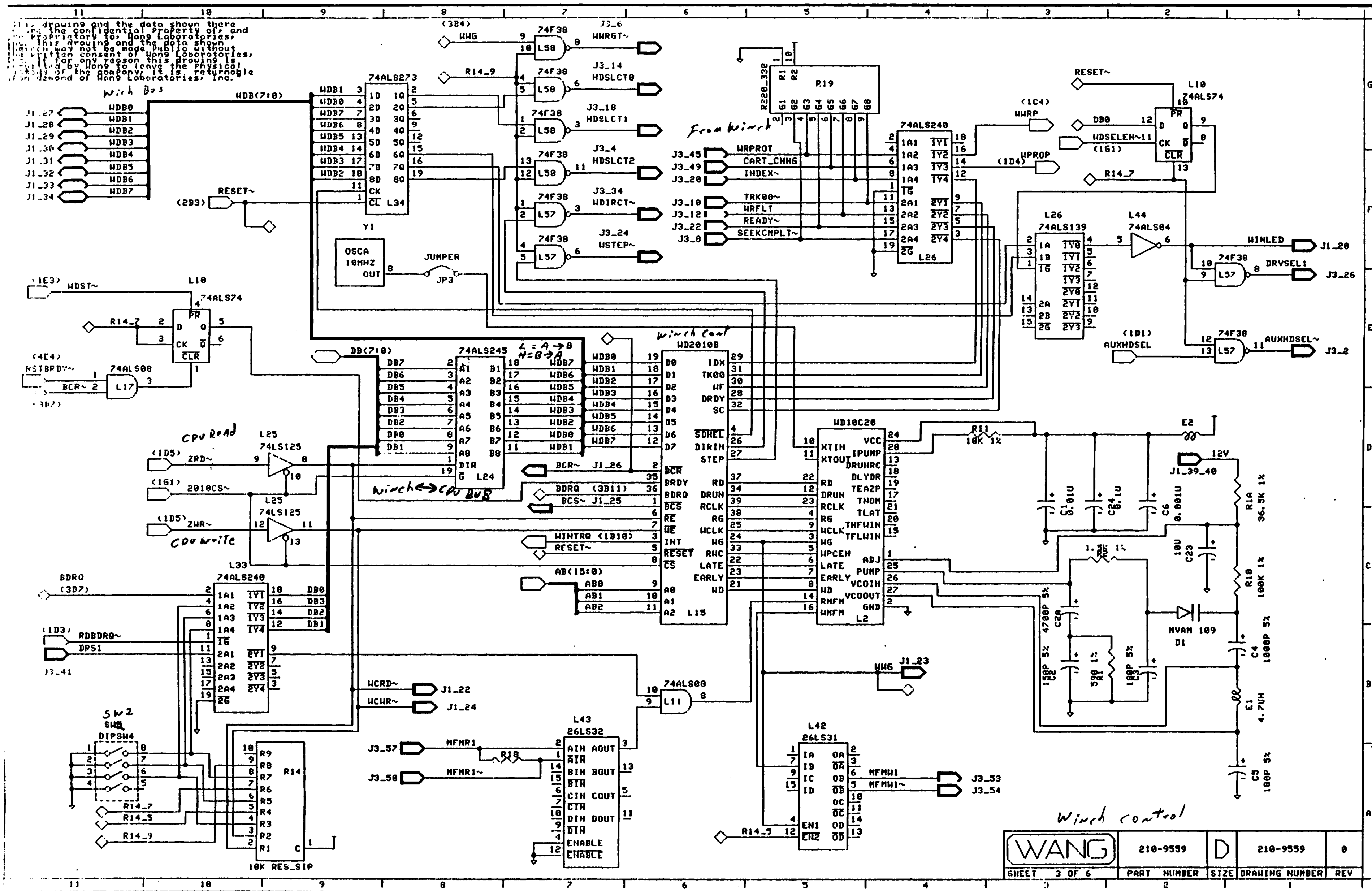

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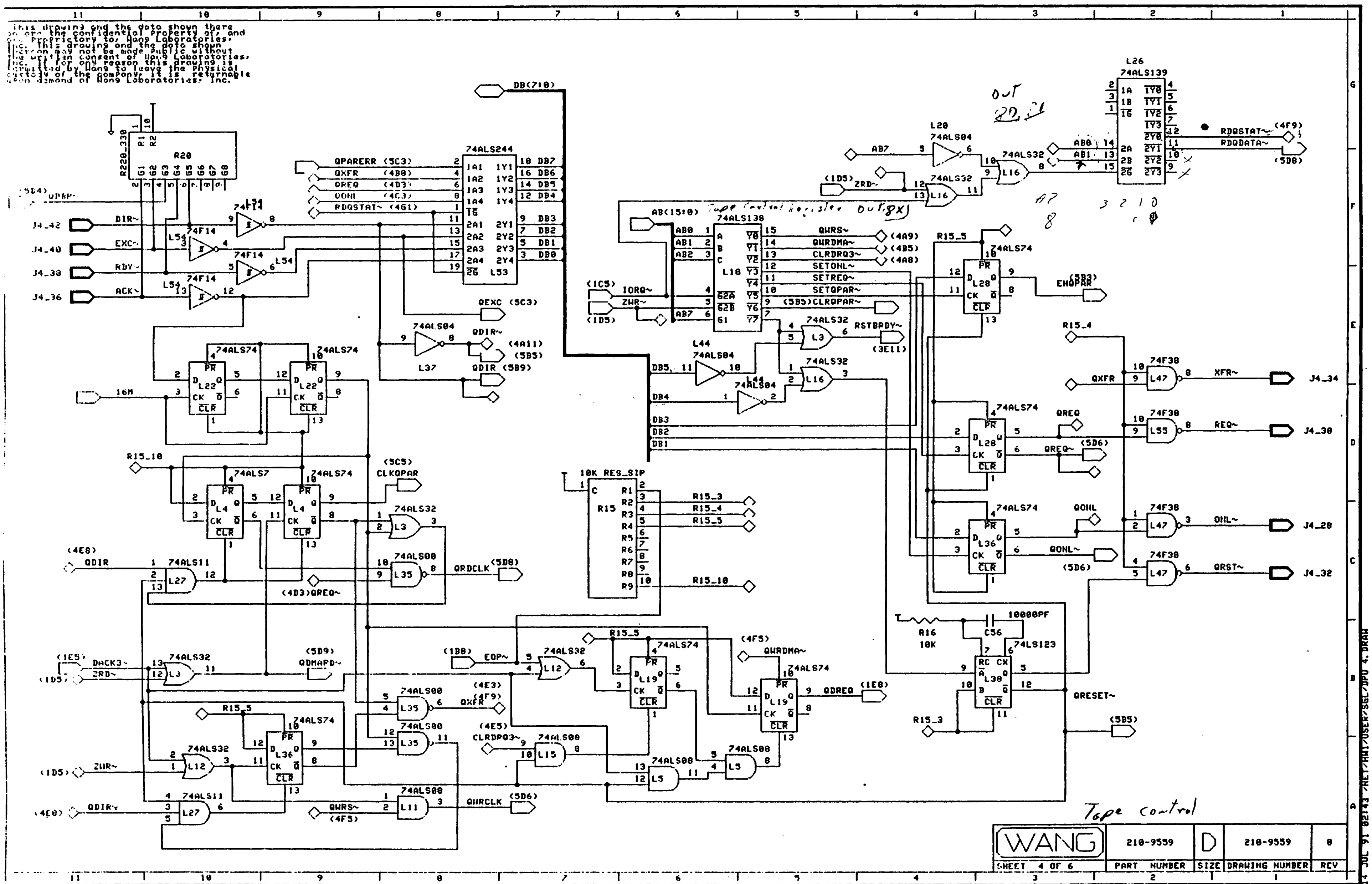
Winch Bus
WDB(7:0)
74ALS273
L34
Y1
OSCA 10MHZ
JUMPER
JP3
74F38
L58
L57
WWRGT~
HDSLCT0
HDSLCT1
HDSLCT2
WDIRCT~
WSTEP~
From Winch
WRPROT
CART_CHNG
INDEX~
TRK00~
WRFLT
READY~
SEEKCMPLT~
R19
R220_330
74ALS240
L26
74ALS139
L44
74ALS04
WINLED
DRVSEL1
AUXHDSEL
AUXHDSEL~
L10
74ALS74
RESET~
WWRP
WPROP
HDSELEN~
74ALS245
L24
L = A → B
H = B → A
Winch ↔ CPU BUS
DB(7:0)
Winch Cont
WD2010B
L15
WD10C20
L2
CPU Read
CPU write
74LS125
L25
2010CS~
ZRD~
ZWR~
WDST~
RSTBRDY~
BCR~
74ALS08
L17
L11
L33
BDRQ
RDBDRQ~
DPS1
WCRD~
WCWR~
L43
26LS32
L42
26LS31
MFMR1
MFMR1~
MFMW1
MFMW1~
SW2
DIPSW4
10K RES_SIP
R14
MVAM 109
D1
E1 4.7UH
E2
12V
Winch control
WANG
210-9559
D
210-9559
0
SHEET 3 OF 6
PART NUMBER
SIZE
DRAWING NUMBER
REV
14 JUL 91 02141 /NET/HW1/USER/SGL/DPU 3.DRAW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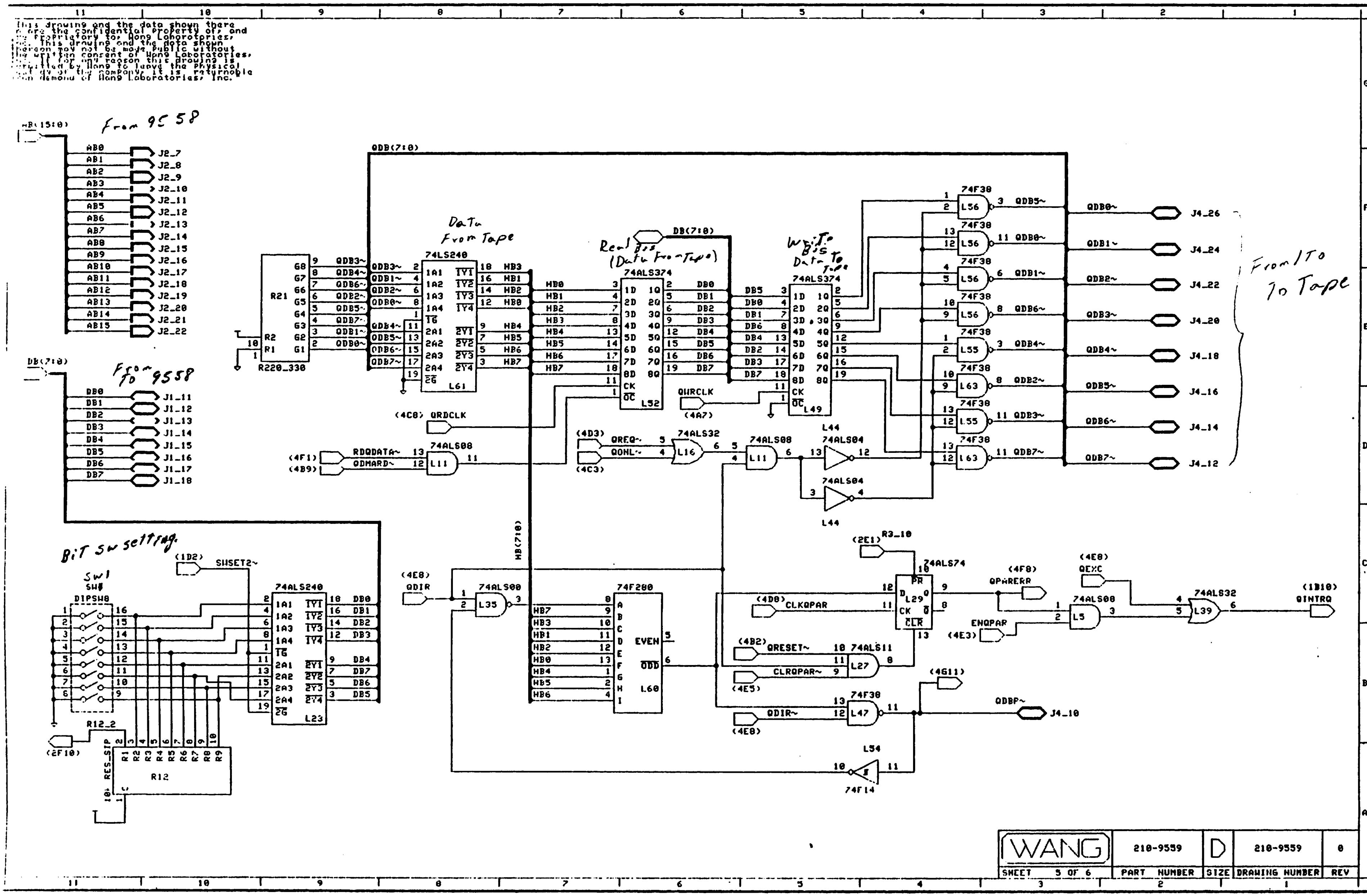
DB(7:0)
AB(15:0)
Tape Control Register OUT 8X
74ALS244
74ALS138
74ALS139
74ALS123
10K RES_SIP
J4_42
J4_40
J4_38
J4_36
J4_34
J4_30
J4_28
J4_32
XFR~
REQ~
ONL~
QRST~
RDQSTAT~
RDQDATA~
QRESET~
Tape control
WANG
210-9559
D
210-9559
0
SHEET 4 OF 6
PART NUMBER
SIZE
DRAWING NUMBER
REV
14 JUL 91 02:43 /NET/HW1/USER/SGL/DPU 4.DRAW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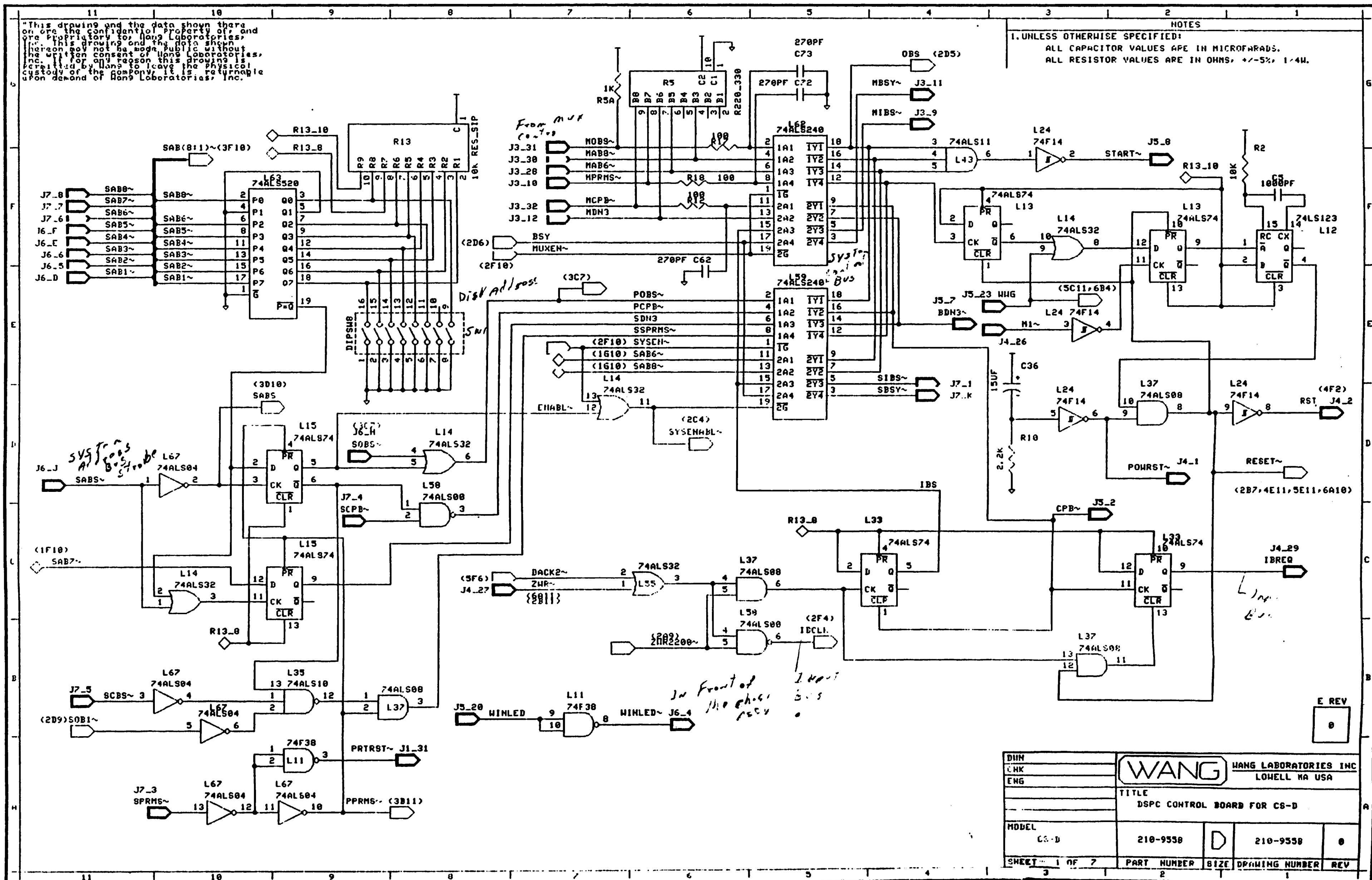
From 9558
From/To 9558
Bit Sw setting
SW1
Data From Tape
Read Bus (Data From Tape)
Write Bus To Data To Tape
From/To To Tape
74LS240
74ALS374
74ALS374
74F38
74ALS32
74ALS08
74ALS04
74ALS00
74F280
74ALS74
74ALS11
74F14
74ALS08
74ALS32
R220_330
DIPSW8
RES_SIP
R12
QDB(7:0)
DB(7:0)
HB(7:0)
QINTRQ
J4_10
WANG
210-9559
PART NUMBER
D
SIZE
210-9559
DRAWING NUMBER
0
REV
SHEET 5 OF 6
14 JUL 91 08:45 /NET/HMI/USER/SGL/DPU 5.DRAW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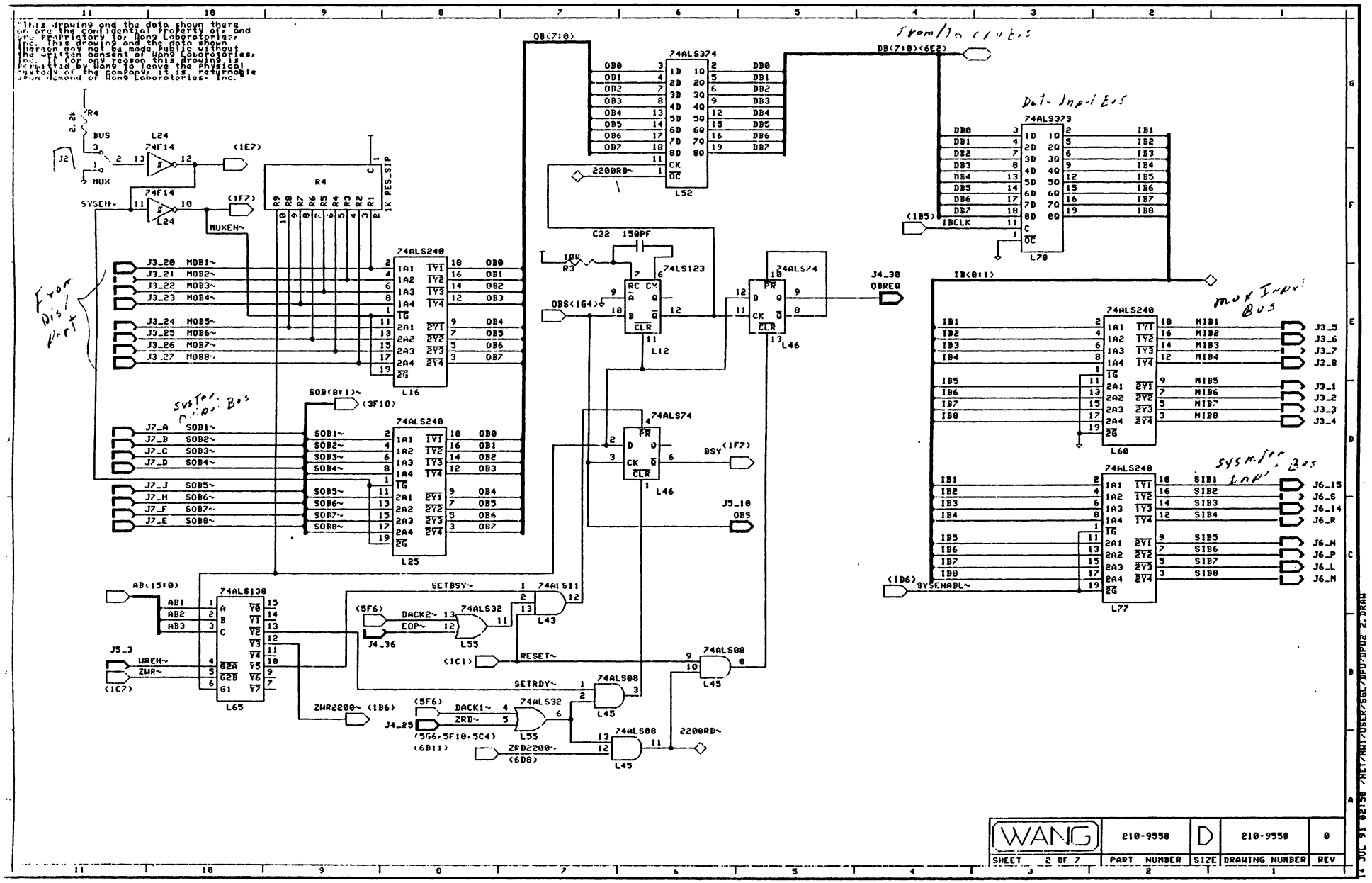
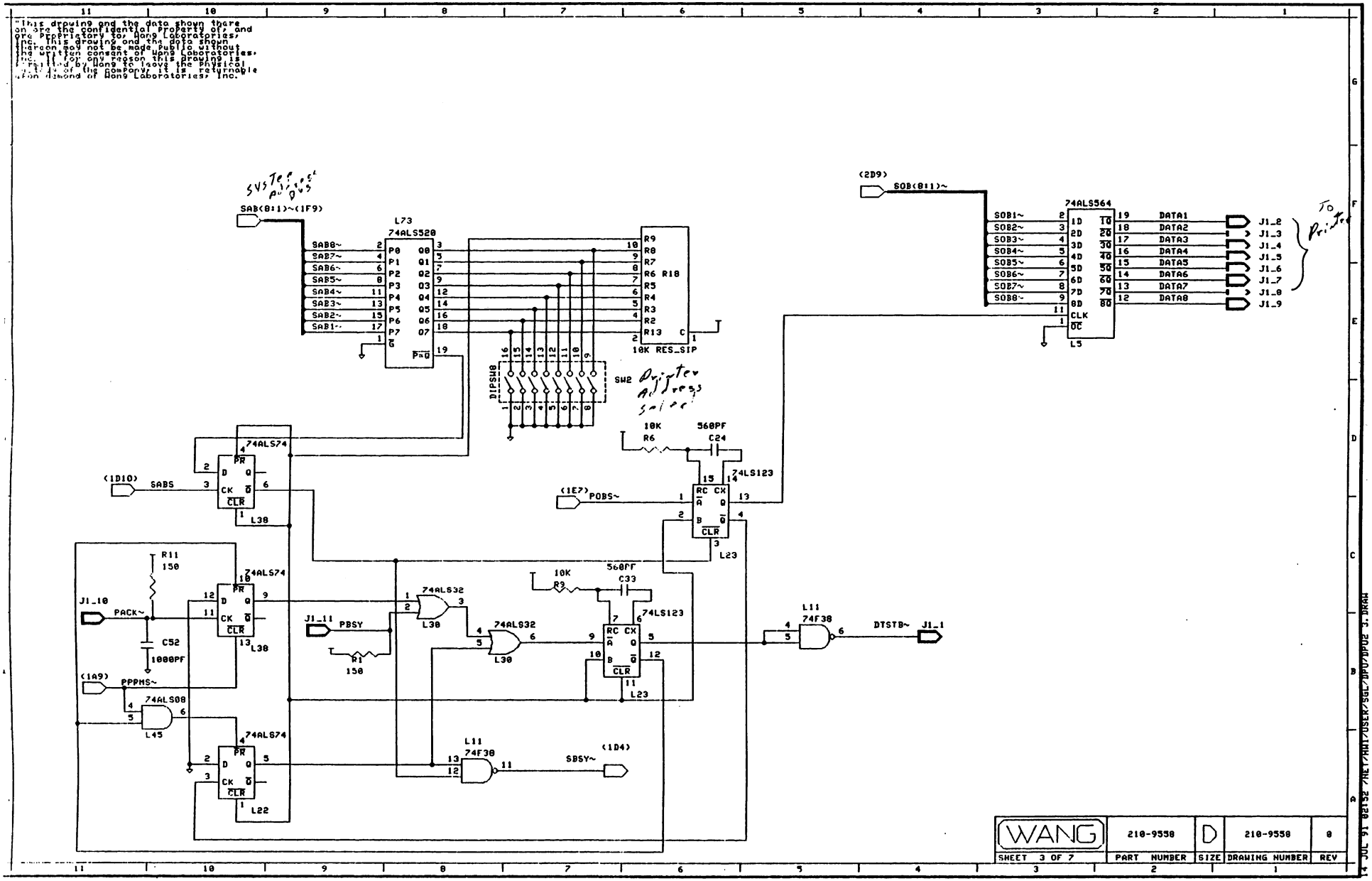
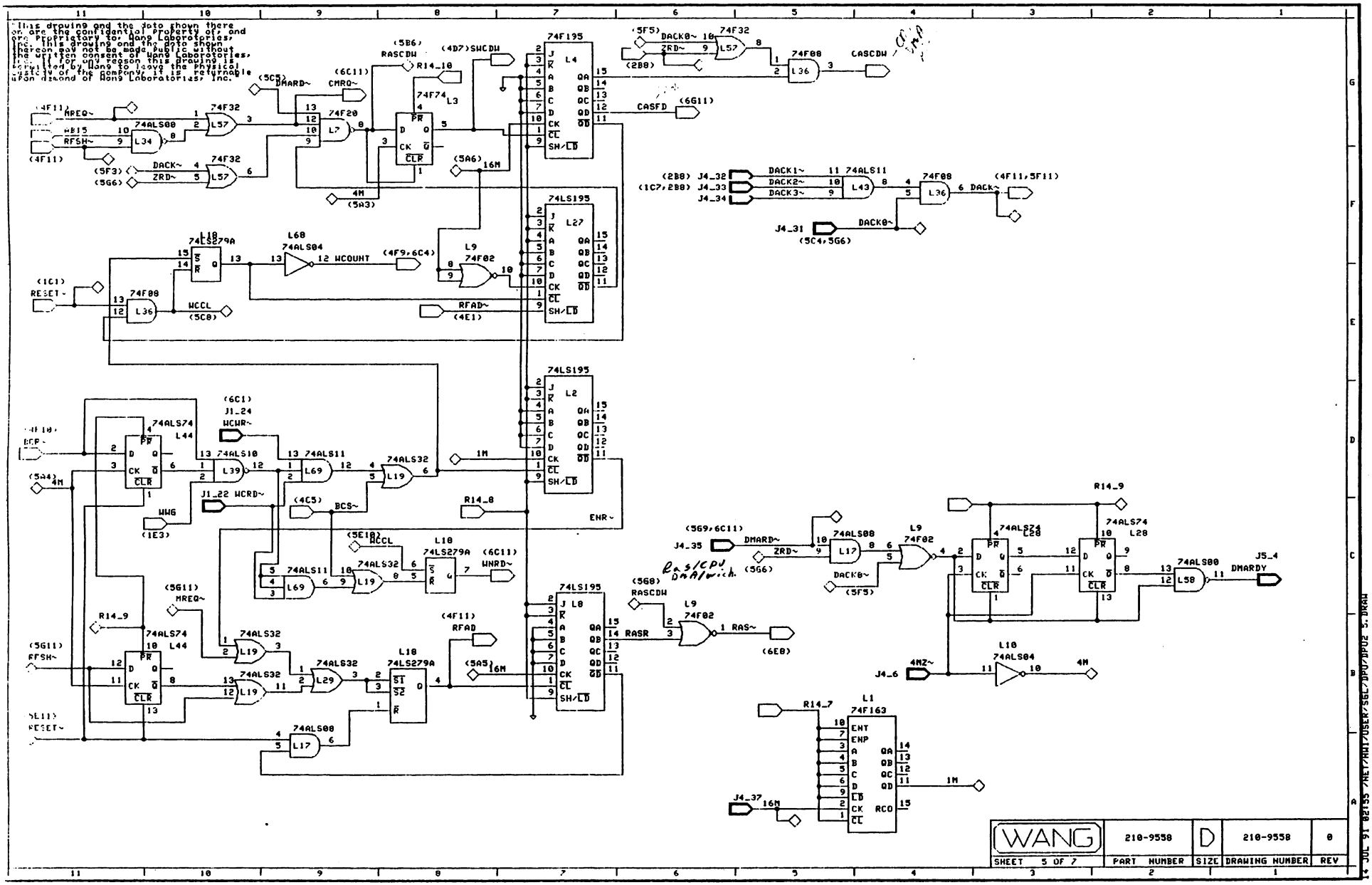
NOTES
1. UNLESS OTHERWISE SPECIFIED:
ALL CAPACITOR VALUES ARE IN MICROFARADS.
ALL RESISTOR VALUES ARE IN OHMS, +/-5%, 1/4W.
74ALS520
74ALS240
74ALS11
74F14
74ALS74
74ALS32
74ALS123
74ALS08
74ALS04
74ALS10
74F38
DIPSW8
R13
10K RES_SIP
R5
R220_330
START~
RST
RESET~
POWRST~
IBREQ
WINLED~
PRTRST~
SABS~
SAB7~
SCBS~
SOB1~
SPRMS~
PPRMS~
DACK2~
ZWR~
ZWR200~
IBCLK
SYSENABL~
ENABL~
POBS~
PCPB~
SDN3
SSPRMS~
SYSEN~
SAB6~
SAB8~
SIBS~
SBSY~
MOBS~
MAB8~
MAB6~
MPRMS~
MCPB~
MDN3
BSY
MUXEN~
OBS
MBSY~
MIBS~
WANG
WANG LABORATORIES INC
LOWELL MA USA
TITLE
DSPC CONTROL BOARD FOR CS-D
MODEL
CS-D
210-9558
D
210-9558
SHEET 1 OF 7
PART NUMBER
SIZE
DRAWING NUMBER
REV
14 JUL 91 02149 /NET/HW1/USER/SGL/DPU/DPU2 1.DRAW



WANG	210-9558	D	210-9558	0
SHEET 2 OF 7	PART NUMBER	SIZE	DRAWING NUMBER	REV

14 JUL 91 02:58 /NET/MAI/USER/SGL/DPU/DPU2.DRAW

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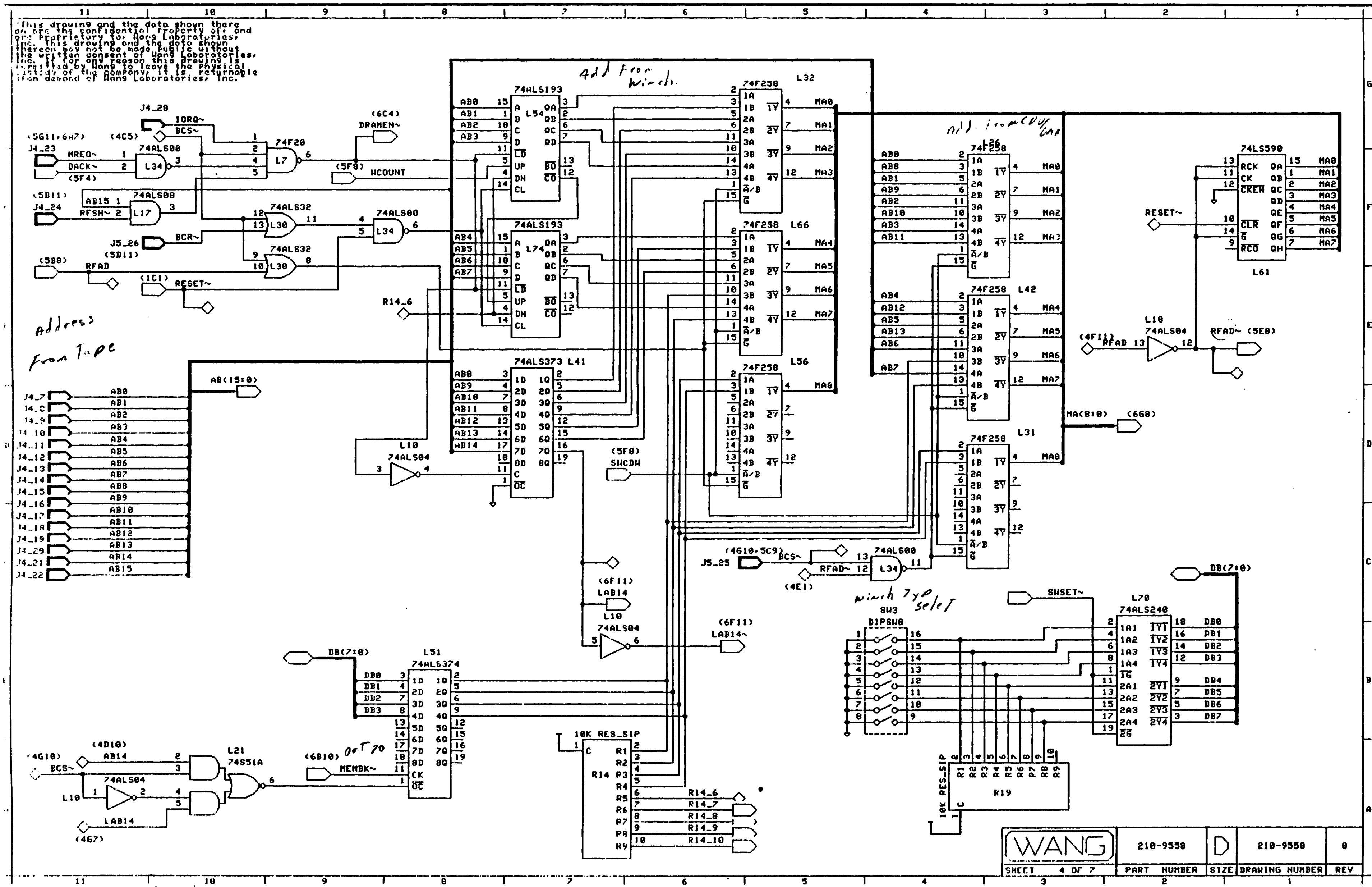
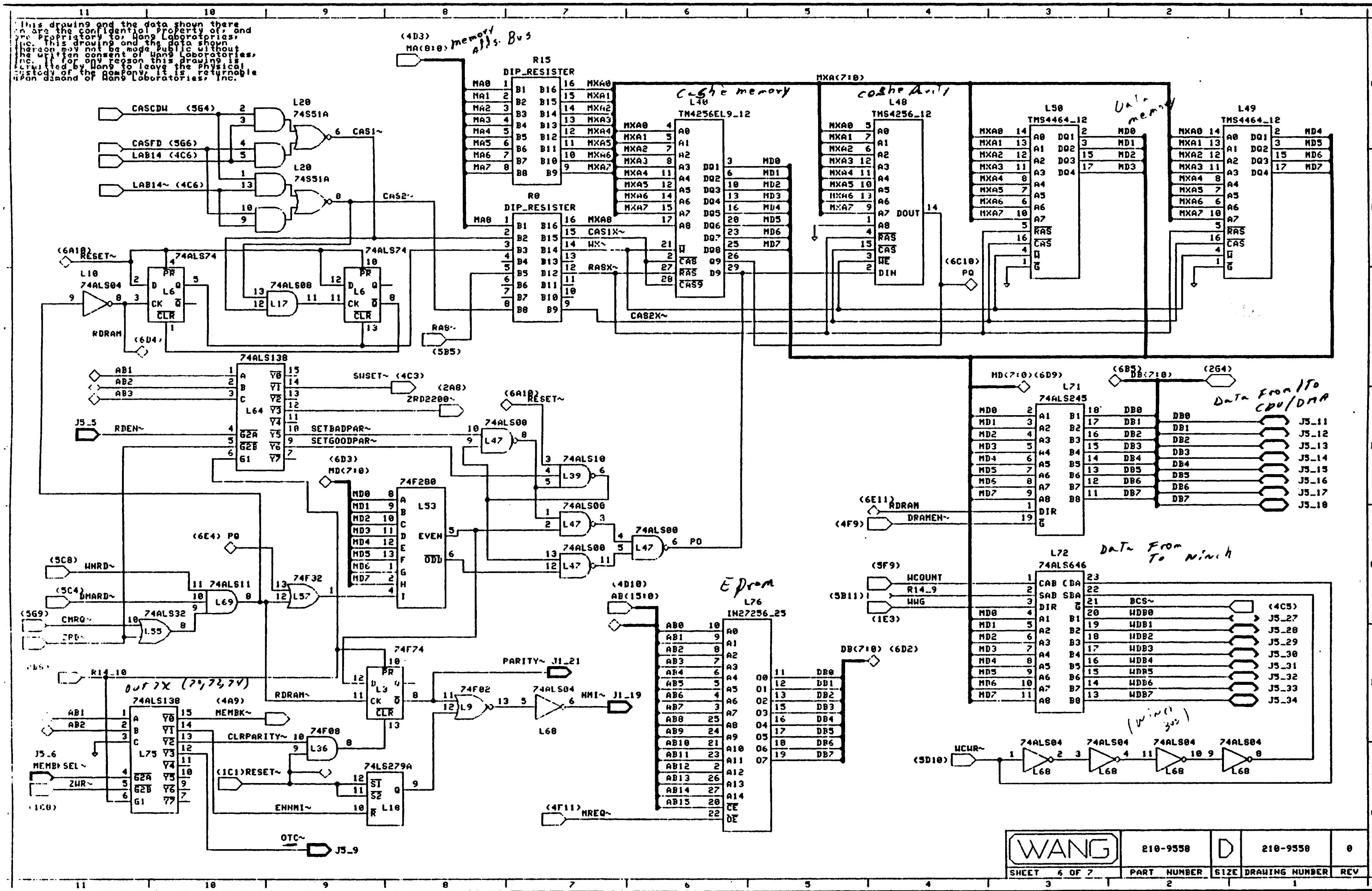
74F195
74LS195
74F32
74F08
74ALS00
74F20
74F74
74ALS74
74ALS32
74ALS10
74ALS11
74ALS04
74F02
74LS279A
74F163
74ALS08
74ALS11
MREQ~
RFSH~
DACK~
ZRD~
RASCDW
CASCDW
CASFD
DMARD~
CMRO~
16M
4M
1M
RESET~
WCCL
WCOUNT
RFAD~
HWR~
HWRD~
DACK0~
DACK1~
DACK2~
DACK3~
DMARDY
RAS~
RASR
ENR~
WAIT/CPU DMA Arbitrator
WANG
210-9558
D
210-9558
0
SHEET 5 OF 7
PART NUMBER
SIZE
DRAWING NUMBER
REV
14-JUL-91 02:55 /NET/MAI/USER/SEL/DPU/DPU2 5.DRAW

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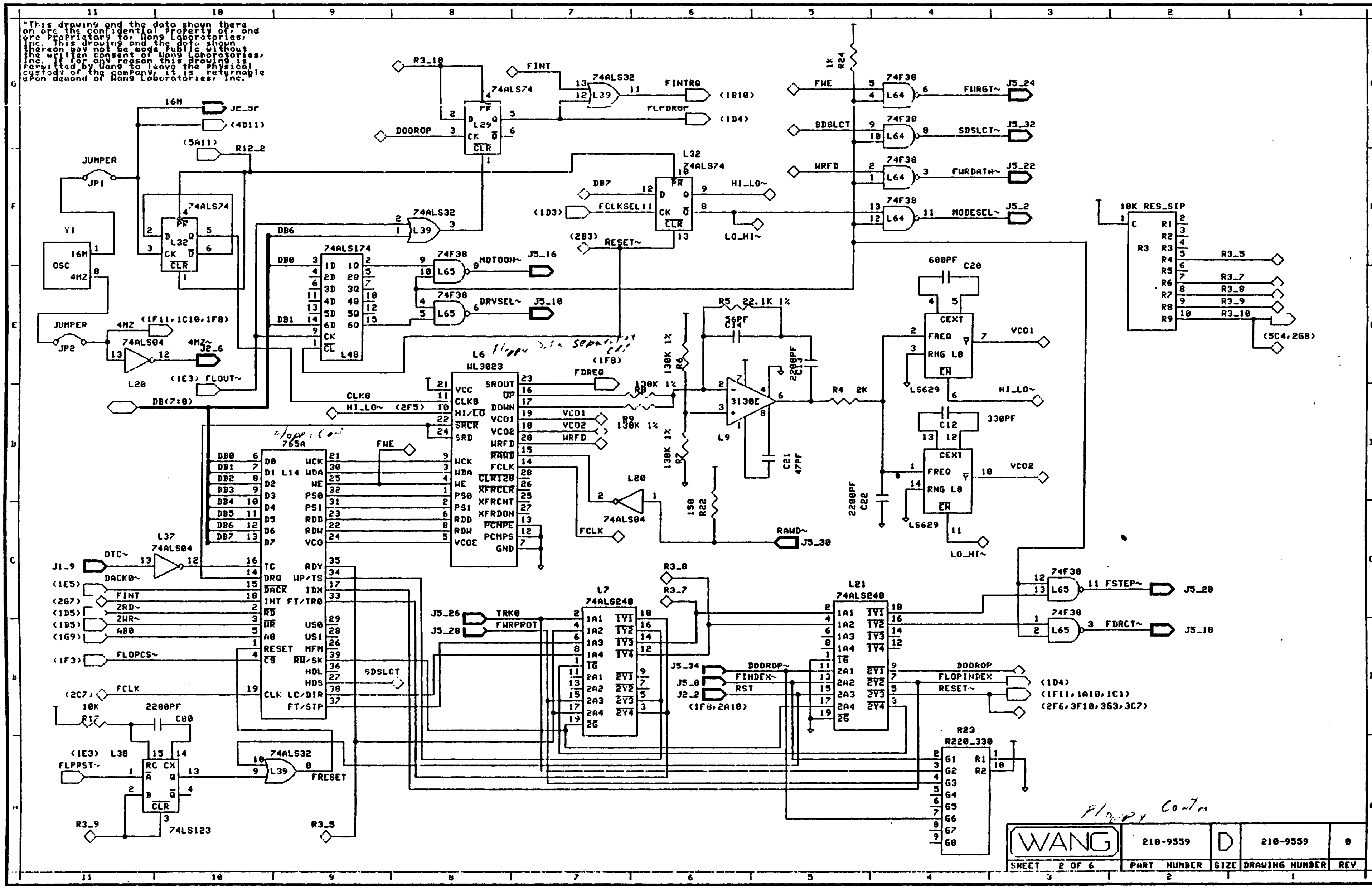
WANG
SHEET 6 OF 7
210-9558
PART NUMBER
D
SIZE
210-9558
DRAWING NUMBER
0
REV
14 JUL 91 02:57 /NET/HMI/USER/SEL/DPU/DPU2_6.DRAW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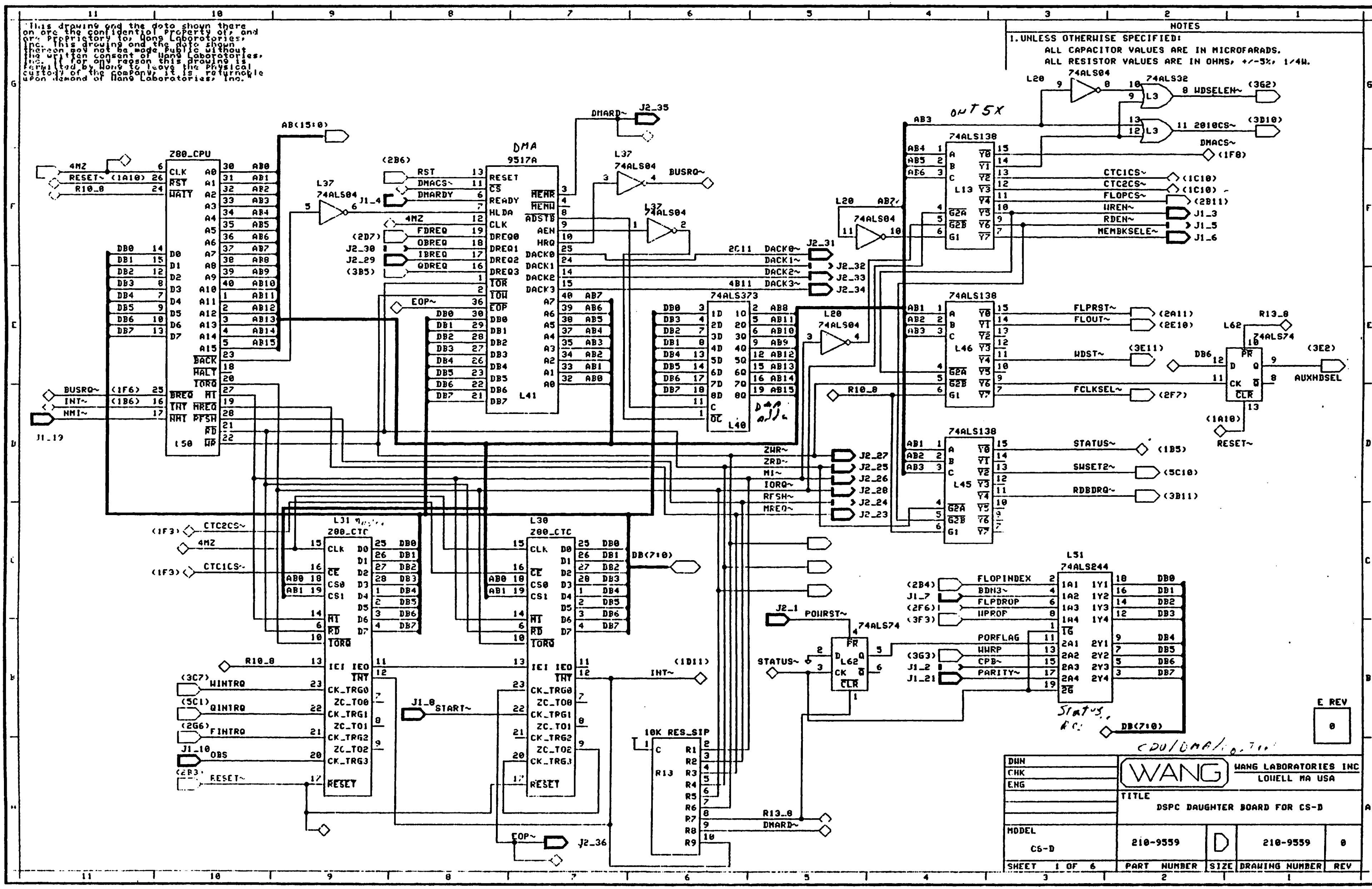
Floppy Cont
WANG
SHEET 2 OF 6
210-9559
PART NUMBER
D
SIZE
210-9559
DRAWING NUMBER
0
REV



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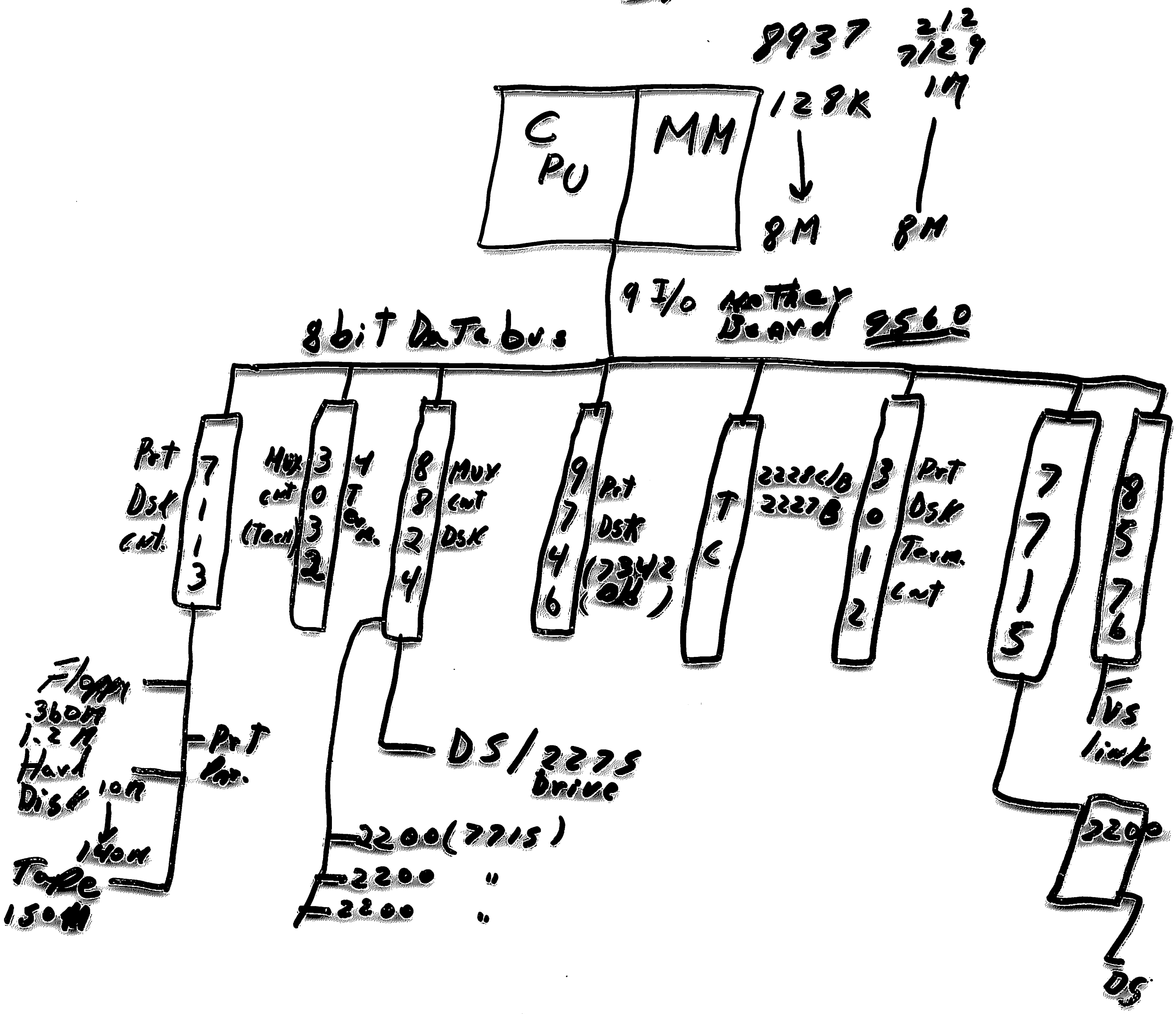
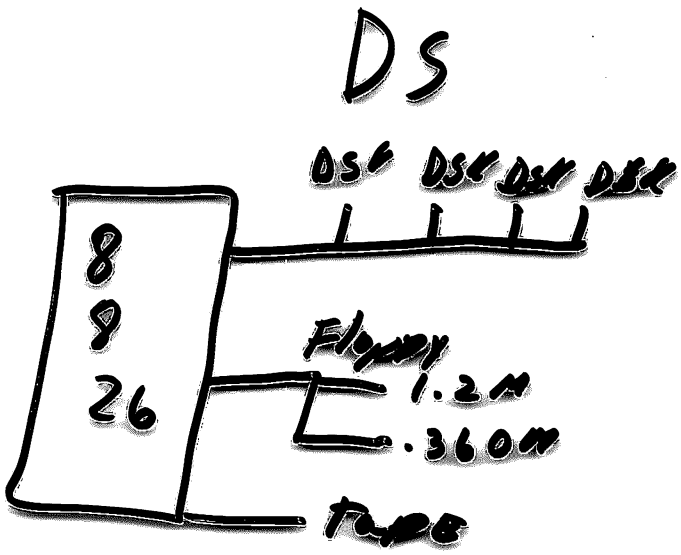
NOTES
1. UNLESS OTHERWISE SPECIFIED:
ALL CAPACITOR VALUES ARE IN MICROFARADS.
ALL RESISTOR VALUES ARE IN OHMS, +/-5%, 1/4W.
Z80_CPU
DMA 9517A
74ALS373
74ALS138
74ALS74
74ALS244
Z80_CTC
10K RES_SIP
WANG LABORATORIES INC
LOWELL MA USA
TITLE
DSPC DAUGHTER BOARD FOR CS-D
MODEL CS-D
PART NUMBER 210-9559
SIZE D
DRAWING NUMBER 210-9559
REV 0
SHEET 1 OF 6
E REV 0
14 JUL 91 02:34 /NET/HMI/USER/SEL/DPU 1.DRAW

C S - D/N



8937
212
7129
1M
128K
8M
8M
CPU
MM
9 I/O Mother Board 9560
8bit DaTabus
PrT Dsk cnt. 7113
Mux cnt (Term) 3032
4 T ...
8824 MUX cnt DSK
9746 PrT DSK (7342 OK)
TC
2228C/B 2227B
3012 PrT DSK Term. cnt
7715
8576
Floppy .360M 1.2M
Hard Disk 10M 140M
Tape 150M
PrT ...
DS/2275 Drive
2200(7715)
2200 "
2200 "
VS link
2200
DS


DS
8
9
26
1.2M
.360M

To: Merle McIntosh
From: Rich Leis/Jack Kelley
Subj: 2200 CPU Test Capacity
Date: 2/21/90

Our memo of 2/9/90 stressed the need for additional output of the CPU boards (212-7129-A/B/C/D). On the memo was a matrix of the needs of each board type. The total of all boards was 159 pcs with a demand window through 2/23/90. This is an update to that memo reflecting the output of those boards.

Of the 159 boards needed through 2/23 Ed Bradley and his people have output 128. The Hotlist has virtually been eliminated and we are nearly on schedule with kitting. This past weekends performance (resulting in a yield of 49 boards) took us out of the backlog/scrambling situation. A new matrix is attached to show the needs through 3/16 by board type.

