

The Wang CS central processing unit (CPU) is a high-performance VLSI processor that supports up to 16 terminals and 16 jobs concurrently in a multi-programming environment. The system offers data communications capabilities and an extremely low-overhead operating system. Designed for simplicity of operation and flexibility in system configuration, the CS can be easily adapted to meet each user's unique processing requirements.

The CS utilizes a user-defined, fixed-partition memory configuration and a fast, efficient central processor to extend multi-programming capabilities to system users. In a fixed-partition memory scheme, user memory is divided into a number of distinct areas called partitions, each of

program. The central processor allocates intervals of processing time to each partition in turn. Thus, the program in an individual partition executes for a brief time before the CPU services the next partition. Response time is fast for all users, regardless of the number of partitions or types of programs being executed.

System users can communicate directly with the CS by using any 2236, 2336, or 2436 terminal. Each terminal consists of a large, easy-to-read, 24 by 80 (24 lines, 80 characters per line) CRT screen display with a type-writer-style keyboard. The system performs automatic data compression on information transmitted to each terminal to accelerate communication and increase response time.

Since each terminal can support its own local printer, screen dumps and standard printing operations can be performed. All 2200, MicroVP, and CS terminals generate extensive bar and line graphics by using standard program statements to provide the user with valuable displays for business applications.

Wang 2436 DW Series terminals support an optional Word Processing software package. This package enables users to perform both word processing and data processing applications at the same terminal.

Terminals can be attached to the CPU either locally, at distances up to 2,000 feet (609.6 metres), or remotely, through the use of modems and telephone lines. Optionally, the CS can be equipped with communi-

cations controllers that allow remote devices to be attached directly to the CPU and accessed by a user at the terminal. Asynchronous, synchronous, and advanced bit-oriented protocols are supported by the CS processor.

Additionally, the CS chassis contains nine input/output (I/O) slots to support a wide range of other peripheral devices. Each I/O slot can contain a controller that is capable of controlling one or more peripheral devices. These devices include a selection of flexible and hard disk drives and an extensive array of printers and plotters.

The CS is available in two versions: the CS-2, which has 128K bytes of user memory, and the CS-5, which has 512K bytes of user memory. Both the CS-2 and the CS-5 are programmable in the popular

High-Speed Performance

The CS central processor is a high-performance, custom-designed VLSI processor built with fast, reliable components. CPU memory cycle time is 600 nanoseconds—usually sufficient to execute and retrieve a control memory instruction, as well as to read two bytes of user memory. When combined with the low-overhead operating system and the incremental compiler, the CS provides exceptional response time for all system users.

To illustrate the speed of the CPU, a representative selection of BASIC-2 floating-point arithmetic operations is listed in the following table, along with the times required for each computation. These times represent average execution times and assume full 13-digit precision for each operation.

The CS also provides high-speed, alphanumeric string processing capabilities. For example, the following times were measured when the specified BASIC-2 operations were performed upon an alpha array consisting of 1000 8-character elements.

Floating-Point Arithmetic Operation Times

Operation	Central Processing Time
Addition (+)	0.11 msec
Subtraction (-)	0.11 msec
Multiplication (*)	0.39 msec
Division (/)	0.79 msec
Exponentiation	6.40 msec
LOG	3.30 msec
LGT	2.90 msec
EXP	3.40 msec
SQR	1.80 msec
SIN	4.60 msec
COS	4.70 msec
TAN	8.00 msec
ARCSIN	12.90 msec
ARCCOS	13.00 msec
ARCTAN	10.20 msec
RND	0.28 msec
MOD	1.10 msec
ROUND	0.12 msec
Matrix Inversion (10x10)	0.57 sec
Matrix Inversion (20x20)	4.30 sec

BASIC-2 Alpha Array Operation Times

Operation	Central Processing Time
Search for a specified value	0.02 sec (maximum)
Memory sort of random data	1.68 sec

Easy Operation

The CS is simple to operate and easy to program. There are no special job-control languages or elaborate operating procedures. System resources are allocated through a supplied partition-generation program that guides the user through the process of configuring user memory. By running this program, the user creates partitions and assigns them to terminals. Each terminal can control one or more partitions.

Once the system has been configured, each partition functions independently. Within each partition, a user can develop and run a program as if the partitions were on a single-user system.

Because each user communicates with the system interactively, the program requests required information with clear, nontechnical prompts. For the programmer, interactive operation greatly simplifies program development and maintenance. Programs can be entered, edited, and run directly from the terminal keyboard. In addition, the CS processor performs a range of error checks to detect and identify various types of errors. It also provides an extensive set of edit functions to facilitate error correction.

Functional Organisation

The CS consists of a microprogrammed VLSI processor coupled with a number of special-purpose LSI I/O processors and controllers. The operating system and incremental compiler reside in 32Kb of control storage memory that is independent from user data memory.

The microprogram, comprises of the operating system and incremental compiler, directs the execution of the CPU and co-ordinates communication with the I/O processors. The independent I/O processors permit the overlap of CPU and I/O processing; thus, the CPU is relieved of responsibility for controlling peripherals that would otherwise require frequent or dedicated CPU attention.

Refer to the figure, "Logical Organisation of the CS" for an illustration of the CS architecture.

Memory Organisation

Among the most significant features of the CS are those that contribute to its highly efficient use of memory. These features include the following two characteristics:

1. Use of dedicated control memory for storage of the incremental compiler and the operating system
2. Use of a unique "atomization" technique for storing program text
3. Use of unpartitioned user memory for RAMDISK

Dedicated Control Memory

The CS control memory contains 32K of 24-bit words. When the system is powered on, the system programs are loaded into control memory from the system disk and remain resident in memory until the system is either powered off or reinitialised. Since the contents of control memory are inaccessible to the user or the user's programs, the system programs are always protected against accidental interference or destruction.

User memory is the area of memory available to the user's programs and data. The CS-2 has 128K bytes of user memory; the CS-5 has 512K bytes of user memory. All user memory, except for a small portion used for system control, is available for user programs and data.

User memory is divided into areas, or *banks*, of 64K bytes each. The CS-2 can contain a maximum of two banks of user memory; the CS-5 can be organised into a maximum of eight banks. The user can subdivide each bank into a number of partitions of fixed size, each of which is capable of executing a separate program. Partitions cannot span bank boundaries. Within each bank, a fixed amount of memory is reserved for system control information.

The operating system and incremental compiler require 3K bytes of user memory in the first bank for storage of control information, the system requires 8K bytes of user memory in each subsequent bank. Thus, a total of 61K bytes in Bank 1 and 56K bytes in Banks 2 through 8 is available for partitioning. In addition, the system reserves 1K byte of memory in each user partition for tracking the state of the partition, e.g., which files the partition has open. All remaining memory is available for user programs and data.

Atomisation

The CS uses an atomisation technique to automatically condense each program line. The condensed format conserves the memory needed for program storage and, additionally, contributes to fast program execution.

RAMDISK

RAMDISK allows a portion of user memory to be used as a high-speed disk. All of the BASIC-2 disk statements can be used with the RAMDISK logical platter. Since user memory is used to emulate disk storage and there is no physical disk address, RAMDISK access is considerably faster than access to an actual disk. RAMDISK, however, provides only temporary storage; all information stored is lost when the system is powered off.

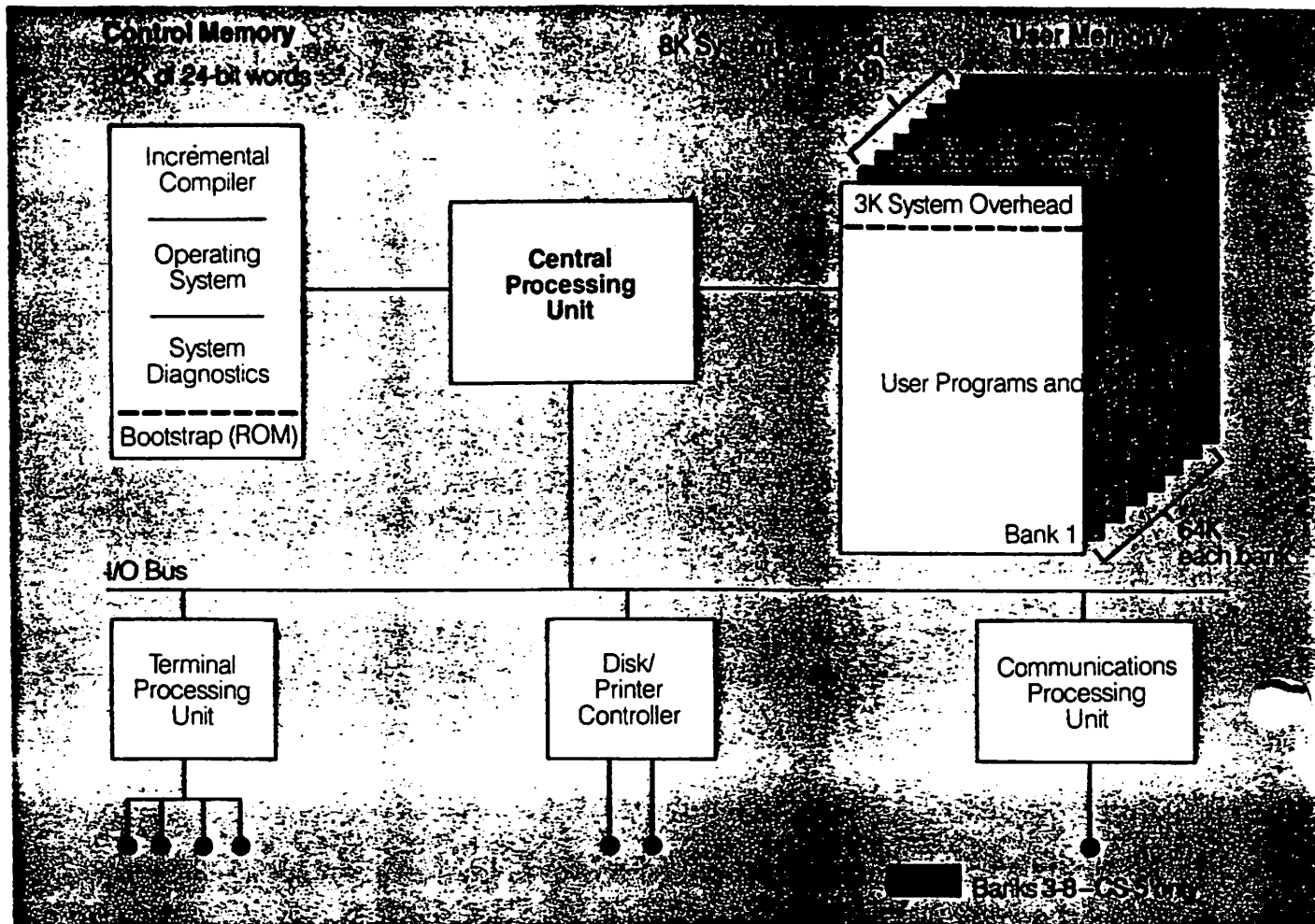
Foreground/Background Operation

Since each terminal on the system can be assigned more than one memory partition, each terminal is capable of running several jobs concurrently. The job that is in the process of communicating with the terminal at a given time is said to be running in the *foreground*. The job or jobs associated with the terminal, but not communicating with it, are said to be running in the *background*.

The terminal's attention can be transferred from one partition to another to shift the current foreground job into the background and a particular background job into the foreground. Thus, the operator can interact with each program as needed. A typical example of foreground/background operation would be running a batch-type job requiring minimal operator interaction (such as payroll processing) in the background, while running an interactive job (such as word processing) in the foreground.

Multiuser BASIC-2 Operating System

The Multiuser BASIC-2 Operating System supports the BASIC-2 language and runs on the CS. The Multiuser BASIC-2 Operating System provides facilities for program coordination and the sharing of system resources. The operating system protects multiple users from disk and printer conflicts by using BASIC-2 language features that enable a program to seize temporary control of a device and, subsequently, to release it.



Logical Organisation of the CS

Users can select Disabled Programming mode to prevent unauthorised access to important files and unauthorised execution of critical programs. In Disabled Programming mode, a terminal functions exclusively under program control; an operator is prevented from entering or modifying program text, as well as from directly accessing disk files from the specified terminal.

The Multiuser BASIC-2 Operating System includes a set of BASIC-2 instructions for handling disk operations. These instructions allow the programmer to choose between Automatic File Cataloging mode, in which the system automatically

performs the tasks associated with disk maintenance, and Absolute Sector Addressing mode, in which the programmer can directly access any sector on the disk.

Single-User Operation

The CS can be configured as a single-user, stand-alone system with the same features and language capabilities as the multiuser arrangement. Unlike most single-user systems, the CS enables a single terminal to control several programs executing concurrently, while maintaining fast execution speeds. Thus, the CS is an excellent choice for the first-

time user because it combines high-performance computing with the capacity for expansion from a single-user system to a multiuser system.

Communications Capabilities

The CS supports a full range of communications capabilities between remote terminals and the CPU and between the CS and other computer systems. Wang also offers a number of software packages to emulate common communications protocols.

Each terminal is connected to the CS by a Wang Model 22C32 Triple Controller or a Model 2236MXE Terminal Processor. These

devices control I/O operations between the CPU and the terminals. Line handling between the CPU and each terminal is asynchronous and full-duplex, with selectable line speeds ranging from 300 to 19,200 bits per second (bps).

For remote connection, two RS-232-C-compatible modems are required to provide the communication link. Remote terminals, located miles from the CPU, can function as local terminals, communicate directly with the system to perform operations within their assigned partitions.

Both remote and local terminals can have their own local printers to produce hard copy at the terminal site

For communicating with other computer systems, the CS can be configured with Wang Communications Controller Model 2227B, 2228B, 2228C, or 2228D. Model 2227B supports asynchronous-only communications in half- or full duplex, at line speeds ranging from 300 to 9600 bps. Models 2228B and 2228C offer a choice of synchronous or asynchronous communications at speeds ranging from 300 to 4800 bps. Additionally, Model 2228C supports 3275 Emulation, Model 2228D offers synchronous communications at speeds ranging from 300 to 19,200 bps and supports the following protocols:

MAILWAY®
2780/3780
3274 SNA
Remote WangNet
X.25 Packet Network Access
3274 BSC (3271)
ASYNCTeletypewriter Emulation
TELETEX

For communicating with the Wang VS, the 2200/VS Local Communications Option (LCO) is supported. This hardware and software package enables a Wang MicroVP, 2200MVP, -LVP, or CS to communicate with the Wang VS computer system. Communication between the CS and the VS system occur at speeds of 4.27 megabits per second over dual coaxial cable facilities.

The BASIC-2 Programming Language

The CS supports the BASIC-2 language, which is a high-level programming language designed for interactive programming on the CS. Beginning programmers can learn BASIC-2 easily. Wang Laboratories, Inc., has developed a variety of extensions and enhancements that have been added to BASIC-2 to facilitate writing, documenting, and debugging programs, as well as to provide flexible language capabilities for a wide range of applications.

The BASIC-2 instruction set is comprehensive and extremely powerful. A math package includes numerous system-defined mathematical and trigonometric functions. The results obtained are accurate to 13 digits and can be either rounded or truncated.

Alphanumeric data can be compared, analyzed, and modified with a variety of data manipulation statements. These statements permit the programmer to manipulate characters at the bit and byte levels and to perform various Boolean and binary arithmetic operations.

System commands let the user use the terminal keyboard to control system operations in each partition. System commands also serve as useful debugging tools.

In addition to the standard general-purpose BASIC statements, BASIC-2 provides several groups of special-purpose statements that perform such specialised operations as code conversion, sorting, matrix arithmetic, and customised I/O control. Language enhancements within BASIC-2 also include statements that enable the user to share program text, manage shared resources, and define system configurations.

Compatibility With 2200 Systems

Software compatibility is an important consideration in the selection of a new system. The CS has been designed to preserve maximum compatibility with single-user and multiuser 2200 Series systems. Since the CS is compatible with the 2200MVP and the MicroVP, multiuser software written for the 2200MVP and MicroVP functions correctly on the CS.

The BASIC-2 language supported on the CS is identical to the BASIC-2 language on the 2200VP, SVP, LVP, MVP and MicroVP. The CS also supports Wang BASIC syntax, providing a significant degree of compatibility with earlier Wang 2200 systems. Since each interactive terminal functions similar to single-user 2200 system for program development purposes, language compatibility ensures that programmers familiar with 2200 systems can quickly become productive on the CS.

The CS enables the programmer to use the memory available for multiuser programs with maximum efficiency. If a programmer must adapt a single-user program for multiuser operations on a CS, the programmer may want to modify the program to capitalise on these multi-programming features. In general, such modification is not extensive. When memory space is not a problem, however, the program can be loaded and run in each partition with little or no modification.

CPU Specifications

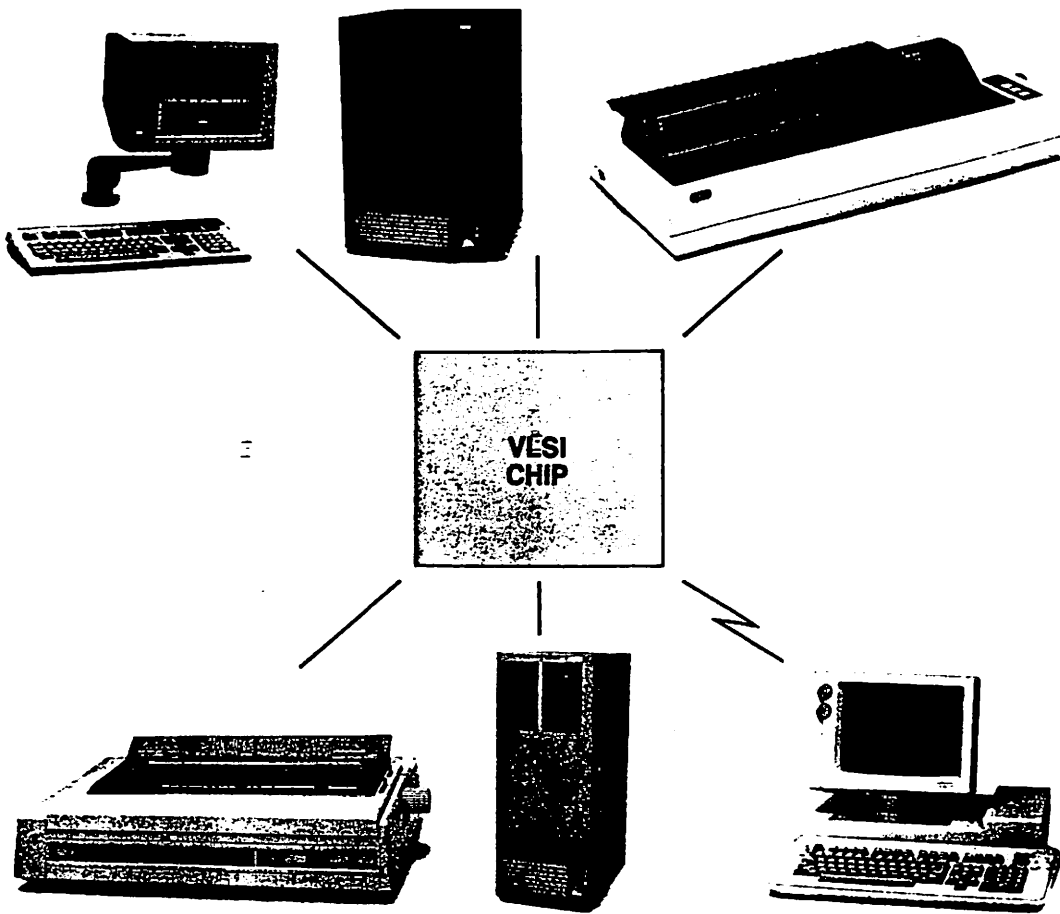
Size
Height 22.75 in.
Width 15 in.
Depth 5.75 in.

Weight
70 lb with all nine slots loaded.

Control Memory Size
32K bytes of 24-bit words

User Memory Size
CS-2: 128K bytes
CS-5: 512K bytes

I/O Slots
9



Ordering Specifications

The interactive multiuser central processing unit (CPU) must include the BASIC-2 incremental compiler, the latest release of the BASIC-2 Multiuser Operating System, and extensive system diagnostics. The CPU must contain approximately 32K of 24-bit words of control memory and nine I/O slots. The CPU must be provided with 128K bytes of user memory and must be expandable to 512K bytes. User memory must be divisible into a maximum of 16 separate partitions. The multiuser operating system and the BASIC-2 incremental compiler must reside in a separate control memory. The memory cycle time must be 600 nanoseconds nominal. Full memory parity must be provided throughout both control and user memory. The CPU must be capable of supporting up to 16 interactive terminals concurrently. The system must support the BASIC-2 language, provide a complete set of I/O instructions to control system peripherals, and it must include both automatic cataloging and direct addressing instructions for disk I/O operations. Both synchronous and asynchronous communications hardware, on a single board, must be available for installation directly within the processor.

Memory Cycle Time
600 nsec

Power Requirements
115 Vac \pm 10%, 60Hz \pm 1Hz
230 Vac \pm 10%, 50Hz \pm 1Hz
230 W

Heat Output
745 Btu/hr

Operating Environment
Temperature
50°F to 90°F (10°C to 32°C)

Relative humidity, noncondensing
35% to 65% recommended
20% to 80% allowable

Operating System Specifications
Memory available for partitions
117K (119,808) bytes for 128K machines
483K (463,872) bytes for 512K machines
Overhead per partition
1K (1,024) bytes

Maximum number of partitions 16
Minimum partition size 1.25K (1,280) bytes
Maximum partition size
Bank 1: 61K (62,464) bytes
Banks 2-8: 56K (57,344) bytes
Maximum number of terminals 16

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Standard Warranty Applies
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UK CS 003/02/87
US 715-0587A

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C U S T O M E R E N G I N E E R I N G

F I N A L

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

VS/2200/OA NEW PRODUCTS

December 16, 1987

2200 VLSI
8MB CPU/Memory PCB

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I. PRODUCT DESCRIPTION

A. OVERVIEW OF THE PRODUCT

As a further enhancement of the 2200 CS a modified version of the 2200 VLSI CPU/Memory PCB has been developed. The new version of the CPU/Memory PCB supports up to 8 Megabytes (MB) of user memory. All unused memory, memory not allocated to user partitions, is allocated to RAM Disk. The new version of the CPU/Memory PCB will be supported in all VLSI 2200 systems. This includes the CS, Micro/VP, and the MVP-128/512.

B. SIMILARITIES/DIFFERENCES (with other WANG products)

- 1) Software:
Release 3.1 of the 2200 operating system is required to access memory beyond 512 Kilobytes (KB).
- 2) Hardware:
The new CPU/Memory PCB is an enhanced version of the current 2200 VLSI CPU/Memory PCB. The new CPU/Memory PCB will increase the maximum user memory from 512KB to 8MB. The 8MB CPU/Memory PCB will use the Micro 2200 chip. This is the same 121 pin gate array CPU used on the previous VLSI CPU/Memory PCB (210-8034-X).
- 3) Other:
The increased memory will allow the customer to allocate up to 1MB of Memory to user partitions. Any memory not allocated to user partitions may be used for RAMDISK.

C. ANNOUNCE/FIRST CUSTOMER SHIPMENT DATE

- | | | |
|-------------------|---------------------------|-------------------|
| 1) Domestic: | Announce:October 15, 1987 | FCS:December 1987 |
| | Volume Ship:January 1988 | |
| 2) International: | Announce:October 15, 1987 | FCS:January 1988 |

D. SERVICE OFFERINGS/WARRANTY

This product will be installed by Customer Engineering personnel, and maintained by Customer Engineering 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

The new 2200 VLSI CPU/Memory PCB may be divided into the following components.

1) CPU:

The new CPU/Memory PCB uses the VLSI 2200 CPU chip. This is the same CPU used on the current 2200 VLSI CPU/Memory PCB (210-8034).

2) DRAM Controller:

The new CPU/Memory PCB (210-8937) utilizes a one Megabyte Dynamic RAM Controller chip. From a system perspective this design will provide a maximum of 128 memory segments (banks). Each bank is 64 kilobytes, for a maximum of 8 megabytes of user memory.

3) Boot Proms:

The prom code has not been changed and reflects the current revision of the proms.

4) Control Memory:

The new CPU/Memory PCB will ship with 32 Kilobytes of Control Memory. Space has been provided on the PCB for expansion to 64 Kilobytes of Control Memory.

5) Data Memory:

The Fixed (soldered) RAM chips used on the previous CPU/Memory PCB have been replaced by SIMM modules on the new board and maximum memory size is increased from 512 Kilobytes, on the previous version of the CPU/memory PCB, to 8 Megabytes. PAL (programmable array logic) is used for memory addressing. The flexibility of the PAL allows unique addressing circuitry for each memory configuration.

G. CONFIGURATION REQUIREMENTS

The new CPU/Memory PCB will be configured in 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, and 8 MB versions. The 128 KB, 512 KB, and 1 MB versions will utilize 256 KB SIMM modules. The 2 MB, 4 MB, and 8 MB versions will utilize 1 MB SIMM modules. A jumper (JP2) must be set to indicate which SIMM modules, 256KB or 1MB, are on the board. The PAL chip located at L2 will determine addressing capacity and must be compatible with the amount of memory loaded on the PCB.

Memory upgrades in the field will be accomplished with one of two methods. If the system is being upgraded from the old CPU/Memory PCB to one of the new memory configurations a new CPU/Memory PCB will be supplied. If memory is being upgraded on a new CPU/Memory PCB in the field the kit will include the proper SIMM modules and PAL addressing chip (L2).

COMPANY PROPRIETARY

II. MAINTENANCE PHILOSOPHY

A. Maintenance Objectives

1) C.E. Level:

This product will function as part of a 2200 CS, Micro VP, or MVP-128/512 system. Therefore effective maintenance of a system that includes this option will require the following:

- a) Skillful cause analysis at the system level.
- b) Knowledge of the diagnostics on the 2200 system.
- c) Knowledge of the overall system configuration.

2) Maintenance Procedures:

Maintenance on this product will be performed on-site by a Wang Customer Engineer. Currently existing diagnostics will aid the CE in isolating hardware failures to the failing board. When a board failure occurs, that board will be replaced with a board from C.E. stock and the bad board returned through C.E. logistics channels for repair.

B. Types of contract to be offered

On-Site Maintenance Contracts will be offered.

C. P.M. requirements

1) Customer performed:

To insure proper operation of this product, and the system in which it is installed, the Customer should observe the Environmental Considerations outlined in the CUSTOMER SITE PLANNING GUIDE (part # 700-5978) section 4.

2) WANG C.E. performed:

This product will not require P.M.

- a) Interval: N/A
- b) Parts/Consumables required: N/A
- c) Time to perform: N/A

D. Diagnostics required:

- 1) The Data Memory Diagnostic has been revised to test the increased memory on the enhanced PCB and is incorporated in Release 3.1 of the 2200 Operating System.

III. TRAINING

The 8MB CPU/MEM PCB will be included in the 2200 System training class as they are scheduled. Previously trained 2200 Customer Engineers will be updated via the Technical Service Bulletin (TSB) and PUB's to existing 2200 Product Maintenance Manuals.

A. CUSTOMER ENGINEER COURSE

1) COURSE OBJECTIVE:

The training objective will be to provide information that will enable the Wang Customer Engineer to meet the maintenance objectives for this product. These maintenance objectives are detailed in section II of this plan.

2) TIMETABLE and FORMAT:

Training does not offer scheduled 2200 hardware classes. Training for 2200 is done on an as needed basis depending on demand for classes. The Product Maintenance Manual and TSB will be distributed before FCS date.

3) PREREQUISITES:

The 2200 System Course prerequisites are:

- a) 6 months field experience following New Hire Training.

B. SALES SUPPORT COURSE

1) TIMETABLE and FORMAT
TBD

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

This product will require +5 VDC to be supplied by the 2200 system in which it is installed.

C. HUMIDITY RANGE

Storage (packaged) 10% to 90%
Operating 40% to 60%
Wet Bulb Temperature 75 deg f max.

D. PHYSICAL SPECIFICATIONS

Height 7 inches 17.5 centimeters
Width 12 inches 30 centimeters

E. SERVICE SPACE REQUIREMENTS

No additional service space will be required for this product.
Observe the service space requirements for the 2200 CPU in which
the product is installed.

