

Handy 2200 Commands

This is a quick reference to a list of commands that can aid the CE in testing, troubleshooting, and isolating problems. In most cases the commands should be self-explanatory to those familiar with the product line. No command should be used which may affect customer data unless the ramifications of using that command are understood. Refer to the Multiuser Basic-2 Language Reference Manual, part number 715-4080F for more information.

\$INIT"SYSTEM"	Causes the system to reboot bringing all users down and displaying 'Mount System Platter, Press Reset' on the screen. Must be on terminal 1. All users must complete operations before issuing this command or data corruption could result. SYSTEM is the default password with all virgin Wang operating systems. It can be changed by the operator during boot. See C.7.10, step 15 for additional information.
CLEAR	Completely clears memory on the partition being used.
CLEARF line#,line#	Clears only the program lines from the 1st line number up to and including the 2nd line number.
\$CLEAR 215	Turbo only. Clears the printer buffer for the High Speed Printer port.
LIST	Displays the program now in memory on the screen 1 screen at a time. Key RETURN for subsequent screens.
LISTDT	Displays the contents of the device table on the CRT. The device table shows the default addresses for console input and output, CI & CO, and for INPUT, PRINT, PLOT, and LIST commands. The MDT (master device table) field identifies defined addresses. The PHT (platter hog table) identifies platter addresses being hogged if using SELECT H ON. This field only exists on Turbo and 386 CPU's. If an address is followed by a dash (-) and a number, it is being hogged by the partition whose number is shown. The PDT (printer driver table) identifies what printer drivers are available to the partition being used, the associated printer address, and if the driver is on or off. Displays in a more readable format with Basic-2 O/S 3.0 & all higher version O/S's.
LIST ERROR	Lists all errors codes with their meanings. Basic-2 O/S 3.0 and higher.
LIST T " "	Will display the line numbers on the screen of all lines exactly matching the text within the " ". Basic-2 O/S 3.0 & higher.
LIST V	Prints to the screen a cross reference of all variables used in the current program in memory for this partition. Basic-2 O/S 3.0 & higher.
LIST SELECT	Similar to LISTDT in that it lists the default addresses for the console, PRINT, LIST, PLOT, and DISK for the partition used, but also shows the current defaults for 'OLD' or 'NEW' format and platter hog. This command is only supported on the Turbo and 386 CPUs.
SELECT LIST xxx (y)	Changes the default address for the LIST command to the address given. The CRT, address 005, is the default address at power up. y is the line length. If not given the default is 80.
PRINT ERR	Will print on the screen the last error that occurred since the last RESET or CLEAR.
PRINT"abcde....."	Will print to the CRT exactly what is written within the " "s.
PRINT #CPU	Prints on the screen the CPU #. This number is used with 'platter hog' (SELECT H ON) in a multi-CPU environment to identify to the disk which CPU the partition hogging a platter is coming from. The CPU number only exists on the 386 and Turbo CPUs.
PRINT #ID	Will print on the screen the CPU ID# which can be used by programmers to protect their programs. This number is hard coded in the CPU board boot proms.
PRINT #PART	Prints the partition number for the terminal being used on the CRT.
PRINT #TERM	Prints the physical terminal number for the terminal in use on the CRT.
PRINT #VERSION	Prints the O/S version on the screen.
SELECT PRINT xxx (y)	Changes the default address for all PRINT commands to address xxx. y is the line length. If y is not given the default is 80. The default address at power up is 005 which is the CRT.
REM %%	Used to REM a command for a standard 2200 which will execute with the CS/386 or Turbo.
RENUMBER	Renumbers the program lines in memory by 10.
RUN	Execute the program currently in memory.
TRACE	Programmers aid which causes the system to print out variable names and values each time they change. It also displays line numbers each time a program branch is done. Can help identify where a program may hang.
TRACE OFF	Shuts the TRACE command off.

Disk Related Commands

SELECT DISK Dxx	Sets the disk default address to the address given for the partition being used. When this is done, this address is used for any disk command for which an address is not specified. The address from which the system boots from is the default address unless the address is changed with this command.
\$FORMAT DISK T/Dxx	Formats address given, all data is cleared and sector headers rewritten.
VERIFY T/Dxx, (X,Y)	Where X = the 1st sector to verify & Y the last. Will read all sectors from X to Y at the address given. If a sector cannot be read the message: 'Error in Sector x' is returned.
COPY T/Dxx, (X,Y) TOT/Dxx, (Z)	Copies all data from 1st address given starting at sector X to and including Y to the 2nd address given starting at sector Z. COPY creates an exact duplicate of the data read. All sectors on the 2nd disk will be overwritten starting at sector Z for as many sectors as defined by X and Y. If (Z) is not used, the exact same sectors will be written to on the output disk.
LIST DCT/Dxx	Displays the index of the disk address showing file names, type (program or data), where the file starts and ends on disk, and how many sectors it is using and still has available. 1 screen is displayed at a time. Key RETURN for additional screens. If the disk address (/Dxx) is left off, the current default address is used.
LOAD DCT/Dxx, "program"	Reads the program specified from the address given into memory. Memory should be cleared before loading the new program as any non-conflicting program line/s will remain. If the disk address (/Dxx,) is left out, the default disk address is used which is either the boot disk address or the address specified by the last SELECT DISK Dxx command. The RUN command is used to execute the program once it is in memory.
LOAD R/JNT/Dxx, "program"	Reads the program specified from the disk address given into memory and proceeds to execute the program. Memory is automatically cleared with this command. If the disk address (T/Dxx,) is left out, the default disk address is used which is either the boot disk address or the address specified by the last SELECT DISK Dxx command.
SAVE T/Dxx, "program"	Reads the program currently in memory and writes it to the disk address given using the program name in quotes. There must be space in the index and catalog of the disk given and the program name cannot already exist at that address or an error will be returned. Existing data on the disk is not affected.
MOVET/Dxx, TOT/Dxx,	Takes data off the 1st address file by file and saves these files on the 2nd address. Scratched files will not be moved. Index is reorganized by the system at the new address for optimum accessing. The address being written to must have an index and catalog area large enough to hold the files being moved. All data that was on the disk being written to will be lost.
MOVET/Dxx, "filename" TOT/Dxx,	Reads the program or data file from the 1st address and writes it to the 2nd address. There must be room in the index and catalog of the 2nd disk or an error will occur. Existing data is not affected on either disk.
MOVE END T/Dxx = X	Changes the last sector for the address given to sector X. X must be beyond where the last file ends or an error is returned. Data in the catalog area is not affected.
SCRATCH DISK T/Dxx, LS=X, END=Y	Creates a new index of X number of sectors at the address given. The Y parameter is the last sector of the catalog of which the files to be stored cannot go beyond. All data that was at this address before the SCRATCH will now be inaccessible.
SCRATCH T/Dxx, "filename"	Designates a file as obsolete. When LISTing disk an S will precede the file type identifying it as scratched. Scratched files are not moved with the MOVE command.
RENAME T/Dxx, "oldname" TO "newname"	Changes the name of the file at the address given. Basic-2 O/S 3.0 & higher.

#FORMATDISKT/Dxx

COPYT/Dxx, (0, ^{LAST SECTOR}) TOT/Dxx,

IF WANT OUTPUT DISK TO START AT DIFFERENT SECTOR THAN INPUT, PUT START SECTOR ONLY IN () AFTER LAST COMMA, CREATES MIRROR IMAGE.

MOVET/Dxx, "FILENAME" TOT/Dxx,

MOVES ~~FILE~~ IN " " FROM 1ST ADDRESS TO 2ND. OUTPUT DISK MUST HAVE INDEX SETUP.

SCRATCHDISKT/Dxx, LS = 2#, END = 65023

^{SETS UP}
~~CREATES~~ DISK FOR AUTOMDISK CATALOGING
LS IS INDEX SIZE, END IS LAST SECTOR.

SETS UP FORMATTED DISK FOR SAVING FILGS. IF USED ON EXISTING DISK ALL FILGS WILL BE INACCESSIBLE

MOVSENDT/Dxx = 65023

MOVES END OF CATALOG IF DISK SPACE AVAILABLE

PRINT # VERSION

PRINTS O/S VERSION W/ NEWER O/S.

LISTDT

DISPLAYS DEVICE TABLE WHICH SHOWS ~~CONFIGURED~~
ADDRESSES, LOGGED ADDRESSES, & PRINTER DEVICE TABLE.

SELECTDISKD_ _

CHANGES THE DEFAULT DISK ADDRESS TO ADDR GIVEN

PRINT ERR

PRINTS LAST ERROR THAT OCCURRED SINCE LAST RESET OR CLEAR OR IMPLIED CLEAR.

LOADDCT/Dxx, "PROGRAM
FILENAME"

LOADS PROGRAM

LOADRUN

LOADS PROGRAM CALLED START & EXECUTES

SAVEDCT/Dxx, "PROGRAMNAME"

SAVE PROGRAM IN MEMORY ON DISK. DISK MUST HAVE INDEX & CATALOG.

RENAME T/Dxx, "FILENAME" TO "NEWNAME" RENAMES A PROGRAM OR DATA FILE TO NEWNAME GIVEN.

MOVET/Dxx, TOT/Dxx,

MOVES EACH FILE AT 1ST ADDR TO 2ND ADDR. ALL SCRATCH FILGS ARE REMOVED.

SCRATCHT/Dxx, "PROGRAM"

SCRATCHES PROGRAM. PROGRAM IS THEN UNUSABLE.

C.5.8 Handy Commands to Know

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LIST SELECT

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Will print to the CRT exactly what is written within the " "s.

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Shuts the TRACE command off.

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MOVET/Dxx, "filename"TOT/Dxx, Reads the program or data file from the 1st address and writes it to the 2nd address. There must be room in the index and catalog of the 2nd disk or an error will occur. Existing data is not affected on either disk.

MOVE END T/Dxx = X Changes the last sector for the address given to sector X. X must be beyond where the last file ends or an error is returned. Data in the catalog area is not affected.

SCRATCH DISK T/Dxx,LS=X,END=Y Creates a new index of X number of sectors at the address given. The Y parameter is the last sector of the catalog of which the files to be stored cannot go beyond. All data that was at this address before the SCRATCH will now be inaccessible.

SCRATCHT/Dxx, "filename" Designates a file as obsolete. When LISTing disk an S will precede the file type identifying it as scratched. Scratched files are not moved with the MOVE command.

RENAME T/Dxx, "oldname"TO"newname" Changes the name of the file at the address given. Basic-2 O/S 3.0 & higher.

List Name: 2200

Entry Count: 21 Access: Shared
Modified: 06/02/95 Used: 02/01/95

Modified: 06/02/95 Used: 02/01/95

User Name	Type	Recipient	Access	Rights
Mike Bahia	Person	T (T,C,B)	X Use	X Modify
Wilson Brown	Person	T (T,C,B)	Use	Modify
John F. Calvey	Person	T (T,C,B)	Use	Modify
Walter Carney	RMT Person	T (T,C,B)	Use	Modify
2200 Mailbox Club	Owner	(T,C,B)		
Anthony Copeland	Person	T (T,C,B)	Use	Modify
Joe F Davis	Person	T (T,C,B)	Use	Modify
Randy P. Foht	RMT Person	T (T,C,B)	Use	Modify
Jeffrey D. Gossett	Person	T (T,C,B)	Use	Modify
Bob Hattier	Person	T (T,C,B)	Use	Modify
Craig Lavis	Person	T (T,C,B)	Use	Modify
Steve McKenzie	RMT Person	T (T,C,B)	Use	Modify
Ray Meyer	Person	T (T,C,B)	Use	Modify
Robert P. Minock	Person	T (T,C,B)	Use	Modify
Pat O'Bryant	Person	T (T,C,B)	Use	Modify
Leo Olmos	Person	T (T,C,B)	Use	Modify
Wayne Osborn	Person	T (T,C,B)	Use	Modify
Alton Phillips	RMT Person	C (T,C,B)	Use	Modify
JIM RABER	Person	T (T,C,B)	Use	Modify
Carla VanNocker	RMT Person	T (T,C,B)	Use	Modify
George Weeks	Person	T (T,C,B)	Use	Modify

ANDERS BACKNER

List Name: 2200 MAILBOX 3

Entry Count: 75 Access: Shared
Modified: 06/02/95 Used: 02/01/95

User Name		Type	Recipient	Access	Rights
Kevin Addison		Person	T (T,C,B)	Use	Modify
Denis Allaire		Person	T (T,C,B)	Use	Modify
Dave Amini		Person	T (T,C,B)	Use	Modify
Randy R. Anderson		Person	T (T,C,B)	Use	Modify
Mike Bahia		Person	T (T,C,B)	X Use	X Modify
CHUCK BERNALES	(V)	Person	T (T,C,B)	Use	Modify
Ray Berry	RMT	Person	T (T,C,B)	Use	Modify
Ragaie Bishay		Person	T (T,C,B)	Use	Modify
Larry F. Blasini		Person	T (T,C,B)	Use	Modify
Terry Boyles		Person	T (T,C,B)	Use	Modify
Karl Brachmanis		Person	T (T,C,B)	Use	Modify
John Browne		Person	T (T,C,B)	Use	Modify
Gianmario Canaparo		Person	T (T,C,B)	Use	Modify
Christian Cautaerts		Person	T (T,C,B)	Use	Modify
Steve Cheatham		Person	T (T,C,B)	Use	Modify
Lew Christy	RMT	Person	T (T,C,B)	Use	Modify
Simon Chui		Person	T (T,C,B)	Use	Modify
Stephen Chung		Person	T (T,C,B)	Use	Modify
2200 Mailbox Club		Owner	T (T,C,B)		
Gray Crayton	RMT	Person	T (T,C,B)	Use	Modify
Alex Damiano		Person	T (T,C,B)	Use	Modify
Philippe De Laulanie		Person	T (T,C,B)	Use	Modify
Bruce Dunmore		Person	T (T,C,B)	Use	Modify
Marty Dusharm		Person	T (T,C,B)	Use	Modify
Marty Dusharm		Person	T (T,C,B)	Use	Modify

List Name: 2200 MAILBOX 3

Entry Count: 75 Access: Shared
Modified: 06/02/95 Used: 02/01/95

User Name	Type	Recipient	Access	Rights
Jack Fannon	Person	T (T,C,B)	Use	Modify
Bill H. Fesler	Person	T (T,C,B)	Use	Modify
Susan Freeling	Person	T (T,C,B)	Use	Modify
Chris Garvey	Person	T (T,C,B)	Use	Modify
William Godsey	RMT Person	T (T,C,B)	Use	Modify
Bill Gooden	RMT Person	T (T,C,B)	Use	Modify
John Hadzicki	RMT Person	T (T,C,B)	Use	Modify
Joe Havelka	Person	T (T,C,B)	Use	Modify
Bob Hayes	Person	T (T,C,B)	Use	Modify
Josef Heinz	Person	T (T,C,B)	Use	Modify
Werner Heinzl	Person	T (T,C,B)	Use	Modify
Tom Hendriks	Person	T (T,C,B)	Use	Modify
John Howser	Person	T (T,C,B)	Use	Modify
Mike Ivey	Person	T (T,C,B)	Use	Modify
Dexter G. Kim	Person	T (T,C,B)	Use	Modify
Les Kish	(V) Person	T (T,C,B)	Use	Modify
Don Kranz	Person	T (T,C,B)	Use	Modify
VICTOR LAU	Person	T (T,C,B)	Use	Modify
George A. Lemke	Person	T (T,C,B)	Use	Modify
Gary Marcotte	Person	T (T,C,B)	Use	Modify
John Martens	Person	T (T,C,B)	Use	Modify
Greg Matney	Person	T (T,C,B)	Use	Modify
Tom McCoy	Person	T (T,C,B)	Use	Modify
Felix Miscioscia	Person	T (T,C,B)	Use	Modify
John Murdock	Person	T (T,C,B)	Use	Modify

List Name: 2200 MAILBOX 3

 Entry Count: 75 Access: Shared
 Modified: 06/02/95 Used: 02/01/95

User Name	Type	Recipient	Access	Rights
Manual Orona	Person	T (T,C,B)	Use	Modify
John Pardoe	Person	T (T,C,B)	Use	Modify
John Parkes	Person	T (T,C,B)	Use	Modify
Ross Parkes	Person	T (T,C,B)	Use	Modify
Ralph Pincek	Person	T (T,C,B)	Use	Modify
Ken Proffitt	Person	T (T,C,B)	Use	Modify
ASC PROFIT	Person	T (T,C,B)	Use	Modify
Robert W. Raikes	Person	T (T,C,B)	Use	Modify
Ed Ratka	Person	T (T,C,B)	Use	Modify
George Reinhart	Person	T (T,C,B)	Use	Modify
Mike Rettig	Person	T (T,C,B)	Use	Modify
Torbjorn Sagner	Person	T (T,C,B)	Use	Modify
Marty Scharf	RMT Person	T (T,C,B)	Use	Modify
Willem Sloep	Person	T (T,C,B)	Use	Modify
Bill Smith	Person	T (T,C,B)	Use	Modify
Smith, Frank (MSMAIL)	Person	T (T,C,B)	Use	Modify
Jeff Smith	Person	T (T,C,B)	Use	Modify
Lamont Smith	Person	T (T,C,B)	Use	Modify
Richard Solomon	Person	T (T,C,B)	Use	Modify
Broadus Verhine	Person	T (T,C,B)	Use	Modify
Claudio Visigalli	Person	T (T,C,B)	Use	Modify
Brian F. Weir	RMT Person	T (T,C,B)	Use	Modify
Scott Westin	RMT Person	T (T,C,B)	Use	Modify
Thik Fong Wong	Person	T (T,C,B)	Use	Modify
Edgar Wuest	Person	T (T,C,B)	Use	Modify

OCTOBER '92 BASIC-2 REPORT

DRAFT

WANG IS COMMITTED TO ITS 2200 CUSTOMERS & PARTNERS

David Goulden, VP Marketing, Wang Laboratories

EXECUTIVE SUMMARY

Wang Laboratories views the 2200 market as a viable business segment and remains fully committed to its loyal 2200 customers and Value Added Resellers. The Company plans to continue to manufacture, sell and support the 2200 product line on a worldwide basis. Further, all new 2200 products under development prior to the Wang's Chapter 11 filing on August 18, 1992, will be brought to market by the end of calendar year 1992. These new development projects include a new general release CS/386 Turbo Operating System and a new ~~Dual~~ SCSI Controller for CS/386 Turbo systems supporting a system printer and ~~wide~~ array of Wang PC and VS SCSI devices.

UNDERSTANDING WANG'S CHAPTER 11 FILING AND WHAT IT MEANS TO OUR CUSTOMERS

Hanna Herwick to supply.

THE WANG 2200, A LONG AND SUCCESSFUL HISTORY

By all standard computer industry measures (units, third party partnerships, total revenues, active customers, applications written, etc.), the Wang 2200 product line and innovative BASIC-2 programming language have enjoyed a long and successful history.. Since the first single user/single-tasking system was introduced in 1972, Wang has sold over 75,000 2200 systems. It is estimated that at least 250,000 people still work with BASIC-2 or derivatives on a daily basis at 50,000 sites in 40 countries.. Although the initial hardware architecture and operating system was developed over 20 years ago, it is estimated that up to 40% of the systems sold are still in active service. The latest advance in the 2200 product line, the CS/386 Turbo (is generating considerable interest in the 2200 marketplace.) BECAUSE IT PROVIDES LONG SOUGHT ~~IMPROVEMENT IN~~ I/O PERFORMANCE AND CAPACITY ~~AS WELL AS CPU PERFORMANCE UP AND CAPACITY~~ AT RELATIVELY ATTRACTIVE PRICES.

~~CONSIDERABLE CPU AND~~ ~~IMPROVEMENT IN~~ ~~AS WELL AS CPU PERFORMANCE UP AND CAPACITY~~

The original single-user/single tasking 2200 system platform generated 8 follow-on models until it was superseded in 1977 by the MVP architecture, Wang's first multi-user/multi-tasking 2200 system. The MVP and later LVP models propelled the 2200 into a much broader small business market. The MVP models alone generated over \$100M revenue in the first year of sale. The MVP and LVP gave way to the MVPC and LVPC models, but were later obsoleted by a major new system innovation in 1985. In 1985, Wang announced the MICROVP 2200 system. The MICROVP was only 10% faster than its predecessors, but was a major success. Through the use of VLSI technology, Wang was able to reduce 7 to 9 system boards to one, reducing 2200 monthly system maintenance by 70%. In 1987, the 2200 CS and DS models were introduced. The CS and DS models repackaged the MICROVP VLSI technology

SIGNIFICANT

in a VS ^{11K6} cabinet and electronics package and supported all existing MICROVP option boards. Perhaps the most significant announcement in the 2200 product line were the CS/386-D and CS/386-N models in 1987. With these new models, Wang was the first major manufacturer to take an aging 16 year old product line into the 21st century by rehosting the 2200 operating system on a high growth industry standard INTEL 80386 architecture. The CS/386 was designed to field replace the CS-10D through CS-80D and CS-10N through CS-80N VLSI series of CPUs. Finally in 1991, the introduction of the CS/386 ^{TURBO} brought major performance and capacity enhancements to CS/386 users and an easy, low cost upgrade opportunity for the majority of 2200 users still operating on older 2200 models.

EXHIBIT 1 Progression of 2200 capabilities over 20 years

Features	2200 R/C 54K/6 PLS	DES VP/5VP	MVP- MVPC	LVP- LVPC	MICROVP VP CS	CS-D/N	386	TURBO
Memory	4K-32K	8K-128K 16	16K- 512K	16K- 512K	128K- 8M	128K- 8M	1M-8M	4M-32M
I/O Slots	3-11 3-11	1-9	7-9	3-7	9	9	9	9
Users	1	1-3	16	8-16	16	16	16	32
Tasks	1	1-16 1-16	16	16	16	16	16	22 64
BASIC-2	no	yes	yes	yes	yes	yes	yes	yes
Control Memory	prom	32K	32K	32K	32K	32K	256K	256K
Performance versus previous model		4-30X	N/A	N/A	.1X	N/A	2.22X	2.14X

THE WANG CS/386 TURBO, OUR MOST HIGHLY EVOLVED 2200 SYSTEM

The announcement of the CS/386 TURBO in 1991 represents a crowning achieving for one of Wang's most popular legacy systems. The CS/386 Turbo provides 5 times the CPU performance of VLSI 2200 systems and 2.5 times the performance of the original CS/386-D and N systems announced only 2 years earlier. The CS/386 Turbo also represents the climax of a long term effort to move the 2200 product line from a proprietary to industry standard hardware platform. After the announcement of the original CS/386 models, Wang also announced migration paths to open system platforms to protect our customer's greatest investment, their tried and proven custom BASIC-2 applications and vital corporate data. In 1990, Wang contracted rights to resell the NIAKWA BASIC-2C and ^{in 1991, the} Kerridge (KCML) BASIC-K compilers, giving our 2200 users an easy migration path to PC and RISC Series open system platforms. Portation to either platform also provided for reuse of ^{most} certain 2200 workstation and printers. Our most recent CS/386 Turbo product, ~~was~~ the new ~~new~~ SCSI Controller now in Beta test further advances our investment protection strategy. The CS/386 Turbo allows users to upgrade to our highest performance/capacity 2200 CPU and add the highest performance/capacity SCSI storage devices offered on our VS systems. The ~~new~~ SCSI Controller overcomes the limitation of 2200 ST-506 ~~DASD~~ ^{DISK} ~~QIC-2~~ ^{as 2200} ^{TECHNICAL} ^{FILE}

technology, ^{PROVIDING 2 MEG OF CACHE AND DISK} expanding the maximum storage capacity of the 2200 system from 948MB to 1¹2.65GB. The CS/386 Turbo can support 3 ~~SCSI~~ SCSI controllers, with up to ⁶ SCSI devices (maximum 650MB) ^{WITH CURRENTLY TESTED DRIVES AT THIS TIME} per controller. But, the ~~SCSI~~ SCSI Controller is more than a high performance controller, by supporting ~~the~~ the same SCSI devices offered for Wang PC and VS systems, CS/386 TURBO users can also enjoy support from Wang's OPEN Peripheral Strategy. The OPEN Peripheral Strategy allows SCSI peripherals from PC, VS and now 2200 systems to be transferred intact to the Wang RISC Series. With the ~~SCSI~~ SCSI controller, Wang now protects your 2200 investment from workstations, printers, and applications to storage peripherals.

WHO ARE OUR 2200 CUSTOMERS?

The majority of Wang's 2200 installed base is composed of small business users with vital yet stable business environments. In many cases, our small business user has met with rapid growth and expansion over the last decade. It is this user who awaits every new product announcement, seeking greater performance and connectivity or a migration capability to a higher performance/capacity platform like the Wang RISC Series. A small percentage of our 2200 users have adopted an OPEN system platform standard even though they may have unused 2200 capacity. This user also requires a straightforward mechanism to move their mission critical 2200 processes to a UNIX platform. The largest segment of 2200 users would like to remain on the 2200 platform and see a CS/386 Turbo upgrade opportunity. Because our customers have diverse needs, Wang has carefully engineered new platforms for upgrade and programs to provide migration paths to open platforms to meet the needs of each of these 2200 audiences.

EXHIBIT 2 INSTALLED BASE 2200 GROWTH OPTIONS

Profile	Add-on existing system	Upgrade to CS/386 Turbo	Migrate to PC UNIX	Migrate to RISC Series
Singe user solution	possibly	yes	yes	yes
Older multi-user 2200, capacity available	possibly	yes	Future Option	Future option
High end 2200, no capacity left	unlikely	unlikely possibly	possibly	yes
Company adopts open system standard	no	no	yes	yes

CHOICES, CHOICES, CHOICES-WANG'S 2200 STRATEGY PROVIDES A GOOD GROWTH PATH FOR ALL USERS

In some cases, a user can do quite nicely on their existing CPU, but may require expansion of memory, workstation connections or ~~DASD~~. For a moderate growth user, Wang offers an excellent upgrade path with the 386/Turbo Series platform. For ~~40%~~ ^{A LARGE PERCENTAGE} of the installed base, existing system add-on or CS/386 Turbo upgrade represents a tremendous value with minimal impact to vital business processes. For some ~~40%~~ ^{MAY PROVIDE} of the installed base, the 386/Turbo ~~cannot support~~ the number of users or processing power required. Here Wang offers ~~an~~ excellent low impact migration capability to the Wang RISC Series platform and considerable investment protection for applications, training, peripherals and workstations. Lastly, some ~~20%~~ of the customer base have standardized on an open system platform for future purchase. Again, Wang offers the path to industry standard PC or RISC Series platforms for customers who have standardized on UNIX.

Exhibit 3 ESTIMATED BALLPARK COST OF 2200 GROWTH ALTERNATIVES

CS/386 TURBO UPGRADE	MIGRATE TO PC	MIGRATE TO RISC SERIES
10K	25K	50K

A PROMISING FUTURE FOR OUR OLDEST LEGACY PRODUCT AND AN EXPANDING ROLE FOR VALUE- ADDED RESELLERS

Some of our customers will stay with Wang 2200 technology indefinitely. Fortunately, we have planned ahead and have traditional 2200 platforms to support those needs for a large segment of our 2200 base well into the future. But should you need to move to an open PC or RISC Series platform, we also have a range of programs to help you get there. Key to both our 386 Turbo upgrade and PC /RISC migration programs are the vital services and expertise rendered by our 2200 Value Added Resellers. Our VARS have been instrumental in the long successful history of the 2200 and our delivery strategy again positions the Wang VAR as the primary provider of sales and support to the customer base. Wang will concentrate on providing ~~adequate~~ technical support, operating system maintenance and upgrade and migration platforms for our VARS to service our customers in 40 countries

NEW VAR PROGRAMS

The 2200 sales and support model has been very successful, so much so that it will be increasingly adopted for other product lines. You can expect further focus on VAR programs and territory reselling as the primary marketing and support channel for the 2200 customer base. We will be evaluating and strengthening our third party program in the near future and hopefully will be able to communicate it to you in this very space in November. Until then, we would like you to consider this thought. Your 2200 investment is more fully protected than anytime in your system ownership history. You have three times the number of alternative growth paths than existed only three years ago. Even after filing for Chapter 11 protection, Wang can offer you more alternative growth paths than any other vendor. We want your business ^{are} trying hard to meet your current and future needs.

NEED TO TALK TO AN EXPERT?

If you foresee a requirement to upgrade or change your platforms call 1-800-WANG and ask for a 2200 VARS to review your situation and recommend the best growth alternative.

?

TECHNICAL SERVICE BULLETIN
SECTION: Hardware Technical

NUMBER: HWT REPLACES: HWT 9942 DATE: 10/05/95 PAGE 1 OF 2

MATRIX ID. 3110 PRODUCT/RELEASE# VS5/6/75E/5000/6000 & 2200 CS-D/DS

TITLE: VS/2200 5 1/4" 1.2MB Floppy Drive Compatibility & Configuration Issues

PURPOSE:

To alert the Field to possible configuration problems with the 5 1/4" 1.2MB floppy drive used with the VS and 2200 due to an incorrect jumper which may be soldered in or to a switch change required on the VS5000/6000 RCU Brd when changing drive manufacturers, and to provide specific information on which drives are compatible and how to jumper those drives.

EXPLANATION:

There are several different 5 1/4" 1.2MB Floppy Drives that are usable with the VS (2270V7) and also with the 2200. The jumper configuration is the same for both product lines. Several part numbers have been associated with these drives. Those part numbers include:

- 278-4055 tested drive with black bezel
- 725-0232 vendor part # with black bezel (replaced by 278-4055)
- 725-0258 vendor part # with black bezel (replaced by 278-4055)
- 725-0258G vendor part # with gray bezel
- 270-5162 tested drive with gray bezel
- 725-5083VS vendor part # with gray bezel (replaced by 270-5162)

Under any of these part #s, there are only 4 specific models numbers that should be found. Any other models from these Manufacturers or any other companies including Chinon are not compatible. The 4 models are:

- Panasonic JU-475-1xxx
- Panasonic JU-475-2xxx
- Panasonic JU-475-3xxx
- Mitsubishi MF504C-327Ux Rev P only

Recently a large number of 1.2M drives have been returned to stock, taken from hardware returned to Asset Recovery. As these and similar drives are also used in many PCs which may require different jumper settings, the model numbers and jumpers need to be checked carefully when replacing.

CORRECTIVE ACTION:

PANASONIC JU-475-1xxx Jumpers: p/n 278-4055/725-0258G —

A problem was found with several Panasonic JU-475-1xxx drives. A soldered jumper, DR, had to be cut. With the DR jumper in, the 'door closed' signal is tied to 'drive select'. This causes the floppy LED to stay on and the spindle to continuously spin if the door is open on power up. The drive is then inaccessible. On a 2200 system the symptom is the same if the door is open, but with a diskette installed & the door closed, the drive will pass the power up self-test and appear to work ok. Be sure when replacing this drive to check this jumper and cut it if it's closed.

OVER

GROUP: Continuation Engineering

MAIL STOP: 027-G1D

COMPANY CONFIDENTIAL
WANG Laboratories, Inc.