The demand for these boards through 3/16 is as follows:

	SPECIAL PRODUCTS			2200 PUERTO RICO NEEDS			
	HOT LIST	SCHEDULE	CE	KIT SHORTS	SCHEDULE	TOTAL	REVISED TOTAL**
212-7129-A	5	12	8	18	47	90	77
-B	3	8	9	5	0	25	11
-C	0	4	9	8	0	21	10
-D	0	8	12	0	0	20	9
TOTAL	8	32	38	44	47		
					GRAND TOTAL	156	107 **

** The 49 pc output of 2/20 has not been applied to specific kits or hot list needs as of this writing so it's merely netted out at the end.

cc: B. Dorazio
P. Martell
G. Terris
S. Nichols
F. Stec
E. Bradley
S. Anthony

TMD DISTRIBUTION FOR 2200 CS-386
MODEL 210-9561 C-D
TMD# 2415

	D. Aldrich	018-28C
	K. Azar	018-27C
	R. Bator	018-21I
	K. Bean	018-26F
	P. Doris	015-17B
	R. Downing	018-27C
	D. Eno	019-490
	D. Foley	018-28B
	D. Heiner	018-21I
	D. Jarry	018-25A
	J. Manion	018-18D
	D. Monahan	018-27C
	K. Morman	018-17D
	B. O'Connor	018-G1F
	J. O'Hara	018-26C
	D. Pestana	018-25E
	J. Proulx	012-190
	W. Quigley	018-18A
	C. Seto	018-26F
	B. Spera	018-15A
	R. Sutton	018-27C
	B. Todd	018-G1C
	R. Tudisco	018-26C
	J. Tyler	024-290
	T. Zacher	018-G1B
SIGNEES:	S. Anthony	018-25D
	J. Hondras	018-27B
CC:	T. LaMonica	018-28G
	L. Prudencio	018-28F

WANG

TMD No. 2415
Sheet 1 of 1

TEMPORARY MANUFACTURING DEVIATION

Originator	Date	M/S	Ext.	Ref. TMD
John Hendrickson	3/1/90	[illegible]	[illegible]	

Part Number	Description	Model
210-9561-CA	[illegible]	2200 CS-386

ECO Pending?	If yes, ECO#	ECO REQ'D	Temporary Change Only
NO			Yes

SWO or CWO Number	SWO or CWO Quantity

Effectivity Date	Expiration Date
3/1/90	4/10/90

Affected Areas	[illegible]	Line E									
Quantity											

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

Restrict Vendor N.E.C (WANG#379-4518) from Locations L10, L13, L14, L35, L37, L51, L43 and L45

NEC# MC-4310CA9B-10 Cause 100% Failure at In-Systems test using these parts

Add to Component Restriction list

APPROVALS

Quality Control	Date	Resident Comp. Eng.	Date
Material Control	Date	CATA	Date
Operations Manager	Date	Mfg. Engineering	Date
[signature]	3/1/90	John Hendrickson	3/1/90

cc: T. La Monica R. Downing
L. Prudencio Ken Blair

TMD DISTRIBUTION FOR 2200 CS-386
MODEL 210-9561 A-D
TMD# 2414

	D. Aldrich	018-28C
	K. Azar	018-27C
	R. Bator	018-21I
	K. Bean	018-26F
	P. Doris	015-17B
	R. Downing	018-27C
	D. Eno	019-490
	D. Foley	018-28B
	D. Heiner	018-21I
	D. Jarry	018-25A
	J. Manion	018-18D
	D. Monahan	018-27C
	K. Morman	018-17D
	B. O'Connor	018-G1F
	J. O'Hara	018-26C
	D. Pestana	018-25E
	J. Proulx	012-190
	W. Quigley	018-18A
	C. Seto	018-26F
	B. Spera	018-15A
	R. Sutton	018-27C
	B. Todd	018-G1C
	R. Tudisco	018-26C
	J. Tyler	024-290
	T. Zacher	018-G1B
SIGNEES:	S. Anthony	018-25D
	J. Hondras	018-27B
CC:	S. Hamel	018-28G
	L. Prudencio	018-28F

TMD No. 2414
Sheet of

TEMPORARY MANUFACTURING DEVIATION

Originator	Date	M/S	Ext.	Ref. TMD
STEVE ANTHONY	3/1/90	018-250	64478	
Part Number	**Description**		**Model**	
210-9561 A-0	2200 CS-386		—	
ECO Pending?	**If yes, ECO#**	**ECO REQ'D**	**Temporary Change Only**	
NO		—	NO	
SWO or CWO Number		**SWO or CWO Quantity**		
—		—		
Effectivity Date		**Expiration Date**		
3/1/90		4/1/90		

Affected Areas	KITTING	PROM ROOM	EPIC E								
Quantity											

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

DUE TO EXCESSIVE FAICURES IN THE IN-SYSTEMS TEST AREA, RESTRICT VENDOR MMI PAL NPN 377-3774 AND 377-3776 FROM PCB LOCATIONS L44 AND L62. ALL OTHER WILL WORK IN THESE LOCATIONS.

APPROVALS

Quality Control	Date	Resident Comp. Eng.	Date
Material Control	**Date**	**CATA**	**Date**
Operations Manager	**Date**	**Mfg. Engineering**	**Date**
[signature]	3/1/90	Steven J. Anthony	3/1/90

TMD No: 24/4
Sheet of

TEMPORARY MANUFACTURING DEVIATION

Originator	Date	M/S	Ext.	Ref. TMD
STEVE ANTHONY	3/1/90	018-250	64478	

Part Number	Description	Model
210-9561 A-0	2200 CS-386	—

ECO Pending?	If yes, ECO#	ECO REQ'D	Temporary Change Only
NO		—	NO

SWO or CWO Number	SWO or CWO Quantity
—	

Effectivity Date	Expiration Date
3/1/90	4/1/90

Affected Areas	KITTING	PROM ROOM	EPIC E									
Quantity												

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

DUE TO EXCESSIVE FAILURES IN THE IN-SYSTEMS TEST AREA, RESTRICT VENDOR MMI PAL WPN 377-3774 AND 377-3776 FROM PCB LOCATIONS L44 AND L62. ALL OTHER WILL WORK IN THESE LOCATIONS.

APPROVALS

Quality Control	Date	Resident Comp. Eng.	Date
Material Control	Date	CATA	Date
~~Operations Manager~~	Date	Mfg. Engineering	Date
[illegible]	3/1/90	Steven J. Anthony	3/1/90

Diagnostic Program Documentation

Documentation Release: 99C1 Software Release: 69C1
Documentation Part Number: 760-1209D

Program Name: 2200 Multiple Disk Exerciser

Date: December 18, 1989

Table of Contents

Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTS

2200 Multiple Disk Exerciser

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

2200 with the minimum required configuration

Soft-sectored diskettes are not supported on 2270A controllers

2236DE/DW or equivalent terminal

If a printer is used, it must have a column width of at least 66 characters

2.2 Software

MVP CPU software must be rev. 1.8 or higher

VP CPU software must be rev. 2.1 or higher

Media containing the 2200 Multiple Disk Exerciser which is labeled: MULTIDSK

3.0 PROGRAM DESCRIPTION

The 2200 Multi-Disk Exerciser is a disk burn-in/exerciser with error logging capabilities. The exerciser tests eight sequential sectors for each random selection of; function, disk address and sector address.

4.0 LOAD PROCEDURES

4.1 Load directly from disk

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN "MULTIDSK"'

4.2 Load from 2200 Diagnostic Package

1) Select the device address with a 'SELECT DISK ###' statement (see note 1)
2) Input command 'LOAD RUN'
3) If 'MAGNETIC MEDIA' disk proceed with step 4
   Under '2200 DIAGNOSTIC PACKAGE' menu, select 'Magnetic Media'
4) Under 'MAGNETIC MEDIA' menu, select 'Disk Exercisers'
5) Under 'DISK EXERCISERS' menu, select 'Multiple Disk Exerciser'

Note 1: (### equals the device address where program resides)

5.0 OPERATING INSTRUCTIONS

5.1 Description of Operation

The first two screens of the exerciser require operator input to select the processes, the function, and amount of testing. The third screen displays the functions running, device being tested, number of errors, and the number of accesses that have been completed. When inputs are needed, it is indicated and all the options are listed at the bottom of the screen.

7.2 Screen Descriptions

On each screen, lines:

a) 20 and 21 will describe any status or error information.
b) 22 and 23, (in box), describe all input/command options for the current screen.

7.3 Procedures

1) For the exercisers set up procedure and screens see Appendix A.
2) For a description of the run time screen see Appendix B.
3) For a description of standard input and command options see Appendix C.

6.0 MISCELLANEOUS

6.1 Definitions

Hard error — A disk operation that failed during normal testing and would not successfully execute during ten retries.

Soft error — A disk operation that failed during normal testing and was successfully executed in less than eleven retries. Also a data compare error is considered a soft error.

7.0 PROGRAM REVISION HISTORY

Rev 69C1:

This Revision corrects the problem running multi disk diagnostics with the 386 Board.
The software has been patched to permenantly circumvent the error message "CPU SOFTWARE MUST BE UPGRADED TO RUN THIS PROGRAM".

Rev. 6735:

Added support for 2200DS and RAM Disk. Also fixed time out errors on long cabled mux.

Rev. 64A4:

Added a routine to zero the sector to R/A/W test so intermittent write problems would show up.

Removed the zero retries function.

Added the 30 MEG to the 2275.

Rev. 6441:

Corrected counter problem during init read and write.

Rev. 639C:

The 2275 option (Winchester and 5 1/4" floppy disk) have been added to the list of recognizable devices.

The screening has been made more user friendly. This will speed up the time it takes to initiate the test and also made it easier to understand.

Rev. 61B4:

The Quantum drives have been added to the list of recognizable devices. Since the Quantum Q2040 responds to two addresses it is treated as two separate devices.

Rev. 61A4:

Firmware retries on error are now suppressed on Disk Processing Unit's that have the ability.

Rev. 1.1:

Sector write backfill is now randomly selecting worst case data patterns.

APPENDIX A

IMPORTANT: THIS EXERCISOR WILL RENDER ALL RESIDENT DATA IN THE RANGE OF THE SELECTED SECTORS INVALID AND TOTALLY USELESS.

A.1 INITIAL INPUT and SCREEN

1 The operator is instructed to mount platters in all the drives that are to be tested. For a device to be testable it must:

a) have a scratch platter mounted.
b) not be write protected.
c) be operable enough for the address to be recognized as available.

2 Press 'RUN' or 'RETURN' and the program will scan all the possible disk addresses. The routine tries to ascertain what types of devices are at what addresses and reports this information on the Test and Parameter Select screen.

NOTE: If desired the default parmeters can be altered by pressing SF'2 and then editing to the desired parmeters (as described by appendix A.2). These parmeters will then be inserted as the test parmeters. If a sector selected is out of range of a device then the parmeter used will be as close to the the altered default as possible.

A.2 TEST and PARAMETER SELECTION

1 A display of all devices available for testing is given with the following information:

a) test options
b) device address (see note 2)
c) model number
d) address of the first sector to be tested
e) address of the last sector to be tested

Note 2: (If the address was recognized, but an error occurred, the error is printed to the left of the device address).

2 The user prompts are as follows:

A) "Are all the above parameters correct?"

'N' (no), enters the edit mode, and 'CONT'/'CTNUE' will exit the edit mode. The option select menu may be edited using the following options:

a) Test	'yes' or 'no'	If no, then no functions will be run on that device.
b) Frmt	'yes' or 'no'	Format device?

A) (continued)

c)	Init	'yes' or 'no'	Initialize the device. Write a test pattern on every sector selected for test.
d)	Ver	'yes' or 'no'	Verify the device. Read the test pattern from every sector selected for test.
e)	Address	'xxx'	xxx=address of the device to be tested.
f)	Model	'xxxxxxxx'	Model number. (not used in exerciser operation)
g)	Sec. Range	'xxxxx/yyyyy'	Sectors to be tested, from xxxxx to yyyyy. (must be greater than 8)
h)	Accesses	'xxxxxxxx'	Number of sectors to be read. Type infinite for infinite.

'Y' (yes) or 'CONT'/'CTNUE', then the system proceeds to the next prompt.

B) "To proceed type ENABLE WRITING "

The operator MUST enter 'ENABLE WRITING' to proceed further. If the phrase has already been entered correctly, and the exerciser has not been returned to the first screen (A1), then the phrase will not be requested again and the exerciser will by-pass this prompt.

C) "'WARNING: All resident data will be DESTROYED by this exercise'"

This is the final step and warning before any WRITING is done.

Ensure that all devices to be tested have scratch media installed.

Depressing CONT/CTNUE will start the exerciser.

A.3 Miscellaneous

1 No further operator commands are needed UNLESS:

a) An error occurs during format, at which time the exerciser will have to be restarted.

b) A format is requested on a device that can't be software formatted.

2 If an error occurs during Init, then the device is eliminated from the test and the exerciser continues.

3 The model descriptions of the drives are as follows;

```
850 DSDD    - Double Sided Double Density floppy
1000        - internal winchester
1002        - internal winchester
1004        - internal winchester
Q2040       - internal winchester
Q2020       - internal winchester
2200DS RAMD- 2200 Data Storage Cabinit ram disk
2200DS FLPk- 2200 Data Storage Cabinit 320/360k floppy
2200DS FLPm- 2200 Data Storage Cabinit 1.2 meg floppy
2200DS WINr- 2200 Data Storage Cabinit removable carterage winchester
2200DS WIN - 2200 Data Storage Cabinit winchester
2230-1      - external disk drive
2260-1/2    - external disk drive
2260-1/4    - external disk drive
2266        - external disk drive
2275   WIN - 2275 winchester
2275   FLPm- 2275 1.2 meg floppy
2275   FLPk- 2275 320/360k floppy
2270        - external floppy drives
2270a       - external floppy drives
2280        - external disk drive
SYSTEM RAMD- System ram disk
```

APPENDIX B

The following screen/test descriptions are in the order in which they occur.

B.1 If no devices have been selected to test, then the following message will be displayed on line 20 and the exerciser will wait for a command.

"RECHECK PARAMETERS, NO DEVICES ARE SELECTED"

Pressing 'RETURN' or 'RUN' will cause the routine to return to the Test and Parameter Select Menu.

B.2 Format

1 If a device is selected for Test and Format, and:

a) It can be software formatted, then the following message will appear on line 22 and the format will begin.

" CHECK: to ensure that the device is formatting and the system isn't hung"

b) It can not be software formatted, then the exerciser will stop, print the following message on line 20, and will wait for a command.

"Press the format button for XXX" (where xxx is the device address to be formatted)

2 When all of the devices requesting a format are formatted, then the initialize and/or test routines will commence.

B.3 Run Screen

The run screen will be displayed with the following information of all the devices that are to being tested.

a) the disk address
b) the function (see note 3)
c) the number of accesses
d) the sector range being tested
e) the number of hard errors (see note 4)
f) the number of soft errors (see note 4)

Note 3: The current function (if in process) or the last function (if not in process) processed. During init "w" or "r" is printed next to "init" to indicate whether reading or writing.

Note 4: During init this column will stay blank. Init terminates testing of the device if an error is encountered.

The line containing the parameters of the device currently being processed is highlighted and the function updated, when applicable.

B.4 Initialization

1 Init — A lower case 'w' appears to the right of the function name (Init) while the media is being written.

All disks sectors to be tested must be written, in the data field, with the current sector and disk addresses and then back-filled with a worst case data pattern.

2 Ver — A lower case 'r' appears to the right of the function name (Init) while the media is being verified. Seek location is also checked whenever a read is performed.

A) If media verification was selected, all sectors to be tested are read. The sector and disk addresses written in the data field are compared with the current sector and disk addresses for equality (i.e., to see if the heads seek to the correct location).

B) If media verification was not selected, the first, middle and last sectors to be tested on the disks are verified.

B.5 Test

This is the exerciser portion of the "EXERCISER". The device, sector address, and function are reselected after eight sequential accesses.

1 All the devices selected for Test are assembled in a device list and the device to be tested is randomly selected.

2 The function is randomly selected from one of the following four:

a) VERIFY — Verifies the sectors selected and reports controller detected errors.
b) READ — Reads the selected sectors and checks that the correct data was read.
c) WRITE — Writes the selected sectors with same information that Init does and will report controller detected errors.
d) R/A/W — Writes the 8 sectors selected then immediately reads them and reports any errors.

3 The sector address is randomly selected from within the range allowed by the test parameters. That address PLUS 7 are the eight sectors tested (the range of sectors allowed for test can vary up to eight greater than the maximum address selected in the test parameters but not more than the system allows).

4 These parameters are combined, the test is run, and the above selection process is redone. Each device will be accessed (access = 1 sector R/A/W, READ, WRITE or VERIFY) as many times as was specified.

B.6 Error Recovery

1 Four types of errors can occur:

A) The first error is a hardware error. When a hardware error occurs the statement "CHECKING ERROR" appears at the top center of the screen. This statement remains while the program does up to ten retries of the current function on the failing sector and then reports the error.

B) The second type of error is a seek error (the disk and sector address read from the media, as written by Init, did not compare with the addresses requested). If this error is detected, the error is reported, counted as a soft error and the test continues.

C) The third type of error is a data compare error (the data read from the disk didn't compare with the data that was expected from the disk, as written by Init). If this error is detected, the error is reported, counted as a soft error and the test continues.

D) The fourth error is a format error. If an error occurred during a Format operation, then the exerciser will stop, report the error, and wait for another command.

2 Errors are reported with the device address, sector address, function that was being performed, and the type of error that occurred.

A) The last error that occurred is displayed on line 21 of the RUN SCREEN. If the screen has been changed (define an error or to change the page) then the error is not redisplayed, but new ones will be displayed when they occur.

B) Errors can be printed on either printer 204 or printer 215. If the printer is selected, 500 errors will be printed and then printing will cease, unless SF'14 (printer select key) is toggled or the exerciser screen is changed (to a different page or screen), but the screen error display will constantly update.

APPENDIX C

This is a description of the commonly used commands/inputs. All commands or inputs can be used when defined at the bottom of the screen (in the box).

SF'15/31	change the page. If there are more than 17 devices to be listed, then at the top right corner of the screen "More" will be printed. This applies to the Parameter Select, Test and Run screens, if more than 17 devices are available for testing.
SF'0	"Define error I-xx" will be displayed. There is an explanation of errors I-90 through I-99 in the "Exerciser". xx is the last error encountered or selected by the operator, if neither has occurred then default is 90. xx can be left or changed to select 90-99. When the explanation is displayed the exerciser continues operation.
RETURN	displays the explanation of the error selected.
SF'0	returns to the normal screen.
SF'14	printer select. The currently selected printer option is displayed in the upper left corner of each screen. To change selection press SF'14, the selected printer option will toggle between 204, 215, and off (no printer selected), until the desired option is selected.
CLEAR/PREV SCRN	Returns to the last functional screen or menu.
CONT/CTNUE RETURN or Y	These are general usage keys which cause a continuation to the next step.

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

WANG

REVIEW MEMORANDUM

Diagnostic Engineering Department

To: Phil Doris, Darlene Ross, Henry Shinnagel, Mike Severin, Torry Hack

Date: December 21, 1989

From: Teri Emond

Doc: DERLPRE93/VS6

Subject: 2200 Diagnostic Package, Rev. 2.00.00, Review

The 2200 Diagnostic Package, Rev. 2.00.00, is ready for review.

This review package p/n 195-2956-0/295-2956-0 includes the following:

Documentation:		
2200 Diagnostic Package		760-0029E
2200 Multiple Disk Exerciser		760-1209D
Program Diskettes:		
"ALL" 8" DSDD	2.00.00	732-0002J
Magnetic Media 8" SSSD	2.00.00	702-0292C
Magnetic Media 5.25" DSDD	2.00.00	732-8520A

This revision corrects the problem running Multi Disk diagnostics with the 386 board. The software has been patched to permanently circumvent the Error message "CPU SOFTWARE MUST BE UPGRADED TO RUN THIS PROGRAM"

There will be a meeting held on Monday, January 8, 1990 at 2:00 p.m. in the 6th floor conference room in Tower I, to determine the adequacy of this Diagnostic Package for release. If your review indicates a problem, please contact me immediately so that an attempt may be made to correct the problem prior to this meeting. At the time of the meeting, it will then be determined whether or not these problems can be or have been corrected to everyone's satisfaction. After this meeting, if the package is judged adequate for release, all further problems with it will be accepted only via Problem Reports.

cc: Paul Bencal
Keith DeGiacomo
Dan Horne
Paul Phaneuf
Debbie Querze
Gail Stanwyck
Al Woodruff
Bill Zannini

Rick
for review
D. Ross
12/21/89

Diagnostic Program Documentation

Software Releases:

Category	Disk Type	Part Number	Revision
All	8" DSDD	732-0002J	2.00
Printers/Plotters/Terminals	8" SSSD	702-0295B	6591
	5-1/4" DSDD	732-0052B	6591
Magnetic Media	8" SSSD	702-0292C	2.00
	5-1/4" DSDD	732-8520A	2.00
Telecommunications	8" SSSD	702-0294	6436
	5-1/4" DSDD	732-0051	6436
CPU/Memory test	8" SSSD	702-0293B	18A4
	5-1/4" DSDD	732-8521	18A4

NOTE DSDD means Double-Sided Double-Density
SSSD means Single-Sided Single-Density

Documentation Part Number: 760-0029E

PRE/RELEASE

Package Part Number 195-2956-0/295-2956-0D
ECO Number: xxxxx

Program Name: 2200 Diagnostic Package

Date: December 18, 1989

Table of Contents

Diagnostic Engineering Department
WANG Laboratories, INC.
One Industrial Ave.
Lowell, Massachusetts 01851

1.0 REFERENCE DOCUMENTATION

Wang BASIC 2 Language Reference Manual.

2.0 CONFIGURATION REQUIREMENTS

2.1 Hardware

Minimum required configuration

2200 system
Check the configuration requirements for the program that is going to be run.

NOTE: Ensure that the partition size is large enough and the Device Table is properly configured.

2.2 Software

MVP CPU software must be rev. 1.8 or higher

VP CPU software must be rev. 2.1 or higher

Check the configuration requirements for the program that is going to be run.

3.0 PROGRAM DESCRIPTION

These are menu driven disks containing a combination of the diagnostics, utilities and exercisers for the 2200 MVP/LVP/SVP/VP systems. These programs are divided into four categories:

1. Printers/Plotters/Terminals
2. Magnetic Media
3. Telecommunications
4. CPU/Memory Test

The entire Diagnostic Package is contained on either one 8" Double-Sided Double-Density (DDDS) disk, four 8" Single-Sided Single-Density (SSSD) disks or four 5-1/4" Double-Sided Double-Density (DSDD) disks. The four disk set has the package divided into the four categories previously listed (one category per disk).

4.0 LOAD PROCEDURES

1. Select the device address with a 'SELECT DISK ###' statement (### equals the device address where program resides).

2. Input command 'LOAD RUN' to load if there is a "START" file. Input command 'LOAD RUN T"@MENU"', if there is no start file.

5.0 OPERATING INSTRUCTIONS

The menus in this package run the same as the system menus except the screening is revised. The Terminal number, Partition number and the size of the partition will be displayed in the lower right corner of the screen. Also the menus can be stepped backwards with 'PREV SCRN', CLEAR, or SF'31 keys.

Selection is made with the 'BACK SPACE', 'SPACE' bar, and the cursor arrows. When the desired selection is made (large dot before the name and the line is highlighted), press 'RUN' or 'RETURN' to initiate the selection. If the selection is another menu, then it will be displayed. If the selection is a program, then it will be loaded and run.

In order to support all of the 2200 LVP/SVP/MVP systems the diagnostic package needs to be available on 8" DSDD, 8" SSSD and 5-1/4" DSDD. The package is divided into four categories. Each category is small enough that it will fit on a SSSD 8" (or DSDD 5-1/4") disk. The entire package is on one 8" DSDD disk, four 8" SSSD or four 5-1/4 DSDD disks. The instructions for these disks are as follows:

Disk Type	Category	refer to Section
8" DSDD	All	7.1
8" SSSD & 5-1/4" DSDD	Printers/Plotters/Terminals	7.2
8" SSSD & 5-1/4" DSDD	Magnetic Media	7.3
8" SSSD & 5-1/4" DSDD	Telecommunications	7.4
8" SSSD & 5-1/4" DSDD	CPU/Memory test	7.5

5.1 2200 LVP/SVP Diagnostic Package

After the menu is loaded the following four selections will be displayed on the screen;

. Printers/Plotters/Terminals	Proceed to section 7.2
. Magnetic Media	Proceed to section 7.3
. Telecommunications	Proceed to section 7.4
. CPU/Memory test	Proceed to section 7.5

Select one of the above, using the normal menu selection procedure, and proceed with the corresponding instructions below.

5.2 Printers/Plotters/Terminals

When this menu is loaded the following options are available by the normal menu selection procedure:

- Printers and Plotters
- Terminals/Keyboards

The options for these selections are described in Appendix A.

5.3 Magnetic Media

When this menu is loaded, the following options are available by the normal menu selection procedure:

- PLL/VCO Adjustments
- Alignment Routines
- Disk Utilities
- Disk Exercisers
- Mag Tape

The options for these selections are described in Appendix B.

5.4 Telecommunications

When this menu is loaded, the following options are available by the normal menu selection procedure:

- 2228 D/E/F Power-Up Diagnostic Error Code Interpreter
- 2228 D/E/F 7 Board Burn In
- 2228 E/F Field Service Diagnostic
- 2228 D Field Service Diagnostic Rev. 2
- 2228 D Field Service Diagnostic Rev. 1
- 2227B/2228B T/C Diagnostic

For these procedures, numbers and names see Appendix C.

5.5 CPU/Memory Test

When this menu is loaded, the following options are available by the normal menu selection procedure:

- CPU Instruction Exerciser
- CPU/Memory Diagnostic Procedure
- Memory Error Chip Identifier

For these procedures, numbers and names see Appendix D.

6.0 MISCELLANEOUS

SSSD means Single-Sided Single-Density
DSDD means Double-Sided Double-Density

Revision numbers are explained in Appendix E.

7.0 PROGRAM REVISION HISTORY

2.00.00 This Revision corrects the Problem running Multi Disk Diagnostics with the 386 Board.
The software has been patched to permanently circumvent the Error message "CPU SOFTWARE MUST BE UPGRADED TO RUN THIS PROGRAM"

18A4 Changed the 'IF THEN ELSE' test in the CPU Instructions Exerciser to not error on old releases of BASIC. Replaced a damaged 'FTU' file on the 5-1/4 DSDD Magnetic Media disk (5-1/4 revision is 68A0).

179E Added test to the CPU Instructions to verify the VLSI CPU chip executes conditional branches correctly. Test was written after a bad shipment of chips was received. Rewrote the Data Memory Diagnostic for the VLSI-2 CPU. Added and enhanced many tests. Field Service menu labels changed.

6734 Added support for 2200DS and RAM Disk to MULTIDSK and FTU. Also fixed time out errors on long cabled mux.
Added old style hashing routine to SUPERZAP.

6591 Internal change ECO update needed.

6534 Added 2220DW printer test to package.

64A7 Multidsk has been modified to check for intermittent writing.
STARTPLL was renamed to PLL and address selection was added.
General Disk was converted to an FTU and named FTU.
Phoenix Alignment was renamed to 2280ALGN and now has address selection.

6436 The package has been broken into four sections for use on Single-Sided Single-Density disks and the 5-1/4" disks.
The programs have been updated to the latest revisions.
MECI and FILZAP have been added.

6396 This package has been expanded to exercise the 2209A Tape Drive Unit.

APPENDIX A

OPTIONS FOR PRINTERS/PLOTTERS/TERMINALS

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Program Name	Part Number	Soft	Doc.
. PRINTERS/PLOTTERS				
. 2201L	2201L	760-1259	1.0	9434
. 2220DW	2220DW	760-1327	6534	9534
. 2221W	2221W	(see note 1)		
. 2231W-1	2231W-1	(see note 1)		
. 2231W-2	2231W-2	(see note 1)		
. 2231W-3	2231W-3	(see note 1)		
. 2231W-6	2231W-6	(see note 1)		
. 2232	2232	760-1258	61B0	9434
. 2235	2235	(see note 1)		
. 2245	2245	(see note 1)		
. 2251	2251	(see note 1)		
. 2261W	2261W	(see note 1)		
. 2263-1	2263-1	(see note 1)		
. 2263-2	2263-2	(see note 1)		
. 2263-3	2263-3	(see note 1)		
. 2273-1	2273-1	(see note 1)		
. 2273-2	2273-2	(see note 1)		
. 2281W	2281W	(see note 1)		
. 2282	2282	760-1276	414A	9434
. TERMINALS/KEYBOARDS				
. 2200 Universal Keyboard Test	uTextTst	760-1265	1294	9434
. Burn-In Test	36debin	(see note 2)		
. Local Printer Test	36ptrloc	(see note 2)		
. Character/Attributes Test	36chratb	(see note 2)		
. CRT Alignment Test	36caling	(see note 2)		
. Partition Monitor	36parton	(see note 2)		

Notes

1 - Part of General Printer Exerciser 760-1257 6441 9434

2 - Part of 2236DE/DW Field Service Diag. 760-1270 11B1 9434

Revision numbers are explained in Appendix E.

APPENDIX B

OPTIONS FOR MAGNETIC MEDIA

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Documentation Program Name	Part Number	Revision Soft	Doc.
. PLL/VCO Adjustments				
. PLL Adj. (DSDD/Winchester)	PLL	760-1250B	84A5	94A5
. VCO Adj. (DSDD/Win. w/o scope)	2200 VCO	760-1263	81B4	9434
. Alignment Routines				
. DSDD Drive (850/851)	850ALIGN	760-1223B	8448	9545
. Phoenix	2280ALGN	760-1264A	84A4	94A4
. Disk Utilities				
. Field Test Unit	FTU	760-1261D	68A0	98A0
. Volume Zap	SUPERZAP	760-1260A	8734	9734
. Alternate Sector Test	PLL	760-1250B	84A5	94A5
. Disk Exerciser				
. Multiple Disk Exerciser	MULTIDSK	760-1209D	69C1	99C1
. LVP DPU Burn In	DPU BI	760-1262	41B4	9434
. Mag Tape				
. 2209A Tape Drive	109A010A	760-1269	2.0	9434
. Kennedy Archiving Tape Drive	TAP 29M	760-1103A	7320	9434

Revision numbers are explained in Appendix E.

APPENDIX C

OPTIONS FOR TELECOMMUNICATIONS

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Program Name	Documentation Part Number	Revision Soft	Revision Doc.
. 2228 D/E/F Power-Up Diag. Error Code Interpreter	28DEFEI	760-1121A	3370	9434
. 2228 D/E/F 7 Board Burn In	7BDEFBI	760-1124B	4370	9434
. 2228 E/F F.S. Diag.	28EFSR2	760-1122A	1370	9434
. 2228 D F.S. Diag. Rev. 2	28DFSR2	760-1267	1158	9434
. 2228 D F.S. Diag. Rev. 1	28DFSR1	760-1268	1121	9434
. 2227B/2228B T/C Diagnostic	STARTTC	760-1275	13B1	9434

Revision numbers are explained in Appendix E.

APPENDIX D

OPTIONS FOR CPU/MEMORY TEST

Select the desired test and refer to the appropriate documentation for the procedures.

Menu selection	Program Name	Documentation Part Number	Revision Soft	Revision Doc.
. CPU Instruction Exerciser	SYS1(note 2)	760-1266	1.0	9434
. CPU/Memory Diagnostic Procedure	@@ (note 1)	760-1271A	179E	979E
. Memory Error Chip Identifier	MECI	760-1272	8434	9434

Notes:

1. The CPU/Memory Diagnostic Procedure explains how to load (boot) the CPU/Memory diagnostic. The documentation number and revision numbers are for the CPU/Memory diagnostic.

2. This test contains many files on the media. The file names are listed in the documention for the program.

Revision numbers are explained in Appendix E.

APPENDIX E

EXPLANATION OF REVISION NUMBERS

Rev. ___ ___ ___ ___

1st Position = Kind of Diagnostic

Not Supported	0
Diagnostic Program	1
Monitor Package	2
Monitor Program	3
Burn In	4
Power Up	5
Exerciser	6
Board Repair	7
Utility	8
Document only	9
Reserved	A-F

2nd Position = Last Digit of Year

Self-explanatory	0-9

3rd Position = Month of Revision

January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	A
November	B
December	C

4th Position = Type of Change

Brand New	0
Software Fix	1
Test Added	2
Enhancement	4
Hardware Change	8

These numbers can be added together (in hex) to include more than one type of change.

WANG

MANUFACTURING TEST PROCEDURE

0664S

PART NO.	212-7129A-D
SHEET	1 OF 6
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386	210-9561A-D 210-9562 212-7129A-D	RUN-IN TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT/ENGR. E. Dargeault 9/12/89	
Q.C. REVIEW Bill Dreyfus 9/14/89	PILOT ENGR. Steve Mahony 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S. CLARK
C	SMALL CHANGES	n/a	n/a	09/12/89	S. CLARK

Distr. VS Board Area

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

1. PURPOSE

1.1 To detail the steps necessary when performing a RUN-IN test on the CS386 CPU assembly (212-7129A-D).

NOTE: THERE ARE TWO METHODS THAT CAN BE USED TO RUN-IN THE CPU ASSEMBLY. THIS PROCEDURE COVERS RUNNING THE ASSEMBLY WITHIN THE CS386 SYSTEM. SEE APPENDIX 7.1 FOR A PROCEDURE ON HOW TO RUN THE ASSEMBLY USING THE BUILT IN TEST (BIT).

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

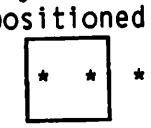
3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a detailed listing of responsibilities.

4. EQUIPMENT REQUIREMENTS

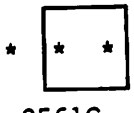
DESCRIPTION	PART NUMBER	QTY.
2436 Workstation	187-3249 or equiv	1
Test fixture which includes:		
- 360K Floppy	289-0846	1
- 20MB Winchester	289-0849	1
- DPU PCB	212-7113	1
- Triple Controller	212-3012	1

5. SETUP PROCEDURE

5.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:



9561A
9561B



9561C
9561D

5.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

5.4 Insert the assembly under test (212-7129A-D) into the CPU position of the test bed motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST

6.1 Power UP the test bed. The following screen will appear:

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SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

6.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

6.3 The following message will appear:

Mount system platter
Press Reset

6.4 After the LED on the floppy drive has extinguished, press the SHIFT and RESET keys simultaneously (SHIFT/RESET).

6.5 The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST (cont'd)

6.6 Press the SFO key. The following screen will appear:

```
                    ***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE.                    MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen  TERMINAL 1




                          # Multiuser BASIC-2

                          . Diagnostics
```

6.7 Select "DIAGNOSTICS". Press the RUN key. The "Customer Diagnostic" screen will appear.

6.8 Allow the test to run for a specified period.

6.9 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Disconnect the battery and remove the assembly from the test fixture.

6.10 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

6.11 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST

7.1 RUN-IN TEST (BIT):

7.1.1 EQUIPMENT REQUIREMENTS

- One 2436 Workstation (187-3249 or equivalent)
- One Cabinet Assembly CS-D/N (279-0873)
- One Triple Controller (212-3012)

7.1.2 SETUP PROCEDURE

7.1.2.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:

9561A
9561B

9561C
9561D

7.1.2.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

7.1.2.3 Attach jumper to location J7 of the 210-9561 board.

7.1.2.4 Insert the 212-3012 Triple Controller into any available slot.

7.1.2.5 Attach a workstation cable to the terminal position of the 212-3012 Triple Controller.

7.1.2.6 Insert the assembly under test (212-7129A-D) into the CPU position of the motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST (cont'd)

7.1 RUN-IN TEST (BIT): (cont'd)

7.1.3 ACTUAL TEST

7.1.3.1 Power ON the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

7.1.3.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

7.1.3.3 The assembly under test will continue to cycle for a specified run-in period (or until an error is detected).

7.1.3.4 Run the diagnostic for a specified period.

7.1.3.5 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Power down the test bed. Disconnect the battery and remove the assembly from the test fixture.

7.1.3.6 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

7.1.3.7 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

WANG

MANUFACTURING TEST PROCEDURE

0664S

PART NO.	212-7129A-D
SHEET	1 OF 6
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386	210-9561A-D 210-9562 212-7129A-D	RUN-IN TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M Clark	PRODUCT SUPT/ENGR. E. Dargeault 9/12/89	
Q.C. REVIEW Bob Douglas 9/14/89	PILOT ENGR. Steve Mahoney 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S. CLARK
C	SMALL CHANGES	n/a	n/a	09/12/89	S. CLARK

Distr. VS Board Area

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

1. PURPOSE

1.1 To detail the steps necessary when performing a RUN-IN test on the CS386 CPU assembly (212-7129A-D).

NOTE: THERE ARE TWO METHODS THAT CAN BE USED TO RUN-IN THE CPU ASSEMBLY. THIS PROCEDURE COVERS RUNNING THE ASSEMBLY WITHIN THE CS386 SYSTEM. SEE APPENDIX 7.1 FOR A PROCEDURE ON HOW TO RUN THE ASSEMBLY USING THE BUILT IN TEST (BIT).

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a detailed listing of responsibilities.

4. EQUIPMENT REQUIREMENTS

DESCRIPTION	PART NUMBER	QTY.
2436 Workstation	187-3249 or equiv	1
Test fixture which includes:		
- 360K Floppy	289-0846	1
- 20MB Winchester	289-0849	1
- DPU PCB	212-7113	1
- Triple Controller	212-3012	1

5. SETUP PROCEDURE

5.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:

9561A
9561B

9561C
9561D

5.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

5.4 Insert the assembly under test (212-7129A-D) into the CPU position of the test bed motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST

6.1 Power UP the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

6.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

6.3 The following message will appear:

Mount system platter
Press Reset

6.4 After the LED on the floppy drive has extinguished, press the SHIFT and RESET keys simultaneously (SHIFT/RESET).

6.5 The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST (cont'd)

6.6 Press the SFO key. The following screen will appear:

```
                    ***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE.                    MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen  TERMINAL 1




                          # Multiuser BASIC-2

                          . Diagnostics
```

6.7 Select "DIAGNOSTICS". Press the RUN key. The "Customer Diagnostic" screen will appear.

6.8 Allow the test to run for a specified period.

6.9 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Disconnect the battery and remove the assembly from the test fixture.

6.10 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

6.11 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST

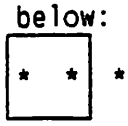
7.1 RUN-IN TEST (BIT):

7.1.1 EQUIPMENT REQUIREMENTS

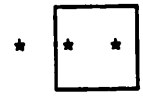
- One 2436 Workstation (187-3249 or equivalent)
- One Cabinet Assembly CS-D/N (279-0873)
- One Triple Controller (212-3012)

7.1.2 SETUP PROCEDURE

7.1.2.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:



9561A
9561B



9561C
9561D

7.1.2.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

7.1.2.3 Attach jumper to location J7 of the 210-9561 board.

7.1.2.4 Insert the 212-3012 Triple Controller into any available slot.

7.1.2.5 Attach a workstation cable to the terminal position of the 212-3012 Triple Controller.

7.1.2.6 Insert the assembly under test (212-7129A-D) into the CPU position of the motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST (cont'd)

7.1 RUN-IN TEST (BIT): (cont'd)

7.1.3 ACTUAL TEST

7.1.3.1 Power ON the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

7.1.3.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

7.1.3.3 The assembly under test will continue to cycle for a specified run-in period (or until an error is detected).

7.1.3.4 Run the diagnostic for a specified period.

7.1.3.5 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Power down the test bed. Disconnect the battery and remove the assembly from the test fixture.

7.1.3.6 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

7.1.3.7 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

VS OFFICE ELECTRONIC MAIL FRIDAY 12/15/89 03:52 PM PAGE: 1

CC: RICHARD SUTTON MS018-26C/PB
FROM: ELIACIM CORTES
SUBJECT: SURPLUS 2200 EQUIPMENT DATE: 12/15/89

DISTRIBUTION:

NOT REQUESTED

TO: ED DAIGNEAULT CC. RICK SUTTON
FROM: ELIACIM CORTES
DATE: 12-15-89
SUBJECT: 2200 EQUIPMENT

212-3032 TERM CONT.
210-7342 DISK/PRINTER CONT.

WPR CURRENTLY HAS THE FOLLOWING EQUIPMENT AVAILABLE:

1. 3 GOOD DISKS 2275-10 AND 3 BAD ONES.
2. 1 MICRO VP WHICH ONLY HAS CHASSIS, POWER SUPPLY AND MOTHERBOARD (NO BOARDS)
3. 2 BAD TRIPLE CONTROLLERS (NEED REPAIRS).
4. 4 KEYBOARDS PN 279-2030 (WILL THESE FIT YOUR APPLICATION?)
5. I HAVE NO DATA AT THIS MOMENT ON AVAILABILITY OF THE WORKSTATION CABLES.

PLEASE ADVISE IF YOU WANT US TO SHIP THESE.

REGARDS: ELIACIM.

(809) 734-9264
PAGE

P.O. MADE FOR THIS } NO EQUIPMENT

NEED NEW P.O. #

→ DEP

TO: KHALIL AZAR

FROM: STEVEN J. ANTHONY / MICHAEL DICK

SUBJECT CS 386 (2200 /386) Outstanding Run-In Equipment

DATE: 14 DEC 89

On 20 Sept 89, Ed Daignault generated a C.A.R. for support of the CS 386 product, a 2200 80386 microprocessor based product. In this C.A.R., is equipment designated for use in the PB PCB Run-In area. The list of equipment required to perform PCB Run-In, per projected build quantities, is as follows:

QUANTITY	ITEM	P/N
5	TERMINAL	187-3249
5	VLSI CHASIS	270-1018
5	TRIPLE CONTROLLER	212-3012
5	DISK SYSTEM	187-3505
5	DISK CABLE	220-0365
5	TERMINAL CABLE	220-0447

To date the following equipment is still required to perform PCB level Run-In:

QUANTITY	ITEM	P/N
2	VLSI CHASIS	270-1018
2	TRIPLE CONTROLLER	212-3012
4	DISK SYSTEM	187-3505
5	DISK CABLE	220-0365

In an effort to attain the required equipment to begin PCB level Run-In, the following will occur:

1) Wang Re-Manufacturing, athough previous checked twice for available required equipment, will be checked again. This will be complete 14 DEC 89.

2) Product Support Engineering and Finance will be requested to expedite any remaining equipment shortages from Wang Labs Puerto Rico and/ or Wang stock. Additionally, expected ship times and delivery dates will be requested.

TO: KHALIL AZAR

FROM: STEVEN J. ANTHONY / MICHAEL DICK

SUBJECT CS 386 (2200 /386) Outstanding Run-In Equipment

DATE: 14 DEC 89

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QUANTITY	ITEM	P/N
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5	VLSI CHASIS	270-1018
5	TRIPLE CONTROLLER	212-3012
5	DISK SYSTEM	187-3505
5	DISK CABLE	220-0365
5	TERMINAL CABLE	220-0447

To date the following equipment is still required to perform PCB level Run-In:

QUANTITY	ITEM	P/N
2	VLSI CHASIS	270-1018
2	TRIPLE CONTROLLER	212-3012
4	DISK SYSTEM	187-3505
5	DISK CABLE	220-0365

In an effort to attain the required equipment to begin PCB level Run-In, the following will occur:

1) Wang Re-Manufacturing, athough previous checked twice for available required equipment, will be checked again. This will be complete 14 DEC 89.

2) Product Support Engineering and Finance will be requested to expedite any remaining equipment shortages from Wang Labs Puerto Rico and/ or Wang stock. Additionally, expected ship times and delivery dates will be requested.

WED 1:30

~~WED~~ WED 3:00 PM

CC: KHALIL AZAR MS013-27C/PB
FROM: STEVEN J. ANTHONY
SUBJECT: 212-7129 PB TEST INFO DATE: 12/21/89

DISTRIBUTION:

NOT REQUESTED

JUAN,

I HAVE RECEIVED THE 8 212-7129 PCB'S AND TESTED THEM IN PB. THE RESULTS OF THESE TESTS ARE AS FOLLWOS:

BOARD #	SERIAL #	WPR FAIL AT LOOP	PB TEST RESULT
212-7129-A	04204683	18	PASS
212-7129-A	04273459	DOA	PASS
212-7129-A	04273420	66	PASS
212-7129-A	04241448	5351	* FAIL (BOOT TEST)
212-7129-A	04241459	2084	PASS
212-7129-B	04208206	4	PASS
212-7129-A	04208203	----	* FAIL (LOAD DIAGS)
212-7129-A	04273450	----	PASS

THE IN-SYSTEMS TEST IN PB CONSISTS OF RUNNING DIAGNOSTICS FOR 100 PASSES. THESE PCB'S WILL NOT BE SHIPPED UNTIL PB HAS FULL RUN-IN CAPABILITIES AND IS ABLE TO PERFORM ALL RUN-IN TESTS. IF THERE ARE ANY QUESTIONS, PLEASE CALL ME AT TELEPHONE NUMBER (508) 656-4478.

REGARDS,

STEVE ANTHONY

CC: KHALIL AZAR MS01>-27C/PB
FROM: STEVEN J. ANTHONY
SUBJECT: 212-7129 PB TEST INFO DATE: 12/21/89

DISTRIBUTION:

NOT REQUESTED

JUAN,

I HAVE RECEIVED THE 8 212-7129 PCB'S AND TESTED THEM IN PB. THE RESULTS OF THESE TESTS ARE AS FOLLWOS:

BOARD #	SERIAL #	WPB FAIL AT LOOP	PB TEST RESULT
212-7129-A	04204583	13	PASS
212-7129-A	04273459	DOA	PASS
212-7129-A	04273420	66	PASS
212-7129-A	04241448	5351	* FAIL (BOOT TEST)
212-7129-A	04241459	2094	PASS
212-7129-B	04208206	4	PASS
212-7129-A	04208203	----	* FAIL (LOAD DIAGS)
212-7129-A	04273450	----	PASS

THE IN-SYSTEMS TEST IN PB CONSISTS OF RUNNING DIAGNOSTICS FOR 100 PASSES. THESE PCB'S WILL NOT BE SHIPPED UNTIL PB HAS FULL RUN-IN CAPABILITIES AND IS ABLE TO PERFORM ALL RUN-IN TESTS. IF THERE ARE ANY QUESTIONS, PLEASE CALL ME AT TELEPHONE NUMBER (508) 656-4478.

REGARDS,

STEVE ANTHONY

FAX

WANG

TO: JUAN PENA

COMPANY: WANG LABS PR

LOCATION: PUERTO RICO

FAX #: (809) 734-8775

FROM: STEVEN J. ANTHONY

DATE: 18 DEC 89

# of PAGES (Including Cover): 2

1001 Pawtucket Blvd
LOWELL, Ma

TO: JUAN PENA

FROM: STEVEN J. ANTHONY

SUBJECT: 2200/386 SYSTEM RUN-IN OF 212-7129A-D PCB SET

DATE: 18 DEC 89

In October of 1989, the Pawtucket Boulevard Manufacturing facility began production of the the 2200/386 pcb card set, 212-7129A-D (PCB 210-9561A-D and PCB 210-9562). Due to the reschedule of site sourcing at this time, PCB Run-In test equipment was not available. Therefore Functional Run-In of these PCB's is not available in Pawtucket Boulevard. In lieu of the complete run-in capabilities, the PB maufacturing site has been performing a limited Built In Test for 24 hours as a prerequisit to final shipment.

Due to the lack of Run-In equipment, which is currently on order, and until this Run-In equipment becomes operational in Pawtucket Boulevard, it is recommended by the PB PCB Test Engineering group that a 24 HR System Run-In Test be performed in Wang Labs Puerto Rico. If there are any questions, please contact me at Tel. (508) 656-4478.

Steven J. Anthony

CAPITAL APPROPRIATION REQUEST
(SEE SCHEDULE "A" FOR SUMMARY)

PROJECT TITLE: CS-386 CPU PROJECT NUMBER:

SECTION I - DEPARTMENT DETAIL:

REQUESTOR: Edmond Daigneault DATE: 09/28/89
DEPARTMENT #: 007 TEL. EXT.: 78635
FACILITY: Parkwood COST CENTER:
CC MANAGER: 6022/ Don Monahan J.O'Hara

SECTION II - EXPENDITURE SUMMARY: (Attach Schedule B)

CAPITAL EQUIPMENT:	$ ~~11,985.00~~	ARE THERE RELATED REQUESTS? (Y/N)	
FIXTURES: N	$		
TOOLING:	$ 28,200.00	TOTAL PREVIOUS REQUEST:	(B) $
INSTALLATION:	$	BOOK VALUE OF TRANSFER:	(C) $
FREIGHT:	$	RELATED EXPENSES:	(D) $
DUTY:	$	(Schedule E - Part 4)	
		TOTAL RELATED EXPENSES:	(E) $
TOTAL REQUEST:	(A) $	(Add B, C, & D)	
AMOUNT BUDGETED:	$ 40,185.00	TOTAL PROJECT SCOPE (A + E)	$ 40,185.00

SECTION III - PROJECT CATEGORY: (Check Only One)

CAPACITY:		TACTICAL:		STRATEGIC:	
1. PRODUCTION (STD EQUIP)	___	4. PRODUCTIVITY: COST REDUCTION/ REPLACEMENT	___	6. NEW PRODUCT/ PRODUCT TRANSFER	___
2. OFFICE FUR & FIXTURES	___	5. REGULATION/SAFETY	___	7. NEW PLANT FIT-UP	___
3. WANG BUILT EQUIPMENT				8. TECHNOLOGY DEVELOPMENT	___
a. OFFICE AUTOMATION	___				
b. BUSINESS SYSTEMS	___				

SECTION IV - SUPPORTING SCHEDULES

- IF YOU CHECKED 1,3,4, or 6 ABOVE; WHAT IS PAYBACK:_____ NPV:_____ IRR:_____? (SCHEDULE C)
- IF YOU CHECKED 6, 7 OR 8 ATTACH SUMMARY OF STRATEGIC/COST ADVANTAGES. (SCHEDULE D)
- IF YOU CHECKED 1 OR 6 ATTACH PRODUCTION FACT SHEET. (SCHEDULE E)
- IF YOU CHECKED 4 OR 8, COMPLETE ONLY PART 4 OF SCHEDULE E.
- IS EQUIPMENT ON PLANT "STANDARDS" LIST (Y/N)? ____ IF NO, PLEASE ATTACH EQUIPMENT CHECK-OFF LIST. (SCHEDULE F)
- IF TOOLING IS PART OF REQUEST ATTACH SCHEDULE G.
- IF YOU CHECKED 3A OR 3B ATTACH INFORMATION TECHNOLOGY JUSTIFICATION ANALYSIS. (SCHEDULE H)
- IF YOU CHECKED 6 (PRODUCT TRANSFER) ATTACH EQUIPMENT TRANSFER CHECKLIST. (SCHEDULE I)

SECTION V - SIGNATURES:

REVIEW	DATE	APPROVAL	DATE
CENTRAL CAPITAL PURCHASING		DIRECTOR	
SITE ENGINEERING		FINANCE (PER AUTHORIZATION POLICY)	
MIS		AREA VP (UNDER 100K)	
SUB-COMMITTEE CHAIRPERSON		CAPITAL COMMITTEE (FINANCE VP)	
OTHERS		EXECUTIVE VP (OVER $250,000)	
NOTE: IF REVIEWER DOES NOT CONCUR WITH PROPOSAL PLEASE PUT AN ASTERISK (*) BESIDE SIGNATURE AND ATTACH SUMMARY OF CONCERNS AND OBSERVATIONS. OTHERWISE, SIGNATURE REPRESENTS AGREEMENT WITH PROPOSAL.		VICE CHAIRMAN*	
		*EQUIPMENT OVER $1,000,000, ALL BUILDING IMPROVEMENTS, LAND & BUILDING OVER $ 250,000.	

Capital Appropriation Request Package
Executive Summary Sheet

Project Title: CS-386 CPU

Project Number: **Date:** 09/28/89

Department Name: New Product Introduction **Department** 007

Requestors Name: Edmond Daigneault **Telephone Ext.** 78635

Executive Summary: (The objective of the Program or Project)

The CS-386 CPU board is intended to :
1. Improve CS CPU performance by up to 300%.
2. Create CS/2200 look alike system that uses modern technology.
3. Enable the CS system to handle 16 users at the same performance level currently available to only 8.

Capital Spending Request Summary:

A.) Outside Vendor Purchases: $_____ **(exc.Tooling costs)**

B.) Wang Serialized Equipment: $ 11985.00 **(at WLI MFG. COST)**

C.) Tooling Expenditures: $_____

D.) Other: $_____

E.) ATE: $ 28,200.00

F.) CTE: $_____

G.) Total Cash Outflow(A+B+C+D+E+F): $ 40,185.00 **Exchange Rate** _____

H.) Domestic Mfg. Transfers In: $_____

I.) International Mfg. Transfers In: $_____ **Exchange Rate** _____

J.) Total Related Previous Requests: $_____

K.) Total Project Scope: (G+H+I+J) $ 40,185.00
==========

Finance Methods in Evaluating Capital Projects:

Capital Budget Amount $_____

NPV _____ **IRR** _____ **PAYBACK** _____

TOTAl CASH OUTFLOW BY QUARTER: Q1 $_____ **Q2** $_____ **Q3** $_____ **Q4** $_____

WANG

Schedule A

TECHNICAL SUMMARY/NEEDS ANALYSIS

Most of the cost in this request is for two In Circuit Test fixtures. One fixture will test the 210-9561 PCB. The other will test the 210-9562 PCB. These boards make up the 212-7129A-D assemblies. These assemblies will be the CPU board set for CS386 1MB thru 8MB systems.

These fixtures will be used to detect process related and other defects before they are passed on to the test technicians. It is anticipated that this will increase the first pass yield at Pretest by at least 25%. This will decrease the amount of technician repair time required.

Also included is the cost of remanufactured 2200 equipment to be used as test stations for board run-in. Five systems have been requested to cover CSO spares, and upgrade kits which will ship out of Pawtucket Boulevard. This amount of stations should also allow run-in of system boards if P.B. desires.

WANG

Schedule B

EXPENDITURE DETAIL LIST

(ATTACH PURCHASE, CONSIGNMENT, ATE FIXTURE, CTE, REQS. HERE)

	ITEM DESCRIPTION	PART/ MODEL #	UNIT COST	QTY	EXTENDED COST			G.L. # *
					VENDOR	CONSIGN MFG COST	OTHER WANG BUILT	
1.	In Circuit Test Fixture 210-9561	F89-0[illegible]7	14100	1			14100	14100
2.	In Circuit Test Fixture 210-9562	F89-0[illegible]8	14100	1			14100	14100
3.	VLSI Chassis	270-1[illegible]18	524	5		2620		2620
4.	Terminal	187-3[illegible]49 25361W	597	5		2985		2985
5.	Triple Controller	212-3[illegible]12	191	5		955		955
6.	Disk System	187-3[illegible]05 2275-[illegible]0	1019	5		5095		5095
7.	Disk Cable	220-0[illegible]65	38	5		190		190
8.	Terminal Cable	220-0[illegible]47	10	5		50		50
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
	TOTAL EQUIPMENT:				(VENDOR) +	11,985.00 (CONSIGN)	28,200 (OTHER) =	$40,185

WANG

Schedule D

STRATEGIC/COST ADVANTAGE ANALYSIS

(Describe Below As Appropriate)

STRATEGIC: ***locational advantages, grants, second builder of product, closeness to markets, etc.***

COST FACTORS: ***economic/cost advantages of approach versus alternatives considered (used in place of payback when relationship to cash inflow is not direct).***

The use of the requested In Circuit test fixtures will increase the first pass yield at the Pretest station by an estimated 25%. This increase will result in lower costs. This will come from using less costly labor to detect the bulk of the defects.

Since the bulk of the defects detected will be manufacturing problems, detecting these problems early will facilitate information feedback to correct repetitive problems. This will further reduce labor costs.

The run-in stations will enable Wang to detect latent process defects that would otherwise be detected at the customers site.

