

DATE TO R&D: 04/17/89
WKDAYS IN R&D: 36.00
TOT WKDAYS OPEN: 457.00

PROBLEM STATEMENT :RILEY J MICHAEL DATE: 04/12/89 TIME: 08:27
CS386 O. S. :2229 Tape Unit will ERROR OUT with a 192 when running long test.

PROBLEM NO: M100003221
STATUS CODE: S C 595 STATUS ABBR: PERM FIX DATE ENTERED: 04/08/93

ORIGINAL	MODEL NUMBER	GENERIC MODEL		VERSION
SYSTEM :	CS-10D	2200 CS	O.S:	00 07
HARDWARE:				
SOFTWARE:	CS-10D	2200 CS CPU	SWR:	00 07

		VERSION
	O.S:	
	SWR:	

SOLUTION TEXT :BAHIA MICHAEL E DATE: 04/08/93 TIME: 10:28
SC595. No problem on VLSI 3.5 or 386 1.1z using 2229 Tape Utilities rel 2.0 with the configuration 16 prom per FCO 1069 from 12/83. Ran long test for 2 straight days on both CPU types without failure. Close call.

ASSIGNED: BAHIA MICHAEL E DATE: 04/08/93 TIME: 10:27
Tested on both the VLSI with O/S 3.5 and the 386 w/ O/S 1.1z and no problems running the long test with the 2229 Tape Utilities with prom rev 16 (FCO 1069). Ran test without error with both CPUs for 2 straight days. With pron rev 10 would get intermittent error 8 on Tape Write within 8 passes on either machine.

ASSIGNED: BAHIA MICHAEL E DATE: 04/05/93 TIME: 10:18
Tested against rel 3.5. Did get an error both with the Short & Long Test w/ 2229 Utilities 2.0 with new tape. After wring on the tape no problem. Ran 8 passes of the long test before coming up with a write error. No 192. 2229 had prom rev 10 as displayed by the diagnostic program while executing. Started long test on 2229 with 386 1.1z. Still running on first pass, no errors. Diagnostic displays 2229 Prom rev as 16.

ASSIGNED: BAHIA MICHAEL E DATE: 03/04/93 TIME: 08:43
Problem accepted. Need to test.

ASSIGNED: ROY EUGENE T DATE: 03/03/93 TIME: 14:05
Clean up 2200 maint mailbox

ASSIGNED: RILEY J MICHAEL DATE: 04/12/89 TIME: 08:27
Run 2229 Diag. long test.

SELECTION CRITERIA

PTR NUMBER -	START: C200004646		END: C200004646
PRIORITY:	ALL		
PROBLEM TYPE:	ALL		
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL	ORIG RDB: ALL
HW/SW INDICATOR:	ALL		
STATUS TYPE:	C		
STATUS CODE:	ALL		

PROBLEM NUMBER:	C200004646	CUST NAME:	WANG LABORATORIES INC
PRIORITY	P3	CUST NUMBER:	00 00000507103
PROBLEM TYPE:	INFO	CUST CONTACT:	DAVID KEIMIG
PRODUCT PROB NO:	NOT LINKED	CUST CONT PHONE:	-713-783-5294
		CUST ADDRESS 1:	7111 HARWIN DR STE 101
		CUST ADDRESS 2:	
		CUST ADDRESS 3:	
SYSTEM MODEL NO:	VS65	CUST CITY:	HOUSTON
GEN SYST MODEL:	VS MIDRANGE VS	CUST ST/PROV:	TX
O. S. VERSION:		CUST ZIP:	77036-0000
HW MODEL NUMBER:	2509V	CUST COUNTRY:	
SW MODEL NUMBER:		RDB ASSIGNED:	8760
SW VERSION:		PERSON ASSIGNED:	BAHIA MICHAEL E
PART NUMBER:		ORIG NAME:	BAHIA MICHAEL E
PART NUM REV:		ORIG PHONE:	- - -
CALL TRKG DATE:	00/00/00	NETWORKED:	N
CALL TRKG NO:		RES DEPLOYED:	
ORG ACT/SYM/ACN:		DATE ENTER PTR:	03/30/89
STATUS DATE:	05/01/89	DATE TO R&D:	
STATUS CODE:	H C 640	WKDYS IN R&D:	20.79
STATUS ABBREV:	RP KN FAIL	TOT WKDYS OPEN:	20.79

PROBLEM SUMMARY :BAHIA MICHAEL E DATE: 03/30/89 TIME: 17:39
D.E. CAREN EMP28978 DAVID KEIMIG DSP329752 OFF713-968-7880
HAVING A PROBLEM WITH MOUNTING THE SERIAL TAPE DRIVE.

