PROBLEMS:

I-90 ERRORS, DPU/SYSTEM HANGS, INCORRECT DRIVE SELECTED.

NOTE:

AN I-90 ERROR INDICATES THAT THE 2280 DPU CAN NOT COMMUNICATE WITH THE CPU.
AN I-91 ERROR INDICATES THAT THE DRIVE CAN NOT COMMUNICATE WITH THE DPU.

CONDITIONS:

SOURCE OF PROBLEM WAS DUE TO NOISE ON THE (READY LINE) AND ON THE (ON CYLINDER LINE) FROM THE DRIVES TO THE DPU. NOISE ON THESE LINES EXTENDED BEYOND THE 4 us READY SIGNAL OF DRIVE 1 INTO THE AREA OF WHERE THE DRIVE 2 READY SIGNAL WOULD BE. THIS CAUSED SELECTION OF DRIVE #2 TO TAKE PLACE. IF THIS HAPPENS AND DRIVE 2 IS NOT AVAILABLE, THE SYSTEM HANGS. IF THE DRIVE IS AVAILABLE, THEN DATA IS READ FROM OR WRITTEN TO DRIVE 2 CAUSING DATA INTREGRITY PROBLEMS.

DRIVER/RECEIVER CIRCUITS ARE BALANCED LINE TYPE WITH AN UNBALANCED INPUT SIGNAL WHICH DEFEATS NIOSE IMMUNITY IN THE DIFFERENTIAL AMPLIFIER INPUTS. (SIGNAL BALANCE VARIATIONS ARE CAUSED BY TERMINATORS, CABLES AND CIRCUIT BOARDS. TERMINATORS SHOWED SIGNAL VARIATIONS OF AS MUCH AS 160 MILLIVOLTS AT THE RECEIVER INPUTS).

TO PREVENT THE NECESSITY OF AN ARTWORK CHANGE TO THE BOARD, THE TERMINATING RESISTORS ON THE + INPUT SIDE OF THE RECEIVERS WERE INCREASED IN VALUE TO ALLOW PROPER SIGNAL BALANCE AND NOISE REJECTION. A BETTER FIX WOULD HAVE USED A VOLTAGE DIVIDER NETWORK WITH A PULL-UP RESISTOR, BUT THIS WOULD HAVE ADDED EXTRA COMPONENTS TO THE BOARD.

TESTING:

INITIAL TESTING WAS CARRIED OUT IN MANUFACTURING IN ORDER TO OBTAIN DEFECTIVE 210-7422 BOARDS. FAILING BOARDS WERE BROUGHT TO R & D. THE BOARDS WERE TESTED AGAIN, MODIFIED AND RETESTED FOR SEVERAL HUNDRED HOURS WITH DIFFERENT PROM REVS, (REV-7 TO REV-0C), CABLE LENGTHS UP TO 50' AND VARIOUS TERMINATORS. EVERY CONFIGURATION CHANGE PRODUCED VARIOUS RESULTS WITH UNMODIFIED BOARDS. ALL MODIFIED BOARDS GAVE CONSISTANT RESULTS, WITH CLEAN SIGNALS AND NO FAILURES. ALL DEFECTIVE BOARDS OBTAINED FROM MANUFACTURING WORKED PROPERLY WITH THE CHANGE INSTALLED.

RESOLUTION:

CHANGE TERMINATION RESISTORS ON 210-7422 BOARD AT LOCATIONS R46 AND R48. RESISTORS WERE CHANGED FROM 56 OHMS TO 510 OHMS.

NOTE:

SEE ATTACHED ECO #36643 FOR BOARD CHANGE.

WANG

ECO

ECO NO. 36643

SHEET 1 OF

ORIGINATOR	Sau Cai	M/S	1439	EXT.	77332	DATE	05/08/85
WRITTEN BY	Jeannine Roy	M/S	1218B	EXT.	76930	DATE	05/08/85

PART NO. 210-7422	DESCRIPTION 2200 SMD ECC/Device Interface
DWG NO. 7422	
MODEL NO. 2280	PEP # PEP# H0133A
CLASS I (II) III	TYPE [X] HARDWARE [ ] SOFTWARE

DESCRIPTION OF CHANGE

Change assembly drawing, schematic and sample board per attached prints.

Change BOM 210-7422 as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE		QTY	QTY TYPE
CHANGE	330-1057	Res 56 Ohm 1/4w 5%	EA	1	From:	96	1
					To:	94	
ADD	330-2052	Res 510 Ohm 1/4w 5%	EA	1		2	1

Note to EDD: Create a 210 History Sheet for this board and create a VS laser parts list for 210-7422. Delete parts list on sheet 6 of 6 of schematics and change parts list as follows:

Change R46 and R48 from 56 Ohm Res 1/4 5% (330-1057)
to 510 Ohm Res 1/4w 5% (330-2052)

REASON/SYMPTOM FOR CHANGE

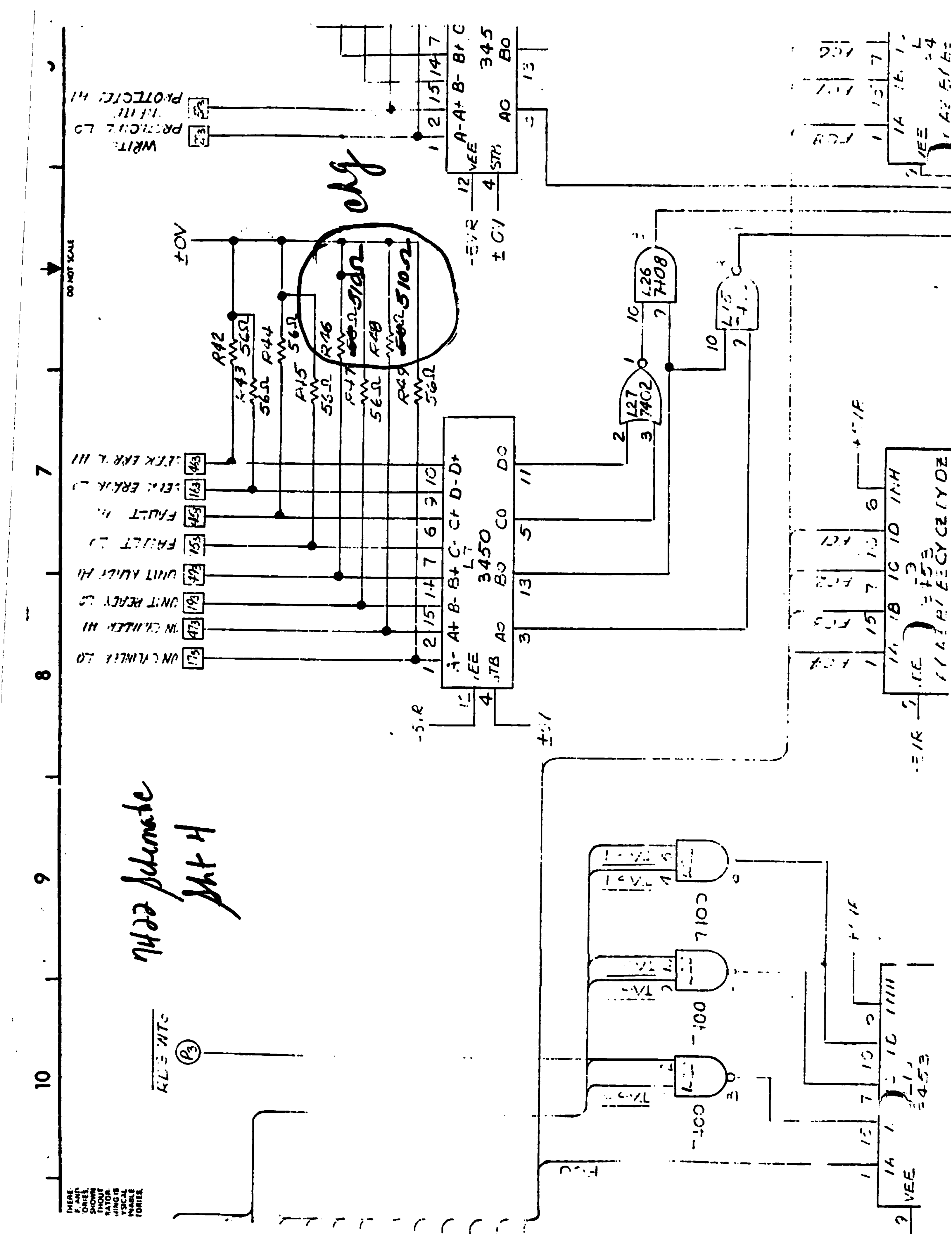
To eliminate noise on the ready line.
To correct intermittent hangs and incorrect drive selection.

DOCUMENTS	REVISIONS F	REVISIONS T
BOM		
ARTWORK		
E-REV	4	5
SAMPLE BD	4	5
ASSY. DWG.		
DRILL DWG.		
SCHEM. DWG.		
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	X	X			X	
USE AS IS TO PREVIOUS REV.			X	X		

APPROVALS	DATE
ECO MGR.	
DES. ENGRG. L. Comaro Sau Cai	5/8/85
CUST. ENGRG.	
MFG. ENGRG.	
ORIGINATOR Sau Cai	5/8/85
F.C.C.	

13-8644C Printed in U.S.A. 3-84



WRITE PROTECTED LO
WRITE PROTECTED HI
3450
345
R42 56Ω
R43 56Ω
R44 56Ω
R45 56Ω
R46 510Ω
R47 56Ω
R48 510Ω
R49 56Ω
L26 7408
L27 7402
SEEK ERROR HI
SEEK ERROR LO
FAULT HI
FAULT LO
UNIT READY HI
UNIT READY LO
ON CYLINDER HI
ON CYLINDER LO
COIL
DO NOT SCALE
7
8
9
10
chg
Schematic
Sht H

2280 DPU MICROCODE

2280 MICROCODE REVISION R-09:
ALL BOARDS WERE TESTED WITH R-09 PROMS AND RELEASE 2.5 OPERATING SYSTEM AS THESE CONDITIONS CAUSED THE MOST PROBLEMS IN THE FIELD. PROBLEMS INCLUDE I-90/I-91 ERRORS, SYSTEM HANGS, DATA INTEGRITY, INCORRECT DRIVE SELECTION AND THE AMBI SPIN UP PROBLEM.

2280 MICROCODE REVISION R-0A:
THIS WAS AN INTERIM CHANGE THAT WILL NOT BE USED IN THE FIELD.

2280 MICROCODE REVISION R-0B:
THIS WAS ALSO AN INTERIM CHANGE.

2280 MICROCODE REVISION R-0C:
THIS VERSION OF CODE CURED PROBLEMS ASSOCIATED WITH R-09 AND THE PREVIOUS INTERIM CHANGES. FURTHER INVESTIGATION OF THE CODE REVEALED THAT IT WOULD INTERMITTENTLY FAIL TO LOAD THE ALTERNATE SECTOR MAPS DURING POWER UP SEQUENCES. ALSO THE SPIN UP PROBLEM WAS NOT FIXED IN THE CODE.

2280 MICROCODE REVISION R-0D:
AFTER A COMPLETE ARCHITECTURAL REDESIGN, THIS REVISION CURED THE SPIN UP AND MAP LOADING PROBLEMS AND TESTED OK FOR SEVERAL HOURS. FURTHER TESTING REVEALED THAT I-90 ERRORS WOULD BE ENCOUNTERED IF DELAYED SEQUENCIAL READ OR WRITE OPERATIONS WERE DONE ON CERTAIN DRIVES. (IF A DELAY IS INSERTED INTO A PROGRAM, THIS ALLOWS THE MICROCODE TO GO TO WAIT LOOP BETWEEN OPERATIONS AND PERFORM DIAGNOSTICS). THE DIAGNOSTICS WOULD FAIL DURING TESTING OF THE ALT. SECTOR MAP LOCATIONS IN MEMORY. INVESTIGATION REVEALED THAT THE MAPS WERE NOT IN THE CORRECT LOCATION FOR THE CORRESPONDING DRIVE AND THEREFORE WOULD FAIL ONLY IF THE DRIVE HAD ALT. SECTORS ASSIGNED AND THE DPU WAS IN AN IDLE STATE. A DRIVE WITHOUT ALT. SECTORS WOULD WORK CORRECTLY. THIS CHANGE ALSO NEGATED THE NEED FOR THE HARDWARE SPIN UP CHANGE ON THE 210-7422 BOARD.

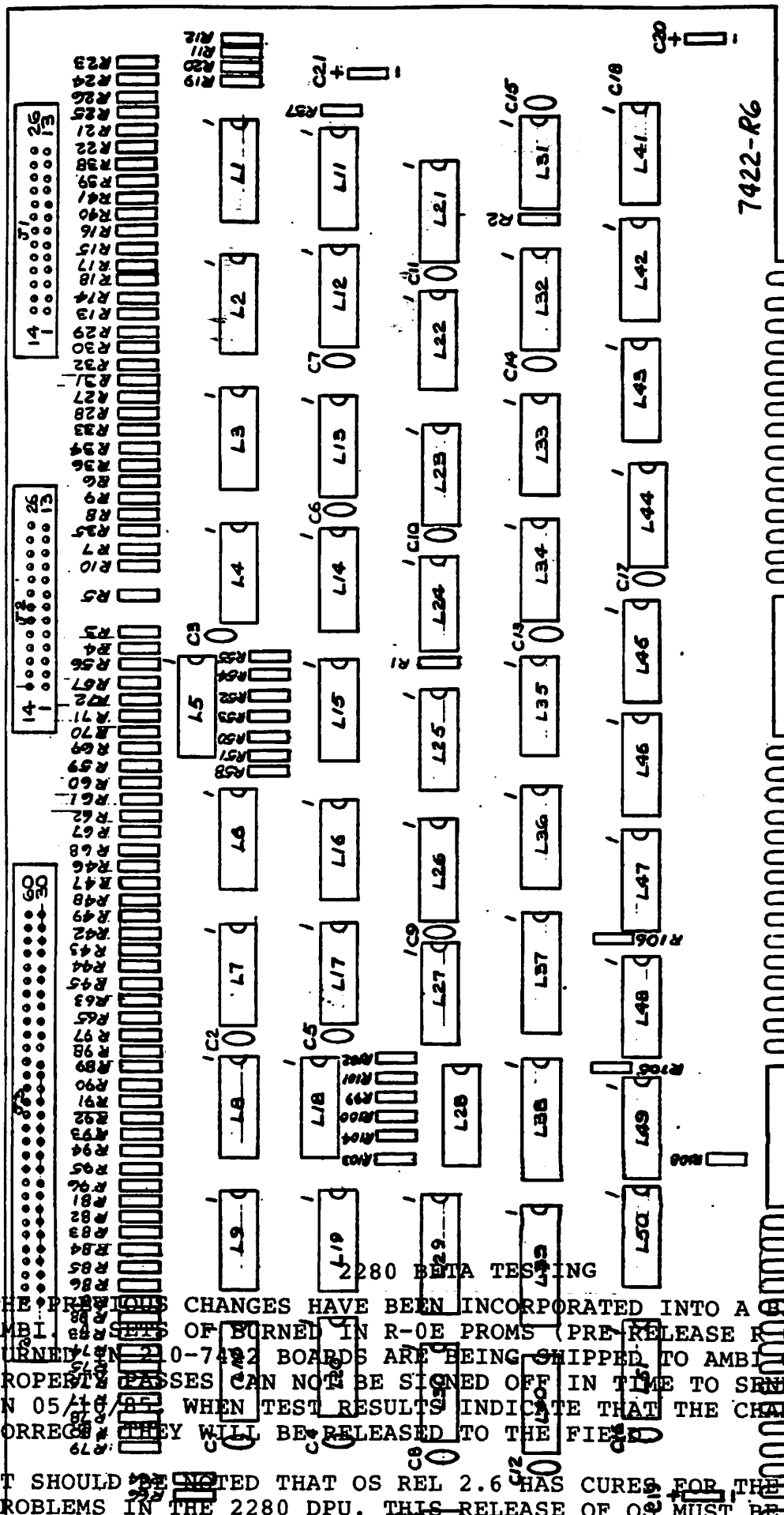
2280 MICROCODE REVISION R-0E: (R10)

THIS REVISION CURED THE ALT. SECTOR MAP PROBLEM AND TESTED 100% ERROR FREE. ALT. SECTOR MAPS WERE VERIFIED AND EXTENSIVELY TESTED. THIS IS THE FINAL REVISION AND WILL BE RELEASED TO THE FIELD AS RELEASE R-0A, PROVIDING PROBLEMS ARE NOT ENCOUNTERED DURING BETA TEST AT AMBI.

2280 BETA TESTING

THE PREVIOUS CHANGES HAVE BEEN INCORPORATED INTO A BETA PACKAGE FOR AMBI. 4 SETS OF BURNED IN R-0E PROMS (PRE-RELEASE R-0A) AND 4 BURNED IN 210-7422 BOARDS ARE BEING SHIPPED TO AMBI ON 05/13/85 AS PROPERTY PASSES CAN NOT BE SIGNED OFF IN TIME TO SEND THE PACKAGE ON 05/10/85. WHEN TEST RESULTS INDICATE THAT THE CHANGES ARE CORRECT, THEY WILL BE RELEASED TO THE FIELD.

IT SHOULD BE NOTED THAT OS REL 2.6 HAS CURES FOR THE MULTIPLEXER PROBLEMS IN THE 2280 DPU. THIS RELEASE OF OS MUST BE USED WHEN MULTIPLE CPU INSTALLATIONS ARE USING A SINGLE 2280 DPU.



2280 BETA TESTING

THE PREVIOUS CHANGES HAVE BEEN INCORPORATED INTO A BETA PACKAGE FOR AMBI. SETS OF BURNED IN R-0E PROMS (PRE-RELEASE R-0A) AND 4 BURNED IN 210-7482 BOARDS ARE BEING SHIPPED TO AMBI ON 05/13/85 AS PROPERLY PASSES CAN NOT BE SIGNED OFF IN TIME TO SEND THE PACKAGE ON 05/10/85. WHEN TEST RESULTS INDICATE THAT THE CHANGES ARE CORRECT, THEY WILL BE RELEASED TO THE FIELD.

IT SHOULD BE NOTED THAT OS REL 2.6 HAS CURES FOR THE MULTIPLEXER PROBLEMS IN THE 2280 DPU. THIS RELEASE OF OS MUST BE USED WHEN MULTIPLE CPU INSTALLATIONS ARE USING A SINGLE 2280

PROBLEM:

DRIVE SPIN UP AFTER A PACK CHANGE AND SIMULTANIOUS INTERROGATION OF DRIVE READY, CAUSES DRIVE TO SEEK TO TRACK 0 AND RETRACT. THIS IS A CONTINOUS CYCLE CAUSING POWER AMPLIFIER FAILURE IN THE DRIVE IF ALLOWED TO CONTINUE. AT BEST THE DRIVE WILL NEVER COME READY AS SEEK COMPLETE IS NEVER ACTIVE.

CONDITIONS:

ALL LINES FROM THE DRIVE ARE GATED WITH THE UNIT SELECT SIGNAL INCLUDING THE READY LINE. MICROCODE SEQUENCES HAVE TO BE USED TO DETERMINE THE STATUS OF THE DRIVE AT ANY GIVEN TIME. IN ORDER TO PREVENT THESE SEQUENCES TO THE DRIVE, THE UNUSED SEEK COMPLETE SIGNAL IN THE B CABLE WAS ANDED WITH UNIT SELECTED TO GATE THE TAG-3 SIGNAL TO THE DRIVE. THIS WAS DONE AT PORT 1 AND PORT 2 AND THE SIGNALS COMBINED WITH AN OR CIRCUIT. (THE SEEK COMPLETE LINE IS THE ONLY HARDWARE LINE AVAILABLE WITHIN THE CABLE TO THE DPU NOT GATED WITH UNIT SELECT). THE END RESULT IS, IF THE MICROCODE TESTED THE DRIVE FOR READY DURING FIRST SEEK AND FOUND IT NOT READY, A RESTORE COULD NOT BE ISSUED TO THE DRIVE. (NORMAL SEQUENCE IN THE MICROCODE IS TO DESELECT DRIVE, SELECT DRIVE, TEST FOR READY AND DESELECT AGAIN IF THE DRIVE IS NOT READY. IF THE DRIVE IS DOING FIRST SEEK TO COME READY AND IT IS DESELECTED, A RESTORE IS ISSUED TO THE DRIVE CAUSING A RETRACT)

TESTING:

A SIMPLE PROGRAM TO READ A SECTOR OF DATA WAS USED TO CHECK THIS CONDITION DURING DRIVE SPIN UP. ALL DIAGNOSTIC TEST PROCEDURES WERE RUN FOR EXTENSIVE PERIODS OF TIME TO ELIMINATE THE POSSIBILITY OF TIMING PROBLEMS CAUSED BY THIS MODIFICATION.

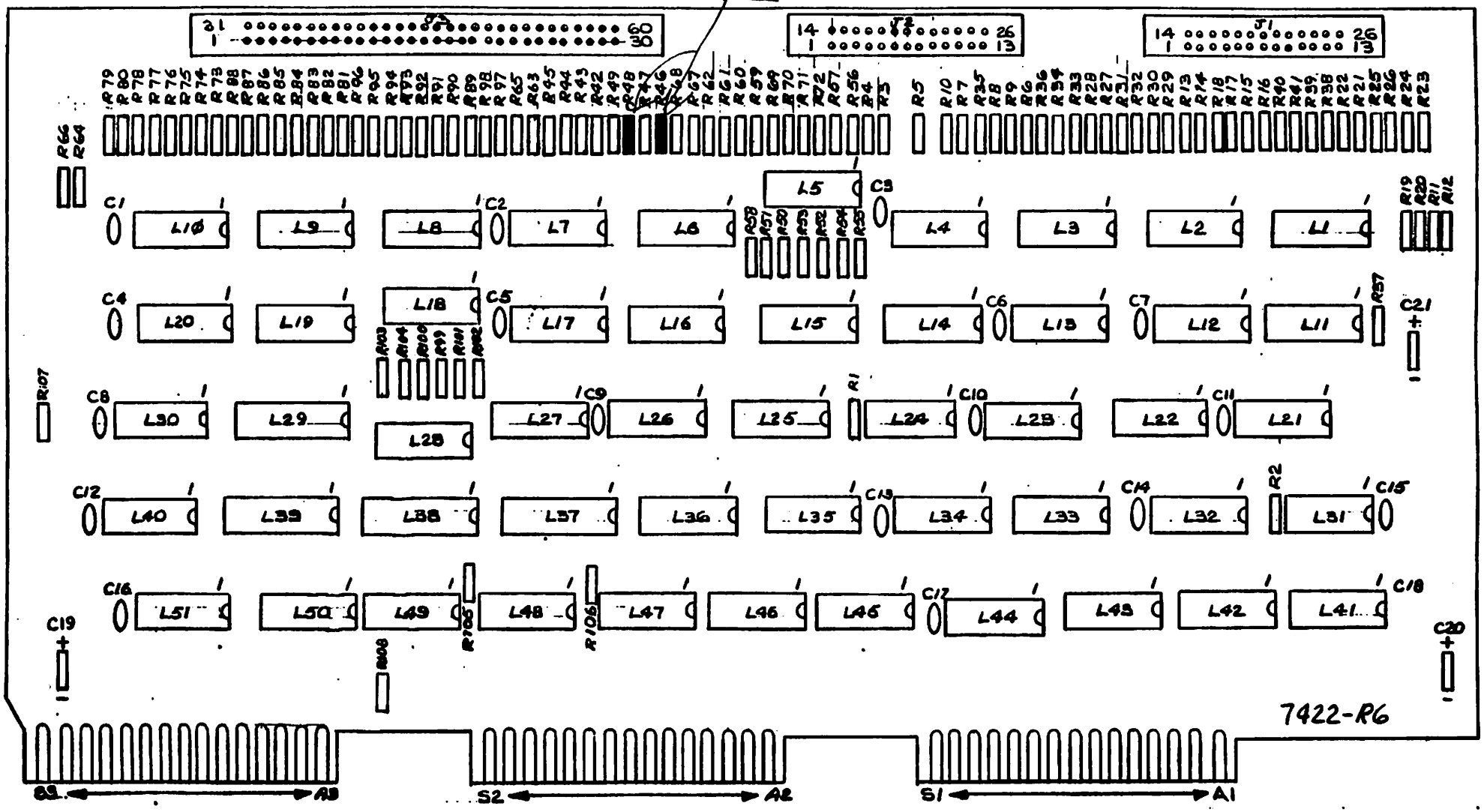
RESOLUTION:

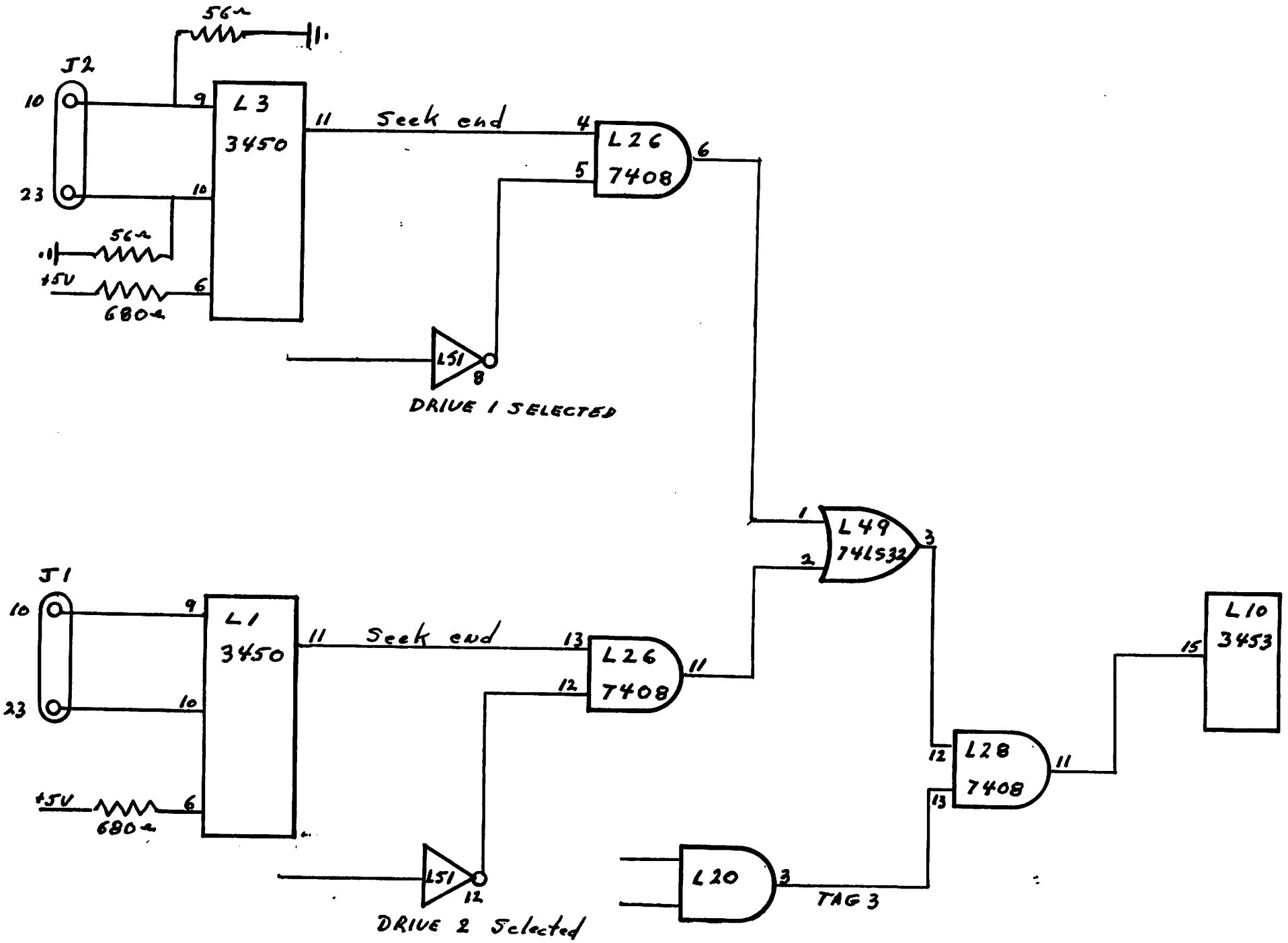
MAJOR CHANGES HAD TO BE MADE TO THE 210-7422 BOARD. THIS WILL REQUIRE AN ARTWORK REVISION TO THE BOARD WHICH WILL TAKE SEVERAL MONTHS TO COMPLETE. IF THE PROBLEM CAN BE RESOLVED IN THE MICROCODE, THE BOARD CHANGE WILL NOT BE NECESSARY.

NOTE:

SEE ATTACHED LOGIC DIAGRAM AND CHANGE INSTRUCTIONS.

change R-46 + R48 to 510Ω Resistors




56Ω
J2
10
23
9
10
L3
3450
11
Seek end
4
5
L26
7408
6
56Ω
+5V
6
680Ω
LS1
8
DRIVE 1 SELECTED
J1
10
23
9
10
L1
3450
11
Seek end
13
12
L26
7408
11
1
2
L49
74LS32
3
+5V
6
680Ω
LS1
12
DRIVE 2 Selected
L20
3
TAG 3
12
13
L28
7408
11
15
L10
3453

210-7422 BOARD
HARDWARE SPIN UP FIX

COMPONENT LIST

QTY	DESCRIPTION
2	56 OHM 5% RESISTOR
2	680 OHM 5% RESISTOR

DELETES

FROM	TO	DESCRIPTION
L20-1	L10-15	ETCH ON BACK SIDE OF BOARD

ADD WIRING/COMPONENTS

FROM	TO	DESCRIPTION
J2-10	L3-9	WIRE
J2-23	L3-10	WIRE
L3-9	GROUND	RESISTOR 56 OHMS
L3-10	GROUND	RESISTOR 56 OHMS
L3-6	+5 VOLTS	RESISTOR 680 OHMS
J1-10	L1-9	WIRE
J1-23	L1-10	WIRE
L1-6	+5 VOLTS	RESISTOR 680 OHMS
L3-11	L26-4	WIRE
L51-8	L26-5	WIRE
L1-11	L26-13	WIRE
L51-12	L26-12	WIRE
L26-6	L49-1	WIRE
L26-11	L49-2	WIRE
L49-3	L28-12	WIRE
L20-3	L28-13	WIRE
L28-11	L10-15	WIRE

TAC Center

BULLETIN

WANG LABORATORIES, INC.

DATE: 12/14/84 ADMINISTRATIVE ____ TECHNICAL X NUMBER 324

ORIGINATOR: John Howser REVIEWED BY: Dennis Ivey

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

ALL OFFICES X HOME OFFICE X EACH EMPLOYEE ____

SUBJECT: 2280 DPU PAGE 1 OF 2

Equipment: 2280 DPU/Mux
Product Line: 2200 VP/MVP/LVP
Prerequisite to installation: Back up all Fixed surfaces.
Problem: Special considerations and operation of newly released DPU proms on the RAM/Prom Control Board (210-7423-A).

L 13 - 378-4083 R9
L 14 - 378-4084 R9
L 15 - 378-4085 R9
L 16 - 378-4086 R9

Problem Corrected:

1. Intermittent problems due to alternate sector problems. Usually generating one or all of the following symptoms.
   a. D82 errors
   b. D88 errors
   c. Disk hangs
2. In a two drive Daisy configuration, the problem of writing the same file to both Disks (same sector) when the file is larger than previously written to Disk.

Special Considerations: When installing R9 proms, the following conditions must be met:

1. All PCB's must be up to proper Rev. levels. Note: Very Important.

210-7718	E-Rev 1	Mux Slave
210-7717	E-Rev 2	Mux Master
*210-7422	E-Rev 4	ECC Device Interface
210-7421A	E-Rev 3	ALU Mux Interface
210-7423A	E-Rev 4	RAM/Prom Control
210-7424	E-Rev 9	I/O Controller
210-7415	E-Rev 0	Prime Circuit
210-L567	E-Rev 7	Regulator
210-7416	E-Rev 2	Motherboard
210-7715	E-Rev 6	Mux Disk Controller
210-7716	E-Rev 1	Motherboard

*Note: There may be a compatability problem with the 7422 board and the new R9 Proms. An ECO is forthcoming. (Refer to Item 1a Note Special Procedures).

2. All cables must be shielded and appropriately clamped and/or fastened to DPU, Disk Drive, and CPU.

Special Procedures: The following represents some observations that must be made to ensure the R9 prom are functioning properly and procedures for installing R9.

1. After installing R9 proms one must observe the Drive(s) operation on the first access. The Drive(s) will be expected to perform or respond as follows:

   a. The heads will seek to the maximum cylinder and restore two times per Drive. The purpose for this is to load the alternate sector maps of the Fixed surfaces and the removable surfaces into DPU memory.

Note: If the Drive does not respond as stated and performs only one sequence of seek/restore, it has not loaded the alternate sector map of the removable. In this case suspect a compatibility problem with the 210-7422 board. Try another 7422. (It may take several)

2. After verification of Basic Prom functionality, the CE must format all Fixed surfaces with the new proms installed and then cycle all Removable packs through the Format process, by first copying to Fixed, Format then restore to the Removable.

3. Due to changes in Prom operation and handling of alternate sectors the maximum allowable alternates per surface is 16 versus the previously allowed 32 alternates per surface. This fact can in some cases causes the requirement of Fixed Module or Removable Pack replacement. In the case that in formatting or reading a particular surface previously created on R7 proms, one encounters an error on the R9 proms where there was none on R7 one must assume that the Disk surface has something greater than 16 sector defects. In this case the defective module must be replaced.

WANG LABORATORIES, INC.

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

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

FROM: John Forbes

DATE: July 19, 1984

SUBJECT: FCO 1086 (2280 DPU)

Due to a number of problems in the proms released with FCO 1086, the shipping of this FCO has been stopped.

There is a new FCO being developed to correct problems found in the R8 proms. In the meantime, do not install the R8 proms in FCO 1086. I will pass along any information as it becomes available.

Thanks to John Murdock, D.T.S. from Connecticut, for passing this information along.

Regards,

John Forbes
Area Technical Specialist

JF:0109L

#2 of 10.

WANG LABORATORIES, INC.

TO: ALL COMPUTER PERSONNEL

FROM: KEITH JONES
JOE McDERMOTT
TIM DAWSON
DICK KNAPP

SUBJ.: WEEKLY COMPUTER TELEX #35

DATE: APRIL 28, 1980

Phoenix 2280

R5 proms are now available for the 210-7483 board in the Phoenix microprocessor. ECN 14856 gives all pertinent information regarding the installation of these proms. They are as follows.

1. ECN #14561 must be done on the 210-7423.
2. ECN #14563 must be done on the 210-7424.
3. ECN #14564 must be done on the 210-7422.

The proms are: 378-4083-R5
378-4084-R5
378-4085-R5
378-4086-R5

Also R5 proms allow us to do Phoenix Alignments without the F.T.U., using the alignment program distributed with the new diagnostics.

2246R

All locations running remote workstations should have a system which contains all of the below.

1. Operating System - Upgrade to 4.1.10 (pre-release)
2. 2246 Remote WS - ECN 14855
3. 22V06 IOP - ECN 14158

Any questions on these ECN's should be directed to the Area Office.

F.T.U. Software

F.T.U. simulator software for an all serial systems is available at the Area Office. These packages are stand alone simulators which enable you to get to a drive even if you cannot I.P.L. the system because of a drive problem.

Phoenix
Problems with R8 Proms in DPU

Some problems have been reported with the R8 proms found on the 7423 board in the DPU. One problem has been a hang on first access. If having problems revert back to the R7 proms or upgrade to R9.

PHOENIX DPU

Compatibility Problem With R9 Proms

A compatibility problem has been found with the new R9 proms used on the 210-7423 board and the 210-7422 board. The problem appears to be the 7422 board in most cases although it may not display a problem with lower revision proms.

The symptoms observed have been PECM errors, screen resetting when accessing the Phoenix and hangs.

If using the R9 proms thoroughly test the DPU after installing as follows:

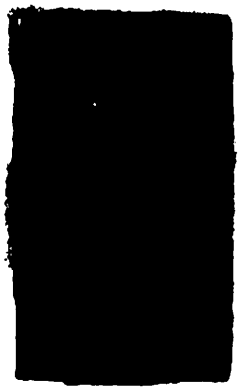
1. With the phoenix connected and powered on, but no up to speed every attempted access should result in an I91. Repeat 10-20 times.

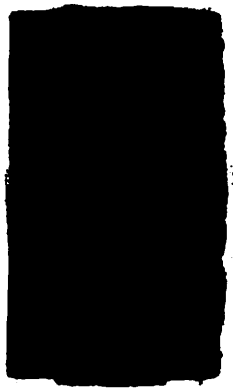
2. Check voltages and ripple in the backplane of the DPU after the drive has been up to speed with heads loaded for 10 to 15 minutes. Ripple should be less than 30 mil V.

3. Run a program to do random R/W's to a scratch surface for several minutes then copy some programs to that surface and run them.

4. If using a MDPU test from all CPU's.

If a problem is found, it is possible to be something other than the 7422 board or R9 proms. If it appears to be the compatibility problem try to replace the 7422 board before down-grading the proms.





PHOENIX

There is a new cable out which is shielded to replace the cable running between the CPU and DPU. The part number is " 220-0105-3

The part number for the rail kit needed to ground shielded A and B cables at the DPU is" 728-0004
This may include A & B cables" 220-3041-7 A cable and 220-3033-21 B Cable

The A and B shielded cables for 2200 are not available yet. However you may use the following shielded cables"

15' A cable-220-3041-1
15' B cable-220-3033-6

WANG LABORATORIES, INC., 67 SOUTH BEDFORD STREET, BURLINGTON, MA 01803 • TEL: 617/272-0800

WANG

DTS; FYI. Dick

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

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

FROM: John Forbes

DATE: October 23, 1984

SUBJECT: 2280 DPU/MUX FCO

FCO #1114 released August 29, 1984, calls for the replacement of four proms on the 210-7423 board in the 2280 DPU. The first installation of these proms met with little success and it appeared as if the proms were bad.

Further testing showed that the 210-7422 board was in fact the problem and not the proms. This was verified by Product Support who stated that the new proms would not run properly with marginal 7422 boards.

Several symptoms observed were PECM errors, software reset when accessing 2280 and disk hangs. At this time, there is no way of knowing which 7422 will run with the R9 proms. Product Support and R&D are working on a resolution and expect one shortly.

Should it become necessary to install a 7423 board with R-9 proms, insure C.E.'s thoroughly test DPU to insure compatability. Further information will be distributed via TAC. I will pass along information as it becomes available. Should you have any questions, please don't hesitate to call.

Regards,

John Forbes

John Forbes
Area Technical Specialist

JF:0056y

SUBJ: Total 2280DPU/MUX Static Changes

This memo is regarding all the static and operational changes going into the 2280DPU/MUX disk proccessing unit.....

Cable Changes:

Cable Description	Old P/N	New P/N
CPU to DPU cable	220-0138	220-0105-3
DPU to Disk, 'A' cable	220-3032	*220-3041-22
DPU to Disk, 'B' cable	220-3033-5	*220-3033-36
2280 MUX jumper cable	220-0257	**220-0257

Board Changes:

Board P/N	Change Description
210-7422	Shielded cable clamps were added to rail.*
210-7715	Termination resistors changed to 220 ohms.
210-7717	Termination resistors changed to 220 ohms. MUX reset changed from async signal to sync signal.
210-7718	Termination resistors changed to 220 ohms.

DPU Chassis Changes:

A line filter is added to the DPU chassis to filter out line noise.

* - These parts can be routine ordered by using the ECO kit part number 728-0004.....
**- All new 220-0257 cables will have braided shields.....

Software changes:

Operating System - The VP & MVP operating systems will be changed in the next release to include retries for I96 errors on a write to the 2280 disk drive.

Problems to Check For:

1) MVP Chassis - Make sure all covers are on and screwed down tight. Check all I/O card rails with Ohm meter to assure the metal is conductive, (non-anodized). Tighten down all I/O cards and cables.

2) DPU Chassis - Same as above.

3) Disk Drive - Assure all grounds between cover, drive, and base, are connected. Make sure cables make contact with drive, (conductive strip on back of drive may, after some time, go non-conductive).

4) Power - Check all outlets for good grounds and wiring.

5) Printer - On printers with detachable cables, shielded cables should be used.

6) TC - on TC cards and remote terminal applications make sure shielded cables are used, and they are grounded on both ends.

ECO Listings:

Listed below are the ECO's and the parts that incorporate the mux static cahanges.

ECO #	Part No.	New P/N	Description
21758	210-7717	N/A	2280MUX Master Card
21759	210-7715	N/A	22C80 Mux Controller
21760	210-7718	N/A	2280MUX Expander Card
20771	220-0138	220-0105-3	CPU To DPU Cable
17671	728-0004*	N/A	DPU To Disk Shielded Cable Clamp Kit
22430	410-2005	N/A	Line Filter 5 Amp
22430	451-4916	N/A	Filter bracket
22430	220-1769	N/A	Wire & Lug Assy.
22430	220-1770	N/A	Wire & Lug Assy.
22430	220-1742	N/A	Wire & Lug Assy.
22430	220-1780	N/A	AC Cable

* - ECO Kit 728-0004 comes with cables 220-3033-36, 220-3041-22, and clamp-rail assy. 279-0485.....

Regards,

Gilles Carrier
2200 Product Support

cc: Earl Emerick
George Debin
Mike Riley
All ATS's

Dick Fischer
Don Pauling
All ATOM's

SHIELDED CABLE KIT

Contents of Kit 728-0004 for ECO 17671 for 2280

PART NUMBER	DESCRIPTION	QTY
449-0247	Handle Faceplate	2
452-2095-35	Faceplate 2200 Phoenix	1
452-2690	Wide Clamp	1
452-2691	Narrow Clamp	2
458-0786	Ground Strap Cable (Wide)	1
458-0787	Ground Strap Cable (Narrow)	2
458-0826	Retainer Ribbon (Wide)	1
458-0827	Retainer Ribbon (Narrow)	2
458-0828	Retainer Cable Clamp (Narrow)	2
458-0829	Retainer Cable Clamp (Wide)	1
461-3140	Screw Cap 8-32	2
461-3141	Screw Cap Housing	2
651-0030	Screw Self Tap T-B 4 X 1/2 L PN HD PH	4
651-0401	Rivet Pop 1/8 X 3/16	12
650-3120	6-32 X 3/8 PAN HD PHL MS SS SEMS	6
220-3041-7	'A' Cable 15'	1
220-3033-21	'B' Cable 15'	1

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

TECHNICAL SERVICE BULLETIN

SECTION: HardWare Technical

NUMBER: HWT 6256 REPLACES: _____ DATE: 11/11/86 PAGE 1 OF 1

MATRIX ID. 3104 PRODUCT/RELEASE# 2280/2280 DPU

TITLE: R10 Prom Problem

PURPOSE:

To inform the field of an existing problem with R10 Proms.

EXPLANATION:

A problem has been identified with the R10 Proms located on the 210-7423A board in the Phoenix DPU. With some Phoenix drives on "first access only" after a power up or spin up, a hang or I92 error may result. This problem may occur intermittently, or consistently. Most drives work fine. The problem does seem more prevalent with Blockpt 3 drives than Blockpt 4. A drive would have to be formatted and tested with R10 Proms to insure compatibility.

Some systems require the DPU to be powered off and on to correct the error, while others can be "Reset" from the terminal. Once this is done, the system will work error free. The 'first access' problem is the only known problem with R10 Proms. All other problems should be fixable. R&D is aware of the problem and is working on a fix.

Please be aware that when using R10 proms, all surfaces must be formatted with the R10 Proms. If not, the 'first access' problem and/or other problems may result. This is true even if only accessing the surfaces formatted with R10 Proms. The reason is with R10 Proms only, the alternate sector map for each surface is read each time the heads are loaded.

The only other proms that could be used are the R7 Proms. The R7 Proms have a different number of alternate sectors (twice that of R10's). If using R7 Proms, all platters should be formatted with the R7 Proms as a precaution. R7 Proms do not have the 'first access' problem but may present a data integrity problem on a surface with alternate sectors. Most R7's work fine. R7 Proms will read platters formatted with R10 Proms but must not be left in without formatting.

R7 Proms cannot be ordered from Logistics. Please call On Line Product Support (TAC) with any questions concerning this TSB.

GROUP: VS/2200/PC On Line Hardware Support Group MAIL STOP: 001-260

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 6044 REPLACES: _____ DATE: 03/04/86 PAGE 1 OF 1

MATRIX ID. 3107 PRODUCT/RELEASE# 2200 Disk Function

TITLE: FCO 1161A, 2280

PURPOSE:

To inform the field that FCO 1161A was released February 18, 1986 and that it replaces FCO 1161.

EXPLANATION:

This FCO changes R46 and R48 on the 210-7422 PCB. Although the resistors shown in the illustration included with the installation procedure in FCO 1161 are the correct resistors, the drawing of the connector above the resistors is not correct. It has been brought to our attention that this connector is being used as a reference point to locate the resistors; therefore we have reissued the FCO with a more accurate drawing of the connector and a more specific description of the resistors being changed. There are no other changes to the FCO.

FCO kit #728-0177A containing parts and documentation will be available March 3, 1986 and can be obtained by placing a special order. Special orders for FCO kits are exempt from the established approval loop. They should be mailed directly to:

Logistics Order Processing
Wang Laboratories
45 Computer Drive
Haverhill, MA 01830

Att'n: Order Services

GROUP: ECO Support Group MAIL STOP: 0139

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

WANG

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5160 REPLACES: _____ DATE: 08/13/85 PAGE 1 OF 1

MATRIX ID. 3107 PRODUCT/RELEASE# 2200 Disk Function

TITLE: FCO 1168, 2280 DPU/MUX

PURPOSE:
To inform the field that FCO 1168 has been released.

EXPLANATION:
FCO 1168, released July 17, 1985, documents ECO 37156 and informs the field that FCO's 1086 and 1114 have been replaced by FCO 1168. Four EPROM's on the 210-7423-A PCB are changed. The reasons for the change are as follows.

1. Multi-sector writes that end on relocated alternate sectors can cause extra sectors to be written.

2. When the first operation of a DPU is multi-sector write, the DPU will return an I91 on this and all other subsequent requests. The I91 will be returned until a reset is issued followed immediately by a non-multisector write operation.

3. The DPU will hang if a data transmission error occurs during the "Compare" sequence of a "Read After Write" command.

4. Attempts to access the drive while it was seeking to track "0" during the power-up (or spin-up) sequence causes the drive to retry the seek. If this happens several times in a row, the drive will hang and have to be shut down to clear the condition.

The upgraded EPROM's in FCO Kit #728-0184 are designed to fix the problems cited in both FCO 1086 and FCO 1114.

FCO Kit #728-0184 will be available August 5, 1985 and can be obtained by placing a routine order through the Logistics Order Processing system.

NOTE: FCO 1161, which adds two resistors to the 210-7422 PCB, must be done in conjunction with FCO 1168. Refer to FCO 1161 for further information.

GROUP: ECO Support Group MAIL STOP: 0139

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WANG

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5140 REPLACES: _____ DATE: 07/09/85 PAGE 1 OF 1

MATRIX ID. 3107 PRODUCT/RELEASE# 2200 Disk Function

TITLE: FCO 1161, 2280

PURPOSE:
To inform the field that FCO 1161 has been released.

EXPLANATION:
FCO 1161, released June 26, 1985, documents ECO 36643. Two resistors on the 210-7422 PCB are changed. The reasons for the change are to eliminate noise on the ready line and to correct intermittent hangs and incorrect drive selection. The FCO kit will be available July 8, 1985, and can be obtained by placing a routine order through the Logistics Order Processing system for kit #728-0177.

GROUP: ECO Support Group MAIL STOP: 0139

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#40911

3107

PERIPHERALS-DISK DRIVES-2200 DISK FUNCTION

TOPIC: FCO 1114, 2280 DPU/MUX

FCO 1114, released August 29, 1984, documents ECO 33310 and informs the field that FCO Kit #728-0104 (referenced in FCO 1086) has been replaced by Kit #728-0131. Four EPROM's are changed on the 210-7423-A PCB. The upgraded EPROM's in kit #728-0131 are designed to fix the problems cited in both FCO 1086 and FCO 1114. The reason for changes made in FCO 1086 are 1) to prevent read cache from being lost when a reset is issued from one of the terminals on the system, and 2) to allow the DPU to reselect the destination drive when dumping the multi-sector write cache to one of the drives. The reason for the change made in FCO 1114 is to correct start-up problems which result in DPU hangs by making sure that the state of the drives is properly determined before normal processing is continued. The hangs are caused by the DPU registers left in an unknown state after trying to read the Alternate Sector Map from a non-existent disk. FCO Kit #728-0131 will be available September 17, 1984, and can be obtained by placing a routine order through the Logisitics Order Processing System.

***Note: Prior to installing R9 EPROM's, back up customer's data. After installing R9 EPROM's, reformat all surfaces.**

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#40731

4202

2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER

TOPIC: 2280 DPU PROM PROBLEMS (DISK MULTIPLEXERS)

There have been several reports regarding the 2280 DPU R8 PROMS creating a disk hang problem. R&D retested the R8 PROMS and found that in a single disk system, the R8 PROMS will cause a disk hang upon the first disk access, after powering on the DPU or bringing the disk to a ready state.

To recover from the hang, press RESET and execute the program. Once the disk hang has been recovered, the problem will not reoccur until either the DPU or the disk loses ready. Only the single disk systems (one disk and a DPU) are effected. Daisy chained drives work with no problem.

R&D is working on R9 PROMS and hope to have them released shortly.

All single disk systems should remain at R7 PROMS until the new PROMS are released.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#40501

3107

PERIPHERALS-DISK DRIVES-2200 DISK FUNCTION

TOPIC: FCO 1086, 2280 DPU

FCO 1086, released April 23, 1984, documents ECO 31181. The change: 1) prevents read cache from being lost when a reset is issued from one of the terminals on the system, and 2) allows the DPU to reselect the destination drive when dumping the multi-sector write cache to one of the drives. Four PROM's are changed on the 210-7423-A PCA. To obtain the FCO kit, place a routine order through the Logistics Order Processing System for Kit #728-0104.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#30614

202

2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

TOPIC: 2280 DPU/MUX CABLES

The question of maximum cable lengths has arisen for the cable between the 2280 DPU/MUX and the 2200 CPU. Below is a list of cables that are supported.

When using unmuxed DPU to CPU (12' maximum) use:

220-0105-2	12'
220-0105-3	8'

When using DPU/MUX to CPU (2000' maximum) use:

220-0105-2	12'
220-0105-3	8'
120-2280-01	25'
120-2280-02	50'
120-2280-03	100'
120-2280-04	250'
120-2280-05	500'
120-2280-06	750'
120-2280-07	1000'

WANG LABORATORIES, INC.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#10616

IV.B.3
2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

IQEIC:__2280_DISK_MULTIPLEXER

When updating a 2280DPU MUX to an expanded MUX and the motherboard (210-7716) is an R0 artwork, pin D of J19, J20, J21, and J22 must be tied together. If this is not done the DPU will hang as soon as you install the expanded MUX card (210-7718).

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#10519

IV.B.3
2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

TOPIC: CHANGES TO TAC NEWSLETTER #10414

TAC Newsletter #10414 contained information on ECOs which cured about 99% of all problems on the 2280 DPU. However the Newsletter did not contain the part numbers of the PCBs which the ECOs were on. So saying, this is a reprint of that article with the PCB numbers included.

- - - - - - - - - - - - - - - - - -

This TAC Newsletter is to inform the field of known problems on the 2280 MUX/DPU and the changes to correct them.

1. There is a problem with R6 proms when the DPU is trying to access an alternate sector for a write, the alternate sector map is not properly set up, and the DPU lost where it was. There was an ECO (#18418) written to update the proms to R7.

   ECO #18418 PCB 210-7423A

CHANGE:	FROM	TO
	378-4083-R6	378-4083-R7
	378-4084-R6	378-4084-R7
	378-4085-R6	378-4085-R7
	378-4086-R6	378-4086-R7

2. There is an incompatibility problem between disk drives and the 2280 MUX/DPU. The next four ECO's (#18091, 18092, 18093 and 18094) correct this problem.

   ECO #18091 PCB 210-7421

   a. Add a 470 ohm resistor (330-2047) between L22 pin 14 and plus 5VR.
   b. Add a 150 PF cap (300-1150) between L22 pin 14 and plus/minus OV.
   c. Remove R27 1K ohm resistor.
   d. Remove C2 .001uf cap.
   e. Tie L29 pin 12 to L29 pin 13.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#10519

IV.B.3
2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

TOPIC: CHANGES TO TAC NEWSLETTER #10414 (Continued)

ECO #18092 PCB 210-7422

a. Change L46 from a 74S00 (376-0228) to a 7400 (378-0002).

ECO #18093 PCB 210-7423

a. Cut etch from L49 pin 3 to L45 pin 12.
b. Add jumper from L49 pin 3 to L32 pin 9.
c. Cut etch from L49 pin 2 to plus and minus OV.
d. Add jumper from L49 pin 2 to L38 pin 4.
e. Add jumper from L49 pin 1 to L49 pin 4.
f. Cut etch from L46 pin 3 to L49 pin 4.
g. Cut etch from K1 to L46 pin 3.
h. Add jumper from L49 pin 6 to K1.
i. Add jumper from L49 pin 4 to L31 pin 3.
j. Add jumper from L38 pin 3 to L46 pin 3.

ECO #18094 PCB 210-7424

a. Change L12 from a 7404 (376-0010) to a 7414 (376-0139).

3. There is a problem with the 210-7715 cards. The boards are sometimes shipped out with R1 artworks which are not necessarily updated properly and will not access a daisy chain disk drive. These R1 artwork boards also are vulnerable to I96 errors. From this time on, only R3 or above artwork 210-7715 cards will be shipped. If any of these problems occur with R1 artwork cards, please order R3 artwork cards.

4. There are registration problems on the 210-7717 and the 210-7718 where the pins on the connectors are shifted over, but only on one connector. There is a possiblility of shorting plus 5V and plus and minus OV. An ECO has been written and all cards manufactured in the future will be corrected. In the meantime, when installing any of these cards, look down into the chassis to see if you are shorting and if you are, re-seat the card. Chances of shorting out are slim but do not take chances.

WANG LABORATORIES, INC.

CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#10414

IV.B.3
2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

TOPIC: CHANGES TO 2280 MUX/DPU

This TAC Newsletter is to inform the field of known problems on the 2280 MUX/DPU and the changes to correct them.

1. There is a problem with R6 proms when the DPU is trying to access an alternate sector for a write, the alternate sector map is not properly set up, and the DPU lost where it was. There was an ECO (#18418) written to update the proms to R7.

   ECO #18418

CHANGE:	FROM	TO
	378-4083-R6	378-4083-R7
	378-4084-R6	378-4084-R7
	378-4085-R6	378-4085-R7
	378-4086-R6	378-4086-R7

2. There is an incompatibility problem between disk drives and the 2280 MUX/DPU. The next four ECO's (#18091, 18092, 18093 and 18094) correct this problem.

   ECO #18091

   a. Add a 470 ohm resistor (330-2047) between L22 pin 14 and plus 5VR.
   b. Add a 150 PF cap (300-1150) between L22 pin 14 and plus/minus 0V.
   c. Remove R27 1K ohm resistor.
   d. Remove C2 .001uf cap.
   e. Tie L29 pin 12 to L29 pin 13.

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CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#10414

IV.B.3
2200 SYSTEMS-INTERFACE-DISK MULTIPLEXER.

IOBIC: CHANGES TO 2200 MUX/DEV (Continued)

ECO #18092

a. Change L46 from a 74S00 (376-0228) to a 7400 (378-0002).

ECO #18093

a. Cut etch from L49 pin 3 to L45 pin 12.
b. Add jumper from L49 pin 3 to L32 pin 9.
c. Cut etch from L49 pin 2 to plus and minus 0V.
d. Add jumper from L49 pin 2 to L38 pin 4.
e. Add jumper from L49 pin 1 to L49 pin 4.
f. Cut etch from L46 pin 3 to L49 pin 4.
g. Cut etch from K1 to L46 pin 3.
h. Add jumper from L49 pin 6 to K1.
i. Add jumper from L49 pin 4 to L31 pin 3.
j. Add jumper from L38 pin 3 to L46 pin 3.

ECO #18094

a. Change L12 from a 7404 (376-0010) to a 7414 (376-0139).

3. There is a problem with the 210-7715 cards. The boards are sometimes shipped out with R1 artworks which are not necessarily updated properly and will not access a daisy chain disk drive. These R1 artwork boards also are vulnerable to I96 errors. From this time on only R3 or above artwork 210-7715 cards will be shipped. If any of these problems occur with R1 artwork cards, please order R3 artwork cards.

4. There are registration problems on the 210-7717 and the 210-7718 where the pins on the connectors are shifted over, but only on one connector. There is a possiblility of shorting plus 5V and plus and minus 0V. An ECO has been written and all cards manufactured in the future will be corrected. In the meantime, when installing any of these cards, look down into the chassis to see if you are shorting and if you are, re-seat the card. Chances of shorting out are slim but do not take chances.

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CUSTOMER ENGINEERING
TECHNICAL ASSISTANCE CENTER
NEWSLETTER

#01125

L4 - BOTTOM RIGHT COMPONENT SIDE

.A.1
2200 SYSTEMS-MAINFRAMES-A/B/C/S/T CPU'S.

TOPIC:__DISCREPENCIES_IN_L56Z_POWER_SUPPLY_REGULATORS

There has been problems out in the field with the 210-L567 working on the 2200T and 2280 DPU. Below is a chart on which boards work on what systems.

1. For boards with R9M9 artwork.

   a. Check if board has been reworked per ECN 16283. If it hasn't, mark board L567-1. (These can only be used on the PAC tester.)

   b. Any board shipped from now on with R9M9 artwork will work on 2200T and 2280 DPU.

2. For boards with R8M8 artwork.

   a. Cut etch between L4 pin 6 and L4 pin 10.

   b. Cut jumper between L4 pin 6 and L4 pin 10. (Some of these boards have both jumper and etch.)

   c. When this is done, these boards will work on both the 2200T and 2288 DPU.

3. For boards with R7 or lower artwork.

   a. Cut jumper between L4 pin 6 and L4 pin 10.

   b. When this is done, these boards will work on both the 2200T and 2280DPU

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2280 MICROPROCESSOR ECN'S

210-7415 (small regulator PCB) E Rev 0

Remove L2 (7407). Add jumper tieing pins 12 and 13 of location L2.

REASON: Buffer no longer needed.

210-7416 (mother PCB) E Rev 1

0 to 1: On the L567 connector tie 10UF 35V cap (300-4041) pin 7_2 to ground (plus side to ground).

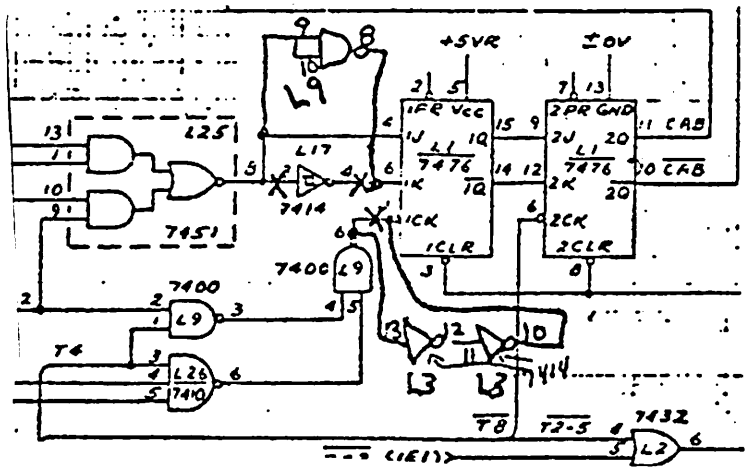
REASON: To prevent oscullation on -15V regulator.

210-7421 E Rev 2

0 to 1: Cut etch at L6 pin 9. Add etch from L6 pin 9 to L15 pin 23.

REASON: To compensate for different speeds of the 74181's .

1 to 2: See Below.



REASON: Data set up time for carry bit.

210-7422 E Rev 2

0 to 1: Change resistors on pins 26 and 56 of J3 from 20K (330-4021) to 680 ohm (330-2068).

REASON: To prevent wrong disk selection.

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210-7422

1 to 2: Cut etch going to L13 pin 5 and add etch from L13 pin 5 to L2 pin 5.

REASON: To ensure clock/data relationship is correct.

210-7423 E Rev 2 UP TO R8 PROMS (R8?)

0 to 1: Add 100PF cap (300-1100) from L10 pin 5 to +5 volts.

REASON: To prevent noise spikes on address.

1 to 2: Prom change S/B to R4 (378-4083-84-85-86)

REASON: To correct format problems.

210-7424 E Rev 7

0 to 1:
1. Cut etch from L46 pin 4 and L46 pin 8.
2. Add etch from L46 pin 3 and tie to L46 pin 8.
3. Cut etch to L35 pin 6.
4. Add etch from L35 pin 6 and tie to L48 pin 15.

REASON: Artwork errors on R1 and R2 boards.

1 to 2: Tie L3 pins 1-2-13 together (from L6 pin 6)
Cut etch L3 pin 9
Tie L3 pin 12 to L3 pin 9

REASON: To prevent format errors.

Rev 2-3: Add 220pf cap (300-1220) from L3 pin 6 to 0 volts.

REASON: Timing problem on write.

Rev 3 to 4: Cut etch going to L32 pin 9.

REASON: Change CRESET from 50 NSEC to 100 NSEC for better compatibility with 7423 PCB.

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Rev 4 to 5:
1. Change C1 from 220PF to 470PF cap (300-1470)
2. Cut etch between L5 pin 4 and L5 pin 13.
3. Cut etch between L5 pin 13 and L6 pin 4.
4. Tie L6 pin 4 to 5 volts.

REASON: To prevent errors during format.

Rev 5 to 6:
1. Change L43 to a 7420 IC (376-0004).
2. Cut etch from L43 pin 1 to L12 pin 2.
3. Cut etch to L12 pin 1.
4. Add wire from etch at L12 pin 1 (not pin 1) to L23 pin 12 & 13.
5. Add wire to L23 pin 12 to L31 pin 9.
6. L23 pin 11 wire to L31 pin 8.
7. L31 pin 10 to L43 pin 1.

REASON: To correct reading sector errors due to noise on sync-byte.

Rev 6 to 7:
1. Cut etch from L36 pin 3 to L36 pin 9.
2. Jump L36 pin 3 to L26 pin 4.

REASON: Disk drive selection problem due to select timing problem.

8960A

WANG

ECO

ECO NO. 451 B

SHEET 1 OF 4

ORIGINATOR	Giles Carrier	M/S	014390	EXT 74478	DATE 06/16/87
WRITTEN BY	Valerie Donahoe	M/S	012-188	EXT 74313	DATE 06/16/87

PART NO. 209-7421	DESCRIPTION 2280 ALU/MUX Intfc
DWG NO. D 7421	
MODEL NO. 2200 SMD	PEP #
CLASS I (II) III	

DESCRIPTION OF CHANGE

NOTE 1: Engineering has decided that the artwork will not be modified at this time, it is not cost justifiable.

Change schematic and sample board per attached prints and as follows:

Cut etch leading to L12 pin 3 on circuit side.

On component side:
Tie L12 pin 3 to L29 pin 5. (zone 1E3)
Tie L3 pin 6 to L29 pin 4.
Tie L4 pin 12 to L29 pin 6.

NOTE TO EDD: Create 210 History sheet

AUG 0 6 1987

REASON/SYMPTOM FOR CHANGE

To stop R/B̄ from reaching the CPU late.

COMPANY CONFIDENTIAL

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DOCUMENTS

	REVISIONS FROM	TO
HISTORY SHT. 510		
HISTORY SHT. 210	SEE BELOW	
ARTWORK		
E-REV.	3	4
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			X		

CONFORMANCE DATE 8-21-87

APPROVALS

	DATE
ECO CHAIRPERSON	8/4
DES. ENGRG.	
CUST. ENGRG.	8/5
MFG.	
MTO	
PP&M	
F.C.C.	
PROD. SAFETY	7/1/87
SECURE SYS.	
ORIGINATOR	
OTHER	

WANG

ECO

ECO NO. 37156

SHEET 1 OF 7

ORIGINATOR	Elaine Roux	M/S	1489	EXT. 74122	DATE 06/10/85
WRITTEN BY	Jeannine Roy	M/S	1218B	EXT. 76930	DATE 06/10/85

PART NO. 210-7423-A	DESCRIPTION Ram/Prom Control Bd
DWG NO. 7423	
MODEL NO. 2200 SMD	PEP # PEP# H0133A
CLASS I (II) III	

DESCRIPTION OF CHANGE

Delete schematic software loading chart and create a parts list loading variation table and change as follows:
Change sample board as follows:

	FROM	TO
L13	378-~~4083~~-R9	378-~~4083~~-R10
L14	378-4084-R9	378-4084-R10
L15	378-4085-R9	378-4085-R10
L16	378-4086-R9	378-4086-R10

Change BOM 210-7423-A as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE	QTY	QTY TYPE
DELETE	378-4083-R9	Prom	EA	SP	~~RECEIVED~~ 1	1
	378-4084-R9	Prom	EA	SP	1	1

JUN 27 1985
PRINT ROOM

Note to EDD: Create a 210 History Sheet and a VS laser parts list for this board. Also delete parts list on sheet 5 of 5 of schematics.

Continued on next page

REASON/SYMPTOM FOR CHANGE

This revision of the 2280 DPC microcode corrects four bugs that are causing serious customer problems.

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DOCUMENTS

	REVISIONS FROM	REVISIONS TO
HISTORY SHT. 510		
HISTORY SHT. 210		
ARTWORK		
E-REV.		
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	X	X	X		

CONFORMANCE DATE 6/28

APPROVALS

	DATE
ECO CHAIRPERSON	6/26
DES. ENGRG.	
CUST. ENGRG.	6/24/85
MFG.	6/26/85
MTO	
PP&M	
F.C.C.	6/13/85
PROD. SAFETY	6/13/85
SECURE SYS.	
ORIGINATOR Elaine Roux	6/14/85
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. 37156	SHT 2	OF 7

DESCRIPTION OF CHANGE:

Continued from page one

Change BOM 210-7423-A as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE	QTY	QTY TYPE
DELETE	378-4085-R9	Prom	EA	5P	1	1
	378-4086-R9	Prom	EA	5P	1	1
ADD	378-4083-R10	Prom	EA	5P	1	1
	378-4084-R10	Prom	EA	5P	1	1
	378-4085-R10	Prom	EA	5P	1	1
	378-4086-R10	Prom	EA	5P	1	1

Delete the Product Structures and Part Numbers from the Data Base for the following proms:

378-4083-R9
378-4084-R9
378-4085-R9
378-4086-R9

WANG

ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET

ECO NO. 37556
SHEET 3 OF 7

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			

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		

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 ☐	_____ ☐

APPROVALS

ECO ADMIN
MFG ENG [signature] 6/26/85
QUALITY [signature] 6/26
MATERIALS [signature] 6/25/85
PROD. CONTROL
FINANCE
RE-MFG [signature]
OTHER

REMARKS

WIP = (131) ; (50) @ STA 1, (1) @ STA 5, (1) @ STA 31, (79) @ STA 54
QTY BUILD SCHEDULE = (31) ; (13) BDS IN STOCK
MATERIAL AVAILABLE — 6/25

CE spares shipped after 6/28/85 will be reworked

SMS EFFECTIVITY DATE 7/24

DOCUMENTATION ONLY ☐

14-19032 Printed in U.S.A. 5-85-7M

WANG

ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING IMPACT SHEET

ECO NO. 37156
SHEET 1 OF 7

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

IMPACT COMMENTS

Purge stock.
FCO for field
Rework during R/R

	DOMESTIC	INTER-NATIONAL
EST. UNIT POP	8413	7755
EST. SPARE POP	661	264
TOTAL	9074	8019

EST. COST IMPACT		APPROVALS	DATE
MATERIAL	$43,071.00	TECH OPS	6/25/85
LABOR	$429,757.00	LOGISTICS	6/25/85
TOTAL	$472,828.00	FSC SUPPORT	
IMPLEMENTATION PERIOD		FINAL	6/26/85
ANNUAL COST		OTHER	6/20

GENERAL COMMENTS

Install this FCO with ECO 36693 (FCO 1161)

SSD RELEASE MEMORANDUM

37156

SUMMARY DATA

Release Memo #:	194
Release Coordinator:	Elaine Roux M/S1489
Date:	June 5, 1985
Product Line:	2200
Product Name:	2280 Disk Processing Unit
Version Number:	10
Customer Version Number:	10
Maximum Memory Requirement:	N/A
Release Type:	( ) Initial Release( ) Pre-Release ( ) Internal Release (X)Customer Release
Release Purpose:	(X) Problem Correction ( ) Enhancement
Submission Type:	( ) Preliminary (X) Critical
Part Number:	378-4083 R10, 387-4084 R10 378-4085 R10, 378-4086 R10
Board Number:	209-7423
PEP Number:	N/A
Total Number of Diskettes:	(1)

GENERAL DESCRIPTION

This revision of the 2280 DPC microcode corrects four bugs that are causing serious Customer problems and costing the company much in the way of time, effort, money, and Customer confidence. This code has been tested by the developer, by Customer Engineering at Beta test sites, and by Continuation Engineering.

PREREQUISITE HARDWARE

The Wang 2280 DPC with hardware ECO 36643 installed on PC board # 210-7422 is required.

2716 EPROMS are required and are installed on PC board #210-7423.

PREREQUISITE SOFTWARE (Enter Name, Version, Model Numbers If Applicable)

None

TECHNICAL DOCUMENTATION

None

ECO NO 37156
SHT 5 OF 7

WHERE TO OBTAIN THIS RELEASE

Via corporate WISE network, 8th Floor, Tower I/II Lab or Tower II Resource Room.

Software	Proms
Release Memorandum	Library: rmlib ID: 194
Technical Documentation	None

RESTRICTIONS

None

SPECIAL CONSIDERATIONS

Revision 10 should be integrated into manufacturing stock ASAP.

INTERNATIONAL CONSIDERATIONS

None

ECO NO 32156
SHT 6 OF 2

ENHANCEMENTS

None

PROBLEMS CORRECTED (Enter P.R.O.B.E Number If Applicable)

Multisector writes that end on a relocated sector write extra sectors to disk under certain conditions causing a loss of data integrity.

When the first operation requested of a DPU is multisector write, the DPU will return an 191 on this and all other subsequent requests. The 191 will be returned until a reset is issued followed immediately by a non-multisector write operation.

The DPU will hang if a data transmission error occurs during the "Compare" sequence of a "Read After Write" command.

Attempts to access the drive while it was seeking to track 0 during the power-up (or spin-up) sequence causes the drive retry the seek. If this happens several times in a row the drive will hang and have to be shut down to clear the condition.

KNOWN ANOMALIES

None

MEDIA

One White Label diskette containing:

File	Part Number	Chip Location	Description
84083R10	3[illegible]-4083 R10	L13	EPROM 4 microcode
84084R10	3[illegible]-4084 R10	L14	EPROM 2 microcode
84085R10	3[illegible]-4085 R10	L15	EPROM 1 microcode
84086R10	3[illegible]-4086 R10	L16	EPROM 3 microcode

Total Files (4)

All EPROMs are to be TMS-2716's.

ECO NO 37156
SHT 2 OF 2

WANG

ECN

CE# 236

ECN No. 12060

SHEET 1 OF 1
DATE 7-03-79
RFA NO. (REF)

ORIGINATOR Dave Reeder DEPT. 05 EXT. 349 DATE 6/22/79
MODEL NO. 2280 TITLE

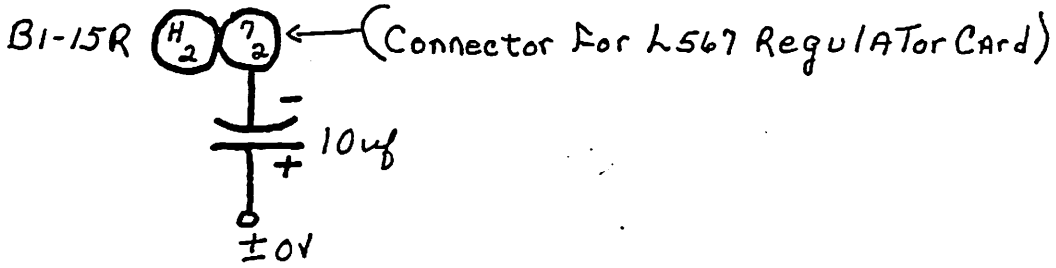
PART NO.	PART NAME (DWG. TITLE)	REV. F	REV. T	P.C. REV. FROM	P.C. REV. TO	ELEC. REV. FROM	ELEC. REV. TO
210-7416	Motherboard	-	-	-	-	-	-
DWG. NO. 7416						1	2

ASSY. PART NO. | ASSY. TITLE | EFFECTED ☐ NO EFFECT ☐

ECN NO. 12060

DESCRIPTION OF CHANGE

Change artwork, assembly drawing and schematic as follows:



Change BOM as follows:

	WL#	QTY	DESCRIPTION
Add	300-4041	1	10uf 35 V Tant Cap

RECEIVED
JUL 09 1979
PRINT ROOM

REASON FOR CHANGE

To prevent oscillation on -15V regulator

0010M/55

54

NEW PURCHASE REQ'D. ☐ | SHOP REWORK REQ'D. ☐ | VENDOR REWORK REQ'D. ☐

CUSTOMER ENGINEERING
☐ IMMEDIATE CUST.
☐ CUST. PER NEXT CALL
☒ INFORMATION ONLY
☐ NONE

ACKNOWLEDGE
BY:
DATE:

☒ MANDATORY CHANGE
☒ DOCUMENTATION CHANGE (PL, BOM, DWG) ✓
[ ] EASE OF MFG., COST REDUCTION
[ ] PRODUCT IMPROVEMENT

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM						X
TO CONFORM IF NOT BEYOND OPERATIONS EFFECTED						

FINAL APPROVAL M. Reeve 6/29 D. Reeve
APPROVED DESIGN ENGRG. Mickey Gates
APPROVED MFG. ENGRG. D Reeve
WRITTEN BY

WANG

ECN

ECN No. 1128.3

SHEET 1 OF 2

DATE 4-3-79

RFA NO. (REF)

ORIGINATOR Alan Waldrip DEPT. 16 EXT. 2068 DATE 3/30/79

MODEL NO. 2200SMD TITLE

PART NO.	PART NAME (DWG. TITLE)	REV. F	REV. T	P.C. REV. FROM	P.C. REV. TO	ELEC. REV. FROM	ELEC. REV. TO
210-7416	Motherboard	-	-	-	-	0	1
DWG. NO. 7416							
ASSY. PART NO.	ASSY. TITLE					EFFECTED ☐ NO EFFECT ☐	

ECN NO.