F. INPUT CURRENT

This product will require +5 VDC at 3.4 amps to be supplied by the
2200 system in which it is installed.

G. INPUT POWER

The 2200 8 MB CPU/Memory PCB when installed will result in an
additional 17 watt load on the power supply. This additional load
results in a trivial increase in input power requirements.

H. POWER FACTOR

This product will have no measurable effect on the power factor of
the system in which it is installed.

I. HEAT LOSS

53 BTU/hr (13.4 KgCal/hr.)

J. LEAKAGE CURRENT (grounding requirements)

N/A

VI. POWER CORD DATA

A. PLUG TYPE

N/A

B. LENGTH

N/A

VII. DOCUMENTATION LIST

- A. PRINTS:.....210-8937
- B. MAINTENANCE MANUAL:.....PUB 741-1769-1 (CS)
741-1668-2 (MicroVP)
729-0584-A3 (MVP-128/512)
- C. VENDOR MANUALS:.....N/A
- D. DIAGNOSTIC ERROR LISTINGS:.....Included in Maintenance Manual
- E. P.M. PROCEDURES:.....N/A
- F. REPAIR PLAN:.....Repair Plan # 611-0
- G. SALES LITERATURE:.....Number Not Available
- H. OPERATORS' GUIDE/USER INFORMATION:...Number Not Available

APPENDICES

A1

MARKETING FORECAST 2275MUX

	Q3 FY88	Q4 FY88	Q1 FY89	Q2 FY89
DOMESTIC	125	125	125	125
INTERNATIONAL	175	175	175	175
TOTAL	300	300	300	300

COMPANY PROPRIETARY

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>
N/A	2200 8MB CPU/MEM PCB	Field Failures	0.41	
		Calls	0.53	
		MTTR		1.70
		Call Duration		2.75
		Installation Time		0.75
		PM Calls	0.00	
		PM MTTR		0.00
		FCO Calls	0.00	
		FCO MTTR		0.00
		Upgrades/Model	0.10	
		Upgrade Install Time		1.00

PRODUCT ANALYSIS WITH GROWTH

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

Model Number: N/A

Product Description: 2200 8MB CPU/MEM PCB

	<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	1.16	0.46	0.44	0.44	0.44	0.44	0.44	0.44
Calls/Year	1.19	0.63	0.48	0.43	0.43	0.43	0.43	0.43

COMPANY PROPRIETARY

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.

FRUs, CRUs,

		: stocking :			
		: location :			
:PART #	: DESCRIPTION	:FRU:CRU:Unique:	B	A	H
:210-8937-A	: 128 KB CPU/MEM. PCB	: X : : X	: X	:	:
:210-8937-B	: 512 KB CPU/MEM. PCB	: X : : X	: X	:	:
:210-8937-C	: 1 MB CPU/MEM. PCB	: X : : X	: X	:	:
:210-8937-D	: 2 MB CPU/MEM. PCB	: X : : X	: X	:	:
:210-8937-E	: 4 MB CPU/MEM. PCB	: X : : X	: X	:	:
:210-8937-F	: 8 MB CPU/MEM. PCB	: X : : X	: X	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:

PARTS LIST

Diagnostic Part Number: 195-2956-0

Parts required for P.M.: N/A

NEW PRODUCT STATUS

CS-2 and CS-5
(repackage MicroVP1 & 2)

Current Status: CS-2 and CS-5, PEP # H0245A

First Customer Ship: Q4 FY87

Logistics:

This product will be a repackaged version of the MicroVP. The new cabinet will house the same FRU's as the MicroVP.

270-0986	Power Supply	MTBF: 20,000 hrs
210-8176	Mother Bd.	MTBF: 717,154 hrs
210-8034-1A	CPU/MEM Bd.	MTBF: 24,451 hrs
210-8034-2A	CPU/MEM Bd.	MTBF: 19,616 hrs

Technical Documentation:

Documentation class code is 4103.

Joe Himingway has assigned Ed Bogusz to produce a Product Maintenance Manual in the I/M format for this product.

Have provided Motherboard, Power Supply, CPU/Memory PCB, CS cabinet and typical Device Controllers for artwork.

CS cabinet provided for photo session.

The Product Maintenance Manual is in final editing.

TEE/FSC:

Determine if there is any impact on the existing Repair Plan for the MicroVP.

Diagnostic Support:

No new diagnostics are planned for this product. Existing 2200 Diagnostic package # 195-2956-0 will be used.

Technical Training Center:

This new cabinet should be included in the 2200 System Class. The Product Maintenance Manual and TSB will provide necessary information for Customer Engineers previously trained on the 2200 system.

Do NOT mix 100 NANOSEC (-10) &

120 NANOSEC (+2) SIMMS ON SAME BRD.

2200 8MB CPU/MEMORY PCB UPGRADE KITS

ANY BRD w/ SIMM's SHOULD BE CHECKED

FOR PROPER JUMPING OF J2.

1MBE } IF SIMMS CHIPS HAVE LEGS ON JUST SIDES
 256KB } IN 4 GROUPS OF 5 SET J2 LEFT TO CTR.
 } IF SIMMS CHIPS HAVE LEGS ON ALL 4 SIDES
 } JUMPER J2 LTR TO RT.

<u>FROM</u>	<u>TO</u>	<u>KIT NUMBER</u>	<u>PART NUMBER</u>	<u>COMMENTS</u>
128KB	512KB	UJ5057	289-0969	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-B).
128KB	1MB	UJ5065	289-0968	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-C).
128KB	2MB	UJ5066	289-0967	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-D).
128KB	4MB	UJ5067	289-0966	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-E).
128KB	8MB	UJ5068	289-0965	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-F).
512KB	1MB	UJ5069	289-0964	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-C).
512KB	2MB	UJ5070	289-0963	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-D).
512KB	4MB	UJ5071	289-0962	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-E).
512KB	8MB	UJ5072	289-0961	Kit includes new PCB. Remove CPU/Memory PCB from system and install new CPU/Memory PCB (210-8937-F).

<u>FROM</u>	<u>TO</u>	<u>KIT NUMBER</u>	<u>PART NUMBER</u>	<u>COMMENTS</u>
1MB	2MB	UJ5059	289-0960	Kit includes 1 PAL chip (377-3486) for memory addressing and 2 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Remove the 4 256KB SIMM's and insert the 2 1MB SIMM's from the Kit into the first two sockets beginning at the bottom ^{TOP} . Put the PCB back in the system and run diagnostics.
1MB	4MB	UJ5060	289-0959	Kit includes 1 PAL chip (377-3487) for memory addressing and 4 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Remove the 4 256KB SIMM's and insert the 4 1MB SIMM's from the Kit into the first four sockets beginning at the bottom ^{TOP} . Put the PCB back in the system and run diagnostics.
1MB	8MB	UJ5061	289-0958	Kit includes 1 PAL chip (377-3488) for memory addressing and 8 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Remove the 4 256KB SIMM's and insert the 8 1MB SIMM's from the Kit into the sockets beginning at the bottom ^{TOP} . Put the PCB back in the system and run diagnostics.
2MB	4MB	UJ5062	289-0957	Kit includes 1 PAL chip (377-3487) for memory addressing and 2 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Insert the 2 1MB X 9 SIMM's from the kit into the first two empty sockets. from ^{TOP} Put the PCB back in the system and run diagnostics.

<u>FROM</u>	<u>TO</u>	<u>KIT NUMBER</u>	<u>PART NUMBER</u>	<u>COMMENTS</u>
2MB	8MB	UJ5063	289-0956	Kit includes 1 PAL chip (377-3488) for memory addressing and 6 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Insert the 6 1MB X 9 SIMM's from the kit into the empty sockets. Put the PCB back in the system and run diagnostics.
4MB	8MB	UJ5064	289-0955	Kit includes 1 PAL chip (377-3488) for memory addressing and 4 1MB x 9 SIMMS (377-4513). Remove CPU/Memory PCB from system. Replace the PAL chip at location L2 with the one in the kit. Insert the 4 1MB X 9 SIMM's from the kit into the empty sockets. Put the PCB back in the system and run diagnostics.

83	128K
84	512K
85	1
86	2
87	4
377-3488	8 M _{EG} PAL

1- J1 always in 1

2- J2 - . . .

Center to left = 1 Meg Sims

Center to Right = 256 K. Sims

3- ~~Ch. L45 Motorola MC 743539 N - ?~~

~~F 74539 - seen to be etc~~

4- Ch. that Sims are all the same.

(-10)

(-12)

5- LAST RESORT PULL VLSI

+ RESEAT IT PUSH DOWN

ON FLAT SURFACE.

* THIS WORKED 2 TIMES IN CANADA ↴

1 MEG PROB.

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 8003 REPLACES: _____ DATE: 02/09/88 PAGE 1 OF 4
MATRIX ID. 4103 PRODUCT/RELEASE# 2200 VLSI 8MB CPU/MEMORY PCB
TITLE: 2200 VLSI 8MB CPU/MEMORY PCB NEW PRODUCT INFORMATION

PURPOSE:

To inform the field of a new VLSI CPU/Memory PCB for the 2200.

EXPLANATION:

Beginning in February, 1988, Wang will begin shipping an enhanced version of the 2200 VLSI CPU/Memory PCB. The new CPU/Memory PCB will be supported in the 2200 CS, MicroVP, and MVP-128/512 system. The new CPU/Memory PCB will increase the maximum user memory from 512 kilobytes (KB) to 8 megabytes (MB). The increased user memory will allow the user to allocate up to 1MB to user partitions. Any memory not allocated to user partitions will be reserved for RAMDISK.

CONFIGURATION:

The new CPU/Memory PCB will be offered with 128KB, 512KB, 1MB, 2MB, 4MB, or 8MB of user memory. The 128KB, 512KB, 1MB versions will use 256KB SIMM modules and the 2MB, 4MB, and 8MB version will use 1MB SIMM modules. A programmable array logic (PAL) chip at location L2 will determine addressing capacity and must be compatible with the amount of memory loaded on the PCB.

JUMPERS:

There are two jumpers located on the new CPU/Memory PCB;

J1, enables the CPU clock and MUST BE IN.

J2, is used to indicate whether 256KB or 1MB SIMM modules are to be used for memory on the PCB. The jumper has three pins. If 256KB SIMM modules are being used the jumper MUST BE INSERTED BETWEEN PINS 2 AND 3. If 1MB SIMM modules are being used the jumper MUST BE INSERTED BETWEEN PINS 1 AND 2.

DIAGNOSTICS:

Testing of the increased memory on the new PCB is supported by revision 179E of the 2200 memory diagnostic. This diagnostic is contained in the 2200 diagnostic package (195-2956-0).

GROUP: VS/2200/OA New Products Hardware MAIL STOP: 001-220

COMPANY CONFIDENTIAL

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 8003 REPLACES: _____ DATE: 02/09/88 PAGE 2 OF 4
 MATRIX ID. 4103 PRODUCT/RELEASE# 2200 VLSI 8MB CPU/MEMORY PCB
 TITLE: 2200 VLSI 8MB CPU/MEMORY PCB NEW PRODUCT INFORMATION

EXPLANATION (cont'):

DOCUMENTATION:

The new CPU/Memory PCB will be documented in the following publication update bulletins;

741-1769-1 (CS)
 741-1668-2 (MicroVP)
 729-0584-A3 (MVP-128/512)

PART NUMBERS:

Part #	Description	PAL 311-
210-8937-A	128KB CPU/Memory PCB	L2 = 3483
210-8937-B	512KB CPU/Memory PCB	L2 = 3484
210-8937-C	1MB CPU/Memory PCB	L2 = 3485
210-8937-D	2MB CPU/Memory PCB	L2 = 3486
210-8937-E	4MB CPU/Memory PCB	L2 = 3487
210-8937-F	8MB CPU/Memory PCB	L2 = 3488

MEMORY UPGRADES:

Memory upgrades in the field will be accomplished with one of two methods. If the system is being upgraded from a 128KB or 512KB system to one of the other memory options a new CPU/Memory PCB will be supplied. If the system is being upgraded from 1MB or greater to one of the other memory options the kit will include the proper SIMM modules and a PAL addressing chip to replace the one in location L2.

From	To	Kit #	Part #	Kit Contents
128KB	512KB	UJ5057	289-0969	210-8937-B
128KB	1MB	UJ5065	289-0968	210-8937-C
128KB	2MB	UJ5066	289-0967	210-8937-D
128KB	4MB	UJ5067	289-0966	210-8937-E
128KB	8MB	UJ5068	289-0965	210-8937-F
512KB	1MB	UJ5069	289-0964	210-8937-C
512KB	2MB	UJ5070	289-0963	210-8937-D

GROUP: VS/2200/OA New Products Hardware MAIL STOP: 001-220

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 8003 REPLACES: _____ DATE: 02/09/88 PAGE 3 OF 4

MATRIX ID. 4103 PRODUCT/RELEASE# 2200 VLSI 8MB CPU/MEMORY PCB

TITLE: 2200 VLSI 8MB CPU/MEMORY PCB NEW PRODUCT INFORMATION

EXPLANATION (cont'):

MEMORY UPGRADES (cont'):

<u>From</u>	<u>To</u>	<u>Kit #</u>	<u>Part #</u>	<u>Kit Contents</u>
512KB	4MB	UJ5071	289-0962	210-8937-E
512KB	8MB	UJ5072	289-0961	210-8937-F

Instructions:

1. Power down the system.
2. Remove the old CPU/Memory PCB.
3. Install the CPU/Memory PCB from the kit.
4. Power up the system.
4. Run the diagnostics to verify operation.
5. Return the system to the Customer.

<u>From</u>	<u>To</u>	<u>Kit #</u>	<u>Part #</u>	<u>Kit Contents</u>
1MB	2MB	UJ5059	289-0960	PAL addressing chip (377-3486). Two 1MB x 9 SIMM modules (377-4513).
1MB	4MB	UJ5060	289-0959	PAL addressing chip (377-3487). Four 1MB x 9 SIMM modules (377-4513).
1MB	8MB	UJ5061	289-0958	PAL addressing chip (377-3488). Eight 1MB x 9 SIMM modules (377-4513).

Instructions:

1. Power down the system.
2. Remove the CPU/Memory PCB from the system.

GROUP: VS/2200/OA New Products Hardware MAIL STOP: 001-220

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

EXPLANATION (cont'):

MEMORY UPGRADES (cont'):

Instructions (cont')

3. Remove the 256KB SIMMs from the memory sockets on the PCB.
4. Insert the 1MB SIMMs supplied with the kit into the memory sockets.
5. Remove the PAL addressing chip from location L2 on the PCB.
6. Insert the PAL addressing chip supplied with the kit into the socket at location L2 on the PCB.
7. Reposition jumper J2 from pins 2 and 3 to pins 1 and 2.
8. Re-install the CPU/Memory PCB in the system.
8. Power up the system.
9. Run the diagnostics to verify operation.
10. Return the system to the customer.

<u>From</u>	<u>To</u>	<u>Kit #</u>	<u>Part #</u>	<u>Kit Contents</u>
2MB	4MB	UJ5062	289-0957	PAL addressing chip (377-3487). Two 1MB x 9 SIMM modules (377-4513).
2MB	8MB	UJ5063	289-0956	PAL addressing chip (377-3488). Six 1MB x 9 SIMM modules (377-4513).
4MB	8MB	UJ5064	289-0955	PAL addressing chip (377-3488). Four 1MB x 9 SIMM modules (377-4513).

Instructions:

1. Power down the system.
2. Remove the CPU/Memory PCB from the system.
3. Insert the 1MB SIMMs supplied with the kit into the memory sockets.
4. Remove the PAL addressing chip from location L2 on the PCB.
5. Insert the PAL addressing chip supplied with the kit into the socket at location L2 on the PCB.
6. Re-install the CPU/Memory PCB in the system.
7. Power up the system.
8. Run the diagnostics to verify operation.
9. Return the system to the customer.

NOTE: SIMM modules are inserted beginning in location L1.

<u>MEMORY SIZE</u>	<u>SIMM'S</u>	<u>LOCATIONS</u>
128KB	(2) 256KB X 9	L1, L9
512KB	(2) 256KB X 9	L1, L9
1MB	(4) 256KB X 9	L1, L9, L10, L13
2MB	(2) 1MB X 9	L1, L9
4MB	(4) 1MB X 9	L1, L9, L10, L13
8MB	(8) 1MB X 9	L1, L9, L10, L13, L14, L15, L23, L24

WANG

TECHNICAL SERVICE BULLETIN
SECTION: HardWare General

NUMBER: HWG 7012 REPLACES: _____ DATE: 06/02/87 PAGE 1 OF 1

MATRIX ID. 4103 PRODUCT/RELEASE# CS2 AND CS5

TITLE: CS MODEL NUMBER CORRECTION

PURPOSE:

To inform the field of model number errors in the CS Product Maintenance Manual.

EXPLANATION:

The CS Product Maintenance Manual, both the micro fiche and the hard copy, was printed using incorrect model numbers. The correct model numbers are CS2 and CS5. Any reference in the manual to CS1 should be replaced by CS2 and any reference to CS2 should be replaced by CS5.

For further information on the difference between the CS2 and CS5 see TSB HWT 7092, distribution date 05/05/87.

This error will be corrected in the next printing of the manual.

GROUP: VS/2200/OA New Products Hardware MAIL STOP: 001-220

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 7092 REPLACES: _____ DATE: 05/05/87 PAGE 1 OF 1
MATRIX ID. 4103 PRODUCT/RELEASE# CS2 AND CS5
TITLE: CS NEW PRODUCT INFORMATION

PURPOSE:

To inform the field of the new CS.

EXPLANATION:

Starting in April, 1987, Wang will begin shipping the CS. The CS is a re-packaged version of the Micro/VP. There are two models of the CS. The CS2 with 128KB of data memory and the CS5 with 512KB of data memory. Both models have 32KB of control memory and 9 I/O slots.

The CS will support all Wang, vendor, and user software currently supported on the Micro/VP. It is supported by the current release of the 2200 Multi-User Operating System (Rev 2.7).

These systems may utilize existing 2200 controllers such as; MXE, Triple Controller, and many of the disk, printer, and Telecommunications controllers.

PART NUMBER INFORMATION FOR THE CS:

128KB CPU Board	210-8034-1 (same as Micro/VP-1)
512KB CPU Board	210-8034-2 (same as Micro/VP-2)
Motherboard	210-8176 (same as Micro/VP)
Switching Power Supply	270-0986 (same as Micro/VP)
DC Fan Assembly	270-3403 (unique)
AC Cable (internal)	220-2569 (unique)
DC Harness	220-2606 (unique)

DIAGNOSTICS:

195-2956-0

PRODUCT MAINTENANCE MANUAL:

741-1769

GROUP: VS New Products Hardware

MAIL STOP: 001-220

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.



ECO

ECO NO. 5234

SHEET 1 OF 8

ORIGINATOR Gilles Carrier Dept 167 M/S 014-390 EXT74478 DATE01/13/89

WRITTEN BY Carol Sullivan M/S 012-188 EXT74312 DATE01/13/89

PART NO.	DESCRIPTION	REVISIONS	
		FROM	TO
DWG NO. 8937	CS CPU CARD	3	4
MODEL NO. CS CPU	PEP #	0	1
CLASS I (II) III	HF		

DESCRIPTION OF CHANGE

Change parts list and sample board per attached sheets and as follows:

Change BOM 210-8937-A, 210-8937-B, 210-8937-C, 210-8937-D, 210-8937-E and 210-8937-F as follows:

WLI#	DESCRIPTION	UM	COMP TYPE	QTY	TYPE
Delete: 377-3490	IC PAL 16R4	EA	I	1	I
Add: 377-3490-R1	IC PAL 16R4	EA	I	1	I

CHANGE ~~COMP~~ PAL AT LOCATION L4L.
Delete the part number and product structure for 377-3490. **ECO TO BE**

FEB 08 1989

REVIEWED

REASON/SYMPATOM FOR CHANGE

To correct memory sizing problem.

FIXES PROBLEM WHEN PARTITIONING SCREEN SHOWS 512K MEMORY AVAILABLE & LETS YOU PRETENTION IT WHEN ONLY HAVE 12.8K BOARD (WHEN PARTITION MAKE THAN 12.8K RESULTS IN A PECM ERROR

DOCUMENTS

DOCUMENTS	FROM	TO
HISTORY SHT. 510		
HISTORY SHT. 210	3	4
ARTWORK		
E-REV.	0	1
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
SPI.		
SPECIFICATION		

CONFORMING AREA	CF	RMFG	DST	FINL ASSY AREA	SCB ASSY AREA	NEXT ORDER	INFO ONLY
	X	X		X	X		

CONFORMANCE DATE

APPROVALS

ECO CHAIRPERSON	DATE
DES. ENGRG. <i>Killed Carrin</i>	1/18/89
CUST. ENGRG.	
MFG.	
MTO	
PP&M	
FCC <i>Michael Buzter</i>	1/23/89
PROD. SAFETY <i>ASD</i>	1/27/89
SECURE SYS	
ORIGINATOR	
OTHER	

IMPACT REVIEW CHECKLIST

WANG ECO# 52361

OEM ECO# _____

PN# 210-8937A

1. WANG MODEL #s AFFECTED: CS, MICROVP, MVP128

2. WANG FRU(s) #s AFFECTED: 210-8937A

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (IF NO, GO TO 7) YES NO

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS SOME UNITS

5. HOW ARE THESE UNITS IMPACTED? (CHECK ANY THAT APPLY):

SAFETY	_____	INTERMITTENT	_____	ENHANCEMENT	_____
FCC COMPLIANCE	_____	HARD FAILURE	_____	RELIABILITY	<input checked="" type="checkbox"/>
TEMPEST INTEG.	_____	CATASTROPHIC	_____	OTHER (See 7)	<input checked="" type="checkbox"/>

6. PLR DATA: <u>Unit Population</u>	<u>Product Failure Data</u>			<u>Parts Related To ECO/PN</u>			
	last 12 mo.	Total Calls	Total Fails	Fails per Year	Total Used	Reduction by ECO/PN %	Reduced FPY
_____	_____	_____	_____	_____	_____	_____	_____

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSB required	<input checked="" type="checkbox"/>
Level C	FCO required	<input checked="" type="checkbox"/>

FCO requirements Next Call Immediate Est. installation time 10 min
Est. % of units to FCO _____

8. FSC REQUIREMENTS:

Level A	Information only	_____
Level B	Upgrade on failure only	_____
Level C	Upgrade all assy's (MUB)	<input checked="" type="checkbox"/>

9. LOGISTICS REQUIREMENTS:

Level A	Information only	_____
Level B	Future purchases	<input checked="" type="checkbox"/>
Level C	Purge stock (FSC rework)	<input checked="" type="checkbox"/>

ANY OTHER INFO TO CLARIFY IMPACT: (S/N range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

ONLY THE 210-8937A BOARD NEEDS TO BE ECO'D AS IT IS THE ONLY CONFIGURATION WHERE A PROBLEM EXISTS. ALL NEW BOARDS, 210-8937A/B/C/D E/F, SHOULD BE BUILT WITH THIS CHIP AS THE SAME CHIP IS USED ON ALL BOARDS.

REVIEWER'S SIGNATURE: Michael Bahia

DATE: 1 / 31 / 89

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK



ECO

ECO NO. 48049D
SHEET 1 OF 11

ORIGINATOR: Mohammed Makhlouf Dept 120
 WRITTEN BY: Carol Sullivan
 EXT 159
 DATE: 12/09/88
 M/S UI4-42U
 M/S UI2-18B
 EXT 431Z

PART NO.	DESCRIPTION	REVISIONS	
		FROM	TO
DWG NO. 8957	2200UCPU W EXT. MLM	0	1
MODEL NO. 2200	PEP # HU245B	0	1
CLASS I	HD		

DESCRIPTION OF CHANGE

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

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

- Change L5 from IC prom (377-3159-R1) to IC prom (377-3157-R1)
- L55 from IC prom (377-3157-R1) to IC prom (377-3159-R1)
- C5 from cap luf 50V+80% (300-1929) to cap luf 50V+80% (500-1999)
- L58 from IC pal 16L8 (577-5489) to IC pal 16L8 (577-5489-R1)
- L42 from IC pal 16R4 (577-5490) to IC Bpal 16R4 (577-5581)
- L43 from IC pal 16R4 (577-5491) to IC Bpal 16R4 (577-5582)

Tie L26 pin 12 to L26 pin 7
 U0 not load L6, L21 and L56 IC 52KX8 SRAM (577-U884)

CONTINUED

REASON/SYMPOTM FOR CHANGE

To correct errors on drawings and omissions in artwork. Enhancement of program.

CONFORMING AREA	CF	REMG	DIST	FINAL ASSY AREA	SCB ASSY AREA	NEXT ORDER	INFO ONLY
CONFORMANCE DATE							

APPROVALS	DATE
ECO CHAIRPERSON	
DES ENGRG <i>M. Sullivan</i>	3-7-88
CUST. ENGRG.	
MFG.	
MTO	
PP&M	
FCC (L. Thompson)	3/9/88
PROD SAFETY (D. J. ...)	3/1/88
SECURE SYS	
ORIGINATOR <i>M. Sullivan</i>	
OTHER	



**ENGINEERING CHANGE ORDER
CONTINUATION SHEET**

DOCUMENT NO.	OLD REV	NEW REV
ECO NO 48049D	SHT 2	OF 11

THIS ECO SHT, WHEN ATTACHED TO DOCUMENT OF PREVIOUS REV CONSTITUTES THE LATEST DOC.

DOCUMENT TITLE:

DESCRIPTION OF CHANGE:

CONTINUED

Change BOM 209-8937 as follows:

WLI#	DESCRIPTION	UM	COMP TYPE	QTY	QTY TYPE
Delete: 300-1929	CAP 1UF 50V	EA	1	1	1
Add: 300-1999	CAP 1UF 50V	EA	1	1	1

Change BOM 210-8957-A, 210-8937-B, 210-8937-C, 210-8937-D, 210-8937-E and 210-8937-F as follows:

WLI#	DESCRIPTION	UM	COMP TYPE	From:	To:	QTY	QTY TYPE
Change: 377-0884	IC 32X8 SRAM	EA	1	6	3	1	1
Delete: 377-3489	IC PAL 16L8	EA	1	1	1	1	1
	IC PAL 16R4	EA	1	1	1	1	1
	IC PAL 16R4	EA	1	1	1	1	1
Add: 377-3489-R1	IC PAL 16L8	EA	1	1	1	1	1
	ICPAL 16R4	EA	1	1	1	1	1
	ICPAL 16R4	EA	1	1	1	1	1

HANG LABORATORIES, INC.