ASSIGNED: BAHIA MICHAEL E DATE: 05/01/89 TIME: 10:12
LEFT MESSAGE AT OFFFICE TO CALL. (5MIN) MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 03/30/89 TIME: 18:35
DRIVE SEEMS TO WORK FINE IF ON AT IPL & LEFT ON BUT IF POWER OFF & BACK ON USUALLY WON'T LOAD UCODE. HAS TRIED SER INT BRDS, FORMATTER BRDS, PORT, & CABLES TO & FROM SER INT. HAS O/S 7.10. MANY INTERFACE PROBS ARE CABLE CONNS. CE TO CHECK CABLE CONNECTORS FOR CRACKS OR ANY TYPE PROB FROM CPU TO TRANSPORT. MAY ALSO HAVE PROB IN INTERFACE SECTION OF XSPORT. WILL TRY THOSE BRDS. IS TRYING TO LOAD CODE USING MOUNT. POSSIBLE COULD BE MARGINAL SER DA OR O/S PROB. O/S TO UPDATED NEXT WEEK. (40MIN) MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 03/30/89 TIME: 17:39

SELECTION CRITERIA

PTR NUMBER -	START: C200004646		END: C200004646
PRIORITY:	ALL		
PROBLEM TYPE:	ALL		
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL	ORIG RDB: ALL
HW/SW INDICATOR:	ALL		
STATUS TYPE:	C		
STATUS CODE:	ALL		

PROBLEM NUMBER:	C200004646	CUST NAME:	WANG LABORATORIES INC
PRIORITY	P3	CUST NUMBER:	00 00000507103

REPLACED. REPLACED SER CONTROLLER & NO PROB SINCE. ALSO FOUND THAT IF DISCO
NNECTED EITHER THE BNC OR TNC WOULD WORK CORRECTLY. CLOSE CALL /CE.
(10MIN) MIKEB

SELECTION CRITERIA

PTR NUMBER -	START: C200003566		END: C200003566
PRIORITY:	ALL		
PROBLEM TYPE:	ALL		
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL	ORIG RDB: ALL
HW/SW INDICATOR:	ALL		
STATUS TYPE:	C		
STATUS CODE:	ALL		

PROBLEM NUMBER:	C200003566	CUST NAME:	COMPCO INC
PRIORITY	P3	CUST NUMBER:	00 00001155571
PROBLEM TYPE:	INFO	CUST CONTACT:	TERRY RICHARDSON
PRODUCT PROB NO:	NOT LINKED	CUST CONT PHONE:	-615-373-3636
		CUST ADDRESS 1:	151 ATHENS WAY STE 101
		CUST ADDRESS 2:	
		CUST ADDRESS 3:	
SYSTEM MODEL NO:	VS300	CUST CITY:	NASHVILLE
GEN SYST MODEL:	VS HIGH END VS	CUST ST/PROV:	TN
O. S. VERSION:		CUST ZIP:	37228-0000
HW MODEL NUMBER:	2529V	CUST COUNTRY:	
SW MODEL NUMBER:		RDB ASSIGNED:	8760
SW VERSION:		PERSON ASSIGNED:	BAHIA MICHAEL E
PART NUMBER:		ORIG NAME:	BAHIA MICHAEL E
PART NUM REV:		ORIG PHONE:	- - -
CALL TRKG DATE:	00/00/00	NETWORKED:	N
CALL TRKG NO:		RES DEPLOYED:	
ORG ACT/SYM/ACN:		DATE ENTER PTR:	03/10/89
STATUS DATE:	03/28/89	DATE TO R&D:	
STATUS CODE:	H C 625	WKDYS IN R&D:	12.58
STATUS ABBREV:	REFERRED	TOT WKDYS OPEN:	12.58

PROBLEM SUMMARY :BAHIA MICHAEL E DATE: 03/10/89 TIME: 09:46
EMP# 34781 DISPATCH 133876
HAVING PROBLEM WILL TAPE DRIVE WILL ONLY WORK AFTER IPL.

ASSIGNED: BAHIA MICHAEL E DATE: 03/28/89 TIME: 15:08
LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 03/10/89 TIME: 10:41
TAPE DRIVE WORKS FINE IF ON AT IPL & USE IMMEDIATELY, BUT CE SAYS IF USE DURING DAY CAN'T ACCESS. TOLD CE TO POWER OFF UNIT & NOT TO POWER ON UNTIL MOUNT PROCEDURE REQUESTS TAPE MOUNTED. AT THAT TIME THE UNIT SHOULD BE POWERD ON & THE TAPE LOADED & THIS SHOULD FORCE LOAD UCODE. IF THIS DOES NOT WORK MOST LIKELY THE INTERFACE BRD IN THE DRIVE IS BAD. (15MIN) MIKEB

ASSIGNED: WHITE DONNA P DATE: 03/10/89 TIME: 09:46

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 03/28/89 TIME: 15:55
HC 625. AFTER IPL TAPE DRIVE SEEMED TO WORK FINE BUT ALL DEVICES WOULD BE
MISSING FROM DEVICE LISTINGS. IF TRIED TO MOUNT AFTER LEFT ON

W A N G L A B O R A T O R I E S I N C .
PROBLEM TRACKING AND REPORTING
CUSTOMER ACCOUNT DETAIL REPORT

SELECTION CRITERIA

PTR NUMBER -	START: C200003566		END: C200003566
PRIORITY:	ALL		
PROBLEM TYPE:	ALL		
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL	ORIG RDB: ALL
HW/SW INDICATOR:	ALL		
STATUS TYPE:	C		
STATUS CODE:	ALL		