DESCRIPTION OF CHANGE

Change artwork, assembly drawing and schematic per attached print

Change BOM as follows:

	WL#	QTY	DESCRIPTION
Add:	300-4032	1	10 uf 35V Tant Cap

RECEIVED

APR 06 1979

PRINT ROOM

REASON FOR CHANGE

To eliminate one volt ripple on -12V line

2842J/47

(46)

NEW PURCHASE REQ'D. ☐ SHOP REWORK REQ'D. ☐ VENDOR REWORK REQ'D. ☐

CUSTOMER ENGINEERING
- ☐ IMMEDIATE CUST.
- ☐ CUST. PER NEXT CALL
- ☐ INFORMATION ONLY
- ☐ NONE

ACKNOWLEDGE BY: _____ DATE: _____

- [X] MANDATORY CHANGE
- [X] DOCUMENTATION CHANGE (PL, BOM, DWG)
- [ ] EASE OF MFG., COST REDUCTION
- [ ] PRODUCT IMPROVEMENT

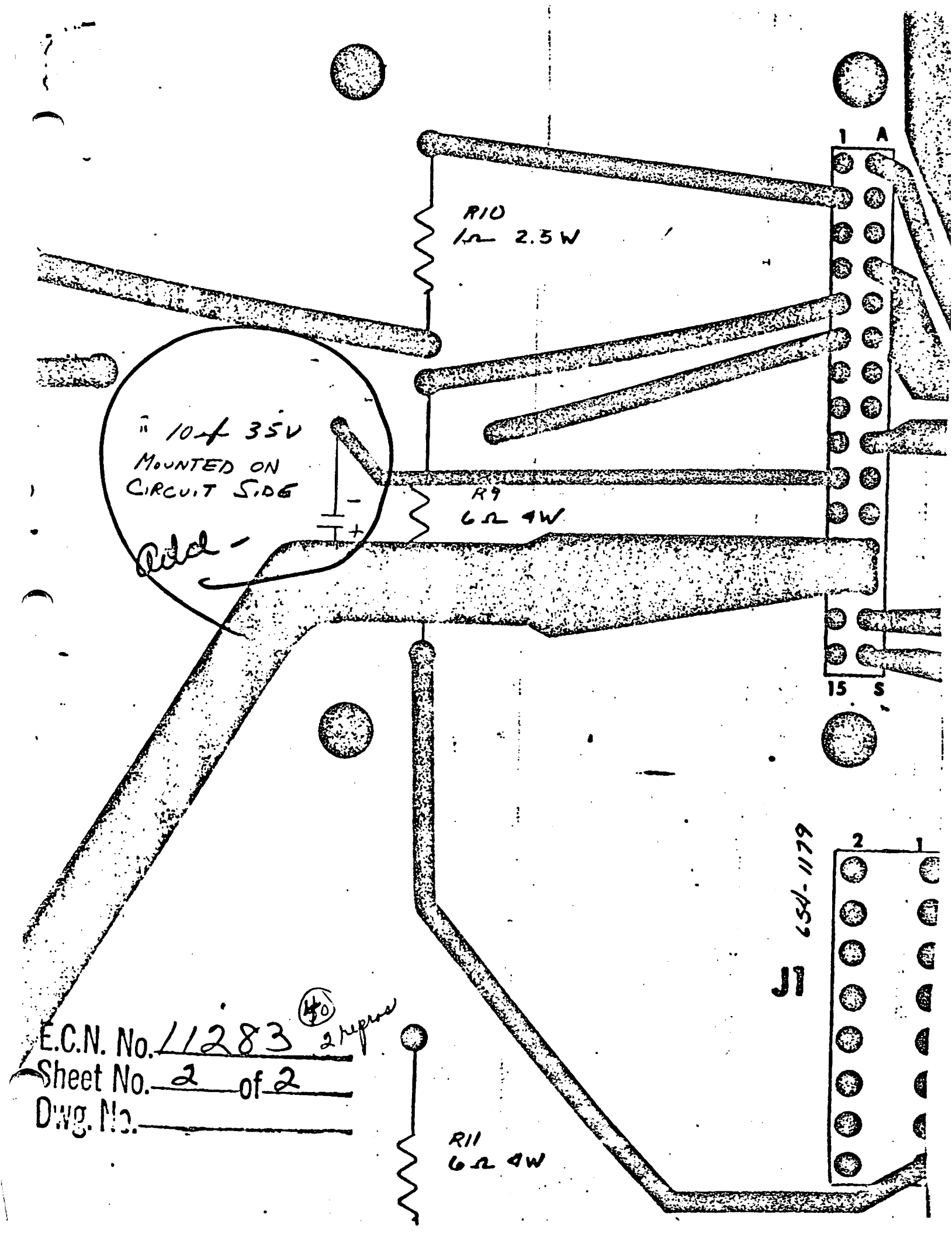
DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM	X	X		X		X
TO CONFORM IF NOT BEYOND OPERATIONS						

FINAL APPROVAL M Lowney 4/2/79

APPROVED DESIGN ENGRG. Richard Spencer

APPROVED MFG. ENGRG. R.P.

WRITTEN BY Paul Richard nms



E.C.N. No. 11283 (40) 2 reprints
Sheet No. 2 of 2
Dwg. No.

WANG

ECO

ECO NO. 1809

SHEET 1 OF 5

ORIGINATOR	Ken Dillon	M/S 1339	EXT. 2578	DATE 01/23/81
WRITTEN BY	Laurie David	M/S 1329	EXT. 2126	DATE 01/23/81

PART NO./ITEM NO. 209-7421	TITLE ALU/MUX Interface
DWG. NO./P. L. NO. 7421	
NEXT ASSY. Y / EFFECTED N 210-7421-A	TITLE
MODEL NO. 2280	

DOCUMENTS	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV.	2	3	✓	
SAMPLE BD	2	3	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DESCRIPTION OF CHANGE

Engineering has decided that the artwork will not be modified at this time

Change assembly drawing, schematic and sample board per attached prints and as follows

Tie a 470 ohm res (330-2047) from L22 pin 14 to +5VR
Tie a 150pf cer cap (300-1150) from L22 pin 14 to ±0v
Cut etch between L20 pin 6 and L29 pin 12
Remove R27 1K ohm res (330-3010)
Remove C2 .001uf cer cap (300-1906)
Tie L29 pin 12 to L29 pin 13

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	300-1906	.001uf cer cap	1
Change	330-3010	1K ohm res	from 10 to 9
Add	330-2047	470 ohm res	1
	300-1150	150pf cer cap	1

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

RECEIVED

MAR 09 1981

PRINT ROOM

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

APPROVALS	DATE
FINAL Paul Richer 2/26 M Devine	2/9/81
DES. ENG. K. Dillon	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	

2240M/130

VENDOR REQUEST ☐

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7422 ECN # 11587 Latest Artwork 2

Applies To Artwork Revisions 0-2 E-REV 0 To 1 Page 1 Of 2

Purpose / Symptom

TO PREVENT WRONG DISK SELECTION.

Prerequisite

ECN Kit Required

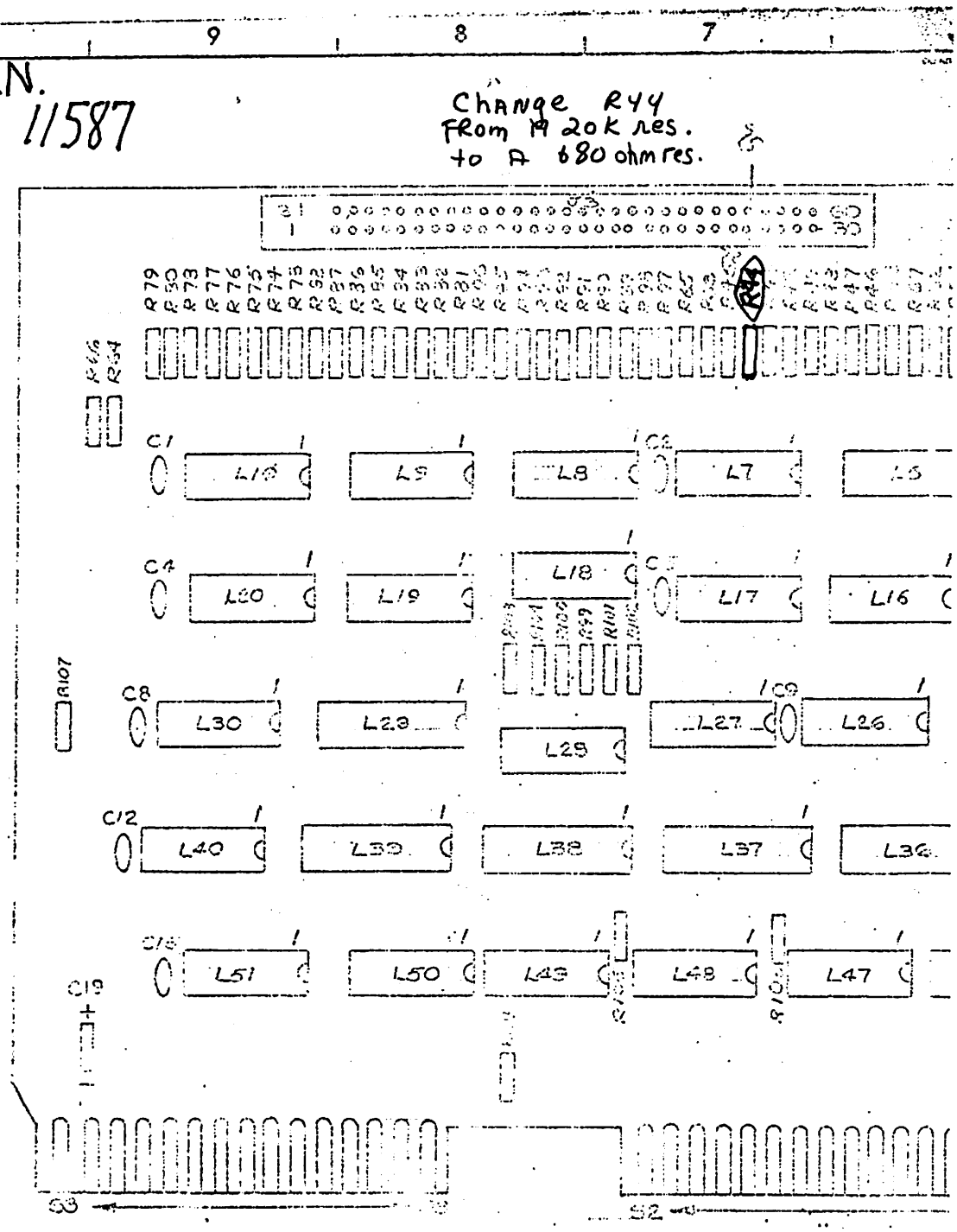
Mandatory X Info Fig. Included X Est. Comp. Time .15 Hour(s)

Procedure

1. REMOVE AND REPLACE THE 20K RESISTOR (WL#330-4021) CONNECTED TO PINS 26 AND 56 OF CONNECTOR J3 WITH A 680 OHM RESISTOR (WL#330-2068).

E.C.N. 11587

Change R44 From A 20K res. to A 680 ohm res.



CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

E.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7422 ECN # 11638 Latest Artwork 2

Applies To Artwork Revisions 0-2 E-REV 1 To 2 Page 1 Of 2

Purpose / Symptom

TO ENSURE THAT CLOCK/DATA RELATIONSHIP IS CORRECT.

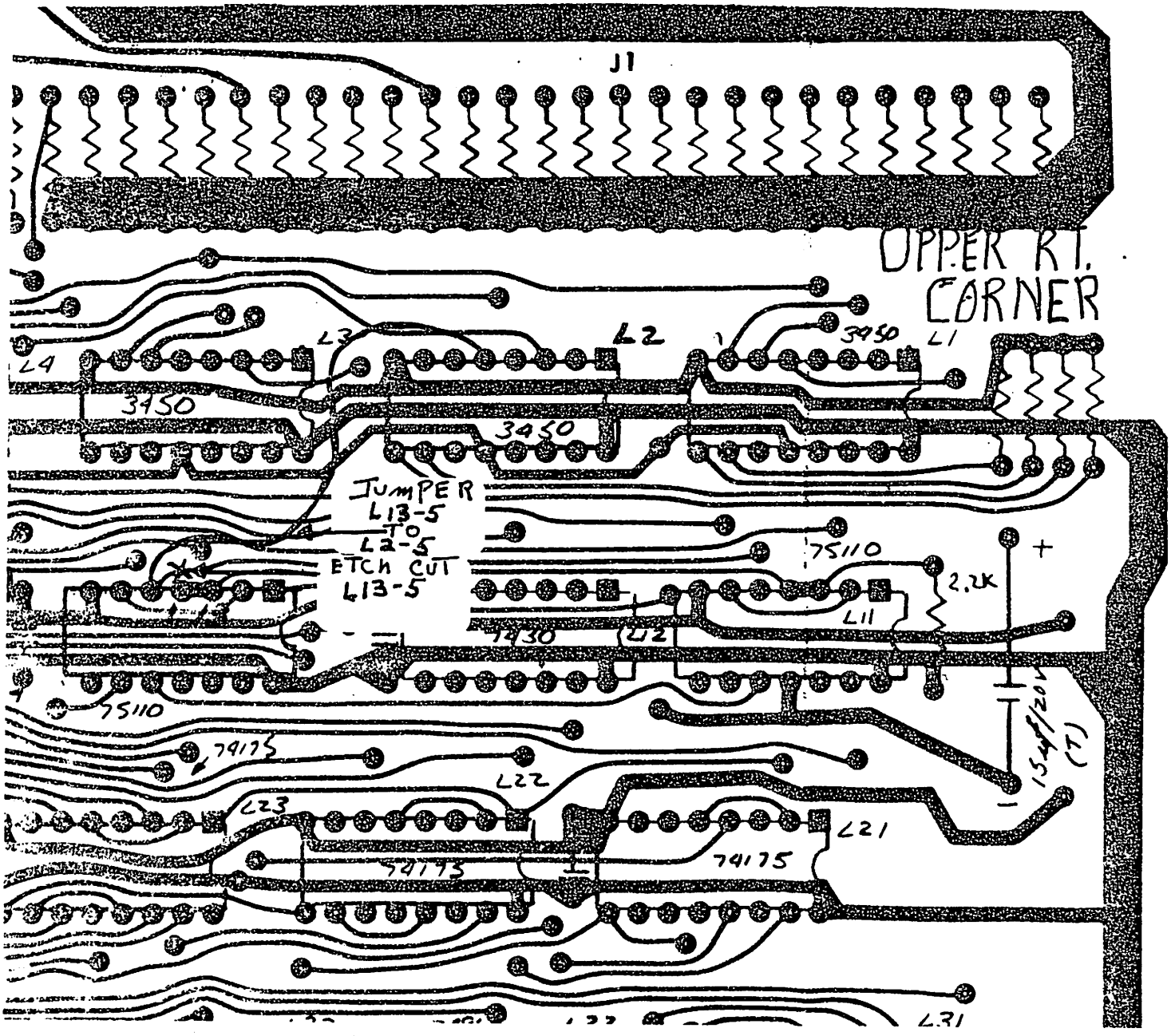
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .15 Hour(s)

Procedure

1. CUT ETCH AT L13-5.
2. JUMPER L13-5 TO L2-5.


J1
UPPER RT.
CORNER
L3
L2
3450
L1
L4
3450
3450
JUMPER
L13-5
TO
L2-5
ETCH CUT
L13-5
75110
2.2K
+
L11
7430
L12
75110
74175
L22
L23
L21
74175
74175
L31

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7422 ECN # 14564 Latest Artwork 4

Applies To Artwork Revisions 1-4 E-REV 2 To 3

Purpose / Symptom

THIS ECN WILL ENABLE ECC TO CORRECT MULTI-BIT ERRORS AND TO ALLOW FOR GROSS ECC ERRORS (12 BIT).

Prerequisite

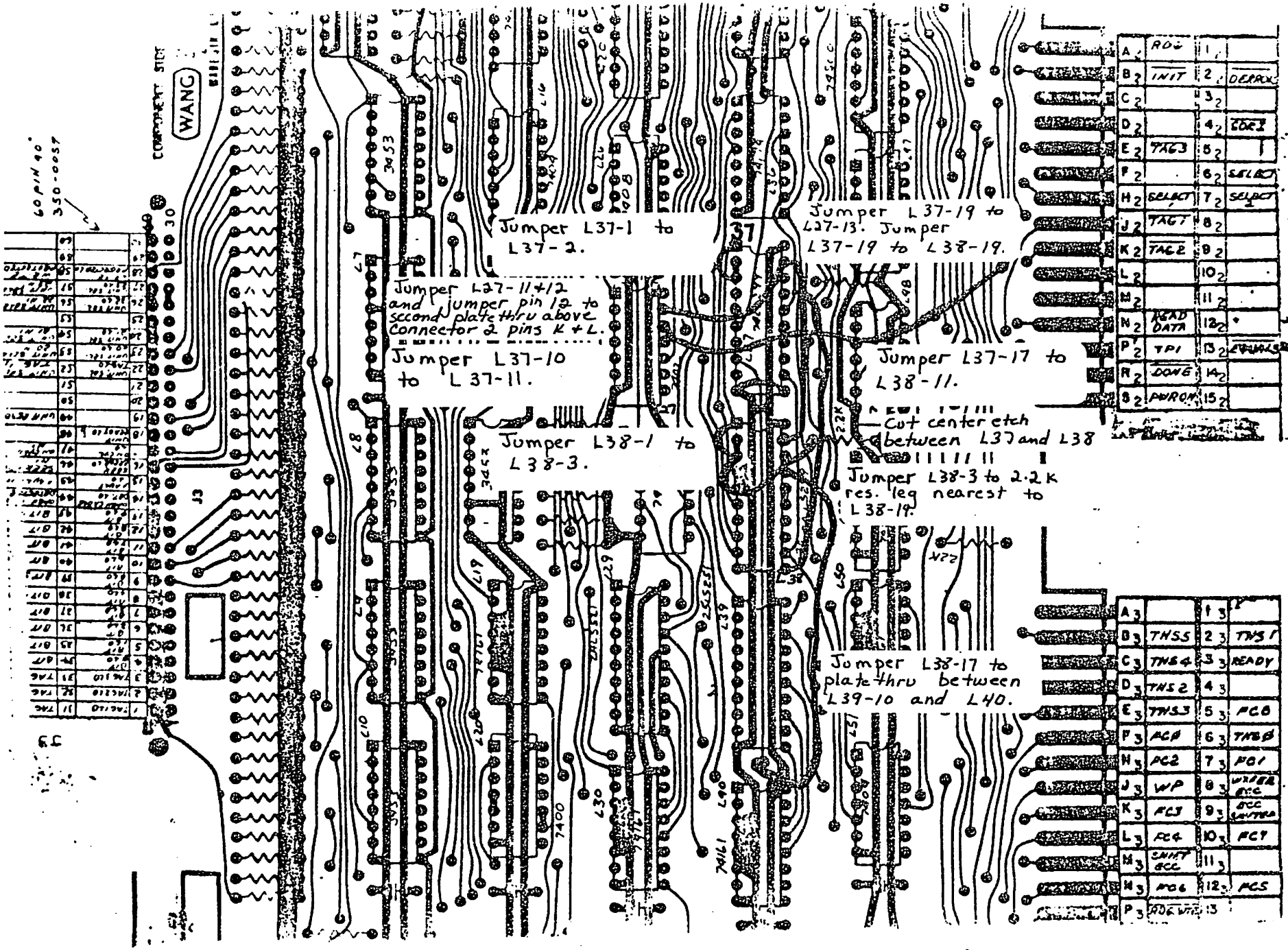
THIS ECN IS REQUIRED ON DPU'S USING R5 PROMS.

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time 1 Hour(s)

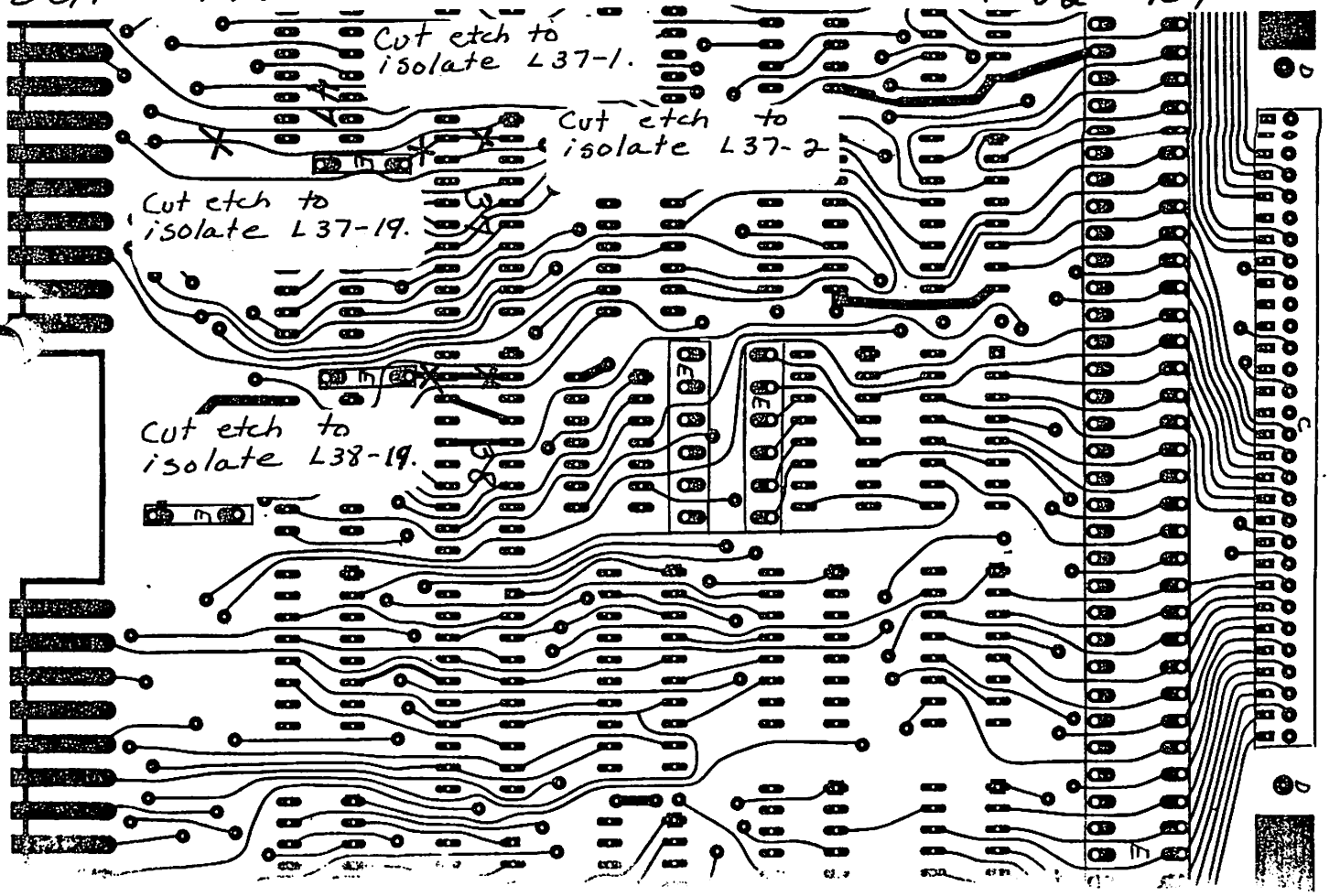
Procedure

1. JUMPER L37-1 TO L37-2.
2. JUMPER L37-19 TO L27-13.
3. JUMPER L37-10 TO L37-11 AND JUMPER L37-17 TO L38-11.
4. JUMPER L37-19 TO L38-19 AND JUMPER L38-1 TO L38-3.
5. JUMPER L38-3 TO THE 2.2K RES LEG NEAREST TO L38-19.
6. JUMPER L38-17 TO THE PLATETHRU BETWEEN L39-10 AND L40.
7. CUT THE CENTER ETCH BETWEEN L37 AND L38.
8. JOIN L27-11+12 AND JUMPER PIN 12 TO SECOND PLATETHRU ABOVE CONNECTOR 2 PINS K AND L.
9. NON-COMPONENT SIDE: CUT ETCH TO ISOLATE L37-2.
10. CUT ETCHES TO ISOLATE L37-1, L37-19 AND L38-19.- ETCH SIDE


WANG
COMPONENT SIDE
60 PIN 90°
350-0057
Jumper L37-1 to L37-2.
Jumper L37-11+12 and jumper pin 12 to second plate thru above connector 2 pins K+L.
Jumper L37-10 to L37-11.
Jumper L38-1 to L38-3.
Jumper L37-19 to L37-13. Jumper L37-19 to L38-19.
Jumper L37-17 to L38-11.
Cut center etch between L37 and L38
Jumper L38-3 to 2.2K res. leg nearest to L38-19.
Jumper L38-17 to plate-thru between L39-10 and L40.
PHOTOGRAPH THIS SIDE
ECN 14564
7422 R4

ECN 14564

7422 R4



WANG

ECO

ECO NO. 18092

SHEET 1 OF 4

ORIGINATOR	Ken Dillon	M/S	1339	EXT.	2578	DATE	01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT.	2126	DATE	01/23/81

PART NO./ITEM NO. 210-7422	TITLE ECC/Device Interface
DWG. NO./P. L. NO. 7422	
NEXT ASSY. Y EFFECTED N See Below	TITLE
MODEL NO. 2280	

DESCRIPTION OF CHANGE

Change assembly drawing, schematic and sample board per attached print and as follows

Change L46 from a 74S00 (376-0228)
to a 7400 (376-0002)

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	376-0228	IC 74S00	1
Change	376-0002	IC 7400	from 2 to 3

Next assemblies effected 167/187-2200-79/-80, 212-2280

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

RECEIVED

MAR 0 9 1981

2249M/130

DOCUMENTS	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV	3	4	✓	
SAMPLE BD	3	4	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS	DATE
FINAL Karl Richer 2/26	2/9/81
DES. ENG. T. Dillon R. Coon NCP	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐ | ☐ VALUE ENGRG NO. _____ PRINT ROOM

Printed in U.S.A. 13-8643A 9-80

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7423 ECN # 11586 Latest Artwork 1

Applies To Artwork Revisions 1 E-REV 0 To 1 Page 1 Of 1

Purpose / Symptom

TO PREVENT NOISE SPIKE ON ADDRESS INCREMENT.

Prerequisite

ECN Kit Required

Mandatory Info X Fig. Included Est. Comp. Time 0 Hour(s)

Procedure

THIS ECN SHOWS A 100PF CER CAP TO BE ADDED FROM L10-5 TO +5V.
HOWEVER ECN 11671 (E-REV 1/2) STATES TO REMOVE THIS CAP.

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7423 ECN # 11671 Latest Artwork 1

Applies To Artwork Revisions 1 E-REV 1 To 2

Purpose / Symptom

TO CORRECT FORMAT PROBLEMS AND ENSURE PROPER LOADING OF THE INSTRUCTION REGISTER.

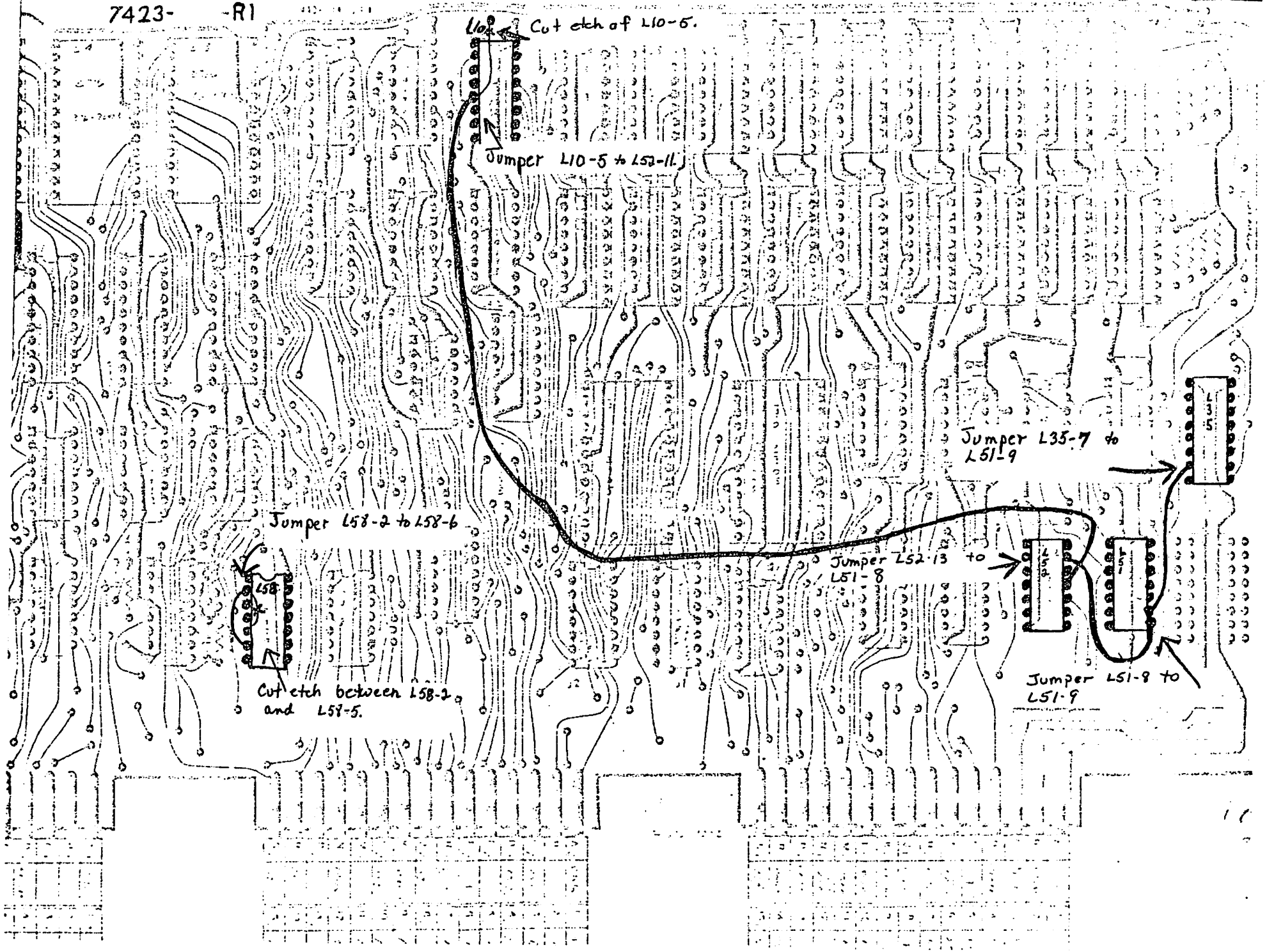
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .50 Hour(s)

Procedure

1. CUT ETCH CONNECTING TO L10-5.
2. JUMPER L35-7 TO L51-8+9 AND TO L52-13.
3. JUMPER L10-5 TO L52-11.
4. REMOVE 100 PF CAP ON L10-5 (PER ECN 11586).
5. CUT ETCH BETWEEN L58-2+5.
6. JUMPER L58-2 TO L58-6.
7. JUMPER L51-8 TO L51-9.


7423-R1
Cut etch of L10-6.
Jumper L10-5 to L52-11.
Jumper L35-7 to L51-9
Jumper L58-2 to L58-6
Jumper L52-13 to L51-8
Cut etch between L58-2 and L58-5.
Jumper L51-8 to L51-9

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7423 ECN # 11671 Latest Artwork 1

Applies To Artwork Revisions 1 E-REV 1 To 2

Purpose / Symptom

TO CORRECT FORMAT PROBLEMS AND ENSURE PROPER LOADING OF THE INSTRUCTION REGISTER.

Prerequisite

ECN Kit Required

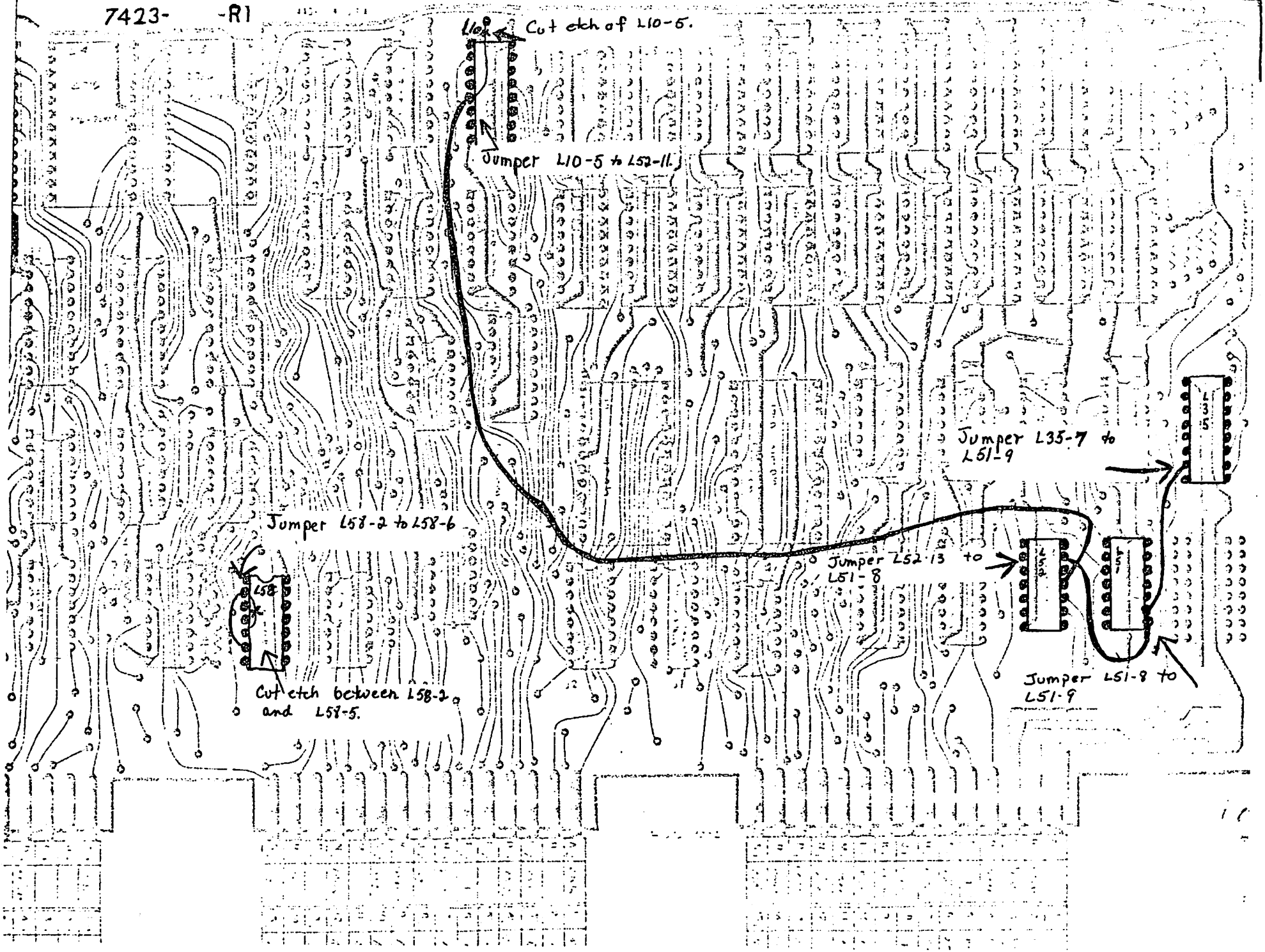
Mandatory X Info Fig. Included X Est. Comp. Time .50 Hour(s)

Procedure

1. CUT ETCH CONNECTING TO L10-5.
2. JUMPER L35-7 TO L51-8+9 AND TO L52-13.
3. JUMPER L10-5 TO L52-11.
4. REMOVE 100 PF CAP ON L10-5 (PER ECN 11586).
5. CUT ETCH BETWEEN L58-2+5.
6. JUMPER L58-2 TO L58-6.
7. JUMPER L51-8 TO L51-9.

7423- -R1

7423 R1



CUSTOMER ENGINEERING CIVISION
ECN UPDATE BULLETIN

U.S Release Date..082980A Model..228C Release #.. 11

Ass'y #..210-7423 ECN #..14561 Latest Artwork.. 2

Applies To Artwork Revisions..1,2 E-Rev. 2 To. 3 Page 1 Of.. 3

Purpose / Symotom

PRIME WILL NOT ALWAYS TRAP TO LOCATION 0000 (2911 DESIGN ERROR).

Prerequisite

ECN Kit Required.. Scrap Board..

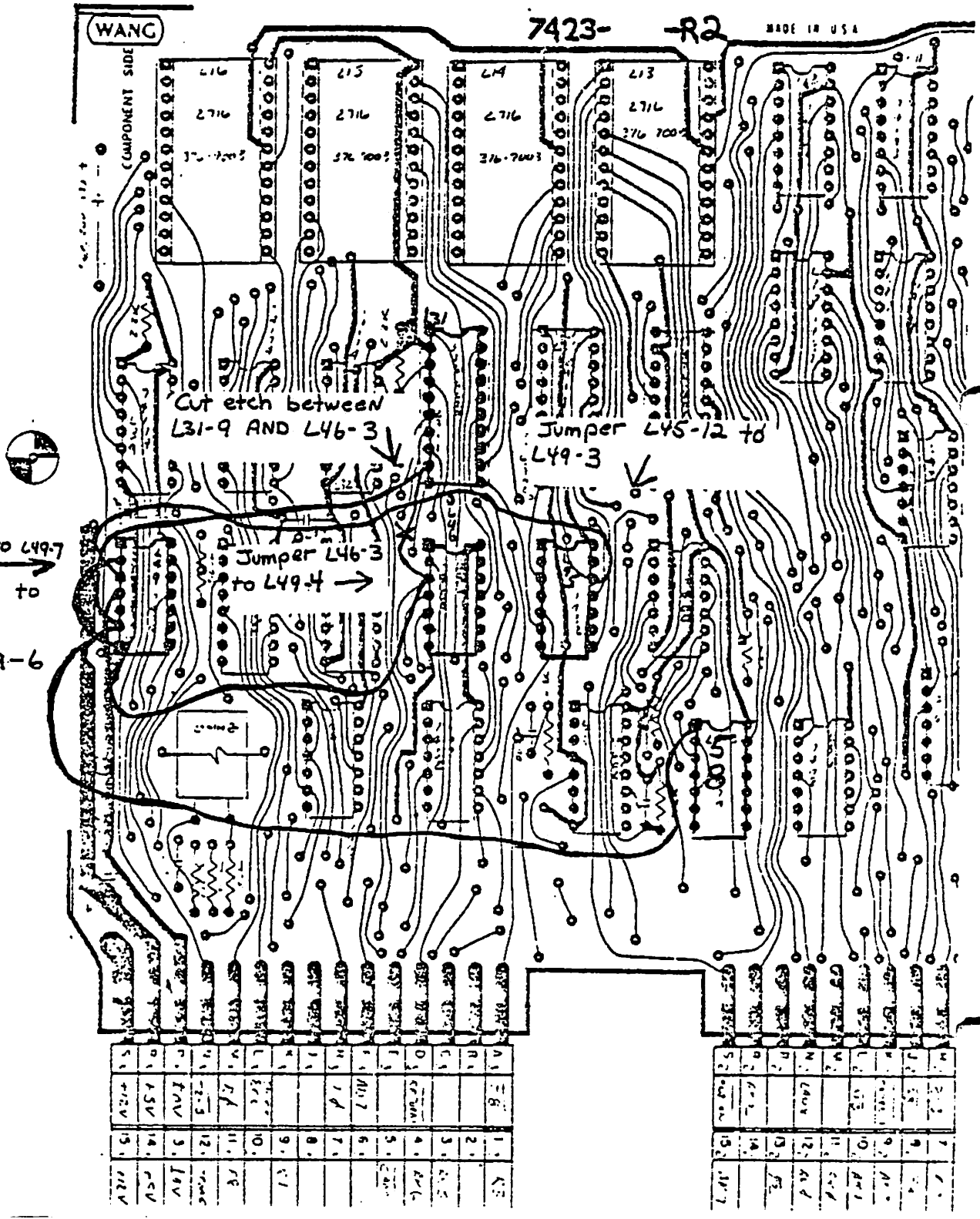
Mandatory..X Info.. Fig. Included..X Est. Comp. Time .50 Hour(s)

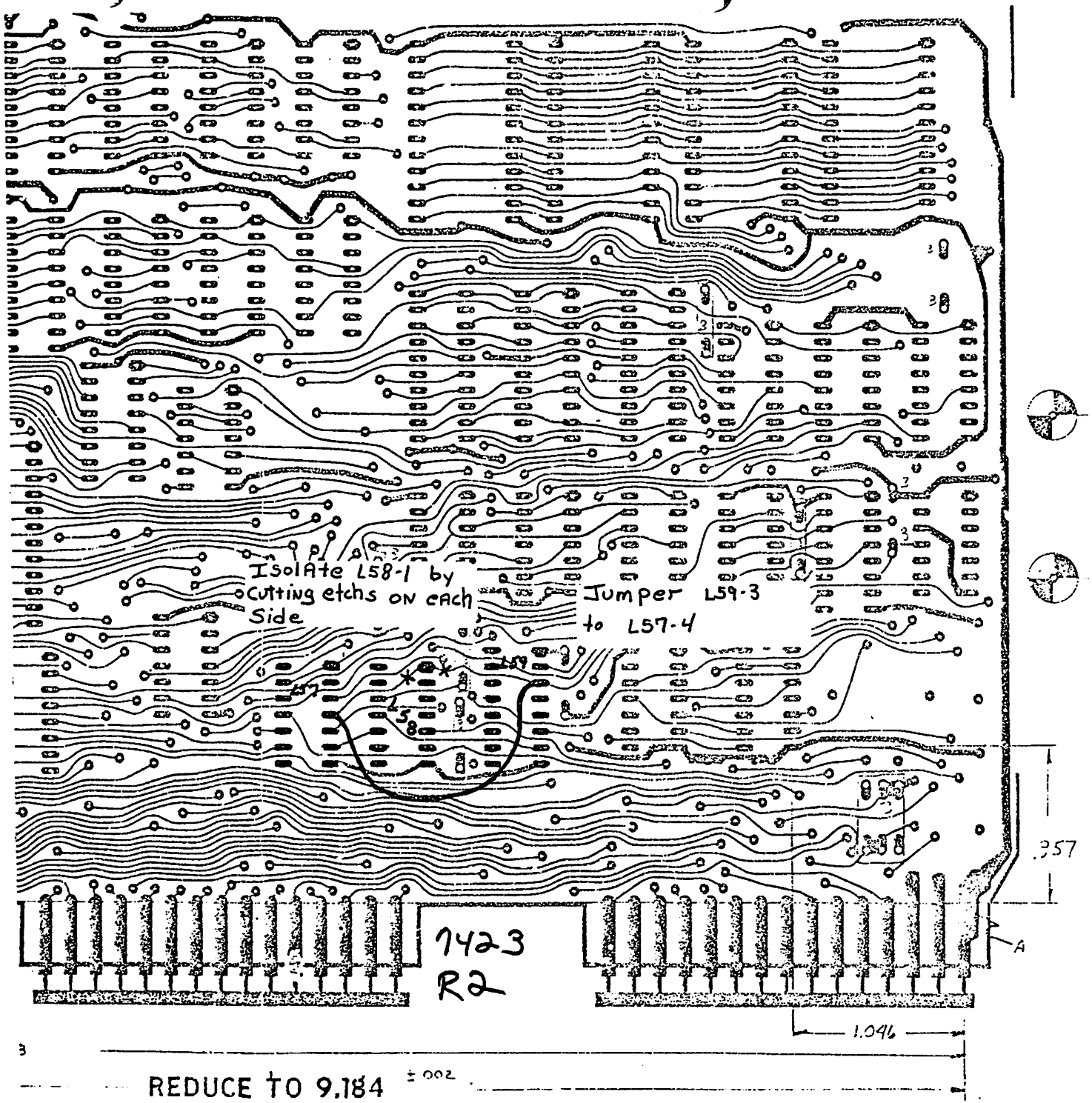
Procedure

1. JUMPER L49-4 TO L46-3.
2. CUT ETCH BETWEEN L31-9 AND L46-3.
3. JUMPER L49-6 TO L31-9 AND L58-1.
4. JUMPER L49-3 TO L45-12.
5. JUMPER L49-2 TO L49-7.

NON COMPONENT SIDE

6. CUT ETCHES ON EITHER SIDE OF L58-1.
7. JUMPER L57-4 TO L59-3.


WANG
7423-
-R2
MADE IN USA
COMPONENT SIDE
Cut etch between L31-9 AND L46-3
Jumper L45-12 to L49-3
Jumper L46-3 to L49-4
Jumper L49-2 to L49-7
Jumper L49-6 to L31-9
Jumper L49-6 to L58-1.


Isolate L58-1 by
Cutting etchs on each
Side
Jumper L59-3
to L57-4
1423
R2
.957
1.046
A
REDUCE TO 9.184 ±.002

WANG

ECO

ECO NO. 18043

SHEET 1 OF 4

ORIGINATOR	Ken Dillon	M/S	1339	EXT. 2578	DATE 01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT. 2126	DATE 01/23/81

PART NO./ITEM NO. 510-7423	TITLE Ram/Prom Controller
DWG. NO./P. L. NO. 7423	
NEXT ASSY. Y EFFECTED N 209-7423	TITLE
MODEL NO. 2280	

DESCRIPTION OF CHANGE

Change artwork, assembly drawing, schematic and sample board per attached print and as follows

Cut etch from L49 pin 3 to L45 pin 12
Tie L49 pin 3 to L32 pin 9
Cut etch from L49 pin 2 to ±0v
Tie L49 pin 2 to L38 pin 4
Tie L49 pin 1 to L49 pin 4
Cut etch from L46 pin 3 to L49 pin 4
Cut etch from K_1 to L46 pin 3
Tie L49 pin 6 to K_1
Tie L49 pin 4 to L31 pin 3
Tie L38 pin 3 to L46 pin 3

RECEIVED
MAR 02 1981
PRINT ROOM

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

(78)

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

2250M/130

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM				✓
ARTWORK	3	4	✓	
E-REV	3	4	✓	
SAMPLE BD	3	4	✓	
ASSY. DWG.			✓	
DRILL DWG.			✓	
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS	DATE
FINAL R. Pearce 2/26 M Lourie	2/9/81
DES. ENG. L. Dillon	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	

WANG

ECO 2-19

ECO NO. 18418

SHEET 1 OF 3

ORIGINATOR	Max Blomme	M/S 1383	EXT. 4885	DATE 2/18/81
WRITTEN BY	Judy Mulno	M/S 1329	EXT. 2634	DATE 2/18/81

PART NO./ITEM NO. 210-7423-A	TITLE RAM/PROM Cntlr
DWG. NO./P. L. NO. 7423	
NEXT ASSY. EFFECTED Y N See Below	TITLE
MODEL NO. 2280	

DESCRIPTION OF CHANGE

RECEIVED
MAR 10 1981
PRINT ROOM

Change schematic and software loading chart as follows:

FROM	TO
378-4083-R6	378-4083-R7
378-4084-R6	378-4084-R7
378-4085-R6	378-4085-R7
378-4086-R6	378-4086-R 7

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	378-4083-R6	PROM	1
	378-4084-R6	PROM	1
	378-4085-R6	PROM	1
	378-4086-R6	PROM	1
Add	378-4083-R7	PROM	1
	378-4084-R7	PROM	1
	378-4085-R7	PROM	1
	378-4086-R7	PROM	1

Next Assemblies Effected: 167/187-2200-79/80, 212-2280

REASON/SYMPTON FOR CHANGE

The alternate map read was not set up properly in write so that the DPU lost where it was and failed to do the write

2413M/137

(80)

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV				✓
SAMPLE BD				✓
ASSY. DWG.				✓
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	3-4-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM	X	X	X			X
TO CONFORM WHERE FEASIBLE						

APPROVALS	DATE
FINAL Paul Richen 3/4	
DES. ENG.	
CUST. ENGRG. J. Proulx	2/27/81
MFG. ENGRG. R. Pearce	2/26/81
OTHER SIGN	
DRAWING UPDATED	

Printed in U.S.A. 13-8044A 9-80

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 11639 Latest Artwork 1

Applies To Artwork Revisions 1 E-REV 0 To 1 Page 1 Of 2

Purpose / Symptom

TO CORRECT ARTWORK ERRORS ON R1 BOARDS.

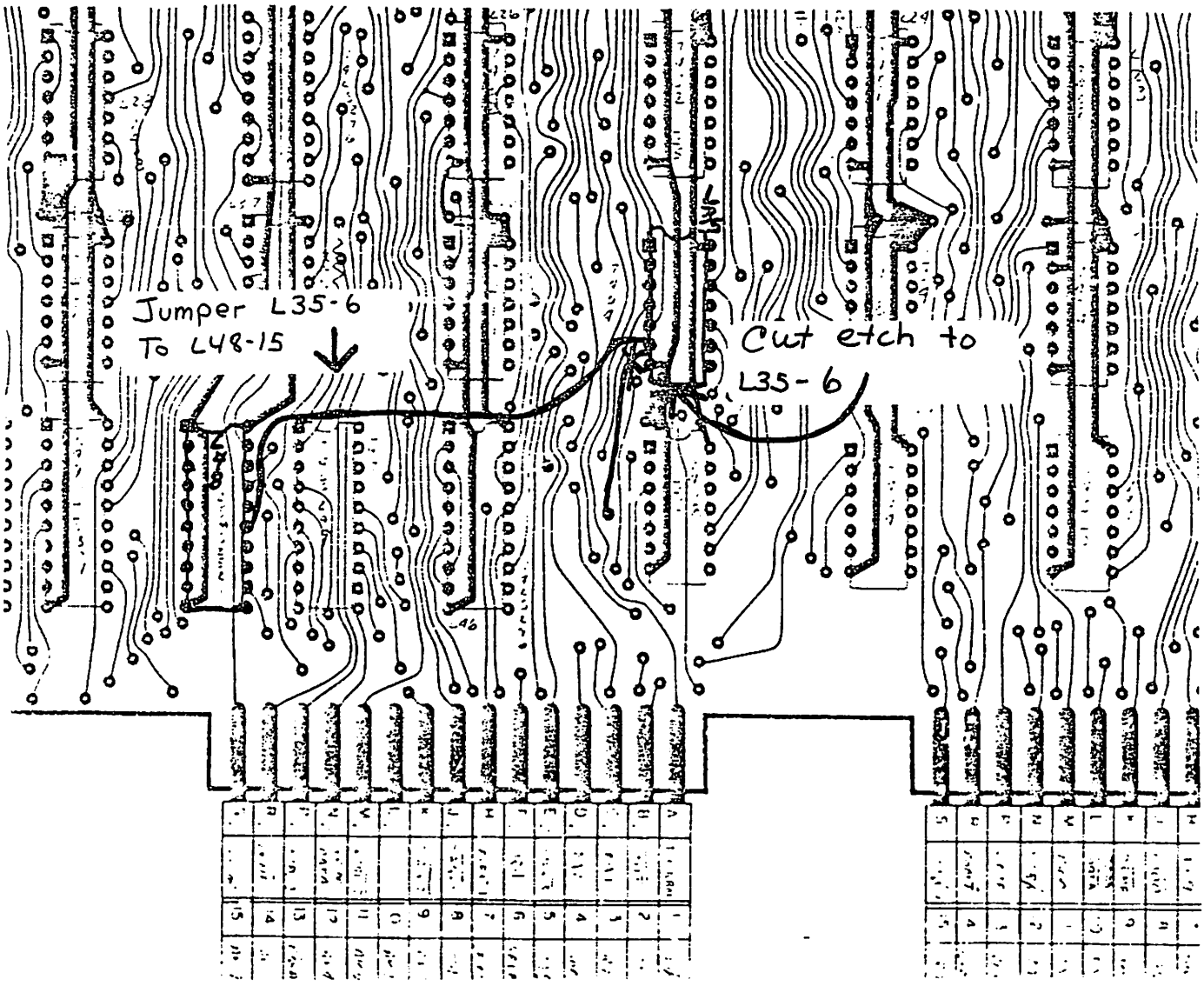
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .25 Hour(s)

Procedure

1. CUT ETCH OF L35-6.
2. JUMPER L35-6 TO L48-15.


Jumper L35-6
To L48-15
Cut etch to
L35-6

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 11639 Latest Artwork 2

Applies To Artwork Revisions 2 E-REV 0 To 1

Purpose / Symptom

TO CORRECT ARTWORK ERRORS ON R2 BOARDS.

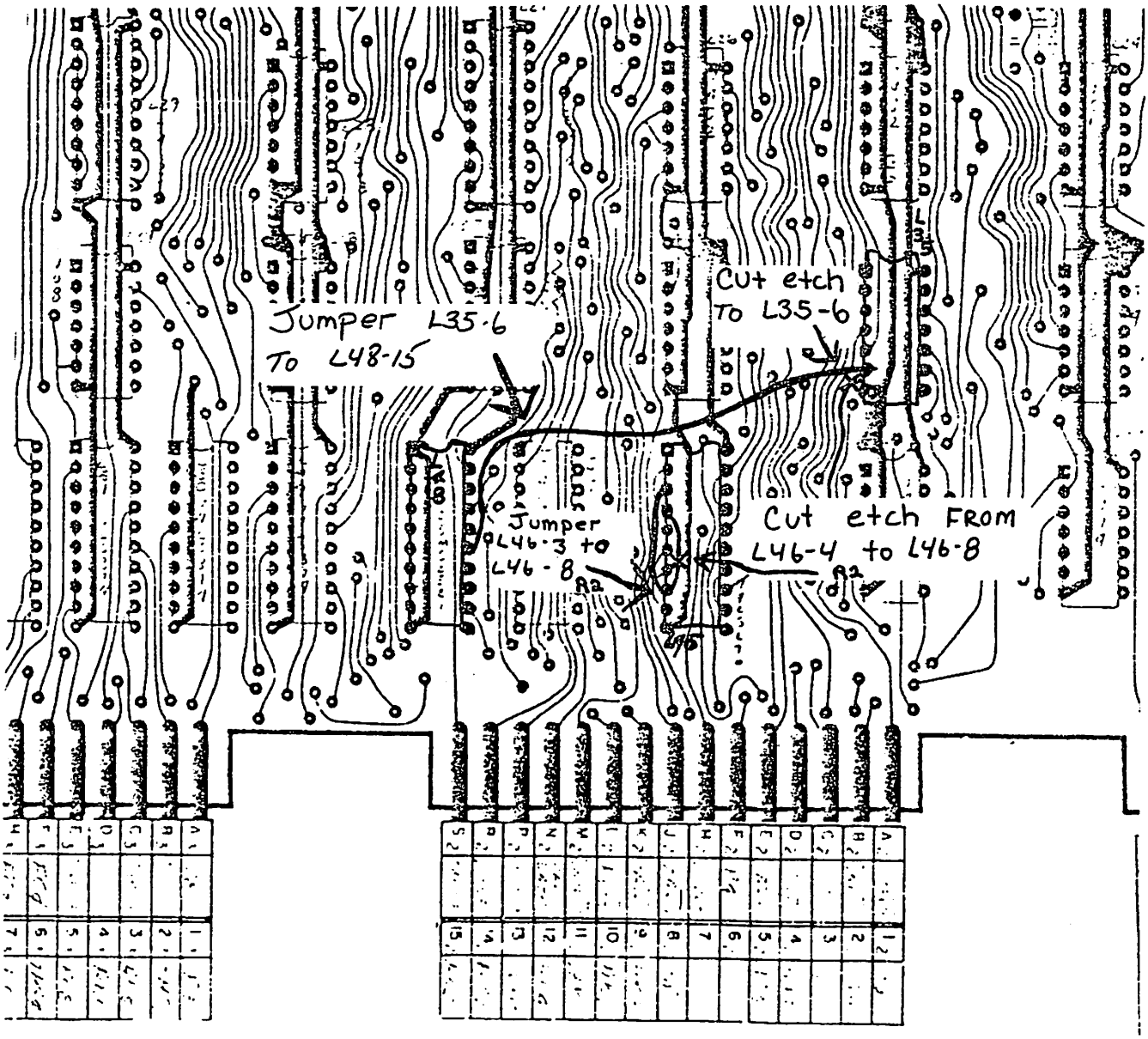
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .5 Hour(s)

Procedure

1. CUT ETCH FROM L46-4 TO L46-8.
2. JUMPER L46-3 TO L46-8.
3. CUT ETCH AT L35-6.
4. JUMPER L35-6 TO L48-15.


Jumper L35-6
To L48-15
Cut etch
To L35-6
Jumper
L46-3 to
L46-8
Cut etch FROM
L46-4 to L46-8

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 11832 Latest Artwork 2

Applies To Artwork Revisions 1,2 E-REV 1 To 2 Page 1 Of 2

Purpose / Symptom

FORMAT ERRORS WILL OCCUR IF THIS ECN IS NOT PERFORMED.

Prerequisite

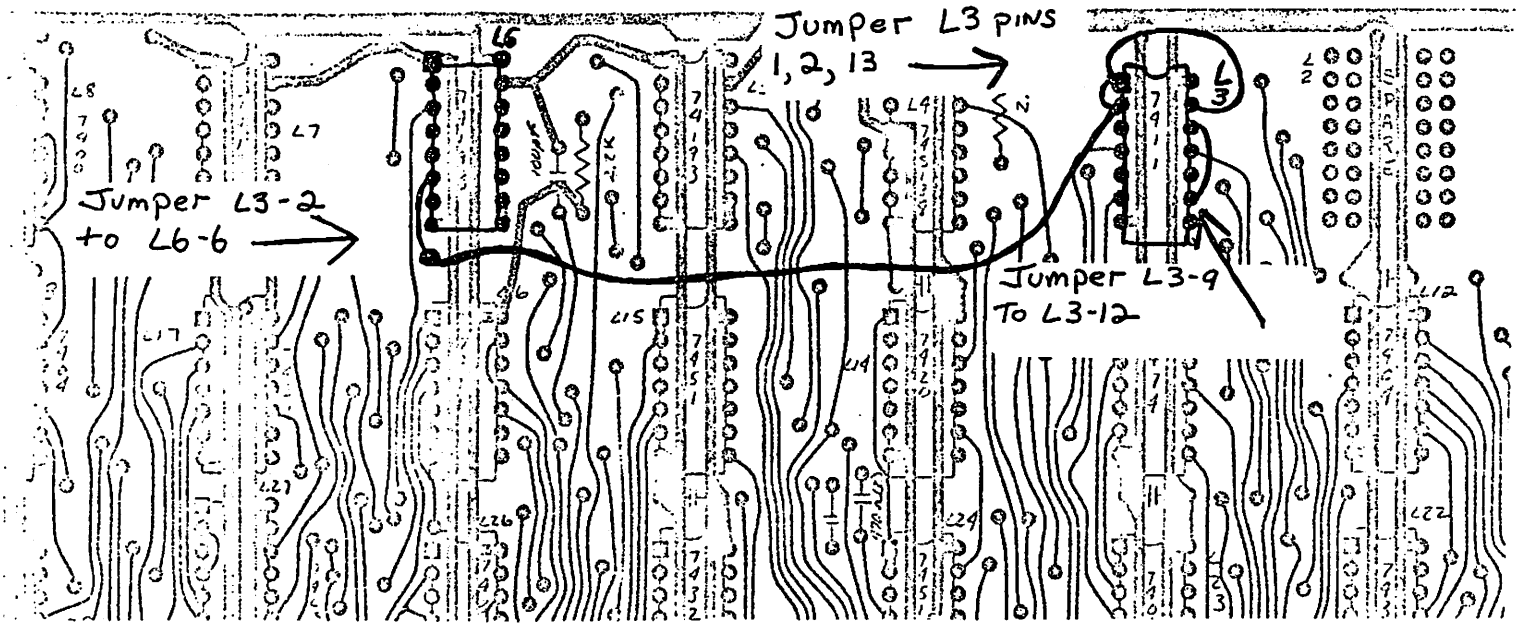
ECN Kit Required

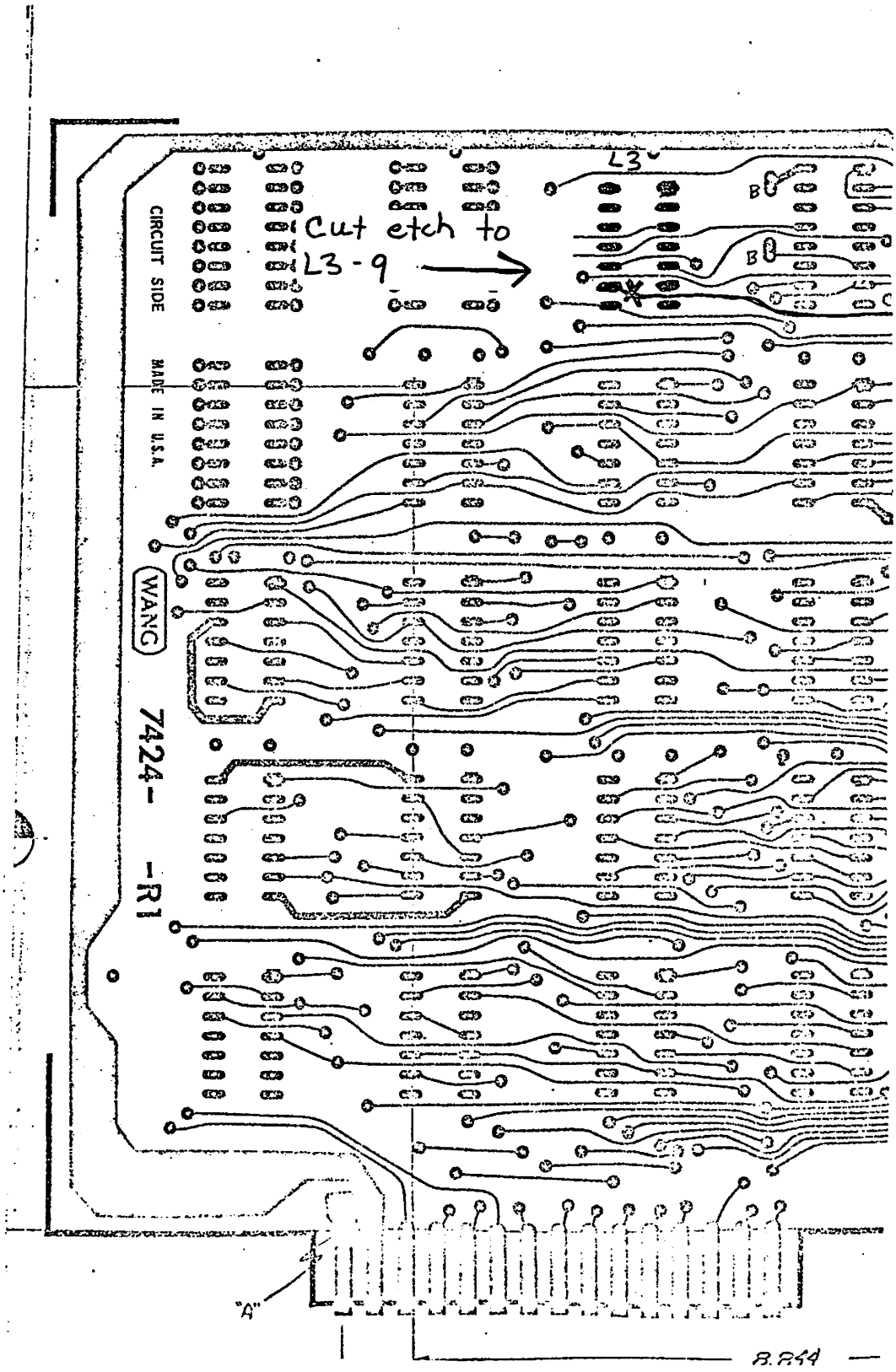
Mandatory X Info Fig. Included X Est. Comp. Time .5 Hour(s)

Procedure

COMPONENT SIDE
1. JUMPER L3-9 TO L3-12.
2. JUMPER L3-1,2,13 TO L6-6 AS ILLUSTRATED.

NON-COMPONENT SIDE
3. CUT ETCH AT L3-9.




Cut etch to
L3-9
L3
B
B
CIRCUIT SIDE
MADE IN U.S.A.
WANG
7424-
-R1
"A"
B.P.H

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 12080 Latest Artwork 3

Applies To Artwork Revisions 1-3 E-REV 2 To 3 Page 1 Of 1

Purpose / Symptom

TO CORRECT TIMING PROBLEM ON WRITE.

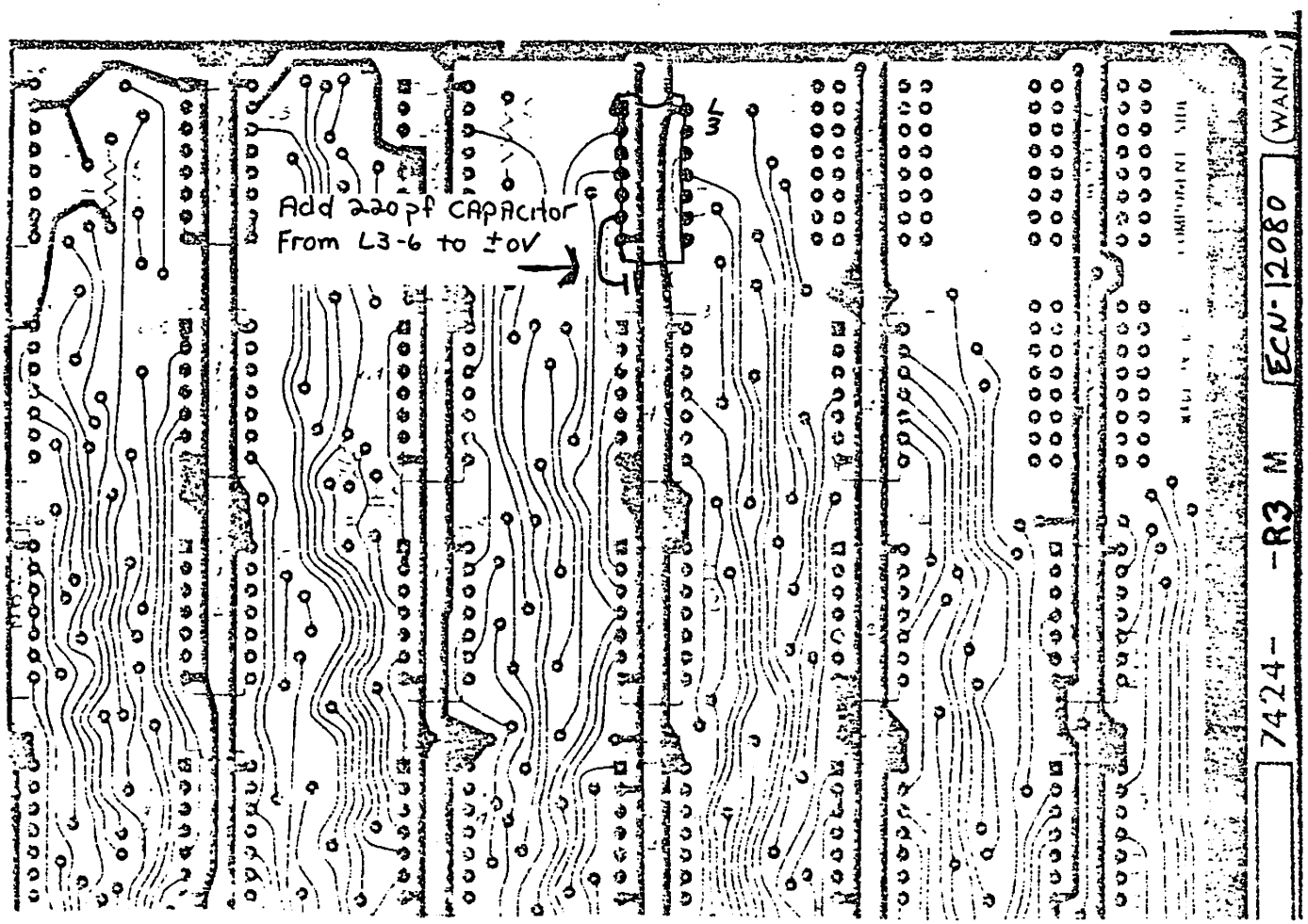
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .25 Hour(s)

Procedure

INSTALL A 220 PF CAP (WL#300-1220) FROM L3-6 TO +0V.



CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 12191 Latest Artwork 3

Applies To Artwork Revisions 1-3 E-REV 3 To 4 Page 1 Of 1

Purpose / Symptom

TO INCREASE COMPATIBILITY WITH 7423 BOARD.

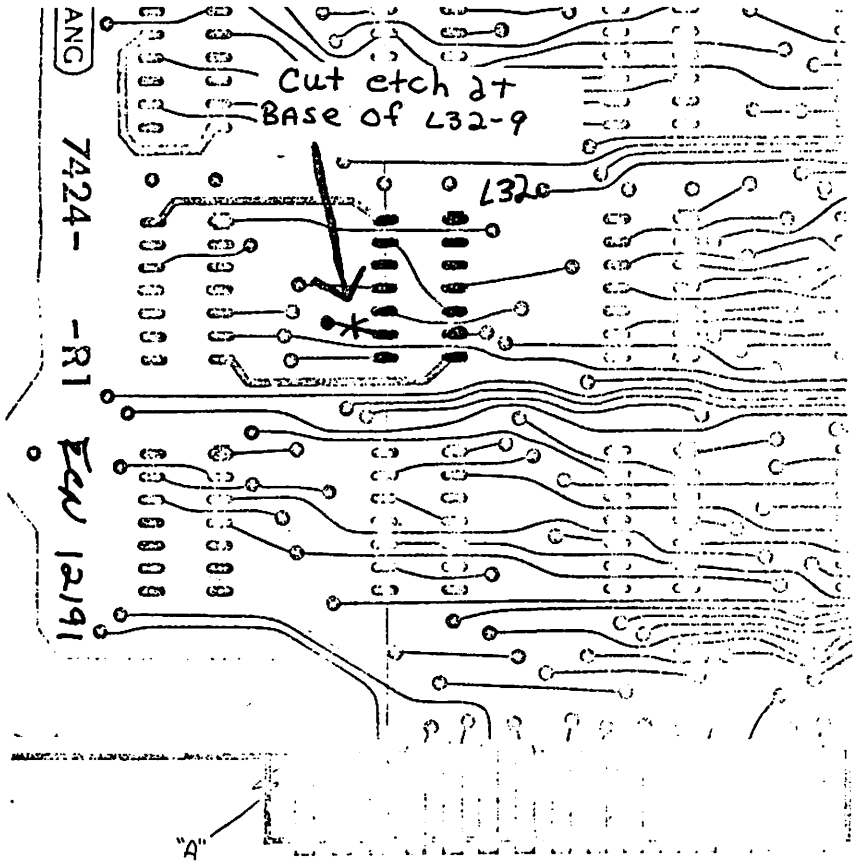
Prerequisite

ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .1 Hour(s)

Procedure

NON-COMPONENT SIDE
1. CUT ETCH AT BASE OF L32-9.



CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 12231 Latest Artwork 3

Applies To Artwork Revisions 1-3 E-REV 4 To 5 Page 1 Of 2

Purpose / Symptom

1. TO PREVENT ERRORS DURING A FORMAT OPERATION.
2. TO CORRECT ARTWORK ERRORS ON LOADING SKETCH.

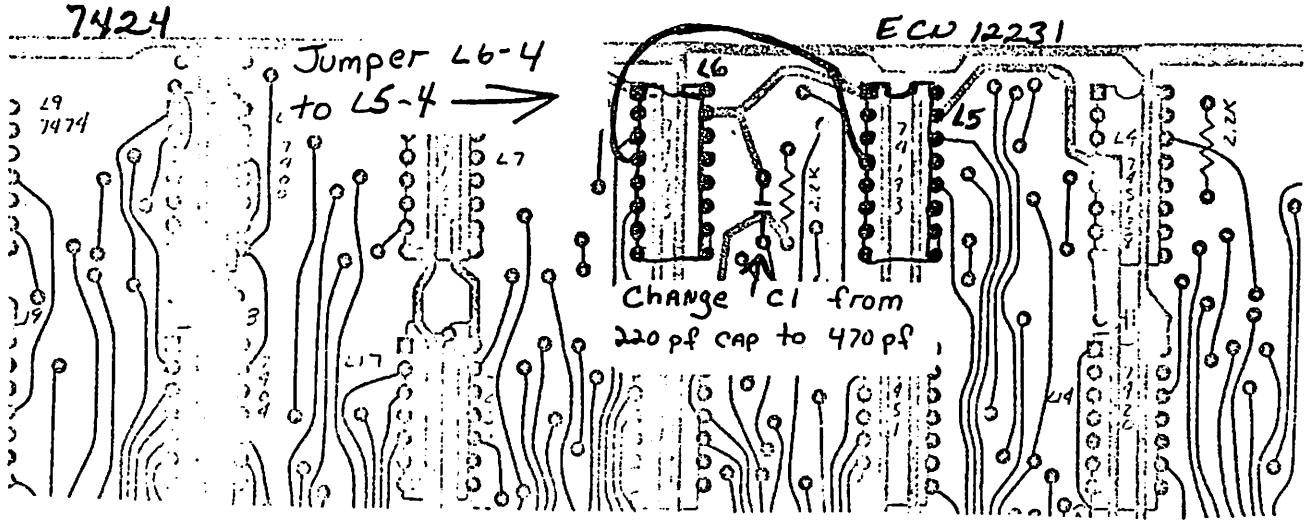
Prerequisite

ECN Kit Required

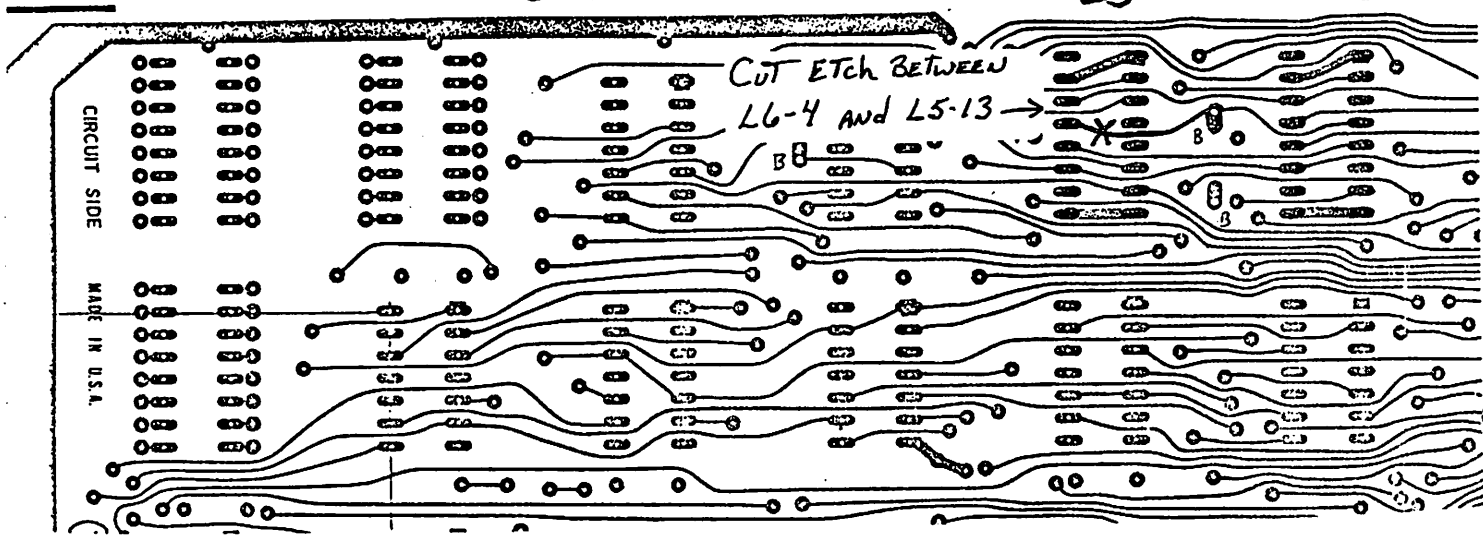
Mandatory X Info Fig. Included X Est. Comp. Time .5 Hour(s)

Procedure

COMPONENT SIDE
1. CHANGE C1, LOCATED TO THE LEFT OF L6, FROM A 220 PF CAP TO A 470 PF CAP (WL#300-1470).
2. JUMPER L6-4 TO L5-4.
NON-COMPONENT SIDE
3. CUT ETCH BETWEEN L6-4 AND L5-13.