MATRIX ID. 3110 PRODUCT/RELEASE# VS5/6/75E/5000/6000 & 2200 CS-D/DS

TITLE: VS/2200 5 1/4" 1.2MB Floppy Drive Compatibility & Configuration Issues

CORRECTIVE ACTION (cont):

The DR jumper is found between rows 'A' & 'B' and chips 4 & 5, next to the DD jumper. The correct jumpers settings are:

DS1 in, DS2,3,4 out	DS/MX - DS
DO in, DC,LR out	BX/CX - BX
AX/AT - AX	SP,IX,DD all out
IRD out	MM,DA in, MS,OA,UA out
HA out	

150 OHM Terminator Chip in at location C1 (next to the I/O cable conn)

- ** VS5000/6000: if replacing a Mitsubishi, RCU Sw Bk 2, sw 6 must be set to ON
PANASONIC JU-475-2xxx Jumpers: p/n 278-4055/725-0258G

DS1 in, DS2,3,4 out	DS/MX - DS
DO in, DR,DC,LR,RD all out	AX/AT - AX
IRD out	SP out
BX/CX - BX	MM,DA in, MS,HA,OA,UA all out

150 OHM Terminator Chip in (located next to the I/O cable connector)

- ** VS5000/6000: if replacing a Mitsubishi, RCU Sw Bk 2, sw 6 must be set to ON
PANASONIC JU-475-3xxx Jumpers: p/n 278-4055/725-0258G

DS1 in, DS2,3,4,MX all out	PH/HH - PH
DA in, PA,UA,HA,LA,IM all out	TM in (jpr for termination)
MS/MM MM	TH in, MDA,MDB,DD out
BX in	NAX in

- ** VS5000/6000: if replacing a Mitsubishi, RCU Sw Bk 2, sw 6 must be set to ON
MITSUBISHI MF504C-327U REV P Jumpers: p/n 270-5162/725-5083VS

The Mitsubishi drives have a silver label on either the top or bottom edge near the rear with the Mitsubishi name, model #, and revision. Only the P rev drives with a special terminator sip are usable with the VS or 2200. There are other floppy drives that fall under the 725-5083 part #, but only the Mitsubishi MF504C-327U Rev P can be converted. If you have a 270-5162 or 725-5083VS, it should be jumpered correctly with the right terminator. If it is jumpered incorrectly you should assume it is a 725-5083 and has the wrong terminator. These incorrect terminators can be used by cutting pin 4 & soldering a wire to pin 2 that inserts into the hole for pin 4. The new terminator is p/n 333-0988, has no missing legs, and is marked 4609X-N74. The correct jumper settings are: —

MX in, DS3,0,1,2 out	TPA out
SS in, ND,SB,SG,IP out	
SR,RD,RI,IU,IR,MM,IS,HR in, DC,MS,IL,DD out	
Terminator Sip, p/n 333-0988, in (located next to the I/O cable conn)	

- ** VS5000/6000: RCU Sw Bk 2, sw 6 OFF (ON for Panasonic). Min @MCRUCU@ 1.06.03

For questions concerning this TSB contact: Mike Bahia 508-858-7095

GROUP: Continuation Engineering

MAIL STOP: 027-G1D

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

HARDWARE SWITCH SETTINGS

BAUD RATE				SWITCH 3				SWITCH 2								
PORT 1				PORT 2				PORT 3				PORT 4				
BAUD RATE	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
110	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
134.5	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
150	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
200	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF
300	OFF	OFF	DN	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
600	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
1200	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF
UNDEFINED	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF
2400	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
UNDEFINED	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON
4800	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
UNDEFINED	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON
9600	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
19,200	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON
	L			M	L			M	L			M	L			M
	S			S	S			S	S			S	S			S
	D			D	D			D	D			D	D			D
BINARY	1	2	4	8	1	2	4	8	1	2	4	8	1	2	4	8

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 removed)

The board can be loaded for 4 different memory sizes:

<u>SIMM Part #</u>	<u>Memory Size</u>	<u>SIMM Modules</u>	<u>SW1 on 9576</u>
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

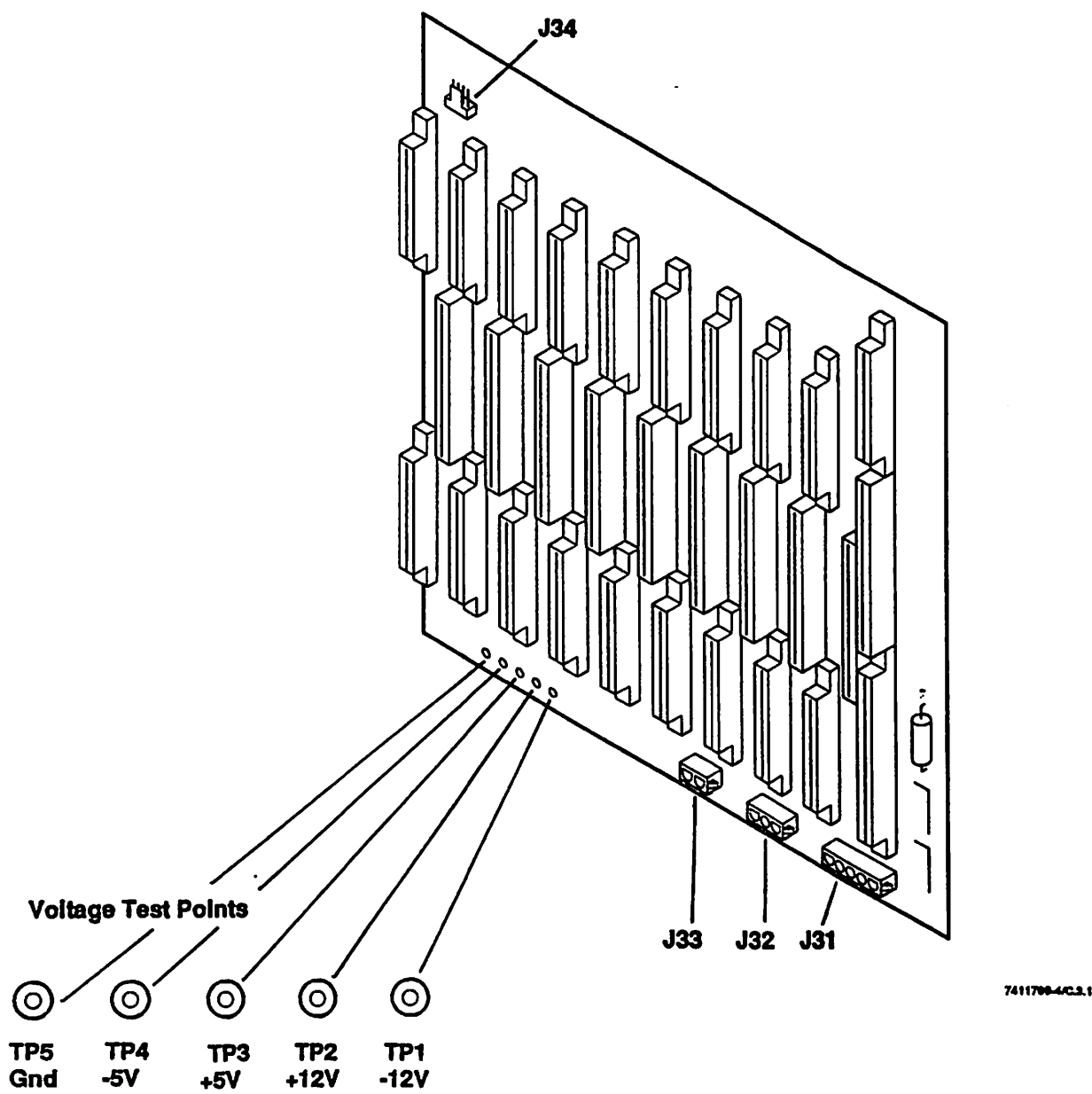
- J2 - obsolete. 2 pin conn which was to be used for for Battery
(666-1016) Backup for clk. New real-time clock chip L5 with
built-in battery eliminates need for connector J2.

LED1 - Diagnostic Indicator - comes on during power up & goes out
if passes diagnostics (beside L28)

386 TURBO

Controls and Indicators

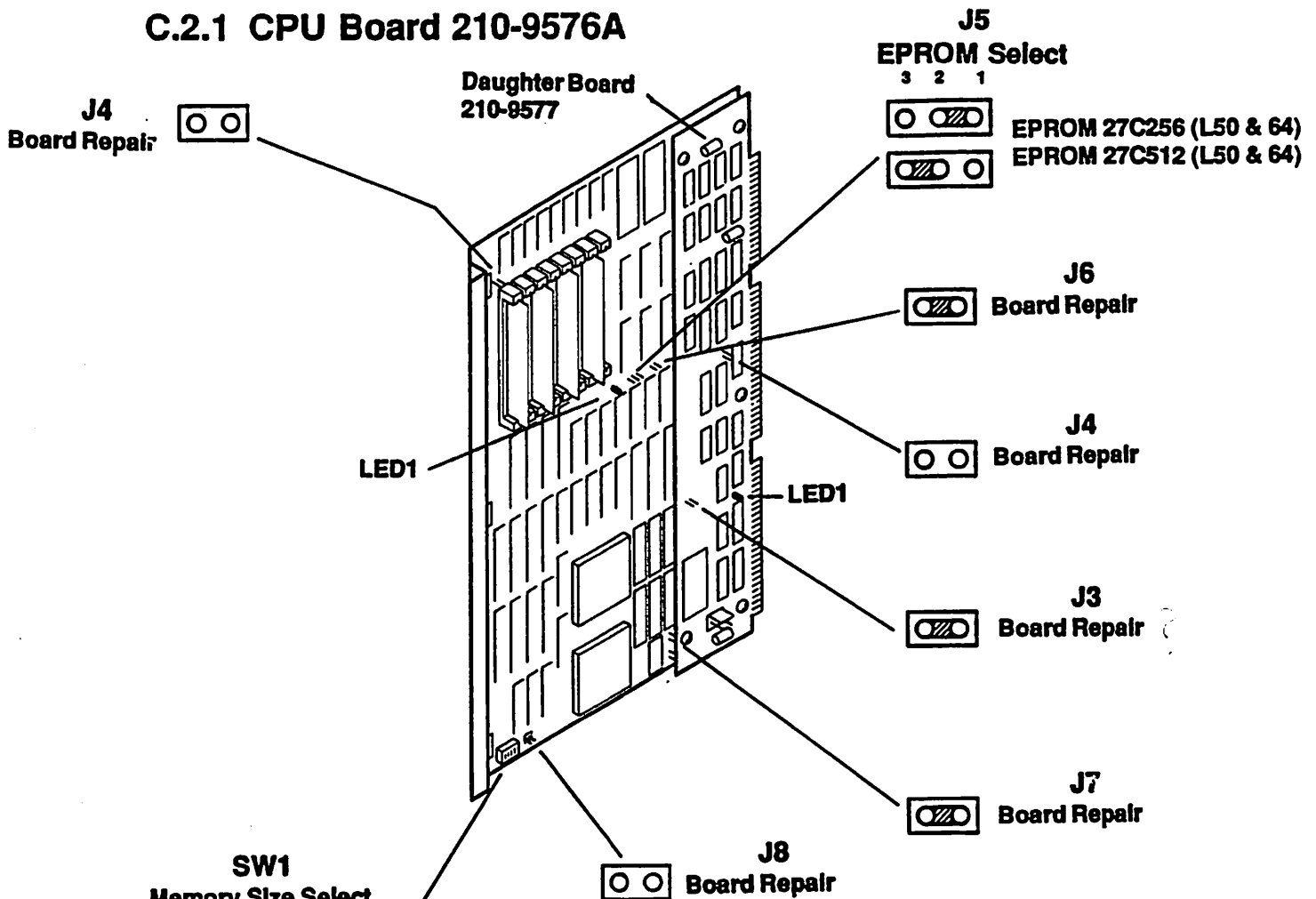
Motherboard 210-9578



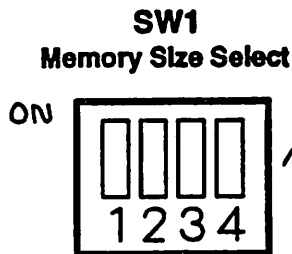
386 TURBO

Settings

C.2.1 CPU Board 210-9576A



7411700-4C2.1



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)



Fco 1501
L50 - 378-9509R2
L64 - 378-9508R2

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.

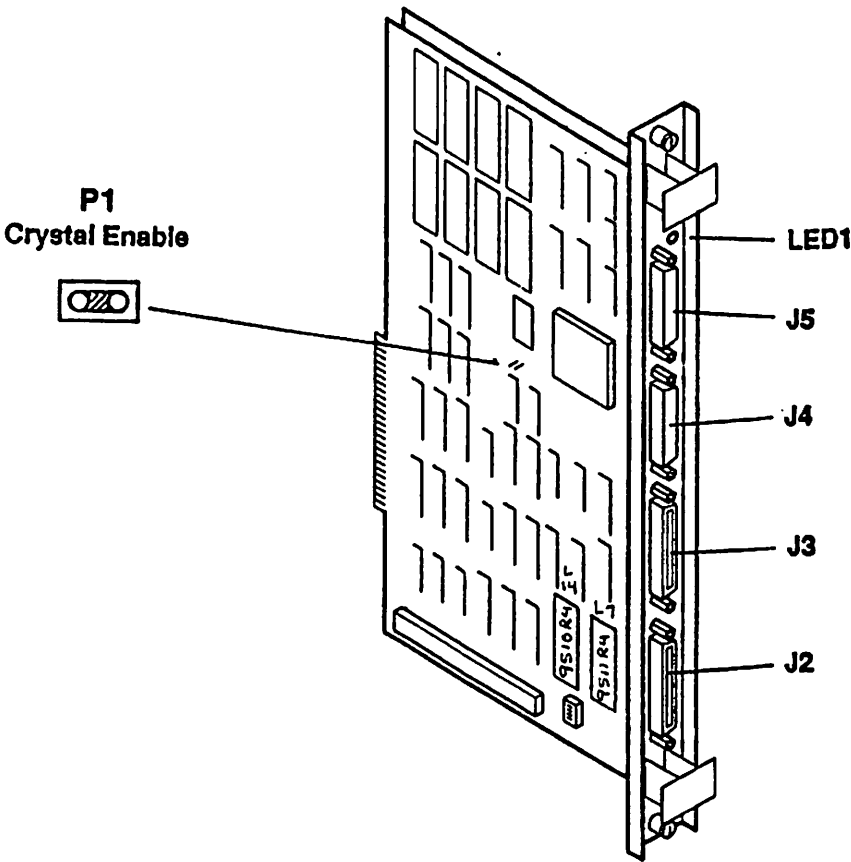
Jumpers

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)

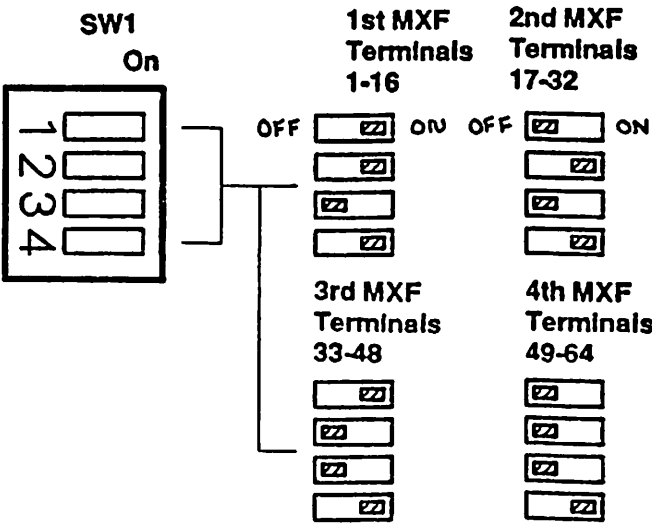
210-9579



FC01502

L7 - 318-9511 R4

L14 - 318-9510 R4

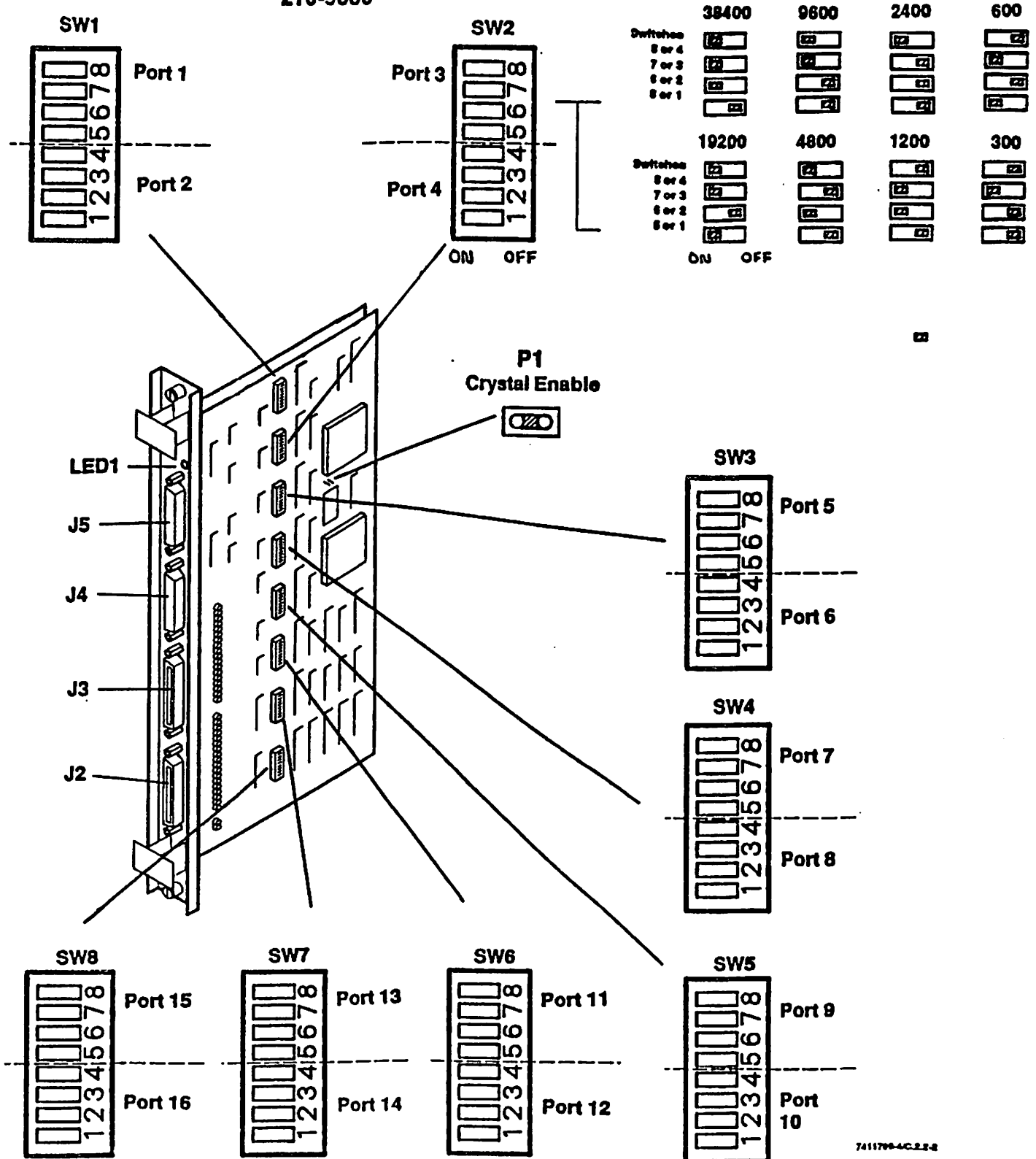


386 TURBO

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

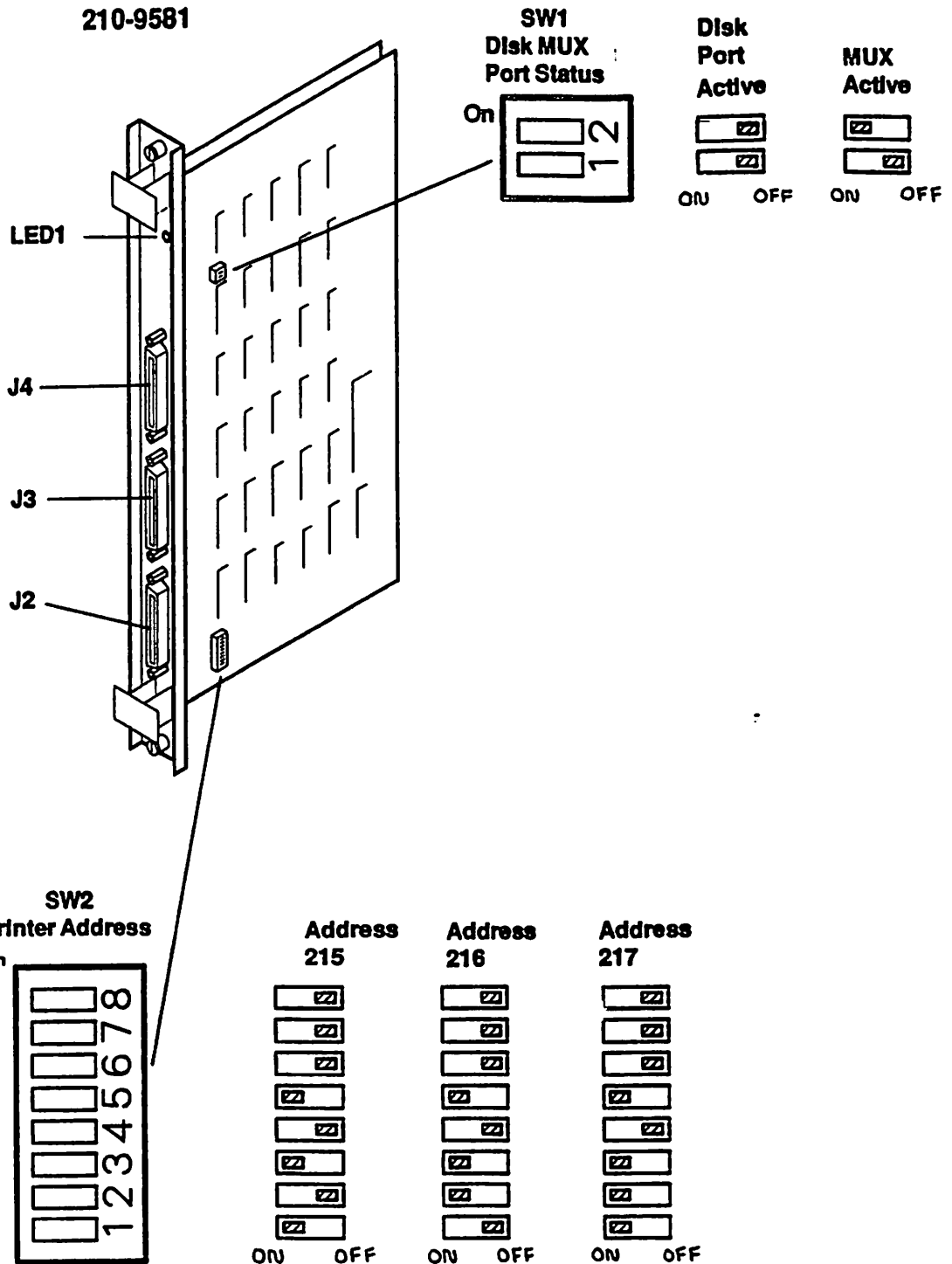
Jumpers

P1 - IN (2 pin jumper on 9579 board next to clock Y1 for MFG)

Settings

Printer/Disk Dual Controller (212-9718)

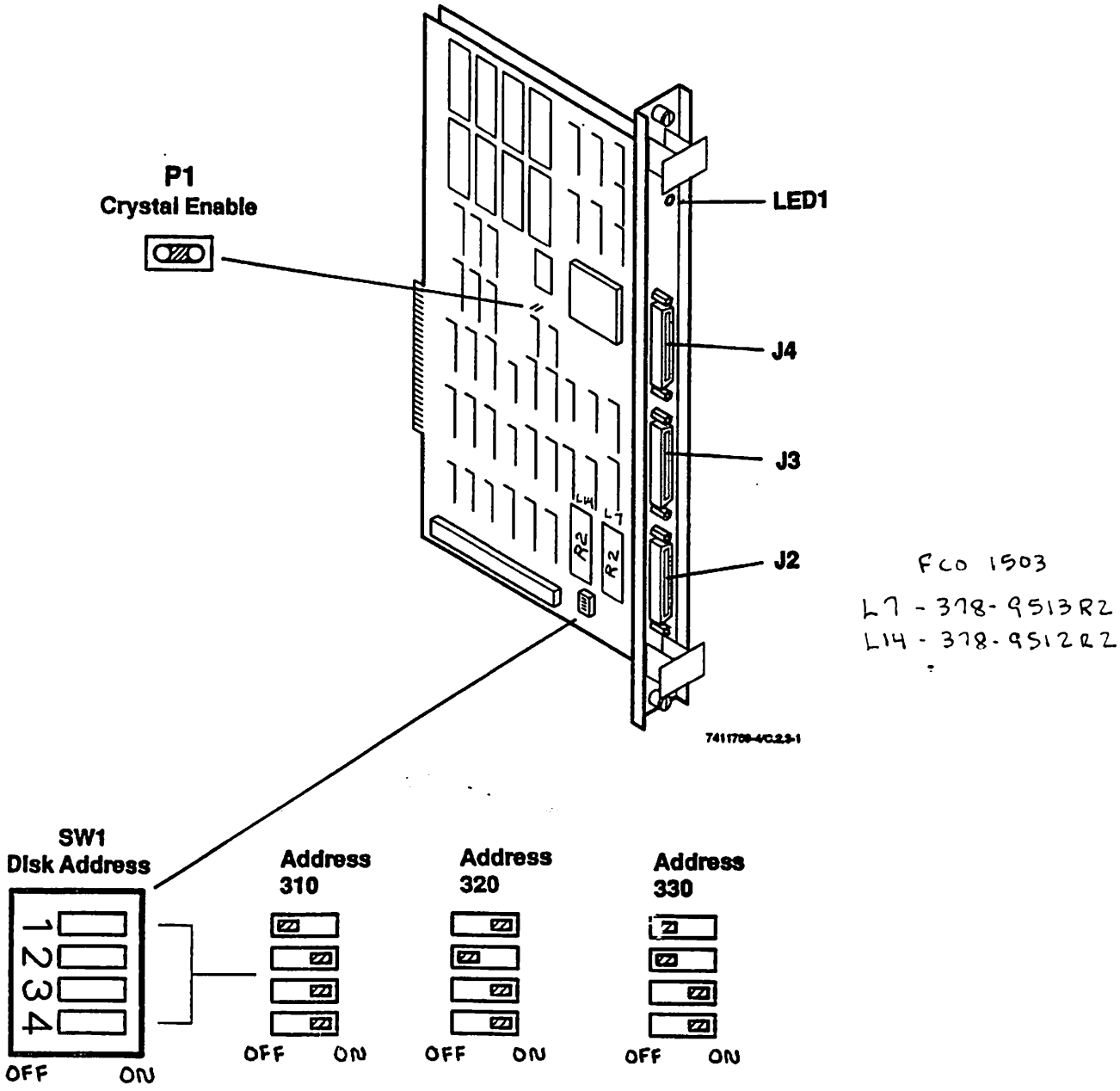
210-9581



Settings

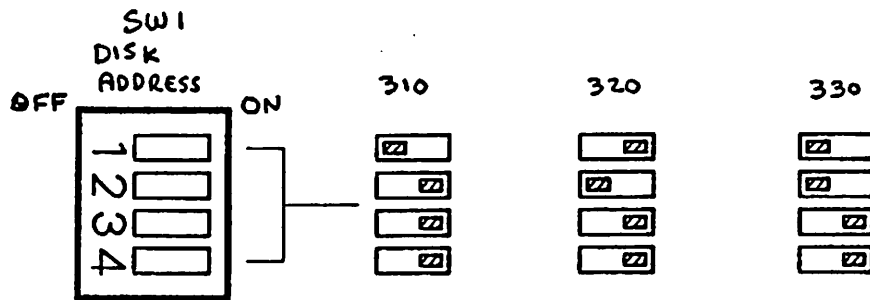
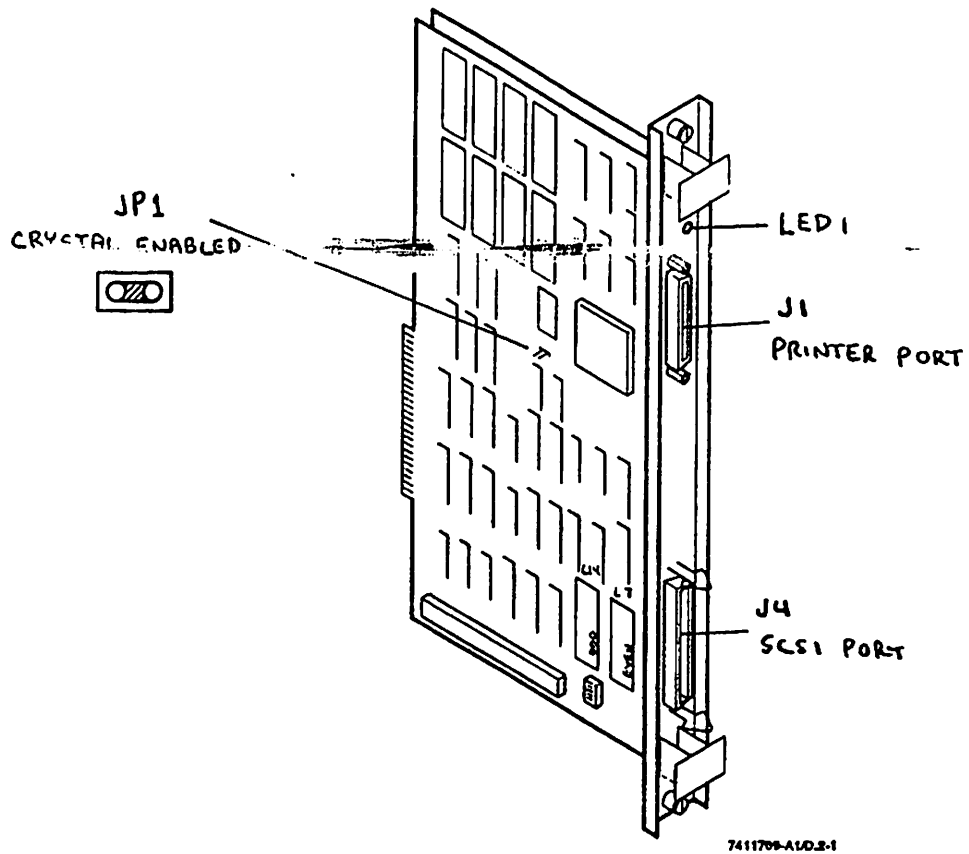
Printer/Disk Dual Controller (212-9718)

210-9579



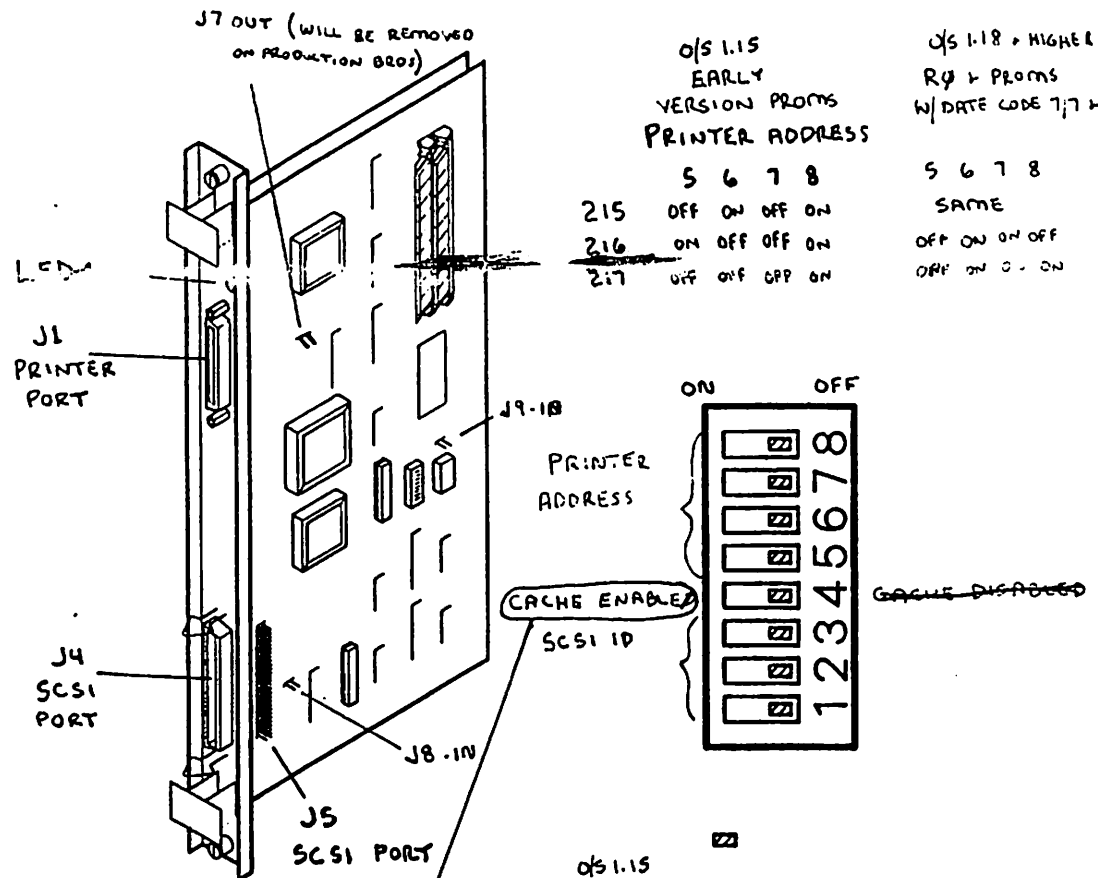
22C11-SCSI CONTROLLER 212-9727

HIGH SPEED I/O PROCESSOR 210-9579



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
R/P + 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
R/P 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	SUGGESTED ID
ID 7	ON	ON	ON	
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-A10.02

O/S 1.18 + HIGHER
R/P + PROMS W/
DATE CODE 7/7 OR HIGHER

	1	2	3	SUGGESTED ID
ID 7	SAME			
6	ON ON OFF			
5	SAME			
4	ON OFF OFF			
3	OFF ON ON			
2	SAME			
1	OFF OFF ON			
0	SAME			

TURBO PROMS 27C256-12 (120 nanosec)

210-9576A CPU BOARD	L50	388-9509R2	R3	PGA FCO 1501
(ALSO CONTAINS PAL CHIPS)	L64	378-9508R2	R3	

212-9717 MXF BOARD				
210-9579 I/O PROCESSOR	L7	378-9511R3	R4	PGA FCO 1502
	L14	378-9510R3	R4	

212-9718 HS PRINTER/DISK CONTROLLER				
210-9579 I/O PROCESSOR	L7	378-9513R1	R2	PGA FCO 1503
	L14	378-9512R1	R2	

212-9727 SCSI/PRINTER CONTROLLER				
210-9579 I/O PROCESSOR	L7	?		
	L14	?		

CS/386 PROMS D27128A20

212-7129x CPU BOARD	(ALSO HAS SEVERAL PAL CHIPS)		
210-9562A DAUGHTER BRD	L13	379-2513R1	
	L23	379-2514R1	

Running Release 3.01 with BASIC-2/386

The following procedures have been shown to bypass certain compatibility problems that arise when using Release 3.01 with BASIC-2/386.

1. Make sure you have Revision 5.01 of the Registration 5 software. The revision number is displayed on the first startup screen. Without this revision, the startup programs will refuse to run with BASIC-2/386.
2. Make sure you have the latest revision of SPEED I. Recent revisions have incorporated code to make transitions to BASIC-2/386 much easier. At this writing, you should be using Revision 90-01 of 3.01.

These two revisions solve all reported compatibility problems in the SP module that prevent SPEED from running when using OLD external format. Compatibility issues in other modules will be addressed in future revisions of the software.

To use programs in NEW format, you must:

1. Make sure that the image statement "load line" in all of your applications programs is the last line of your program. If it is not, SP LOAD may not find the load line or may find only a portion of it.
2. Modify line 8320 of SP LOAD. After the statement
 Q=POS(QS()=Q9S)
add
 IF US(1)="W" THEN Q=256.

Bear in mind that several SPEED I utilities, such as Verify Load Lines, Program Listing, Program Compare, and Search & Replace will not work with NEW format.

Running D.A.T.A. 3500 with BASIC-2/386

D.A.T.A. 3500 is apparently running successfully under BASIC-2/386 with very few problems.

Running in OLD Format

A problem was reported with a \$GIO in WP 425 3 in early releases of BASIC-2/386. The statement causes a hard error when executed. If you encounter this error, REM out the SGIO statement. The only effect will be the loss of printer timeout sensing.

Running in NEW Format

A problem occurs in WP 010 1 because of the new disk index identifiers used for programs stored in NEW format. If you intend to use new format, change the last statement of line 560 of WP 010 1 from

```
IF STR(R1$( ),Q1,2)<>HEX(1080) THEN 580
```

to

```
IF STR(R1$( ),Q1,1)<>HEX(10) OR STR(R1$( ),Q1+1,1)=HEX(00) THEN 580
```


***	***
***	***
***	***
***	***
***	***

*** **
 *** P R E L I M I N A R Y ***

```

**
**      M A I N T E N A N C E   P L A N      **
**

```

[illegible]

**	**
**	**

** May 26, 1991 **
 ** **

```
**          CS/386 Turbo 22C11-SCSI Controller          **  
**                                                    **
```

[illegible]

**	Product Line Manager	Product Line Director	**
**	Gene Roy	Mike Runge	**
**			**

**	Product Line Manager	Product Line Director	**
**	Gene Roy	Mike Runge	**
**			**

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I. PRODUCT DESCRIPTION

A. OVERVIEW OF THE PRODUCT

The 22C11-SCSI Controller is a new intelligent controller for use with the CS/386 Turbo CPU. It provides the Turbo with an industry standard SCSI interface capable of significant disk I/O performance beyond anything currently now available to the product line. The SCSI controller has 2 Meg of on-board cache dedicated to it. Taking full advantage of the potential of this controller may require some programming changes. With this controller and the drives tested, multiple sectors can be read as quickly as 1 sector. If only reading 1 sector per access, throughput will be minimized. The number of sectors to read for optimum performance may vary from drive to drive. Changing programs on disk to 386 or 'NEW' format is recommended. A new command operational with the Turbo system is available to greatly simplify this process (\$MOVE!). The board consists of a 210-9579 High Speed I/O Processor Board and a 210-9582 SCSI/Printer Controller Board. The 9579 I/O Processor Board is the same basic board used with the Turbo MXF Terminal Controller and the 22C11-HS Printer/Disk Controller. The 9582 board handles all communication to any attached device. It has 2 common SCSI connectors, J4 external on the bottom half of the outer rail, and J5 found on the board just behind J4. These connectors provide an A Cable connection for either a 50 pin shielded amphenol connector via J4, or a 50 pin ribbon cable via J5. The SCSI port is ANSI X3.131-1986 compatible. The SCSI bus can support 8 SCSI devices of which the controller itself will be one. The controller has it's own unique device number set via switches. At the top of the outer rail is a standard 2200 Centronics printer interface, J1. Because printing from this port uses a 256K cache buffer and is controlled by the 286 processor freeing the CPU to other tasks, it too can enhance performance.