PROBLEM NUMBER:	C200003566	CUST NAME:	COMPCO INC
PRIORITY	P3	CUST NUMBER:	00 00001155571

FOR AWHILE WOULD JUST HANG. SOMETIMES WOULD CAUSE SYTEM TO GO INTO CONTROL MODE. TRIED 2ND TAPE DRIVE & ALSO REPLACED UCODE BUT NO CHANGE. WANTS TO CLOSE CALL. APPEARS TO HAVE S/W PROB. SS TO LOAD NEW O/S. CLOSE CALL /CE.
(15MIN) MIKEB

TAC

Problem Call

Control Number 08340020

Contact Name TIM TAYLOR Position CE
Rdb # 3414 Tdx # Phone # 703 471 0193 Ext #

System Type 2200 Device Type 2229
Utility Name Software Level

Method of Call P T = Telex, P = Phone, M = Memo, E = Ems
Has the Area or District been contacted
N A = Area, D = District, B = Both, N = None
Is this inquiry pertaining to a National Account ?
U Y = Yes, N = No, U = Unknown

Use the following area to describe the site that created this request
Cust/Office Name Phone #
Address 6510 City State
On Site Contact Name

Problem (*) Solution (+)

*EMP#23526
*DSP#N/A
*PROBLEM WITH ERROR 92 TAKING CONTROL OF THE STATUS
*ONSITE# 703-648-1168
12/5/88: GETS I92 TAKING CONTROLLER STATUS W/ CUST S/W.
GETS I92 W/ WANG S/W ALSO. BROUGHT TAPE DRIVE &
CONTROLLER TO ANOTHER SITE & TESTED OK. CE TO
REMOVE ALL EXCESS CONTROLLERS FROM CPU & TEST.
SHOULD ALSO CHECK AC POWER TO TAPE DRIVE & INSURE
BOTH DRIVE & CPU PROPERLY GROUNDED & CABLE BETWEEN
GROUNDED. IF STILL FAILING MAY WANT TO RETRY AT
OTHER SITE &/OR BRING A 2ND UVP TO SITE. HAS TRIED
ALL BRDS EXCEPT CPU & HAS TRIED DIFFERENT SLOTS.
(20MIN) MIKEB
+PROBLEM WAS HAD 4 PRINTER CONTROLLERS AT ADDRESSES 215,
+216, 217, & 218 & 218 WAS CONFLICTING W/ ADDRESS 018 OF
+TAPE DRIVE.
12/7/88: NOW NEED TO KNOW WHAT ARE THE LEGAL PRINTER ADDR'S
IF ANY BESIDES 215 & 216 FOR SYSTEM PRINTERS. LEFT
MESSAGE FOR TO TO CALL ME. (10MIN) MIKEB
12/28/88: ADDRESSES 215,216,217, & 218 ARE ALL LEGAL AS LONG
THE LAST 2 DIGITS DO NOT CONFLICT W/ THE LAST 2
DIGITS ON ANY OTHER CONTROLLER ADDRESS. LEFT
MESSAGE AT OFFICE FOR CE TO CALL. (10MIN) MIKEB
+GAVE CE INFO. ADDRESSES 215, 216, 217, & 218 CAN ALL BE
+USED FOR PRINTERS AS LONG AS THE LAST 2 DIGITS DO NOT CON-
+FLICT W/ THE LAST 2 DIGITS OF ANY OTHER CONTROLLER. CLOSE.
1/17/89 (10MIN) MIKEB

TAC

PROBLEM CALL

CONTROL NUMBER C7099130

CONTACT NAME ROSALINDA BALLARD POSITION CE
RDB # 3117 TDX # PHONE # 603 472 2262 EXT #

SYSTEM TYPE 2200MVP DEVICE TYPE 2229
UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME PHONE #
ADDRESS 6501 CITY STATE
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*EMP 20072
*WHAT IS ERROR CODE 8 WHEN PERFORMING TAPE TENSION TEST/FORM
*TAPE LITIALTIES?
*CE WILL CALL BACK COULDN'T REACH ANYONE NOW.
+ERROR 8 IS NOT SPECIFICALLY DEFINED. IT'S MEANING IS DRIVE
+OR CONTROLLER FLT. IF LED ON I/O CONTROLLER ON MOST LIKELY
+CONTROLLER BRD & IF NOT COULD BE TRANSPORT OR INTERFACE
+BRD.
4/9/87: WAITING FOR CE TO CALL BACK. (15MIN) MIKEB
4/10/87: CE REPLACED TRANSPORT -DID NOT HELP.
HAD CE REPLACE I/O CABLE NO GOOD.
+CE TO ORDER I/O AND CONTROLLER FOR MONDAY.
CE ALSO GETTING ISE ERROR ON SYSTEM. WENT OVER FORMAT
SCRATCH. WHEN LISTING OUT FLOPPY BACKUP MADE BY TOM SFTW.
WE FOUND THE SCRATCH WAS SET UP FOR LVP FLOPPY 3873 AND NOT
FOR THE 2275 FLOPPY BEING 1279.
CE WILL CALL BACK ON MON. WITH RESULTS. (30 MIN)
4/13/87: TRIED TRANSPORT, I/O CONTROLLER, & ADAPTER BRD &
STILL GETTING ERROR 8 ON THE TAPE TENSION TEST. CE
TO GET 2ND I/O BRD, ADAPTER BRD, AS WELL AS BRING-
ING THE REGULATOR BRD & THE TRANSPORT. LED ON I/O
BRD IS GOING OUT. IF STILL NO LUCK WILL TEST TAPE
AT A 2ND SITE AS WELL AS THE CONTROLLER.
(15MIN) MIKEB
+BAD REGULATOR BRD. REPLACED & TESTED OK.
(5MIN) MIKEB