REQUEST FOR A.T.E. FIXTURES AND PROGRAMS

FINANCIAL PROJECT # _____ ENGINEERING REQUEST # _____

****

REQUESTOR SUPPLIED INFORMATION:

BRD/ASSY PART # 210-9561 FOR SUPPORT OF: CS-386

BRD/ASSY DESCRIPTION: CS-386 CPU DATE REQ'D JUNE 89

REASON FOR REQUEST: NEW PRODUCT MPP REV. _____

VOLUME: 450 Q1 FY'90: 450 Q2 FY'90: 450 Q3 FY'90: 450 Q4 FY'90

REQUEST FOR: PROGRAM ✓ FIXTURE ✓ NEW ✓ DUPLICATE ___ UPGRADE ___

TYPE OF TEST: BARE BOARD ___ IN-CIRCUIT ✓ LOADED BOARD ___ EMULATION ___

FUNCTIONAL ___ OTHER _____

EQUIPMENT TYPE: FAIRCHILD STD ✓ ECL ___ SMD ___ ESTIMATED COST: $44,100

FIX. SIZE: S___ M ✓ L___ XL___ O___ BOARD DIMENSIONS: 11.25 x 8.5"

COMMENTS: _____

REQUESTOR: E. DAIGNEAULT EXT: 78635 M/S: 015-11B DATE: 4/12/89

****

TEST ENGINEERING SUPPLIED INFORMATION:

JUSTIFICATION OF SELECTION OR REJECTION: _____

SPECIAL PROGRAMMING CONSIDERATIONS: _____

****

RDB RECEIVING EQUIPMENT: _____

APPROVAL:

PRODUCT ENG. MGR. W.D. Pelham 4/14 __/__/__ TEST STRATEGY [signature] 5/1/89

A.T.E. OPERATION [signature] 5/1/89

SR. BUSINESS _____ __/__/__

FINANCE _____ __/__/__ DIRECTOR _____ __/__/__

****

A.T.E. SUPPLIED INFORMATION: DATE REC'D: __/__/__

S/N FIM-1606 PROJECT TRACKING NO FB9-057

(REV. 2)

REQUEST FOR A.T.E. FIXTURES AND PROGRAMS

FINANCIAL PROJECT # ______________ ENGINEERING REQUEST # ______________

****

REQUESTOR SUPPLIED INFORMATION:

BRD/ASSY PART # 210-9562 FOR SUPPORT OF: CS-386

BRD/ASSY DESCRIPTION: CPU DAUGHTER BOARD DATE REQ'D JUNE 89

REASON FOR REQUEST: NEW PRODUCT MPP REV. ______

VOLUME: 450 Q1 FY'90 : 450 Q2 FY'90 : 450 Q3 FY'90 : 450 Q4 FY'90

REQUEST FOR: PROGRAM ✓ FIXTURE ✓ NEW ✓ DUPLICATE ___ UPGRADE ___

TYPE OF TEST: BARE BOARD ___ IN-CIRCUIT ✓ LOADED BOARD ___ EMULATION ___

FUNCTIONAL ___ OTHER ______________

EQUIPMENT TYPE: FAIRCHILD STD ✓ ECL ___ SMD ___ ESTIMATED COST: $ 14,100.00

FIX. SIZE: S ~~X~~ M ✓ L ___ XL ___ O ___ BOARD DIMENSIONS: 3.50 X 11.25

COMMENTS: ______________

REQUESTOR: ED. DAIGNEAULT EXT: 78635 M/S: 015-11B DATE: 4/12/89

****

TEST ENGINEERING SUPPLIED INFORMATION:

JUSTIFICATION OF SELECTION OR REJECTION: ______________

SPECIAL PROGRAMMING CONSIDERATIONS: ______________

****

RDB RECEIVING EQUIPMENT: ______

APPROVAL:

PRODUCT ENG. MGR. [signature] __/__/__ [signature] 4/14

TEST STRATEGY [signature] 5/1/89

A.T.E. OPERATION [signature] 5/1/89

SR. BUSINESS ______________ __/__/__

FINANCE ______________ __/__/__

DIRECTOR ______________ __/__/__

****

A.T.E. SUPPLIED INFORMATION: DATE REC'D: __/__/__

S/N FIX-1607

PROJECT TRACKING NO F89-058

(REV. 2)

WANG

(3)

Schedule D

STRATEGIC/COST ADVANTAGE ANALYSIS

(Describe Below As Appropriate)

STRATEGIC: ***locational advantages, grants, second builder of product, closeness to markets, etc.***

COST FACTORS: ***economic/cost advantages of approach versus alternatives considered (used in place of payback when relationship to cash inflow is not direct).***

The use of the requested In Circuit test fixtures will increase the first pass yield at the Pretest station by an estimated 25%. This increase will result in lower costs. This will come from using less costly labor to detect the bulk of the defects.

Since the bulk of the defects detected will be manufacturing problems, detecting these problems early will facilitate information feedback to correct repetitive problems. This will further reduce labor costs.

WANG

Schedule E

PRODUCTION FACT SHEET

(ATTACH SUPPORTING DOCUMENTATION HERE AS NECESSARY)

1. PRODUCTION SCHEDULE

MPP REV #: [ ]

A. MPP (6 months): 400 400 400 400 400 400

B. Factory Plan: 400 400 400 400 400 400

(MPP + Assembly Allowance + C.E. + R & D − OVO − Sourcing − OEM ± Other) % passing through equipment

Explain Other: _____

C. Date Equipment Required: 07/89

2. CURRENT PLANT CAPACITY

A. # Machines: _____

B. # of Shifts: _____

C. Available Hours: _____

(40 * # Shifts * Utilization Rate * # of Units)

3. NEW CAPACITY

A. # Machines: _____

B. # of Shifts: _____

C. Available Hours: _____

(40 * # Shifts * Utilization Rate * # of Units)

4. ADDITIONAL OPERATING FACTORS

A. Additional Manpower

	BUDGETED	NOT BUDGETED
# DL:	_____	_____
# IL:	_____	_____

B. Training Costs (yearly): $_____

C. Operating Costs (yearly): $_____

D. Is Space Available? (Y/N): _____

E. Maintenance Costs (yearly): $_____

Describe Maintenance Plan:

_____

_____

_____

_____

CAPITAL EQUIPMENT APPROVALS

SAFETY CHECKLIST

EQUIPMENT ATE FIXTURES MANUFACTURER : WANG

VENDOR CONTACT _____ PHONE # _____

1. Any chemicals used in the machine/process? MSDS's? Any waste stream?
2. Excessive noise generated?
3. Is equipment UL-Listed / FM-Approved for the intended purpose?
4. Is electr. wiring/grounding equivalent to that req'd for UL listing?
5. Is equipment movable?
6. Does equipment plug in, or is it hard-wired?
7. Any exposed electrics / removable panels for service / self-enclosed?
8. Any safety interlocks or guards required?
9. Any pers. prot. eqt. required (i.e., safety glasses, gloves, etc.)?
10. Any hot surfaces / sharp objects/edges / pinch points?
11. Material handling involved with the process? Special eqt./concerns?
12. Is weight a concern for building structure?
13. Any special HVAC / venting concerns?
14. Is location compatible with adjoining equipment / operations? Any special clearances required?
15. Does eqt. need to be attended constantly?
16. Any special training / maint. required? Provided by vendor?
17. Any special restrictions?

NOTES:

COPY & ATTACH PACKAGE SUBMITTED DATE SIGNED _____

---COMPANY CONFIDENTIAL---

TO: Distribution

FROM Edmond Daigneault
Production Support/Pilot Engineering

DATE: September 27, 1989

SUBJECT: CS386 CPU Revised Test Plan

Attached is a copy of revision B of the Manufacturing Test Plan for the CS386 CPU board.. This plan is intended to provide an overview of the proposed test, and repair processes for CS386 project. Originally issued as part of the Manufacturing Engineering Plan, the test plan is being issued as a separate document. Changes were needed as a result of the decision to build and test the boards at Pawtucket Boulevard, and the final systems at Puerto Rico. Your input to this document is requested as this plan will be modified and reissued as details become available.

Please review this plan for the impact of this product on your operation. Direct questions and comments to the Production Support Engineer shown below.

PRODUCT: CS386 CPU

PRODUCTION SUPPORT ENGINEER: Edmond Daigneault
78635
015-11B

Distribution:

2 SD

S. Anthony	018-26C
K. Azar	018-27C
J. Lynch	015-11B
T. Mahoney	015-11B
M. Negron	015-17B
J. O'Hara	018-26C
E. Schulz	014-A3A
S. Stevenson	015-130
R. Sutton	018-27C
D.P. Wilson	018-21F

SUM Dos

TEST PLAN
CS-386 CPU BOARD

This revised Test Plan will only be concerned with testing after A.T.E. testing has been completed. Full in circuit test fixtures have been provided for both the 210-9561, and the 210-9562 boards, as outlined in Rev A of the M.E.P., distributed on April 11, 1989.

PWA TEST

All boards that pass in circuit test will be tested in the PWA test area. A known good board will be mated with the board under test. Tests used in this area will include the following:

BIT	379-3513R1 or greater.
	379-3514R1 or greater.
CS386 O.S.	Rev. 1.0 or greater.
CS386 Customer	Diagnostics

Note; CS386 OS and Customer Diagnostics are on the system diskette.

The following is a list of equipment needed for one functional test station, either Pre Test or Final Acceptance.

Test Equipment List

Description	Qty	MEI/Model#	Available	Needed	Cost
Terminal	1	2436DW			597.27
CS-D/N Chassis	1	279-0873			680.59
Triple Cont.	1	212-3012			191.70
DS. DPU Board	1	212-7113			592.92
20MB Winch.	1	289-0849			204.95
360K Floppy	1	289-0846			74.49
				Total	2341.92

Substitution of the chassis and disk drives depending on availability would be acceptable as follows:

VLSI Chassis	1	270-1018	524.27
2275-10 Disk	1	187-3505	1019.14
CS System	1	187-3316	962.24
2275-10 Disk	1	187-3505	1019.14

Note: CS system would include cost of 210-8937A CPU board (543.45). CS chassis is not structured separately.

Run-In:

If PCB level run-in of this assembly is required, the following equipment will be needed. Two methods are outlined. Either method will require one setup for each assembly to be run-in. Board level run-in will be required for CSO spares, and system upgrade kits. The board level run-in periods will be as follows.

System boards → 6 Hrs. Minimum.
Spares/Upgrades → 12 Hrs. Minimum (Overnight)

BIT

Part Number	Description	Qty.
Various	CS, CS-D/N, VLSI chassis	1
212-3012	Triple Controller	1
187-3249	Workstation	1
220-0447	Workstation cable	1

Customer Diagnostics

279-0873	CS-D chassis	1
212-3012	Triple Controller	1
187-3249	Workstation	1
220-0447	Workstation cable	1
289-0849	20MB Winchester	1

Run-In Equipment Needs Analysis

MP&BM's proposed forecast for the CS386 CPU boards indicates that the average quarterly demand over the next year will average 273 system boards, and 191 spares and upgrades. The following analysis is based on this demand, and the run-in times previously proposed.

System	273/Qtr.	
	21/Week	
	4.2/Day (use 5)	
Spares/Upgrd	191/Qtr.	
	14.7/Week	
	2.9/Day (use 3)	

If 5 run-in systems are made available, a maximum of 10 boards could be run-in per day. This would also provide a cushion, to the availability vs. demand problem.

The prefferred run-in mode is to use the Customer Diagnostics, which are not prom resident. This would mean an increase in the cost of any run-in stations. PSE has calculated that the average cost of a run-in station will be $2300.40. Remanufactured equipment should be used if possible.

Run-In Equipment List

	Description	Qty	MEI/Model#	Available	Needed	Cost
	Terminal	1	2436DW			597.27
(1)	CS-D/N Chassis	1	279-0873			680.59
	Triple Cont.	1	212-3012			191.70
(2)	DS. DPU Board	1	212-7113			592.92
(2)	20MB Winch.	1	289-0849			204.95
(2)	360K Floppy	1	289-0846			74.49
					Total	2341.92

Alternate Equipment

(1)	VLSI chassis	1	270-1018			524.27
(1)	CS chassis	1	187-3316			418.79
(2)	2275-10 Disk	1	187-3505			1019.14

Note; Cost of CS chassis was calculated by subtracting cost of 210-8937X CPU board, which is not needed.

Fault Analysis and Repair

All boards that fail pre test, functional test or run-in will be sent to the fault analysis and repair area. Completed units will be routed back to pre test.

Fault Analysis/Repair Station;

Part Number	Description	Qty.
None	Modified CS/D chassis	1
212-7113	DPU PCB	1
212-3012	Triple Controller	1
289-0846	360K Floppy	1
289-0849	20MB Winchester	1
289-0905	Tape Cassette Drive	1
187-3249	Workstation	1
220-0447	Workstation cable	1
666-1016	3.5V Lithium battery	1

System Test

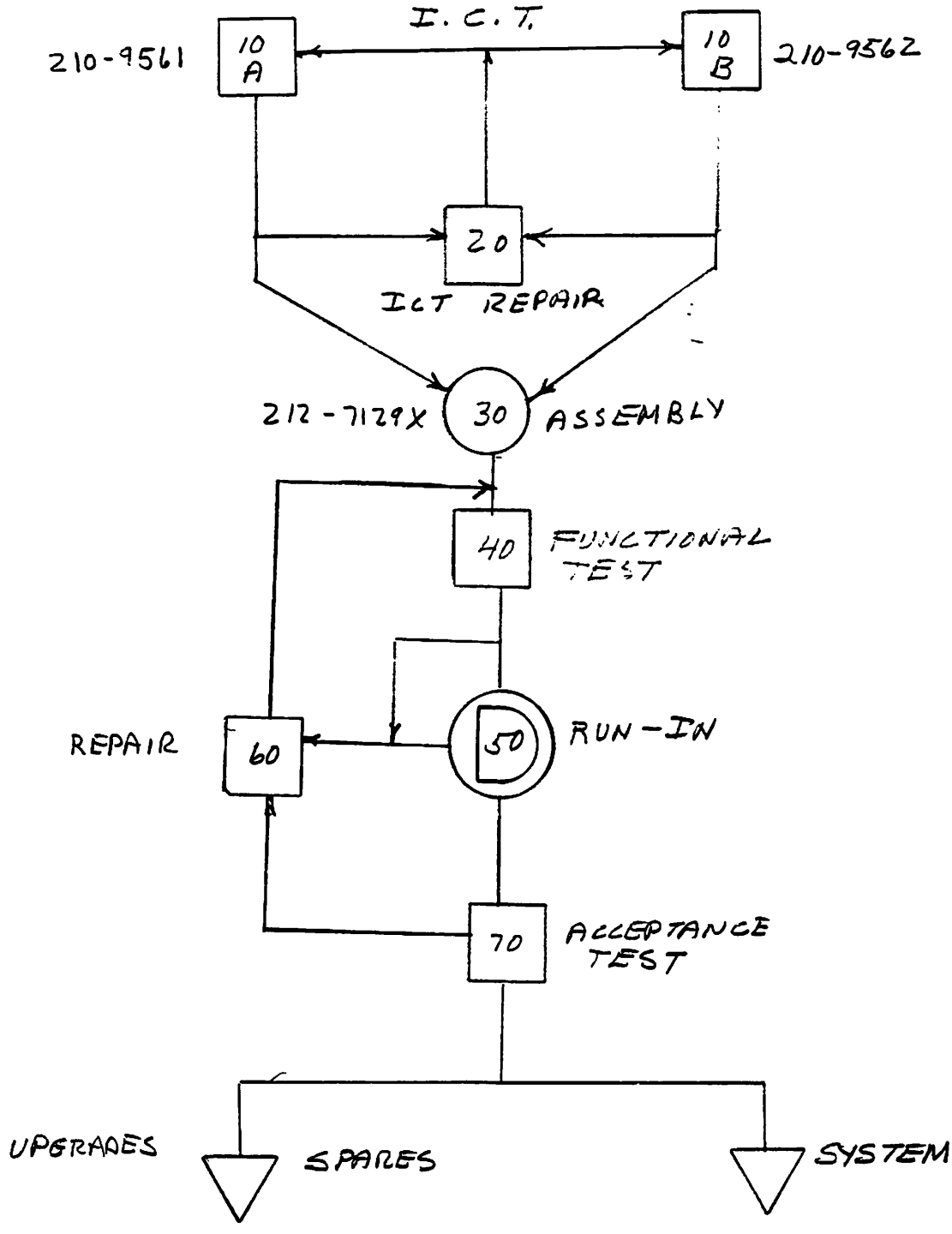
System test will follow the same procedure as the present CS-2 or CS-5D/N systems. The only difference will be the Operating System program, and the Customer Diagnostic program.

System Run-In

System Run-In will follow the procedure as outlined in Manufacturing Test Procedure 167/187-3539-3542 (CS386-10N/20N/40N/80N), Run-In/Final Test..

Final Test

If system to be shipped is a CS-N, the final test procedure is as outlined in the System Run-In step. If the system to be shipped is a CS-D, Test Procedure 167/197-3543-3546 (Final Acceptance Test) must also be performed.



WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY	D.
	DWN EJO	9/28/89	E ENGR	
	CHK		M ENGR	
			MFG ENGR	
MATERIAL	MODEL NO. CS386		TITLE BOARD TEST FLOW (212-7129X)	
	SEE ENGRG. SPECIFICATIONS			

WANG

MANUFACTURING TEST PROCEDURE

0657S

PART NO.	
	212-7129A-D
SHEET	1 OF 14
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386	210-9561A-D 210-9562 212-7129A-D	PRETEST/ACCEPTANCE TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT. ENGR. E. Daigneault 9/12/89	
Q.C. REVIEW 9/14/89	PILOT ENGR. Tom Mahoney 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S. CLARK
C	SMALL CHANGE	n/a	n/a	09/12/89	S. CLARK

Distr. VS Board Area

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

1. PURPOSE

1.1 To detail the steps necessary when performing a PRETEST/ACCEPTANCE test on the CS386 (212-7129A-D)

1.2 This procedure can be used for testing either the 210-9561A-D, or the 210-9562. When testing a 9561 board, a known good 9562 must be used. When testing a 9562 board, a known good 9561 must be used. When assembled, these boards make up the 212-7129A-D assembly.

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a detailed listing of responsibilities.

4. EQUIPMENT REQUIREMENTS

DESCRIPTION	PART NUMBER	QTY.
2436 Workstation	187-3249 or equiv	1
Known good 9562 or 9561 board (depending on board under test)		1
Test fixture which includes:		
- 360K Floppy	289-0846	1
- 20MB Winchester	289-0849	1
- DPU PCB	212-7113	1
- MXE Controller	212-3032	1

5. SETUP PROCEDURE

5.1 Connect a known good board (210-9562 or 9561) to the board under test (we are now testing a 212-7129A-D).

5.2 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:

9561A
9561B

9561C
9561D

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

5. SETUP PROCEDURE (cont'd)

5.3 Connect the battery (from test fixture) to location J2 of the 210-9562 board.

5.4 Insert the assembly under test (212-7129A-D) into the CPU position of the test bed motherboard.

6. ACTUAL TEST

6.1 Power UP the test bed. The following screen will appear:

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SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

6.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

6.3 The following message will appear:

Mount system platter
Press Reset

6.4 After the LED on the floppy drive has extinguished, press the SHIFT and RESET keys simultaneously (SHIFT/RESET).

6.5 The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.6 Press the SF0 key. The following screen will appear:

***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE. MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen TERMINAL 1

Multiuser BASIC-2

. Diagnostics

6.7 Select "DIAGNOSTICS". Press the RUN key. The "Customer Diagnostic" screen will appear:

6.8 Complete five (5) passes of the test program. When complete, press the SHIFT/RESET keys.

6.9 The following message will appear:

Mount system platter
Press Reset

6.10 Press the RESET key. The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.11 Press the SFO key. The following screen will appear:

```
***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE.                    MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen  TERMINAL 1

# Multiuser BASIC-2

. Diagnostics
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.12 Select "MULTIUSER BASIC 2". Press the RUN key. The following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
(c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

                                                    List of options:
O.K.  Configuration  (#Partitions)  (CPU number)    '00 - clear partitions
 y       current          ( 4)          (01)       '01 - clear device table

                                                    '02 - divide memory evenly
                                                    '04 - edit partitions
                                                    '05 - edit device table
                                                    '06 - edit $MSG
                                                    '07 - select printer driver

                                                    '08 - load configuration
                                                    '09 - save configuration
                                                    '10 - delete configuration

                                                    '11 - edit CPU number


                                                    Press FN/TAB to exit

Configuration 'current' loaded.  Name of configuration to load?
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.13 Press the SF15 key. The following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
(c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

Available memory: 1,024 K                          List of options:
No. of terminals  16       CPU number  1          '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM   '01 - clear device table
    1     150.00      1        Y
    2     150.00      2        Y                  '02 - divide memory evenly
    3     150.00      3        Y                  '04 - edit partitions
    4     150.00      0        Y                  '05 - edit device table
                                                  '06 - edit $MSG
                                                  '07 - select printer driver

                                                  '08 - load configuration
                                                  '09 - save configuration
                                                  '10 - delete configuration

                                                  '11 - edit CPU number

                                                  '15 - execute
                                                  Press FN/TAB to exit

Check configuration.  OK to execute (Y or N)?
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.14 Press the "Y" key. Press the RETURN key and the following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
(c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

Available memory: 1,024 K                          List of options:
No. of terminals  16      CPU number  1            '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM    '01 - clear device table
    1     150.00      1        Y
    2     150.00      2        Y                   '02 - divide memory evenly
    3     150.00      3        Y                   '04 - edit partitions
    4     150.00      0        Y                   '05 - edit device table
                                                   '06 - edit $MSG
                                                   '07 - select printer driver

                                                   '08 - load configuration
                                                   '09 - save configuration
                                                   '10 - delete configuration

                                                   '11 - edit CPU number

                                                   '15 - execute
                                                   Press FN/TAB to exit
```

RECONFIGURATION PASSWORD ? SYSTEM

6.15 Press the RETURN key again. The following message will appear:

Ready (Basic 2) Partition 01

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.16 Press the LOAD, RUN, and RETURN keys. The following screen will appear:

```
System Utilities - (c) Copr. Wang Laboratories, Inc. 1989

                                                    Partition 1, 150 K
Select an item and press RUN/EXEC:                        Terminal 1


                    # Partition Generator
                    # Partition Status
                    # Format Disk Platter
                    # Move File
                    # Backup Platter
                    # Recover from Backup
                    # System Install
                    # Make a Reference List of File Names
                    # Initialize Date & Time
                    # Vertical Format Control
                    # DS Utilities
                    # Game
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.17 Select "DS UTILITIES". Press the RUN key and the following screen will appear:

```
                DS Data Storage Cabinet Utilities  (Release 2.0)

  Select an item and press RUN/EXEC                    Partition 1, 150 K
  or press CANCEL/EDIT for previous menu:                    Terminal 1


                        # DS Configuration
                        # Protect/Unprotect DS Surfaces
                        # RAM Disk Allocation
                        # Cache Usage
                        # Backup Disk Platters to Tape Cassette
                        # Restore Disk Platters from Tape Cassette
                        # Field Test Unit
                        # File Repair
                        # Multi-Disk Utility
                        # Printer Test
```

6.18 Select "FIELD TEST UNIT". Press the RUN key. The following message will appear on the monitor screen:

Load all devices to be tested

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.19 Press the RETURN key. The following screen will appear:

```
                    2200 FTU (Field Test Unit)  Rev. 873E*
          Available Addresses             Disk Model              Ending Sector
    >-          340           -< >-      2270a          -< >-       1231       -<
    >-          D10           -< >-      2200DS  FLPm   -< >-       4159       -<
    >-          D11           -< >-      2200DS WIN     -< >-       38911      -<
    >-          D12           -< >-      2200DS WIN     -< >-       38911      -<




                 Select the address of the device to be tested.

    Press: ANY KEY to input parameters               SF'0 define err
           CLEAR/PREV SCRN - to exit                 RETURN/RUN to cont.
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.20 Enter "340" as the address. Press the RETURN key and the following screen will appear:

```
                    TEST SELECTION MENU  Rev. 873E*

SF 01 - Compare Sector(s)                    SF 08 - Write Enable
SF 02 - Compare File                         SF 09 - Write Lock
SF 03 - Display a Sector                     SF 10 - Scratch Disk
SF 04 - Verify                 WRITE LOCKED  SF 11 - Format Disk
SF 05 - Read                                 SF 12 - Write
SF 06 - Position Head(s)                     SF 13 - Read After Write
SF 07 - DPU Prom Rev.                        SF 14 - Instruction Test


                Device  340
           Start Sector  0       Track  0
             End Sector  1231    Track  76     Maximum =  1231
        Hex data pattern  B8888888888888888888888888888888
                Printer  OFF (204, 215, OFF)
                   Loop  N (N=No, T=on Test, E=on Error or test)
                   Mode  I (I = sequential step In,  A = Alternate step)
                           (O = sequential step Out, R = Random step)


Press: ANY KEY to input parameters SF' key listed above  SF'0 define err
       CLEAR/PREV SCRN - to exit
```

6.21 Press the SF8 key to "release" WRITE LOCK (WRITE ENABLE). Press the RETURN key.

6.22 Using the RETURN key, tab over to "LOOP" and change to "T". Press the RETURN key.

6.23 Using the RETURN key, tab over to "MODE" and set to "RANDOM". Press the RETURN key.

6.24 Set "RANDOM OPERATIONS" to "1000". Press the RETURN key.

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.25 Press the SF13 key. Press the RETURN key.

6.26 The RANDOM READ AFTER WRITE TESTS will now run. Allow the test to complete one (1) pass. When complete, press the SHIFT/RESET keys and the following message will appear:

Ready (Basic 2) Partition 01"

6.27 Press the LOAD, RUN, and RETURN keys. The following screen will appear:

```
System Utilities - (c) Copr. Wang Laboratories, Inc. 1989

                                                    Partition 1, 150 K
Select an item and press RUN/EXEC:                        Terminal 1


                    # Partition Generator
                    # Partition Status
                    # Format Disk Platter
                    # Move File
                    # Backup Platter
                    # Recover from Backup
                    # System Install
                    # Make a Reference List of File Names
                    # Initialize Date & Time
                    # Vertical Format Control
                    # DS Utilities
                    # Game
```

6.28 Select "INITIALIZE DATE AND TIME". Press the RUN key.

6.29 A clock will appear. Enter the correct DATE and press the RETURN key. Enter the correct TIME and press the RETURN key.

6.30 Verify that the clock is running.

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.31 Press the SHIFT/RESET keys and power down the test bed.

6.32 Remove the 212-7129A-D assembly. If the board/assembly has passed PRETEST, fill out the appropriate paperwork and send the assembly to the RUN-IN AREA. If the board/assembly has just passed FINAL ACCEPTANCE, send the assembly to STOCK.

6.33 If the board/assembly did not pass, fill out the appropriate paperwork, noting the discrepancy, and send the board/assembly to the REPAIR AREA.

TMD DISTRIBUTION FOR CS 386 CPU BD.
MODEL CS 386
TMD# 2380

	K. Azar	018-27C
	K. Bean	018-26F
	P. Doris	018-21H
	R. Downing	018-27C
	D. Eno	019-490
	J. Flynn	018-27C
	D. Foley	018-28B
	L. Gaskell	015-350
	F. Gibeau	025-210
	A. Gliksberg	014-B30
	D. Heiner	018-21I
	J. Hondras	018-27B
	V. Iosilevich	018-21H
	D. Jarry	018-25A
	D. LeFebvre	018-21E
	R. Morin	015-130
	K. Morman	018-12I
	T. Noonan	018-27C
	J. O'Hara	018-26C
	D. Pestana	018-25E
	J. Proulx	012-190
	W. Quigley	018-21F
	B. Rowlette	018-18D
	C. Seto	018-26F
	C. Scribner	013-490
	R. Tudisco	018-26C
	J. Tyler	024-290
SIGNEES:	S. Anthony	018-26C
	S. Dorval	018-28I
	R. Keenan	018-27B
	T. LaMonica	018-28G
	R. Sutton	018-27C
CC:	E. Daigneault	015-11B

WANG

TMD No. 2380
Sheet 1 of 5

TEMPORARY MANUFACTURING DEVIATION

Originator	Date	M/S	Ext.	Ref. TMD
E. DAIGNEAULT	9/25/89	015-11B	78635	
Part Number	**Description**		**Model**	
209-9561	CS 386 CPU BD.		CS386	
ECO Pending?	**If yes, ECO#**	**ECO REQ'D**	**Temporary Change Only**	
YES		YES		
SWO or CWO Number		**SWO or CWO Quantity**		
Effectivity Date		**Expiration Date**		
9/25/89		10/25/89		

Affected Areas	EPIC										
Quantity											

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

CHANGE RESISTOR VALUES AS FOLLOWS;

R12

FROM - 330-4021 - RES., 20KΩ, 1/4W, 5%.
TO - 330-2025 - RES., 240Ω, 1/4W, 5%

R14

FROM - 330-2025 - RES 240Ω, 1/4W, 5%
TO - 330-4021 - RES 20KΩ, 1/4W, 5%

See ATTACHED ECO FOR REASON.

Change E Rev. from 2 to 3 FOR ALL VERSIONS (210 A-B-C-D)

APPROVALS

Quality Control	Date	Resident Comp. Eng.	Date
R. Keenan	9/26/89		
Material Control	**Date**	**CATA**	**Date**
Operations Manager	**Date**	**Mfg. Engineering**	**Date**
Shirley Doroal	9/26/89	[illegible]	9-25-89
		[illegible]	9/25/89
		[illegible]	9/26/89

TMD 2380 242

WANG

ECO

ECO NO.

SHEET OF

ORIGINATOR	Edmond Daigneault	Dept007	M/S 015-11B	EXT. 78635	DATE 09/22/89
WRITTEN BY	Edmond Daigneault	Dept007	M/S 015-11B	EXT. 78635	DATE 09/22/89

PART NO. 209-9561	DESCRIPTION PCA CS-386 CPU Board
DWG NO.	
MODEL NO. CS-386	PER# H0213C
CLASS I (II) III	

DESCRIPTION OF CHANGE

Change 209-9561 Parts List and schematics as follows:

Change resistor values as follows:

	WLI #	Description		Ref. Des.
Change:	330-2025	Res 240 ohms 1/4W 5%	From	R14
			To	R12
Change:	330-4021	Res 20K ohms 1/4W 5%	From	R12
			To	R14

REASON/SYMPTOM FOR CHANGE

Correct problem in operation of LED1 circuit.

DOCUMENTS

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

CONFORMANCE DATE

APPROVALS

	DATE
ECO CHAIRPERSON	
DES. ENGRG. S. M. Chiou	9/22/89
CUST. ENGRG.	
MFG.	
MTO	
PP&M	
F.C.C.	
PROD. SAFETY	
SECURE SYS.	
ORIGINATOR E. Daigneault	9/22/89

TMD 8389

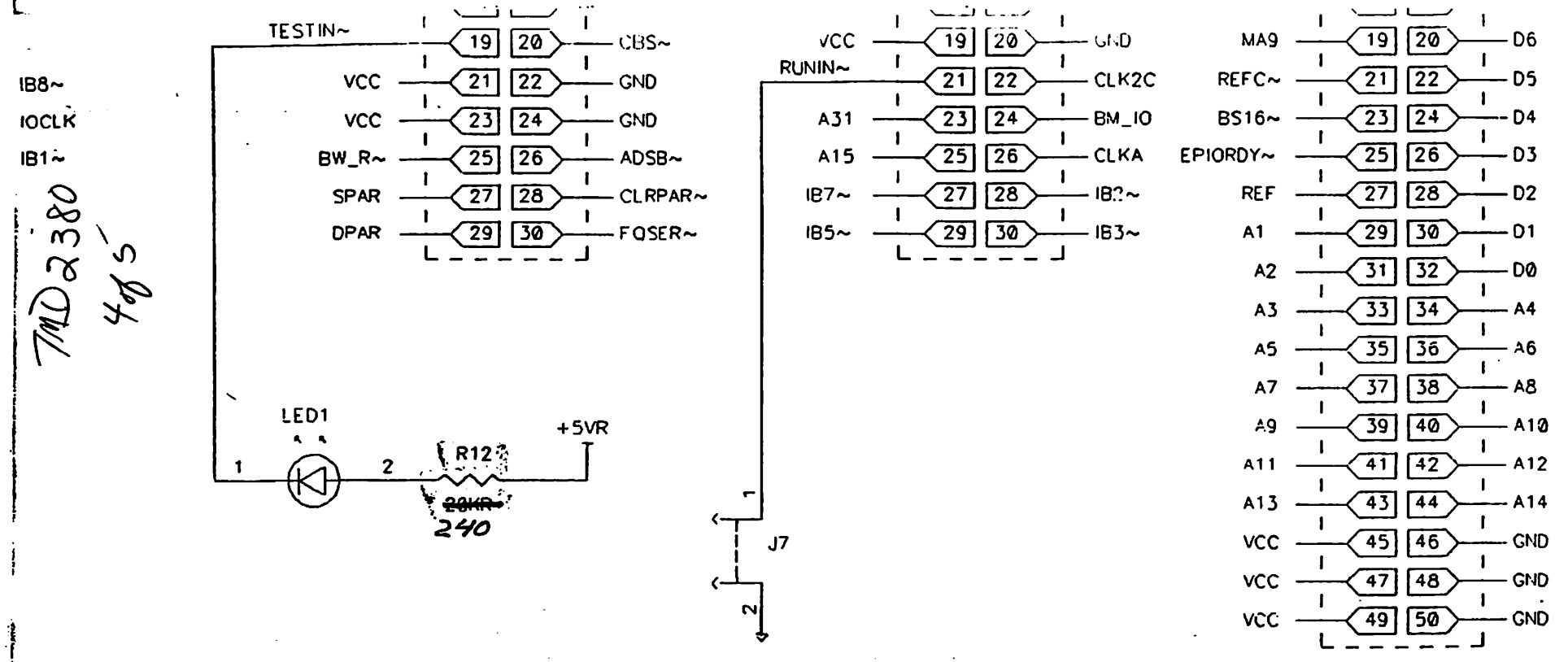
HANG LABORATORIES, INC. RUN DATE: 07/24/89 08:50

>>>>> PARTS LIST <<<<< SHEET OF PAGE 1

(FINAL PARTS LIST)

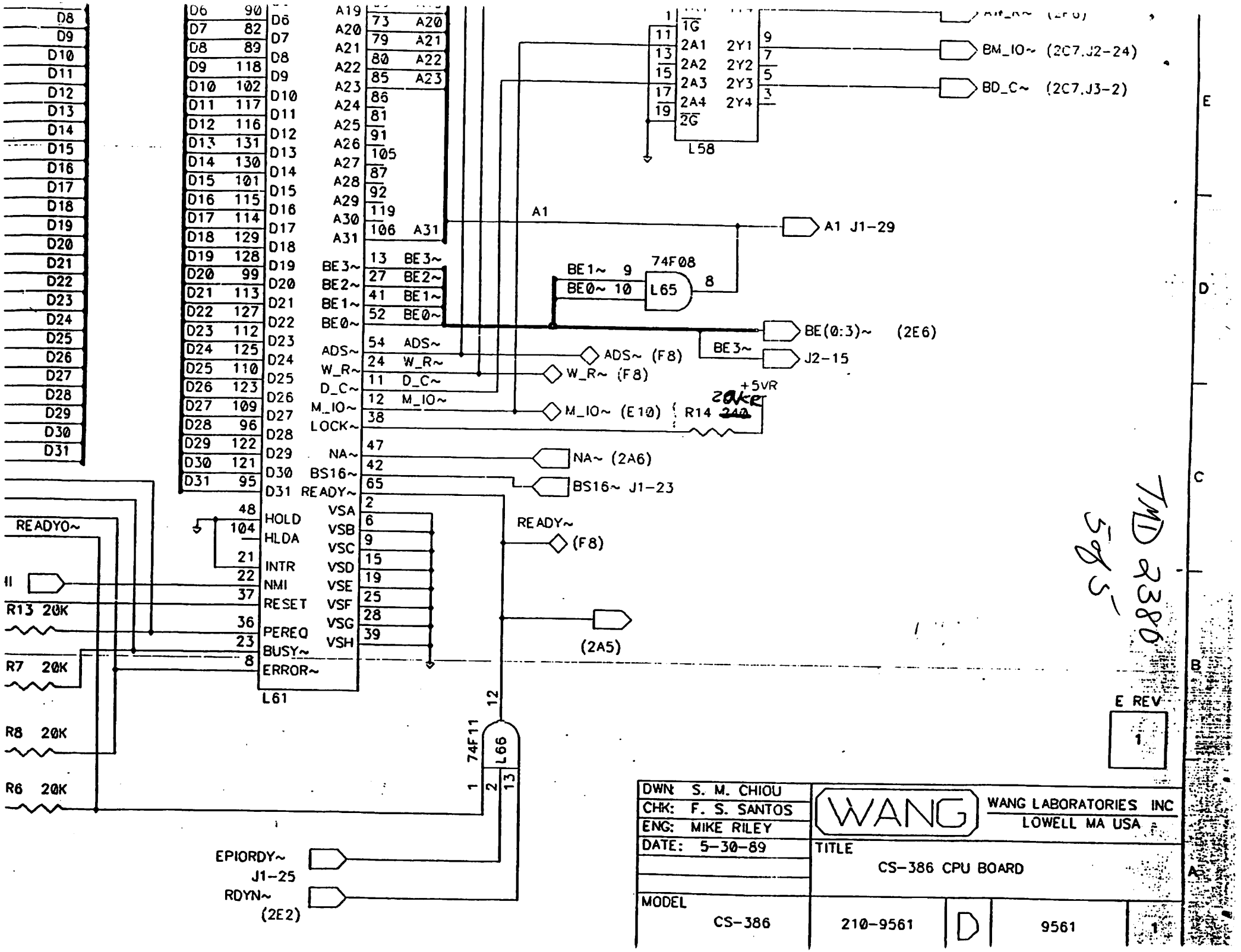
BOARD NO. & TITLE: C9561 PCA CS-386 CPU BD CREATED: 10/05/88 12:53
ASSEMBLY LEVEL & TITLE: 209 9561 LAST MODIFIED: 07/24/89 08:49 BY: JMD
PARTS LIST REVISION (P): 1 EDITING REVISION: 24

* REF. DES.	* HANG PART NO.	* VALUE/TYPE	DESCRIPTION	* DRAWING NO.	* QTY.
C2 - C9	300-1833-	100N	CAP .1 UF 50V +80-20% Z5UCER MONO AXL	ECO 54752D	19
C22 - C25					
C43					
C52					
C62 - C65					
C83					
C1	300-1966-	47000P	CAP .047UF 50V+80-20% Z5UCER MLD AXL	ECO 54752D	55
C12 - C13					
C16 - C21					
C28 - C33					
C37 - C42					
C44 - C51					
C53 - C61					
C66 - C82					
C10 - C11	300-4024-	33000N	CAP 33 UF 10V 5% TANTALUMAXIAL	ECO 54752D	9
C14 - C15					
C26 - C27					
C35 - C36					
C84					
C34	300-4034-	47000N	CAP 47 UF 20V 10% TANTALUM AXIAL		1
Y1	321-1041-	32.0000	CLK OSC 32.0 MHZ .01% TTL		1
R1	330-1048-	47	RES 47 OHM 1/4W 5% METAL FILM 200 PPM		1
~~R14~~ R12	330-2025-	240	RES 240 OHM 1/4W 5% METAL FILM 200 PPM		1
R5	330-3023-	2.2K	RES 2.2K OHM 1/4W 5% METAL FILM 200 PPM		4
R9 - R11					
R2	330-4011-	10K	RES 10K OHM 1/4W 5% METAL FILM 200 PPM		1
R3 - R4	330-4021-	20K	RES 20K OHM 1/4W 5% METAL FILM 200 PPM		7
R6 - R8					
~~R12~~ - R13 R14					
R15	333-0912-	2.20KN	RES 2200 OHM NETWORK SIP 10 PIN 9 RES BUSS TYPE		1
J4	350-0203-	2 CONT	CONN HDR 2 POS .100 1 ROW STR PIN	ECO 54752D	2
J7					
J1	[illegible]-5335-	50 CONT	CON BRK-WY HDR 25-25P .1C180PCB .24/.10T GOLD		1
J2 - J3	350-5336-	30 CONT	CON BRK-WY HDR 15-15P .1C180 PCB .24/.11T GOLD		2



TMD2380 40's

WANG	210-3561	D	9561
SHEET 6 OF 7	PART NUMBER	SIZE	DRAWING NUMBER


D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 D30 D31
D6 90 D6
D7 82 D7
D8 89 D8
D9 118 D9
D10 102 D10
D11 117 D11
D12 116 D12
D13 131 D13
D14 130 D14
D15 101 D15
D16 115 D16
D17 114 D17
D18 129 D18
D19 128 D19
D20 99 D20
D21 113 D21
D22 127 D22
D23 112 D23
D24 125 D24
D25 110 D25
D26 123 D26
D27 109 D27
D28 96 D28
D29 122 D29
D30 121 D30
D31 95 D31
A19 73 A20
A20 79 A21
A21 80 A22
A22 85 A23
A23 86
A24 81
A25 91
A26 105
A27 87
A28 92
A29 119
A30 106 A31
A31
BE3~ 13 BE3~
BE2~ 27 BE2~
BE1~ 41 BE1~
BE0~ 52 BE0~
ADS~ 54 ADS~
W_R~ 24 W_R~
D_C~ 11 D_C~
M_IO~ 12 M_IO~
LOCK~ 38
NA~ 47
BS16~ 42
READY~ 65
48 HOLD
104 HLDA
21 INTR
22 NMI
37 RESET
36 PEREQ
23 BUSY~
8 ERROR~
L61
VSA 2
VSB 6
VSC 9
VSD 15
VSE 19
VSF 25
VSG 28
VSH 39
READYO~
R13 20K
R7 20K
R8 20K
R6 20K
74F11 L66
1 2 12 13
1 1G
11 2A1 2Y1 9
13 2A2 2Y2 7
15 2A3 2Y3 5
17 2A4 2Y4 3
19 2G
L58
BM_IO~ (2C7.J2-24)
BD_C~ (2C7.J3-2)
A1
A1 J1-29
74F08
BE1~ 9
BE0~ 10
L65
8
BE(0:3)~ (2E6)
BE3~
J2-15
ADS~ (F8)
W_R~ (F8)
M_IO~ (E10)
+5VR
20KR
R14 24Ω
NA~ (2A6)
BS16~ J1-23
READY~
(F8)
(2A5)
EPIORDY~
J1-25
RDYN~
(2E2)
E REV
1
DWN: S. M. CHIOU
CHK: F. S. SANTOS
ENG: MIKE RILEY
DATE: 5-30-89
WANG
WANG LABORATORIES INC
LOWELL MA USA
TITLE
CS-386 CPU BOARD
MODEL
CS-386
210-9561
D
9561
1
E
D
C
B
A

212-7129A-D PCB Test

Equipment Requirements

Functional Test:

Functional Test/Repair Station;

Part Number	Description	Qty.	Misc.
None	Modified CS/D chassis	1	
212-7113	DPU PCB	1	
212-3012	Triple Controller	1	
289-0846	360K Floppy	1	
289-0849	20MB Winchester	1	
289-0905	Tape Cassette Drive	1	
187-3249	Workstation	1	
220-0447	Workstation cable	1	
666-1016	3.5V Lithium battery	1	

Run-In:

If PCB level run-in of this assembly is required, the following equipment will be needed. Two methods are reflected here and in the test procedures. Either method will require one setup for each assembly to be run-in.

BIT

Various	CS, CS-D/N, VLSI chassis	1	
212-3012	Triple Controller	1	or 212-3032
187-3249	Workstation	1	
220-0447	Workstation cable	1	

Customer Diagnostics

279-0873	CS-D chassis	1	
212-3012	Triple Controller	1	or 212-3032
187-3249	Workstation	1	
220-0447	Workstation cable	1	
289-0849	20MB Winchester	1	

Acceptance Test:

Acceptance test will use the same type of equipment as is used in the functional test/ or as is used in the Customer Diagnostic testing at run-in.

CAPITAL APPROPRIATION REQUEST
(SEE SCHEDULE "A" FOR SUMMARY)

PROJECT TITLE: CS-386 CPU PROJECT NUMBER:

SECTION I - DEPARTMENT DETAIL:

REQUESTOR: Edmond Daigneault
DEPARTMENT #: 007
FACILITY: Parkwood
DATE: 09/28/89
TEL. EXT.: 78635
COST CENTER: 6022/6023
CC MANAGER: Don Monahan / J.O'Hara

SECTION II - EXPENDITURE SUMMARY: (Attach Schedule B)

CAPITAL EQUIPMENT:	$ 14,085.00	ARE THERE RELATED REQUESTS? (Y/N)	N
FIXTURES:	$ 28,200.00		
TOOLING:	$	TOTAL PREVIOUS REQUEST: (B)	$
INSTALLATION:	$	BOOK VALUE OF TRANSFER: (C)	$
FREIGHT:	$	RELATED EXPENSES: (D)	$
DUTY:	$	(Schedule E - Part 4)	
		TOTAL RELATED EXPENSES: (E)	$ 42,285.00
TOTAL REQUEST: (A)	$ 42,285.00	(Add B. C. & D)	
AMOUNT BUDGETED:	$	TOTAL PROJECT SCOPE (A + E)	$

SECTION III - PROJECT CATEGORY: (Check Only One)

CAPACITY:		TACTICAL:		STRATEGIC:	
1. PRODUCTION (STD EQUIP)	___	4. PRODUCTIVITY: COST REDUCTION/ REPLACEMENT	___	6. NEW PRODUCT/ PRODUCT TRANSFER	___
2. OFFICE FUR & FIXTURES	___	5. REGULATION/SAFETY	___	7. NEW PLANT FIT-UP	___
3. WANG BUILT EQUIPMENT				8. TECHNOLOGY DEVELOPMENT	___
a. OFFICE AUTOMATION	___				
b. BUSINESS SYSTEMS	___				

SECTION IV - SUPPORTING SCHEDULES

- IF YOU CHECKED 1,3,4, or 6 ABOVE; WHAT IS PAYBACK:_____ NPV:_____ IRR:_____? (SCHEDULE C)
- IF YOU CHECKED 6, 7 OR 8 ATTACH SUMMARY OF STRATEGIC/COST ADVANTAGES. (SCHEDULE D)
- IF YOU CHECKED 1 OR 5 ATTACH PRODUCTION FACT SHEET. (SCHEDULE E)
- IF YOU CHECKED 4 OR 8, COMPLETE ONLY PART 4 OF SCHEDULE E.
- IS EQUIPMENT ON PLANT "STANDARDS" LIST (Y/N)? ____ IF NO, PLEASE ATTACH EQUIPMENT CHECK-OFF LIST. (SCHEDULE F)
- IF TOOLING IS PART OF REQUEST ATTACH SCHEDULE G.
- IF YOU CHECKED 3A OR 3B ATTACH INFORMATION TECHNOLOGY JUSTIFICATION ANALYSIS. (SCHEDULE H)
- IF YOU CHECKED 6 (PRODUCT TRANSFER) ATTACH EQUIPMENT TRANSFER CHECKLIST. (SCHEDULE I)

SECTION V - SIGNATURES:

REVIEW	DATE	APPROVAL	DATE
CENTRAL CAPITAL PURCHASING		DIRECTOR	
SITE ENGINEERING		FINANCE (PER AUTHORIZATION POLICY)	
MIS		AREA VP (UNDER 100K)	
SUB-COMMITTEE CHAIRPERSON		CAPITAL COMMITTEE (FINANCE VP)	
OTHERS		EXECUTIVE VP (OVER $250,000)	
NOTE: IF REVIEWER DOES NOT CONCUR WITH PROPOSAL PLEASE PUT AN ASTERISK (*) BESIDE SIGNATURE AND ATTACH SUMMARY OF CONCERNS AND RESERVATIONS. OTHERWISE, SIGNATURE REPRESENTS AGREEMENT WITH PROPOSAL.		VICE CHAIRMAN*	
		*EQUIPMENT OVER $1,000,000. ALL BUILDING IMPROVEMENTS, LAND & BUILDING OVER $ 250,000.	

Capital Appropriation Request Package
Executive Summary Sheet

Project Title: CS-386 CPU

Project Number: **Date:** 09/28/89

Department Name: New Product Introductio **Department** 007

Requestors Name: Edmond Daigneault **Telephone Ext.** 78635

Executive Summary: (The objective of the Program or Project)

The CS-386 CPU board is intended to :
1. Improve CS CPU performance by up to 300%.
2. Create CS/2200 look alike system that uses modern technology.
3. Enable the CS system to handle 16 users at the same performance level currently available to only 8.

Capital Spending Request Summary:

A.) Outside Vendor Purchases: $_____ (exc.Tooling costs)

B.) Wang Serialized Equipment: $ 14,085.00 (at WLI MFG. COST)

C.) Tooling Expenditures: $_____

D.) Other: $_____

E.) ATE: $ 28,200.00

F.) CTE: $_____

G.) Total Cash Outflow(A+B+C+D+E+F): $ 42,285.00 **Exchange Rate** _____

H.) Domestic Mfg. Transfers In: $_____

I.) International Mfg. Transfers In: $_____ **Exchange Rate** _____

J.) Total Related Previous Requests: $_____

K.) Total Project Scope: (G+H+I+J) $ 42,285.00

Finance Methods in Evaluating Capital Projects:

Capital Budget Amount $_____

NPV _____ / **IRR** _____ **PAYBACK** _____

TOTAl CASH OUTFLOW BY QUARTER: Q1 $_____ Q2 $_____ Q3 $_____ Q4 $_____

WANG

Schedule A

TECHNICAL SUMMARY/NEEDS ANALYSIS

Most of the cost in this request is for two In Circuit Test fixtures. One fixture will test the 210-9561 PCB. The other will test the 210-9562 PCB. These boards make up the 212-7129A-D assemblies. These assemblies will be the CPU board set for CS386 1MB thru 8MB systems.

These fixtures will be used to detect process related and other defects before they are passed on to the test technicians. It is anticipated that this will increase the first pass yield at Pretest by at least 25%. This will decrease the amount of technician repair time required.

Also included is the cost of remanufactured 2200 equipment to be used as test stations for board run-in. Five systems have been requested to cover CSO spares, and upgrade kits which will ship out of Pawtucket Boulevard. This amount of stations should also allow run-in of system boards if P.B. desires.

WANG

Schedule B

EXPENDITURE DETAIL LIST

(ATTACH PURCHASE, CONSIGNMENT, ATE FIXTURE, CTE, REQS. HERE)

	ITEM DESCRIPTION	PART/ MODEL #	UNIT COST	QTY	EXTENDED COST			G.L. # *
					VENDOR	CONSIGN MFG COST	OTHER WANG BUILT	
1.	In Circuit Test Fixture 210-9561	F89-057	14100	1			14100	14100
2.	~~In Circuit Test~~ Fixture 210-9562	~~F89-058~~	~~14100~~	~~1~~			14100	14100
3.	CS2 System	187-3315	962	5		4810		4810
4.	Terminal	187-3249 2536DW	597	5		2985		2985
5.	Triple Controller	212-3012	191	5		955		955
6.	Disk System	187-3505 2275-10	1019	5		5095		5095
7.	Disk Cable	220-0365	38	5		190		190
8.	Terminal Cable	220-0447	10	5		50		50
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
	TOTAL EQUIPMENT:				(VENDOR) +	14,085 (CONSIGN) +	28,200 (OTHER) =	$ 42,285

WANG

Schedule D

STRATEGIC/COST ADVANTAGE ANALYSIS

(Describe Below As Appropriate)

STRATEGIC: ***locational advantages, grants, second builder of product, closeness to markets, etc.***

COST FACTORS: ***economic/cost advantages of approach versus alternatives considered (used in place of payback when relationship to cash inflow is not direct).***

The use of the requested In Circuit test fixtures will increase the first pass yield at the Pretest station by an estimated 25%. This increase will result in lower costs. This will come from using less costly labor to detect the bulk of the defects.

Since the bulk of the defects detected will be manufacturing problems, detecting these problems early will facilitate information feedback to correct repetitive problems. This will further reduce labor costs.

The run-in stations will enable Wang to detect latent process defects that would otherwise be detected at the customers site.

Cost Analysis:

PP&M has predicted sales of 1800 CS386 cpu boards per year. This will be 1000 boards for new systems, and 800 boards for system upgrades. Since there is a minimum of 4 system types, and 4 upgrade types available, the costs were averaged.

Systems:	Average Cost	Average Sale Price
	2507.00	9250.00
GPM	73%	6743.00
Upgrade	1656.00	5375.00
GPM	69%	3719.00

Payback (Systems) = Cost of test equipment/GPM.
= 42,285/6743 = 6.27 Systems

Payback (upgrade) = Cost of test equipment/ GPM
= 42,285/3719 = 11.36 upgrades

REQUEST FOR A.T.E. FIXTURES AND PROGRAMS

FINANCIAL PROJECT # ______ ENGINEERING REQUEST # ______

****

REQUESTOR SUPPLIED INFORMATION:

BRD/ASSY PART # 210-9561 FOR SUPPORT OF: CS-386

BRD/ASSY DESCRIPTION: CS-386 CPU DATE REQ'D JUNE 89

REASON FOR REQUEST: NEW PRODUCT MPP REV. ______

VOLUME: 450 Q1 FY'90: 450 Q2 FY'90: 450 Q3 FY'90: 450 Q4 FY'90

REQUEST FOR: PROGRAM ✓ FIXTURE ✓ NEW ✓ DUPLICATE __ UPGRADE __

TYPE OF TEST: BARE BOARD __ IN-CIRCUIT ✓ LOADED BOARD __ EMULATION __

FUNCTIONAL __ OTHER ______

EQUIPMENT TYPE: FAIRCHILD STD ✓ ECL __ SMD __ ESTIMATED COST: $14,100

FIX. SIZE: S__ M ✓ L__ XL__ O__ BOARD DIMENSIONS: 11.25 x 8.5"

COMMENTS: ______

REQUESTOR: E. DAIGNEAULT EXT: 78635 M/S: 015-11B DATE: 4/12/89

****

TEST ENGINEERING SUPPLIED INFORMATION:

JUSTIFICATION OF SELECTION OR REJECTION: ______

SPECIAL PROGRAMMING CONSIDERATIONS: ______

****

RDB RECEIVING EQUIPMENT: ______

APPROVAL:

PRODUCT ENG. MGR. [signature] [signature] 4/14 __/__/__

TEST STRATEGY [signature] 5/1/89

A.T.E. OPERATION [signature] 5/1/89

SR. BUSINESS ______ __/__/__

FINANCE ______ __/__/__

DIRECTOR ______ __/__/__

****

A.T.E. SUPPLIED INFORMATION: DATE REC'D: __/__/__

S/N FIM-1606 PROJECT TRACKING NO F89-057

(REV. 2)

REQUEST FOR A.T.E. FIXTURES AND PROGRAMS

FINANCIAL PROJECT # _____ ENGINEERING REQUEST # _____

****

REQUESTOR SUPPLIED INFORMATION:

BRD/ASSY PART # 210-9562 FOR SUPPORT OF: CS-386

BRD/ASSY DESCRIPTION: CPU DAUGHTER BOARD DATE REQ'D JUNE 89

REASON FOR REQUEST: NEW PRODUCT MPP REV. _____

VOLUME: 450 Q1 FY'90 : 450 Q2 FY'90 : 450 Q3 FY'90 : 450 Q4 FY'90

REQUEST FOR: PROGRAM ✓ FIXTURE ✓ NEW ✓ DUPLICATE ___ UPGRADE ___

TYPE OF TEST: BARE BOARD ___ IN-CIRCUIT ✓ LOADED BOARD ___ EMULATION ___

FUNCTIONAL ___ OTHER _____

EQUIPMENT TYPE: FAIRCHILD STD ✓ ECL ___ SMD ___ ESTIMATED COST: $ 14,100.00

FIX. SIZE: S ✗ M ✓ L ___ XL ___ O ___ BOARD DIMENSIONS: 3.50 x 11.25

COMMENTS: _____

REQUESTOR: ED. DAIGNEAULT EXT: 78635 M/S: 015-11B DATE: 4/12/89

****

TEST ENGINEERING SUPPLIED INFORMATION:

JUSTIFICATION OF SELECTION OR REJECTION: _____

SPECIAL PROGRAMMING CONSIDERATIONS: _____

****

RDB RECEIVING EQUIPMENT: _____

APPROVAL:

PRODUCT ENG. MGR. N.D. Callon 4/14 __/__/__ TEST STRATEGY [signature] 5/1/89

A.T.E. OPERATION [signature] 5/1/89

SR. BUSINESS _____ __/__/__

FINANCE _____ __/__/__ DIRECTOR _____ __/__/__

****

A.T.E. SUPPLIED INFORMATION: DATE REC'D: __/__/__

S/N FTS-1607 PROJECT TRACKING NO F89-058

(REV. 2)

WANG

Schedule E

PRODUCTION FACT SHEET

(ATTACH SUPPORTING DOCUMENTATION HERE AS NECESSARY)

1. PRODUCTION SCHEDULE

MPP REV #: ☐

A. MPP (6 months): 400 400 400 400 400 400

B. Factory Plan: 400 400 400 400 400 400

(MPP + Assembly Allowance + C.E. + R & D − OVO − Sourcing − OEM ± Other) % passing through equipment

Explain Other: _____

C. Date Equipment Required: 07/89

2. CURRENT PLANT CAPACITY

A. # Machines: _____

B. # of Shifts: _____

C. Available Hours: _____

*(40 * # Shifts * Utilization Rate * # of Units)*

3. NEW CAPACITY

A. # Machines: _____

B. # of Shifts: _____

C. Available Hours: _____

*(40 * # Shifts * Utilization Rate * # of Units)*

4. ADDITIONAL OPERATING FACTORS

A. Additional Manpower

	BUDGETED	*NOT BUDGETED*
# DL:	_____	_____
# IL:	_____	_____

B. Training Costs (yearly): $_____

C. Operating Costs (yearly): $_____

D. Is Space Available? (Y/N): _____

E. Maintenance Costs (yearly): $_____

Describe Maintenance Plan:

_____

_____

_____

CAPITAL EQUIPMENT APPROVALS

SAFETY CHECKLIST

EQUIPMENT ATE FIXTURES MANUFACTURER WANG

VENDOR CONTACT _____ PHONE # _____

1. Any chemicals used in the machine/process? MSDS's? Any waste stream?
2. Excessive noise generated?
3. Is equipment UL-Listed / FM-Approved for the intended purpose?
4. Is electr. wiring/grounding equivalent to that req'd for UL listing?
5. Is equipment movable?
6. Does equipment plug in, or is it hard-wired?
7. Any exposed electrics / removable panels for service / self-enclosed?
8. Any safety interlocks or guards required?
9. Any pers. prot. eqt. required (i.e., safety glasses, gloves, etc.)?
10. Any hot surfaces / sharp objects/edges / pinch points?
11. Material handling involved with the process? Special eqt./concerns?
12. Is weight a concern for building structure?
13. Any special HVAC / venting concerns?
14. Is location compatible with adjoining equipment / operations? Any special clearances required?
15. Does eqt. need to be attended constantly?
16. Any special training / maint. required? Provided by vendor?
17. Any special restrictions?