7424 - R3 ECN 12231



CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 12490 Latest Artwork 3

Applies To Artwork Revisions 2,3 E-REV 5 To 6 Page 1 Of 2

Purpose / Symptom

NOISE ON SYNC-BYTE CAN CAUSE FORMAT ERRORS.

Prerequisite

ECN Kit Required

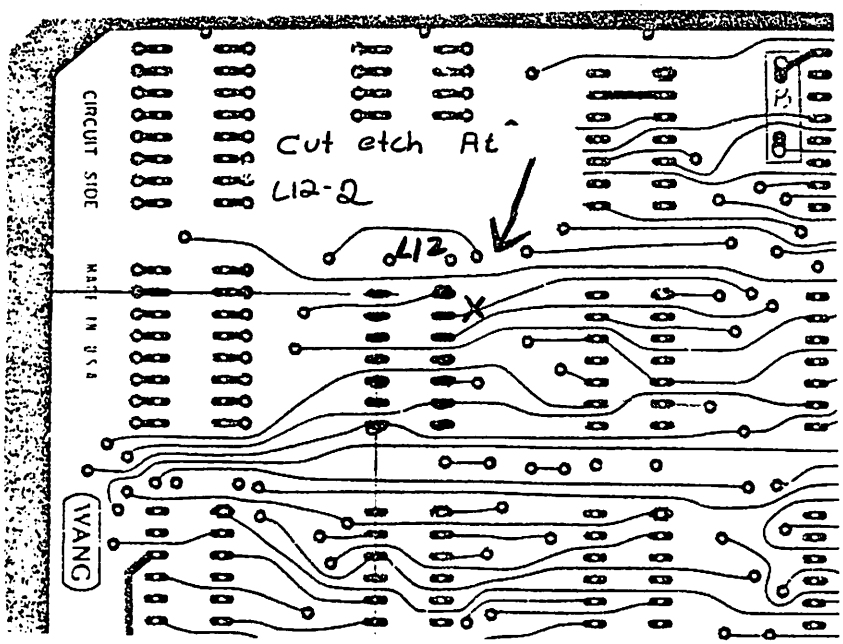
Mandatory X Info Fig. Included X Est. Comp. Time .75 Hour(s)

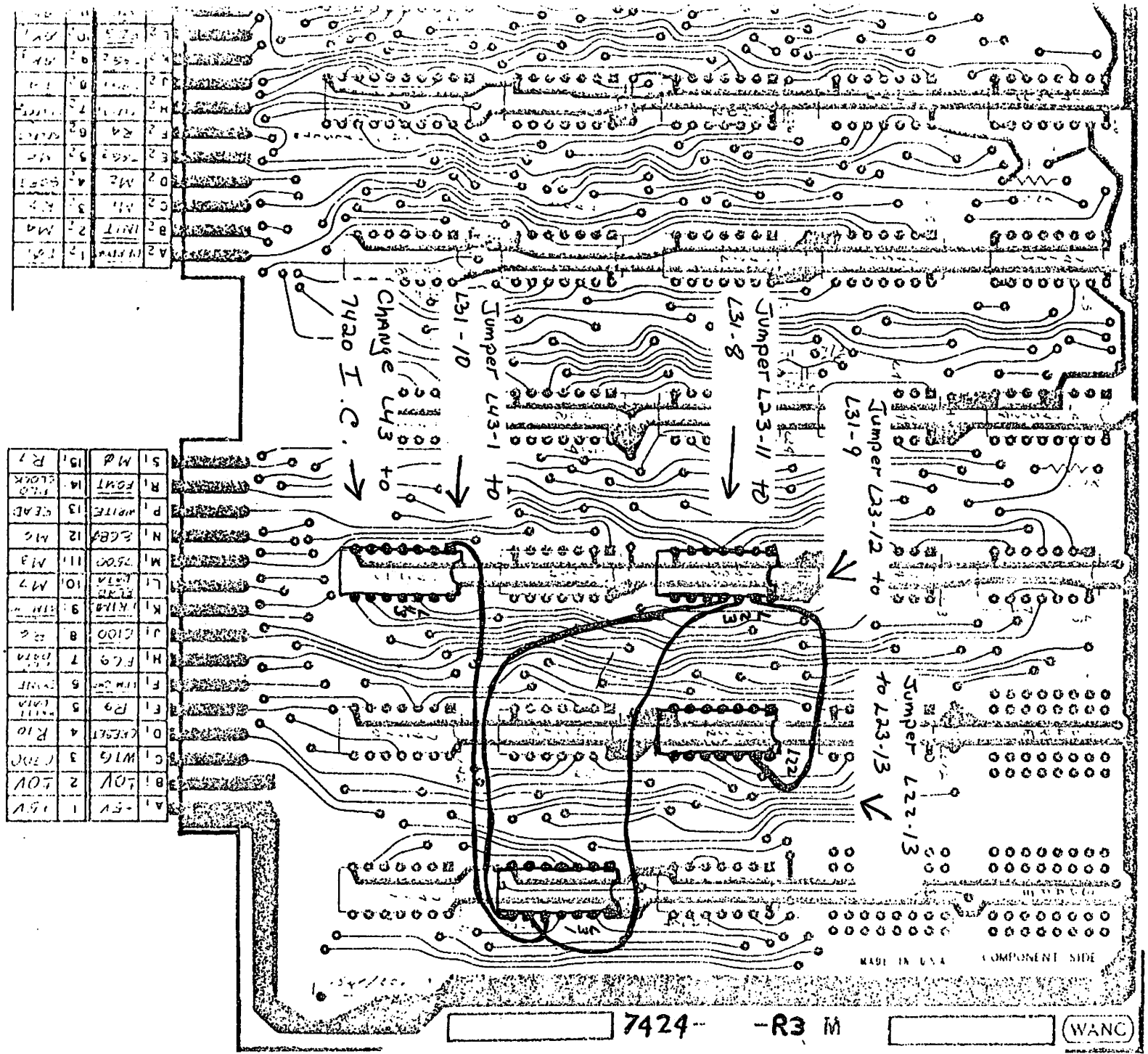
Procedure

1. CHANGE L43 FROM A 74S20 TO A 7420 (WL#376-0004).
2. JUMPER L31-8 TO L23-11.
3. JUMPER L31-9 TO L23-12.
4. JUMPER L31-10 TO L43-1.
5. JUMPER L23-13 TO L22-13.

NON-COMPONENT SIDE

6. CUT ETCH AT BASE OF L12-2.




Change L43 to 7420 I.C.
Jumper L43-1 to L31-10
Jumper L23-11 to L31-8
Jumper L23-12 to L31-9
Jumper L22-13 to L23-13
L43
L22
WM
WM
MADE IN U.S.A.
COMPONENT SIDE
7424--
-R3 M
WANC

ECN 12490

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 12497 Latest Artwork 3

Applies To Artwork Revisions 1-3 E-REV 6 To 7 Page 1 Of 2

Purpose / Symptom

ARTWORK ERROR CAUSED TIMING TO BE OUT OF SPEC THEREFORE SOME DISK DRIVES COULD NOT BE SELECTED BY THE 2280.

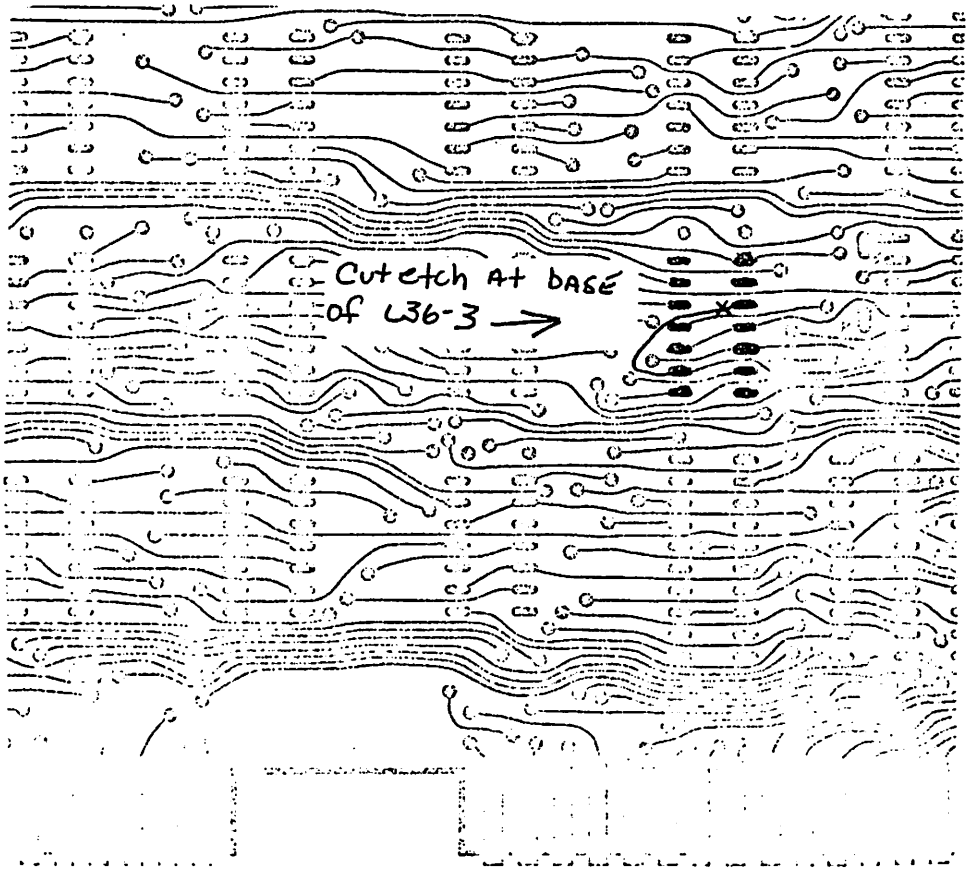
Prerequisite

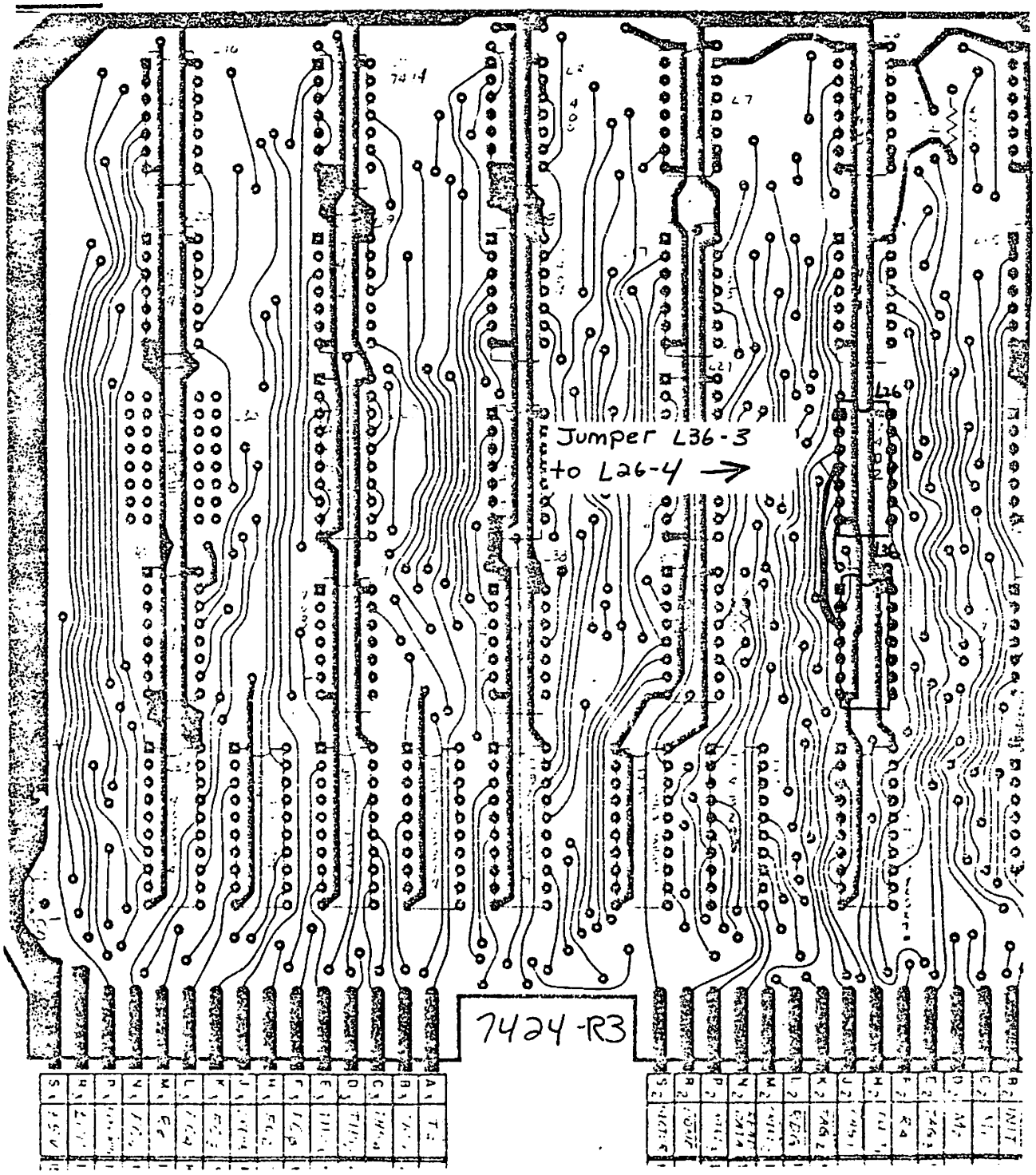
ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .15 Hour(s)

Procedure

COMPONENT SIDE
1. JUMPER L36-3 TO L26-4.
NON-COMPONENT SIDE
2. CUT ETCH CONNECTING L36-3 TO L36-9.




Jumper L36-3
to L26-4
7424-R3

CUSTOMER ENGINEERING DIVISION
ECN UPDATE BULLETIN

M.U.B. Release Date 053180 Model 2280 Release # 9

Ass'y # 210-7424 ECN # 14563 Latest Artwork 4

Applies To Artwork Revisions 1-4 E-REV 7 To 8

Purpose / Symptom

THE READ FIELD IS ONE BYTE TOO LONG.

Prerequisite

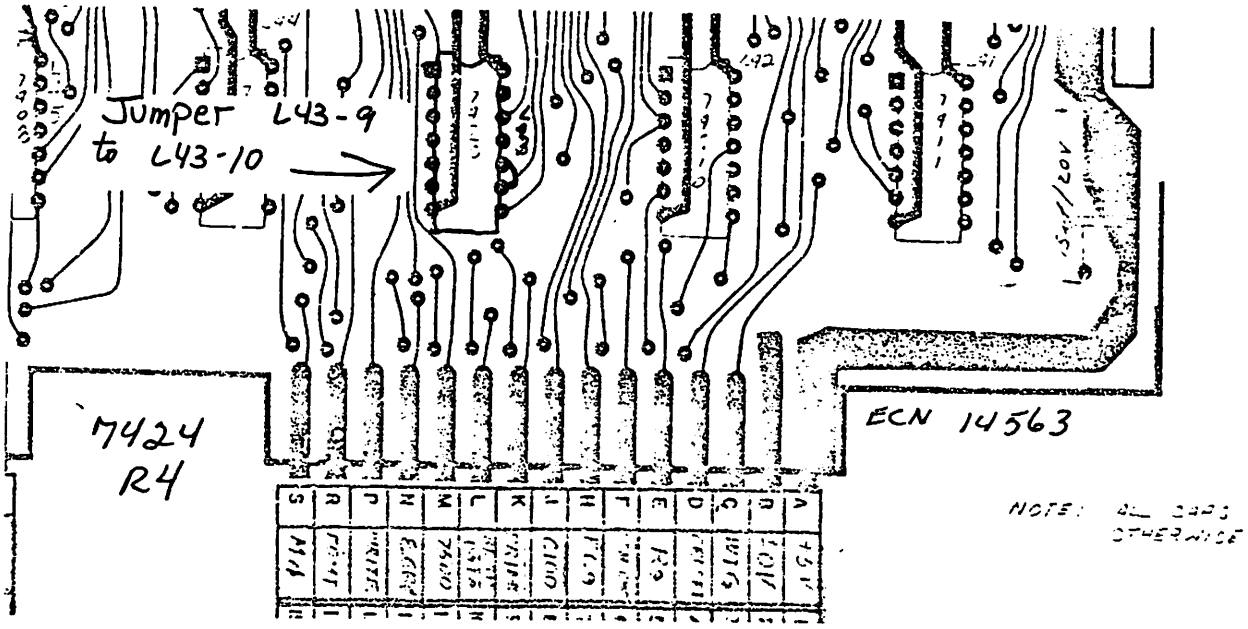
THIS ECN IS REQUIRED ON DPU'S USING R5 PROMS.

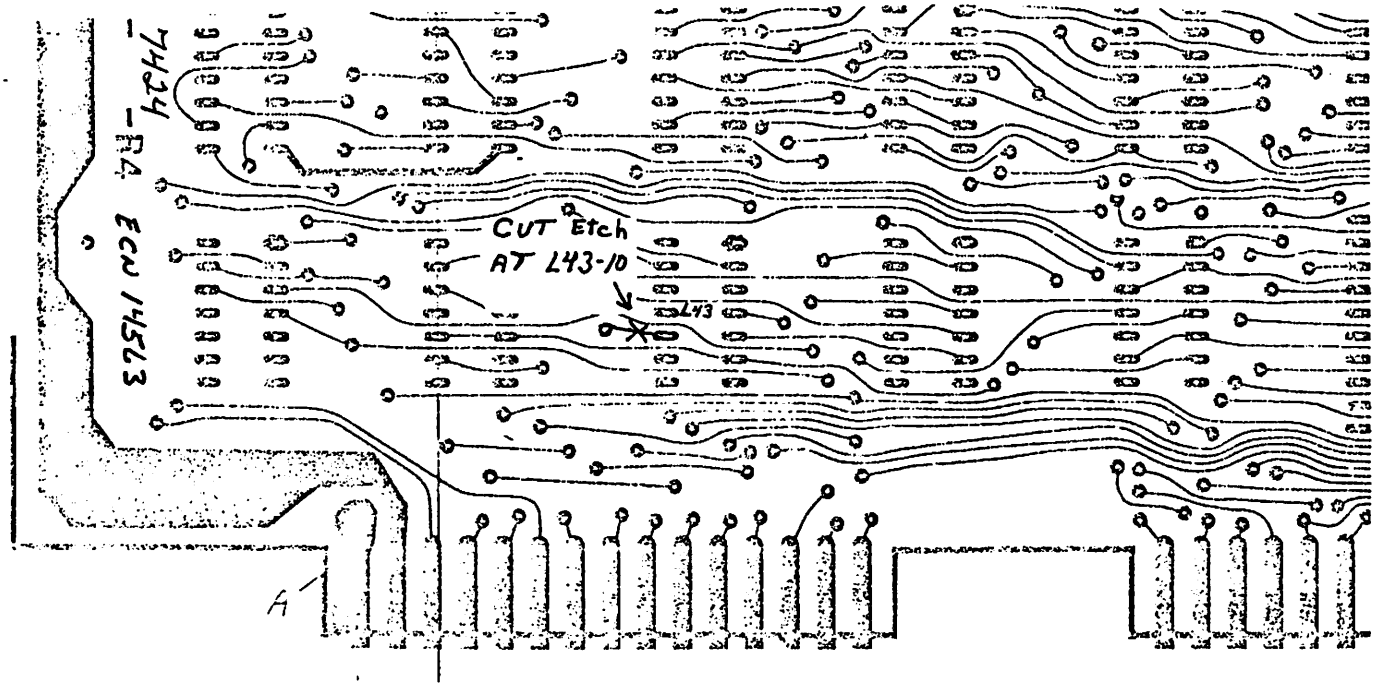
ECN Kit Required

Mandatory X Info Fig. Included X Est. Comp. Time .15 Hour(s)

Procedure

COMPONENT SIDE
1. CONNECT L43-9 TO L43-10.
NON COMPONENT SIDE
2. CUT ETCH AT L43-10 TO ISOLATE THAT CONNECTION FROM L5-7.


Jumper L43-9
to L43-10
7424
R4
ECN 14563
NOTE: ALL CAPS
OTHERWISE


7424 - R4 ECN 14563
CUT Etch
AT L43-10
L43
A

WANG

ECO

ECO NO. 18094

SHEET 1 OF 5

ORIGINATOR	Ken Dillon	M/S	1339	EXT.	2758	DATE	01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT.	2126	DATE	01/23/81

PART NO./ITEM NO.	210-7424	TITLE	I/O Controller
DWG. NO./P. L. NO.	7424		
NEXT ASSY. EFFECTED Y / N	See Below	TITLE	
MODEL NO.	2280		

DESCRIPTION OF CHANGE

Change assembly drawing, schematic and sample board per attached prints and as follows

RECEIVED
MAR 09 1981
PRINT ROOM

Change L12 from a 7404 (376-0010)
to a 7414 (376-0139)

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Change	376-0010	IC 7404	from 4 to 3
Add	376-0139	IC 7414	1

Next assemblies effected 167/187-2200-79/-80, 212-2280

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

2251M/130

(80)

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV	8	9	✓	
SAMPLE BD	8	9	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS		DATE
FINAL	N Lourie Paul Richer 2/26	2/9/81
DES. ENG.	K Dillon Con WCP.	
CUST. ENGRG.	J. Proulx	2/20/81
MFG. ENGRG.	R. Pearce	2/24/81
OTHER SIGN		
DRAWING UPDATED		

Printed in U.S.A. 13-8644A 9-80

M. Bahia

WANG LABORATORIES, INC.

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

TO: All Northeast Area Computer DTS's

FROM: John Forbes

DATE: April 7, 1981

SUBJECT: 2280 DPU ECN's

Attached is a copy of all ECN's necessary to bring the 2280 DPU up to current E-Rev level as of March, 1981. Implementation of these ECN's will cure the intermittent problems with the 2280 DPU.

The following is a list of the schematic release in which the print and board layout of all PCB's are found.

PCB	Release Number
210-7421	18
210-7422	14
210-7423	12
210-7424	13
210-7416	20

The current E-Rev of boards in DPU should be:

PCB	E - Rev.
210-7415	0
210-L567	7
210-7416	2
210-7421	3
210-7422	4
210-7423	4
210-7424	9

If you have any questions, you can contact me at extension 274.

Regards,

John Forbes

John Forbes
Area Technical Specialist

cc: Joe McDermott
Bill Dini
JF:LCM:0325A

20 SOUTH AVENUE, BURLINGTON, MASSACHUSETTS 01803 • TEL. (617) 272-8550 • TWX 710-343-6769 • TELEX 94-0499

7424 (REQUIRED FOR R5 PROMS) REV 7-8

CUT ETCH FROM L43 PIN 10 TO L5 PIN 7

TIE L43 PINS 9 & 10

7423 REV 2-3

CUT ETCH AT L31 PIN 9 & L46 PIN 3 ✓

- ISOLATE L58 PIN 1 (CUT ETCH ON EITHER SIDE OF PIN 1 & CONNECT ETCHES) ✓
- RUN WIRE FROM L58 PIN 1 TO L49 PIN 6 ✓
- RUN WIRE FROM L58 PIN 1 TO L29 PIN 9 ✓
- ~~RUN WIRE FROM L49 PIN 4 TO L46 PIN 3~~ ✓ REMOVED W/ ECN 18093
- ~~RUN WIRE FROM L49 PIN 3 TO L45 PIN 12~~ ✓ REMOVED W/ ECN 18093
- ~~RUN WIRE FROM L49 PIN 2 TO L49 PIN 7~~ ✓ REMOVED W/ ECN 18093

7422 (REQUIRED FOR R5 PROMS) ECN14564 REV 2-3

- CUT ETCH NON-COMPONENT SIDE AT L37 PIN 1.

~~ISOLATE L37 PIN 1 & REJOIN ETCH~~

~~ISOLATE L38 PIN 1 & REJOIN ETCH.~~

DO → ~~CUT ETCH GOING TO L37 PIN 8 (BETWEEN L37 & L38 BOT.)~~

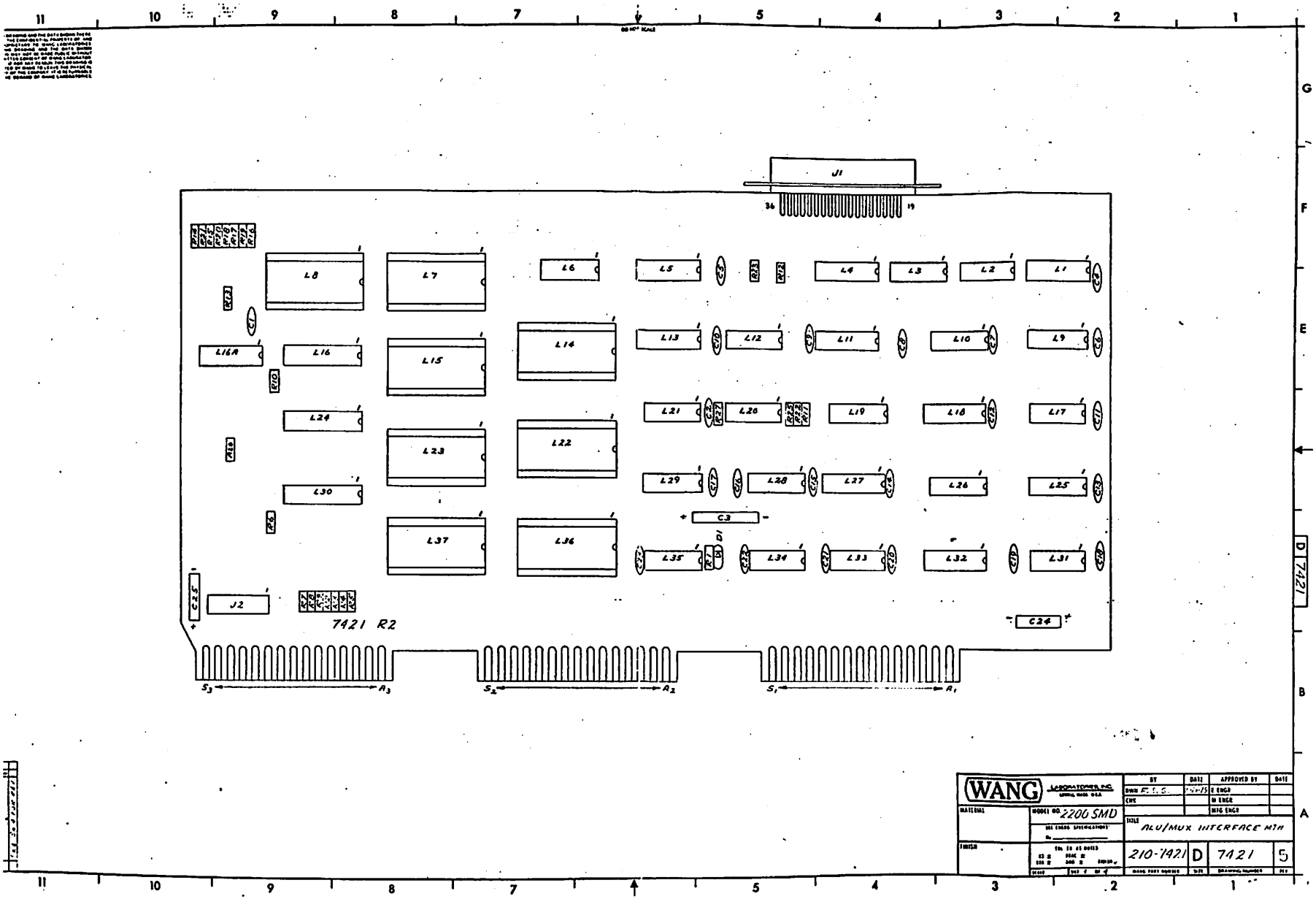
- RUN WIRE FROM PLATE THRU OFF P_1 TO L27 PINS 12 & 11.
- RUN WIRE FROM L27 PIN 13 TO L37 PIN 19.
- " L37 PIN 19 TO L38 PIN 19.
- L37 PIN 11 TO L37 PIN 10 (±0V).
- L38 PIN 11 TO L37 PIN 17.
- L38 PIN 17 TO 9_3 (PLATE THRU TO LEFT OF L39).
- L37 PIN 1 TO L37 PIN 2.
- L38 PIN 1 TO L38 PIN 2.

ENSURE L38 PIN 4 DOES NOT CONNECT TO L38 PIN 1

ENSURE L38 PIN 4 & 5 GOTO ±0V

- CUT ETCH GOING TO L37 PIN 8 (BETWEEN L37 & L38 BOT)

- WIRE FROM L38 PIN 1,23 TO R105 TOP
- CUT ETCH BTWN L38 PIN 2 & PIN 19
- CUT ETCH BTWN L38 PIN 19 & R105 TOP
- CUT ETCH BTWN L37 PIN 2 & PIN 19
- CUT ETCH BTWN L37 PIN 19 & R106 TOP



WANG LABORATORIES, INC.	BY	DATE	APPROVED BY	DATE
	DWN F. T. C.	7-7-75	E ENGR	
	CHK		M ENGR	
MATERIAL	MODEL NO. 2200 SMD		MFG ENGR	
	SEE ENGR SPECIFICATION NO.	TITLE	ALU/MUX INTERFACE MTH	
FINISH		210-7421	D 7421	5
	SHT 1 OF 1			

D 7421

WANG

ECO

ECO NO. 1809

SHEET 1 OF 5

ORIGINATOR	Ken Dillon	M/S 1339	EXT. 2578	DATE 01/23/81
WRITTEN BY	Laurie David	M/S 1329	EXT. 2126	DATE 01/23/81

PART NO./ITEM NO. 209-7421	TITLE ALU/MUX Interface
DWG. NO./P. L. NO. 7421	
NEXT ASSY. Y / EFFECTED N 210-7421-A	TITLE
MODEL NO. 2280	

DESCRIPTION OF CHANGE

Engineering has decided that the artwork will not be modified at this time

Change assembly drawing, schematic and sample board per attached prints and as follows

Tie a 470 ohm res (330-2047) from L22 pin 14 to +5VR
Tie a 150pf cer cap (300-1150) from L22 pin 14 to ±0v
Cut etch between L20 pin 6 and L29 pin 12
Remove R27 1K ohm res (330-3010)
Remove C2 .001uf cer cap (300-1906)
Tie L29 pin 12 to L29 pin 13

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	300-1906	.001uf cer cap	1
Change	330-3010	1K ohm res	from 10 to 9
Add	330-2047	470 ohm res	1
	300-1150	150pf cer cap	1

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

RECEIVED
MAR 09 1981
PRINT ROOM

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

2240M/130

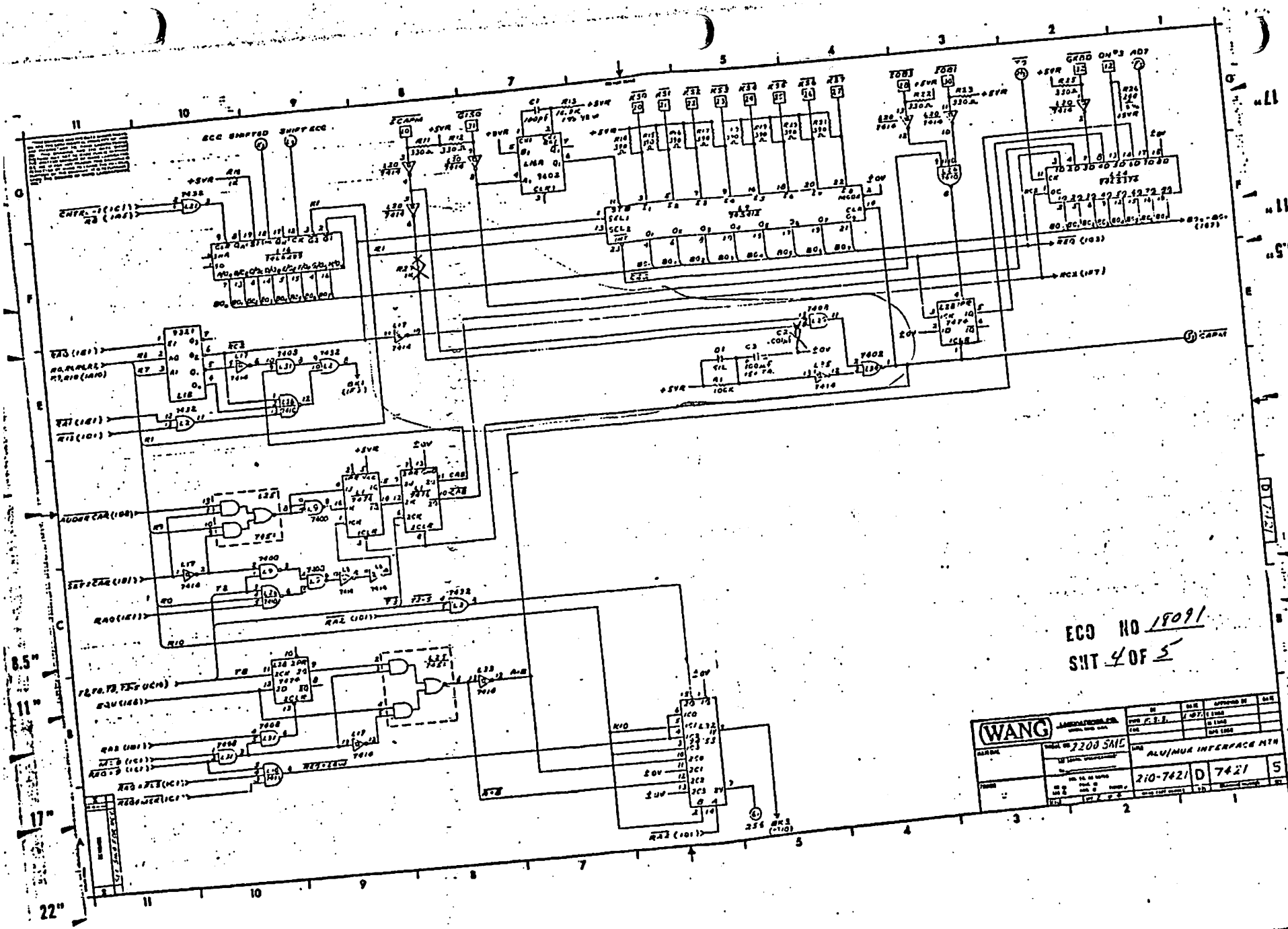
DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

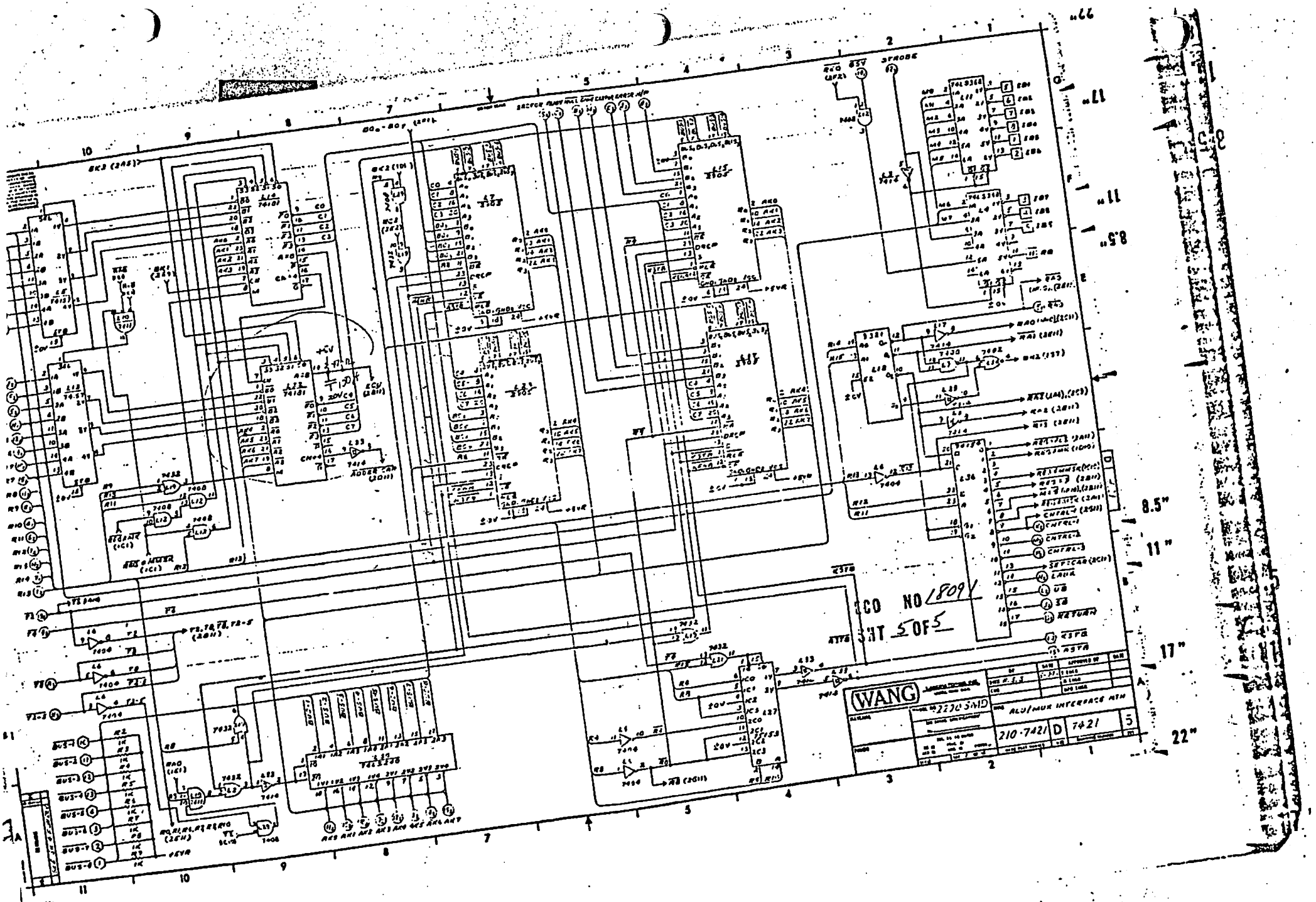
DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV.	2	3	✓	
SAMPLE BD	2	3	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS	DATE
FINAL Paul Richer 2/26 M Devine	2/9/81
DES. ENG. K. Dillon	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	


ECO NO 15091
SHT 4 OF 5
WANG
2200 SVP
ALU/MUX INTERFACE MTH
210-7421
D
7421
5


ECO NO 18094
SHT 5 OF 5
WANG
2200 SVP
ALU/MUX INTERFACE MTH
210-7421
D
7421
5

ENGINEERING CHA[illegible]E ORDER
(EFFECTIVI[illegible]ES)
MANUFACTURING

ECO # 18[illegible]41
Sheet 2 of 5

SPECIAL INSTRUCTIONS

- [ ] Total Number of Units Affected________
- [ ] All Units Prior to Being Shipped On or Before________
- [ ] All Units Prior to Packaging On or Before________
- [ ] All Units Prior to Final Electrical Test On or Before________
- [ ] All Units Prior to System Level Electrical Test On or Before________
- [ ] All Units Prior to Assembly On or Before________
- [ ] RCO All Open Orders
  - [ ] Scrap
  - [ ] Rework
  - [ ] Not to Affect Finished Parts.
- [ ] Material Disposition
  - [ ] Scrap
  - [ ] Rework
  - [ ] Use As Is
  - [ ] Next Buy
- [ ] Special Instructions — See Note (*)
- [ ] Documentation Only
- [ ] VALUE ENGINEERING# ________

COMMITTEE CHAIRMAN	R. E. Pearce 2/24/81
QUALITY CONTROL	B. Thornton J. Mancourt 2-24-81
MATERIAL PLANNING	John E. Watts
MANUFACTURING ENGINEER	W. E. Gallagher
PRODUCT LINE MANAGER	W. E. Gallagher

effective 3/6/81

COST IMPACT			
	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

13-8647

0850A/13A

ENGINEERING CHANGE ORDER
(EFFECTIVITIES)

CUSTOMER ENGINEERING

ECO # 1809

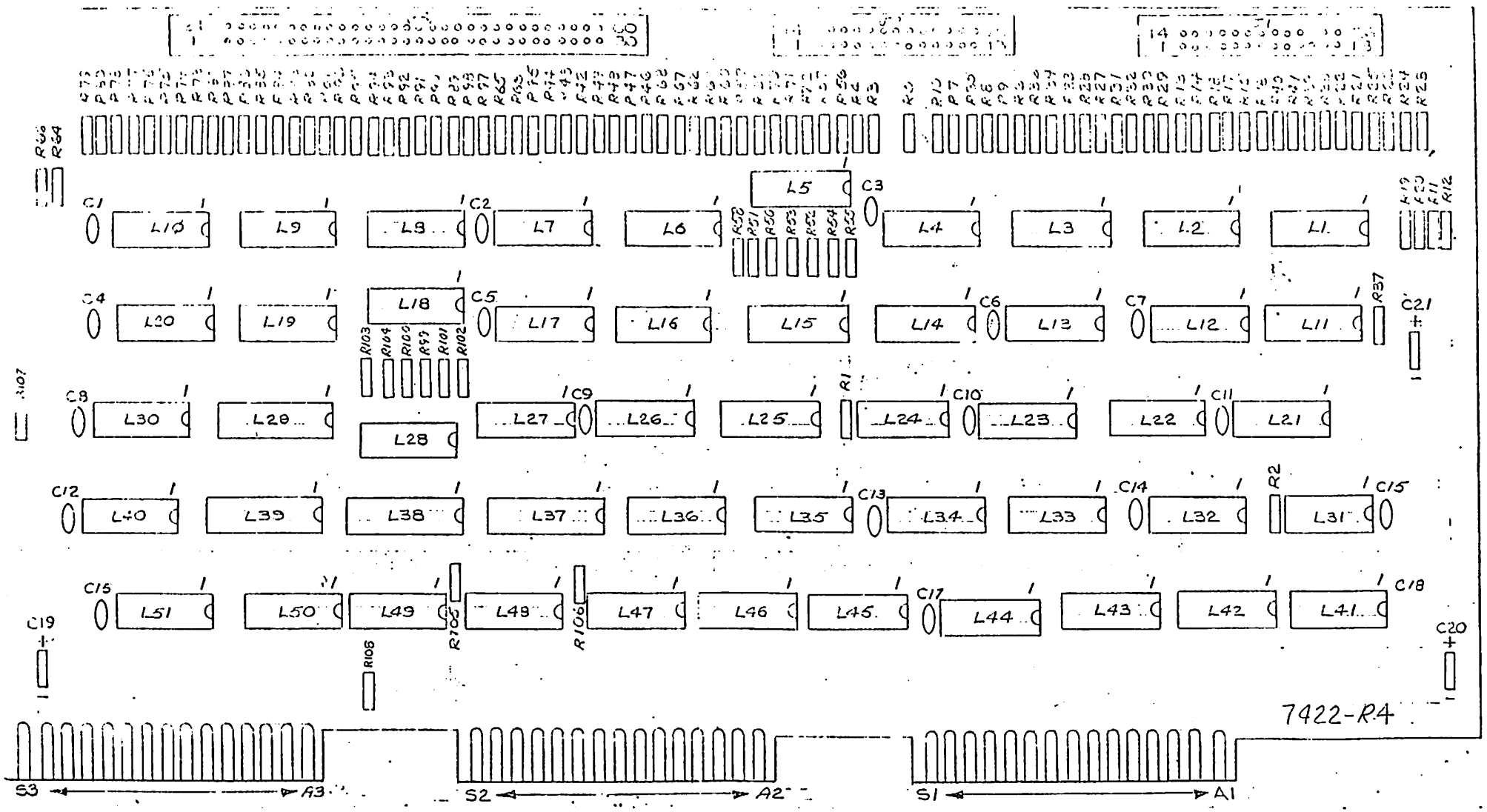
Sheet 3 of 5

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected
- ☐ All Customer Engineering Units. ASAP
- ☒ All Customer Engineering Units at Next Maintenance Visit.
- ☐ All Customer Engineering Units Having Problem Only.
- ☐ Information Only.
- ☐ Special Instructions – See Note (*)

COST IMPACT			
☒	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

7422



ttL

OCT

WANG

ECN

2280

3-4

ECN No. 1456-4

SHEET 1 OF 2

DATE 3-10-80

ORIGINATOR Mickey Greer DEPT. 16 EXT. 2060 DATE 3/5/80

MODEL NO. 2280 TITLE

PART NO.	PART NAME (DWG. TITLE)	REV. F	REV. T	PC REV FROM	PC REV TO	ELEC REV FROM	ELEC REV TO
210-7422	ECC Device Interface MB					2	3
DWG. NO. 7422							
ASSY. PART NO.	ASSY. TITLE					EFFECTED ☐ NO EFFECT ☐	

ECN NO. 1456-4

DESCRIPTION OF CHANGE

Change artwork, assembly drawing, schematic and sample board per attached print. Zone F-6

No BOM changes required

RECEIVED

MAR 1

PRINT

NOTE: This ECN is required on Controllers using R5 PROMS

REASON FOR CHANGE

ECC as is will not correct multi bit errors. These changes will allow for gross ECC error (12 Bit)

0740M/89

NEW PURCHASE REQ'D ☐ SHOP REWORK REQ'D. ☐ VENDOR REWORK REQ'D ☐

CUSTOMER ENGINEERING
☐ IMMEDIATE CUST.
☐ CUST PER NEXT CALL
☒ INFORMATION ONLY
☐ NONE

ACKNOWLEDGE
BY:
DATE:

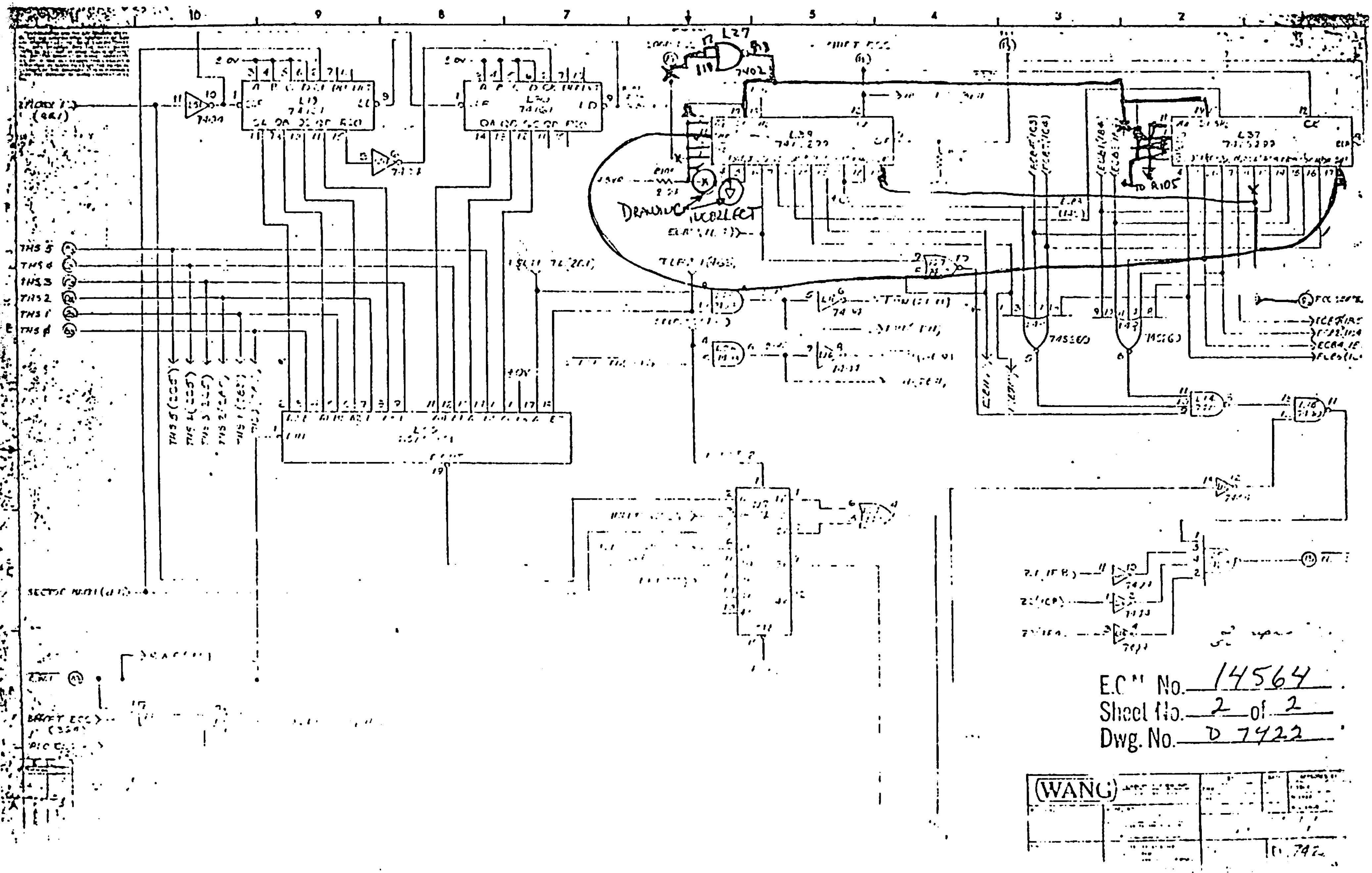
☒ MANDATORY CHANGE
☒ DOCUMENTATION CHANGE (PL, BOM, DWG)
[ ] EASE OF MFG., COST REDUCTION
[ ] PRODUCT IMPROVEMENT

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV.	X	X	X			
TO CONFORM						X

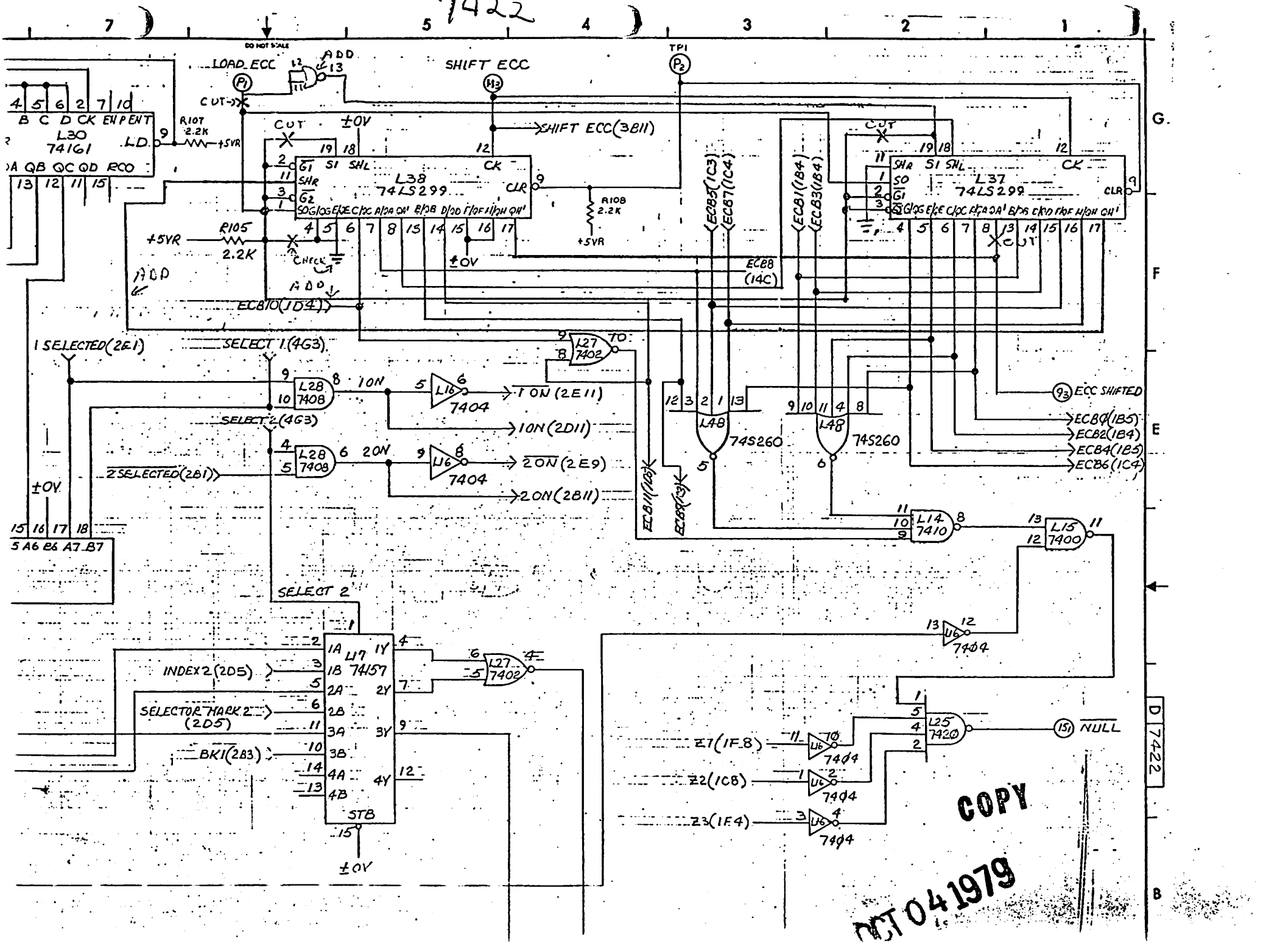
FINAL APPROVAL N Lourie 3/6/80

APPROVED DESIGN ENGRG. Mickey Greer

APPROVED D. CAFELLE



E.C.N. No. 14564
Sheet No. 2 of 2
Dwg. No. D 7422


7422
LOAD ECC
ADD
SHIFT ECC
TP1
CUT
L30 74161
R107 2.2K
+5VR
L38 74LS299
SHIFT ECC(3B11)
R108 2.2K
R105 2.2K
CHECK
ADD
ECB10(1D4)
ECB8 (14C)
ECB5(1C3)
ECB7(1C4)
ECB1(1B4)
ECB3(1B4)
L37 74LS299
I SELECTED(2E1)
SELECT 1(4G3)
L27 7402
L28 7408
1ON
L16 7404
1 ON (2E11)
1ON(2D11)
SELECT 2(4G3)
2ON
2 ON (2E9)
2ON(2B11)
2SELECTED(2B1)
L48 74S260
ECB11(1D6)
ECB9(1C3)
ECC SHIFTED
ECB0(1B5)
ECB2(1B4)
ECB4(1B5)
ECB6(1C4)
L14 7410
L15 7400
SELECT 2
L17 74157
INDEX 2(2D5)
SELECTOR MARK 2 (2D5)
BK1(2B3)
STB
L25 7420
NULL
Z1(1F8)
Z2(1C8)
Z3(1F4)
COPY
OCT 04 1979

WANG

ECO

ECO NO. 1809c

SHEET 1 OF 4

ORIGINATOR	Ken Dillon	M/S	1339	EXT.	2578	DATE	01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT.	2126	DATE	01/23/81

PART NO./ITEM NO. 210-7422	TITLE ECC/Device Interface	
DWG. NO./P. L. NO. 7422		
NEXT ASSY. Y EFFECTED N See Below	TITLE	
MODEL NO. 2280		

DESCRIPTION OF CHANGE

Change assembly drawing, schematic and sample board per attached print and as follows

Change L46 from a 74S00 (376-0228)
to a 7400 (376-0002)

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	376-0228	IC 74S00	1
Change	376-0002	IC 7400	from 2 to 3

Next assemblies effected 167/187-2200-79/-80, 212-2280

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

RECEIVED

MAR 0 9 1981

2249M/130

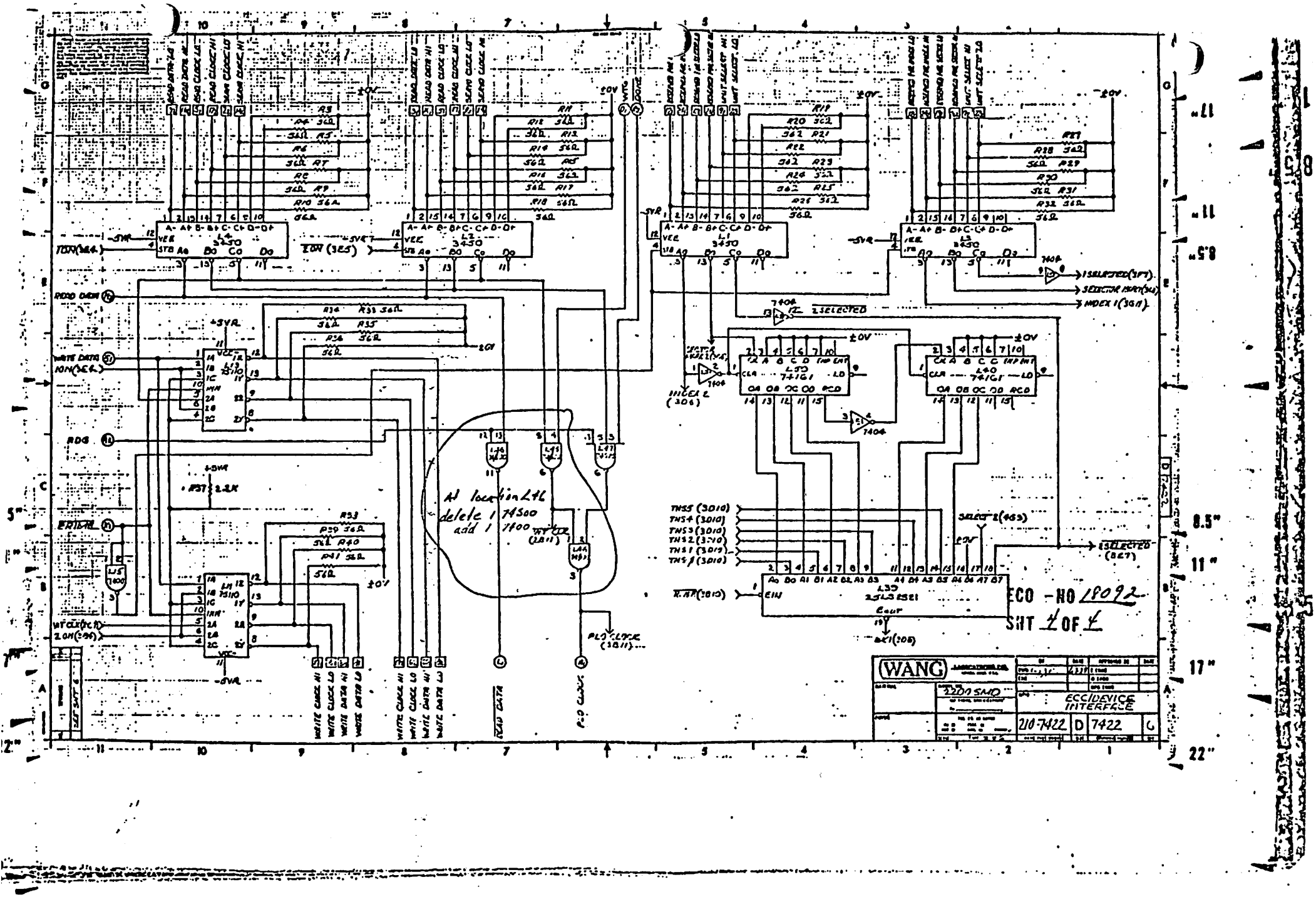
DOCUMENTS	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV	3	4	✓	
SAMPLE BD	3	4	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS	DATE
FINAL Paul Richer 2/26	2/9/81
DES. ENG. K. Dillon R. Coon NCP	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐ | ☐ VALUE ENGRG NO. _____ PRINT ROOM

Printed in U.S.A. 13-8643A 9-80


At location L46
delete 174500
add 1 1400
ECO -NO 18092
SHT 1 OF 1
WANG
2200 SMD
ECC/DEVICE INTERFACE
210-7422
D
7422
C

WANG

ENGINEERING CHA' E ORDER
(EFFECTIVIT..S)

MANUFACTURING

ECO # 18(P2

Sheet 2 of 4

☐ Total Number of Units Affected _____.

☐ All Units Prior to Being Shipped On or Before _____.

☐ All Units Prior to Packaging On or Before _____.

☐ All Units Prior to Final Electrical Test On or Before _____.

☐ All Units Prior to System Level Electrical Test On or Before _____.

☐ All Units Prior to Assembly On or Before _____.

☐ RCO All Open Orders

- ☐ Scrap
- ☐ Rework
- ☐ Not to Affect Finished Parts.

☐ Material Disposition

- ☐ Scrap
- ☐ Rework
- ☐ Use As Is
- ☐ Next Buy

☐ Special Instructions – See Note (*)

☐ Documentation Only

☐ VALUE ENGINEERING # _____

SPECIAL INSTRUCTIONS

COMMITTEE CHAIRMAN	R.E. Pearce 2/24/81
QUALITY CONTROL	Bob Thornton J.M. Lancaster 2-24-81
MATERIAL PLANNING	John Elliott Effective 3/6/81
MANUFACTURING ENGINEER	W. Gallagher
PRODUCT LINE MANAGER	W. Gallagher

COST IMPACT			
	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

0850A/13A

Printed in U.S.A. 13-8647A 9-80

ENGINEERING CHANGE ORDER
(EFFECTIVITIES)

CUSTOMER ENGINEERING

ECO # 18092

Sheet 3 of 4

SPECIAL INSTRUCTIONS

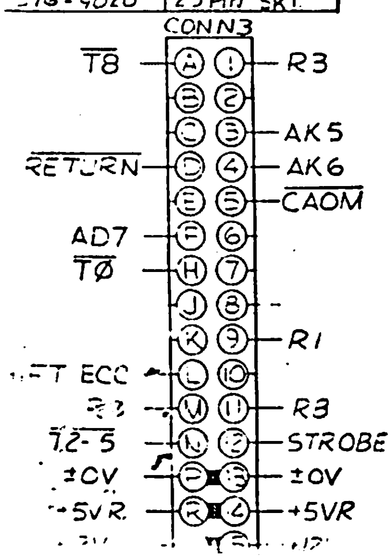
- ☐ Total Number of Units Affected
- ☐ All Customer Engineering Units. ASAP
- ☒ All Customer Engineering Units at Next Maintenance Visit.
- ☐ All Customer Engineering Units Having Problem Only.
- ☐ Information Only.
- ☐ Special Instructions – See Note (*)

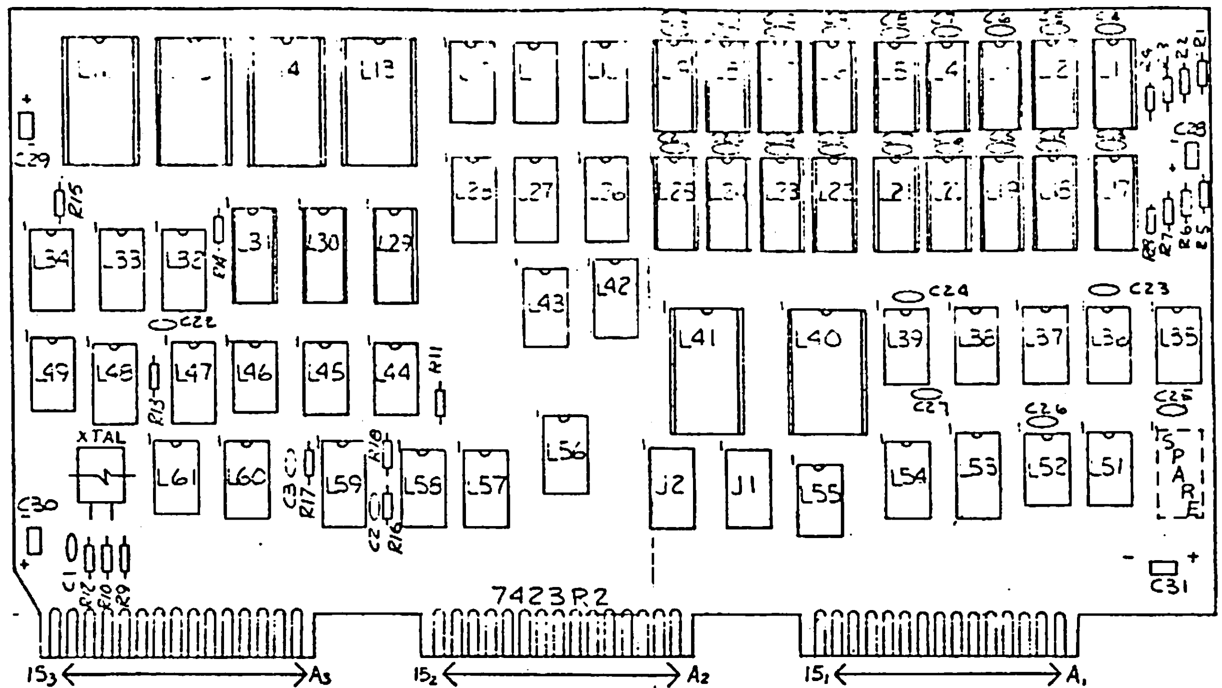
COST IMPACT			
☒	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

7423

?19		
L14	L15	L16
?6-4084-R3	378-4085-R3	378-4086-R3

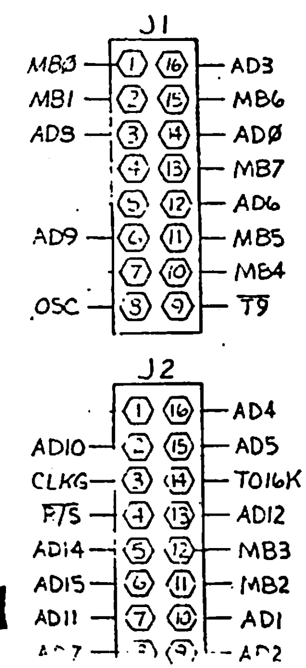
PART NO	TYPE
?-?4-L	2114-L
[illegible]3	74193
[illegible]082	74157
SEE CHART	2716
?7-0347	2911
?6-0098	74174
?6-0045	74153
[illegible]	9321
[illegible]	7432
376-0139	7414
?6-0012	7451
377-0353	2905
?6-0294	74LS138
376-0002	7400
376-0051	7408
376-0191	74160
376-0008	7442
376-0006	7474
?6-0016	7402
376-0097	74195
376-0125	7427
376-0010	7404
376-0?34	9602
	SPARE
376-9014	18 PIN SKT.
376-9030	24 PIN SKT.
376-9020	20 PIN SKT.





MNEMONIC	COORDINATE
AD7	4C1
AKØ-AK7	2C11
BFM-CMP	4A11
ESY	4E1
CAOM	3B11
CNTRL-T	4G4
CRESET	1A11
C100	4B11
C700	4B11
FOMT	4G1
LAUX	4D11
LOAD ECC	4G1
MØ-M7	2C1
PRIME	3A10
PWR ON	3B11
RAØ	4C11
RDG	2C11

MNEMONIC	COORDINATE
RØ-R15	3E1
SB	3E11
SHIFT ECC	4E1
STROBE	4F1
T500	1B11
TO,T2,T2-5	2D1
T4, T8	2D1
TO16K	4A5
T9	2A4
R15	3C11
[illegible]	3E11
[illegible]	4G1
[illegible]	4A11
[illegible]	3E11



D 7423

COPY

WANG 2280

ECN

ECN NO. 14561

ORIGINATOR Mic[illegible] 228[illegible] DEPT. 10 EXT. [illegible]

MODEL NO [illegible] TITLE [illegible]

PART NO. 209-7[illegible]	PART NAME (DWG TITLE) RAM/PROM Cntl Dghtr Bd	REV. F	T	FR	ELEC FROM 2
DWG. NO. 7423 7423					
ASSY. PART NO.	ASSY. TITLE				EFFECTED NO EFFECT

DESCRIPTION OF CHANGE

Change . assembly drawing, schematic and sample board per attached print

No BOM changes required

NOTE: At the request of Manufacturing the artwork will not be modified per this ECN

RECEIVED

MAR 1 , 1980

PRINT ROOM

REASON FOR CHANGE

To ensure RESET to 2911 will not switch while the chips are in an indeterminate state. Prime will not always trap to location 0000 2911 design error

0738M/89

NEW PURCHASE REQ'D. ☐ SHOP REWORK REQ'D. ☐ VENDOR REWORK REQ'D ☐

CUSTOMER ENGINEERING
- ☐ IMMEDIATE CUST
- ☐ CUST PER NEXT CALL
- ☐ INFORMATION ONLY
- ☐ NONE

ACKNOWLEDGE
BY: _____
DATE: _____

- [X] MANDATORY CHANGE
- [ ] DOCUMENTATION CHANGE (PL, BOM, DWG)
- [ ] EASE OF MFG, COST REDUCTION
- [ ] PRODUCT IMPROVEMENT

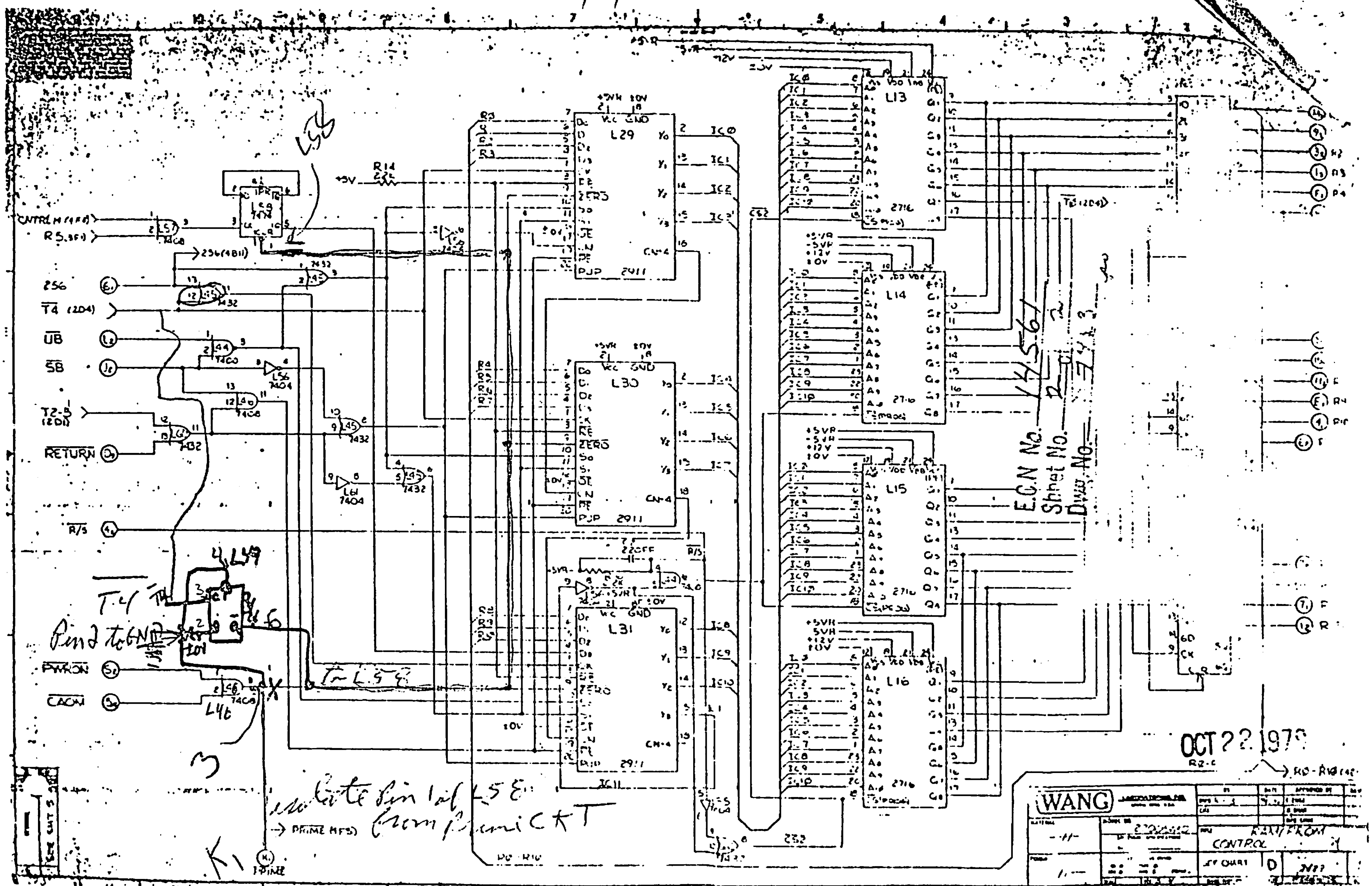
DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV.	X	X	X			
TO CONFORM						X
TO CONFORM IF NOT BEYOND OPERATIONS						

FINAL APPROVAL [illegible] 3/6/80

APPROVED DESIGN ENGRG. [illegible]

APPROVED MFG. ENGRG. D. CAFFELLE [illegible]

7423



CNTRL H
R5
256
T4
UB
SB
T2-5
RETURN
R/S
PWRON
CAON
PRIME
L29
L30
L31
2911
L13
L14
L15
L16
2716
R14
+5V
E.C.N No. 14561
Sheet No. 2
Dwg. No.
OCT 22 1979
WANG
CONTROL

7423

(WANG)

ECN

CE# 429

3-21

ECN No. 17036

SHEET 1 OF 2 B

DATE 3-27-80

RFA NO. (REF)

ORIGINATOR Max Bloome DEPT. 40 EXT. 3561 DATE 3/21/80

MODEL NO. 2280 TITLE

PART NO.	PART NAME (DWG. TITLE)	REV. F	REV. T	P.C. REV. FROM	P.C. REV. TO	ELEC. REV. FROM	ELEC. REV. TO
210-7423-A	RAM/PROM Cntlr						
DWG. NO. 7423							
ASSY. PART NO.	ASSY. TITLE					EFFECTED ☐ NO EFFECT ☐	

ECN NO. 14856

DESCRIPTION OF CHANGE

Change schematic, software loading chart and BOM as follows:

FROM	TO	QTY
378-4083-R4	378-4083-R5	1
378-4084-R4	378-4084-R5	1
378-4085-R4	378-4085-R5	1
378-4086-R4	378-4086-R5	1

NOTE: The following ECNS must also be installed

ECN 14561 on the 209-7423
ECN 14563 on the 210-7424
ECN 14564 on tne 210-7422

RECEIVED
APR 03 1980
PRINT ROOM

No artwork, assembly drawing or sample board changes required

REASON FOR CHANGE

See attached descriptions of corrections and enhancements.