TAC

PROBLEM CALL

CONTROL NUMBER 07043102

CONTACT NAME WARDELL JONES POSITION CE
RDB # 3547 TDX # PHONE # 601 956 7190 EXT #

SYSTEM TYPE 2200LVP DEVICE TYPE 2229
UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME CHOCTAW MAID PHONE # 601 267 5601
ADDRESS 6501 CITY STATE
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*EMP 34624
*DSIP # 357644
*CE HAVING TRBL GETTING POWER ON LITE AND DOES HAVE 5 VOLTS
*AT CONTROL PANEL
2/11/87: DRIVE NOT WORKING. CAN NOT GET POWER LITE ON 2229.
MUST HAVE 2229 CABLE TO CPU & BOTH POWERED ON.
DOES & STILL NO POWER LITE. HAS LED ON TAPE CONTROLLER ON WHICH SIGNIFIES A PROBLEM. APPEARS TO HAVE BAD TAPE CONTROLLER. LED ON CONTROLLER SHOULD COME ON FOR MOMENT WHEN CPU POWERED ON & THEN GO OFF & STAY OFF. CE TO GET CONTROLLER, INTERFACE, & DRIVE UNIT. (15MIN) MIKEB
2/23/87: TRIED A 212-3037 CONTROLLER BUT LED ON CONTROLLER WON'T GO OUT W/ OR W/OUT CABLE CONNECTED. TRIED SWAPPING DAUGHTER BDS BETWEEN NEW & ORIGINAL CONTROLLERS & STILL LED DOES NOT GO OUT W/ CABLE IN OR OUT. WILL TEST CONTROLLER LED W/ CABLE DISCONNECTED HERE & CALL BACK CE TO INFORM IF LED SHOULD GO OUT W/ CABLE OFF. (15MIN) MIKEB
>TESTED CONTROLLER. LED SHOULD GO OUT W/ CABLE TO TAPE DRIVE DISCONNECTED. CE TO VERIFY 2ND 5 V SET PROPERLY & REMOVE OTHER I/O BDS & TEST. IF STILL FAILING WILL NEED ANOTHER CONTROLLER, 212-3012. (10MIN) MIKEB
2/26/87: HAS NOW TRIED 4 CONTROLLER BDS AT THIS SITE & W/ ALL OF THEM THE CONTROLLER LED WON'T GO OUT W/ OR W/OUT THE CABLE ATTACHED. CE TO BRING THE 4 CONTROLLERS TO ANOTHER SITE W/ A WORKING TAPE DRIVE TO TEST. DID TRY BDS IN DIFFERENT SLOTS & ALSO W/ ALL OTHER I/O BDS REMOVED. (15MIN) MIKEB
+ORIGINAL CONTROLLER BAD. HAD SW SETTINGS INCORRECT AFTER
+THAT. WOULD NOT PASS POWER UP DIAGS WITH SW'S WRONG.
(5MIN) MIKEB

TAC

CUSTOMER ALERT

CONTROL NUMBER 05346036

CONTACT NAME SEAN MCCORMICK POSITION CE
RDB # 3487 TDX # PHONE # EXT #

SYSTEM TYPE 2200VP DEVICE TYPE 2229
UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME ORBENSKI & KENTWELL PHONE # 703 941 4110
ADDRESS 6503 CITY VIENNA STATE VA
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

**NEED TO KNOW 4 BANK SWITCH SETTINGS
+NEEDS SW SETTINGS ON THE 210-8260 ACTD CONTROLLER WHICH
+PLUGS INTO THE 2200 I/O SECTION. SW BK 1 IS A 4 BK OPTION
+SW. SW 1 & 4 ON NORMALLY FOR 4 TRACK DRIVE. SW 2 IS THE
+ADDRESS SW & SHOULD BE SET FOR ADDR HEX 018, SW 4 & 5 ON
+ONLY.