B. SIMILARITIES/DIFFERENCES (with other WANG products)

1) Software:

Use of the 22C11-SCSI Controller requires at minimum Turbo General Release 1.10.00 or higher. All standard BASIC-2 disk commands compatible to the DS with the CS/386 or Turbo are 100% compatible to the 22C11-SCSI disks. There are also new commands to talk directly to the SCSI disk drives and tapes. Unlike current disk drives now used with the 2200 product line which are pre-configured through switches and prom based code, SCSI disk drives must be configured through software. This is done with a new utility program which will be included with the Turbo Operating System. New menu picks will include 'SCSI Configuration' and updated versions of the 'Tape Backup and Restore' programs which will work with both the DS and SCSI. The 'SCSI Configuration' menu pick steps the user through the processes needed to initially setup the drive for use including a low level SCSI format and configuring the hard disk drive/s for various platter sizes. Pre-release versions of this software allow from 1 to 15 master addresses (D11-D1F, D21-D2F, or D31-D3F) or from 1 to 14 slave addresses (D51-D5E, D61-D6E,

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or D71-D7E) per disk drive, with a maximum of 29 hard disk addresses per controller. The first master and slave addresses (D10, D20, D30, D50, D60, & D70)) will be reserved for floppy drives and the last slave address for tape (D5F, D6F, or D7F). Final version software is expected to allow from 1 to 28 addresses per disk drive and per controller to take better advantage of systems with one large drive. The final version utility is also expected to reserve the last master address (D1F, D2F, or D3F) for a 2nd optional tape unit. After configuring the drive/s, all surfaces should be formatted using the standard 2200 format (\$FORMATDISKT/Dxx). A 16 Meg surface can be formatted in a matter of seconds dependent on drive speed. This overwrites any code which may have been written to disk with the SCSI format which may create confusion for the system. Anytime a drive is to be reconfigured, both a low level SCSI format via the utility and a 2200 format should be done to insure all new surfaces are 100% clean. The 'Backup' & 'Restore' to SCSI Tape procedures are quite similar to the DS tape procedures. The main difference is you cannot append to a tape on 'Backup'. This is because the tape drives currently available write in a serial format and do not have the separate directory track used with the DS version tape drives. At this writing, if using a 5 1/4" SCSI floppy, only 1.2M 2200 diskettes formatted in DOS format (512 byte sectors) are compatible. A DOS format can be done on a 1.2M DS floppy by using the 'Format Disk Platter' menu pick from the main menu of the operating system. Once into the program, you enter the floppy address and you will be prompted to select either 'CS/2200 format' or 'DOS format'. Any 1.2M diskette formatted in DOS format written by a 1.2M DS floppy drive will be readable on the SCSI floppy. The SCSI floppy drive suggested by Wang will only write in 1.2M format. Properly created, these diskettes will be readable on the DS 1.2M floppy. Diskettes in standard 2200 format (256 byte sectors), both 360K and 1.2M, are expected to be supported with a future release of the O/S. All Turbo O/S disks are being created in DOS format for SCSI floppy compatibility. If set up properly, a boot can be done from the SCSI floppy before configuring the drives.

2) Hardware:

As stated, the controller consists of 2 boards and is supported only in a CS/386 Turbo CPU. The 210-9579 High-Speed I/O Processor Board is the same board used with the MXF and 22C11-HS but with it's own proms at location L7 and L14. The 210-9582 SCSI/Printer Controller is new. The printer port supports all existing 2200 printers. Multiplexing to multiple CPU's is not currently supported.

The SCSI port is compatible to the same SCSI devices supported on our VS systems which use the SSM-C SCSI Storage Module and the MDSC SCSI Mini Data Storage Cabinet. These 2 units will be the offered Wang devices for housing SCSI drives for the Turbo. As each SCSI device is handled by a transparent driver imbedded in microcode, some SCSI devices may not be compatible unless they comply with existing drivers for devices that have already been tested. R&D will add drivers for those SCSI devices which become popular. Current supported devices include: see next page.

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CDC Magnetic Periph Model 94221 150MB HH Disk Drive	725-3822
Micropolis Model 1684 326MB HH Disk Drive	725-4895
Micropolis Model 1578 326MB FH Disk Drive	725-3814
Hewlett Packard Model 97548S 647MB FH Disk Drive	725-4858
Archive Model 2150S 150MB HH Viper Tape Drive	725-3820
Archive Model 4320NT 1.2GB HH Python Tape Dr	see Appx A3
Teac FD-55GS 751-U 5 1/4" Floppy Drive (not avail from Wang)	

3) Other:

The normal procedure for powering disk units in the past has been to power the disk units up last after the CPU. With the SCSI devices currently being used, the SCSI unit must be powered on first and allowed to complete any self-test it may run. This normally takes just a few seconds and often completes with a clicking noise. None of the above listed devices on their own require more than 15 seconds. Multiple drives in a single cabinet may need more time. Once all drives within a unit complete self-tests the CPU can be turned on. After powering on the CPU, between 10 and 15 seconds, the CPU will go out and talk to the drive. Usually the drive LED will blink twice during this period. When booting the CPU, RESET should not be keyed until this communication takes place, otherwise the drive/s may not be recognized by the system. If the SCSI unit is to be powered off while the system is up and running, all existing accesses and all drive activity should be allowed to complete to prevent problems. The system should recognize any SCSI device which was operational before the unit was powered down. Any physical changes such as adding a device or changing a device ID # will require the system be rebooted.

C. ANNOUNCE/FIRST CUSTOMER SHIPMENT DATE

- | | | |
|-------------------|------------------------------|--------------------|
| 1) Domestic: | Announce: July 1, 1992 | FCS: July 31, 1992 |
| | Volume Ship: August 31, 1992 | |
| 2) International: | Announce: July 1, 1992 | FCS: July 31, 1992 |
| | Volume Ship: August 31, 1992 | |

D. SERVICE OFFERINGS/WARRANTY

This product will be installed and maintained by Customer Engineering personnel for customers with On-Site service.

This product will be covered by the standard Wang 90 day warranty.

E. SPECIAL PROGRAM/PROCEDURES

N/A

F. MAJOR COMPONENTS

- 1) 210-9579 High-Speed I/O Processor:
Contains a 286 processor which controls all I/O to any attached SCSI device or printer freeing the CPU to go off and handle other tasks. Communication to the CPU is handled via the 32 bit bus now present with the Turbo.
- 2) 210-9582 SCSI/Printer Controller Board:
The 9582 Controller Board was designed to maximize total system

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performance. It's major components include an NCR 53C90A SCSI Controller, an NCR 52C61 High Performance Memory Array Controller, a 16C452 2S/1P Serial/Parallel Controller, and a 2 Meg DRAM cache buffer.

G. CONFIGURATION REQUIREMENTS

Use of the 22C11-SCSI Controller requires the following:

1. Turbo CPU
2. Turbo General Release 1.10.00 (beta test) 291-1001A
3. New Disk/Tape Utilities for SCSI (included w/ future O/S's)
4. SSM-C SCSI Storage Module or a MDSC Mini Data Storage Cabinet
5. The following is a list of SCSI devices that have been tested. Devices other than those listed would need to be thoroughly tested to insure proper operation. Some may require a software driver be built and imbedded in microcode by R&D.

All new drivers will be built at the discretion of Wang Labs.

CDC Magnetic Periph Model 94221 150MB HH Disk Drive	725-3822
Micropolis Model 1684 326MB HH Disk Drive	725-4895
Micropolis Model 1578 326MB FH Disk Drive	725-3814
Hewlett Packard Model 97548S 647MB FH Disk Drive	725-4858
Archive Model 2150S 150MB HH Viper Tape Drive	725-3820
Archive Model 4320NT 1.2GB HH Python Tape Dr	see Appx A3
Teac FD-55GS 751-U 5 1/4" Floppy Drive (not avail from Wang)	

II. MAINTENANCE PHILOSOPHY

A. Maintenance Objectives

1) C.E. Level:

This board will operate in a similar way to existing 2200 controllers. Effective maintenance of the 22C11-SCSI will require the following:

- a) A working familiarity with the 2200 hardware and O/S.
- b) Skillful cause analysis at the system level.
- c) Knowledge of the diagnostics on the 2200 system.
- d) A working knowledge of SCSI drives.

2) Maintenance Procedures:

Maintenance on this product will be performed on-site by a Wang Customer Engineer. A working knowledge of the system along with built-in diagnostics in the hardware and operating system as well as existing on-line diagnostics will help the C.E. to isolate hardware failures. The 22C11-SCSI board has an LED that lights during power up and goes out if the board passes built-in self test. When a board failure occurs, that board will be replaced with a board from C.E. stock and the bad board will be returned through C.E. logistics channels for repair.

B. Types of contract to be offered

On-Site Maintenance Contracts will be offered.

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C. P.M. requirements

1) Customer performed:

To insure proper operation of this product, the Customer should observe the Environmental, Power and Cabling, and Site Selection Considerations outlined in the CUSTOMER SITE PLANNING GUIDE (part # 700-5978).

2) WANG C.E. performed:

This product will not require scheduled preventive maintenance.

D. Diagnostics required/available:

1) C.E. Level:

Magnetic Media p/n 732-8520A 5-1/4" DSDD
This diagnostic disk is part of the 2200 Diagnostic Package (currently Rev 2.00.00, p/n 195-2956-0).

2) Customer Level: Machine level diagnostics built into the Operating System run a cursory test to all the Turbo specific controllers to check status during boot if RESET is not keyed. There are also similar tests that check communication between the controller and the CPU which can be selected by PF' key during boot. Customer Engineering should not depend on these diagnostics solely to identify problems. Problems especially of an intermittent nature will not likely fail with these tests.

3) Built-in: The 22C11-SCSI has a LED which will light during power up self tests. If the LED stays on, the board has failed self-test and should be replaced.

Note: On the pre-release SCSI beta boards the LED is not functioning and is on always. This does not affect normal operation.

III. TRAINING

There is no planned training on this product or the product line at this time. In response to a memo sent out by CSO in the fall of 1991, the domestic field offices indicated there personnel had enough experience on the product line where a formal training class was not deemed necessary. There will be an announcement TSB with technical information to support initial installations. An addendum to the Maintenance Manual, part number 741-1769A will follow.

A. CUSTOMER ENGINEER COURSE:

N/A

B. SALES SUPPORT COURSE

1) TIMETABLE and FORMAT

The 2200 Product Line is normally sold through a close-knit VAR network highly familiar with the product, many of whom are in regular contact with the 2200 Group. These people will be generally familiar with the product through newsletters and marketing literature distributed by Wang and the User group and by the their contacts with Wang and other VARs.

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IV. SPECIAL TOOLS/TEST EQUIPMENT

No unique items required to service this product.

V. OPERATING ENVIRONMENT

A. TEMPERATURE RANGE

Storage (packaged) 0 to 120 deg F (-17 to 50 deg C)
Operating 60 to 90 deg F (16 to 28 deg C)

B. VOLTAGE RANGE

115 VAC +/- 12 VAC at 60 Hz +/- 0.5 Hz
230 VAC +/- 24 VAC at 50 Hz +/- 0.5 Hz

C. HUMIDITY RANGE

Storage (packaged) 10% to 90%
Operating 20% to 80%
Wet Bulb Temperature 75 deg F max (24.4 deg C)

D. PHYSICAL SPECIFICATIONS

The controller is a mother/daughter board setup using 1 CPU I/O slot.
Height 14.9 inches (35.3 centimeters)
Width 1.15 inches (2.9 centimeters)
Depth 8.32 inches (21.1 centimeters)

E. SERVICE SPACE REQUIREMENTS

Observe service space requirements for unit models involved.

F. INPUT CURRENT

Observe the input current requirements for the 2200 CPU in which the board is installed. For the CS-D/N these requirements are:
2.0 amps at 115 VAC 60 Hz (running)
1.0 amps at 230 VAC 50 Hz (running)

G. INPUT POWER

Input power drawn will be dictated by the 2200 CPU in which the boards are installed. For the CS-D/N the power drawn will be:
170 Watts
230 Voltamps

H. POWER FACTOR

The power factor of the system in which it is installed will be unchanged. For the CS-D/N the power factor is:
0.74 lagging

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I. HEAT LOSS

The heat loss for the CPU in which this board is installed will be virtually unchanged. For the CS-D/N:
581 BTU/hr (146.4 KgCal/hr.)

J. LEAKAGE CURRENT (grounding requirements)

The leakage current will be determined by the CPU in which the Turbo card set resides. For the CS-D/N:
0.2 Ampere at 115 VAC 60 Hz, 0.2 Ampere at 230 VAC 50 Hz

VI. POWER CORD DATA

N/A

VII. I/O CABLE DATA

Maximum SCSI cable length from controller to last device:
18.75 feet (6 meters)

VIII. DOCUMENTATION LIST

- ```

A. PRINTS:.....210-9579
 210-9582

B. MAINTENANCE MANUALS:.....741-1769-A (includes Turbo)
 741-1874-A SCSI SSM-C
 741-1879 SCSI MDSC

C. VENDOR MANUALS:.....N/A

D. DIAGNOSTIC ERROR LISTINGS:.....Included in Turbo
Maintenance Manual (741-1769-A)

E. P.M. PROCEDURES:.....N/A

F. REPAIR PLAN:.....??

G. SALES LITERATURE:.....see Focus, July 1, 1992

H. OPERATORS' GUIDE/USER INFORMATION:...in process

```

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**APPENDICES**

MARKETING FORECAST

|               | ! | Q1   | ! | Q2   | ! | Q3   | ! | Q4   | ! |
|---------------|---|------|---|------|---|------|---|------|---|
|               | ! | FY93 | ! | FY93 | ! | FY93 | ! | FY93 | ! |
| DOMESTIC      | ! | 25   | ! | 25   | ! | 25   | ! | 25   | ! |
| INTERNATIONAL | ! | 25   | ! | 25   | ! | 25   | ! | 25   | ! |
| TOTAL         | ! | 50   | ! | 50   | ! | 50   | ! | 50   | ! |

PRODUCT MATURE PERFORMANCE PREDICTED

| <u>Model Number</u> | <u>Product Description</u> | <u>Service Parameter</u> | <u>Rate per Year</u> | <u>Time (hours)</u> |
|---------------------|----------------------------|--------------------------|----------------------|---------------------|
| 22C11-SCSI          | SCSI/Printer Contrlr       | Field Failures           | 0.06                 |                     |
|                     |                            | Calls                    | 0.40                 |                     |
|                     |                            | MTTR                     |                      | 1.77                |
|                     |                            | Call Duration            |                      | 2.82                |
|                     |                            | Installation Time        |                      | 1.30                |
|                     |                            | PM Calls                 | 0.00                 |                     |
|                     |                            | PM MTTR                  |                      | 0.00                |
|                     |                            | FCO Calls                | 0.00                 |                     |
|                     |                            | FCO MTTR                 |                      | 0.00                |
|                     |                            | Upgrades/Model           | 0.02                 |                     |
|                     |                            | Upgrade Install Time     |                      | 1.03                |

PRODUCT ANALYSIS WITH GROWTH

Product Field Failures/Year and Calls/Year  
by Month after Installation

Model Number: 22C11-SCSI

Product Description: Turbo SCSI/Printer Controller

|                     | <u>Month after Installation</u> |          |          |          |          |          |          |           |
|---------------------|---------------------------------|----------|----------|----------|----------|----------|----------|-----------|
|                     | <u>1</u>                        | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8+</u> |
| Field Failures/Year | 0.18                            | 0.07     | 0.07     | 0.07     | 0.07     | 0.07     | 0.07     | 0.07      |
| Calls/Year          | 0.36                            | 0.19     | 0.14     | 0.13     | 0.13     | 0.13     | 0.13     | 0.13      |

**NOTE:**

Every effort has been made to include the most current information available, but these part numbers are subject to change.

Customer Service Logistics will provide updated, released part numbers through the normal RSL process.

## PARTS LIST

FRUs, CRUs,

|                   |                                 | : stocking :               |             |
|-------------------|---------------------------------|----------------------------|-------------|
|                   |                                 | : location :               |             |
| :PART #           | : DESCRIPTION                   | :FRU:CRU:Unique:           | B : A : H : |
| :212-9727         | : 22C11-SCSI Controller         | : X :                      | : : : :     |
| Related hardware: |                                 |                            |             |
| :725-3822         | : Mag Periph 94221 150M HH Dsk: | X :                        | : : : :     |
| :725-4895         | : Micropolis 1684 326M HH Disk: | X :                        | : : : :     |
| :725-3814         | : Micropolis 1578 326M FH Disk: | X :                        | : : : :     |
| :725-4858         | : HP Model 97548S 647M FH Disk: | X :                        | : : : :     |
| :725-3820         | : Archive 2150S 150M HH Tape :  | 'X :                       | : : : :     |
| :725-5981         | : Archive 4320NT 1.2G HH Tape : | not avail at this writing: |             |
| :421-0066         | : 50 Pin I/O Cable-SSM & MDSC : | X :                        | : : : :     |
| :725-4910         | : 50 Pin SCSI Terminator w/LED: | X :                        | : : : :     |
| :725-7269         | : Term (repl'd by 725-4910)     | : X :                      | : : : :     |
| :725-1294         | : 600' Data Cart Tape/Arch 150: | X :                        | : : : :     |
| :725-9119         | : 4mm Data Cart Tape/Arch 1.2M: | X :                        | : : : :     |
| :                 | : TEAC FD-55GS 751-U 5 1/4" Dr: | not avail from Wang :      |             |

**Diagnostic Part Number: 195-2956-0**

Parts required for P.M.: N/A

CSCSICF6

JPR IN

TYPE

VENDOR

CAP

SECTORS

DRIVE ID 6 | REMOVABLE DRIVE | TEAC FC-1 | 6 | 1.2 | 4800

6 HR AHEAD

WOLFGANG BORKE

ALEC

GERMANY 011-0049 231 923 700 (UP TO 4:45)  
10:45 EST

SCSI - SEAGATE ST4385N 330 MEG FORMATTED

1. USING DATALOAD BM 2 MEG 1000 DIMA#(1024,1024)2  
1 MIN 10 SEC

60K BLOCKS FOR 2 MEG 10-12 SEC

2. FLOPPY - CANNOT READ OR WRITE A03 ERR NO LITE

RECOGNIZED IN SCSI CONFIG

DRIVE ID IS 1

DD or HD. COMMAND FOR SIZE OF DISKETTE

FLOPPY IS TERMINATED

TEAC FD55GS750

SCSI FLOPPY

TEAC FD-55GS 751-U

SQ BRD SAN - S294V8

DD IN HL IN

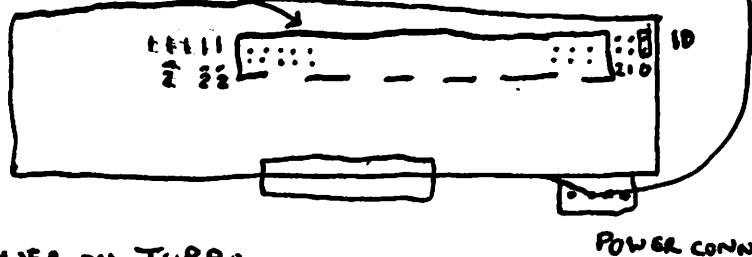
DL IN FG IN

(512) 32 MOST EFFICIENT  
BLOCK SIZE FOR R/W TO SCSI

3 TERM REMOVED

BEHIND COMB

SCSI INTERFACE BOARD



KEY FULLY TO LEFT

WAIT TILL ALL DRIVE LEDS GO OUT, ∴ POWER ON TURBO.

SCSI CONTROLLER 212-9127

9579 JPI IN SW 1 34 ON ONLY DISK ADDR 1 off - 310, 2 off - 320, 1+2 off - 330

ID CONT

9582 J8, J9 IN R6, R7, R8 IN SW 1, 2, 4, 5 ON ONLY

SCSI BRD

512 BYT SECTOR FLOPPY

1, 2, 3 ON = 7

CONTROLLER ADDRESS

PRINTOR ADDRESS

215 - 5.7 OFF 215

6.7 OFF 216

5.6, 7 OFF 217

LOW DENSITY

FORMAT UTIL TYPE 2 DOS FORMAT

MUST TELL IF HD OR LOW DENSITY  
1.2 360K

SCSI FLOPPY T/D -- HD EXCL  
THEN RESET

# POWER ON PROCEDURE WITH SCSI

WITH ARCHIVE VIPER 150, MICROF 1684-0

POWER ON SCSI UNIT. (SPECIFIC TO DRIVES LISTED ↑)

TAPE LED STAYS ON.

DISK LED BLINKS 3 OR 4 TIMES IN 1<sup>ST</sup> 5 SECONDS & GOES OUT.

WITHIN 10-15 SECONDS A CLICK WILL BE HEARD FROM THE DRIVE.

TERMINATOR LED IS OUT.

## POWER ON CPU

TERMINATOR LED COMES ON IMMEDIATELY.

TAPE LED GOES OFF WITHIN 1 SECOND

AT 3 SECONDS LEDS ON NEW TURBO CONTROLLERS GO OUT. (MXE/22C11-HS)

SCSI LED AS IS NOW WILL STAY ON. (SCSI LED WILL BE CORRECTED TO GO OUT ON LATER VERSIONS)

AT 5 SECONDS MXE (IF PRESENT) LED GOES OUT.

AT 10-15 SECONDS, THE DISK LED WILL BLINK ONCE, PAUSE A SECOND & BLINK AGAIN. THIS INDICATES COMMUNICATION WITH C.P.U.

SYSTEM IS READY TO BOOT. KEY SHIFT/RESET OR ALLOW DIAGNOSTICS TO COMPLETE FOR: MOUNT SYSTEM PLATTER  
PRESS RESET

COMPLETE O/S WITH SYSTEM UTILITIES INCLUDING SCSI UTILITIES IS LOADED ON 1<sup>ST</sup> MASTER ADDRESS; D<sub>2</sub><sup>1</sup>/<sub>3</sub> 1.

SCSI UTILITIES - LOAD RUN FROM 1<sup>ST</sup> SCSI ADDRESS. SELECT DS UTILITIES.

TAPE DRIVE IS ID 1, DISK IDS.

DISK IS CONFIGURED FOR 15 SURFACES; D<sub>x</sub>1 THRU D<sub>x</sub>E 0 TO 65024  
D<sub>x</sub>F 0 TO 416600



DS UTILITIES FOR SCSI ARE NOT FINAL CUSTOMER SHIP VERSION. NOT ALL KEYS ON ALL MENUS ARE FUNCTIONAL, ESPECIALLY KEYS TO RETURN TO PREVIOUS MENUS.

SCSI CONFIGURATION - USED FOR INITIAL FORMAT (LOW LEVEL) AND CONFIGURING SURFACES FOR INITIAL SETUP. USE THE 'CONFIGURATION SCREEN' TO DETERMINE IF SYSTEM IS RECOGNIZING SCSI DEVICES.

### SCSI CONFIGURATION

| DRIVE ID | DRIVE TYPE               | VENDOR            | CAPACITY | SECTORS |
|----------|--------------------------|-------------------|----------|---------|
| 1        | SEQUENTIAL ACCESS DEVICE | ARCHIVE VIPGR150  | 0.00     | 0       |
| 5        | DIRECT ACCESS DEVICE     | MICROW 1684-07MB1 | 331.73   | 1326952 |

WITH ADDRESS D<sub>2</sub>F, 3 BYTE ADDRESSING MUST BE USED TO USE BEYOND SECTOR 65024 APPROXIMATELY. IF FILES ARE TO BE STORED BEYOND THE 1<sup>ST</sup> 16 MEG, THE SURFACE MUST BE SCRATCHED FOR 3 BYTE ADDRESSING.

LIST SELECT - WILL SHOW IF 3 BYTE ADDRESSING IS OFF OR ON.

SELECT 3 ON - TURNS ON 3 BYTE ADDRESSING FOR THAT PARTITION

SELECT 3 OFF - TURNS OFF 3 BYTE ADDRESSING

SCRATCH DISK 8 - SCRATCH COMMAND FOR 3 BYTE INDEX

SELECT 3 ONLY NEEDS TO BE ON WHEN ACCESSING BEYOND 16 MEG. IF JUST CALLING UP FILES FROM THE INDEX OR DOING DIRECT ACCESS WITH NUMERICAL SECTOR NUMBERING, NO PROBLEM. IF USING ALPHA VARIABLES PLEASE CONTACT MIKE RILEY TO INSURE FULL UNDERSTANDING OF WHAT NEEDS TO

## TURBO UPGRADE

### HARDWARE INSTALLATION PROCEDURE

Only CPUs specifically built for the single board 2200 CPU, VLSI or 386, can be upgraded to a Turbo. Those CPUs are the MicroVP, the CS, and the CS-D/N. Each chassis type has specific differences that affect installation. As such, there are 3 procedures determined by chassis type included within.

NOTE 1: 2200 '386' CPUs. Any programs running on a 386 based 2200 CPU board should run with little or no change on the Turbo. The exception would be programs that may reference status bytes in the O/S such as the CPU type or references to the CPU ID number. There could also be a problem with GIO commands. All GIO commands had to be recoded individually. All the standard GIOs were done. If a programmer created his own GIO there could be a problem. In that case a PTR should be opened through the RSC and escalated to RDB 8760. As with the 386 CPU Board, having programs in 'NEW' format is critical to reaching full performance potential. Please see the following TSB for additional information on 'NEW' or 386 format:

HWT 9640 Matrix 4103 11/xx/91 - CS/386 Turbo Announcement (pg 5, # 14)

NOTE 2: 2200 'VLSI' CPUs. VLSI, Very Large System Integration, refers to the technology that allowed Wang to take the multi-board MVP CPU and replace it with a single CPU board completely compatible to the multi-board units. Customers upgrading from a VLSI CPU must be aware that there are changes that may be required to their software to insure maximum performance and proper operation. Two of the more significant changes may be the additional memory required for partitions when upgrading from a VLSI or MVP CPU to the Turbo and the need for converting programs on disk to 'NEW' or '386' format. Simply, partitions should be made 80% larger. Included as part of the Turbo O/S is a new Basic command, \$MOVE!, which helps automate the conversion of programs from standard 2200 format to 'NEW' or '386' format. These changes are basically the same as those required when upgrading to the '386' Prom based CPU Board. Please see the following TSB's for more specific information:

HWT 9640 Matrix 4103 11/xx/91 - CS/386 Turbo Announcement

Before starting insure the customer has received all the necessary hardware and a Operating System. See page 7 for a breakdown of each of the Upgrade kits. Upgrades standardly come with 4 Meg of memory. Additional memory would be ordered through a 2nd Upgrade kit. The MXF and High Speed Disk Controllers are not included in the Turbo Upgrade Kits and must be ordered separately. The following checklist should help identify the needed hardware:

- Turbo Motherboard - 210-9583 for CS/MicroVP or 210-9578 for CS- /N  
included in upgrade
- Turbo CPU Board - 210-9576A (comes with 4 Meg Memory) included
- Turbo Operating System Diskette included in upgrade
- Rail Kit for MicroVP - 6 pcs (see page 7) incl w/ MicroVP upgrade
- Rail Kit for CS - 4 Rails plus a new CPU Door Cover (see page 7)  
included with CS-TURBO Upgrade
- Additional Memory SIMMS - mem only, for 8/16/32M. ordered separately
- MXF Boards - 212-9717 - supports 16 terminals, comes with 1 octopus cable, 421-0181. A 2nd Octopus cable must be ordered separately to connect the 9th thru 16th terminals. This board is ordered individually.
- 22C11-HS Hi-Speed Printer/Disk Contrl - 212-9718 - ordered individually

Next, find out from the customer how the system should be configured. What addresses should be used with the High Speed Printer/Disk Controllers and what devices should be connected. Baud rates for the different terminal ports will have to be determined. The 2536DW W/S supports 38K Baud while older terminals support a max of 19200. A port for remote use would likely use a lower Baud.

MicroVP Upgrades: orders a MicroVP-Turbo, CEI # 200-6006, base package.

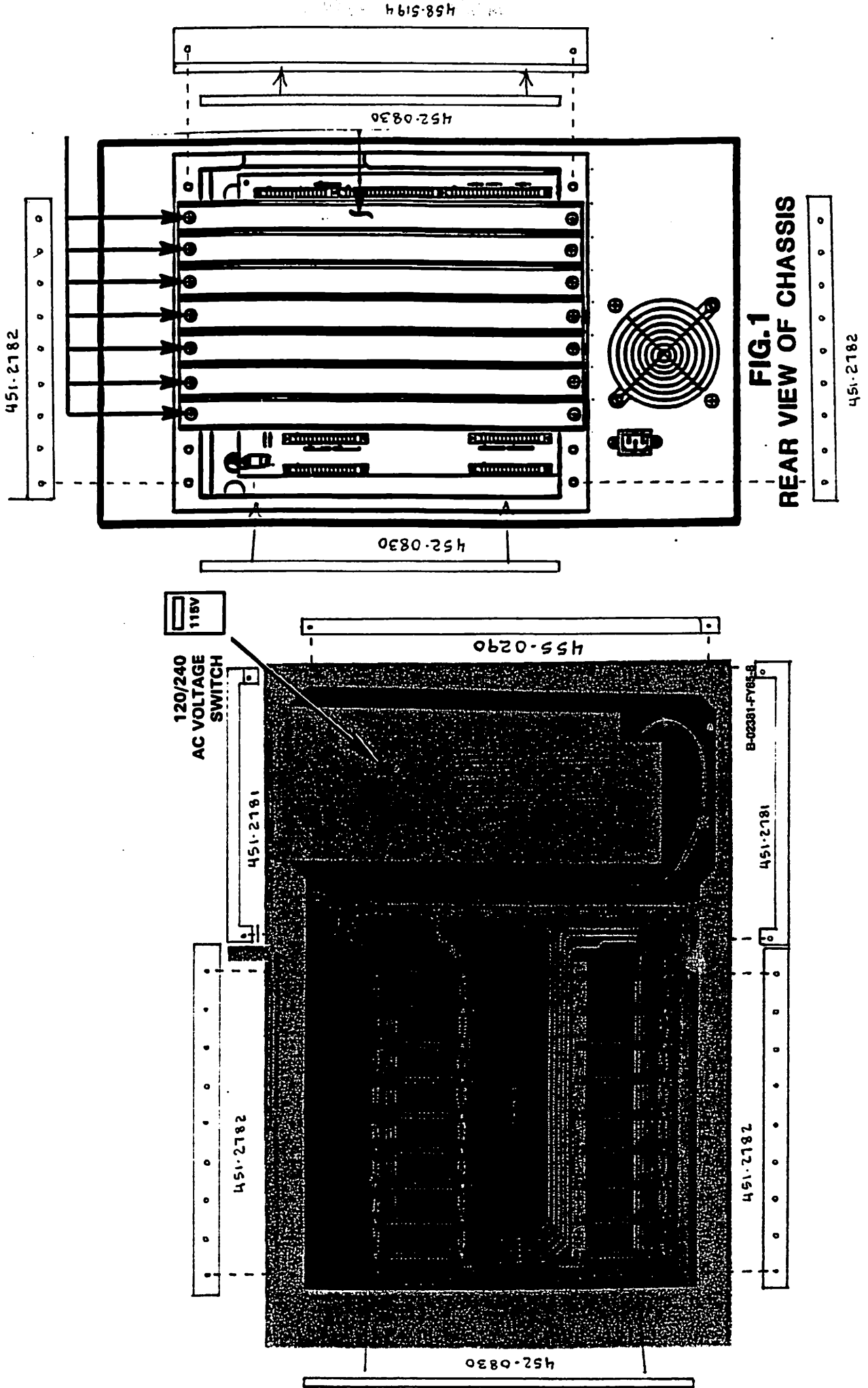
Removal:

1. Insure everyone is off the system and all jobs have completed. A complete back-up of all customer software should be done by the customer.
2. Power down the system, disk drives first, CPU last.
3. Unplug CPU power cable from wall.
4. Remove cover over CPU board and CPU board.
5. Remove all spacers over empty I/O slots and all I/O boards. Make note of all I/O board switch settings. If cables are disconnected from I/O boards please note orientation and location, and make note of the device address as set by the device switch on the controller.
6. Unplug all cables from the motherboard noting orientation and location.
7. Remove the existing motherboard by removing all screws.

Installation:

1. Install the 210-9583 Turbo Motherboard using the screws removed from the old motherboard. With some early version motherboards, some screw holes will not line up. In those instances secure the motherboard as follows:
  - a. Line up the screw holes for the CPU board connectors. Install screws in the top and bottom holes of the top (J1) and bottom (J21) connectors for the CPU board but leave the screws loose to allow the motherboard to move.
  - b. Install screws but do not tighten in the top and bottom I/O connectors for the furthest slot from the CPU board that lines up. Screws should line up for J8 and J28, third slot from the end. Do not force the screws in.
  - c. Install screws in the holes toward the middle of the top and bottom I/O connectors for the closest I/O slot to the CPU board that lines up. The 3rd slot in from the CPU, connectors J4 and J24 should line up. Do not force the screws.
  - d. Tighten all screws. Install any remaining screws in holes that line up in a balanced pattern from top to bottom and side to side. Do not over tighten the screws.
2. Connect the power supply cables disconnected in step 6 above.
3. Insure all SIMM Memory Modules ordered for the new Turbo CPU Board are installed in the correct locations (L3,L10,L18,L29 for 4 or 16 meg). Verify SW1 on the Turbo CPU board is set correctly as determined by the SIMM Module size. (4 ON only for 1M SIMMs, all OFF for 8M SIMMs)
4. Carefully install the new 210-9576A Turbo CPU Board visually lining up the contacts on the board with the contacts in the mating motherboard connectors. Verify the board is fully and evenly seated.
5. Clean the lip of the chassis above and below the I/O section where the controllers screw in. With the CPU on it's backside, place the Top and Bottom I/O Rails (451-2782) on the upper and lower lip of chassis I/O section lining up the holes with the holes for the I/O boards. See picture on last page. Peel back the protective tape from the ends of each rail and place the sticky side down lined up as before. Do not press down yet to allow some movement when seating the first few I/O Controllers.
6. Install all Turbo MXF Terminal Controllers verifying all switches are set properly to indicate board number (SW1 on the 9579) and correct Baud rates (SW1-SW8 on the 9580). See CS Maintenance Manual, 741-1769A, or TSB HWT 9640, 11/xx/91 for switch settings. Attach terminal cables.