0835M/91

NEW PURCHASE REQ'D ☐ | SHOP REWORK REQ'D. ☐ | VENDOR REWORK REQ'D ☐

CUSTOMER ENGINEERING
☐ IMMEDIATE CUST.
☑ CUST. PER NEXT CALL
☐ INFORMATION ONLY
☐ NONE

ACKNOWLEDGE
BY:
DATE:

☒ MANDATORY CHANGE
☒ DOCUMENTATION CHANGE (PL, BOM, DWG)
[ ] EASE OF MFG., COST REDUCTION
[ ] PRODUCT IMPROVEMENT

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV	X	X	X			
TO CONFORM						X
TO CONFORM IF NOT BEYOND OPERATIONS EFFECTED						

FINAL APPROVAL Paul Richman

APPROVED DESIGN ENGRG. Peter Spencer

APPROVED MFG. ENGRG. D. CAFFELLE

WRITTEN BY

Corrections:

1. The sector buffers were not flushed when a disk cartridge was changed. This could result in data from the old cartridge to be read rather than data from the cartridge currently mounted.

2. Ready/Busy was not always set properly. This could have resulted in ERR 92.

3. VERIFY beyond end of platter did not return proper errors.

4. COPY beyond end of platter did not return proper errors.

Enhancements:

1. Error correction (ECC) on sector data.

2. Power on diagnostic including RAM test. If diagnostic fails, CPU will receive ERR 90 whenever disk is accessed.

3. CPU readable microprogram revision number.

4. CPU readable soft error counts.

5. Compatibility with proposed 2280 multiplexer.

6. Field service alignment command for disk alignment without an FTU.

7. Write protect switches now fully operable.

E.C.N. No. 14856
Sheet No. 2 of 20
Dwg. No. ———

WANG

ECO

ECO NO. 180 ; 3

SHEET 1 OF 4

ORIGINATOR	Ken Dillon	M/S	1339	EXT. 2578	DATE 01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT. 2126	DATE 01/23/81

PART NO./ITEM NO. 510-7423	TITLE Ram/Prom Controller
DWG. NO./P. L. NO. 7423	
NEXT ASSY. Y / EFFECTED N 209-7423	TITLE
MODEL NO. 2280	

DESCRIPTION OF CHANGE

Change artwork, assembly drawing, schematic and sample board per attached print and as follows

- Cut etch from L49 pin 3 to L45 pin 12
- Tie L49 pin 3 to L32 pin 9
- Cut etch from L49 pin 2 to +0v (L49 pin 7)
- Tie L49 pin 2 to L38 pin 4
- Tie L49 pin 1 to L49 pin 4
- Cut etch from L46 pin 3 to L49 pin 4
- ✱ Cut etch from K_1 to L46 pin 3 ✱
- Tie L49 pin 6 to K_1
- Tie L49 pin 4 to L31 pin 3
- Tie L38 pin 3 to L46 pin 3

RECEIVED
MAR 02 1981
PRINT ROOM

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

✱ CUT NEXT TO L46 PIN 3 AS IT HEADS TO BOTTOM OF BOARD

(78)

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

2250M/130

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

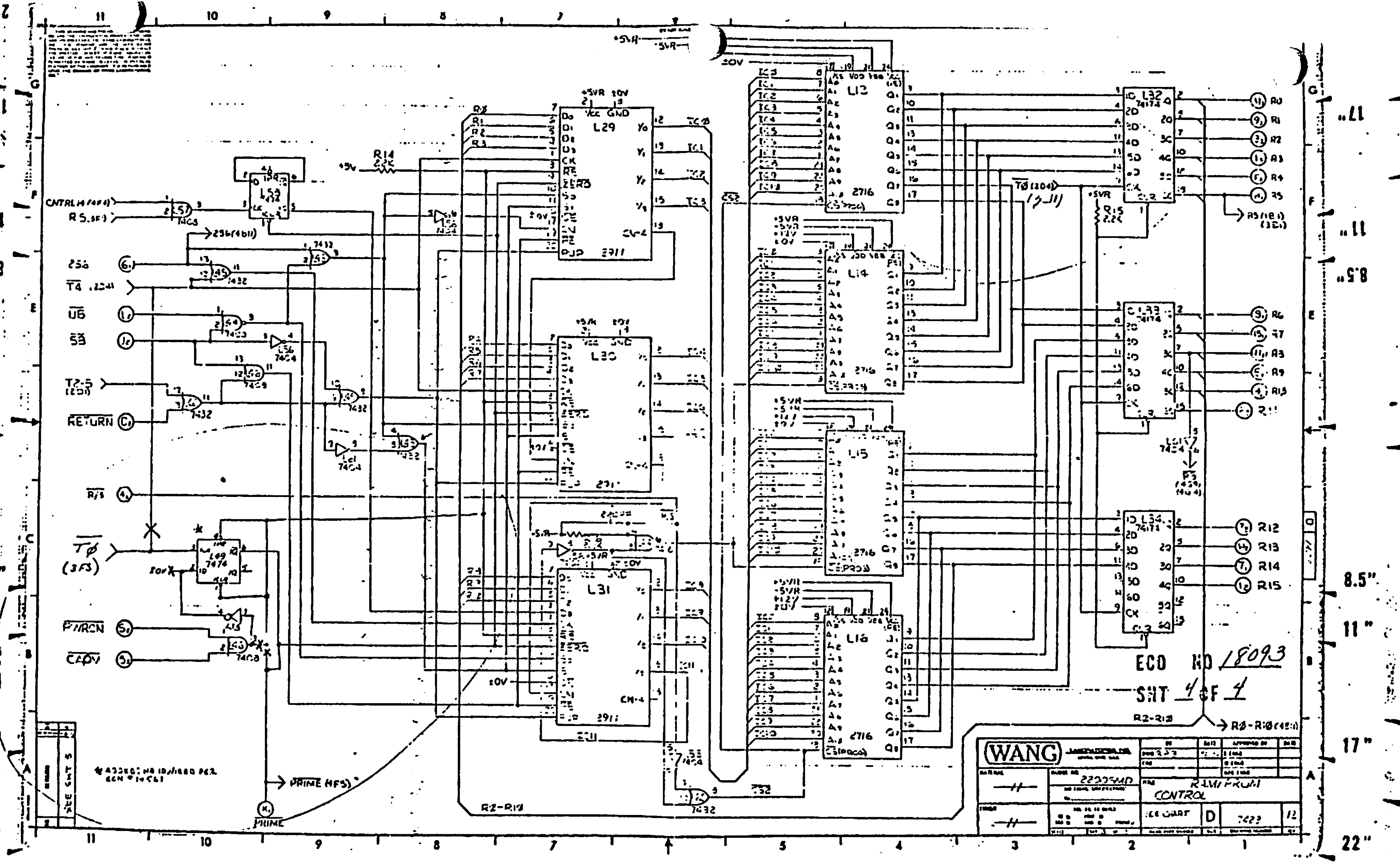
DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM				✓
ARTWORK	3	4	✓	
E-REV	3	4	✓	
SAMPLE BD	3	4	✓	
ASSY. DWG.			✓	
DRILL DWG.			✓	
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS	DATE
FINAL M Lourie 2/26	2/9/81
DES. ENG. L. Dillon R. Pearce W.C.P.	
CUST. ENGRG. J. Proulx	2/20/81
MFG. ENGRG. R. Pearce	2/24/81
OTHER SIGN	
DRAWING UPDATED	

Printed in U.S.A. 13-8644A 9-80


L29
2911
L30
L31
L12
L13
L14
L15
L16
2716
L32
74174
L33
L34
L49
7474
L53
R14
R15
CNTRL
256
T4
U6
S3
T2-5
RETURN
R/S
Tø (3F5)
PWRCN
CAOV
PRIME
PRIME (4F5)
R0
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R2-R13
RØ-RØ
ECO NO 18093
SHT 4 OF 4
WANG
RAM/PROM CONTROL
D
7423

ENGINEERING CHANGE ORDER
(EFFECTIVITIES)
MANUFACTURING

ECO # 10173

Sheet 2 of 4

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected_____.
- ☐ All Units Prior to Being Shipped On or Before_____.
- ☐ All Units Prior to Packaging On or Before_____.
- ☐ All Units Prior to Final Electrical Test On or Before_____.
- ☐ All Units Prior to System Level Electrical Test On or Before_____.
- ☐ All Units Prior to Assembly On or Before_____.
- ☐ RCO All Open Orders
  - ☐ Scrap
  - ☐ Rework
  - ☐ Not to Affect Finished Parts.
- ☐ Material Disposition
  - ☐ Scrap
  - ☐ Rework
  - ☐ Use As Is
  - ☐ Next Buy
- ☐ Special Instructions – See Note (*)
- ☐ Documentation Only
- ☐ VALUE ENGINEERING** _____

COMMITTEE CHAIRMAN	R.E. Pearce 2/24/81
QUALITY CONTROL	B. Upton J.M. Rancoast 2-24-81
MATERIAL PLANNING	John Elliott Effective 3/6/81
MANUFACTURING ENGINEER	W.C. Gallagher
PRODUCT LINE MANAGER	W.C. Gallagher

COST IMPACT			
	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

78

13-8647

0850A/13A

ENGINEERING CHANGE ORDER
(EFFECTIVITIES)

CUSTOMER ENGINEERING

ECO # 18093

Sheet 3 of 4

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected
- ☐ All Customer Engineering Units: ASAP
- ☒ All Customer Engineering Units at Next Maintenance Visit.
- ☐ All Customer Engineering Units Having Problem Only.
- ☐ Information Only.
- ☐ Special Instructions – See Note (*)

COST IMPACT			
☒	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

(78)

WANG

ECO

ECO NO. 1841B

SHEET 1 OF 3

ORIGINATOR	Max Blomme		M/S	1383	EXT.	4885	DATE 2/18/81
WRITTEN BY	Judy Mulno		M/S	1329	EXT.	2634	DATE 2/18/81

PART NO./ITEM NO.	210-7423-A	TITLE	RAM/PROM Cntlr
DWG. NO./P. L. NO.	7423		
NEXT ASSY. EFFECTED	Y N See Below	TITLE	
MODEL NO.	2280		

DESCRIPTION OF CHANGE

RECEIVED
MAR 10 1981
PRINT ROOM

Change schematic and software loading chart as follows:

FROM	TO
378-4083-R6	378-4083-R7
378-4084-R6	378-4084-R7
378-4085-R6	378-4085-R7
378-4086-R6	378-4086-R 7

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Delete	378-4083-R6	PROM	1
	378-4084-R6	PROM	1
	378-4085-R6	PROM	1
	378-4086-R6	PROM	1
Add	378-4083-R7	PROM	1
	378-4084-R7	PROM	1
	378-4085-R7	PROM	1
	378-4086-R7	PROM	1

Next Assemblies Effected: 167/187-2200-79/80, 212-2280

REASON/SYMPTON FOR CHANGE

The alternate map read was not set up properly in write so that the DPU lost where it was and failed to do the write

2413M/137

(80)

DESIGN IMPROVEMENT ☐ | VENDOR REQUEST ☐

DOCUMENTS

	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV				✓
SAMPLE BD				✓
ASSY. DWG.				✓
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	3-4-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM	X	X	X			X
TO CONFORM WHERE FEASIBLE						

APPROVALS	DATE
FINAL Paul Richen 3/4	
DES. ENG.	
CUST. ENGRG. J. Proulx	2/27/81
MFG. ENGRG. R. Pearce	2/26/81
OTHER SIGN	
DRAWING UPDATED	

Printed in U.S.A. 13-8644A 9-80

ENGINEERING CHANGE ORDER
(EFFECTIVITIES)
MANUFACTURING

ECO # 18 V8

Sheet 2 of 3

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected_____.
- ☐ All Units Prior to Being Shipped On or Before_____.
- ☐ All Units Prior to Packaging On or Before_____.
- ☐ All Units Prior to Final Electrical Test On or Before_____.
- ☐ All Units Prior to System Level Electrical Test On or Before_____.
- ☐ All Units Prior to Assembly On or Before_____.
- ☐ RCO All Open Orders
  - ☐ Scrap
  - ☐ Rework
  - ☐ Not to Affect Finished Parts.
- ☐ Material Disposition
  - ☐ Scrap
  - ☐ Rework
  - ☐ Use As Is
  - ☐ Next Buy
- ☐ Special Instructions – See Note (*)
- ☐ Documentation Only
- ☐ VALUE ENGINEERING** _____

COMMITTEE CHAIRMAN	R. E. Pearce 2/24/81
QUALITY CONTROL	B. Thornton J M Pancoast 2-26-81
MATERIAL PLANNING	John E Little
MANUFACTURING ENGINEER	W F Gallagher
PRODUCT LINE MANAGER	W F Gallagher

effective 3/10/81

COST IMPACT	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

13-8647

0850A/13A

ENGINEERING CHAN ORDER
(EFFECTIVITIES)

CUSTOMER ENGINEERING

ECO # 18,318

Sheet 3 of 3

SPECIAL INSTRUCTIONS

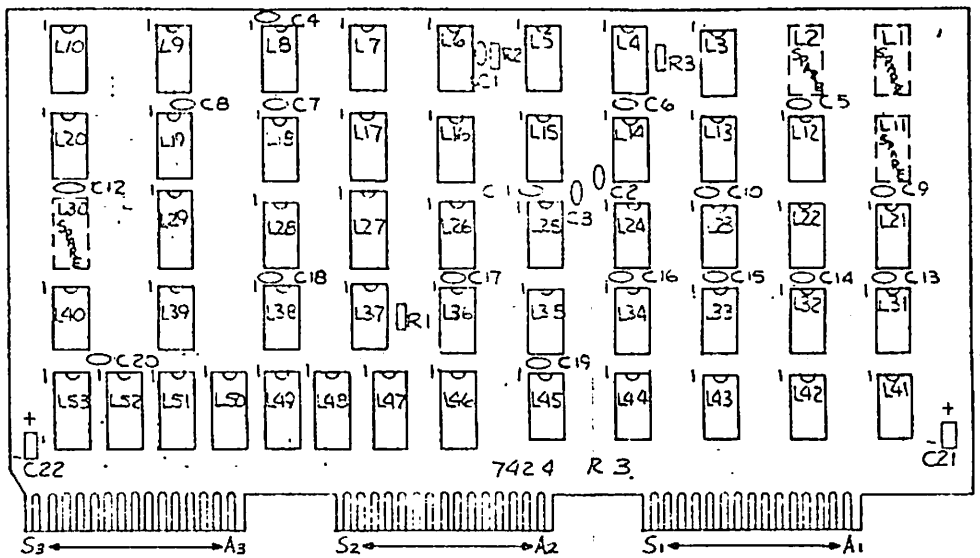
- ☐ Total Number of Units Affected
- ☐ All Customer Engineering Units. ASAP
- ☐ All Customer Engineering Units at Next Maintenance Visit.
- ☒ All Customer Engineering Units Having Problem Only.
- ☐ Information Only.
- ☐ Special Instructions – See Note (*)

COST IMPACT			
☒	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

T E	CA N	PA S
7432	L22	1
7408	L23	1
7402	L31	
1408	L21	
7411	L41	1
7474	L44	1

7424

ATION	WL PART NO.	TYPE
6,L36,L41	376-0194	7411
L4	376-0295	74S138
6,L7	376-0053	74193
15,L24	376-0012	7451
20,L35	376-0010	7404
9,L2,L33,44	376-0006	7474
L14	376-0004	7420
2,L25	376-0093	7432
4,39,45	376-0081	7408
L31	376-0016	7402
29 L46	376-0318	74276
3,L42	376-0238	74S10
7,L40,	376-0096	9321
L38	376-0002	7400
L43	376-0230	74S20
47	376-0303	74LS299
48	376-0317	25LS2521
L53	376-0256	74LS374
L52	376-0288	74LS244
L11,L30	SPARE	



J3

①	R3
②	THS1
③	AK5
④	AK6
⑤	FC8
⑥	THSØ
⑦	FC1
⑧	WXFER ECC
⑨	R1
⑩	FC7
⑪	R8
⑫	FC5
⑬	—
⑭	+5V

MNEMONIC	COORDINATE
AKØ-AK7	1F11
CNTRLZ	3G7
CNTRL3	2G5
CRESET	3G1
C7S1	2B1
C700	2A7
DERROR	3G8
DONE	2A5
DONE	2A5
ECBØ	1D11
ECC DATA	2A6
EQUALS	3G8
ERROR	1B1
F/W-R/W	1E1
FUMT	2D11
INIT	2F1
MØ-M7	1D1
[illegible]	[illegible]

MNEMONIC	COORDINATE
R/D	1G4
SECTOR	3B1
SELECT-SELECT 2	2E1
SCZ1	3G9
[illegible]	2G1
[illegible]	1C1
[illegible]	3G1
[illegible]	2G6
[illegible]	2G5
[illegible]	3F7
[illegible]	1B11
WRITE DATA	2A6
[illegible]	2A9
[illegible]	3E
[illegible]	2A4

JUN 26 1979

COPY

7424

WANG

2280

FCN

ECN No. 14563

SHEET 1 OF 1

DATE 3-10-85

RFA NO. (REF)

ORIGIN Mickey Greer DEPT. 16 EXT. 2068 DATE 3/3/85

MODEL NO. 2280 TITLE

PART NO.	PART NAME (DWG. TITLE)	REV. F	REV. T	PC REV FROM	PC REV TO	ELEC REV FROM	ELEC REV TO
210-7424	I/O Control Dghtr	-	-	-	-	7	8
DWG. NO. 7424							

ASSY. PART NO.	ASSY. TITLE	EFFECTED ☐ NO EFFECT ☐

ECN NO. 14563

DESCRIPTION OF CHANGE

Change assemlby drawing, schematic and sample board as follows:

Cut etch from L43 pin 10 to L5 pin 7
Tie L43 pins 9 and 10 together

No BOM changes required

RECEIVED
MAR 1 [illegible]
PRINT ROOM

NOTE: This ECN is required on controllers using R5 PROMS

NOTE: At the request of Manufacturing the artwork will not be modified per this ECN

REASON FOR CHANGE

The READ field is 1 byte too long when doing ECC.

0739M/89

NEW PURCHASE REQ'D. ☐ | SHOP REWORK REQ'D. ☐ | VENDOR REWORK REQ'D ☐

CUSTOMER ENGINEERING
☐ IMMEDIATE CUST
☐ CUST PER NEXT CALL
☐ INFORMATION ONLY
☐ NONE

ACKNOWLEDGE BY: _____ DATE: _____

☒ MANDATORY CHANGE
☒ DOCUMENTATION CHANGE (PL, BOM, DWG)
[ ] EASE OF MFG., COST REDUCTION
[ ] PRODUCT IMPROVEMENT

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN House	PARTS Outside Vendor	Future MFG.
USE AS IS TO PREVIOUS REV.	X	X	X			
TO CONFORM						X
TO CONFORM IF NOT BEYOND OPERATIONS						

FINAL APPROVAL [signature] 3/6/85

APPROVED DESIGN ENGRG. [signature]

APPROVED MFG. ENGRG. D. CAFFELLE MAR

WANG

ECO

ECO NO. 1809, Y

SHEET 1 OF 5

ORIGINATOR	Ken Dillon	M/S	1339	EXT.	2758	DATE	01/23/81
WRITTEN BY	Laurie David	M/S	1329	EXT.	2126	DATE	01/23/81

PART NO./ITEM NO.	210-7424	TITLE	I/O Controller
DWG. NO./P. L. NO.	7424		
NEXT ASSY. EFFECTED Y N	See Below	TITLE	
MODEL NO.	2280		

DESCRIPTION OF CHANGE

Change assembly drawing, schematic and sample board per attached prints and as follows

RECEIVED
MAR 09 1981
PRINT ROOM

Change L12 from a 7404 (376-0010)
to a 7414 (376-0139)

Change BOM as follows:

	WLI #	DESCRIPTION	QTY
Change	376-0010	IC 7404	from 4 to 3
Add	376-0139	IC 7414	1

Next assemblies effected 167/187-2200-79/-80, 212-2280

NOTE: Customer Engineering may want to install this ECO at sites where there are frequent unexplained disk errors

REASON/SYMPTON FOR CHANGE

To correct incompatibility between disk drives and 2280 DPU

2251M/130

80

DESIGN IMPROVEMENT ☐ VENDOR REQUEST ☐

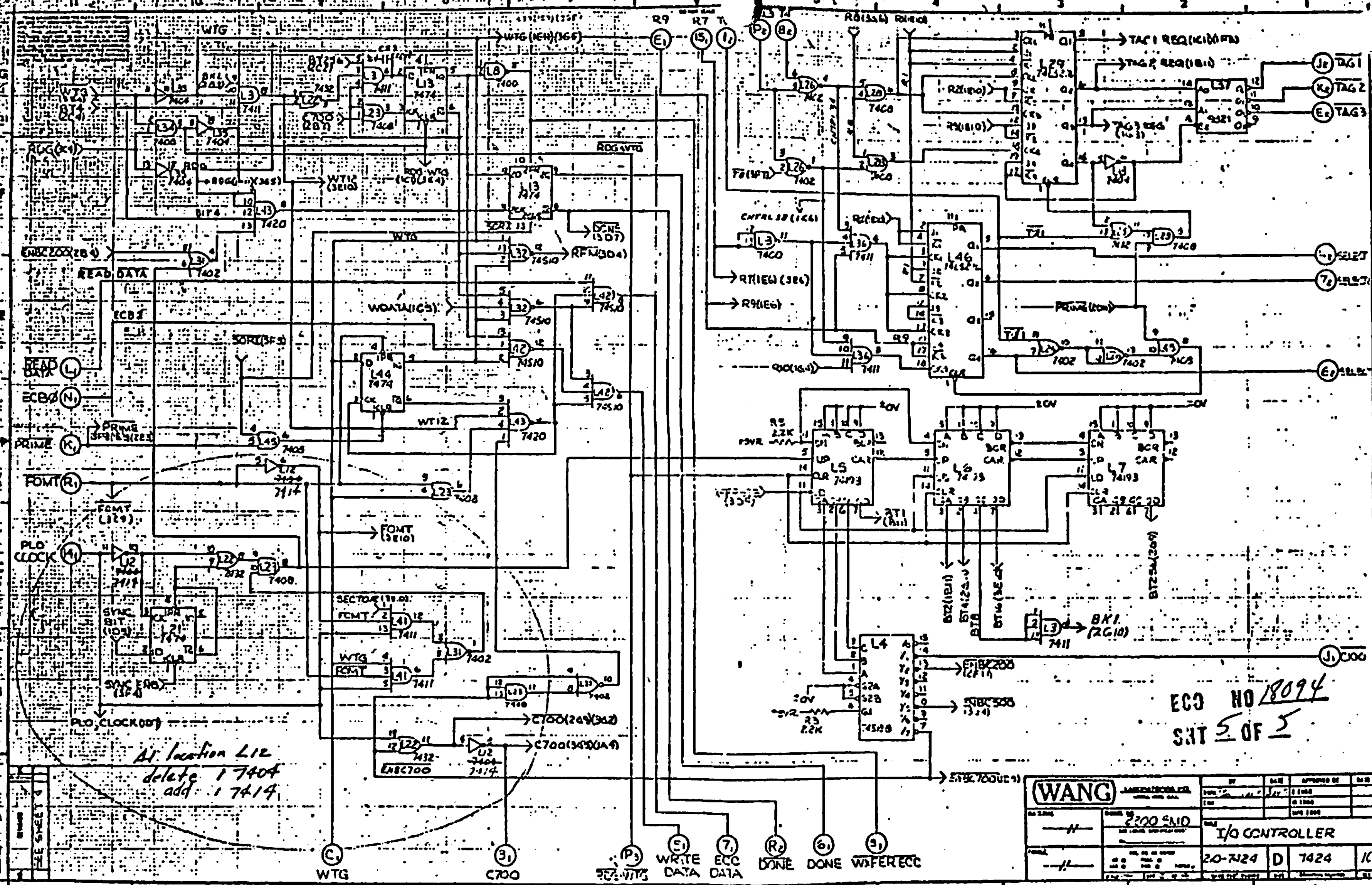
DOCUMENTS

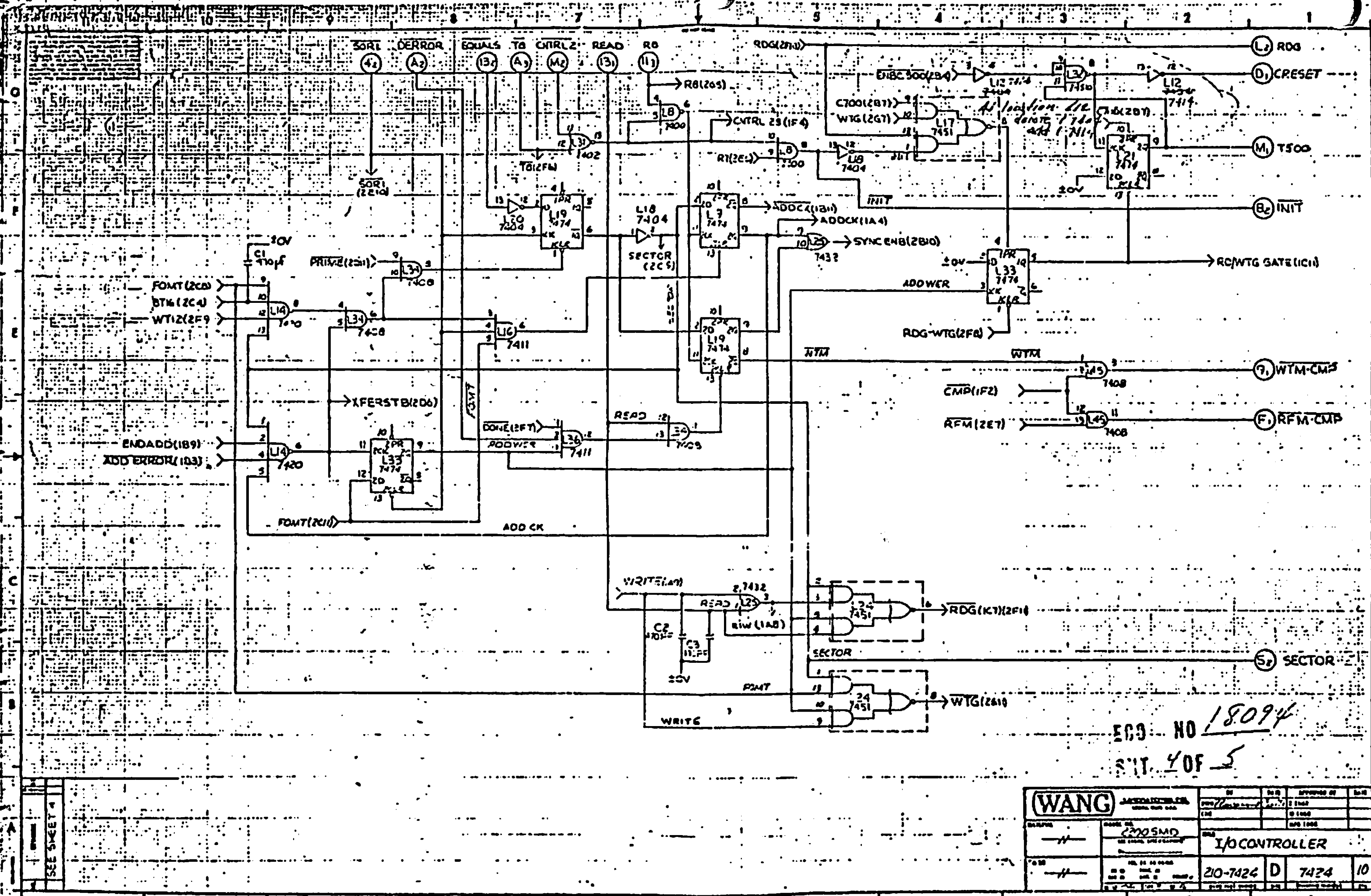
	REV F	REV T	EFFECTED Y	EFFECTED N
BOM			✓	
ARTWORK				✓
E-REV	8	9	✓	
SAMPLE BD	8	9	✓	
ASSY. DWG.			✓	
DRILL DWG.				✓
SCHEM. DWG.			✓	
MECH. DWG				
DATE TO DOCUM	2-27-81			

DISPOSITION	Bonded	FINAL ASSY AREA	SUB ASSY AREA	PARTS IN HOUSE	PARTS OUTSIDE VENDOR	Future MFG.
USE AS IS TO PREVIOUS REV.						
TO CONFORM		X	X			X
TO CONFORM WHERE FEASIBLE	X					

APPROVALS		DATE
FINAL	N Lourie Paul Richer 2/26	2/9/81
DES. ENG.	K. Dillon Recon Dwg.	
CUST. ENGRG.	J. Proulx	2/20/81
MFG. ENGRG.	R. Pearce	2/24/81
OTHER SIGN		
DRAWING UPDATED		

Printed in U.S.A. 13-8644A 9-80


WANG
2200 SMD
I/O CONTROLLER
20-7424
D
7424
ECO NO 18094
SHT 5 OF 5
At location L12 delete 1 7404 add 1 7414
WTG
C700
WRITE DATA
ECC DATA
DONE
DONE
W/FER ECC
READ DATA
ECBØ
PRIME
FOMT
PLO CLOCK
TAG 1
TAG 2
TAG 3
TAG 1 REQ
TAG 2 REQ
TAG 3 REQ
RFM
WDATA
SYNC BIT
SYNC ERR
PLO CLOCK
SECTOR
ENBC200
ENBC500
ENBC700
BK1



SORI
DERROR
EQUALS
T8
CNTRL 2
READ
R8
RDG
CRESET
T500
INIT
RC/WTG GATE(1C11)
SYNC ENB(2B10)
ADDCK(1A4)
XFERSTB(2D6)
ADD CK
WTM-CMP
RFM-CMP
CMP(1F2)
RFM(2E7)
RDG(K7)(2F11)
SECTOR
WTG(2G11)
FOMT(2C8)
BT16(2C4)
WT12(2F9)
ENDADD(1B9)
ADD ERROR(1D3)
PRIME(2G11)
DONE(2E7)
ADDWER
RDG-WTG(2F8)
WRITE
READ
RIW(1A8)
SEE SHEET 4
ECO NO 18094
SHT. 4 OF 5
WANG
2200SMD
I/O CONTROLLER
210-7424
D
7424
10

ENGINEERING CHANGE ORDER
(EFFECTIVITY)
MANUFACTURING

ECO # 10177

Sheet 2 of 5

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected _____.
- ☐ All Units Prior to Being Shipped On or Before _____.
- ☐ All Units Prior to Packaging On or Before _____.
- ☐ All Units Prior to Final Electrical Test On or Before _____.
- ☐ All Units Prior to System Level Electrical Test On or Before _____.
- ☐ All Units Prior to Assembly On or Before _____.
- ☐ RCO All Open Orders
  - ☐ Scrap
  - ☐ Rework
  - ☐ Not to Affect Finished Parts.
- ☐ Material Disposition
  - ☐ Scrap
  - ☐ Rework
  - ☐ Use As Is
  - ☐ Next Buy
- ☐ Special Instructions – See Note (*)
- ☐ Documentation Only
- ☐ VALUE ENGINEERING** _____

COMMITTEE CHAIRMAN	R. E. Pearce 2/24/81
QUALITY CONTROL	B. Thornton J M Pancoast 2-24-81
MATERIAL PLANNING	Lou Collette effective 3/6/81
MANUFACTURING ENGINEER	W P Gallagher
PRODUCT LINE MANAGER	W P Gallagher

COST IMPACT			
	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

13-8647

0850A/13A

ENGINEERING CHAN ORDER
(EFFECTIVITIES)

CUSTOMER ENGINEERING

ECO # 18[illegible]4

Sheet 3 of 5

SPECIAL INSTRUCTIONS

- ☐ Total Number of Units Affected
- ☐ All Customer Engineering Units ASAP
- ☒ All Customer Engineering Units at Next Maintenance Visit.
- ☐ All Customer Engineering Units Having Problem Only.
- ☐ Information Only.
- ☐ Special Instructions – See Note (*)

COST IMPACT			
☒	MAT'L.	LABOR	TOTAL
MFG.			
C.E.			
TOTALS			

WANG

ECO

ECO NO. 410067 SHEET 1 OF 7

ORIGINATOR	Gilles Carrier	M/S	1439	EXT.	74478	DATE	05/29/86
WRITTEN BY	Elly Gilks	M/S	1218B	EXT.	73230	DATE	05/29/86

PART NO. 210-7717	DESCRIPTION DISK MUX MASTER
DWG NO. 7717	
MODEL NO. 2280 MUX	PEP #
CLASS I (II) III	

DESCRIPTION OF CHANGE

NOTE 1: Engineering has decided that the artwork will not be modified at this time, it is not cost justifiable.

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

Change L34 from IC 7432 (376-0093)
to IC 7408 (376-0081).
Cut etch at L42 pin 8. (schem. zone 2A11, component side)
Cut etch at L42 pin 10. (schem. zone 2A11, component side)
Cut etch at L42 pin 9. (schem. zone 2A11, circuit side)
Cut etch at L18 pin 5. (schem. zone 2D4, circuit side)
Lift pins L37 pin 12 and L37 pin 13. (schem. 2A10)
Tie L39 pin 1 to L34 pin 10.
Tie L39 pin 13 to L34 pin 9.
Tie L34 pin 8 to L34 pin 5 and to L36 pin 3. (schem. zone 2A9,1C6)
Tie L19 pin 9 to L19 pin 10. (schem. zone 2B3)

RECEIVED
JUL 10 1986
PRINT ROOM

NOTE TO EDD: Create 210-7717 History Sheet.

Continued on next page

REASON/SYMPTOM FOR CHANGE

COMPANY CONFIDENTIAL

To stop I90 and I92 errors due to ring counter hangs in Mux.

DOCUMENTS

	REVISIONS FROM	REVISIONS TO
HISTORY SHT. 510		
HISTORY SHT. 210	See Below	
ARTWORK		
E-REV.	2	3
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	X	X	X		

CONFORMANCE DATE 7/23

APPROVALS

	DATE
ECO CHAIRPERSON J. Mulvey	7/8
DES. ENGRG. Gilles Carrier	6/3/86
CUST. ENGRG. Crowley	7/9/86
MFG. John Hyson	7/9/86
MTO	
PP&M	
F.C.C. Michael J. Bucci	6/6/86
PROD. SAFETY Dick Bernier	
SECURE SYS.	
ORIGINATOR	
OTHER	

14-19030 Printed in U.S.A. 5-85-7M

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. 41006	SHT 2 OF 7	

DESCRIPTION OF CHANGE:

Continued from page one

Change BOM 210-7717 as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE		QTY	QTY TYPE
Change:	376-0093	IC 7432	EA	1	From:	2	1
			EA	1	To:	1	1
Add:	376-0081	IC 7408	EA	1		1	1

WANG

ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET

ECO NO 41006
SHEET 3 OF 7

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	Darlene M. Ross 7/9/86
MFG ENG	Sam J Not 7/9/86
QUALITY	
MATERIALS	S. Mundel
PROD. CONTROL	
FINANCE	
RE-MFG	D. Hanson
OTHER	

REMARKS Doesn't impact Jwks This board is now being built in P.B. OEM

CE spares shipped after 7/23/86 will conform

SMS EFFECTIVITY DATE 7-18-86

DOCUMENTATION ONLY ☐

WANG

ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING IMPACT SHEET

ECO NO. 41006
SHEET 4 OF 7

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

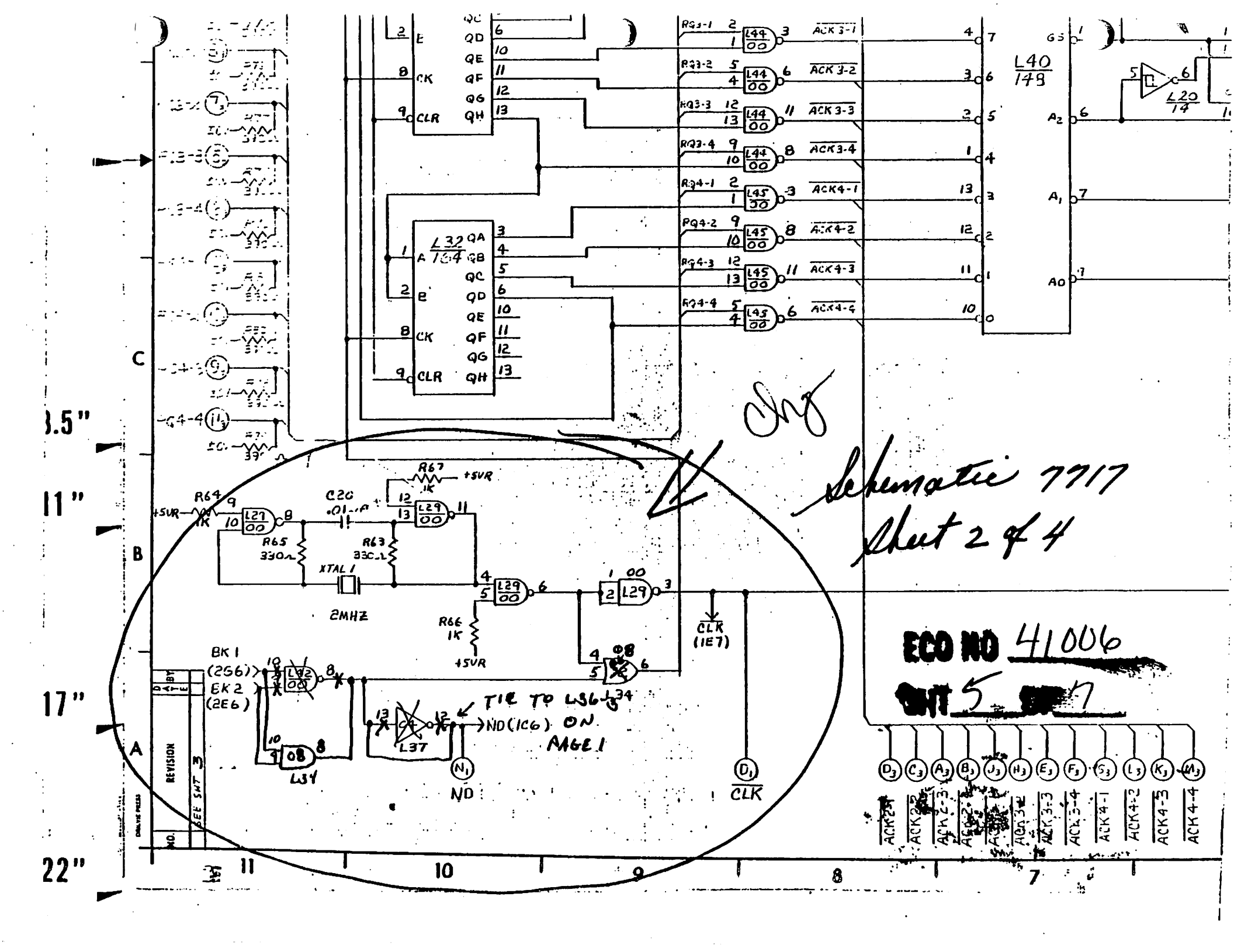
IMPACT COMMENTS

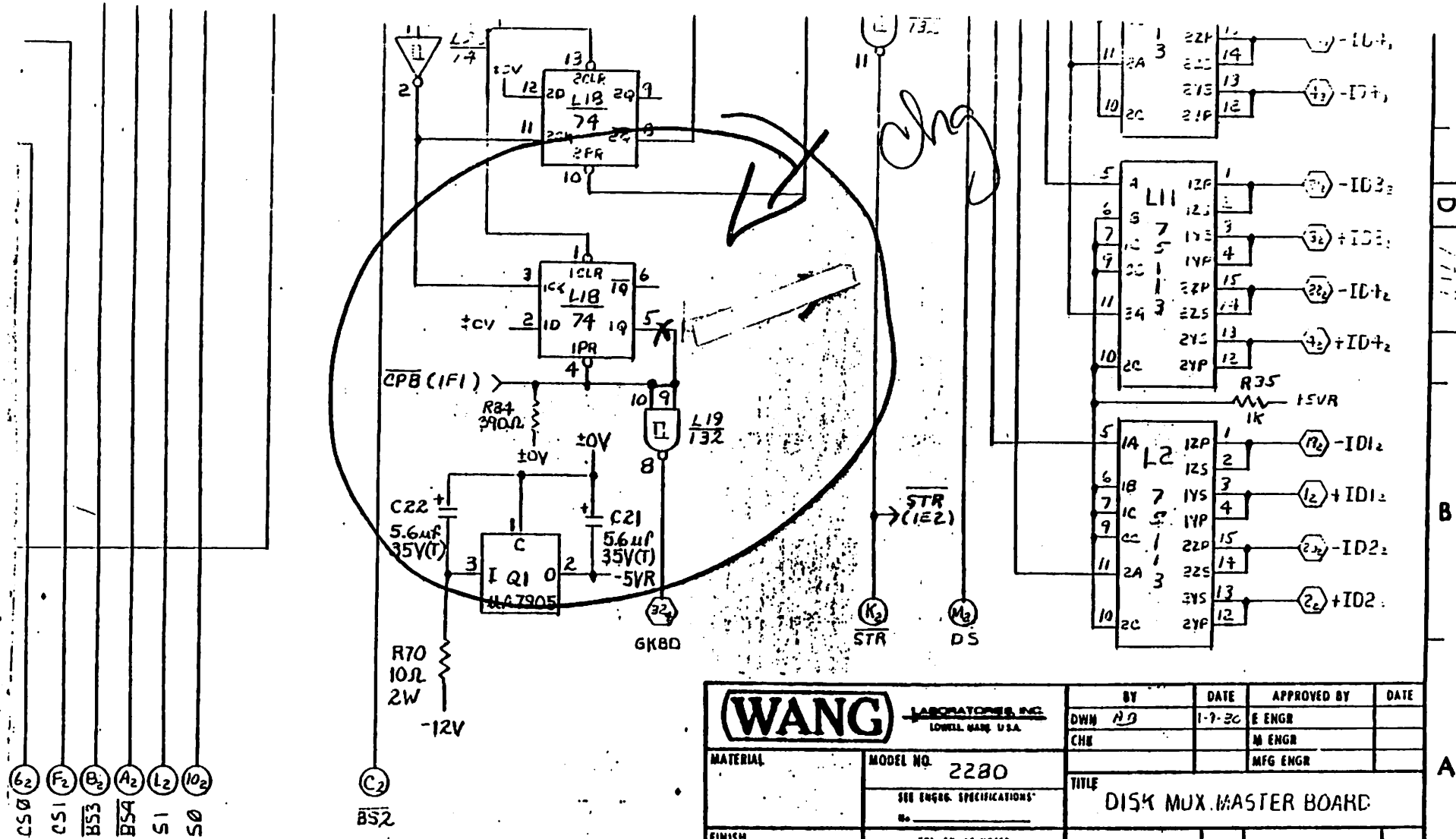
Rework during FSC repair
Purge

	DOMESTIC	INTER-NATIONAL
EST. UNIT POP	249	100
EST. SPARE POP	287	115
TOTAL	536	215

EST. COST IMPACT		APPROVALS	DATE
MATERIAL	$169.00	TECH OPS	7/8
LABOR	$4213.00	LOGISTICS	7/8
TOTAL	$4382.00	FSC SUPPORT	7/8
IMPLEMENTATION PERIOD	7.8 yrs	FINAL	7/8
ANNUAL COST	$561.00	OTHER	

GENERAL COMMENTS

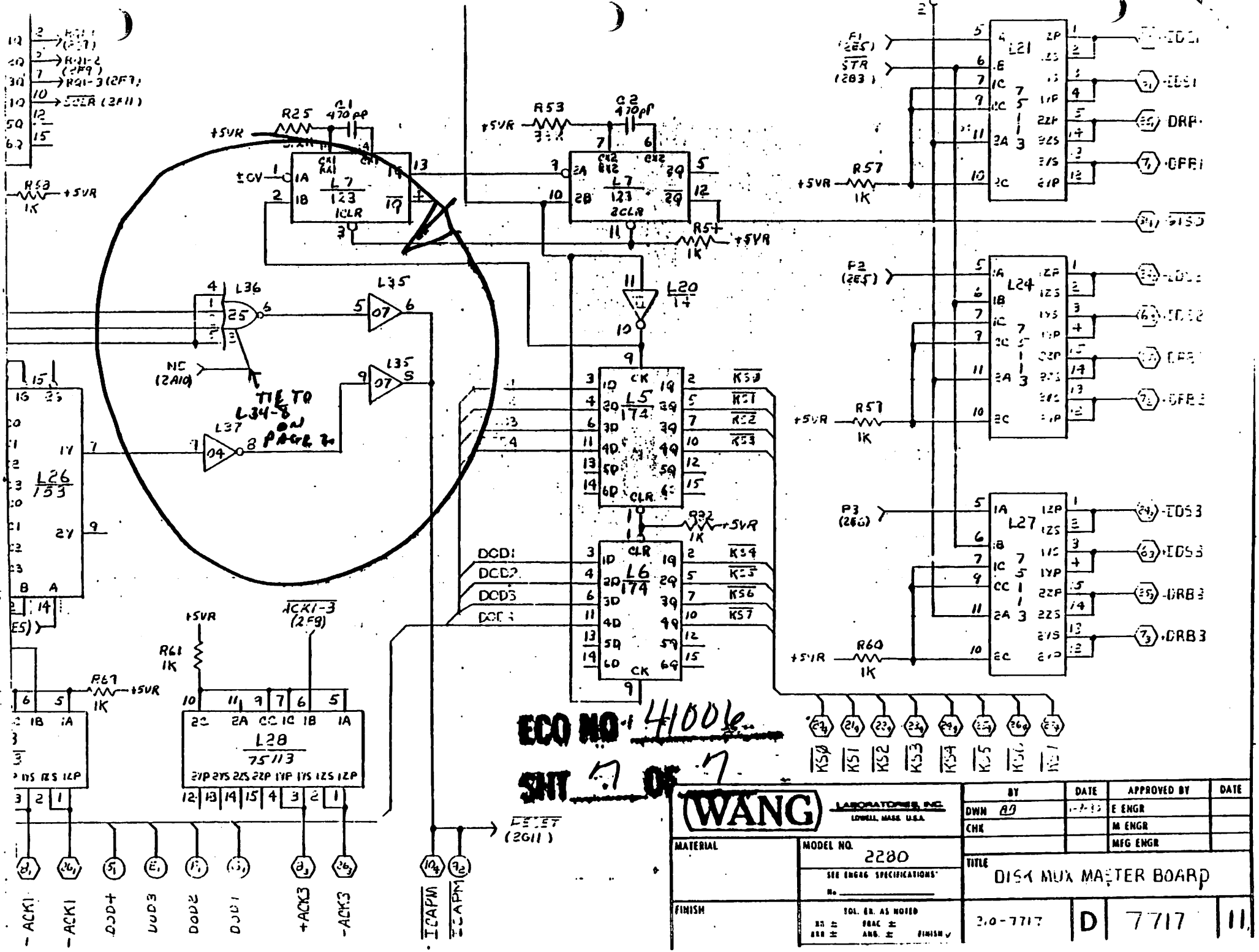

L32 164
L40 149
L20 14
L44 00
L45 00
L29 00
L42 00
08
L37
L34
R67 1K +5VR
R64 1K +5VR
C20 .01
R65 330Ω
R63 330Ω
XTAL 1
2MHZ
R66 1K +5VR
BK 1 (2G6)
EK 2 (2E6)
TIE TO LS6-L34
ND (IC6) ON PAGE 1
ND
CLK (1E7)
CLK
ECO NO 41006
CUT 5
Schematic 7717
Sheet 2 of 4
REVISION
SEE SHT 3
ACK2-1
ACK2-2
ACK2-3
ACK2-4
ACK3-1
ACK3-2
ACK3-3
ACK3-4
ACK4-1
ACK4-2
ACK4-3
ACK4-4
11
10
9
8
7
A
B
C
3.5"
11"
17"
22"



WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
		DWN RD	1-9-80	E ENGR	
		CHK		M ENGR	
				MFG ENGR	
MATERIAL	MODEL NO. 2280	TITLE DISK MUX MASTER BOARD			
	SEE ENGRG. SPECIFICATIONS No.				
FINISH	TOL. OTH. AS NOTED .XX ± .XXX ± FRAC. ± ANG. ± FINISH √	210-7717	D	7717	11
	SCALE SHT 2 OF 4	WANG PART NUMBER	SIZE	DRAWING NUMBER	REV

ECO NO 41006

SHT 6 OF 17



ECO NO. 41006

SHT 7 OF 7

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY	DATE
	DWN AD	1-7-75	E ENGR	
	CHK		M ENGR	
			MFG ENGR	
MATERIAL	MODEL NO. 2280	TITLE DISK MUX MASTER BOARD		
	SEE ENGRG SPECIFICATIONS No.			
FINISH	TOL. ER. AS NOTED .XX ± .XXX ± FRAC ± ANG. ±	2.0-7717	D	7717 11

WANG

TMD No. 0363
Sheet 1 of 3

TEMPORARY MANUFACTURING DEVIATION

Originator	Date	M/S	Ext.	Ref. TMD
Barbara Kendall	12/17/86		6-4161	
Part Number	**Description**		**Model**	
210-7715	Disk Controller		2280	
ECO Pending?	**If yes, enter ECO Number**		**Temporary Change?**	
YES	42957		NO	
SWO or CWO Number		**SWO or CWO Quantity**		
Effectivity Date		**Expiration Date**		
Dec. 17, 1986		Jan. 28, 1987		

Affected Areas											
Quantity											

Completely describe deviation including instructions for rework, assembly and test, etc. Include drawings and visual aids as necessary.

Stop ECO # 41615 because of component incompatibility with the change.

CHANGE E Rev from 7 to 8.

NOTE:
ECO 42957 VOIDS out ECO 41615.

APPROVALS

Quality Control	Date	Resident Comp. Eng.	Date
R. Keenan	12-17-86	N/A	
Material Control	**Date**	**CATA**	**Date**
Dave Sousa	12-17-86	N/A	
Operations Manager	**Date**	**Mfg. Engineering**	**Date**
Shirley Doval	12-17-86	Barbara Kendall	12/17/86

WANG

ECO

ECO NO. 21615

SHEET 1 OF 4

ORIGINATOR	Gilles Carrier	M/S	1439	EXT.	74478	DATE	08/01/86
WRITTEN BY	Valerie Goguen	M/S	12188	EXT.	74313	DATE	08/01/86

PART NO.	209-7715	DESCRIPTION	Mux Controller
DWG NO.	7715		
MODEL NO.	22C80	PEP #	
CLASS	I (II) III		

DOCUMENTS	REVISIONS FROM	TO
HISTORY SHT. 510		
HISTORY SHT. 210	0	1
ARTWORK		
E-REV.	6	7
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
S.P.I.		
SPECIFICATION		

CONFORMING AREA	CE	REMFG.	DIST.	FINAL ASSY. AREA	SUB ASSY. AREA	NEXT ORDER	INFO ONLY
	X	X		X	X		

CONFORMANCE DATE 9-24-86

DESCRIPTION OF CHANGE

NOTE 1: Manufacturing has decided that the artwork will not be modified at this time, it is not cost justifiable.

Change schematic and sample board per attached print and as follows:

Cut etch going to L30 pin 6. (Zone 2F4)
Tie L30 pin 8 to L29 pin 2.

RECEIVED
BY
SEP 25 1986
DOCUMENT CONTROL CENTER
TEWKSBURY

COMPANY CONFIDENTIAL

RECEIVED
SEP 15 1986
PRINT ROOM

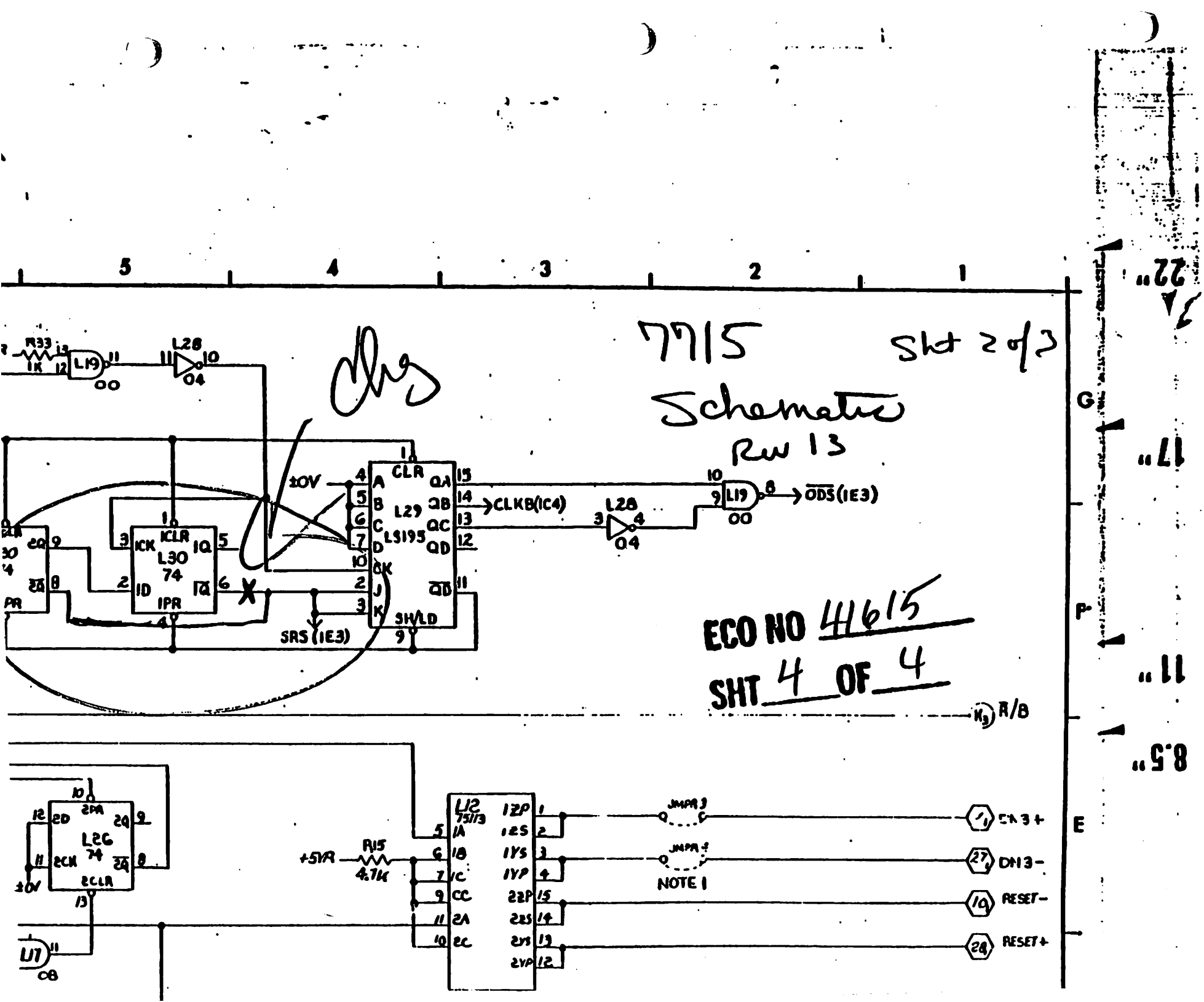
APPROVALS

	DATE
ECO CHAIRPERSON	Judy Mulvey 9/16
DES. ENGRG.	
CUST. ENGRG.	9/10/86
MFG.	John Walmsley
MTO	
PP&M	
F.C.C.	
PROD. SAFETY	
SECURE SYS.	
ORIGINATOR	
OTHER	

REASON/SYMPTOM FOR CHANGE

To correct the problem of an I92 error occuring with 2280 MUX.

98


7715
Schematic
Rev 13
Sht 2 of 3
ECO NO 44615
SHT 4 OF 4
L19
00
L28
04
L29
LS195
CLR
SHLD
CLKB(IC4)
ODS(IE3)
SRS(IE3)
+5V
L30
74
IPR
ICLR
L26
74
ECLR
L17
08
L12
75113
R15
4.7K
JMPR 3
JMPR 4
NOTE 1
R/B
DN3+
DN3-
RESET-
RESET+

WANG

ECO

ECO NO. 45133

SHEET 1 OF 4

ORIGINATOR	Giles Carrier	M/S 014390	EXT 74478	DATE 06/16/87
WRITTEN BY	Valerie Donahoe	M/S 012-188	EXT 74313	DATE 06/16/87

PART NO. 209-7421	DESCRIPTION 2280 ALU/MUX Intfc
DWG NO. D 7421	
MODEL NO. 2200 SMD	PEP #
CLASS I (II) III	

DESCRIPTION OF CHANGE

NOTE 1: Engineering has decided that the artwork will not be modified at this time, it is not cost justifiable.

Change schematic and sample board per attached prints and as follows:

Cut etch leading to L12 pin 3 on circuit side.

On component side:
Tie L12 pin 3 to L29 pin 5. (zone 1E3)
Tie L3 pin 6 to L29 pin 4.
Tie L4 pin 12 to L29 pin 6.

NOTE TO EDD: Create 210 History sheet

AUG 0 6 1987

REASON/SYMPTOM FOR CHANGE

To stop R/B from reaching the CPU late.

COMPANY CONFIDENTIAL

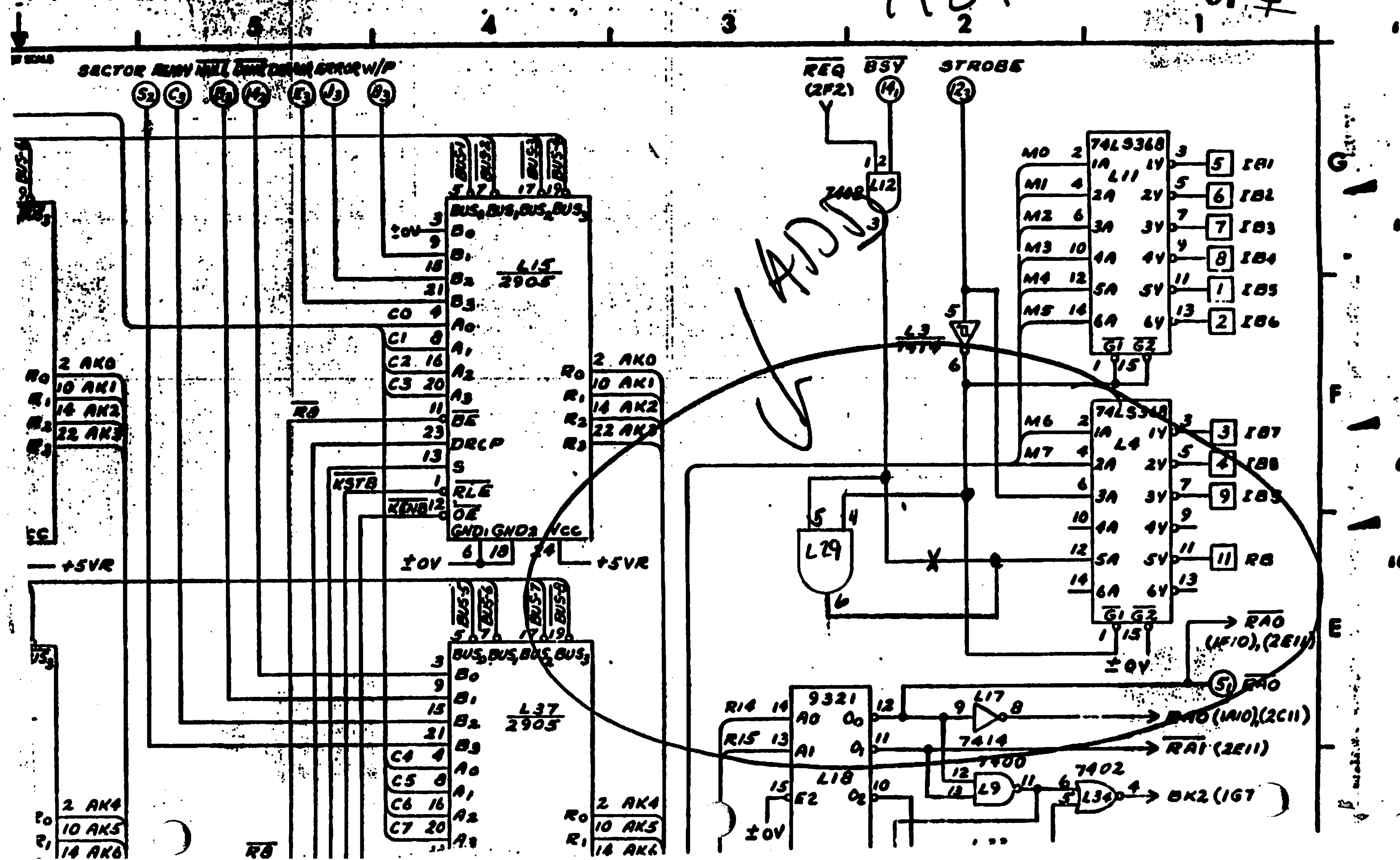
DOCUMENTS	REVISIONS FROM	REVISIONS TO
HISTORY SHT. 510		
HISTORY SHT. 210	SEE BELOW	
ARTWORK		
E-REV.	3	4
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
S.P.I.		
SPECIFICATION		

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

CONFORMANCE DATE 8-21-87

APPROVALS	DATE
ECO CHAIRPERSON	8/4
DES. ENGRG.	
CUST. ENGRG.	8/5
MFG.	
MTO	
PP&M	
F.C.C.	
PROD. SAFETY	7/1/87
SECURE SYS.	
ORIGINATOR	
OTHER	

ECO NO 45153
SHT 2 OF 4
7421



WANG

ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET

ECO NO. 45153
SHEET 3 OF 4

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

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		

REMARKS

210 INV = 32
" W.I.P = ϕ
BAL ϕ, SCHED = 64
NEXT SWO = 8/14/87

SMS EFFECTIVITY DATE

DOCUMENTATION ONLY ☑ 8/14/87

AFFECTED SITES

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

APPROVALS

ECO ADMIN	
MFG ENG	
QUALITY	[illegible] 8/4/87
MATERIALS	C J Hale 7/31/87
PROD. CONTROL	Dave Sousa 8/4/87
FINANCE	
RE-MFG	
OTHER	

WANG

ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING IMPACT SHEET

ECO NO. 45153
SHEET 4 OF 4

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

IMPACT COMMENTS

Normal Repair Cycle

	DOMESTIC	INTER-NATIONAL
EST. UNIT POP	1008	403
EST. SPARE POP	479	192
TOTAL	1487	595

EST. COST IMPACT		APPROVALS	DATE
MATERIAL	—	TECH OPS Douglas MacMillan	7/28/87
LABOR	$3,539.00	LOGISTICS Phil Murphy	7/28/87
TOTAL	$3,539.00	FSC SUPPORT Jo Hibard	7/27/87
IMPLEMENTATION PERIOD	4.44 mo	FINAL W Dennis	7/28
ANNUAL COST	$796.00	OTHER	

GENERAL COMMENTS

14-19031 Printed in U.S.A. 5-85-7M

WANG

ECO

ECO NO. 489 19

SHEET 1 OF 7

ORIGINATOR	Gilles Carrier	Dept 120 M/S	014-390	EXT	74478	DATE 04/19/88
WRITTEN BY	Arlene Elliott	120 M/S	012-188	EXT.	74313	DATE 04/19/88

PART NO. 510/ 210-7715	DESCRIPTION 22C80 CONTROLLER
DWG NO. 7715	
MODEL NO. 22C80	PEP # PEP# HO
CLASS I (II) III	HF

DESCRIPTION OF CHANGE

Change artwork, assembly drawing, fabrication drawing, schematic, parts list and sample board per attached prints and as follows:
Remove L25 and L37 (376-0098).74174
Remove L23 and L42 (376-0242).74LS280
On component side:
Cut etch leading to L6 pin 11.
Tie L39 pin 2 to L39 pin 3.
Remove wire between L30 pin 8 and L29 pins 2 & 3.
Tie L30 pin 6 to L29 pins 2 & 3.
Tie L35 pin 1 to R31 (signal side).
Change BOM 210-7715 as follows:

	WLI#	DESCRIPTION	UM	COMP TYPE		QTY	QTY TYPE
Change	376-0098	74174 IC	EA	1	From:	4	1
					To:	2	
Delete:	376-0242	74LS280 IC	EA	1		2	1

MAY 26 1988

REASON/SYMPTOM FOR CHANGE

For cost reduction and elimination of hang problems.

COMMENTS:

DOCUMENTS

	REVISIONS FROM	TO
HISTORY SHT. 510	8	9
HISTORY SHT. 210	3	4
ARTWORK		
E-REV.	9	10
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			X	X	

CONFORMANCE DATE 6-3

APPROVALS

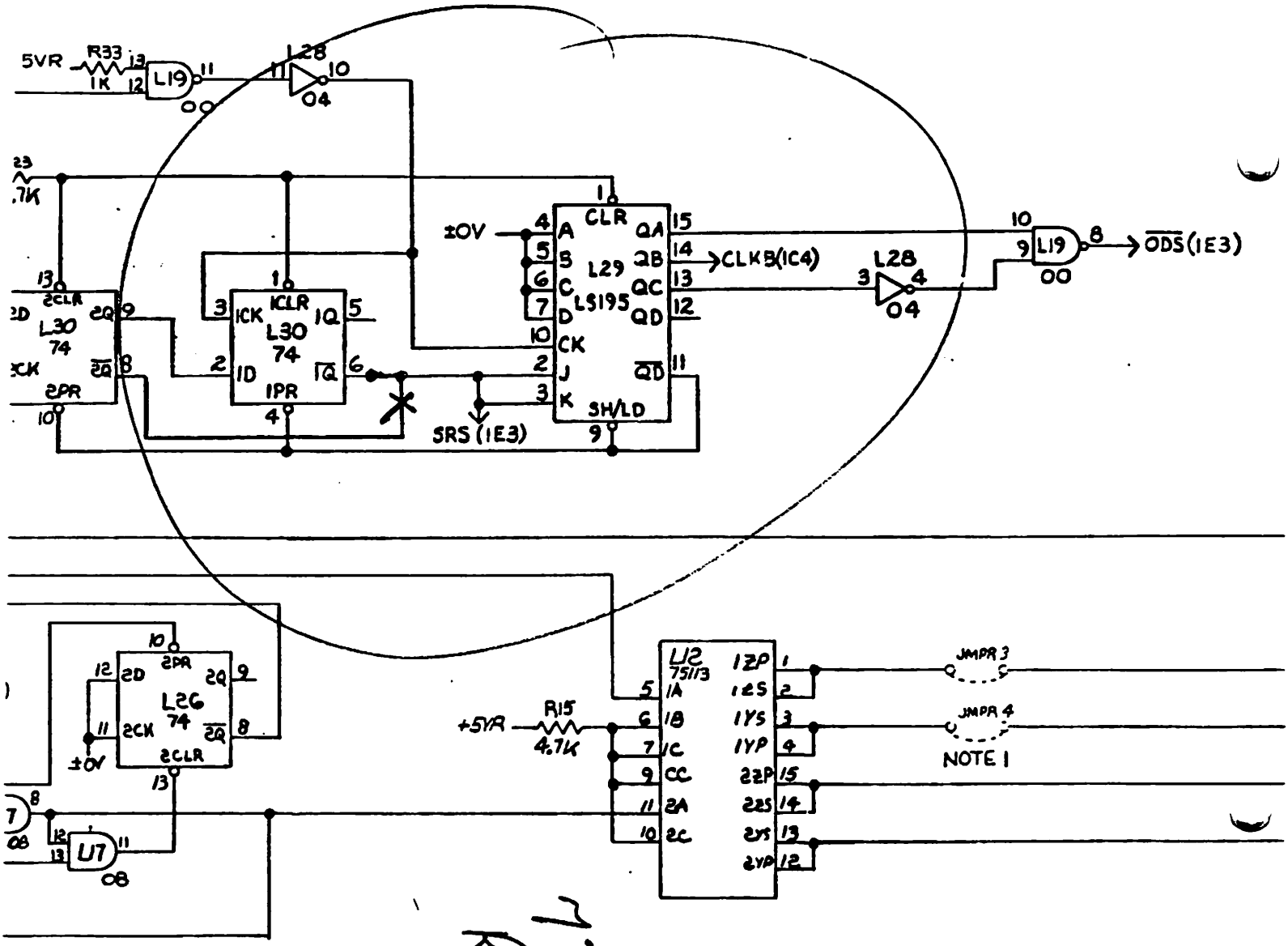
	DATE
ECO CHAIRPERSON	Paul M. Daniel 5/25
DES. ENGRG.	Gilles Carrier 4/20/88 4/21/88
CUST. ENGRG.	[illegible] 5/25
MFG.	
MTO	Doug Coffelt 5/25
PP&M	
F.C.C.	Michael Bitetto 4/25/88
PROD. SAFETY	[illegible] 4/25/88
SECURE SYS	
ORIGINATOR	
OTHER	

ARD NUMBER & TITLE: C7715 DISK CONTROLLER BOARD SHEET OF PAGE 2
SEMBLY LEVEL & TITLE: 210 7715

REF. DES.	* MANG PART NO.	* VALUE/TYPE *	DESCRIPTION	* DRAWING NO. *	QTY. *
L39	376-0012-	7451	IC DUAL 2-WIDE 2-INPUT AND-OR-INVERT GATE		1
L7	376-0016-	7402	IC QUAD 2-INPUT NOR GATE		1
L40	376-0028-	7403	IC QUAD 2-INPUT NAND GATE O/C OUTPUTS		1
L38	376-0080-	74123	IC DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR		1
L6	376-0081-	7408	IC QUAD 2-INPUT AND GATE		3
L8					
L17					
L41	376-0082-	74157	IC QUAD 2-INPUT MULTIPLEXER		1
L10	376-0093-	7432	IC QUAD 2-INPUT POSITIVE OR GATE		1
L18	376-0096-	9321	IC DUAL 1 OF 4 DECODER		1
L24 - ~~L26~~	376-0098-	74174	IC HEX D FLIP-FLOP		X2
L36 - ~~L37~~					
L22	376-0148-	74LS266	IC QUAD 2-INPUT EXCLUSIVE-NOR GATE O/C OUTPUTS		2
L33					
L27	376-0180-	74LS04	IC HEX INVERTER		1
L34 - L35	376-0204-	74LS257A	IC QUAD 2-LINE TO 1-LINE DATA SEL/MUX		2
~~L32~~	~~376-0242-~~	~~74LS280~~	~~IC 9-BIT ODD/EVEN PARITY GENERATOR/CHECKER~~		~~0~~
~~L28~~					
L29	376-0248-	74LS195A	IC 4-BIT UNIVERSAL SHIFT REGISTER		1
L4	376-0256-	75113	IC DUAL LINE DRIVER 16 PIN DIP		5
L12 - L15					
L1 - L3	376-0275-	MC3450	IC QUAD LINE RECEIVER 16 PIN DIP		3
@2 - @3	449-0247-	HANDLE	FACEP CATS HANDLE		2
@19	452-2095-36	FACEPLAT	FACEPLATE		1
@4 - @5	461-3140-	SCREW	SCREW CAP		2
@6 - @7	461-3141-	SCREW	SCREW CAP HANDLE		2
@8 - @9	462-0291-	STANDOFF	STANDOFF		2
@1	510-7715-		PCB		1
@20	600-9007-	24AWG	WIRE 24AWG SOLID BARE TINNED COPPER !000.167		.16
@10 - @12	650-2120-	SCREW	SCREW		3
@13	650-3087-	SCREW	SCREW		1
@14 - @17	651-0030-	SCREW	SCREW		4
@18	652-3002-	NUT	NUT		1

48919

2 7

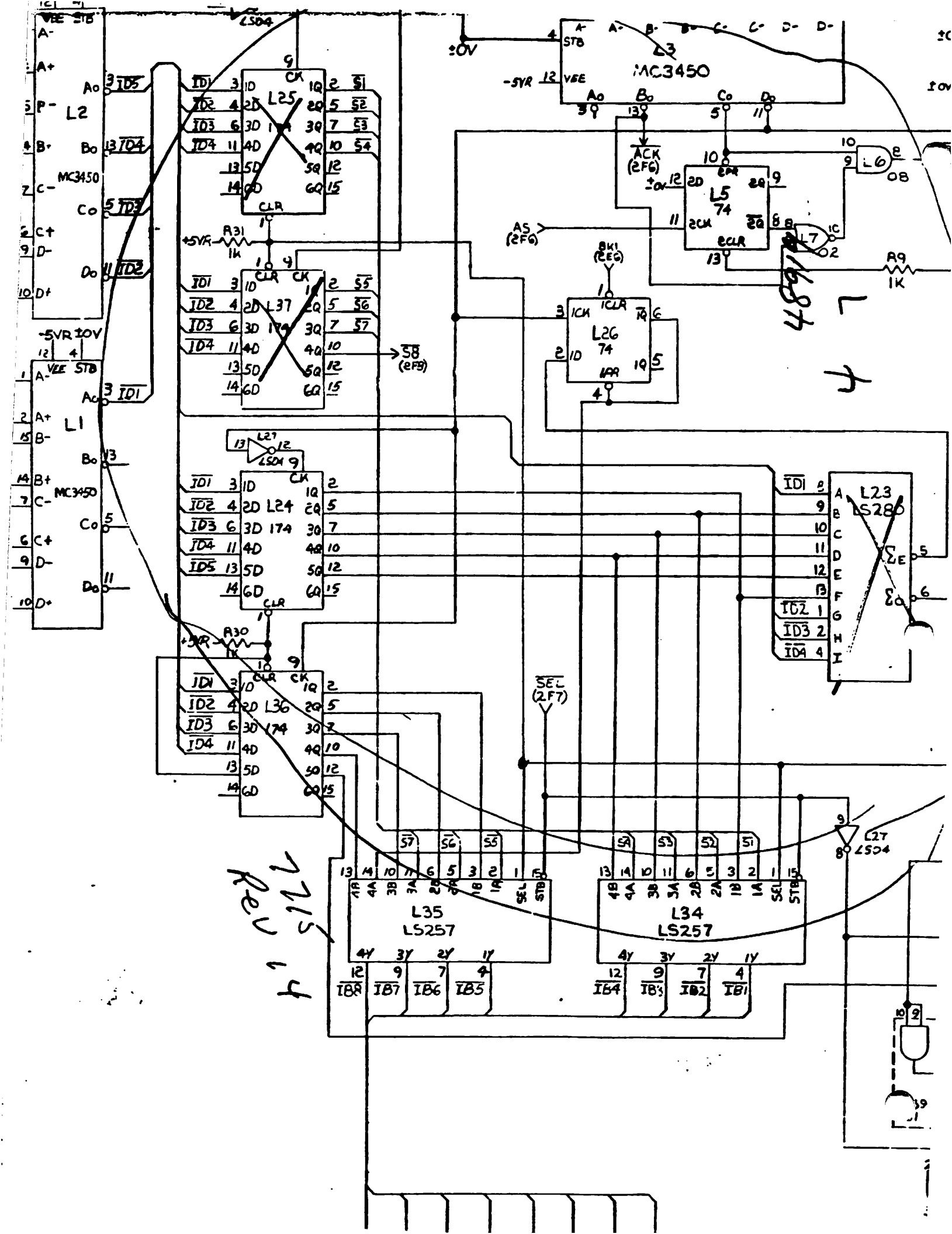


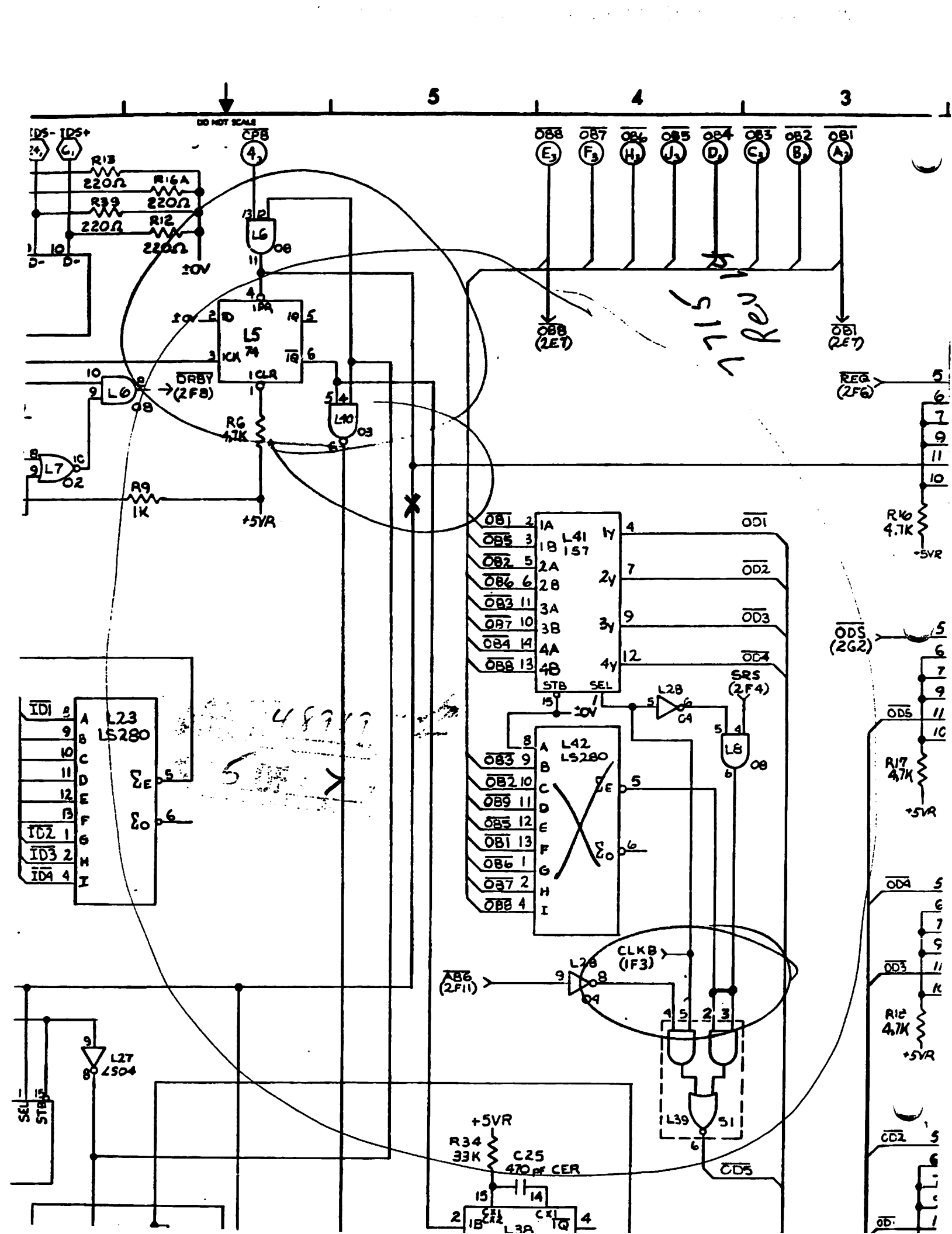
7715-1 Rev 4

3

4891a

NOTE:
1. JUMPERS 3 AND 4 MUST BE LOADED AT ALL TIMES.