RUN DATE: 11/13/87 11:14

SHEET OF PAGE 1

>>>> PARTS LIST <<<<<

(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 FCn 2200 MICRO VP CPU RD
ASSEMBLY LEVEL & TITLE: 209 8937
PARTS LIST REVISION (P): 0

CREATED: 12/22/86 08:27
LAST MODIFIED: 11/13/87 11:10 BY: SHA
EDITING REVISION: 17

REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

C1 - C8	300-1833-	100N	CAP .1 UF 50V +80-20% ZSUCER MONO AXL		9
C10					
C21 - C22					
C24					
C38 - C39					
C41					
C5					
C2	300-1929-306-141000N	10000P	CAP 1UF 50V +80-20% Z5U CER AXIAL		1
C4	300-2620-		CAP .01 UF 100V 10% Z5R CER MONO RDL		34
C6					
C11					
C14					
C17 - C20					
C28 - C34					
C36 - C37					
C42 - C53					
C55 - C58					
C1	300-4022-	15000N	CAP 15 UF 20V 10% TANTALUM AXIAL		14
C3					
C9					
C12 - C13					
C15 - C16					
C23					
C25 - C27					
C35					
C40					
C54					
Y1	321-1082-	10.0000	CLK OSC 10.0 MHZ .01% 1-STTL		1
R11 - R14	330-1010-	10	RES 10 OHM 1/4W 5% CARBON COMPOSITION		4
R1 - R7	330-1010-	39	RES 39 OHM 1/4W 5% METAL FILM 200 PPM		14
R15 - R21					
R10	330-2011-	100	RES 100 OHM 1/4W 5% METAL FILM 200 PPM		3
R14					
R18					

200 RD 486490
SWT 3 OF 11

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(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 PCA 2200 MICRO VP CPU BD
 ASSEMBLY LEVEL & TITLE: 210-A 8537-2200 CS-2
 PARTS LIST REVISION (P): 0
 CREATED: 12/22/86 08:27
 LAST MODIFIED: 11/13/87 11:10 BY: SHA
 EDITING REVISION: 17

* REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

01	209-8937-		PCA 2200 MICRO VP CPU BD		1
02	377-0884-	62 156-12	IC 32K X 8 SRAM 120NS CMOS 28 PIN		3
03	377-3137-01	377-3139-R1	IC PROM CONTAINS CPU ID #		1
04	377-3138-R1	377-3137-R1	IC PROM		1
05	377-3139-R1		IC PROM		1
06	377-3483-		IC PAL 20L8 ADDRESS DECODER		1
07	377-3489-R1		IC PAL 16L8 SELECT PROM		1
08	377-3490-	377-3581	IC8PAL 16R4 GENERATE SIGNALS FOR DRAM		1
09	377-3491-	377-3582	IC PAL 16R4 FOUR SEPARATE CAS SIGNALS		1
10	377-3492-		IC PAL 16R8 WRITE ENABLE		1
11	377-4508-	41256-12	IC 41256 256K X 9 DRAM 120NS SIMM NMOS 30P		2
L9					
L3	377-5055-	8429-70	PLCC 8429-70 1 MEG/DRAM CONTROLLER ALS 68 PIN		1
L32	377-6054-	CUSTOM	IC 2200 CPU CUSTOM 120P PROG GATE ARRAY		1

480 490
 480 490
 480 490

BOARD NO. & TITLE: C8937 PCA 2200 MICRO VP CPU BD
ASSEMBLY LEVEL & TITLE: 210-B 8937-2200 CS-5
PARTS LIST REVISION (P): 0

CREATED: 12/22/86 08:27
LAST MODIFIED: 11/13/87 11:10 BY: SHA
EDITING REVISION: 17

* HANG PART NO. * VALUE/TYPE *
* DRAWING NO. * QTY. *

REF. DES.	HANG PART NO.	VALUE/TYPE	DESCRIPTION	QTY.
L1	209-8937-		PCA 2200 MICRO VP CPU BD	1
L2	377-0884-	62256-12	IC 32K X 8 SRAM 120NS CMOS 28 PIN	6
L3	377-3137-R1	377-3137-R1	IC PROM CONTAINS CPU ID #	1
L4	377-3138-R1		IC PROM	1
L5	377-3139-R1	377-3137-R1	IC PROM	1
L6	377-3484-		IC PAL 20L8 ADDRESS DECODER	1
L7	377-3489-R1		IC PAL 16L8 SELECT PROM	1
L8	377-3490-	377-3581	IC PALB16R4 GENERATE SIGNALS FOR DRAM	1
L9	377-3491-	377-3582	IC PAL 16R4 FOUR SEPARATE CAS SIGNALS	1
L10	377-3492-		IC PAL 16R8 WRITE ENABLE	1
L11	377-4508-	41256-12	IC 41256 256K X 9 DRAM 120NS SIMM NMOS 30P	2
L12	377-5055-	8429-70	PLCC 8429-70 1 MEG/DRAM CONTROLLER ALS 68 PIN	1
L13	377-6054-	CUSTOM	IC 2200 CPU CUSTOM 120P PROG GATE ARRAY	1

READ ME 480490
5-11

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>>>> PARTS LIST <<<<<

(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 PCA 2200 MICRO VP CPU BD
ASSEMBLY LEVEL & TITLE: 210-C 8-37-2200 CS-10
PARTS LIST REVISION (P): 0

CREATED: 12/22/86 08:27
LAST MODIFIED: 11/13/87 11:10 BY: SHA
EDITING REVISION: 17

* REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

01	209-8937-		PCA 2200 MICRO VP CPU BD		1
L1	377-0884-	62256-12	IC 32K X 8 SRAM 120NS CMOS 28 PIN		6
L2	377-3137-RT	377-3139-R1	IC PROM CONTAINS CPU ID#		1
L3	377-3138-R1		IC PROM		1
L4	377-3139-RT	377-3137-R1	IC PROM		1
L5	377-3485-		IC PAL 20L8 ADDRESS DECODER		1
L6	377-3489-R1		IC PAL 16L8 SELECT PROM		1
L7	377-3490-	377-3581	IC PAL 16R4 GENERATE SIGNALS FOR DRAM		1
L8	377-3491-	377-3582-	IC PAL 16R4 FOUR SEPARATE CAS SIGNALS		1
L9	377-3492-		IC PAL 16R8 WRITE ENABLE		1
L10	377-4508-	41256-12	IC 41256 256K X 9 DRAM 120NS SIMM NMOS 30P		4
L11	377-5055-	8429-70	PLCC 8429-70 1 MEG/DRAM CONTROLLER ALS 68 PIN		1
L12	377-6054-	CUSTOM	IC 2200 CPU CUSTOM 120P PROG GATE ARRAY		1

Handwritten: 480490
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>>>> PARTS LIST <<<<

(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 PCA 2200 MICRO VP CPU BD
 ASSEMBLY LEVEL & TITLE: 210-E 8937-2200 CS-40
 PARTS LIST REVISION (P): 0
 CREATED: 12/22/86 08:27
 LAST MODIFIED: 11/13/87 11:10 BY: SHA
 EDITING REVISION: 17

* REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

REF. DES.	HANG PART NO.	VALUE/TYPE	DESCRIPTION	DRAWING NO.	QTY.
L1	209-8937-		PCA 2200 MICRO VP CPU BD		1
L2	377-0884-	62256-12	IC 32K X 8 SRAM 120NS CMOS 28 PIN		6
L3	377-3137-RT	377-3135-R1	IC PROM CONTAINS CPU ID #		1
L4	377-3138-R1		IC PROM		1
L5	377-3139-RT	377-3137-R1	IC PROM		1
L6	377-3487-		IC PAL 20L8 ADDRESS DECODER		1
L7	377-3489-R1		IC PAL 16L8 SELECT PROM		1
L8	377-3490-	377-3581	IC PAL16R4 GENERATE SIGNALS FOR DRAM		1
L9	377-3491-	377-3582	IC PAL 16R4 FOUR SEPARATE CAS SIGNALS		1
L10	377-3492-		IC PAL 16R8 WRITE ENABLE		1
L11	377-4513-	31009-12	IC 1MX9 DRAM SIMM 120NS 30 PIN		4
L12	377-5055-	8429-70	PLCC 8429-70 1 MEG/DRAM CONTROLLER ALS 68 PIN		1
L13	377-6054-	CUSTOM	IC 2200 CPU CUSTOM 120P PROG GATE ARRAY		1

Handwritten notes:
 480490
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 11

(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 PCA 2200 MICRO VP CPU BD
ASSEMBLY LEVEL & TITLE: 210-F 8937-2200 CS-80
PARTS LIST REVISION (P): 0

CREATED: 12/22/86 08:27
LAST MODIFIED: 11/13/87 11:10 BY: SHA
EDITING REVISION: 17

* REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

01	209-8937-		PCA 2200 MICRO VP CPU BL		1
L6 - L7	377-0884-	62256-12	IC 32K X 8 SRAM 120NS CMOS 28 PIN		6
L21 - L22					
L26 - L37					
L35	377-3137-R1	377-3135-R1	IC PROM (CONTAINS CPU ID)		1
L20	377-3138-R1	377-3138-R1	IC PROM		1
L5	377-3139-RL	377-3137-R1	IC PROM		1
L2	377-3488-		IC PAL 2018 ADDRESS DECODER		1
L38	377-3489-R1		IC PAL 1618 SELECT PROM		1
L42	377-3490-	377-3481	IC PALB16R4 GENERATE SIGNALS FOR DRAM		1
L43	377-3491-	377-3482	IC PAL 16R4 FOUR SEPARATE CAS SIGNALS		1
L44	377-3492-		IC PAL 16R8 WRITE ENABLE		1
L1	377-4513-	31009-12	IC 1MX9 DRAM SIMM 120NS 30 PIN		1
L9 - L10					8
L13 - L15					
L23 - L24					
L3	377-5055-	8429-70	PLCC 8429-70 1 MEG/DRAM CONTROLLER ALS 68 PIN		1
L32	377-6054-	CUSTOM	IC 2200 CPU CUSTOM 120P PROG GATE ARRAY		1

Handwritten notes: 48649D, 9, 11

LVTREP

HANG LABORATORIES, INC.

RUN DATE: 11/13/87 11:18

>>>> LOADING VARIATION TABLE, <<<<< SHEET OF PAGE 1

<FINAL PARTS LIST>

BOARD NO. & TITLE: C8937
PARTS LIST REVISION <P>: 0

PCA 2200 MICRO VP CPU BD

CREATED: 12/22/86 08:27

LAST MODIFIED: 11/13/87 11:10 BY: SHA

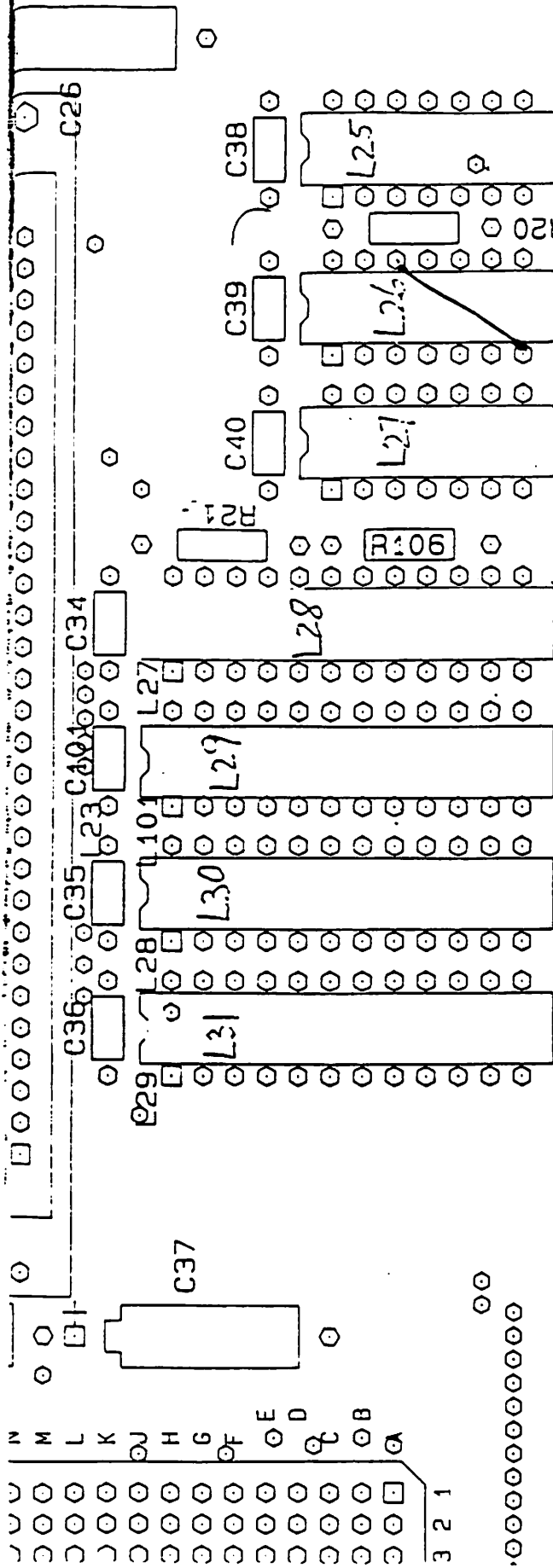
EDITING REVISION: 17

210	DESCRIPTION	L1	L9	L2	L3	L4	L5
210A	8937[2200 CS[2	377[4508	377[3483	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210B	8937[2200 CS[5	377[4508	377[3484	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210C	8937[2200 CS[10	377[4508	377[3485	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210D	8937[2200 CS[20	377[4513	377[3486	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210E	8937[2200 CS[40	377[4513	377[3487	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210F	8937[2200 CS[80	377[4513	377[3488	377[5055	377[3138[R]	377[3138[R]	377[3138[R]

210	DESCRIPTION	L10	L13	L20	L24	L28	L35
210A	8937[2200 CS[2	377[4508	377[3483	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210B	8937[2200 CS[5	377[4508	377[3484	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210C	8937[2200 CS[10	377[4508	377[3485	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210D	8937[2200 CS[20	377[4513	377[3486	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210E	8937[2200 CS[40	377[4513	377[3487	377[5055	377[3138[R]	377[3138[R]	377[3138[R]
210F	8937[2200 CS[80	377[4513	377[3488	377[5055	377[3138[R]	377[3138[R]	377[3138[R]

LOG NO 48049D
SHT 12 OF 11

*** END[O]F[RE]PORT ***



ADD 8537

480490

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WANG

ECO

ECO NO. 47508

SHEET 1 OF 4

ORIGINATOR James Mahoney Dept U7 EXT. 78154 DATE 12/21/87

WRITTEN BY Carol Sullivan M/S 015-1B EXT. 74512 DATE 12/21/87

PART NO. See Below

DWG NO. N/A

MODEL NO. CS2, CS5

CLASS I II III

DOCUMENTS	REVISIONS	
	FROM	TO
HISTORY SHT. 510		10
HISTORY SHT. 210		
ARTWORK		
E-REV.		
ASSY DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
SPI.		
SPECIFICATION		

CONFORMING AREA	CF	REMG	DIST	FINAL ASSY AREA	ASSY AREA	NEXT ORDER	INFO ONLY

CONFORMANCE DATE 3-7-88

APPROVALS

ECO CHAIRPERSON *[Signature]* DATE

DES. ENGRG. *[Signature]*

CUST. ENGRG. *[Signature]*

MFG. *[Signature]*

MTO *[Signature]*

PP&M

F.C.C.

PROD SAFETY

SECURE SYS.

ORIGINATOR *[Signature]*

OTHER

DESCRIPTION

PCA VLSI

PEP #

B-2

DESCRIPTION OF CHANGE

Change BUM 167-3311, 187-3311, 167-3313, 187-3315 and 187-3315 as follows:

WLI#	DESCRIPTION	UM	EA	EA	EA	COMP TYPE	QTY	TYPE	QTY	TYPE
Delete: 21U-8034-1A	PCA VLSI CPU	EA	EA	EA	EA	1	1	1	1	1
Add: 21U-8957-A	PCA 2200 CPU BU	EA	EA	EA	EA	1	1	1	1	1

Change BUM 167-3312, 187-3312, 167-3314, 187-3314, 167-3316, 187-3316 and 289-0485 as follows:

WLI#	DESCRIPTION	UM	EA	EA	EA	COMP TYPE	QTY	TYPE	QTY	TYPE
Delete: 21U-8034-2A	PCA VLSI CPU/MEM	EA	EA	EA	EA	1	1	1	1	1
Add: 21U-8957-B	PCA 2200 CPU BU	EA	EA	EA	EA	1	1	1	1	1

Note: Use all existing inventory when feasible.

REASON/SYMPOTM FOR CHANGE

Implementing a new expandable memory CPU board to manufacturing. Present board (8034) will become obsolete and be replaced by the new expandable 8937.

WANG

**ENGINEERING CHANGE ORDER
CONTINUATION SHEET**

DOCUMENT NO.

OLD REV

NEW REV

DOCUMENT TITLE:

THIS ECO SHT, WHEN ATTACHED TO DOCUMENT OF
PREVIOUS REV CONSTITUTES THE LATEST DOC.

ECO NO.

SHT

OF

DESCRIPTION OF CHANGE:

CONTINUED

Change Item Master description as follows:

WLI#	Line I:	From:	To:	DESCRIPTION	ITEM STATUS
510-8034		From:	To:	PCA VLSI CPU/M 32K M	2
				RPL BY 510-8937 EC47508	3
209-8034		From:	To:	PCA VLSI 512K CPU/M 64K	2
				RPL BY 209-8937 EC47508	3
209-8034-1		From:	To:	PCA VLSI CPU/M 128K/32K	2
				RPL BY 209-8937 EC47508	3
209-8034-2		From:	To:	PCA VLSI CPU/MEM 512K 32K	2
				RPL BY 209-8937 EC47508	3
210-8034-A		From:	To:	PCA VLSI 512K CPU/M 64K M	2
				RPL BY 210-8937-B EC47508	3
210-8034-1A		From:	To:	PCA VLSI CPU/MEM 128K/32K	2
				RPLBY 210-8937-A EC47508	3
210-8034-2A		From:	To:	PCA VLSI CPU/MEM 512K 32K	2
				RPLBY 210-8937-B EC47508	3



ECO

ECO NO. 44.15

SHEET 1 OF 22

ORIGINATOR Joe Frieni M/S 013-290 EXT 6817 DATE 5/28/87

WRITTEN BY Leora Wells M/S 012-188 EXT 283 DATE 5/28/87

PART NO.	SEE BELOW	DESCRIPTION	SEE BELOW
DWG NO.	SEE BELOW	PEP #	HO242A
MODEL NO.	2200-CS		
CLASS	I II III		

DESCRIPTION OF CHANGE

Change Item Status for the following items from I to 2:
458-3760

Release and change the following drawings to production level, Rev. 0:

DWG#	WLI#	DESCRIPTION	DWG REV
			F T
C00451-3781	451-3781	PANEL, POWER SUPPLY	B 0
E00451-5540	451-5540	BRACKET, SUPPORT	B 0
E00451-5541	451-5541	BRACKET, SWITCH	B 0
E00452-4802	452-4902	ENCLOSURE	B 0
D00458-3760	458-3760	COVER, PANEL REAR	B 0
E00458-3777	458-3777	PANEL, REAR WELDMENT	B 0

Transfer all alpha rev stock listed below to non-alpha rev.
451-5541 452-4902 458-3760
458-3777 451-5781 451-5540

NOTE: Notify vendor of alpha rev to non-alpha rev changes.
CONTINUED ON PAGE 2

JUL 02 1987

REASON/SYMPOTM FOR CHANGE

COMPANY CONFIDENTIAL

To release drawings and part numbers to production. Update drawings to reflect latest design changes.

DOCUMENTS

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

CONFORMING AREA	CF	REMG	DIST	ASSY AREA	SCB AREA	ASSY AREA	FINAL AREA	ORDER	INFO ONLY
								X	

APPROVALS

	DATE
ECO CHAIRPERSON <i>J. Mulgan</i>	
DES. ENGRG. <i>John Mulgan</i>	6/3/87
CUST. ENGRG. <i>John Mulgan</i>	6/17/87
MFG. <i>John Mulgan</i>	
MTO	
PP&M	
F.C.C. <i>Michael Beccia</i>	6/1/87
PROD. SAFETY <i>Tom Pozzella</i>	6/17/87
SECURE SYS.	
ORIGINATOR <i>Joe Frieni</i>	6-3-87
OTHER	



ECO

ECO NO. 45183

SHEET 1 OF 3

ORIGINATOR	Carolyn Gacek	EXT. 64520	DATE	6/2/87
WRITTEN BY	Carolyn Gacek	EXT.	DATE	
M/S 018-12C				
M/S				

PART NO.	DESCRIPTION
167/187-3315, 3316	CS-2 128KB CPU CS-5 512KB CPU
DWG NO.	DESCRIPTION
MODEL NO.	DESCRIPTION
2200CS	PEP #
CLASS	DESCRIPTION
I II III	

DESCRIPTION OF CHANGE

Change Boms 167/187-3315, 3316 as follows:

WLI	Description	UM	Comp Type	Qty	From	To
	Cable tie	ea	1	2		
	8-32x1/2 ph	scr ea	1	3		
	Cable Clamp	ea	1	8		
	Base, Cable mount	ea	1	6		
	Dock Merge Label	EA	1	3		
			1	2		
			1	1		
			1	2		
			1	1		
			1	1		

REASON/SYMPOTM FOR CHANGE

Updating per actual build configuration.

JUL 02 1987

DOCUMENTS

HISTORY SHT.	FROM	TO
510		
210		
ARTWORK		
E-REV.		
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.		
CBL DWG.		
SPI.		
SPECIFICATION		

CONFORMING AREA	CF	REMG.	DIST.	FINAL ASSY AREA	SUB ASSY AREA	NEXT ORDER	INFO ONLY
							X

APPROVALS

CONFORMANCE DATE: N/A

ECO CHAIRPERSON: *[Signature]* DATE

DES. ENGRG. *[Signature]*

CUST. ENGRG. *[Signature]*

MFG. *[Signature]*

MTO *[Signature]*

PP&M

F.C.C.

PROD. SAFETY

SECURE SYS.

ORIGINATOR: *[Signature]* 6-2-87

OTHER: *[Signature]* 6-5-87



**ENGINEERING CHANGE ORDER
MANUFACTURING IMPACT SHEET**

ECO NO. 25107
SHEET 2 OF 3

PART NO./ASSY NO.

MATERIAL DISPOSITION	QUANTITY	DISP	COST
PARTS ON HAND			
PARTS ON ORDER			
ASSEMBLIES IN PROCESS			
FINISHED SUB ASSEMBLIES			
ASSEMBLIES IN UNITS			

PREPARATION, IMPLEMENTATION COSTS

COST OF INCORPORATION

PRODUCT COST CHANGE PER UNIT

PRODUCTION QUANTITY FROM MPP IN WKS _____ WKS

PRODUCT COST CHANGE (EXTENDED)

TOTAL COST (OR COST SAVINGS) OF ECO

REMARKS

SIR Dmn

~~6/18/87~~
7/16/87

SMS EFFECTIVITY DATE

DOCUMENTATION ONLY

DISPOSITION

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

AFFECTED SITES

- | | | |
|----------------------------------|--|-------------------------------|
| TEWKS <input type="checkbox"/> | BOS <input type="checkbox"/> | HONG <input type="checkbox"/> |
| PKWD <input type="checkbox"/> | IR <input checked="" type="checkbox"/> | MEX <input type="checkbox"/> |
| METH <input type="checkbox"/> | PR <input type="checkbox"/> | |
| LOW <input type="checkbox"/> | SCOT <input type="checkbox"/> | |
| HLOK <input type="checkbox"/> | AUST <input type="checkbox"/> | |
| PT BLVD <input type="checkbox"/> | TW <input type="checkbox"/> | |

APPROVALS

ECO ADMIN

MFG ENG

QUALITY

MATERIALS

PROD. CONTROL

FINANCE

RE-MFG

OTHER

Sam J. [unclear] 7/1/87

[Signature] 6/23

WANG

ENGINEERING CHANGE ORDER CUSTOMER ENGINEERING IMPACT SHEET

ECO NO. 45187
SHEET 3 OF 3

ALL UNITS	<input type="checkbox"/>
PROB ONLY	<input type="checkbox"/>
INFO	<input checked="" type="checkbox"/>
FCO REQUIRED	<input type="checkbox"/>
IMMED	<input type="checkbox"/>
NEXT CALL	<input type="checkbox"/>
IS A MUB REQUIRED FOR FSC REWORK	<input type="checkbox"/>

IMPACT COMMENTS

Documentation

	DOMESTIC	INTER-NATIONAL
EST. UNIT POP		
EST. SPARE POP		
TOTAL		

EST. COST IMPACT	APPROVALS	DATE
MATERIAL	TECH OPS	
LABOR	LOGISTICS <i>Phil Murphy</i>	<i>6/23/87</i>
TOTAL	FSC SUPPORT	
IMPLEMENTATION PERIOD	FINAL <i>Williams</i>	<i>6/34</i>
ANNUAL COST	OTHER	

GENERAL COMMENTS

TAC

Problem Call

Control Number 08237035

Contact Name LARRY HORNIBROOK Position CE
Rdb # 3522 Tdx # Phone # 405 848 9852 Ext #

System Type 2200CS Device Type DS
Utility Name Software Level

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

Use the following area to describe the site that created this request

Cust/Office Name OMEGA INSURANCE Phone # 405 769 6701
Address 2K08 City CHOCPAU State OK
On Site Contact Name

Problem (*) Solution (+)

*EMP 28543

*DISPATCH 20A206898

*HAVING CS GETTING PEDM ERROR WHILE BOOTING UNSURE WHETHER
*HARDWARE OR SOFTWARE

8/24/88: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
>REDSHAW ACCOUNT USING THE NEW SIMMS CPU BRDS W/
128K MEM. GETTING PEDM ERROR CONSISTENTLY ON BOOT.
TRIED ANOTHER BRD & NO CHANGE. TESTED W/ O/S 3.1 &
NO PROB. REDSHAW MUST EITHER UPGRADE THE CUST O/S
TO 3.1 OR MUST DOWNGRADE TO A NON-SIMM BRD. CE TO
TALK W/ CUST & CALL BACK. (15MIN) MIKEB

8/25 4:29 CE CALLED AND SAID THANKS FOR YOUR HELP. HE SAID
IF YOU WANT YOU CAN CALL RUTH AT 1-800-999-1115 AT REDSHAW
ACCOUNT D WHITE

8/26/88: CALLED RUTH AT REDSHAW. WAS NOT AVAILABLE. LEFT
MESSAGE TO CALL. LEFT MESSAGE FOR CE TO CALL.