(15MIN) MIKEB

TAL

PROBLEM CALL

CONTROL NUMBER 05:04114

CONTACT NAME MIKE HARDEMAN POSITION CE
PCB # 3436 TLX # PHONE # 404 955 1135 EXT #

SYSTEM TYPE VS CE DEVICE TYPE 2529V
UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME SEARS PHONE # 404 255 5385
ADDRESS 6512 CITY ATLANTA STATE GA
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*GETTING ERRORS WHEN DOING BACK UP.
10/31/85: WHEN DOING A BACKUP & RESTORE W/ THE STANDALONE UTILITY WORKS FINE BUT SHOWS MANY ERRORS W/ ACTC IN ERROR LOG. THIS APPEARS TO BE A BUG. THE CIR-CUMVENTION APPEARS TO BE TO LEAVE THE ACTC POWERED OFF UNTIL REQUESTED TO INSTALL CARTRIDGE. CE TO HAVE CUST TRY THIS & CALL BACK. ALSO COULD HAVE PROBLEMS IF THE FAULT TOLERANCE OF THE DISK BEING RESTORED TO IS DIFFERENT FROM THE DISK FROM WHICH THE BACKUP WAS MADE. (15MIN) MIKEB
11/11/85: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
11/25/85: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
+LEAVING ACTC POWERED OFF UNTIL NECESSARY CLEARED ERROR LOG.
12/02/85 (5MIN) MIKEB

WANG

VS

Model 2529V Cartridge Tape Drive Operating Procedures

This summary card discusses the physical operation of the Model 2529V Cartridge Tape Drive. For information on VS System utilities that support this peripheral, refer to the *VS System Operations Guide* (800-1102SO) and the *VS System Utilities Reference* (800-1303UT).

The operating controls/indicators for the Model 2529V Cartridge Tape Drive are located on the left side of the front panel.

Pressing the Online button brings the tape drive on-line and causes the indicator lamp to illuminate. When you press the button a second time, you bring the tape drive off-line, and the indicator lamp extinguishes. (This control is disabled when the tape drive is loading or unloading tape.)

The FAULT lamp illuminates when an unrecoverable error condition exists in the controller board or the tape drive. If this condition occurs, the speaker emits a series of warning beeps. This type of error is generally not user-caused, and should be reported to a Wang service representative if it persists.

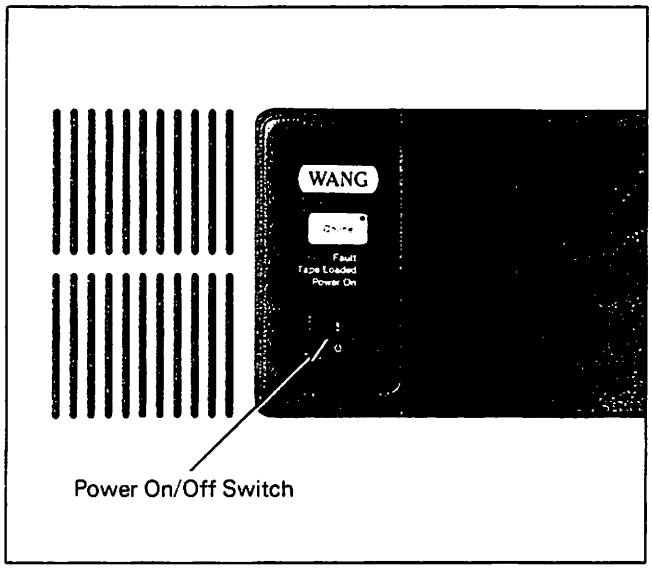
The TAPE LOADED indicator illuminates when the drive has finished loading the tape.

The POWER ON indicator illuminates when you apply power to the tape drive.

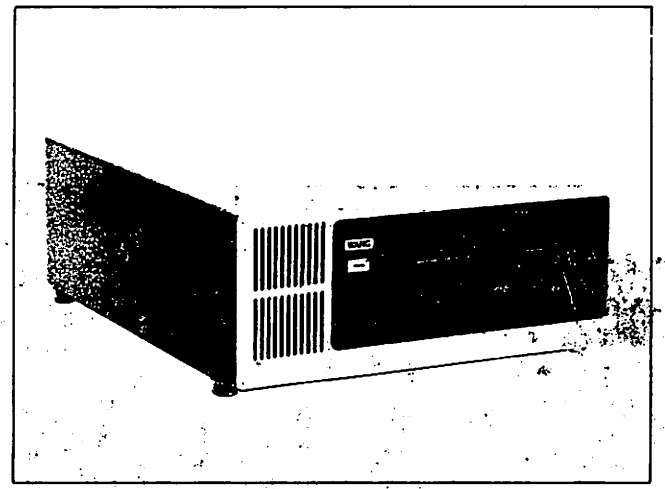
The Power On/Off Switch applies or removes all operating power to or from the tape drive. Press 1 to power the unit on, and 0 to turn it off. When you power the tape drive on, the speaker emits a beep to indicate the system code has been successfully loaded.

Note

For information on VS system power up and power down procedures, refer to the *VS Systems Operation Guide* (800-1106SO).



Model 2529V Control Panel



Model 2529V Cartridge Tape Drive

3.5.3 2529V UTILITIES

NOTE

Before running the 2529V Utilities be sure the device has been entered into the 'CONFIG' file. Enter the device as model "2529V".