L2
MC3450
L1
MC3450
L25
L37
L24
L36
L26
74
L5
74
L6
08
L7
L23
LS280
L27
LS04
L35
LS257
L34
LS257
R31
1K
R30
1K
R9
1K
ACK
(2FG)
AS
(2FG)
BK1
(2EG)
SEL
(2F7)
-5VR
+5V
+0V
ID1
ID2
ID3
ID4
ID5
S1
S2
S3
S4
S5
S6
S7
S8
(2F8)
IB1
IB2
IB3
IB4
IB5
IB6
IB7
IB8


5
4
3
DO NOT SCALE
IDS- IDS+
CPB
OB8 OB7 OB6 OB5 OB4 OB3 OB2 OB1
R13 220Ω
R16A 220Ω
R39 220Ω
R12 220Ω
±0V
L6
L5
L6
L10
L7
DRBY (2F8)
RG 4.7K
R9 1K
+5VR
OB8 (2E7)
OB1 (2E7)
REG (2F6)
R16 4.7K
L41 157
L42 LS280
L23 LS280
SRS (2F4)
L28
L8
OD1
OD2
OD3
OD4
ODS (2G2)
R17 4.7K
R18 4.7K
CLKB (1F3)
AB6 (2F11)
L27 LS04
L39
S1
+5VR
R34 33K
C25 470pf CER
CDS
CD2

WANG

ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET

ECO NO. 48919
SHEET 6 OF 7

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 D Cipolla
MFG ENG
QUALITY
MATERIALS Peter Sullivan
PROD. CONTROL
FINANCE
RE-MFG
OTHER

REMARKS

WPR's response 5/18 - Sub Assy Conf 6-1-88
Next order 7-5-88

Ireland's response 5-18- Conf 5/20

6/3

6-3-88

ENG RECEIPT/VITY DATE

WANG

ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING IMPACT SHEET

ECO 48919
SHEET 7 OF 7

ALL UNITS	[ ]		
PROBODY	☐		
BUILD	☒		
RECORDED	☐		
TIMED [ ]	NEXT CALL	☐	
IS A MOD REQUIRED FOR FSC REWORK	☒		

IMPACT COMMENTS

MUB for Repair
Purge

	DOMESTIC	INTERNATIONAL
EST UNIT POP	337	158
EST SPARE POP	170	108
TOTAL	507	258

EST. COST IMPACT

MATERIAL	—
LABOR	$1,088.00
TOTAL	$1,088.00
IMPLEMENTATION PERIOD	3.39 yrs
ANNUAL COST	323.00

APPROVALS

		DA
TECH OPS		5/17/8
LOGISTICS		5/17/8
FSC SUPPORT		5/17/8
FINAL	W.D. Annis	5/18
OTHER		

GENERAL COMMENTS

TSB for field.

WANG FIELD CHANGE ORDER

FCO NO.
1168

Equipment Affected: 2280 DPU/MUX

FCO Class: All Units, Immediate | FCO Kit No.: 728-0184 | Page: 1 of 4

Documentation Class Code: 3107 | FCO Doc. No.: 729-1598 | Approval Date: JUL 17 1985

Est. Install Time: 30 Minutes | Ref. ECO No.: 37156

This FCO replaces FCO's 1086 and 1114.

1. REASON FOR CHANGE

This revision of the 2280 DPU microcode corrects four bugs that are causing serious customer problems. The problems corrected are the following.

A. Multi-sector writes that end on relocated alternate sectors can cause extra sectors to be written.

B. When the first operation of a DPU is multi-sector write, the DPU will return an I91 on this and all other subsequent requests. The I91 will be returned until a reset is issued followed immediately by a non-multisector write operation.

C. The DPU will hang if a data transmission error occurs during the "Compare" sequence of a "Read After Write" command.

D. Attempts to access the drive while it was seeking to track "0" during the power-up (or spin-up) sequence causes the drive to retry the seek. If this happens several times in a row, the drive will hang and have to be shut down to clear the condition.

2. DESCRIPTION OF CHANGE

Four EPROM's on the 210-7423-A PCB are changed.

3. DOCUMENTATION AFFECTED

N/A

Field Support Ops.	Logistics	Originator	ECO Support Mgr.
7/17/85	7-17-85		7/17/85

4. PREREQUISITE (S)

A. Hardware

1. **This FCO must be done in conjunction with FCO 1161.**

2. Before installing this FCO, insure that customer has backed up data.

B. Software

N/A

5. INSTALLATION PROCEDURE

A. Power off. Remove AC plug at wall.

B. Refer to the Customer Engineering Product Maintenance Manual, "2280 DPU" (729-0971) p. 4.3, sections 4.5 through 4.5.1 for top cover removal/replacement procedures.

C. Refer to Figure 1. Remove the 210-7423-A PCB from the Disk Processing Unit (DPU).

D. Refer to Figure 2. Change the four EPROM's on the 210-7423-A PCB as follows:

1. Component Side:

a. Change L13 to 378-4083-R10.

b. Change L14 to 378-4084-R10.

c. Change L15 to 378-4085-R10.

d. Change L16 to 378-4086-R10.

E. Reassemble the unit by reversing the procedures in Steps B through D.

F. Perform check-out procedure described in Section 6 below.

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

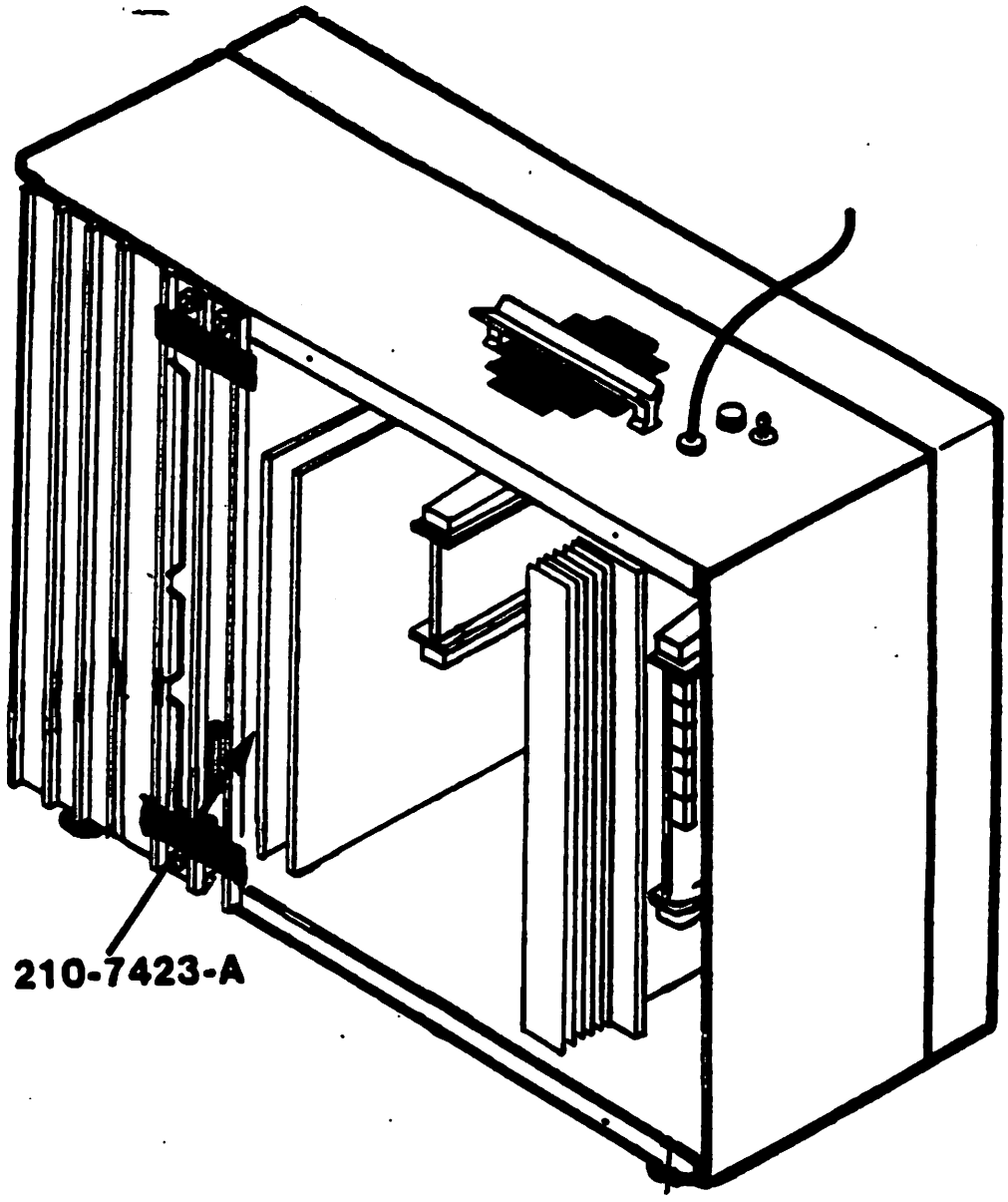


FIGURE 1: CIRCUIT BOARD LOADING

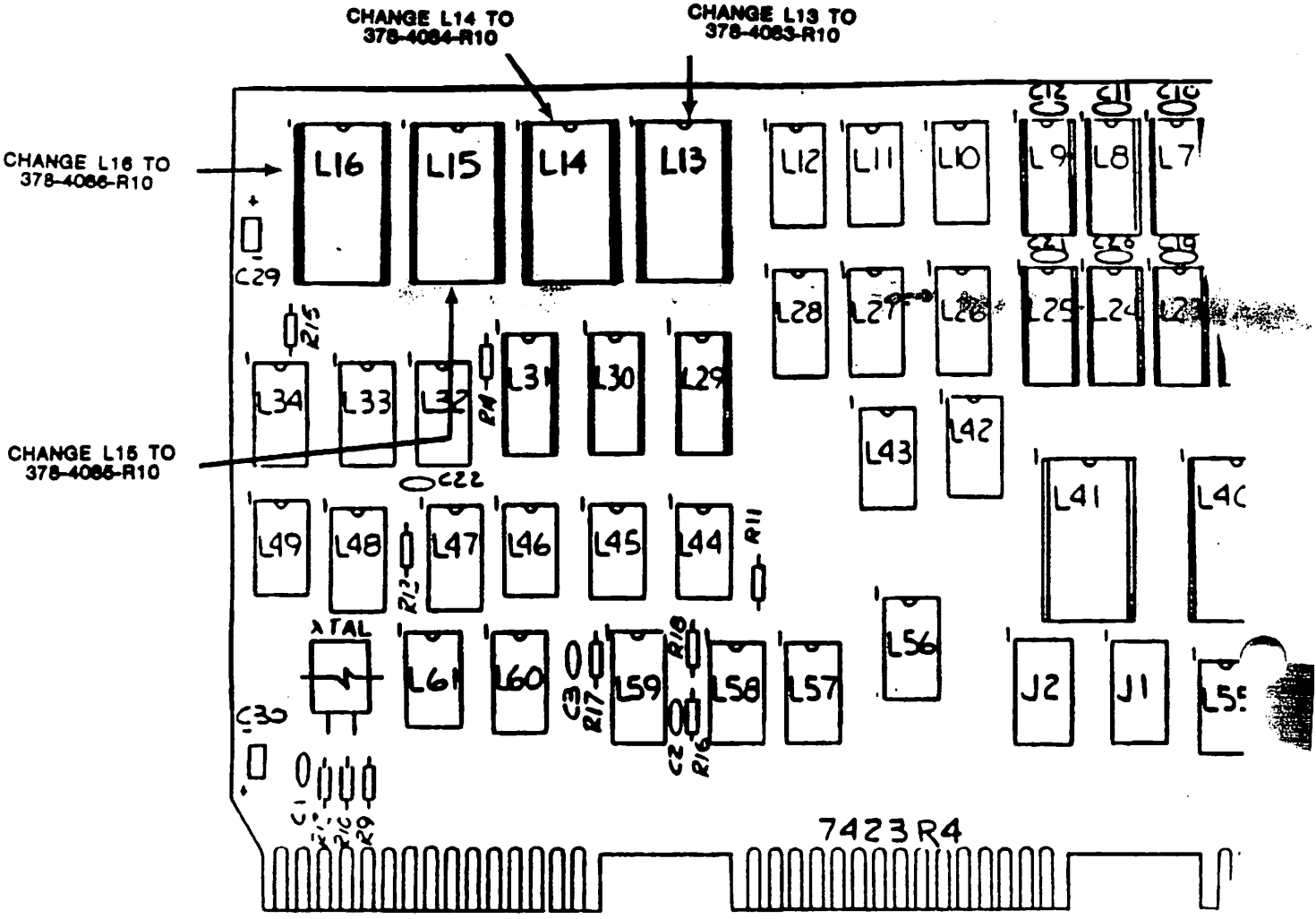


FIGURE 2: 210-7423-A
EPROM LOCATIONS

6. CHECK-OUT PROCEDURE

Power up. Observe normal operation.

7. FCO KIT PARTS LISTING

KIT #728-0184

Item	Qty	Item Description
729-1598	1	FCO Document 1168
378-4083-R10	1	EPROM
378-4084-R10	1	EPROM
378-4085-R10	1	EPROM
378-4086-R10	1	EPROM

8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0184 will be available August 5, 1985 and can be obtained by placing a routine order through the Logistics Order Processing System.

9. REMOVED PARTS DISPOSITION

Recycle removed EPROM's through your FSC.

10. MISCELLANEOUS

The upgraded EPROM's in FCO Kit #728-0184 are designed to fix the problems cited in both FCO 1086 and FCO 1114.

The reasons for change made in FCO 1086 are as follows.

A. To prevent read cache from being lost when a reset is issued from one of the terminals on the system.

B. To allow the DPU to reselect the destination drive when dumping the multi-sector write cache to one to the drives.

The reason for change made in FCO 1114 is as follows.

To correct start-up problems which result in DPU hangs by making sure that the state of the drives is properly determined before normal processing is continued. The hangs are caused by DPU registers left in an unknown state after trying to read the Alternate Sector Map from a non-existent disk.

WANG FIELD CHANGE ORDER

COMPANY CONFIDENTIAL

FCO NO.
1161A

Equipment Affected: 2280

FCO Class: All Units, Next Call FCO Kit No.: *728-0177A Page: 1 of 5

Documentation Class Code: 3107 FCO Doc. No.: *729-1590A Approval Date:

Est. Install Time: 15 Minutes Ref. ECO No.: 36643 ~~FEB 10 1986~~

This FCO replaces FCO 1161.

1. REASON FOR CHANGE

   A. To eliminate noise on the ready line.

   B. To correct intermittent hangs and incorrect drive selection.

2. DESCRIPTION OF CHANGE

   Two resistors on the 210-7422 PCB are changed.

3. DOCUMENTATION AFFECTED

   N/A

4. PREREQUISITE (S)

   A. Hardware

      210-7422 should be at E-Rev 4 prior to installing this FCO.

      Quick Check: Ensure that L46 is a 7400 (376-0002) IC.

   B. Software

      N/A

5. INSTALLATION PROCEDURE

   A. Power off. Remove AC from unit.

   B. Remove the top cover of the Disk Processing Unit (DPU). Refer to p. 4-3, Sections 4.5 through 4.5.1 of the Customer Engineering Product Maintenance Manual, "2280 DPU" (729-0971) for removal/replacement procedures.

   C. Remove the 210-7422 PCB from the DPU. (Figure 1)

Field Support Ops	Logistics	Originator	ECO Support Mgr.
2/12/86	2-12-86	2/12/86	2/13/86

D. Make the following changes to the 210-7422 Artworks R1-R6 board. (Figure 2)

Component Side:

*1. Change R48 and R46 to 510 ohm resistors (330-2052). (The top of R46 is connected to L7-14 on the circuit side; the top of R48 is connected to L7-2 on the circuit side)

Non-Component Side:

2. Place E-Rev 5 sticker in upper right corner of board.

E. Reassemble the unit by reversing Steps B and C.

F. Perform check-out procedure described in Section 6 below.

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

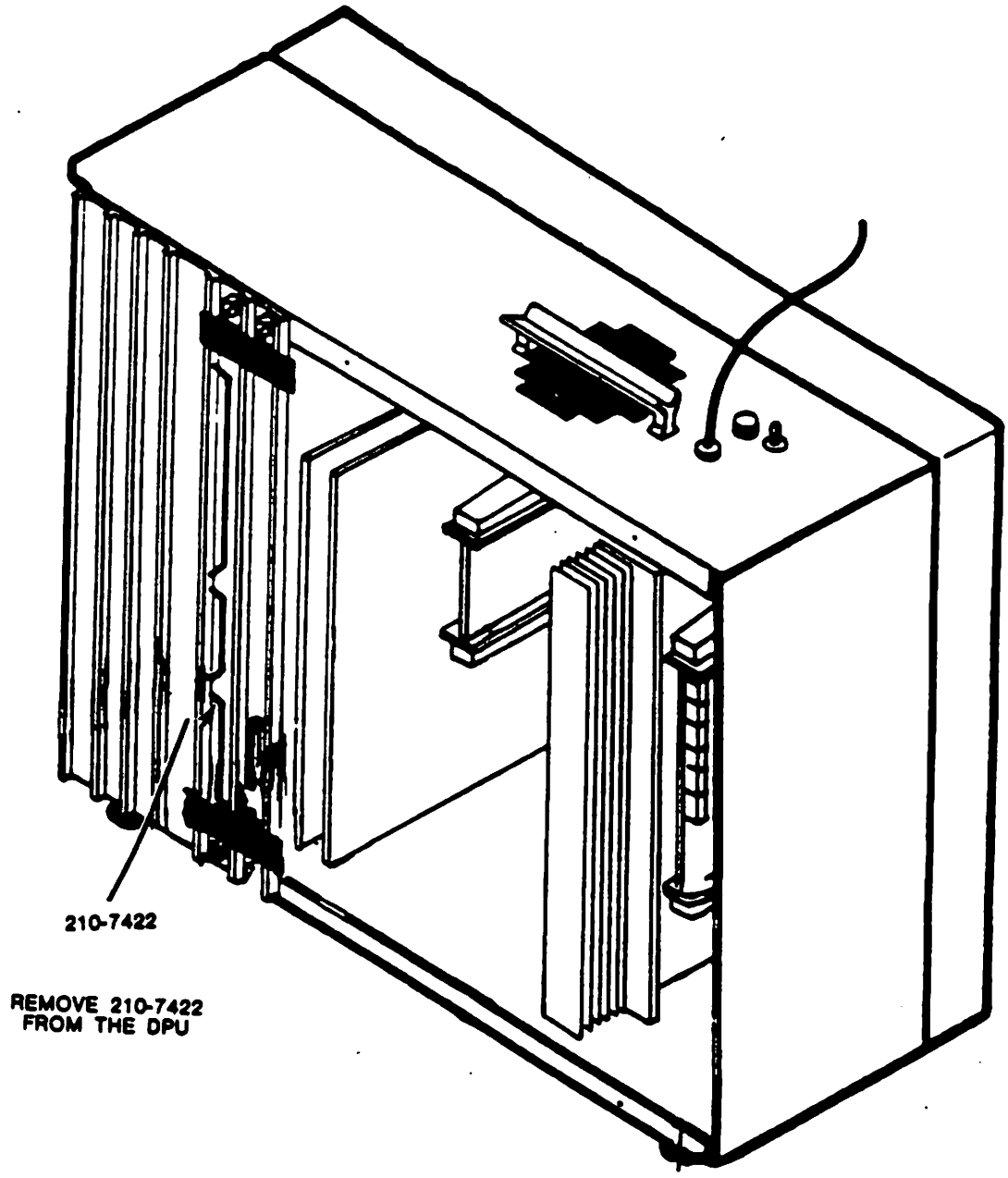


FIGURE 1: LOCATION OF 210-7422 PCB IN DPU

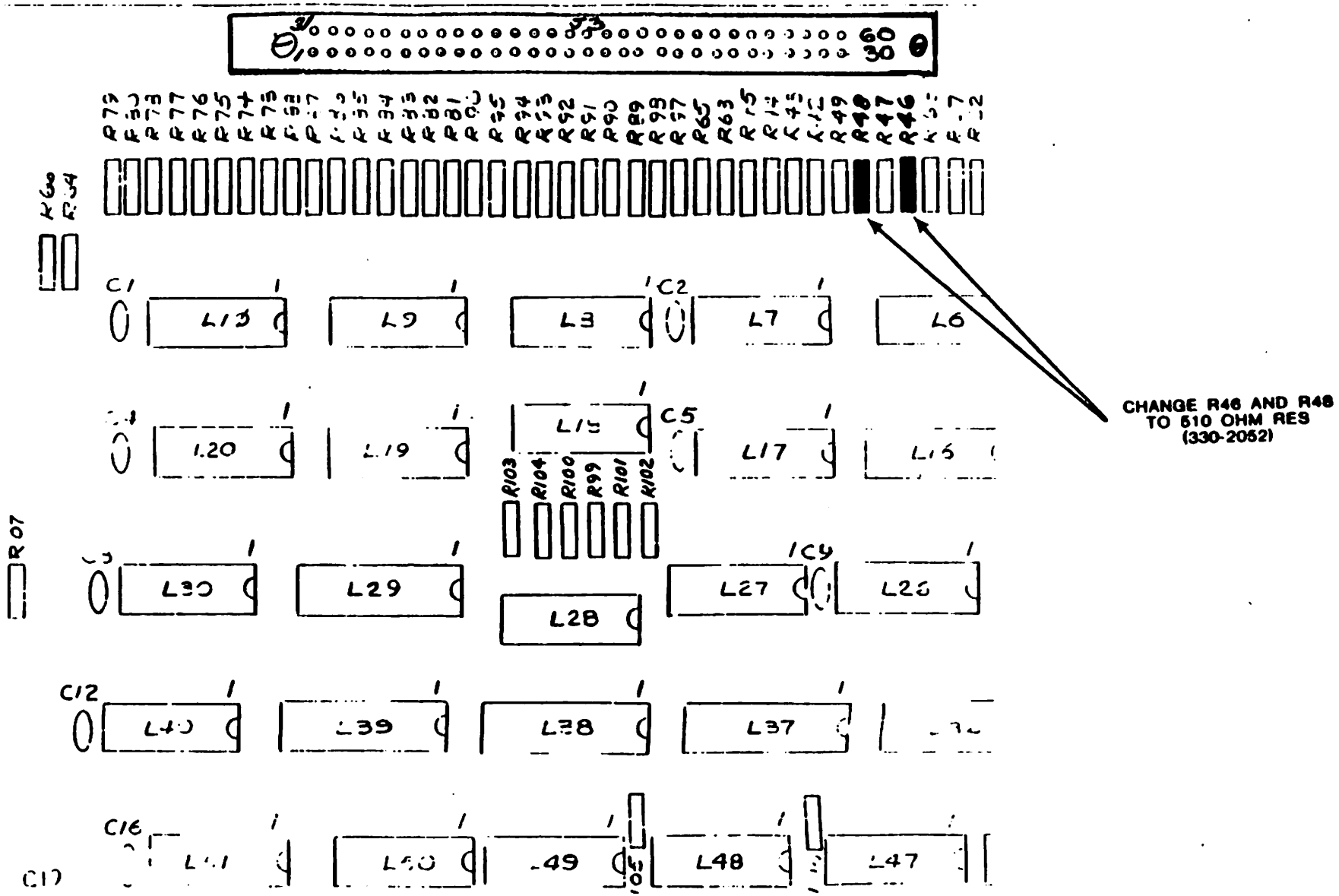


FIGURE 2: 210-7422, COMPONENT SIDE
RESISTOR LOCATIONS

6. CHECK-OUT PROCEDURE

Power up. Observe normal operation.

*7. FCO KIT PARTS LISTING

KIT #728-0177A

Item	Qty	Item Description
729-1590A	1	FCO Document 1161A
330-2052	2	510 ohm resistors
615-1283-5	1	E-Rev 5 sticker

*8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0177A will be available March 3, 1985 and can be obtained by placing a routine order through the Logistics Order Processing system.

9. REMOVED PARTS DISPOSITION

Discard removed resistors.

*10. MISCELLANEOUS

Return Artwork R0 to FSC for rework.

WANG FIELD CHANGE ORDER

FCO NO.
*1114A

Equipment Affected 2280 DPU/MUX

FCO Class All Units | FCO Kit No. 728-0131 | Page 1 of 5

Documentation Class Code 3107 | FCO Doc. No.*729-1533A | Approval Date: JUL 17 1985

Est. Install Time 30 Minutes | Ref. ECO No.33310

*This FCO voids FCO 1114; refer to FCO 1168.

1. REASON FOR CHANGE

To correct start-up problems which result in DPU hangs by making sure that the state of the drives is properly determined before normal processing is continued. The hangs are caused by DPU registers left in an unknown state after trying to read the Alternate Sector Map from a nonexistent disk.

2. DESCRIPTION OF CHANGE

Four EPROM's are changed on the 210-7423-A PCB.

3. DOCUMENTATION AFFECTED

N/A.

4. PREREQUISITE (S)

210-7423 should be at E-Rev 4.

5. INSTALLATION PROCEDURE

A. Back up customer's data. (Must be done prior to installing R9 EPROM's)

B. Power off. Remove AC plug at wall.

C. Refer to "2280 DPU Customer Engineering Product Maintenance Manual" (729-0971) p. 4.3, sections 4.5 through 4.5.1 for top cover removal/replacement procedures.

Field Support Ops	Logistics	Originator	ECO Support Mgr.
J Allen 7/17/85	Phil Murphy 7-17-85	Richard McMullen 7/17/85	John Powlik 7/17/85

D. Refer to Figure 1. Remove the 210-7423-A PCB from the Disk Processing Unit (DPU).

E. Refer to Figure 2. Change the four EPROM's on the 210-7423-A PCB as follows:

1. Component Side:

   a. Change L13 to 378-4083-R9.

   b. Change L14 to 378-4084-R9.

   c. Change L15 to 378-4085-R9.

   d. Change L16 to 378-4086-R9.

F. Reformat all surfaces.

G. Reassemble the unit by reversing the procedures in Steps B through D.

H. Perform check-out procedure described in Section 6 below.

I. Reinstall customer's data.

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

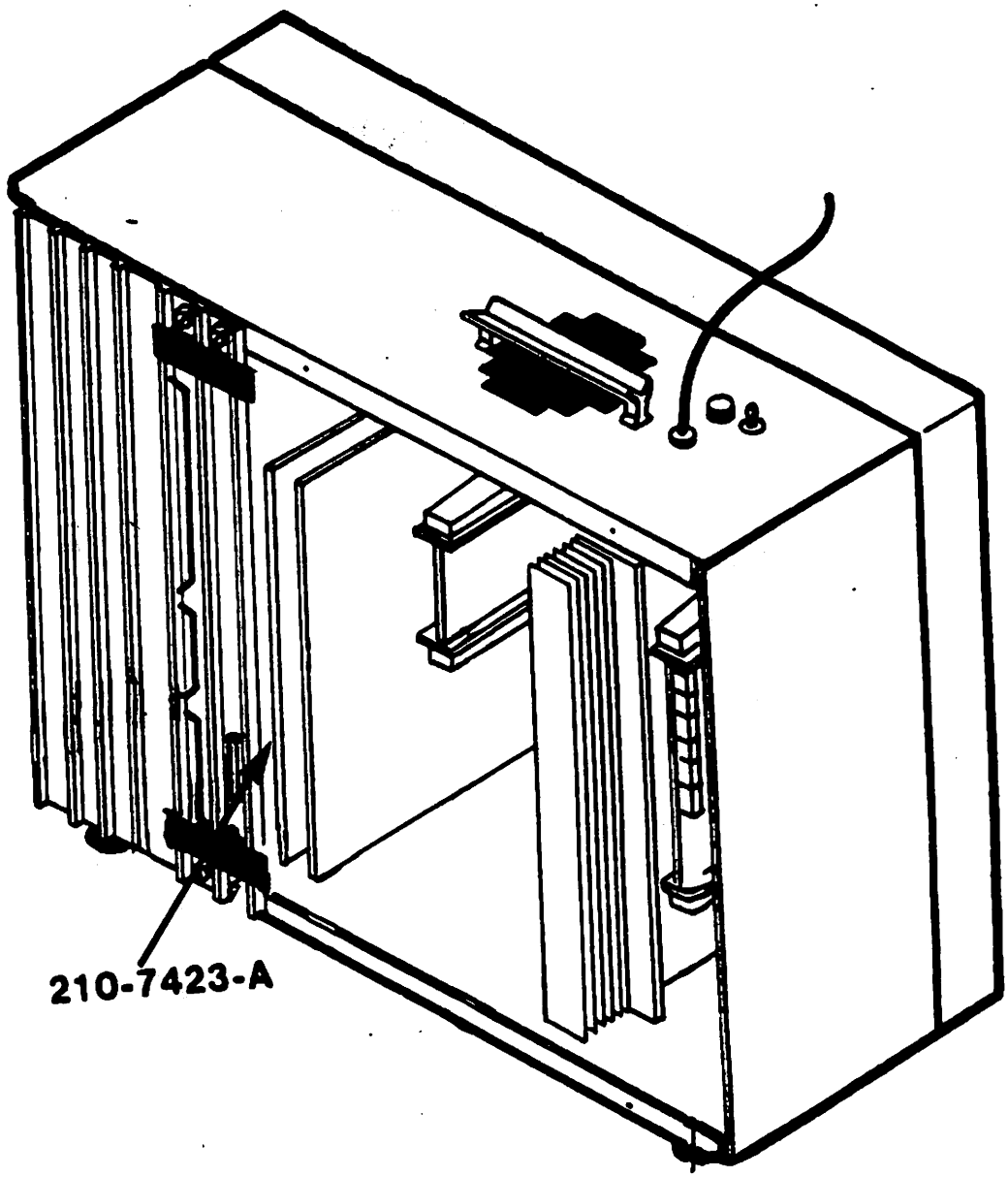


FIGURE 1

CIRCUIT BOARD LOADING

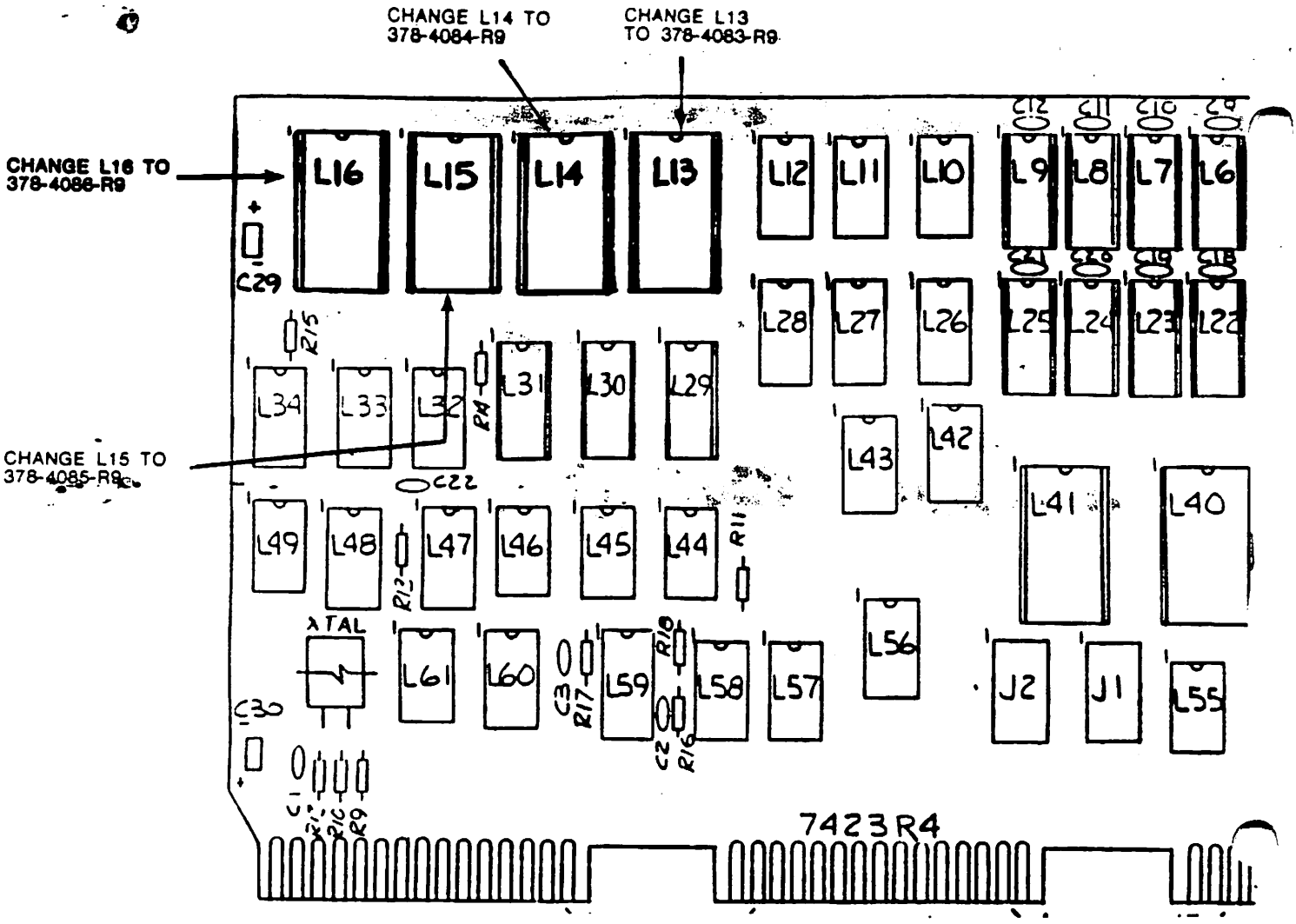


FIGURE 2: 210-7423-A EPROM LOCATIONS

6. CHECK-OUT PROCEDURE

From the 2200 Diagnostics Package #195-2956-0, run "Pseudo-random Verifies" by accessing a)"Magnetic Media", b)"General Disk Exerciser", c)"Special Function 07".

7. FCO KIT PARTS LISTING

KIT #728-0131

Item	Qty	Item Description
729-1533	1	FCO Document 1114
378-4083-R9	1	EPROM
378-4084-R9	1	EPROM
378-4085-R9	1	EPROM
378-4086-R9	1	EPROM

*8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0131 is no longer available effective August 5, 1984. It has been replaced by FCO Kit #728-0184 (referenced in FCO 1168). Kit #728-0184 will be available August 5, 1985 and can be obtained by placing a routine order through the Logistics Order Processing System..

9. REMOVED PARTS DISPOSITION

Recycle removed EPROM's through your FSC.

10. MISCELLANEOUS

FCO Kit #728-0104 (referenced in FCO 1086) is replaced by FCO Kit #728-0131 (referenced in FCO 1114). The upgraded EPROM's in FCO Kit #728-0131 are designed to fix the problems cited in both FCO 1086 and FCO 1114.

The reasons for change made in FCO 1086 are as follows.

A. To prevent read cache from being lost when a reset is issued from one of the terminals on the system.

B. To allow the DPU to reselect the destination drive when dumping the multi-sector write cache to one to the drives.

WANG FIELD CHANGE ORDER

FCO NO. 1114

Equipment Affected 2280 DPU/MUX

Class All Units | FCO Kit # 728-0131 | Page 1 of 5

Org. Code 3107 | FCO Doc. # 729-1533 | Approval Date: AUG 29 1984

Est. Install. Time 45 Minutes | Ref. ECO # 33310

*This FCO voids FCO 1086

*See Miscellaneous for information related to FCO 1086

1. REASON FOR CHANGE

To correct start-up problems which result in DPU hangs by making sure that the state of the drives is properly determined before normal processing is continued. The hangs are caused by DPU registers left in an unknown state after trying to read the Alternate Sector Map from a non-existent disk.

2. DESCRIPTION OF CHANGE

Four EPROM's are changed on the 210-7423-A PCB.

3. DOCUMENTATION AFFECTED

N/A.

4. PREREQUISITE (S)

210-7423 should be at E-Rev 4.

5. INSTALLATION PROCEDURE

A. Power off. Remove AC plug at wall.

B. Refer to "2280 DPU Customer Engineering Product Maintenance Manual" (729-0971) p. 4.3, sections 4.5 through 4.5.1 for top cover removal/replacement procedures.

C. Refer to Figure 1. Remove the 210-7423-A PCB from the Disk Processing Unit (DPU).

Tech Ops	Logistics	Originator	FCO Coordinator
8-29-84	8-29-84	8/29/84	8/29/84

D. Refer to Figure 2. Change the four EPROM's on the 210-7423-A PCB as follows:

1. Component Side:

   a. Change L13 to 378-4083-R9.

   b. Change L14 to 378-4084-R9.

   c. Change L15 to 378-4085-R9.

   d. Change L16 to 378-4086-R9.

E. Reassemble the unit by reversing the procedures in Steps A through C.

F. Perform check-out procedure described in Section 6 below.

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

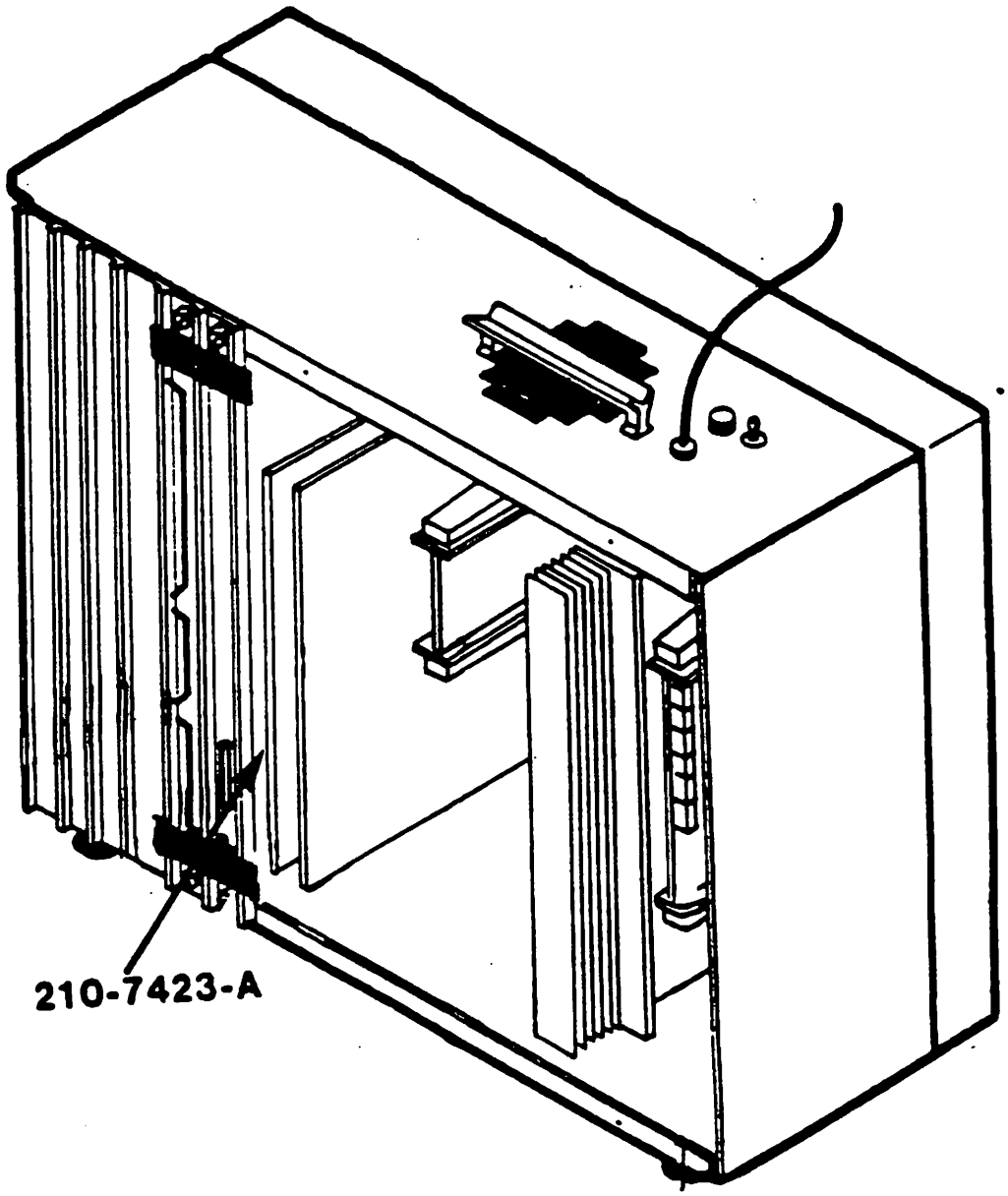


FIGURE 1

CIRCUIT BOARD LOADING

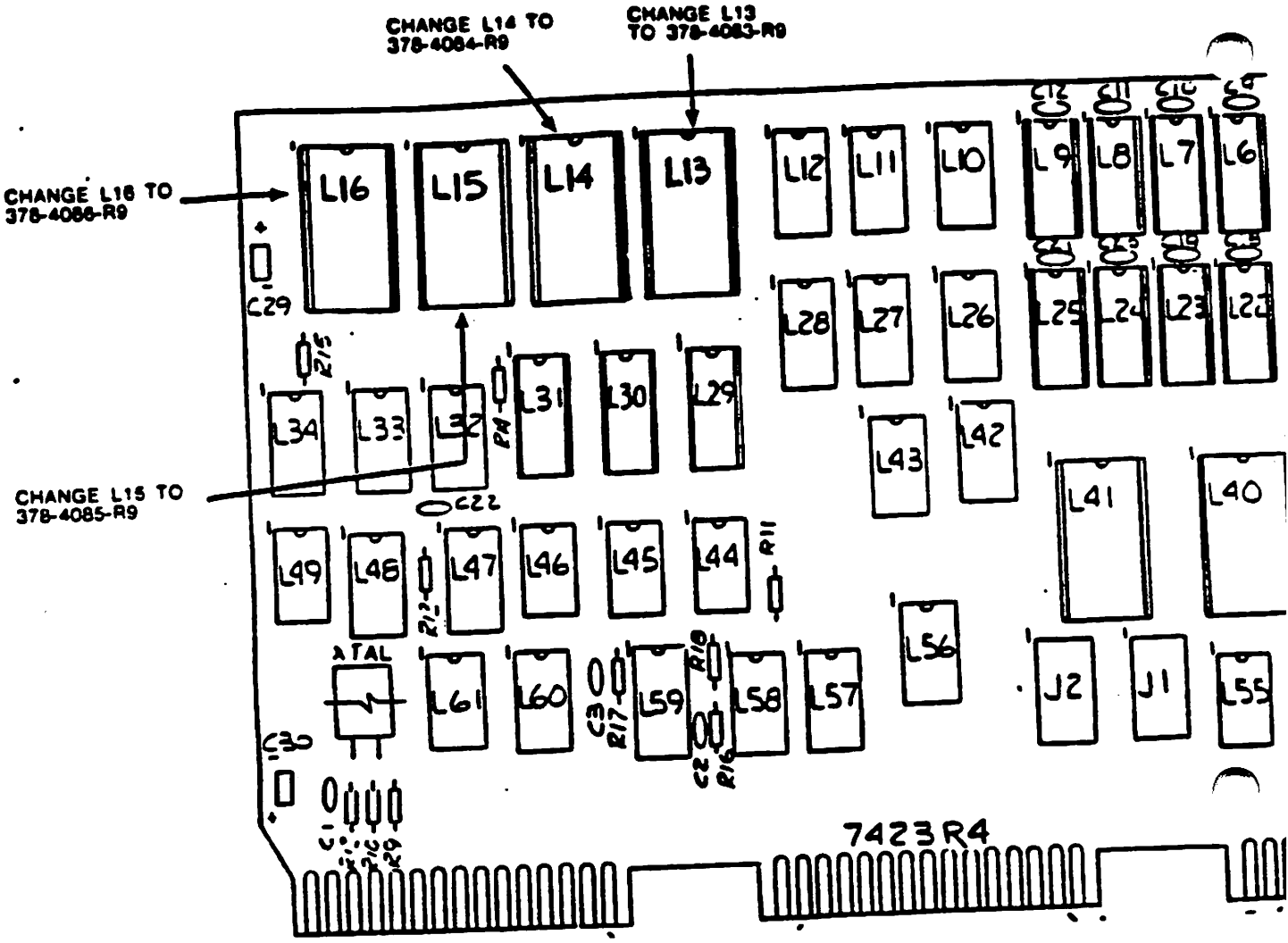


FIGURE 2: 210-7423-A EPROM LOCATIONS

6. CHECK-OUT PROCEDURE

From the 2200 Diagnostics Package #195-2956-0, run "Pseudo-random Verifies" by accessing a)"Magnetic Media", b)"General Disk Exerciser", c)"Special Function 07".

7. FCO KIT PARTS LISTING

KIT #728-0131

Item	Qty	Item Description
729-1533	1	FCO Document 1114
378-4083-R9	1	EPROM
378-4084-R9	1	EPROM
378-4085-R9	1	EPROM
378-4086-R9	1	EPROM

8. FCO KIT AVAILABILITY DATE

FCO Kit #728-0131 will be available September 17, 1984. It can be obtained by placing a routine order through the Logistics Order Processing System.

9. REMOVED PARTS DISPOSITION

Recycle removed EPROM's through your FSC.

10. MISCELLANEOUS

FCO Kit #728-0104 (referenced in FCO 1086) is replaced by FCO Kit #728-0131 (referenced in FCO 1114). The upgraded EPROM's in FCO Kit #728-0131 are designed to fix the problems cited in both FCO 1086 and FCO 1114.

The reasons for change made in FCO 1086 are as follows.

A. To prevent read cache from being lost when a reset is issued from one of the terminals on the system.

B. To allow the DPU to reselect the destination drive when dumping the multi-sector write cache to one of the drives.

WANG FIELD CHANGE ORDER

FCO NO. 1086A

Equipment Affected: 2280 DPU

Class: ALL UNITS | FCO Kit #: 728-0104 | Page 1 of 5

Org. Code: 3107 (III A.10 M-2) | FCO Doc. #: *729-1 '92A | Approval Date: AUG 29 1984

Est. Install. Time: 45 MINUTES | Ref. ECO #: 31181

*This FCO voids FCO 1086; Refer to FCO 1114.

1. REASON FOR CHANGE

   A. To prevent read cache from being lost when a reset is issued from one of the terminals on the system.

   B. To allow the DPU to reselect the destination drive when dumping the multi-sector write cache to one of the drives.

4. DESCRIPTION OF CHANGE

   Four PROM's on the 210-7423-A PCA are changed.

3. DOCUMENTATION AFFECTED

   N/A

4. PREREQUISITE (S)

   Refer to Step 10 for a list of serial numbers of units requiring this change.

5. INSTALLATION PROCEDURE

   A. Power off. Remove AC plug at wall.

   B. Refer to "Customer Engineering Maintenance Manual" (729-0971) p.4.3, sections 4.5 through 4.5.1 for top cover removal/replacement procedures.

   C. Refer to Figure 1. Remove the 210-7423-A PCA from the Disk Processing Unit (DPU).

Tech Ops	Logistics	Originator	FCO Coordinator
8-28-84	8-29-84	8/29/84	8/29/84

D. Refer to Figure 2. Change PROM's on the 210-7423-A PCA as follows:

1. Component Side:

   a. Change L13 to 378-4083-R8.

   b. Change L14 to 378-4084-R8.

   c. Change L15 to 378-4085-R8.

   d. Change L16 to 378-4086-R8.

E. Reassemble the unit by reversing the procedures in Steps A through C.

F. Perform check-out procedure described in Section 6 below.

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

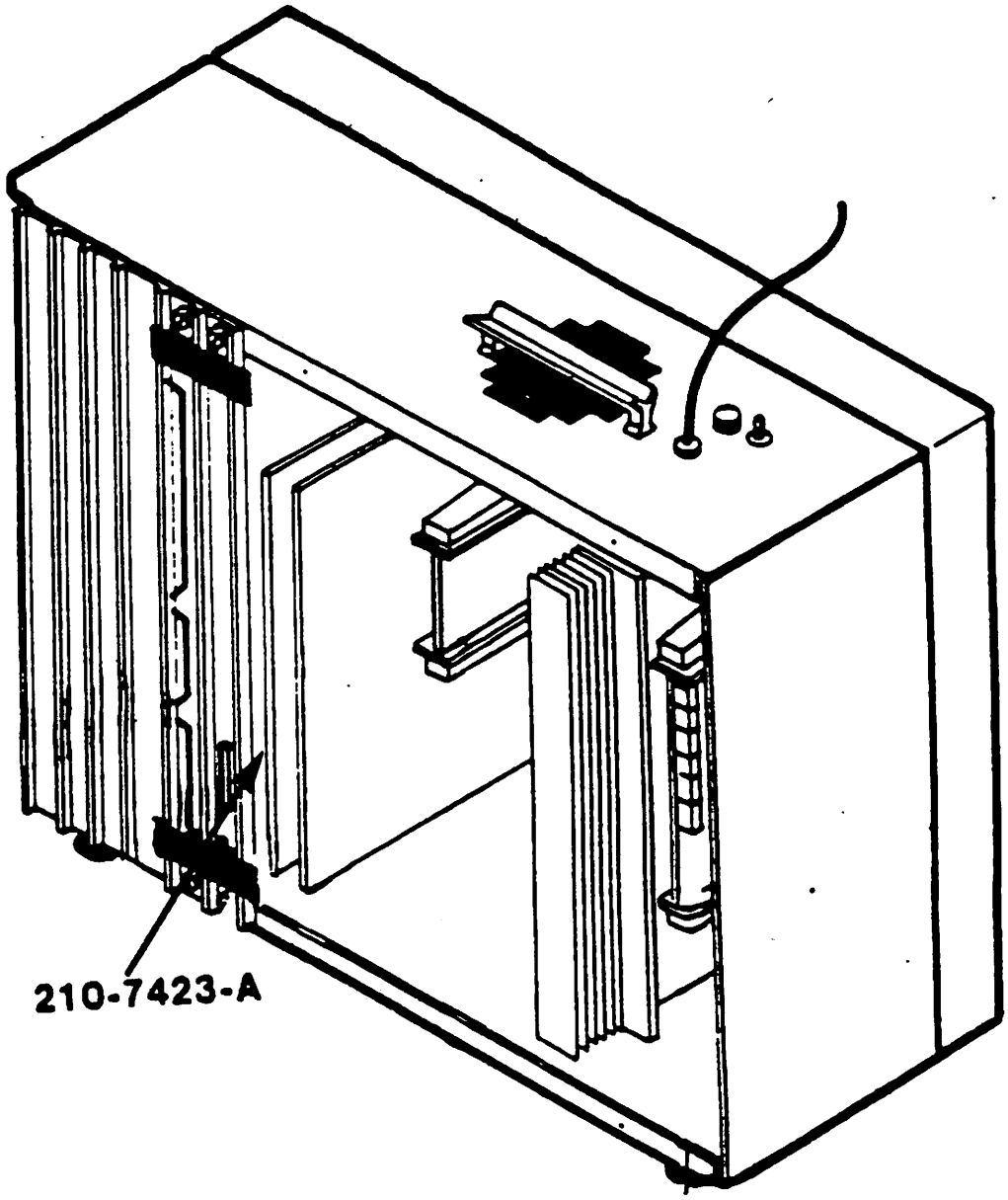


FIGURE 1

CIRCUIT BOARD LOADING

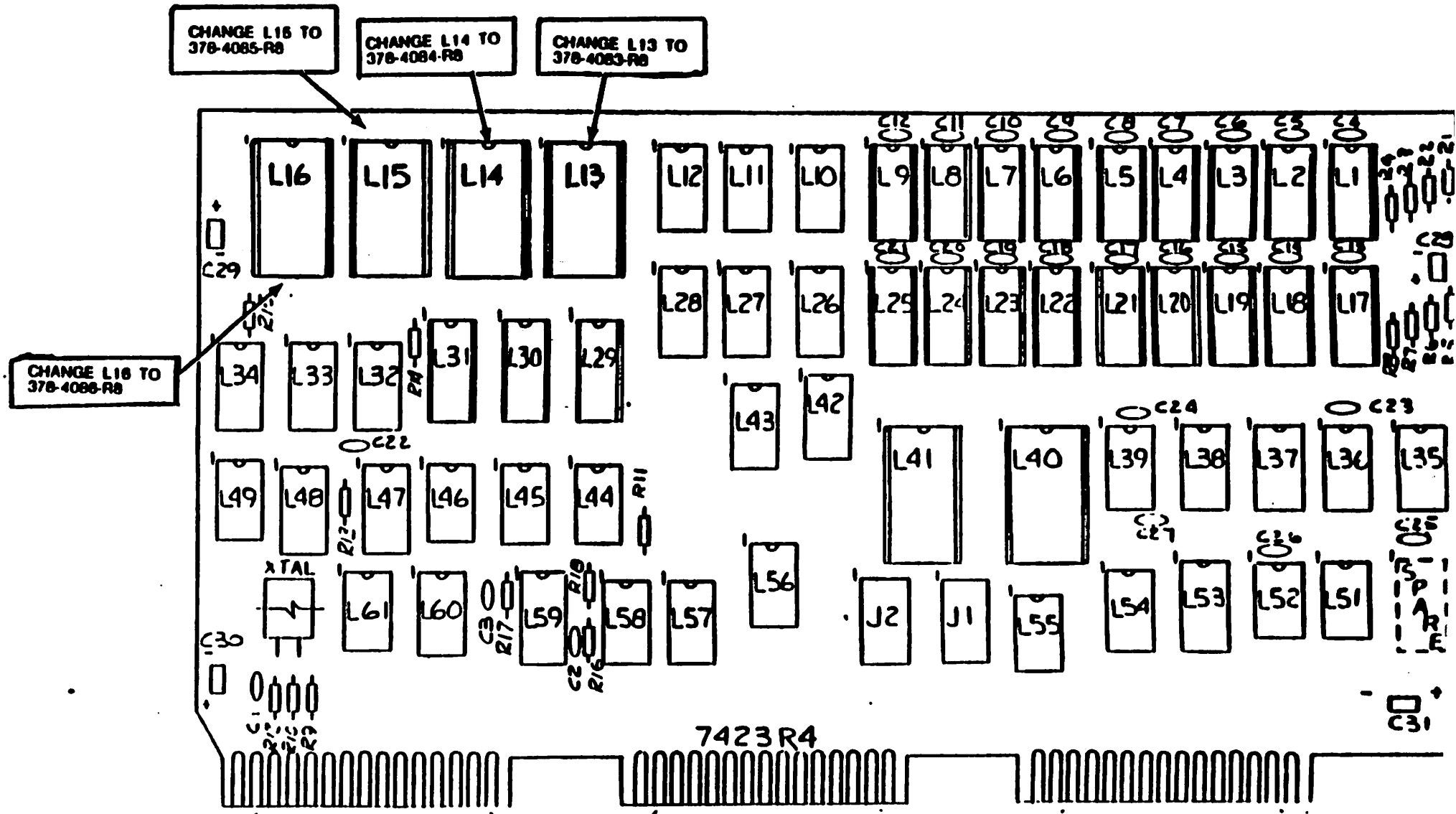


FIGURE 2

7423 IC LOCATIONS

6. CHECK-OUT PROCEDURE

Run 2280 Disk Diagnostics from 2200 Diagnostics Package #195-2956-0.

7. FCO KIT PARTS LISTING

KIT #728-0104

Item	Qty	Item Description
729-1482	1	FCO Document 1086
378-4083-R8	1	PROM
378-4084-R8	1	PROM
378-4085-R8	1	PROM
378-4086-R8	1	PROM

*8. FCO KIT AVAILABILITY DATE

FCO Kit# 728-0104 is no longer available effective September 17, 1984. It is replaced by FCO Kit #728-0131 (referenced in FCO 1114) which can be obtained by placing a routine order through the Logistics Order Processing System.

9. REMOVED PARTS DISPOSITION

Recycle removed PROM's through your FSC.

10. MISCELLANEOUS

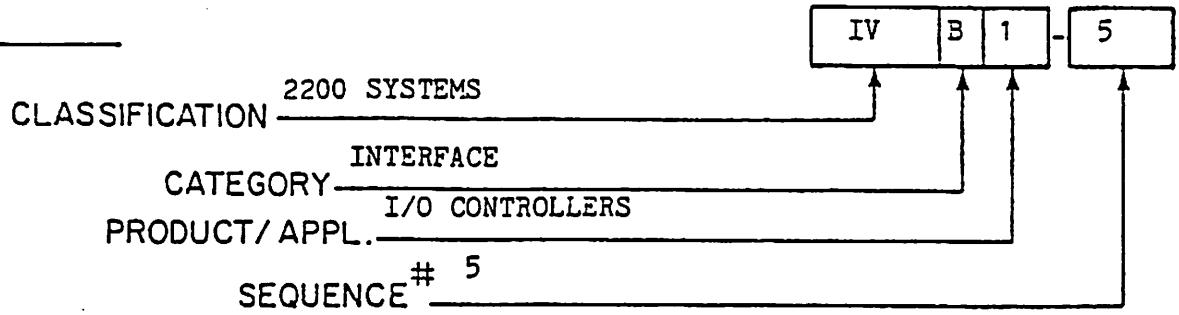
This FCO applies to units that fall within the following serial number ranges.

026513
135033 through 135984
687297
941797
DL5772
EB1277
EB1339 through EB1341
EB2626 through EB2632
FY1038
GN1706
GU1341
HN2809
HU1505
HU2465
HU3775
HU5714
HU8365
HV1955
IC5325 through IC5328
IG5042
IN1002 through IN3138
IN7407
KH1380
KR6959
KV1701
KV3474
KV4680 through KV4813
KV5354 through KV5608
KY1002 through KY6572
KY7250 through KY7822
KY8056 through KY8454
KY9330 through KY9654
LI2427
LS1747
LY2317
NS17464 through NS17468
NY1619

CUSTOMER ENGINEERING

PRODUCT SERVICE NOTICE

DATE: 9/22/80



TITLE:

MODEL 22C80 DISK MULTIPLEXER INTERFACE CONTROLLER (WL# 177-2280C)

★ WHEN UPDATING TO MUX/DPU MUST ORDER NEW CHASSIS NO CHARGE THRU SALES ★

This PSN contains the following 2280 Disk Multiplexer Interface Controller information.

1. GENERAL DESCRIPTION
2. SWITCH SETTINGS
3. INSTALLATION
4. SYSTEM INTERCONNECTION
5. DIAGNOSTICS
6. TROUBLESHOOTING
7. HARDWARE THEORY OF OPERATION (MAJOR-FUNCTION LEVEL)

Following is a list of documentation categories referenced by this PSN. Documentation from these other categories is required for the performance of certain installation/maintenance tasks.

Device Address Switch Settings -- IV.B.1-3
CPU Power Supply Voltage Adjustments -- IV.A.3
2280MUX System Interconnection -- IV.B.3
2280 Disk Diagnostic -- IV.C.1

1. GENERAL DESCRIPTION

The Model 22C80 I/O controller (WL# 177-2280C or WL# 210-7715) provides the input/output interface between a 2200VP/LVP/MVP Central Processing Unit and a 2280 Disk Multiplexer (2280MUX).

2. SWITCH SETTINGS

See FIGURE 1 for information concerning the setting of device address switch SW1. The device addresses normally used for the 2280 Disk Drive are HEX 10 (primary address), HEX 20 (secondary address), or HEX 30 (secondary address). Refer to PSN IV.B.1-3 for more information concerning the setting of device address switches.

NOTE:

The HEX values given in FIGURE 1 are correct only for boards at Revision 2 and above. For R0 and R1 boards (limited distribution) the HEX values are as follows.

210-7715

SWITCH #	R0, R1 HEX VALUE	R2 + ABOVE HEX VALUE
1	01	01
2	80	02
3	20	04
4	10	08
5	08	10
6	04	20
7	02	40
8	NOT USED	80

3. INSTALLATION

The 22C80 can be installed in any available I/O slot in the 2200VP/LVP/MVP CPU. Be certain to power-off the CPU before installing the controller. Prior to inserting the 22C80 in a CPU, ensure that all switches on that board are set correctly (ref: Section 2). Also check to see that the fingerboard connectors are clean.

After installing the 22C80 in a unit, be certain to recheck and adjust, if necessary, CPU power supply voltages +5V (I/O) and -12V. Refer to documentation category IV.A.3 for the appropriate CPU voltage adjustment procedures.

R2 + ABOVE ONLY

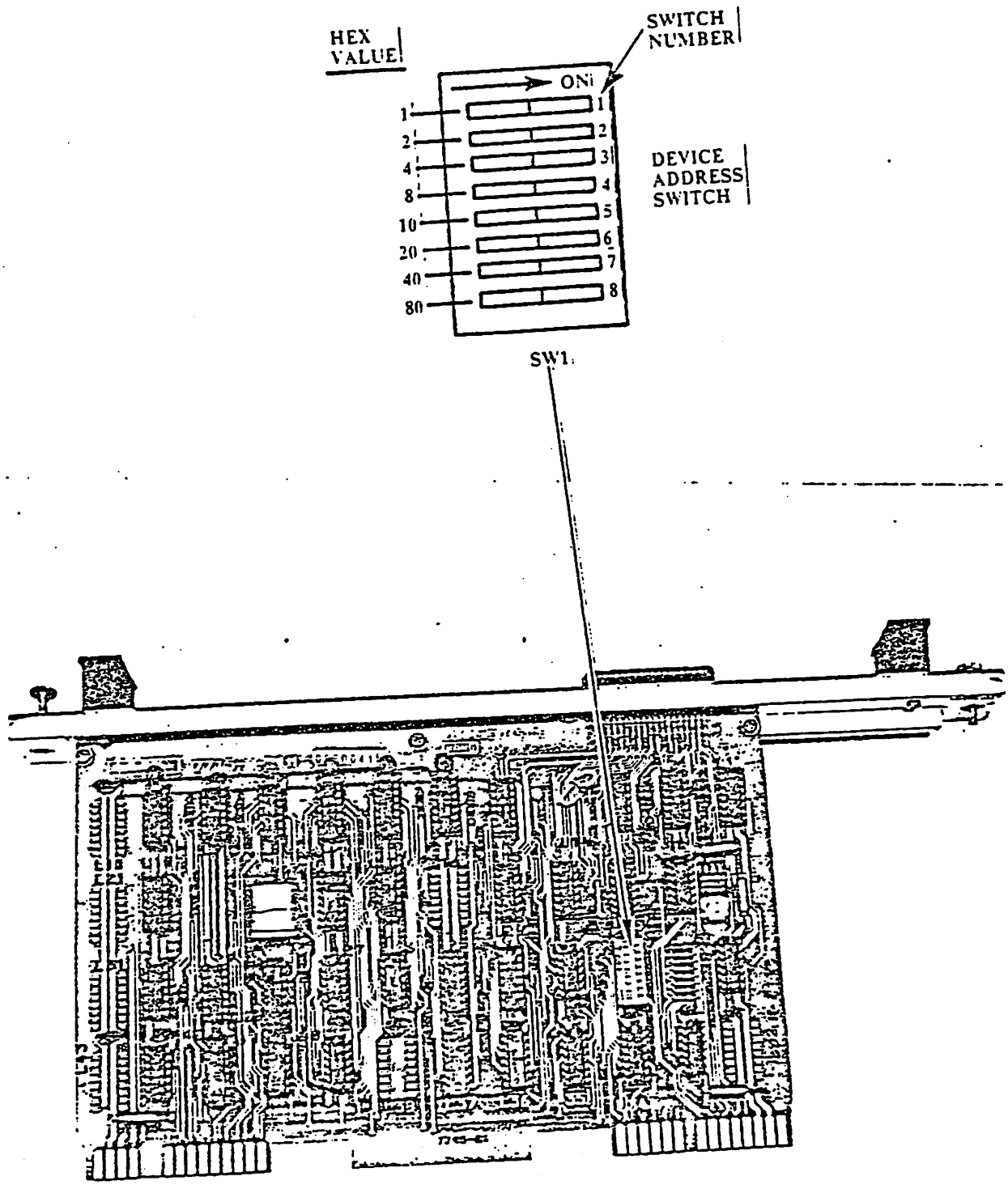
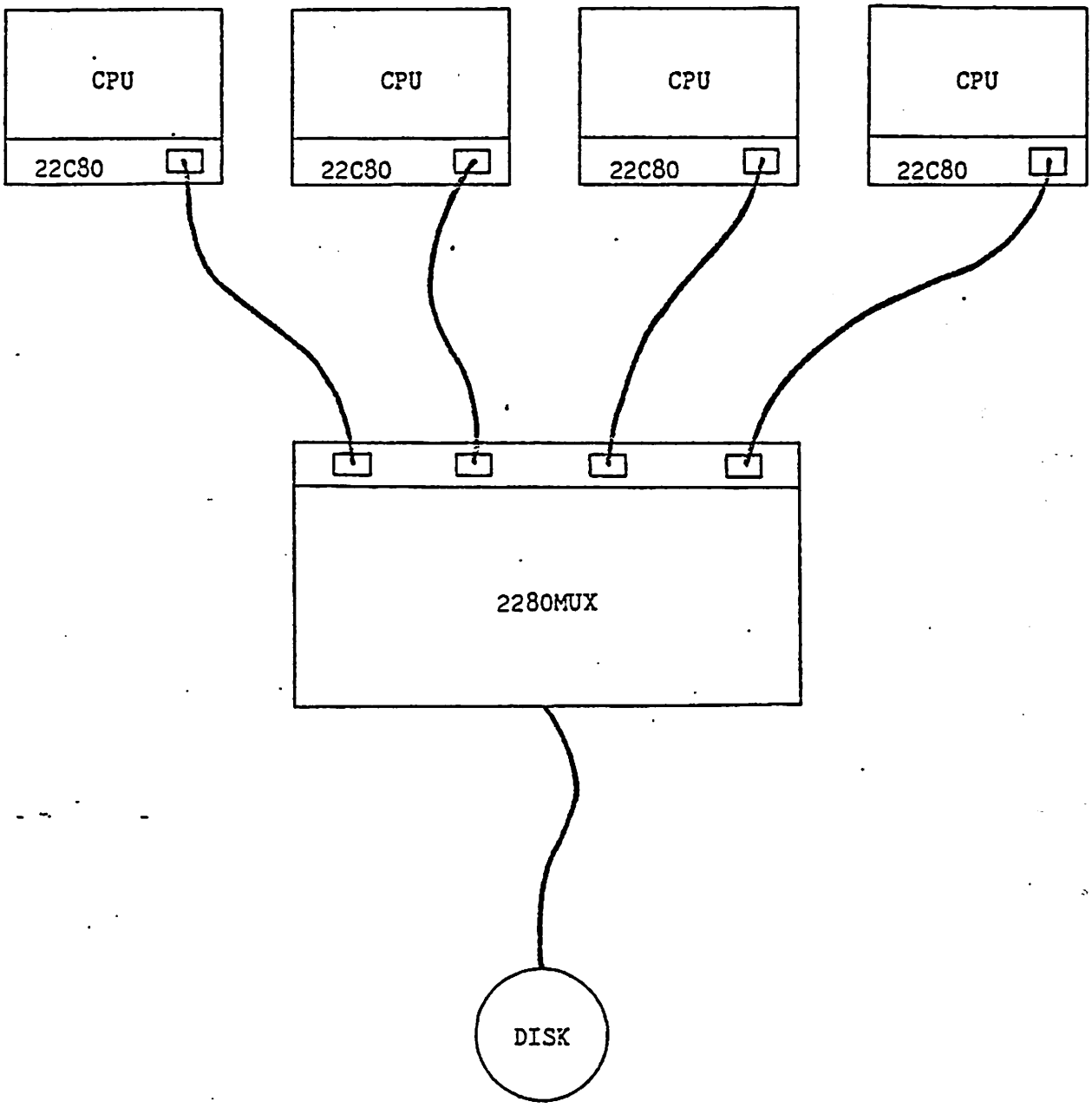


FIGURE 1 WL NO. 210-7715 22CS0 INTERFACE BOARD

4. SYSTEM INTERCONNECTION

The I/O cables (WL# 220-0138) attached to jacks J1-J3 on the 2280MUX Multiplexer board (WL# 210-7717), and to jacks J1-J4 on the 2280MUX Port Expander boards (WL# 210-7718) connect to the 22C80 controller in each CPU of the multiplex system (see "Star" configuration below). Refer to documentation category IV.B.3 for more information concerning 2280MUX system interconnection.