(10MIN) MIKEB

>RUTH CALLED BACK. RT NOW WILL NEED TO USE THE
OLDER SINGLE BRD CPU CARDS TO ALLEVIATE THE COMPAT
PROB. WILL TALK TO R&D ABOUT STEPS TO TAKE. LEFT
MESSAGE FOR MR TO CALL. (20MIN) MIKEB

8/26 11:06 CE WILL C/B VSP

8/26 1:35 CALLED AND NEEDS A C/B ON HIS BEEPER @ # 405-686-
3286 CAREN 1:35

8/26/88: TALKED W/ CE. NEED TO CHECK CHIP L45 TO INSURE IT
IS NOT A MOTOROLA MC74F539N. IF IT IS, NEED TO TEST
W/ A BRD W/ A DIFFERENT L45 CHIP. IF FAILS W/ GOOD
CHIP WILL NEED TO TEST W/ 8 PARTITIONS OR MORE ON
O/S'S 2.7 & 3.0. IF CAN'T CHECK WILL REQUEST BRD
SENT IN. (20MIN) MIKEB

8/29/88: BRD HAS GOOD CHIP AT L45. CE TO SEND IN BRD FOR TESTING W/ OUR 2.7 & 3.0. (10MIN) MIKEB

9/2/88: RCV'D BRD. OUR MVP 2.7 IS NOT RECOGNIZING THE PAL CHIP & AS A RESULT IT WILL ALLOW YOU TO GEN 512K MEM. GEN'G BEYOND 128K WILL CAUSE A PEDM ERROR. R&D LOOKING INTO SITUATION. PROB LOOKS TO ONLY EXIST ONLY W/ 128K BRDS. R&D TO TEST A 512K W/ OUR 2.7. (1HR) MIKEB

9/6 CALLED AND WILL CALL BACK LATER. CAREN 11:15
FLASHED

12:15 CALLED CE. CUST NOW HAVING ANOTHER PROB, CAN'T ACCESS DISK. CE GOING ON SITE TODAY. TOLD CE THERE IS A PROB W/ 2.7 USING THE NEW BRDS AS 2.7 WILL NOT READ THE PAL & THINKS 128K BRD HAS 512K. WAITING FOR WORD BACK FROM R&D ON FIX. ALSO WANTS TO KNOW IF OLD & NEW BRDS LOGISTICALLY INTER-CHANGEABLE. (1HR) MIKEB

9/12/88: BRDS ARE LOGISTICALLY INTERCHANGEABLE /JC. CALLED CE. INSTALLED O/S BRD. LEAVING CALL OPEN AS POSSIBLE BETA SITE FOR NEW PAL. (10MIN) MIKEB

10/17/88: CE TO CHECK W/ CUST TO SEE IF WILLING TO BETA TEST NEW CHIP. WILL CALL BACK. (10MIN) MIKEB

10/18/88: CE CALLED IN. CUST RELUCTANT TO BETA UNTIL END OF MONTH. WILL CHECK FOR OTHER BETA SITES WHICH COULD TEST EARLIER & USE THIS SITE AS A BACKUP IF NEEDED. (10MIN) MIKEB

10/19 9:05 CALL BACK TO OFC VSP

10/20/88: TALKED W/ CE. REDSHAW DOES NOT WANT US BETA TESTING CHIP AT SITE. REDSHAW WILL BETA TEST AT THEIR HO. RUTH MOORE IS CONTACT AT REDSHAW, 1-800-999-1115. WILL CHECK W/ R&D THEN CALL REDSHAW. (5MIN) MIKEB

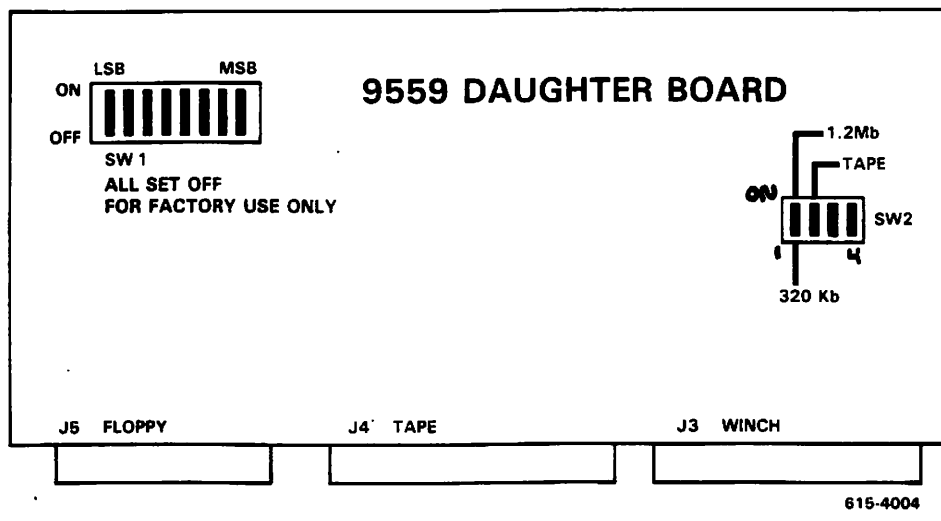
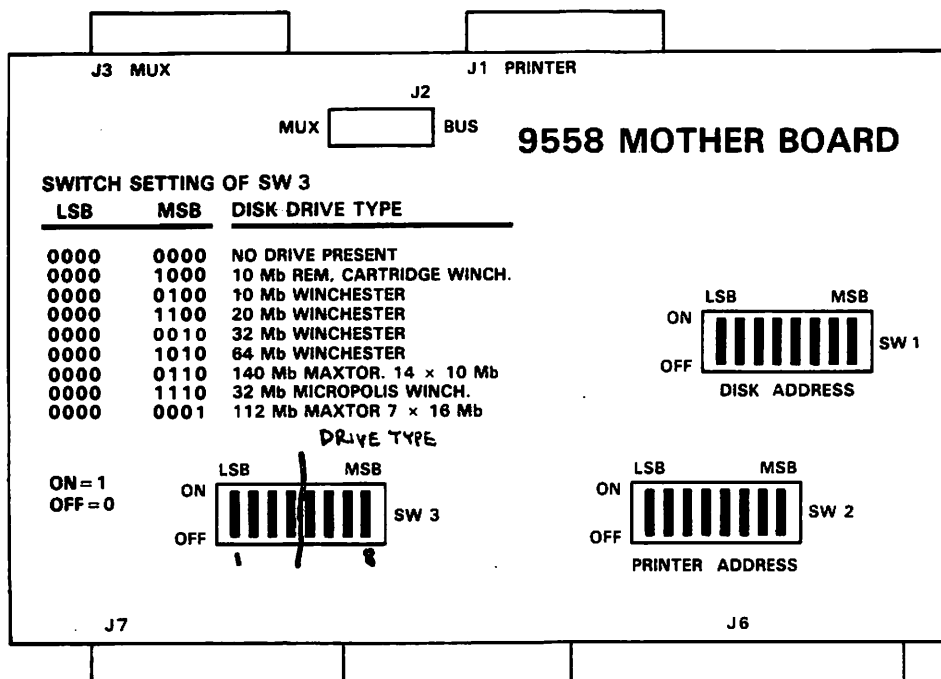
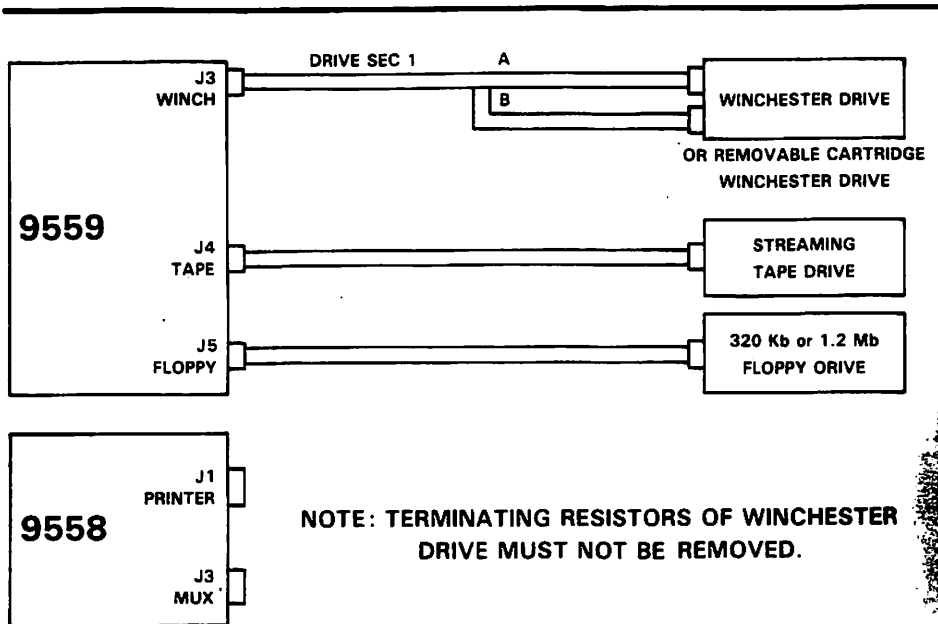
12/12/88: IN TRAINING TILL 12/26. LEFT MESSAGE. (5MIN) MIKE

12/27/88: TALKED W/ CE. WILL SEND OUT CHIP FOR BETA TESTING TODAY. (5MIN) MIKEB

>CHIP SENT OUT FED XPRESS, AIR BILL 1069820735. CE TO CALL BACK WHEN INSTALLED & TESTED. (10MIN) MB

12/28/88: RCV'D BETA CHIP BUT INSTALLED AT SITE ON 512K BRD. NEEDS TO PUT ON 128K BRD & VERIFY AT PARTITIONING SCREEN ONLY SHOWING 128K. CE TO CORRECT & TEST. (10MIN) MIKEB

+INSTALL NEW CHIP AT L42 & WORKING PERFECTLY. CLOSING CALL. 1/4/88 (10MIN) MIKEB





TECHNICAL SERVICE BULLETIN
SECTION: HardWare General

NUMBER: HWT 9449 REPLACES: _____ DATE: 04/17/90 PAGE 1 OF 2

MATRIX ID. 4103 PRODUCT/RELEASE# 2200 CS-D/N

TITLE: DPU Disk Port & Jumper Information/Part Number Correction

PURPOSE:

To inform the field of the purpose of the disk/mux port and jumper on the 212-7113 DPU Board which is not documented and to provide the field with the correct part numbers for the Power Supply & On/Off switch.

EXPLANATION:

Every CS-D CPU comes with a 212-7113 DPU Board used to control all internal drives. The DPU Board consists of a 210-9558 Motherboard which has two I/O connectors and a 210-9559 Daughter Board. The top connector is a standard system printer port. The bottom connector is a disk/mux port. The disk/mux port is used to allow access to the internal CS-D drives by other CPUs. This port is activated by the MUX/BUS jumper located on the 210-9558 motherboard up next to the rail between the 2 I/O connectors.

Normally this jumper will be in the BUS position. This causes the disk/mux port to be inactive allowing only the internal CPU to have access to it's drives. When the jumper is moved to the MUX position all access must be through the disk/mux port including access by the CS-D CPU itself.

In the MUX position, the drives and DPU Board should be thought of as a separate device much like the DS Cabinet or the 2275. The disk port on the 212-7113 DPU Board is the I/O connector similar to the I/O connectors on the back of the DS & 2275. Any CPU requiring access to these drives must now have a disk controller cabled to this port. Normally when in the MUX position a 2275MUX Master Board, 210-8824, would be installed in the I/O section with a cable from it's disk port to the disk/mux port of the DPU Board. This connection allows the CS-D to access the internal CS-D drives. Other CPU's (up to 16 can be mux'd) using 210-7715 boards can be cabled (100' max) to the 2275MUX Master CPU ports allowing them access to the internal CS-D drives. Of course a standard disk controller in any CPU could be cabled directly to this port, but that would limit access to only that CPU. When used in the MUX position, the disk controller in the CPU accessing the drives determines the device address via the device address switch bank on that board. This overrides the device address set on the CS-D DPU Board. This is the same way it is done on all similar 2200 disk connections. Switch settings are discussed on page 2.

GROUP: 2200 Product Support MAIL STOP: 001-330

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TECHNICAL SERVICE BULLETIN
SECTION: SoftWare General

NUMBER: HWT 9449 REPLACES: _____ DATE: 03/06/90 PAGE 2 OF 2
MATRIX ID. 4103 PRODUCT/RELEASE# 2200 CS-D/N
TITLE: DPU Disk Port & Jumper Information/Part Number Correction

EXPLANATION (cont'):

Switch settings for the CS-D DPU Board can be found on a sticker on the right side panel of the CS-D cabinet. These switch settings are correct. Appendix A of the CS Maintenance Manual, 741-1769-2, covers the CS-D & CS-N CPU's and on page A-38 incorrectly shows the drive type switch settings. What is shown as ON should be OFF and vice versa. There is also added confusion as the sticker & manual do not agree on the switch labeling and the male connectors on the sticker do not match the board. Use the side panel for sw settings but beware, labeling may not match. To access, remove the top cover by removing the 2 screws in back. The side panel can then be removed by sliding it up. The correct sw settings are:

210-9558 Motherboard

SW 1 - Winc Drive Type - between L8 & L13 near bottom of board
 No Winc = All OFF 10 Meg Rem Winc = 5 ON only
 10 Meg Winc = 6 ON only 20 Meg Winc = 5,6 ON only
 32 Meg Quantum Q540 = 7 ON only 64 Meg Winc = 5,7 ON only
 140 Meg Maxtor = 6,7 ON only 32/42 Mg Micropolis = 5,6,7 ON
 112 Meg Maxtor = 8 ON only

SW 2 - Printer Address - next to L69 just above connector J5
 215 = 1,3,5 ON only 216 = 2,3,5 ON only 217 = 1,2,3,5 ON only

SW 3 - Drive/s Device Address - between L76 & L77 at top of board
 310 = 5 ON only 320 = 6 ON only 330 = 5&6 ON only

210-9559 Daughter Board

SW 1 - Factory Use Only - 8 bank sw at top of board ALL OFF
SW 2 - Floppy/Tape Switch - 4 bank switch at bottom of board
 1 OFF = 320 Kb Floppy 1 ON = 1.2 Meg Floppy
 2 OFF = No Tape 2 ON = Tape Drive installed
 3,4 = OFF (not used)

ADDITIONAL INFORMATION:

Also in Appendix A of the CS Manual, 741-1769-2, on pages A-54 and A-55 the AC On/Off Switch and the CS-D/N SPS-255 Power Supply have incorrect part numbers. The part numbers shown are for the CS. The On/Off switch is not physically compatible and although both CPU's use the same base Power Supply the harness is different. The correct part numbers are:⁴⁰

CS-D/N On/Off Sw 325-0105 CS-D/N SPS-255 Power Supply 270-080-1

GROUP: 2200 Product Support MAIL STOP: 001-330

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CS-D/N COMPUTER SYSTEM - DESCRIPTION/STRATEGY

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12/17/92

- CS-5D 512KB CPU with internal disk storage
- CS-5N 512KB CPU without internal disk storage

The CS-D combines into one package the functionality of a CS CPU, a data processing unit (DPU) as contained in a DS, and a 22C11 printer/disk I/O controller. With the ability to have up to three internal storage devices, the user whose requirements do not go beyond a single fixed Winchester (or 140MB) need not purchase a data storage cabinet or a 22C11.

The CS-D is an enhanced, redesigned, repackaged and cost-reduced VLSI-based CPU, consistent with the image and appearance of the VS product line. The hardware is compatible with all 2200, MicroVP and CS peripherals, I/O controllers and CS/DS options, with one exception: the DS-10R is not supported on the CS-D/N. THIS UNIT IS ALSO UPGRADEABLE TO EITHER THE CS/386 OR TURBO, PROVIDING EXTENSIVE GROWTH AND PERFORMANCE POSSIBILITIES. Built on the base of the CS, the CS-D has a restyled cabinet and a new mother board to accommodate an external DPU and three internal storage devices. The CPU, a high-performance VLSI processor, supports up to 16 terminals and 16 jobs concurrently in a multi-programming environment. Including the CPU and storage devices in one cabinet results in a compact and cost-effective mini-computer system. The CS-D chassis contains nine input/output (I/O) slots to support a wide range of other peripheral devices. Each I/O slot can contain a controller for one or more peripheral devices. These devices include a selection of flexible and hard external disk drives and an extensive array of printers. The CS-D system offers data communications capabilities and an operating system with low overhead. Designed for simplicity of operation and ~~flexibility~~ flexibility in system configuration, the CS-D can be easily adapted to meet each user's unique processing requirements. The system performs automatic data compression on information transmitted to each terminal to accelerate communication and increase response time.

The CS-D control memory contains 32 KB of 24-bit words. When the system is powered on, the ~~system programs are~~ ^{operating code} loaded into control memory from the system disk and reside ^{in memory} until the system is either powered off or re-initialized. Since the contents of control memory are inaccessible to the user or the user's programs, the ~~system programs~~ ^{operating programs} ~~is~~ ^{are} always protected against accidental interference or destruction. THERE

User memory is the area of memory available to the user's programs and data. User memory is divided into areas, or banks, of 64 KB each. The user can subdivide each bank into a number of partitions of fixed size, each of which is capable of executing a separate program. Partitions cannot span bank boundaries. Within each bank, a fixed amount of memory is reserved for system control information. Only 16 banks (up to 1 MB) of user memory can be used for programs and data. The remaining ~~banks~~ ^{memory} can be used only for RAMDISK.

The CS-D is easy to operate and to program. No special job-control languages or elaborate operating procedures are involved. System resources are allocated through a supplied partition-generation program that guides the user through the process of configuring user memory. By running this program, the user creates partitions and assigns them to terminals. Each terminal can control one or more partitions. In a fixed-partition memory scheme, user memory is divided into a number of distinct areas called partitions, each of which can contain a separate program. The central processor allocates intervals of processing time to each partition in turn. Thus, the program in an individual partition is executed briefly before the CPU services the next partition.

The CS-D/N supports all 2200/MicroVP series terminals. Terminals can be attached to the CPU either locally, at distances up to 2000 feet, or remotely, through the use of modems and telephone lines. Since each terminal can support its own local printer, screen dumps and standard printing operations can be performed.

Optionally, the CS-D can be equipped with communications controllers that allow remote

devices to be attached directly to the CPU and accessed by a user at the terminal. The CS-D also supports asynchronous, synchronous and advanced bit-oriented protocols.

The DPU can support either a 320KB or 1.2MB diskette, a 150MB tape streamer, one fixed Winchester and 1,024 sectors of cache. The Winchester supported are a 20MB, 32MB, 64MB and a 140MB that can either be formatted as fourteen 10MB platters (140MB) or seven 16MB platters (112MB). ^{WITH CUSTOMER HARDWARE TWO USER CAN CONFIGURE WITH THEIR FIXED WINCHESTER WITH} The diskette and tape streamer are visible and easily accessible for inserting and removing media. The fixed Winchester is inside the cabinet, but a disk activity light, located below the power-on indicator light, is provided on the front of the CPU panel.

Unlike the DPU contained in the DS, the DPU for the CS-D is an external board that is inserted into I/O slot 9, the same as an I/O controller. The DPU also contains a system printer port. Hence, no I/O slots are lost because the DPU occupies the same I/O slot that a 22C11 dual printer/disk controller would occupy if ~~used~~ ^{with} an external DS.

The DPU has the same functionality as the DPU in the DS, except that it only supports three storage devices instead of six, making it attractive to users with modest storage requirements. 1,024 sectors of cache are included, plus the ability to allocate up to 990 sectors (256 bytes/sector) of ~~the cache memory to~~ ^{AS} ~~DSPC~~ RAMDISK. Once the ~~DS~~ RAMDISK is established, it is accessed as a normal disk platter and supports all disk commands. It is best suited for frequently accessed programs or data files whose contents remain constant. If the number of sectors to allocate is specified as 0, the ~~DS~~ RAMDISK is de-allocated. NOTE : RAMDISK provides only temporary storage. All data is lost when the system is turned off.

Up to 1MB of main memory can be allocated to ~~program~~ ^{PARTITIONS} (twice the previous capacity), and all unused main memory can be allocated to RAMDISK. Therefore, with an 1MB CPU, a user can have up to fifteen 56KB partitions and one 61KB partition. With an 8MB CPU, a user can have 1MB allocated to ~~program~~ ^{PARTITIONS} and 7MB of RAMDISK.

The ~~fixed Winchester~~ ^{INTERNAL DRIVES} can be multiplexed the same as a DS, with up to 16 CPUs by using a combination of 2275MUX and 2275MUXE controllers. The difference is that the DPU, instead of the DS, is cable-connected to the 2275MUX. Three CPUs can be cable-connected to the 2275MUX. Additional CPUs can be multiplexed ~~to the fixed disk storage unit~~ by adding up to three model 2275 MUXEs (MUX Extenders). Each 2275MUXE supports four CPUs. These boards are placed next to the 2275MUX and are connected to the 2275MUX by a ribbon cable. Participating CPUs must each have a 22C80 controller.

CPUs multiplexing the fixed Winchester can be any type of CS/2200 CPU that supports a 22C80 board. These CPUs can be CS-Ds with their own local storage. Up to two external DSs can be added to a CS-D via ~~22C11~~ disk/printer controllers. In addition, the end-user can remove the storage devices from the CS-D and insert them into a DS, ~~if the need arises to replace the internal storage with a DS. The DPU is then removed and replaced by a 22C11 disk controller.~~

The CS-N is a CS-D without a DPU board. Panels cover the diskette and tape streamer slots. The CS-N is available with either 128KB, 512KB, 1MB, 2MB, 4MB or 8MB (CS-80N) of main memory. The CS-N replaces the CS-2 through CS-80. As with the previous CS-2 through CS-80, an external DS is required for storage. CS-N models are field-upgradeable to a CS-D.

Using Release 3.3 or later of the multi-user operating system, up to 1MB of memory may be allocated to ~~program~~ ^{PARTITIONS}. Any unused main memory or memory in excess of 1MB (up to 7MB on a 8MB CPU), may be allocated to RAMDISK. RAMDISK allows a portion of memory to be used as a high-speed disk, ~~and~~ ^{and} ~~All of the~~ BASIC-2 statements can be used with RAMDISK. Since user memory is used to emulate disk storage and there is no I/O to a physical disk address, RAMDISK access is considerably faster than access to an actual disk.

The CS-D/N can be configured as a single-user, standalone system with the same features and language capabilities as the multi-user arrangement. Unlike most single-user systems, the CS-D/N enables a single terminal to control several programs executing concurrently, while maintaining fast execution speeds. Thus the CS-D/N are

WINCHESTER WITH
FROM 1 TO 14
ADDRESS
16 MB
WITHIN THE
LIMITS OF THE
DRIVE.

SHOULD IT BE
DS1R50.

excellent choices for the first time user because they combine high-performance computing with the capacity for expansion from a single-user system to a multi-user system.

The new multi-user operating system supports up to 16 users, has more than 35 BASIC-2 enhancements, and the ability to support all unused main memory as RAMDISK.

~~BOTH THE CS-D AND CS-N ARE DESIGNED TO BRING THE CS-26 UP TO THE NEXT EXTENSIVE LEVEL~~
Users needing less storage than 140MB or a single Winchester should purchase a CS-D series CPU, but those needing more than 140MB or more than a single fixed Winchester should order a CS-N and a DS. AND PROVIDING POSSIBLE ENHANCEMENTS

Users who buy a CS-D CPU but later need more than 140MB or a second Winchester would now order a DS and have the option of transferring CS-D drives to the DS.

Users who want a lower-cost multiplexed CPU solution should order a CS-D as the main CPU and CS-Ns without the built in DPU as CPUs multiplexing the internal disk drive.

Larger users wanting unlimited storage flexibility, with the ability to multiplex a common disk or disks and have local storage capabilities, should order either a CS-D or CS-N with a DS as CPU 1, and CS-Ds as additional CPUs.

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CS-D/N COMPUTER SYSTEM - BASIC SYSTEM COMPONENTS

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12/17/92

- o CPU with 128K, 512K, 1MB, 2MB, 4MB or 8MB of User Memory
- o 32K of Control Memory
- o Multi-user BASIC-2 Operating System
- o 9 I/O Slots
- o DPU controller (CS-D models only)

COUNTRY KITS

When ordering a CS-D or CS-N, a country kit, CS-D-CK-XX or CS-N-CK-XX, must be ordered for each CPU. A country kit is a no charge item containing a country-specific power cord and documentation.

OPTIONS

DISK CONTROLLER

- 2275MUX - 2275/DS Disk Multiplexing Unit. Supports up to 3 CPUs
- 2275MUXE - 2275/DS Disk Multiplexing Extender. Supports up to 4 CPUs
- 22C11 - Dual Controller for Disk/Diskette and Printer
- 22C80 - Disk Multiplexing Controller. One required for each CPU interfacing with 2280MUX or 2275MUX

LOCAL COMMUNICATIONS OPTION

- 2258-X - Allows the CS-D or CS-N to communicate with a VS

PRINTER CONTROLLER

- 22C11 - Dual Controller for Disk/Diskette and Printer

TELECOMMUNICATIONS CONTROLLER

- 2227B - Async. Communication Controller (Includes 195-2056-X software)
- 2228B - Communication Controller 8K. (Includes 195-2057-X software)
- 2228C - Communication Controller for IBM 3275 Emulation. (Includes 195-2048-5 software)
- 2228D-4 64K Communication Controller RS-232-C/V.24/RS-449 only
- 2229N - Null Modem

WORKSTATION CONTROLLER

- 2236MXE - 4-Port Terminal Processor with Asynchronous Communication capabilities
- 22C32 - Triple Controller for diskette, printer and workstation

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CS-D/N COMPUTER SYSTEM - SPECIFICATIONS

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12/17/92

CENTRAL PROCESSOR

Floating Point	Yes
Interrupt Levels	8
Logic Terminology	MSI
Microprogrammed	Yes
Standard Registers	48

MEMORY

Control Memory	32K
Minimum User Memory	128K
Maximum User Memory	8MB

SYSTEM MAXIMUMS

Disk Units	3
Partitions	16
Printers	depends on I/O availability SUPPORTS 3 SYSTEM PRINT
Terminals	16 * EACH TERMINAL CAN SUPPORT A LOCAL PRINT.

PERFORMANCE

Cycle Time	600ns
Word Length	16 bits

PHYSICAL DIMENSIONS

Height	23.10 inches
Width	13.60 inches
Depth	20.30 inches
Weight	66 lbs (without drives)

POWER REQUIREMENTS

Dedicated Branch Circuit	Yes
Incoming Line Voltages	5 amps @ 115V or 2.5 amps @ 230V
Line Frequency	50Hz +/- 1Hz or 60Hz +/- 1Hz
Power Connection	8-ft power cord

ENVIRONMENTAL

Heat Dissipation	1020 BTU/hour
Humidity	35 to 65% noncondensing
Noise Level	35 dB (A)
Temperature Range Operating Environment	50 to 90 degrees F

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CS-D/N COMPUTER SYSTEM - DISK SUPPORT

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12/17/92

For detailed information regarding the following currently marketed disk drives, use the PF16 key and choose the PERIPHERALS pick off the 2200 PRODUCT menu.

Information regarding support of select discontinued disk drives can be found in the Discontinued Product Support section.

DS	Data Storage Cabinet
DS-1.2	1.2MB Floppy Diskette
DS-20	20MB Fixed Winchester
DS-32	32MB Fixed Winchester
DS-64	64MB Fixed Winchester
DS-140	140MB Fixed Winchester
DS-320	320KB Diskette Drive

The following table illustrates the maximum number and type of fixed/removable Winchesters, diskette and tape streamer the CS-D can accommodate. The CS-D uses the same storage devices as the DS, with the exception of the DS-10R. Orders for storage devices must always include either a DS-320 or DS-1.2, in addition to any other storage device. A minimum allowable configuration is a CS-D and either a DS-320 or DS-1.2. The CS-D supports a maximum of three devices. Order DS-TSA, DS-20A, DS-32A, 64A or DS-140A model numbers for field upgrades. For CS-Ns, order DS plus peripherals, the same as a CS/DS configuration.

Diskette	Tape Streamer	20MB Winchester	32MB Winchester	64MB Winchester	140MB Winchester
1	0	1	0	0	0
1	0	0	1	0	0
1	0	0	0	1	0
1	0	0	0	0	1
1	1	1	0	0	0
1	1	0	1	0	0
1	1	0	0	1	0
1	1	0	0	0	1

NOTE: ~~The DS-140 can be configured as either ten 14MB platters or seven 10MB platters.~~ WITH THE LATEST FIRMWARE AND SOFTWARE THESE WINCHESTER CAN BE CONFIGURED BY THE USER WITH FROM 1 TO 14 ADDRESSES UP TO 16 MB IN SIZE NOT TO EXCEED IN TOTAL THE ~~DS~~ CAPACITY OF THE DRIVE.

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CS-D/N COMPUTER SYSTEM - PRINTER SUPPORT

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12/17/92

For detailed information regarding the following currently marketed printers, use the PF16 key and choose the PERIPHERALS pick off the 2200 PRODUCT menu.

Information regarding support of select discontinued printers can be found in the Discontinued Product Support section.

2200-PM017	400 cps matrix printer
2273-1	250 lpm band printer with 1 utility B print band
2273-2	600 lpm band printer with 1 utility C print band
DM50/300	50/300 cps multi-functional matrix printer
LCS8-DSK	8 ppm postscript laser printer
LCS15-CMB	15 ppm laser printer
LCS15-DSK	15 ppm laser printer
PM060	Multi-functional matrix printer
HQ300	300 cps matrix printer

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CS-D/N COMPUTER SYSTEM - SOFTWARE SUPPORT

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12/17/92

For detailed information regarding the following currently marketed software, use the PF16 key and choose the SOFTWARE pick off the 2200 PRODUCT menu.

Information regarding support of select discontinued software can be found in the Discontinued Product Support section

2200/CS Word Processing
DATAMERGE
IDEAS Release 1
IDEAS Release 2
ISS Release 5.5

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CS-D/N COMPUTER SYSTEM - TAPE SUPPORT

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12/17/92

For detailed information regarding the following currently marketed tape drives, use the PF16 key and choose the PERIPHERALS pick off the 2200 PRODUCT menu.

Information regarding support of select discontinued tape drives can be found in the Discontinued Product Support section.

2209A	1600 bpi 9-track tape drive with controller
DS-TS150	150MB tape streamer

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CS-D/N COMPUTER SYSTEM - TELECOMMUNICATION SUPPORT

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12/17/92

For detailed information regarding the following currently marketed telecommunications, use the PF16 key and choose the TELECOMMUNICATION pick off the 2200 PRODUCT menu.

SOFTWARE

Information regarding support of select discontinued telecommunications can be found in the Discontinued Product Support section.

IBM BSC Batch
Remote Control and Maintenance

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CS-D/N COMPUTER SYSTEM - WORKSTATION SUPPORT

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12/17/92

For detailed information regarding the following currently marketed workstations, use the PF16 key and choose the PERIPHERALS pick off the 2200 PRODUCT menu.

Information regarding support of select discontinued workstations can be found in the Discontinued Product Support section.