NOTES:

COPY & ATTACH PACKAGE SUBMITTED DATE SIGNED _____

WANG

Schedule A

TECHNICAL SUMMARY/NEEDS ANALYSIS

Most of the cost in this request is for two In Circuit Test fixtures. One fixture will test the 210-9561 PCB. The other will test the 210-9562 PCB. These boards make up the 212-7129A-D assemblies. These assemblies will be the CPU board set for CS386 1MB thru 8MB systems.

These fixtures will be used to detect process related and other defects before they are passed on to the test technicians. It is anticipated that this will increase the first pass yield at Pretest by at least 25%. This will decrease the amount of technician repair time required.

Also included is the cost of remanufactured 2200 equipment to be used as test stations for board run-in. Five systems have been requested to cover CSO spares, and upgrade kits which will ship out of Pawtucket Boulevard. This amount of stations should also allow run-in of system boards if P.B. desires.

Capacity Analysis:

Average total 212-7129 per quarter = 464

Total run-in hours available per quarter;
13 weeks x 5 days x 24 hours = 1560 hours

Capacity of one station = Available hrs./Run-in period.
Capacity = 1560/12 = 130 boards per quarter.

Test stations needed = 464 boards/130 boards = 3.56 stations
Four (4) test stations is the minimum needed.

The fifth test station is being requested to provide a cushion to the availability vs demand problem in both the run-in and functional test area.

WANG

Schedule F

CAPITAL EQUIPMENT CHECK-OFF LIST

DESCRIPTION OF EQUIPMENT: Fairchild based In Circuit fixtures. CS systems and support hardware.

MANUFACTURER: WANG **PART NO./MODEL NO.:** See Schedule B

RESPONSIBLE ENGINEER Ed Daigneault - PSE / Steve Anthony - Site

NOTE: IT IS INTENDED THAT THE APPROPRIATE ENGINEER(S) BE CONTACTED BY THE REQUISITIONER FOR SIGN OFF OF ITEMS III, IV AND V; PROCUREMENT WILL COMPLETE ITEM VI.

DATE: _____ **SIGNATURE:** _____ **(SEC. III)**
PLANT SAFETY ENGINEER

DATE: _____ **SIGNATURE:** _____ **(SEC. IV)**
PLANT MAINTENANCE ENGINEER

DATE: _____ **SIGNATURE:** _____ **(SEC. V)**
ELECTRONIC MAINTENANCE ENGINEER

I. ACCEPTANCE OF EQUIPMENT

	YES	NO
A. Is equipment acceptance required?		
B. Is source acceptance required?		
C. Is there an acceptance specification established?		
D. Is there an "In-Plant" time trial prior to final acceptance? (If "yes", how long? _____)		
E. Are special payment plans requested to be compatible with acceptance of unit? (If "yes", explain: _____)		

II. VENDOR SERVICE OF EQUIPMENT

A. Is vendor warranty acceptable?	N/A	
If "no", does Wang have an alternative warranty that is required?		
Explain: _____		
B. Will Wang require vendor training of operators or maintenance personnel?		

VI. PROCUREMENT DEPARTMENT

	YES
A. Will terms and conditions of P.O. be accepted?	____
B. Does vendor supply other Wang facilities?	____
C. Is vendor planning or in process of revising current model?	____
D. Are quotes on file for this equipment?	____
E. Has a D & B report been done?	____
F. Is vendor survey required?	____
G. Does requisitioner request special shipment of materials?	____
H. Are special shipping instructions required from Traffic Department?	____

If "yes", explain: _____

_____

_____

	YES	NO
C. Will vendor supply all manuals required, including spare parts list? (How many copies? _____)	N/A	

III. PLANT SAFETY ENGINEERING

A. Will this equipment be guaranteed to meet applicable OSHA standards?		
B. Are either UL or FM approvals required?		
C. Would use, or installation, of this equipment conflict with safety or health practices established for Local Area Operations?		

IV. PLANT MAINTENANCE ENGINEERING

A. Will vendor install equipment?		
B. Will equipment require plumbing, wiring, air system, etc.?		
If "yes", are these "expense type" items on order?		
C. Are all specifications for installation available?		
D. Will equipment require riggers?		
E. Electrical specifications of equipment. Voltage _____ CY _____ PH _____		

V. ELECTRONIC MAINTENANCE AND CALIBRATION

A. Does equipment cost exceed $10,000 <u>and</u> does this equipment contain electronics? (If "yes", continue...)	✓	
1. Will equipment require scheduled calibration?		✓
2. Has cost of electronic spare parts been budgeted? (If "yes", how much? $_____)		✓
3. How long is this equipment under warranty?		
4. Will equipment require a maintenance agreement after warranty?		✓
(If "yes", has the requirement been budgeted?)		

WANG

NOTIFICATION OF TRANSFER

TO: DISTRIBUTION

FROM: JOHN R. LYNCH - NEW PROD ENG. MGR. - M/S 015-11B - (508) 967-8160

RE: NEW PRODUCT TRANSFER

DATE: OCTOBER 3, 1989

****

ATTACHED IS A COPY OF THE MANUFACTURING ENGINEERING TRANSFER PACKAGE FOR THE CS-386 COMPUTER SYSTEM (210-9561/9562), WHICH HAS COMPLETED THE PILOT PHASE AND IS TRANSFERRING TO MAINSTREAM MANUFACTURING. PLEASE HAVE THE RESPONSIBLE ENGINEERS WITHIN YOUR GROUP REVIEW THE CONTENTS, SIGN THEIR APPROVAL, AND RETURN A COPY OF SIGNED COVER SHEET TO ME WITHIN 30 DAYS FROM RECEIPT. CALL ME OR SEND WANG OFFICE TO ADD ADDITIONAL OUTSTANDING ISSUES IF NECESSARY. ANY OUTSTANDING ISSUES WILL BE MONITORED AND DATED WHEN COMPLETE.

THE NEW PRODUCT ENGINEER FROM PARKWOOD WILL PROVIDE IMMEDIATE SUPPORT FOR THIS PRODUCT IF REQUIRED FOR THE NEXT 30 DAYS. BEYOND THAT POINT, THE PRODUCTION SUPPORT ENGINEER WILL PROVIDE SUPPORT WHEN REQUIRED.

DISTRIBUTION:

BILL QUIGLEY - PB FA&T ENG SR.MGR
CLAUDE PIOTTE - PB PCB ASSEMBLY & TEST REP
PHIL DORIS - PRODUCTION SUPPORT ENG. MGR.

CC: (COVER MEMO AND CONTENTS LIST ONLY)

RICHARD DOWNING
SCOTT STEVENSON
SIGNATORIES

WANG

MANUFACTURING ENGINEERING TRANSFER PACKAGE

PRODUCT: CS 386 TRANSFERRING TO: P.B. 10/3/89

I HEREBY CONFIRM THAT MY AREA OF RESPONSIBILITY IS COMPLETE AND ACCURATE. ANY EXCEPTIONS ARE NOTED ON ATTACHED OUTSTANDING ISSUES LIST:

SENDING SITE FUNCTION	NAME/PRINT	SIGNATURE	DATE
MFG. PROGRAM MANAGER:	MANNY NEGRON	Manuel Negrón	9/13/89
TEST MFG. ENGINEER:	ED DANIEAULT	Ed Daigneault	9/25/89
MECH/ASS'Y MFG. ENGINEER:	Tom MAHONEY	Tom Mahoney	9/25/89
PCB PROCESS ENGINEER:	"	"	
QUALITY CONTROL ENGINEER:			
PCB DOC. COORDINATOR:	JOYCE LANGAN	Joyce Langan	9/25/89
ASS'Y/TEST DOC. COORDINATOR:	SUE CLARK	Sue Clark	9-14-89
ATE/CTE COORDINATOR:	MARIA DERY	Maria Dery	9/13/89
WANG/VENDOR EQUIPMENT COORD.:	DORI ALBAN PROPOULAS		

I HAVE REVIEWED THE TRANSFER PACKAGE AND HEREBY ACCEPT ITS CONTENTS WITH EXCEPTIONS NOTED ON ATTACHED OUTSTANDING ISSUES LIST:

RECEIVING SITE FUNCTION	NAME/PRINT	SIGNATURE	DATE
PRODUCTION SUPPORT ENG.			
ASSEMBLY TEST ENGINEER:			
ASSEMBLY MFG ENGINEER:			
PCB PROCESS ENGINEER:			
PCB TEST ENGINEER:			
PCB QUALITY ENGINEER:			
FINAL QUALITY ENGINEER:			
PCB DOC. COORDINATOR:			

WANG

TRANSFER PACKAGE CONTENTS

I.

ASSEMBLY WLNO'S	PROCESS SHEETS/ ASS'Y DOC.	TEST PROCEDURES	RUN-IN TIME
210-9561	CAM DATA	PRE-TEST/ALIGNMENT	
210-9562	SENT 9/15/89	RUN-IN	
212-7129-A,B,C,D	YES		
167/187-3543-3546	YES	FINAL ALIGNMENT	
167/187-3539-3542	YES	RUN-IN/FINAL	6 HRS

WANG

TRANSFER PACKAGE CONTENTS

II.	TRANSFER FILE	YES	NO	COMMENTS
1)	UL APPROVAL MEMO:		✓	N/A
2)	CSA APPROVAL MEMO:		✓	N/A
3)	IEC APPROVAL MEMO:		✓	N/A
4)	FCC PT. 15 (A OR B) APPROVAL MEMO:	✓		CLASS 'A' 8/24/89 (WHITEDOWN)
5)	FCC PT. 68 APPROVAL MEMO:		✓	N/A
6)	VDE APPROVAL MEMO:		✓	N/A
7)	ESD TEST RESULTS:		✓	SEE ISSUES LIST
8)	CS-03 APPROVAL MEMO:		✓	N/A
9)	ENVIRONMEMTAL TEST RESULTS:		✓	SEE ISSUES LIST
10)	ACCOUSTICAL TEST RESULTS:		✓	N/A
11)	PACKAGING DATA ANNOUNCEMENT:	✓		9/5/89 (WINSTON)
12)	THEORY OF OPERATION:		✓	
13)	TEST STRATEGY:	✓		4/11/89 (DAIGNAULT) REVISED 9/27/89
14)	ENG. REVIEW BULLETIN REV 2:		✓	
15)	P.R.S. REPORTS:		✓	
16)	PCB MANUFACTURABILITY REVIEW:	✓		5/2/89 (T. MATHENY)
17)	ITEM STATUS ECO:	✓		9/11/89 (T. MATHENY)
18)	QUALITY AUDIT REPORT:			
19)	YIELD REPORTS:	✓		
20)	QVL REPORT:			
21)	100% 1st PIECE INSP. REPORT:		✓	N/A
22)	UNIQUE PARTS REVIEW LIST:		✓	N/A
23)	DEVIATION NOTICES:		✓	N/A
24)	DIAGNOSTIC SOFTWARE:	✓		
25)	OPER SYS SOFTWARE:	✓		RELEASED

WANG

TRANSFER PACKAGE CONTENTS

III. ATE STATUS:

PCB #	SYSTEM COVERAGE	BMK YIELDS	RELEASE DATE TO MFG. SITE	COMMENTS
9561 R1	Fairchild		9/15/89	Waiting for tech results
9562 R0	Fairchild	85%	8/24/89	

IV. CTE STATUS:

PROJECT #	DESCRIPTION	RELEASE DATE TO MFG. SITE	COMMENTS
	N/A		

V. WANG/VENDOR EQUIPMENT STATUS:

DESCRIPTION	QUANTITY	RELEASE DATE TO MFG. SITE	COMMENTS
VS W/S	2	9/18/89	
CS CAB	1	9/18/89	
DEBUG CAB	1	9/18/89	

VI. WAVE SOLDER FIXTURES/SMT STENCILS STATUS:

PCB#	FIXTURE NO.	QUANTITY	RELEASE DATE TO MFG. SITE	COMMENTS

WANG

TRANSFER PACKAGE CONTENTS

VII. OUTSTANDING ISSUES LIST:

1.) P.B. FA&T WILL USE 21 CS-N SYSTEMS TO DO RUN-IN OF BOARDS SHIPPED AS UPGRADES - UNTIL P.R. COMES BACK ON LINE. - ED DAIGNAULT

2.) CS-386 HAS NOT COMPLETED ESD AND ENVIRONMENTAL TESTING AS OF 10/3/89.

3.) 2 PARTS NOT ON QVL - JOHN TIGHE

trans
rev 5

WANG

MANUFACTURING TEST PROCEDURE

0657S

PART NO.	212-7129A-D
SHEET	1 OF 14
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386	210-9561A-D 210-9562 212-7129A-D	PRETEST/ACCEPTANCE TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT. ENGR. E. Dargeaults 9/12/89	
Q.C. REVIEW 9/14/89 Bob Douglas	PILOT ENGR. Tom Mahoney 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S. CLARK
C	SMALL CHANGE	n/a	n/a	09/12/89	S. CLARK

Distr. VS Board Area

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

1. PURPOSE

1.1 To detail the steps necessary when performing a PRETEST/ACCEPTANCE test on the CS386 (212-7129A-D)

1.2 This procedure can be used for testing either the 210-9561A-D, or the 210-9562. When testing a 9561 board, a known good 9562 must be used. When testing a 9562 board, a known good 9561 must be used. When assembled, these boards make up the 212-7129A-D assembly.

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a detailed listing of responsibilities.

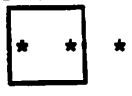
4. EQUIPMENT REQUIREMENTS

DESCRIPTION	PART NUMBER	QTY.
2436 Workstation	187-3249 or equiv	1
Known good 9562 or 9561 board (depending on board under test)		1
Test fixture which includes:		
- 360K Floppy	289-0846	1
- 20MB Winchester	289-0849	1
- DPU PCB	212-7113	1
- MXE Controller	212-3032	1

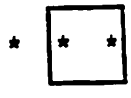
5. SETUP PROCEDURE

5.1 Connect a known good board (210-9562 or 9561) to the board under test (we are now testing a 212-7129A-D).

5.2 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:



9561A
9561B



9561C
9561D

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

5. SETUP PROCEDURE (cont'd)

5.3 Connect the battery (from test fixture) to location J2 of the 210-9562 board.

5.4 Insert the assembly under test (212-7129A-D) into the CPU position of the test bed motherboard.

6. ACTUAL TEST

6.1 Power UP the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

6.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

6.3 The following message will appear:

Mount system platter
Press Reset

6.4 After the LED on the floppy drive has extinguished, press the SHIFT and RESET keys simultaneously (SHIFT/RESET).

6.5 The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.6 Press the SF0 key. The following screen will appear:

***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE. MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen TERMINAL 1

Multiuser BASIC-2

. Diagnostics

6.7 Select "DIAGNOSTICS". Press the RUN key. The "Customer Diagnostic" screen will appear:

6.8 Complete five (5) passes of the test program. When complete, press the SHIFT/RESET keys.

6.9 The following message will appear:

Mount system platter
Press Reset

6.10 Press the RESET key. The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.11 Press the SFO key. The following screen will appear:

***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE. MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen TERMINAL 1

Multiuser BASIC-2

. Diagnostics

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.12 Select "MULTIUSER BASIC 2". Press the RUN key. The following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
(c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

                                                    List of options:
O.K.  Configuration  (#Partitions)  (CPU number)    '00 - clear partitions
 y       current          ( 4)          (01)       '01 - clear device table

                                                    '02 - divide memory evenly
                                                    '04 - edit partitions
                                                    '05 - edit device table
                                                    '06 - edit $MSG
                                                    '07 - select printer driver

                                                    '08 - load configuration
                                                    '09 - save configuration
                                                    '10 - delete configuration

                                                    '11 - edit CPU number


                                                    Press FN/TAB to exit        -_

Configuration 'current' loaded.  Name of configuration to load?
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.13 Press the SF15 key. The following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
(c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

Available memory: 1,024 K                          List of options:
No. of terminals  16       CPU number  1           '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM    '01 - clear device table
    1     150.00      1        Y
    2     150.00      2        Y                   '02 - divide memory evenly
    3     150.00      3        Y                   '04 - edit partitions
    4     150.00      0        Y                   '05 - edit device table
                                                   '06 - edit $MSG
                                                   '07 - select printer driver

                                                   '08 - load configuration
                                                   '09 - save configuration
                                                   '10 - delete configuration

                                                   '11 - edit CPU number

                                                   '15 - execute
                                                   Press FN/TAB to exit

Check configuration.  OK to execute (Y or N)?
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.14 Press the "Y" key. Press the RETURN key and the following screen will appear:

```
***** Multiuser BASIC-2 Partition Generation Program *****
    (c) Copr. Wang Laboratories, Inc. 1986, 1987, 1989

Available memory: 1,024 K                          List of options:
No. of terminals  16      CPU number  1          '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM  '01 - clear device table
    1     150.00     1        Y
    2     150.00     2        Y                 '02 - divide memory evenly
    3     150.00     3        Y                 '04 - edit partitions
    4     150.00     0        Y                 '05 - edit device table
                                                 '06 - edit $MSG
                                                 '07 - select printer driver

                                                 '08 - load configuration
                                                 '09 - save configuration
                                                 '10 - delete configuration

                                                 '11 - edit CPU number

                                                 '15 - execute
                                                 Press FN/TAB to exit

RECONFIGURATION PASSWORD ? SYSTEM
```

6.15 Press the RETURN key again. The following message will appear:

Ready (Basic 2) Partition 01

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.16 Press the LOAD, RUN, and RETURN keys. The following screen will appear:

```
System Utilities - (c) Copr. Wang Laboratories, Inc. 1989

                                                    Partition 1, 150 K
Select an item and press RUN/EXEC:                        Terminal 1


                    # Partition Generator
                    # Partition Status
                    # Format Disk Platter
                    # Move File
                    # Backup Platter
                    # Recover from Backup
                    # System Install
                    # Make a Reference List of File Names
                    # Initialize Date & Time
                    # Vertical Format Control
                    # DS Utilities
                    # Game
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.17 Select "DS UTILITIES". Press the RUN key and the following screen will appear:

```
DS Data Storage Cabinet Utilities  (Release 2.0)

Select an item and press RUN/EXEC                    Partition 1, 150 K
or press CANCEL/EDIT for previous menu:                    Terminal 1


                    # DS Configuration
                    # Protect/Unprotect DS Surfaces
                    # RAM Disk Allocation
                    # Cache Usage
                    # Backup Disk Platters to Tape Cassette
                    # Restore Disk Platters from Tape Cassette
                    # Field Test Unit
                    # File Repair
                    # Multi-Disk Utility
                    # Printer Test
```

6.18 Select "FIELD TEST UNIT". Press the RUN key. The following message will appear on the monitor screen:

Load all devices to be tested

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.19 Press the RETURN key. The following screen will appear:

```
                    2200 FTU (Field Test Unit)  Rev. 873E*
         Available Addresses            Disk Model             Ending Sector
>-           340            -< >-   2270a            -< >-       1231        -<
>-           D10            -< >-   2200DS  FLPa     -< >-       4159        -<
>-           D11            -< >-   2200DS WIN       -< >-       38911       -<
>-           D12            -< >-   2200DS WIN       -< >-       38911       -<




              Select the address of the device to be tested.

Press: ANY KEY to input parameters                      SF'0 define err
       CLEAR/PREV SCRN - to exit                        RETURN/RUN to cont.
```

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.20 Enter "340" as the address. Press the RETURN key and the following screen will appear:

```
                    TEST SELECTION MENU  Rev. 873E*

SF 01 - Compare Sector(s)                      SF 08 - Write Enable
SF 02 - Compare File                           SF 09 - Write Lock
SF 03 - Display a Sector                       SF 10 - Scratch Disk
SF 04 - Verify              WRITE LOCKED       SF 11 - Format Disk
SF 05 - Read                                   SF 12 - Write
SF 06 - Position Head(s)                       SF 13 - Read After Write
SF 07 - DPU Prom Rev.                          SF 14 - Instruction Test


                Device  340
           Start Sector  0       Track  0
             End Sector  1231    Track  76     Maximum =  1231
        Hex data pattern  BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
                Printer  OFF (204, 215, OFF)
                   Loop  N (N=No, T=on Test, E=on Error or test)
                   Mode  I (I = sequential step In,  A = Alternate step)
                           (O = sequential step Out, R = Random step)