5. DIAGNOSTICS

Up to the date of this publication, diagnostics designed to test all 2280MUX functions, as well as the associated 22C80 controllers, had not been completed. It is possible to test a majority of the 2280MUX and 22C80 functions with the standard 2280 Disk Diagnostic (WL# 701-2555). This is accomplished by running the diagnostic at several (a predetermined number) CPU's at the same time, with each CPU addressing a different disk surface (one surface only) in the drive. The predetermined number of CPU's at which the diagnostic can be run is equal to the number of data surfaces present in the drive under test (that is, 2280-1: two surfaces; 2280-2: four surfaces; 2280-3: six surfaces). Refer to documentation category IV.C.1 for detailed information concerning the standard 2280 Disk Diagnostic.

6. TROUBLESHOOTING

If only one channel of a 2280MUX system fails (I/O error indication), it is possible to isolate the cause of the failure by interchanging the I/O cables at the Port Expander board or Multiplexer board (as applicable) in the 2280 DPU/MUX. If, after swapping CPU-to-MUX cables, the problem remains with the same 2280MUX channel, conclude that the Port Expander/Multiplexer is defective; if the problem moves with the suspected 2200 CPU to the different 2280MUX channel, conclude that the 2200 CPU is defective--the most likely cause being the 22C80 I/O controller. If all channels fail, the 2280 DPU, the DPU/MUX power supply, the 2280MUX multiplexer board, the disk cables, or the 2280 disk itself may be defective.

7. HARDWARE THEORY OF OPERATION (MAJOR-FUNCTION LEVEL)

Address Bus and Control Circuitry (ref: FIGURE 2 and MNEMONICS)

Device Address Switch--

Represents the device address of the 2280 Disk Drive. This address is chosen by the customer and set by the Customer Engineer. The outputs of the switch are inputs to the Address Compare Circuit.

Address Compare Circuit--

Verifies the device address received from the CPU via the Address Bus ($\overline{AB1}$-$\overline{AB8}$) against the address represented by the Device Address Switch. The output of the compare circuit is input to the Select Latch. The output also enables operation of the DN3 Latch.

Select Latch--

Produces a Select ($\overline{SEL}$) signal if the device address received from the CPU and the address represented by the Device Address Switch setting are identical. This Select signal in turn generates a Request ($\overline{REQ}$) signal, which is sent to the 2280 Disk Multiplexer (2280MUX) indicating the CPU requires disk access. The Select signal also enables operation of the Control Decoder, and the OBS Latch.

DN3 Latch--

Monitors CPU Address Bus bit 7 (HEX 40) to determine whether access to the second 2280 Disk Drive in a daisy-chain configuration is requested. If the second drive is specified, a DN3 signal is sent to the 2280MUX indicating such.

Control Decoder--

Decodes control data received from the CPU via the Output Bus ($\overline{OB1}$, and $\overline{OB8}$) into the desired command as follows:

	LOGIC LEVEL			
OB1	"0"	"1"	"0"	"1"
OB8	"0"	"0"	"1"	"1"
COMMAND	Clear Parity Error	Hog Disk	Reset Disk	Release Disk

Hog Latch--

When a "Hog" command is decoded (see Control Decoder), the Hog Latch produces a Request ($\overline{REQ}$) signal which is sent to the 2280MUX indicating the CPU requires exclusive use of the disk.

When a "Release Disk" command is decoded, the Hog Latch terminates the Request signal.

Disk Ready/Busy Circuit--

Monitors the Ready/Busy signal received from the disk ($\overline{DRBY}$), and relays that status to the CPU.

OBS Latch--

Generates an Output Data Strobe ($\overline{ODS}$) which strobes the Output Data to the 2280MUX.

Shift Register--

Produces the timing pulses required for controlling the transfer of data between the CPU and the 2280MUX.

Level Converters (Line Receivers/Drivers)--

Convert TTL voltage levels to the differential voltage levels (Emitter Coupled Logic--ECL--levels) required by the 2280MUX Port Expander board. Use of ECL in this application allows each CPU disk I/O logic to operate at optimum speed even with the greater distance from CPU to multiplexer, as compared to the driver/receiver distances possible with TTL.

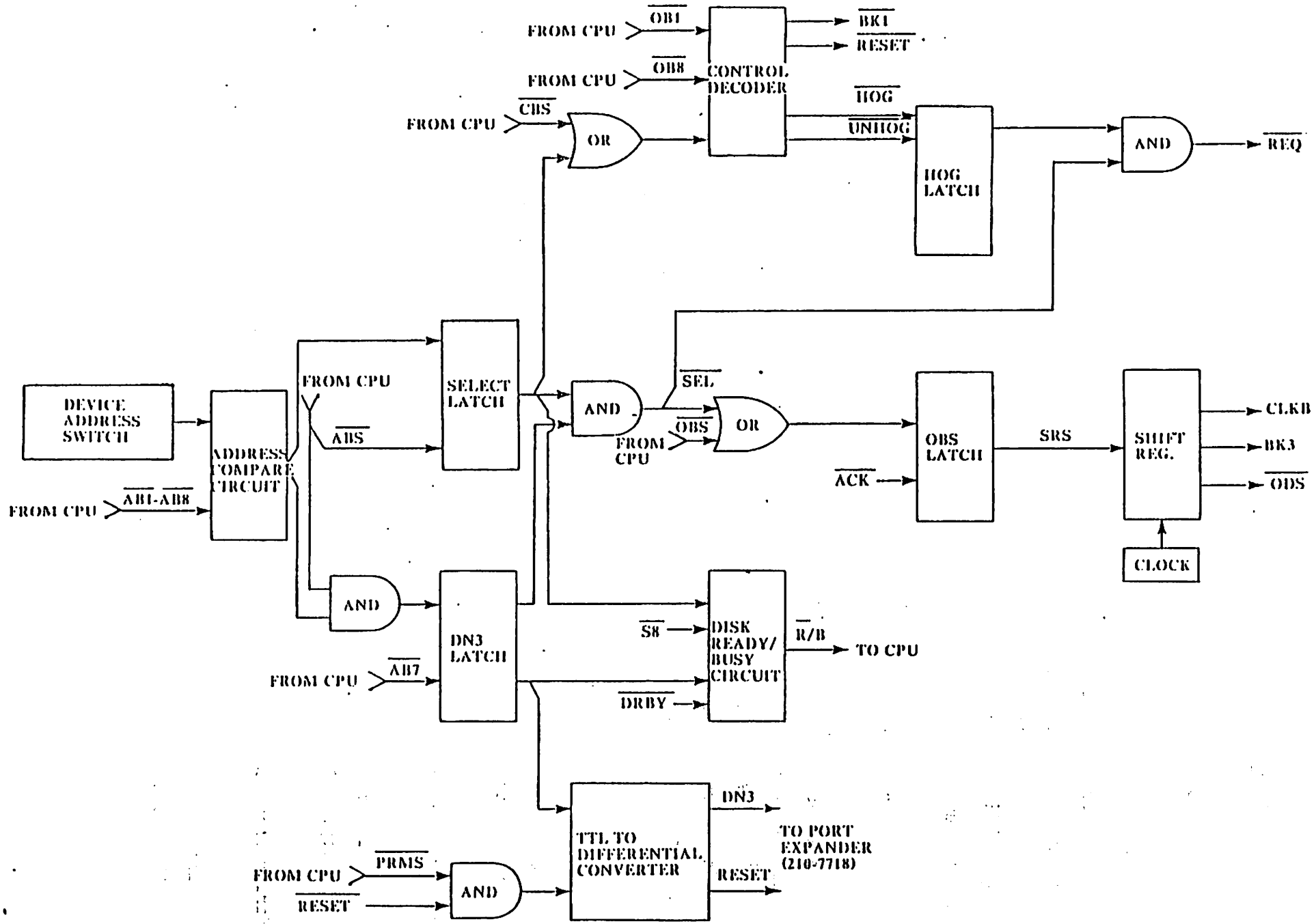


FIGURE 2 22C80 BLOCK DIAGRAM (ADDRESS BUS AND CONTROL CIRCUITRY)

Input Bus Circuitry (ref: FIGURE 3 and MNEMONICS)

Input Data Demultiplex Latches (Data)--

Receives the read data that is to be sent to the CPU from the 2280MUX Port Expander board. On the leading edge of the Input Data Strobe ($\overline{IDS}$), the low order Input Data bits ($\overline{ID1}$-$\overline{ID4}$) are selected through the demultiplexer, and are then sent to the Parity Checker and the Input Bus Mux. On the trailing edge of $\overline{IDS}$, the high order bits ($\overline{ID5}$-$\overline{ID8}$) are selected through the demultiplexer.

Input Data Demultiplex Latches (Disk Status)--

Receives the disk status from the 2280MUX Port Expander board. On the leading edge of the Status Request Strobe ($\overline{SRB}$), the low order Input Data bits ($\overline{ID1}$-$\overline{ID4}$) are selected through the demultiplexer as S1-S4, and the are sent to the Input Bus Mux for transmission to the CPU. On the trailing edge of $\overline{SRB}$, the high order bits ($\overline{ID5}$-$\overline{ID8}$) are selected through the demultiplexer as $\overline{S5}$-$\overline{S8}$.

Input Bus Mux--

Selects either disk status or data as Input Bus bits $\overline{IB1}$-$\overline{IB8}$, and transmits the information to the CPU.

Parity Checker--

Verifies the parity bit, which is received along with the Input Data for integrity. If the parity bit is incorrect the Parity Error Latch is set.

Parity Error Latch--

Indicates a parity error occurring during transfer of data between the 2280MUX and the 22C80 Interface.

Level Converters (Line Receivers/Drivers)--

Convert differential voltage levels (Emitter Coupled Logic--ECL--levels) received from the 2280MUX Port Expander board to the TTL levels required by the 22C80 Interface board. Use of ECL in this application allows each CPU disk I/O logic to operate at optimum speed even with the greater distance from CPU to multiplexer, as compared to the driver/receiver distances possible with TTL.

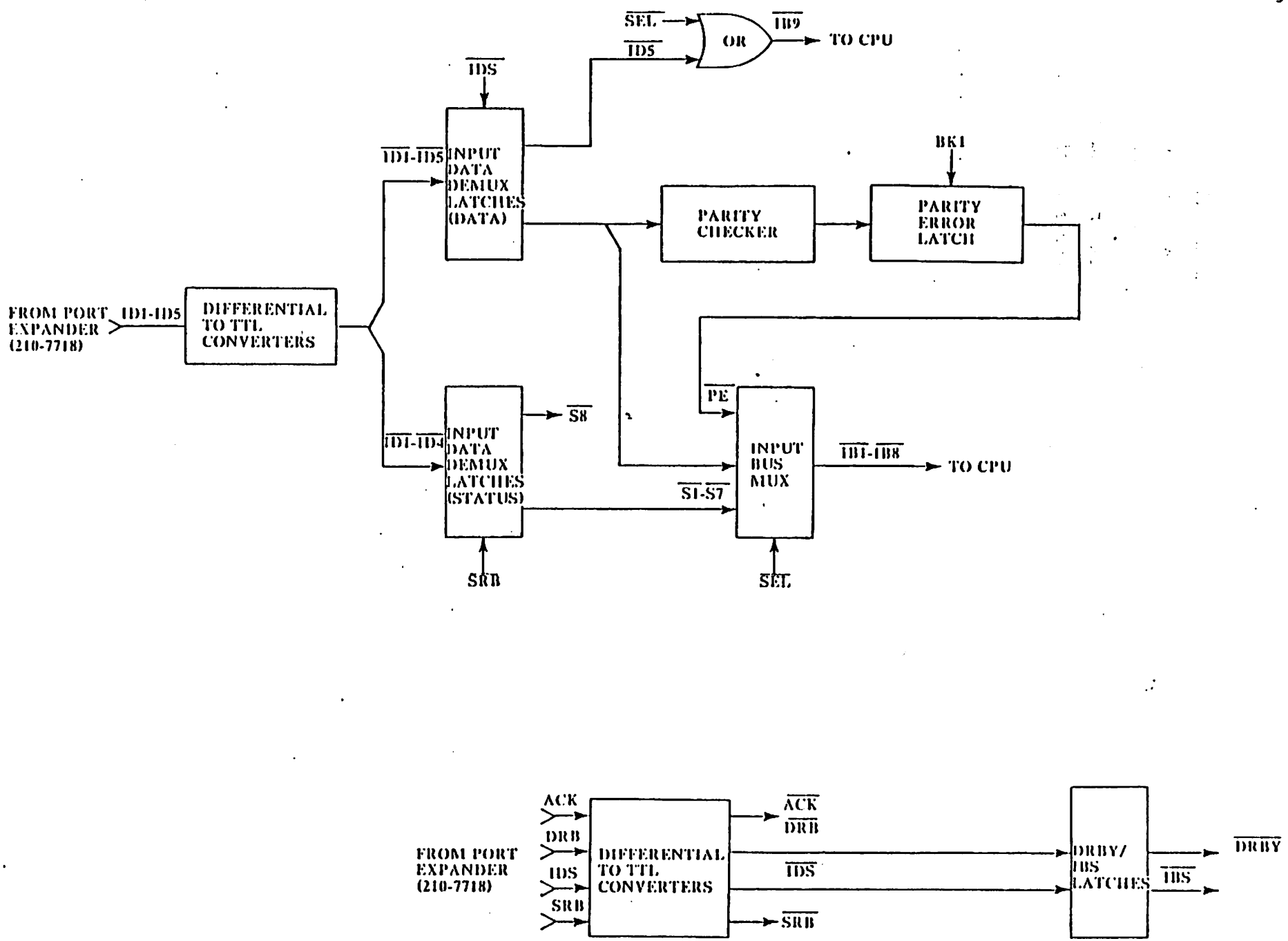


FIGURE 3 22C80 BLOCK DIAGRAM (INPUT BUS CIRCUITRY)

Output Bus Circuitry (ref: FIGURE 4 and MNEMONICS)

Output Bus Mux--

Receives the write data that is to be sent to the disk from the CPU Output Bus ($\overline{OB1}$-$\overline{OB8}$). During the first half of the Output Bus Strobe ($\overline{OBS}$), the low order bits ($\overline{OB1}$-$\overline{OB4}$) are selected through the Output Bus Mux as Output Data bits $\overline{OD1}$-$\overline{OD4}$. During the second half of the $\overline{OBS}$, the high order bits ($\overline{OB5}$-$\overline{OB8}$) are selected through the multiplexer. The Output Data bits are sent to the 2280MUX for transmission to the disk drive.

Parity Generator--

Accepts the write data that is to be sent to the disk from the CPU Output Bus ($\overline{OB1}$-$\overline{OB8}$), and generates a parity bit ($\overline{OD5}$) which is sent to the 2280MUX along with the Output Data.

Level Converters (Line Receivers/Drivers)--

Convert TTL voltage levels to the differential voltage levels (Emitter Coupled Logic--ECL--levels) required by the 2280MUX Port Expander board. Use of ECL in this application allows each CPU disk I/O logic to operate at optimum speed even with the greater distance from CPU to multiplexer, as compared to the driver/receiver distances possible with TTL.

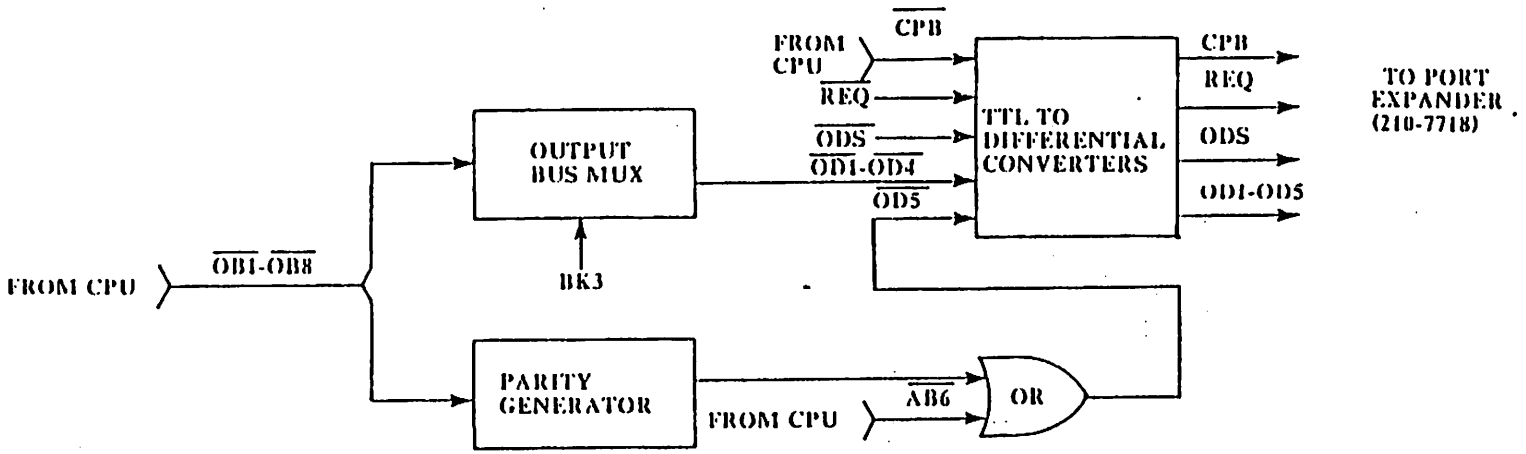


FIGURE 4 22C80 BLOCK DIAGRAM (OUTPUT BUS CIRCUITRY)

PHOENIX

CUSTOMER ENGINEERING

PRODUCT SERVICE NOTICE

DATE: 9/22/80

IV | B | 3 - 1

CLASSIFICATION 2200 SYSTEMS

CATEGORY INTERFACE

PRODUCT/APPL. DISK MULTIPLEXERS

SEQUENCE # 1

TITLE:

MODEL 2280 DISK MULTIPLEXER

CAN NOT UPDATE DPU TO MUX/DPU | NEW CHASSIS ORDERED BY SALES

This PSN contains the following 2280 Disk Multiplexer information.

1. GENERAL DESCRIPTION
2. PHYSICAL CHARACTERISTICS
3. INSTALLATION
4. DIAGNOSTICS
5. TROUBLESHOOTING
6. HARDWARE THEORY OF OPERATION (MAJOR-FUNCTION LEVEL)

Following is a list of documentation categories referenced by this PSN. Documentation from these other categories is required for the performance of certain installation/maintenance tasks.

22C80 Disk Multiplexer Interface -- IV.B.1
2280 DPU-to-2280 DPU/MUX Conversion -- I.B.2
2280 DPU Power Supply Voltage Adjustments -- III.A.7
2280 Disk Diagnostic -- IV.C.1
2200VP BASIC-2 Language Reference Manual, WL# 700-4080 -- IV.C.2

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13-5852 12-79

1. GENERAL DESCRIPTION

The Model 2280 Disk Multiplexer (hereinafter referred to as the 2280MUX) is optionally resident in the 2280 Disk Processing Unit (DPU) and permits two to fifteen 2200VP/LVP/MVP Central Processing Units to share one or two Model 2280 Disk Drives (Phoenix Drive or CDC 9448 Cartridge Module Drive--CMD). Unlike earlier disk multiplexers, which were of the "daisy-chain" type, the 2280MUX is a "star" type multiplexer. In a "star" configuration, the CPU's are individually connected directly to the multiplexer. (See FIGURE 1.)

The 2280MUX allocates disk time to multiple systems in a manner that enables all systems to have virtually concurrent access to the disk. The multiplexer sequentially polls all systems until one of the systems attempts to access the disk. At that point, the multiplexer momentarily ceases polling and passes control of the disk to the inquiring system, which is permitted to execute a single disk statement or command. The multiplexer does not monitor the amount of time required to execute each statement, nor does it limit the number of sectors transferred by a statement. A single statement may read or write only one sector, or may carry out multi-sector transfers. (For example, a MOVE or COPY statement might transfer the contents of an entire disk platter to a second platter; however, major file maintenance operations should be executed only by a system in Hog Mode--see following). When execution of the single disk operation is completed, sequential polling of on-line CPU's resumes from the last requesting CPU.

Some disk operations, such as the on-line updating of a shared common file, require that one system have a period of exclusive, uninterrupted access to the disk. For such operations, the $OPEN statement from the Wang BASIC-2 language should be used (ref: 2200VP BASIC-2 Language Reference Manual, WL# 700-4080, IV.C.2). In this mode of operation, one system temporarily monopolizes or "hogs" the disk, locking out all other systems. Critical file maintenance operations may then be carried out by the privileged system without interruption. After file maintenance has been completed, the $CLOSE statement should be used to release the disk, restoring all CPU's to equal disk-access priority.

2. PHYSICAL CHARACTERISTICS

The 2280MUX consists of the following:

-- A Multiplexer board (WL# 177-2280-X or WL# 210-7717) containing the polling and port- selection circuitry, which interfaces the 2280 Disk Processing Unit (DPU) and up to three CPU's.

-- Up to three Port Expander boards (WL# 177-2280-XE or WL# 210-7718), each of which interfaces up to four additional CPU's.

The 2280MUX circuit boards install directly into a Model 2280 Disk Processing Unit. (A special DPU motherboard (WL# 210-7716) is required. More detailed information follows.)

Each CPU connected to the 2280MUX must have a Model 22C80 I/O controller (WL# 177-2280-C or WL# 210-7715) to interface the 2280MUX.

NOTE:

Refer to documentation category IV.B.1 for information concerning the required 22C80 I/O controller.

For system interconnection, standard 12-foot (3.6-meter) I/O cables (WL# 220-0138) are supplied with the multiplexer. Extension cables are available, allowing for a maximum distance between CPU and 2280MUX of 1,012 ft (306.7 m). Extension cable lengths and part numbers are as follows:

LENGTH (FEET)	LENGTH (METERS)	WL #
25	7.6	120-2280-01
50	15.2	120-2280-02
100	30.3	120-2280-03
250	75.8	120-2280-04
500	151.5	120-2280-05
750	227.3	120-2280-06
1000	303.0	120-2280-07

A 15-inch (37.5-cm) cable (WL# 220-0257) is also provided for connecting the Multiplexer board (WL# 210-7717) to the ALU/MUX board (WL# 210-7421-A) in the DPU.

FIGURE 1 below illustrates a typical four-system, dual-drive configuration. Two unused (not required) Port Expander boards are also shown in the figure.

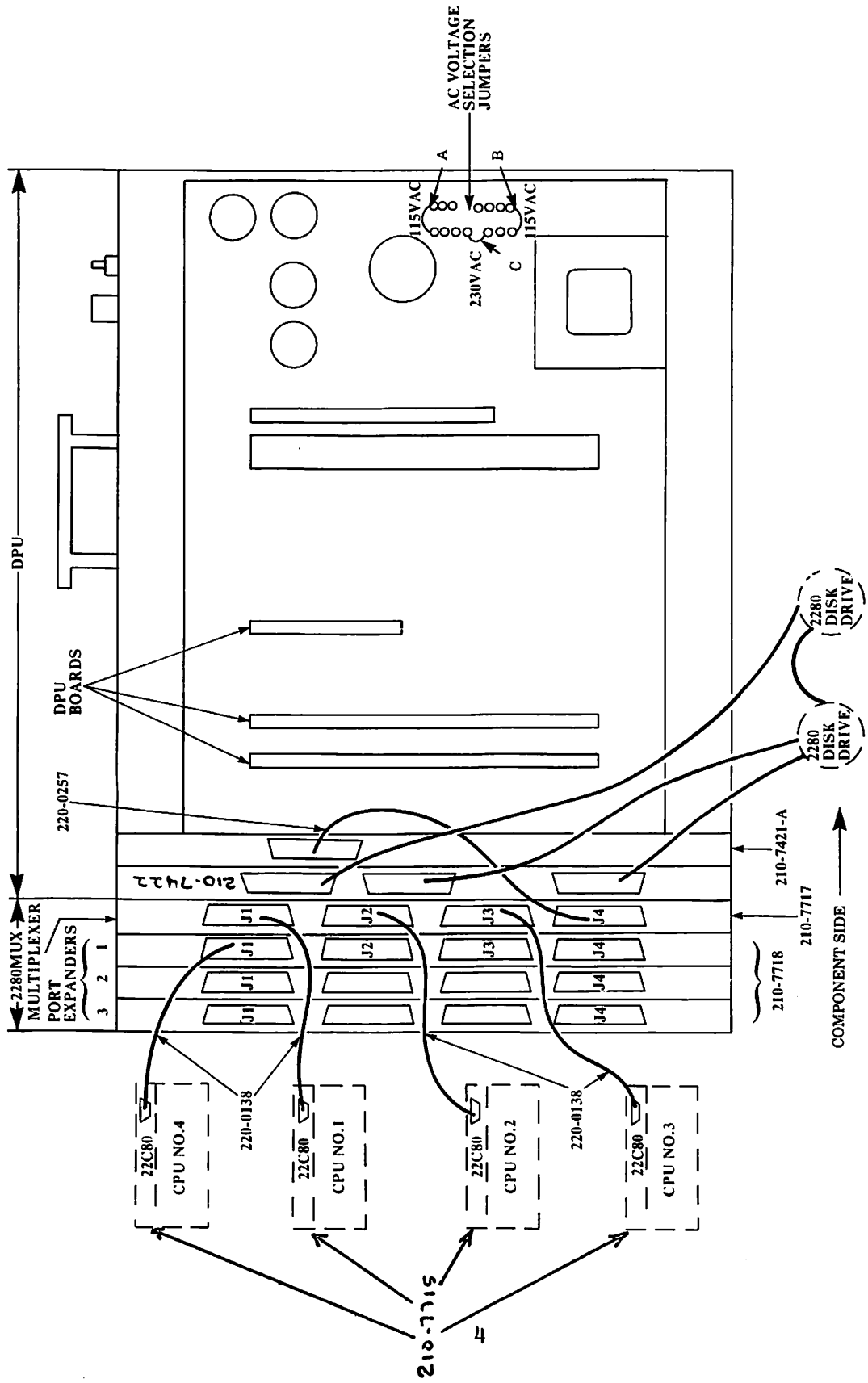


FIGURE 1 2280 DPU/MUX SYSTEM CONFIGURATION AND BOARD LAYOUT

3. INSTALLATION

NOTE:
Be sure to power-off the 2280 DPU/MUX before performing any installation procedure.

3.1 MOTHERBOARD REQUIREMENTS

The 2280MUX requires that a WL# 210-7716 motherboard be resident in the 2280 Disk Processing Unit (DPU). Model 2280 DPU's sold with the MUX have a WL# 210-7716 motherboard. All newly manufactured 2280 DPU's also have this motherboard installed, providing for easier installation of a MUX upgrade.

If an older-version 2280 DPU is to be upgraded to add multiplex capabilities, the entire 2280 DPU chassis must be replaced with the newer-version chassis (WL# 270-0688-60 for 60 Hz, or WL# 270-0688-50 for 50 Hz), containing a WL# 210-7716 motherboard.

Refer to documentation category I.B.2 for detailed conversion procedures, and then continue with Section 3.2 of this installation procedure.

3.2 MOTHERBOARD AC INPUT VOLTAGE SELECTION JUMPERS

Jumper wires are provided on the WL# 210-7716 motherboard for ac input voltage (115V or 230V) selection. Two jumpers are installed for 115VAC and one jumper for 230VAC. FIGURE 1 shows the positions of these jumpers. Be certain the jumper configuration is correct for the supplied ac voltage (see following chart).

VOLTAGE SELECTION JUMPERS

	115VAC	230VAC
JUMPER A	IN	OUT
JUMPER B	IN	OUT
JUMPER C	OUT	IN

3.3 MOTHERBOARD/PCB LAYOUT

The locations of the 2280MUX circuit boards in relation to the motherboard/chassis are shown in FIGURE 1. Ensure that all fingerboard connectors are clean prior to installing the boards in the DPU. (An ink eraser should be used to clean the pins if necessary.)

After installing the 2280MUX circuit boards, be certain to recheck and adjust, if necessary, DPU power supply voltages +5V and -12V. Refer to Wang Cartridge Module Disk Drive Field Level Maintenance Manual Addendum One, CE #03-0080-A (III.A.7), for 2280 DPU voltage adjustment procedures.

3.4 SYSTEM INTERCONNECTION

Refer to FIGURES 1, 2, 3, and the following table when interconnecting CPU's and 2280MUX.

TABLE 1 2280MUX SYSTEM CABLE CONNECTIONS

CABLE #	FROM	TO
220-0138	210-7717 Multiplexer--J1	CPU #1--22C80
220-0138	210-7717 Multiplexer--J2	CPU #2--22C80
220-0138	210-7717 Multiplexer--J3	CPU #3--22C80
220-0138	210-7718 Port Expander #1--J1	CPU #4--22C80
220-0138	210-7718 Port Expander #1--J2	CPU #5--22C80
220-0138	210-7718 Port Expander #1--J3	CPU #6--22C80
220-0138	210-7718 Port Expander #1--J4	CPU #7--22C80
220-0138	210-7718 Port Expander #2--J1	CPU #8--22C80
.		
.		
220-0138	210-7718 Port Expander #3--J4	CPU #15--22C80
220-0257	210-7717 Multiplexer--J4	210-7421-A (in DPU)

4. DIAGNOSTICS

Up to the date of this publication, diagnostics designed to test all 2280MUX functions had not been completed. It is possible to test a majority of the 2280MUX functions with the standard 2280 Disk Diagnostic (WL# 701-2555). This is accomplished by running the diagnostic at several (a predetermined number) CPU's at the same time, with each CPU addressing a different disk surface (one surface only) in the drive. The predetermined number of CPU's at which the diagnostic can be run is equal to the number of data surfaces present in the drive under test (that is, 2280-1: two surfaces; 2280-2: four surfaces; 2280-3: six surfaces).

Refer to documentation category IV.C.1 for detailed information concerning the standard 2280 Disk Diagnostic.

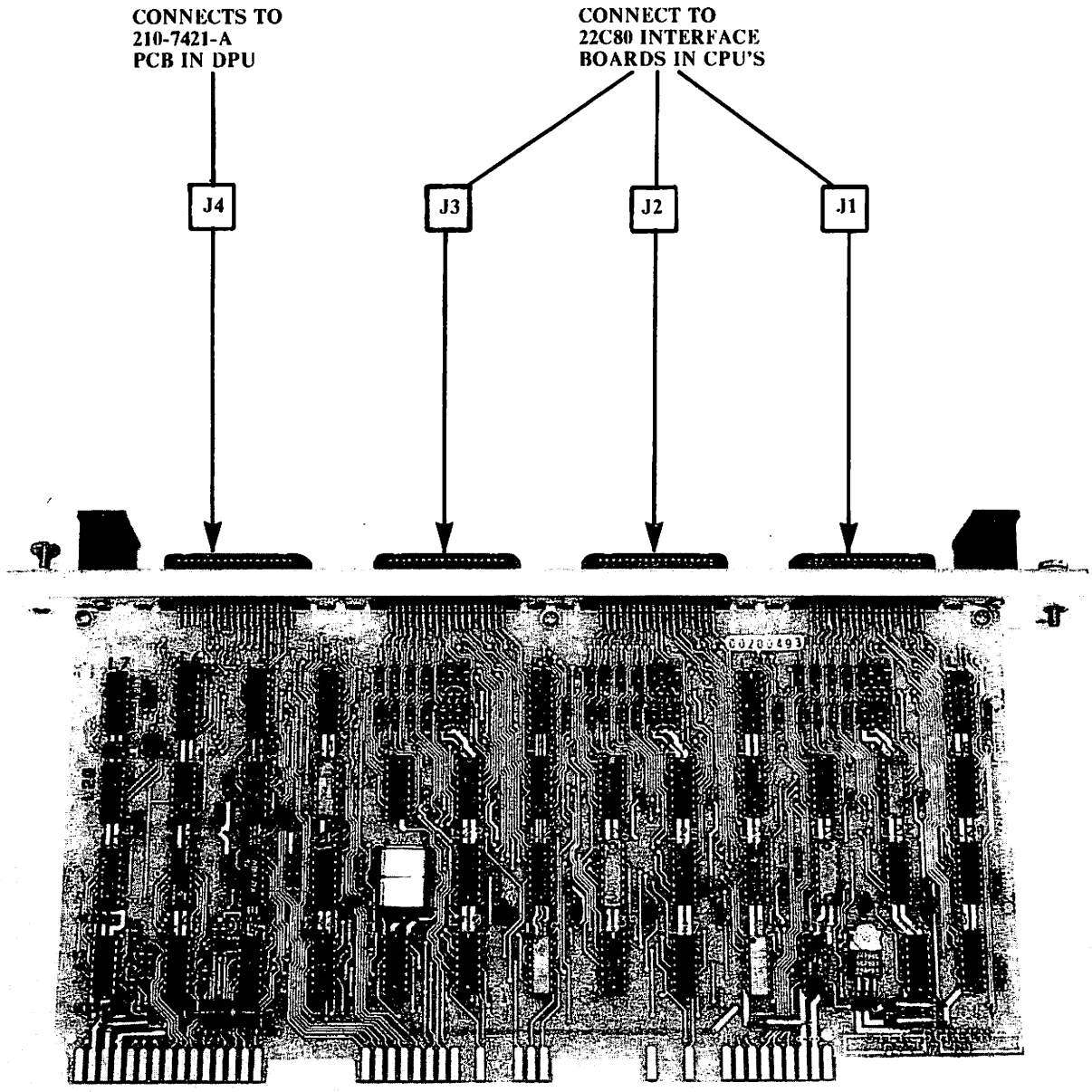


FIGURE 2 WL NO. 210-7717 MULTIPLEXER BOARD

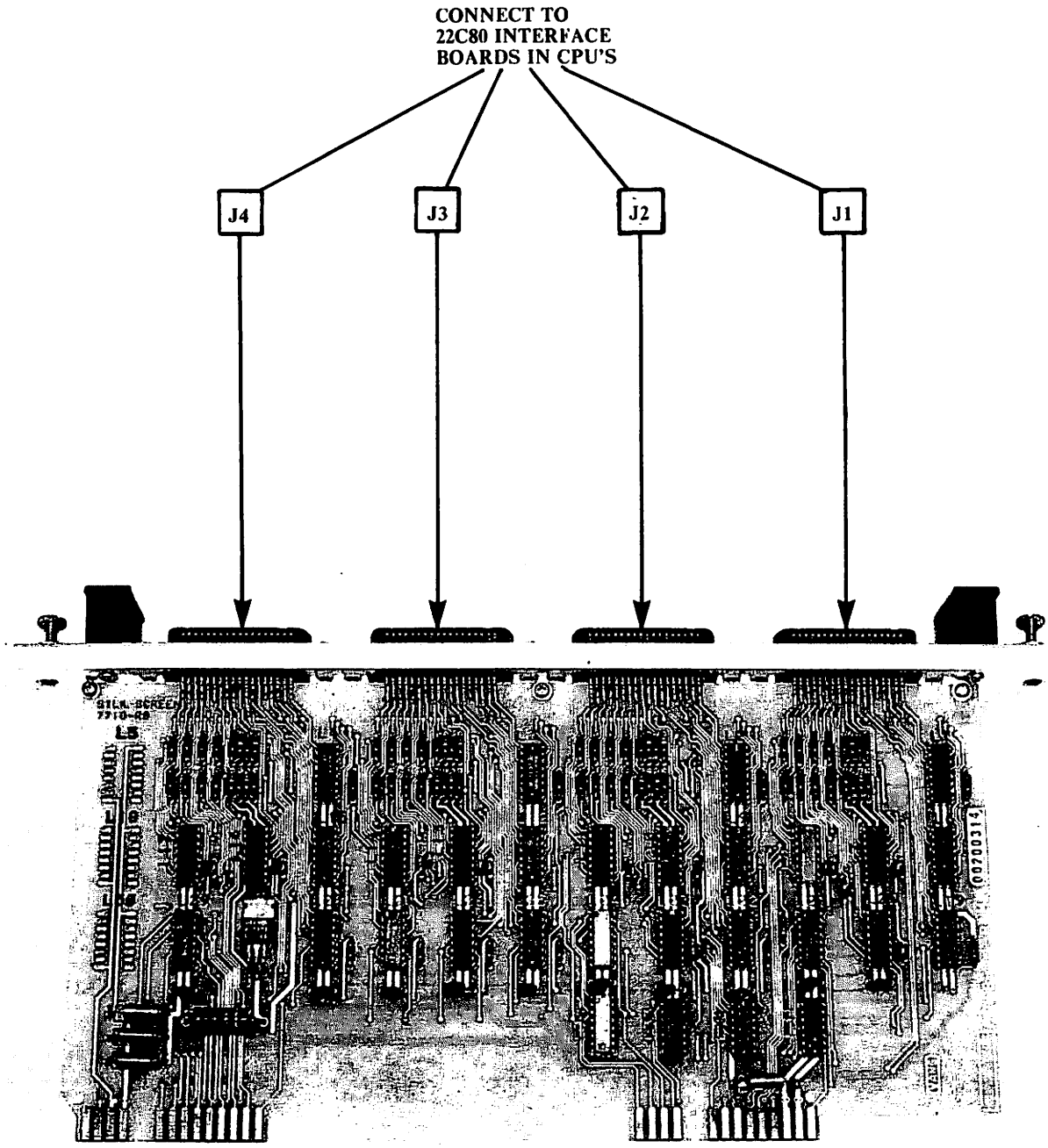


FIGURE 3 WL NO. 210-7718 PORT EXPANDER BOARD

5. TROUBLESHOOTING

If only one channel of a 2280MUX system fails (I/O error indication), it is possible to isolate the cause of the failure by interchanging the I/O cables at the Port Expander board or Multiplexer board (as applicable) in the 2280 DPU/MUX. If, after swapping CPU-to-MUX cables, the problem remains with the same 2280MUX channel, conclude that the Port Expander/Multiplexer is defective; if the problem moves with the suspected 2200 CPU to the different 2280MUX channel, conclude that the 2200 CPU is defective--the most likely cause being the 22C80 I/O controller.

If all channels fail, the 2280 DPU, the DPU/MUX power supply, the 2280MUX multiplexer board, the disk cables, or the 2280 disk itself may be defective.

6. HARDWARE THEORY OF OPERATION (MAJOR-FUNCTION LEVEL)

Port Expander Board (WL #210-7718) (ref: FIGURE 4 and MNEMONICS)

Port Selector--

Decodes the port-select signals ($\overline{SO-1}$), received from the Multiplexer board, into port-select signals $\overline{P_{1-4}}$. These signals enable one of four CPU I/O ports on the Port Expander board.

Reset Mux--

Selects the appropriate Reset pulse (RESET1-4), received from the CPU's, for output to the Multiplexer board as $\overline{ICAPM}$. The Reset pulse is used to initialize the DPU, the MUX, and the disk drive.

Request Latch--

Selects the appropriate Request signal (REQ_{1-4}), received from the CPU's, for output to the Multiplexer board as RQ_{1-4}. The Request line informs the DPU that a CPU requires disk access.

Input Bus Mux--

Receives the read data (IB_{1-8}) that is to be sent to the CPU. During the first half of the Input Data Strobe (IDS), the low order bits (IB_{1-4}) are selected through the Input Bus Mux as Input Data bits ID1-ID4. During the second half of the IDS, the high order bits (IB_{5-8}) are selected through the multiplexer. The Input Data bits are sent to the CPU's, via the 22C80 I/O controller.

Level Converters (Line Receivers/Drivers)--

Convert differential voltage levels (Emitter Coupled Logic--ECL--levels) received from the CPU's (22C80) to the TTL levels required by the Multiplexer board. Convert TTL voltage levels received from the Multiplexer board to the differential driving levels required by the CPU's (22C80). Use of ECL in this application allows each CPU disk I/O logic to operate at optimum speed even with the greater distance from CPU to multiplexer, as compared to the driver/receiver distances possible with TTL.

PORT EXPANDER SIGNAL MNEMONICS

$\overline{ACK}_{1-4}$ (Acknowledge):

Acknowledgement of CPU request for disk use -- from MUX (210-7717)

ACK (Acknowledge):

Acknowledgement of CPU request for disk use -- to CPU's (22C80)

CLK (Clock):

Clocks Request Latch -- from MUX (210-7717)

CPB (Central Processor Busy):

CPU ready/busy status -- from CPU's (22C80)

$\overline{CPB}$ (Central Processor Busy):

CPU ready/busy status -- to MUX (210-7717)

DN3 (Disk Number 3):

Indicates access to second drive is required -- from CPU's (22C80)

$\overline{\text{DN3}}$ (Disk Number 3):

Indicates access to second drive is required -- to MUX (210-7717)

DOD1-DOD4 (Data Out to Disk):

Write data to be sent to disk -- to MUX (210-7717)

DRB (Disk Ready/Busy):

Disk ready/busy status -- to CPU's (22C80)

DS (Data Select):

Selects IB_{1-4} or IB_{5-8} for output -- from MUX (210-7717)

IB_{1-8} (Input Bus):

Read data to be sent to CPU's -- from MUX (210-7717)

$\overline{\text{ICAPM}}$ (Input Calculator Prime):

Resets DPU and disk -- to MUX (210-7717)

ID1-ID4 (Input Data):

Read data to be sent to CPU's -- to CPU's (22C80)

IDS (Input Data Strobe):

Strobes read data from disk to CPU's -- to CPU's (22C80)

IOB1 (Input/Output Bit 1):

Parity bit for write data to be sent to disk -- from CPU's (22C80)

$\overline{\text{IOB1}}$ (Input/Output Bit 1):

Parity bit for write data to be sent to disk -- to MUX (210-7717)

OBS (Output Bus Strobe):

Strobes write data from CPU's to disk -- from CPU's (22C80)

$\overline{\text{OBS}}$ (Output Bus Strobe):

Strobes write data from CPU's to disk -- to MUX (210-7717)

OD1-OD4 (Output Data):

Write data to be sent to disk -- from CPU's (22C80)

$\overline{P_{1-4}}$ (Port):

Select appropriate CPU port circuitry -- internal

RB (Ready/Busy):

Disk ready/busy status -- from MUX (210-7717)

REQ_{1-4} (Request):

Request by CPU for disk use -- from CPU's (22C80)

$RESET_{1-4}$:

Reset DPU and disk -- from CPU's (22C80)

RQ_{1-4} (Request):

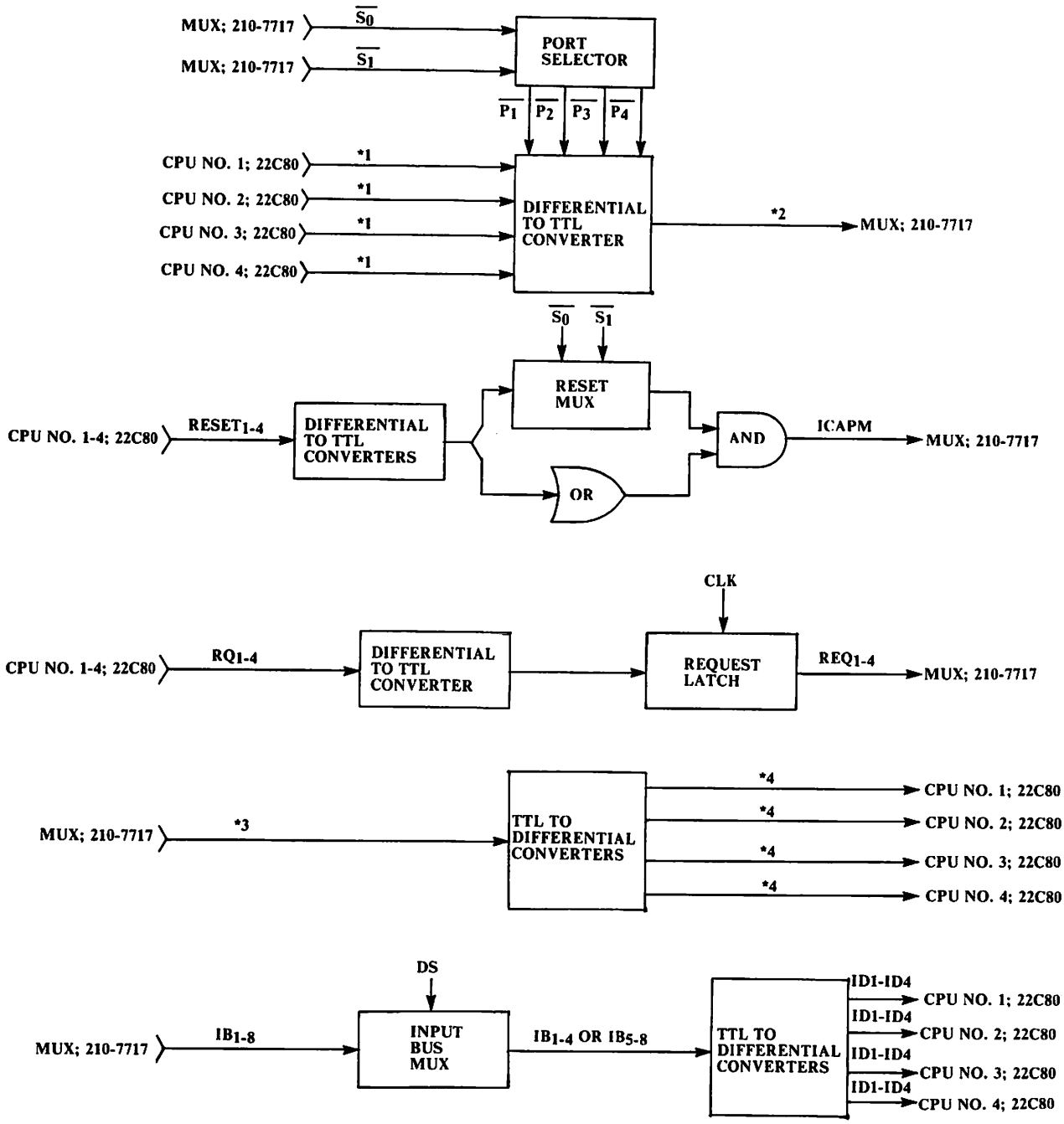
Request by CPU for disk use -- to MUX (210-7717)

$\overline{S_{0-1}}$ (Select):

Decoded into port select signals -- from MUX (210-7717)

$\overline{STR}$ (Strobe):

Strobes read data from disk to CPU's -- from MUX (210-7717)



*1 — OD1-OD4, IOB1, DN3, CPB, OBS
*2 — DOD1-DOD4, $\overline{IOB1}$, $\overline{DN3}$, $\overline{CPB}$, $\overline{OBS}$
*3 —RB, $\overline{STR}$, $\overline{ACK}_{1-4}$
*4 —DRB, IDS, ACK

FIGURE 4 PORT EXPANDER BLOCK DIAGRAM

Multiplexer Board (WL #210-7717) (ref: FIGURE 5 and MNEMONICS)

Output Data Latch--

Receives the write data (DOD1-DOD4) that is to be sent to (written on) the disk. During the first half of the Output Bus Strobe ($\overline{OBS}$), the data-out bits are clocked through the Output Data Latch as KS0-KS3. During the second half of OBS, the data-out bits are clocked through the latch as KS4-KS7. The KS bits are sent to the disk via the DPU.

Reset Mux--

Selects the appropriate (desired) Reset pulse (RESET1-RESET3) received from the CPU's for output to the DPU as $\overline{ICAPM}$. The Reset pulse is used to initialize the DPU and disk drive.

Request Latch--

Selects the appropriate (desired) Request signal (REQ1-REQ3) received from the CPU's. The Request line informs the DPU that a CPU requires disk access.

Polling Circuit--

Scans the CPU request lines ($RQ1\text{-}4_{1\text{-}4}$) to determine whether disk access is desired. When a request is received, the multiplexer sends an acknowledge signal ($\overline{ACK1\text{-}4_{1\text{-}4}}$) to the requesting CPU, and the polling sequence is momentarily halted until that CPU completes its disk operation. Polling resumes with the next sequential channel. RESET initializes the polling circuit to a count of one (channel #1 of the WL# 210-7717 Multiplexer board).

Clock--

Increments the CPU polling circuit.

Decode Control Circuit--

Monitors the acknowledge signals ($\overline{ACK1\text{-}4_{1\text{-}4}}$), and decodes these signals

into the appropriate Board Select (BS1-BS4), Port Select (P1-P3), and Select (S0-S1) signals.

Port Selector--

Decodes the port-select signals ($\overline{S0}$-$\overline{S1}$) into port-select signals $\overline{P1}$-$\overline{P3}$. These signals enable the port circuitry for the CPU requiring disk access.

CPU Ready/Busy Latch--

Provides the DPU with the CPU ready/busy status.

Input Bus Strobe Latch--

Receives the Input Bus Strobe from the DPU, and retransmits the strobe to each CPU at the appropriate time.

Input Bus Mux--

Receives the read data (IB1-IB8) that is to be sent to the CPU. During the first half of the Input Bus Strobe ($\overline{IBS}$), the low order bits (IB1-IB4) are selected through the Input Bus Mux as Input Data bits ID1-ID4. During the second half of the IBS, the high order bits (IB5-IB8) are selected through the multiplexer. The Input Data bits are sent to the CPU's via the 22C80 I/O controller.

Level Converters (Line Receivers/Drivers)--

Convert differential voltage levels (Emitter Coupled Logic--ECL--levels) received from the CPU's (22C80) to the TTL levels required by the Multiplexer board. Convert TTL voltage levels received from the Multiplexer board to the differential driving levels required by the CPU's (22C80). Use of ECL in this application allows each CPU disk I/O logic to operate at optimum speed even with the greater distance from CPU to multiplexer, as compared to the driver/receiver distances possible with TTL.

MULTIPLEXER SIGNAL MNEMONICS

$\overline{ACK1_{1-3}}$ (Acknowledge):

Acknowledgement of CPU request for disk use -- internal

$\overline{ACK2\text{-}4_{1-4}}$ (Acknowledge):

Acknowledgement of CPU request for disk use -- to Port Expanders (210-7718)

ACK (Acknowledge):

Acknowledgement of CPU request for disk use -- to CPU's (22C80)

$\overline{BS2}$-$\overline{BS4}$ (Board Select):

Selects the appropriate Port Expander -- to Port Expanders (210-7718)

CLK (Clock):

Clocks Request Latch -- internal

CPB (Central Processor Busy):

CPU ready/busy status -- from CPU's (22C80)

$\overline{CPB}$ (Central Processor Busy):

CPU ready/busy status -- to DPU (210-7421-A)

DN3 (Disk Number 3):

Indicates access to second drive is required -- from CPU's (22C80)

$\overline{DN3}$ (Disk Number 3):

Indicates access to second drive is required -- to DPU (210-7421-A)

DOD1-DOD4 (Data Out to Disk):

Write data to be sent to disk -- internal

DRB (Disk Ready/Busy):

Disk ready/busy status -- to CPU's (22C80)

DS (Data Select):

Selects IB1-IB4 or IB5-IB8 for output -- internal

$\overline{GISO}$:

Strobes write data from CPU's to disk -- to DPU (210-7421-A)

GKBD:

CPU ready/busy status -- to DPU (210-7421-A)

$\overline{\text{IBS}}$ (Input Bus Strobe):

Strobes read data from disk to CPU's -- from DPU (210-7421-A)

IB1-IB8 (Input Bus):

Read data to be sent to CPU's -- from DPU (210-7421-A)

$\overline{\text{ICAPM}}$ (Input Calculator Prime):

Resets DPU and disk -- to DPU (210-7421-A)

ID1-ID4 (Input Data):

Read data to be sent to CPU's -- to CPU's (22C80)

IDS (Input Data Strobe):

Strobes read data from disk to CPU's -- to CPU's (22C80)

IOB1 (Input/Output Bit 1):

Parity bit for write data to be sent to disk -- from CPU's (22C80)

$\overline{\text{IOB1}}$ (Input/Output Bit 1):

Parity bit for write data to be sent to disk -- to DPU (210-7421-A)

KS0-KS7:

Write data to be sent to disk -- to DPU (210-7421-A)

$\overline{\text{OBS}}$ (Output Bus Strobe):

Strobes write data from CPU's to disk -- from Port Expanders (210-7718)

OD1-OD4 (Output Data):

Write data to be sent to disk -- from CPU's (22C80)

ODS (Output Data Strobe):

Strobes write data from CPU's to disk -- from CPU's (22C80)

$\overline{\text{P1}}$-$\overline{\text{P3}}$ (Port):

Select appropriate CPU port circuitry -- internal

RB (Ready/Busy):

Disk ready/busy status -- from DPU (210-7421-A)

REQ1-REQ3 (Request):

Request by CPU for disk use -- from CPU's (22C80)

RESET1-RESET3:

Reset DPU and disk -- from CPU's (22C80)

$RQ1_{1-3}$ (Request):

Request by CPU for disk use -- internal

$RQ2\text{-}4_{1-4}$ (Request):

Request by CPU for disk use -- from Port Expanders (210-7718)

S0-S1 (Select):

Decoded into port select signals -- internal

$\overline{STR}$ (Strobe):

Strobes read data from disk to CPU's -- to Port Expanders (210-7718)

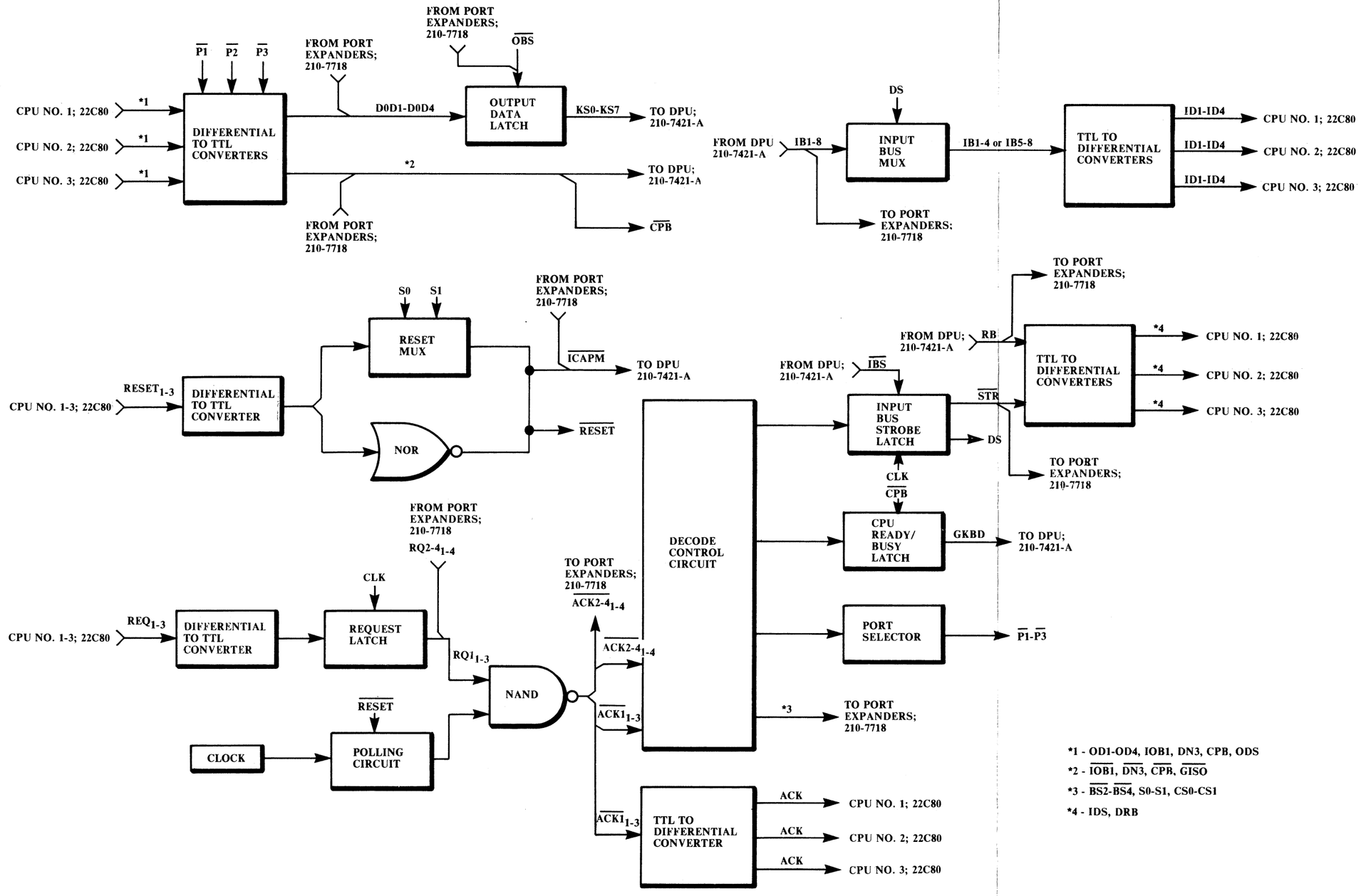
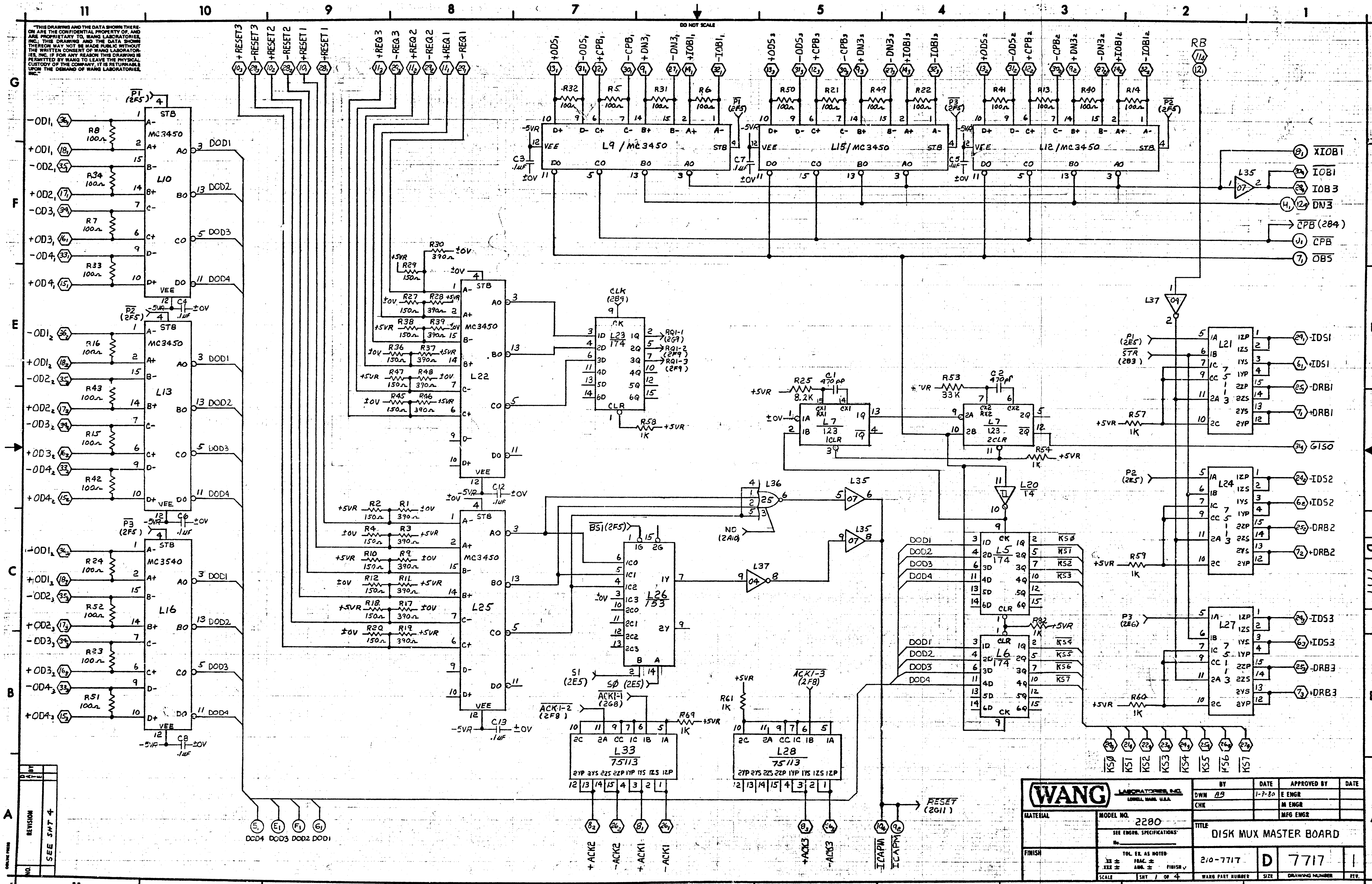


FIGURE 5 WL. NO. 210-7717 MULTIPLEXER BLOCK DIAGRAM



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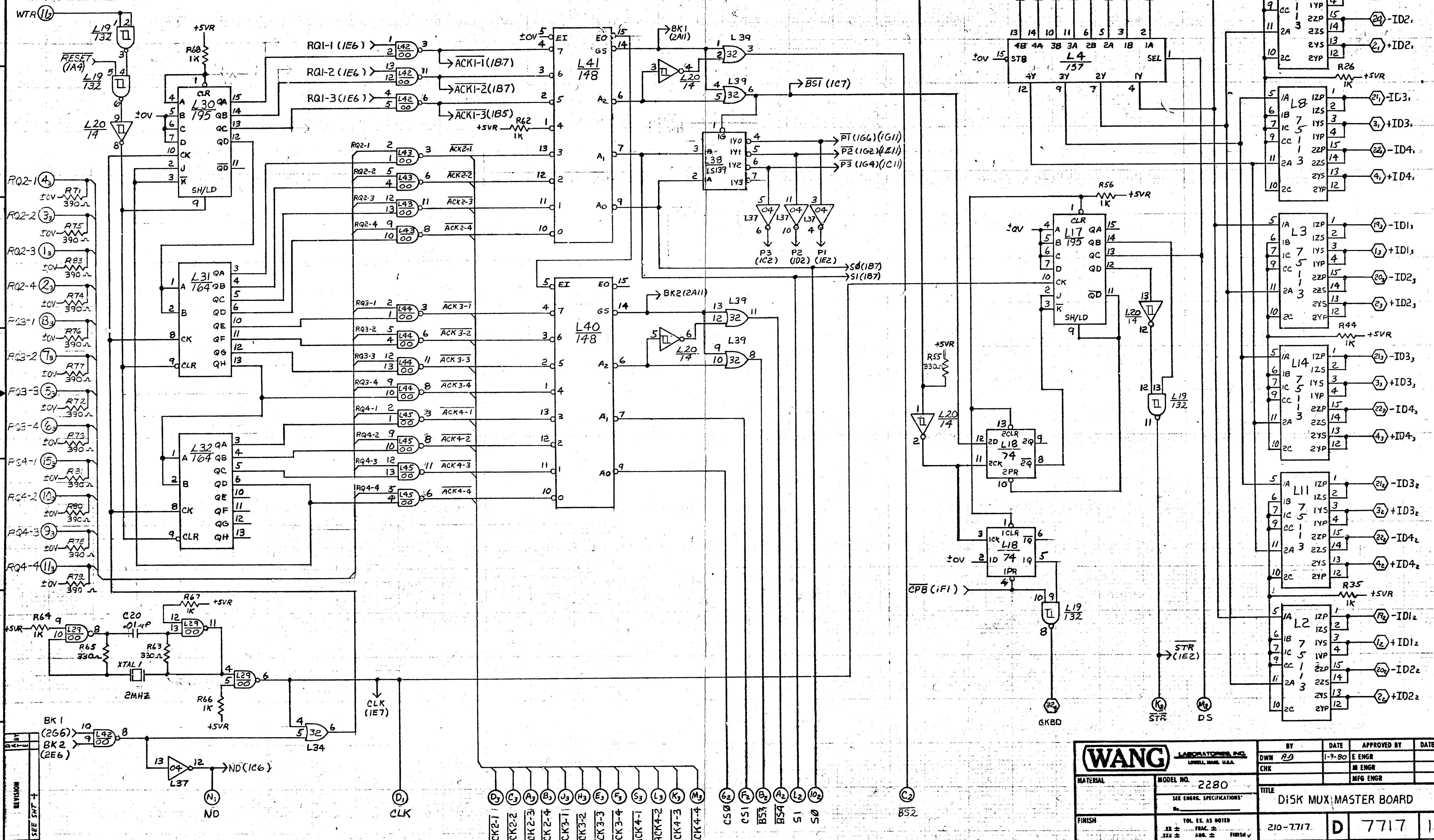
L10 MC3450
L13 MC3450
L16 MC3540
L22 MC3450
L25 MC3450
L9 / MC3450
L15 / MC3450
L12 / MC3450
L23 174
L26 153
L7 123
L5 174
L6 174
L21
L24
L27
L33 75113
L28 75113
L35
L36
L37
L20
XIOB1
IOB1
IOB3
DN3
CPB (2B4)
CPB
OB5
GISO
-IDS1
+IDS1
-DRB1
+DRB1
-IDS2
+IDS2
-DRB2
+DRB2
-IDS3
+IDS3
-DRB3
+DRB3
KS0 KS1 KS2 KS3 KS4 KS5 KS6 KS7
DOD4 DOD3 DOD2 DOD1
+ACK2 -ACK2 +ACK1 -ACK1
+ACK3 -ACK3
ICAPW ICAPM
RESET (2G11)
REVISION SEE SHT 4
WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.
DWN AB 1-7-80
MODEL NO. 2280
TITLE DISK MUX MASTER BOARD
210-7717
D 7717 1
SHT 1 OF 4

DO NOT SCALE



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	BY	DATE	APPROVED BY	DATE
DWN	A.B	1-9-80	E ENGR	
CHK			M ENGR	
			MFG ENGR	

MATERIAL

MODEL NO. 2280

SEE ENGRG. SPECIFICATIONS No.

FINISH

TOL. EX. AS NOTED .XX ± FRAC. ± .XXX ± ANG. ± FINISH ✓

SCALE SHT 2 OF 4

TITLE DISK MUX MASTER BOARD

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.
210-7717	D	7717	1

DO NOT SCALE

J4 J3 J2 J1 (36 … 19)

L7 L6 L5 L4 L3 L2 L1 L20 L19 L18 L17 L16 L15 L14 L13 L12 L11 L10 L9 L8 L32 L31 L30 L29 L28 L27 L26 L25 L24 L23 L22 L21 L45 L44 L43 L42 L41 L40 L39 L38 L37 L36 L35 L34 L33

R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41 R42 R43 R44 R45 R46 R47 R48 R50 R51 R52 R53 R54 R55 R56 R57 R58 R59 R60 R61 R62 R63 R64 R65 R67 R66 R68 R70 R69 R71 R72 R73 R74 R75 R76 R77 R78 R79 R80 R81

C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24

XTAL1 Q1

7717 R1

7717-A1

S3 → A3 S2 → A2 S1 → A1

BY	DATE	APPROVED BY	DATE
DWN AB	3/19/80	E ENGR	
CHK		M ENGR	
		MFG ENGR	

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.

MATERIAL

MODEL NO. 2280 — SEE ENGRG. SPECIFICATIONS No.

TITLE: DISK MUX MASTER BOARD

FINISH

TOL. EX. AS NOTED .XX ± FRAC. ± .XXX ± ANG. ± FINISH √

SCALE SHT 3 OF 4

210-7717 | D | 7717 | 1

WANG PART NUMBER | SIZE | DRAWING NUMBER | REV.

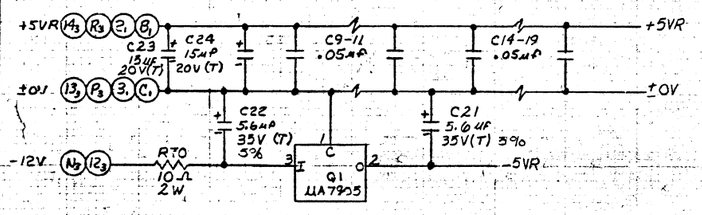
REVISION NO. SEE SHEET 4

DO NOT SCALE

I.C. LOCATION	W.L. PART NO.	TYPE
L1,2,3,8,11,19, 21,24,27,28,33	376-0256	75113
L4	376-0082	74157
L5,6,23	376-0098	74174
L7	376-0080	74123
L9,10,12,13,15, 16,22,25	376-0275	MC3450
L17,30	376-0097	74195
L18	376-0006	7474
L29,42-45	376-0002	7400
L37	376-0010	7404
L26	376-0048	74153
L31,32	376-0102	74164
L34,39	376-0093	7432
L35	376-0056	7407
L36	376-0092	7425
L38	376-0226	74LS139
L40,41	376-0171	74148
L19	376-0266	74132
L20	376-0139	7419

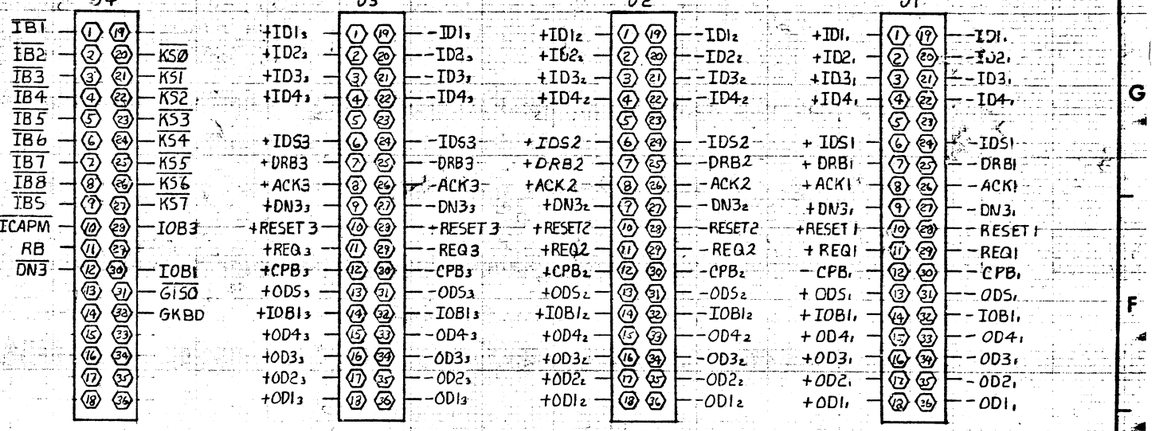
IC TYPE	LOCATION	SPARES
7400	L29	1
7407	L35	3
7425	L36	1
7432	L34	3
74LS139	L38	1

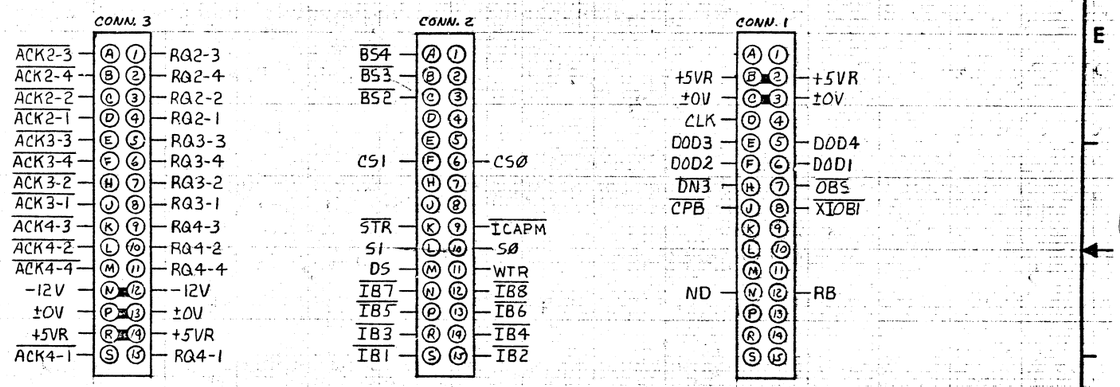
COMPONENT	TYPE	W.L. PART NO.
R1,3,9,11,17, 19,28,30,37, 39,46,48, 71-81,83	39Ω 1/4W,10%	330-2039
R2,4,10,12,18, 20,27,29,36, 38,45,47	150Ω 1/4W,10%	330-2015
R5-8,13-16, 21-24,31-34, 40-43,49-52	100Ω 1/4W,10%	330-2010
R25	8.2K 1/4W,10%	330-3082
R26,35,44,54 56-62,64, 66-69,82	1K 1/4W, 10%	330-3010
R53	33K 1/4W,10%	330-4033
R55,63,65	330Ω 1/4W,10%	330-2033
R70	10Ω 2W, 10%	337-1010
C1,2	4700pF 500V	300-1470
C3-8,12,13,	.1μF 50V	300-1930
C9-11,14-19	.05μF 12V	300-1900
C20	.01μF 25V	300-1903
C21,22	5.6μF 35V (T) 5%	300-4025
C23,24	15μF 20V (T)	300-4022
XTAL1	2 MHz	321-0010
Q1	UA7905	374-0002
J1-4	36 PIN CONN.	350-1044



MNEMONIC	COORD.
ACK2-1, ACK4-4	2A8
ACK2+, ACK2-	1A7
ACK1+, ACK1-	1A6
ACK3+, ACK3-	1A5
$\overline{BS2}$	2A5
$\overline{BS3}$	2A6
BS4	2A6
CLK	2A8
CS0	2A6
CS1	2A6
$\overline{CPB}$	1F1
$+CPB_1$, $-CPB_1$	1G7
$+CPB_2$, $-CPB_2$	1G3
$+CPB_3$, $-CPB_3$	1G5
$\overline{DN3}$	1F1
$+DN3_1$, $-DN3_1$	1G6
$+DN3_2$, $-DN3_2$	1G3
$+DN3_3$, $-DN3_3$	1G5
DOD1 - DOD4	1A8
DRB1+, DRB1-	1D1
DRB2+, DRB2-	1C1
DRB3+, DRB3-	1B1
DS	2A2
$\overline{GIS0}$	1D1
GKBD	2A4
$\overline{IBS}$	2G4
$\overline{IB1}$ - $\overline{IB8}$	2G3
$\overline{ICAPM}$	1A4
$-ID1_1$ - $-ID4_1$	2G1
$+ID1_1$ - $+ID4_1$	2G1
$-ID1_2$ - $-ID4_2$	2B1
$+ID1_2$ - $+ID4_2$	2B1
$-ID1_3$ - $-ID4_3$	2E1
$+ID1_3$ - $+ID4_3$	2E1
$+IOB1_1$, $-IOB1_1$	1G6
$+IOB1_2$, $-IOB1_2$	1G3
$+IOB1_3$, $-IOB1_3$	1G4
IOB1	1F1
IOB3	1F1

MNEMONIC	COORD.
IDS1-, IDS1+	1B1
IDS2-, IDS2+	1D1
IDS3-, IDS3+	1C1
$\overline{KS0}$ - $\overline{KS7}$	1B2
NO	2A10
$\overline{OBS}$	1F1
$-OD1_1$ - $-OD4_1$	1F11
$+OD1_1$ - $+OD4_1$	1F11
$-OD1_2$ - $-OD4_2$	1E11
$+OD1_2$ - $+OD4_2$	1E11
$-OD1_3$ - $-OD4_3$	1C11
$+CD1_3$ - $+OD4_3$	1C11
$+OD5_1$, $-OD5_1$	1G7
$+OD5_2$, $-OD5_2$	1G4
$+OD5_3$, $-OD5_3$	1G5
RB	1G2
-RESET1 - -RESET3	1G9
+RESET1 - +RESET3	1G9
-REQ1 - -REQ3	1G8
+REQ1 - +REQ3	1G8
RQ2-1 - RQ4-4	2E11
SØ	2A3
SI	2A5
$\overline{STR}$	1B3
WTR	2G11
$\overline{XIOB1}$	1F1





E-REV 0

NO.	REVISION	BY	DATE
0	ORIGINATED PER ECN # 5808	RB	1-9-80
1	REVISED PER ECN # 5196	RB	5-19-80
2	APPD: [illegible]	[illegible]	7-10-80

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.