2536DW

Async Workstation

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CS-D/N COMPUTER SYSTEM - DOCUMENTATION

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12/17/92

LITERATURE

Part Number	Title
700-3231G	Programming in BASIC
700-40801 F	CS Multi-user BASIC-2 Language Reference Manual
700-40801E.01	CS Multi-user BASIC-2 Language Reference Manual Update
700-6855A	CS BASIC-2 Utilities Reference Manual
715-3949A 700-6855A.01	BASIC-2 Utilities Reference Manual
700-6855A.02	CS BASIC-2 Utilities Reference Manual
700-8098A	Asynchronous Communications User's Guide
714-9219	2200 DS Floppy Install
715-1831A	Multi-user BASIC-2 Operating System CSRN
715-2211	Data Storage Cabinet Utilities CSRN
715-2252	2536DW Interactive Terminal User's Guide
715-2364A	CS-D User's Guide

DATA SHEETS/MANUALS

Part Number	Title
715-2363	CS-D Data Sheet

FOCUS

Title	Date
CS/386 Turbo System	10/01/91
SCSI Disk Controller for 2200 Products	12/01/90
CS 2200 DS peripherals repriced/discontinued	11/01/90
PC2200 2200/CS/CS386 Workstation Terminal Emulator	07/15/89
CS/2200 Mature computer architecture incorporates new platform	05/15/89
New CS System Package and Rel 3.1 Operating System Enhancements	12/15/87

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CS-D/N COMPUTER SYSTEM - UPGRADE INFORMATION

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12/17/92

UJ-5057	128K to 512K Memory Upgrade
UJ-5059	1MB to 2MB Memory Upgrade
UJ-5060	1MB to 4MB Memory Upgrade
UJ-5061	1MB to 8MB Memory Upgrade
UJ-5062	2MB to 4MB Memory Upgrade
UJ-5063	2MB to 8MB Memory Upgrade
UJ-5064	4MB to 8MB Memory Upgrade
UJ-5065	128 to 1MB Memory Upgrade
UJ-5066	128K to 2MB Memory Upgrade
UJ-5067	128K to 4MB Memory Upgrade
UJ-5068	128K to 8MB Memory Upgrade
UJ-5069	512K to 1MB Memory Upgrade
UJ-5070	512K to 2MB Memory Upgrade
UJ-5071	512K to 4MB Memory Upgrade
UJ-5072	512K to 8MB Memory Upgrade
UJ-6047	CS-N to CS-D Upgrade
CS-N-TURBO	CS-N+CS/386-N To 4MB CS/386 Turbo CPU
CS-D-TURBO	CS-D+CS/386-D To 4MB CS/386 Turbo CPU

Upgrades from 128K or 512K to at least 1MB involve removal of the existing memory board and replacing it with the new board.

Any VLSI CPU (MVP-128, MVP-512, MicroVP-1, MicroVP-2, CS, CS-D, or CS-N) that has 1MB or more can be field upgraded to a maximum of 8MB by adding memory modules to the CPU board. ^{AND REPAIRING A PAL CHIP}

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CS-D/N COMPUTER SYSTEM - DISCONTINUED PRODUCT SUPPORT

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12/17/92

The following represents a list of select discontinued products that are currently supported. This list is not all inclusive.

Disk Drives :

2230-1	Fixed/removable disk drive
2230-2	Fixed/removable disk drive
2230-3	Fixed/removable disk drive
2260B	10MB fixed/removable disk drive
2260BC	5MB fixed/5MB removable disk drive with 22C13 controller
2260C	5MB fixed/5MB removable disk drive with 22C12 controller
2270A-1	.25MB Industry Compatible Single Removable Diskette Drive
2270A-2	.50MB Industry Compatible Dual Removable Diskette Drive
2270A-3	.75MB Industry Compatible Triple Removable Diskette Drive
2275-10	10MB 5 1/4" Winchester Drive 320KB Floppy Drive
2275-20	Dual 10MB 5 1/4" winchester drive
2275-30	30MB 5 1/4" Winchester Drive 320KB Floppy Drive
2275-60	Dual 30MB 5 1/4" winchester drive
2280-1	13.4 Removable/13.4MB fixed disk drive
2280-2	13.4 Removable/40.2MB fixed disk drive
2280-3	13.4 Removable/67MB fixed disk drive
2280-3A	13.4 Removable/67MB fixed disk drive with 22C14 DPU
2280N-1	13.4 Removable/13.4MB fixed disk drive without DPU
2280N-3A	13.4 Removable/67MB fixed disk drive without DPU
DS-10R	10MB Removable drive for DS

Tape Drives :

2209	800 bpi 9-Track tape drive
2229	Four track, 6400 bpi, 14MB tape drive
DS-TS	45MB tape streamer

Printers/Plotters :

2200-PM018	60 cps daisy printer
2201L	15 cps output writer
2211M	Printer multiplexer
2221W	200 cps matrix printer with stand
2231	80 column line printer
2231W-1	120 cps 112 column matrix printer
2231W-2	120 cps 132 column matrix printer
2231W-3	Graphic matrix printer
2231W-6	70 cps 132 column high density matrix printer
2232-A	Digital flatbed plotter
2232B	Digital flatbed plotter
2235	180/222 cps 10/12.2 pitch bidirectional matrix printer
2241	80 column thermal printer
2245	80 cps draft matrix printer
2245/160	160 cps 132 column draft matrix printer
2251	60 cps matrix printer
2261	High speed printer
2261W	220 lpm dual pitch matrix printer
2263-1	400 lpm 64 character line printer
2263-2	600 lpm 64 character line printer
2263-3	430 lpm 96 character line printer
2271	Bidirectional output writer

2271P	Plotting output writer
2272-1	One-pen drum plotter
2272-2	Three-pen drum plotter
2281	Daisy output writer
2281P	30 cps plotting output writer
2281W	30 cps Wang daisy printer/plotter
DW/22-20	20 cps bidirectional daisy printer
LDP8-DSK	8 ppm laser printer

Workstations :

2236D	Interactive terminal
2236DE	Interactive DP workstation
2236DW	Interactive DP/WP workstation
2282	Graphic CRT
2326DW	DP/WP workstation with expanded keyboard
2336DE	DP Workstation
2336DW	DP/WP Workstation
2426DW	DP/WP Workstation with Expanded Keyboard
2436DE	DP Workstation
2436DW	DP/WP Workstation
2436WP	512K CPU, 1 Floppy System
2436WP-1	512K CPU, 2 Floppy System and Printer
2436WP-2	512K CPU, Winchester and Printer
PC/APC	PC/APC with PC/2200 Support Utilities Software

Controllers :

2207A	I/O interface controller
2228D-4E	64KB communications controller
2228D-4X	64KB data communications controller X.21 only
2228D-8E	128KB communications controller
2228D-8X	128KB data communications controller X.21 only
2228N	Null Modem
2230MXA	Disk multiplexer controller
2230MXB	Disk multiplexer controller
2236MXD	4-Port Terminal Multiplexer
2280MUX	Disk multiplexing unit
2280MUX-E	Disk multiplexer for 4 additional CPUs
22C01	Output write/plotter controller
22C02	Printer/Plotter Controller
22C03	Disk/Diskette drive controller
22C05	2230/2240 disk drive controller
22C12	2260C disk drive controller
22C13	2260C disk drive controller for multiplexing
22C14	DPU for 2280 Disk Drive

2227N - Null Modem

Software :

195-2217-X Wang P.R.I.S.M. software
 Univac 1004 RMS-1 Batch Emulation
 Univac Uniscope 100/200 Single Station Emulation
 CDC UT200 Emulation
 3271 BSC Emulation
 Asynchronous Communications
 Burroughs Poll/Select

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CS-D/N COMPUTER SYSTEM - ADDITIONAL INFORMATION

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12/17/92

- o PC2200, a distributed software product, is now available to ^{Turbo} CS/386, CS, MicroVP users. PC2200 is a terminal emulator which allows users to operate Wang PC200/300 or other XT or AT compatible personal computers as a CS/200 terminals. For detailed information refer to the 07/15/89 FOCUS.
- o Operating system Release 3.3 ^{or higher} is recommended for the CS-D and CS-N. However, if the end-user does not wish to use Release 3.3, the CS-D/N can use any operating system supported on the CS.
- o Release 3.1 or greater of the multi-user operating system is required in order to access memory greater than 512K.
- o Release 3.3 of the operating system is required to support the PM060 printer.
- o The Generalized Printer Driver that ships with 3.1 or greater contains the @LASRJVO printer driver table, which supports the LCS15-DSK and LDP8-DSK printers.
- o The DM50/300 printer is supported by the @DM50/VO printer driver table included with Release 3.1 or greater of the multi-user operating system.
- o THE HQ360 DRIVER IS INCLUDED WITH RELEASE 3.5 OF THE MULTI-USER OPERATING SYSTEM.
- o Current users of earlier versions of the 2200 OS that are not under WSS contract may purchase a per-incident update copy of release 3.3 through Wang Direct.
- o The use of 2236MXDs in lieu of 2236MXEs is not recommended.
- o Any of the "D" series data communications controllers on the 2200 that indicate an RS-366 compatibility will support an auto-calling unit. The modem must have auto-dial capability as well.
- o When ordering removable storage devices for the CS-D like the DS-320, DS-1.2, or DS-TS, the end-user is responsible for ordering the necessary diskette, disk or tape media. This media must be present at the time the Wang customer service rep installs the drives into the CS-D so testing of the drive(s) can be performed. Also, the CS-D will not be shipped with the drives installed; all drives must be installed at the customer site. Therefore, it is recommended that the system be delivered directly to the end-user and not set up at a VAR site. In the event a VAR has the equipment sent to its office prior to customer delivery, the drives should not be unpacked. If VARs have CS-Ds set up at their offices, all drives must be removed from the CS-D and repacked in their original containers prior to shipment to the customer. There is a charge for this service if performed by a Wang customer service rep.
- o The CS-D and CS-N models cannot be rented. In addition, the CS-D does not come with any storage devices. The devices must be ordered separately.
- o The CS-D and CS-N are warranted to be free from defects in materials or workmanship for a period of 90 days from date of installation. Warranty is in accordance with terms and conditions in effect at the time of sales.
- o Wang's standard on-site maintenance agreement, On-Site (Plan A), provides for 12 months of on-site service.
- o Per-Call On-Site service is available on a time and material basis. Customers who wish to use this service should call the nearest Regional Call Control Center toll-free number to arrange for a service appointment.
- o The new CS/386 CPUs replace the CS-10D through CS-80D, and CS-10N through

CS-80N VLSI series. Orders for CS-10D through CS-80D and CS-10N through CS-80N CPUs will be accepted up to August 31, 1989. Orders submitted after August 31, 1989 must be for CS/386-D or CS/386-N configurations.

0 UPGRADES TO A 386 OR TURBO SYSTEM ^{may} ~~will~~ REQUIRE SOME CHANGES TO EXISTING SOFTWARE. ~~most programs will run as they are but~~ ~~SECURITY IF THE PROGRAM MAKES USE OF ACCESS TO THE CPU ID NUMBER OR STATUS BYTE IN THE OS A CHANGE MAY BE REQUIRED.~~

~~The change~~ Most ~~new~~ SOFTWARE WILL RUN ~~as is~~ AS IT CURRENTLY EXISTS.

CHANGES COULD BE REQUIRED IF A PROGRAM USED A UNIQUE RESOURCE OF IT CURRENT CPU TYPE. THIS COULD INCLUDE CPU ID NUMBER, CERTAIN OS STATUS BYTES, ~~PARTITION FILE,~~

~~OR ADDITIONAL CHANGES TO STANDARD PROGRAM SYSTEMS CONTROLLED~~ OTHER RESTRICTIONS OR CHANGES MAY APPLY. CONSULT YOUR WANG REPRESENTATIVE ^{OR} ~~VAR~~ ~~VAR~~

FOR ADDITIONAL INFORMATION.

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CUSTOMER ENGINEERING
FINAL
MAINTENANCE PLAN
VS/2200/OA NEW PRODUCTS

January 26, 1989

CS-D

J.P. Costello

 New Products Engineer
 Joseph P. Costello

Ibrahim Azar

 New Products Manager
 Ibrahim Azar

Sheila S. Mitchell

 Product Line Manager
 Sheila Mitchell

Henry A. Schinnagel

 Product Line Director
 Henry A. Schinnagel

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I. PRODUCT DESCRIPTION

A. OVERVIEW OF THE PRODUCT

The CS-D has a restyled cabinet and a new motherboard to support a disk processing unit (DPU) and three internal storage devices. The DPU can support either a 320 kilobyte (KB) or 1.2 megabyte (MB) diskette, a 45MB tape streamer, one fixed winchester, and 1024 sectors of cache memory. The winchesters supported are 20MB, 32MB, 64MB, and a 140MB that can be formatted as fourteen 10MB platters (140MB) or seven 16MB platters (112MB).

The DPU is constructed as a standard I/O controller and is inserted into I/O slot 9. The DPU incorporates a printer port that allows it to function as a printer/disk controller.

There are six models of the CS-D based on memory size. CS-2D (128KB), CS-5D (512KB), CS-10D (1MB), CS-20D (2MB), CS-40D (4MB), and the CS-80D (8MB). The CS-D will use the CS memory upgrade kits.

B. SIMILARITIES/DIFFERENCES (with other WANG products)

1) Software:

Release 3.1 of the 2200 operating system is required to access memory beyond 512 Kilobytes (KB). To fully utilize all of the enhancements of the CS-D the customer should be using O/S version 3.3.

2) Hardware:

The CS-D uses the same CPU board and memory configurations as the current CS. The CS-D will accommodate all of the I/O controllers supported on the Micro/VP and CS. With the exception of the DS-10R (10MB removable winchester) all of the peripherals supported on the Micro/VP and CS are compatible with the CS-D.

3) Other:

Software is compatible with all existing 2200, Micro/VP, and CS software.

C. ANNOUNCE/FIRST CUSTOMER SHIPMENT DATE

- | | | |
|-------------------|----------------------------|-------------------|
| 1) Domestic: | Announce:December 15, 1988 | FCS:February 1989 |
| | Volume Ship:March 1989 | |
| 2) International: | Announce:December 15, 1988 | FCS:February 1989 |

D. SERVICE OFFERINGS/WARRANTY

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

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

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E. SPECIAL PROGRAM/PROCEDURES

N/A

F. MAJOR COMPONENTS

The CS-D may be divided into the following subassemblies (FRU'S):

1) CPU:

The CS-D uses the same CPU PCB (210-8937) as the current CS-D. The PCB has 32KB of control memory and up to 8MB of user memory. Programmable array logic (PAL) is used for memory addressing. The flexibility of the PAL allows unique addressing circuitry for each memory configuration.

2) DPU:

The disk processing unit consists of a mother board and daughter board. The Z80 controlled logic is capable of supporting three internal storage devices. I/O slot 9 is reserved for the DPU.

3) Mother Board:

The CS-D mother board has a slot for the CPU/Memory PCB and nine I/O slots. It provides the interface between the CPU/Memory PCB and the I/O controllers. The interface consists of an 8 bit address bus, 8 bit output data bus, a 9 bit input bus, and control strobes.

4) Power Supply:

The CS-D utilizes a 255 watt switching power supply. It provides +5, -5, +12, and -12 volts DC. The power supply can use a line voltage of 110 or 230 volts AC, selectable by a switch on the power supply.

5) Disk Drives:

The CS-D will support either a 320 KB or 1.2 MB floppy drive, a 45 MB streaming cartridge tape drive, and one fixed winchester. The winchester may be either a 20 MB, 32 MB, 64 MB, or a 140 MB. The 140MB may be formatted as fourteen 10 MB platters or seven 16 MB platters.

G. CONFIGURATION REQUIREMENTS

The CPU/Memory PCB will be configured in 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, and 8 MB versions. The 128 KB, 512 KB, and 1 MB versions will utilize 256 KB SIMM modules. The 2 MB, 4 MB, and 8 MB versions will utilize 1 MB SIMM modules. A jumper (JP2) must be set to indicate which SIMM modules, 256KB or 1MB, are on the board. The PAL chip located at L2 will determine addressing capacity and must be compatible with the amount of memory loaded on the PCB.

G. CONFIGURATION REQUIREMENTS (cont')

On the DPU the CE must set switches to indicate the floppy drive type, if the cartridge tape drive is present in the system, and the capacity of the winchester drive installed in the system. Switches for the disk and printer address must also be set. The DPU must be installed in I/O slot number 9.

The internal winchester disk drive may be multiplexed with up to 16 CPU's by using a combination of 2275MUX and 2275MUXE controllers. This is accomplished by cabling the MUX port on the DPU to the 2275MUX controller.

II. MAINTENANCE PHILOSOPHY

A. Maintenance Objectives

1) C.E. Level:

This system is a migration of the current 2200 CS with the additional capability of internal disk storage. Effective maintenance of the system will require the following:

- a) Skillful cause analysis at the system level.
- b) Knowledge of the diagnostics on the 2200 system.
- c) Knowledge of the overall system configuration.

2) Maintenance Procedures:

Maintenance on this product will be performed on-site by a Wang Customer Engineer. Currently existing diagnostics will aid the CE in isolating hardware failures to the failing board. When a board failure occurs, that board will be replaced with a board from C.E. stock and the bad board returned through C.E. logistics channels for repair.

B. Types of contract to be offered

On-Site Maintenance Contracts will be offered.

C. P.M. requirements

1) Customer performed:

To insure proper operation of this product, and the system in which it is installed, the Customer should observe the Environmental Considerations outlined in the CUSTOMER SITE PLANNING GUIDE (part # 700-5978) section 4.

2) WANG C.E. performed:

This product will not require P.M.

- a) Interval: N/A
- b) Parts/Consumables required: N/A
- c) Time to perform: N/A

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D. Diagnostics required:

- 1) The CS-D will utilize the same CPU/memory diagnostics as the CS. A prom based built in test has been provided on the DPU. This will aid the CE in isolating problems to the DPU.

III. TRAINING

The CS-D will be included in the 2200 System training class as they are scheduled. Previously trained 2200 Customer Engineers will be updated via the Technical Service Bulletin (TSB) and PUB's to existing 2200 Product Maintenance Manuals.

A. CUSTOMER ENGINEER COURSE

- 1) COURSE OBJECTIVE:
The training objective will be to provide information that will enable the Wang Customer Engineer to meet the maintenance objectives for this product. These maintenance objectives are detailed in section II of this plan.
- 2) TIMETABLE and FORMAT:
The CS-D will be included in the 2200 training class. Currently, 2200 classes are scheduled once per quarter. The Product Maintenance Manual and TSB will be distributed before FCS date.
- 3) PREREQUISITES:
The 2200 System Course prerequisites are:
 - a) 6 months field experience following New Hire Training.

B. SALES SUPPORT COURSE

- 1) TIMETABLE and FORMAT
TBD

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 (17 to 28 deg c)

B. Voltage Range

115vac, +/- 12 volts, 60 hz. +/- 0.5 hz.
230vac +/- 24 volts, 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

Height 23.9 inches 60.7 centimeters
Width 15 inches 38.1 centimeters
Depth 15.75 inches 40.0 centimeters

E. Service Space Requirements

Front: 30 in (91.4 cm)
Rear: 36 in (76.2 cm)
Top: 20 in (96.5 cm)

F. Input Current

2.0 amps @ 115V 60hz (running)
1.0 amps @ 230V 50hz (running)

G. Input Power

170 Watts
230 VoltAmps

H. Power Factor

0.74 lagging

I. Heat Loss

581 BTU/hr (146.4 KgCal/hr.)

J. Leakage Current

0.2 Ampere @ 115V 60hz 0.2 Ampere @ 230V 50hz

VI. POWER CORD DATA

A. Plug Type

NEMA 5-15 120V

B. Length

6 Feet (1.8 Meters)

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>
CS-2D	2200 Computer System	Field Failures	0.40	
CS-5D	2200 Computer System	Calls	0.82	
		MTTR		1.50
		Call Duration		2.55
		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 GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-2D and CS-5DProduct Description: 2200 Computer System

	<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	1.07	0.43	0.41	0.40	0.40	0.40	0.40	0.40
Calls/Year	2.22	1.18	0.89	0.80	0.80	0.80	0.80	0.80

COMPANY PROPRIETARY

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>
CS-100	2200 Computer System	Field Failures	0.43	
CS-200	2200 Computer System	Calls	0.88	
		MTRR		1.50
		Call Duration		2.55
		Installation Time		1.30
		PM Calls	0.00	
		PM MTRR		0.00
		FCO Calls	0.00	
		FCO MTRR		0.00
		Upgrades/Model	0.02	
		Upgrade Install Time		1.03

PRODUCT ANALYSIS WITH GROWTHProduct Field Failures/Year and Calls/Year
by Month after Installation

Model Number: CS-100 and CS-200

Product Description: 2200 Computer System

	<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	1.16	0.46	0.44	0.43	0.43	0.43	0.43	0.43
Calls/Year	2.38	1.26	0.95	0.86	0.86	0.86	0.86	0.86

COMPANY PROPRIETARY

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>
CS-40D	2200 Computer System	Field Failures	0.49	
		Calls	1.01	
		MTRR		1.50
		Call Duration		2.55
		Installation Time		1.30
		PM Calls	0.00	
		PM MTRR		0.00
		FCO Calls	0.00	
		FCO MTRR		0.00
		Upgrades/Model	0.02	
		Upgrade Install Time		1.03

PRODUCT ANALYSIS WITH GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-40DProduct Description: 2200 Computer System

	<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	1.32	0.52	0.50	0.49	0.49	0.49	0.49	0.49
Calls/Year	2.74	1.46	1.10	0.99	0.99	0.99	0.99	0.99

COMPANY PROPRIETARY

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>
CS-40D	2200 Computer System	Field Failures	0.49	
		Calls	1.01	
		MTR		1.50
		Call Duration		2.55
		Installation Time		1.30
		PM Calls	0.00	
		PM MTR		0.00
		FCO Calls	0.00	
		FCO MTR		0.00
		Upgrades/Model	0.02	
		Upgrade Install Time		1.03

PRODUCT ANALYSIS WITH GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-40DProduct Description: 2200 Computer System

	<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	1.32	0.52	0.50	0.49	0.49	0.49	0.49	0.49
Calls/Year	2.74	1.46	1.10	0.99	0.99	0.99	0.99	0.99

COMPANY PROPRIETARY

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>
CS-80D	2200 Computer System	Field Failures	0.62	
		Calls	1.25	
		MTTR		1.50
		Call Duration		2.55
		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 GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-80DProduct Description: 2200 Computer System

	<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	1.65	0.66	0.63	0.62	0.62	0.62	0.62	0.62
Calls/Year	3.41	1.81	1.37	1.23	1.23	1.23	1.23	1.23

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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.

FRUs, CRUs,

:PART #	: DESCRIPTION	:FRU:CRU:Unique:	: stocking :		
			B	A	H
:210-8937-A	: 128 KB CPU/MEM. PCB	: X : :	: X :	:	:
:210-8937-B	: 512 KB CPU/MEM. PCB	: X : :	: X :	:	:
:210-8937-C	: 1 MB CPU/MEM. PCB	: X : :	: X :	:	:
:210-8937-D	: 2 MB CPU/MEM. PCB	: X : :	: X :	:	:
:210-8937-E	: 4 MB CPU/MEM. PCB	: X : :	: X :	:	:
:210-8937-F	: 8 MB CPU/MEM. PCB	: X : :	: X :	:	:
:212-7113	: DPU Assembly	: X : : X	: X :	:	:
:270-0890-1	: Power Supply	: X : :	: X :	:	:
:270-3483	: DC Fan Assembly	: X : :	: X :	:	:
:210-9560	: Mother Board	: X : :	: X :	:	:
:220-2849	: Indicator Cable	: X : :	: X :	:	:
:220-2850	: Power Harness #1	: X : :	: X :	:	:
:220-2851	: Power Harness #2	: X : :	: X :	:	:
:220-2852	: Power Extension Cable	: X : :	: X :	:	:
:220-3707	: Tape Drive I/O Cable	: X : :	: X :	:	:
:220-3708	: Floppy Drive I/O Cable	: X : :	: X :	:	:
:220-3709	: Wini I/O Cable	: X : :	: X :	:	:
:220-2057	: On/Off switch cable	: : :	: : :	:	:
325-0105	on/off sw				

PARTS LIST

Diagnostic Part Number: 195-2956-0

Parts required for P.M.: N/A

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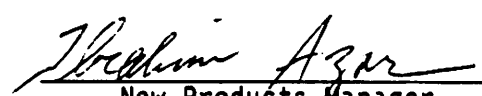
C U S T O M E R E N G I N E E R I N G
F I N A L
M A I N T E N A N C E P L A N
V S / 2 2 0 0 / O A N E W P R O D U C T S

January 26, 1989

CS-N




 New Products Engineer
 Joseph P. Costello



 New Products Manager
 Ibrahim Azar



 Product Line Manager
 Sheila Mitchell



 Product Line Director
 Henry A. Schinnage

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I. PRODUCT DESCRIPTION

A. OVERVIEW OF THE PRODUCT

The CS-N is a CS-D without a disk processing unit (DPU). The slots where the diskette and tape streamer would be located are covered by panels in the CS-N. The CS-N is available with either 128KB (CS-2N), 512KB (CS-5N), 1MB (CS-10N), 2MB (CS-20N), 4MB (CS-40N), or 8MB (CS-80N) of main memory. The CS-N will replace the current CS-2 through CS-80 models and is field-upgradeable to a CS-D.

Like the CS-D the CS-N has 32KB of control memory, nine I/O slots and supports 16 users. The CS-N will also use CS memory upgrade kits.

With the CS-N as with the previous CS-2 through CS-80 an external disk storage cabinet (DS) is required for data storage.

B. SIMILARITIES/DIFFERENCES (with other WANG products)

1) Software:

Release 3.1 of the 2200 operating system is required to access memory beyond 512 Kilobytes (KB). Using release 3.3 or later of the multi-user operating system, up to 1MB of memory may be allocated to program. Any unused main memory or memory in excess 1MB may be allocated to RAMDISK.

2) Hardware:

The CS-N uses the same CPU board and memory configurations as the current CS. The CS-N will accommodate all of the I/O controllers supported on the Micro/VP and CS. All of the peripherals supported on the Micro/VP and CS are compatible with the CS-N.

3) Other:

Software is compatible with all existing 2200, Micro/VP, and CS software.

C. ANNOUNCE/FIRST CUSTOMER SHIPMENT DATE

- | | | |
|-------------------|-----------------------------|--------------------|
| 1) Domestic: | Announce: December 15, 1988 | FCS: February 1989 |
| | Volume Ship: March 1989 | |
| 2) International: | Announce: December 15, 1988 | FCS: February 1989 |

D. SERVICE OFFERINGS/WARRANTY

This product will be installed by Customer Engineering personnel, and maintained by Customer Engineering 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

The CS-N may be divided into the following subassemblies (FRU'S).

1) CPU:

The CS-N uses the same CPU PCB (210-8937) as the current CS. The PCB has 32KB of control memory and up to 8MB of user memory. Programmable array logic (PAL) is used for memory addressing. The flexibility of the PAL allows unique addressing circuitry for each memory configuration.

3) Mother Board:

The CS-N mother board has a slot for the CPU/Memory PCB and nine I/O slots. It provides the interface between the CPU/Memory PCB and the I/O controllers. The interface consists of an 8 bit address bus, 8 bit output data bus, a 9 bit input bus, and control strobes.

4) Power Supply:

The CS-N utilizes a 255 watt switching power supply. It provides +5, -5, +12, and -12 volts DC. The power supply can use a line voltage of 110 or 230 volts AC, selectable by a switch on the power supply.

G. CONFIGURATION REQUIREMENTS

The CPU/Memory PCB will be configured in 128 KB, 512 KB, 1 MB, 2 MB, 4 MB, and 8 MB versions. The 128 KB, 512 KB, and 1 MB versions will utilize 256 KB SIMM modules. The 2 MB, 4 MB, and 8 MB versions will utilize 1 MB SIMM modules. A jumper (JP2) must be set to indicate which SIMM modules, 256KB or 1MB, are on the board. The PAL chip located at L2 will determine addressing capacity and must be compatible with the amount of memory loaded on the PCB.

The CS-N may be upgraded to a CS-D by ordering kit UJ6047 (PN 205-6047). This kit contains a DPU that must be installed in I/O slot 9. Any disk drives must be ordered separately.