# RAIL PLACEMENT



7. Install any additional terminal controllers remembering the maximum number of terminal controller boards is still 4. When setting the board number for an MXE or MXD, count the MXF boards first as if they were MXEs. For example, if 2 MXF boards are installed, the first MXE/MXD would be board number 3. As in the past, if a 212-3012 Triple Controller is used the terminal port must always be the last terminal. Again count each MXF as 1 board as you would an MXE in setting the terminal port switch and insure the printer and disk address switches are set to legal addresses not used by any other boards to be installed. Legal disk addresses are 310, 320, 330. Legal printer addresses are 215, 216, 217. Attach cables as necessary.

8. Set the switches on all High Speed Printer/Disk Controllers to be installed. See CS Maint Mnl, 741-1769A, or TSB HWT 9640, 11/xx/91. The printer and disk address switches must be set to legal addresses not used by any other boards installed. Legal disk addresses are 310, 320, and 330. Legal printer addresses are 215, 216, and 217. Install the High Speed Printer/Disk Controllers and attach cables.

NOTE: This board has 2 disk options determined by SW1 on the 9581 board. It can be used as a straight disk controller (sw 1, both OFF) which uses the J2 disk port (bottom connector), or to access a drive being multiplexed via the middle connector, J3 (2 ON only). J3 is comparable to a 22C80 (210-7715) and would cable to a CPU port normally either on a 210-8824 2275 MUX Board or a 210-8825 MUX Extender Board.

9. Install all remaining I/O Controllers verifying all switch settings are set properly and have not been inadvertently changed. Reconnect any cables to these boards that may have been removed.

10. Install I/O spacer covers over any open I/O slots.

11. Install remaining pieces of rail kit as follows: See last page.

- Remove the protective tape from the sticky surface at the ends of the Side Rail for the I/O Section (452-0830). Firmly press the rail with the sticky side down against the chassis lip centering it and butting it up against the last I/O board or spacer cover.

- Remove the hex-shaped extension posts from the chassis used for the screws which hold down the CPU cover.

- Lay the Top and Bottom Rails for the CPU Cover (451-2781) on the lip of the CPU lining up the screw holes as shown in the picture on last pg.

- Lay the Outer Rail for the CPU Cover (455-0290) on the chassis lip between the top and bottom rails as shown on last page.

- With the holes in the rails lined up with the holes in the chassis for the cover, reinstall the hex-shaped extension posts for the cover previously removed. Reinstall the CPU cover.

12. Reconnect power. Boot the system using the Turbo O/S and run CPU and disk diagnostics. Verify as much as possible all hardware is operational.

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CS Upgrades: orders a CS-Turbo, CEI # 200-6009, base package.

Removal:

1. Insure everyone is off the system & all jobs have completed. A complete back-up of all customer software should be done by the customer.

2. Power down the system, disk drives first, CPU last.

3. Unplug CPU power cable from wall.

4. Remove door/cover over CPU board and CPU board.

5. Remove all spacers over empty I/O slots and all I/O boards. Make note of all I/O board switch settings. If cables are disconnected from I/O boards please note orientation and location, and make note of the device address as set by the device switch on the controller.

6. Unplug all cables from the motherboard noting orientation and location.
7. If a non-scratch type surface like a carpet is available, lay the CPU cabinet on the floor on it's front side to ease removal of the motherboard. Remove the existing motherboard by removing all screws.

Installation:

If a non-scratch type surface like a carpet is available, lay the CPU cabinet on the floor on it's front side to ease installation.

1. Install the 210-9583 Turbo Motherboard using the screws removed from the old motherboard. With some early version motherboards the screw holes for the last I/O slot of the motherboard do not line up properly and you will be unable to install these screws. Also, the screw in the top right corner above the CPU board cannot be installed as the hole is incorrectly positioned. The other 5 screws for the bottom connector of the CPU board, J21, the first I/O slot from the CPU, J2 and J22 and the middle I/O slot, J6 and J26 should line up and provide reasonable support. Do not tighten any of the 5 screws until all 5 are started. Do not force the screws or over tighten.
2. Connect the power supply cables disconnected in step 6 above.
3. Insure all SIMM Memory Modules ordered for the new Turbo CPU Board are installed in the correct locations (L3,L10,L18,L29 for 4 or 16 meg). Verify SW1 on the Turbo CPU board is set correctly as determined by the SIMM Module size. (4 ON only for 1M SIMMs, all OFF for 8M SIMMs)
4. Carefully install the new 210-9576A Turbo CPU Board visually lining up the contacts on the board with the contacts in the mating motherboard connectors. Verify the board is fully and evenly seated.
5. Clean the lip of the chassis above and below the I/O section where the controllers screw in. Place the Top and Bottom I/O Rails (451-2782) on the upper and lower lip of chassis I/O section lining up the holes with the screw holes for the I/O boards. See picture on last page. Peel back the protective tape from the ends of each rail and place the sticky side against the chassis. If the chassis is in a upright position with the holes lined up, firmly press in place. Otherwise apply light pressure as to allow some movement when seating the first few I/O Controllers.
6. Install all Turbo MXF Terminal Controllers verifying all switches are set properly to indicate board number (SW1 on the 9579) and correct Baud rates (SW1-SW8 on the 9580). See the CS Maint Mnl, 741-1769A, or TSB HWT 9640 from 11/xx/91 for switch settings. Attach terminal cables. NOTE: When the MXF or any controller is fully seated, it's metal rail which is secured to the chassis by screws on either end, should be in contact with the I/O rails installed in step 5. If a gap exists between the board and rail please escalate the problem via PTR to the 2200 Support Group, RDB 8760, or call or Wang Office Mike Bahia, telephone 508-656-0256.
7. Install any additional terminal controllers remembering the maximum number of terminal controller boards is still 4. When setting the board number for an MXE or MXD, count the MXF boards first as if they were MXEs. For example, if 2 MXF boards are installed, the first MXE/MXD would be board number 3. As in the past, if a 212-3012 Triple Controller is used the terminal port must always be the last terminal. Again count each MXF as 1 board as you would an MXE in setting the terminal port switch and insure the printer and disk address switches are set to legal addresses not used by any other boards to be installed. Legal disk addresses are 310, 320, 330. Legal printer addresses are 215, 216, 217. Attach cables as necessary.

8. Set the switches on all High Speed Printer/Disk Controllers to be installed. See the CS Maint Mnl, 741-1769A, or TSB HWT 9640 from 11/xx/91 for switch settings. The printer and disk address switches must be set to legal addresses not used by any other boards installed in this unit. Legal disk addresses are 310, 320, and 330. Legal printer addresses are 215, 216, and 217. Install any High Speed Printer/Disk Controller and attach cables.

NOTE: This board has 2 disk options determined by SW1 on the 9581 board. It can be used as a straight disk controller (sw 1 both OFF) which uses the J2 disk port (bottom connector), or to access a drive being multiplexed via the middle connector, J3 (2 ON only). J3 is comparable to a 22C80 (210-7715) and would cable to a CPU port normally either on a 210-8824 2275 MUX Board or a 210-8825 MUX Extender Board.

9. Install all remaining I/O Controllers verifying all switch settings are set properly and have not been inadvertently changed. Reconnect any cables to these boards that may have been removed.

10. Install I/O spacer covers over any open I/O slots.

11. Install remaining pieces of rail kit and new door assembly as follows: Reference last page.

- Remove the protective tape from the sticky surface at the ends 1 of the 2 remaining Side Rails (452-0830). This piece will be used for the far end of the I/O Section. Make sure this area is clean. Firmly press the rail with the sticky side down against the chassis lip and butt it up against the last I/O board or spacer cover.

- Install the new door assembly (458-5194) over the CPU Board.

- Remove the protective tape from the sticky surface at the ends of the remaining Side Rail (452-0830). This piece will be used on the lip that divides the I/O and CPU sections. Place the rail with the sticky side down against the lip butting it up against the I/O Controller in the first slot and center it. Firmly press in place.

12. Reconnect power. Boot the system using the Turbo O/S and run CPU and disk diagnostics. Verify as much as possible all hardware is operational.

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CS-D/N Upgrades:            orders a CS-D-Turbo, CEI # 200-6009, or CS-N-Turbo, CEI # 200-6008, base package.

Removal:

1. Insure everyone is off the system & all jobs have completed. A complete back-up of all customer software should be done by the customer.

2. Power down the system, disk drives first, CPU last.

3. Unplug CPU power cable from wall.

4. Remove door/cover over CPU board and CPU board.

5. Remove all spacers over empty I/O slots and all I/O boards. Make note of all I/O board switch settings. If cables are disconnected from I/O boards please note orientation and location, and make note of the device address as set by the device switch on the controller.

6. Remove the top cover from the CPU by removing the 2 screws in the back and sliding back and lifting. Remove the front cover by loosening the 2 screws on top, sliding the cover forward until free from the screws and lifting. Remove the 2 side panels by lifting up and then back from the top.

7. Disconnect all cables from the motherboard noting orientation and location.

8. Remove the existing motherboard by removing the screws which hold the metal motherboard rails on the backside of the motherboard to the metal wall that divides the front and back of the cabinet. DO NOT REMOVE THE 14 SCREWS THROUGH THE MOTHERBOARD THAT HOLD IT TO IT'S RAILS.

## Installation:

### 1. Install the 210-9578 Turbo Motherboard as follows:

NOTE: This procedure is critical to proper operation. If the motherboard is not aligned properly in the chassis, the I/O boards may not make proper contact. This is especially true with the new Turbo I/O Controllers which use the center I/O connector. This connector has 140 pins which are in a much tighter configuration than the older boards and if a board is askew at all there is a high probability of failure.

- Using the screws removed in step 8 above, install the new motherboard but leave the screws loose enough to allow the motherboard to freely move.

- To align the motherboard, 2 I/O controllers with hold-down screws on both ends are needed. Install the 2 boards in the first and last slots of the I/O section visually lining up the contacts on the board connectors with the pins in the I/O connectors when inserting. Insure both boards are fully and evenly seated.

- Slide the motherboard as necessary so as to line up the hold-down screws on the I/O boards with the mating holes on the chassis. Tighten down the 4 screws evenly a little at a time in a balanced procedure. All 4 should tighten without binding.

- Secure the screws to hold the motherboard to the metal partition separating the front and the back of the cabinet which were loosely in place.

- Remove the 2 I/O boards used to align the motherboard.

### 2. Reconnect the cables to the motherboard disconnected in step 7 above.

3. Insure all SIMM Memory Modules ordered for the new Turbo CPU Board are installed in the correct locations (L3,L10,L18,L29 for 4 or 16 meg). Verify SW1 on the Turbo CPU board is set correctly as determined by the SIMM Module size. (4 ON only for 1M SIMMs, all OFF for 8M SIMMs)

4. Carefully install the new 210-9576A Turbo CPU Board visually lining up the contacts on the board with the contacts in the mating motherboard connectors. Verify the board is fully and evenly seated.

5. Install all Turbo MXF Terminal Controllers verifying all switches are set properly to indicate board number (SW1 on the 9579) and correct Baud rates (SW1-SW8 on the 9580). See the CS Maint Mnl, 741-1769A, or TSB HWT 9640 from 11/xx/91 for switch settings. Attach terminal cables.

6. Install any additional terminal controllers remembering the maximum number of terminal controller boards is still 4. When setting the board number for an MXE or MXD, count the MXF boards first as if they were MXEs. For example, if 2 MXF boards are installed, the first MXE/MXD would be board number 3. As in the past, if a 212-3012 Triple Controller is used the terminal port must always be the last terminal. Again count each MXF as 1 board as you would an MXE in setting the terminal port switch and insure the printer and disk address switches are set to legal addresses not used by any other boards to be installed. Legal disk addresses are 310, 320, 330. Legal printer addresses are 215, 216, 217. Attach cables as necessary.

7. Set the switches on all High Speed Printer/Disk Controllers to be installed. See CS Maint Mnl, 741-1769A, or TSB HWT 9640 from 11/xx/91. The printer and disk address switches must be set to legal addresses not used by any other boards installed. Legal disk addresses are 310, 320, and 330. Legal printer addresses are 215, 216, and 217. Install all High Speed Printer/Disk Controllers and attach cables.

NOTE: This board has 2 disk options determined by SW1 on the 9581 board. It can be used as a straight disk controller (sw 1 both OFF) which uses the J2 disk port (bottom connector), or to access a drive being multiplexed via the middle connector, J3 (2 ON only). J3 is comparable to a 22C80 (210-7715) and would cable to a CPU port normally either on a 210-8824 2275 MUX Board or a 210-8825 MUX Extender Board.



## SOFTWARE COMPATIBILITY

**'386' CPUs:** The Turbo Operating System is based on the latest CS/386 O/S and has the look & feel of it's 2200 predecessors. As such, most programs now running on a 2200 '386' CPU should run without change. The exception would be programs that reference a status byte in the O/S or the CPU ID number. There could also be a problem with non-standard GIO commands. See item 12 on page 5 for more information. Although no additional memory is needed for programs when upgrading from a '386', there is additional overhead used by the operating system. With programs that come close to using the entire partition, a small amount of additional memory may be necessary. As with the '386', it is critical to have programs on disk in 'NEW' or '386' format for maximum disk I/O performance. See item 14, pg 5.

**VLSI & older CPUs:** Most software running on non-386 2200 CPUs will run on the Turbo, but there may be some changes needed to insure proper operation and maximum performance. Most of these changes are the same ones required when upgrading from a non-386 to the CS/386 CPU Board. The following is a list of things, both hardware and software, to be aware of to help insure a smooth installation:

### Operating System

5. Partition size: When upgrading from a non-386 CPU, partition size must be increased about 80% as a general rule of thumb. This is because the 386 CPUs use a binary format and non-386 CPUs are in binary coded decimal, BCD. Some commands as well as variables require more space in binary. If inadequate partition size is set, A01 and A02 errors will occur. Partitions can be of any size as long as available memory is not exceeded.

6. Global Partitions: Any partition of any size may be global to any other partition. Bank partitions do not exist with the CS/386 and Turbo.

7. Device Table: Within "@GENPART" only 1 entry may be made per disk controller address. There are only 3 supported disk controller addresses: /310, /320, & /330. For example, for controller address /310 make a single entry /310 in the device table and not 1 for every address or for the tape drive such as /D10, /D11, /D12, /D51, or /D5F etc. Additional entries could result in I92 errors if RESET is keyed while accessing disk or possibly in other unforeseen errors.

### Programming and Operational Problems and Concerns

8. Increasing the partition size for some programs can create a problem. Certain sort modules and possibly other programs may make a calculation based on partition size. One such program is part of KFAM and the ISS Utilities. In program "SORT.402A" line 4590 should be changed:  
From: 4590 M1=INT(M\*1024)-698 To: 4590 M1=INT(MIN(M,64)\*1024)-698  
These type changes should be made by the customer's software vendor.

9. For any program or software package that looks for CPU type, the partition status line byte 9 is coded as "T" for the Turbo, "W" for the CS/386, "M" for MVP/LVP/VLSI, and "V" for VP. Certain versions of TOM software utilize this bit and would need to be changed. In the ISS Utilities, program "ISS.000M" needs this change. In line 420, change the "M" to a "T": \*

```
420 A$=$PSTAT(#PART):IF STR(A$,9,1)="M" THEN S3=4:...etc.
```

This problem may also occur running Multi-Disk, "MULTIDSK", where you see the message, "CPU SOFTWARE MUST BE UPGRADED TO RUN THIS PROGRAM". On the latest version, 69C1, this message is on line 175. On the previous line, 170 in this case, which begins as follows: 170 P\$=\$PSTAT(1):...etc. append to the end of the line: :IF STR(P\$,9,1)="T" THEN 180

Program FTU from the same Magnetic Media Diagnostic Disk also must be revised. With the latest version of FTU, rev 8734, corrected for the CS/386, line 120 needs to be changed or a similar message to that shown above for MULTIDSK will be given. Line 120 begins as follows:

```
120 B$=$PSTAT(1): IF STR(B$,9,1)...etc. After the first colon ':' insert:
IF STR(B$,9,1)="T" THEN 125: DELETE ENTIRE LINE STARTING AT FIRST COLON
```

10. If the current 2200/VLSI software makes decisions using partition status line bytes 10 & 11, a change would be required to run on the Turbo or the "386" CPU. Under the non-386 multi-user operating systems, byte 10 denotes memory bank and byte 11 the amount of partition memory. On the Turbo and 386 bytes 10 and 11 signify partition size. There are no banks.

11. Floating Point mathematics on the Turbo & '386' insures accuracy to only 10 digits compared with 13 digits with earlier 2200 CPUs. This could cause the 9th through 13th numbers to the right of the decimal point to be slightly different after a calculation between these machines. Programs dependent on 13 digit accuracy may need to be altered by the programmer.

12. GIO commands are handled differently on the Turbo from both the CS/386 and non-386 CPUs. Each GIO command had to be recoded individually. The standard GIOs have all been done, but for those programmers who developed their own GIOs, there may be a problem. In this case, the problem should be escalated via a PTR to RDB 8760. In the PTR, provide the specific GIO with an exact explanation of its purpose. This will help to prevent delays in correcting. With non-386 CPUs, GIO commands could speed up processing because they directly addressed code in the O/S. With the Turbo and the 386 this is not the case and usually a GIO will be slower than the basic command it replaces. Customers may want to consider replacing GIOs with the applicable basic command where possible.

13. The first byte of a header record for a program on disk must be 40, 50, 60, or 70. If the 2nd digit is other than 0 an error A01 may occur. Older 2200 systems did not care about this bit and it was used by some programmers to protect their software.

14. For maximum disk performance, it is critical to have programs in 'NEW' or '386' format. As mentioned, the Turbo is coded in binary while non-386 2200s are in binary coded decimal, BCD. Programs in binary require more memory. When loading a program in 'OLD' format (BCD) on the Turbo it has to go through a conversion process which slows down disk I/O. If the program is in a binary (NEW or 386) format this conversion process is eliminated. There are 2 Basic-2 commands to aid the user in making this conversion, 'SELECT NEW' and '\$MOVE!'. As mentioned, programs require more space when converted to 'NEW' format both in memory and on disk. Additionally any long program line of approximately 190 characters or more when converted to 'NEW' format could exceed the 256 character/line limit requiring the line to be split into 2 lines to enable the conversion. Noting that, if the 'SELECT NEW' command is executed, any program saved will be in the 'NEW' format. Any program in new format can be identified by a ' after the P for program when LISTing the disk, P'. The 'SELECT OLD' command allows you to change to 'OLD' or BCD format and is the default at boot time. The 'LIST SELECT' command can be used to identify if 'OLD' or 'NEW' format is currently selected. The '\$MOVE!' command is used to move an entire address from 'OLD' to 'NEW' format. It provides the ability to identify each program that cannot be MOVE'd and the 1st line number in that program needing a line split. '\$MOVE!' does this on the fly while converting all other programs and moving all other files. Non-386 CPUs cannot read programs in 'NEW' format. Data files are loaded as is with all CPU types and have no effect on performance. The conversion process should be done by a programmer or the system administrator and not by Wang.

January 20, 1994  
Wang Laboratories, Inc.  
1 Industrial Avenue  
Lowell, MA 01851 USA

Release Notes  
for  
CS/386 TURBO Maintenance Release 1.30.01

This Turbo Maintenance Release, 1.30.01, represents the latest Turbo Operating System software now available for beta test. The @MVP microcode file has been modified to correct a number of unique problems. The release number was bumped from 1.18 to 1.29 and then to 1.30 to prevent any confusion with existing test, beta, and older pre-releases of the Turbo Operating Systems.

- Note 1: Use of maintenance release 1.18 and above requires new prompts on the CPU board at locations L50 and L64, and on all Turbo Controllers (MXF, 22C11-HS, and 22C11-SCSI) at locations L7 and L14 of the 210-9579 I/O Processor. These prompts are only available from R&D and/or Product Support at this time.
- Note 2: If upgrading from Turbo General Release 1.10 or Turbo Maintenance Release 1.15 and using Three Byte Addressing, a compatibility problem exists with O/S 1.18 and higher. A bug exists on 1.1 and 1.15 which moves the index up 1 sector but only on a 3 byte address. It may also result in index entries which normally should be in the last index sector being written out in the catalog area. A 3 byte address can easily be identified on a LIST of a disk by the & sign immediately following the the right most digit of the 'INDEX SECTORS =' entry. On 1.1 or 1.15, any file entries that the system tries to place in the last sector of the index could be a problem. If the first file was a program, this problem could be harmless because the first sector of a program contains just the filename and the index can work around it. If the first file following the index is a data file, a data integrity problem could exist. Writing to that data file could overwrite index entries that should be in the last sector of the index. Adding files to that address could result in the index entry be written out in the catalog area. Although filenames which should be located in the last sector can be loaded if programs or read or written to if data, they will not show up on a LIST.

On 1.18 and higher, 3 Byte indices have been corrected to start at sector 0. This results in an inability of the O/S to locate a file explicitly by name if on a 3 byte address created by 1.1 or 1.15. A D82, 'File not Found', is issued even though the file may show on a standard LIST. This is also the case if the 3 byte address was created on 1.18 or higher and the system was downgraded to 1.1 or 1.15. Explicit reference to a filename will fail because in each case the O/S is looking 1 sector off and not finding the file. Special care will need to be taken when upgrading to 1.30.01 from 1.1 or 1.15 to insure no files are lost. If a MOVE disk command is used with 1.18 or above to MOVE a 3 byte address created with 1.1 or 1.15, filenames in the last sector of the index (actually last sector + 1) will not be moved. If you are using 3 byte addressing on 1.15 or 1.1 please contact Product Support before upgrading to insure this problem is properly addressed. Failure to fully comprehend the situation could result in a number of files being lost. Release 1.30.01 is the minimum release recommended for 3 Byte Addressing. See also 'Clarification' for additional related information.

The following list highlights in brief the problems fixed and modifications made to the operating system since the last General Release of the Operating System, release 1.10:

- corrects problem with assigning Printer Drivers to address 204 for terminals beyond the first 16. (1.16)
- fixes problem where a MXE TC port might not show up in the Device Table as well as problems hogging those TC addresses. (1.16)
- corrects problem where with 3 byte addressing selected there could be a problem saving multiple data files with DATA SAVE DC OPEN. (1.16)
- corrects problem where calculations greater than E99 could give an incorrect answer, should give an error. (1.17)
- resolves the terminal hang issue associated with the LINPUT and KEYIN commands where the terminal would intermittently not respond to a keyboard entry. (1.18)
- corrects a problem where printer drivers would not show up for any controller following an MXE or MXD. (1.18)
- corrects a problem where if using address 405 to PRINT to the screen, linefeeds would not be suppressed. (1.18)
- allows the SCSI floppy to read a 256 byte 360K or 1.2M 2200 diskette. (1.18)
- corrects problem where a rewind or retension of SCSI tape would fail with a virgin tape. (1.18)
- corrects problem where if a REM% was followed by a hex 7D or hex 7E character, all subsequent commands on the same line would be ignored. (1.18Q)
- corrects an intermittent hang which could occur when mux'ing 2 CPUs to 2 disk drives if 2 or more partitions from each CPU where hogging both mux'd units. (1.18Q)
- if a program was enlarged to require an additional sector and resaved within a program, the RESAVE would appear to successfully execute but the saved file would be blank. (1.29.00)
- if in immediate mode a string of 87 1s were added in a PRINT command, the O/S would blow and the system would need to be rebooted. Other long string combinations could also cause problems. (1.29.00)
- SELECT NEW would default to OLD after a CLEAR or LOADRUN. Now, the only way to change the NEW/OLD default is with the SELECT command. SELECT OLD is still the default on power up. (1.29.00)
- a line with a DEFFN' statement may not execute any command following it on the same line if in a Global with a higher partition #. (1.29.00)
- the RENAME command could corrupt the disk if renaming a program on a 3 byte address. (1.30.00)
- the LOADDAT and SAVEDAT commands would not work on a 3 byte address beyond 65534. (1.30.00)
- if an address with more than 65534 sectors had been scratched as a 2 byte catalog (less than 65535 sectors), a MOVEEND command beyond 65535 could be executed without an error and could corrupt the index. Now it correctly returns an illegal value for any number beyond 65534. (1.30.00)
- if a COPY command resulted in an error, the address involved could be locked out to all other users unless that same partition issues a RESET or reaccesses that address before another partition does. (1.30.00)
- if an address with 65535 sectors or more was scratched for 65535 sectors, the End Catalog Area would show an illegal address. To set the Catalog End to 65535, a 3 byte address must be created. (1.30.00)
- the MOVE command would cause the Catalog End to be set to the Current End. It now correctly uses the Catalog End from the input address unless otherwise specified. (1.30.00)
- a SCRATCH statement with index greater than 255 or catalog greater than 65535 would automatically create a 3 byte index. SCRATCHDISK& must now be used, otherwise the index or catalog will cause error P34, illegal value.

- COPY command would not work with an address of 65535 or higher with SELECT 3 ON with Rel 1.30.00. (1.30.01)
- VERIFY would not work with an address of 65535 or higher with SELECT 3 ON with Rel 1.30.00. (1.30.01)

#### Enhancements:

The MOVE command has been enhanced to dynamically allow the creation of a 3 byte index or a 2 byte index on the output disk regardless of the index type on the input disk. The syntax for this is as follows:

|                    |                                             |
|--------------------|---------------------------------------------|
| MOVET/Dxx,TO&T/Dxx | creates a 3 byte index on the output disk   |
| MOVET/Dxx,TO'T/Dxx | creates a 2 byte Type 1 index on the output |

After the 2nd address, the index size (LS = #) and catalog size (END = #) can optionally be given by using a comma after the last address and after the index size if both options are used. If not specified, the MOVE command will create the same type index on the output disk as existed on the input disk. If a 2 byte index is MOVE'd and either the index size or catalog end is specified without using the ' or &, the output index will always default to a type 1 index. To create an index size greater than 255 or a catalog end greater than 65534 using a 2 byte index as the input, the & must be specified. Otherwise a P34, illegal value error, will occur.

#### Clarification:

SELECT 3 ON/OFF - is used in conjunction with 3 byte addressing, an optional Turbo feature with the new DS or CS-D R4 prom. Three Byte Addressing provides 1 additional byte for each address entry when creating a disk catalog. This enables the user to create a disk catalog which can extend beyond 65534 sectors and/or an index greater than 256 sectors. Because alphavariabls can be used within certain disk commands to specify the sector address, the system must now be able to identify whether the alphavariabls is 2 or 3 bytes long. This is the main purpose of the SELECT 3 command. SELECT 3 must be on to read a 3 byte address when using an alphavariabls for a sector address in a DATALOAD or DATASAVE command. Subsequently, a SELECT 3 OFF command must be issued from the same partition if switching back to a 2 byte address in an alphavariabls. Failure to set SELECT 3 ON and OFF appropriately when using alphavariabls for sector addresses will likely corrupt your disk. Additionally, unless explicitly identified as a 3 byte command (use of & in a SCRATCH or MOVE), SELECT 3 is required for the system to accept an address beyond sector 65534 in a disk command.

#### Known anomalies:

##### PERFORMANCE:

1. CPU intensive processes can be negatively impacted when upgrading from Turbo O/S 1.1 to O/S 1.18 or higher when running at the same time as certain disk processes. CPU intensive processes seem to have priority on 1.1 where disk I/O seems to have priority on 1.18 and above.

##### 22C11-HS HIGH SPEED PRINTER PORT:

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.

3. A special machine code command to check printer ready can cause a problem with the high-speed printer port on the 22C11-HS. This program works perfectly with the old bus indicating READY or NOT READY if you deselect the printer. On the 22C11-HS, READY is usually indicated even without a printer connected. If the command is looped on while the printer is deselected, within approximately 5-10 minutes the system is hung until the printer is selected.
4. 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.
5. After a warm boot, \$INIT"SYSTEM", if using a printer with a buffer such as the PM017 on the 22C11-HS, some garbage characters will print out preceding the first printed data.

#### MUXing DISKS:

6. Intermittent I90 errors occur if using the 22C11-HS Mux port. The more terminals controllers in the Turbo the more likely the problem.
7. If using the 22C11-HS Mux port to boot, all other CPUs using the common 2275MUX will be locked out of all access through that controller until @GENPART is loaded.
8. If a Turbo housing a 2275MUX is powered off and on, all access by secondary CPUs through the 2275MUX will hang until either RESET is keyed on the CPU attempting access or the Turbo accesses that address.
9. If boot diagnostics are executed on the Turbo through a 22C80, all disk access by other CPUs through the common 2275MUX will hang until the diagnostics are exited.

#### DISK RELATED:

10. VERIFY does not work properly with the 2275 if verifying just sector 0 on the 22C11-HS. The entire disk is verified.

#### SPECIFIC COMMAND RELATED:

11. The MAT MERGE/MOVE/SEARCH/SORT will now erroneously accept arrays with parameters exceeding 255 rows or columns. However, the system cannot reliably handle data beyond those limits. Manipulating an array in a MATMOVE which exceeds those parameters can result in system hangs or data integrity errors.
12. The INPUT CURSOR command may intermittently hang.
13. LISTS & LISTSD do not work correctly to a system or terminal printer. If the printer requires a printer driver it will not linefeed. If the printout should take more than 1 screen, the 2nd screen does not occur.

#### SELECT H:

14. If 2 partitions are constantly accessing the same DS, only 1 with SELECT H ON, the partition using SELECT H ON will hang until the 2nd partition finishes if using the 22C11-HS.

#### MXF:

15. 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.
16. Some TC functions which run correctly on the MXE may fail with the MXF. Certain GIO commands used to 'send control vector' may hang or result in error.

17. 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.
18. The PRINT AT command does not position properly with the MXF in some cases.

OTHER:

19. 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.
20. If using 2 22C11-HS Controllers, the 2nd 22C11-HS always fails the 'System Interface Card Test on the first pass only.

Please notify me of any problems which may occur or for any questions.

Sincerely,

Mike Bahia  
2200 Product Support  
M/S 019-690  
Tel: 508-656-0256

0116D



Package Subject: TC Communications/Turbo

Item Title: Cover Memo

Duncan,

Have some information to pass onto you. Have received a few calls concerning TC Communications & MXF performance on the Turbo. We have not been able to duplicate these problems but you should be aware of these concerns.

1. Attached are 2 memos from Sweden. They had problems using the 2227B board at a customer site so they went to the MXE board. The MXE board works fine on 1.1 (1.15) but does not work with 1.18. See the 2 attached memos for more information.

2. Hutchison Paging may have already mentioned this problem to you. What happens is a background partition which I believe initiates a paging signal to someone's beeper intermittently stops. Other partitions continue to run so there is no immediate indication of the problem. Apparently RAMDisk is used to log incoming pages. When RAMDisk is filled because the background partition to service the pages has stopped, some type of program error message comes up. When this occurs & they check the Device Table, the entry for the disk address involved begins with a 3 instead of D (331 instead of D31 for example). Do not know if that has anything to do with the problem but that is all the information they supplied. Possibly the TC port hangs causing the background partition to hang. They are using 1.18 as you know.

3. One of our customers who has done a lot of testing for us also had some problems that may be of interest. Intermittently the system would run very slow for no apparent reason. Found problem caused by a cabled he had connected between 2 MXE ports. One port was a standard partition & the 2nd a TC port. This connection was used to run a program he wrote to convert programs from 'old' to 'new' format. Since removing the cable, no slowdowns have been encountered. These ports were set up as a TC port & a partition but were not being used at all during any of the slowdowns.

4. In upgrading from 1.07 to 1.15 one customer had to slow down his bar code reader which is connected in parallel to his workstations on the MXF. With 1.07 everything worked fine. With 1.15 he started to intermittently drop the last few characters being read by the bar code wand. By slowing it down with 1.15 the problem was eliminated. This may be normal but thought you may want to know.

5. 2 or 3 customers who have updated from 1.15 to 1.18 have noticed a decided screen performance loss. We have not been able to duplicate this problem. Will forward you more on this if I get more information.

Don't know how helpful this information is but wanted to make sure you were aware. Where do we stand on a new O/S? Marketing does want to go ahead with the 22C11-SCSI. Just about everything is completed on this end. Need new O/S with fixes to problems 1 to 9, the SCSI floppy problems (11, 12, & 14), and the SCSI prom issue (# 30). Please let me know what is happening.

Best regards,

Mike

# PROBLEM AFTER COMPILING 386/TURBO O/S

- 1.) WHEN LIST DISK CURRENT ~~DISK~~ <sup>END</sup> = LAST SECTOR IN INDEX INSTEAD OF END SECTOR OF CMVP.

EXAMPLE:

LIST DCT/D\_0

INDEX SECTORS = 00000024

END CAT. AREA = 00001279

CURRENT END = 00000023

END SHOULD BE 892 SAME AS

| NAME | TYPE | START    | END      | USED     | FREE     |
|------|------|----------|----------|----------|----------|
| CMVP | D    | 00000024 | 00000892 | 00000869 | 00000000 |

TO FIX

USE TOOLBOX UTILITIES + RUN FILEZAP

WILL ASK FOR DEVICE?

ENTER DISK ADDRESS WHERE CORRECTIONS WILL BE MADE

D20 RETURN

LOADS SECTOR 0 FROM ADDRESS GIVEN.

SECTOR 0 CONTAINS INDEX INFO IN BYTES 00-0F AS FOLLOWS:

|     | 00 | 01 | 0203 | 0405 | 060708090A0B0C0D0E0F |
|-----|----|----|------|------|----------------------|
| HEX | 00 | 18 | 0018 | 0500 |                      |
| DEC | 00 | 24 | 24   | 1280 |                      |

| INDEX TYPE | INDEX SECTORS | CURRENT + 1 | END CATALOG |
|------------|---------------|-------------|-------------|
|            |               |             |             |

CURRENT END SHOULD BE 892 IN THIS CASE. 892 DECIMAL = 37C

CHANGE BYTES 2 & 3 FROM 0018 (24 DEC) TO 037D (893 DEC) USING

EDIT KEY TO ENTER EDIT MODE, USE ARROW KEYS TO MOVE TO BYTE 02, ENTER 037D.

SF'16 TO SAVE CHANGES

2.) FILE ENTRY FOR CMVP IS IN BYTES 16-31 OF SECTOR 0. THIS ENTRY SHOULD BE IN SECTOR 9, BYTES 00-15.

Using FILE ZAP WRITE DOWN THE HEX CODES ON THE 2<sup>ND</sup> LINE OF SECTOR 0.