BY	DATE	APPROVED BY	DATE
DWN RB	1-9-80	E ENGR [illegible]	7-10-80
CHK [illegible]	7-10-80	M ENGR	
		MFG ENGR	

MATERIAL

MODEL NO. 2280

SEE ENGR. SPECIFICATIONS No.

FINISH

TOL. EX. AS NOTED .XX ± FRAC ± .XXX ± ANG. ± FINISH √

SCALE SAT + OF +

TITLE DISK MUX MASTER BOARD

210-7717 | D | 7717 | 1

WANG PART NUMBER | SIZE | DRAWING NUMBER | REV.

D 7717

DO NOT SCALE

$\overline{P_1}$ (2B9) $\overline{P_2}$ (2B9) $\overline{P_3}$ (2C9) $\overline{P_4}$ (2C9)

MC3450 L17 L8 L11 L14 L7 L10 L13 L16

+5VR -5VR ±10V

+ODI1 -ODI1 +OD21 -OD21 +OD31 -OD31 +OD41 -OD41
+ODI2 -ODI2 +OD22 -OD22 +OD32 -OD32 +OD42 -OD42
+ODI3 -ODI3 +OD23 -OD23 +OD33 -OD33 +OD43 -OD43
+IOBI1 -IOBI1 +DN31 -DN31 +CPB1 -CPB1 +OBS1 -OBS1
+IOBI2 -IOBI2 +DN32 -DN32 +CPB2 -CPB2 +OBS2 -OBS2
+IOBI3 -IOBI3 +DN33 -DN33 +CPB3 -CPB3 +OBS3 -OBS3

R32 R28 R31 R27 R8 R4 R7 R10 R16 R50 R15 R49 R24 R59 R23 R58 R22 R56 R21 R57 R30 R65 R29 R66 R33 R5 R32 R6 R37 R13 R39 R14

C8 C2 C4 C6 C5 C7 C3 C22 C23 .1μF 5.6μF (T)

R76 10Ω 2W Q1 MR7905 R74 1K R73 1K

L26 L27 75113

ACK1 − ACK1 + ACK2 − ACK2 + ACK3 − ACK3 + ACK4 − ACK4 +

DOD1 DOD2 DOD3 DOD4 IOBI DN3 CPB OBS

REVISION	BY	DATE
D Change		
SEE SHT 1		

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY	DATE
	DWN CB	3/8/80	E ENGR	
	CHK		M ENGR	
			MFG ENGR	

MATERIAL	MODEL NO. 2280	TITLE DISK MUX SLAVE BD
	SEE ENGRG. SPECIFICATIONS No.	
FINISH	TOL. EX. AS NOTED XX ± FRAC. ± XXX ± ANG. ± FINISH √	210-7718 D 7718 2
	SCALE SHT / OF	WANG PART NUMBER SIZE DRAWING NUMBER REV.

7718 D

DO NOT SCALE

+RESET1 (10) −RESET1 (28) +RESET2 (10₂) −RESET2 (28₂) +RESET3 (10₃) −RESET3 (28₃) +RESET4 (10₄) −RESET4 (28₄)

+REQ1 (11₁) −REQ1 (29₁) +REQ2 (11₂) −REQ2 (29₂) +REQ3 (11₃) −REQ3 (29₃) +REQ4 (11₄) −REQ4 (29₄)

ND (Y1) CLK. (D1)

L23 L20 MC3450 — R1 R2 R3 R4 R7 R8 R11 R12 R17 R18 R25 R26 R27 R28 R34 R35 R36 R37 R43 R44 R45 R46 R52 R53 R54 R55 R61 R62 R63 R64 150Ω 390Ω ±0V +5VR C10 C9 .1MF

S_0 (2C11) S_1 (2C11) $\overline{BS}$ (2B11)

L24 74153 — L33 7404 — L32 7425 — L37 7409

L21 74174 — R70 1K CLR

L34 74LS139 — S_1 (2G8) S_0 (2G8) $\overline{BS}$ (2F7) $\overline{P_4}$ (1G11)(1C7) $\overline{P_3}$ (1C11)(1E7) $\overline{P_2}$ (1E11)(1G4) $\overline{P_1}$ (1B11)(1G6) RB (12) STR (N1)

L19 L22 L25 L29 75113 — R67 R71 R72 R75 1K +5VR

IBS1− IBS1+ DRB1− DRB1+ IBS2− IBS2+ DRB2− DRB2+ IBS3− IBS3+ DRB3− DRB3+ IBS4− IBS4+ DRB4− DRB4+

RQ4 RQ3 RQ2 RQ1 ICAPM

IB_4 IB_8 IB_3 IB_7 IB_2 IB_6 IB_1 IB_5 DS

L26 74157 SEL STB ±0V

L1 L6 L2 L9 L3 L12 75113 — R33 R42 R51 R60 1K +5VR

−IB1₁ +IB1₁ −IB2₁ +IB2₁ −IB3₁ +IB3₁ −IB4₁ +IB4₁ −IB1₂ +IB1₂ −IB2₂ +IB2₂ −IB3₂ +IB3₂ −IB4₂ +IB4₂ −IB1₃ +IB1₃ −IB2₃ +IB2₃ −IB3₃ +IB3₃ −IB4₃ +IB4₃

L15 L4 75113

+IB4₄ −IB4₄ +IB3₄ −IB3₄ +IB2₄ −IB2₄ +IB1₄ −IB1₄

REVISION	BY	DATE	APPROVED BY	DATE
SEE SHT 1	DWN RB	7/8/8	E ENGR	
	CHK		M ENGR	
			MFG ENGR	

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.

MATERIAL — MODEL NO. 2280 — SEE ENGR. SPECIFICATIONS — No.

FINISH — TOL. EX. AS NOTED XX ± FRAC. ± XXX ± ANG. ± FINISH √

TITLE: DISK MUX SLAVE BD

210-7718 | D 7718 | 2

SCALE — SHT — OF — | WANG PART NUMBER | SIZE | DRAWING NUMBER

DO NOT SCALE

J4 J3 J2 J1

L5 SPARE

L18 SPARE

L30 SPARE

L4 L3 L2 L1

L17 L16 L15 L14 L13 L12 L11 L10 L9 L8 L7 L6

L29 Q1 L28 L27 L26 L25 L24 L23 L22 L21 L20 L19

L34 L33 L32 L31

+ C21

C22 +

C23 +

R76

- C24 +

S3 A3 S1 A1

7718

REVISION	BY	DATE	APPROVED BY	DATE
SEE SHT 4	DWN	3/26/80	E ENGR	
	CHK		M ENGR	
			MFG ENGR	

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.

MATERIAL

MODEL NO. 2280
SEE ENGR. SPECIFICATIONS
No.

FINISH

TOL. EX. AS NOTED
.XX ± FRAC. ±
.XXX ± ANG. ± FINISH √

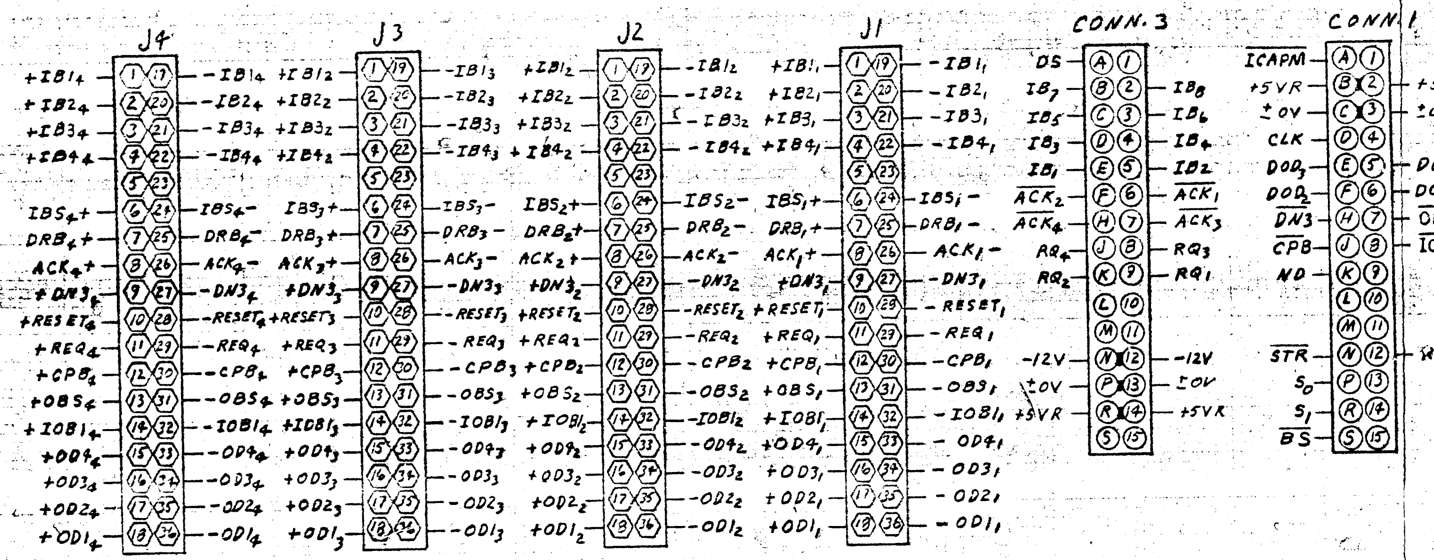
SCALE — INT 3 OF 4

TITLE DISK MUX SLAVE BD

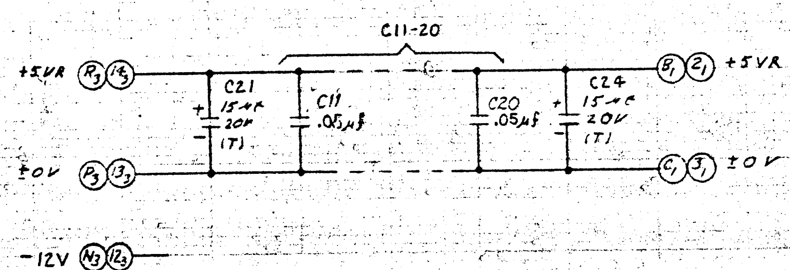
210-7718 | D | 7718 | 2

WANG PART NUMBER | SIZE | DRAWING NUMBER | REV

DO NOT SCALE



I.C. TYPE	LOCATION	SPARES
7409	L31	3
7425	L32	1
74LS139	L34	1



LOCATION	WL PART No.	TYPE
L1-4, 6, 9, 12, 15, 19, 22, 25-28	376-0256	75113
L5, 18, 30		SPARE
L7, 8, 10, 11, 13, 14, 16, 17, 20, 23	376-0275	MC3450
L21	376-0098	74174
L24	376-0098	74153
L29	376-0082	74157
L31	376-0085	7409
L32	376-0092	7425
L33	376-0010	7404
L34	376-0226	74LS139

MNEMONIC	COORDINATE
RB	2 B 11
+RESET₁ THRU +RESET₄	2 G 11
-RESET₁ THRU -RESET₄	2 G 11
+REQ₁ THRU +REQ₄	2 D 11
-REQ₁ THRU -REQ₄	2 D 11
RQ₁ - RQ₄	2 A 5
S₀, S₁	2 C 11
STR	2 B 11

COMPONENT	WL PART No	TYPE
R1, 3, 9, 11, 17, 19, 25, 27, 35, 37, 44, 46, 53, 55, 62, 64	330-2039	390Ω 1/4W 10%
R2, 4, 10, 12, 18, 20, 26, 28, 34, 36, 43, 45, 52, 54, 61, 63	330-2015	150Ω 1/4W 10%
R5-8, 13-16, 21-24, 29-32, 38-41, 47-50, 56-59, 65-68	330-2010	100Ω 1/4W 10%
R33, 42, 51, 60, 69-75	330-3010	1K 1/4W 10%
R76	337-1010	10Ω 2W 10%
C1-10	300-1930	.1μF 50V CER
C11-20	300-1900	.05μF 12V CER
C21, 24	300-4022	15μF 20V (T)
C22, 23	300-4025	5.6μF 35V (T)
Q1	374-0002	7905

MNEMONIC	COORDINATE
+IB3₁, +IB4₁	2 F 1
-IB3₁, -IB4₁	2 F 1
+IB3₂, +IB4₂	2 D 1
-IB3₂, -IB4₂	2 D 1
+IB3₃, +IB4₃	2 B 1
-IB3₃, -IB4₃	2 B 1
+IB3₄, +IB4₄	2 B 4
-IB3₄, -IB4₄	2 B 4
IBS1+	2 A 9
IBS1-	2 A 9
IBS2+	2 A 8
IBS2-	2 A 9
IBS3+	2 A 7
IBS3-	2 A 8
IBS4+	2 A 6
IBS4-	2 A 7
ICAPM	2 A 5
IOB₁	1 B 4
+IOB1₁	1 G 6
-IOB1₁	1 G 6
+IOB1₂	1 G 4
-IOB1₂	1 G 4
+IOB1₃	1 G 7
-IOB1₃	1 G 7
+IOB1₄	1 G 8
-IOB1₄	1 G 8
ND	2 E 11
OBS	1 B 3
+OBS₁	1 G 5
-OBS₁	1 G 5
+OBS₂	1 G 3
-OBS₂	1 G 3
+OBS₃	1 G 6
-OBS₃	1 G 6
+OBS₄	1 G 7
-OBS₄	1 G 7
+OD1₁ THRU +OD4₁	1 F 11
-OD1₁ THRU -OD4₁	1 F 11
+OD1₂ THRU +OD4₂	1 D 11
-OD1₂ THRU -OD4₂	1 D 11
+OD1₃ THRU +OD4₃	1 B 11
-OD1₃ THRU -OD4₃	1 B 11
+OD1₄ THRU +OD4₄	1 G 10
-OD1₄ THRU -OD4₄	1 G 10

MNEMONIC	COORDINATE
ACK₁ - ACK₄	1 G 2
ACK1-, ACK2-	1 E 1
ACK1+, ACK2+	1 E 1
ACK3-, ACK4-	1 D 1
ACK3+, ACK4+	1 D 1
BS	2 B 11
CLK	2 C 11
CPB	1 B 3
+CPB1	1 G 5
-CPB1	1 G 5
+CPB2	1 G 3
-CPB2	1 G 3
+CPB3	1 G 7
-CPB3	1 G 7
+CPB4	1 G 8
-CPB4	1 G 8
DN3	1 B 4
+DN3₁	1 G 6
-DN3₁	1 G 5
+DN3₂	1 G 4
-DN3₂	1 G 3
+DN3₃	1 G 7
-DN3₃	1 G 7
+DN3₄	1 G 8
-DN3₄	1 G 8
DOD₁ - DOD₄	1 A 10
DRB1+	2 A 9
DRB1-	2 A 9
DRB2+	2 A 8
DRB2-	2 A 8
DRB3+	2 A 7
DRB3-	2 A 7
DRB4+	2 A 6
DRB4-	2 A 6
DS	2 G 3
IB₁ - IB₈	2 G 4
+IB1₁, +IB2₁	2 G 1
-IB1₁, -IB2₁	2 G 1
+IB1₂, +IB2₂	2 E 1
-IB1₂, -IB2₂	2 E 1
+IB1₃, +IB2₃	2 C 1
-IB1₃, -IB2₃	2 C 1
+IB1₄, +IB2₄	2 B 3
-IB1₄, -IB2₄	2 B 3

NO.	REVISION	DATE	BY
0	ORG PER LWR #E893 APP'D 7-21-80	3-8-80	
1	REV. PER ECN NA 1197 DR 7-21-80		
2	REWORKED PER ECN 1774 7-21-80	7-7-80	

WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
		DWN	3/8/80	E ENGR	7-21-80
		CHK R. LeBlanc	7-21-80	M ENGR	
				MFG ENGR	
MATERIAL	MODEL NO. 2230	TITLE DISK MUX SLAVE BD			
	SEE ENGRG. SPECIFICATIONS No.				
FINISH	TOL. EX. AS NOTED .XX ± .XXX ± FRAC. ± ANG. ± FINISH	210-7718	D	7718	2
	SCALE	SHT OF	WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.

WANG LABORATORIES, INC.

BULLETIN

DATE: 05/10/85 ADMINISTRATIVE ____ TECHNICAL X NUMBER 336

ORIGINATOR: Dennis Ivey REVIEWED BY: John Howser

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

ALL OFFICES X HOME OFFICE X EACH EMPLOYEE ____

SUBJECT: 2280 DPU Prom Levels PAGE 1 OF 1

There has been some confusion over proper prom levels for the 2280 DPU. R&D is in the process of an intensive evaluation of the DPU performance. This study will inevitably lead to extensive ECO changes in the near future. The latest information from TAC suggest that R9 proms should now be currently installed. Our experience at the Area has convinced me that R9's produce more problems than they resolve. After installation, reports of random execution and program errors (ex.X75, P55) starts to occur.

I am endeavoring to stay in close contact with Product Support on all ECO and FCO information concerning this subject. If you have any questions please contact Dennis Ivey At the Area.

R7 Proms are the only stable version I can currently sanction at this time. Do not upgrade to R9's until further noticed.

CAT 3107

CAT 3107

MIKE - FROM FRANK CHATIGNY
DTSM - ATLANTA

2280 DPU STATUS REPORT

RDB	Total	R10	R7
3463	7	1	6
3486	4	1	3
3496	10	5	10
3469	10	2	8
3468	25	3	22
3462	22	11	11
3461	24	7	17
3460 Total	107	30	77

PROBLEMS ENCOUNTERED

Had a situation where we tried to upgraded dpu from R7 to R10. We were able to format disk with R10 Proms but when verify was run we got sector erros on two particular sectors, even after reformatting the disk platter. We installed a 7423 and 7422(rev 5), both the pcb's were at the proper rev. level. We tried two different sets of boards and got the same problems. We went back to the R7 proms and found that the sectors in question we flagged as alternate sectors by the R7 proms. We did not have to reformat with the R7 proms. It looked as if the R10 proms did not flag the bad sectors and they were picked up as header errors on a verify(0,52607). The pcb's were shipped out by the ce before I could test them out at the District Office.

I have noticed another situation where when you verify a disk platter(0,52608) which have know alternate sectors that you get an error in a sector outside the normal max. sector limits. These are not alternate sectors that have been flagged by the format routine. Sometime the error is outside the alternate range(64 higher than 52607). I have noticed this on both R7 and R10 proms. This does not seem to cause problems with the system operating properly.

Doris, please send this to.

Regards,

Charles A. Perkins
Atl.East DTS

ATTN: Mike Bahia
"M/S 001-260"
59 Electronics Ave.
Lowell, MA 01851

Branch DPU PROM Summary

Branch: Bloomington RDB: 3531

Known R7 DPU prom :	18
Known R10 DPU prom :	17
Total Branch DPU population:	35
R10 to R7 Downgrade for problems:	0

Present DPU Problem Accounts:

Dacomed
Freidman(AdCom Express)
Universal Title
Miller Schroeder Finance
Marquette-Holm
City of Bloomington

Branch: St. Paul RDB: 3538

Known R7 DPU proms:	20
Known R10 DPU proms:	3
Total Branch DPU population:	23
R10 to R7 Downgrade for problems:	0

St. Paul Problem accounts:

CUSTMER	PROM LEVEL
William Mitchell	R10 PROMS
Juran and Moody	R7 PROMS
Sanger Corporation	R7 PROMS

Branch: Rock Island RDB: 3533

Known R7 DPU proms:..... 5
Known R10 DPU proms:..... 7
Total Branch DPU population:..... 12

R10 to R7 Downgrades for problems:..... 1

Present DPU Problem Accounts:
See Iowa Rollup

Branch: Des Moines RDB: 3534

Known R7 DPU proms:..... 8
Known R10 DPU proms:..... 6
Total Branch DPU population:..... 14

R10 to R7 Downgrades for problems:..... 0

Branch: Cedar Rapids RDB: 3536

Known R7 DPU proms:..... 0
Known R10 DPU proms:..... 2
Total Branch DPU population:..... 2

R10 to R7 Downgrades for problems:..... 0

IOWA Problem Account Rollup(3533, 3534, 3536):

CUSTMER	PROM LEVEL
COBBS MANF.	R10
Iowa Muscular Skeletal	R10
CONT.WEST. INS	R10
RADIOLOGIST/MC	R10
GRINNELL INS	R10
Q.C. Pathology	R7
Beling Consultants	R10
Republic Electric	R10

District 3530 DPU PROM Status

	Accounts	R7	R10	R10 TO R7	Problem Accounts
3531	35	18	17	0	6
3533	12	5	7	1	3(est)
3534	14	8	6	0	4(est)
3536	2	0	2	0	1(est)
3538	23	20	3	0	3
Totals	86	51	35	1	17

est=estimated problem distribution between Iowa branches

bk
0589X

Mike, three of the four branchs have provided input, the number look like this;
Total DPUs: 220
R7 Proms: 209
R10 Proms: 11
Dgraded to R7: 9

As a side note the software vender REDSHAW is having their customers request down grading to R7 Proms when we install the systems.
Hope this helps.
Regards, Tony 3/31

To: Mike Bahia
From: Fritz Brown
Subject: Tech. Info. Date: 04/17/87
Reply by: / /

In talking to Mike Lyons he didn't know about this request either. He, too, thinks that if you have 70% of the Districts that you should have enough data to measure the extent of the problem. I don't mean to to be uncooperative but like I told you on the phone we are being inundated at the Branch level for information. The timing is bad.

```
WORKSTATION  69  -  USER WEB  -  MIKE BAHIA     0135-00256

 8:23:16 AM     FRIDAY        JANUARY 30, 1987


**********************************************************************************
****          1         2         3         4         5         6         7
**** 12345678901234567890123456789012345678901234567890123456789012345678901234567
**********************************************************************************
*  *
* 1*                                        T4C       LAST CALLS DISPLAYED
* 2*                                  H22 DEPT ACTIVE CALLS
* 3*                          POSITION THE CURSOR UNDER THE CALL DESIRED
* 4*                        AND SELECT THE PF KEY FOR THE DESIRED FUNCTION
* 5*                    (1 OR ENTER) DISPLAY (2) FIRST (3) LAST (5) NEXT SCRN
* 6*
* 7*      TYPE    CONTROL      DATE  TIME     SYSTEM      DEVICE       PERSON ASSIGNED
* 8*
* 9*       E      16097000     01/27 06:53    2200        2275         +
*10*     ★ E      16207003     01/23 15:24    2200MVP     2280-3       VARICARE
* 1*       E      26062002     01/27 08:13    2200        2275-60      +
* 2*       E      66312002     12/22 16:59    MVP         2280-3       + MVP-G. JUNIOR
* 3*       E      66022002     01/28 16:42    2200 MVP    2280-3       VAMCO 2280 DPU
* 4*       E      66066001     12/12 13:09    MICRO-VP    2280-3       +
* 5*       E      56170007     11/11 09:22    2200MVP     2280DPU
* 6*       E      86297003     01/13 08:39    2200MICR    2280DPU
* 7*       E      86310006     01/13 09:12    2200MVP     2280-3
* 8*       E      86336005     12/30 14:12    2200MVP     CPU          PER/WORTHINGTON
* 9*       E      87020002     01/23 09:49    2200MVP     DPU
*20*       E      H6022004     01/08 17:19    2200        2280 DPJ     +
* 1*       E      P5343000     11/12 10:25    2200MVP     DPU          +    OS
* 2*       E      P6226001     01/14 08:57    2200 CPU    2280 DRI     T22/MIKE B
* 3*
* 4*
*  *
**********************************************************************************
****          1         2         3         4         5         6         7
**** 12345678901234567890123456789012345678901234567890123456789012345678901234567
**********************************************************************************
```

WORKSTATION 69 - USER MEB - MIKE BAHIA 0126-60256

2:01:44 PM WEDNESDAY MARCH 11, 1987

```
****************************************************************************
****          1         2         3         4         5         6         7
**** 12345678901234567890123456789012345678901234567890123456789012345678
****************************************************************************
*  *
* 1*                                        TAC      LAST CALLS DISPLAYED
* 2*                                  H22 DEPT ACTIVE CALLS
* 3*                          POSITION THE CURSOR UNDER THE CALL DESIRED
* 4*                        AND SELECT THE PF KEY FOR THE DESIRED FUNCTION
* 5*                    (1 OR ENTER) DISPLAY (2) FIRST (3) LAST (5) NEXT SCRN
* 6*
* 7*      TYPE   CONTROL     DATE  TIME    SYSTEM     DEVICE       PERSON ASSIGNED
* 8*
* 9*       P     07051013    02/23 12:12   2200       2280-3       TVS/SANDERS,JAC
*10*       E     16097000    03/02 15:04   2200       2275         +
* 1*       E     16307003    02/26 08:23   2200MVP    2280-3
* 2*       E     26062002    02/23 10:07   2200       2275-60
* 3*       E     55312002    02/13 08:47   MVP        2280-3       + MVP-S. JUNIOR
* 4*       E     66022002    02/09 14:52   2200 MVP   2280-3       VAMCO 2280 DPU
* 5*       E     66066001    12/12 13:08   MICRO-VP   2280-3       +
* 6*       E     66170007    02/09 14:41   2200MVP    2280DPU
* 7*       E     86297003    02/09 15:12   2200MICR   2280DPU
* 8*       E     87065001    03/09 12:29   2200LVPC   CPU          TVS/US NAVY
* 9*       E     H6022004    02/09 16:30   2200       2280 DPU     +
*20*       E     P5343000    11/12 10:25   2200MVP    DPU          +     OS
* 1*       E     P6226001    03/06 08:13   2200 CPU   2280 DRE
* 2*       E     P7040000    02/25 08:25   2200       2280
* 3*
* 4*
*  *
****************************************************************************
****          1         2         3         4         5         6         7
**** 12345678901234567890123456789012345678901234567890123456789012345678
****************************************************************************
```

MEMO TO LOU CORNARO

REQUEST R&D ASSISTANCE

P5349000

Px I92 ON FIRST SEEK

FIXED BY ALIGNM

CALL #	06164095	66022002 (5 SITES RP)	P6226001	16307003 (JUMPER PLUG)	76321001 / 07051018
CONTACT	DAN SULLIVAN (JIM GRANVILLE)	RALPH PINCEK (HAS OTHER PROBLEM SITES WORKING W/ R7)	SIMON CHUI	RICH LYONS/BUTCH KNOBEL	GARY LODGE
POSITION	DTS	DTS		DTSM DTS	CE
CUSTOMER	HAZEN PAPER	VAMCO MACHINE	AALFSC	VARICARE	SANDERS, JACOB
LOCALE	HOLYOKE, MA	PITTSBURGH, PA	HONG KONG	ALBANY	WEST REG
DO R7'S WORK	YES	YES	YES	YES	
ERROR CODE	I92	I92 HANGS ON 1ST SEEK, FET LT READ OFF CYL, HEADS UNLOAD, OR HANG NO TRACK LOCK SETTLING	I92	I92	I92
INSTRUCTION	LIST	IPL KEY SF'	IPL OR LOAD RUN	LIST	
POWER UP/SPIN UP	SPIN	1ST POWER UP	DPU ON/OFF SOMETIMES Px POWER UP	SPIN UP	
HOW OFTEN	98%	100% ON SITE F	80% W/ DPU ON/OFF	100%	100%
TYPE OF Px/REFURB	BP3 REFURB 1 77665650E C 77666950A S 77622700A	BP3 NOT A REFURB 1 77669650E C 77666209 S 77622770A	BP3 1 77616770 C 77616620 S 79885620	BP3 77665650E 77666008 77666801	
I/O,CM,SC #'s					
DPU ERRS	17 21 22 23 24 15 (W/REMARKS)	21 22 23 24	21 22 23 24	21 22 23 24	
CABLING KIT	Y	Y	NO	YES	
DISK CONTROLLER	7715	6541-2	6541-2	7342	
STATUS	LIVING W/ PROBLEM	WORKING ON R7 WOULD NOT WORK W/ R10 REPLACED ACTUATOR & OK FLT - READ OFF CYL, HEADS UNLOAD IF LEFT UP & RUNNING 20 MIN OR	MUST KEY RESET U/ R90 AFTER DPU ON OK U/ R7	DOES NOT HAVE IT ACCESS PLUG AFT ALIGN. INT R/W ERROR CE CANT GET TO FAN, REPL REQUESTED	
PLATTERS REFORMAT	Y	Y	Y	Y	
F & R	Y	Y	Y D.O NOT TRY 2ND REM		
DAISY CHAIN	Y	NO	NO	NO	
DOES PROB CLEAR					
W/ EITHER DRIVE USING CDC	NO				
TERM PART #	9/16 LMTC 210-8017	9/15 CDC	9/16 75786102B		
CHIP #	916C560X2PE	BECKMAN 898-1-R56	BECKMAN 898-1-R56		
CHIP COLOR	BLACK	WHITE	WHITE		
OFFSETS BEFORE AFTER	REPLACED DRIVE 12/8/86 CLOSED 12/11	2/2/87 FORMALLY REQUESTED ALIGNMENT	D 8: 500, 404: 500, 800: 500 S D 8: 50, 404: 50, 800: 50 S 8: 100, 404: 100, 800: 100	8: 125, 404: 100, 800: 175 8: 70, 404: 20, 800: 140	

MEMO TO LOU CORNARO

REQUEST R&D ASSISTANCE

Px I92 ON FIRST SEEK

FIXED BY ALIGNIN

CALL #	06164095	66022002 (5 SITES RP)	P6226001	16307603 (JUMPER PLUG)	76321001 / 07051018
CONTACT	DAN SULLIVAN (JIM GRANVILLE)	RALPH PINCEK (HQS OTHER PROBLEM SITES WORKING W/ R7)	SIMON CHUI	RICH LYONS/BUTCH KNOBEL	GARY LODGE
POSITION	DTS	DTS		DTSM DTS	CE
CUSTOMER	HAZEN PAPER	VAMCO MACHINE	AALFSC	VARICARE	SANDERS/JACOB
LOCALE	HOLYOKE, MA	PITTSBURGH, PA	HONG KONG	ALBANY	WEST REG
1 DO R7's WORK	YES	YES	YES	YES	
2 ERROR CODE	I92	I92 HANGS ON 1ST SEEK, FLT LT READ OFF CYL, HEADS UNLOAD, OR HANG NO TRACK LOCK SETTLING	I92	I92	I92
3 INSTRUCTION	LIST	IPL KEY SF'	IPL OR LOAD RUN	LIST	
4 POWER UP/SPIN UP	SPIN	1ST POWER UP	DPU ON/OFF SOMETIMES PWR	SPIN UP	
5 HOW OFTEN	98%	100% ON SITE F	80% W/ DPU ON/OFF	100%	100%
6 TYPE OF P/R/REFURB	BP3 REFURB	BP3 NOT A REFURB	BP3	BP3	
7 VO, CM, SC #'s	1 77665650E C 77666950A S 77622700A	1 77665650E C 77616620A S 77622770A	1 77616770 C 77616620 S 79885620	77665650E 77616600B 77666801	
8 DPU E-REGS	17 21 22 23 24 15 (W/R REMOVED)	21 22 23 24	21 22 23 24	21 22 23 24	
9 CABLING KIT	Y	Y	NO	YES	
10 DISK CONTROLLER	7715	6541-2 WORKING ON R7	6541-2	7342	
STATUS	LIVING W/ PROBLEM	WOULD NOT WORK W/R10 REPLACED ACTUATOR & OK FLT - READ OFF CYL, HEADS UNLOAD IF LEFT UP & RUNNING 20 MIN OK	MUST KEY RESET U/ R80 AFTER DPU ON OK W/ R7	DOES NOT HAVE 1ST ACCESS PLUG AFT ALIGN. INT R/W ERROR, CE CAN GET TO FAIL, REPL REQUESTED	
PLATTERS REFORMAT	Y	Y	Y	Y	
F & R	Y	Y	Y D.O NOT TRY 2ND REM		
DAISY CHAIN	Y	NO	NO	NO	
DOES PROB OCCUR W/ EITHER DRIVE UNIT/CODE	NO 9/16 LMTC	9/15 CDC	9/16		
TERM PART #	210-8017		7586102B		
CHIP #	916C560X2PE	BECKMAN 898-1-R56	BECKMAN 898-1-R56		
CHIP COLOR	BLACK	WHITE	WHITE		
OFFSETS BOPOLO	REPLACED DRIVE 12/1/86 CLOSED 12/11	2/2/87 FORMALLY REQUESTED ALIGNMENT	D 8: 500, 404: 500, 800: 500 S: D 50, 50, 50; S 100, 100, 100	8: 125, 404: 100, 800: 175 70, 20, 140	
ATTEL					

Recommended Term 726-6953 41006 7717 2-3

Until all surfaces are formatted may have problem

Daisy Chained Px' w/ First Seek Problems

06233019	[illegible]	06261143	06135089 [illegible]		is updated 7717 install
86007000	66170007	P5343000	H6022004	86336005	06143042
Steve Schuster	Gary Loper		Randy Cooper	Eric Hamamura	Robert Raik
DTS	G. Lemke (MS)		DTSM	SrCE	CE
Imperial HeadWear	Luvan	Testrite	Naval Sea Sys (7 sites)	City of Los Altos	Treb, Brockenbrough
Denver, Co	Belding, Mi	Taiwan	Indianhead, Md	Los Altos, Ca.	Richmond, Va
Fail & frequently hangs;	R7's not tried	Y hangs		Yes	
Reset I90	I90/I91	I92		Hangs on IPL	
$IF ON	Backup only	LIST			
Spin	Spin				
R10 10% R7 2%	50%	Frequent			
BP4 new BP4 new	CDC BP4 WANG BP3 I/O 77616198E/77622501C CM 77616600B/77666958A SC 77622400/77666801	BP4 new I/O 77616770/7766565[illegible] CM [illegible] SC 77622950/[illegible]			
21 22 23 24 15 L567	21 22 23 24 L567	21 22 23 24 17			
Y	Y	N (WR installed [illegible])			
6541-2 using R7's	6541-2 Loaner DPU running fine Cust DPU in shop testing 3/4/97 Fails w/ D53 only	7715 need to key reset w/ R10 using R7's	Error Free 2 DPU	Call closed error free using R7's	
Y	Y now but still fails problem only on R packs started on Wang drive	Y			
Y		Y			
Y	Y	Y	Y	Y	Y
Y	N DTS added 2 270Ω ¼w R				
	75886120B	7586100	75886120		
	CTS 8234	CTS 8234 56Ω			
	Has 2 drive	Black			
	3/4/97 requested status	3/4 installed 41006 & OK so far monitoring			

WANG LABORATORIES, INC., 59 ELECTRONICS AVENUE. LOWELL, MA 01851 • TEL 617/656-0208

2200 HARDWARE DESIGN ISSUES

WANG

1.PROBLEM: Intermittent hangs, I90, and I92 errors after powering up the drive/s when using the R10 DPU proms. I90 and I92 are disk hardware errors caused by the disk drive not responding properly to the system.

CIRCUMVENTION: a. Downgrade to R7 proms. R7 proms may present a data integrity problem on a surface with alternate sectors.
b. Key reset on workstation.
c. Have a DPU installed for each Phoenix drive if daisy-chained.
d. Try an old CDC Terminator with the black chips or possibly one with the white chips. The newer terminators, especially from Wang are noisy and may have a relationship to the problem.
e. Power DPU on and off every time a drive is powered up. The DPU should not be powered on and off when the attached Phoenix is on-line and ready.

R & D CONTACT: Mike Riley, Lou Cornaro, S.K.Ho

STATUS: On August 13th, 1986 a trip was personally made to Hazen Paper in Holyoke, Ma to install an updated 7422 board. On site after speaking with the CE it was realized that this customer did not have the exact problem they were thought to have. Only one drive had a problem and whether configured as a single drive or daisy-chained it would fail consistently with an I92 on first seek after a spin-up. Tried both 7422 boards in any case but they did not correct the problem but did functionally work. Imperial Head Wear then became the primary site. On Friday, September 5th the board was tested on-site. A back-up was done to test the fix and on the 3rd spin-up the system hung which is exactly what has been happening on this site.

On September 12th I met with Lou Cornaro, Manager of Continuation Engineering to discuss the problem. At this time I am collecting specific data defining the problem and the exact hardware involved at each site, from all sites experiencing problems with R10's where R7's work error free. This information will then be given to R&D. The R10 proms are the catalyst for the problem and Lou will be sitting down with Dave Barrett who wrote the code for the R10's to determine what may need to be done. R&D has requested the 7422 board from Imperial Head Wear which I have requested from the field. This may be a problem at this time as the system is being heavily used. Right now the board will be removed at a next call basis. This may need to change if not agreeable with R&D. Looking into the possibility of either having equipment experiencing the problem sent in or possibly having R&D go on site if a local site can be made available.

ACTIVE CALLS: ESCALATIONS: (daisy-chained drives)

06143042 TABB, BROCKENBROUGH
66170007 LUVAN
86007000 IMPERIAL HEAD WEAR
H6022004 NAVAL SEA SYSTEMS
P5343000 TAIWAN
P6083000 TESTRITE COMPANY, LTD

(single drives)

06164095 HAZEN PAPER
66022002 VAMCO MACHINE
P6226001 AALFSC

2.PROBLEM: When using a printer/disk controller (210-7342) with the Phoenix Disk Drive or the 2275, intermittent I90, I91, I92, and possibly I96 errors occur. I90, I91, and I92 errors are caused by the disk unit not properly responding to the system. I96 is a read error.

CIRCUMVENTION: a. Place the 7342 printer/disk controller in the last I/O slot of the CPU farthest from the CPU boards. In testing for this problem it was found that boards which fail solidly when next to the CPU boards ran error free when placed in the last I/O slot.
b. Replace the printer/disk controller with the older version printer/disk controller (210-7042-2) if available.
c. Replace the printer/disk controller with a single disk and a single printer controller.
d. Replace the printer/disk controller with a triple controller (212-3012), workstation/printer/disk. Although no problems have been reported with this board the design is the same as the 7342 printer/disk controller. As such this board may also exhibit the same problems.

R & D CONTACT: Gil Carrier, Lou Cornaro, Mike Riley

STATUS: R & D has identified the problem with this board. The problem is related to the design of the line driving circuit and the speed of the chips used. R & D has updated 25 boards, thirteen which have been domestically distributed. All domestic boards are currntly installed at beta sites and all have reportedly been running error free.

A limited number of new artwork boards are being prepared at this time and hopefully will be ready by November. At that time the new boards will replace some of the updated boards now being beta tested and serve as beta boards themselves. Once the new beta boards prove successful all the updated boards now being beta tested will be returned and replaced with the new artwork boards. The new boards will then go into mass production and production on the 7342 board will be stopped.

On Wednesday, August 20th a meeting was held w/ R&D, Logistics, and Product Support in attendance to determine the fate of the 7342 board. Since many of the boards work without error the board will still be available. As new boards become available many of the old boards will end up on stockroom shelves unused where eventually a decision will be made probably to junk the greater majority.

A similar fix will also be needed for the 212-3012 Triple Controller (terminal/printer/disk) as this board has the same design issue.

A TSB was sent out with the July 1st issue on the status and circumventions with the 7342 board.

ACTIVE CALLS: ESCALATIONS:

16097000	NORTHWEST SAVINGS	(beta)
26062002	OCEAN CITY POLICE	(beta)
65312002	GEORGE JR REP	(beta)
66066001	ASSOCIATION OF DERMATOLOGY	(beta)

3.PROBLEM: Poor mating connection between the I/O cable and the I/O port on the 8396 board of the 2275.

CIRCUMVENTION: a. A shorter standoff (462-0452) can be ordered and used to replace the larger standoffs.
b. Extra care taken to insure proper connection and unit operating properly.
c. Trying a different I/O cable may help.

R & D CONTACT: Steve Caparella, Mario Palmeri, Harvey Worthington

STATUS: A shorter standoff (462-0452) is being used to replace the current standoff. This should allow the cable to firmly mate. Steve Caparella is suppose to write a TMD which is used in manufacturing to incorporate the change. He will also write the ECO. Have been trying to contact Steve to verify the TMD and ECO are done but there has been no answer at his extension. Harvey Worthington was going to write a TSB informing the field of the new standoff but as of now has not. Will followup with both to insure at least the TMD and ECO are done.

ACTIVE CALLS: ESCALATIONS:

26062002	OCEAN CITY POLICE

Mike Bahia
Product Line Engineer
Technical Assistance Center

September 18, 1986

0980D

PHOENIX BRDS

I/O BOARD 726-5778

75891850 SERIES CODE 2 (UNIQUE TO WANG)

LOC NORM 77616751 SERIES CODE 2/3 (UNIQUE TO WANG)
NO SWITCH 77616770A VS85 W/ EITHER 22V28/V88 FAILED SW'S WILL BE USE W/ BRD
1 ON 77616790
2,3,4 OFF 77622500 SERIES CODE 3 (UNIVERSAL)

726-6669
* 77665650 SERIES CODE 4 (UNIVERSAL)

UPWARD & DOWNWARD COMPATIBLE BUT DON'T USE OLD BRDS IN NEW PX'S DUE TO TIMING DIFFERENCES W/ WANG CNTLR

CONTROL MUX 726-5779

U33 FROM BOTTOM 90 CUT 1 60 CUT 2 30 CUT 3 77616600
1 OFF 77624700
2,3 ON (3 OFF INVERTS VOL) 726-6668
* 77666950

* POSSIBLE PROBLEMS IF INTERMIX NEW BRDS W/ OLD BOARDS

SERVO COARSE 726-5780

REPL CHAIN 75885600 INTERCHANGEABLE

VS SW1,4 OFF 2,3,5,6,7,8 ON 77622400
2200/015 SW 7 OFF ONLY 77622401
77622402
77622403
77622750
77666800
77666801
77682950 HAS CONTROL J2- (BETWEEN U22 & U27) IN - 90 SEC PURGE OUT - 120 SEC
J1 (TOP RIGHT) IN - LOSS OF AGC RECOVERABLE
OUT - LOSS OF AGC - MUST POWER OFF & ON

RELAY BOARD

726-5686 BP 3 ONLY
75898850
77634490

NOT COMPATIBLE
726-6724 & BP 4 ONLY → 726-6724A
77680650 77713900

TAC

INFORMATION CALL

CONTROL NUMBER 06322000

CONTACT NAME LARRY MILLER POSITION CE
RDB # 3412 TDX # PHONE # 301 296 1663 EXT #

SYSTEM TYPE VS 85 DEVICE TYPE 2280-3
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 3310 CITY STATE
ON SITE CONTACT NAME

QUESTION (*) / ANSWER (+)

*EMP. # 32527.
*RE: OLD STYLE IO BOARD ON THE PHOENIX CAUSING PROBLEMS.
11/18/86: CALLING IN TO DOCUMENT A PROBLEM.
+A COMPATIBLITY PROBLEM HAS BEEN FOUND W/ CERTAIN VERSIONS
+OF THE PX I/O BRD WHEN USED W/ CERTAIN SYSTEMS OR WANG DISK
+CONTROLLERS. IN THIS PARTICULAR CASE A WORKING BP3 PX WAS
+INSTALLED ON A VS85 AND SOFT ERRORS WERE GENERATED WHENEVER
+VOLUMES WERE SWITCHED. THE ALIGNMENT OF THE DRIVE WAS
+CHECKED 3 TIMES & WAS ALWAYS WELL WITHIN SPECS. CAUSE OF
+THIS PROBLEM WAS THE I/O BRD, CDC # 77616770A. THIS IS AN
+OLDER STYLE BRD W/ NO SW BANK & BLK CONNECTORS FOR THE A
+CABLE & TERMINATOR. WHEN THE BRDS WERE 1ST REPLACED FOR
+THIS PROBLEM A SIMILAR VERSION I/O BRD WAS USED & THE PROB-
+LEM WAS STILL PRESENT. ANOTHER BP3 PX FROM THE OFFICE WAS
+BROUGHT IN & USING THIS SAME TYPE I/O BRD ALSO FAILED. THE
+PROBLEM OCCURRED W/ BOTH A 22V88 & THE 22V28, BUT THESE
+SAME DRIVES WORKED FINE ON A VS65. ONCE THE CURE WAS FOUND
+TO BE A NEWER VERSION OF THE I/O BRD W/ THE SW BK, OLDER &
+NEWER VERSIONS OF THE OTHER CARD CAGE BRDS WERE TESTED BUT
+NO DIFFERENCE WAS FOUND. THE CDC 77516770A I/O BRD WOULD
+CAUSE SOFT ERRORS WHEN CHANGING VOLUMES W/ EITHER OLD OR
+NEW CDC BRDS ON THE VS85 W/ EITHER A 22V28 OR A 22V88.
+GIVING COPY OF CALL TO DJ.

(30MIN) MIKE8

3.PROBLEM: I92 error followed by I90 a couple of times a week on systems with more than 1 CPU multiplexed to the same Phoenix drive. I92 and I90 errors are generated by the Phoenix DPU not properly responding to the system.

FIX: ECN 41006 has been released and all boards sent in for repair will now have this fix incorporated.

R & D CONTACT: Gilles Carrier

ACTIVE CALLS: ESCALATIONS:

66045000	THIRD FEDERAL SAVINGS	closed
66079000	LYNN CITY ORTHO RHEUM	closed
66051000	DACOMED	closed

4.PROBLEM: Poor mating connection between the I/O cable and the I/O port on the 8396 board of the 2275.

CIRCUMVENTION: a. A shorter standoff (462-0452) can be ordered and used to replace the larger standoffs.
b. Extra care taken to insure proper connection and unit operating properly.
c. Trying a different I/O cable may help.

R & D CONTACT: Steve Caparella, Mario Palmeri, Harvey Worthington

STATUS: A shorter standoff (462-0452) is being used to replace the current larger standoff. This should allow the cable to firmly mate. Steve Caparella is writing a TMD which is used in manufacturing to incorporate the change. He will also write the ECO. Harvey Worthington will write a TSB informing the field of the new standoff. Waiting for both Steve and Harvey to followup.

ACTIVE CALLS: ESCALATIONS:

26062002	OCEAN CITY POLICE

Mike Bahia
Product Line Engineer
Technical Assistance Center

August 5, 1986

0974D

TECHNICAL SERVICE BULLETIN

SECTION: HARDWARE TECHNICAL

NUMBER: HWT6291 REPLACES: _____ DATE: 11/18/86 PAGE 1 OF 1

MATRIX: 3110 PRODUCT/RELEASE # 2275

TITLE: 2275 I/O CABLE PROBLEM

PURPOSE:

To inform the field ~~on some cases of~~ OF A POSSIBLE poor mating connection between the I/O cable and the I/O port connector on the 210-8396A board.

EXPLANATION:

Manufacturing has used some standoffs on the 2275 port connector that prevent the I/O cable from making a good electronic contact with the 210-8396A port connector on the board causing I-92 errors.

The circumventions are:

-Reinsert the I/O cable into the port of the 2275 unit.
-Try a different I/O cable.

Boards with the wrong standoffs can be identified by observing the I/O cable connector sitting too high on the 210-8396 port connector.

To correct this problem ORDER the correct standoff, WLN 462-0452, ~~can be ordered~~ from stock.

McElven Insurance

1. Need to know exact errors? I90 aft changing pack
2. When exactly errors occur?
3. How often do they occur?
4. Can we make it fail?

Field to do

1. Insure no ripple on DPU voltages.
   Check using DVM while drive is up & ready & being accessed. Use a loop on a LIST command. All ripple should be less than 30 mil V on all voltages. Check a 2nd time after running 10-15 min consecutively.
2. Insure if try to access drive when not ready, but blower on, always responds w/ I91. Use a list & try 15-20 times in a row.
3. Verify drives work fine running random R/W's

☆ If have 1st Seek Symptoms & Reproduce

1. Try drives individually. If prob not

REPRODUCIBLE WITH 1 DRIVE & WAS WITH 2, MAY HAVE TERMINATOR PROBLEM.

2. IF REPRODUCEBLE WITH ONLY 1 DRIVE. TEST AGAIN W/ 2ND SET OF DPU BRDS & THEN WITH 2ND SET OF Px BRDS. IF STILL FAILING ALIGN DRIVE TO TIGHTEST SPECS REASONABLY POSSIBLE, EVEN IF IN ALIGNMENT. REFORMAT ALL SURFACES INCLUDING REMOVABLE & RETEST.

3. IF BOTH DRIVES FAIL REPEAT STEP 2 ON 2ND PRIVE.

IF STILL FAILING W/ FIRST SEEK CIRCUMVENTIONS ARE:

R7 PROMS - MUST REFORMAT ALL SURFACES

DIFFERENT DRIVES - NOT ALL DRIVES HAVE 1ST SEEK PROB.

ARGUS INSURANCE, YAKIMA, WA RDB 3830 86297003

DOWNGRADED TO R7 PROMS & ERROR-FREE.

DID FORMAT ALL SURFACES BUT KEPT FAILING W/ R10's PROMS

TRYING TO RUN REDSHAW S/W PACKAGE.

NAVAL SEA SYSTEMS, INDIANHEAD, MD RDB 3492 H6022004

RUNNING ERROR-FREE W/ 2 DPU's.

NOW ON 3RD PARTY MAINTENANCE.

SANDERS, JACOBS, GR CA RDB 3810 07051018

DOWNGRADED TO R7 PROMS & ERROR-FREE

I92 ON 'FIRST ACCESS', CAN RESET AT TERMINAL

ALIGNMENT OFF, WAS AT 800 - 1000 MILV, BEST COULD GET 800 MILV

MUTUAL INSURERS RICHMOND, VA RDB 3432 07065045

ALIGNED DRIVE & TESTED OK APPROX 100 MILV BEFORE, 15 MILV AFTER

I92 ON 'FIRST ACCESS' 75% OF TIME

TESTRITE TAIWAN RDB 9908 PS343000

DOWNGRADED TO R7 PROMS & ERROR-FREE

HANGS, I90, I92 DURING SORT PROGRAM FIRST ACCESS?

Mike,

I know that R&D does not want to hear that there are any 2280 DPU's with PROM's below R-7, but the reality is there are some out in the field. Up until now, going from below R-7 PROMs to R-10 PROM's has resulted in basically an operational inconvience or problem. However, as the enclosed memo points out, there also appears to be a risk of lossing data when working with Redshaw software systems. I am forwarding this information to you for general info., as I understand you are persuing the R-10 update situation.

Regards, Cal Blackburn DTS (206-340-6129)

A problem has occurred in the Northwest District after updating a 2280 DPU from R-5 to R-10 PROM's on a Redshaw software system. The DPU was first updated to R-7 PROM's and the fixed platters were reformatted. This then allowed the DPU to be updated to R-10 PROMs and the fixed platters were then reformatted again. Software and data were restored, and system appeared to be operating normally. One week later, upon restoring data following a software update, it was found that from 1/3 to 1/2 of the Risk File data was missing. Redshaw software was contacted and they said they were aware of this problem. It is a result of the backup routine writing to removable platters that were still formatted from the R-5 PROMs. No errors were generated during backup routines following the R-10 PROM update. CE is presently trying to recover the lost data by taking the DPU back down to R-5 PROMs.
This is another instance of "BEWARE", when updating to R-10 PROMs in the 2280 DPU.

TAC

CRITICAL ACCOUNT

CONTROL NUMBER 16223001

CONTACT NAME PETER MALECKI POSITION DTS
RDB # 3150 TDX # PHONE # 203-356-7914 EXT #

SYSTEM TYPE 2200MVP DEVICE TYPE CPU
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 SKANSKA PHONE # 203 869 1760
ADDRESS 3A F CITY GREENWICH STATE CT
ON SITE CONTACT NAME *2200 FS2

PROBLEM (*) SOLUTION (+)

*THIS MACHINE HAS HAD MANY PROBLEMS. NOW IT HANGS WHEN THE
*HANGS WHEN CUST TURNS IT ON, OR WILL HANG DURING THE DAY.
08/12/86: HAVE BEEN WORKING WITH JOHN MURDOCK OVER THE PAST FEW WEEKS. THIS HAS BEEN AN INTERMITTENT PROBLEM. ALL HAS BEEN GOOD FOR THE PAST TWO WEEKS.
08/12/86: SPOKE WITH PETER AND THE CE YESTERDAY, THE CE IS TO CALL ME NEXT TIME HE IS ON SITE. J.MURDOCK
08/13/86: SPOKE WITH JOE ADELIZZI DPU HAS HIGH AC RIPPLE ON +12V (83MV) HE IS ORDERING A CHASSIS AND REG IF NOT IN STOCK,THE RIPPLE IS A RE-OCCURRING PROBLEM. THE PROBLEM IS NOW DURING POWER-UP ONLY, THE DPU IS ALL THAT NEEDS TO PWR OFF/ON. JOE CHANGED THE 210-7421 TODAY AND WILL MAKE MORNING MONITORS FOR SYSTEM PWR UP IN AM TO SEE THE OUT COME.
J.MURDOCK
08/22/86: STATUS? J.FORBES
09/03/86: SEEMS TO BE WORKING WILL MONITOR FOR ANOTHER WEEK TO SEE IF IT WILL WORK. R.ROBERTO
09/05/86: WORKING OK. (R.ROBERTO)
09/11/86: HAD ANOTHER HANG. WITH I 92 ERRORS, AND PROGRAM ERRORS. CUSTOMER GETTING HOT. THIS HAS BEEN AN INTERMITTENT ONE IT WILL GO TWO TO THREE WEEKS WITH NO PROBLEM. WE CAN NOT AT THIS TIME WAIT FOR ANOTHER HANG. CAN WE FORCE A HANG TO TRY TO FIX IT, I ALSO AM REQUESTING ON SITE SUPPORT TO HELP US GET TO THE BOTTOM OF THIS. (R.ROBERTO)
09/22/86: COMPLETED ALL TESTS THAT WERE NEEDED TO BE DONE. TEST DID NOT SHOW ANYTHING.WE COULD NOT REPRODUCE THIS PROBLEM. REQUEST ON SITE SUPPORT. R.ROBERTO
09/22/86: TALKED WITH CE W.MECHEN:THE DIAG RAN OVER NITE, SYSTEM HAS NOT FAILED SINCE 11TH, WHEN THE CE WAS ON SITE HE HAD A HANG ONCE AND A I-90 ONCE DURING A WARM BOOT, RESET AND A 2ND TRY WORKED. GOING BY

PREVIOUS ACTIONS APPEARS TO BE IN CPU, CE TO TRY
6789 + 6790 REPLACEMENT, SEE IF PROBLEM CAN BE.
IF NEEDED CHANGE THE 6791,6792. J.MURDOCK
09/23/86: ESCALATING CALL TO H.O. J. MURDOCK IS ON VACATION
FOR TWO WEEKS. DISTRICT IS REQUESTING ADDITIONAL
SUPPORT. WOULD LIKE TO HAVE J. FORBES REVIEW THIS
CALL WITH PRODUCT SUPPORT TO DETERMINE ACTION PLAN
TO ADDRESS THIS HIGHLY INTERMITTENT PROBLEM.
G. MCMANN
$10/02/86:WENT ONSITE WITH P.MALECKI 10/1.SYSTEM WAS RUNNING
$ POWERED 2280 & DPU OFF,BROUGHT THEM BOTH UP AND
$ COULD NOT ACCESS DRIVE.DISABLE DRIVE I/O AND PWR
$ DPU OFF/ON AND WAS ABLE TO ACCESS DRIVE.FOUND SOME
$ BROKEN CAPS AND LOOSE ECN WIRES ON THE 7422 BD.
$ REPLACED 7422 BD AND COULD NOT REPRODUCE HANG.RAN
$ RND VERIFY BETWEEN FIXED AND REM NO PROBLEM.
$ CHECKED VOLTAGES,ALL WITHIN TOLERANCES WITH MIN.
$ RIPPLE.ALL BDS AT CURRENT E-REV.SYSTEM RUNNING
$ 2.5 SOFTWARE.WILL BURN IN A DPU IN DISTRICT OFFICE
$10/02/86:CUSTOMER HAD ANOTHER HANG AROUND 8:30 THIS MORNING
$ WE ARE WORKING ON DPU TO REPLACE AT CUSTOMERS SITE
$ WE HAVE REPLACED THIS DPU BEFORE. WE NEED A ACTION
$ PLAN OF ON SITE SUPPORT IF THIS CUSTOMER HAS ANOTE
$ HANG WITH THIS NEWLY REPLACED DPU. TIM HEALD
$10/02/86: REQUESTING PRODUCT SUPPORT ON-SITE ASSISTANCE IN
$ IDENTIFING THIS HIGHLY INTERMITTENT PROBLEM. RTS
$ ON SITE YESTERDAY. COULD NOT IDENTIFY ANY ISSUES.
$ SPOKE TO M. THOMPSON AND PLANNING TO HAVE ON SITE
$ VISIT PLANNED FOR MONDAY, 10/6. G. MCMANN
&10/3/86: 9:00 SPOKE W/ J FORBES. APPEARS TO BE 2 VERY IN-
& TERMITTENT PROBLEMS. 1.INTERMITTENTLY ON FIRST
& ACCESS AFTER A POWER UP OR SPIN UP SYS MAY HANG &
& THE DPU NEEDS TO BE RESET BY POWERING IT ON & OFF
& TO CORRECT. THERE IS A GOOD CHANCE THIS MAY BE DUE
& TO THE R10 PROMS IN THE DPU. IF USING R10 PROMS
& ALL SURFACES INCLUDING ALL REMOVABLE PACKS MUST BE
& FORMATTED W/ R10 PROMS OR THIS TYPE PROBLEM COULD
& RESULT. IF ALL SURFACES INCLUDING ALL REMOVEABLE
& SURFACES HAVE BEEN FORMATTED DOWNGRADING TO R7
& PROMS WILL RESOLVE IT IF THE PROBLEM IS THE R10
& PROMS. THIS IS A PROBLEM R&D IS CURRENTLY WORKING
& ON. LESS LIKELY IS THERE IS A FLAKEY PROBLEM IN
& THE DRIVE OR DPU WHICH NEEDS TO BE CORRECTED. IN
& THIS CASE WE WOULD NEED TO SYSTEMATICALLY GO THRU
& THE DRIVE & DPU REPLACING FRU'S.
& 2.THE 2ND PROBLEM ASSUMING R10 PROMS ARE THE 1ST
& IS INTERMITTENTLY THE SYSTEM WILL HANG DURING
& OPERATION. THE 7422 BRD JF REPLACED ON 10/1 MAY
& HAVE BEEN THE CAUSE. OTHERWISE ALIGNMENT NEEDS TO
& BE VERIFIED, ALL SURFACES SHOULD BE REFORMATTED
& AGAIN, & IF STILL OCCURRING WE WOULD NEED TO SYS-
& TEMATICALLY GO THRU THE DRIVE & DPU AS ABOVE. IF
& NO ERROR MESSAGE IS PRESENT MAY BE A CPU PROBLEM,
& MOST LIKELY THE 6791. IN ANY CASE EVERY ERROR AT
& THIS TIME NEEDS TO BE ACCURATELY DOCUMENTED IN-
& CLUDING ERROR CODE, WHAT WAS BEING DONE WHEN
& FAILED, WHAT SURFACE WAS BEING ACCESSED IF KNOWN,
& & WHAT REMOVABLE PACK WAS MOUNTED.
& 9:45 TALKED W/ PETER M. CUST RUNNING OK AT THIS
& TIME. TRYING TO LOCATE AN R7 BRD. WILL ALSO FIND
& OUT EXACTLY WHAT ERRORS HAVE OCCURRED SINCE 10/1,
& & INSURE ALL SURFACES INCLUDING ALL REMOVABLE
& PACKS HAVE BEEN FORMATTED W/ R10'S. MIKEB
$10/03/86:PER M.BAHIA,P.MALECKI TO INSTALL R7 PROMS AND
$10/06/86: MIKE BAHIA (PRODUCT SUPPORT) TO MEET DISTRICT ON
$ SITE AT 11AM, PER CONVERSATION WITH RON OLSON.

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$                                                    G. MCMANN
$10/7/86: MIKE BAHIA ON SITE WITH BM,CE,DTS. WILL ADVISE OF
$        PROBLEMS FOUND AND ACTION PLAN....RICH ROBERTO
$10/8/86: MACHINE FAILED AGAIN TODAY...PLEASE ADVISE ON WHAT
$        OUR NEXT MOVE SHOULD BE.  RICH ROBERTO
$10/08/86: MACHINE FAILED THIS MORNING.  CUSTOMER IS VERY UN
$         HAPPY.  PRODUCT SUPPORT ON-SITE VISIT PROVED TO BE
$         OF NO VALUE-ADDED.  RAISING TO CRITICAL STATUS. IF
$         R-10 PROMS ARE THE PROBLEM, NEED R&D INVOLVEMENT.
$         COMMENT WAS MADE THAT CUSTOMER IS USING A BLOCK-3
$         PHOENIX DRIVE AND THAT R-10 PROMS DO NOT EXPER-
$         IENCE THESE PROBLEMS WHEN RUN WITH A BLOCK-4 DISK
$         DRIVE.  IF THAT IS THE CASE, AN EXCHANGE SEEMS THE
$         MOST EXPEDITIOUS APPROACH.                 G. MCMANN
$10/08/86: SPOKE TO RON OLSON ABOUT POSSIBLE EXCHANGE OF
$         DISK DRIVE FOR BLOCK POINT 4 DRIVE.  WAITING HIS
$         INVESTIGATION AS TO WHETHER THAT WILL RESOLVE THE
$         IMMEDIATE CUSTOMER PROBLEM.                G. MCMANN
$10/09/86: CUSTOMER THREATENS TO CALL DR. WANG AGAIN. DSSM
$         FORCED TO COMMIT REGION ON SITE AGAIN TODAY. RTS
$         (J. MURDOCK) ON SITE THIS MORNING.  WHILE PRODUCT
$         SUPPORT MAY NOT SUPPORT 2200 SYSTEMS ANY LONGER,
$         IF THE PROBLEM IS IN FACT WITH THE R-10 PROMS IN
$         THE DPU, THEN THE FIELD WILL NEVER BE ABLE TO FIX
$         THIS PROBLEM.  WOULD AN EXCHANGE OF THE BLOCK
$         POINT 3 DISK DRIVE BE VALUABLE? CAN ANYONE VERIFY
$         THAT SUCH AN EXCHANGE WILL RESOLVE THE PROBLEM FOR
$         THIS CUSTOMER?                             G. MCMANN
&10/10/86:ON SITE TUES, 10/7. TESTED SYSTEM. COULD NOT DUPE
&         POWER UP PROBLEM. DID FIND A NEW PROBLEM W/ W/S'S
&         HANGING. TRIED BOTH TERMINAL MUX BRDS USING THE
&         1ST MUX BRD REPLACED TO REPLACE THE 2ND WHEN THE
&         PROBLEM OCCURRED A 2ND TIME. HAD TO REPLACE THE
&         REG BRD IN DPU FOR RIPPLE PROBLEM ON 12V. NEXT
&         MORNING IT APPEAR THAT BOTH THE 'FIRST ACCESS'
&         PROBLEM THEN THE TERMINAL PROBLEM OCCURRED. BOTH
&         TERMINAL MUX BRDS HAVE NOW BEEN REPLACED & THE
&         6792 & 6793 AS WELL ON 10/9. THE TERMINAL PROBLEM
&         HAS NOT OCCURRED SINCE. MOST TERMINALS ON THIS
&         SITE ARE IN CARPETED OFFICES & THE POSSIBILITY OF
&         A STATIC PROBLEM EXIST. SOME OF THE TERMINAL
&         CABLES ARE NOT WANG & MAY ALSO BE A PROBLEM. AM IN
&         THE PROCESS OF LINING UP R7 PROMS IF NEEDED.
&        >GARY, HAVE DOCUMENTATION ON 7 SITES W/ THE 1ST
&         SEEK PROBLEM. IN ALL CASES THE R7 PROMS HAVE NOT
&         EXHIBITED THE PROBLEM. AT SOME OF THESE SITES THE
&         DRIVE HAS BEEN REPLACED TEMPORARILY W/ THE LOANER
&         WORKING FINE. SOME SITES HAVE 2 DRIVES W/ ONLY 1
&         EXHIBITING THE PROBLEM. AT THIS TIME THE BLKPT 3
&         SEEMS MORE LIKELY TO EXHIBIT THE PROBLEM BUT MANY
&         BLKPT 3 DRIVES WORK. WITH EITHER A BLKPT 3 OR 4 IT
&         WOULD HAVE TO BE TESTED TO INSURE IT DID NOT HAVE
&         THE PROBLEM. HAVING THE R7 BRD AVAILABLE WOULD BE
&         A GOOD IDEA.                                MIKEB
$10/14/86:WHEN ON SITE FOUND W/S CABLES NOT WIRED CORRECTLY,
$         CORRECTED ALL CABLES. ALSO FCO 1161 WAS NOT INSTAL
$         LED , THIS IS A PREREQUISITE FOR R-10 PROMS. THE
$         6793-1 AND 6792 PCB'S IN THE CPU WERE CHANGED FOR
$         POSSIBLE CPU/WS HANG PROBLEM.              J.MURDOCK
#10/14/86: MONITOR.
$10/15/86: THE SYSTEM FAILED AGAIN.  RTS (J. MURDOCK) ONSITE
$         LAST THURSDAY AND FRIDAY.  REPAIRED CABLE CONNECT-
$         IONS, INSTALLED MISSING FCO AND A NUMBER OF OTHER
$         ISSUES WERE ADDRESSED.  AFTER TALKING TO PRODUCT
$         SUPPORT, AM NOT SURE THAT THIS PROBLEM CAN BE RE-
$         SOLVED USING NORMAL REPAIR PROCESS.  R-10 PROMS
```

POWER UP PROBLEM