The 2529V ACTD Utilities are a part of the VS Operating System. OS Release 5.3.70 or greater is needed to support the tape drive.

The 2529V can run the following VS utilites:

a. TAPEINIT
b. BACKUP

3202

The following paragraphs provide a description of these procedures. Additional information can be found in the VS Utilities Reference Manual (WLI# 800-1303UT) and the Model 2529V User Summary Card (WLI# 800-6212).

3.5.3.1 Tapeinit

TAPEINIT initializes a tape and writes a label on it. All information stored on the tape is destroyed. A new tape must be initialized before being written on for the first time. The tape name, label type (NOTE: ONLY "NL" (Non-Labeled) LABEL TYPE IS SUPPORTED), and tape length are written to the tape.

3.5.3.2 Backup

BACKUP copies a file, library, or volume from one location to another. It also restores backed up copies.

Printed in U.S.A.
800-6212
3-83-10M

WORKSTATION 0 - USER CSG - Customer Engineering

2:45:16 pm Monday June 5, 1995

```
****************************************************************************
****          1         2         3         4         5         6         7
**** 123456789012345678901234567890123456789012345678901234567890123456789012345
****************************************************************************

     GENEDIT                                                   Devices on DA/IO
      @CONFIG@ in @SYSTEM@ on SYSTEM                                Model VS545
               50V67    Serial IOC              IOP# 4          EAPA  1
                 Unit# Port#  Type             Description          WP?
                   40    0    4250IMG          Image MWS             N
                   41    1    LCS15-2          15 ppm Laser System   N
                   42    2    4250IMG          Image MWS             N
                   43    3    4250IMG          Image MWS             N
                   44    4    4250IMG          Image MWS             N
                   45    5    4250IMG          Image MWS             N
                   46    6    2529V            6400bpi Cartridge Tp  N
                   47
                   48
                   49
                   50                          For MWS - port  2
                   51                          For MWS - port  2
                   52                          For MWS - port  2
                   53                          For MWS - port  3
                   54
                   55

     TAB to a Device Type and PRESS:      or PRESS:               (5) Next
     (ENTER) Reserve cluster devices      (9) Valid devices     (7) Define DLP na
     (12) Shift                               (13) Modify    (6) Comments   (16) R

****************************************************************************
****          1         2         3         4         5         6         7
**** 123456789012345678901234567890123456789012345678901234567890123456789012345
****************************************************************************
```

MEMORANDUM

TO: Wang Worldwide Sales, Service, Marketing, Subsidiaries, & Distributors

FROM: VS Systems Product Planning & Management

DATE: August 24, 1988

RE: URGENT VS BACKUP UTILITY NOTIFICATION

Please be advised that some versions of the VS BACKUP utility may, in certain instances, generate backup tapes that contain corrupted files. In the event that customers try to restore these files, some data may be lost.

This will affect customers who meet all three of the following conditions:

1. Are using one of the BACKUP versions listed below, and
2. Backup to 9-track and cartridge tape, and
3. Have files that span tape volumes.

This will not occur on backups made to disk.

The affected BACKUP versions are:

BACKUP Version Numbers	Corresponding VS Operating System
5.01.68 to 5.02.26	OS 6
7.11.68 to 7.12.26	OS 7.10 through 7.14
7.21.68 to 7.22.26	OS 7.18, 7.19

We are making every effort to address this problem, and corrected versions of BACKUP will be available shortly. In the meantime, to prevent loss of information, we are requesting that customers immediately perform a full system backup using the VOLCOPY utility.

Customers backing up to disk or a single tape reel may continue to use their current procedures. For backup operations which require multiple tape reels, VOLCOPY should be used until further notice.

For customers concerned that they may have affected tapes, we are offering the following services at no charge:

1. CSO will receive a procedure that will help identify those tapes that are not affected.
2. If data from affected tapes is required, your customer's local Customer Service Organization (CSO) office, in conjuction with Home Office, will make every reasonable effort to try to reclaim as much data as possible from these tapes.

Customers who may be affected by this problem are urged to contact their Regional Support Center (RSC) as soon as possible:

in the South/Central at	1-800-241-9002
in the East at	1-800-232-9264
in the West at	1-800-235-9264

The installed base must be quickly notified of this situation. The attached correspondence is being sent to United States VS system users who may be affected according to home office records. Every effort should be made to contact any customers known to be using the affected versions of BACKUP to reduce disruption in their operations. Subsidiaries and distributors are responsible for locating and updating any affected users in their installed base as quickly as possible. Through CSO, we will provide the customer base a number of options in order to lessen disruption. Your cooperation is imperative if we are to successfully implement this program.

Support and Policy Statements

Wang Laboratories feels that it is most important that the customer base be protected first and foremost. For this reason, common sense, practicality and expedience are called for. A wide range of solutions is being offered in order to insure success.

Implementation Responsibility

Primary responsibility for implementation has been given to CSO/TSO. The nature of the problem requires notification to the sales, marketing and support organizations as well. A cooperative effort between DSO and CSO will be necessary if implementation is going to be successful.