II. MAINTENANCE PHILOSOPHY

A. Maintenance Objectives

1) C.E. Level:

This system is a migration of the current 2200 CS with the additional capability of internal disk storage. Effective maintenance of the system will require the following:

- a) Skillful cause analysis at the system level.
- b) Knowledge of the diagnostics on the 2200 system.
- c) Knowledge of the overall system configuration.

2) Maintenance Procedures:

Maintenance on this product will be performed on-site by a Wang Customer Engineer. Currently existing diagnostics will aid the CE in isolating hardware failures to the failing board. When a board failure occurs, that board will be replaced with a board from C.E. stock and the bad board returned through C.E. logistics channels for repair.

B. Types of contract to be offered

On-Site Maintenance Contracts will be offered.

C. P.M. requirements

1) Customer performed:

To insure proper operation of this product, and the system in which it is installed, the Customer should observe the Environmental Considerations outlined in the CUSTOMER SITE PLANNING GUIDE (part # 700-5978) section 4.

2) WANG C.E. performed:

This product will not require P.M.

- a) Interval: N/A
- b) Parts/Consumables required: N/A
- c) Time to perform: N/A

D. Diagnostics required:

- 1) The Data Memory Diagnostic has been revised to test the increased memory on the enhanced PCB and is incorporated in Release 3.3 of the 2200 Operating System.

III. TRAINING

The CS-N will be included in the 2200 System training class as they are scheduled. Previously trained 2200 Customer Engineers will be updated via the Technical Service Bulletin (TSB) and PUB's to existing 2200 Product Maintenance Manuals.

A. CUSTOMER ENGINEER COURSE

- 1) COURSE OBJECTIVE:
The training objective will be to provide information that will enable the Wang Customer Engineer to meet the maintenance objectives for this product. These maintenance objectives are detailed in section II of this plan.
- 2) TIMETABLE and FORMAT:
The 2200 training classes are currently scheduled once per quarter. The Product Maintenance Manual and TSB will be distributed before FCS date.
- 3) PREREQUISITES:
The 2200 System Course prerequisites are:
 - a) 6 months field experience following New Hire Training.

B. SALES SUPPORT COURSE

- 1) TIMETABLE and FORMAT
TBD

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 (17 to 28 deg c)

B. Voltage Range

115vac, +/- 12 volts, 60 hz. +/- 0.5 hz.
230vac +/- 24 volts, 50 hz. +/- 0.5 hz.

APPENDICES

COMPANY PROPRIETARY

MARKETING FORECAST ALL MODELS

	Q3 FY89	Q4 FY89	Q1 FY90	Q2 FY90
DOMESTIC	211	211	211	211
INTERNATIONAL	211	211	211	211
TOTAL	422	422	422	422

COMPANY PROPRIETARY

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>
CS-2N	2200 Computer System	Field Failures	0.28	
CS-5N	2200 Computer System	Calls	0.57	
		MTRR		1.50
		Call Duration		2.55
		Installation Time		1.30
		PM Calls	0.00	
		PM MTRR		0.00
		FCO Calls	0.00	
		FCO MTRR		0.00
		Upgrades/Model	0.02	
		Upgrade Install Time		1.03

PRODUCT ANALYSIS WITH GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-2N and CS-5NProduct Description: 2200 Computer System

	<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	0.74	0.29	0.28	0.28	0.28	0.28	0.28	0.28
Calls/Year	1.52	0.81	0.61	0.55	0.55	0.55	0.55	0.55

COMPANY PROPRIETARY

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>
CS-10N	2200 Computer System	Field Failures	0.31	
CS-20N	2200 Computer System	Calls	0.63	
		MTTR		1.50
		Call Duration		2.55
		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 GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-10N and CS-20NProduct Description: 2200 Computer System

	<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	0.82	0.33	0.31	0.31	0.31	0.31	0.31	0.31
Calls/Year	1.69	0.90	0.68	0.61	0.61	0.61	0.61	0.61

COMPANY PROPRIETARY

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>
CS-40N	2200 Computer System	Field Failures	0.37	
		Calls	0.75	
		MTRR		1.50
		Call Duration		2.55
		Installation Time		1.30
		PM Calls	0.00	
		PM MTRR		0.00
		FCO Calls	0.00	
		FCO MTRR		0.00
		Upgrades/Model	0.02	
		Upgrade Install Time		1.03

PRODUCT ANALYSIS WITH GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-40NProduct Description: 2200 Computer System

	<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	0.99	0.39	0.37	0.37	0.37	0.37	0.37	0.37
Calls/Year	2.02	1.07	0.81	0.73	0.73	0.73	0.73	0.73

COMPANY PROPRIETARY

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>
CS-80N	2200 Computer System	Field Failures	0.49	
		Calls	1.00	
		MTTR		1.50
		Call Duration		2.55
		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 GROWTHProduct Field Failures/Year and Calls/Year
by Month after InstallationModel Number: CS-80NProduct Description: 2200 Computer System

	<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	1.32	0.52	0.50	0.49	0.49	0.49	0.49	0.49
Calls/Year	2.71	1.44	1.09	0.98	0.98	0.98	0.98	0.98

COMPANY PROPRIETARY

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.

FRUs, CRUs,

:PART #	: DESCRIPTION	:FRU	:CRU	:Unique	: stocking :		
					: B	: A	: H
:210-8937-A	: 128 KB CPU/MEM. PCB	: X	:	:	: X	:	:
:210-8937-B	: 512 KB CPU/MEM. PCB	: X	:	:	: X	:	:
:210-8937-C	: 1 MB CPU/MEM. PCB	: X	:	:	: X	:	:
:210-8937-D	: 2 MB CPU/MEM. PCB	: X	:	:	: X	:	:
:210-8937-E	: 4 MB CPU/MEM. PCB	: X	:	:	: X	:	:
:210-8937-F	: 8 MB CPU/MEM. PCB	: X	:	:	: X	:	:
:270-0890-1	: Power Supply	: X	:	:	: X	:	:
:270-3483	: DC Fan Assembly	: X	:	:	: X	:	:
:210-9560	: Mother Board	: X	:	:	: X	:	:
:220-2850	: Power Harness #1	: X	:	:	: X	:	:
:220-2851	: Power Harness #2	: X	:	:	: X	:	:
:220-2852	: Power Extension Cable	: X	:	:	: X	:	:
:220-2057	: On/Off switch cable	: X	:	:	: X	:	:
325-0105	ON/OFF SWITCH						

PARTS LIST

Diagnostic Part Number: 195-2956-0

Parts required for P.M.: N/A

COMPANY PROPRIETARY

Diagnostic Functional Specification

Documentation Release: xxxx Software Release: xxxx
Documentation Part No: 760-xxxx Software Part Number: 7xx-xxxx

PROM Part Number: 379-xxxx

Product Name: CS-D Disk Controller

Originator: W.J Lo

Date: March 16 1988

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- 1.0 Reference Documentation
- 2.0 Configuration Requirements
- 3.0 Program Description
- 4.0 Load Procedure
- 5.0 Operating Instruction
- 6.0 Miscellaneous
- 7.0 Program Revision History
- Appendix A - Test and error table

Engineering Service Department
Wang Computer (Taiwan) Ltd.
2, Science-Based Industrial Park
Hsinchu, Taiwan, R.O.C.

1.0 Reference Documentation

2275F/R Disk Unit for the 2200
Software functional specification
Author: Dave Barrett
CS-D/CS-N Hardware Specification. Rev. A

2.0 Configuration Requirements

2.1 Hardware

Minimum required configuration for the BIT portion of the diagnostic consists of a 2200 CS-D Disk Controller (210-XXXX), chassis and a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT. The minimum required configuration for the Burn-In portion of the diagnostic consists of a 2200 CS-D disk controller(210-XXXX), chassis, a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT. and a chip with a LED on it. that gets attached to the chip at location LXXX (for Mfg. only). The minimum required configuration for the repair aids portion of the diagnostic consists of a 2200 CS-D Disk Controller (210-XXXX), chassis, a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT, a 5 1/4" floppy drive, a 20 Meg winchester disk drive, a TEAC cassette tape drive and a Z-BUG Emulator. In addition, a diskette with the file "DATTEST" on it and a 2200 system is needed in order to be able to on the optional interface test.

2.2 Software

A 32k PROM loaded with the latest revision of diagnostic and operating system code located at LXXX of the (210-XXXX) board. Also a 5 1/4" diskette with a basic program on it called "DATTEST" is needed to run the optional interface test.

3.0 Program Description

3.1 Applications

To test hardware locate on the 2200 CS-D Disk Controller (210-XXXX) and clear a path for the 2200 operating System. There is also a board repair diagnostic included in the PROM code, as well as, an optional interface test. These additional tests are designed to provide Manufacturing with a more complete diagnosis of the hardware and give them Burn-In capabilities.

3.2 User Interface

Refer to the 2200 DS Disk Processing Unit (DPU) BIT, June 24, 1987

3.3 Hardware Tested

The hardware on the board consists of a 32K PROM, 16K of RAM, 256K of bank selectable RAM (16K banks), Z80 CPU chip, CTC, 765 Floppy Disk Controller chip, 2010 Winchester Controller chip and a QIC-02 Interface.

3.4 Tests in the Program

<u>Name of Test</u>	<u>Hardware Tested</u>
1. Cache Data Lines Shorts Test	Data lines of all Cache banks
2. Data Line Stuck Test	Data lines of RAM
3. Address Lines Test	RAM address lines
4. Address Line Test	Cache address lines
5. Bank Select Test	Cache bank select hardware
6. Push/Pop Memory Test	RAM & Cache
7. Reverse Parity & Parity GEN. Test	Parity circuitry
8. CTC Control, Data, & Addr. Test	CTC
9. CTC Downcounter & Timer Mode Test	CTC
A. CTC Interrupt Test	CTC
B. DMA Clear Test	DMA, temporary register
C. DMA Channel Addressing Test	DMA
D. DMA Current Address Reg. Test	DMA, current address register
E. DMA Verify Transfer Test	DMA, EOP
F. 765 FDD Chip Test	UPD765 FDC chip
10. 2010 Wini Controller Chip Test	WD2010 chip
11. QIC-02 Interface Test	QIC-02 Interface

3.4.1 Program Jump Table

A program jump table at the beginning of the program gives user the ability to go directly to a test routine and execute from that point on. The procedure for doing this is as follows. Using the Z-Bug emulator set the Program Counter (PC) to X'6050' and load the accumulator with the test routine desired using the hex value of the test routine that precedes each test in the table of tests above. This is a function of the Board Repair portion of the diagnostic.

4.0 Load Procedures

Refer to the 2200 DS Disk Processing Unit (DPU) BIT, June 24, 1987

5.0 operating instructions

Refer to the 2200 DS Disk Processing Unit (DPU) BIT, June 24, 1987

6.0 Miscellaneous

None

7.0 Program Revision History

Appendix A

TEST AND ERROR TABLE

As described earlier in section 3.2 of this document the Z-Bug emulator may be halted on an error and viewing of the Z80 prime registers will contain specific fault isolation information. This means that without a Z-bug emulator error information cannot be retrieved from the diagnostic. Error codes are left in the 'B' register for all tests except test 6. For test 6 the error code will be left in 'A' the address at fault will be in register 'BC'. Depending on what test is running determined what the other prime registers are holding for information. The following is a listing of tests with the error codes associated with it. Further information may be found in the listing test headers.

<u>TEST ROUTINES</u>	<u>ERROR CODES</u>
1. Cache Data Lines Shorts Test	01
2. Data Line Stuck Test	02
3. Address Lines Test	03
4. Address Line Test	04
5. Bank Select Test	05
6. Push/Pop Memory Test	06
7. Reverse Parity & Parity GEN. Test	07
8. CTC Control, Data, & Addr. Test	08
9. CTC Downcounter & Timer Mode Test	09
A. CTC Interrupt Test	0A
B. DMA Clear Test	0B
C. DMA Channel Addressing Test	0C
D. DMA Current Address Reg. Test	0D
E. DMA Verify Transfer Test	0E
F. 765 FDD Chip Test	0F Thru 15
10. 2010 Wini Controller Chip Test	16 Thru 19
11. QIC-02 Interface Test	1A Thru 23

Diagnostic Engineering Plan

Preliminary

PEP Number: HO212E Revision 0.0

Product Name: CS-D Disk Controller

Originator: W.J. Lo

Date: March 16 1988

Tables of Contents

- 1.0 Personnel
- 2.0 Hardware
- 3.0 Reference Documents
- 4.0 Diagnostic Plan
- 5.0 Prototype development
- 6.0 Applications
- 7.0 Schedule

Engineering Service Department
Wang Computer (Taiwan) Ltd.
2, Science-Based Industrial Park
Hsinchu, Taiwan, R.O.C.

1.0 PERSONNEL

1.1 Hardware Engineering	S.M. Chiou, G.L. Su
1.2 Mechanical Engineering	K.C. Yang
1.3 Software Engineering	
1.4 Diagnostic Development	W.J. Lo
1.5 Manufacturing	
1.6 System Integration	
1.7 Customer Engineering	M.K. Kao
1.8 Product Planning & Marketing	
1.9 Product QA	

2.0 Hardware

The disk controller, located in the CS-D cabinet, consists a mother board and a daughter board with the Z80 controlled logic that is capable of supporting one ST-506 Winchester disk drives, a 1.2 MB floppy drive, and a TEAC 45DF Streaming Tape Drive (STD). The Winchester can be the RICOH RH5130 10 MB removable cartridge drive. The disk controller can be accessed through built in 22C03 by 2200 CS-D data storage controller or through MUX cable to access disk controller by other 2200 CPU(including CS-N).

3.0 Diagnostic Plan

The Diagnostic Plan is to design a PROM with Built-In-Test (BIT) and Board repair Functionality. Both will have Burn-in capabilities. Also in the PROM is a 2200 Interface test that Handshakes with a special 2200 program that will reside on a separate floppy diskette. Further details are in the sections that follow.

3.1 Built-in-Test (BIT) Diagnostic

The Built-In-Test (BIT) will consist of electronic and drive tests. The electronic tests will not require any drives to be present and will be local to the 2275 board. Failures will result in the controller being unaccessible to the 2200 (control not being passed to PROM firmware) and a flashing floppy drive LED (if possible). Failures within the drive test will result in a flag being set in a semaphore address to be defined later and eventual control being passed to operational firmware. Catastrophic drive problems will result in an error flag 'FF' being set, while media related problems will set an error flag 'FE'.

BIT Fatal Kernal Tests

PROM
CPU
RAM/BANKING
CTC / Interrupts
765 status and control
2010 status and control
QIC-02 status and control

BIT Non-Fatal Tests

Winchester Drive (Status / Sector 0 Integrity Read)
Streaming Tape (Status / Self Test)
Floppy (Status / Sector 0 Integrity Read)

3.2 Board Repair

Setting Switch bank 2 (at localtion SW2) to X'OF', will signal to the BIT that Board repair functionality is desired. The BIT will process through the above fatal Kernal tests, but upon error detection will attempt to loop on the condition causing the error. A register will contain the error code. A recalibrate, a formal cylinder, a write sector, a read sector, a step function (with verification that the step was successful), cylinder, a write sector and a read sector will be executed on the floppy, on the fixed winchester (if presend), on units (must be the same type as the fixed winchester). The streaming tape drive must contain a tape and will be tested using standard drive commands. Upon error detection an attempt will be made to loop on the condition causing the error. If no errors are detected, control will pass to operational firmware. To aid with problem isolation. A jump table will be available in PROM which will provide entry points to debug routines. These routines will be accessible using a Zebug and will provide simple functions such as: read sector, formal cylinder, write sector and will use low level firmware routines where possible..

setting switch bank 2 to X'OE' will signal to the BIT that the 2200 interface test is selected. This test will verify the 2200 to 2275 interface by executing code which will handshake with a special 2200 interface test program.

3.2.1 Burn-In

Setting Switch 2 to X'FF' will signal to the BIT that burn-in mode is selected. This will be an extention to the BIT and will perform non-destructive testing of the media (like the BIT), but will continuously loop instead of passing control to operation firmware.

Setting Switch bank 2 to X'FO', will signal to the BIT that burn-in mode with destructive testing is desired. This mode is the same as the board repair mode with the exception is not passed to operational firmware upon successful completion, but instead it will continuously loop.

4.0 Prototype Support

Diagnostic support will be provided in bringing up prototype hardware. The tests provided for this purpose will be incorporated into the programs listed in section 3 above as appropriate.

5.0 Application

<u>Diagnostic Package</u>	<u>Hardware Tested</u>	<u>Minimum Equip. Needed</u>
<u>BOARD TEST</u> Board Repair	Controller	2275 & Drives Zebug & 2200
<u>BOARD RUNIN</u> BIT	Controller	2275 & Zebug 2200
<u>UNIT TEST</u> Board Repair	Controller	2275 & Drives Zebug & 2200
<u>UNIT RUNIN</u> BIT or Board Repair	Controller	2275 & Drives Zebug & 2200
<u>SYSTEM INTEGRATION</u> Board Repair	Controller	Configuration System
<u>CUSTOMER SIDE</u> BIT	Controller	Configuration System

6.0 Schedule

Plan to test prototype on 5/21/88

Plan to finish diagnostic program on 6/15/88

CS-D/CS-X
Hardware Specification

(Preliminary)

Rev B

By

G.L.Su
K.C.Yang
S.M.Chiou

Date : Mar.11, 1988

Company confidential
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.System Overview

CS-X is a new cabinet and new chassis system which is 100 % hardware and software compatible with the current CS system.

CS-D is a CPU built in less than 140 MB can impact data storage cabinet. This model is the same as CS-X except includes a cost reduced DS DPU board with a 22C03-type interface to the I/O bus.

2.Cabinet

This cabinet is available with or without internal disks/tape and DPU board. CS-X models without the internal DPU would have a panel covering the disk/tape opening.

CS-D models with the internal DPU would have 2 half-height opening, one for 320 KB or 1.2 MB diskette and other one for tape streamer or cartridge. Other mounting choice of a single internal 20, 32 or 42, 64 or 140 MB fixed winchester, with external visible red light for the fixed Winchester.

Cabinet Assembly Diagram see attachment.

3.CPU Chassis and Configuration

CS-X Configuration

! Slot 0	!-----	up to 8MB extended memory CPU board
! Slot 1	!-----	I/O Controller
! Slot 2	!-----	I/O Controller
! Slot 3	!-----	I/O Controller
! Slot 4	!-----	I/O Controller
! Slot 5	!-----	I/O Controller
! Slot 6	!-----	I/O Controller
! Slot 7	!-----	I/O Controller
! Slot 8	!-----	I/O Controller
! Slot 9	!-----	I/O Controller

Note: All I/O Controller must be same as all existing I/O Controller used on the CS series.

CS-D Configuration

! Slot 0	-----	up to 8MB extended memory CPU board
! Slot 1	-----	I/O Controller
! Slot 2	-----	I/O Controller
! Slot 3	-----	I/O Controller
! Slot 4	-----	I/O Controller
! Slot 5	-----	I/O Controller
! Slot 6	-----	I/O Controller
! Slot 7	-----	I/O Controller
! Slot 8	-----	I/O Controller
! Slot 9	-----	internal D.S.Controller

Note: All I/O Controller must be same as all existing I/O Controller used on the CS series.

Internal D.S.Controller is costed reduced DPU board with a 22C03-type interface to the I/O bus. This controller will support one diskette, one streamer tape or cartridge and winchester fixed disk. The winchester can be 20, 32 or 42, 64 or 140 MB fixed Winchester, so User needing more than 140 MB or more than a single fixed winchester, would order a CS-X without a DPU and a old DS.

4. Power Supply

This system use WANG SPS-255 switching power supply and Computer Product Inc. (Boschert) Model No. SL-40-8601 Switching power supply.

A. SPS-255

<u>VOLTAGE</u>	<u>CURRENT</u>	
+5V	36 A	used for full system
-5V	0.2A	used for full system
+12V	6A	used for full system except tape and floppy disk
-12V	0.5A	used for full system

B. SL40-8601

+12V	3.5A	used for tape and floppy disk
------	------	-------------------------------

5.Data Storage System

GENERAL:

The disk controller ,located in the CS-D cabinet, consists of a mother board and a daughter board with the Z80 controlled logic that is capable of supporting a one ST-506 model Winchester disk drives, a 1.2 Mb or 320 KB floppy drive, and a TEAC 45DF Streaming Tape Drive (STD). The Winchester can be the RICOH RH5130, 10 Mb removable cartridge drive. The disk controller can be only accessed thru built in 22C03 by 2200 CS-D CPU or thru MUX cable to access disk controller by other 2200 CPU (including CS-X).

The disk controller is comprised of the following:"

4 MHZ Z80A Microprocessor.

32 KB EPROM.

Four-Channel DMA controller chip.

Two Four-Channel CTC chips.

16 ~~KB~~ system RAM with parity.

16 banks of 16 KB cache RAM with parity.

765 floppy disk controller, together with a companion data separator.

Western Digital 2010B Winchester Disk Controller.

Western Digital 10C20B Data Separator.

QIC-02 interface logic for controlling the TEAC tape drive.

2200 bus interface logic.

2200 Bus Interface

This Interface logic is 100 % hardware compatible with 22C03 logic in function. Using this logic to direct interface with data storage unit (such as tape, floppy drive, fixed drive) and not thru MUX.

But the function of 22C03 would be disabled if connect a cable with MUX or MUXE and the DPU would become a storage controller only. In this case the functions are the same as old DS system except capable of supporting Winchester drive. The new DPU is supporting a one ST-506 Winchester drive but old DS system is supporting a total of four ST-506 Winchester disk drive.

MEMORY CONTROL

The disk controller memory consists of 32 Kbytes of EPROM, 16 Kbytes of system RAM, and 256 Kbytes of cache RAM. Cache RAM is organized in 16 banks. Only one of the 16 banks can occupy the top 16k slot of the Z80A memory address space. Bank selection is done with MEMBKSEL/ (OUT 70) in conjunction with D0 - D3 (see Lxx, sheet 1).

Address Range	Memory Type	A15	A14	A13	D0	D1	D2	D3
FFFF	Cache Memory (One of 16 banks)	1	1	1				
C000 - BFFF					1	1	0	
8000 - 7FFF	System RAM 16 Kbytes	1	0	1				
	EPROM 32 Kbytes	0	1	1				
		0	1	0				
		0	0	1				
0					0	0	0	

Memory Allocation

A15=0: EPROM is selected

A15=1: RAM is selected

A14=0: System RAM is selected

A14=1: Cache RAM is selected, one bank at a time.

Address lines ABO - AB14 (sheet 1) are buffered by external registers. These address lines are driven by the Z80 during a Z80 memory cycle, and by the DMAC during a DMA cycle. Z80 and DMAC access to RAM is possible only if SRAMEN/ has been asserted. SRAMEN is generated by either MREQ/ or DACK/ . SRAMEN/ generation is inhibited when any one of the following signals are asserted (ground level): IORQ/ , BCS/ , AB15 , and RFSH/ . The logic level of AB15 determines whether RAM or EPROM is selected. RAM is selected when AB15=1, and EPROM is selected when AB15=0.

DISK CONTROLLER I/O COMMANDS.

MAIN DECODER:

A7	A6	A5	A4	A3	A2	A1	A0	MNEMONIC	
0	0	0	0	X	X	X	X	DMACS	See DMA I/O Commands.
0	0	0	1	0	X	X	X	2010CS/	See 2010 I/O Commands.
0	0	0	1	1	X	X	X	WDSELEN/	See WDSELEN I/O Commands.
0	0	1	0	X	X	X	X	CTC1CS/	See CTC I/O Commands.
0	0	1	1	X	X	X	X	CTC2CS/	See CTC I/O Commands.
0	1	0	0	X	X	X	X	FLOPCS/	See FLOPPY I/O Commands.
0	1	0	1	X	X	X	X	WREN/	See I/O Write Commands.
0	1	1	0	X	X	X	X	DEN/	See I/O Read Commands.
0	1	1	1	X	X	X	X	MEMBKSELE/	See MEMBKSELE I/O Commands.
1	0	0	0	0	0	0	0	Separately decoded in Tape Drive section.	
To									
1	0	0	0	0	1	1	1	See TAPE DRIVE I/O Commands.	

I/O WRITE COMMANDS:

I/O Cmnd(Hex)	Data	Mnemonic	Description
50	x	FLPYRST/	Reset Floppy Drive Logic.
52	D0=0	FLOUT/	Floppy motor off.
52	D0=1	FLOUT/	Floppy motor on.
54	x	SETRDY/	Set 2200 Rdy/Bsy line to ready.
56	DATA	ZWR2200/	Send data to 2200.
58	x	WDST/	Set 2010 Buffer Ready line to ready.
5A	x	SETBSY/	Set 2200 Rdy/Bsy line to busy.
5C	D6=1	AUXHEADSEL/	Select Aux. Winchester Heads.
5C	D6=0	AUXHEDSEL/	Deselect Aux. Winchester Heads.
5E	D7=1	FCLKSEL/	Select 1.2 Mb. Floppy (8 MHZ clk).
5E	D7=0	FCLKSEL/	Select 320 Kb. Floppy (4 MHZ clk).
80	DATA	QWRS/	Write data to tape
81	X	QWRDMA/	Generate QDRQ3
82	X	CLRDRQ3/	Enable QDRQ3
83	D1=1	SETONL/	Set tape interface online
84	D2=1	SETREQ/	Set tape interface request
85	D3=1	SETQPAR/	Enable tape interface parity error interrupt
86	X	CLRQPAR/	Clear tape interface parity error
87	D4=1	QSOFTRST/	Reset tape interface logic
87	D5=1	RSTBRDY/	Reset winchester buffer ready

I/O READ COMMANDS:

I/O Comnd(Hex)	Data	Mnemonic	Description
60	D0-D7	STATUS/	Status information follows
60	D0=0	FLOPINDEX	Within Floppy index hole
60	D0=1	FLOPINDEX	Outside Floppy index hole
60	D1=0	DN3/	Master Disk address
60	D1=1	DN3/	Slave Disk address
60	D2=0	FLPDROP	floppy door was disturbed
60	D2=1	FLPDROP	floppy door was not disturbed
60	D3=0	WPORP	Winch. cartridge undisturbed
60	D3=1	WPORP	Winch. cartridge disturbed
60	D4=0	PORFLAG	Power-on flag was not set
60	D4=1	PORFLAG	Power-on flag was set
60	D5=0	WWRP	Winch. cartridge write unprotected
60	D5=1	WWRP	Winch. cartridge write protected
60	D6=0	CPB/	2200 CPU ready to accept data
60	D6=1	CPB/	2200 cpu not ready
60	D7=0	PARITY/	Sys/Cash mem. parity error
60	D7=1	PARITY/	No parity error
62	DATA	HDDTYPE/	Disk drive type switch
66	DATA	ZRD2200/	Read 2200 CPU Data
68	D0=0	RDBDRQ/	2010 not requesting buffer data
68	D0=1	RDBDRQ/	2010 requesting buffer data
68	D1=0	RDBDRQ/	Switch #3 position #1 off
68	D1=1	RDBDRQ/	Switch #3 position #1 on
68	D2=0	RDBDRQ/	Switch #3 position #2 off
68	D2=1	RDBDRQ/	Switch #3 position #2 on

68	D3=0	RDBDRQ/	Switch #3 position #3 off
68	D3=1	RDBDRQ/	Switch #3 position #3 on
6A	X	SETBADPAR/	Force bad parity during BIT
6C	X	SETGOODPAR/	Force good parity during BIT
80	D7=1	QPARERR	Tape parity error
80	D6=1	QXFR	Tape data transfer
80	D5=1	QREQ	Tape request
80	D4=1	QONL	Tape online
80	D3=1	QDIR	Tape bus in input direction
80	D2=1	QEXC	Tape interface exception
80	D1=1	QRDY	Tape interface ready
80	D0=1	QACK	Tape interface acknowledge
81	DATA	RDQDATA/	Read data from tape

Detailed switch setting information appears elsewhere in this text.