Press: ANY KEY to input parameters SF' key listed above  SF'0 define err
       CLEAR/PREV SCRN - to exit
```

6.21 Press the SF8 key to "release" WRITE LOCK (WRITE ENABLE). Press the RETURN key.

6.22 Using the RETURN key, tab over to "LOOP" and change to "T". Press the RETURN key.

6.23 Using the RETURN key, tab over to "MODE" and set to "RANDOM". Press the RETURN key.

6.24 Set "RANDOM OPERATIONS" to "1000". Press the RETURN key.

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.25 Press the SF13 key. Press the RETURN key.

6.26 The RANDOM READ AFTER WRITE TESTS will now run. Allow the test to complete one (1) pass. When complete, press the SHIFT/RESET keys and the following message will appear:

Ready (Basic 2) Partition 01"

6.27 Press the LOAD, RUN, and RETURN keys. The following screen will appear:

System Utilities - (c) Copr. Wang Laboratories, Inc. 1989

Partition 1, 150 K
Terminal 1

Select an item and press RUN/EXEC:

Partition Generator
Partition Status
Format Disk Platter
Move File
Backup Platter
Recover from Backup
System Install
Make a Reference List of File Names
Initialize Date & Time
Vertical Format Control
DS Utilities
Game

6.28 Select "INITIALIZE DATE AND TIME". Press the RUN key.

6.29 A clock will appear. Enter the correct DATE and press the RETURN key. Enter the correct TIME and press the RETURN key.

6.30 Verify that the clock is running.

TITLE

CS386 (212-7129A-D)
PRETEST/ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.31 Press the SHIFT/RESET keys and power down the test bed.

6.32 Remove the 212-7129A-D assembly. If the board/assembly has passed PRETEST, fill out the appropriate paperwork and send the assembly to the RUN-IN AREA. If the board/assembly has just passed FINAL ACCEPTANCE, send the assembly to STOCK.

6.33 If the board/assembly did not pass, fill out the appropriate paperwork, noting the discrepancy, and send the board/assembly to the REPAIR AREA.

PUERTO RICO PRODUCTION TRANSFER

SCHEDULE FOR IN-SYSTEMS TEST / RUN-IN / REPAIR EQUIPMENT - WILFAB SET-UP

SCHEDULE FOR RUN-IN / TEST / REPAIR STATIONS RECEIVED TO DATE IN PB

DATE: 9/7/89

ACTION	9/4 M.T.W.T.F.S.S	9/11 M.T.W.T.F.S.S	9/18 M.T.W.T.F.S.S	9/25 M.T.W.T.F.S.S	10/2 M.T.W.T.F.S.S	10/9 M.T.W.T.F.S.S	10/16 M.T.W.T.F.S.S
COMPLETE WILFAB BUILD	:XXXXXXXX========						
SET UP 2200 386 TEST/REP STA.	:	=.....======					
LVS: STA. 12; TEST/ REP. (9094)	:	=.....======					
LVS: STA. 13; TEST/ REP. (9416)	:	=.....======					
WKSTA.: RUN-IN TRAYS; (8577)	:	====					
WKSTA.: RUN-IN TRAYS; (8167)	:	====					

NOTE: BUILD PLAN RESPONSIBILITY:

PRODUCTION: SET-UP WILFAB AND EQUIPMENT

ENGINEERING: PERFORM STATION OPERATIONAL TESTS

WANG

ASSEMBLY PROCEDURE

PART NO. 212-7129-A,-B,-C,-D	DESCRIPTION CS 386 CPU BOARD ASSY (1MB, 2MB, 4MB, 8MB)	MODEL	TYPE

PREP. BY Bob Graves	MFG. ENG. APPROVAL Tom Mahoney 9/11/89	Q. C. ENG. REVIEW Bob Douglas 9/11/89

ISSUE DATE	ISSUE	BOM REV.	OPER. NO.	SHT. NO.	ECO/MPC NO.	DESCRIPTION	WRITER
9/12/89	A	AC	ALL	ALL		RELEASE TO MANUFACTURING	

DISTRIBUTION:

WANG LABORATORIES INC. OPERATION SHEET

PART NO.	DESCRIPTION	TYPE	ISS.	REV.	SHT.
212-7129-A,-B,-C,-D	CS 386 CPU BOARD ASSY				1 OF 1

OPER. NO.	OPERATION	WORK CTR.	STD.	SPECIAL TOOLS/FIXTURES
1.0	ASSEMBLE BOARDS TOGETHER			
1.5	QC INSPECTION			
2.0	TEST			

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	212-7129-A,-B,-C,-D	DESCRIPTION	CS 386 CPU BOARD ASSY (1MB, 2MB, 4MB, 8 MB)	SHT. 1 OF 1
OPER. NO.	1.0	OPERATION	ASSEMBLE BOARDS TOGETHER	ISSUE / REV. / TYPE

NOTE: BEFORE ASSEMBLING ANY PARTS, MAKE SURE THERE IS NO OBVIOUS DAMAGE OR CORROSION TO PARTS. VERIFY THE BOARD E REV. ON THE BOARDS PER THE E REV. CHART.

REFER TO THE CHART BELOW TO DETERMINE WHICH CPU BOARD TO USE.

CPU BOARD CHART

PART NUMBER	DESCRIPTION	CPU BOARD
212-7129-A	CS/386-1MB	210-9561-A
212-7129-B	CS/386-2MB	210-9561-B
212-7129-C	CS/386-4MB	210-9561-C
212-7129-D	CS/386-8MB	210-9561-D

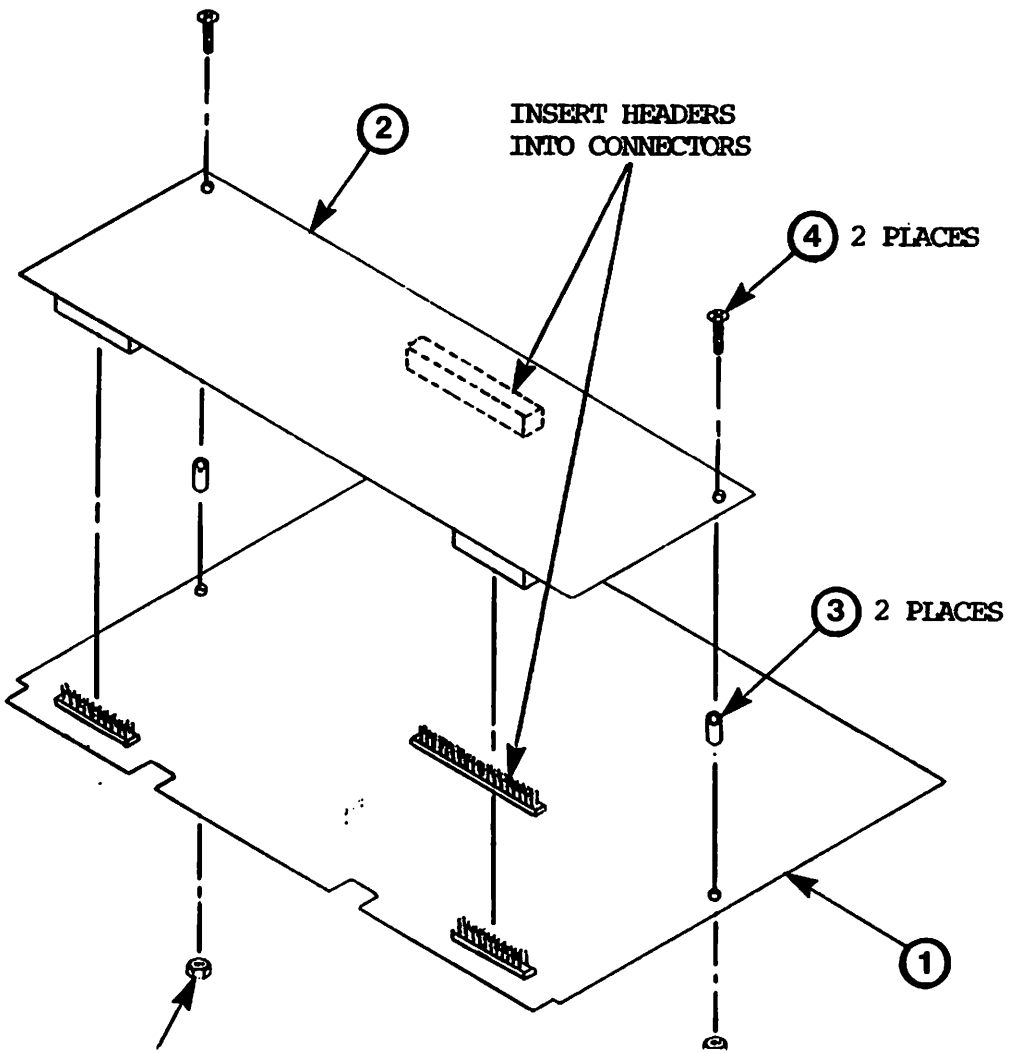
A.

1. 210-9561-X CPU BOARD (SEE CHART)
2. 210-9562-A CPU DAUGHTER BOARD
3. 462-0410 (2) SPACER, NYLON, .437" LONG
4. 650-2202 (2) SCREW, NYLON, #4-40 X 5/8"
5. 652-2001 (2) HEX NUT, NYLON, #4-40

POSITION THE APPROPRIATE CPU BOARD (SEE CHART) AND THE CPU DAUGHTER BOARD WITH THE CIRCUIT SIDES FACING UP AND INSERT THE HEADERS ON THE CPU BOARD INTO THE CONNECTORS ON THE DAUGHTER BOARD. POSITION THE SPACERS (2) BETWEEN THE BOARDS AS SHOWN, INSERT THE SCREWS DOWN THROUGH THE BOARDS AND THE SPACERS AND SECURE THEM WITH THE HEX NUTS (2).

B.

CHECK TO MAKE SURE THAT THE HARDWARE IS TIGHT.



WANG

MANUFACTURING TEST PROCEDURE

0665S

PART NO.	167/187-3543-3546
SHEET	1 OF 8
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386-D	167/187-3543-3546	FINAL ACCEPTANCE TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT./ENGR. E. Dargeaults 9/12/89	PRODUCT TEST ENGR. N/A
Q.C. REVIEW Bob Donahue 9/14/89	PILOT ENGR. Tom Mahoney 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	SMALL CHANGES	n/a	n/a	09/12/89	S. CLARK

Distr. VS

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

1. PURPOSE

1.1 To allow an operator to thoroughly perform a FINAL ACCEPTANCE test on the CS386D (167/187-3543-3546).

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a complete listing of responsibilities.

4. EQUIPMENT REQUIREMENTS

DESCRIPTION	PART NUMBER	QTY.
CS386D System to be tested	167/187-3543-3546	1
System Configuration:		
Triple Controller	212-3012	1
Workstation w/cabling	187-3249 or equiv	1
320 Floppy	289-0846	1
Tape Streamer	289-0905	1
20 Meg Wini	289-0849 or equiv	1
Printer PM018	157-3520 or equiv	1
CS386 BASIC-2 O.S. Software	(rev. 1.0 or greater)	1
CS386 Customer Diagnostic	(rev. 1960 or greater)	1

NOTE: SOFTWARE 732-0049B IS PART OF THE 2200 DIAGNOSTIC PACKAGE.

NOTE: DRIVES MUST BE INITIALIZED.

5. SETUP PROCEDURE

5.1 Connect the 220-0447 cable, leading from the back of the workstation, to the TERMINAL PORT of the Triple Controller located in the CS386-D System.

5.2 Set switches, located on the 212-7113 assembly, as shown in APPENDIX 9.1.

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

5. SETUP PROCEDURE (cont'd)

5.3 Verify that the workstation and CS-D system are plugged into an appropriate 115V power source.

5.4 Load the 212-7113 assembly into the CS-D system.

5.5 Connect the printer to the printer port located on the 212-7113 assembly.

6. ACTUAL TEST

6.1 Turn the workstation ON. Power UP the CS-D system. Power UP the printer.

6.2 The following message will appear on the workstation screen:

MOUNT SYSTEM PLATTER
PRESS RESET

6.3 Observe the floppy LED.

6.3.1 If the LED is OFF, the BIT (built in test) is complete.

6.3.2 If the LED is flashing, the BIT has failed. Proceed to section 8 (POWER DOWN).

6.4 Press the RESET key.

6.5 The following message will appear on the workstation screen:

SF?

6.6 Press the SF0 key. The following menu will appear:

__ MULTIUSER BASIC -2
__ DIAGNOSTICS

6.7 DIAGNOSTICS:

6.7.1 Select DIAGNOSTICS. The "Customer Diagnostics" menu will appear.

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.7 DIAGNOSTICS: (cont'd)

6.7.2 Run this series of tests for three (3) passes.

6.7.3 Press the RESET button.

6.7.4 Press the "SF0" key.

6.8 Select Multiuser Basic-2. Press the RUN key.

6.9 Press the SF15 key.

6.10 The "Check Configuration" screen will appear. Press the "Y" key. Press the RETURN key.

6.11 The following message will appear:

RECONFIGURE PASSWORD? SYSTEM

6.12 Press the RETURN key. The following message will appear on the workstation screen:

READY (BASIC2) PARTITION 01
PRESS LOAD, RUN, RETURN

6.13 Press the LOAD, RUN, and RETURN keys. The "System Utilities" screen will appear. Select "DS UTILITIES". Press the RUN key. The "DS" Utilities" screen will appear.

6.14 Using the keyboard SPACEBAR, select the PRINTER TEST selection. Press the RUN key.

6.15 The following information will be printed:

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789
END OF THE TEST

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

6. ACTUAL TEST (cont'd)

6.16 On the "DS Data Storage Cabinet Utilities" screen, select the BACKUP DISK PLATTERS TO TAPE CASSETTE selection. Press the RUN key.

6.17 To run a backup test, perform the following:

6.17.1 Enter "D5F" for address of tape cassette. Press the RETURN key.

6.17.2 Enter "E" to erase tape. Press the RETURN key.

6.17.3 Enter "D10" for address of disk platter (blank if no more). Press the RETURN key.

6.17.4 Enter "01/01/00" for platter name. Press the RETURN key.

6.17.5 Enter "00000" for starting sector (defaults = beginning of platter). Press the RETURN key.

6.17.6 Enter "1200" for ending sector (default = current end of cataloged data). Press the RETURN key.

6.17.7 Enter "Y" to accept this entry. Press the RETURN key.

6.17.8 Press the RETURN key (address of this platter to backup (blank if last).

6.18 Backup should now be running. At the completion of the test, press the "FN" key.

6.19 To return to the "System Utilities" menu, press the RESET, LOAD, RUN, and RETURN keys.

7. DISK TESTS

7.1 From the "System Utilities" menu, select DISK UTILITIES. Press the RUN key.

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

7. DISK TESTS (cont'd)

7.2 From the "Disk Utilities" menu, select MULTIDISK TEST. Press the RUN key.

7.3 The following message will appear on the workstation screen:

* MULTI-DISK EXERCISER REV XXXX *
MOUNT ALL DEVICES TO BE TESTED

7.4 Press the RETURN key. The following DISK PARAMETER CHART will appear:

TEST	FRMT	INIT	VER	ADDRESS	MODEL	SECTOR RANGE	ACCESS
NO	NO	NO	NO				INFINITE
YES	NO	NO	NO	D10	2200 DS FLPY	1200/1279	INFINITE
NO	NO	NO	NO	D11	2200 DS WIN	0/38911	INFINITE
YES	NO	NO	NO	D12	2200 DS WIN	20000/38911	INFINITE

7.5 Using the cursor keys to select test parameters, fill out the chart as shown above. Press "N" for "NO" and "Y" for "YES".

****
CAUTION!!! DO NOT TEST D11. TEST PROGRAMS WILL BE DESTROYED!!!
****

7.6 Press the CONTINUE key. Press the RETURN key. The following message will appear:

TO PROCEED, TYPE 'ENABLE WRITING'

7.7 Type 'ENABLE WRITING'. The following warning message will appear:

Warning: All resident data will be destroyed by this exercise

7.8 Press the CONTINUE key.

7.9 The test will now run. Allow the test to run for 200 accesses on each drive and then press the HALT key to stop the test. If there are "0" errors on each drive, the unit has passed. If there are errors, the unit has failed. PROCEED TO SECTION 8 (POWER DOWN).

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

8. POWER DOWN

8.1 Power OFF the CS-D System.

8.2 If an error was detected, fill out the appropriate paperwork, noting the discrepancy, and send the unit to the REPAIR AREA.

8.3 If no errors were detected, fill out the appropriate paperwork, and send the unit to the FINAL ASSEMBLY AREA.

TITLE

CS386-D (167/187-3543-3546)
FINAL ACCEPTANCE TEST

9. SWITCH SETTINGS:

9.1 SWITCH SETTING FOR THE 210-9558 BOARD:

SW1 - 5 ON, ALL OTHERS OFF

SW2 - 1, 3, 5 ON, ALL OTHERS OFF

SW3 - 5, 6 ON, ALL OTHERS OFF

J2 SHUNT

MUX BUS

9.2 SWITCH SETTING FOR THE 210-9559 BOARD:

SW4 - ALL OFF

SW5 - 1, 3, 4 OFF
2 ON

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 172108

WANG

MEMORANDUM

TO: Michael Britko

FROM: Arthur Whelden

SUBJECT: FCC Electromagnetic Emission Testing of a CPU Printed Circuit Board Set (210-9561 & 210-9562) in a Micro VP Computer Cabinet (PEP H0213C)

DATE: September 14,1989

A CPU printed circuit board set (210-9561 & 210-9562) was installed within a Wang 2200 Micro VP Cabinet. With this change the computer model no. changes to Micro VP/386. Testing was then performed in accordance with the FCC Rules and Regulations for the measurement of electromagnetic emissions from digital devices. The measured values, obtained during testing, showed the system to be in compliance with the FCC Class "A" requirements.

During testing, the computer was running a CS O/S Basic-2/386 Software Program which provided a full screen of continuously repeating H's. Alternately, this pattern was sent to the printer.

The system under test consisted of the following devices:

1)	Wang Computer	M/N Micro VP/386 S/N PR1594
2)	Workstation	M/N 2536DW S/N 41002W
3)	25' Shielded Monitor Cable	WPN 220-0447
4)	Keyboard	M/N 720
5)	Keyboard Cable Coiled to 3'	Not Identified

6)	Disk Drive	M/N 2275-10 S/N VL4608
7)	8' Shielded Disk Drive Cable	WPN 220-0365
8)	Printer	M/N PM060 S/N 13627E
9)	12' Shielded Printer Cable	WPN 220-0364

The following printed circuit boards were installed within the computer during testing:

1)	CPU Board Set	210-9561 & 210-9562
2)	MXE Two (2) Board Set (210-7973 & 210-7874)	212-3032
3)	MUX Master	210-8824

Arthur Whelden

Arthur Whelden
FCC/VDE Eng.

anw316

WANG LABORATORIES, INC.
ONE INDUSTRIAL AVENUE, LOWELL, MA 01851 • TEL: 617/459-5000, TWX 710-343-6769, TELEX 172108

WANG

MEMORANDUM

TO: Michael Britko

FROM: Arthur Whelden

SUBJECT: FCC Electromagnetic Emission Testing of a CPU Printed Circuit Board Set (210-9561 & 210-9562) in a CS Cabinet (PEP H0213C)

DATE: September 14,1989

A CPU printed circuit board set (210-9561 & 210-9562) was installed within a Wang Computer Cabinet M/N CS20. With this change the computer model no. changes to CS/386. Testing was then performed in accordance with the FCC Rules and Regulations for the measurement of electromagnetic emissions from digital devices. The measured values, obtained during testing, showed the system to be NONCOMPLIANT.

To bring the system into FCC Class "A" compliance a Ferrite Sleeve (WPN 410-1037) had to be installed on each end of the disk drive cable (WPN 220-0365). Therefore, when ever the two (2) board CPU set (210-9561 & 210-9562) is installed within the above cabinet the disk drive cable must be modified as above.

During testing, the computer was running a CS O/S Basic-2/386 Software Program which provided a full screen of continuously repeating H's. Alternately, this pattern was sent to the printer.

The system under test consisted of the following devices:

1)	Wang Computer	M/N CS/386 S/N 52740R
2)	Workstation	M/N 2536DW S/N 41002W
3)	25' Shielded Monitor Cable	WPN 220-0447
4)	Keyboard	M/N 720
5)	Keyboard Cable Coiled to 3'	Not Identified

6)	Disk Drive	M/N 2275-10 S/N VL4608
7)	8' Shielded Disk Drive Cable with a ferrite sleeve added to each end	WPN 220-0365
8)	Printer	M/N PM060 S/N 13627E
9)	12' Shielded Printer Cable	WPN 220-0364

The following printed circuit boards were installed within the computer during testing:

1)	CPU Board Set	210-9561 & 210-9562
2)	MXE Two (2) Board Set (210-7973 & 210-7874)	212-3032
3)	MUX Master	210-8824

Arthur Whelden

Arthur Whelden
FCC/VDE Eng.

anw315

ITEM SUBJECT: COMPUTER CS-386 PILOT

MEMORANDUM

TO: MICHAEL BRITKO

FROM: ARTHUR WHELDEN

SUBJECT: FCC/VDE CLASS "A" EVALUATION TESTING OF A COMPUTER M/N CS-386 FROM A PILOT RUN (PEP H0213C)

DATE: AUGUST 24,1989

A WANG COMPUTER MODEL NO. CS-386 FROM A PILOT RUN WAS TESTED IN ACCORDANCE WITH THE FCC/VDE RULES AND REGULATIONS FOR ELECTROMAGNETIC EMISSIONS. THE MEASURED VALUES OBTAINED DURING TESTING SHOWED THAT THE SYSTEM WAS IN COMPLIANCE WITH THE REGULATIONS FOR A CLASS "A" COMPUTING DEVICE.

DURING TESTING, THE COMPUTER WAS RUNNING A CS O/S BASIC SOFTWARE PROGRAM WHICH PROVIDED A FULL SCREEN OF CONTINUOUSLY REPEATING H'S. ALTERNATELY, THIS PATTERN WAS SENT TO THE PRINTER.

THE SYSTEM UNDER TEST CONSISTED OF THE FOLLOWING DEVICES:

1)	COMPUTER S/N 15798W	M/N CS-386
2)	WORKSTATION S/N 41002W	M/N 2536DW
3)	25' SHIELDED WORKSTATION CABLE	WPN 220-0447
4)	KEYBOARD	WPN 725-3155-US
5)	PRINTER S/N 14062E	M/N PM060
6)	12' SHIELDED PRINTER CABLE	WPN 220-0364
7)	1' SHIELDED CABLE	WPN 220-0257
8)	12" SHIELDED CABLE WITH FERRITE BEADS	WPN 220-0359

THE COMPUTER CONSISTED OF THE FOLLOWING DEVICES:

1)	MOTHER BOARD	WPN 210-9560
2)	CPU BOARD	WPN 210-9561-1-B
3)	CPU DAUGHTER BOARD	WPN 210-9562-0
4)	PCA 2280 DISK CONTROLLER	WPN 210-7715
5)	PCA DSPC MB CSD	WPN 210-9558
6)	PCA CSD	WPN 210-9559
7)	PCA 2275 MUX MASTER	WPN 210-8824-0
8)	MUX 7874-A/7973-A MXE MLT CONTROLLER	WPN 212-3032
9)	POWER SUPPLY WITH A DELTA POWER LINE FILTER P/N 04DCHW3 (WPN 410-2041)	WPN 270-0890-1

A PRODUCTION UNIT WILL BE REQUIRED FOR THE FINAL FCC/VDE VERIFICATION TESTING.

ARTHUR WHELDEN

AW0301

Benchmark 1/5

FAILURE ANALYSIS BY ERROR CODE

REPORT DATE: 09-13-1989

BOARD TYPE: 9561 LOT SIZE: 15 1st PASS YIELD: 86.7%

SOLDER SHORTS 04.20	ETCH SHORTS 04.14	ETCH OPENS 04.13	DEFECT/ COMP. XX.02	WRONG PART XX.05	MISSING PART XX.01
			L62 Y1		

LEAD SHORTS XX.16	ECO WRONG 07.XX	SOLDER PROB. 13.XX	REVRSD/ COMP. XX.03	MOUNT WRONG XX.06	LEAD NOT THRU XX.14,15

Benchmark 1/C

FAILURE ANALYSIS BY ERROR CODE

REPORT DATE: 08-30-1989

BOARD TYPE: 9561 LOT SIZE: 15 1st PASS YIELD: 73.3%

SOLDER SHORTS 04.20	ETCH SHORTS 04.14	ETCH OPENS 04.13	DEFECT/ COMP. XX.02	WRONG PART XX.05	MISSING PART XX.01
		LD1 (2)	Y1 (2)		

LEAD SHORTS XX.16	ECO WRONG 07.XX	SOLDER PROB. 13.XX	REVRSD/ COMP. XX.03	MOUNT WRONG XX.06	LEAD NOT THRU XX.14,15

PCB TEST

FIRST PASS YIELD

TYPE OF TEST:

NAME: CHONG VAN TRANG

DATE: 8/30/89 → 9/13/89

WLI #: 210-9561-A R1

SWO #: _____

___ LBST

___ INCIRCUIT

✓ PRETEST W ATE

___ PRETEST W/O ATE

___ ACCEPTANCE

SERIAL NUMBER	PASS/ FAIL	DEFECT CODE	SERIAL NUMBER	PASS/ FAIL	DEFECT CODE
04171220	P				
04171233	P				
04171221	P				
04171228	P				
04171227	P				
04171224	P				
04171229	P				
04171219	P				
04171225	P				
04171222	P				
04171223	P				
04171226	P				
04171232	P				
04171231	F				
04171230	F				

PCB REPAIR

FAILURE ANALYSIS

NAME CUONG VAN TRANG

DATE 9/11/89

P/N 210- 9561 R1

TYPE OF TEST

A = LBST

B = INCIRCUIT

(C) = PRETEST

D = RUN-IN

E = ACCEPTANCE

SERIAL NUMBER	TYPE OF TEST FAILED	REPAIR LOCATION	REPAIR CODE	COMMENT
04171231	C	L62	66.02	
04171230	C	Y1	79.02	

PCB REPAIR

FAILURE ANALYSIS

NAME _____

DATE 8/30/89

P/N 210- 9561

TYPE OF TEST

A = LBST

B = INCIRCUIT

C = PRETEST

D = RUN-IN

E = ACCEPTANCE

SERIAL NUMBER	TYPE OF TEST FAILED	REPAIR LOCATION	REPAIR CODE	COMMENT
222		L01	04.13	
226		L01	04.13	
230		Y1	79.02	
233		Y1	79.02	
—				
—		—		
				—

FIRST PASS YIELD

TYPE OF TEST:

AME: _____

ATE: 8/29/89

LI #: 210-9561

NO #: _____

___ LBST

_/_ INCIRCUIT

___ PRETEST

___ ACCEPTANCE

SERIAL NUMBER	PASS/ FAIL	DEFECT CODE		SERIAL NUMBER	PASS/ FAIL	DEFECT CODE
04171 232	P					
220	P					
231	P					
221	P					
223	P					
228	P					
227	P					
224	P					
229	P					
225	P					
219	P					
222	F					
226	F					
230	F					
233	F					-

Benchmark 1/5

FAILURE ANALYSIS BY ERROR CODE

REPORT DATE: 08-16-1989

BOARD TYPE: 9562 LOT SIZE: 25 1st PASS YIELD: 84.0%

SOLDER SHORTS 04.20	ETCH SHORTS 04.14	ETCH OPENS 04.13	DEFECT/ COMP. XX.02	WRONG PART XX.05	MISSING PART XX.01
			L13 L35 L8		

LEAD SHORTS XX.16	ECO WRONG 07.XX	SOLDER PROB. 13.XX	REVRSD/ COMP. XX.03	MOUNT WRONG XX.06	LEAD NOT THRU XX.14,15
					L8

Benchmark 1/C

FAILURE ANALYSIS BY ERROR CODE

REPORT DATE: 08-10-1989

BOARD TYPE: 9562 LOT SIZE: 25 1st PASS YIELD: 64.0%

SOLDER SHORTS 04.20	ETCH SHORTS 04.14	ETCH OPENS 04.13	DEFECT/ COMP. XX.02	WRONG PART XX.05	MISSING PART XX.01
L38 Y1 (2)		L32	L35		

Pads too close together

LEAD SHORTS XX.16	ECO WRONG 07.XX	SOLDER PROB. 13.XX	REVRSD/ COMP. XX.03	MOUNT WRONG XX.06	LEAD NOT THRU XX.14,15
C16 C27 C37 C4 Y1			L35		

Poor solder Mask

PCB REPAIR

FAILURE ANALYSIS

TYPE OF TEST

NAME CUONG-V-TRANG

DATE 8/11/89 → 8/15/89

P/N 210-9562

A = LBST

B = INCIRCUIT

C = PRETEST

D = RUN-IN

E = ACCEPTANCE

SERIAL NUMBER	TYPE OF TEST FAILED	REPAIR LOCATION	REPAIR CODE	COMMENT
03896883	C	L13	66.02	
03896884	C	L35	66.02	
03896888	C	L8 p13→16	66.06	
03896878	C	L8	66.02	

PCB TEST

FIRST PASS YIELD

NAME: CUONG V. TRANG

DATE: 8/11/89 -- 8/15/89

WLI #: 210-9562

SWO #: _____

TYPE OF TEST:

___ LEST

___ INCIRCUIT

✓ PRETEST W ATE

___ PRETEST W/O ATE

___ ACCEPTANCE

SERIAL NUMBER	PASS/ FAIL	DEFECT CODE	SERIAL NUMBER	PASS/ FAIL	DEFECT CODE
03896872	P		03896884	F	
03896870	P		03896885	F	
03896889	P		03896878	F	
03896891	P				
03896883	F				
03896879	P				
03896882	P				
03896890	P				
03896869	P				
03896880	P				
03896893	P				
03896886	P				
03896874	P				
03896885	P				
03896871	P				
03896875	P				
03896873	P				
03896887	P				
03896876	P				
03896881	P				
03896892	P				
03896877	P				

Benchmark

PCB REPAIR

FAILURE ANALYSIS

NAME _____

DATE 8/10/89

P/N 210-9562

TYPE OF TEST

A = LEST ~~C = PRETEST~~

B = INCIRCUIT D = RUN-IN

E = ACCEPTANCE

SERIAL NUMBER	TYPE OF TEST FAILED	REPAIR LOCATION	REPAIR CODE	COMMENT
889		Y1	04.20	
		L35	66.02	
891		C4	69.16	
882		L32	04.13	
890		Y1	04.20	
884		C16	69.16	
887		L35	66.03	
880		L38	04.20	
893		C27	69.16	
		C37	69.16	
886		Y1	71.16	

FIRST PASS YIELD

Benchmark

TYPE OF TEST:

AME: _____

ATE: 6/10/89

LI #: 210-9562

WO #: _____

___ LBST

___ INCIRCUIT

___ PRETEST

___ ACCEPTANCE

SERIAL NUMBER	PASS/ FAIL	DEFECT CODE		SERIAL NUMBER	PASS/ FAIL	DEFECT CODE
03896 877	P			891	F	
892	P			889	F	
883	P			870	P	
881	P					
872	P					
888	P					
885	P					
874	P					
876	P					
878	P					
879	P					
869	P					
873	P					
875	P					
871	P					
886	F					
893	F					
880	F					
887	F					
884	F					
890	F					
882	F					

PACKAGING DATA ANNOUNCEMENT

DISTRIBUTION:

J. Schultz	014-A3A	PP&M Product Manager
M. Negron	015-17B	R & D
R. Bator	018-21I	MFG - Secured Systems Engineering Mgr
P. Biancavilla	015-420	R & D Package Design Eng Mgr
M. Cronin	027-210	CSO - Packaging/Customer Engineering
L. Gaskell	015-350	R & D Methods Engineering
J. Wagner	015-130	Pilot Planning Manager
J. Sheehan	013-A80	R & D Hardware Product Configuration
D. Scamporino	018-G1F	Purchasing - Packaging Materials Buyer
K. Shaughnessy	015-420	R & D Package Design Proj Coordinator
D. Wilson	018-21F	MFG - Product Support Engineering Mgr
J. Lynch	015-11B	MFG - Pilot Engineering Mgr

FROM: Roslyn Winston R&D Package Design Engineering
SUBJ: Package Design Documentation for the new 386 BASED CS PRODUCTS, PEP H0213C.
DATE: September 5, 1989 REV

The following packaging has been designed, approved, and documented for implementation. Please note that this packaging is approved for shipping CPU cabinets without drives.

1. PACKAGING DATA:
   Packaging Test #880-125 PASSED per SPI 10-521
   Packaging BOM #290-0685
   Packaging BOM Description: SHPG PKG BOM:CS-D-2200-CPU

2. PACKAGING MATERIALS PER BOM 290-0685:

WIL#	COMPONENT DESCRIPTION	QTY PER PKG BOM	KNOCKED DOWN FLAT SIZE LENGTH X WIDTH X HEIGHT
685-0100	Edge Protector 2.5x2.5x3.0	4	N/A
685-0474	2" Clear PP tape	a/r	N/A
685-0664	Strapping, Polyester, 50W	a/r	N/A
685-0665	Strapping Seals	2	N/A
685-0723	Bag, Gusset 23x17x36	1	N/A
685-2410	FOLHSC 27.13 x 20.00 x 27.30	1	48.00 X 37.50 X .63
685-2411	Pallet, Cushioned	1	28.00 X 20.88 X 7.63
685-2412	Cushion Assy, Top	1	27.00 X 19.75 X 4.31

525 031P

3. SHIPPING DATA - PACKAGED PRODUCT [ENGLISH: IN - (METRIC: CM)]

OUTSIDE DIMENSIONS LENGTH	X	WIDTH	X	DEPTH	VOLUME
28.00	X	20.88	X	30.38	10.27 ft^3
(71)	X	(53)	X	(77)	(.29 m^3)

Packaged weight: 93.5 lbs

4. PRODUCT DATA

WLI#	TITLE
167/187-3589	CS 386-10N 1MB CS CPU W/O DPU
167/187-3540	CS/386-20N 2MB CS CPU W/O DPU
167/187-3541	CS/386-40N 4MB CS CPU W/O DPU
167/187-3542	CS/386-80N 8MB CS CPU W/O DPU
167/187-3543	CS/386-10D 1MB CS CPU W/DPU
167/187-3544	CS/386-20D 2MB CS CPU W/DPU
167/187-3545	CS/386-40D 4MB CS CPU W/DPU
167/187-3546	CS/386-80D 8MB CS CPU W/DPU

doc 0208W

MANUFACTURABILITY REVIEW SHEET

REVIEW DATE 5/2/89 PROJECT CS-386 BOARD # 9561

CHECK ITEM	RA	RB	RC	RD	RO	R1	R2	R3
1 TOOLING HOLES			N1					
2 COMPONENT HOLES			✓					
3 COMPONENT SPACING			N2					
4 CHANGE RADIAL TO AXIAL			✓					
5 STANDARD SIPS			✓					
6 SOLDERABILITY			✓					
7 S.M.O.B.C.			✓					
8 FINE LINE BOARD POOL.			✓					
9 TRANSPORTABILITY			✓					
10 WIRE ROUTING			N3					
11 MANUAL VS. POST			✓					
12 SOLDER FIXTURING								
13 PANELLIZATION			✓					
14 OTHER			✓					

NAME Tom Mahoney EXT 28269

COMMENTS

NOTE 1: only 2 tooling holes, not located .250 from edges (.200) ICs too close to tooling holes for auto-insertion

NOTE 2: Almost every socket on bd is too close

NOTE 3: 3 wires on circuit side, 2 on comp side

NOTE 4:

NOTE 5:

MANUFACTURABILITY REVIEW SHEET

REVIEW DATE 5/2/89 PROJECT CS-326 BOARD # 9562

CHECK ITEM	RA	RB	RC	RD	RO	R1	R2	R3
1 TOOLING HOLES			N1					
2 COMPONENT HOLES			✓					
3 COMPONENT SPACING			N2					
4 CHANGE RADIAL TO AXIAL			✓					
5 STANDARD SIPS			✓					
6 SOLDERABILITY			✓					
7 S.M.O.B.C.			✓					
8 FINE LINE BOARD POOL.			✓					
9 TRANSPORTABILITY			✓					
10 WIRE ROUTING			N3					
11 MANUAL VS. POST			✓					
12 SOLDER FIXTURING			✓					
13 PANELLIZATION			✓					
14 OTHER								

NAME Tom Mahoney EXT 78269

COMMENTS

NOTE 1: lower right tooling hole is covered by JP1, will create problem for ATE. All tooling holes have caps and ICs too close for auto-insertion.

NOTE 2: L13 and L23 sockets are too close for auto-insertion

NOTE 3: 4 wires on circuit side, 7 wires on component side

NOTE 4:

NOTE 5:

M.E.P.

---COMPANY CONFIDENTIAL---

TO: Distribution

FROM: Bill Callahan
Edmond Daigneault
Production Support Engineering

DATE: April 11, 1989

SUBJECT: CS/386 CPU Board

Attached is the Manufacturing Engineering Plan for the CS /386 CPU board. The Product Support Engineer assigned to this new product will develop and lead the technical team in Manufacturing for the new product introduction period and will remain as the technical product focus in Manufacturing throughout the life of the product.

Please review this plan for the impact of this product on your operation. Direct questions and comments to the Product Support Engineer shown below.

PRODUCT:CS/386 CPU Board

PRODUCT SUPPORT ENGINEER: Edmond Daigneault
78635
015-11B

C O M P A N Y C O N F I D E N T I A L

MANUFACTURING ENGINEERING PLAN
TEST PLAN
FOR
CS-386 CPU BOARD

Originator: Edmond Daigneault
Production Support Engineer
Revision: A
Date: April 10, 1989

INTRODUCTION

Edmond Daigneault will develop and maintain a checklist and schedule indicating the Manufacturing Engineering activities required for the new product introduction.

Edmond Daigneault will lead the technical team in Manufacturing during the new product introduction period, working in conjunction with the Manufacturing Program Manager for the product.

PRODUCT DESCRIPTION

The CS-386 will be an enhancement of the present CS series of systems. It will be a 80386 based CPU board set. Minimum memory size will be 1MB, and the maximum will be 8MB. The new CPU board will be capable of running all current 2200 instructions. For more information refer to PEP # H 0213C.

MARKETING / BUSINESS PLAN

The projected yearly volume for this product is 1980. This includes CSO spares and boards used in upgrade kits. This volume is based on projections from the PP&M business plan dated January 18, 1989.

The build site will be Wang Puerto Rico.

Pilot manufacturing is expected to begin at the Parkwood facility during June, 1989.

The 212-7129-A-C will replace the 210-8937-C-F.

SPECIFICATIONS AND DOCUMENTATION

No new manufacturing specifications, standards or documentation will be required beyond the normal new product documentation.

NEW PARTS AND TECHNOLOGY

No new parts will be used in this product; however, each variation of memory size will have a unique PAL installed with the memory SIMM's.

ASSEMBLY

The following is a list of the proposed new CS CPU model numbers and the associated memory size. The CPU board numbers have not been determined at this time.

MODEL	MEMORY SIZE	SIMM TYPE	CPU BOARD NUMBER
CS/386-10	1MB	256KB (377-4516)	212-7129-A
CS/386-20	2MB	256KB (377-4516)	212-7129-B
CS/386-40	4MB	1MB (377-4518)	212-7129-C
CS/386-80	8MB	1MB (377-4518)	212-7129-D

In addition to the above CPU's, it is planned to offer 10 memory upgrades of various configurations.

RELIABILITY

The MTBF calculation for this product is not available at this time.

TEST PLAN

The test plan for this product will follow very closely the process for the present 210-8937 CPU board and the present CS-D/CS-N systems. This process is outlined in the attached process flow charts.

In Circuit Test

The 210-9561 will be tested on a Fairchild in circuit test fixture. This test will detect process defects and most defective components.

Fixture project number.- Cost ---$14100.00

In Circuit Test

The 210-9562 will be tested on a Fairchild in circuit test fixture. This test will detect process defects and most defective components.

Fixture project number.- Cost ---$14100.00

TEST PLAN

Fault Analysis and Repair

All boards that fail in circuit test will be routed to the fault analysis and repair area. Repaired boards will be routed back to in circuit test.

PWA TEST

All boards that pass in circuit test will be tested in an PWA test area. A known good board will be mated with the board under test. Tests used in this area will be from the updated 2200 diagnostic package, with emphasis on cpu instruction and memory testing.

Test Equipment List

Description	Qty.	MEI/Model#	Available	Needed	Cost
CS-D System	1	187-3527			
Triple Controller	1	212-3012			
360KB Floppy Disk	1				
20MB Winchester	1	725-0242			
Workstation 2436	1	187-3249			
Cable Workstation	1	220-0447			

Board Run-In

Run-in will follow the same procedure as the present CS cpu board (210-8937). Run-in will be done on the final line in the new CS chassis. Provision will be made to run-in CSO spares. The run-in period will be 24 hours. Changes in this run-in period will be made as outlined in the Run-IN / Burn-IN Policy #191-0917.

Final Lines Test Equipment

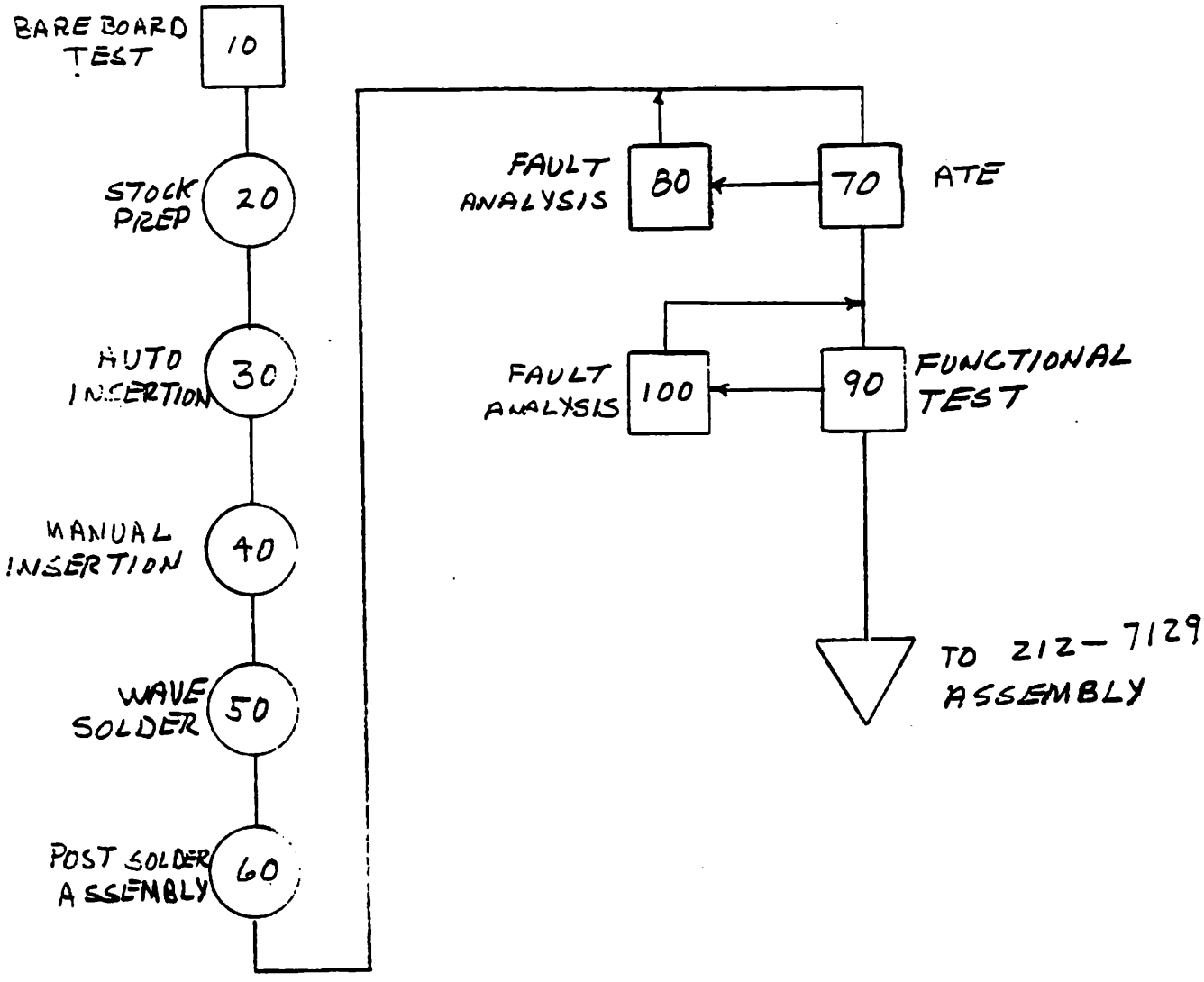
The present final lines test capacity at WPR is 22 systems per day. Based on the PP&M projections this appears to be adequate. If additional capacity is needed, requests for additional equipment will have to be generated.

210-9561 / 210-9562 CS/386 BOARDS

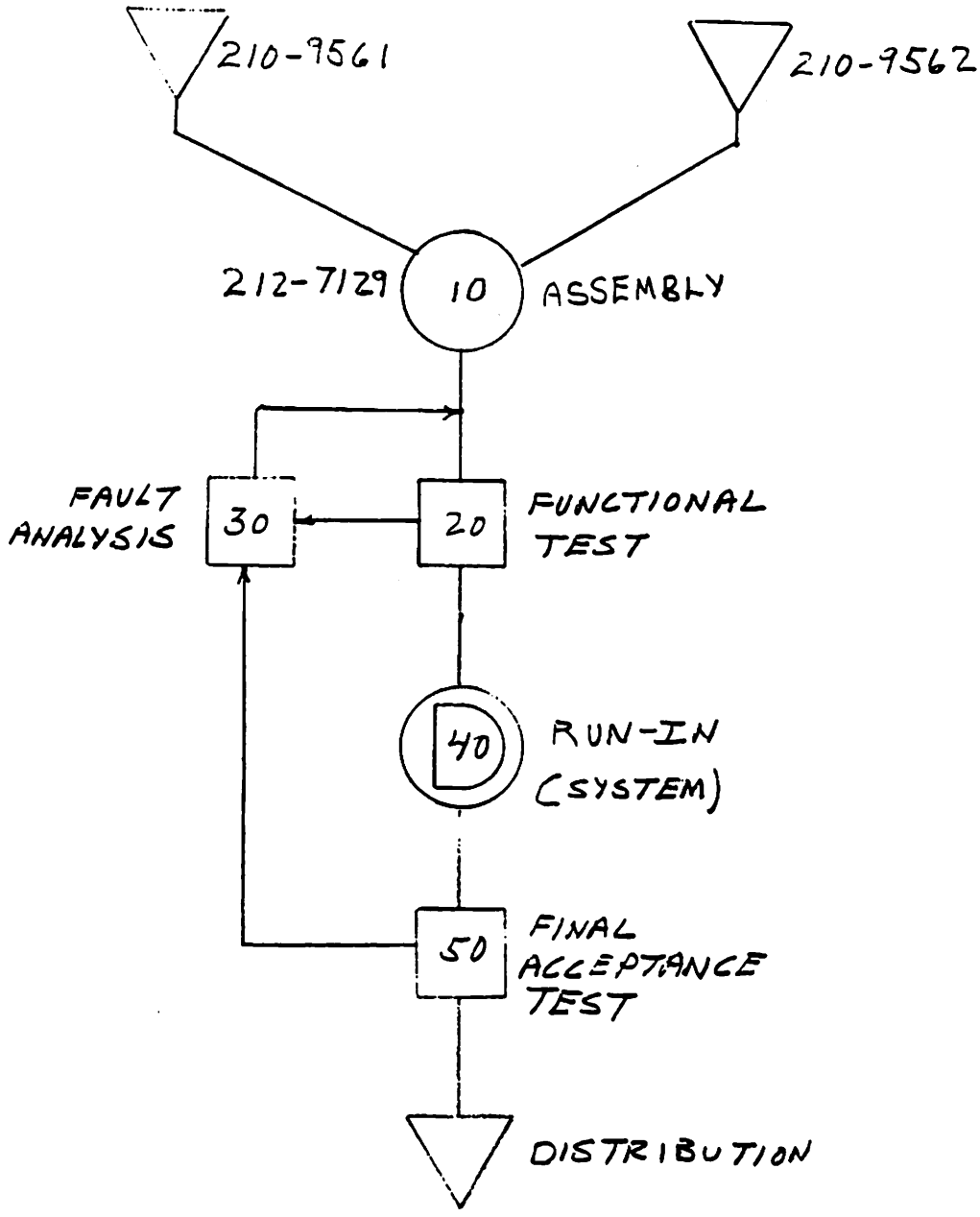
OPERATION NUMBER	DESCRIPTION	EQUIPMENT	PROCEDURES	SOFTWARE	NOTES
10	Bareboard Test	Bareboard Tester	Standard Operating	Bareboard test Program	
20	Stock prep.	Sequencer Verifier Board Bake Oven	Sequencer Proc. Verifier Proc. Board Bake Proc. Barcode Proc. Kitting List	Sequencer Prog. Verifier Prog.	
30	Auto Insertion	Dip Inserter VCD Radial Inserter Fixture	Dip Procedure VCD Procedure Radial Proc.	Dip Program VCD Program Radial Program	
40	Manual Insert	Contact System Visual Aids Standard Tools	Contact System Procedures	Contact System Program	
50	Wave Solder	Wave Solder Machine Wave Solder Fixture	Standard Wave Solder Procedure	N/A	
60	Post Solder Assembly	Visual Aids Standard Tools	Post Solder Procedures	N/A	
70	ATE In Circuit Test	Fairchild Tester ATE Fixture	Standard ATE Procedure	ATE Program	
80	Fault Analysis	Standard Tools	N/A	N/A	
90	Functional Test	See Test Section of This Document	Functional Test Procedures	Operating System Diagnostics	
100	Fault Analysis	Standard Tools	N/A	N/A	

212-7129A-C CS/386 CPU BOARD ASSEMBLY

OPERATION NUMBER	DESCRIPTION	EQUIPMENT	PROCEDURES	SOFTWARE	NOTES
10	Assembly	Standard Tools	Assembly Procedures		
20	Functional Test	See Test Plan Section of This Document	DSP Test Procedures	2200 Diagnostics	
30	Fault Analysis	See Test Plan Section of This Document	See Test Plan Section of This Document.	See Test Plan Section of This Document.	Is it 9561 or is it t 9562 board
40	Run In	See Test Plan Section of This Document	See Test Plan Section of This Document.	See Test Plan Section of This Document.	System Lev
50	Final Acceptance Test	See Test Plan Section of This Document.			



WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY
	DWN		E ENGR
	CHK		M ENGR
			MFG ENGR
MATERIAL	MODEL NO. CS/386		TITLE 210-9561 / 210-9562
	SEE ENGRG. SPECIFICATIONS No.		PROCESS FLOW



WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY
	DWN EJO	4/13/79	E ENGR
	CHK		M ENGR
			MFG ENGR
MATERIAL	MODEL NO. CS1386	TITLE TEST FLOW (212-7129)	
	SEE ENGRG. SPECIFICATIONS		

---COMPANY CONFIDENTIAL---

TO: Distribution

FROM Edmond Daigneault
Production Support/Pilot Engineering

DATE: September 27, 1989

SUBJECT: CS386 CPU Revised Test Plan

Attached is a copy of revision B of the Manufacturing Test Plan for the CS386 CPU board.. This plan is intended to provide an overview of the proposed test, and repair processes for CS386 project. Originally issued as part of the Manufacturing Engineering Plan, the test plan is being issued as a separate document. Changes were needed as a result of the decision to build and test the boards at Pawtucket Boulevard, and the final systems at Puerto Rico. Your input to this document is requested as this plan will be modified and reissued as details become available.

Please review this plan for the impact of this product on your operation. Direct questions and comments to the Production Support Engineer shown below.

PRODUCT: CS386 CPU

PRODUCTION SUPPORT ENGINEER: Edmond Daigneault
78635
015-11B

Distribution:

S. Anthony	018-26C
K. Azar	018-27C
J. Lynch	015-11B
T. Mahoney	015-11B
M. Negron	015-17B
J. O'Hara	018-26C
E. Schulz	014-A3A
S. Stevenson	015-130
R. Sutton	018-27C
D.P. Wilson	018-21F

TEST PLAN
CS-386 CPU BOARD

This revised Test Plan will only be concerned with testing after A.T.E. testing has been completed. Full in circuit test fixtures have been provided for both the 210-9561, and the 210-9562 boards, as outlined in Rev A of the M.E.P., distributed on April 11, 1989.

PWA TEST

All boards that pass in circuit test will be tested in the PWA test area. A known good board will be mated with the board under test. Tests used in this area will include the following:

BIT	379-3513R1 or greater.
	379-3514R1 or greater.
CS386 O.S.	Rev. 1.0 or greater.
CS386 Customer	Diagnostics

Note; CS386 OS and Customer Diagnostics are on the system diskette.

The following is a list of equipment needed for one functional test station, either Pre Test or Final Acceptance.

Test Equipment List

Description	Qty	MEI/Model#	Available	Needed	Cost
Terminal	1	2436DW			597.27
CS-D/N Chassis	1	279-0873			680.59
Triple Cont.	1	212-3012			191.70
DS. DPU Board	1	212-7113			592.92
20MB Winch.	1	289-0849			204.95
360K Floppy	1	289-0846			74.49
				Total	2341.92

Substitution of the chassis and disk drives depending on availability would be acceptable as follows:

VLSI Chassis	1	270-1018		524.27
2275-10 Disk	1	187-3505		1019.14
CS System	1	187-3316		962.24
2275-10 Disk	1	187-3505		1019.14

Note: CS system would include cost of 210-8937A CPU board (543.45). CS chassis is not structured separately.

Run-In:

If PCB level run-in of this assembly is required, the following equipment will be needed. Two methods are outlined. Either method will require one setup for each assembly to be run-in. Board level run-in will be required for CSO spares, and system upgrade kits. The board level run-in periods will be as follows.

System boards	6 Hrs. Minimum.
Spares/Upgrades	12 Hrs. Minimum (Overnight)

BIT

Part Number	Description	Qty.
Various	CS, CS-D/N, VLSI chassis	1
212-3012	Triple Controller	1
187-3249	Workstation	1
220-0447	Workstation cable	1

Customer Diagnostics

279-0873	CS-D chassis	1
212-3012	Triple Controller	1
187-3249	Workstation	1
220-0447	Workstation cable	1
289-0849	20MB Winchester	1

Run-In Equipment Needs Analysis

MP&BM's proposed forecast for the CS386 CPU boards indicates that the average quarterly demand over the next year will average 273 system boards, and 191 spares and upgrades. The following analysis is based on this demand, and the run-in times previously proposed.

System	273/Qtr.
	21/Week
	4.2/Day (use 5)
Spares/Upgrd	191/Qtr.
	14.7/Week
	2.9/Day (use 3)

If 5 run-in systems are made available, a maximum of 10 boards could be run-in per day. This would also provide a cushion, to the availability vs. demand problem.

The prefferred run-in mode is to use the Customer Diagnostics, which are not prom resident. This would mean an increase in the cost of any run-in stations. PSE has calculated that the average cost of a run-in station will be $2300.40. Remanufactured equipment should be used if possible.

Run-In Equipment List

	Description	Qty	MEI/Model#	Available	Needed	Cost
	Terminal	1	2436DW			597.27
(1)	CS-D/N Chassis	1	279-0873			680.59
	Triple Cont.	1	212-3012			191.70
(2)	DS. DPU Board	1	212-7113			592.92
(2)	20MB Winch.	1	289-0849			204.95
(2)	360K Floppy	1	289-0846			74.49
					Total	2341.92

Alternate Equipment

(1)	VLSI chassis	1	270-1018			524.27
(1)	CS chassis	1	187-3316			418.79
(2)	2275-10 Disk	1	187-3505			1019.14

Note; Cost of CS chassis was calculated by subtracting cost of 210-8937X CPU board, which is not needed.

Fault Analysis and Repair

All boards that fail pre test, functional test or run-in will be sent to the fault analysis and repair area. Completed units will be routed back to pre test.

Fault Analysis/Repair Station;

Part Number	Description	Qty.
None	Modified CS/D chassis	1
212-7113	DPU PCB	1
212-3012	Triple Controller	1
289-0846	360K Floppy	1
289-0849	20MB Winchester	1
289-0905	Tape Cassette Drive	1
187-3249	Workstation	1
220-0447	Workstation cable	1
666-1016	3.5V Lithium battery	1

System Test

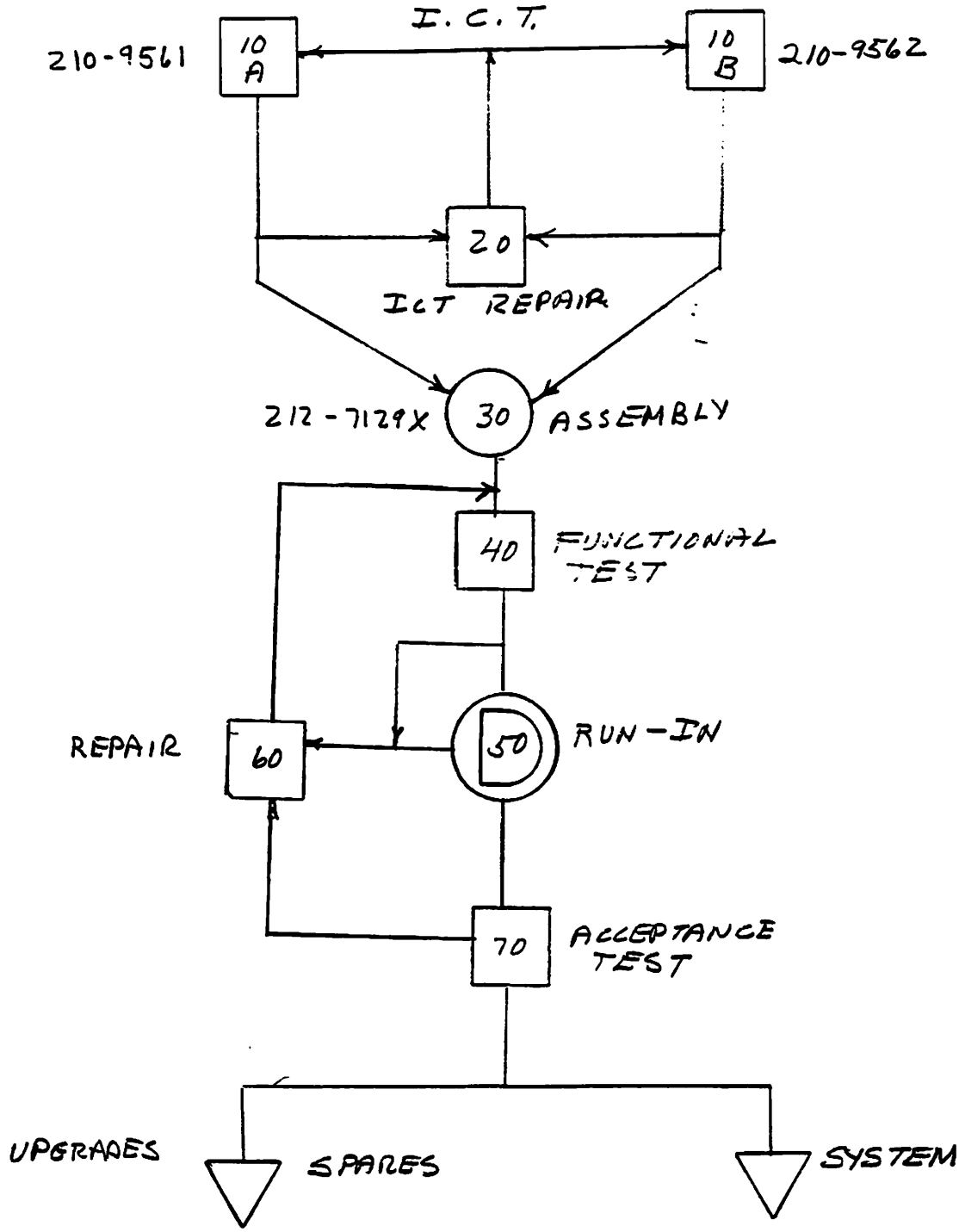
System test will follow the same procedure as the present CS-2 or CS-5D/N systems. The only difference will be the Operating System program, and the Customer Diagnostic program.

System Run-In

System Run-In will follow the procedure as outlined in Manufacturing Test Procedure 167/187-3539-3542 (CS386-10N/20N/40N/80N), Run-In/Final Test..

Final Test

If system to be shipped is a CS-N, the final test procedure is as outlined in the System Run-In step. If the system to be shipped is a CS-D, Test Procedure 167/197-3543-3546 (Final Acceptance Test) must also be performed.



WANG LABORATORIES, INC. LOWELL, MASS. U.S.A.	BY	DATE	APPROVED BY	D.
	DWN EJO	9/27/89	E ENGR	
	CHK		M ENGR	
			MFG ENGR	
MATERIAL	MODEL NO. CS386		TITLE BOARD TEST FLOW (212-7129X)	
	SEE ENGRG. SPECIFICATIONS			

WANG

ASSEMBLY PROCEDURE

PART NO.	DESCRIPTION	MODEL	TYPE
167/187-3539-3542	CS/386 CPU W/O DPU - FINAL ASSY		

PREP. BY	MFG. ENG. APPROVAL	Q. C. ENG. REVIEW
Bob Graves	Kevin Mahoney 9/8/89	Bob Donoghue 9/11/89

ISSUE DATE	ISSUE	BOM REV.	OPER. NO.	SHT. NO.	ECO/MPC NO.	DESCRIPTION	WRITER
9/12/89	A	AB	ALL	ALL		RELEASE TO MANUFACTURING	

DISTRIBUTION:

VS

WANG LABORATORIES Inc. OPERATION SHEET

PART NO.	DESCRIPTION	TYPE	ISS.	REV.	SHT.
167/187-3539-3542	CS/386 CPU W/O DPU - FINAL ASSY				1 OF 1

OPER. NO.	OPERATION	WORK CTR.	STD.	SPECIAL TOOLS/FIXTURES
0.5	INSPECTION GUIDELINES			
1.0	CS/386 CPU BOARD CHART			
2.0	MOUNT/SECURE CPU BOARD			
3.0	MOUNT/SECURE BLANK PANELS			
4.0	SET POWER SUPPLY VOLTAGE			
4.5	QC INSPECTION (INTERNAL)			
5.0	RUN-IN/FINAL TEST			T.P. 167/187-3539 THRU 3542
6.0	APPLY LABELS			
7.0	MOUNT/SECURE COVERS			
7.5	HY-POT			PER SPI 10-605
8.0	QC INSPECTION (EXTERNAL)			
9.0	PACKAGING			

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	0.5	OPERATION	INSPECTION GUIDELINES	ISSUE	REV.	TYPE

*** ATTENTION-IMPORTANT ***

THE FOLLOWING GUIDELINES ARE TO BE USED WHILE ASSEMBLING THIS PRODUCT.

1. VERIFICATION OF PCB REVISIONS (E REV'S) BEFORE ASSEMBLY INTO UNITS.
2. VERIFICATION THAT EXTERNALLY VISIBLE PARTS ARE FREE OF SCRATCHES, DISCOLORATION, IMPERFECTIONS, CORROSION OR ANY OTHER OBVIOUS COSMETIC DEFECTS.
3. VERIFICATION THAT ALL HARDWARE IS FUNCTIONAL AND WORKS FREELY. THIS INCLUDES KEY LOCKS, HINGES, SLIDES, LATCHES, SWITCHES, CASTERS, ETC.
4. INCLUSION OF ALL PROPER SWITCH SETTINGS.
5. INCLUSION OF PROPER ALIGNMENT AND BALANCE OF ALL VISIBLE GAPS OR SPACING BETWEEN MATING PANELS, BEZELS, DOORS, OR EXTERNAL SUB ASSEMBLIES.
6. INCLUSION OF PROPER TORQUE REQUIREMENTS FOR ALL HARDWARE FASTENERS.
7. THE INCLUSION OF QC CHECKS AS PART OF LAST OPERATION OF EACH SUB AND FINAL ASSEMBLY.

(WANG) LABORATORIES INC. ASSEMBLY SHEET 240/76

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	1.0	OPERATION	CS/386 CPU BOARD CHART	ISSUE	REV.	TYPE

CS/386 CPU BOARD CHART

ITEM NUMBER	MODEL NO.	ITEM DESCRIPTION	CPU BOARD
167/187-3539	CS/386-10N	1MB CPU W/O DPU	212-7129-A
167/187-3540	CS/386-20N	2MB CPU W/O DPU	212-7129-B
167/187-3541	CS/386-40N	4MB CPU W/O DPU	212-7129-C
167/187-3542	CS/386-80N	8MB CPU W/O DPU	212-7129-D

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 2		
OPER. NO.	2.0	OPERATION	MOUNT/SECURE CPU BOARD	ISSUE	REV.	TYPE

A. 1. 458-5026 COVER, PANEL, REAR (WELD)
2. 449-0702 HANDLE, CHASSIS
3. 650-3200 SCR, 6-32 x 5/8 PL PN (2)

USING THE HARDWARE AS SHOWN, SECURE THE CHASSIS HANDLE TO THE REAR PANEL COVER.

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.

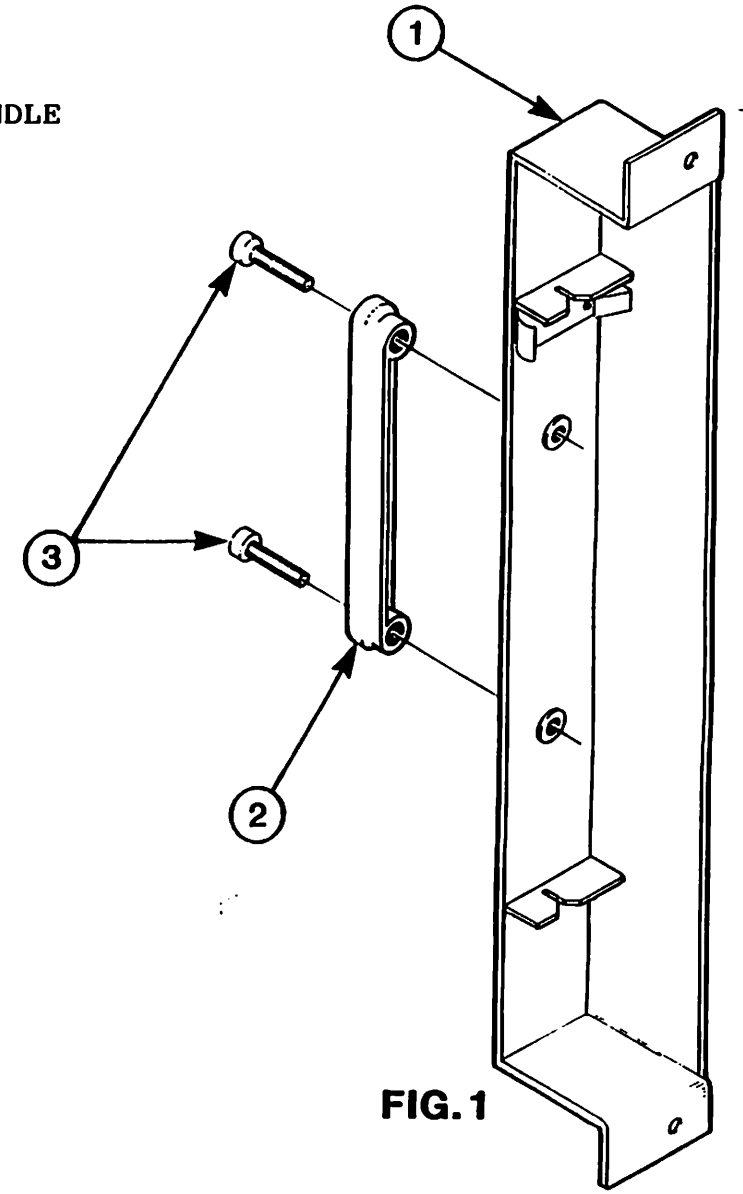


FIG. 1

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 2 OF 2
OPER. NO.	2.0	OPERATION	MOUNT/SECURE CPU BOARD	ISSUE / REV. / TYPE

B.
1. 212-7129-X CS/386 CPU BOARD (REFER TO CPU BOARD CHART - OP. 1.0)
2. 279-0873 CABINET ASSY CS-D/N
3. 650-4120 SCREW, #8-32 X 5/8" SEMS (2)
4. 656-0145 CONDUCTIVE GASKET (21") (2 PIECES)
5. 666-1016 BATTERY

VERIFY CPU BOARD E REV. PER E REV. CHART.

MOUNT THE CPU BOARD, WITH THE CORRECT CORRESPONDING SUFFIX LETTER (REFER TO "CS/386 CPU BOARD CHART" OPERATION 1.0) TO THE CS MOTHER BOARD (210-9560 REF.) AT POSITION AS SHOWN. USING HARDWARE AND REAR PANEL COVER (458-5026 REF.), SECURE THE CPU BOARD AT THE REAR OF THE CHASSIS.

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

CUT TWO PIECES OF CONDUCTIVE GASKET TO A LENGTH OF 21" AND ATTACH THEM TO BOTH SIDES OF THE CHASSIS AT THE REAR AS SHOWN. (ONLY THE LEFT SIDE IS SHOWN). CENTER THE GASKET BETWEEN THE TOP AND BOTTOM EDGES OF THE CHASSIS.

PEEL THE VELCRO BACKING OFF THE BATTERY AND ATTACH IT TO THE UNDERSIDE SURFACE OF THE CHASSIS SO THAT THE WIRES BREAK OUT TOWARD THE FRONT OF THE CHASSIS. PLUG THE 2 PIN HOUSING INTO THE J2 CONNECTOR ON THE 9562 BOARD (BEHIND THE 9561 BOARD).

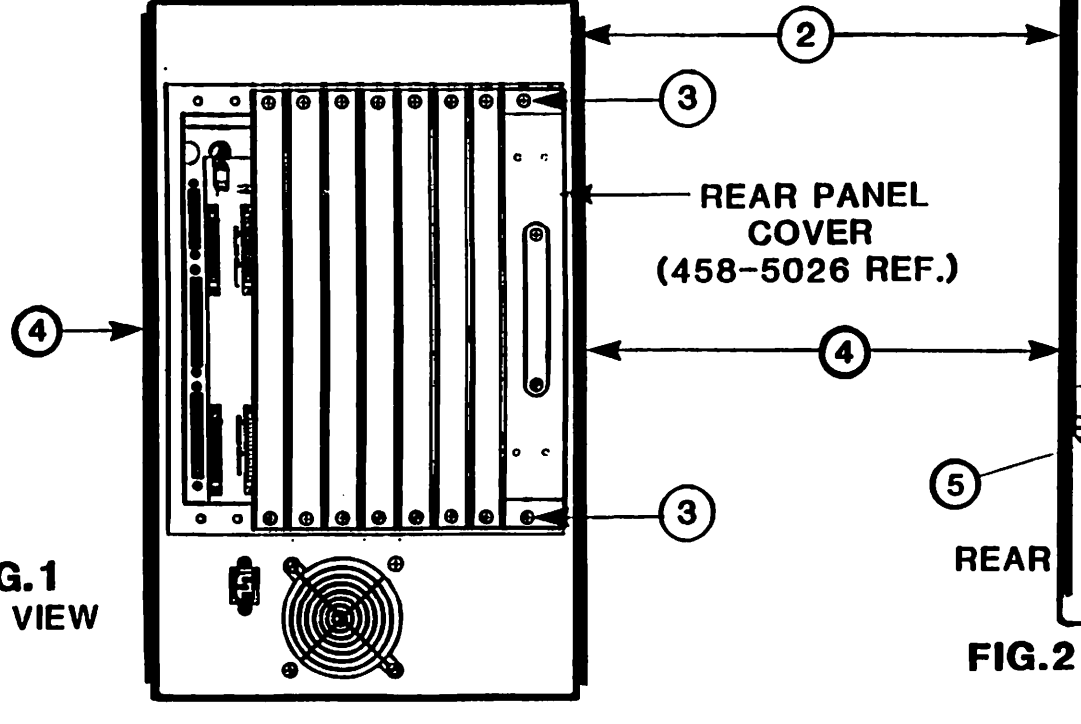


FIG.1 REAR VIEW

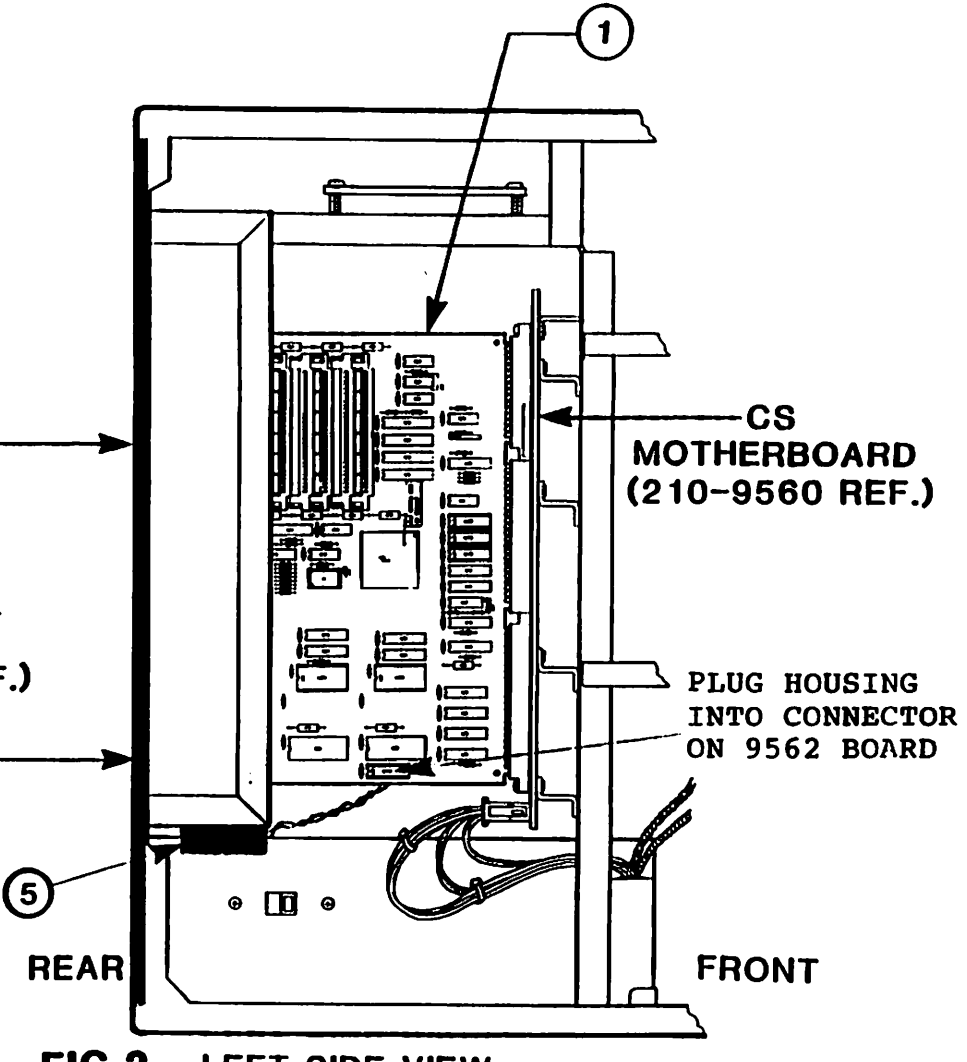


FIG.2 LEFT SIDE VIEW

(WANG LABORATORIES INC) ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	3.0	OPERATION	MOUNT/SECURE BLANK BRACKETS	ISSUE	REV. / TYPE

A. 1. 455-0093 BRACKET, BLANK
2. 650-4120 SCR, 8-32 x 3/8 SEMS (2)

USING THE HARDWARE AS SHOWN, SECURE THE BLANK BRACKET TO THE REAR OF THE CHASSIS AT POSITION AS SHOWN.

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

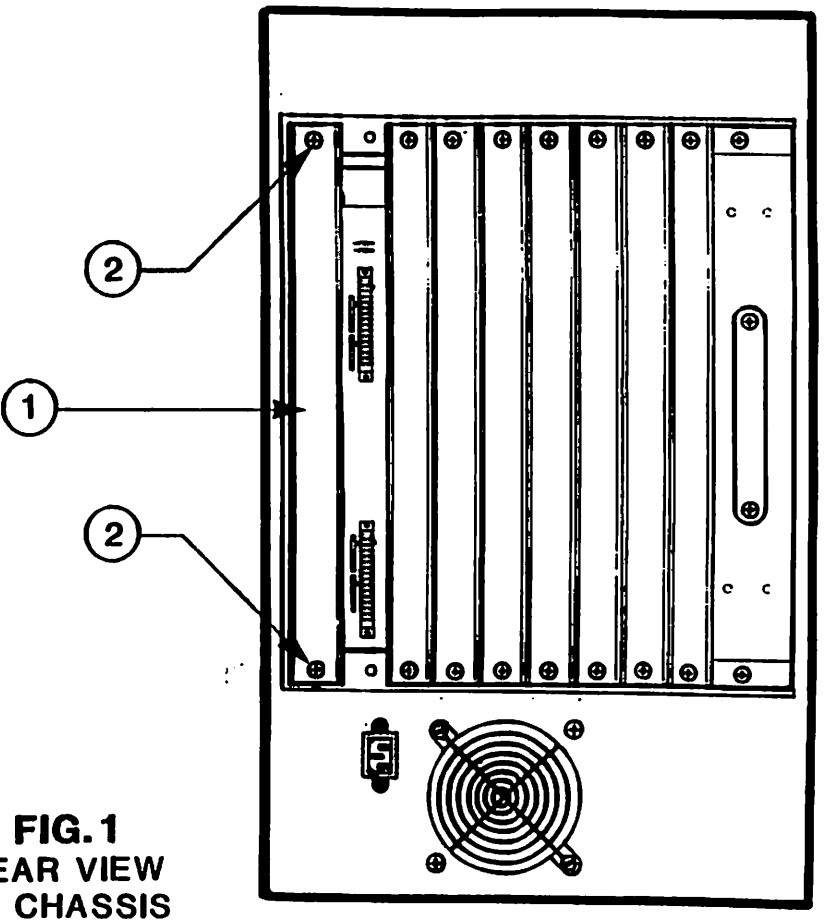


FIG. 1
REAR VIEW
OF CHASSIS

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1		
OPER. NO.	4.0	OPERATION	SET POWER SUPPLY VOLTAGE	ISSUE	REV.	TYPE

A. SET THE VOLTAGE SWITCH ON THE POWER SUPPLY AS FOLLOWS:

FOR 167 ASSEMBLIES SET SWITCH TO 230V 50Hz. (INTERNATIONAL)

FOR 187 ASSEMBLIES SET SWITCH TO 115V 60Hz. (DOMESTIC)

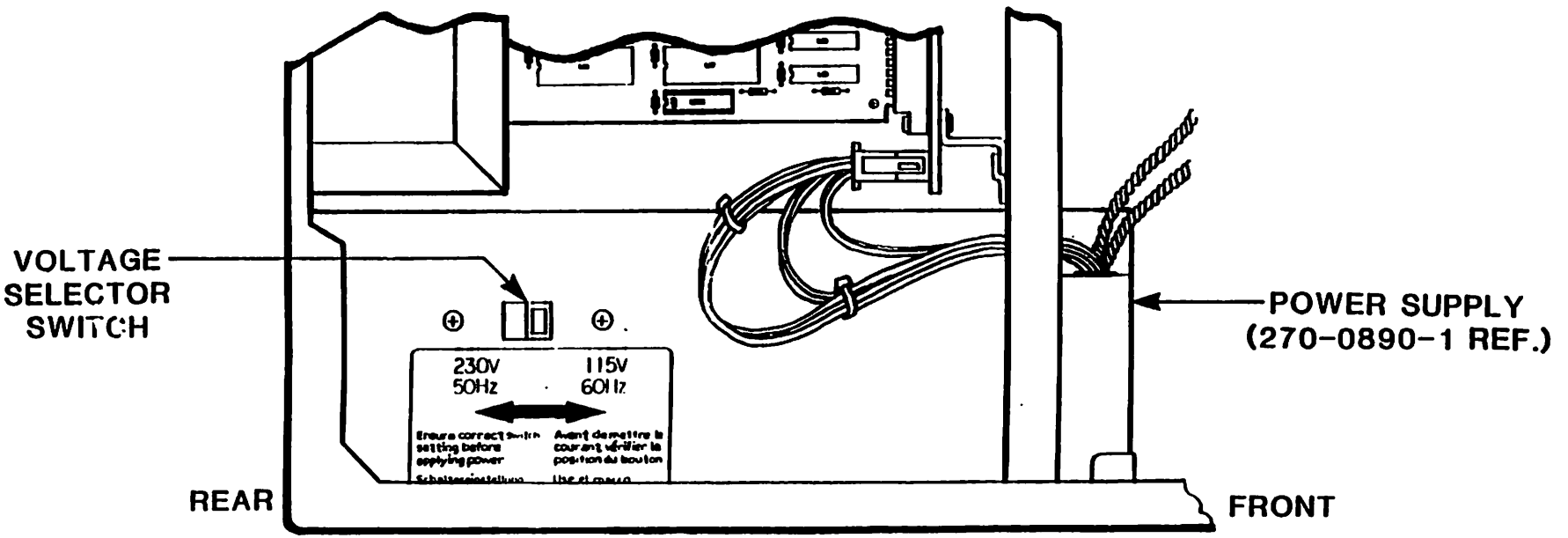


FIG. 1
LEFT SIDE VIEW
OF CHASSIS

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	4.5	OPERATION	QC INSPECTION (INTERNAL)	ISSUE	REV.	TYPE

PERFORM INTERNAL INSPECTION

REFER TO OPERATION 0.5 "INSPECTION GUIDELINES".

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	5.0	OPERATION	RUN-IN/FINAL TEST	ISSUE	REV.	TYPE

PERFORM SYSTEM TEST USING T.P. 167/187-3539 THROUGH -3542.

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1	OF 1
OPER. NO.	6.0	OPERATION	APPLY LABELS	ISSUE	REV. / TYPE

A. 1. 615-3872 LABEL, CORP. SERIAL NO. (3 PARTS)
2. 615-4282 LABEL, MODEL NO.

APPLY THE SMALL PART OF THE SERIAL NO. LABEL TO THE FRONT BEZEL (449-1577 REF.) BELOW THE WANG LOGO (451-3727 REF.) ON CENTER AT APPROXIMATE LOCATION. APPLY ONE OF THE LARGER PARTS OF THE SERIAL NO. LABEL TO THE INSIDE UPPER RIGHT OF THE CHASSIS. APPLY THE OTHER LARGE PART OF THE LABEL TO THE OUTSIDE LOWER LEFT REAR OF THE CHASSIS, AS SHOWN.
APPLY THE MODEL NO. LABEL TO THE LOWER LEFT REAR OF THE CHASSIS.

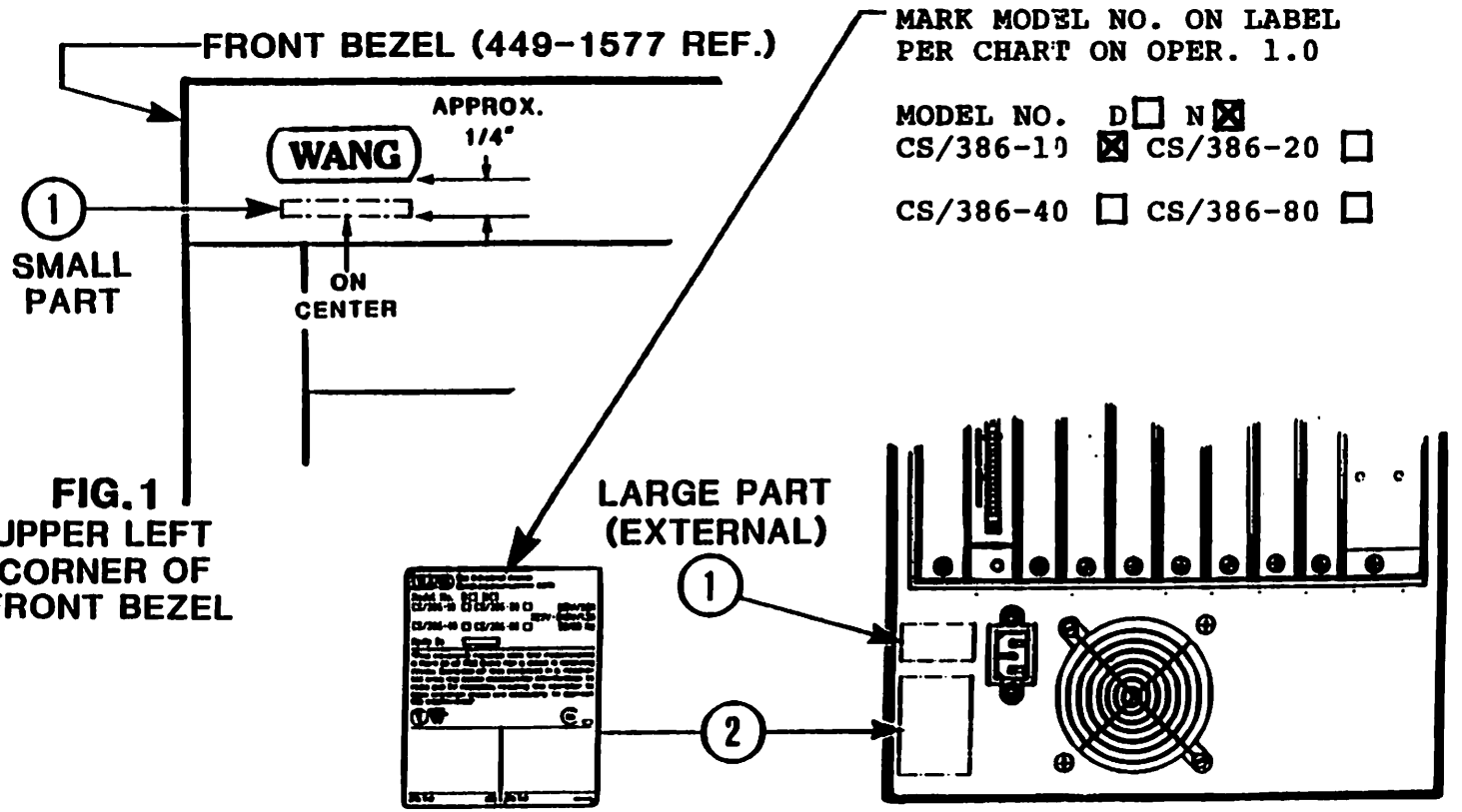


FIG.1 UPPER LEFT CORNER OF FRONT BEZEL

FIG.3 REAR VIEW OF CHASSIS

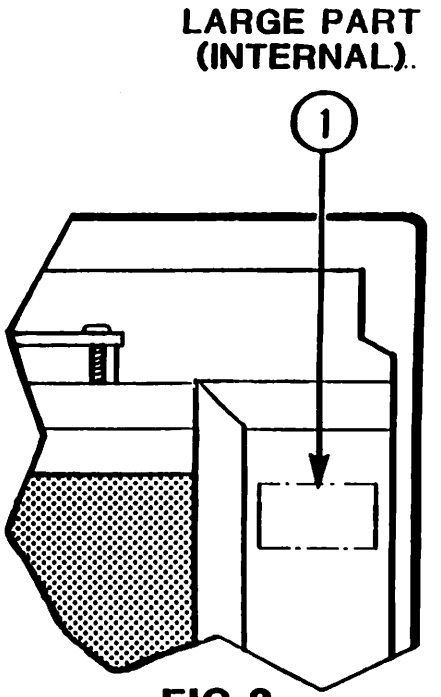


FIG.2 INSIDE UPPER RIGHT REAR OF CHASSIS (RIGHT SIDE VIEW)

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 2	
OPER. NO.	7.0	OPERATION	MOUNT/SECURE COVERS	ISSUE	REV. / TYPE

A. MOUNT THE L.H. AND R.H. COVERS TO THE CS-D/N FRAME BY INSERTING THE FRONT BRACKETS OF THE COVERS FIRST AND THEN PUSHING DOWN INTO POSITION.

NOTE: CHECK INSIDE OF R.H. COVER FOR SWITCH SETTING LABEL.

a) 458-3899 CS-D/N FRAME (WELD) REF.
b) 458-5028 COVER, L.H. (WELD) REF.
c) 458-5029 COVER, R.H. (WELD) REF.
d) 615-4004 LABEL, SWITCH SETTING REF.

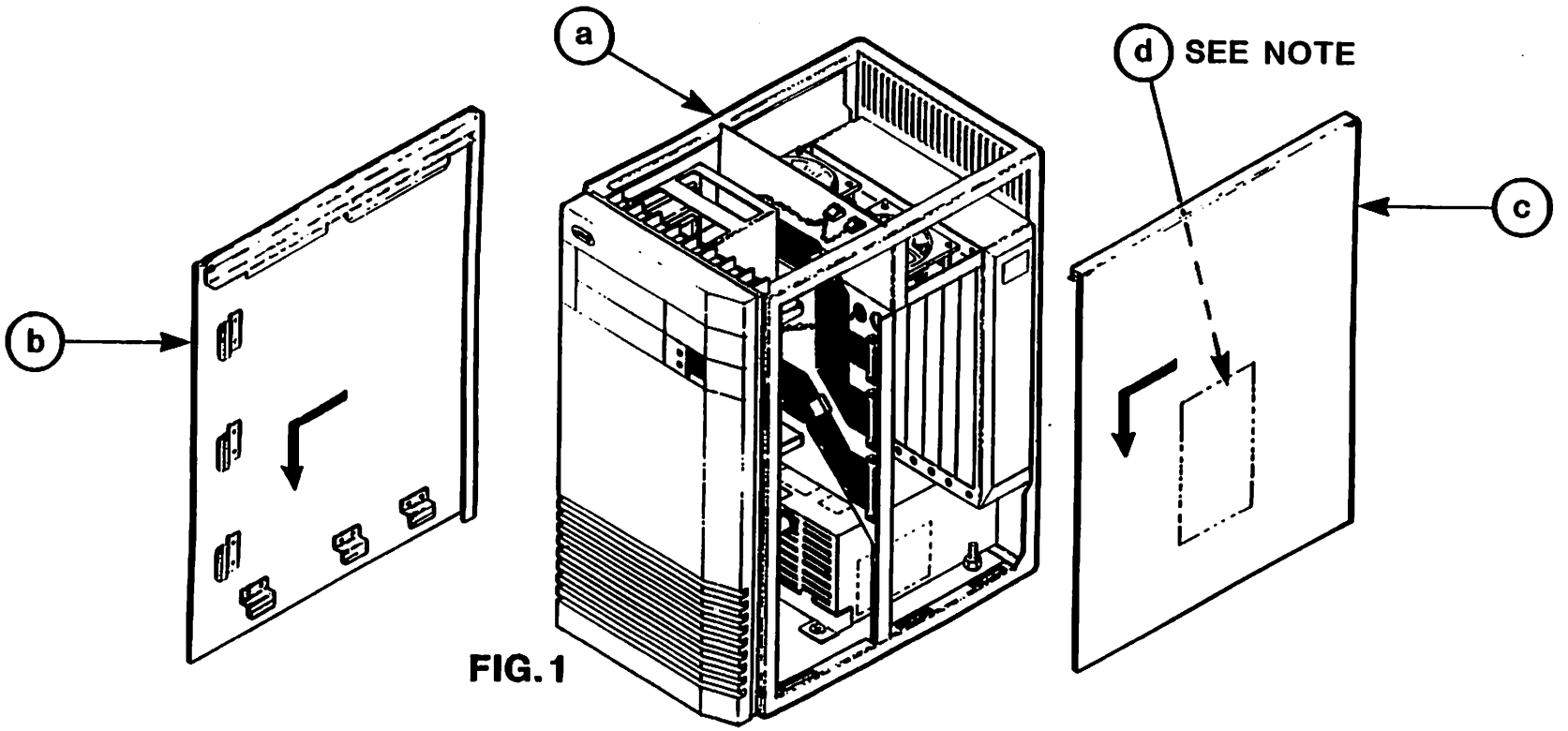


FIG. 1

WANG LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 2 OF 2	
OPER. NO.	7.0	OPERATION	MOUNT/SECURE COVERS	ISSUE	REV. / TYPE

B. MOUNT THE TOP COVER TO THE FRAME BY INSERTING THE FRONT BRACKET OF THE TOP COVER UNDER THE FRONT LIP OF THE FRAME AND SECURE WITH HARDWARE, AS SHOWN.

a) 453-5027 COVER, TOP (WELD)
b) 650-4120 SCR, 8-32 x 3/8 PN HD PHL (2)

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

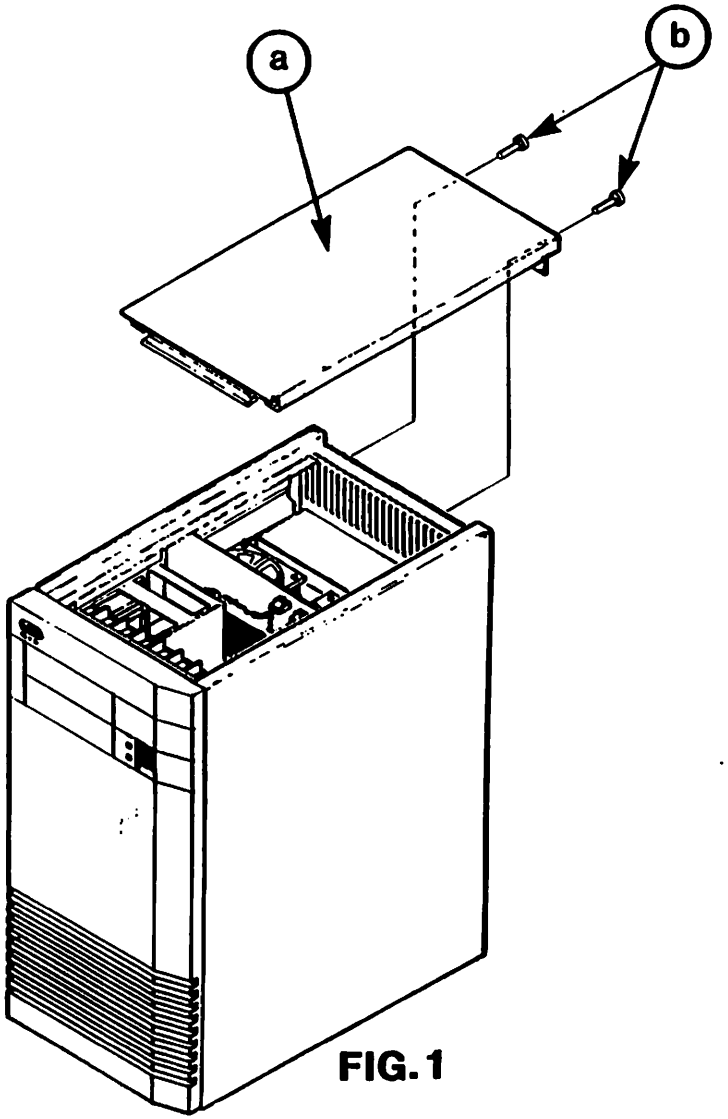


FIG. 1

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1		
OPER. NO.	7.5	OPERATION	HY-POT TEST	ISSUE	REV.	TYPE

A. HY-POT PER SPI 10-605

ATTACH THE HY-POT GROUND PROBE TO THE BLANK BRACKETS (455-0093 REF.) LOCATED ON THE REAR OF THE CABINET ASSEMBLY AS SHOWN ON ILLUSTRATION BELOW (UNPAINTED SURFACE).

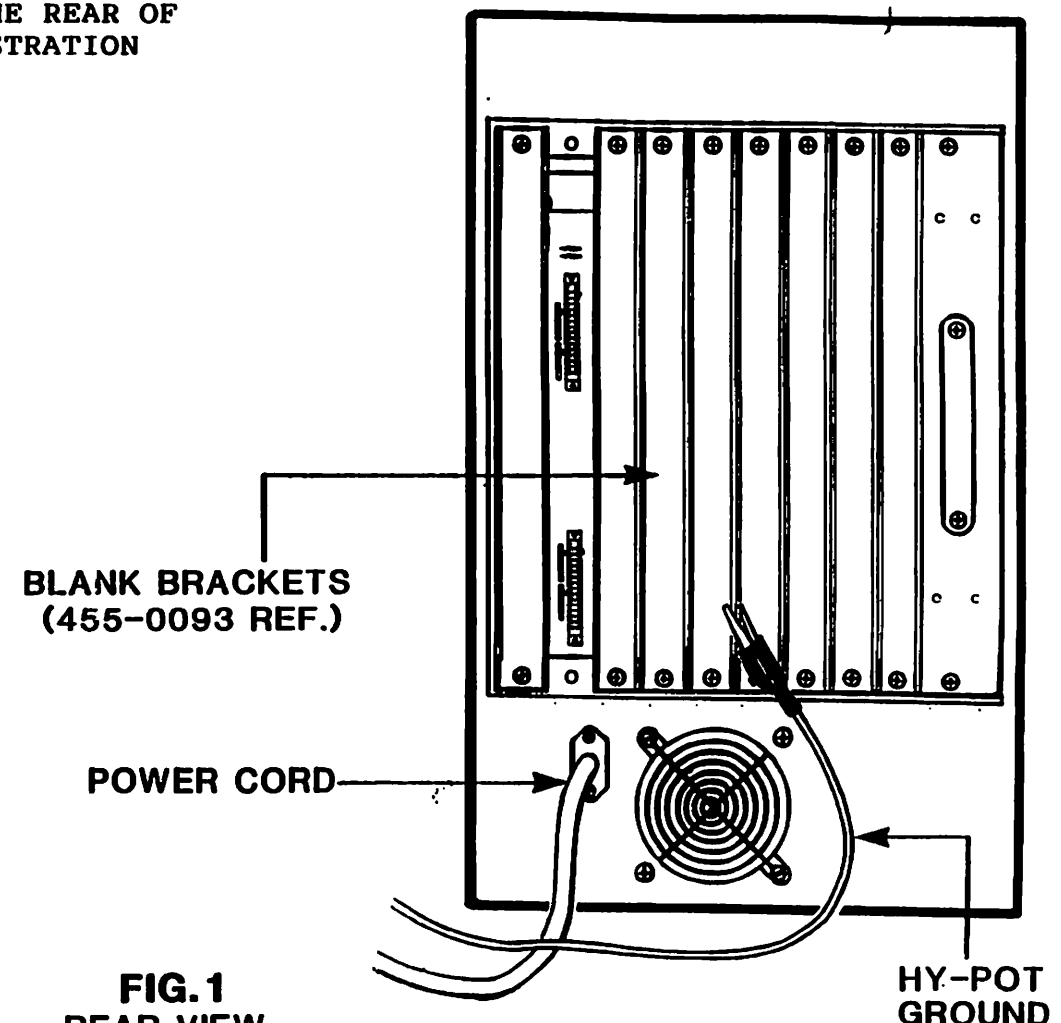


FIG. 1
REAR VIEW
OF CHASSIS

WANG LABORATORIES INC. ASSEMBLY SHEET 380/12

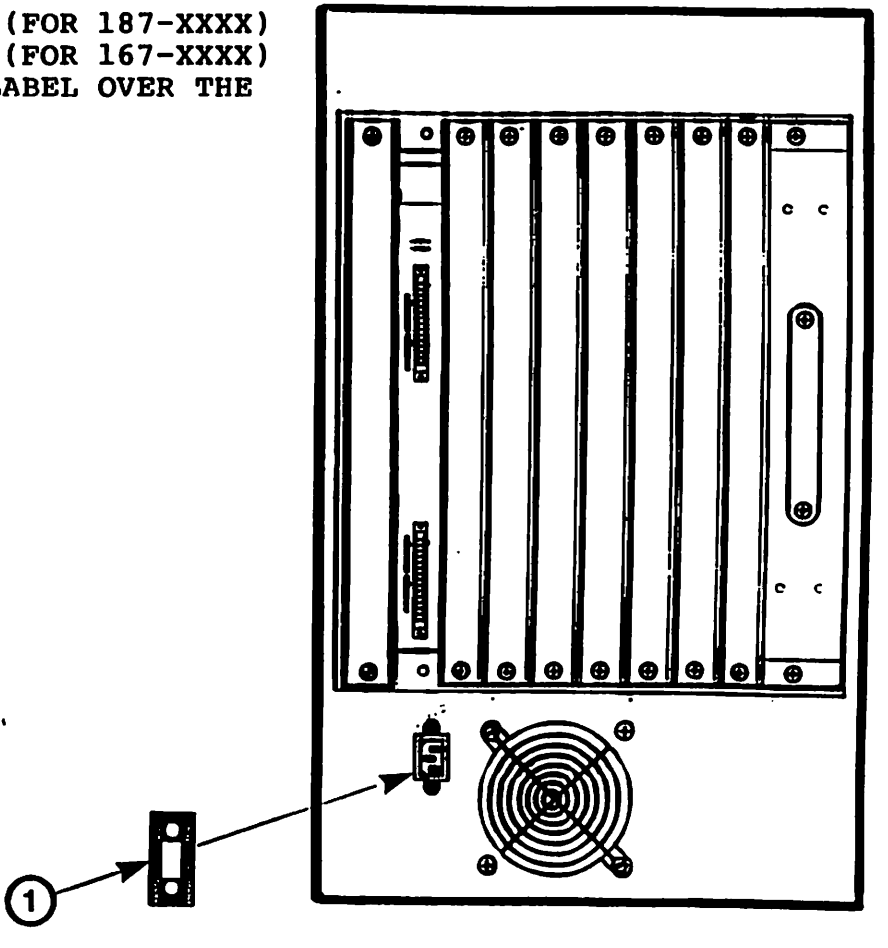
PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1		
OPER. NO.	8.0	OPERATION	QC INSPECTION (EXTERNAL)	ISSUE	REV.	TYPE

PERFORM INTERNAL INSPECTION

REFER TO OPERATION 0.5 "INSPECTION GUIDELINES".

A.

1. 615-2029 VOLTAGE WARNING LABEL (115V)(FOR 187-XXXX)
   615-2071 VOLTAGE WARNING LABEL (230V)(FOR 167-XXXX)
   ATTACH THE APPROPRIATE VOLTAGE WARNING LABEL OVER THE AC PLUG AS SHOWN.



WANG LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3539-3542	DESCRIPTION	CS/386 CPU W/O DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	9.0	OPERATION	PACKAGING	ISSUE / REV. / TYPE

A. THE FOLLOWING ITEMS ARE ALL PART OF THE SHIPPING PACKAGE, 290-0685 AND **290-0685-02

a) **685-0100 EDGE PROTECTOR (4)
b) **685-0474 TAPE 2" CLEAR POLY (A/R)
c) **685-0664 STRAPPING POLY .50 (A/R)
d) **685-0665 SEAL STRAPPING FOR .50 (2)
e) 685-0723 BAG GUSSET 23 x 17 x 36
f) 685-2410 FOLHSC 27.13 x 20.00
g) 685-2411 PALLET 28.00 x 20.88
h) 685-2412 CUSHION ASSY, TOP

PLACE CABINET ASSEMBLY ON CUSHION PALLET, AS SHOWN. PLACE GUSSET OVER CABINET AND PLACE TOP CUSHION ASSEMBLY ONTO CABINET ASSEMBLY, AS SHOWN.

SET UP BOX, FOLD TOP FLAPS OVER AND SEAL WITH 2" CLEAR TAPE. PLACE BOX OVER CABINET, AS SHOWN.

RUN POLY STRAPPING UNDER CUSHION PALLET AND OVER THE TOP OF THE BOX, USE EDGE PROTECTORS ON THE TOP OF THE BOX. SECURE STRAPPING USING STRAPPING SEALS, AT POSITIONS AS SHOWN.

1. 615-2265 LABEL, DOCK MERGE

APPLY LABEL AT POSITION, AS SHOWN.

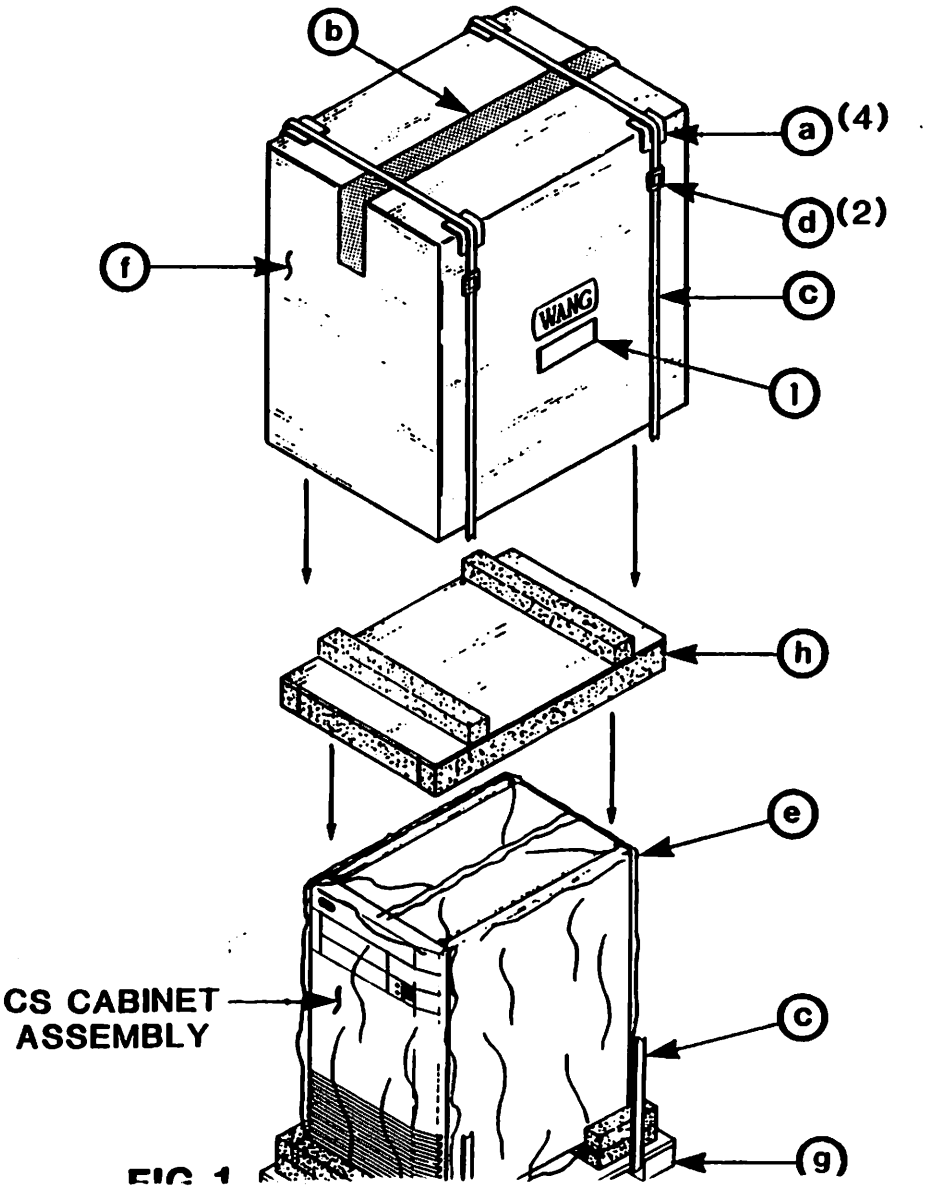


FIG. 1

WANG LABORATORIES Inc. OPERATION SHEET

PART NO.	DESCRIPTION	TYPE	ISS.	REV.	SHT.
167/187-3543-3546	CS/386 CPU WITH DPU - FINAL ASSY				1 OF 1

OPER. NO.	OPERATION	WORK CTR.	STD.	SPECIAL TOOLS/FIXTURES
0.5	INSPECTION GUIDELINES			
1.0	CS/386 CPU BOARD CHART			
2.0	MOUNT/SECURE CPU BOARD			
3.0	MOUNT/SECURE DSPC BOARD SET			
4.0	SET POWER SUPPLY VOLTAGE			
4.5	QC INSPECTION (INTERNAL)			
5.0	FINAL ACCEPTANCE TEST			T.P. 167/187-3543 THRU 3546
6.0	APPLY LABELS			
7.0	MOUNT/SECURE COVERS			
7.5	HY-POT			PER SPI 10-605
8.0	QC INSPECTION (EXTERNAL)			
9.0	PACKAGING			

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	0.5	OPERATION	INSPECTION GUIDELINES	ISSUE	REV.	TYPE

*** ATTENTION-IMPORTANT ***

THE FOLLOWING GUIDELINES ARE TO BE USED WHILE ASSEMBLING THIS PRODUCT.

1. VERIFICATION OF PCB REVISIONS (E REV'S) BEFORE ASSEMBLY INTO UNITS.
2. VERIFICATION THAT EXTERNALLY VISIBLE PARTS ARE FREE OF SCRATCHES, DISCOLORATION, IMPERFECTIONS, CORROSION OR ANY OTHER OBVIOUS COSMETIC DEFECTS.
3. VERIFICATION THAT ALL HARDWARE IS FUNCTIONAL AND WORKS FREELY. THIS INCLUDES KEY LOCKS, HINGES, SLIDES, LATCHES, SWITCHES, CASTERS, ETC.
4. INCLUSION OF ALL PROPER SWITCH SETTINGS.
5. INCLUSION OF PROPER ALIGNMENT AND BALANCE OF ALL VISIBLE GAPS OR SPACING BETWEEN MATING PANELS, BEZELS, DOORS, OR EXTERNAL SUB ASSEMBLIES.
6. INCLUSION OF PROPER TORQUE REQUIREMENTS FOR ALL HARDWARE FASTENERS.
7. THE INCLUSION OF QC CHECKS AS PART OF LAST OPERATION OF EACH SUB AND FINAL ASSEMBLY.

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	1.0	OPERATION	CS/386 CPU BOARD CHART	ISSUE / REV. / TYPE

CS/386 CPU BOARD CHART

ITEM NUMBER	MODEL NO.	ITEM DESCRIPTION	CPU BOARD
167/187-3543	CS/386-10D	1MB CPU WITH DPU	212-7129-A
167/187-3544	CS/386-20D	2MB CPU WITH DPU	212-7129-B
167/187-3545	CS/386-40D	4MB CPU WITH DPU	212-7129-C
167/187-3546	CS/386-80D	8MB CPU WITH DPU	212-7129-D

(WANG LABORATORIES INC.) ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 2	
OPER. NO.	2.0	OPERATION	MOUNT/SECURE CPU BOARD	ISSUE	REV. / TYPE

A. 1. 458-5026 COVER, PANEL, REAR (WELD)
2. 449-0702 HANDLE, CHASSIS
3. 650-3200 SCR, 6-32 x 5/8 PL PN (2)

USING THE HARDWARE AS SHOWN, SECURE THE CHASSIS HANDLE TO THE REAR PANEL COVER.

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.

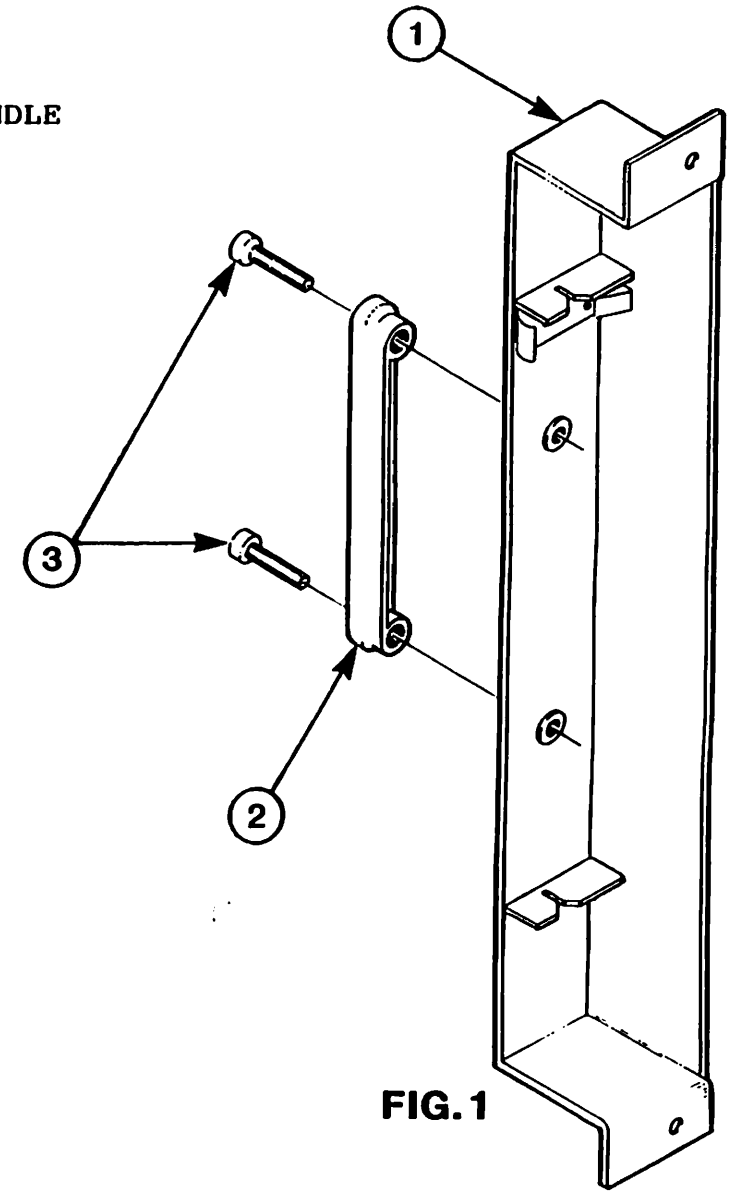


FIG.1

WANG LABORATORIES INC. ASSEMBLY SHEET

380/11

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT.	2 OF 2
OPER. NO.	2.0	OPERATION	MOUNT/SECURE CPU BOARD	ISSUE / REV. / TYPE	

B. 1. 212-7129-X CS/386 CPU BOARD (REFER TO CPU BOARD CHART - OP. 1.0)
2. 279-0873 CABINET ASSY CS-D/N
3. 650-4120 SCREW, #8-32 X 5/8" SEMS (2)
4. 656-0145 CONDUCTIVE GASKET (21")(2 PIECES)

VERIFY CPU BOARD E REV. PER E REV. CHART.

MOUNT THE CPU BOARD, WITH THE CORRECT CORRESPONDING SUFFIX LETTER (REFER TO "CS/386 CPU BOARD CHART" OPERATION 1.0) TO THE CS MOTHER BOARD (210-9560 REF.) AT POSITION AS SHOWN. USING HARDWARE AND REAR PANEL COVER (458-5026 REF.), SECURE THE CPU BOARD AT THE REAR OF THE CHASSIS.

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

CUT TWO PIECES OF CONDUCTIVE GASKET TO A LENGTH OF 21" AND ATTACH THEM TO BOTH SIDES OF THE CHASSIS AT THE REAR AS SHOWN. (ONLY THE LEFT SIDE IS SHOWN). CENTER THE GASKET BETWEEN THE TOP AND BOTTOM EDGES OF THE CHASSIS.

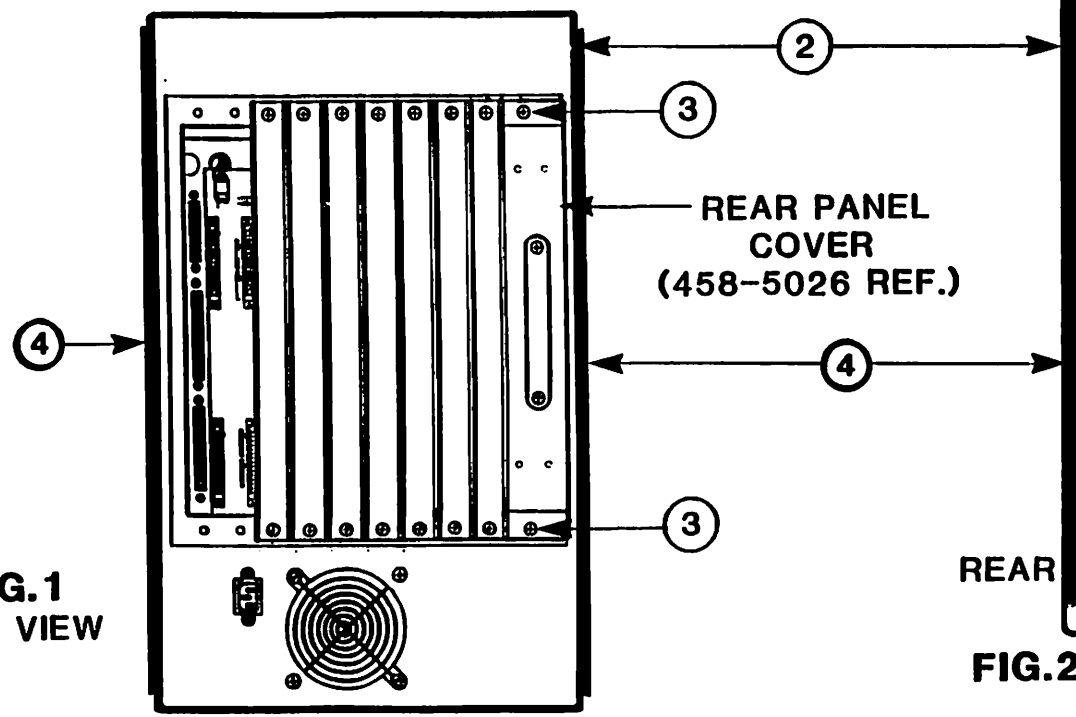


FIG.1 REAR VIEW

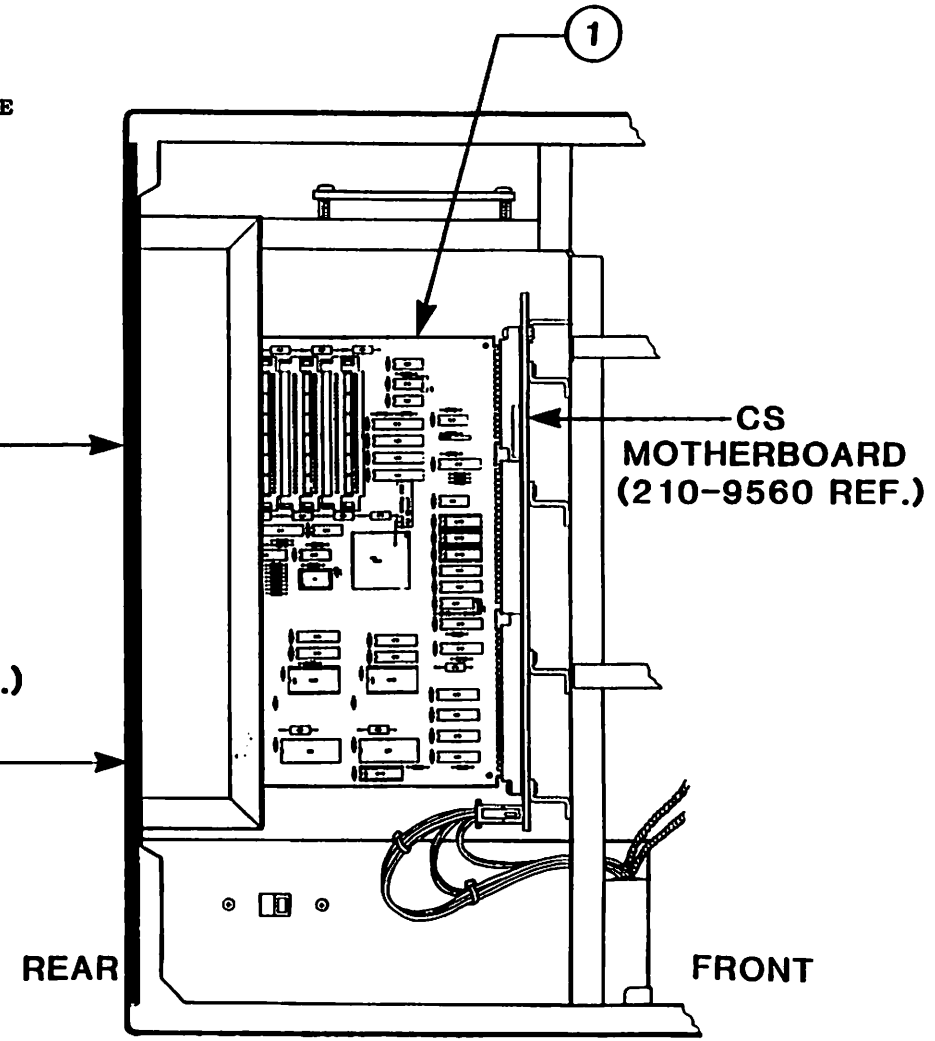


FIG.2 LEFT SIDE VIEW

(WANG LABORATORIES INC.) ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1	
OPER. NO.	3.0	OPERATION	MOUNT/SECURE DSPC BOARD SET	ISSUE	REV.	TYPE

A. 1. 212-7113 DSPC BOARD SET

VERIFY BOARD SET E REV. PER E REV. CHART.
VERIFY DSPC BOARD SET "SWITCH SETTINGS". REFER TO "SWITCH SETTING LABEL" (615-4004 REF.) LOCATED ON INSIDE OF R.H. COVER (458-5029 REF.).

POSITION THE DSPC BOARD SET AS SHOWN AND PLUG INTO CS MOTHER BOARD (210-9560 REF.) AND DRIVE OPTION FLAT CABLE CONNECTORS. SECURE THE DSPC BOARD SET AT THE REAR OF THE CHASSIS BY TIGHTENING THE FACE PLATE SCREWS INTO MOUNTING HOLES, AS SHOWN.

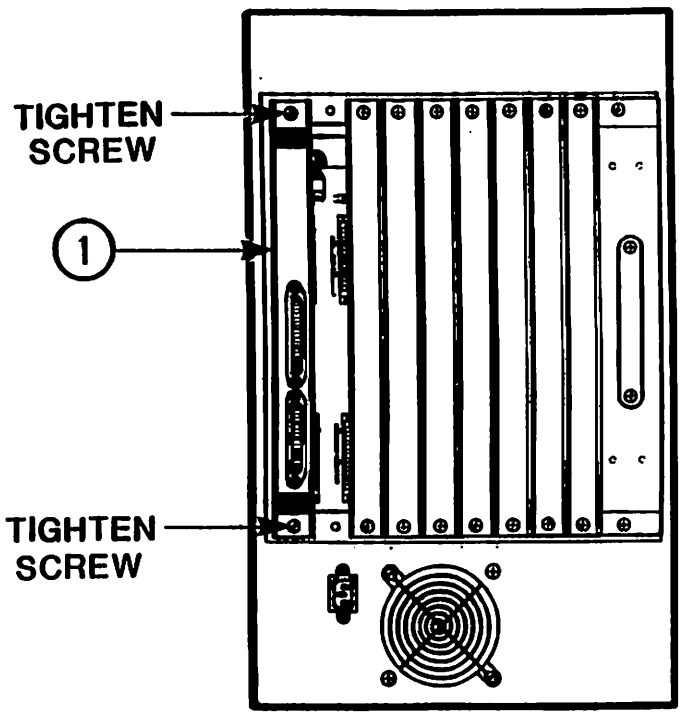


FIG. 1 REAR VIEW OF CHASSIS

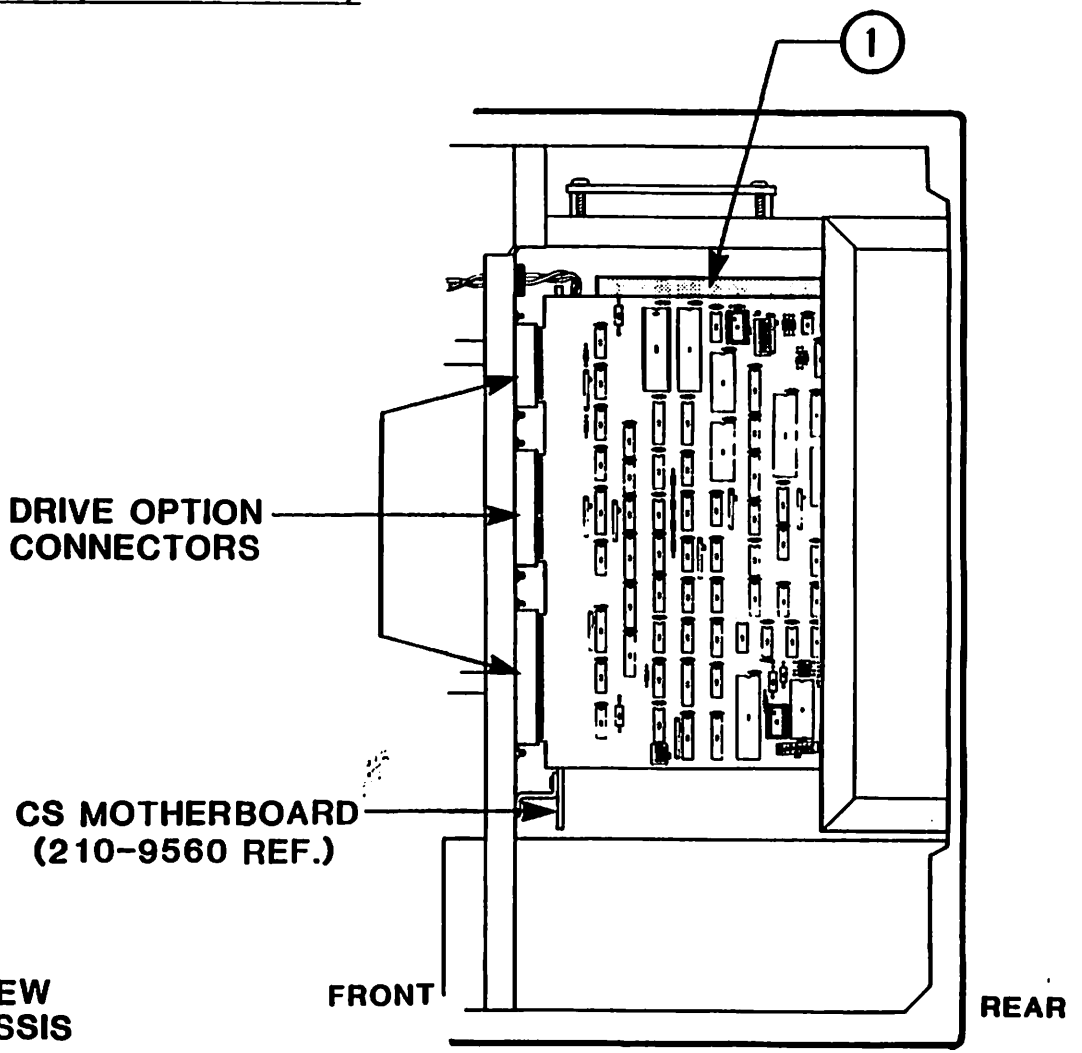


FIG. 2 RIGHT SIDE VIEW

(WANG) LABORATORIES INC ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	4.0	OPERATION	SET POWER SUPPLY VOLTAGE	ISSUE / REV. / TYPE

A. SET THE VOLTAGE SWITCH ON THE POWER SUPPLY AS FOLLOWS:

FOR 167 ASSEMBLIES SET SWITCH TO 230V 50Hz. (INTERNATIONAL)

FOR 187 ASSEMBLIES SET SWITCH TO 115V 60Hz. (DOMESTIC)

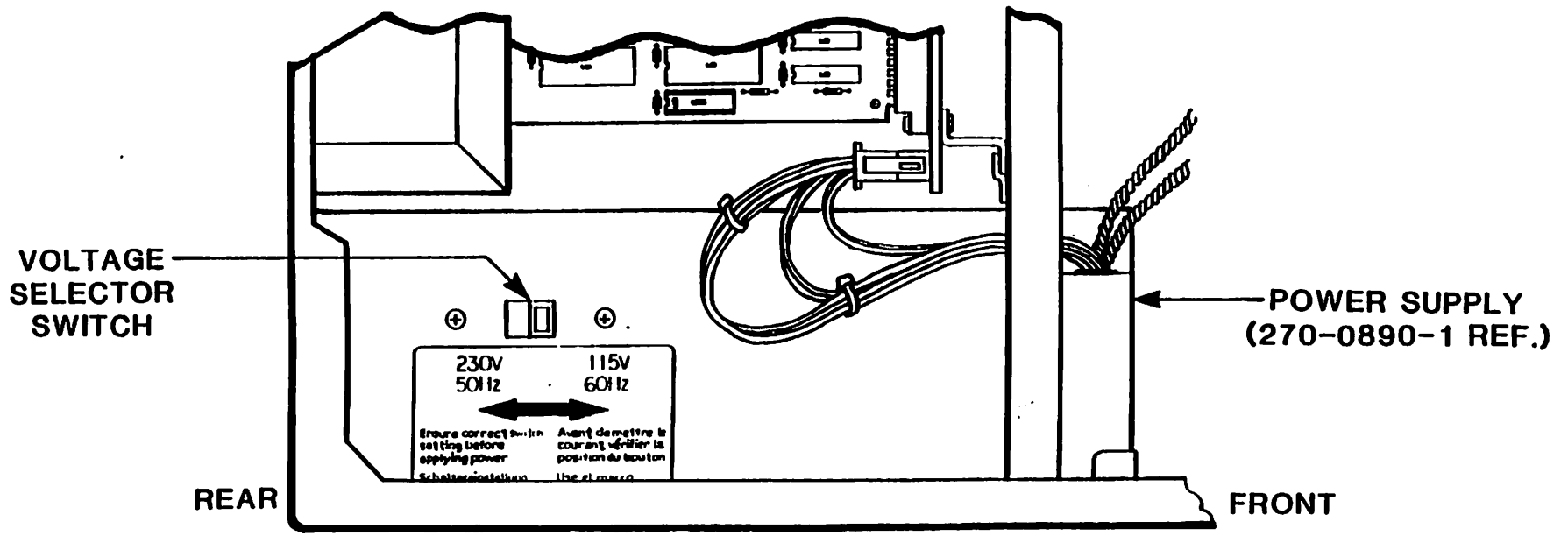


FIG. 1
LEFT SIDE VIEW
OF CHASSIS

WANG LABORATORIES INC.

ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	4.5	OPERATION	QC INSPECTION (INTERNAL)	ISSUE / REV. / TYPE

PERFORM INTERNAL INSPECTION

REFER TO OPERATION 0.5 "INSPECTION GUIDELINES".

(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	5.0	OPERATION	FINAL ACCEPTANCE TEST	ISSUE / REV. / TYPE

PERFORM SYSTEM TEST USING T.P. 167/187-3543 THROUGH -3546.

WANG LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	6.0	OPERATION	APPLY LABELS	ISSUE / REV. / TYPE

A. 1. 615-3872 LABEL, CORP. SERIAL NO. (3 PARTS)
2. 615-4282 LABEL, MODEL NO.

APPLY THE SMALL PART OF THE SERIAL NO. LABEL TO THE FRONT BEZEL (449-1577 REF.) BELOW THE WANG LOGO (451-3727 REF.) ON CENTER AT APPROXIMATE LOCATION. APPLY ONE OF THE LARGER PARTS OF THE SERIAL NO. LABEL TO THE INSIDE UPPER RIGHT OF THE CHASSIS. APPLY THE OTHER LARGE PART OF THE LABEL TO THE OUTSIDE LOWER LEFT REAR OF THE CHASSIS, AS SHOWN.
APPLY THE MODEL NO. LABEL TO THE LOWER LEFT REAR OF THE CHASSIS.

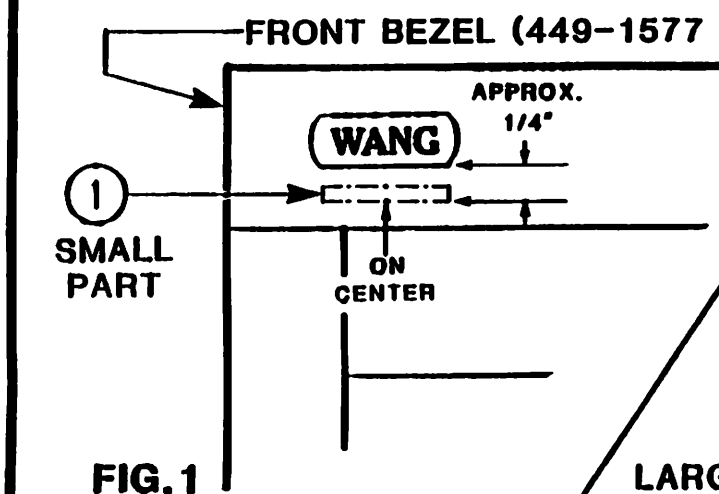


FIG.1
UPPER LEFT CORNER OF FRONT BEZEL

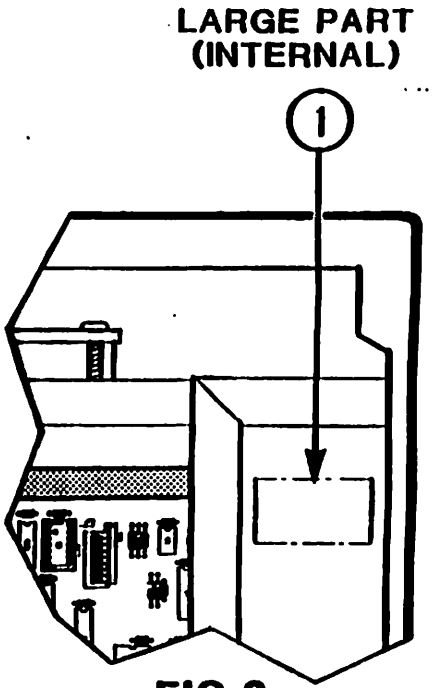


FIG.2
INSIDE UPPER RIGHT REAR OF CHASSIS (RIGHT SIDE VIEW)

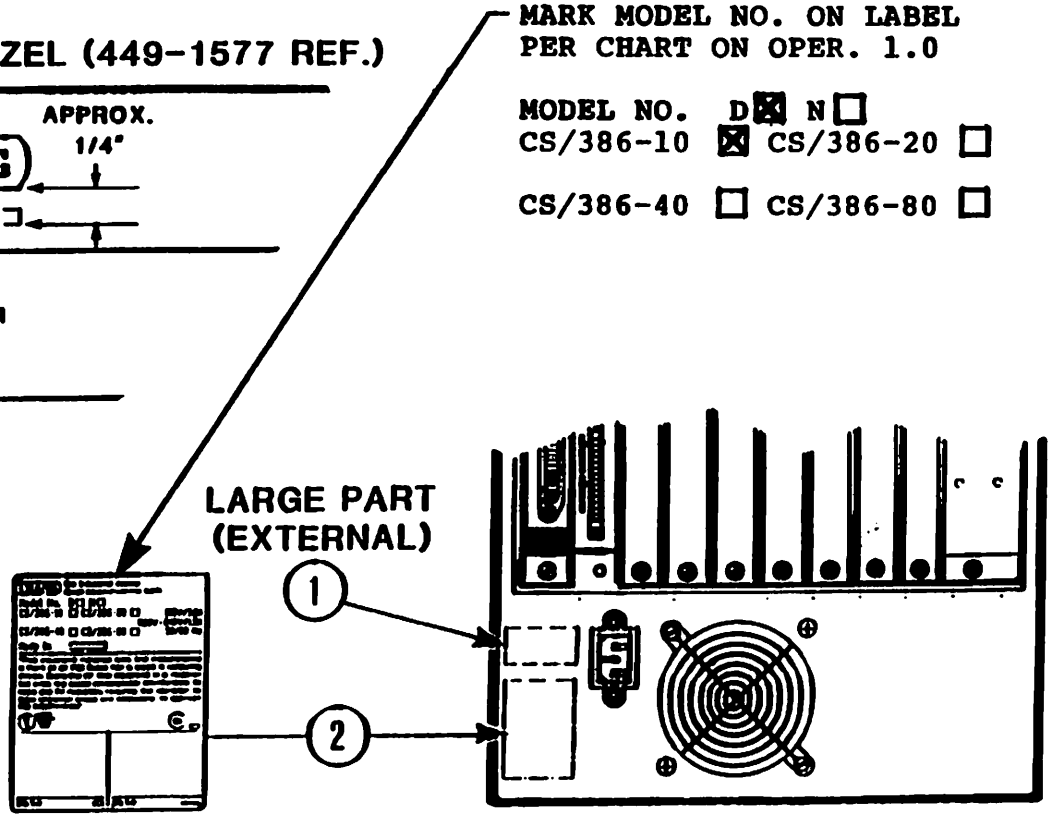


FIG.3 REAR VIEW OF CHASSIS

WANG LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 2	
OPER. NO.	7.0	OPERATION	MOUNT/SECURE COVERS	ISSUE	REV.	TYPE

A. MOUNT THE L.H. AND R.H. COVERS TO THE CS-D/N FRAME BY INSERTING THE FRONT BRACKETS OF THE COVERS FIRST AND THEN PUSHING DOWN INTO POSITION.

NOTE: CHECK INSIDE OF R.H. COVER FOR SWITCH SETTING LABEL.

a) 458-3899 CS-D/N FRAME (WELD) REF.
b) 458-5028 COVER, L.H. (WELD) REF.
c) 458-5029 COVER, R.H. (WELD) REF.
d) 615-4004 LABEL, SWITCH SETTING REF.

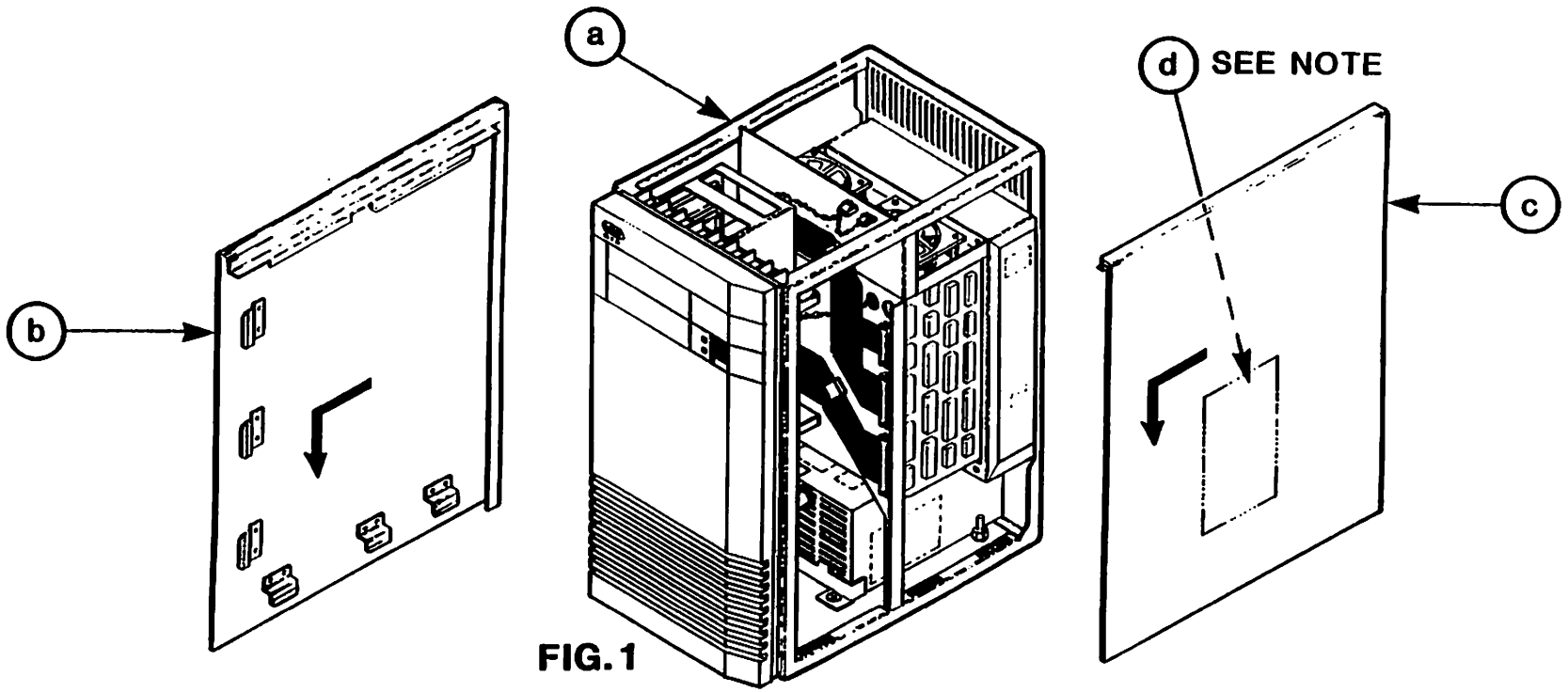


FIG. 1

WANG LABORATORIES INC ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 2 OF 2
OPER. NO.	7.0	OPERATION	MOUNT/SECURE COVERS	ISSUE / REV. / TYPE

B. MOUNT THE TOP COVER TO THE FRAME BY INSERTING THE FRONT BRACKET OF THE TOP COVER UNDER THE FRONT LIP OF THE FRAME AND SECURE WITH HARDWARE, AS SHOWN.

a) 458-5027 COVER, TOP (WELD)
b) 650-4120 SCR, 8-32 x 3/8 PN HD PHL (2)

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

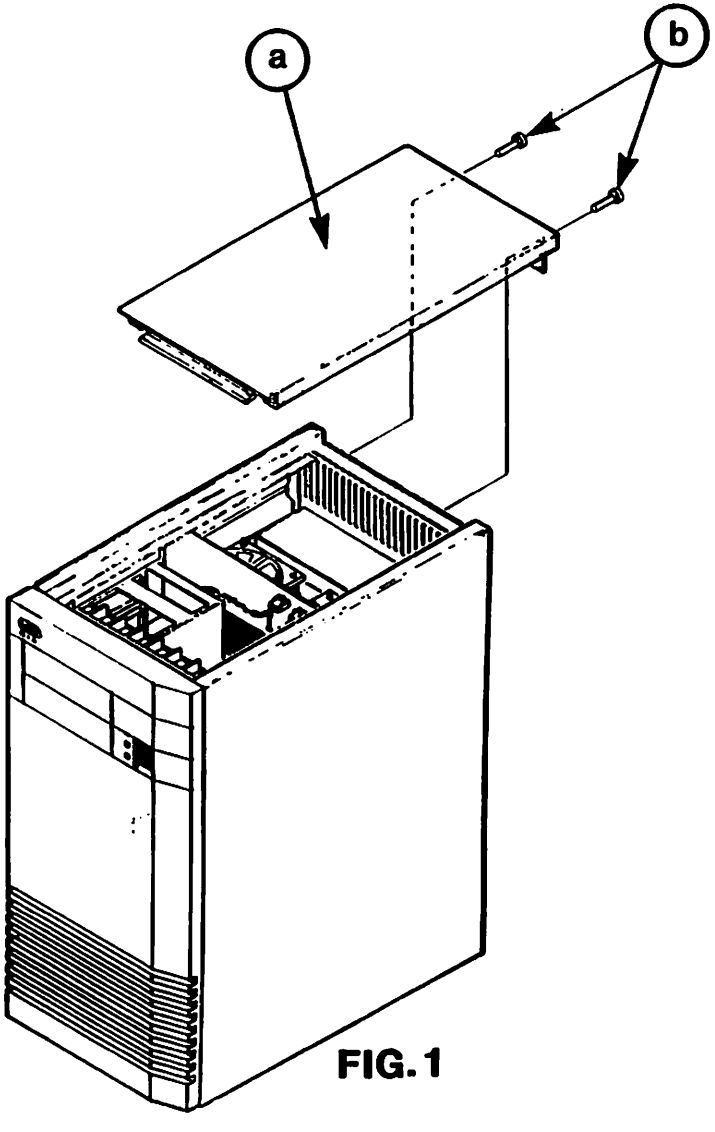


FIG. 1

WANG LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1		
OPER. NO.	7.5	OPERATION	HY-POT TEST	ISSUE	REV.	TYPE

A. HY-POT PER SPI 10-605

ATTACH THE HY-POT GROUND PROBE TO THE BLANK BRACKETS (455-0093 REF.) LOCATED ON THE REAR OF THE CABINET ASSEMBLY AS SHOWN ON ILLUSTRATION BELOW (UNPAINTED SURFACE).

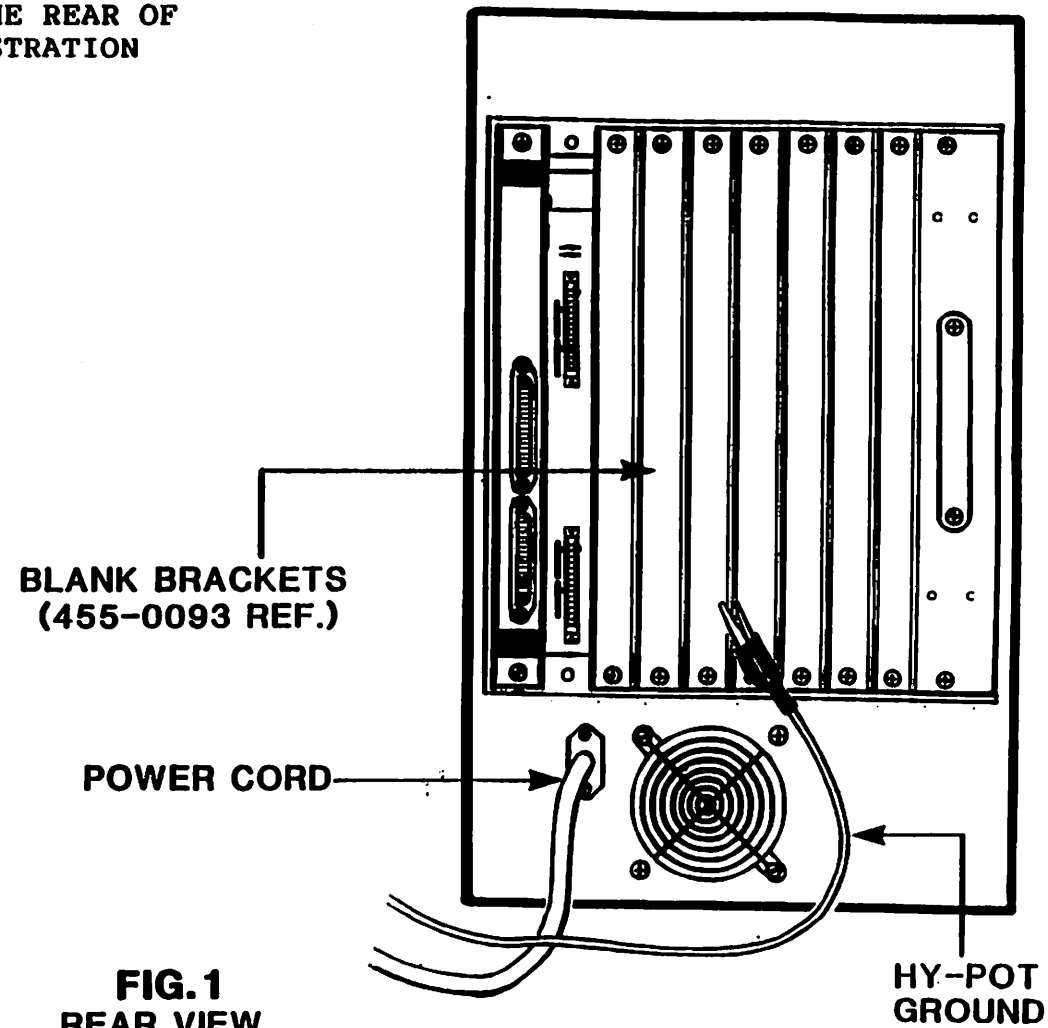


FIG. 1
REAR VIEW
OF CHASSIS

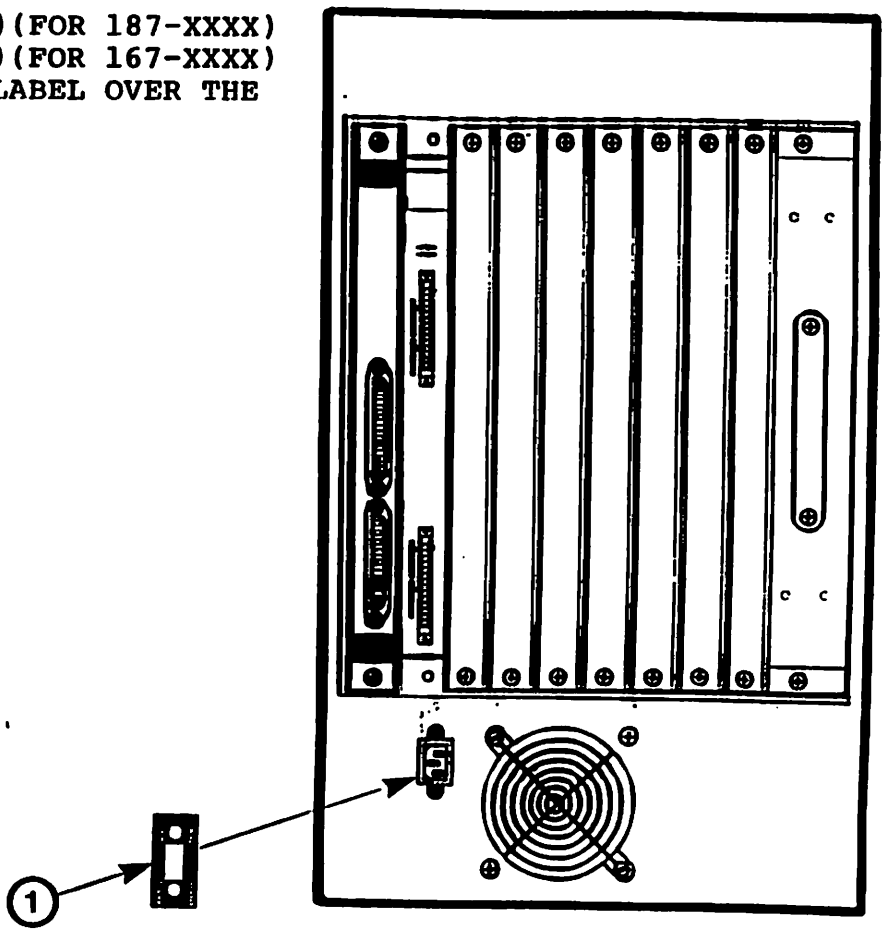
PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	8.0	OPERATION	QC INSPECTION (EXTERNAL)	ISSUE / REV. / TYPE

PERFORM INTERNAL INSPECTION

REFER TO OPERATION 0.5 "INSPECTION GUIDELINES".

A.

1. 615-2029 VOLTAGE WARNING LABEL (115V)(FOR 187-XXXX)
   615-2071 VOLTAGE WARNING LABEL (230V)(FOR 167-XXXX)
   ATTACH THE APPROPRIATE VOLTAGE WARNING LABEL OVER THE AC PLUG AS SHOWN.



(WANG) LABORATORIES INC. ASSEMBLY SHEET

PART NO.	167/187-3543-3546	DESCRIPTION	CS/386 CPU WITH DPU - FINAL ASSY	SHT. 1 OF 1
OPER. NO.	9.0	OPERATION	PACKAGING	ISSUE / REV. / TYPE

A. THE FOLLOWING ITEMS ARE ALL PART OF THE SHIPPING PACKAGE, 290-0685 AND **290-0685-02

a) **685-0100 EDGE PROTECTOR (4)
b) **685-0474 TAPE 2" CLEAR POLY (A/R)
c) **685-0664 STRAPPING POLY .50 (A/R)
d) **685-0665 SEAL STRAPPING FOR .50 (2)
e) 685-0723 BAG GUSSET 23 x 17 x 36
f) 685-2410 FOLHSC 27.13 x 20.00
g) 685-2411 PALLET 28.00 x 20.88
h) 685-2412 CUSHION ASSY, TOP

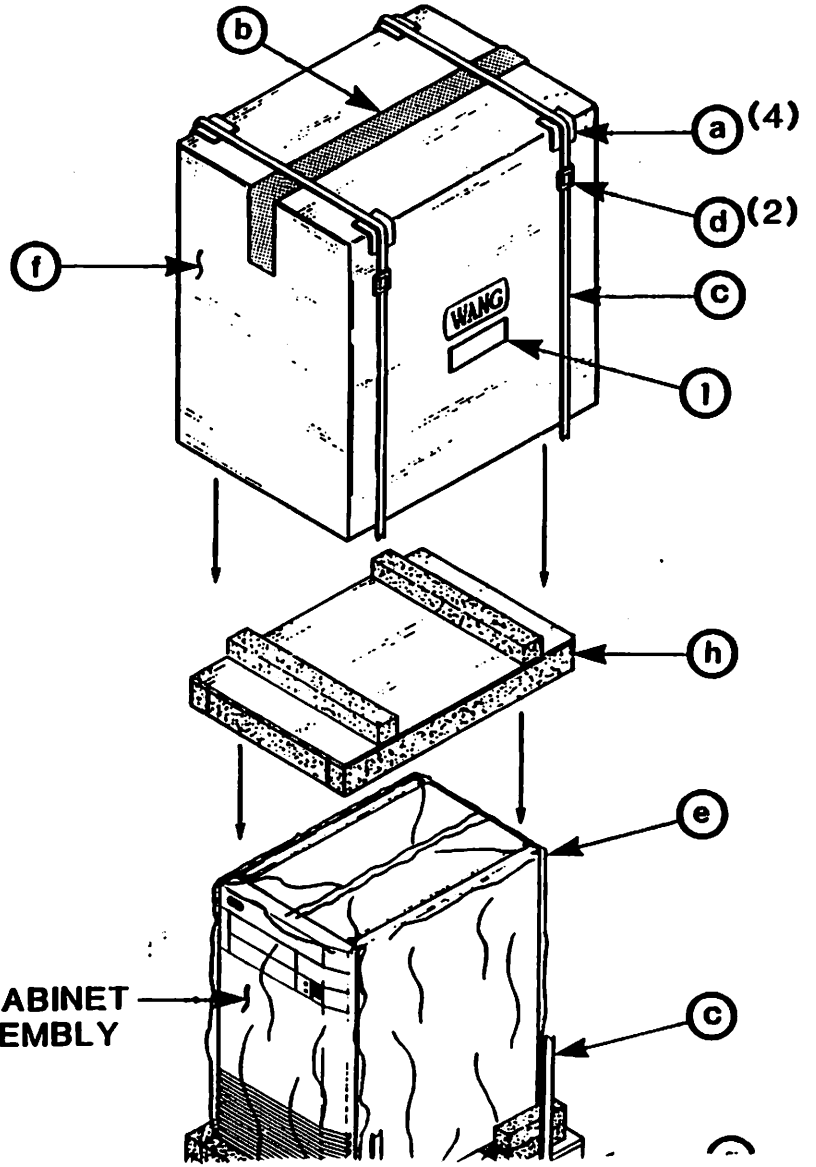
PLACE CABINET ASSEMBLY ON CUSHION PALLET, AS SHOWN. PLACE GUSSET OVER CABINET AND PLACE TOP CUSHION ASSEMBLY ONTO CABINET ASSEMBLY, AS SHOWN.

SET UP BOX, FOLD TOP FLAPS OVER AND SEAL WITH 2" CLEAR TAPE. PLACE BOX OVER CABINET, AS SHOWN.

RUN POLY STRAPPING UNDER CUSHION PALLET AND OVER THE TOP OF THE BOX, USE EDGE PROTECTORS ON THE TOP OF THE BOX. SECURE STRAPPING USING STRAPPING SEALS, AT POSITIONS AS SHOWN.

1. 615-2265 LABEL, DOCK MERGE

APPLY LABEL AT POSITION, AS SHOWN.



WANG

MANUFACTURING TEST PROCEDURE

0666S

PART NO. 167/187-3539-3542

SHEET 1 OF 6

DATE 09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386-10N/20N 40N/80N	167/187-3539-3542	RUN-IN/FINAL TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT. ENGR. E. Dougherty 9/12/89	
Q.C. REVIEW Bob Donahue 9/14/89	PILOT ENGR. Tom Mahoney 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S.CLARK

Distr. VS

WANG

MANUFACTURING TEST PROCEDURE

PART NO. 167/187-3539-42

SHEET 2 OF 6

DATE 09/14/89

TITLE

CS386-N (167/187-3539 THRU 3542)
RUN-IN/FINAL TEST

1. PURPOSE

1.1 To allow an operator to thoroughly test the CS386-10N thru CS386-80N (167/187-3539-3542).

1.2 To standardize the testing of the CS386-N.

2. SCOPE

2.1 This procedure applies to the testing of the 167/187-3539 thru 167/187-3542 only.

3. REFERENCES

3.1 Guidelines for Writing Test Procedures (PROC-0009)

3.2 Hypot Test Documentation (SP1-10-605).

3.3 Appendix A (Safety Instructions).

4. RESPONSIBILITIES

4.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURE (PROC-0009) section 4., for a detailed listing of responsibilities.

5. HARDWARE REQUIREMENTS

5.1 (1) 2236DE Workstation or equivalent

5.2 (1) 2275 Disk Drive

5.3 (1) 210-6541 Disk Controller

5.4 (1) 212-3012 Triple Controller

5.5 (1) 8022A Multimeter (voltage meter)

6. SOFTWARE REQUIREMENTS

6.1 (1) CS386 BASIC-2 O.S. (rev 1.0 or greater)

6.2 (1) CS386 Customer Diagnostics (rev 1960 or greater)

7. DOCUMENTATION REQUIREMENTS

7.1 167/187-3539 thru 167/187-3542 Assembly Process Sheet.

TITLE

CS386-N (167/187-3539 THRU 3542)
RUN-IN/FINAL TEST

8. DESCRIPTION

8.1 Run-In will be 24 error free hours or six hours if the CPU PCB was previously Run-In for 24 hours in a specified Run-In chassis. If an error occurs and the solution is to replace the CPU board, the system must be run-in for an additional 24 hours. If the error correction is anything other than a board (i.e. power supply or chassis), the system will also be run-in for an additional time period.

NOTE: BEFORE INSTALLING THE CPU PCB, VERIFY THAT J5 IS CORRECT.

J5 [. .] . 212-7129-A, B

J5 . [. .] 212-7129-C, D

MODEL	MEI	CPU PCB
CS386-10N	167/187-3539	212-7129-A
CS386-20N	167/187-3540	212-7129-B
CS386-40N	167/187-3541	212-7129-C
CS386-80N	167/187-3542	212-7129-D

9. PRELIMINARY ASSEMBLY

9.1 Insert the PCB's as shown below:

```
! 2 2 S S S S S S S          2 !
! 1 1 P P P P P P P          1 !
! 0 2 A A A A A A A          2 !
!     R R R R R R R            !
! 6 3 E E E E E E E          7 !
! 7 0                        1 !
! 8 1 I I I I I I I          2 !
! 6 2 / / / / / / /          9 !
!     0 0 0 0 0 0 0            !
```

NOTE: DO NOT APPLY POWER TO THE SYSTEM UNTIL ALL BOARDS HAVE BEEN INSERTED!

TITLE

CS386-N (167/187-3539 THRU 3542)
RUN-IN/FINAL TEST

10. VOLTAGE MEASUREMENT

10.1 Plug the CPU into the correct receptacle (i.e. 50HZ into a 50 HZ).

10.2 Add an 7129-X CPU/MEM PCB and a 212-3012 Triple Controller PCB as a minimum load into any of the available I/O slots while leaving test points TP1 - TP5 accessible.

10.3 Power up the system and read the voltages as follows (this is the beginning of Run-In):

10.3.1 Voltage readings are taken from the test points labeled TP1 - TP5 on the 9560 motherboard. If voltage readings cannot be adjusted within the stated specification, reject the unit.

10.3.2 The power supply must be partially removed from the chassis to access voltage adjustments.

10.3.3 Attach the negative lead (black) of the voltmeter to the test point labeled TP1.

10.3.4 Attach the positive lead (red) of the voltmeter to TP3. This is the +5V measuring point. The required voltage is +5.00 to +5.25VDC; +5.00 VDC optimum. If the voltage is outside these limits, adjust using a non-metallic screwdriver by turning the pot on the lower left hand side of the switching power supply facing the CPU board. If it cannot be adjusted within the stated specifications, reject the system.

10.3.5 Attach the positive lead (red) of the voltmeter to TP4. This is the +12V measuring point. The required reading is +12.00 to 12.20 VDC; +12.00VDC optimum. If the voltage is outside these limits, adjust using a non-metallic screwdriver by turning the pot on the lower right hand side of the switching power supply facing the CPU board. If it cannot be adjusted within the stated specifications, reject the system.

TITLE

CS386-N (167/187-3539 THRU 3542)
RUN-IN/FINAL TEST

10. VOLTAGE MEASUREMENT

10.3.6 Attach the positive lead (red) of the voltmeter to TP2. This is the -5V measuring point. The required voltage reading is -4.80 to -5.20 VDC; -5.00 VDC optimum. This voltage is not adjustable. If the reading does not meet the specification, reject the system.

10.3.7 Attach the positive lead (red) of the voltmeter to TP5. This is the -12V measuring point. The required voltage reading is -11.50 to -12.50 VDC; -12.00 VDC optimum. This voltage is not adjustable. If the reading does not meet the specification, reject the system.

11. INITIAL RUN IN

11.1 After ensuring that the voltages are correct, power down the unit. Connect the disk cable to the disk output of the triple controller.

11.2 Power UP the unit. The following message will appear on the workstation screen:

MOUNT SYSTEM PLATTER PRESS RESET

11.3 Press the RESET button. The following prompt will appear on the screen:

SF ?

11.4 Press the SF0 key. The "User Menu" will appear on the workstation screen.

11.5 Select "Diagnostics". Press the RUN key.

11.6 Run this diagnostic for 6 hours.

TITLE

CS386-N (167/187-3539 THRU 3542)
RUN-IN/FINAL TEST

11. INITIAL RUN IN (cont'd)

11.7 Place six (6) 478-0863 faceplate PC blanks onto the first six I/O slots.

11.8 Once the unit has been run-in for the required time period, Q.C. must verify run-in data.

11.9 Power down the unit.

11.10 If the unit has passed with "0" errors, fill out the appropriate paperwork and complete assembly per 167/187-3539-3542 Assembly Process Sheet.

11.10.1 If the unit did not pass with "0" errors, fill out the appropriate paperwork, noting the discrepancy, and send the unit to the REPAIR AREA.

11.11 Run a standard Hypot test (reference Documentation SP1-10-605).

APPENDIX A

SAFETY INSTRUCTIONS

1. No unauthorized person shall use or be permitted to use the testing equipment.

2. Testing will be performed on a wooden bench whenever possible.

3. There shall always be two knowledgeable persons in the immediate area whenever the dielectric voltage-withstand test is being performed.

4. No AC outlet shall be used that is not properly grounded.

5. No adapters of any kind shall be used on the power cord for Hypot tester.

6. Personnel performing the test shall be alert, cognizant, and maintain a constant awareness that lethal high voltages are present.

7. There shall be periodic checking of all wires, clips, and all insulation relating to the test equipment.

8. The test area should be clear of debris.

9. Do not touch the UUT while testing is being performed.

WANG

ASSEMBLY PROCEDURE

PART NO.	DESCRIPTION	MODEL	TYPE
167/187-3543-3546	CS/386 CPU WITH DPU - FINAL ASSY		

PREP. BY	MFG. ENG. APPROVAL	Q. C. ENG. REVIEW
Bob Graves	Tom Mahoney 9/8/89	Bob Donoghue 9/11/89

ISSUE DATE	ISSUE	BOM REV.	OPER. NO.	SHT. NO.	ECO/MPC NO.	DESCRIPTION	WRITER
9/12/89	A	AB	ALL	ALL		RELEASE TO MANUFACTURING	

DISTRIBUTION:

VS

FAX

WANG

TO: JUAN PENA

COMPANY: WANG LABS PR

LOCATION: PUERTO RICO

FAX #: (809) 734-8725

FROM: STEVEN ANTHONY

DATE: 12/13/89

# of PAGES (Including Cover): 8

1001 Pawtucket Blvd
LOWELL, Ma

TO: JUAN PENA

FROM: STEVEN J. ANTHONY

SUBJECT: 2200/386 RUN-IN OF 212-7129A-D PCB SET

DATE: 12 DEC 89

In October of 1989, the Pawtucket Boulevard Manufacturing facility began production of the the 2200/386 pcb card set, 212-7129A-D (PCB 210-9561A-D and PCB 210-9562). Due to the reschedule of site sourcing at this time, PCB Run-In test equipment was not available and therefore Functional Run-In of these PCB's was not available in Pawtucket Boulevard. In lieu of the complete run-in capabilities, the PB maufacturing site has been performing a limited Built In Test for 24 hours as a prerequisit to final shipment.

Due to the lack of Run-In equipment, which is currently on order, and until this Run-In equipment becomes operational in Pawtucket Boulevard, it is recommended by the PB PCB Test Engineering group that at least a 12 HR Run-In Test be performed in Wang Labs Puerto Rico per the attached Run-In test Procedure titled "CS386 Run-In Test". If there are any questions, please contact me at Tel. (508) 656-4478.

Steven J. Anthony

WANG

MANUFACTURING TEST PROCEDURE

0664S

PART NO.	212-7129A-D
SHEET	1 OF 6
DATE	09/14/89

TITLE	PART NUMBER	TYPE OF TEST
CS386	210-9561A-D 210-9562 212-7129A-D	RUN-IN TEST

APPROVAL	APPROVAL	APPROVAL
TECHNICAL WRITER 9-12-89 Suzanne M. Clark	PRODUCT SUPT/ENGR. E. Dargeault 9/12/89	
Q.C. REVIEW Bill Dreyfus 9/14/89	PILOT ENGR. Tom Mahony 9/12/89	

REVISION HISTORY

REV.	DESCRIPTION	SHT.	MPC/ECO	DATE	CHANGED BY
A	PRELIMINARY DRAFT			09/08/89	
B	CHANGES PER ENGINEERING			09/12/89	S. CLARK
C	SMALL CHANGES	n/a	n/a	09/12/89	S. CLARK

Distr. VS Board Area

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

1. PURPOSE

1.1 To detail the steps necessary when performing a RUN-IN test on the CS386 CPU assembly (212-7129A-D).

NOTE: THERE ARE TWO METHODS THAT CAN BE USED TO RUN-IN THE CPU ASSEMBLY. THIS PROCEDURE COVERS RUNNING THE ASSEMBLY WITHIN THE CS386 SYSTEM. SEE APPENDIX 7.1 FOR A PROCEDURE ON HOW TO RUN THE ASSEMBLY USING THE BUILT IN TEST (BIT).

2. REFERENCES

2.1 None required.

3. RESPONSIBILITIES

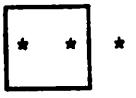
3.1 Refer to GUIDELINES FOR WRITING TEST PROCEDURES (PROC-0009), section 4., for a detailed listing of responsibilities.

4. EQUIPMENT REQUIREMENTS

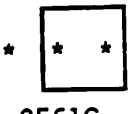
DESCRIPTION	PART NUMBER	QTY.
2436 Workstation	187-3249 or equiv	1
Test fixture which includes:		
- 360K Floppy	289-0846	1
- 20MB Winchester	289-0849	1
- DPU PCB	212-7113	1
- Triple Controller	212-3012	1

5. SETUP PROCEDURE

5.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:



9561A
9561B



9561C
9561D

5.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

5.4 Insert the assembly under test (212-7129A-D) into the CPU position of the test bed motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST

6.1 Power UP the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

6.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

6.3 The following message will appear:

Mount system platter
Press Reset

6.4 After the LED on the floppy drive has extinguished, press the SHIFT and RESET keys simultaneously (SHIFT/RESET).

6.5 The following prompt will appear on the monitor screen:

Key SF?

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

6. ACTUAL TEST (cont'd)

6.6 Press the SF0 key. The following screen will appear:

```
                    ***** SYSTEM SOFTWARE *****

Select item with SPACE & BACKSPACE.                    MEMORY 1024 K
Key RUN to execute, CLEAR or PREV for previous screen  TERMINAL 1




                          # Multiuser BASIC-2

                          . Diagnostics
```

6.7 Select "DIAGNOSTICS". Press the RUN key. The "Customer Diagnostic" screen will appear.

6.8 Allow the test to run for a specified period.

6.9 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Disconnect the battery and remove the assembly from the test fixture.

6.10 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

6.11 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST

7.1 RUN-IN TEST (BIT):

7.1.1 EQUIPMENT REQUIREMENTS

- One 2436 Workstation (187-3249 or equivalent)
- One Cabinet Assembly CS-D/N (279-0873)
- One Triple Controller (212-3012)

7.1.2 SETUP PROCEDURE

7.1.2.1 Verify that the jumper (J5), located on the 210-9561X board, is positioned as shown below:

9561A
9561B

9561C
9561D

7.1.2.2 Connect the battery (from the test fixture) to location J2 of the 210-9562 board.

7.1.2.3 Attach jumper to location J7 of the 210-9561 board.

7.1.2.4 Insert the 212-3012 Triple Controller into any available slot.

7.1.2.5 Attach a workstation cable to the terminal position of the 212-3012 Triple Controller.

7.1.2.6 Insert the assembly under test (212-7129A-D) into the CPU position of the motherboard.

TITLE

CS386 (212-7129A-D)
RUN-IN TEST

7. APPENDIX - ALTERNATE TEST (cont'd)

7.1 RUN-IN TEST (BIT): (cont'd)

7.1.3 ACTUAL TEST

7.1.3.1 Power ON the test bed. The following screen will appear:

COPYRIGHT, WANG LABORATORIES, INC., 1989 REV 5930

SRAM 256KB
DRAM XXXXKB

LOOP COUNT: XX

7.1.3.2 Verify that the amount of "D RAM" tested is equal to that expected for the assembly under test (see above). If the amount is less than expected, the assembly has failed.

7.1.3.3 The assembly under test will continue to cycle for a specified run-in period (or until an error is detected).

7.1.3.4 Run the diagnostic for a specified period.

7.1.3.5 When complete, press the SHIFT and RESET keys at the same time (SHIFT/RESET). Power down the test bed. Disconnect the battery and remove the assembly from the test fixture.

7.1.3.6 If the assembly has run error free, fill out the appropriate paperwork and submit the assembly for FINAL ACCEPTANCE TESTING.

7.1.3.7 If a failure was detected, fill out the appropriate paperwork, noting the discrepancy, and send the assembly to the REPAIR AREA.

12.2 Magnetic Devices ILLUSTRATED PARTS

	Wang Part No.	Vendor Part No.	
5 1/4" HH 360KB Floppy	278-4033	JU455	725-0142
5 1/4" HH 1.2MB Floppy	278-4055	JU475	725-0232
5 1/4" HH Cassette Tape	725-1481	MT-2ST	725-0258
10 MB HH Removeable Disk	278-4049	RH5130/360	725-0195
20 MB HH Winchester	278-4062	ST225/D5126	725-0242
32 MB FH Winchester	278-4034	Q540 QUANTUM	725-0144
32 MB FH Winchester	278-4069	1323 MICROPOLIS	725-0254
64 MB FH Winchester	278-4054	1325W	725-0231
112 MB FH Winchester	725-0271	Maxtor 7 x 16	725-0211
140 MB FH Winchester		Maxtor 14 x 10	
32 MB HH Winc (42 meg)	725-3493	CDC Mag Periph 94205-53	
I/O Cable	220-0364		
Winc A Cable	220-3629		
Winc B Cable	220-3630		
Floppy Cable	220-3629		
Cassette Cable	220-3628		
TEAC Tape Cleaning Kit	725-7374	TEAC # TZ 380	
CDC Imprimus Mag Periph MN94205-53 HH 42 Meg	725-3493	MN94205-53	
150 Meg Tape Drive	725-4893	TEAC MT-2ST/N55-20-U	
Standoffs for I/O Cable	462-0611		

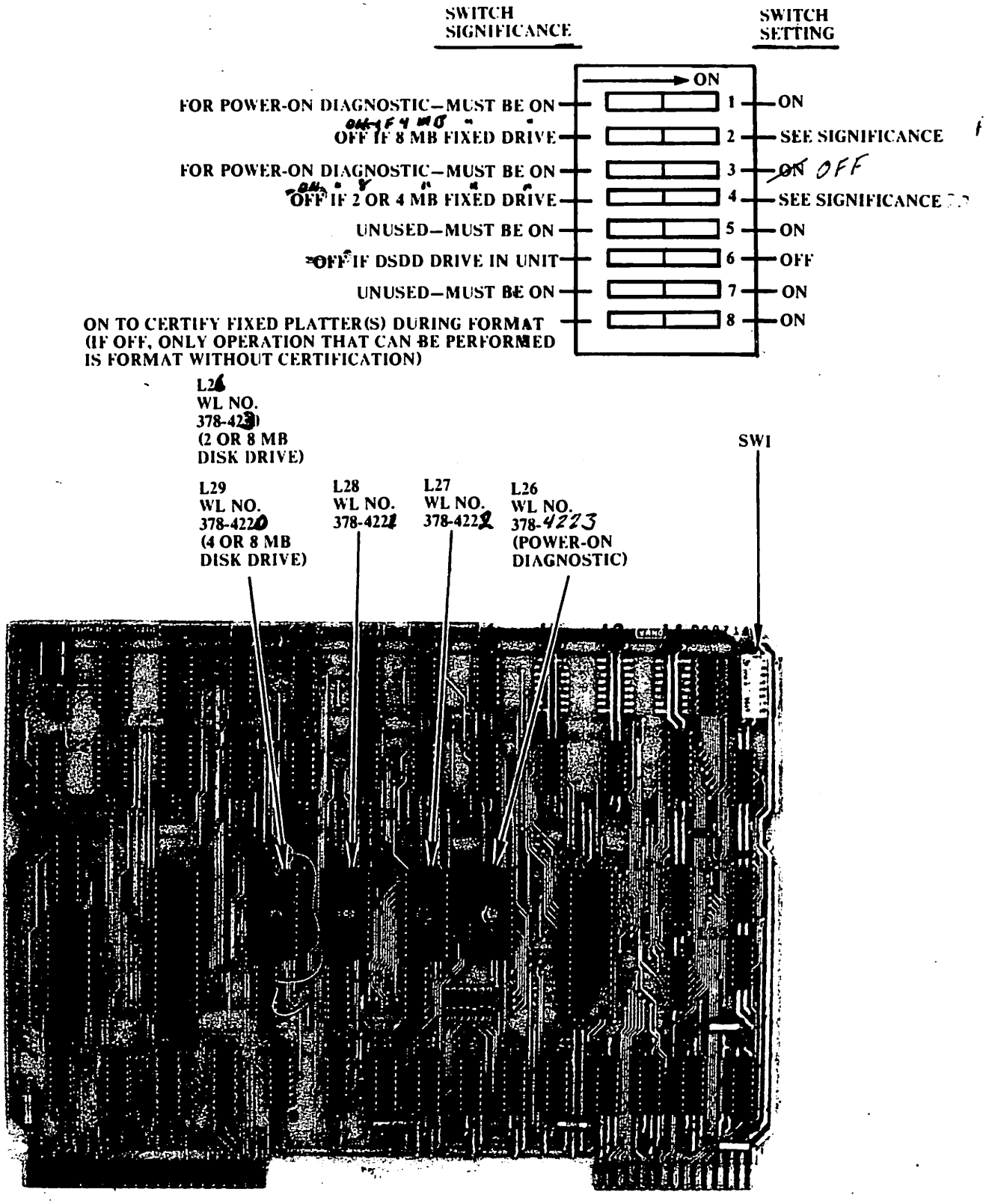


FIGURE 8-15 WL NO. 210-7696-A MICROCOMPUTER/MEMORY (DPU)

October 24, 1991

2200 386 TURBO

The 386 Turbo is the latest edition to the 2200 family. It consists of 4 major components, a new CPU motherboard, one version compatible to the CS-D and CS-N, a 2nd version compatible to the CS and MicroVP, a new 386 based CPU board, a new 16 port MXF terminal controller board, and a new printer/disk controller. Together this new hardware provides dramatic improvement in performance over existing 2200 hardware. Most hardware and software compatible to the 386 is 100% compatible to the 'Turbo'. Some of the disk drives such as the 2270A are still being evaluated to determine if they can be made to work with the Turbo. As for the software, changes may be necessary for those programs which reference a status byte in the O/S or the CPU ID number. There could also be problems with non-standard GIO commands. See TSB HWT 9640 due out in November 1991 or the updated CS Maintenance Manual, 741-1769A, which includes the Turbo for details under 'Compatibility'. Additionally, for maximum performance, programs must be in 'NEW' or '386' format. In conjunction with the new Operating System required by the 'Turbo' the following major enhancements have been made:

- supports up to 64 user partitions.

- supports up to 64 terminals. 32 is the recommended max currently.

- supports from 4 Meg to 32 Meg of memory.

- extended RAM Disk capabilities, all non-partitioned memory, address 340.

- CPU processing speed twice as fast as the 386, 4 to 6 times faster than the VLSI and MVP/LVPs.

- supports 3 byte addressing which will allow disk surfaces greater than the current 16 Meg restriction. Will only be supported on the DS with the next prom revision, R4, due out the end of the year and with the Turbo SCSI Controller due out the beginning of 92.

- new $MOVE! command simplifies conversion of programs from 'OLD' to 'NEW' format.

- Disk I/O performance is up to 25% faster with existing drives. The percentage of improvement will vary according to the number of users on the system and amount of disk access. In the past, disk access was strictly a serial function. If the disk access time for a particular function was '5' seconds, then every user running that function would require '5' seconds. The new disk controller (22C11-2) is an intelligent controller and can handle disk I/O on it's own while the CPU does other tasks. This allows an improvement in performance that increases as the number of users increases. On a system of 1 to 3 users an improvement in disk performance may not be seen as basically the disk drives themselves are the slowest factor and not the interface. Some changes may be necessary with some software for maximum disk performance. Changing programs on disk to 386 or 'NEW' format is highly recommended.

- new SCSI Controller built for the Turbo provides 7-10 times the throughput of the DS. Due out beginning of '92.

'386' TURBO CARD SET

MOTHERBOARD: 210-9578 (mandatory) compatible to the CS-D/N only.
210-9583 (mandatory) compatible to the CS and MicroVP only

Switch settings - none

Jumpers - none

Test points - (for 9578) located underneath the 7th I/O slot
(for 9583) exact location to be determined
TP1 - -12V +/-.50 (not adjustable)
TP2 - +12V +/-.05 (pot located inside PS on left side front)
TP3 - +5V +/-.05 (pot located inside PS on left side rear)
TP4 - -5V +/-.05 (not adjustable)
TP5 - +/-0V

Connectors
J34 - 4 pin connector to front panel LEDs (top left from rear) unnecessary on the 9583.
J31 - 5 pin connector to PS (bottom right from rear)
J32 - 3 pin connector to PS (bottom right from rear)
J33 - 2 pin connector to PS (bottom right from rear)

CPU BOARD: 210-9576A (mandatory) consists of 210-9576 Mbrd & 210-9577 Dbrd (comes with all SIMM Memory Modules rewmoved)

The board can be loaded for 4 different memory sizes:

SIMM Part #	Memory Size	SIMM Modules	SW1 on 9576
377-4533	4 Meg	4 1 Meg SIMMs in L3,L10,L18,L29	4 closed only
377-4533	8 Meg	8 1 Meg SIMMs	4 closed only
377-4535	16 Meg	4 4 Meg SIMMs in L3,L10,L18,L29	all open
377-4535	32 Meg	8 4 Meg SIMMs	all open

Jumpers - 210-9576 Motherboard
J4 - OUT (2 pin jumper in top rt corner - for Brd Repair)
J5 - 1-2 for 27C256 E Proms at L50/L64 (ctr of brd above J6)
2-3 for 27C512 E Proms at L50/L64
J6 - IN (2 pin jumper above L59 - for Brd Repair)
J7 - IN (2 pin jumper under rt corner of clk Y1 - for Brd Rpr)
J8 - OUT (2 pin jpr next to SW1 - for Brd Repair)

LED1 - 210-9576 Motherboard Diagnostic Indicator - comes on during power up & goes out if passes diagnostics (lower right corner of SIMMs)

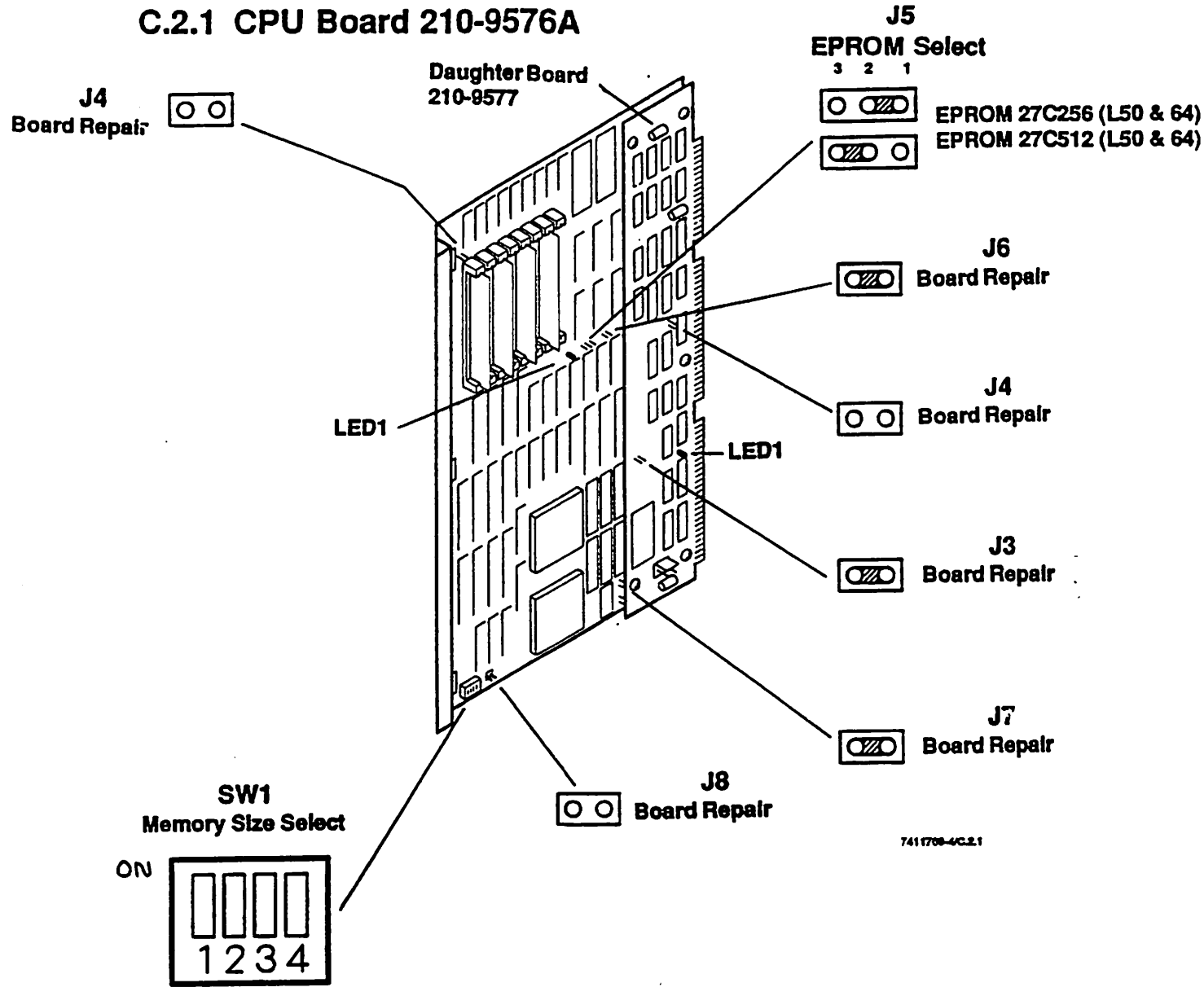
Jumpers - 210-9577 Daughterboard
J3 - IN (2 pin jumper above L18 - for Board Repair)
J4 - OUT (2 pin jumper above L25 - for Brd Repair)

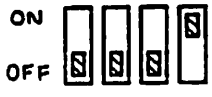
Connectors - 210-9577 Daughterboard
J2 - obsolete. 2 pin conn which was to be used for for Battery (666-1016) Backup for clk. New real-time clock chip L5 with built-in battery eliminates need for connector J2.

LED1 - Diagnostic Indicator - comes on during power up & goes out if passes diagnostics (beside L28)

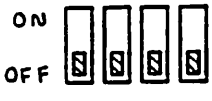
Settings

C.2.1 CPU Board 210-9576A





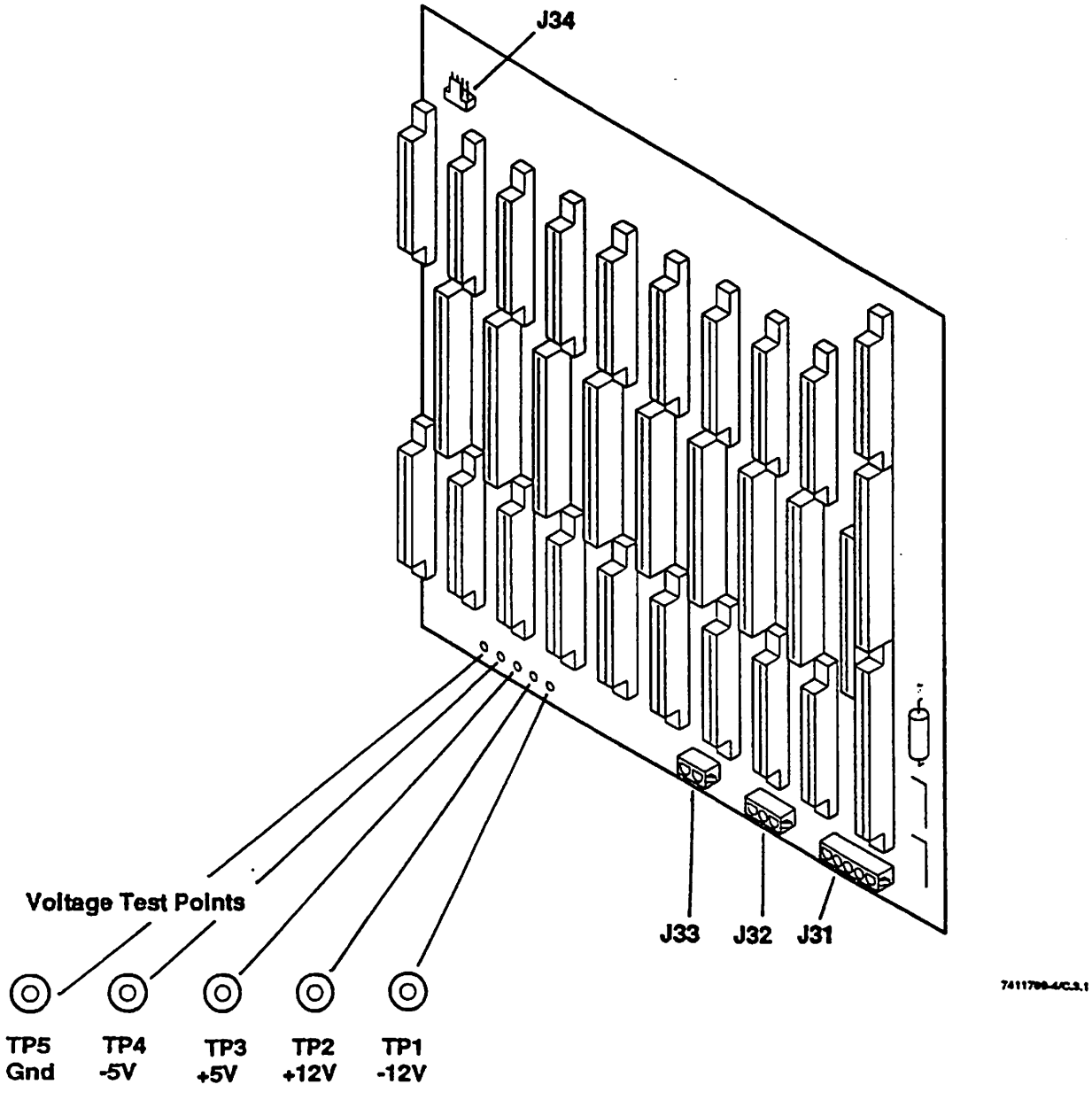
4MB - 4 1MB SIMMS (locations L3, L10, L18, L29) (210-9576-A)
8MB - 8 1MB SIMMS (All locations) (210-9576-B)



16MB - 4 4MB SIMMS (locations L3, L10, L18, L29) (210-9576-C)
31MB - 8 4MB SIMMS (All locations) (210-9576-D)

Controls and Indicators

Motherboard 210-9578



MXF 16 PORT TERMINAL CONTROLLER: 212-9717 (desirable for maximum performance)
- consists of 210-9579A Hi Speed I/O Proc Brd & 210-9580 Term Cont Brd.
- supports all workstations currently supported by the MXE and MXD.
- maximum terminal configuration cannot exceed 64 terminals. Total number of terminal controller boards cannot exceed 4. With 3 MXF boards, you can use only 1 MXE/MXD, with 2 MXFs up to 2 MXE/MXDs, and so forth. In setting up terminal numbers always start with the MXFs first. In numbering the MXE/MXD board as set by it's 4/5 bank switch, count the MXFs as you would MXEs. That is if 1 MXF exists the 1st MXE or MXD would be set as board 2, with 2 MXFs it would be board 3, and with 3 MXFs it would be board 4. The switch settings for the MXE/MXD boards are set the same as they have always been.

External Connectors

J5 - top connector, RS232 type, for term 1 (same as MXE/MXD)
J4 - 2nd connector, RS232 type, for term 2 (same as MXE/MXD)
J3 - 3rd connector, 36 pin Amphenol, for terminals 3 thru 9 (must use special Octopus Adapter Cable, 421-0181, with 36 pin male connector on 1 end and 7 female RS232 conn on other)
J2 - 4th connector, 36 pin Amphenol, for terminals 10 thru 16 (must use special Octopus Adapter Cable, 421-0181, with 36 pin male connector on 1 end and 7 female RS232 conn on other)

LED1 - Self-Test Indicator - on during power up & goes out if passes

Switch Settings - 210-9579 High Speed I/O Processor Board

SW1 sets the MXF Board Number from 1st board to 4th board.
1st MXF (term 1-16) - 1,2,4 ON only: 2nd MXF (term 17-32) - 2,4 ON only
3rd MXF (term 33-48) - 1,4 ON only : 4th MXF (term 49-64) - 4 ON only

Switch Settings - 210-9580 Terminal Controller Board

SW1 thru SW8 control the baud rates for up to 16 terminals.
*** SW1 thru SW8, all sw's OFF - DIAGNOSTIC RUN-IN MODE.
RUN-IN Mode can be run on any MXF board with a terminal attached to port 1. The CPU is inoperable during this test. To run on the 1st MXF, the CPU board must be removed. A loopback connector is required for a channel to pass the test. The test will continually loop however without loopback connectors. The test is used to test the port and gives either a 'Pass or Fail' response. Some PCs or modems could hang the test because of the presence of a signal on a line normally unused by the standard Wang 2200 terminals. A signal on pin 8 would commonly do this.

Loopback Conn: J5/J4 2,3; J3/J2 2,20; 4,22; 7,25; 9,27; 12,30; 14;32; 17,35

PORT Assignments

Terminal #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
switches 1-4	SW1		SW2		SW3		SW4		SW5		SW6		SW7		SW8	
switches 5-8		SW1		SW2		SW3		SW4		SW5		SW6		SW7		SW8

BAUD Rate Settings

38400 =	2,3,4	or	5,6,7	ON only	:	19200 =	1,3,4	or	5,7,8	ON only
9600 =	3,4	or	7,8	ON only	:	7200 =	1,2,4	or	5,6,8	ON only
4800 =	2,4	or	6,8	ON only	:	2400 =	4	or	8	ON only
1800 =	1,2,3	or	5,6,7	ON only	:	1200 =	2,3	or	6,7	ON only
600 =	1,3	or	5,7	ON only	:	300 =	3	or	7	ON only
200 =	1,2	or	5,6	ON only	:	150 =	2	or	6	ON only
134.5 =	1	or	5	ON only	:	110 =		or		ON only

*** Note: All unlisted Baud rates will default to 19200 except all OFF.

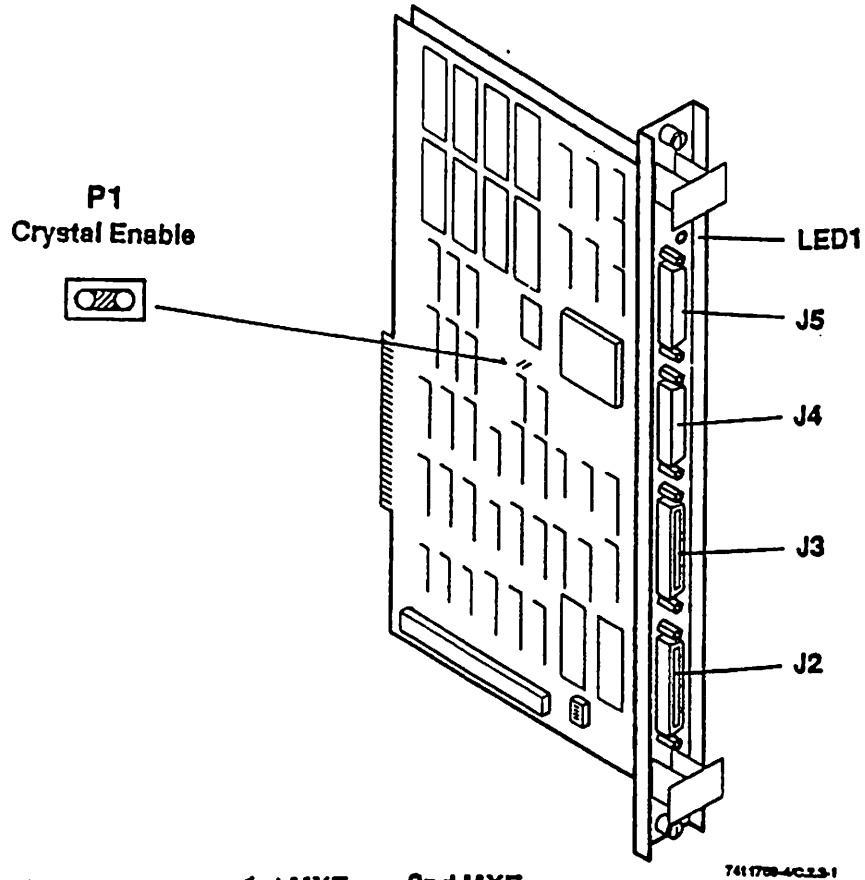
Jumpers

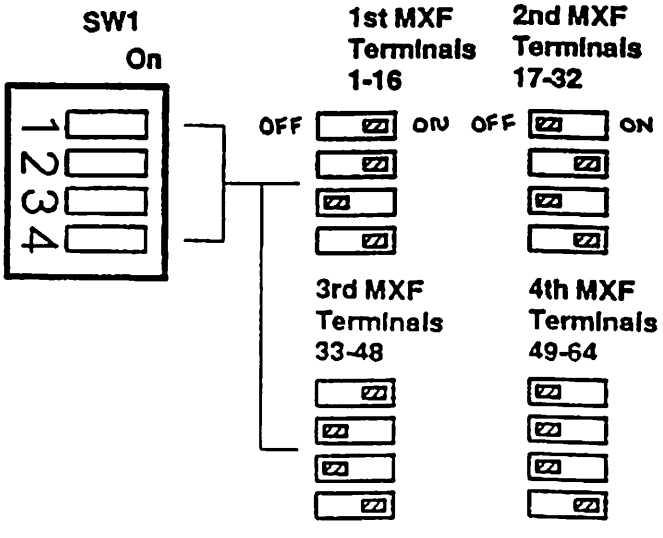
P1 - IN (2 pin jumper on 9579 board next to clock Y1 for MFG)
JP1 - IN (2 pin jumper on 9580 board next to clock Y1 for MFG)

Settings

MXF 16-Port Terminal Controller (212-9717)

210-9579



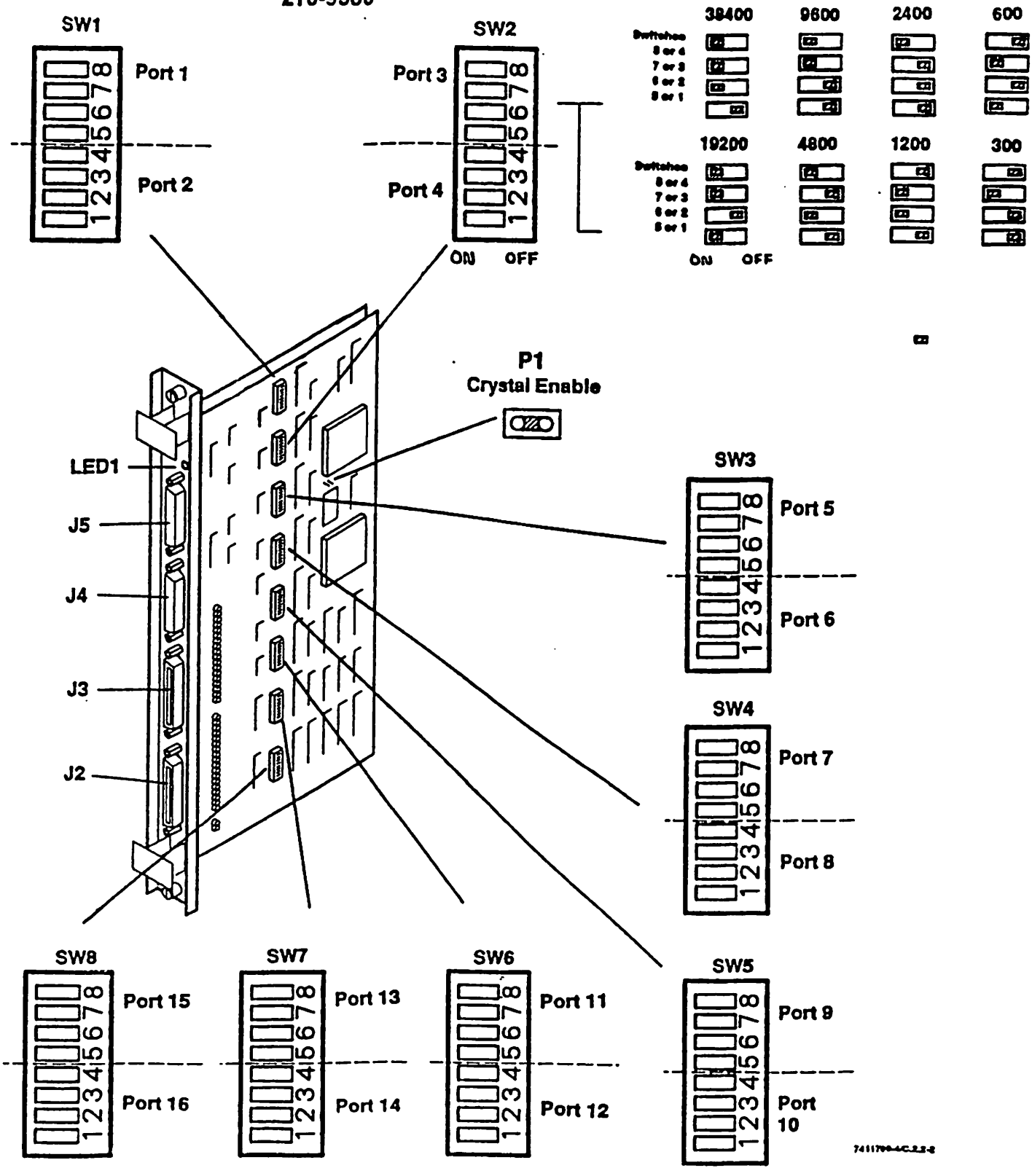


386 TURBO

Settings

MXF 16-Port Terminal Controller (212-9717)

210-9580



22C11-2 PRINTER/DISK (DUAL) CONTROLLER: 212-9718 (desirable for maximum performance. In some situations, some software changes may be required to take advantage of full performance capabilities. Contact the 2200 BASIC-2 Platform Group for further information.)
- consists of 210-9579 Hi Speed I/O Proc Brd & 210-9581 Periph Cont Brd.
- disk port supports all disk drives except SCSI.
- printer port supports all existing 2200 printers.
- mux port can be used as a 22C80 (210-7715) if the disk port is not used.

External Connectors

J4 - Printer port (top connector, cabled directly to printer)
J3 - Disk Mux port (middle connector, allows the controller to be used in place of a 22C80 (7715) which would cable to a CPU port on a 2275 MUX Master, MUX Extender, or similar brd.)
J2 - Disk Port (bottom connector, cabled directly to disk)

NOTE: Only J3 or J2 can be used at 1 time as determined by SW1.

LED1 - Diagnostic Indicator - comes on during power up & goes out if passes diagnostics

Switch Settings - 210-9579 High Speed I/O Processor Board

SW1 sets the disk address for all access through this controller.

```
SW1 -  1   2   3   4
       OFF ON  ON  ON  = address 310 selected
       ON  OFF ON  ON  = address 320 selected
       OFF OFF ON  ON  = address 330 selected
```

Switch Settings - 210-9581 Peripheral Controller Board

SW1 activates the Disk MUX port. If the MUX port is activated, the disk port is inactive. The MUX port is equivalent to a 22C80 (210-7715) controller. It therefore most often will connect to a 210-8824 2275 MUX Master CPU port to share access to the drive attached to the Disk port of the 2275 MUX Master.

```
SW1 - 1   2
      OFF OFF  = Disk Port J2 Active (MUX Inactive)
      OFF ON = MUX Port J3 Active (Disk port inactive)
```

SW2 sets the printer address.