In the United States, the District Customer Engineering Manager is the designated person responsible for addressing and fixing this problem. The RSC will advise the district CE manager as soon as a customer, affected by this problem, is identified.

Because the number of sites needing assistance in a given district may exceed the resources of the CE organization, the district CE manager has authority to utilize any other qualified personnel to assist in installing new versions of BACKUP and/or assisting in attempts to recover data. All other field managers are expected to give unqualified support in this matter.

Sales personnel should take steps to insure that their own customers are advised of this problem, and that the customers contact the RSC if needed.

It is the responsibility of the individual subsidiaries and distributors to best address this issue locally. Wang corporate will offer practical assistance where possible. Normal escalation procedures should be followed.

Attachment
2620M.03

TAC

INFORMATION CALL

CONTROL NUMBER 05197121

CONTACT NAME BRANDON SUSSMAN POSITION RSC
RDB # 3109 TOX # PHONE # 617 656 9200 EXT #

SYSTEM TYPE VS 80 DEVICE TYPE 2529V
UTILITY NAME SOFTWARE LEVEL

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME PHONE #
ADDRESS 6596 CITY STATE
ON SITE CONTACT NAME

QUESTION (*) / ANSWER (+)

*NEED TO KNOW IF YOU CAN ATTACH THE 2529V ON A NON EXTENDED
*SERIAL IOP AND ALSO NEED TO KNOW WHERE THE INFORMATION CAN
*BE FOUND.
+FOR A VS-80, NEED A 22V17 EXTENDED IOP WITH REV 1 PROMS PER
+MAINTENANCE PLAN.

WFC

+PROBLEM WHEN TRIED TO ADD 3RD TERMINAL IN U.S. MIXED TABLE &
+TESTED OK. CLOSE CALL /CE.

(10MIN) MIKEB

T&C

ESCALATION CALL

CONTROL NUMBER 87246001

CONTACT NAME A BARTLE POSITION DSS
RDB # 9911 TDX # 613 PHONE # 003 618 6545 EXT #

SYSTEM TYPE 2200MVP DEVICE TYPE 2229
UTILITY NAME SOFTWARE LEVEL 2.6

METHOD OF CALL P T = TELEX, P = PHONE, M = MEMO, E = EMS
HAS THE AREA OR DISTRICT BEEN CONTACTED
N A = AREA, D = DISTRICT, B = BOTH, N = NONE
IS THIS INQUIRY PERTAINING TO A NATIONAL ACCOUNT ?
U Y = YES, N = NO, U = UNKNOWN

USE THE FOLLOWING AREA TO DESCRIBE THE SITE THAT CREATED THIS REQUEST
CUST/OFFICE NAME ROLLS PRINTING PHONE # 003 618 6545
ADDRESS 650e CITY SEAFORD STATE VI
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*03SEPT87: PROBLEM WITH 2229 TAPE UNIT USING A.C.T.D CONTROL
*ER. ALL LIGHT FLASH ON/OFF AFTER BACKUP COMPLETE AND TAPE D
*ECK IS POWERED OFF THEN ON. CART TAPE UTILITIES =REL1 OPSYS
*IS 2.6 OR 2.5 BOTH GIVE PROB. HAVE REPLACED TAPE CONTROLLER
*AND DECK(TWICE). REPLACED PWER SUPPLY AND CPU BOARD IN MICR
*O VP. HAVE ASKED AROUND OTHER BRANCHES AND IT WAS STATED
*THIS MAY BE ANOMALLY. WITH LIGHTS FLASHING TAPE WILL STILL
*OPERATE NORMALLY AND FLASHING LIGHTS WILL CLEAR AFTER MICRO
*CODE IS RELOADED TO CONTROLLER.I WILL TRY TO REPRODUCE IN
*WORKSHOP ASAP.ANY IDEAS OR INFO ON THIS? (ANDREW)
&9/4/87: NEED CLARIFICATION OF PROBLEM. AT END OF BACKUP
& DO LITES START FLASHING OR IS IT AFTER DOING A
& BACKUP, THEN POWERING OFF THEN ON & THAT THE LITES
& START FLASHING? I'M ASSUMING YOU ARE MANUALLY
& POWERING THE DRIVE OFF & ON. HAS THE PROBLEM BEEN
& DUPLICATED ON ANOTHER SYSTEM? MIKEB
&! UPDATE QUEUED TO FIELD OFFICE
&!CALL SUCCESSFULLY SENT TO FIELD SYSTEM
$7/4/87: BACKUP WORKS OK THEN WE POWER DRIVE OFF THEN ON
$ AND FRONT PANEL LIGHTS FLASH AS WELL LIGHT ON CONTR
$ OLLER. I HAVE NOT REPRODUCED IT AS YET ON ANOTHER
$ CPU (I HAVE EQUIPMENT PROBS) BUT I AM INFORMED THAT
$ THIS PROB DOES OCCUR ELSE WHERE. (ANDREW)
&9/9/87: HAVE NOT HEARD OF PROBLEM BEFORE. TRY TO REPRODUCE
& PROBLEM ON ANOTHER SYSTEM & LET US KNOW RESULTS.
& IF REPRODUCEABLE WILL TRY TO REPRODUCE HERE. MIKEB
$14/9/87: REPRODUCED PROBLEM USING LVP WITH 2229 CART TAPE
$ CART TAPE UTILITIES REL1. 2200 OPSYS 2.5 OR 2.6
$ PROCEDURE: 1. RUN BACKUP FUNCTION ON CART TAPE UTS
$ 2. AFTER COMPLETION TURN CART TAPE DRIV
$ OFF.
$ 3. TURN CART TAPE DRIVE ON. AND FRONT
$ PANEL LIGHTS AND TAPE CONTROLLER
$ LIGHT WILL FLASH.
$ THE TAPE UNIT MAY HAVE TO BE POWERED OFF THEN ON