'BIT' indicates Built In-Test

'X' indicates that the data portion of the I/O command is a "don't care"

MEMBKSEL I/O WRITE COMMANDS

I/O Comnd(Hex)	Data	Mnemonic	Description
70	D0-D3	MEMBKSEL/	Selects memory banks 0 to FF.
72	X	ENPARITY/	Enable System/Cash parity
74	X	CLRPARITY/	Clear System/Cash parity
76	X	OTC/	Signals TC(Terminal count) to the Floppy Controller Chips.

TASK FILE

The Task File is a bank of nine, 8-bit registers used to hold status information indicating the success or failure of an operation, as well the parameters under which the drive is to operate. They are addressed by A0 through A2 lines. A0 through A2=0 is unused by the 2010 and when received, puts its bus in the tri-state condition isolating it from the bus.

IN 11-ERROR REGISTER

! D7 !	D6 !	D5 !	D4 !	D3 !	D2 !	D1 !	D0 !
! BB !	CRC/ECC!	0 !	ID !	0 !	AC2 !	TK !	DM !

Bit 7 - Bad Block Detect

This bit is set when an ID field has been encountered that contains a Bad Block Mark. It is used for bad sector mapping.

Bit 6 - CRC/ECC Data Field Error

CRC mode of operation (SDH 7=0): this bit is set when a CRC error occurs in the data field. When Retry is enabled, ten more attempts are made to read the sector correctly. If none of these attempts are successful, bit zero in the Status Register is set also. If one of the attempts is successful, this bit remains set to inform the Host that a marginal condition exists. However the zero status bit is not set. No attempt is made to correct the error.

ECC mode of operation (SDH 7=1): This bit is when the first non-zero syndrome is detected. When Retry is enabled, up to ten attempts are made to correct the error. If successful this bit remains on. However bit 2 of the Status Register is set to inform the Host that the error has been corrected. If unsuccessful, this bit remains on and bit zero of the Status Register is set also. When Retry is disabled no attempt is made to correct the error.

The data may be read even if errors do exist.

NOTE: If the Long Mode it is set in thr Read Or Write command, no error checking is performed.

Bit 5 - Not used, forced to zero.

Bit 4 - ID Not found

This bit is set to indicate that the correct cylinder, head, sector, or size parameter could not be found, or an CRC error occured on the ID field. This bit is set on the first failure and remains set even if the error is recovered on retry. When recovery is unsuccessful, the Error Status bit is also set.

For a Scan ID Command with Retry enabled (T=0), the Error Status bit is set after ten unsuccessful attempts have been made to find the correct ID. With Retry disabled (T=1) only two attempts are made before setting the Error Status.

For a Read and Write Command with Retry enabled (T=0), ten attempts are made to find the correct ID field. If there is still an error on the tenth try, an auto-scan and auto-seek are performed. Then, ten more tries are made before setting the Error Status. When the Retry is disabled (T=1) only two tries are made, and no auto-scan or auto-seek operations are performed.

Bit 3 - Reserved

Not used, forced to zero

Bit 2 - Aborted Command

The command is aborted and this bit is set if, DRDY(data ready) has not been asserted, WF(write fault) is asserted, or the command issued had an undefined code.

Bit 1 - Track Zero Error

This bit is set during Restore Command when TK000(track zero) input has indicated that the head has reached track zero by 2047 steps.

Bit 0 - Data Address Mark Not Found

This bit is set during Read Sector Command if the Data Address Mark is not found following the proper sector ID.

OUT 11-WRITE PRECOMP CYLINDER

This register is used to define the cylinder number where the RWC(reduce write current) output signal is asserted. In this design, this signal is connected to the WPCEN(write precompensation enable) input of the IOC20B Data Separator chip. It is not connected to the RWC input of the Winchester drives. The RWC Winchester input is used as auxiliary head select. Maxtor drives use this signal to select a second set of 8 heads.

!	D7	!	D6	!	D5	!	D4	!	D3	!	D2	!	D1	!	D0	!
!	CYLINDER NUMBER / 4														!	

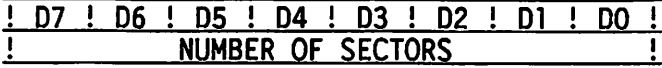
The value 00-FF loaded into this register is internally multiplied by four to specify the actual cylinder where RWC(WPCEN in this case) is to be asserted. Thus a value of 9C hex causes the RWC to be asserted on cylinder 270 hex, 9D hex on cylinder 274 hex, etc. RWC is asserted when the present cylinder is equal to, or greater than the value of this register. For example, the ST506 requires precomp 80 hex(128 dec.) and above. Therefore, the write precomp cylinder should be loaded with 20 hex(20 dec.)

A value of FF hex causes RWC to remain de-asserted, regardless of the cylinder number value.

The Sector Count, Sector Number, Cylinder Low, Cylinder High, and SDH Registers allow both read and write operations.

IN/OUT 12 ACCESS SECTOR COUNT REGISTER

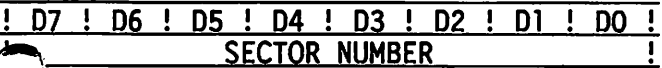
In multiple sector operations, this register contains the number of sectors involved with Read Sector, Write Sector, and Format commands.



The value written in this register is decremented by one after each sector is transferred to or from the Sector Buffer, A zero represents a 256 sector transfer, a 1=one sector, etc. This register is disregarded when a single sector command is specified.

IN/OUT 13 - ACCESS SECTOR NUMBER REGISTER

This register holds the number of the desired sector.



This is the starting sector in a multiple sector command. It is incremented by one after each sector has been transferred to or from the Sector Buffer. The register can contain any value from 0 to 255.

This register also specifies the minimum GAP 3 length, minus 3 during Format Command.

IN/OUT 14 CYLINDER NUMBER LOW REGISTER

This register the least significant 8 bits of the desired cylinder number.

!	D7	!	D6	!	D5	!	D4	!	D3	!	D2	!	D1	!	D0	!
!	LS BYTE OF CYLINDER NUMBER															!

It is used in conjunction with cylinder Number High Register to specify a range of 0 to 2047.

IN/OUT 15 - CYLINDER NUMBER HIGH REGISTER

This register contains the three most significant bits of the desired cylinder number.

!	D7	!	D6	!	D5	!	D4	!	D3	!	D2	!	D1	!	D0	!
!	X	!	X	!	X	!	X	!	X	!	#	!	#	!	#	!

These registers determine where the R/W are to be positioned. The Host writes the desired cylinder into these registers. Internal to the 2010 is another pair of registers pointing to where the heads are presently located, When any command, other than Restore, is executed these registers are compared. The difference between them results in a DIRIN and STEP signaling the drive how many cylinder to move the heads and in which direction.

The Present Cylinder Position Register is updated to equal The Cylinder Number Register at the completion of the seek.

When a Restore Command is executed, the Present Cylinder Position Register is reset to zero, while DIRIN and step move the heads to track zero.

IN/OUT 16 - ACCESS THE SDH REGISTER

This register contains the desired sector size, drive number, and head number parameters.

! D7 !	D6	D5	! D4	D3	! D2!	D1!	D0 !
! EXT !	SIZE		! DRIVE		! HEAD		

! D6!	D5	SECTOR SIZE !	!D4!	D3 !	DRIVE#!	!D2!	D1!	D0!	HEAD# !
0	0	256	0	0	DSEL 1	0	0	0	HSEL 0
0	1	512	0	1	DSEL 2	0	0	1	HSEL 1
1	0	1024	1	0	DSEL 3	0	1	0	HSEL 2
1	1	128	1	1	DSEL 4	0	1	1	HSEL 3
						1	0	0	HSEL 4
						1	0	1	HSEL 5
						1	1	0	HSEL 6
						1	1	1	HSEL 7

Bit 7 - One selects the ECC mode for the data field. Zero selects the CRC mode for the data field.

NOTE; Drive Select decoding is by external logic. Head Select decoding is done within the Winchester drives logic.

IN 17 - STATUS REGISTER

IMPORTANT: The data read from the Status Register IS NOT valid when the 2010 is doing data transfers.

The Status Register is used to inform the Host of certain events performed by the 2010 as well as reporting status from the drive control lines. Reading the Status Register de-asserts INTR(Interrupt Request).

! D7	! D6	! D5	! D4	! D3	! D2	! D1	! D0	!
! BSY	! RDY	! WF	! SC	! DRO	! DWC	! CIP	! ERR	!

Bit 7 - Busy

BUSY is asserted when a command is written into the Command Register and, except for the Read Command, it is de-asserted at the end of the command. When executing Read Sector Command, BUSY is de-asserted when the Sector Buffer is full. Commands should not be loaded into the Command register when this bit is set. When the BUSY bit is set, no other bits in the Status or Error Register are valid.

Bit 6 - Ready

This bit reflects the status DRDY(Data Ready). When this bit equals zero, the command is aborted and status of this bit is latched.

Bit 5 Write Fault

This bit reflects the status of WF, When this bit equals one, the command is aborted, INTRQ is asserted, and the status of this bit is latched.

Bit 4 - Seek Complete

This bit reflects the status of SC. When a seek or implied seek has been initiated by the command, it pauses until seek is complete. This bit is latched after "aborted command" error.

Bit 3 - Data Request

DRQ reflects the same status as BDRQ. It is asserted when the data Sector Buffer must be written into, or read from. DRQ and BDRQ remain asserted until BRDY indicates that the Sector Buffer has been filled or emptied, depending upon the command. DRQ is used during program Interrupt and must be interrogated by the Host to determine that the 2010 is ready.

Bit 2 - Data Was Corrected

When a one, this indicates an error has been detected during the ECC mode of operation and the data in the Sector Buffer has been corrected. This provides the user with an indication that there may be a marginal condition within the drive before the errors become incorectable. This bit is forced to zero when not in the ECC mode of operation.

Bit 1 - Command In Progress(CIP)

When this bit is set, a command is been executed and a new command should not be loaded. Although a command is been executed the Sector Buffer is still available for access by the Host. When the 2010 is no longer busy, (bit 7=0) the Status Register can be read. Any attempt to read the other registers results reading the status.

Bit 0 - Error

This bit indicates that a non-recoverable error has occured. When the Host reads the status and finds this bit set, it must read then the Error Register to determine what type of error it was.

OUT 17 - COMMAND REGISTER

!	D7	!	D6	!	D5	!	D4	!	D3	!	D2	!	D1	!	D0	!
!	COMMAND														!	

COMMAND SUMMARY:

COMMAND	! D7 !	D6 !	D5 !	D4 !	D3 !	D2 !	D1 !	D0 !
RESTORE	0	0	0	1	R3	R2	R1	R0
SEEK	0	1	1	1	R3	R2	R1	R0
READ SECTOR	0	0	1	0	I	M	L	T
WRITE SECTOR	0	0	1	1	0	M	L	T
SCAN ID	0	1	0	0	0	0	0	T
WRITE FORMAT	0	1	0	1	0	0	0	0
COMPUTE CORRECTION	0	0	0	0	1	0	0	0
SET PARAMETER	0	0	0	0	0	0	0	S

Stepping Rate Field R3-R0

For 5 MHZ WCLK

R3-R0= 0000 - 35 microsec

0001 - .5 msec

0010 - 1.0 msec

0011 - 1.5 msec

0100 - 2.0 msec

0101 - 2.5 msec

0110 - 3.0 msec

0111 - 3.5 msec

1000 - 4.0 msec

1001 - 4.5 msec

1010 - 5.0 msec

1011 - 5.5 msec

1100 - 6.0 msec

1101 - 6.5 msec

1110 - 3.2 microsec

1111 - 16 microsec

STEP PULSE WIDTH= 1.6 at 3.2 microsec rate

8.0 microsec at all others

I - Interrupt Control

- I=0 INTRQ occurs with BDRQ/DRQ indicating Sector buffer is full(valid only when M=0).
- I=1 INTRQ when the command is completed and Host has read the Sector Buffer.

M - Multiple Sector Flag

- M=0 Transfer one sector(the scetor count is ignored).
- M=1 Transfer multiple sectors.

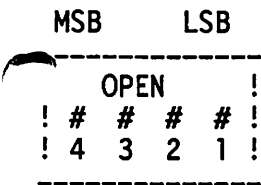
L - Long Mode

- L=0 Normal mode, normal CRC or ECC functions are performed.
- L=1 Long mode, no CRC or ECC bytes are developed or error checking performed on the data field. The 2010 appends the four additional bytes supplied by the Host or disk to the data field.

T - Retry Flag

- T=0 Enable Retry
- T=1 Disable Retry

DISK DRIVE TYPE SWITCH SETTING



OPEN=deselect=0

SWITCH SETTING		DISK DRIVE TYPE
MSB	LSB	
0	0 0 0 0	No Drive selected
0	0 0 0 1	10 Mb Removable Cartridge Winchester
0	0 0 1 0	10 Mb Winchester
0	0 0 1 1	20 Mb Winchester
0	1 0 0 0	32 Mb (non-Micropolis) Winchester
0	1 0 0 1	64 Mb Winchester
0	1 1 0 0	140 Mb Maxtor 14x10 Mb
0	1 1 0 1	32 Mb Micropolis Winchester
1	0 0 0 0	112 Mb Maxtor 7x16 Mb

NOTE1: The same Maxtor drive is used for both the 140 Mb and the 112 Mb configuration

NOTE2: Not all DIP switches have the markings shown above. Another version shows an arrow pointing to the word 'ON' In this application ON=select=1

FLOPPY DRIVE

The main components of the Floppy Drive logic are the NEC 765A (or equiv.) Floppy Disk Controller (FDC) chip and Floppy Interface Data Ordinator (FIDO).

! 250ns ! _____ ! 250ns !

! _____ 2us _____ !

FDC WCK waveform when HIGH/LOW/ is low

! _____ ! _____ ! _____ ! _____ ! _____ !

FDC CLK waveform when HIGH/LOW/ is low
Frequency =4 MHZ

! 250ns ! _____ ! 250ns !

! _____ 1us _____ !

FDC WCK waveform when HIGH/LOW/ is high

! _____ ! _____ ! _____ ! _____ ! _____ !

FDC CLK waveform when HIGH/LOW/ is high
Frequency =8 MHZ

QIC Interface Logic

The DISK CONTROLLER provides hardware logic that makes it possible to interface with any Streaming Cartridge Tape Drive (SCTD), however the present firmware is tailored specifically for the TEAC SCTD.

I/O commands are used for both reading SCTD status, and for sending control commands to the SCTD.

Data transfers, to and from the SCTD, are done via DMA.

The SCTD records data in 512 byte blocks, while data in the Z80 is organized in 256 byte blocks. This makes it necessary to have two separate 256 byte DMA transfers in order to meet the 512 byte block requirement of the SCTD.

The SCTD controls the bus direction.

The DISK CONTROLLER generates and sends to the SCTD an odd parity bit during both data and control transmission. The SCTD reciprocates with its own odd parity bit during its transmission cycle to the DISK CONTROLLER. The Z80 is interrupted if the DISK CONTROLLER parity checker detects a parity error during incoming data or status from the SCTD. All Z80 interrupts, except NMI, are routed to the Z80 via the two CTC chips. The SCTD generates an exception when it receives wrong parity from the DISK CONTROLLER.

2200 TO DISK CONTROLLER INTERFACE

The DISK CONTROLLER accepts data from the 2200 either by using Z80 I/O command or by using DMA channel 1.

Data flow is controlled by the DISK CONTROLLER generated Ready/Busy(R/B) line. This line is set to the '0' level when the DISK CONTROLLER is ready to receive data from the 2200. Output Bus Strobe (OBS) signals the DISK CONTROLLER that a byte of data (OB1-OB8) has been placed on the 2200 output bus.

OBS sets the R/B line to busy

OBS (after a 500ns delay) stores OB1-OB8 in register

OBS asserts the OBREQ (DREQ1 of the DMA chip). The DMA chip will reply only if DMA channel 0 had been initialized prior to this.

OBS asserts START/ if and AB8 are true. The 2200 uses START/ to inform the DISK CONTROLLER that the data on the bus a command byte.

OBS signals the Z80 via (CTC chip) to read the data in register. The Z80 OBS handling routine issues an IN 66 command (ZRD2200) in order to generate 220ORD/ . This signal is also generated during DMA . The Z80 uses 220ORD/ to read the data in register. The Z80 processes the data, and when it is ready to accept the next byte from the 2200 it generates SETRDY/ in order to set the R/B line to ready. Note that the transfers of DMA channel 1 also sets the R/B line to ready.

It should be pointed out that the 2200 I/O bus does not support DMA transfers. It is the DISK CONTROLLER hardware and firmware that provide the handshake signals that are necessary during a DMA cycle.

DISK CONTROLLER To 2200 INTERFACE

The DISK CONTROLLER transfers data to the 2200 either by using Z80 I/O commands or DMA channel 2.

The Z80 stores data in output register by generating ZWR2200/ (OUT 56/). This signal also generates IBS (Input bus Strobe) to the 2200. IBS is terminated by 2200 generated signal CPB/ (CPU BUSY). The 2200 asserts this signal when it is not ready to accept data from the DISK CONTROLLER. IBREQ (DREQ2) is generated when the 2200 is ready to receive data (CPB/=1). The DMA chip responds to IBREQ only when it has been properly initialized. During a DMA cycle the DACK2/ OR ZWR/ is used to store data in the output register and is also used to generate IBS, and to reset IBREQ.

(WANG)

0058W

ASSEMBLY PROCEDURE

SHT. 1 OF 28

PART NO. 279-0873		DESCRIPTION		CS-D/N CABINET SUB-ASSEMBLY		MODEL		CS-D/N		TYPE		CPU	
PREP BY <i>Robert Wilson</i>		<i>2/16/89</i>		MFG. ENG. APPROVAL <i>For Markony 3/14/89</i>		REVIEW <i>GC</i>		<i>3/17/89</i>					
ISSUE DATE	ISSUE	BOM REV.	OPER. NO.	SHT. NO.	ECO/MPC NO.	DESCRIPTION	WRITER						
01/09/89	A	AA	ALL	ALL		PRELIMINARY-(FIRST DRAFT)	ROB WILSON						
02/16/89	B	AA	ALL	ALL	PCN 1375	PRELIMINARY-(SECOND DRAFT)	ROB WILSON						
<i>5-6-89</i>	<i>C</i>				<i># 52509D</i>	<i>Changes Per Tmc</i>	<i>Don Deschenes</i>						
5/17/89	D				53843	Change previously incorporated	S. Clark						

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2200 FINAL



OPERATION SHEET

PART NO. 279-0873 DESCRIPTION CS-D/N CAB. SUB-ASS'Y TYPE CPU ISSUE REV. SHT. 3 OF 28

OPER. NO.	OPERATION	WORK CTR.	STD.	SPECIAL TOOLS/FIXTURES
0.5	INSPECTION GUIDELINES			
1.0	REMOVE PACKAGING (VENDOR)			
2.0	REMOVE COVERS FROM CABINET			
3.0	MOUNT LEVELING SUPPORTS			
4.0	MOUNT POWER SUPPLY			
5.0	MOUNT FAN ASSEMBLIES			
6.0	MOUNT SWITCH ASSEMBLY			
7.0	SECURE MOTHER BOARD TO CHASSIS			
8.0	MOUNT/SECURE CABLES			
9.0	MOUNT/SECURE BLANK BRACKETS			
10.0	ASSEMBLE/MOUNT FRONT BEZEL			
10.5	Q.C. INSPECTION			

ASSEMBLY SHEET



PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SHT. 4 OF 28
OPER. NO. 0.5	OPERATION INSPECTION GUIDELINES	ISSUE
		REV.
		TYPE

***** ATTENTION-IMPORTANT *****

THE FOLLOWING GUIDELINES ARE TO BE USED WHILE ASSEMBLING THIS PRODUCT.

1. VERIFICATION OF PCB REVISIONS (E REV'S) BEFORE ASSEMBLY INTO UNITS.
2. VERIFICATION THAT EXTERNALLY VISIBLE PARTS ARE FREE OF SCRATCHES, DISCOLORATION, IMPERFECTIONS, CORROSION OR ANY OTHER OBVIOUS COSMETIC DEFECTS.
3. VERIFICATION THAT ALL HARDWARE IS FUNCTIONAL AND WORKS FREELY. THIS INCLUDES KEY LOCKS, HINGES, SLIDES, LATCHES, SWITCHES, CASTERS, ETC.
4. INCLUSION OF ALL PROPER SWITCH SETTINGS.
5. INCLUSION OF PROPER ALIGNMENT AND BALANCE OF ALL VISIBLE GAPS OR SPACING BETWEEN MATING PANELS, BEZELS, DOORS, OR EXTERNAL SUB ASSEMBLIES.
6. INCLUSION OF PROPER TORQUE REQUIREMENTS FOR ALL HARDWARE FASTENERS.
7. THE INCLUSION OF QC CHECKS AS PART OF LAST OPERATION OF EACH SUB AND FINAL ASSEMBLY.

(WANG) ASSEMBLY SHEET

LABORATORY INC.

SMT. 5 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

PART NO. 279-0873

ISSUE REV. TYPE

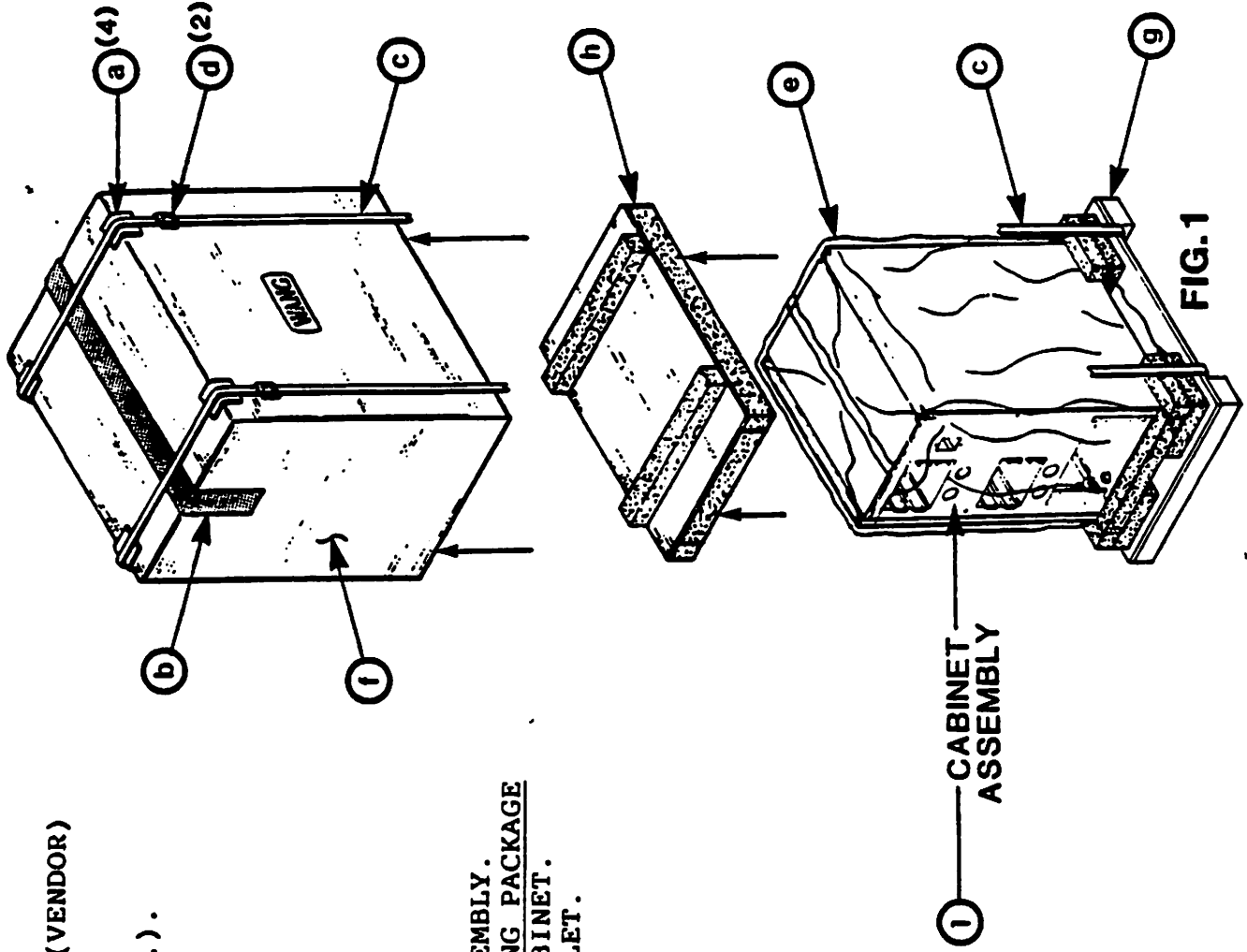
OPER. NO. 1.0 **OPERATION** REMOVE PACKAGING (VENDOR)

A. 1. 279-0921 CS-D/N CABINET SUB-ASS'Y (VENDOR)

THE FOLLOWING ITEMS ARE PART OF THE VENDOR SHIPPING PACKAGE, (290-0685-01 REF.).

- a) 685-0100 EDGE PROTECTOR (4)
- b) 685-0474 TAPE 2" CLEAR POLY (A/R)
- c) 685-0664 STRAPPING POLY .50 (A/R)
- d) 685-0665 SEAL STRAPPING FOR .50 (2)
- e) 685-0723 BAG GUSSET 23 x 17 x 36
- f) 685-2410 FOLHSC 27.13 x 20.00
- g) 685-2411 PALLET 28.00 x 20.88
- h) 685-2412 CUSHION ASSY, TOP

REMOVE THE PACKAGING FROM THE CABINET ASSEMBLY.
SAVE ALL THE RE-USEABLE ITEMS OF THE SHIPPING PACKAGE FOR THE FINAL PACKAGING OF THE COMPLETED CABINET.
 REMOVE THE CABINET FROM THE CUSHIONED PALLET.



① — CABINET ASSEMBLY

FIG. 1

ASSEMBLY SHEET

WANG
LABORATORIES INC.

SMT. 6 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

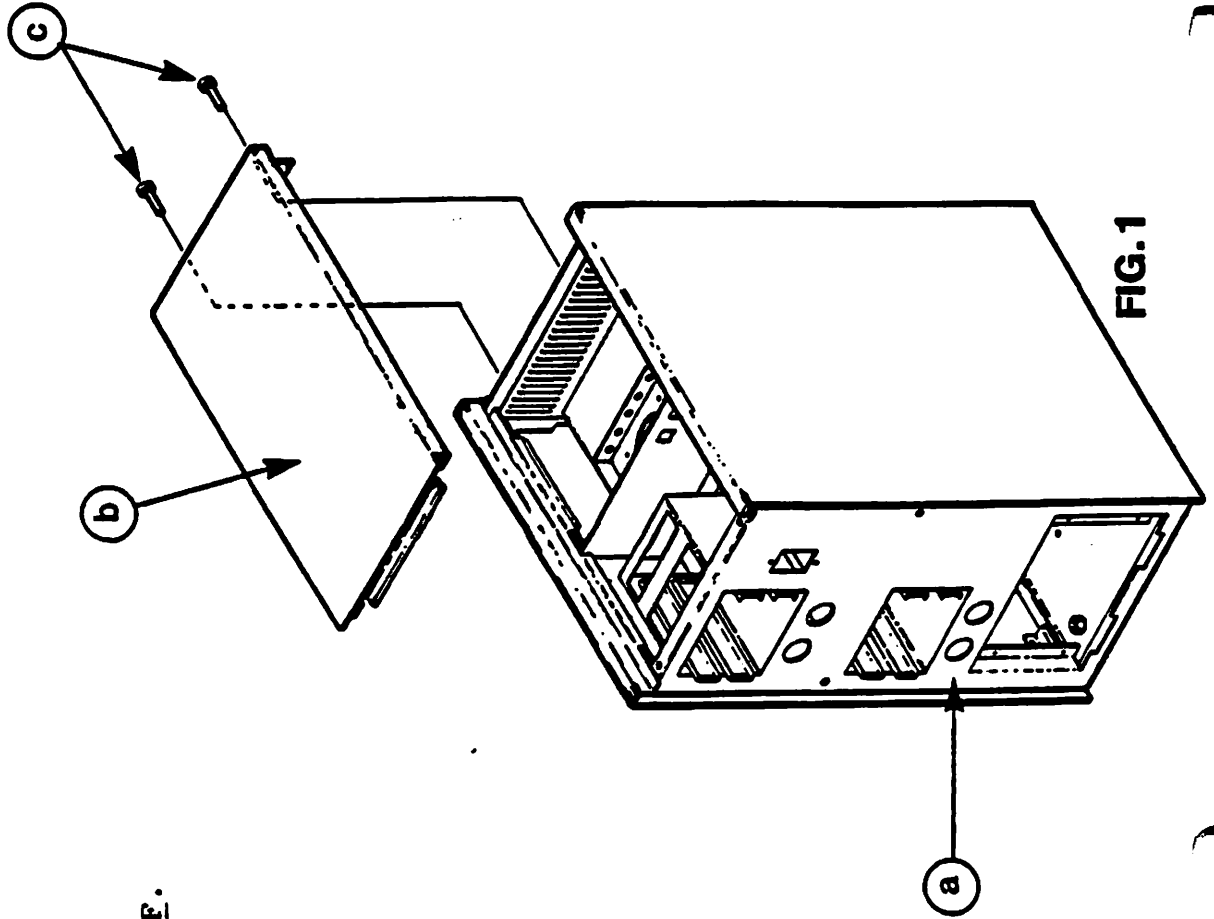
PART NO. 279-0873

ISSUE REV. TYPE

OPER. 2.0 OPERATION REMOVE COVERS FROM CABINET

A. REMOVE THE SCREWS FROM THE TOP COVER. SLIDE THE TOP COVER BACK AND REMOVE IT FROM THE CABINET. SAVE TOP COVER AND HARDWARE FOR RE-ASSEMBLY.