IT SHOULD BE SIMILAR TO THE FOLLOWING:

→ A DATA | 0018 037D 0500 0000 0000 0000 0000 0000 |  
          | 1000 0018 037C 0000 404D 5650 2020 2020 | ..... CMVP

EDIT 2<sup>ND</sup> LINE TO BE ALL 0s LIKE REST OF SECTOR.

SF' 16 TO SAVE CHANGE

GO TO SECTOR 9 AND INSERT DATA FROM 2<sup>ND</sup> LINE JUST 0 OUT INTO FIRST LINE.

---

# Facsimile Cover Sheet

**To:** Duncan Chou

**Company:**

**Phone:** 011-886-2-7328196

**Fax:** 011-886-2-7388371

**From:** Mike Bahia

**Company:** Wang

**Phone:** 508-656-0256

**Fax:** 508-967-2125

**Date:** 09/27/93

**Pages including this  
cover page:** 4

## Comments:

Duncan,

Currently I am testing a new release for the Turbo which we are calling 1.30.00. So far it looks very good. From the attached release notes it also fixes anomalies 11, 12, 13, 15 and 17. Number 10 is not a problem. If you would like a copy let me know.

In the meantime Tony is starting to look at anomaly #1 which probably resulted from the fix done to correct the intermittent terminal hang problem with the LINPUT command on release 1.15. We could use some help on this. If you could let us know what changes were made to fix the terminal hang it could be helpful. Any specific details you could provide could help Tony reverse engineer if necessary. Also, any ideas or insights into how we might address this problem would be very helpful.

Would you be interested in helping us with this on a contracting nature if necessary?

Best regards,



---

# Facsimile Cover Sheet

**To:** Duncan Chou

**Company:**

**Phone:** 011-886-2-7328196

**Fax:** 011-886-2-7388371

**From:** Mike Bahia

**Company:** Wang

**Phone:** 508-656-0256

**Fax:** 508-967-2125

**Date:** 09/24/93

**Pages Including this**

**cover page: 1**

## Comments:

Duncan,

Had not heard back from you. We are getting ready with our first Turbo release. Tony has done about a dozen fixes including the background problem where if you GOSUB into a Global with a higher partition #, commands on the same line as the DEFFN will not execute. The problem was when the DEFFN was executed the system would check for the end of partition but was looking at the end of the calling partition. If the calling partition was a lower #, the system would think no more commands on this line, jump to next command line. Anyway I do not know if you sent the source yet but it has not been received. If you have sent it, can you give me the carrier name and air bill#. If it has not been sent the billing # 's for Wang are below. It would be appreciated if you could send it as soon as possible to insure the fixes you did for Hutchison are included in this next release.

For DHL our billing # is 753876097. Mark to 'bill recipient'.

For Federal Express our billing # is 00213600. Again mark 'bill recipient'.

Again on the 386 1.2x source code. I understand you do not have it but is there anyone at Wang or anywhere at Wang it might be found, on a disk or in a cabinet? Is there anyone at Wang we might be able to have look? We would like to hopefully get some of those changes for 3 byte addressing and \$MOVEI that you had made and possibly come up with a single 386 and Turbo source code. Thanks again for your help.

;

Best regards,



---

# Facsimile Cover Sheet

**To:** Duncan Chou

**Company:**

**Phone:** 011-886-2-7328196

**Fax:** 011-886-2-7388371

**From:** Mike Bahia

**Company:** Wang

**Phone:** 508-656-0256

**Fax:** 508-967-2125

**Date:** 09/03/93

**Pages including this  
cover page:** 1

## Comments:

Duncan,

Thanks for getting back to me. Sorry for the delay. Tony was attempting to get the \$MOVEI code on the CS386 O/S and I was waiting to see if he would be successful. We decided to hold off as the job was getting too involved and we did not want to put off working on the Turbo for another week. We plan to come back to it later. If you can provide source code for a working CS/386 O/S with the \$MOVEI code that would help us quite a bit.

As for the Turbo, MXF, and SCSI source code with the changes you made, again we would appreciate if you could send it to us. You can use either DHL or Federal Express and bill it to us.

For DHL our billing # is 753876097. Mark to 'bill recipient'.

For Federal Express our billing # is 00213600. Again mark 'bill recipient'.

Just to let you know, we have a new CS/386 Maint release which fixes the following problems:

1. Partition hangs if after pointing to a variable stack address of FF (last address in 1 of the general registers is FF), the programs addresses 340 or an external terminal or system printer.

2. Can blow O/S if add or subtract a string of 87 1s in an immediate mode PRINT statement. Also fails on Turbo.

3. If a program saved in NEW format using 'wrap' mode contains a DEFFN' for an SF key and the program is loaded into memory, pressing the defined key before executing the program blows the O/S.

4. If a program has been enlarged to require additional sectors and is then RESAVED, the RESAVE may appear to successfully execute but when the program is reloaded you may find there is no program there. This also fails on the Turbo.

5. SELECT NEW has been changed so that CLEAR or LOADRUN will no longer reset it back to SELECT OLD. The only way to change from NEW to OLD or back is to execute another SELECT statement. This problem also exists on the Turbo.

Known anomalies:

1. SELECT H can cause intermittent hangs in a multi-CPU environment.

If you would like a copy let me know. I am currently testing in house and no new problems so far. Expect to send out for beta testing the end of next week.

If you want to help us with any of the bugs on the list please let us know. We would need the source code for any new problems fixed. Tony is in the process of moving the fixes made to the 386 which also affect the Turbo to the current source code we have (1.18Q).

As for the 386 1.2x source code. I understand you do not have it but is there anyone at Wang or anywhere at Wang it might be found, on a disk or in a cabinet? Is there anyone at Wang we might be able to have look? We would like to hopefully get some of those changes for 3 byte addressing and \$MOVEI that you had made and possibly come up with a single 386 and Turbo source code. Thanks again for your help.

;

Best regards,



DDUC HALL

967-1401

DATE : Aug 31, 1993

TO : Mike Bahia

:

FROM : Duncan Chou

:

FAX PHONE : INT + 886 2 7388371

VOICE PHONE : INT + 886 2 7328196

MESSAGE :

---

:

:



HI, MIKE

SORRY FOR LATE ANSWER YOUR PROBLEM ON FAX !!!

NO PROBLEM, I CAN SEND SOURCE CODE OF TURBO, 243GMIF AND ACCESS TO YOU.

I HAVE LOST REV 1.2X SOURCE SINCE IT IS NOT A FORMAL RELEASE PRODUCT BUT I CAN ADD \$HOVE ON CS386 FOR YOU. (HOVE CODE FROM TURBO)

I THINK I ALSO CAN FIX SOME PROBLEMS FOR YOU ON THE BUGS LISTING.

REGARDS/DUNCAN CHOU

*For Mike*

SOURCE OF ANY <sup>CODE</sup> ~~THAT~~ FIXED

ANY INFO ON BUGS FIXED SINCE 1.18Q

---

# Facsimile Cover Sheet

**To:** Duncan Chou

**Company:**

**Phone:** 011-886-2-9353923

**Fax:** 011-886-2-7388371

**From:** Mike Bahia

**Company:** Wang

**Phone:** 508-656-0256

**Fax:** 508-967-2125

**Date:** 08/06/93

**Pages Including this  
cover page:** 8

## Comments:

Duncan,

How are you? Have been trying to send you a FAX all week. I had 3 different FAX numbers and all would just ring. Today I called Marc and he gave me a forth FAX # to try which was successful if you are reading this. In talking with Marc it sounds like you guys have a real nice product and a great opportunity. I really hope this works out well for all of you involved. Anyway as you are aware we have been working on the existing O/S bugs and have just sent out our first release. This is a CS/386 release and fixes bugs that were identified with 1.1z. Additionally we would like to include some of the programming enhancements currently on the Turbo which you had also done on CS/386 Rel 1.2x. The most important piece we would like to add is for the \$MOVEI command used to convert programs from OLD to NEW format. If we could get the source code for that CS/386 1.2x release it would be a very big help.

Very shortly we also expect to be getting involved with fixing the outstanding O/S bugs on the Turbo. Tony Parker, who you met in Taiwan, has done a good job with the CS/386 bugs. Before we start in on the Turbo we would like to know if you would be willing to provide us with the source code for the last Turbo release and the MXF code installed at Hutchison. I am not sure exactly what the new code fixed but it did seem to help according to the PTR call updates. Unfortunately whatever changes you have made will not likely be present in our first Turbo release if we do not have the source code and we may end up reintroducing a problem for this customer. Marc has indicated to me that you would be willing to provide us with the source which we really appreciate. He also indicated that it would be a good idea to send you a list of bugs for the Turbo so that you could check off those problems that have been fixed so I have included that in the FAX. If it is not too much of an inconvenience it would also help us quite a

bit if you could indicate the module each particular fix was made in but if that is a problem then do not worry about it.

If you could let me know what we need to do to make this happen, I will try to follow through on it. If you want some kind of financial settlement please indicate that and I will talk with management and a decision can then be made. If for some reason you decide you would rather not provide us with the source code I will honor your wish and that will be it. Just let us know what you would like if anything and how you would like us to proceed and we will work from there.

To summarize what we would like to try and get is:

- source code for CS/386 Rel 1.2x which contains \$MOVE! command
- source code for latest Turbo Rel installed at Hutchison
  - If possible check off bugs fixed from bug list provided and additional bugs fixed if any.
  - If not an inconvenience, identify module each fix was made in.
- source code for MXF (@2236MXF)

We are aware of 2 releases over and above 1.18Q being installed at Hutchison. The last release fixed a DATA LOAD AC bug that popped up in the previous release you gave them. It also corrected a SCSI bug where the SCSI drives would not be properly recognized which came up on the previous release. Thanks for your help on this matter. Look forward to hearing from you.

Best regards,



PS On vacation next week. Back August 16th.

## 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:

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. CRITICAL

## 22C11-HS HIGH SPEED PRINTER PORT:

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 $IF OFF/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.

```
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

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
```

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

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

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:

```
10 DIM A$(16)
20 X=INT(RND(1)*65000)
30 DATALOADBAT/Dxx,(X,L)A$()
40 Y=INT (RND(1)*65000)
50 DATASAVEBAT/Dxx,(Y,L)A$():GOTO 20
```

CRITICAL

8. (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. 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

```
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
```

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

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

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

FIXED w/  
1.18Q

### 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.

CRITICAL

13. (6) RENAME command may corrupt disk index on a 3 byte surface. This is probably related to problem 12.

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:

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:

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.

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.

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 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

60 REM BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

70 REM CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

80 REM DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

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, 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

17. (7) VERIFY does not work properly with the 2275. Run the following program:

VERIFYT/Dxx,(0,0)A0: PRINT A0 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. P3

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

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

21. (15) The INPUT CURSOR command intermittently hangs. Run following program from a 2536DW terminal. This command is not valid on older terminals.

```
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.

P2

23. (27) SELECT NEW defaults to OLD after CLEAR or LOAD RUN. Should only change by re-entering the SELECT command.

P2

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

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

SELECT H:

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:

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

MXF:

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:

```
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:

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

FIXED w/  
1.18Q

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 "CPUDEM01". With just these CPU intensive tasks there is not too much difference:

|                  | 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

SCSI:

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

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

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

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

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

|          |                                    |   |
|----------|------------------------------------|---|
| 210-7042 | HYBRD/PTR/DISK                     | 1 |
|          | TRIPLE CONTROLLERS (TERM/DISK/PTR) | 4 |
| 210-7342 | DUAL CONT (PTR/DISK)               | 5 |
| 210-9746 | DUAL CONT (PTR/DISK)               | 4 |
| 210-8824 | 2275 MUX MASTER                    | 7 |
| 210-8825 | 2275 MUX EXT                       | 3 |
| 221-7715 | 22C80 DISK CONT FOR MUX            | 6 |

|            |                    |                |
|------------|--------------------|----------------|
|            | 2227B              | 3              |
|            | 2228B              | 4              |
|            | 2228C              | 1              |
|            | 2228DTC            | 2              |
|            | 2258               | 5              |
|            | MXE CONTROLLERS    | <del>3</del> 2 |
| 210-6541-2 | DISK CONTROLLER    | 2              |
| 210-7079   | PRINTER CONTROLLER | 1              |

|          |                       |   |
|----------|-----------------------|---|
|          | 2260C DISK CONTROLLER | 2 |
| 212-3037 | 2229 TAPE CONTROLLER  | 2 |

|          |                    |                |
|----------|--------------------|----------------|
|          | TURBO PTR/DISK/MUX | 7              |
|          | TURBO SCSI         | <del>4</del> 3 |
|          | TURBO MXP          | 4              |
| 210-9578 | TURBO CONT DB      | 3              |

LB

|                                      |           |               |
|--------------------------------------|-----------|---------------|
| MXE BROS                             | 4         | 2             |
| 2228C                                | 2         | 3             |
| PRINTER CONTROLLERS                  | 6         | 1<br>5 DUAL   |
| DISK CONTROLLERS                     | 20L3      | 1<br>1 TRIPLE |
| KEAM MNL                             |           |               |
| BASIC2 UTIL REF MNL                  | 715-3949  | ✓             |
| 2275 627                             |           |               |
| 2275-30.12                           |           |               |
| MICROVP                              | 38,3940   | 1             |
| CS-D/N, CS386, CS TURBO USER'S GUIDE | 715-2364A | ✓             |
| CS/2200 RAMBLINGS                    |           | ✓             |
| BASIC2 LANG REF MNL                  | 700-4080E | ✓             |
| CE SOLV HANDBOOK 2200                | 729-1097A | ✓             |
| MICROVP TURBO                        | ZE8321    |               |
| MICROVP                              | PR1307    |               |
| TURBO INFO & SW SETTINGS             |           |               |
| TURBO MAINT REL 1.30.01              |           |               |
| BASIC2 3.5                           |           |               |

Jim Battle

|                                         |           |
|-----------------------------------------|-----------|
| CS INTRO MNL                            | 715-1213  |
| CS-D USER'S GUIDE & UPDATE              | 715-2364  |
| CS/386 DATA SHEET                       |           |
| CS/386 TURBO DATA SHEET                 |           |
| CS/D/N, CS/386, & CS TURBO USER'S GUIDE | 715-2364A |
| BASIC2/TURBO O/S REL 1.0 CSRN           |           |
| DS DATA SHEET                           |           |
| DS PROD MAINT MNL                       | 741-1806  |
| DS USER'S MNL                           | 715-0740  |
| 2536 DW DATA SHEET                      |           |
| 2536 DW USER'S GUIDE                    | 715-2252  |
| 2436 USER'S MANUAL                      | 715-0739  |
| BASIC2 O/S REL 3.0 CSRN                 |           |
| BASIC2 UTIL REF MNL                     | 715-3949  |
| ISS REL'S USER MNL                      | 700-5010A |
| CS/2200 RAMBLINGS                       |           |
| EXTENDER BROS                           |           |

**August 17, 1989**

**Harris Gates**  
Wang Laboratories, Inc.  
One Industrial Avenue  
Lowell, MA 01851

**Dear Harris:**

Jim Dettmen and I have given considerable thought to the problems of designing a flexible and practical user interface on CS/2200 systems. Unfortunately, our software products (and most others on the CS/2200) must compete in an environment saturated with PCs. We would like to propose enhancements to future terminals to allow programmer to design unique and powerful screen handling on the CS.

### **Modern User Interface for CS/2200**

The "User Interface" has become a driving force in software and hardware development since the introduction of the Macintosh from Apple Computer. The raised expectations of users have caught the CS/2200 and most other minicomputer systems wanting when compared to the all-pervasive PCs. We all know the latest buzz words - windows, pop-up/pull-down menus, mice and icons.

The fundamental performance difference between PC's and the typical minicomputer with regard to the user interface is in the bandwidth available to update screen information. The traditional RS232 interface severely limits the volume of data that may be transmitted to the screen while PC's are many times faster. The net result is that the usual PC interface tends to be graphical and near instantaneous while the usual terminal interface is character based and much slower. **Yet most of the information displayed on either class of machine in a business environment is text.**

This difference in speed makes a graphical windowing interface on PC's very appealing but impossible to achieve on a terminal. The window interface has a major advantage for the user. By their nature, windows allow multiple sets of data to be displayed simultaneously. This lets the user see needed information without abandoning the current operation - i.e. looking up stock items in the middle of entering an order.

What can be done to overcome this disadvantage for the CS? With a few enhancements to a future CS terminal (2636DW?) which do not affect the CS cpu, terminal mux or system software, Wang could provide tools for programmers to produce very impressive user interfaces while retaining the efficiency of a character based environment.

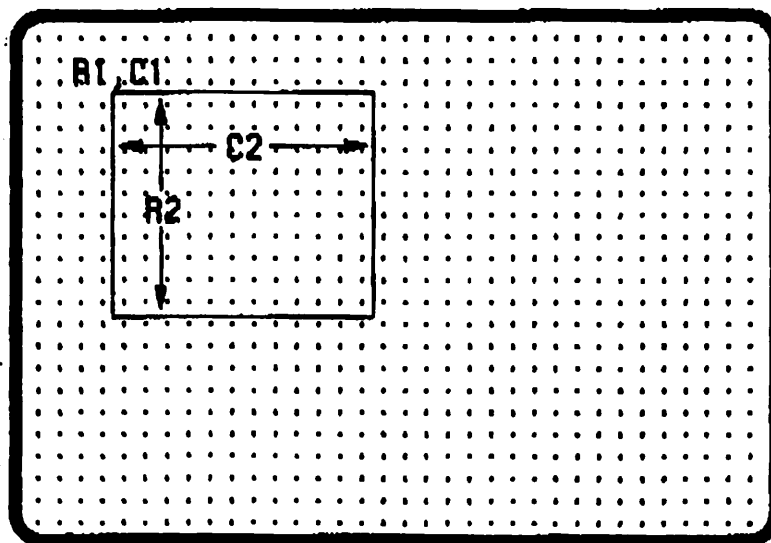
## VIRTUAL SCREENS

Some hardware assistance is needed in the CS terminal to allow programmers to develop a practical windowing environment. Please understand - **we are not proposing pixel level graphics** - just areas of a character based screen which may be manipulated independently of the rest of the screen. These areas could be considered "virtual screens". And, by practical we mean fast windowing with a minimum of support from application programs.

Assume that a virtual screen is a rectangular portion of a standard terminal screen which - when invoked by the application software - responds independently of the rest of the screen. A virtual screen may be as large as the entire physical screen or as small as a single character position.

A virtual screen may be defined by four numbers: the row/column position of the upper left corner (R1, C1) and the row/column height and width (R2, C2).

### Virtual Screen Definition



The most important aspect of a virtual screen is that, with two significant exceptions, it should behave just like a normal physical screen. Once a virtual screen has been declared, all output sent to the terminal is confined to within its boundaries and can not affect the rest of the display.

### BIDIRECTIONAL SCROLLING

A virtual screen should be able to scroll both up and down. Current CS/2200 terminal screens scroll only upward. If the cursor moves up off the top of the screen, it is wrapped around to the bottom of the screen. This is a holdover from the days of "glass teletypes" when terminals were used as a substitute for teletype printers - the paper moved only one way.

The reason that bidirectional scrolling is necessary is that a common use for virtual screens would be to display tables and lists. Browsing through this information is much more useful if lists and tables scroll both up and down.

Of course, to maintain compatibility with all current software, bidirectional scrolling should be available only when a virtual screen has been declared. However, there is no reason why a virtual screen could not be as large as the physical screen in order to provide bidirectional scrolling for the whole screen when desired.

## SCREEN DOWNLOAD

The second area where a virtual screen should behave differently from a physical screen is in the download and upload of screen information. To be efficient, only the area of the virtual screen should be downloaded by the INPUT SCREEN statement. There should be no 80 character self-identification message at the beginning of the screen dump. Any part of the screen could be read quickly by declaring the appropriate virtual screen.

For the sake of speed, a multi-byte control code should be available which signals the terminal to send information about the cursor position and current virtual screen - R1, C1, R2, C2, (virtual screen parameters) R3 and C3 (current cursor position). All zeros could be returned if no virtual screen is in effect. Application software must be able to quickly determined the screen environment.

An upload to the terminal screen should allow the restoration of attribute information as well as character information to a virtual screen. A special multi-byte control code should allow the selection of either the characters or attributes to be uploaded or downloaded. It is currently impossible to restore attributes. The screen must be redrawn instead.

*like this is why  
do not need  
more than one  
virtual screen  
- a time*

The procedure for using a virtual screen would be as follows:

- Declare virtual screen.
- Download contents of virtual screen.
- Clear virtual screen - HEX (03).
- Print to virtual screen.
- Upload original contents of virtual screen.
- Undeclare virtual screen.

## ALTERNATE SCREEN BUFFERS

It is common practice in terminal design to include memory in the terminal for more than one screen of information. If a CS terminal were to incorporate multiple screen buffers which could be switched under software control, near instantaneous screen restoration would be possible with only a short control sequence sent to the terminal.

Screen buffer switching should have two modes: switch to another buffer copying the contents of the current buffer and switch to another

buffer without alternating the new buffer. Managing windows with alternate screen buffers would involve the following steps:

- Switch to another buffer copying current buffer.
- Declare virtual screen.
- Clear virtual screen - HEX(03).
- Print to virtual screen.
- Switch back to original buffer without copying.

Multiple virtual screens could be declared and used in succession and the whole screen could be restored instantaneously by switching back to the starting buffer. The major advantage of alternate screen buffers is that screens may be restored for the user by sending only a few bytes. It would be very quick with a minimum of terminal I/O.

Both terminal upload and alternate screen buffers should be implemented. The first offers great flexibility in selectively opening and closing character windows. The second offers instantaneous and simultaneous closing of multiple windows.

A further thought on alternate screen buffers: they would facilitate the support of multiple sessions or tasks on a single terminal by allowing fast "context switching" of screen displays.

### **High Density Display**

132 column terminal displays are becoming very common. Considering that a terminal is a window into the system, the larger the window, the better the view. Complex master records often require multiple screens to present all pertinent information. The ability to display information formatted for printers saves time and money.

### **Other Notes**

If at least one alternate buffer could be implemented, more than two would require little additional designed effort. The cost of the memory chips is almost insignificant.

Scrolling is accomplished in current CS/2200 terminals by changing a memory pointer. Scrolling a virtual screen would require copying blocks of bytes. This will be slower than the pointer method. However, it would be fast enough to keep pace with disk access in retrieving records.

# Suggested Multibyte Control Codes for Virtual Screens and Alternate Screen Buffers

**HEX(0201r1c1r2c20F)** Declare and activate virtual screen with upper left corner at r1,c1 and size of r2,c2. Zeros for r2 and c2 should default to 1 and numbers larger than possible should default to maximum possible size. All zeros indicate the closing of a virtual screen.

**HEX(02030F)** Request virtual screen definition and cursor position. Six bytes are returned - r1, c1, r2, c2, r3, c3 - where r3, c3 are the cursor position. If r1,c1,r2 and c2 are all zero, no virtual screen has been declared and the cursor position relates to the physical screen.

**HEX(0206xx0F)** Select the character buffer (xx=00) or the attributes buffer (xx=01) for upload and download.

**HEX(0207nnnn...0F)** Upload string of bytes to character or attribute buffer (see previous command) where nnnn is the number of bytes to be sent.

**HEX(0208b1xx0F)** Switch to screen buffer b1. Copy contents of current buffer (xx=00) or do not copy (xx=01).



Item Subject:    2636DW - Redshaw Comments

M E M O R A N D U M

To:                    Gene Schulz  
                         c/c    Bill Hsien  
                                Pro Chao  
                                Mike Riley

From:                 Al Grant  
Date:                  June 7, 1991

Subject:    2636DW - Redshaw Comments

On May 15 - May 17 I attended the Redshaw Users' Conference. We showed the DX-300, Wang PC's with Freestyle and Microsoft Windows 3.0. In addition, our prototype 2636DW terminal was in the Redshaw "Sandbox" area, where they showed off new technologies they are considering for their product line.

The terminal did not get a lot of attention. It was sitting on line with the Magna Falcon and the Wyse 370, both of which feature color and graphical fonts.

On 5/31 I called John Deutsch for his conclusions regarding the 2636DW. His general comments were:

- o    Keyboard Hangups were a problem - when switching personalities.
  - o    Screen (Font) looked grainier that 2536DW (14" screen vs 12" with same font).
  - o    A low cost terminal is desirable that has a life expectancy that is foreseeably longer than its Basic-2 utilization (Must have Ind. Std. personality that is useful for 3rd party applications).
  - o    What is the production rate for the 2536DW? (600-800 annually).
  - o    Working with Dual personality is a complex operation.
- Joe recommended that I ask Joe Heuler about technical observations and recommendations, which I did. Joe's comments are:
- o    Keyboard locks up when log on as "root" as a vt220d.
  - o    When switching to 2200 mode, the transition takes too much time and the display of the power-on messages obscures valuable status information printed by KCM.
  - o    Repeat keys are way too slow. We need this to be faster. It currently is easier to use individual keystrokes.

- o    With TOM software, shift+CONT lock terminal (sends xoff (HEX(13))).
- The Line Enhancer is useful when the Chase and Digiboards do not drive the cables. Chase and Digiboard will drive 100-200 feet if cables were carefully routed. Referred us to Gary Bromley for forecasts and projections.

Item Subject:    2636DW Personality Switch

We need to make the power-on default configurable so those who want to utilize it primarily as a UNIX workstation can do it without fooling around with personality switching.

aeg

# MEMORANDUM

To: Pro Chao  
c/c Gene Schulz  
Bill Hsien  
Mike Riley  
Tony Schott  
Mike Bahia

From: Al Grant  
Date: February 28, 1991

Subject: 2636DW Project Status - VT-220 Personality  
=====

## General

- o EPROM Revision Level: The EPROM revision level was not updated. It is not possible to distinguish between revision levels.
- o 2200 Mode Personality: The "Restart Terminal" immediate command HEX(F2) fails to update the keyboard LED to indicate UPPER CASE after the command forces the terminal into upper case. This is especially noticeable when using Niakwa BASIC-2C under UNIX - After you log into UNIX in lower case, Basic-2C sends HEX(F2) the keyboard is shifted into UPPER CASE but the LED indicates LOWER CASE. This problem exists with the 2536DW also.
- o Documentation: No documentation was present to indicate which problems had been resolved, remaining problems or what still needs to be done.

## Host-To-Terminal protocol

- o Control Sequences - Some ANSI control sequences still fail:
  - o Omitted or "0" parameters do not have defaults in all sequences, and give unspecified results. See the Definitions sections of this report for specified behavior of sequences with omitted parameters.
  - o The ED sequence with a parameter of "1" (ESC[1J) performs power-up reset to the terminal.
  - o The RIS sequence (ESC c) is not functional. Should perform reset as described Definitions section of this report.
  - o The cursor motion sequences, CUB, CUU, CUD, CUF do not have the desired effect. One problem noted is, the parameters seem to be interpreted as being one more than the value contained in the sequence, i.e. if the sequence specifies placing the cursor at line 5, column 5 it actually places the cursor at line 6, column 5. The "Character Insertion" test displays this characteristic.
  - o An as-yet-to-be-determined sequence seems to switch the terminal into a mode where the keystrokes are displayed in HEX. This usually happens in a situation where cursor motion sequences with no parameters are used.

## Host-To-Terminal protocol (cont'd)

- o 7-bit versus 8-bit Representation These difficulties appear to have been resolved.
- o Auto Linefeed - Autolinefeed (autowrap) seems to force 2 linefeeds rather than 1.
- o Character Sets The C0 character set should be supported fully as defined in Appendix E in the Wyse 185 manual. The C1 character set should at least support the ISO Latin-1 supplemental character set which is the most-preferred international character set and may be found in the Wyse-185 manual, Appendix E. This character set is defined in the ISO DIS 8859/1.2 standard. Standard VT100/220 control sequences should be used to switch between character sets.
- o Personality Switch - Still not fixed. This was an original requirement. My recommendation is to implement the 2110A Terminal Operating Mode Control sequence to select 2636DW from VT 220 mode. For the 2636DW mode to VT220 mode switch, an escape sequence needs to be assigned which is transparent to the 2200 system and MXE card.
- o SGR Modes 22, 24, 25, 26 - No change. SGR Modes 22, 24, 25, 27 do not work at all, now. SGR modes 25 and 27 can turn off blink and REV, but 24 cannot turn UNDERLINE off. 22 still does not seem to have any effect.
- o SGR Mode 0 - Seems to be fine, now. The SGR sequence does not work with the parameter omitted.

## Terminal-to-Host Protocol Test

- o Control Characters - No change since last time. The generation of control characters should not depend on the SHIFT key. Example: CTRL+SHIFT+A and CTRL+a should both generate Control A (Hex 01).
- o Function Keys - The C1 versus C2 sequence problem seems be corrected. Now, the HELP, D0, F17, F18, F19, F20 keys do not seem to work.
- o Key Repeat - Keys still do not repeat.
- o Flow Control - DEL, IS and IQ still work intermittently if there is heavy output being sent to the terminal. These are important under UNIX. This usually indicates some sort of terminal performance problem where the handling of the output being sent to the terminal prevents the keystrokes from being picked up and sent out.
  - o Sometimes the keyboard gets into a "debug" mode that displays all transmitted characters in HEX.

## Summation

This product is not acceptable for use under UNIX. There is much work left to do. If communications were ideal and the engineer were here in Lowell, I estimate at least one month's work to complete just the software to my satisfaction.

Item Subject: Cover Memo

Pro -

Here is the results of my testing. Also there is a section on the UNIX TERINFO (M) definitions I gave you. I feel that this level of functionality is all we require. Additionally, We need support of the Special Graphics and LATIN-1 Supplemental character sets. If you have any questions, please feel free to ask.

The DP file in the package (VT220TST) is a 360 K tar diskette image and can be taken off the VS with the FLOPYDUP program. Be sure to use a 360 K formatted diskette! The UNIX file JUNK.BS2 is a Niakwa Disk Image file with several Basic-2C programs in it. The other files are Basic-2C source files.

Best wishes,  
Al Grant

# MEMORANDUM

To: Pro Chao  
c/c Gene Schulz  
Bill Hsien  
Mike Riley  
Tony Schott  
Mike Bahia

From: Al Grant  
Date: January 18, 1991

Subject: 2636DW - Preliminary Evaluation Of VT-220 Personality

=====

This report contains results of the preliminary functional evaluation of the Wang 2636DW VT-220 personality. The test was conducted using the "VT220TST" program written in Basic-2C and executed on a PC-382 using the SCCU-8-DX1 (Digiboard) asynchronous controller. The test program was written using the Wyse 185 with its VT-220 personality enabled.

## Hardware tests results:

- o RS-232 Interface - RS-232 control lines RTS (Pin 4) and DTR (pin 20) are pulled high with pullup resistors, causing insufficient current sourcing on these lines. This will reduce noise immunity on any line driven by these signals. Please refer to the Wang Product Specification for RS-232/V.24 Compatibility, part number 191-3059). The Output Current vs Output Voltage chart for the MC1488 line driver in the Texas Instruments Interface Circuits Data Book (1987 - Page 4-395) describes acceptable voltage & current characteristics for RS-232.

## Software Test Results:

- o Restrictions - Restrictions described by Pro Chao's memo are included for the purposes of this evaluation.

### Host-To-Terminal protocol

- o Control Sequences - Most ANSI control sequences fail. Parameters are sometimes not interpreted as decimal and give unspecified results. Specific results are on the "Terminfo Definitions" section of this document.
- o 7-bit versus 8-bit Representation Terminal should accept 7-bit control sequences as well as 8-bit control sequences, even if in 8-bit mode. Please refer to the Data Representation section in the 2110A specification (page 28).

## Host-To-Terminal protocol (cont'd)

- o Character Sets The C0 character set should be supported fully as defined in Appendix E in the Wyse 185 manual. The C1 character set should at least support the ISO Latin-1 supplemental character set which is the most-preferred international character set and may be found in the Wyse-185 manual, Appendix E. This character set is defined in the ISO DIS 8859/1.2 standard. Standard VT100/220 control sequences should be used to switch between character sets.
- o Personality Switch - No control sequence exists for switching between 2636DW and VT-220 personalities. This was an original requirement. My recommendation is to implement the 2110A Terminal Operating Mode Control sequence to select 2636DW or VT 220 mode.
- o The RIS sequence - The RIS sequence is not functional. Should perform reset as described in the VT-220 or 2110A documentation.
- o Auto Linefeed - It should be possible to turn off auto linefeed.
- o SGR Modes 22, 24, 25, 26 - SGR Modes 22, 24, 25, 27 cannot be sent in a single control sequence. SGR modes 25 and 27 can turn off blink and REV, but 24 cannot turn UNDERLINE off. 22 does not seem to have any effect.
- o SGR Mode 0 - SGR Mode 0 does not turn off BLINK, REV and UNDERLINE attributes.

## Terminal-to-Host Protocol Test

- o Control Characters - Generation of control characters should not depend upon the SHIFT key unless the particular control character key is required to be shifted due to the keycap legend. Example: CTRL+SHIFT+A and CTRL+a should both generate Control A (Hex 01).
- o Function Keys - The function keys send 8-bit C1 sequences, which are not usable to UNIX (See attached TERMINFO chart). Function keys should always send 7-bit C1 sequences except when explicitly configured to send 8-bit sequences. Please refer to the Data Representation section of the 2110A Specification (Page 28).
- o Key Repeat - Keys do not repeat.
- o Control Keys - DEL, IS and IQ have no effect or are severely delayed if there is heavy output being sent to the terminal. These are important under UNIX. This usually indicates some sort of terminal performance problem where the handling of the output being sent to the terminal prevents the keystrokes from being picked up and sent out.

## General Rules for ANSI Control Sequences

1. Control sequences will have the following general form:

ESC i [p0] p1 ; pn F

Where i = introducer character, p1 - pn = parameters, F = Final character.

## General Rules for ANSI Control Sequences (cont'd)

2. Control characters and spaces (20H) are ignored within control sequences.
3. Parameters are ASCII - encoded decimal numeric digits in the range "0 - 9".
4. 'Private' sequences may employ "< = > ?" (3CH-3FH) as p0.
5. The semicolon (;) is used as a delimiter between parameters (p1 - pn).
6. Final characters for ANSI sequences fall in the range of "@ - Z" and 60H-6FH.
7. Final characters for 'private' sequences fall in the range of "p - z" and 7BH-7EH.