$ SEVERAL TIMES BEFORE PROBLEM OCCURS. (ANDREW)
&9/15/87: HOW LONG ARE YOU WAITING AFTER POWER OFF TO POWER
& ON. ARE YOU COMPLETELY LEAVING THE BACKUP PROGRAM
& BEFORE POWERING OFF TAPE DRIVE. SHOULD BE COM-
& PLETELY OUT OF THE BACKUP PROCEDURE WHEN POWERING
& OFF & SHOULD WAIT AT LEAST 5 SECONDS AFTER
& POWERING OFF TO POWER BACK ON. PLEASE VERIFY THE
& ABOVE CRITERIA IS BEING MET WHEN THE PROBLEM
& OCCURS. WILL TRY TO DUPLICATE PROBLEM HERE. MIKEB
&9/18/87: PLEASE RESPOND TO UPDATE OF 9/15/87. MIKEB
$21/9/87: BACKUP PROCEDURE IS COMPLETED. DRIVE IS POWERED OF
$ F THEN ON AND SETTLING TIME IS ALLOWED. GOOD LUCK
$ (ANDREW)
&9/21/87: COULD NOT GET TO FAIL IN TRYING TO DUPLICATE. WHY
& IS THE DRIVE BEING POWERED OFF & ON? IF THE DRIVE
& IS LEFT OFF FOR A FEW HRS OR AN EXTENDED TIME DOES
& THE PROBLEM STILL OCCUR? THE FLASHING LITES ARE
& USUALLY A SIGN OF A BAD CONTROLLER. PROBLEM HAS
& NOT BEEN CALLED IN FROM ANYWHERE ELSE. DO YOU HAVE
& THE LATEST REVISION BROS, ESPECIALLY THE
& CONTROLLER. MIKEB
&9/23/87: HAVE SOMETHING ELSE ON THIS PROBLEM. IF YOU ARE
& TURNING ON THE 2229 WHEN TRYING TO LOAD UCODE THIS
& PROBLEM CAN BE CAUSED. THE SYSTEM SHOULD NOT BE
& TRYING TO MAKE ANY COMMUNICATION WITH THE 2229
& WHEN POWER IS APPLIED TO THE UNIT. INSURE THE 2229
& IS POWERED ON BEFORE ANY COMMUNICATION TO THE UNIT
& IS MADE. OTHERWISE, AGAIN, THE PROBLEM IS COMMONLY
& CAUSED BY THE CONTROLLER. MIKEB
$25/9 THANKS MIKE CAN YOU CONFIRM LATEST REV LEVELS FOR
$ CONTROLLER 2108259 REV(0) 2108260 REV(1).
$ I WILL ENDEVER TO MAKE SURE LASTEST REVES ON SITE
$ AND RETEST TAKING NOTE OF ABOVE COMMENT.
$ I WILL LET YOU KNOW. (ANDREW)
&9/24/87: THE E-REV'S YOU LISTED ARE CORRECT. 210-8259 E-REV
& 0 & THE 210-8260 E-REV 1. MIKEB
$30SEP87: ALL INTERSTATE SYSTEMS DOWN - PLEASE WAIT FOR
$ REPLY <AYLENE>
&9/30/87: AWAITING UPDATE. MIKEB
&10/6/87: PLEASE UPDATE WITH STATUS. MIKEB
$07/10/87: MIKE SORRY TOOK SO LONG TO REPLY AWAITING ECO
$ ON 8260 BOARD TO REV 1. ALL OUR
$ BOARDS IN STOCK ARE REV0 WHICH COULD BE CAUSE
$ OF PROBLEM. WILL KEEP YOU INFORMED. (ANDREW)
&10/8/87: UPDATE ACKNOWLEDGED. MIKEB
$21/10/87: UPDATED 8260 BOARD AND INSTALLED WITH GOOD RESULT
$ S WILL MONITOR FOR ONE WEEK (ANDREW)
&10/22/87:UPDATE ACKNOWLEDGED. MIKEB
$10/28/87: NO FUTHER PROBLEMS CLOSE CALL AND THANKS.(ANDREW)
&10/28/87:CALL CLOSED. UPDATED 8260 PRD RESOLVED. MIKEB
+LATEST E-REV 8260 BRD RESOLVED. CLOSE CALL.
MIKEB