```
$           AND 'BLOCK POINT 3' PHOENIX DISK DRIVES GET MEN-
$           TIONED AS ISSUES THAT AFFECT THE SITUATION. DOWN-
$           GRADING TO R-7 PROMS SEEM NOT TO BE A GOOD LONG-
$           TERM SOLUTION.  EXCHANGING THE BP-3 DRIVE FOR A
$           'BP-4' DRIVE HAS BEEN SUGGESTED, BUT NO ASSURANCE
$           HAS BEEN MADE THAT PROBLEM WILL BE RESOLVED IF
$           THAT ACTION IS TAKEN.  NEED PRODUCT SUPPORT ASSIST
$           ANCE TO COME UP WITH ACTION PLAN TO RESOLVE THIS
$           CUSTOMER ISSUE.                          G. MCMANN
```

CE TO BE ON-SITE EA MORNING FOR POWER UP.

INSTALLED SINGLE BRD DPU FROM SOUTHERN DATA & NO PROBLEMS SINCE.

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 6256 REPLACES: _____ DATE: 11/11/86 PAGE 1 OF 1

MATRIX ID. 3104 PRODUCT/RELEASE# 2280/2280 DPU

TITLE: R10 Prom Problem

PURPOSE:
To inform the field of an existing problem with R10 Proms.

EXPLANATION:
A problem has been identified with the R10 Proms located on the 210-7423A board in the Phoenix DPU. With some Phoenix drives on "first access only" after a power up or spin up, a hang or I92 error may result. This problem may occur intermittently, or consistently. Most drives work fine. The problem does seem more prevalent with Blockpt 3 drives than Blockpt 4. A drive would have to be formatted and tested with R10 Proms to insure compatibility.

Some systems require the DPU to be powered off and on to correct the error, while others can be "Reset" from the terminal. Once this is done, the system will work error free. The 'first access' problem is the only known problem with R10 Proms. All other problems should be fixable. R&D is aware of the problem and is working on a fix.

Please be aware that when using R10 proms, all surfaces must be formatted with the R10 Proms. If not, the 'first access' problem and/or other problems may result. This is true even if only accessing the surfaces formatted with R10 Proms. The reason is with R10 Proms only, the alternate sector map for each surface is read each time the heads are loaded.

The only other proms that could be used are the R7 Proms. The R7 Proms have a different number of alternate sectors (twice that of R10's). If using R7 Proms, all platters should be formatted with the R7 Proms as a precaution. R7 Proms do not have the 'first access' problem but may present a data integrity problem on a surface with alternate sectors. Most R7's work fine. R7 Proms will read platters formatted with R10 Proms but must not be left in without formatting.

R7 Proms cannot be ordered from Logistics. Please call On Line Product Support (TAC) with any questions concerning this TSB.

GROUP: VS/2200/PC On Line Hardware Support Group MAIL STOP: 001-260

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

MEMORANDUM

TO: Gil Carrier

FROM: Mike Bahia

SUBJECT: Phoenix DPU R10/R7 Population

DATE: April 16, 1987

DISTRICT	R7/PROB	R10/PROB	R10 DWNGRDE	OTHER/UNK	TOTAL
NEW ENGLAND	(Too busy to comply)				
BOSTON	25	23	-	-	48
UPSTATE NY	140	56	-	7	203
STAMFORD	70	5	-	-	75
HARTFORD	86	58/ 1	3	-	144
NYC MIDTOWN	40	5/ 2	10	9	54
NYC UPTOWN	100	5	-	-	105
LONG ISLAND	30	80	1	-	110
PENN/DELAWARE	66	100	12	-	166
PHILADELPHIA	60	60	6	-	120
MARYLAND	54	34/ 2	6	-	88
VIRGINIA	(DTSM fill-in failed to followup)				
FEDERAL	0	0	-	-	0
GREENSBORO	75	100/ 10	-	-	175
TAMPA	100	150/ 3	40	-	250
ATLANTA EAST	77	30	1	-	107
MID SOUTH	100	14	1	27	141
CLEVELAND	45	35/ 2	1	-	80
GREAT LAKE	99/ 2	30/ 12	5	6	135
MINNESOTA	51/ 3	35/ 14	1	-	86
OHIO VALLEY	145	36/ 2	40	2	183
MIDWEST	48	66	15	-	114
HOUSTON	0	35/ 10	-	-	35
DALLAS	101	39	15	38	178
ROCKIES	209	11	9	-	220
NORTHERN CAL	63	16	2	-	79
LOS ANGELES	30	28	-	-	58
NORTHWEST	143	39	34	93	275
SOUTHERN CAL	30	50/ 5	-	-	80
MOUNTAIN	9	12	-	-	21
TOTALS	1996/ 5	1152/ 63	204	182	3330

R7/PROB - first number is total of DPU's in District with R7 Proms. The number following the slash, if present, indicates systems with R7 Proms experiencing a Phoenix or DPU related problem.

R10/PROB - first number is total of DPU's in District with R10 Proms. The number following the slash, if present, indicates systems with R10 Proms experiencing a Phoenix or DPU related problem.

R10 DWNGRDE - number of sites where proms were downgraded due to problems with R10 Proms.

OTHER/UNK - number of sites where prom level is unknown or lower than R7.

TOTAL - total number of DPU's in District.

TECHNICAL SERVICE BULLETIN

SECTION: HARDWARE TECHNICAL

NUMBER: HWT6257 REPLACES: N/A DATE: OCT 20/86 PAGE 1 OF 1

MATRIX ID. 3107 PRODUCT RELEASE# 2275

TITLE: PCB 210-8396 REV. 4 GIVING I-92 ERROR

Purpose:

To inform the field on the model 2275 giving I-92 error running customer applications.

Explanation:

In the last 16 weeks manufacturing built the 210-8396 Rev. 4 with the wrong memory chips at locations L9, L10, L11, L12, L13, L14, L15, L16 and L17. The wrong memory chips are from Siemens - SHY B4164 / P2 LF and are out of specifications.

Boards with these memory chips are causing I-92 errors. The correct WLN for the memory chips is 377-0466.

Boards with the incorrect memory chips can be corrected in the field by replacing the Siemens memory chips.

Manufacturing processed a Purge Notice to correct their stock. CE Logistics and Repair Centers were notified of this problem and will correct boards as they are returned.

ITEM SUBJECT: R-10 PROM'S

TO: KEVIN MATHES, DTSM

FROM: CAL BLACKBURN, DTS

DATE: NOVEMBER 7, 1986

SUBJECT: RECENT PROBLEMS WITH 2280 DISK SYSTEMS RELATING TO R-10 PROMS IN THE 2280 DPU.

WE HAVE EXPERIENCED SEVERAL PROBLEMS RECENTLY IN THE DISTRICT, WHICH SEEM TO BE RELATED TO THE R-10 PROMS ON THE 210-7423A BOARD, IN THE 2280 DPU. PROBLEMS HAVE OCCURRED DURING NEW SYSTEMS SOFTWARE INSTALL AND FOLLOWING CORRECTIVE MAINTENANCE. THE FOLLOWING SPECIFICS ARE INCLUDED AS EXAMPLES OF SOME OF THE PROBLEMS ENCOUNTERED.

1. CORKERY & JONES INSURANCE, SPOKANE, WA.
   DURING INSTALL OF REDSHAW ADVANTAGE SOFTWARE FOLLOWING NEW EQUIPMENT INSTALL, SOFTWARE WOULD CONSISTANTLY HANG AT THE SAME STEP. SOFTWARE WOULD COMPLETE "PTOC MERGE", BUT FAIL TO CONTINUE ON TO NEXT SET OF DISPLAYED INSTRUCTIONS. SYSTEM CONSISTED OF A 2200 MICROVP-2, 2280-3 PHOENIX DRIVE, 2280 DPU AND WAS USING ONE 2436DE TERMINAL DURING INSTALL. CE REPLACED ORIGINAL 2280 DPU CONTAINING R-10 PROMS, WITH A TESTED 2280 DPU CONTAINING R-9 PROMS FROM THE SHOP. INSTALL SOFTWARE RAN NORMALLY, AND SYSTEM CONTINUES TO RUN WITH NO PROBLEMS USING THE R-9 PROMS.

2. ARGUS INSURANCE, YAKIMA, WA.
   DURING INSTALL OF REDSHAW ADVANTAGE SOFTWARE FOLLOWING NEW EQUIPMENT INSTALL, SOFTWARE WOULD CONSISTANTLY HANG AT THE SAME STEP. SOFTWARE WOULD COMPLETE "PTOC MERGE", BUT FAIL TO CONTINUE ON TO NEXT SET OF DISPLAYED INSTRUCTIONS. SYSTEM CONSISTED OF A 2200 MICROVP-2, 2280-3 PHOENIX DRIVE, 2280 DPU AND WAS USING ONE 2436DE TERMINAL DURING INSTALL. PROBLEM WAS ESCALATED TO DISTRICT. DTS VERIFIED THAT SYSTEM WOULD PERFORM STANDARD DRIVE OPERATIONS USING WANG MVP O.S. REL. 2.6.2. NO PROBLEMS WERE ENCOUNTERED IN PERFORMING FORMAT, COPY, MOVE OR VERIFY ROUTINES. A SECOND COPY OF THE SOFTWARE WAS SENT TO THE SITE BY REDSHAW. THIS SOFTWARE ALSO FAILED IN THE SAME MANNER AS THE ORIGINAL COPY. DTS TRIED USING PRETESTED CABLING AND A TESTED 2280 DPU WITH R-10 PROMS WITH NO CHANGE IN PROBLEMS SYMPTOMS. DTS INSERTED R-7 PROMS INTO 7423A BOARD IN ORIGINAL 2280 DPU AND INSTALL SOFTWARE RAN NORMALLY AND TO COMPLETION. AFTER INITIAL SOFTWARE WAS INSTALLED, WE REINSERTED THE R-10 PROMS BACK INTO THE DPU AND THE SOFTWARE WOULD CONSISTANTLY HANG DURING SOFTWARE EXECUTION OF LIBRARIES/DOCUMENTS SETUP. R-7 PROMS WERE REINSERTED IN THE DPU AND SITE HAS CONTINUED TO RUN NORMALLY.

3. USN/PSNS TOOL CONTROL, BREMERTON, WA.
DURING POST MAINTENANCE PROCEDURES ON A 2280 PHOENIX DISK DRIVE, DRIVE COULD NOT BE SUCCESSFULLY ACCESSED FOR ANY OPERATIONS WITHOUT GENERATING AN ERROR AND GOING TO A HANG CONDITION. SYSTEM CONSISTED OF A 2200 MVP-64, 2280-3 PHOENIX, 2280 DPU AND THREE 2236DE TERMINALS. MAINTENANCE HAD CONSISTED OF REPLACEMENT OF FIXED MODULE, CARRIAGE/COIL ASSEMBLY, TWO FIXED HEADS AND ONE REMOVABLE HEAD. DRIVE HAD BEEN ALIGNED AND TESTING RUN FROM 4 TO 210 FTU. DRIVE WOULD SUCCESSFULLY ACCESS, FORMAT, READ AND WRITE WHEN USING THE FTU, BUT WOULD ERROR WHEN USING THE SYSTEM. WHEN ACCESSED FROM THE SYSTEM, THE DRIVE WOULD PERFORM AN RTZ, SEEK TO CYLINDER 822 AND HANG. SYSTEM WOULD INDICATE EITHER AN ERROR I-91 OR I-93. ALL ATTEMPTED DRIVE OPERATIONS, INCLUDING FORMAT FAILED IN THE SAME MANNER. PROBLEM WAS ESCALATED TO DISTRICT. DTS CHECKED DRIVE AND RAN FTU TESTING WITH NO PROBLEMS. HOWEVER, WHEN CONNECTED TO SYSTEM, THE SAME SYMPTOMS REMAINED. TESTED CABLES AND TESTED DPU WITH R-10 PROMS WERE TRIED WITH NO CHANGE IN THE PROBLEM. ALL BOARDS IN THE DISK DRIVE WERE CHANGED WITH PRETESTED BOARDS. NO CHANGE IN PROBLEM OCCURRED. DRIVE WAS CONNECTED TO AN OPERATIONAL SYSTEM AND THE FAILING SYSTEM WAS CONNECTED TO OPERATIONAL DRIVES. AT THIS POINT ALL DRIVES COULD BE SUCCESSFULLY ACCESSED. R-7 PROMS FROM THE OPERATIONAL SYSTEM WERE USED TO FORMAT THE FAILING DRIVE. THE R-7 PROMS WERE THEN RETURNED TO THE OPERATIONAL DPU, AND R-10 PROMS WERE REINSERTED BACK INTO THE FAILING SYSTEM DPU. FOLLOWING THE COMPLETION OF FORMATTING USING R-7 PROMS IN THE DPU, THE FAILING DRIVE COULD BE SUCCESSFULLY ACCESSED AND FORMATTED. DRIVE WAS REFORMATTED USING R-10 PROMS AND RETURNED TO NORMAL SYSTEM OPERATION.

4. U.S.C.G., SEATTLE, WA.
FOLLOWING MAINTENANCE ON THE 2280 DPU, DISK OPERATIONS FAILED WITH ERRORS I-90, I-92 AND DISK HANG. SYSTEM CONSISTED OF A 2200 MVP-32, 2280-3, 2280 DPU AND THREE 2236DE TERMINALS. FAILURE OF THE 2280 DPU RESULTED IN A HARD DISK HANG INDICATION. THE 210-7423A BOARD IN THE 2280 DPU WAS CHANGED. ORIGINAL 7423A CONTAINED R-5 PROMS AND REPLACEMENT 7423A CONTAINED R-10 PROMS. REFORMATTING WAS ATTEMPTED PER TSB 5 FOD INSTRUCTIONS, AT WHICH POINT PROBLEMS OCCURRED. PROBLEM WAS ESCALATED TO DISTRICT. AFTER MANY PARTS WERE CHANGED IN BOTH THE DRIVE AND THE DPU, R-7 PROMS WERE INSERTED ONTO THE 7423A BOARD AND DRIVE FUNCTIONS RETURNED TO NORMAL. DRIVE WAS THEN FORMATTED USING THE R-7 PROMS, R-10 PROMS WERE REINSERTED ONTO THE 7423A BOARD AND DRIVE WAS REFORMATTED SUCCESSFULLY

ADDITIONAL R-10 PROM RELATED PROBLEMS THAT HAVE OCCURRED.

1. USN, PSNS TOOL CONTROL.
   WHEN PERFORMING BACKUP USING IMMEDIATE MODE COPY STATEMENT, FAULT LIGHT FLASHES ON THE OFF DURING FIRST ACCESS. PROBLEM COULD BE DUPLICATED ON THE DISTRICT 2200 SYSTEM USING ANY MVP OPERATING SYSTEM. OBSERVING DRIVE WHEN FAILURE OCCURS GIVES THE FOLLOWING INDICATIONS:
   A. DRIVE SPINS UP AND HEADS LOAD NORMALLY.
   B. UPON EXECUTION OF THE COPY STATEMENT, HEADS SEEK TO CYLINDER 822, FAULT LIGHT COMES ON. HEADS THEN IMMEDIATELY SEEK TO CYLINDER ZERO, FAULT LIGHT CLEARS AND COPY STARTS RUNNING NORMALLY. DRIVE WILL CONTINUE TO RUN WITHOUT ANY FAULT LIGHTS UNTIL NEXT ACCESS FOLLOWING A SPIN DOWN/UP.

   FROM SYMPTOMS DISPLAYED, IT APPEARS THAT ON FIRST ACCESS, THE DRIVE SEEKS TO CYCLINDER 822, GENERATES A SEEK ERROR, INIATES AN RTZ (WHICH CLEARS A SEEK ERROR) AND ONCE IT REACHES CYLINDER 0 CLEARS THE FAULT LIGHT, GENERATES THE CORRECT SEEK COMPLETE AND OPERATIONS RETURN TO NORMAL.

TO: KEVIN MATHES, DTSM

FROM: CAL BLACKBURN, DTS

DATE: DECEMBER 30, 1986

SUBJECT: RESPONSE FROM PRODUCT SUPORT REGARDING THE ARGUS INSURANCE AND PSNS TOOL CONTROL ESCALATIONS.

HAVING REVIEWED THE RESPONSE TO THE ABOVE ESCALATIONS AS ENTERED IN THE REGIONAL TACNET SYSTEM, I AM FORWARDING THE FOLLOWING COMMENTS.

1. THE ISSUE OF THE FLASHING FAULT LIGHT ON THE DRIVE WHEN EXECUTING A COPY STATEMENT FOLLOWING SPIN UP, WAS ADDRESSED WITH A BLANKET STATEMENT. WE DO NOT FEEL THIS PROBLEM IS RELATED TO ALIGNMENT, AS WE HAVE BEEN ABLE TO READILY DUPLICATE THIS PROBLEM ON A NUMBER OF DRIVES BY INSERTING R-10 PROMS IN THE DPU.

2. THE CONCEPT THAT THE DRIVE ALIGNMENT MAY BE THE ROOT OF THE PROBLEMS BEING EXPERIENCED WITH R-10 PROMS, HAS SEVERAL RELATED ISSUES THAT WERE NOT ADDRESSED.

   A. THE DRIVE ALIGNMENT SPECIFICATIONS LISTED IN THE TACNET ENTRY, ARE NOT THE CURRENTLY APPROVED SPECIFICATIONS. THE FOLLOWING SPECIFICATIONS HAVE BEEN GIVEN TO BOTH MYSELF AND SEVERAL CE'S BY THE TAC CENTER, AND ARE ALSO CALLED OUT IN THE CE HANDBOOK, PART NUMBER 741-16524 PHOENIX DISK DRIVE.

      LESS THAN 50MV AT TRACK 404 (SERVO & DATA)
      LESS THAN 600MV AT TRACKS 8 & 800 (SERVO)

   B. EXPERIENCE OVER THE LAST SIX MONTHS HAS SHOWN THAT FOLLOWING REPLACEMENT OF THE CARRIAGE ASSEMBLY, EVEN THESE EXPANDED SPECIFICATIONS HAVE OFTEN BEEN DIFFICULT TO ACHIEVE. BOTH THE DTS AND THE CE GROUPS HAVE FOUND THAT WITH THE CARRIAGE ASSEMBLIES BEING SUPPLIED TO THE FIELD, THE BEST ALIGNMENT RESULTS OBTAINABLE ARE APPROXIMATELY AS FOLLOWS:

      30MV AT TRACK 404 (SERVO)
      400MV AT TRACKS 8 & 800 (SERVO)
      10MV AT TRACK 404 (DATA)

   GIVEN THE CURRENT QUALITY OF THE CARRIAGE ASSEMBLIES BEING PROVIDED TO THE FIELD, THE "TIGHTENED UP"

SPECIFICATIONS CALLED FOR ARE NOT REALISTICALLY OBTAINABLE.

C. NONE OF THE PREVIOUSLY DOCUMENTED PROBLEMS SEEM TO HAVE BEEN ADDRESSED. A MEMO WAS FORWARDED LISTING VARIOUS PROBLEMS WHICH HAVE BEEN ENCOUNTER AND ARE RELATED TO THE R-10 PROMS. MOST OF THESE PROBLEMS DO NOT APPEAR TO BE RELATED TO DRIVE ALIGNMENTS AND WERE CORRECTABLE BY USING R-7 PROMS. ENCLOSED IS A COPY OF THE MEMO ADDRESSING THE R-10 PROM RELATED PROBLEMS.

WHILE THE ALIGNMENT OF THE DRIVE BEING USED AT PRODUCT SUPPORT MAY HAVE CLEARED UP THE PROBLEM THEY WERE EXPERIENCING, ONE DRIVE/ONE SOLUTION IS NOT VERY CONVINCING. PRIOR TO ESCALATING THE R-10 PROM PROBLEM, WE EXPERIENCED THE SAME PROBLEMS/SYMPTOMS ON A NUMBER OF DRIVES WITHIN THE DISTRICT. AT THIS TIME AND WITH THE CURRENT FEEDBACK FROM PRODUCT SUPPORT, IT APPEARS WE WILL CONTINUE TO RESOLVE PROBLEMS USING THE LIMITED SUPPLY OF R-7 PROMS AVAILABLE IN THE DISTRICT. WE WILL ALSO CONTINUE TO SUPPLY INFORMATION TO THE PRODUCT SUPPORT GROUP, AS THEY DEFINE AND REQUEST THE INFORMATION THEY REQUIRE.

REGARDS,

CAL BLACKBURN, DTS

TO:
SUBJECT: MEMO'S FROM THE FIELD

CAL,

HAVE READ YOUR MEMO ADDRESSED TO KEVIN MATHES AND WOULD LIKE TO RESPOND TO EACH ITEM AS IT SEEMS YOU HAVE MISINTERPRETED OUR RESPONSES AND SUGGESTIONS.

1. ON THE ISSUE OF THE FLASHING FAULT LITE YOU SAY PRODUCT SUPPORT RESPONDED WITH A BLANKET STATEMENT. WHAT WAS THE STATEMENT? "WE DO NOT FEEL THIS PROBLEM IS RELATED TO ALIGNMENT".

THE FLASHING FAULT LITE IS NOT A SYMPTOM THAT HAS BEEN BROUGHT UP BEFORE THAT I RECALL. IF IT ONLY OCCURS WITH THE R10 PROMS THEN OBVIOUSLY THE R10 PROMS ARE THE CATALYST EITHER DIRECTLY OR INDIRECTLY.

2. ON THE ISSUE OF THE DRIVE ALIGNMENT BEING THE ROOT OF THE PROBLEM: THIS IS NOT WHAT WAS SAID. WHAT WAS SAID WAS THIS:

WHEN INSTALLING R10 PROMS ALL SURFACES MUST BE FORMATTED WITH R10 PROMS. IF EVEN 1 SURFACE IS NOT FORMATTED, A PROBLEM WITH 'FIRST ACCESS' COULD OCCUR. THERE MAY BE A PROBLEM FORMATTING A SURFACE ON THE VERY FIRST ATTEMPT. ON THE 2ND ATTEMPT ON THE SAME SURFACE THE FORMAT SHOULD RUN SUCCESSFULLY. ALL DRIVES IN THE FIELD PREVIOUS TO THE EXISTENCE OF R10 PROMS SHOULD HAVE BEEN UPDATED TO R7 PROMS. DO NOT KNOW WHAT WOULD HAPPEN TRYING TO GO FROM PROMS OTHER THAN R7. THIS OBVIOUSLY CREATED PROBLEMS IN YOUR AREA. HOWEVER, SINCE ONLY R7 PROMS SHOULD BE IN THE FIELD, WE CANNOT GO TO R&D WITH THIS. AT THIS TIME NO ONE HAS BEEN ABLE TO CLEARLY DEFINE A PROBLEM FORMATTING ON THE 2ND ATTEMPT IF COMING FROM R7 PROMS OR FORMATTING A VIRGIN PACK. THE PROBLEM ON FIRST ATTEMPT TO FORMAT IS DUE TO INABILITY TO READ THE ALTERNATE SECTOR MAP. IF UNABLE TO FORMAT ON THE 2ND ATTEMPT OR ANYTIME AFTER AND HARDWARE IS NOT AT FAULT, THEN WE HAVE AN ISSUE ACCORDING TO R&D.

ONCE ALL SURFACES ARE FORMATTED, SOME DRIVES HAVE BEEN FOUND TO HAVE THE 'FIRST ACCESS' PROBLEM. THE PROBLEM APPEARS TO BE RELATED TO THE ALIGNMENT. WE ARE NOT SAYING THE PROBLEM IS OR ISN'T THE ALIGNMENT. WE NEED INPUT FROM FIELD TO DETERMINE THIS RELATIONSHIP. SO FAR 4 DRIVES WITH THE PROBLEM HAVE BEEN ALIGNED AND 3 DID NOT FAIL AGAIN. WAITING FOR MORE DETAILS FROM THE ONE THAT FAILED. WE ARE NOT CHANGING THE ALIGNMENT SPECS, BUT REQUESTING THE DRIVES WITH THE 'FIRST ACCESS' PROBLEM BE ALIGNED AS PERFECTLY AS POSSIBLE TO SEE IF THIS DOES IN FACT IMPACT THE PROBLEM. THE BEFORE & AFTER OFFSETS ARE NEEDED SO A DETERMINATION CAN BE MADE. JUST VERIFYING THE ALIGNMENT DOES NOT TELL US IF ALIGNMENT HAS AN IMPACT. IF IT IS FOUND THAT ALIGNED DRIVES HAVE A PROBLEM WHICH CAN BE CIRCUMVENTED BY IMPROVING THE ALIGNMENT, THIS WOULD BE BROUGHT TO R&D'S ATTENTION & HOPEFULLY SOME CHANGE WOULD BE MADE TO THE PROM. WE NEED TO HAVE THIS INPUT.

NEEDLESS TO SAY THERE IS A LIMITED SUPPLY OF R7 PROMS. THE QUICKER WE GET FEEDBACK FROM THE FIELD THE QUICK THE RESOLVE. IF I CAN HELP OR ANSWER ANY QUESTIONS PLEASE DON'T HESITATE TO CALL.

REGARDS,
MIKE BAHIA

TAC

INFORMATION CALL

CONTROL NUMBER 06329087

CONTACT NAME LARRY MILLER POSITION CE
RDB # 3412 TDX # PHONE # 301 296 1663 EXT #

SYSTEM TYPE 2200MICR DEVICE TYPE 2280DPU
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 3A14 CITY STATE
ON SITE CONTACT NAME

QUESTION (*) / ANSWER (+)

*AVAILABILITY OF THE R11 PROMS.
*EMPLOYEE# 32527
+THERE ARE NO R11 PROMS. HAS INTERMITTENT PROBLEM RUNNING
+BACKUP WHERE AFTER CHANGING PACKS & COMING UP TO SPEED
+FAILS ON FIRST ACCESS W/ EITHER I90, I92, OR A HANG. MUST
+RESET THE DPU TO CORRECT. EXPLAINED CURRENT STATUS OF 1ST
+ACCESS PROBLEM. CLOSE CALL /CE.
(15MIN) MIKEB

DUPLICATE OF CALL H6343000

TAC

INFORMATION CALL

CONTROL NUMBER H6343000

CONTACT NAME LARRY MILLER POSITION CE
RDB # 3412 TDX # PHONE # 301 296 1663 EXT #

SYSTEM TYPE 2200MVP DEVICE TYPE DPU
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 R. B. BROWN. PHONE #
ADDRESS 33 CITY STATE
ON SITE CONTACT NAME

QUESTION (*) / ANSWER (+)

*@12/09 0710: EARLIER THIS YEAR THE CUSTOMER STARTED USING
*THEIR DAISY CHAINED DRIVE.THEY EXPERIENCED HANGING WHEN
*BRINGING UP AFTER BACKUP. WHILE TROUBLESHOOTING CE CALLED
*TAC. TAC STATED IT WAS A KNOWN PROBLEM AND WAS BEING AD-
*DRESSED. SINCE THAT TIME THE CUSTOMER HAS BEEN RESETTING
*THE DPU. RECENTLY THE CUSTOMER SAID HE WAS TOLD BY REDSHAW
*THAT WANG HAD A "FIX" AND REQUESTED THAT WE INSTALL IT. WE
*REFERENCED TSB #HWT6256 AND CALLED TAC AGAIN. WE INFORMED
*THE CUSTOMER THAT THE PROBLEM IS STILL BEING WORKED ON AT
*R&D WITH NO "FIX" AT THIS TIME. TOM P.
12/09 1045:DTSM FORWARDING TO MIKE B IN PRODUCT SUPPORT
EXPEDITING.----------R.COOPER----------
&12/10/86: THIS PROBLEM IS STILL BEING RESEARCHED IN R+D. AS
& SOON AS THERE IS A SOLUTION WE WILL LET YOU KNOW.
& HOPEFULLY IT WON'T BE MUCH LONGER. THE INFO IN
& THE TSB #6256 IS NOT A FIX. CUSTOMER WAS GIVEN
& WRONG INFO BY REDSHAW. (CFS/TAC)
$12/17 0700: I'VE HEARD NOTHING FURTHER FROM CUSTOMER - T.P.
$12/17 1019:TOM TAKE A LOOK AT THE LAST ENTRY ON TAC #
$ H6022004.WE MAY WANT TO GET MARTY TO LOOK AT THESE
$ ADJ AT BROWN.----------R.COOPER----------
$12/22/86 PLEASE UPDATE THIS CALL! JIMO
$12/22 1245:JIM,THIS TAC IS AWAITING H.O. RESOLUTION.JIM,
$ PLS DON'T WORRY ABOUT TAC'S NOT BEING UPDATED
$ WHICH HAVEN'T BEEN ESCALTED TO THE REGION.-(RWC)--
$12/23 0700: I'VE READ H6022004. WHEN R&D REQUESTS REALIGN-
$ MENT OF FAILING FIELD UNITS, WE WILL COMPLY -
$ TOM P.
$01/12 1200:REDSHAW CALLED ED WHITNEY REGARDING THIS PROBLEM
$ BM GOIG ON SITE TO ADDRESS ALTERNATIVE & GET A
$ FEEL FOR SENSE OF URGENCY.----------R.COOPER-----
$1/12 1510: BM/CE GOING TO SITE AT 0800 TOMORROW A.M. TOM P.
$1/13 1050: BM/CE ON SITE THIS A.M. CUSTOMER GENERALLY BACKS
$ UP 3 PACKS DAILY. WOULD NOT HANG WHILE WE WERE
$ THERE BUT SYMPTOMS REPORTED BY CUSTOMER AND CE WHO
$ HAS OBSERVED THIS IN PAST MATCH THOSE IDENTIFIED

$ IN TSB# HWT 6256. THE 2 DPU ALTERNATIVE IS NOT
$ VIABLE FOR THIS CUSTOMER WHO HAS 2 CPUS ACCESSING
$ 2 DRIVES THROUGH DPU. IN LAST TWO DAYS CUSTOMER
$ HAS ALSO EXPERIENCED INTERMITTENT I90 ERRORS DUR-
$ ING NORMAL OPERATION. WE INSTALLED OUR TESTED SHOP
$ SPARE DPU TO SEE IF IT WILL AFFECT EITHER SYMPTOM.
$ BM WILL KEEP IN TOUCH WITH CUSTOMER AND UPDATE
$ PROMPTLY. -- TOM P. --
$01/13 1142:THANKS TOM-I WILL UPDATE ED WHITNEY.LET ME KNOW
$ IF OUR LOANER IMPACTS THE PROBLEM.WHO WOULD ED
$ CONTACT ON SITE REGARDING CUST DIS-SATISFACTION
$ WITH REDSHAW?----------R.COOPER----------
$1/14 1000: PER CUSTOMER THIS A.M., NO TROUBLES DURING BACK-
$ UP OR NORMAL OPERATION SINCE WE SWAPPED DPUS. WE
$ WILL LEAVE DPU INSTALLED UNTIL WE FEEL WE HAVE
$ DEFINITELY PROVED OR DISPROVED SOMETHING. TOM P.
$1/87 1355: CUSTOMER PLACED CALL BEFORE NOON FOR SYSTEM
$ HANGING. CUSTOMER HAD TO POWER DOWN SYSTEM AND
$ BRING BACK UP TO RESUME OPERATIONS. I CONTACTED
$ CUSTOMER AND HE REQUESTED WE WAIT UNTIL 0800
$ TOMORROW TO BEGIN TROUBLESHOOTING SO HE COULD
$ CONTINUE USING SYSTEM THIS AFTERNOON. WE WILL BE
$ TROUBLESHOOTING FOR INTERMITTENT HANGING AND I90
$ PROBLEM THAT BEGAN LAST FRIDAY AFTERNOON. AS DTS
$ WILL ACCOMPANY CE TO SITE, I WILL ASK HIM TO CON-
$ FIRM OTHER SET OF SYMPTOMS DURING SPIN-UP. TOM P.
$01/16 0700: I COULD NOT UP DATE YESTERDAY AS I WAS UNABLE
$ TO ATTACH TO REGION IN THE MORNING AND OUR SYSTEM
$ WAS TIED UP WITH LOGISTICS PROCEDURES IN THE
$ AFTERNOON. CE/DTS ON SITE YESTERDAY AT 0800. DTS
$ WILL PROVIDE UPDATE ON TROUBLESHOOTING/REPAIRS
$ THIS MORNING. -- TOM P. --
$1/16 1130 ON 1/15,WE FOUND THAT WHEN ONE CPU WAS ACCESSING
$ EITHER PHOENIX IN THE CHAIN, HITTING RESET ON ANY
$ TERMINAL ON THE OTHER CPU WOULD CAUSE I92'S ON THE
$ TERMINAL THAT WAS ACCESSING THE DRIVE. REPLACING
$ THE 7717 PCB IN THE DPU (REPLACEMENT 7717 WAS A
$ REV 2) CORRECTED THE PROBLEM. THE CUSTOMER FOR THE
$ FIRST TIME YESTERDAY REVEALED THAT THEY HAD BEEN
$ EXPERIENCING INTERMITTENT I92'S DURING NORMAL OPER
$ ATION. THIS MORNING, THE CUSTOMER INDICATED THAT
$ THE INTERMITTENT HANGS AND I92'S SEEM TO HAVE BEEN
$ CORRECTED WITH THE NEW 7717 PCB BUT THAT AFTER THE
$ MORNING BACKUPS THE SYSTEM GAVE A I90 DURING THE
$ FIRST ACCESS. TALKING TO MIKE BAHIA THIS MORNING,
$ HE INDICATED THAT AT THIS TIME,THERE IS NO FIX FOR
$ THE "FIRST ACCESS PROBLEM" OTHER THAN MAKING THE
$ DRIVE ALIGNMENT OFFSETS AS TIGHT AS POSSIBLE.MIKE
$ DID GIVE US THE DEATAILS OF ECO 41006 FOR THE 7717
$ PCB WHICH HAS HELPED OTHER SITES WITH INTERMITTENT
$ SYSTEM HANGS WHEN DEALING WITH MULTIPLEXED CPUS.
$ THE 7717 PCBS (NOW REV 3) HAVE BEEN ORDERED.IF THE
$ LATEST REV PCBS ARE NOT READILY AVAILABLE, WE WILL
$ ORDER THE 7408 IC NEEDED FOR THE ECO AND UPDATE
$ THE PCBS LOCALLY.WILL CONTINUE TO MONITOR THE
$ CUSTOMER'S OPERATION.--MARTY DUSHARM--
$01/16 1600: PER MIKE HODGESON (P1 SUPERVISOR), REV3 PCBS
$ WILL BE HERE MONDAY. --TOM P. --
$1/19 1515: CUSTOMER EXPERIENCED I90 ERRORS AGAIN ON FRIDAY
$ AFTERNOON. PCBS DID NOT ARRIVE TODAY; PROMISED
$ AGAIN FOR TOMMORROW. CUSTOMER DOES NOT APPEAR TO
$ BE UPSET A ONE DAY DELAY. TOM P.
$01/20 1035: PCBS JUST ARRIVED; WE WILL INSTALL TODAY. PER
$ CUSTOMER, NO I90 ERRORS DURING OPERATION YESTER-
$ DAY. WE WILL MONITOR. --TOM P.--
$01/21 1730:REV3 MUX INSTALLED 1/20.NO I 90'S REPORTED SINCE

$ MONITOR.----------R.COOPER-------
$01/22 0830: PER CUSTOMER THIS AM, NO I90 ERRORS DURING
$ DAILY OPERATIONS SINCE LAST FRIDAY. THEY ARE MONI-
$ TORING "BACKUP PROBLEM" FOR TREND THAT MAY BE OF
$ HELP IN DIAGNOSING. --TOM P.--
$ HELP IN DIAGNOSING. --TOM P.--
$02/02 0845:TOM,WHAT IS STATUS?----------R.COOPER-------
$02/02 1320: PER CUSTOMER, NO ERRORS DURING OPERATION SINCE
$ REV3 BOARDS WERE INSTALLED ON 1/20. STILL INTER-
$ MITTENTLY HANGING WITH I90 DURING BACKUP. RANDY,
$ ARE WE SUPPOSED TO ALIGN DRIVES TO SEE IF WE CAN
$ AFFECT THAT SYMPTOM? -- TOM P. --
$02/02 1350:TOM,I WOULD LIKE TO GIVE IT A TRY WITH A DTS.I
$ DON'T LIKE IT AS A PERMAMENT RESOLUTION BUT IF IT
$ POSITIVELY IMPACTS THE CUSTOMER THEN IT'S WORTH A
$ TRY.----------R.COOPER----------
$02/03 0700: WHEN WILL THE DTS BE AVAIABLE? --TOM P. --
$02/03 0850:TOM,I HAVE BEEP MARTY,I WILL HAVE HIM CONTACT
$ YOU & SET UP A TIME.----------R.COOPER----------
$02/03 1320: PER CUSTOMER WE CAN HAVE THE SYSTEM NEXT WED-
$ NESDAY AT 0800, HOPEFULLY FOR NOT MORE THAN 2
$ HOURS. -- TOM P. --
$02/10 1230: CONFIRMED WITH CUSTOMER THAT HE IS EXPECTING US
$ AT 0800 TOMORROW. --TOM P--
$02/11 0805:MARTY DIDN'T GET HOME FROM WORK UNTIL ABOUT 0630
$ THIS AM.MIKE RETTIG WENT ON SITE WITH CE.-R.COOPER
$02/11 1220: DRIVES ALIGNED BY BRANCH - TW3534 HAD -600 MV
$ OFFSET AT 404, ADJUSTED TO -17. -525 AT 8, ADJ TO
$ -10. -725 AT 800, ADJ TO +55. TW3539 HAD -125MV
$ OFFSET AT 404, ADJ TO -7. -250 AT 8 ADJ TO -125.
$ +90 AT 800 ADJ TO +250. USED ALIGNMENT PACK
$ S/N T791684. CHECKED ELECTRICAL RUNOUT AND VELO-
$ CITY GAIN ON BOTH DRIVES. WILL CONTINUE TO MONITOR
$ --- MIKE R. ----
$02/11 1315:PER BM CUSTOMER SAVED BACKUP UNTIL THEY WERE
$ DONE & EVERYTHING LOOKED GOOD.WE WILL HAVE TO
$ MONITOR TO SEE IF IT WAS A SUCCESS.----R.COOPER---
$ RETURNS OR IN TWO WEEKS WE WILL GO BACK ON SITE TO
$ DETERMINE IF ANY CHANGE HAS OCCURED.----R.COOPER--
$02/12 0915: PER CUSTOMER, HE EXPERIENCED SAME SYMPTOMS THIS
$ A.M.; I90 WHEN BRINGING DRIVE UP DURING BACK-UP
$ PROCESS. WHAT'S THE NEXT STEP, RANDY? --TOM P--
$02/12/1545:TOM,I'M FORWARDING THIS TAC TO THE REGION TO BE
$ DRIVEN.IF POSSIBLE I WOULD LIKE TO GET JIM O & A
$ DTS TO GO ON SITE & RE-VERIFY ADJUSTMENTS.(RWC)
$02/12 1630: RANDY, LET ME KNOW WHEN YOU WOULD LIKE TO
$ SCHEDULE IT AND I WILL TRY TO SET IT UP WITH
$ CUSTOMER. --TOM P.--
$2/12/87 JIM O, CONTACT RANDY AND SEE WHAT HELP YOU CAN PRO
$ VIDE. I LIKE TO PUT THIS PROBLEM TO BED OR DRIVE
$ IT BACK TO TSO FOR A BETTER FIX. J MCEVOY
$02/17 0810:JOHN,THE BM IS CONFIRMING 2/25 0800AM FOR MARTY
$ & JIM O TO GO ON SITE TO VERIFY THE HARDWARE SO
$ THAT WE DRIVE THIS PROBLEM TO TSO.---R.COOPER-----
$02/18 0815: RANDY, PER CUSTOMER THIS MORNING, HE DOESN'T
$ WANT TO COMMIT TO A TIME RIGHT NOW. HE IS IN THE
$ MIDDLE OF A REDSHAW UPDATE WHICH IS EATING UP HIS
$ PRODUCTION TIME. HE HAS ASKED THAT I CALL HIM BACK
$ LATE NEXT WEEK TO SEE HOW HE STANDS AND PERHAPS
$ WE CAN SCHEDULE A TIME THEN. I WILL DO SO. TOM P.
$2/24/87 RANDY, CAN WE GET A DATE THIS WEEK??? J MCEVOY
$02/25/87 0700: RANDY, PER CUSTOMER'S REQUEST OF LAST WEEK,
$ I WILL CALL HIM TODAY TO SCHEDULE.-----TOM P. ----
$02/25/87 0900: PER CONVERSATION WITH CUSTOMER THIS A.M.,
$ REDSHAW UPDATED PROGRAMS LAST WEEK TO ALLOW THEM
$ MORE RISK FILES. NEW PROCEDURES REQUIRE BACKING UP

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$          TO 9 PLATTERS DAILY. CUSTOMER CAME LIVE  LAST
$          FRIDAY MORNING (2/20) WITH NEW PROCEDURES.
$          CUSTOMER HAS NOT EXPERIENCED ANY PROBLEMS DURING
$          BACKUP SINCE THAT TIME. BOTH CUSTOMER AND I FEEL
$          WE SHOULD MONITOR THIS AND NOT DO ANYTHING ELSE
$          UNTIL/UNLESS TROUBLE SYMPTOM REOCCURS. --TOM P. --
$02/25 0915:JOHN,THIS IS A LITTLE STRANGE.I'M GOING TO MOVE
$          THIS BACK TO THE DIST,SEND TO THE HO & MONITOR FOR
$          A WEEK.----------------------------R.COOPER------
$03/02 1640:TOM,ANY UPDATE FROM THE CUST.-----R.COOPER------
$03/04 0700: RANDY, THE CUSTOMER WAS GOING TO CALL ME IF HE
$          EXPERIENCED ANY FURTHER TROUBLES AND I WAS GOING
$          TO CHECK WITH HIM OCCASSIONALLY JUST TO KEEP IN
$          TOUCH. I WILL DO SO TODAY AND UPDATE YOU. -TOM P.-
$03/04 1110: PER CUSTOMER, HE HASN'T CALLED ME BECAUSE HE
$          HASN'T EXPERIENCED ANY MORE SYSTEM HANGS DURING
$          BACKUPS. HE IS CONVINCED THE PROBLEM IS RESOLVED.
$          WHAT SHOULD WE DO WITH THIS CDA? -- TOM P. --
$03/04 1130:TAC CLOSED-------------------------R.COOPER-----
+E-REV 3 7717 BRD RESOLVED INTERMITTENT I92 ERRORS DURING
+OPERATION & ALSO CORRECTED A PROBLEM WHERE I92 WOULD OCCUR
+IF KEYED RESET ON A TERMINAL ON 2ND SYSTEM NOT USING DISK.
+REDSHAW UPDATING S/W CIRCUMVENTED 1ST ACCESS PROBLEM DURING
+BACKUP. BELIEVE MAY HAVE CHANGE IN BACKUP PROGRAM.  MIKEB
@3/9/87:  TALKED W/ DTS. DOES NOT BELIEVE ALL SURFACES WERE
@          FORMATTED AFTER ALIGNING. ALSO TALKED W/ REDSHAW.
@          THEY SAY NO CHANGE TO THE BACKUP PROGRAM. NOW
@          BELIEVE MOST LIKELY WHEN REDSHAW FORMATTED ALL
@          SURFACES, THIS RESOLVED PROBLEM. ALIGNMENT MAY OF
@          ALSO BEEN A FACTOR.              MIKEB
+MOST LIKELY FORMATTING RESOLVED & ALIGNMENT MAY OF BEEN
+FACTOR.
```

TAC

PROBLEM CALL

CONTROL NUMBER 07054069

CONTACT NAME ESSIE POWELL POSITION CE
RCB # 3524 TDX # PHONE # 817 877 1120 EXT #

SYSTEM TYPE 2200MVP DEVICE TYPE CPU
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 AMERICAN STEEL PHONE # 214 264 1533
ADDRESS 3A01 CITY DALLAS STATE TX
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*.EMPL# 28522. DISPATCH# 888384.
*I99 ERRORS.
2/23/87: WAS GETTING I91,I92, & I99 ERRORS WITH DAISY-
CHAINED CONFIG . REPLACED THE 7422 BRD &
THIS CORRECTED THE I91 PROBLEM. THE 7423 RESOLVED
THE I92 ERRORS. NOW ONLY GETTING I99 W/ 1ST DRIVE.
MOST LIKELY 7424 BRD. THE 7423 BRD INSTALLED HAS
R10 PROMS WHILE THE ORIGINAL 7423 HAD R7'S. MUST
FORMAT ALL SURFACES. CE SHOULD ALSO CHECK RIPPLE &
UPGRADE THE 7422 TO E-REV 5, NOW A 4. IF STILL GO-
ING SHOULD EITHER TRY ALL THE REMAINING CPU
BDS &/OR SWAP THE 2 DRIVES AROUND TO MAKE THE
MASTER THE SLAVE & VICE VERSA TO ISOLATE THE PROB-
LEM TO DRIVE OR CPU. (25MIN) MIKEB
+DOWNGRADED TO R7 PROMS. NO PROBLEMS SINCE. CLOSE CALL.
2/23/87 (10MIN) MIKEB

TAC

INFORMATION CALL

CONTROL NUMBER C6288137

CONTACT NAME STEVE KELLS POSITION CE
RDB # 3115 TDX # PHONE # 203 677 5050 EXT #

SYSTEM TYPE 2200LVP DEVICE TYPE CPL
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 HARTFORD SYMPHONY PHONE #
ADDRESS 3A10 CITY HARTFORD STATE CT
ON SITE CONTACT NAME

QUESTION (*) / ANSWER (+)

*PROBLEMS WITH A LVP & A PHOENIX DRIVE.
+REFURBISHED DRIVE. NEW INSTALL. DRIVE FAILS W/ I92 OR HANG
+ON 1ST ACCESS. NO PROBLEMS OTHERWISE. R&D PROBLEM. CE OUT
+SICK. TALKED W/ EM. EXPLAINED ALL PLATTERS MUST BE FORMAT-
+TED W/ R1C AS THIS WILL CAUSE SAME SYMPTOM. PLANS TO DOWN-
+GRADE TO R7 PROMS AS ALL PLATTERS WERE FORMATTED. CLOSE
+CALL /EM.

(15MIN) MIKEE

ITEM SUBJECT: PC22E001 2200 PROBLEM

MIKE,

GOOD NEWS! THE PROBLEM IS FINALLY RESOLVED.

THE DETAILS ARE GIVEN BELOW:

1) 'REFORMATTING ALL PLATTERS', 'ELIMINATION OF DISK', 'RECLOSING RIPPLE IN CPU', 'RUN-OUT CHECK' HAD ALL BEEN TRIED PREVIOUSLY WITHOUT SUCCESS.

2) ON FURTHER INVESTIGATION THE PROBLEM WAS FINALLY TRACED TO THE FOLLOWING TWO REASONS:

   A) ONE OF THE FOUR PIC PROMS WAS FOUND TO HAVE WRONG DATA, AND BOARD REPAIR CENTER WAS USING THIS AS THE MASTER COPY FOR DUPLICATING PIC PROMS. THIS WAS IDENTIFIED WHEN EACH OF THE PIC PROM AT BOARD REPAIR CENTER WAS COMPARED AGAINST KNOWN GOOD PIC PROMS FROM H.C. THIS BAD PIC PROM ONLY AFFECTS THE REFORMATTING OPERATION AND DOES NOT AFFECT NORMAL READ/WRITE OPERATION. DURING REFORMATTING IT DOES NOT FULLY COMPLETE THE OPERATION, RESULTING IN PROPERLY LEAVING THE ALTERNATE SECTOR MAP IN CYLINDER INVALID. HOWEVER, SINCE REFORMATTING IS DONE RARELY, AND BECAUSE OF NO ERROR MESSAGES THIS PROBLEM WAS NEVER NOTICED UNTIL NOW.

   B) THE DRIVE CAPABILITY JUMPER IN CONTROL MUX BOARD OF THE PHOENIX DRIVE WAS SET INCORRECTLY AT 5C MEG FOR THE 20MB-1 DRIVE. AGAIN, THIS INCORRECT SETTING DOES NOT CAUSE ANY PROBLEM WITH RT PROMS, SINCE THEY DO NOT TRY TO READ THE ALTERNATE SECTOR MAP IN ALL SURFACES DURING 'FIRST ACCESS'. HOWEVER PIC PROMS TRY TO READ FROM NON-EXISTANT SURFACES RESULTING IN I92 ERROR.

AFTER USING CORRECT PIC PROMS TO FORMAT AGAIN, AND CHANGING JUMPER IN CONTROL MUX BOARD FROM 50MEG TO 20MEG, 'FIRST ACCESS PROBLEM' DISAPPEARED.

THANK YOU FOR YOUR PATIENCE AND CONTINUED SUPPORT.

REGARDS,
S.PARAPAGURU/ASC-BANGALORE.

---------- ORIGINAL MSG ----------

TO: SANDPAGEGARAN PARAPAGURU FROM: JACK CHEW
SUBJECT: PC22E001 2210 PROBLEM DATE SENT: 07/09/87

PETER/GURU
I FOUND MIKE SAHA TODAY AND DISCUSSED THIS CALL. HE MENTIONED THAT SIMILAR ESCALATIONS WERE RECEIVED IN THE PAST. SO, IT IS NOT THAT H.C. COULD NOT DUPLICATE THE PROBLEM AS DESCRIBED IN YOUR MONTHLY REPORT.

SO FAR, THE WAYS TO SOLVE I92 PROBLEM HAVE BEEN :-)
1. TO REFORMAT THE DISKS
   ALTHOUGH YOU CONFIRMED THAT DISKS HAVE BEEN FORMATTED WITH PIC PROMS. HE DID EMPHASIZE THAT ALL DISK SURFACES HAVE TO BE REFORMATTED. HE INDICATED THAT EVEN IF USER REPLACES ALL THE DISK, BUT TURN BUT ANOTHER REMOVABLE DISK IN AND IT HAS NOT BEEN REFORMATTED, THE ERROR MAY APPEAR. SO, PLS

MAKE SURE AGAIN THAT THIS IS NOT THE CASE.
2. TO PROPERLY ADJUST THE ALIGNMENTS OF ASSUME WE REFERS TO THE DRIVES).

3. HE IS QUITE CONCERNED ABOUT THE VOLTAGE SETTINGS YOU SUBMITTED AS THEY SHOWED A WIDE VARIATION AT DIFFERENT TIMES. HE IS NOT SURE WHETHER THEY WERE RECORDED PROPERLY. FOR EXAMPLE,

	MAY BE	OR BE	OR
+5VR	100MV	*	99MV
+5VL	10MV	*	43MV
+12V	20MV	*	112MV
-12V	100MV	*	112MV
+8V	20MV	*	73MV (IN FACT, THE 8V SHOULD BE
-15V	100MV	*	142MV -8.4V +/- 0.1V)

* MEANS THE READINGS ARE WITHIN SPEC. I.E. < 30MV.

HE MENTIONED THAT HE RESETTING THOSE SETTINGS A FEW TIMES AND NEVER GOT READINGS VARYING SO WIDELY. SO, PLS CHECK AND ADVISE HIM.

4. HE GAVE ME A DESCRIPTION OF THE GROUND CHECK WHICH IS REQUIRED. IT SAYS : "THE NEW PROCEDURE TO CHECK ELECTRICAL GROUND IS TO CONNECT SCOPE TO TEST POINT 10 ON THE SERVO BOARD. SET. VOLT/DIV. - 1 VOLT, TIME BASE IS 10MSEC. GROUND TEST POINT 5 ON THE SERVO BOARD . SELECT THE REMOVABLE OR A FIXED R/W HEAD, WHICHEVER IS TO BE TESTED. OBSERVE THE WAVE FORM AT TP10. PEAK TO PEAK SHOULD BE LESS THAN 2 VOLTS. IF THE SIGNAL IS LARGE THAN 2 VOLTS THE BOARD IS CONSIDERED TO BE BAD AND REPLACED.

BASICALLY, HE SAID THAT IF ALL THESE ARE CHECKED CORRECTLY, IT JUST CONFIRMS THAT THERE IS SOME R/W PROBLEM WITH THE DRIVE. THE ONLY ALTERNATIVES ARE TO EITHER :-

1. REPLACE THE DRIVE, OR
2. GO BACK TO MY PROMS. HE CAN SUPPLY THEM.

HE ALSO GAVE ME A SCHEMATIC OF THE REGULATOR, WHICH MAY BE USEFUL IF THERE IS A RIPPLE PROBLEM.

IF THERE IS ANYTHING YOU NEED TO RELATE TO MIKE. YOU CAN UPDATE THE TAC OR EXPLAIN TO ME ON THURS. MORNING WHEN I CALL. REGARDS, JACK

RDB 3347
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
CRT Management	KY1035	R7	Intermittent I90 & I92	No
CRT Management	KY1081	R7		No
CRT Management	KY4330	R7	No	??
CRT Management	KY5536	R7	No	??
CRT Management	KY6424	R7	No	??
CRT Management	KY7285	R7	No	??
LSD	IN2186	R7		No
Cross & Peters	IN2101	R7		No
Trimetal	KY4818	R7		No
City of Detroit	ZF1335	R7	No	??
City of Detroit	IN2427	R7	No	??
First Fed. Savings	IN2465	R7	No	??
First Fed. Savings	KY7506	R7	No	??

1189v/LL

RDB 3644
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Dearborn Services	IN1584	R10	Yes	No
City of Dearborn	KY3417	R10	Yes	No
City of Dearborn	IN2855	R7	No	No
Metro Home Health	IN2920	R7	No	No

1189v/LL

RDB 3341
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Creative Risk	KY6437	R7	No	No
Macomb Professional	OR2190	R10	Yes	No

1189v/LL

RDB 3342
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
LUVAN	IN2049	R10	Yes	No
Campbell	KY1122	R7	No	No
Oceana Hospital	KY2801	R7	No	No
Plainfield Township	KY2286	R7	No	No
Price Hennevelt	KY7618	R7	No	No
Mutual Benefit	KY3410	R7	No	No
Crosby & Henny	ZF1205	R10	No	No
Auto Wares	IN2389	R10	No	No
Auto Wares	KY5446	R10	No	No
F W Grotenlnus	Unknown	R10	No	No
Advance Packaging	KY5173	R10	No	No
Action Wholesale	KY5219	R10	No	No
Bechtold Agency	ZF1314	Unknown	No	No
Christoff & Sons	KY4994	R7	No	No
GR Chamber of Commerce	KY7914	Unknown	No	No
Hasting Fiberglass	Unknown	Unknown	No	No

RDB 3342
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Hastings Manufacturing	KY3026	Unknown	No	No
Metric Fasteners	KY6383	R10	No	No
Morrison Knudsen	IN2099	R7	No	No
City of Michigan HTS	KY1410	R7	No	No
County of Michigan	KY7267	R7	Yes	Unknown
Newman Audio	KY1959	Unknown	No	No
Rapid Engineering	KY2175	R10	No	No
Varis Pines	KY2937	R7	No	No
West Michigan Clinical	KY5540	R7	No	No
Witte Travel	KY5492	Unknown	No	Unknown

RDB 3655
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Madison Area				
Anchor Savings	KY4518	R7	None	
Anchor Savings	KY7511	R7	None	
Betlach E H & Ass	KY5181	R7	None	
First Federal	KY5584	R7	None	
Klipstein Ins.	KY5581	R7	None	
Renk & Sons	IN1820	R7	None	
Ross & Chattern	KY1636	R7	None	

RDB 3665
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Northern Wis				
First Financial	KY5171	R7	None	
First Financial	IN2765	R7	None	
First Financial	KY4097	R7	None	
Jewell & Assoc.	ZF1613	R10	None	
Marshfield Electric	ZF1547	R10	None	
Weyerhaeuser Co.	KY2509	R7	None	
Weyerhaeuser Co	KY6194	R7	None	
Sentry Ins.	KY2703	R7	None	
Sentry Ins	IN1396	R7	None	

RDB 3657
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Badger Meter	KY1004	R7	No	No
Bayshore Clinical	KY6085	R7	No	No
Republic Savings	IN2496	R7	No	No
Republic Savings	Unknown	R7	No	No
Dykro	KY5302	R7	No	No
Allied Quoting Systems	KY4404	R7	No	No
Allied Quoting Systems	KY4041	R7	No	Yes
Dairyland Foods	KY5153	R7	No	No
First State Bank	KY4449	R7	No	No
Wisconsin CPA's	KY4459	R7	No	No
Cascio Music	KY5223	R7	No	No
Cascio Music	KY5691	R7	No	No
Hanson Najilitzio	KY7301	R7	No	No

RDB 3657
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
A. B. Data	IN1022	R7	No	No
A. B. Data	KY2293	R7	No	No
A. B. Data	KY1121	R7	No	No
A. B. Data	KY7907	R7	No	No
Allen & Assoc.	KY2282	R7	No	No
Aronson & Schroeder	KY3163	R7	No	No

RDB 3666
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
First Wis. National Bank	IN2502	R7	No	No
Mutual Savings	KY1530	R7	No	No
NML #5	KY1956	R7	No	No
NML #17	KY3411	R7	No	No
NML #1	KY4500	R7	No	No
NML	KY3715	R7	No	No
Swatek Sales	ZF1289	R10	Yes	No
Johannsen-Farrar	VM4052	R10	Yes	No
St. Francis Savings	KY3551	R7	No	No
David Insurance Agency	ZF1136	R7	No	No
Kenosha Police	KY1032	R7	No	No
Kenosha Police	KY4194	R7	No	No
Kenosha Savings	KY7445	R7	No	No
Wisconsin Elect. Power	KY7291	R7	No	No
Harold Braun & Co.	KY4995	R7	No	No
M I Grootemaat	KY5786	R7	No	No

RDB 3344
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Tomlin Toledo	KY3600	R7	No	No
Brooks Insurance	IN2417	R10	No	No
Imco	KY6473	R7	No	No
Kahn & Diehl	KY7791	R10	No	No
Ohio Table Pad	KY2460	R7	No	No
Royal Development	IN1768	R7	No	No
St. Francis Rehab.	KY6572	R7	No	No
State Home Savings	KY6031	R7	No	No
Ultalight	KY4934	R7	No	No

RDB 3671
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Indiana Construction	IN1420	R7	No	No
J & D Management	KY3540	R7	No	No
Korte Brothers	KY1998	R7	No	No
Morrison Knudson	KY7355	R7	No	No
Roy Jones Dog Show	KY2689	R7	No	Yes
Schenkel & Schultz	IN1818	R7	No	No

RDB 3675
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Adams Engineering	KY2926	R10	No	No
Don Young Insurance	ZF1597	R7	No	No
Elpaco	IN2020	R7	No	No
Food Specialist	KY6254	R7	No	No
Hess Engineering	KY5155	R7	No	Yes
LRV Inc.	IN1459	R7	No	No
Louies Tux Shops	IN1762	R7	No	Yes
Precision Piece Parts	KY7680	R7	No	No
Schmitt & Kaylor	KY7284	R7	No	Yes
Village Optical	KY7129	R7	No	No

RDB 3343
2200 SYSTEMS DPU SURVEY

Customer Name	DPU Serial No.	PROM Revision (R7/R10)	Problems Encountered (Y/N)	Downgraded from R10 Proms (Y/N)
Charles Richmond Agency	KY7500	R10	No	No
Union Savings & Loan	IN2506	R10	No	No
Allaby & Brewbaker	VM4094	R10	Yes	No
BPS Laboratories	KY5172	R10	Yes	No
Capitol Fed. Savings	KY5731	R7	No	No
Central Management	KY2039	R10	No	No
Central Mich. News	KY4485	R10	Yes	No
Okemos Insurance	KY1843	R10	Yes	No
Weyerhaeuser Corp.	KY3993	R10	No	No
Ed's Refinery	IN1478	R7	No	No
Ingham Otolaryngology	KY2783	R7	No	No
Medical Management	ZF1091	R10	No	No
Midstate Auto	KY2880	R10	Yes	No
Midstate Auto	KY7666	R10	Yes	No

2280 DPU Survey per Product Support Request:

03/27/87 update.

Branch	# of DPU's	# of R-10	# of R-7	# Down to R-7	Other Rev. PROM's
Spokane	28	5	13	3	10
Seattle No.	14	1	13	1	0
Seattle Metro	20	12	8	?	0
Southcenter	84	8	50	26	0
Tacoma	21	2	16	0	3
Portland East	26	6	16	4	0
Portland West	20	3	17	0	0
Salem	2	1	1	0	0
Eugene	23	?	?	0	?
Anchorage	37	1	9	0	27
TOTAL DISTRICT	275	39 + ?	143 + ?	34 + ?	40 + ?

1. Number of 2280 DPU's in district = 275
2. Number of 2280 DPU's with R-10 PROM's = 39 + ?
3. Number of 2280 DPU's with R-7 PROM's = 143 + ?
4. Number of 2280 DPU's downgraded from R-10 to R-7 PROM's = 34 + ?
5. Number of 2280 DPU's with other than R-10/R-7 PROM's = 40 + ?

Kevin, in response to the request from Product Support, the enclosed document lists the approximate count of 2280 DPU's and the associated PROM revision levels. This is the approximate count for the Pacific Northwest District.

Cal (3/27/87)

ROGER KIRK 77624

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

MEMORANDUM

TO: Gil Carrier

FROM: Mike Bahia

SUBJECT: Phoenix DPU R10/R7 Population

DATE: April 16, 1987

DISTRICT	R7/PROB	R10/PROB	R10 DWNGRDE	OTHER/UNK	TOTAL
NEW ENGLAND	(Too busy to comply)				
BOSTON	25	23	-	-	48
UPSTATE NY	140	56	-	7	203
STAMFORD	70	5	-	-	75
HARTFORD	86	58/ 1	3	-	144
NYC MIDTOWN	40	5/ 2	10	9	54
NYC UPTOWN	100	5	-	-	105
LONG ISLAND	30	80	1	-	110
PENN/DELAWARE	66	100	12	-	166
PHILADELPHIA	60	60	6	-	120
MARYLAND	54	34/ 2	6	-	88
VIRGINIA	(DTSM fill-in failed to followup)				
FEDERAL	0	0	-	-	0
GREENSBORO	75	100/ 10	-	-	175
TAMPA	100	150/ 3	40	-	250
ATLANTA EAST	77	30	1	-	107
MID SOUTH	100	14	1	27	141
CLEVELAND	45	35/ 2	1	-	80
GREAT LAKE	99/ 2	30/ 12	5	6	135
MINNESOTA	51/ 3	35/ 14	1	-	86
OHIO VALLEY	145	36/ 2	40	2	183
MIDWEST	48	66	15	-	114
HOUSTON	0	35/ 10	-	-	35
DALLAS	101	39	15	38	178
ROCKIES	209	11	9	-	220
NORTHERN CAL	63	16	2	-	79
LOS ANGELES	30	28	-	-	58
NORTHWEST	143	39	34	93	275
SOUTHERN CAL	30	50/ 5	-	-	80
MOUNTAIN	9	12	-	-	21
TOTALS	1996/ 5	1152/ 63	204	182	3330

R7/PROB - first number is total of DPU's in District with R7 Proms. The number following the slash, if present, indicates systems with R7 Proms experiencing a Phoenix or DPU related problem.

R10/PROB - first number is total of DPU's in District with R10 Proms. The number following the slash, if present, indicates systems with R10 Proms experiencing a Phoenix or DPU related problem.

R10 DWNGRDE - number of sites where proms were downgraded due to problems with R10 Proms.

OTHER/UNK - number of sites where prom level is unknown or lower than R7.

TOTAL - total number of DPU's in District.

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

These are approximate counts for most of the Districts within the United States. If there are any questions please call. Will be in school for 3 weeks. If need to talk with me contact my Manager, Ron Olesen or leave me a DVX. Please keep us posted on the status.

Regards,

Mike Bahia
2200/VS Product Line Engineer

CC: Ron Olesen M/S 001-260
Henry Schinnagel M/S 001-210

1027D

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

MEMORANDUM

TO: Gil Carrier

FROM: Mike Bahia

SUBJECT: Phoenix DPU R10/R7 Population

DATE: April 16, 1987

DISTRICT	R7/PROB	R10/PROB	R10 DWNGRDE	OTHER/UNK	TOTAL
NEW ENGLAND	(Too busy to comply)				
BOSTON	25	23	-	-	48
UPSTATE NY	140	56	-	7	203
STAMFORD	70	5	-	-	75
HARTFORD	86	58/ 1	3	-	144
NYC MIDTOWN	40	5/ 2	10	9	54
NYC UPTOWN	100	5	-	-	105
LONG ISLAND	30	80	1	-	110
PENN/DELAWARE	66	100	12	-	166
PHILADELPHIA	60	60	6	-	120
MARYLAND	54	34/ 2	6	-	88
VIRGINIA	(DTSM fill-in failed to followup)				
FEDERAL	0	0	-	-	0
GREENSBORO	75	100/ 10	-	-	175
TAMPA	100	150/ 3	40	-	250
ATLANTA EAST	77	30	1	-	107
MID SOUTH	100	14	1	27	141
CLEVELAND	45	35/ 2	1	-	80
GREAT LAKE	99/ 2	30/ 12	5	6	135
MINNESOTA	51/ 3	35/ 14	1	-	86
OHIO VALLEY	145	36/ 2	40	2	183
MIDWEST	48	66	15	-	114
HOUSTON	0	35/ 10	-	-	35
DALLAS	101	39	15	38	178
ROCKIES	209	11	9	-	220
NORTHERN CAL	63	16	2	-	79
LOS ANGELES	30	28	-	-	58
NORTHWEST	143	39	34	93	275
SOUTHERN CAL	30	50/ 5	-	-	80
MOUNTAIN	9	12	-	-	21
TOTALS	**1996/ 5**	**1152/ 63**	**204**	**182**	**3330**

R7/PROB - first number is total of DPU's in District with R7 Proms. The number following the slash, if present, indicates systems with R7 Proms experiencing a Phoenix or DPU related problem.

R10/PROB - first number is total of DPU's in District with R10 Proms. The number following the slash, if present, indicates systems with R10 Proms experiencing a Phoenix or DPU related problem.

R10 DWNGRDE - number of sites where proms were downgraded due to problems with R10 Proms.

OTHER/UNK - number of sites where prom level is unknown or lower than R7.

TOTAL - total number of DPU's in District.

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ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 94-7421

These are approximate counts for most of the Districts within the United States. If there are any questions please call. Will be in school for 3 weeks. If need to talk with me contact my Manager, Ron Olesen or leave me a DVX. Please keep us posted on the status.

Regards,

Mike Bahia
2200/VS Product Line Engineer

CC: Ron Olesen M/S 001-260
Henry Schinnagel M/S 001-210

1027D

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STEVE CAPARELLA
1-87272

2200 HARDWARE DESIGN ISSUES

WANG

1.PROBLEM: Intermittent I90 errors after powering up the drive/s when running daisy-chained Phoenix drives using the R10 DPU proms. I90 is a disk hardware error caused by the disk drive not responding properly to the system.

CIRCUMVENTION: a. Have a DPU installed for each Phoenix drive.
b. Downgrade to R7 proms. R7 proms may present a data integrity problem on a surface with alternate sectors.
c. Power DPU on and off every time a drive is powered up.
d. Key reset on workstation.
e. Try an old CDC Terminator with the black chips or possibly one with the white chips. The newer terminators, especially from Wang seem to have a relationship to the problem.

R & D CONTACT: Mike Riley, S.K.Ho

STATUS: The fix to the Phoenix I/O boards has been dropped at this time. As these are not Wang boards and this drive is no longer made by CDC implementing this fix could be a major problem. An updated 210-7422 board was sent to Imperial Head Wear in early July. Problems were encountered with the slave drive on installation and the board was removed. Product Support was not called from site. The board was returned to the Home Office where it was tested without error continuously for several days.

A second board has been made up at our request. One of the 2 boards will be installed at either Imperial Head Wear in Denver or Hazen Paper in Holyoke, Ma, depending on how quickly compliance to certain criteria can be made in Denver. We have requested from the Western Region that all board and prom revisions for the DPU boards at Imperial Head Wear be sent to us and that a complete set of Phoenix and DPU boards be on site at time of installation. The action plan for installation will be developed with Mike Grove (RTS in Western Region) for Imperial Head Wear and Dan Sullivan (DTS in the Farmington, Ct) for Hazen Paper. Once we have a status from the first site a determination can be made on installing the second board. An action plan should be in place by Thursday, 8/7 and hopefully the first board installed by Thursday 8/14.

8/27
9/5

ACTIVE CALLS: ESCALATIONS:

DAN SULLIVAN 9/16 LMTC FOR TERM
GARY LOPEZ 9/16 TERM
STEVE SCHUSTER
LOU MAILLOUX 9/16 TERM

9/10	06164095	HAZEN PAPER SINGLE DRIVE
9/10	66170007	LUVAN
9/15	86007000	IMPERIAL HEAD WEAR
9/16	H6022004	NAVAL SEA SYSTEMS
9/10	P5343000	TAIWAN
9/17	P6083000	TESTRITE COMPANY, LTD
	06143042	TABB, BROCKENBROUGH

2.PROBLEM: When using a printer/disk controller (210-7342) with the Phoenix Disk Drive or the 2275, intermittent I90, I91, I92, and possibly I96 errors occur. I90, I91, and I92 errors are caused by the disk unit not properly responding to the system. I96 is a read error.

CIRCUMVENTION: a. Place the 7342 printer/disk controller in the last I/O slot of the CPU farthest from the CPU boards. In testing for this problem it was found that boards which fail solidly when next to the CPU boards ran error free when placed in the last I/O slot.
b. Replace the printer/disk controller with a single disk and a single printer controller.
c. Replace the printer/disk controller with the older version printer/disk controller (210-7042-2) if available.
d. Replace the printer/disk controller with a triple controller (212-3012), workstation/printer/disk. Although no problems have been reported with this board the design is the same as the 7342 printer/disk controller. As such this board may also exhibit the same problems.

R & D CONTACT: Gil Carrier, Lou Cornaro, Mike Riley

STATUS: R & D has identified the problem with this board. The problem is related to the design of the line driving circuit and the speed of the chips used. R & D has updated 25 boards, thirteen which have been domestically distributed. Ten of these boards are currntly installed at beta sites and all have reportedly been running error free.

A meeting was held Thursday July 31st with representatives of R&D, Product Support, and the ECO group in attendance to discuss the 7342. Results were that by August 15th the needed feedback on beta testing would be significant enough if successful to immediately halt production of the 7342. Meanwhile R&D will draw up the new artwork required for this board, order a minimal number of boards (4 to 8) and prepare for testing the new board. A new part number will be assigned for the new artwork board. I will be looking into the most cost effective way of phasing out the problem 7342 board.

A similar fix will also be needed for the 212-3012 Triple Controller (terminal/printer/disk) as this board has the same design issue.

A TSB was sent out with the July 1st issue on the status and circumventions with the 7342 board.

ACTIVE CALLS: ESCALATIONS:

16097000	NORTHWEST SAVINGS	(beta)
26062002	OCEAN CITY POLICE	(beta)
65312002	GEORGE JR REP	(beta)
66066001	ASSOCIATION OF DERMATOLOGY	(beta)

SASAN NIKSOMANESH LM 9/17 16:15

TAC

PROBLEM CALL

CONTROL NUMBER 06203104

CONTACT NAME ROD STEIN POSITION CE
RDB # 3862 TDX # PHONE # 213 532 0862 EXT #

SYSTEM TYPE 2200LVP DEVICE TYPE DPU
UTILITY NAME E#24576 ↖EMP # 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 ABLE STICK (EPOXIE) PHONE # 213 532 0862
ADDRESS 33 CITY STATE CA
ON SITE CONTACT NAME

PROBLEM (*) SOLUTION (+)

*INT. I90 ERRORS.
7/22/86: 1 LVPC AND 2 MVPC MUXED TO A DPU DAISY CHAIN 2280
9 WORKSTATIONS. CE HAS CK V & RIPPLE, RUN OFF ON
DISK REPLACED DPU AND ALL BDS CUST ON R10 PROMS.
SOME DAYS IT RUNS GOOD OTHER DAYS I90'S AND HANGS
DURING THE DAY. CUST HAS VERY GOOD ENVIROMENT HAS
TO TURN OFF CPU'S TO CLEAR IT.
+CE SHOULD RUN MULTI DISK DIAG FROM ALL CPU'S. ONCE PROB CAN
+BE RECREATED FIX SHOULD BE EASIER. ON A HANG TURN ONE CPU
+OFF AT A TIME (ONE SHOULD CLEAR IT) IF THIS DOESN'T HELP
+BRING NECESSARY BDS AND CONVERT THE SYSTEM TO 1 CPU/ 1 DPU/
+2 CHAINED DRIVES. RUN DIAG. IF ALL THREE PASS INDIVIDUALLY
+PROB IS IN THE MUXING OF THE SYSTEM. 7715 BDS/ 7717/ 7718
+OR CABLES. RUN RANDOM DATA LOAD TEST ON BOTH DRIVES THIS
+WILL CK ALIGN ON DISKS. (35 MIN) JOE
7/30/86: CE REPLACED ALL PHEONIX BDS WITH KNOWN GOOD ONES.
REPL ALL 7717 MUX I/O AND 7421 A IN DPU.
+SENT OUT A COPY OF ECN 41006 FOR THE 7717 BD. (20 MIN) JOE
8/11/86: CE IS ON HIS WAY OUT THERE TODAY CUST CAN'T FORMAT
CE IS GOING OUT WITH ALL DPU BDS. CUST HANGS WHEN
HE BRINGS UP THE DRIVE ALSO WHEN HE BACKS UP. CE
WILL CALL WHEN HE GETS OUT THERE. (15 MIN) JOE
08/11/86-4:25- CALL BACK NEEDED. AT THE # ON FRONT. -BOBBIE
8/14/86: CALLED CE GONE JOE
9/10/86: LEFT MESSAGE AT DISP. (5 MIN) JOE
10/14/86: LEFT MESSAGE AT DISP. 1-800-626-9264. (10 MIN)JOE
10/14/86: CE CALLED BACK, CUST RUNS GOOD DURING THE DAY.
ONLY HAS PROBLEM WITH FIRST ACCESS OF THE DAY
GIVES CUST A HANG, CUST KEEPS SYSTEM UP 24 HRS.
CUST IS NOT TO CONCERNED. (15 MIN)JOE

1027D | 19

PHOENIX DPU R10/R7 POPULATION

REGION/DISTRICT	CONTACT	PHONE	TOT POP (5)	R7 (1)	PROB	R10 (2)	PROB	DOWNGRADED (3)
N.E. DISTRICT	* KATHY CALAMARI DTSM	273-9115						
BOSTON DIST	* BRIAN WEIR, DTS	423-2588	48	25		23		—
UPSTATE NY	* RICHARD LYONS, DTSM	716-232-4010	203	140		56		(7) —
STAMFORD DIST	* RICH ROBERTO, DTSM	203-356-7918	75	70		5		—
HARTFORD DIST	* THOM MITCHEY, DSSM	203-677-5050	144	86		58/1		3
NYC UPTOWN	* JIM CROUCH, DTSM	212-319-5520	105	100		5		—
L.I. DISTRICT	* LARRY POWERS, DTSM	516-364-8610	110	30		80		1
PA/DEL DIST	* JIM HARLACKER, DTSM	215-293-9599	166	66		100		12
NYC MIDTOWN	* VINNIE BARELLI, DTSM	212-599-3454	54	40		5/2		(9) 10
PHIL DISTRICT	* GENE WARRICK, DTSM	215-963-3111	120	60		60		6
MD DISTRICT	* RANDY COOPER, DTSM	301-657-5814	88	54		34/2		6
VA DISTRICT	* TOM PICKETT, DTSM	301-657-5074						
FEDERAL DIST	* DICK OSBORNE, DTSM	301-657-5454	0	—		—		
GREENSBORO DIST	* JIM SMITH, DTSM	919-662-3627	175 APPROX	75		100/10		—
TAMPA DIST	* FRED BECKER, DTSM	813-877-8249	250 APPROX	100		150/3		40
ATL E DIST	* FRANK CHATIGNY, DTSM	404-955-3800	107	77		30		1
MID SOUTH	* MARK GORLEY, DTSM	404-953-5998	141	100		14		(27) 1
CLEV DIST	* STEVE WELFLE, DTSM	216-642-2828	80	45		35/2		1
GRLKS LAKES	* JERRY STUTZMAN, DTSM	313-737-1203	135	99/2		30/12		(6) 5
MINN DIST	* CHUCK SNYDER, DTSM	612-893-5066	86	51/3		35/14		1
OHIO VALLEY	* MIKE KIRCHGESTNER, DTSM	513-621-9264	183	145		36/2		(2) 40
MIDWEST DIST	* JAMES KIDDER, DTSM	312-954-6400	114	48		66		15
HOUSTON DIST	* CHUCK O'MALLEY, DTSM	713-787-2652	35	0		35/10		
DALLAS DIST	* MAX HOGAN, DTSM	214-851-7700	178	101		39		15
ROCKIES DIST	* TONY MACDONALD, DTSM	303-850-0035	220	209		11		9
[illegible] DIST	* BOB BEAULIEU, DTSM	415-391-9770	79	63		16		2

			TOT POP	R7/PROB	R10/PROB	DOWNGRADED	
LA DIST	* LIZ BUTLER ACTING RON FRANK, DTSM	213-337-6250 4/17	58	30	28		
NW DIST	* KEVIN MATHES, DTSM	206-340-6123	275	143+	39+	(93)	34
SCAL DIST	* DAVE LIAO MIKE MORROW, DTSM	714-955-4780	80	30	50/5	—	
MTN DIST	* CLAYTON RAND, DTSM	801-538-0666 4/17	21	9	12	—	
			946	525	230/15	60	131

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

TO: 2200 TAC GROUP

FROM: JOE SCAGLIONE

DATE: SEPTEMBER 29,1987

SUBJ.: NEW 2200 CS / DS NOTICE

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1) 2200 DS

Jack Volpini would like to know of any DS installations that were shipped without installations instructions.

Get:

NAME of CE
CITY and STATE
HARDWARE INSTALLED
CUST. NAME
VENDOR WHO SOLD THE SYSTEM (if possible)

2) 2200 DATA MEMORY UPGRADES

Many calls are coming in asking about 1, 2, 4 and 8 Meg CPU'S.
Oct 15,1987 Focus Announcement
End of Dec. 1st customer ship
End of Jan. volume ship

Up grades can be made to any CS unit and 2200 Micro-VP's only.

joe scaglione

~~Naval Sr~~

City of Los Altos, Los Altos, Ca. — HANGS ON IPL — RUNNING ERROR FREE w/ R7's
86336005 Eric Hamamura

American Steel, Dallas, Tx — OK ON R7's
07054069

Vamco Machine, Pittsburgh, Pa — HANGS 1ST SEEK, FLT LT — RUNNING GOOD ON R7's
66022002 Ralph Pincek — WILL CHECK W/ CUSTOMER — RECEPTIVE

Able Stick, Ca — ~~HANG~~ W/ 1ST ACCESS OF DAY — SYSTEM LEFT UP 24 HRS.
06203104 Rod Stein

R.B. Brown — FORMATTED & OK
06329087 Larry Miller — I90, I92, OR HANG — X

Hartford Symphony — I92 OR HANG ON 1ST ACCESS
06288137 Clive Berry, BM. — WILL CHECK W/ CUSTOMER — ?

DUPLICATABLE PROBLEMS

1. FORMAT REMOVABLE
   KEY RESET WHILE FORMATTING
   POWER DRIVE DOWN & UP
   JUST HANGS

   TO CORRECT
   PLUG REMOVABLE HEAD INTO FIXED LOGIC
   FORMAT
   PLUG BACK INTO REMOVABLE LOGIC

2. POWER UP DRIVE
   EXEC IMMEDIATE MODE COPY
   HEAD SEEKS TO 822
   FLT LITE COMES ON
   HEAD SEEKS TO Ø
   FLT LITE CLEARS
   COPY RUNS NORMALLY

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TECHNICAL SERVICE BULLETIN

WANG

SECTION: HardWare Technical

NUMBER: HWT 6256 REPLACES: _____ DATE: 11/11/86 PAGE 1 OF 1

MATRIX ID. 3104 PRODUCT/RELEASE# 2280/2280 DPU

TITLE: R10 Prom Problem

PURPOSE:

To inform the field of an existing problem with R10 Proms.

EXPLANATION:

A problem has been identified with the R10 Proms located on the 210-7423A board in the Phoenix DPU. With some Phoenix drives on "first access only" after a power up or spin up, a hang or I92 error may result. This problem may occur intermittently, or consistently. Most drives work fine. The problem does seem more prevalent with Blockpt 3 drives than Blockpt 4. A drive would have to be formatted and tested with R10 Proms to insure compatibility.

Some systems require the DPU to be powered off and on to correct the error, while others can be "Reset" from the terminal. Once this is done, the system will work error free. The 'first access' problem is the only known problem with R10 Proms. All other problems should be fixable. R&D is aware of the problem and is working on a fix.

Please be aware that when using R10 proms, all surfaces must be formatted with the R10 Proms. If not, the 'first access' problem and/or other problems may result. This is true even if only accessing the surfaces formatted with R10 Proms. The reason is with R10 Proms only, the alternate sector map for each surface is read each time the heads are loaded.

The only other proms that could be used are the R7 Proms. The R7 Proms have a different number of alternate sectors (twice that of R10's). If using R7 Proms, all platters should be formatted with the R7 Proms as a precaution. R7 Proms do not have the 'first access' problem but may present a data integrity problem on a surface with alternate sectors. Most R7's work fine. R7 Proms will read platters formatted with R10 Proms but must not be left in without formatting.

R7 Proms cannot be ordered from Logistics. Please call On Line Product Support (TAC) with any questions concerning this TSB.

GROUP: VS/2200/PC On Line Hardware Support Group MAIL STOP: 001-260