## Terminfo definitions for VT220-8 (DEC vt220 8 bit terminal)

For definitions of the functions below and their control sequences please refer to the UNIX TERMINFO(M) documentation and ANSI Std X3.64. These definitions describe the functionality expected for UNIX use.

| <u>Terminfo</u>                          | <u>ANSI</u> | <u>Description</u>                                            |
|------------------------------------------|-------------|---------------------------------------------------------------|
| bel= <sup>^</sup> G                      | BEL         | ASCII Bell - Sound bell, beeper                               |
| blink= <sup>\E</sup> [5m                 | SGR         | Set character blink attribute                                 |
| bold= <sup>\E</sup> [1m                  | SGR         | Set character Bold (Bright) attribute                         |
| clear= <sup>\E</sup> [H <sup>\E</sup> [J |             | Home cursor, clear screen                                     |
| cr= <sup>\r</sup>                        | CR          | ASCII Carriage Return                                         |
| csr= <sup>\E</sup> [ p1 ; p2 r           |             | DECSTBM Set top bottom, margins of scrolling region (window). |
| cub= <sup>\E</sup> [ pn D                | CUB         | Move cursor left (n) columns                                  |
| cub1= <sup>\b</sup>                      | BS          | ASCII Backspace                                               |
| cud= <sup>\E</sup> [ pn B                | CUD         | Move cursor down (n) columns                                  |
| cud1= <sup>\n</sup>                      | LF          | ASCII Linefeed                                                |
| cuf= <sup>\E</sup> [ pn C                | CUF         | Move cursor right (n) columns                                 |
| cuf1= <sup>\E</sup> [C                   | CUF         | Move cursor right 1 column                                    |
| cup= <sup>\E</sup> [ pr ; pc H           | CUP         | Move cursor to Row pr, Column pc                              |
| cuu= <sup>\E</sup> [ pn A                | CUU         | Move cursor up n columns                                      |
| cuu1= <sup>\E</sup> [A                   | CUU         | Move cursor up 1 column                                       |
| dch= <sup>\E</sup> [ pn P                | DCH         | Delete n characters to right of and including cursor          |
| dch1= <sup>\E</sup> [P                   | DCH         | Delete 1 character to right of and including cursor           |
| dl= <sup>\E</sup> [ pn M                 | DL          | Delete n line above and including cursor line                 |
| dl1= <sup>\E</sup> [M                    | DL          | Delete cursor line                                            |

# vt-220 terminfo definitions (cont'd)

| <u>Terminfo</u>           | <u>ANSI</u> | <u>Description</u>                         |
|---------------------------|-------------|--------------------------------------------|
| ech=\E[ pn X              | ECH         | Erase n characters beginning at cursor     |
| ed=\E[J                   | ED          | Erase from cursor to end of display        |
| el=\E[K                   | EL          | Erase from cursor to end of line.          |
| el1=\E[1K                 | EL          | Erase from start of line to cursor.        |
| enacs=\E)0                | SCS         | Assign alt char set (G1) to graphics       |
| flash=\E[?5h\$<200> E[?5l |             | Flash screen (visible bell)                |
| home=\E[H                 | CUP         | Move cursor to home site.                  |
| ht=\t                     | HT          | Move cursor 8 (default) columns right.     |
| hts=\EH                   | HTS         | Set tab stop at cursor.                    |
| ich=\E[ pn @              | ICH         | Insert (n) characters at cursor position.  |
| il=\E[ pn L               | IL          | Insert (n) lines at and above cursor line. |
| il1=\E[L                  | IL          | Insert 1 line at cursor line.              |
| ind=\ED                   | IND         | INDEX - LF not affected by LNM mode.       |
| kbs=\b                    |             | Backspace key = ASCII BS                   |
| kcub1=\E[D                |             | West cursor key                            |
| kcud1=\E[B                |             | South cursor key                           |
| kcuf1=\E[C                |             | East cursor key                            |
| kcuu1=\E[A                |             | North cursor key                           |
| kf1=\EOP                  |             | PF1 key                                    |
| kf10=\E[21~               |             | F10 key                                    |
| kf11=\E[23~               |             | F11 key                                    |
| kf12=\E[24~               |             | F12 key                                    |
| kf13=\E[25~               |             | F13 key                                    |
| kf14=\E[26~               |             | F14 key                                    |
| kf17=\E[31~               |             | F17 key                                    |
| kf18=\E[32~               |             | F18 key                                    |
| kf19=\E[33~               |             | F19 key                                    |
| kf2=\EQ                   |             | PF2 key                                    |
| kf20=\E[34~               |             | F20 key                                    |
| kf3=\EOR                  |             | PF3 key                                    |
| kf4=\EOS                  |             | PF4 key                                    |
| kf6=\E[17~                |             | PF6 key                                    |
| kf7=\E[18~                |             | PF7 key                                    |
| kf8=\E[19~                |             | PF8 key                                    |

NOTE: The ~ character denotes a "tilde" (approximation) sign - HEX(7E).



# vt-220 terminfo definitions (cont'd)

| <u>Terminfo</u> | <u>ANSI</u> | <u>Description</u>                             |
|-----------------|-------------|------------------------------------------------|
| kf9=\E[20~      |             | PF9 key                                        |
| kfnd=\E[1~      |             | FIND key                                       |
| khlp=\E[28~     |             | HELP key                                       |
| khome=\E[H      |             | HOME key                                       |
| kich1=\E[2~     |             | INSERT key                                     |
| knp=\E[6~       |             | NEXT screen key (Pg Dn)                        |
| kpp=\E[5~       |             | PREV page key (Pg Up)                          |
| krdo=\E[29~     |             | DO key                                         |
| kslt=\E[4~      |             | SELECT key                                     |
| lf1=pf1         |             | label function keys F1-F4 as PF1-PF4           |
| lf2=pf2         |             |                                                |
| lf3=pf3         |             |                                                |
| lf4=pf4         |             |                                                |
| mc0=\E[i        | MC          | Print Local Screen on local printer            |
| mc4=\E[4i       | MC          | Terminal input routed to screen                |
| mc5=\E[5i       | MC          | Terminal input routed to local printer         |
| nel=\EE         | NEL         | CRLF function regardless of LNM mode state     |
| rc=\E8          |             | DECRC - Restore cursor to position at last sc. |
| rev=\E[7m       | SGR         | Set reverse video attribute.                   |
| ri=\EM          | RI          | Reverse Index, at top of screen, scroll down   |
| rmacs=^O        | SI          | Shift from alt char set (G1) to normal (G0).   |
| rmam=\E[?7l     |             | reset autowrap (DECAWM) mode.                  |
| rmir=\E[4l      | IRM         | Reset insert / replace mode to replace.        |
| rmso=\E[27m     | SGR         | Reset reverse video attribute.                 |
| rmul=\E[24m     | SGR         | Reset underline attribute.                     |
| rs1=\E[?3l      |             | Reset 132 column DECCOLM mode.                 |
| sc=\E7          |             | DECSC - Save current cursor position.          |
| sgr0=\E[Om      | SGR         | Normal attributes (all off).                   |
| smacs=^N        | SO          | Shift from normal char set (G0) to alt (G1).   |
| smam=\E[?7h     |             | Set autowrap (DECAWM) on.                      |
| smir=\E[4h      | IRM         | Set insert - replace mode to INSERT.           |
| smso=\E[7m      | SGR         | Enter reverse video mode.                      |
| smul=\E[4m      | SGR         | Set underline mode.                            |
| tbc=\E[3g       | TBC         | Clear all tab stops.                           |

NOTE: The ~ character denotes a "tilde" (approximation) sign - HEX(7E).

0010 REM %

'VT220TST' - 2636DW - VT Personality Exercisor A.E. Grant, Jr.

```
0020 REM Requires that the tty line connected to the UNIT UNDER TEST (uut)
0030 REM -be disabled and the port be maintained open while test is under way.
0040 REM The UUT should be set to the UNIX defaults to eliminate hassles with
0050 REM -baud rate, parity, etc. The port may be maintained open by placing
0060 REM -the following line in /etc/rc.
0070 REM (stty 9600 -ixany ixon ixoff cllocal min '^A' ; keepit) < /dev/ttyxx &
0080 REM This will keep ttyxx (xx=port name) open for bidirectional commun-
0090 REM -ications with the named parameters set. The $DEVICE statement
0100 REM -must be changed to reflect the port opened by /etc/rc.
0110 REM NOTE - the permissions for /dev/ttyxx must be set to 666 to allow
0120 REM -user level access for the purpose of running this test.
0130 REM
0140 SELECT PRINT 218
0150 $PSTAT="VT220TST"
0170 $DEVICE(/016)="VT220TST.SRC"
0180 $DEVICE(/018)="/dev/tty1a TMO=Y "
0185 PRINT HEX(1B5B481B5B4A1B5B6D);
0190 DIM A$80, T$8, C$1, C$(12)16, S$(12)16, A$(12)16, W$(12)32
0200 C$(1)=HEX(1B5B481B5B324A)
 : C$(2)=HEX(1B5B43)
 : C$(3)=HEX(1B5B44)
 : C$(4)=HEX(1B5B41)
 : C$(5)=HEX(1B5B42)
 : C$(6)=HEX(1B5B3343)
 : C$(7)=HEX(1B5B3344)
 : C$(8)=HEX(1B5B3341)
 : C$(9)=HEX(1B5B3342)
 : C$(10)=HEX(1B5B383B323148)
 : C$(11)=HEX(1B5B353B3048)
 : C$(12)=HEX(1B5B353B3548)
0205 S$(1)=HEX(1B5B3468)
 : S$(2)=HEX(1B5B346C)
 : S$(3)=HEX(1B5B3650)
 : S$(4)=HEX(1B5B304B)
 : S$(5)=HEX(1B5B314B)
 : S$(6)=HEX(1B5B324B)
 : S$(7)=HEX(1B5B304A)
 : S$(8)=HEX(1B5B314A)
 : S$(9)=HEX(1B5B334C)
 : S$(10)=HEX(1B5B334D)
0210 A$(1)=HEX(1B5B306D)
 : A$(2)=HEX(1B5B316D)
 : A$(3)=HEX(1B5B326D)
 : A$(4)=HEX(1B5B346D)
 : A$(5)=HEX(1B5B356D)
 : A$(6)=HEX(1B5B376D)
 : A$(7)=HEX(1B5B373B356D)
 : A$(8)=HEX(1B5B313B356D)
 : A$(9)=HEX(1B5B343B356D)
 : A$(10)=HEX(1B5B343B396D)
 : A$(11)=HEX(1B5B343B353B376D)
 : A$(12)=HEX(1B5B32323B32343B32353B32376D)
```

```

0220 W$(1)="Normal attrib"
 : W$(2)="Bold"
 : W$(3)="dim"
 : W$(4)="Underlined"
 : W$(5)="Normal Blinking"
 : W$(6)="Reverse"
 : W$(7)="Reverse + Blinking"
 : W$(8)="Bold+Blinking"
 : W$(9)="Blinking + Underlined"
 : W$(10)="Double Underline"
 : W$(11)="Blink + Underline + Reverse"
 : W$(12)="Blink, Underline + rev off"
0230 PRINT HEX(1B5B481B5B4A);
0240 REM %

```

Home cursor, clear screen test

```

0250 PRINT "Terminal screen should be clear except for this message -- Press RE
 TURN";
 : INPUT "Scrolling",W
0260 REM %

```

Print chars with scrolling.

```

0270 A$=ALL("#")
 : FOR R=0 TO 22
 : PRINT A$;
 : NEXT R
0280 PRINT "SCROLLING"
0290 A$=ALL("#")
 : FOR R=0 TO 22
 : PRINT A$;
 : NEXT R
0300 PRINT "The word SCROLLING should have scrolled through the screen -- Press
 RETURN";
 : INPUT "Char pairs",W
0310 REM %

```

Print an array of character pairs.

```

0320 A$="()" & A$
 : PRINT C$(1);
 : FOR R=0 TO 22
 : PRINT A$;
 : NEXT R
0330 PRINT "Screen should have filled with pairs of () -- Press RETURN";
 : INPUT "SGR - Attributes",W

```

0340 REM %

Display character attributes.

```
0350 PRINT C$(1);
 : FOR A=1 TO 11
 : PRINT A$(1);W$(A);
 : PRINT A$(A);"ABCDEFGHJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456
 789 !@#$$%^&*()-=+][\"
 : NEXT A
0360 PRINT "All attributes displayed - Bold, Rev & Underline are left on --Pres
 s RETURN";
 : INPUT "SGR 24 25 27",W
0370 REM %
```

Explicitly turn off Bold, Rev and Underline.

```
0380 PRINT A$(12);
 : PRINT W$(12);"ABCDEFGHJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 012345
 6789 !@#$$%^&*()-=+][\";
0390 PRINT "Display should now be normal attributes -- Press RETURN";
 : INPUT "TAB test",W
0400 REM %
```

Tab test - moves diagonal across screen.

```
0410 FOR I=0 TO 79
 : PRINT TAB(I);"*";
 : NEXT I
 : FOR I=0 TO 79
 : PRINT TAB(I);"*";
 : NEXT I
0420 PRINT "Diagonal line should have moved across screen - Press RETURN";
 : INPUT "Blank fields",W
0430 REM %
```

clear screen by printing blank fields, lines

```
0440 FOR R=0 TO 22
 : PRINT ,,,,
 : NEXT R
0450 PRINT "Screen should have cleared using print statements -- Press RETURN";
 : INPUT "CUP CUB CUU CUD CUF Cursor motion",W
```

0460 REM %

Cursor motion tests -- prints a line at Row 8, column 20, two boxes

```
0470 SELECT PRINT 418
0480 GOSUB 3000
0580 PRINT C$(10);"^ At line 08, column 20:";
0590 PRINT C$(10);C$(9);
0600 FOR I=1 TO 5
 : PRINT C$(2);"*";
 : NEXT I
0610 FOR I=1 TO 5
 : PRINT C$(5);"*";HEX(08);
 : NEXT I
0620 PRINT C$(5);
 : FOR I=1 TO 5
 : PRINT C$(3);"*";HEX(0808);
 : NEXT I
0630 FOR I=1 TO 5
 : PRINT C$(4);"*";HEX(08);
 : NEXT I
0640 PRINT HEX(1B5B36411B5B333143);
0650 FOR I=1 TO 5
 : PRINT C$(6);"*";
 : NEXT I
0660 PRINT HEX(08);
 : FOR I=1 TO 5
 : PRINT C$(9);"*";HEX(08);
 : NEXT I
0670 PRINT HEX(08);
 : FOR I=1 TO 5
 : PRINT C$(7);"*";HEX(0808);
 : NEXT I
0680 PRINT C$(2);
 : FOR I=1 TO 5
 : PRINT C$(8);"*";HEX(08);
 : NEXT I
0690 PRINT HEX(1B5B32333B3048);
 : PRINT "Screen should have column no's, line & 2 boxes displayed -- press R
 : ETURN";
 : INPUT "ICH",W
0700 REM %
```

Character Insertion Test

```
0710 GOSUB 3000
0712 PRINT
0713 PRINT "The brown fox (original text)";
0715 PRINT C$(11);"The brown fox";
0720 PRINT C$(12);S$(1);"quick ";S$(2)
0721 PRINT "The word 'quick' should have been inserted at column 5 with a trail
 : ing blank"
 : INPUT "EL 3, DCH tests",W
```

0723 REM %

#### Character deletion, line editing Tests

```
0724 PRINT C$(12);S$(3);
0730 PRINT
 : PRINT S$(6);"The word 'quick' at column 5 should have been erased"
 : INPUT "EL 0 test",W
0731 PRINT C$(12);S$(4);
0732 PRINT
 : PRINT S$(6);"The characters to the right of column 5 should have been erased"
 : INPUT "EL 1 test",W
0733 PRINT C$(12);S$(6);
0734 PRINT
 : PRINT S$(6);"The characters to the left of column 5 should have been erased"
 : INPUT "ED 0 test",W
0800 REM %
```

#### Screen editing tests

```
0805 SELECT PRINT 218
0810 A$=ALL("#")
 : FOR R=0 TO 23
 : PRINT A$;
 : NEXT R
0820 D=1
 : GOSUB 2270
0822 PRINT HEX(1B5B31313B3048);S$(7);
0824 PRINT
 : PRINT S$(6);"The screen should have filled with '#' then the bottom half erased"
 : INPUT "ED 1 test",W
0826 PRINT HEX(1B5B31313B3048);S$(8);
0830 PRINT
 : PRINT S$(6);"The top half of the screen should have been erased"
 : INPUT "IL test",W
0850 REM %
```

#### Line Insertion Tests

```
0851 SELECT PRINT 218
0852 A$=ALL("#")
 : FOR R=0 TO 23
 : PRINT A$;
 : NEXT R
0853 SELECT PRINT 418
0855 PRINT HEX(1B5B31313B3048);
0860 PRINT "The screen should have filled with '#' then 3 blank lines inserted before this ";S$(9);
 : INPUT "DL test",W
```

1300 REM %

### Line Deletion Test

```
1310 PRINT HEX(1B5B31313B3048);
1320 PRINT S$(10);"The 3 blank lines inserted should have been deleted
 ";
 : INPUT "Keyboard test",W
2000 REM %
```

### Keyboard Function Test

```
2010 REM displays chars from the UUT keyboard - control characters are
2020 REM preceded by an up arrow (^) and the value of the character is made
2030 REM printable and represents the ascii character that would be combined
2040 REM with the control key. (char = hex(1B) printed as ^[]) Some characters
2050 REM are displayed in the 2200 character set (7B - 7F Hex) so the 2x36
2060 REM user's manual must be referenced to decode these.
2080 REM
2085 PRINT C$(1);"Keyboard output will appear on the Basic-2C console"
2086 PRINT "Press console F1 (SF'00) to stop test."
2090 SELECT PRINT 005
2095 PRINT "NOTE: In the 2200 character set ";HEX(7E);" HEX(7E) replaces the '
 tilde'"
2100 $OPEN /O18
-2110 $GIO/O18,(HEX(C620),R$) A$
2120 B=VAL(STR(R$,9,2),2)
2130 KEYIN C$,2140,2190
-2140 IF B=0 THEN 2110
2150 FOR I=1 TO B
2160 IF STR(A$,I,1)<HEX(20) THEN GOSUB 2200
 : ELSE PRINT STR(A$,I,1);
2170 NEXT I
2180 GOTO 2110

-2190 STOP
-2200 REM %
```

### Print control chars

```
2210 C=VAL(STR(A$,I,1))
2220 C=C+64
2230 C$=BIN(C)
2240 PRINT " ^";C$;
2250 RETURN
```

2260 REM %

Timer - call with time in seconds in D

```
-2270 T$=TIME
2280 CONVERT STR(T$,,6) TO T1
2290 IF T1-T>=D THEN RETURN
2300 $BREAK 5
2310 GOTO 2270
```

-3000 REM %

Clear screen, print column numbers

```
3020 PRINT HEX(1B5B481B5B324A);
3030 FOR I=0 TO 7
3040 FOR R=0 TO 9
3050 PRINTUSING "#",I;
3060 NEXT R,I
3070 PRINT HEX(1B5B323B3048);
3080 FOR I=0 TO 7
3090 FOR R=0 TO 9
3100 PRINTUSING "#",R;
3110 NEXT R,I
3120 RETURN
```



WANG

MEMORANDUM

TO: Mike Britko  
FROM: Bruce Waite  
SUBJECT: FCC Class "B" Evaluation of a Redesigned 723 Keyboard (PEP# H0283F)  
DATE: January 25, 1988

MIKE -  
PLEASE ALSO MAKE  
SURE THAT THE RF  
SHIELD IS IN PLACE  
ON KEYBOARD  
725-3155 US  
-BOB LIVINGSTON

A redesigned 723 keyboard (WLI# 725-3401) was supplied to the FCC group for Class "B" evaluation testing by Keytronics.

FCC evaluations were performed with a 114 CPU and the results show that the redesigned 723 keyboard meets the Class "B" limits set forth in FCC Rules (47 CFR Part 15, Subpart J).

The keyboard configuration included a torroid assy on the internal cable and an R.F. foil shield.

The redesigned PC board was identified by # 7129-7 and the new R.F. shield was marked 452-3167 C SF.

The keyboard was tested on a 114 CPU. The CPU was installed with a 210-8770, Winni/Floppy Controller board and a 210-8986, Color/Mono Video board. A Wang monochrome monitor was also used.

*Bruce Waite*

Bruce Waite  
FCC/EMI Department

cc: John Bachman  
Steve Brody  
Lorraine Gelzinis  
Jim Hadley  
Ron Leczynski  
Bob Parker  
Don Russell  
Art Whelden

m/s 013-490  
m/s 015-15A  
m/s 015-15A  
m/s 013-490  
m/s 015-15A  
m/s 015-15A  
m/s 013-490  
m/s 015-15A

Shift-F1, F8, F9, F10  
~~Shift-F1, F8, F9, F10~~

HELP

1 2 3 4  
 HOLD RESET SET DATA  
 UP TRIM  
 F1 F2 F3 F4

5 6 7 8  
 BREAK F6 F7 F8  
 F5 F6 F7 F8

9 10 11 12  
 F9 F10 F11 F12  
 F9 F10 F11 F12

13 14 15 16  
 F13 F14 F15 F16  
 F13 F14 F15 F16

CANCEL

|         |   |   |   |   |   |   |   |   |   |     |        |
|---------|---|---|---|---|---|---|---|---|---|-----|--------|
| 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | DEL | BS     |
| ~       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0   | DEL    |
| Tab     | Q | W | E | R | T | Y | U | I | O | P   | { }    |
| CapLock | A | S | D | F | G | H | J | K | L | ;   | Return |
| Shift   | Z | X | C | V | B | N | M | < | > | ?   | Shift  |

|     |      |       |     |
|-----|------|-------|-----|
| ESC | Ctrl | SPACE | Alt |
|-----|------|-------|-----|

|      |        |      |      |
|------|--------|------|------|
| Find | Insert | Home | Left |
| EXEC | DEL    | HOME | HOME |

|     |     |     |       |
|-----|-----|-----|-------|
| PF1 | PF2 | PF3 | PF4   |
| +   | -   | *   | TRIM  |
| 7   | 8   | 9   | PRINT |
| 4   | 5   | 6   | ERASE |
| 1   | 2   | 3   | ENTER |
| φ   | :   | :   | ENTER |

# 286DW Keyboard Mapping for VT220 Emulation

means not implement currently but under implementation.

To:

Subject: 2636 terminal windowing

Distribution:

None, this item is In Progress

-----  
To: Mike Riley  
Subject: 2636 terminal windowing

From: Pro Chao  
Date Sent: 01/10/91

Mike

I had discussed above issues with Duncan, and we found those possible be carried out if few hardware modifications permitted ! So I have to discuss with H/W engineer Robert Hsu to verify whether the hardware can be modified or not ?! If yes, window could be implemented in one working month, including hardware debugging, if not, item 2 cannot be implemented under current H/W limitations.

Beside the window, there is still a VT220 emulation undergoing and is taking almost all my time so that window maybe later than respected in one month. However, no matter what window sequences be taken, I would like a more detail description about window functions under 2636DW.

Anyway, the sequence of Copying one page into another page confuses me that if the page size is different to each other then what action took by terminal ? Just abandon or something else ???

After I discuss with Robert Tsu, I'll tell you the result as soon as possible.

Best Regards  
Pro Chao

----- Original Memo -----  
To: Pro Chao  
Subject: 2636 terminal windowing

From: Mike Riley  
Date Sent: 01/09/91

Duncan and Pro Chao

The customer that wanted windowing on the 2200 did not like how we put the the windowing on the 2636 and the turbo together... What he wants is:

1. Put ALL the windowing on the 2636 terminal only...
2. Be able to access (read & write) to each of the 4 windows on the 2636
3. To open a window on the terminal and have ALL screen control functions (cursor movement, auto line feed, clear screen and page scrolling) only work within the limits of the window.

How can we do it .... ???

1. and 2. Use terminal command code (02 ) form.

02 0C 01 aa bb cc dd 0F open a window at (upper left corner) aa bb  
with cc rows and dd columns.

02 0C 02 aa 0F Read to page aa (aa= 01 for page 1 "CRT SCREEN")  
(aa= 02 for page 2 , aa= 03 for page 3 )  
(aa= 04 for page 4)

02 0C 03 aa 0F Write to page aa (aa= same as for read)

02 0C 04 aa bb 0F Copy aa page to bb page (aa & bb= same as read)

02 0C 05 0F Close current window and go to previous window control values.

This is just a way to control the windowing by the terminal only...

3. Can work by:

When a window is open, you take the current CRT control values put them in

a stack (maybe max of 8) and use the new control values that was given as the new CRT size... If the window is smaller than the previous screen then all outside the window will NOT change but ONLY what is in the window ... It is up to the programmer to save page 1 before a window is opened... You can have a possibility of three different pages each having windows, but only one page can be on the CRT.... cursor will always start at the upper left corner of the window as (00 00)

Do you see any major problems with the way I have lay the windows out ????  
Can we do it this way ???? How long will it take to do it this way ????

Michael Riley

Duncan

I have tested Rev. 1.1B and ALL the bugs are still their !!!! Did you give me the right O.S. file ????

----- Reply -----

Pro Chao

I have some good news on the Windowing/Pages problems....

The 02 0C 02 aa 0F should be Jump to page aa (aa= 01 for page 1, 02 for page 2  
03 for page 3, 04 for page 4

When you jump to another page, you will have to save the screen command values (left corner row & column, row count, column count, cursor row & column count).. If there are no values, row is 25, column is 80 cursor is 00 00 ...

This way we can have four pages but ONLY the current page(one on the CRT) is the one that gets up dated ....We all ready have a SCREEN READ and a SCREEN WRITE commands...

On the 02 0C 01 aa bb cc dd 0F command, if aa bb cc dd is all 00 then that can be the same as close window....You will restore row count to 25 and column to 80 and cursor to 00 00....

Dose this look any better, and with out a hardware change ????

michael Riley

\*\*\*\*\*  
\* VT220 Emulation Feature of 2636DW \*  
\* by \*  
\* Pro Chao \*  
\*\*\*\*\*

This description explains mainly the new feature of VT220 Emulation mode which added by Pro Chao. It consists of two parts: the codes received by terminal and the codes sent by terminal, also it includes the keyboard action internally.

VT220 emulation would support not only 8-bit but also 7-bit environment for using 2636DW terminal and would support almost all VT220 terminal functions except few screen functions (because of hardware limitations).

Following explanations are going to describe how to use the new VT220 Emulation feature step by step.

@ How to invoke and enter into VT220 Emulation mode:

After 2636DW's normal boot-up sequence as old 2536DW, you could enter VT220 emulation mode by pressing Alt+Help keys simultaneously. At this time, the screen should be cleared, cursor home and current status displayed on bottom line (row#24).

The same is true that you also could back to 2200 System for normal operations under using 2636DW on 2200.

Current communication settings are fixed and same as 2536DW, including the baud rate, parity and data bits, etc,. Later, there will be a setup menu to let user update the settings locally.

Note: The RS232 cable connector should also be re-connect to proper cable when entering the other mode.

@ 2636DW's Keyboard Mapping:

The diagram shows the mapping relation between 720 and VT220 keyboards. See the appended page 1.

@ 2636DW's Keyboard Actions:

This section explains what action be taken for pressing key(s).

The keyboard devides keys into four main parts: main keys, function keys, cursor keys and numeric keypads. Each part has different function and different codes sent to host/application.

Main keys except some special keys such like Ctrl key, L/R Shift keys, CapsLock key and Alt key, etc. have normal actions as standard terminal has. It sends the corresponding ASCII code to the host/application.

In the following all descriptions, each code is expressed in hexadecimal digits except indicated specially.

Function keys also devided into two parts: Local function keys and Normal function keys.

@ Local function key commands:

|    |                   |    |                                           |
|----|-------------------|----|-------------------------------------------|
|    | Ctrl + Prev       | := | Home Cursor and Clear Screen              |
|    | Ctrl + Next       | := | Clear from Cursor to End of Page          |
|    | Ctrl + R-Arrow    | := | Turn Local Status Line Display On/Off     |
| *  | Ctrl + L-Arrow    | := | Turn Controls Display Mode On/Off         |
|    | Ctrl + Enter      | := | Turn Keyclick On/Off                      |
|    | F1                | := | Turn Hold Screen Mode On/Off <sup>1</sup> |
|    | F2                | := | Print Page                                |
|    | Ctrl + F2         | := | Turn AutoPrint Mode On/Off                |
|    | Shift + F2        | := | Turn Controller Print Mode On/Off         |
|    | F3                | := | Enter terminal into Setup Mode            |
| ** | Shift + F3        | := | Soft Terminal Reset                       |
| ** | Ctrl + Shift + F3 | := | Hard Terminal Reset                       |
|    | F4                | := | Turn Local Mode On/Off                    |
|    | F5                | := | Send BREAK Signal to Host                 |

---

1. When XON/XOFF handshaking is enabled.

2. If terminal is in On-Line mode and Break Key setup parameter set ON

=====

@ Top function keys:

| Fn Key* | 7-bit            | 8-bit         |
|---------|------------------|---------------|
| F6      | ESC 5B 31 37 TLD | CSI 31 37 TLD |
| F7      | ESC 5B 31 38 TLD | CSI 31 38 TLD |
| F8      | ESC 5B 31 39 TLD | CSI 31 39 TLD |
| F9      | ESC 5B 32 30 TLD | CSI 32 30 TLD |
| F10     | ESC 5B 32 31 TLD | CSI 32 31 TLD |
| F11     | ESC 5B 32 33 TLD | CSI 32 33 TLD |
| F12     | ESC 5B 32 34 TLD | CSI 32 34 TLD |
| F13     | ESC 5B 32 35 TLD | CSI 32 35 TLD |
| F14     | ESC 5B 32 36 TLD | CSI 32 36 TLD |
| Help    | ESC 5B 32 38 TLD | CSI 32 38 TLD |
| Do      | ESC 5B 32 39 TLD | CSI 32 39 TLD |
| F17     | ESC 5B 33 31 TLD | CSI 33 31 TLD |
| F18     | ESC 5B 33 32 TLD | CSI 33 32 TLD |
| F19     | ESC 5B 33 33 TLD | CSI 33 33 TLD |
| F20     | ESC 5B 33 34 TLD | CSI 33 34 TLD |

\* No codes sent when key shifted.

Note: ESC is 1B, CSI is 9B and TLD is 7E hexadecimal,  
Others are also expressed hexadecimally.

=====

@ Codes generated by Cursor Keys:

| Key         | VT220      |
|-------------|------------|
| FIND        | CSI 31 TLD |
| INSERT      | CSI 32 TLD |
| REMOVE      | CSI 33 TLD |
| SELECT      | CSI 34 TLD |
| PREV SCREEN | CSI 35 TLD |
| NEXT SCREEN | CSI 36 TLD |

| Cursor Key  | Normal Mode | Application Mode |
|-------------|-------------|------------------|
| Left-Arrow  | CSI 41      | SS3 41           |
| Down-Aroow  | CSI 42      | SS3 42           |
| Right-Arrow | CSI 43      | SS3 43           |
| Up-Arrow    | CSI 44      | SS3 44           |

Note: SS3 is hexadecimal 8F.

=====

@ Codes generated by Numeric Keypad Keys:

| Keypad Key | Numeric Mode                                | Application Mode |
|------------|---------------------------------------------|------------------|
| 0          | 30                                          | SS3 70           |
| 1          | 31                                          | SS3 71           |
| 2          | 32                                          | SS3 72           |
| 3          | 33                                          | SS3 73           |
| 4          | 34                                          | SS3 74           |
| 5          | 35                                          | SS3 75           |
| 6          | 36                                          | SS3 76           |
| 7          | 37                                          | SS3 77           |
| 8          | 38                                          | SS3 78           |
| 9          | 39                                          | SS3 79           |
| -          | 2D                                          | SS3 6D           |
| ,          | 2C                                          | SS3 6C           |
| .          | 2E                                          | SS3 6E           |
| Enter      | CR                                          | SS3 4D           |
|            | or CR LF (depends on LineFeed/NewLine mode) |                  |
| PF1        | SS3 50                                      | SS3 50           |
| PF2        | SS3 51                                      | SS3 51           |
| PF3        | SS3 52                                      | SS3 52           |
| PF4        | SS3 53                                      | SS3 53           |

=====

@ Keys used with Ctrl key to generate 7-bit Control Characters:

| Key pressed with Ctrl key | Ctrl Mnemonic | Code |
|---------------------------|---------------|------|
| 2, Space                  | NUL           | 00   |
| A                         | SOH           | 01   |
| B                         | STX           | 02   |
| C                         | ETX           | 03   |
| D                         | EOT           | 04   |
| E                         | ENQ           | 05   |
| F                         | ACK           | 06   |
| G                         | BEL           | 07   |
| H                         | BS            | 08   |
| I                         | HT            | 09   |
| J                         | LF            | 0A   |
| K                         | VT            | 0B   |

--- be continued ---



|              |                  |     |
|--------------|------------------|-----|
|              | --- continue --- |     |
| L            | FF               | 0C  |
| M            | CR               | 0D  |
| N            | SO               | 0E  |
| O            | SI               | 0F  |
| P            | DLE              | 10  |
| Q            | DC1              | 11* |
| R            | DC2              | 12  |
| S            | DC3              | 13* |
| T            | DC4              | 14  |
| U            | NAK              | 15  |
| V            | SYN              | 16  |
| W            | ETB              | 17  |
| X            | CAN              | 18  |
| Y            | EM               | 19  |
| Z            | SUB              | 1A  |
| 3, L-Bracket | ESC              | 1B  |
| 4, /         | FS               | 1C  |
| 5, R-Bracket | GS               | 1D  |
| 6, TLD       | RS               | 1E  |
| 7, ?         | US               | 1F  |
| 8            | DEL              | 7F  |

-----

\* These keystrokes are enabled only if XOFF support is disabled. If XOFF is enabled, then Ctrl+S is a "Hold Screen" local function and Ctrl+Q is an "UnHold Screen" local function.

=====

The above description is mainly concentrated in the part of codes which generated by keyboard and sent to host/application.

The last but not the least that this document IS NOT the final version. There is another part that describes the codes received and the actions took by terminal.

# CS/386 PROBLEMS

STEVE SHOESMITH - INTERMITTENTLY CERTAIN PARTITIONS  
WILL CAUSE THE CRT SCREEN TO BE IMPROPERLY  
SETUP & DATA WILL BE ALL OVER THE PLACE & NOT  
WHERE IT SHOULD BE.

8/16 WILL TRY TO ISOLATE

RCM WHEN COPIES A PROGRAM IN NEW FORMAT PUTS  
1<sup>ST</sup> BYTE BACK IN OLD FORMAT. PROGRAM WILL LOAD  
BUT IF LIST WILL BLOW O/S.

8/21 JOHN BAXI CORRECTING RCM

BRIAN WEIR

MBTA POLICE

ON 1 PARTITION A PARTICULAR PROGRAM FAILS CONSISTENTLY.

8/21 SENT 1.1t

FIXED w/ 1.1t

8/29

TODD ANDREWS 603-448-5110

TRANSIST LEBANON, N.H.

1. ON CS/386, CAN MORE THAN 1 SPACE BE PRESERVED BETWEEN LINE # & COMMAND?
2. WILL MXE OR MXF SUPPORT 10 BIT PROTOCOL FOR REMOTE TERMINALS AS 11 BIT MODEMS ARE BECOMING SCARCE?
3. 3278 EMULATION S/W PKG. IS <sup>3278</sup> THE SAME AS 3277 W/S? CUST. TO FIND OUT WHAT 3278 IS.