```
SW2 - 1,3,5 ON only = address 215
      2,3,5 ON only = address 216
      1,2,3,5 ON only = address 217
```

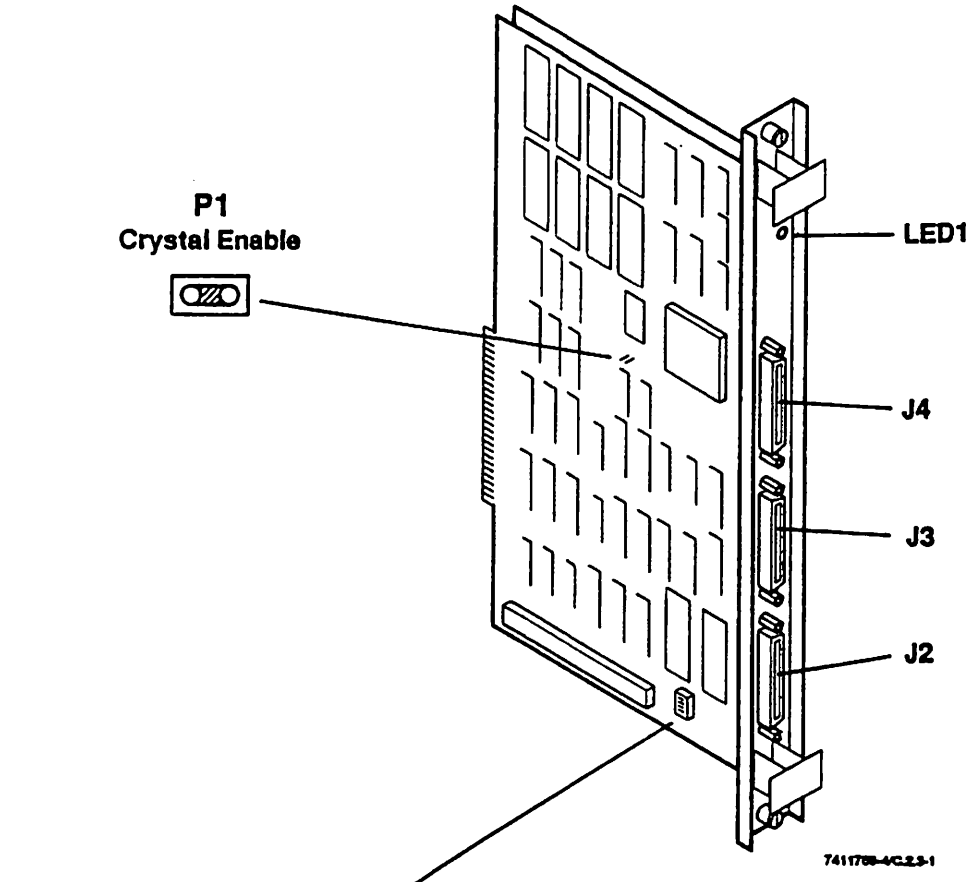
Jumpers

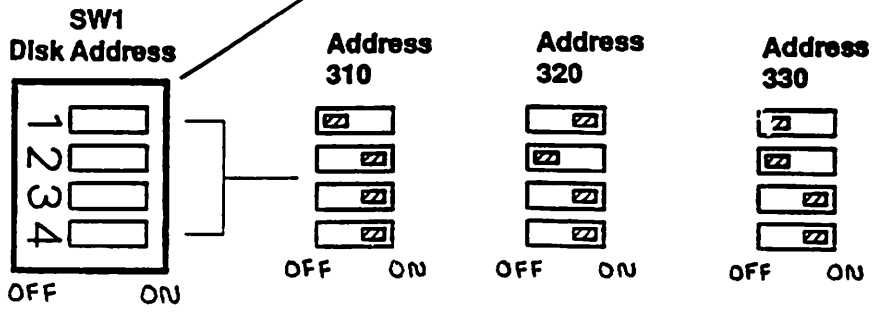
P1 - IN (2 pin jumper on 9579 board next to clock Y1 for MFG)

Settings

Printer/Disk Dual Controller (212-9718)

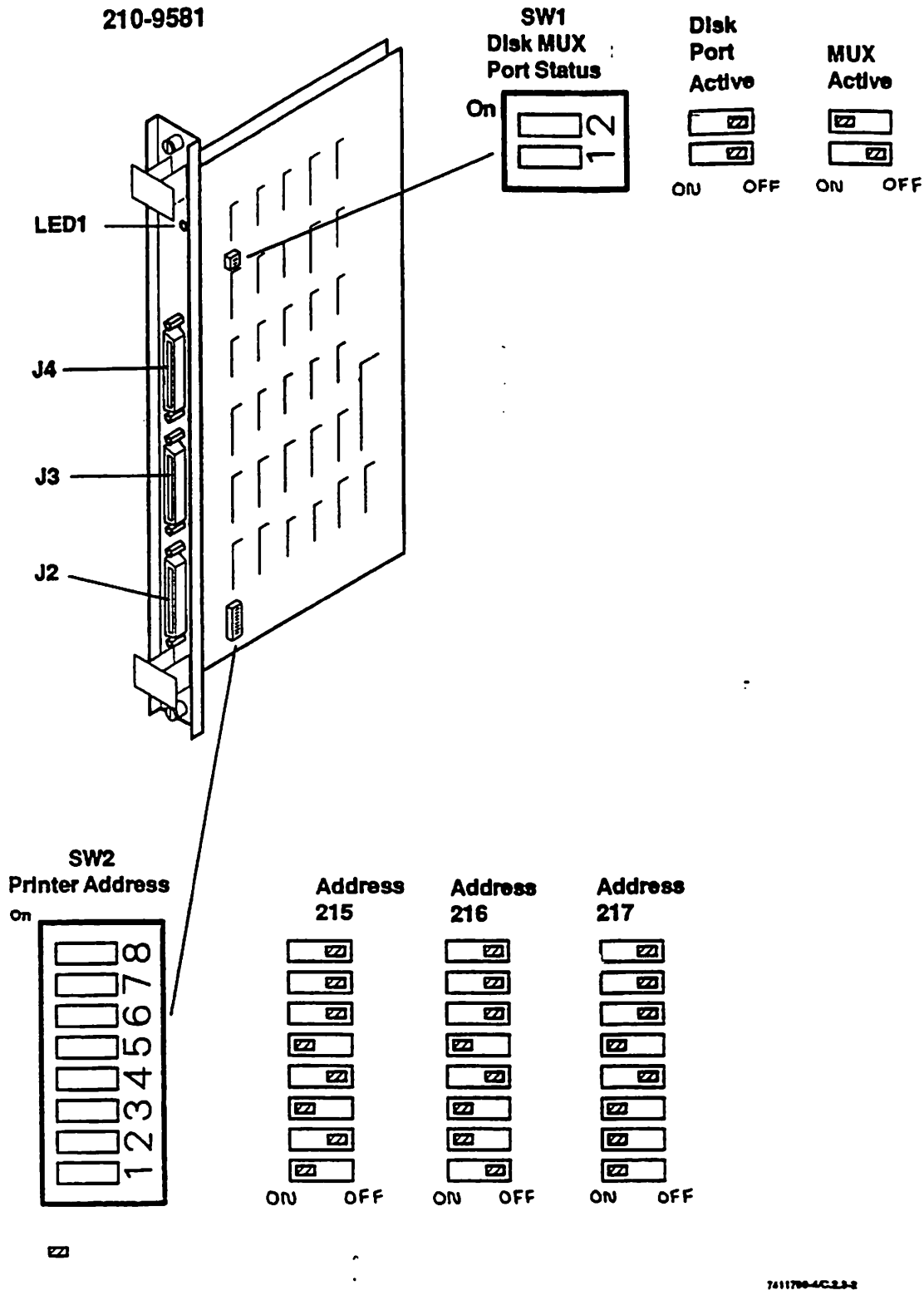
210-9579





Settings

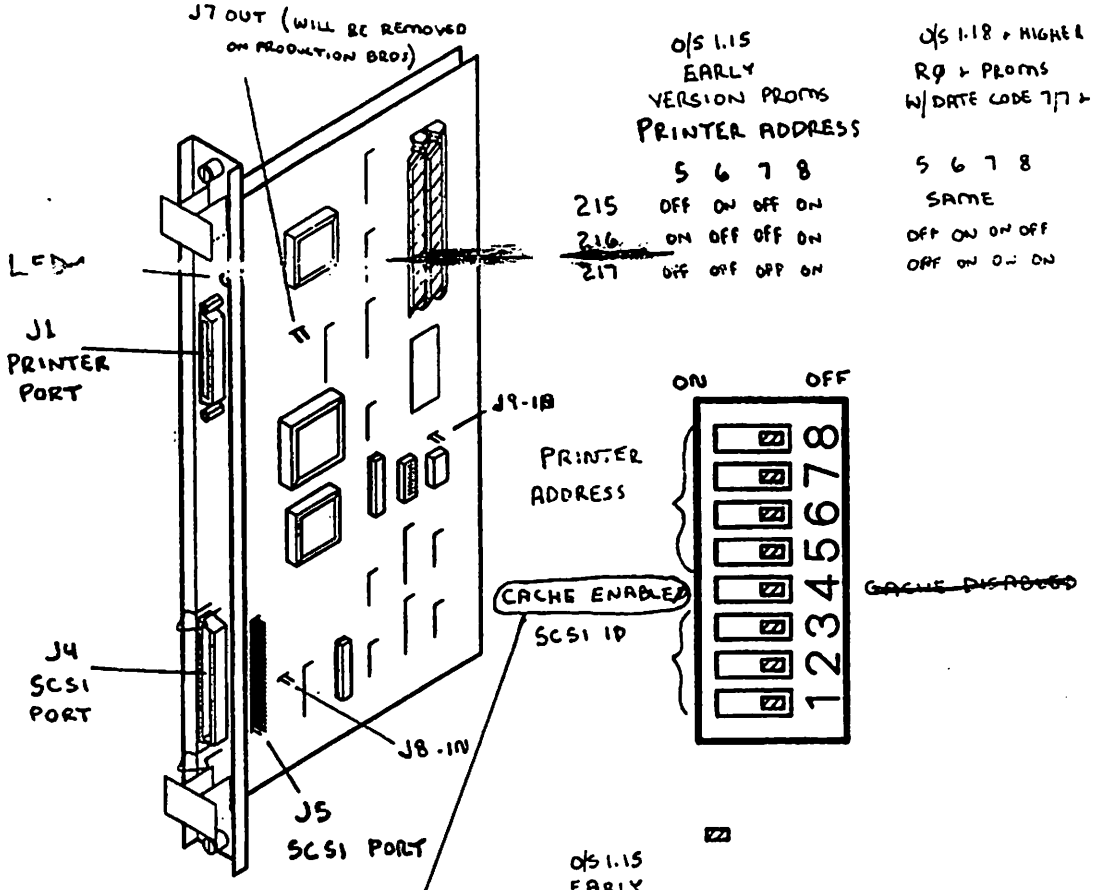
Printer/Disk Dual Controller (212-9718)



UPDATE 7/10/92

22C11 SCSI CONTROLLER 212-9727

SCSI/PRINTER CONTROLLER 210-9582



O/S 1.15 EARLY VERSION PROMS

PRINTER ADDRESS

	5	6	7	8
215	OFF	ON	OFF	ON
216	ON	OFF	OFF	ON
217	OFF	OFF	OFF	ON

O/S 1.18 & HIGHER Rϕ & PROMS W/ DATE CODE 7/7 & ↑

	5	6	7	8
	SAME			
	OFF	ON	ON	OFF
	OFF	ON	ON	ON

O/S 1.15 EARLY VERSION PROMS

4 ON - CACHE ENABLE

O/S 1.18 & HIGHER Rϕ PROMS & PROMS W/ DATE CODE 7/7 OR HIGHER

4 OFF - CACHE ENABLE

O/S 1.15 EARLY VERSION PROMS

SCSI ID

	1	2	3	
ID 7	ON	ON	ON	SUGGESTED ID
6	OFF	ON	ON	
5	ON	OFF	ON	
4	OFF	OFF	ON	
3	ON	ON	OFF	
2	ON	OFF	ON	
1	ON	OFF	OFF	
0	OFF	OFF	OFF	

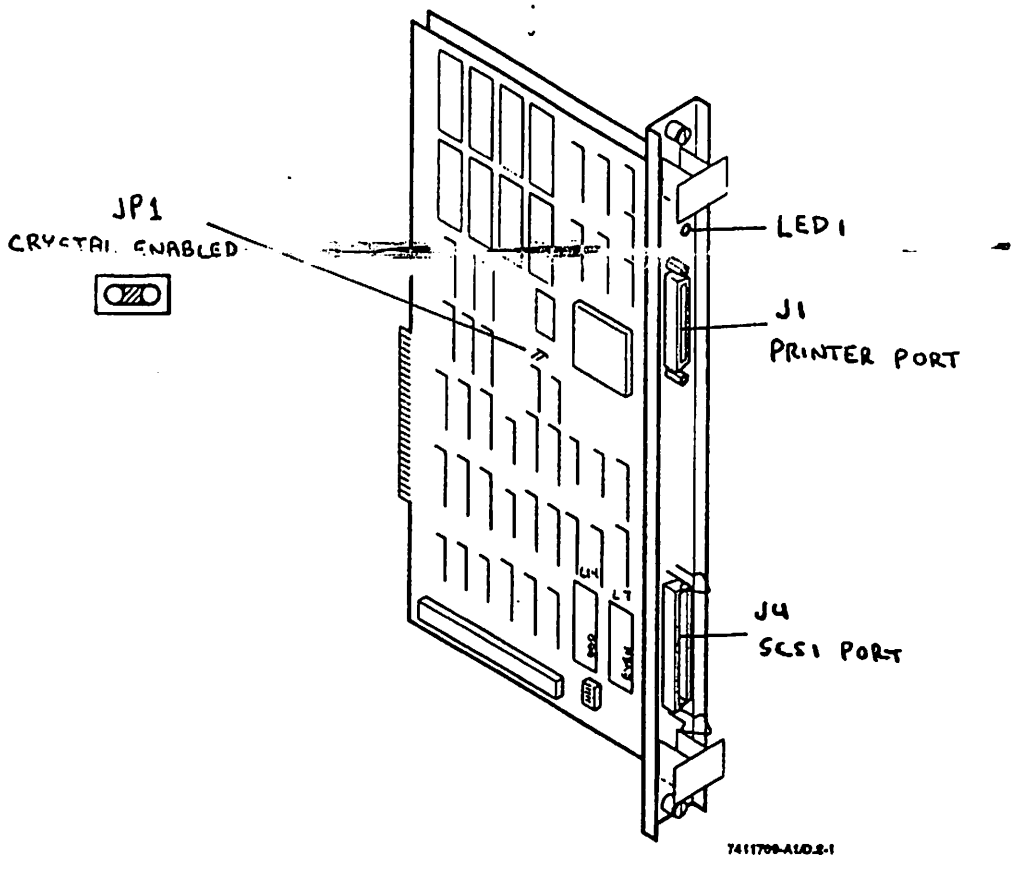
7411700-A10.DS

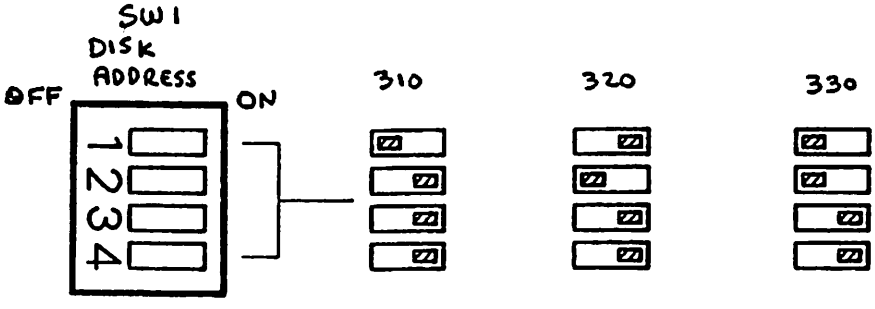
O/S 1.18 & HIGHER Rϕ & PROMS W/ DATE CODE 7/7 OR HIGHER

	1	2	3	
ID 7	SAME			SUGGESTED ID
6	ON	ON	OFF	
5	SAME			
4	ON	OFF	OFF	
3	OFF	ON	ON	
2	SAME			
1	OFF	OFF	ON	
0	SAME			

22C11-SCSI CONTROLLER 212-9727

HIGH SPEED I/O PROCESSOR 210-9579





ISS changes for CS/386 operation. updated 9/18/90

Partition generation:

```
Part 1 make 6K.
Part 2 make 20 K.
Parts 3 .. n make 120 K.
```

ISS.000A

```
330 move last stmt segment to new line 430.  Add following code to end of 330.
330 . : . : . : . :. : IF S3=5 THEN PRINT "CS/386"
```

ISS.000M

```
420 A$= $PSTAT: S3=4: IF STR(A$,9,1)="V"THEN S3=3: IF STR(A$,9,1)="W"THEN S3=5
... leave IF S3 = tests on line 420.
... place 6 stmts beginning $GIO on 430.
430 $GIO/005( ...
```

ISS.205S line 8875 disk addresses see below

ISS.229S $PSTAT

```
7167 R9$(2)=$PSTAT(1) : IF STR(R9$(2),9,1)="W" THEN RETURN : IF STR ..
```

SORT.402A

```
line 4590 change from
4590 M1=INT(M*1024)-698
to 4590 M1=INT(MIN(M,64)*1024)-698
```

Enhancement to ISS utilities to check for all legal disk addresses

In "ISS.205S" Replace DEFFN '205 logic, coded on lines 8875-8915 with

```
8875 DEFFN'205(R,W3$,R1)
    : Q$=" "
    : IF R1<>0 AND R1<>1 OR R<0 OR R>15 THEN Q$="X"
    : IF W3$="340" THEN 8895
    : $TRAN(W3$,"AaBbCcDdEeFf")R
    : IF POS("DB3"=W3$)>0 AND POS("123567"=STR(W3$,2))>0
                          AND VER STR(W3$,3),"H")>0 THEN 8885
    : Q$="I"
    : GOTO 8905
8885 IF POS("3B"=W3$)=0 OR POS("123"=STR(W3$,2))=0 OR STR(W3$,3)<>"0" THEN 8895
    : IF STR(W3$,,1)="3" THEN STR(W3$,3)="1"
    : STR(W3$,,1)="D"
8895 Q$=" "
8905 IF R1=0 OR Q$<>" " THEN RETURN
    : SELECT #R < W3$>
    : RETURN
```

```
"KFAM107U" reported by Tom Carpenter 9/12/90. (he went back to earlier KFAM).
490 GOSUB'50(15):$UNPACK(F=HEX(A008 A003 ....6001 5003 6003 A001 A009))) ...
 should be
490 GOSUB'50(15):$UNPACK(F=HEX(A008 A003 ....6001 5003 5003 A001 A009))) ...
```

IDEAS changes for CS/386 operation. *updated 10/02/90*

Problem programs in NEW format are not recognized:

IDEAS306
line 9060 AND STR(K$(1),2,1),CO) was 80
: IF STR(K$(1),2,1)=HEX(40) THEN 9070

IDEAS ~~[illegible]~~ SOMETIMES FILL ENTIRE 256 BYTES WITH DATA & WOULD NOT PUT AN 'FD' END OF FILE MARKER.

VLSI CAN HANDLE THIS BUT 386 WILL GIVE Aϕ2 ERROR.

GBS notes: from diskette rcvd from David Thompson.

```
 <>
Make Configuration:   TBO.1
Partition 1    5 K   Term 2   Loads "GBSM"
Partition 2   21 K   Term 4   Loads "STARTGBS"
Partition 3   27 K   Term 2   Loads "STARTGBS"
Partition 4    8 K   Term 2   Loads "@GBSM"
Partition 5   56 K   Term 1   Loads "STARTGBS"

Problems in "@GENPART"
1. Device table  remove /204.

On load with above configuration:
Terminal 1 and 4 showed  "Waiting for universal global"

. halt/step showed waiting for "uGBS"
. Partition status program showed   error A02 in Partition 1.


Solution:   Problems in "@GENPART"    Rework Configuration.
.  Assign partitions for  "@GBSM" to terminal 0.
.  Double memory for other partitions.

Partition 1   10 K   Term 1   Loads "GBSM"
Partition 2   21 K   Term 4   Loads "STARTGBS"
Partition 3   27 K   Term 2   Loads "STARTGBS"
Partition 4   16 K   Term 0   Loads "@GBSM"
Partition 5   56 K   Term 1   Loads "STARTGBS"

On load with above configuration:
Terminal 1 shows Partition 5  4150 IF @Q1 GT 0 then 4200
  ERROR P55: Undefined variable

Line 4060 is looking at @PSTAT(1) byte 9 for "M", 386 will show "W"
.looking in bytes 10 and 11 for memory less than 5K.
.... also IF Q7$="u"THEN S$="uGBS"
change end of line 4060 to
4060 . : .: . : . : SO$,S$=" ": IF STR(Q6$,9,1) <> "V"THEN SO$,S$="GBS"
     : IF Q7$="u"THEN S$="uGBS"
```

RICH KUEHNLE 313-744-7215
$OPEN # TO A DISK ADDR - INT DROP HOG CONDITION WITH 1.18 PROMS, NO PROBLEM W/ 1.18O/S W/ 1.1 PROMS

$OPEN TO PRINTER SEEMS TO INTERMITTENTLY DROP - WILL SEND S/W

Turbo O/S 1.18

January 26, 1993

Bug Listing

The following is a list of Turbo bugs grouped by area of concern listed in order of importance within that group of problems. The most critical problems are noted as such on the last line of the problem to the far right. Other problems may exist. Please report any additional errors if not listed to Mike Bahia, 2200 Product Support.

BACKGROUND TASKS:

RICH KUEHNLE, MIDDLESEX FOODS CS/17018
STEVE SHOESMITH
WOLFGANG BORKE
011-49-231-923700
MS/22721 SWEDEN

(1) A line with a DEFFN' statement may not execute any command following it on the same line if in a background task. A program tape was sent to R&D to duplicate this on 8/5. 3 PARTITIONS, 2 TERMS, 100K BA CRITICAL

PART 1
```
1 SELECT @PART*KEAM"
2 STOP: GOSUB'230
```

PART 2
```
10 DEFFN' @PART*KEAM"
20 DEFFN' 230: PRINT LINE 20
30 PRINT" LINE 30": GOTO 50
40 PRINT" LINE 40"
50 PRINT" LINE 50": STOP
```

22C11-HS HIGH SPEED PRINTER PORT:

P2/17591
LARS WALKENSTROM
EQUITY, VA
MARC DEGAGNE
MIDWEST WHOLESALE FOODS, FLINT, MI
RICH KUEHNLE
313-744-7215/2200
DAN COLLINS

(2) The High Speed printer buffer has a 1 character overflow. If the data string sent to the printer exceeds the remaining space in the buffer a hang occurs. To duplicate run the following using the HS or SCSI printer port:

```
10 $CLEAR215
20 $IFOFF/215,100: SELECT PRINT 215
30 PRINT "A";          (this works)  or 30 PRINT "ABCDE";          (this hangs)
40 B=B+1: SELECT PRINT 005              40 B=B+5: SELECT PRINT 005
50 PRINT AT (2,40);"CHARACTERS SENT TO BUFFER ";B
60 GOTO 20
100 SELECT PRINT 005: PRINT "PRINTER NOT READY": GOTO 20
```

Request R&D set buffer overflow to the printer default, 80 chars, but have it change if the line length is changed. SCSI has same problem, #30. CRITICAL

(3) (2a) The following program checks for printer Ready and works on the old bus but not on the High Speed port.

SAME AS 2

```
1 DIM C9$(16)
5 C9$="215"
10 IF ON/215,20:ERROR GOTO 100
20 $OPEN 100,/215:$IF OFF/215,100: $GIOREADPRINTERSTATUS/215,(0100 0201 1212
4000 4000 4000 4000, C9$(2)): IF STR(C9$(2),8,1)=HEX(10)THEN E=1: ELSE E=0:
PRINT "READY": GOTO 200
100 E=-2: PRINT"NOT READY": GOTO 10
200 GOTO 10
```

This program works perfectly with the old bus indicating READY or NOT READY if you deselect the printer. On either the 22C11-HS or -SCSI READY is usually indicated even with no printer connected. If the program is allowed to run while the printer is deselected on either the -HS or -SCSI, within approximately 5-10 minutes the system is hung until the printer is selected. However, when the -HS hangs, NOT READY has printed one time. Never see NOT READY with the -SCSI. CRITICAL

P2/17689
EQUITY, VA

SAME AS #2

(4) (32) A GIO sequence which works with the 386 and on the old bus to determine if the printer is READY or NOT READY if used with the 22C11-HS can cause the disk port on that board to hang or severely slow down. My configuration had a DS at 310 and a PM010 at 215 of the same 22C11-HS.

On the disk port run the following:

```
10 DIM A$(16)
20 X=INT(65023*RND(1))
30 PRINTX
40 DATALOADBAT/D11,(X,L)A$()
50 GOTO 20
```

TRACE

On 2nd partition run the following:

```
10 Q$=HEX(15): $GIO(7310 0201 0300 1222
4000 4000 4000,Q$)
20 HEXPRINT STR(Q$,8,1)
30 IF STR(Q$,8,1)=HEX(00)THEN 100
40 PRINT"PRINTER NOT READY"
50 GOTO 10
100 PRINT "PRINTER READY"
110 GOTO 10
```

continued

If the printer is NOT READY, NOT READY is printed on the screen but disk performance slows way down. If the printer is READY and the program left running, within a few minutes the printout goes NOT READY and disk access on that board is hung. To clear the hang without powering off: a. RESET any workstation accessing that disk. b. $CLEAR215 c. Power printer off and on. d. Send something to the print buffer. Disk should be ok. With the -SCSI printer port you always get READY, but disk performance is not affected.

CRITICAL

5. (19) The 22C11-HS printer port will not pass the following data: HEX(0000 FFFF 0000 FFFF). Do not know the particulars of this problem. Could not duplicate on 1.18. Related to VFU code. Reported by K&R Custom S/W. K&R to retest on 1.18 and provide details if still failing. P2 EQUITY

6. (20) After a warm boot, $INIT"SYSTEM", if using a printer with a buffer (PM017) on the 22C11-HS, will get a few garbage characters when first try to print. Appears the printer's buffer does not get cleared when using the 22C11-HS. P3 P2/17454 LARS

[redacted]

MUXing DISKS:

7. (3) Intermittent I90 errors occur if using the 22C11-HS Mux port. The more terminals controllers in the Turbo the more likely the problem. Install 2 MXFs & 2 MXEs in a Turbo & use the 22C11-HS Mux port to talk to a DS through a 2275MUX in a 2nd CPU. If try to boot through the HS Mux port will likely get I90 or hang. If system boots run the following program: P2/17594 HONG KONG

```
10 DIM A$(16)
20 X=INT(RND(1)*65000)
30DATALOADBAT/Dxx,(X,L)A$()
40 Y=INT (RND(1)*65000)
50 DATASAVEBAT/Dxx,(Y,L)A$():GOTO 20
```

CRITICAL

FIXED 8. (5) If 2 Turbos are mux'd to 2 disk drives with at least 2 terminals on each system constantly accessing both drives, intermittent hangs will occur. SELECT H is OFF. This problem was duplicated with the following hardware: CS/D Turbo w/ 1 MXF, 1 2275MUX cabled to CS-D DPU Brd (310), 22C11-HS Mux (320): MicroVP Turbo w/1 MXF and 2 22C80s (210-7715) (addr 310 & 320) Run the following program from terminal 1 of both CPUs: 10 P2/17629 HONG KONG TOM HENDRIKS

```
DIMA$(16)
20 I=INT(65023*RND(1))
30 J=J+1: PRINT J
40 $OPEN/D11: $OPEN/D21
50 DATALOADBAT/D11,(I,L)A$()
60 DATALOADBAT/D21,(I,L)A$()
70 $CLOSE/D11:$CLOSE/D21
80 GOTO 20
```

"HOGTEST"

FIXED WITH 1.18D

CRITICAL

9. (21) If using the 22C11-HS Mux port during a boot, the 2275MUX becomes locked out from all other CPU's until the booting Turbo gets @GENPART loaded. All other CPU's will hang if try to access disk connected to 2275MUX. P2 HONG KONG

11. (23) If power off Turbo with 2275MUX installed, 2275MUX does not get properly cleared with power on. Other CPUs will hang until a RESET is keyed from that CPU or until the Turbo housing the 2275MUX accesses the disk connected to it. P2 P2/17452 HONG KONG C9/692

10. (22) If run customer level diagnostics from screen where O/S or diagnostics is selected during boot using a 22C80 (210-7715) to a 2275MUX, other users on other CPU's using the same 2275MUX are locked out. P3 P2/17527 HONG KONG

THREE BYTE ADDRESSING:

✓ 12. (4) For Index type 2 (3 byte), sector 0 should only have header information in it. Index information (filenames) should start at sector 1. ✓ ANDRE

CRITICAL M2|20153

✓ 13. (6) RENAME command may corrupt disk index on a 3 byte surface. This is probably related to problem 12. ✓ ANDRE

CRITICAL

✓ 14. (37) The LOADDAT command does not work with an address beyond 16M. With the DS an error D89 (sector address beyond end of file), with SCSI P34 (illegal value). To duplicate: ✓ ANDRE

4/8/93 P34 IF SELECT 3 OFF. D89 IF SELECT 3 ON. SCSI

```
Create a surface with 100000 sectors.
SELECT 3 ON: SCRATCHDISK&T/Dxx,LS=255,END=99999
SELECT#1Dxx: DATASAVEDCOPENT#1,70000"3BYTEFIL"
```

SAVE any program in NEW format and call it "JUNK" on the same 3 byte address.

```
SELECT#1Dxx:LIMITST#1,"JUNK",A,B,C: PRINT A,B,C
LOADDAT(A)
```

P2

✓ 15. (8) VERIFY does not work properly with SELECT 3 ON. Run following program: ✓ ANDRE

```
VERIFYT/Dxx,(65534,65536)A0: PRINT A0
```

(A0 should = 65536, it does not) P2

✓ 16. (13) If booting from a 3 byte surface & O/S is beyond first 16 meg, cannot boot. ✓ ANDRE

P2

DISK RELATED:

44. When a program is renamed and a new program requiring more disk space using the old name is saved within a program, the program executes, but an error A01 (not enough memory) occurs if you try to load the program. To duplicate SAVE the following program (lines 10-40 only) as TEST, then run it. P8|20511

```
10 R$="TEST": S$="SCRA0000"
20 SCRATCH T R$: SAVE DCT () R$: ERROR GOTO 40
30 STOP "RESAVED"
40 SCRATCH T R$: SAVE DCT(R$)S$,1: SAVE DCT (1)R$
```

Comes back with STOP RESAVED. No problem yet. Now add lines:

```
50 REM AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
60 REM BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
70 REM CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
80 REM DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
```

Run program again and system returns ':_. TEST is now resaved with 4 sectors instead of 3 but get error A01 if try to LOAD. SCRA0000 also now exists but with just lines 10-40. On VLSI, this program properly resaves TEST the 2nd time with the additional 4 REM statements. The SCRA0000 program exists but contains no data. The 386 gives the same results as the Turbo. P1

(19) (38) If a COPY is done from disk A to disk B and the last sector on B is reached, an error I98 occurs which is normal. However, both address B is now hung to all other users until you key RESET from the partition that did the COPY. To duplicate: COPYT/D10',(0,100)TOT/D11',(65000) where the last sector on D11 is 65024. Use any disk controller. No problem on 386 or VLSI. P2 DAN COLLINS P2|17750

19A. IF YOU GET A DISK ERROR & A 2ND PART ACCESSES THE DISK BEFORE YOU KEY RESET, THE DISK IS HUNG & THE LED NEVER GOES ON UNTIL ALL PARTS TRYING TO ACCESS KEY RESET. SAW PROB ON FLOPPY W/ DCS... P2|17596

17. (7) VERIFY does not work properly with the 2275. Run the following program: VERIFYT/Dxx,(0,0) TO 2275 DOES WHOLE DISK + 1. SEE CTO.CREF LINE 55.

```
VERIFYT/Dxx,(0,0)A0: PRINT A0
```

MADE FIX 6/10/93 A0 should = 0. It does not. P2

(18) (17) The MOVE command causes the Catalog END to become the Current END on the output disk. The MOVE command should not change the Catalog END on the output disk and did not in the past. MOVE COMMAND OVERWRITES THE DISK INDEX W/ THE INDEX BEING READ FROM. CHANGING TYPE IF DIFFERENT. P3 P2|17601 ✓ ANDRE ✓ JOHN KNGEN

(42) (39) If a DS with an R4 prom is scratched with END to 65535, the END CATALOG AREA shown with LIST is 94967295. Same prob w/ SCSI. To duplicate:

```
SCRATCHDISKT/Dxx,END=65535
LISTDCT/Dxx
```

P3

45. The SAVE DCT (R$)S$,1 on line 40 in program for problem #44 should delete all lines after line 1 as it does on VLSI. On Turbo and 386 lines 10 to 40 exist in program SCRA0000. P3

VS OFFICE Thursday 08/06/92 08:42 am

To: Michael Riley W0000600 6FLT3
From: Michael Riley Security: Limited
Subject: Turbo problems Rev.1.18 Date Received: 08/05/92

Duncan
These are the bugs I have loged in on Rev. 1.18
SCSI

1. When you do a list on the floppy,take out the floppy, do the list again, you still get the floppy index... (Floppy door open dose not clear cache)
2. SCSI controller gives wrong error code... Do a rewind of the tape drive with out tape in it will give A04 ... Should be I91...
3. Can you tell the difference between door open (I98 error) and no formate on a SCSI floppy(I93 error)???? Now both is coming up with the same error...
4. SELECT H needs to work like a DS... (The new cache disk drives are look good for multi CPUs SCSI...)
5. Booting from a 512 byte/sector 1.2M floppy will hang on microcode load... It works OK on a 256 byte/sector 1.2M floppy
   Also it takes 4 min. to boot from a SCSI floppy and less than a min. from a DS floppy drive... Are you checking format each time you read from the floppy ??? If the door is never open, then the floppy is the same format!!

O.S. are as following:

1. A line with a DEFFN, statement will not exacute any other statement after the DEFFN on that line if it is in a background task...(I gave you the programs today)
2. For disk type 2, sector 0 can only have header info in it... Index info will start at sector 1 ...
3. MXF printer problem... (I gave you the programs that will couse the terminal printer to add LF & CR if you SELECT PRINT 204(0).. The MXF needs to work like a MXE for 004,204,404,704 and any character with...
4. MOVE T/Dxx TO T/Dyy... The book state that if the END is NOT stated in the MOVE statement then the END is the same as the source disk...Pg 12-58 LRM
5. VERIFY T/Dxx (0,0)A0:print A0 ... If Dxx is a 2275 Floppy, the VERIFY failes... and dose not give a 0 for A0...
6. VERIFY T/Dxx (65534,65536)A0:PRINT A0... If SELECT 3 ON, you will not get 65536 for A0...
7. We need the TC functions working as soon as posible !!!!Terminal to be setup in any of 3 ways: Terminal in TC or normal mode, 10 or 11 bit protocall, 2200 or XON/XOFF flow control...
8. PRINT AT for the MXF will not print on the correct line... Program:
   10 PRINT AT (21,0);HEX(0A 0A 0E);"TEST"
   10 PRINT AT (21,0);HEX(0A 0A);"TEST"
   Run this program on a on a MXF and a MXE on the Turbo...
9. Printing from a 22C11 HS... you are printing HEX(0000 FFFF 0000 FFFF) to the HS printer, The controller will not pass this data...
10. REM % ... If you have a character of Hex(7D or 7E) after a REM% then it jumps to the next line...
11. SELECT H ON... If you have a Part. doing a 10 $OPEN T/D21:DATA LOAD BA ... : $CLOSE T/D21: GOTO 10 and on another terminal you do a LISTDCT/D21... The LIST will hang the The DATA LOAD program... The Part doing the DATA LOAD has

SELECT H ON...The Part with the LIST has it OFF... I would think the DATA LOAD Prigram would take priority...

12. LISTS & LISTSD dose not line feed when it is sent to a printer using a Printer driver ....LIST a program using LISTSD... You only get one page and can not get any more...

13. On power up of a HS controller.. If a printer is connected to the HS on power up the HS will pass garbage to the printer that dose not get cleared out...

14. RENAME and 3 byte addressing.... On a Type 2 platter... RENAME a progeam or a DATA FILE (like @MVP or 22C11HS) that is grater than 2 bytes... It over write other index files...

PROMs

1. The SCSI burn in test is setup for a 2275, It needs to be setup for a PC printer.. Like a Epson 80 printer...The 22C11HS works OK ... Also change the PROM micro code Rev. number... It is the same as 22C11HS...

2. SCSI PROMs Floppy... If you are doing a inquire to see what is on the SCSI bus ... You do not need to check the different types of formats...This couses the configuration program to take a long time to get status and power up to get to GENPART...

This is all that I can think if today... I know that I am missing some..
Michael Riley

```
10 INPUT CURSOR
A$: A=A+1 : PRINT
AT(10,12); A: GOTO
40
```

SPECIFIC COMMAND RELATED:

(20) (9) If a REM% command is followed by a HEX 7D or 7E, other commands on the same line following it will be ignored. This is fixed on rel 1.18Q. P1 — P2/17460 JAPAN/SWEDEN

21. (15) The INPUT CURSOR command intermittently hangs. Run following program from a 2536DW terminal. This command is not valid on older terminals. — P2/17455 SWEDEN

```
10 DIMA$3                                   "INPCURSR"
20 PRINTHEX(0306):A=0
30 PRINT AT (5,1);HEX(02 05 0F)
40 INPUT CURSOR A$:A=A+1:PRINT AT (10,12);A:GOTO30
```

Program will intermittently hang within 5 minutes. P2

(23.) (27) SELECT NEW defaults to OLD after CLEAR or LOAD RUN. Should only change by re-entering the SELECT command. P2 — P2/17599

22. (25) LISTS & LISTSD do not work correctly to a system or terminal printer. If printer requires a printer driver it will not linefeed. If printout should take more than 1 screen, 2nd screen does not occur. To duplicate LOAD @GENPART and do a SELECT PRINT 215 or 204 using a PM017 printer with driver installed. Do a LISTS or LISTSD. No problem on 386. P3 — P2/17453 LARS

(24.) (29) If do a PRINT 1+1+1+1+1+1 etc when get to 87th + 1 blows O/S. Should give an error and not blow O/S. P3 — P2/17416

SELECT H:

SEEKS OLD BUS SAME ADDR OFF ON 1064 384

25. (10) If 2 partitions are constantly accessing same DS, 1 with SELECT H ON, the partition using SELECT H ON will hang until the 2nd partition finishes. Must use 22C11-HS. Run following programs: — P2/17451 HONG KONG

NEW BUS OFF ON 1000 0

partition 1

```
10 SELECT H ON: $OPEN/D11: DIM A$(16): X=INT(RND(1)*30000):
DATALOADBAT/D11,(X,L)A$():PRINT X;:$CLOSE:GOTO 10
```

partition 2

```
10DIMA$(16): X=INT(RND(1)*30000):DATALOADBAT/D12,(X,L)A$(): PRINT X;: GOTO 10
```

P1

4/5/93 TESTED W/ 1.18I, NO 22C11-HS BETTER. 2 SYSTEMS MUSED.
SYS 1 2 TERMS W/ SEL H OFF - GOOD
2 TERMS W/ SEL H ON - WAITING MOST OF TIME - LITTLE ACCESS
SYS 2 1 SEL H ON 1 SEL H OFF OK BOTH GETTING EQUAL TIME

DS TAPE UTILITIES HUNG W/ BACKGROUND TASK RUNNING & SELECT H ON — TOM REESE KDR S/W VA

MXF:

BABYFARE ED MACHIOCHI STEVE SHOESMITH

26. (16) MXF Octopus ports will not give a DTR indication to a modem. Therefore they will not support a remote terminal. Ports 1 and 2 are OK. P1

46. If RESET is keyed during a GIO/005 command to an MXF port, intermittently subsequent GIO commands will no longer execute or will hang the port. Must reboot to correct. Problem is more persistent with ports 2-16. Use the following program to duplicate: — GERMANY ALEC#6

```
10 DIM Q$104,I$(24)80: PRINT HEX(03 06)
20 Q$=ALL(09): STR(q$,1,24)=ALL(0A): STR(Q$,25,1)=HEX(00)
30 FOR A=1 TO 24: I$(A)="This is a test    line         , please press RESET":
CONVERT A-1 TO STR(I$(A),27,2),(##): NEXT A
40 FOR A=1 TO 23: STR(I$(A),79,2)=HEX(0D 0A): NEXT A
50 P$=HEX(40 01 A2 00 1A 00 A2 00)
60 $GIO/005 (P$)Q$ 25,1 ;I$()     (less than sign after Q$, grter than after 1)
70 GOTO 60
```

Run program & 1st time ok. Key RESET and run again and repeat until fails. P1

★ (27.) (18) The PRINT AT command does not position properly with the MXF in some cases. Run the following examples on the MXF then on the MXE to compare: — P2/17600 RADER (PRTAT) D3i SCSI

Example 1: 10PRINT AT (21,0,);HEX(0A 0A);"TEST" (fails on lines 5 & up)
Example 2: PRINT AT(10,0,);HEX(0A);"TEST" (fails on line 10 only)

In either example, if the HEX(0A) or the last comma within () is removed the problem will likely not occur. P2

28. (24) Need MXF TC functions to work. Should have the following functions: Terminal in TC or normal mode, 10 or 11 bit protocol, XON/XOFF flow control. P3 — ED MACHIOCHI STEVE SHOESMITH JIM DETTMAN JIM SIMPSON EQUITY

~~MXF - COMPARED~~
~~B SYSTEM 1 1200~~

OTHER:

29. (new) CPU intensive processes can be severely impacted when upgrading from Turbo O/S 1.1 to O/S 1.18 when running at the same time as certain disk processes. This problem was duplicated as follows: Partition 16 terminals and 16 partitions on 1 MXF with 100K memory. Setup 4 terminals to run the 2200 Instruction Exerciser test,"INSTROC", and 4 running "CPUDEMO1". With just these CPU intensive tasks there is not too much difference:

C41/8916 BUNN COFFEE BAY CITY METALS BABYFARB?

	1.1	1.18
CPU Benchmark	14-19 seconds/pass	17-20 seconds/pass
Instruction Test	7 min 20 sec/pass approx	8 min 40 sec/pass

Rerun the same test w/ 1 additional W/S running the Disk Benchmark, "BMDIO1P1":

	1.1	1.18
CPU Benchmark	16-19 seconds	39-66 seconds/pass
Instruction Test	8 min 27 seconds/pass	21 min 15 seconds/pass
Disk Benchmark	3 min 17 seconds/pass	24-36 seconds/pass

For disk I/O the CS/D DPU Board was used with an internal 140 Meg drive. As can be seen CPU intensive processes seem to have priority on 1.1 where disk I/O seems to have priority on 1.18. The best solution may be if this balance could be set by the customer to best meet their specific needs. Otherwise a better balance is needed. CRITICAL

47. If using the Make a Reference List of File Names Utility (Moving a Selected List of Files on newer releases) and after selecting your files, option 4 is used to save the list in a program file, an error A02 occurs on line 30, which is a COM statement. No problem on 386 or VLSI. P2

48. If using 2 22C11-HS Controllers, the 2nd 22C11-HS always fails the 'System Interface Card Test on the first pass only. To duplicate install 2 22C11-HS Controllers using addr's 310 and 330. On boot select diags instead of O/S. First pass only of the 'System Interface Card Test' will fail. P3

29a. (36) If booting from a MXE or MXD and SHIFT/RESET is keyed to bypass the boot diagnostics, you must release the SHIFT key and press it again to get RESET to work with 'Mount System Platter, Press Reset'. You do not have to release the SHIFT key with the MXF board. P3

49. EXTERNAL DS BACKUP SLOWER WITH 22C11-HS P2 P8/20512

SCSI: ~~#OPEN COMMAND RETURNS 194 CONSISTENTLY WITH THE SCSI CONTROLLER.~~ SELECT H WAS ON

30. (41) The SCSI printer port has a 1 character overflow. This can cause a hang. Same as problem 2 under 22C11-HS Printer Port. CRITICAL

31. (41a) A program to check for printer READY can hang system. Same as problem 3 under 22C11-HS Printer Port. CRITICAL

32. (33) A GIO sequence to determine if the printer is READY or NOT READY always comes back READY on the SCSI printer port. Use program from bug #4 under 22C11-HS High Speed Printer port. This sequence works properly on the old bus and with the 386. P1

DOES NOT ALWAYS FAIL. MAY ONLY BE W/ DOS DISKETTE. ONCE FAILS ALL DISKS MAY FAIL POSSIBLE DUE TO SYNCHING W/ CACHE.

33. (11) SCSI floppy fails on verify with a 1.2M diskette starting at sector 2400. Sector 2398 appears to be the last usable sector. Any attempt to go beyond 2400 with any disk command will cause an error or hang. This is why booting from SCSI floppy with a 512 byte/sector disk was failing. P1

P2/17595 LOCAL 205 ALEC 6MBH

34. (12) Turbo does not recognize SCSI floppy door open. If LIST a floppy, remove diskette & LIST 2nd floppy, system reads data from 1st diskette still in CACHE. P1

P2/17607 LOCAL 205 MARC

38. (30) SCSI burn-in test does not print out the same on printer port as 22C11-HS printer port if use printer that requires print driver. SCSI printer port is not issuing linefeed & lines overprint. Best answer would be to be able to select issue of linefeed, otherwise both should be the same. Test with same printer with both the 22C11-HS & then with SCSI printer port. P1

35. (14) Booting from SCSI floppy is extremely slow, 4 minutes compared with 52 seconds with DS floppy. Getting the SCSI config program loaded is also extremely slow if a SCSI floppy door is open. It took 5 seconds to pull up the inquiry screen with the door closed, 66 seconds with the door open. P2

P2/17598 LOCAL 205 ALEC

continued

36. (26) SCSI Controller should return T errors using the Tape drive as the DS tape does. If rewind tape with no tape installed SCSI gives A04. Should give a T10. Other Tape problems should also give correct T error, not an Axx error. P2

41. (35) Intermittently if booting with some MXE boards, the system may hang while loading @MVP. These boards work perfectly otherwise. Additional info: while loading the O/S the MXE self-test LED comes on. When the boot is successful, the LED goes out in about a second. If the LED stays on, the boot fails. P2

39. (31) No way at present time to check SCSI tape, 150M, to see if write-protected. If tape is write-protected and try to write, system should return correct error, T12. P3

37. (28) SCSI floppy returns same error if door open or disk not formatted. Door open should give I98. Disk not formatted, I93. P3

40. (34) Cannot boot from SCSI using an MXD board. Screen usually goes blank when key SF or will hang with message, 'Loading O/S'. RESET gets you back to Mount System Platter. P3

42. (39) If a SCSI address is scratched with END to 65535, the END CATALOG AREA shown with LIST is 94967295. To duplicate:
SCRATCHDISKT/Dxx,END=65535
LISTDCT/Dxx P3

43. (40) If do a VERIFYT/Dxx,(0,65023) to a SCSI address with the last sector equal to 65023, an error will be returned (Error in Sector 65024). P3

IF SCSI OR OS BEING ACCESSED WHEN TRY TO FORMAT A DIFFERENT ~~SCSI~~ ADDRESS W/ UTILITY, GET MESSAGE DRIVE ALREADY IN USE. ON 386 UTILITY HANGS.

0109D

CC: Mike Bahia W0000600 6FLT3
From: Mike Bahia Security: Limited
Subject: Are you still there? Date Received: 09/09/92

Duncan,

Thanks for replying. Hope you and your group remain together. Talked with Mike Riley yesterday. He indicated the Wang subsidiary you are working for may be closing and was not sure how that may affect you. They better take care of you guys. Please keep me informed.

The following is a list of Turbo bugs as I know them. It is possible Riley may have reported some I am not aware of but I do have some of his notes:

MOST CRITICAL:

(1) A line with a DEFFN' statement will not execute any other command on that line if in a background task. Mike Riley sent you a program to duplicate this on 8/5. Let me know if I need to resend.

(2) The High Speed printer buffer has a 1 character overflow. If the data string sent to the printer exceeds the remaining space in the buffer a hang occurs. Need to monitor the printer Ready not the buffer Ready. Also should be able to set the buffer overflow to the line length. 80 characters should be the default but it should change if the line length is changed. The following programchecks for printer Ready and works on the old bus but not on the High Speed port.

```
1 DIM C9$(16)
5 C9$="215"
10 IF ON/215,20:ERROR GOTO 100
20 $OPEN 100,/215:$IF OFF/215,100: $GIOREADPRINTERSTATUS/215,(0100 0201 1212
4000 4000 4000 4000, C9$(2)): IF STR(C9$(2),8,1)=HEX(10)THEN E=1: ELSE E=0:
PRINT "READY": GOTO 200
100 E=-2: PRINT"NOT READY": GOTO 10
200 GOTO 10
```

This program works perfectly with the old bus indicating READY or NOT READY if you deselect the printer. On the HIGH Speed port the printer is ignored and the High Speed buffer is checked. Again we also need to correct the buffer overflow to be equal to the selected line length, 80 being the default.

(3) Intermittent I90 errors if use the 22C11-HS Mux port. The more terminals controllers in the Turbo the more likely the problem. Install 2 MXFs & 2 MXEs in a Turbo & use the 22C11-HS Mux port to talk to a DS through a 2275MUX in a 2nd CPU. If try to boot through the HS Mux port will likely get I90 or hang. If boots run the following program:

```
10 DIM A$(16)
20 X=INT(RND(1)*65000)
30DATALOADBAT/Dxx,(X,L)A$()
40 Y=INT (RND(1)*65000)
50 DATASAVEBAT/Dxx,(Y,L)A$():GOTO 20
```

(4) For Index type 2 (3 byte), sector 0 should only have header info in it. Index info (filenames) should start at sector 1.

(5) If 2 Turbos are mux'd to 2 disk drives with at least 1 terminal on each system constantly accessing both drives, intermittent hangs will occur. Sent you this problem through office on 8/27 with program to duplicate. SELECT H is OFF.

STEVE S
ALEC GMBH
WOLFGANG BURKE
011 49 231 923700
P2/17591
EQUITY
MARC
MIDWEST WHOLESALE FOODS
FORT MI
RICH KUCHARE
313-744-7215/2200
DAN COLLINS

P2/17594
HONG KONG

ANDRE
BRAZ

P2/17629
HONG KONG

• (6) RENAME command may corrupt disk index on a 3 byte surface. This is probably related to problem 4. ANDAL

(7) VERIFY does not work properly with the 2275. Run the following program: P2|17596
VERIFYT/Dxx,(0,0)A0: PRINT A0 A0 should = 0. It does not.

• (8) VERIFY does not work properly with SELECT 3 ON. Run following program: ANDRE
VERIFYT/Dxx,(65534,65536)A0: PRINT A0 A0 should = 65536. It does not.

(9) If a REM% command is followed by a HEX 7D or 7E, other commands on the same line following it will be ignored. This is fixed on the 1.18Q sent to Hong Kong which they forwarded to me to test. P2|17460 1.18Q
JAPAN
SWEDEN

Other bugs basically in order of importance:

(10) If 2 partitions are constantly accessing same DS, 1 with SELECT H ON, the partition using SELECT H ON will hang until the 2nd partition finishes. Must use 22C11-HS. Run following programs: P2|17451
HONG KONG
partition 1
10 SELECT H ON: $OPEN/D11: DIM A$(16): X=INT(RND(1)*30000):
DATALOADBAT/D11,(X,L)A$():PRINT X;:$CLOSE:GOTO 10
partition 2
10DIMA$(16): X=INT(RND(1)*30000):DATALOADBAT/D12,(X,L)A$(): PRINT X;: GOTO 10

(11) If boot from a SCSI floppy formatted in 512 byte /sector, will hang on boot. ★ P2|17595
LOCAL 205
ALEC

(12) Turbo does not recognize SCSI floppy door open. If LIST a floppy, remove diskette & LIST 2nd floppy, system readsdata from 1st diskette still in CACHE. ★ P2|17607
LOCAL 205
MARK

• (13) If booting from a 3 byte surface & O/S is beyond first 16 meg, cannot boot. ANDRE

(14) Booting from SCSI floppy is extremely slow, 4 minutes compared with 52 seconds with DS floppy. Getting the SCSI config program loaded is also extremely slow if a SCSI floppy is involved. Can we improve this? ★ P2|17598
LOCAL 205
ALEC

(15) The INPUT CURSOR command intermittently hangs. Run following program from a 2536DW terminal. This command is not valid on older terminals. P2|17455
SWEDEN
10 DIMA$3
20 PRINTHEX(0306):A=0
30 PRINT AT (5,1);HEX(02 05 0F)
40 INPUT CURSOR A$:A=A+1:PRINT AT (10,12);A:GOTO30
Program will intermittently hang within 5 minutes.

• (16) MXF Octopus ports will not give a DTR indication to a modem. Therefore they will not support a remote terminal. Ports 1 and 2 are OK. ED MACHNICKI

(17) The MOVE command causes the Catalog END to become the Current END on the output disk. The MOVE command should not change the Catalog END on the output disk and did not in the past. P2|17601
ANDRE
JOHN KNEEN (BAY CITY DENTAL)

(18) The PRINT AT command does not position properly with the MXF in some cases. Run the following program on the MXF then on the MXE to compare: P2|17600
RADER
10PRINT AT (21,0);HEX(0A 0A);"TEST"

• (19) This was reported by Mike Riley. The 22C11-HS printer port will not pass the following data: HEX(0000 FFFF 0000 FFFF) EQUITY
Have not tested this myself.

(20) After a warm boot, $INIT"SYSTEM", if using a printer with a buffer (PM017) on the 22C11-HS, will get a few garbage characters when first try to print. Appears the printer's buffer does not get cleared with 22C11-HS. P2|17454
LARS

Other open issues:

(21) If using the 22C11-HS Mux port during a boot, the 2275MUX becomes locked out from all other CPU's until the booting Turbo gets @GENPART loaded. All other CPU's will hang if try to access disk connected to 2275MUX.

HONG KONG

(22) If run customer level diagnostics from screen where O/S or diagnostics is selected during boot using a 22C80 (210-7715) to a 2275MUX, other users on other CPU's are locked out.

P2|17527
HONG KONG

(23) If power off Turbo with 2275MUX installed, 2275MUX does not get properly cleared with power on. Other CPUs will hang until a RESET is keyed from that CPU or until the Turbo housing the 2275MUX accesses the disk connected to it.

P2|17452
HONG KONG

(24) Need MXF TC functions to work. According to note from Riley we need port able to setup in 3 ways: Terminal in TC or normal mode, 10 or 11 bit protocol, XON/XOFF flow control.

ED MACHIGCHI
STEVE S
JIM D
JIM SIMPSON
EQUITY

(25) LISTS & LISTSD do not work correctly to a system or terminal printer. If printer requires a printer driver it will not linefeed. If printout should take more than 1 screen, 2nd screen does not occur. To duplicate LOAD @GENPART and do a SELECT PRINT 215 or 204 using a PM017 printer with driver installed. Do a LISTS or LISTSD. No problem on 386.

P2|17453
LARS

(26) SCSI Controller should return T errors using the Tape drive as the DS tape does. If rewind tape with no tape installed SCSI gives A04. Should give a T10. Other Tape problems should also give correct T error, not an Axx error.

(27) SELECT NEW defaults to OLD after CLEAR or LOAD RUN. Should only change by re-entering the SELECT command.

P2|17599

(28) SCSI floppy returns same error if door open or disk not formatted per Riley. Door open should give I98. Disk not formatted I93.

(29) If do a PRINT 1+1+1+1+1+1+1 etc when get to 87th + 1 blows O/S. Should give an error and not blow O/S.

SCSI prom bug:

(30) SCSI burn-in test does not print out the same on printer port as 22C11-HS printer port if use printer that requires print driver. SCSI printer port is not issuing linefeed & lines overprint. Best answer would be to be able to select issue of linefeed, otherwise both should be the same. Test with same printer with both the 22C11-HS & then with SCSI printer port.

Hope these are clear. If you need further detail please let me know.

Best regards,
Mike

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

To: Mike Bahia From: Duncan Chou
Subject: Are you still there? Date Sent: 09/07/92

Mike,
Give me the bugs listing on curent Turbo O.S. and I will testing that by using my newest O.S. and then send it to you include SCSI microcode.

Regards
Duncan Chou

---------- Original Memo ----------

To: Duncan Chou From: Mike Bahia