PE S/W 3278 MODEL 2 DISPLAY STATION  
3279 MODEL 2A DISPLAY STATION

# WOLLASTON TURBO PROBLEMS

1. POWER ON PROBLEM. FAILS INTERMITTENTLY TO START.  
MEM DIAGS ON SCREEN: LED ON MXF USUALLY STAYS ON 5-10 SEC WHEN FAILS. ONLY 3 SEC WHEN WORKS. TRIED 2 MXFS.  
\* EITHER BOTH MXFS FLAKY OR PROB W/ NEW MBRD.

2. PORTS 5 & 13 SENSITIVE TO POWER ON/OFF.

\* APPEARS TO BE DUE TO 2 W/S IN FOUNDARY ON NON-WANG CABLES. THESE PORTS ON BOTH MXFS ARE SENSITIVE. OTHER PORTS SEEM OK.

3. CDSTAPEB FAILS WITH "TAPE COMMAND ERROR"  
AFTER PUTTING IN DISK ADDRESS, BELIEVE ON ERASE.  
\* O/S BUG MOST LIKELY.

4. WITH MXF & MXD BOTH INSTALLED AT SAME TIME, LED ON CPU DERR WON'T GO OUT. TRIED 2 MXDs. MXD COMES UP OK WITH MXF OUT. AS 1<sup>ST</sup> BR.  
\* COMPATIBILITY PROB W/ MXF & MXD?

OTHER TURBO ?

1. KEYS SLOW TO RESPOND.

RUN GMAIAN

2. ~~DOES~~ IS RUNNING > 16 MEG CPU RAM DISK WORKING ?

3. ARE THE MXF PORTS FUNCTIONING FOR TC ?

4. CABLE TROUGH FOR OCTOPUS. WALL MOUNT.

EQUITY INDUSTRIES, VIRGINIA BEACH, VA K&R Custom S/W

LEE RIVERS

TOM REESE 804-595-5400

5/20 TURBO <sup>WAS</sup> ~~BEEN~~ RUNNING FINE SINCE SHUTTING SELECT H OFF  
(1.07) & PUTTING 2273 ON OLD BUS. NO PROBLEM FOR OVER  
A WEEK.

MOVED 2273 TO HS PRINTER PORT & GET A HANG  
ON A TC PROGRAM <sup>G10?</sup> (3270 EMULATION) & INTERMITTENTLY ON  
1 PARTICULAR PRINT JOB WHERE BELIEVES YFU CODE IS BEING  
DOWNLOADED. DOES NOT BLOW O/S BUT CAN NO LONGER ACCESS  
DISK ON SAME CONTROLLER. IF POWER DS OFF & ON CAN  
RESUME WORKING.

PUT DISK & PRINTER ON SEPARATE HS CONTROLLERS AND  
NOW RUNNING OK WHERE WAS FAILING CONSISTENTLY BEFORE.  
PROGRAMMER TO TRY TO GET US G10 COMMAND OR PROGRAM  
WHICH SEEMED TO BE INVOLVED WITH BOTH HANGS.

SINCE THE LAST TIME WE WROTE TO YOU WE HAVE BEEN VERY BUSY

[illegible][illegible]

\_\_\_\_\_ (1994. 12. 15) 0084027

CONFIDENTIAL

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[illegible]

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses for all groups. The number of correct responses was significantly higher than the number of incorrect responses for all groups. The number of correct responses was significantly higher than the number of incorrect responses for all groups.

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Report of the Committee on the Administration of the Court

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Figure 1. The effect of the number of nodes on the number of iterations required to reach the optimal solution for the 1000 nodes problem.

[illegible]

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was plotted against the number of trials for each condition. The number of correct responses increased with the number of trials for all conditions. The number of correct responses was highest for the condition with the highest number of trials (10 trials) and lowest for the condition with the lowest number of trials (2 trials).

Figure 1. The effect of the number of iterations on the accuracy of the proposed algorithm. The accuracy of the proposed algorithm increases with the number of iterations. The accuracy of the proposed algorithm is 100% when the number of iterations is 100.

[illegible]

1. *Journal of Management Studies*, 1996, 33, 1, 1-14.

1000

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| 81   | 81          | Page 81    | Page 81      |
| 82   | 82          | Page 82    | Page 82      |
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| 84   | 84          | Page 84    | Page 84      |
| 85   | 85          | Page 85    | Page 85      |
| 86   | 86          | Page 86    | Page 86      |
| 87   | 87          | Page 87    | Page 87      |
| 88   | 88          | Page 88    | Page 88      |
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HUTCHISON PAGING

PTR C9/6920

TURBO, 2 2275MUX, 2 DS

1. POWER ON CPU - NO ACCESS TO 320 (HANG), NO ACCESS TO 330 (HANG)

POWER OFF DS 320 & ON - BOOT OK FROM 320

LISTDCT/D31 HANGS RESET & OK

\$INIT"SYSTEM" NO PROBLEM

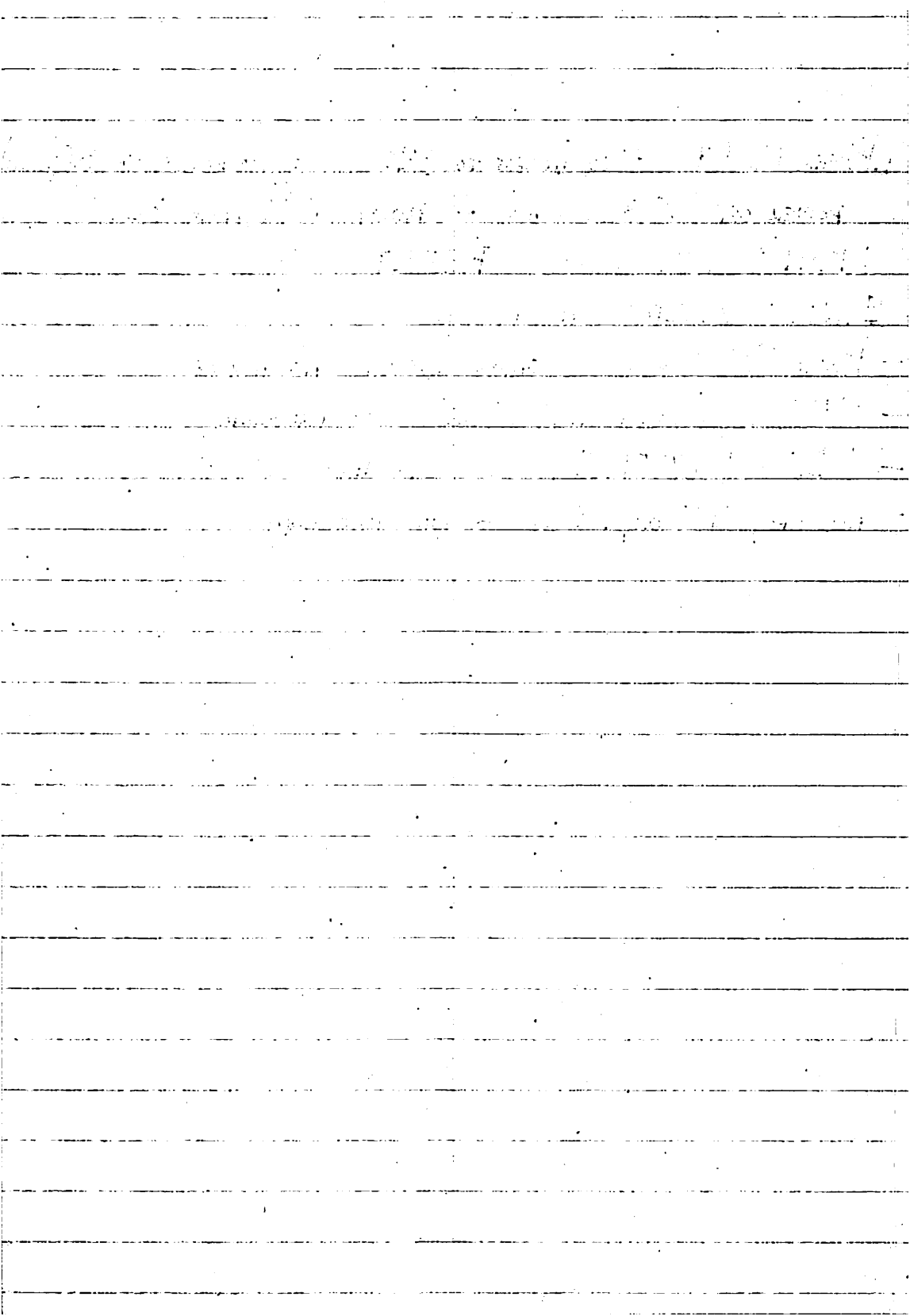
- POWER CPU OFF & ON - SAME RESULTS AS ABOVE

- CPU ON, POWER BOTH DS ON - NO PROBLEMS

- 1 DS & 1 2275MUX. CPU ON. HANG

- ALL OFF, CPU ON, DS ON - NO PROBLEM





# SELECT PRINT 405 . FIX

ADD TO REL NOTES COPY COMMAND WILL NOT  
EXCEPT ADDRESSES ABOVE 65534. FIXED ON 1.30.01

MOVE 2275 VERIFY BUG FROM PHASE 1 TO  
22C11-HS BUG LIST.

1.30.01

DS R4 PROM WING w/ 199999 SECTORS USING 22C11-HS  
3 OFF VERIFY/D21, (0, 65534) ✓  
VERIFY/D21, (0, 65535) ✓  
VERIFY/D24, (0, 65536) P34

SCSI 3 OFF 75000 SECTORS D35

SAME RESULTS AS ABOVE

DS R4 PROM 3 ON HS CONT

STANDARD DISK CONT

VERIFY/D21, (0, 65534) ✓

✓

VERIFY/D21, (0, 65535) ✓

VERIFY/D21, (0, 199999) ✓

VERIFY/D21, (0, 200,000) ✓ ?  
200,001) ✓

✓

SCSI 3 ON

VERIFY/D35 (0, 65534)

IF AFTER (0, 75000)

ERROR IN 75001

IF AFTER (0, 75000)

VERIFY/D35 (0, 65535)

ERROR IN 75000

(0, 75000)

ERROR IN 75001

# 2200 CS386 HISTORY FILE

(+131)

Version A0 1.25.00 05MAY93

This was based on the version brought back from Taiwan and discovered to be identical to Release 1.18Q

Cosmetic changes only -

|          |         |        |
|----------|---------|--------|
| M_HEAD   | renamed | HEAD   |
| M_GLOBAL | renamed | GLOBAL |
| M_MATH   | renamed | MATH   |
| M_DOS    | renamed | DOS    |
| M_END    | renamed | END    |

Various include files in module MATH incorporated into main code

Version B0 1.29.00 05MAY93

This was based on version A0

Cosmetic changes -

|        |         |      |
|--------|---------|------|
| GLOBAL | renamed | GLOB |
| M05    | renamed | DEVS |
| M07    | renamed | EXPR |
| M41    | renamed | DATA |
| M42    | renamed | PROG |
| DOS    | renamed | DOSS |
| END    | renamed | TAIL |

Replace common preamble and two include files by single include file PREAMBLE in following modules -

HEAD DEVS EXPR DATA PROG DOSS TAIL

Version B1      1.29.01      12JUL93

This was based on version B0

Fixes

- B01A -      M41/10576   M41/11192   -   DEVS  
         Subroutine SRCHPLT returned random response on a device  
         which does not support platter hogging
- B01B -      M2/20092   -   PROG  
         LOAD - NEW format - Wrap mode - Not zeroising extra bytes  
         when expanding small constants
- B01C -      Not reported   -   EXPR  
         Testing for Operand Stack Overflow - JA instead of JE
- B01D -      M8/20511   -   M01   PROG  
         Fix bug of not clearing the resave flag if error occurs

Version B2      1.29.02      23AUG93

This was based on version B1

Cosmetic changes -

|     |         |      |
|-----|---------|------|
| M02 | renamed | SNTX |
| M03 | renamed | RUNS |
| M09 | renamed | ARAY |
| M17 | renamed | PACK |
| M18 | renamed | CARD |
| M23 | renamed | RNUM |
| M24 | renamed | CRYP |
| M25 | renamed | GIOS |
| M27 | renamed | LIST |

Replace common preamble and two include files by single include file  
PREAMBLE in remaining modules -

Fixes

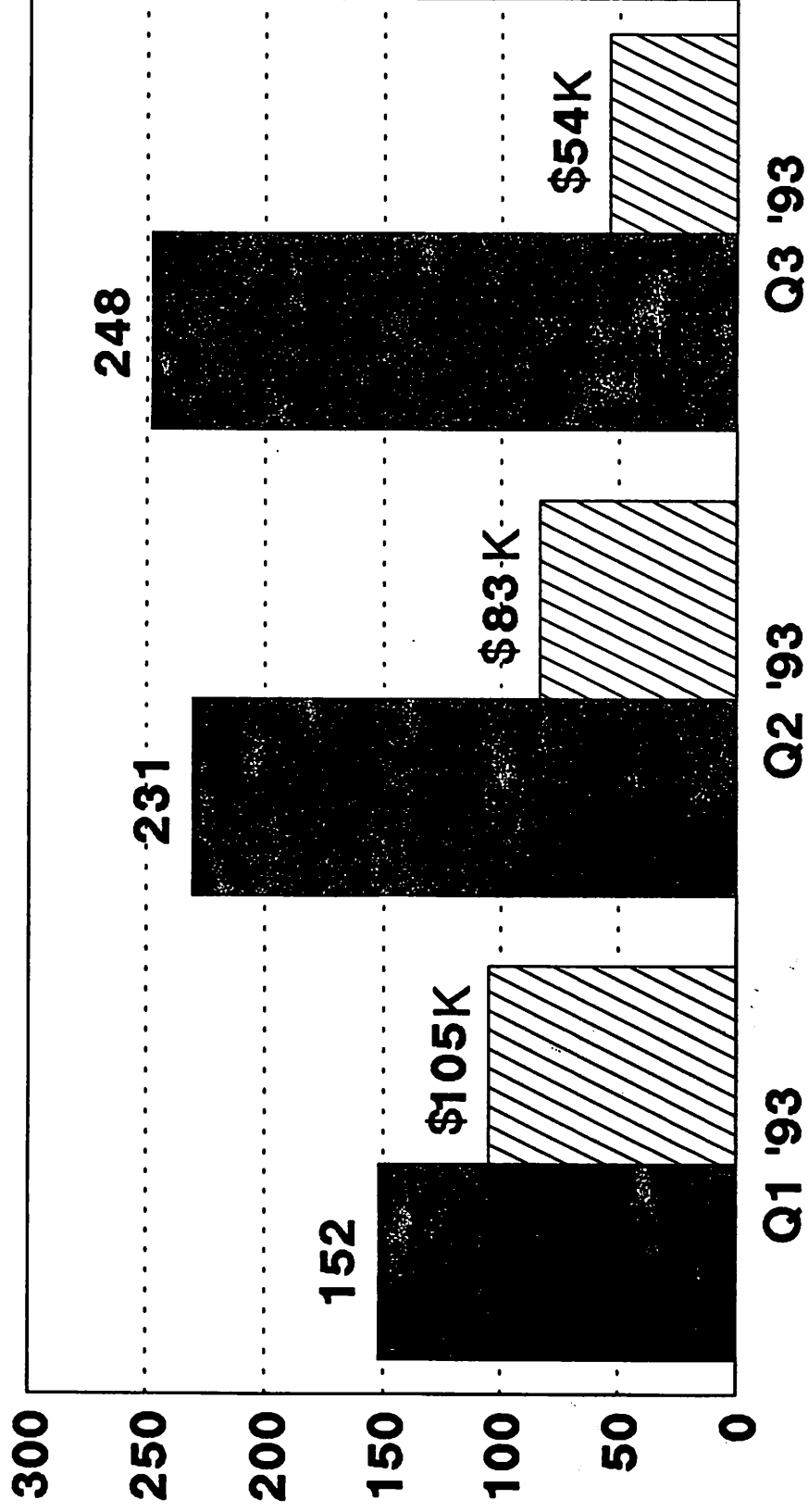
- B02A -      M2/17416   -   GLOB  
         Increase size of stack so that expression analysis can  
         never blow the stack
- B02B -      M2/17599   -   M01  
         Do not clear the Select old/ new flag in CLEAR

# 2200 PRODUCT LINE REVIEW

- LEADTIME OBJECTIVE IS 4-14 WEEKS ON ACTIVE PRODUCTS
- Q4 DEMAND PLAN = \$123.8K OR 292 UNITS REFLECTS 21% GROWTH FROM Q3
- Q4 LOAD (QTD SHIPS & ORDERS) = 5%
- TOP 2200 RELATED EXCESS INVENTORY = \$400K

# 2200 PRODUCT LINE REVIEW

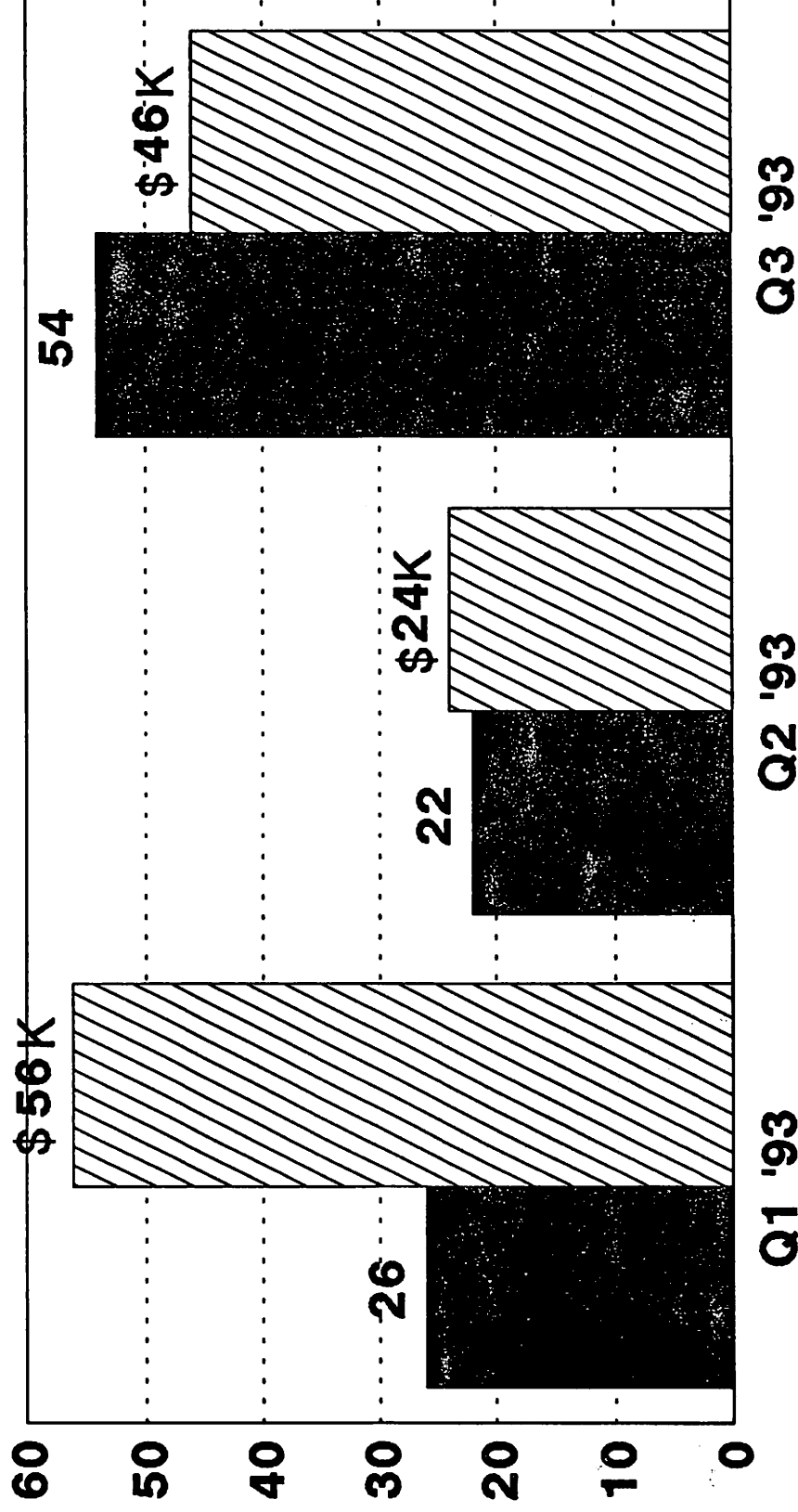
Total Historical Shipments: Units/\$



■ UNITS ▨ \$ IN THOUSANDS

# 2200 PRODUCT LINE REVIEW

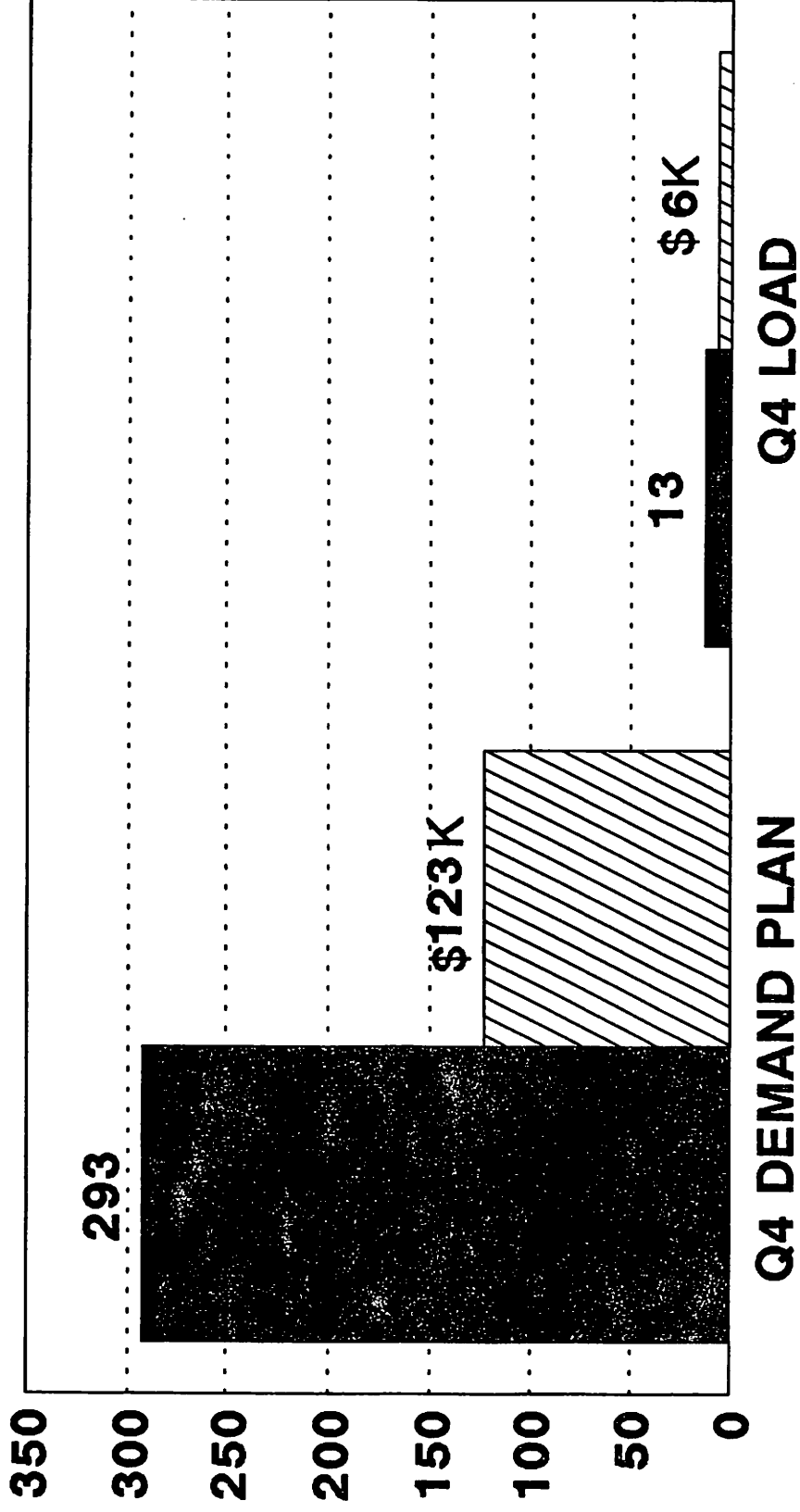
## Systems Historical Shipments



■ UNITS    ▨ \$ IN THOUSANDS

# 2200 PRODUCT LINE

## Current Activity



■ UNITS ▨ \$ IN THOUSANDS



# HISTORICAL ACTIVITY

| MSP<br>NUMBER |                              | Fiscal Week =  |             |          |             |          |             |          |
|---------------|------------------------------|----------------|-------------|----------|-------------|----------|-------------|----------|
|               |                              | Demand Weeks = |             |          |             |          |             |          |
|               |                              | Supply Weeks = |             |          |             |          |             |          |
|               |                              | ADP Weeks =    |             |          |             |          |             |          |
| PART #        | DESCRIPTION                  |                | q1<br>ships | q1<br>\$ | q2<br>ships | q2<br>\$ | q3<br>ships | q3<br>\$ |
| 1573548       | !CS/386-400N 4MB CS/386      | !              | 4           | \$11,316 | 1           | \$2,829  | 0           | \$0      |
| 1573549       | !CS/386-800N 8MB CS/386      | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1573550       | !CS/386-1600N 16MB CS/386    | !              | 1           | \$3,181  | 0           | \$0      | 0           | \$0      |
| 1573551       | !CS/386-3200 32MB CS/386     | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 16722V877F    | !2247V-4POST MODEM SHARING   | !              | 0           | \$0      | 0           | \$0      | 22          | \$15,741 |
| 1673512       | !DS-DATA STORAGE CABINET     | !              | 7           | \$10,720 | 1           | \$1,531  | 0           | \$0      |
| 1673528       | !CS-5D 512K CS CPU W/DPU     | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1673534       | !CS-5N 512K CS CPU W/O DPU   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1673539       | !CS/386-10N, 1MBYTE, CPU, NO | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1673540       | !CS/386-20N 2MBYTE CPU, NO   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1673543       | !CS/386-10D 1MBYTE CPU       | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1673544       | !CS/386-20D 2MBYTE CPU       | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1679495       | !OIS-6554 6554 EXTERNAL      | !              | 0           | \$0      | 0           | \$0      | 4           | \$4,131  |
| 1773548       | !CS/386-400N 4MB CS/386      | !              | 5           | \$14,143 | 0           | \$0      | 0           | \$0      |
| 1773549       | !CS/386-800N 8MB CS/386      | !              | 3           | \$8,847  | 0           | \$0      | 1           | \$2,949  |
| 1773550       | !CS/386-1600N 16MB CS/386    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 1773551       | !CS/386-3200 32MB CS/386     | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 18722V877F    | !2247V-4POST MODEM SHARING   | !              | 0           | \$0      | 5           | \$3,566  | 12          | \$8,558  |
| 1873512       | !DS-DATA STORAGE CABINET     | !              | 3           | \$4,593  | 2           | \$3,062  | 0           | \$0      |
| 1879495       | !OIS-6554 6554 EXTERNAL      | !              | 3           | \$2,910  | 13          | \$12,611 | 15          | \$14,551 |
| 2002650       | !2236MXF-CABLE 7-PORT CBL    | !              | 0           | \$0      | 3           | \$357    | 7           | \$833    |
| 2002691       | !2236MXF 16PORT TERMINAL     | !              | 14          | \$9,620  | 7           | \$4,810  | 6           | \$4,123  |
| 2002692       | !22C11-HS HIGH-SPEED PTR/    | !              | 14          | \$6,575  | 3           | \$1,409  | 1           | \$470    |
| 2006006       | !MICROVP-TURBO TURBO UPG     | !              | ?           | \$0      | 2           | \$2,751  | 0           | \$0      |
| 2006007       | !CS-D-TURBO TURBO UPGRADE    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2006008       | !CS-N-TURBO TURBO UPGRADE    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2006009       | !CS-TURBO TURBO UPGRADE      | !              | 4           | \$5,492  | 0           | \$0      | 2           | \$2,746  |
| 2056067       | !UJ-6067 4MB TO 8MB MEMORY   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2056068       | !UJ-6068 4MB TO 16MB MEMRY   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2056069       | !UJ-6069 4MB TO 32MB MEMRY   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2056070       | !UJ-6070 8MB TO 16MB MEMRY   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2056071       | !UJ-6071 8MB TO 32MB MEMRY   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2056072       | !UJ-6072 16MB TO 32MB MEM    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2066060       | !UJ-6060 8MB CPU/MOTHER      | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2066061       | !UJ-6061 16MB CPU/MOTHER     | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2790555       | !RS 232 TCP INTERNAL CABLE   | !              | 30          | \$1,952  | 49          | \$3,188  | 53          | \$3,449  |
| 2790556       | !RS 366 TCP INTERNAL CABLE   | !              | 2           | \$142    | 21          | \$1,490  | 5           | \$355    |
| 2790557       | !RS 232 OIS INTERNAL CABLE   | !              | 0           | \$0      | 0           | \$0      | 1           | \$86     |
| 2890000       | !22C80 DISK CONTROLLER       | !              | 3           | \$585    | 3           | \$585    | 0           | \$0      |
| 2890017       | !22C11 PCA PTR/DISK CNTLR    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2890032       | !22C32 TRIPLE CNTLR          | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2890128       | !2227B BUFFERED ASYNCH COM   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2890157       | !2236MXE 4PORT TERMINAL CN   | !              | 16          | \$5,144  | 16          | \$5,144  | 0           | \$0      |
| 2890159       | !TCB-3 64K BD 7963-A/7962-   | !              | 3           | \$1,719  | 25          | \$14,324 | 49          | \$28,074 |
| 2890173       | !TCB 128 BD ASSY 7936-A/79   | !              | 4           | \$1,752  | 29          | \$12,705 | 10          | \$4,381  |
| 2890190       | !6554 FR & RR PNL ASSY       | !              | 10          | \$1,831  | 43          | \$7,873  | 56          | \$10,253 |
| 2890196       | !FR & RR PNL ASSY OIS40/50   | !              | 0           | \$0      | 0           | \$0      | 1           | \$135    |
| 2890185       | !UJ-5056 128K TO 512K 2200   | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |
| 2890847       | !DS 1.2MB FLPY DSKT DR       | !              | 10          | \$1,078  | 3           | \$323    | 0           | \$0      |
| 2890849       | !DS20 20MB FXD WIN DSK DR    | !              | 0           | \$0      | 0           | \$0      | 0           | \$0      |

# HISTORICAL ACTIVITY

| DMSP    | N                         | Fiscal Week = 11  |             |          |             |          |             |          |  |
|---------|---------------------------|-------------------|-------------|----------|-------------|----------|-------------|----------|--|
| INV     | Y                         | Demand Weeks = 39 |             |          |             |          |             |          |  |
|         |                           | Supply Weeks = 3  |             |          |             |          |             |          |  |
|         |                           | ADP Weeks = 3     |             |          |             |          |             |          |  |
| PART #  | DESCRIPTION               |                   | q1<br>ships | q1<br>\$ | q2<br>ships | q2<br>\$ | q3<br>ships | q3<br>\$ |  |
| 2890850 | !DS32 32MB FXD WIN DSK DR | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890851 | !DS64 64MB FXD WIN DSK DR | !                 | 9           | \$5,475  | 1           | \$608    | 1           | \$608    |  |
| 2890934 | !DS140MB FX0 WIN DSK DR   | !                 | 7           | \$7,394  | 4           | \$4,225  | 0           | \$0      |  |
| 2890955 | !CS MEM UPGRADE 4MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890956 | !CS MEM UPGRADE 2MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890957 | !CS MEM UPGRADE 2MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890958 | !CS MEM UPGRADE 1MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890959 | !CS MEM UPGRADE 1MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890960 | !CS MEM UPGRADE 1MB TO    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890961 | !CS MEM UPGRADE 512KB TO  | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890962 | !CS MEM UPGRADE 512KB TO  | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890963 | !CS MEM UPGRADE 512KB TO  | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2890964 | !CS MEM UPGRADE 512KB TO  | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891820 | !CS-N TO CS-D UPGRADE     | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891841 | !VLSI TO 1MB CS/386       | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891843 | !VLSI TO 4MB CS/386       | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891844 | !VLSI TO 8MB CS/386       | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891845 | !1MB-2MB CS386 MEM UPG    | !                 | 0           | \$0      | 0           | \$0      | 2           | \$170    |  |
| 2891846 | !1MB-4MB CS386 MEM UPG    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891847 | !1MB-8MB CS386 MEM UPG    | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891848 | !2MB-4MB CS/386 MEM UPG   | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891849 | !2MB-8MB CS/386 MEM UPG   | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| 2891850 | !4MB-8MB CS/386 MEM UPG   | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |
| XXXXXX  | !                         | !                 | 0           | \$0      | 0           | \$0      | 0           | \$0      |  |

|         |     |           |     |          |     |           |
|---------|-----|-----------|-----|----------|-----|-----------|
| Total   | 152 | \$104,470 | 231 | \$83,392 | 248 | \$101,612 |
| 167/187 | 26  | \$55,710  | 22  | \$23,599 | 54  | \$45,930  |

**PC15M 15**

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## CURRENT ACTIVITY - Summary

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**M E M O**

**To: Dave Norton**

**From: Mike Bahia**

**Subject: 2200 Active Products**

**Date: March 5, 1993**

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As per our conversation please insure all products listed on the following pages are set to a 4 to 14 week lead time. The models that have extended information beyond the description are already within this time frame. Those products with only the description shown are either at 52 week lead time or were not found on the listing you previously had sent to me.

At this time Steve Bergmann of Marketing is talking with outside sources who may be interested in marketing and/or purchasing some or all of the 2200 line. Should certain products be out at a 52 week lead time, it could negatively affect these talks. This situation should be resolved within the next 90 days. Once this matter is settled a forecast can be planned. Steve will probably be handling the forecast.

Your prompt attention to this matter would be greatly appreciated. If there are any questions or concerns please do not hesitate to contact me. Thanks for your help.

Regards,  
Mike Bahia  
2200 Product Support  
x60256

cc: Steve Bergmann  
Pat Couillard  
Peter Crenier  
Gene Roy

CPU's

Disks

Tape

Workstations

Controller

Upgrades

**PART # DESCRIPTION**

|          |                              |
|----------|------------------------------|
| 11573548 | ICS/386-400N 4MB CS/386      |
| 11573549 | ICS/386-800N 8MB CS/386      |
| 11573550 | ICS/386-1600N 16MB CS/386    |
| 11573551 | ICS/386-3200 32MB CS/386     |
| 11673512 | IDS-DATA STORAGE CABINET     |
| 11773548 | ICS/386-400N 4MB CS/386      |
| 11773549 | ICS/386-800N 8MB CS/386      |
| 11773550 | ICS/386-1600N 16MB CS/386    |
| 11773551 | ICS/386-3200 32MB CS/386     |
| 11873512 | IDS-DATA STORAGE CABINET     |
| 12002650 | 12236MXF-CABLE 7-PORT CBL    |
| 12002991 | 12236MXF 16PORT TERMINAL     |
| 12002992 | 122C11-HS HIGH-SPEED PTR/    |
| 12006007 | ICS-D-TURBO TURBO UPGRADE    |
| 12006008 | ICS-N-TURBO TURBO UPGRADE    |
| 12006009 | ICS-TURBO TURBO UPGRADE      |
| 12890847 | IDS 1.2MB FLPY DSKT DR       |
| 12890849 | IDS20 20MB FXD WIN DSK DR    |
| 12890850 | IDS32 32MB FXD WIN DSK DR    |
| 12890851 | IDS64 64MB FXD WIN DSK DR    |
| 12890934 | IDS140MB FX0 WIN DSK DR      |
| 1        | ICS/386-10D 1MBYTE CPU W/DPU |
| 1        | ICS/386-10N 1MBYTE CPU, NO   |
| 1        | ICS/386-20D 2MBYTE CPU W/DPU |
| 1        | ICS/386-20N 2MBYTE CPU, NO   |
| 1        | ICS-5D 512K CS CPU W/DPU     |
| 1        | ICS-5N 512K CS CPU W/O DPU   |
| 1        | IDS-TS150 150M TAPE STREAMER |
| 1        | 12536DW WORKSTATION          |
| 1        | 12275 MUX MASTER             |
| 1        | 12275 MUX EXTENDER           |
| 1        | 122C11 PCA PTR/DISK CNTLR    |
| 1        | 122C80 DISK MUX CONTROLLER   |
| 1        | 12227B BUFFERED ASYNCH COM   |
| 1        | 12228B BISYNC TC CONTROLLR   |
| 1        | 12228C CONTROLLER TELECOMM   |
| 1        | 12228D CONTROLLER TELECOMM   |
| 1        | 12258 LCO VS INTERFACE       |
| 1        | 12236MXE 4PORT TERMINAL CN   |
| 1        | 122C32 TRIPLE CNTLR          |
| 1        | 1MICROVP-TURBO TURBO UPG     |
| 1        | 1UJ-6059 4-8MB TURBO MEM UPG |
| 1        | 1UJ-6060 4-16MB TURBO MEM UP |
| 1        | 1UJ-6061 4-32MB TURBO MEM UP |
| 1        | 1UJ-6067 4-8MB TURBO MEM ADD |
| 1        | 1UJ-6068 4-16MB TURBO MEM AD |
| 1        | 1UJ-6069 4-32MB TURBO MEM AD |
| 1        | 1UJ-6070 8-16MB TURBO MEM AD |
| 1        | 1UJ-6071 8-32MB TURBO MEM AD |



|   |                             |
|---|-----------------------------|
| 1 | UJ-6072 16-32M TURBO MEM AD |
| 1 | UJ-6047 CS-N TO D UPGADE    |
| 1 | UJ-6048 VLSI TO 386 1MB UPG |
| 1 | UJ-6049 VLSI TO 386 2MB UPG |
| 1 | UJ-6050 VLSI TO 386 4MB UPG |
| 1 | UJ-6051 VLSI TO 386 8MB UPG |
| 1 | UJ-6052 1MB TO 2MB 386 UPG  |
| 1 | UJ-6053 1MB TO 4MB 386 UPG  |
| 1 | UJ-6054 1MB TO 8MB 386 UPG  |
| 1 | UJ-6055 2MB TO 4MB 386 UPG  |
| 1 | UJ-6056 2MB TO 8MB 386 UPG  |
| 1 | UJ-6057 4MB TO 8MB 386 UPG  |
| 1 | UJ-5057 128-512K VLSI MEM   |
| 1 | UJ-5059 1MB-2MB VLSI MEM UP |
| 1 | UJ-5060 1MB-4MB VLSI MEM UP |
| 1 | UJ-5061 1MB-8MB VLSI MEM UP |
| 1 | UJ-5062 2MB-4MB VLSI MEM UP |
| 1 | UJ-5063 2MB-8MB VLSI MEM UP |
| 1 | UJ-5064 4MB-8MB VLSI MEM UP |
| 1 | UJ-5065 128K-1MB VLSI MEM   |
| 1 | UJ-5066 128K-2MB VLSI MEM   |
| 1 | UJ-5067 128K-4MB VLSI MEM   |
| 1 | UJ-5068 128K-8MB VLSI MEM   |
| 1 | UJ-5069 512K-1MB VLSI MEM   |
| 1 | UJ-5070 512K-2MB VLSI MEM   |
| 1 | UJ-5071 512K-4MB VLSI MEM   |
| 1 | UJ-5072 512K-8MB VLSI MEM   |

TOP 2200 RELATED EXCESS O/H  
TOTAL Current Excess =

\$399,928

| Part Nbr | P/C | M/B | L/T | Vnd | Description               | Unit        | O/H    | O/H INV  | 26 Week Demand | 26 Week Supply | Curr XS Qty | Curr XS Value |
|----------|-----|-----|-----|-----|---------------------------|-------------|--------|----------|----------------|----------------|-------------|---------------|
|          |     |     |     |     |                           | Cost        |        |          |                |                |             |               |
| 2790873  | 69  | 1   | 5   |     | CABINET ASSY CS-DIN       | \$1087.8996 | 67     | \$72,889 | 1              | 0              | 66          | \$71,801      |
| 4210181  | CR  | 2   | 75  |     | OCTOPUS D-STYLE 36P M TO  | \$77.6100   | 179    | \$13,892 | 4              | 0              | 175         | \$13,582      |
| 3775223  | L4  | 2   | 50  |     | SOJ 1MX1 CMOS DRAM 70NS ( | \$3.2000    | 5,034  | \$16,109 | 1,896          | 0              | 3,138       | \$10,042      |
| 3774533  | L4  | 2   | 50  |     | SIMM 1MX9 CMOS DRAM LDLS  | \$28.6000   | 2,856  | \$81,682 | 2,518          | 0              | 338         | \$9,667       |
| 6510205  | I5  | 2   | 45  |     | GROMMET NYLATCH .19-21PN  | \$0.4600    | 18,267 | \$8,403  | 112            | 0              | 18,155      | \$8,351       |
| 6560145  | I5  | 2   | 62  |     | SHLD GSKT RECT .13 X .19  | \$0.9221    | 17,393 | \$16,038 | 10,529         | 0              | 6,864       | \$6,329       |
| 3775336  | 59  | 2   | 83  |     | PGA 82385 32BIT CACHE     | \$176.2000  | 30     | \$5,286  | 0              | 0              | 30          | \$5,286       |
| 6503135  | I5  | 2   | 60  |     | SCR 6-32 3/8L PANEL PHL S | \$0.4678    | 12,523 | \$5,858  | 1,379          | 0              | 11,144      | \$5,213       |
| 2790921  | H6  | 2   | 60  |     | CS-D/N CAB SUB ASSY (VEN) | \$240.2200  | 20     | \$4,804  | 0              | 0              | 20          | \$4,804       |
| 5109579  | 26  | 1   | 28  |     | 386 MASTER I/O CONTROLLER | \$75.7240   | 62     | \$4,695  | 0              | 0              | 62          | \$4,695       |
| 3771155A | CK  | 2   | 45  |     | IC PAL20R6(AMD) 7.5NS 24  | \$6.1000    | 763    | \$4,654  | 0              | 0              | 763         | \$4,654       |
| 4210030  | CR  | 2   | 70  |     | CBL ASSY MLD DSUB 25/25P  | \$18.1221   | 400    | \$7,249  | 151            | 0              | 249         | \$4,512       |
| 4585026  | CM  | 2   | 58  |     | COVER, PANEL, REAR (WELD) | \$24.8200   | 141    | \$3,500  | 1              | 0              | 140         | \$3,475       |
| 6152265  | D2  | 2   | 20  |     | LBL DOCK MERGE ID 8X3     | \$0.0883    | 41,884 | \$3,698  | 2,992          | 0              | 38,892      | \$3,434       |
| 2129720  | F6  | 1   | 15  |     | CS/386-800N CPU W/8MEG    | \$1136.6716 | 4      | \$4,547  | 1              | 0              | 3           | \$3,410       |
| 3770784  | 59  | 2   | 60  |     | IC 2010B WINCHESTER CNTR0 | \$18.1000   | 173    | \$3,131  | 0              | 0              | 173         | \$3,131       |
| 5107962  | 26  | 1   | 28  |     | PCB DLP/64-128 DAUGHTER B | \$40.3500   | 86     | \$3,470  | 10             | 0              | 76          | \$3,067       |
| 6504120  | I5  | 2   | 60  |     | SCR 8-32 3/8L PAN PHL SEM | \$0.0845    | 38,166 | \$3,225  | 3,371          | 0              | 34,795      | \$2,940       |
| 3771070  | 59  | 2   | 80  |     | IC 10C20B DATA SEPARATOR  | \$14.0800   | 182    | \$2,563  | 0              | 0              | 182         | \$2,563       |
| 5109580  | 26  | 1   | 28  |     | 386 TERMINAL SLAVE        | \$75.7240   | 32     | \$2,423  | 0              | 0              | 32          | \$2,423       |
| 40010011 | I5  | 2   | 56  |     | FAN TUBEAXIAL 115V 50/60  | \$7.6169    | 328    | \$2,498  | 10             | 0              | 318         | \$2,422       |
| 3330891  | 59  | 2   | 55  |     | RES NET 10K OHM TYPE: 10/ | \$0.0554    | 53,125 | \$2,943  | 11,205         | 0              | 41,920      | \$2,322       |
| 5107963  | 26  | 1   | 28  |     | PCB DLP/64-128 MOTHER BOA | \$42.7200   | 53     | \$2,264  | 0              | 0              | 53          | \$2,264       |

To: Mike Bahia  
From: Lucille Crist  
Subject: Monday Meeting/2200

W0000600 6FLT3  
Security: Limited  
Date 04/29/93

-----

SUBJECT: 2200 Product Line Review  
PURPOSE: Brief Bob Trottier on current 2200 status and plan.  
Discuss outstanding issues.  
When/Where: Monday May 3, 1993  
2:00 - 3:30 PM  
Conference Room 2 - T2/2f (Trottier Conf. Rm)  
AGENDA: Corporate Marketing - Steve Bergmann  
Review strategy and actions/Chap. 11 refocus  
Alternate Channels- Gordon Cohen  
Status of Magna Contract/Plan for 2200 VARS  
Manufacturing - Brian O'Connor  
Status and plan for 2200 prod. line manufacture  
Sustaining Engineering - Mike Bahia  
Status and polan for 2200 technical support  
Sust. Engineering/Maintenance - Tony Parker  
Status and plan for 2200 OS maintenance  
Customer Support - John Bucsi  
Status and plan for CSO field hardware/Software support

If you have any questions about the agenda please contact  
Steve Bergmann x76547 - or about your attendance contact  
Lucy Crist x73917

Thank you.

CC: Tony Parker W0000600 6FLT3  
From: Eugene Roy (V) Security: Limited  
Subject: 2200 fixes Date 04/05/93

---

Steven,

Its great that we were able to get a fix to the 2200. Mike Bahia has tested and it appears to work fine. Tony Parker who went to Taiwan to pick up the source code is working on bug fixes here. When we have a few fixes made we'll ship our corrections out.

There is a problem that has emerged, with the way we are proceeding: Unless the fixes Tony and Duncan are making, the two sets of fixes won't be in sync with each other.

Would it be possible (when Duncan makes fixes) to get a copy of the source changes as well as the executable?

Thanks.

Package Subject: CS/TURBO Testing Result

Item Title: Latest test results

Victor,

Have done additional testing and have found that this new O/S does fix the MUXing problem reported in PTR P2/17629. See # 8 under MUXing disks in my attached bug listing. This is the problem where if 2 Turbos are constantly accessing 2 different addresses in 2 separate disk units and hogging those addresses a hang would occur within seconds. Have been running the program in bug # 8 for half a day now. Also tested against bugs # 21 under SPECIFIC COMMAND RELATED (INPUT CURSOR) and # 29 under other (disk/terminal performance) with no change from 1.18. Do not plan any further testing at this time unless you have specific problems to test.

Best regards,

Mike

----- Next Memo -----

Item Title: Initial Testing

Victor,

Had my chance today to do some testing with the new O/S. Haven't gone too far but I did find a problem if using SCSI. Was using a 326M drive with 21 surface. The last surface was not being properly recognized. This occurred with 2 different drives on separate controllers, both drives configured the same way, 20 addresses of 65024 sectors and the last with 25722. The last address was a copy of the O/S. If listed the address, D66 or D76, would return 'Index Sectors = 00000000' instead of the proper index. No ex or current end for D66 or D76 was shown. D67 & D77 showed index size 255 & current end 39462 with no catalog max. If listed garbage would display even though this address was not defined. D68 & D78 also showed just a current end and would return I94 if listed. Will do additional testing next week. Attached is a current listing of bugs. If there are specific bugs on the list you would like me to test please let me know. As the list is quite long I would only like to test those bugs which may have been fixed. Right now I plan to only do some standard system tests as well as the problems related to those you have indicated.

Best regards,

Mike

## 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:

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. CRITICAL

## 22C11-HS HIGH SPEED PRINTER PORT:

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 $IF OFF/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 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 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

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$(16)
20 X=INT(65023*RND(1))
30 PRINTX
40 DATALOADBAT/D11,(X,L)A$()
GOTO 20
```

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

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

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:

```
10 DIM A$(16)
20 X=INT(RND(1)*65000)
30 DATALOADBAT/Dxx,(X,L)A$()
40 Y=INT (RND(1)*65000)
50 DATASAVEBAT/Dxx,(Y,L)A$():GOTO 20
```

CRITICAL

8. (5) If 2 Turbos are mux'd to 2 disk drives with at least 1 terminal on a 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

```
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
```

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

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

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

### 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.

CRITICAL

13. (6) RENAME command may corrupt disk index on a 3 byte surface. This is probably related to problem 12.

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:

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:

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.

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.

10 R\$="TEST": S\$="SCRA0000"

20 SCRATCH T R\$: SAVE DCT () R\$: ERROR GOTO 40

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 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

60 REM BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

70 REM CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

80 REM DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

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, 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

17. (7) VERIFY does not work properly with the 2275. Run the following program:

VERIFYT/Dxx,(0,0)A0: PRINT A0 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. P3

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



#### SPECIFIC COMMAND RELATED:

20. (9) If a REM% command is followed by a HEX 7D or 7E, other commands the same line following it will be ignored. This is fixed on rel 1.18Q. P1

21. (15) The INPUT CURSOR command intermittently hangs. Run following program from a 2536DW terminal. This command is not valid on older terminals.

```
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.

P2

23. (27) SELECT NEW defaults to OLD after CLEAR or LOAD RUN. Should only change by re-entering the SELECT command.

P2

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

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

#### SELECT H:

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:

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

```
10 DIMA$(16): X=INT(RND(1)*30000):DATALOADBAT/D12,(X,L)A$(): PRINT X;: GOTO 10
```

P1

#### MXF:

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:

```
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:

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)

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

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:

|                                                                                 | 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

SCSI:

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

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

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

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

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

Package Subject: CS/TURBO Testing Result

Item Title: Cover memo

Mike

Duncan said the MXF code should fixed the cursor problem, and the OS solves other bugs expecially the I92 errors. He might just want someone to QA for his OS.

Lending user's machine half day for testing, found some problems as in the attached document.

Do you find any other problems at your side, especially those in the PTR?

Regd/ Victor

Duncan

Primary testing on new OS and MXF code, found the following problems

- 1) A WS intermittently hang up with no response 2 times, but the CPU still working, have to power OFF WS and then ON to resume. Under investigation to see whether the problem cause by WS
- 2) Error when execute the following command  
  
DATA SAVE  
  
DATA SAVE AC OPEN T#1, (2000) "TESTING"  
ERR S29 @ Missing Alpha Variable
- 3) Error when execute the following command  
  
DATA SAVE AC #15, (2000) P1\$  
ERR D80 @ File not open
- 4) When 2 CPUs each with 32 partitions, executing R/W to 2 disks in background, press RESET on 1 WS repeatly and rapidly will intermittently cause disk hang in background.

Pls solve the problems ASAP

Victor / 19/3/93

CC: Tony Parker W0000600 6FLT3  
From: Eugene Roy (V) Security: Limited  
Subject: 2200 fixes Date 04/05/93

---

Steven,

Its great that we were able to get a fix to the 2200. Mike Bahia has tested and it appears to work fine. Tony Parker who went to Taiwan to pick up the source code is working on bug fixes here. When we have a few fixes made we'll ship our corrections out.

There is a problem that has emerged, with the way we are proceeding: Unless the fixes Tony and Duncan are making, the two sets of fixes won't be in sync with each other.

Would it be possible (when Duncan makes fixes) to get a copy of the source changes as well as the executable?

Thanks.

## Report on a trip to Taiwan To Obtain 2200 Products

Tony Parker March 5th 1993

### Introduction

Between the 18th and 27th of February 1993 I was in Taiwan to obtain the 2200 Products and bring them back to Lowell. This report briefly describes the products involved, the objectives I had going over there and what was actually achieved.

### Products Involved

There are two - CS386 and 386 Turbo - Each component potentially consists of two object file - one for RAM memory and one for EPROM

1. CS386  
MVP MVP Microcode (Operating system)  
DG1 Menu for System Diagnostics (RAM only)
2. Turbo  
MVP MVP Microcode (Operating system)  
DG2 Menu for System Diagnostics (RAM only)  
22C11HS 22C11-HS Microcode  
SLOW-HS Optional 22C11-HS Microcode (Alternative RAM  
code)  
22C11SS SCSI Microcode (not officially released)  
236MXF MXF Microcode

### Releases Involved

1. CS386
  - Release 1.10.00
  - Release 1.10.z
  - Unreleased Version 1.20
2. Turbo
  - Release 1.10.00
  - Release 1.18.00
  - Unreleased Version 1.20.00

Prior to the trip over we had in Lowell one set of source code (of indeterminate vintage) for both CS386 and Turbo MVP systems (RAM only)

### Objectives of Trip

1. Source Code of above products / releases
2. Build Systems for above products including source if possible for any non-standard software required  
Also ascertain Hardware requirements of build systems
3. Verification on-site that, using the acquired source code, the Build Systems will produce executable products , hopefully identical to the released objects
4. Source and/object of any regression tests or other test software
5. Any documentation and/or manuals deemed relevant both in hard-copy and electronic form if available
6. All possible discussions with knowledgeable technical personnel on the following areas
  - Build systems
  - Diagnostic / Problem solving Techniques
  - Known solutions to outstanding bugs

### The Actual Trip

I arrived Friday and spent the weekend recovering from jetlag. On the Monday morning I was met at my hotel by Frank Wu and taken to the Wang Facility.

By the end of the morning I was installed in an office with my own PC networked to give access to all the 2200 files they had. These I immediately backed up.

That afternoon I was introduced to Duncan Chow (an erstwhile 2200 developer) who then came in periodically over the next three days to help me (a total of about 10 hours). During this time new directories were created and one by one the components built. In many cases this involved Duncan appearing the next day with missing files!

Friday I backed the new directories and returned Saturday.



## Objectives Achieved

1. Source Code of above products / releases  
I obtained source code for all the components listed above with the exception of the CS386 DG1 (not considered a serious ommision). However there was, in all cases, only one version which I suspect is version 1.18 + minor changes.
2. Build Systems  
All the components were built on-site and copies of build programs required were obtained.  
Source was obtained of two critical non-standard progams although one source - namely that of the ulitivity to create files on 2200 diskettes was of dubious origin and could create problems later
3. Verication on-site that the Built Systems are executable.  
This was only done for the Turbo MVP (RAM)
4. Regression tests or other test software  
I was unable to ascertain how they ever tested there software.
5. Documentation  
Some documentation apparently exists in electronic form on a VS over there. Due to their VS being down all week I never got this although they promised to EMAIL it to me later. (Not yet received)
6. Discussions with knowledgible technical personel.  
Useful discussions on the build systems but little of use elsewhere.

CC: Tony Parker W0000600 6FLT3  
From: Eugene Roy (V) Security: Limited  
Subject: Tony's travel plans Date 02/12/93

-----

Frank,

Tony is scheduled to arrive in Taipei on Friday Feb 19 at 7:15 PM. The flight is United Airlines Flight 845.

Even though L.S. offered to make hotel reservations, the travel agent set up reservations at the Howard Plaza Hotel.

What is the best way for you and Tony to connect with each other? Is it better for you to meet Tony at the Airport when he arrives, or would you prefer to meet Tony at his hotel Monday morning? Or would it be better for Tony to just arrive at the Wang facility on Monday?

Is the Wang Facility at 8/F, 56 TUN HWA Road or 4/F, 7 TUN HWA S. ROAD?

Thank you for your help.

CC: Tony Parker W0000600 6FLT3  
From: Eugene Roy (V) Security: Limited  
Subject: 2200 Plans Date 02/12/93

-----

Stephen,

I wanted to let you know what our plans are for the 2200.

We will be sending an engineer, Tony Parker, over to Taiwan to pick up the 2200 source and any material that would be useful for continued maintenance. He will be starting work in Taiwan the week of Feb 22. We are hopeful for a successful completion to this task. L.S. Sun and Frank Wu have been very helpful in planning this trip and should be very gracious hosts for Tony.

I don't think that we'll need it, but should the occasion arise that we need additional help, would you have anyone available with 2200 experience who could fly over to Taiwan to help Tony (at our expense)? If you have any other thoughts or suggestions on this matter please don't hesitate to let us know.

As always, we are most appreciative of the help you are given us on this.

Gene Roy

☹

☹

Package Subject: 2200 Taiwan Trip

Item Title: this is the reply I got

from Frank Wu.

Mike, Tony

Although we didn't get all the detailed responses we were looking for, I feel good that Tony will have a contact when he gets there and will have some 2200 material to look at.

Package Subject: 2200 Taiwan Trip

Item Title: 2200 Taiwan Trip

Eugene Roy

As your request , The status is: We do not know what is 2200 development software, and so far we only have turbor386 cpu not CS386 cpu, and here have 2200 source code but release number need to check after Tony come here.

Please tell me the arrive time and if need me to airport please let me know.

(fly number)

Regards

Frank Wu 2/10/93 pm

CC: Tony Parker W0000600 6FLT3  
From: Eugene Roy (V) Security: Limited  
Subject: Tony's travel plans Date 02/16/93

-----  
Thank you very much. Tony will see you Monday morning at the Wang Facility.

----- Reply -----  
To: Eugene Roy (V) From: Frank Wu  
Subject: Tony's travel plans Date Sent: 02/15/93

Eugene Roy

Mr. SUN has arrange CSO secretary Ann Wu to help Tony's receiveing and hotel reservation. But after she check to the hotel using "Tony Parker" name ,the answer is no such people reserve. Please contact Ann directly.

My Facility address is 8/f,56 TUN HWA N. ROAD, and i will wait at office Monday morning.

Regards

Frank Wu 2/15/pm 14:40

----- Reply -----  
To: Frank Wu From: Eugene Roy (V)  
Subject: Tony's travel plans Date Sent: 02/12/93

Frank,

Tony is scheduled to arrive in Taipei on Friday Feb 19 at 7:15 PM. The flight is United Airlines Flight 845.

Even though L.S. offered to make hotel reservations, the travel agent set up reservations at the Howard Plaza Hotel.

What is the best way for you and Tony to connect with each other? Is it better for you to meet Tony at the Airport when he arrives, or would you prefer to meet Tony at his hotel Monday morning? Or would it be better for Tony to just arrive at the Wang facility on monday?

Is the Wang Facility at 8/F, 56 TUN HWA Road or 4/F, 7 TUN HWA S. ROAD?

Thank you for your help.

Wang - 8/F 7216121  
Frank WU 886-2-7814181  
L.S. - SU.  
Ann WU  
4/F.

TO: Frank Wu  
CC: Mike Runge  
L.S. Sun  
Tony Parker  
FROM: Gene Roy  
DATE: January 22, 1993  
SUBJECT: 2200 Source Code Retrieval

Mike Runge had asked L.S. Sun for the name of someone who could help us retrieve the 2200 source code from Taiwan, and your name was given. I very much look forward to working with you and will be greatly appreciative of your help.

We are trying to consolidate all the software assets for all products in Sustaining Engineering. We do not have the 2200 source code which is currently in Taiwan somewhere. We have contracted an engineer (Tony Parker) in Lowell to go over to Taiwan to pick up the source code (and related development and technical information) for the 2200 Turbo and CS386 products, and to verify the completeness of this source code (by building and testing the product while over in Taiwan).

To accomplish these goals, we will need some help from you.

- We will need a system (PC386) to compile and build these releases;
- the 2200 development software installed on the system;
- a copy of the source code (we would like to get the code for Turbo releases 1.10.00, 1.18.00, 1.20.00; and CS386 releases 1.10.00 and 1.10.z), and
- a 2200 Turbo and 2200 CS386 for testing.

Will you be able to make arrangements for this on our behalf?

This effort could be greatly facilitated if we were able to contract Duncan Chow (or one of the other former 2200 developers) to help with the build and testing of these products. If you know or are able to contact any of the former developers, would you be able to see if one of them is interested in being contracted to help us with this effort? If you can find someone, then I would need their address, former grade and salary (or what he/she would require for services), so that I could set up a purchase order to contract him/her for their help.

Tony will be ready to go over to Taiwan by 1/29/93. Before he leaves there are a few additional questions we would need to get answered: When Tony arrives in Taiwan, where would he be going to do his work (where would the development system be)?; Would you be ready to receive Tony by Feb 1 and would most of the preparations (outlined above) also be ready by then? If not how soon after could you receive him?

Although we are hopeful that these tasks won't take too long, we will be allowing Tony three weeks (which includes travel time) to complete these tasks.

I will be sending you another memo early next week outlining the minimal the minimal preparations required.

Thank you in advance for your help. I hope you have a good holiday. And I look forward to working with you on this project.

TO: Frank Wu  
CC: Mike Runge  
Tony Parker  
FROM: Gene Roy  
DATE: January 22, 1993

Mike Runge had asked L.S. Sun for the name of someone who could help us retrieve the 2200 source code from Taiwan, and your name was given. I very much look forward to working with you and will be greatly appreciative of your help.

We are trying to consolidate all the software assets for all products in Sustaining Engineering. We do not have the 2200 source code which is currently in Taiwan somewhere. We have contracted an engineer (Tony Parker) in Lowell to go over to Taiwan to pick up the source code (and related development and technical information) for the 2200 Turbo and CS386 products, and to verify the completeness of this source code (by building and testing the product while over in Taiwan).

To accomplish these goals, we will need some help from you. We will need a system (PC386) to compile and build these releases; the 2200 development software installed on the system; a copy of the source code, and a 2200 Turbo and 2200 CS386 for testing. Will you be able to make arrangements for this on our behalf?

This effort could be greatly facilitated if we were able to contract Duncan Chow (or one of the other former 2200 developers) to help with the build and testing of these products. If you know or are able to contact any of the former developers, would you be able to see if one of them is interested in being contracted to help us with this effort? If you can find someone, then I would need their address, former grade and salary (or what he/she would require for services), so that I could set up a purchase order to contract him/her for their help.

Tony will be ready to go over to Taiwan soon. Before he leaves there are a few additional questions we would need to get answered: When Tony arrives in Taiwan, where would he be going to do his work (where would the development system be)?; What is the name of a good nearby hotel where he could stay? When would you be ready to receive Tony?

Although we are hopeful that these tasks won't take too long, we will be allowing Tony three weeks (which includes travel time) to complete these tasks.

Thank you in advance for your help. I hope you have a good holiday. And I look forward to working with you on this project.



## Trip to Taiwan and/or Hong Kong To Obtain 2200 Products

### Products Involved

1. 2200 OS/Turbo
    - Release 1.10.00
    - Release 1.18.00 ←
    - Unreleased Version 1.20.00 }
  2. 2200 OS/386
    - Release 1.10.00
    - Release 1.10.z }
- 1.20 ←

### Objectives

1. Source Code of above products
2. Build Systems and (if any) macro libraries etc. for above products including source if possible for any non-standard software required  
Also ascertain Hardware requirements of build systems
3. Verification on-site that, using the aquired source code, the Build Systems will produce executable products , hopefully identical to the released objects
4. Source and/object of any regression tests or other test software
5. Any and all documentation and manuals deemed relevant both in hard copy and electronic form if available
6. All possible discussions with knowledgible technical personel on the following areas
  - Build systems
  - Diagnostic / Problem solving Techniques
  - Known solutions to outstanding bugs

# Non Basic files on Release Diskettes

|                     |        |      |                             |
|---------------------|--------|------|-----------------------------|
| @@                  | Turbo  | 386  | MVP System Menu             |
| @DATE               | Turbo  | 386  | Date File                   |
| @DG1                |        | 386  | Menu for System Diagnostics |
| <del>Red</del> @DG2 | Turbo✓ |      | Menu for System Diagnostics |
| @DM50/V0            | Turbo  | 386  | Printer Driver              |
| @DOScfig            | Turbo  |      | Data file                   |
| @DOSfmt1            | Turbo  |      | Data File                   |
| @DOSfmt2            | Turbo  |      | Data file                   |
| @DOS.HLP            | Turbo  |      | Help Menu                   |
| @LASRJV1            | Turbo  | 386  | Printer Driver              |
| <del>MXE0</del>     | Turbo  | 386  | MXE Microcode               |
| ✓@MVP               | Turbo✓ | 386✓ | MVP Microcode               |
| @PM010V2            | Turbo  | 386  | Printer Driver              |
| @PM016V3            | Turbo  | 386  | Printer Driver              |
| @PM017V3            | Turbo  | 386  | Printer Driver              |
| @PM018V3            | Turbo  | 386  | Printer Driver              |
| @PM060V0            | Turbo  | 386  | Printer Driver              |
| @SLOW-HS            | Turbo✓ |      | Optional 22C11-HS Microcode |
| @SYSFILE            | Turbo  | 386  | System Configuration File   |
| ✓@22C11HS           | Turbo✓ |      | 22C11-HS Microcode          |
| ✓@22C11SS           | Turbo✓ |      | SCS1 Microcode              |
| ✓@2236MXF           | Turbo✓ |      | MXF Microcode               |
| .STARTD             | Turbo  | 386  | System Menu Support         |

## Basic Program Files on Released Diskettes

|           |       |     |                                   |
|-----------|-------|-----|-----------------------------------|
| @.DS      | Turbo |     | DS Menu                           |
| @BACKUP   | Turbo | 386 | BACKUP Utility                    |
| @BOOT     | Turbo | 386 | Menu for Bootstrap                |
| @CLOC     | Turbo | 386 | Initialize Date / Time            |
| @DAVFU    |       | 386 | Vertical Format Control Utility   |
| @DOS      | Turbo |     | Start Program                     |
| @DOSCYCS  | Turbo |     | Copy CS Program                   |
| @DOSDEL   | Turbo |     | Delete Program                    |
| @DOSDIRW  | Turbo |     | Directory Program                 |
| @DOSCOPY  | Turbo |     | Copy                              |
| @DOSDCPY  | Turbo |     | Disk Copy Program                 |
| @DOSEXIT  | Turbo |     | Exit DOS                          |
| @DOSFORM  | Turbo |     | Format Program                    |
| @DOSHELP  | Turbo |     | Help Menu                         |
| @DOSREN   | Turbo |     | Rename Program                    |
| @DOSSET   | Turbo |     | Set up Program                    |
| @DOSSTRT  | Turbo |     | Start Module                      |
| @DOSTYLP  | Turbo |     | Disk Type Program                 |
| @DOSTYPE  | Turbo |     | Disk Type Program                 |
| @DSAPPLY  | Turbo |     |                                   |
| @DSDIRP   | Turbo |     |                                   |
| @DSCFIG   | Turbo |     | DC Configuration                  |
| @DSCFIGP  | Turbo |     | Protect / Unprotect DS surfaces   |
| @DSTAPEB  | Turbo |     | Backup to Tape                    |
| @DSTAPER  | Turbo |     | Restore from Tape                 |
| @FORMAT   | Turbo | 386 | Format Disk Platter               |
| @GENPART  | Turbo | 386 | Partion Generator                 |
| @GEN.386  | Turbo | 386 |                                   |
| @HITRATE  | Turbo |     | Cache Usage                       |
| @INSTALL  | Turbo | 386 | System Install                    |
| @MENU     | Turbo | 386 | System Menu Program               |
| @MODSYSF  | Turbo | 386 | Convert system Configuration File |
| @MOVEFIL  | Turbo | 386 | Move File                         |
| @MOVE1    | Turbo | 386 | Overlay for MOVFIL & INSTALL      |
| @MRTIAN   | Turbo | 386 | Game                              |
| @PSTAT    | Turbo | 386 | Partion Status                    |
| @RAMDISK  | Turbo |     | RAM Disk Allocation               |
| @RECOVER  | Turbo | 386 | Recover from BACKUP               |
| @SYSFILE  | Turbo | 386 | MVP Configuration File            |
| @SYSMPVB  |       | 386 | Menu for System Utilities         |
| @TO.CREF  | Turbo | 386 | Create Reference File             |
| @TO.CRE0  | Turbo | 386 | Load or Create Reference File     |
| @TO.DISK  | Turbo | 386 | Copy to Disk                      |
| @TO.IMAGE | Turbo | 386 | Copy to Disk Image                |
| @TO.SUBS  | Turbo | 386 | Overlay for TODISK / TOIMAGE      |
| START     | Turbo | 386 |                                   |

TURBO PROMS 27C256-12 (120 nanosec)

210-9516A CPU BOARD  
(ALSO CONTAINS PAL CHIPS)

L50  
L64

378-9509R2  
378-9508R2

3 600t (R1)  
turbo/CPU ROM

212-9717 MXF BOARD

210-9579 I/O PROCESSOR

L7  
L14

378-9511R3  
378-9510R3

\*  
\*

212-9718 HS PRINTER/DISK CONTROLLER

210-9579 I/O PROCESSOR

L7  
L14

378-9513R1  
378-9512R1

\*  
\*

212-9727 SCSI/PRINTER CONTROLLER

210-9579 I/O PROCESSOR

L7  
L14

?  
?

no part # since  
not yet released.

CS/386 PROMS D27128A20

212-7129x CPU BOARD

210-9562A DAUGHTER BOARD

(ALSO HAS SEVERAL PAL CHIPS)

L13  
L23

379-2513R1  
379-2514R1

CS/386/CPU ROM

PAC

9259561  
9562