- a) 458-3899 CS-D/N FRAME (WELD) REF.
- b) 458-5027 COVER, TOP (WELD) REF.
- c) 650-4120 SCR, 8-32 x 3/8 PN HD PHL (2) REF.



ASSEMBLY SHEET

WANG
LABORATORIES INC.

SHT. 7 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

PART NO. 279-0873

ISSUE REV. TYPE

OPER. NO. 2.0 OPERATION REMOVE COVERS FROM CABINET

B. 1. 615-4004 LABEL, SWITCH SETTING

REMOVE THE L.H. AND R.H. COVERS BY SLIDING THEM BACK AND UP AWAY FROM THE CABINET FRAME. APPLY SWITCH SETTING LABEL TO THE INSIDE OF THE R.H. COVER AT POSITION, AS SHOWN. PLACE SIDE COVERS ON APPROPRIATE CART WITH TOP COVER (458-5027 REF.).

- a) 458-3899 CS-D/N FRAME (WELD) REF.
- b) 458-5028 COVER, L.H. (WELD) REF.
- c) 458-5029 COVER, R.H. (WELD) REF.

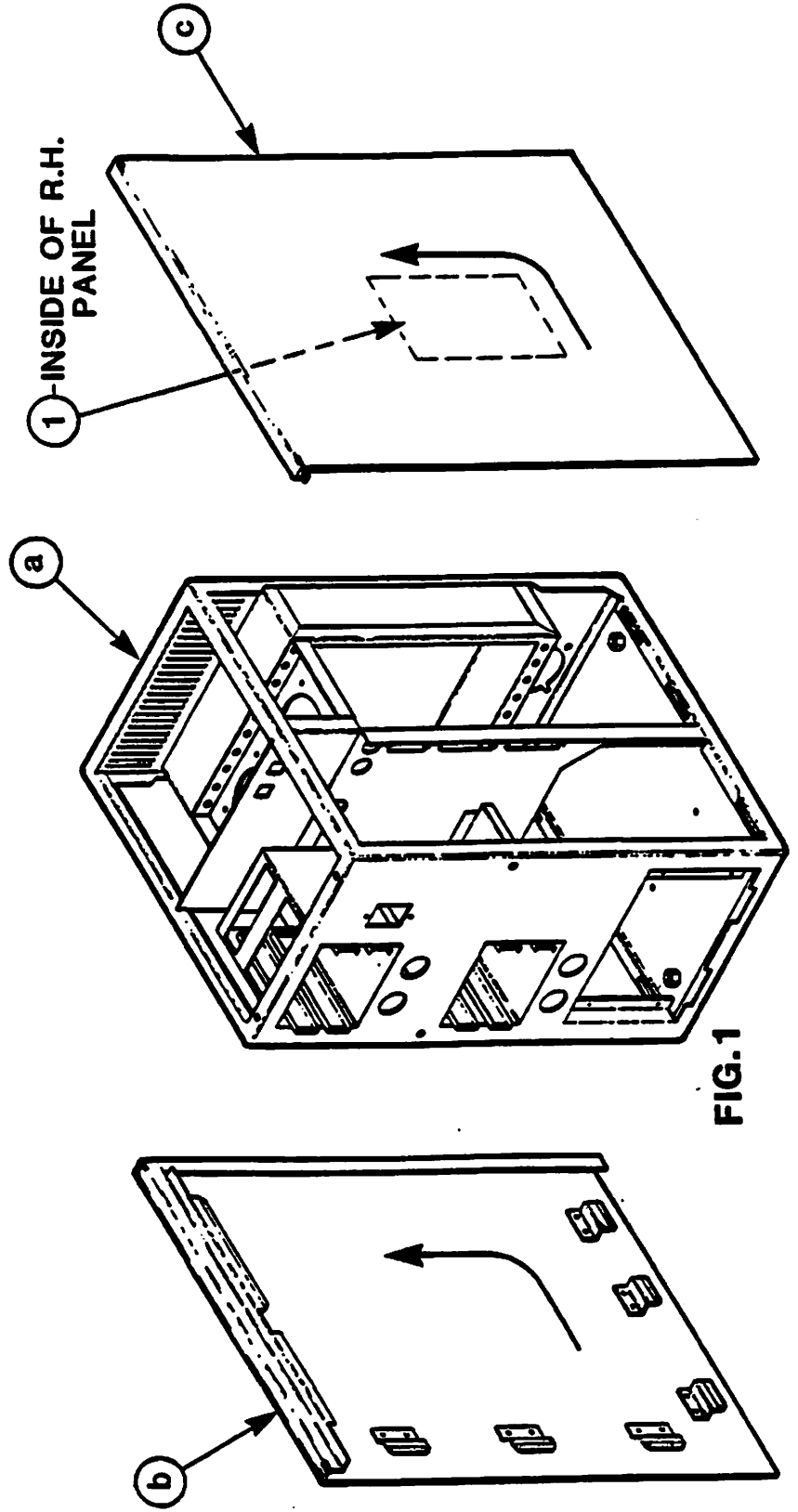


FIG. 1

ASSEMBLY SHEET

WANG
LABORATORIES, INC.

PART NO. 279-0873

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

SHT. 8 OF 28

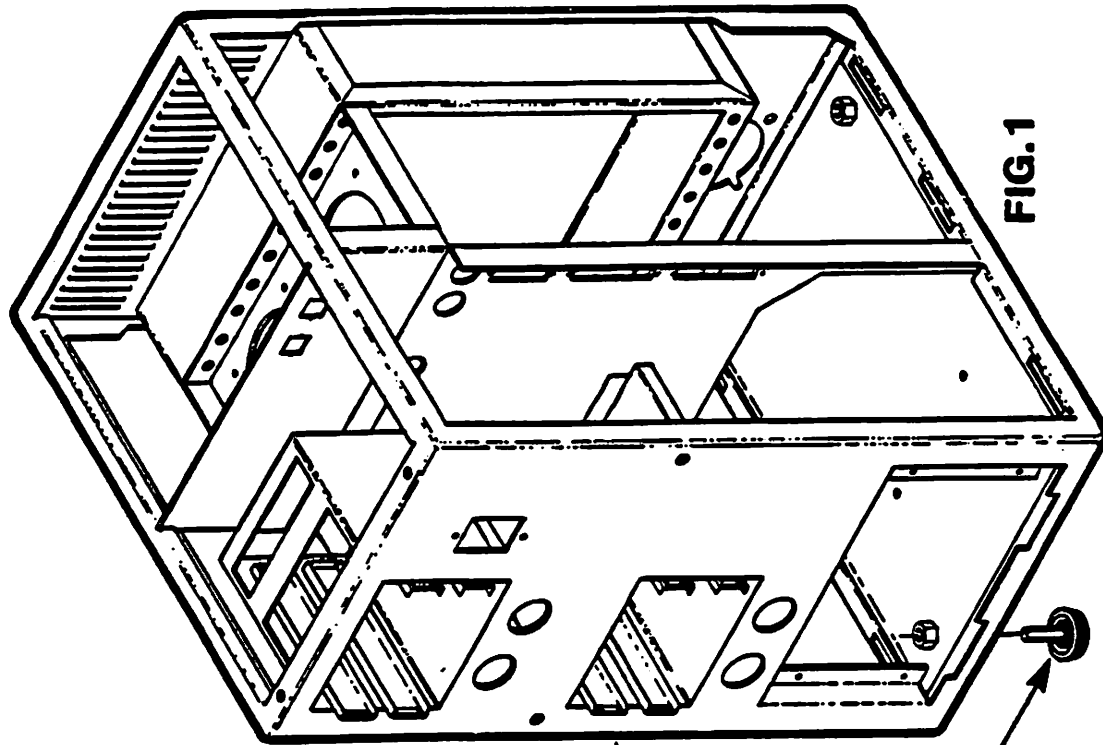
OPER. NO. 3.0

OPERATION MOUNT LEVELING SUPPORTS

ISSUE REV. TYPE

A. 1. 655-0072 APPLIANCE GLIDE 1-1/2" (4)

MOUNT THE FOUR (4) APPLIANCE GLIDE LEVELING SUPPORTS TO THE BOTTOM OF THE CHASSIS, AT POSITIONS AS SHOWN.



CS-D/N FRAME
(458-3899 REF.)

(4) 1
ASSEMBLY TYPICAL
4 PLACES

FIG. 1

(WANG) ASSEMBLY SHEET

PART NO.	279-0873	DESCRIPTION	CS-D/N CABINET SUB-ASSEMBLY
OPER. NO.	4.0	OPERATION	MOUNT POWER SUPPLY
		ISSUE	REV.
			TYPE

SMT. 9 OF 28

- A. 1. 270-0890-1 SPS 255 ASSEMBLY
- 2. 458-2252 SUPPORT, POWER SPLY
- 3. 650-3080 SCR, 6-32 x 1/4" PN HD SEMS (2)
- 4. 651-0039 SCR, 8-18 1/2LG SLF TPG (2)

USING THE HARDWARE AS SHOWN, SECURE THE POWER SUPPLY TO THE REAR OF THE CHASSIS. USING HARDWARE AND POWER SUPPLY SUPPORT, SECURE THE OTHER END OF THE POWER SUPPLY TO THE BASE OF THE CHASSIS, AS SHOWN.

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.
VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

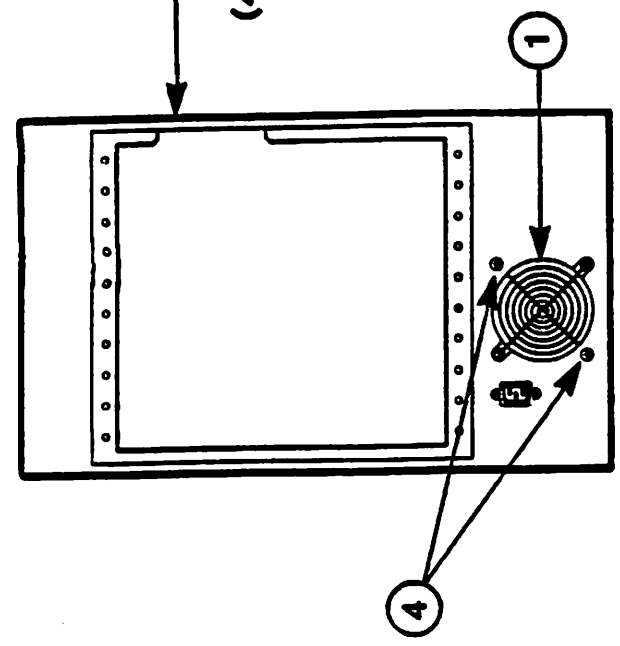
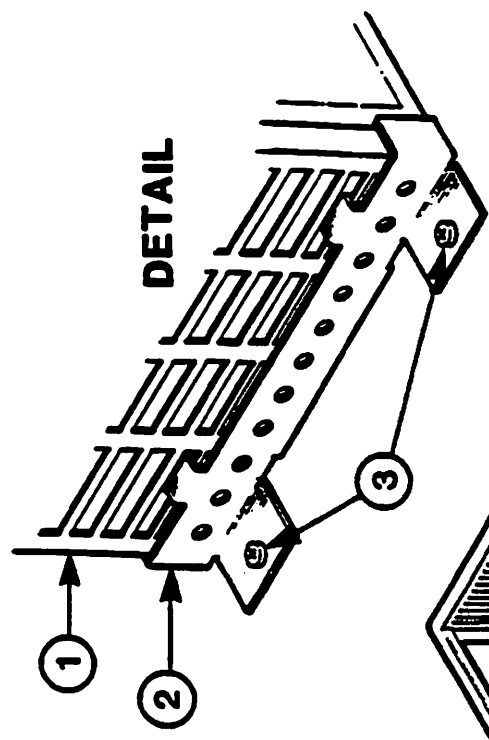


FIG.1 REAR VIEW

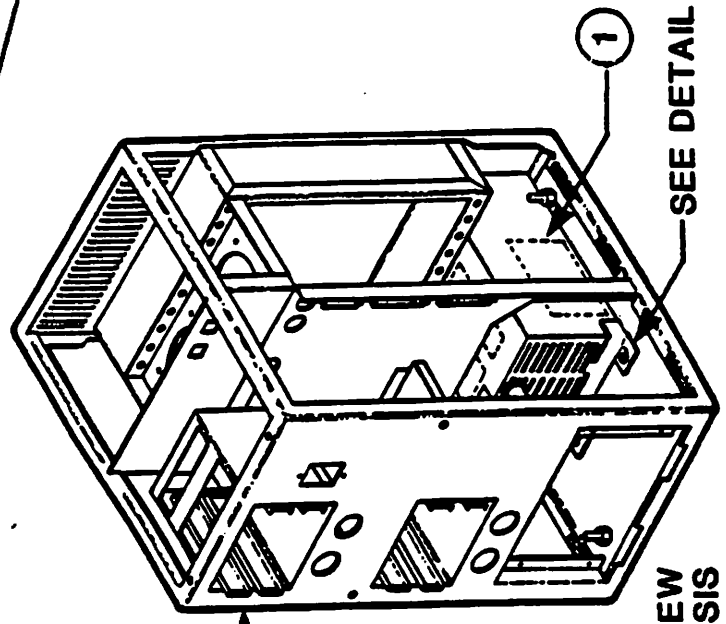


FIG.2 FRONT VIEW OF CHASSIS

CS-D/N
CHASSIS
(458-3899 REF.)

WANG ASSEMBLY SHEET

LABORATORIES INC

PART NO.	279-0873	DESCRIPTION	CS-D/N CABINET SUB-ASSEMBLY
OPER. NO.	5.0	OPERATION	MOUNT FAN ASSEMBLIES
		ISSUE	REV.
			TYPE

SMT. 10 OF 28

- A. 1. 270-3483 DC FAN (1049) ASSEMBLY (2)
2. 650-3524 SCR, 6-32 x 1.87LG PHL (8)
3. 653-3000 WASH, #6 FLAT (8)
4. 653-3003 WASH, #6 SPLIT (8)

POSITIONS FANS ON TOP OF THE CHASSIS AS SHOWN (SEE FIG.1), BE SURE THAT THE WIRES OF THE FANS ARE SHOWING ON TOP FOR CORRECT POSITIONING. REFER TO "DETAIL" ILLUSTRATION FOR HARDWARE STACK-UP AND AIR FLOW DIRECTION. SECURE THE FANS TO THE CHASSIS, USING THE HARDWARE AS SHOWN.

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.

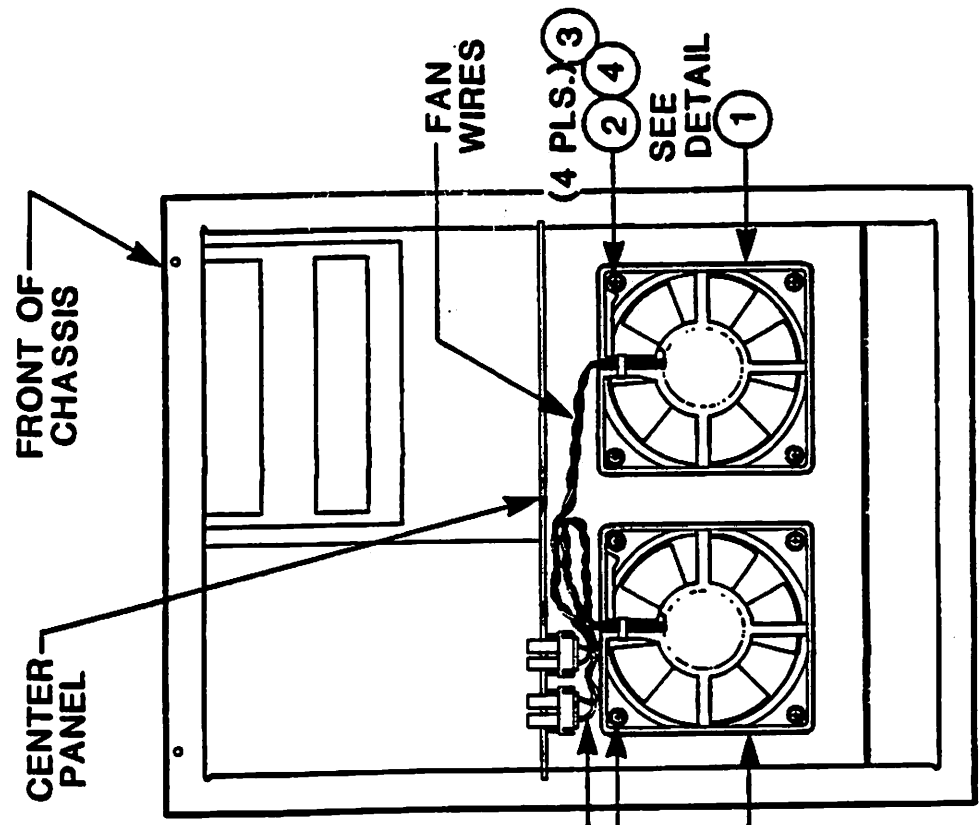
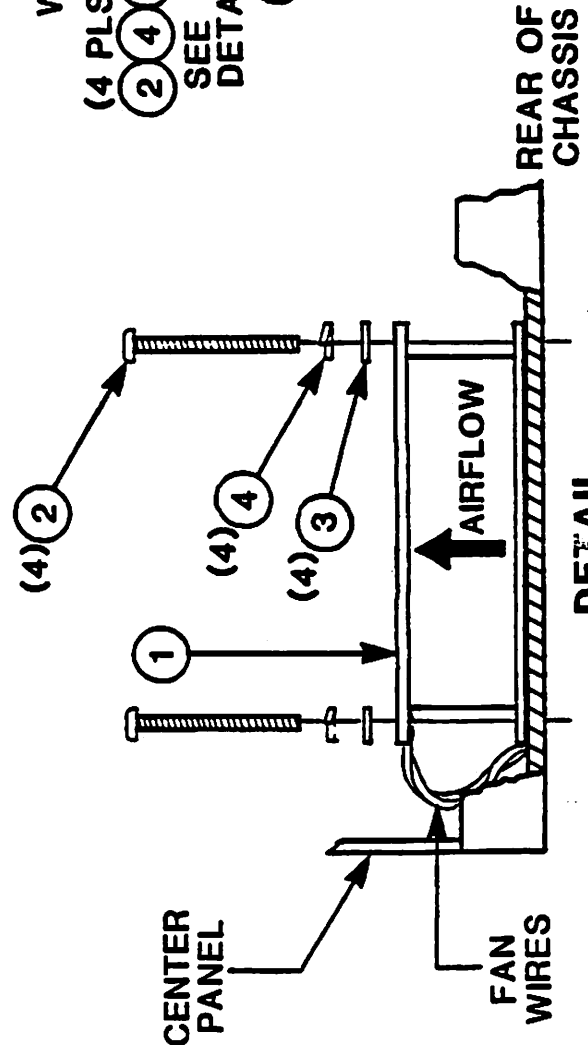


FIG. 1 TOP VIEW OF CHASSIS



DETAIL
ASSEMBLY TYPICAL
BOTH FANS

(WANG) ASSEMBLY SHEET

L. DONATOGRETTI, INC.

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SNT. // OF 28
OPER. NO. 6.0	OPERATION MOUNT SWITCH ASSEMBLY	ISSUE REV. TYPE

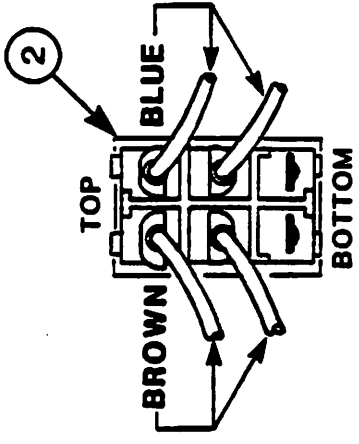
- A. 1. 220-2057 CABLE, JITCH
- 2. 325-0105 125VAC PNL-MNT. UL/CSA/VDE BRACKET, SWITCH
- 3. 455-0104 BRACKET, SWITCH
- 4. 654-1204 GROMMET 3/16 ID FOR 5/16 (2)

MOUNT THE SWITCH TO THE SWITCH BRACKET, BY PRESSING SWITCH INTO SWITCH BRACKET, AT POSITION AS SHOWN. APPLY THE RUBBER GROMMETS TO THE SWITCH BRACKET, AS SHOWN. PLUG-IN THE FOUR WIRES OF THE SWITCH CABLE TO THE REAR TERMINALS OF THE SWITCH. (SEE DETAIL FOR WIRE CONNECTIONS)

- 5. 650-3080 SCR, 6-32 x 1/4" SEMS (2)

USING THE HARDWARE AS SHOWN, SECURE THE SWITCH BRACKET TO THE FRONT OF THE CHASSIS AT POSITION AS SHOWN. (SEE FIG.2)

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.



REAR VIEW OF SWITCH DETAIL

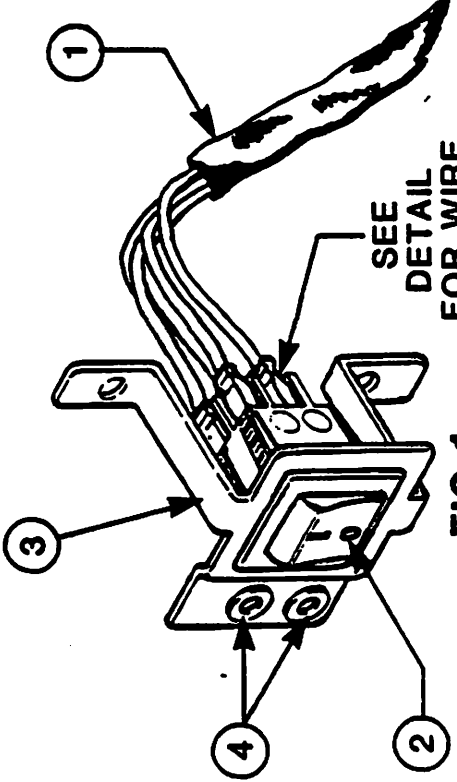


FIG. 1
SEE DETAIL FOR WIRE CONNECTIONS

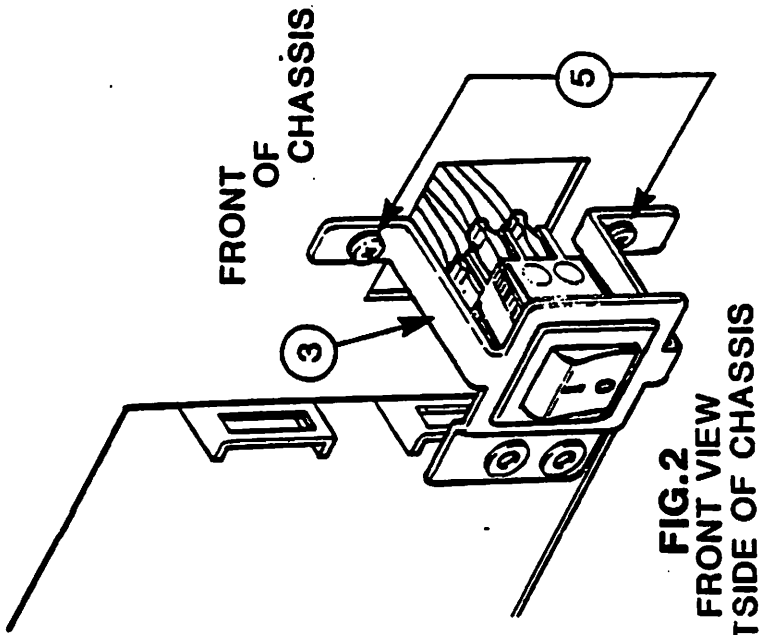


FIG. 2
FRONT VIEW OUTSIDE OF CHASSIS

(WANG) ASSEMBLY SHEET

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SHT. 12 OF 23
OPER. NO. 7.0	OPERATION SECURE MOTHER BOARD TO CHASSIS	ISSUE
		REV.
		TYPE

- A. 1. 210-9560 PCA, CS MOTHER BOARD
2. 458-2326 SUPPORT, MEDIUM (3)
3. 458-2327 SUPPORT, SMALL
4. 458-2328 SUPPORT, LARGE
5. 650-2203 SCR, 4-40 x 5/8 SEMS (14)

USING THE HARDWARE AS SHOWN, SECURE THE SUPPORTS TO THE CIRCUIT SIDE OF THE CS MOTHER BOARD AT POSITIONS AS SHOWN.

VERIFY TORQUE OF 4-40 HARDWARE TO 5 INCH/LBS. 13 PLACES
14TH PLACE SCREW IS TO BE HANDTIGHTENED ONLY.

HANDTIGHTEN ONLY

TORQUE
13 PLACES

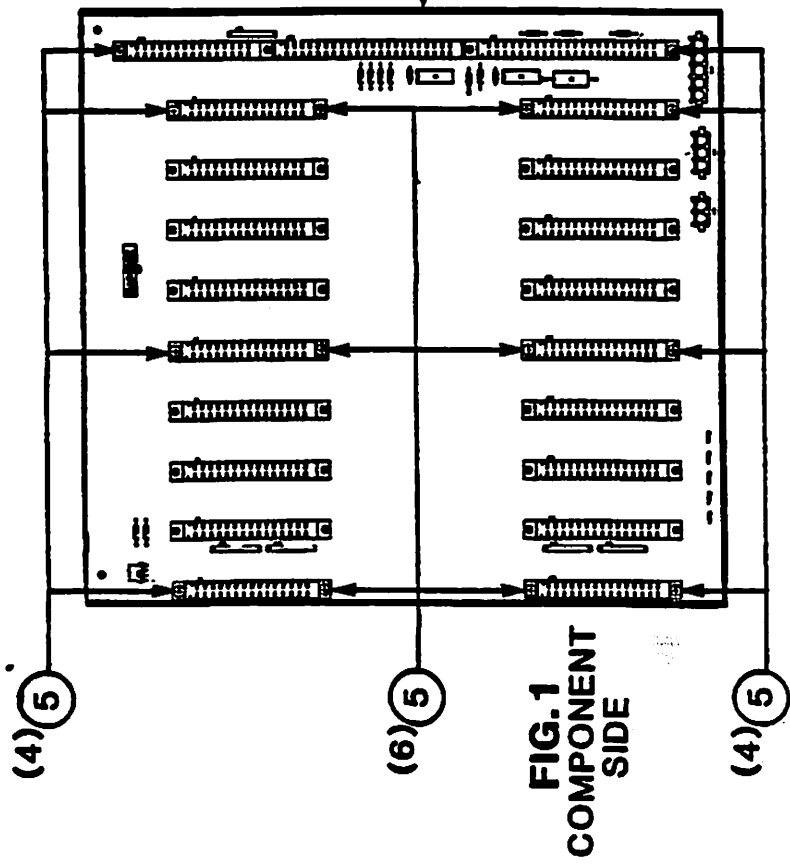


FIG. 1
COMPONENT
SIDE

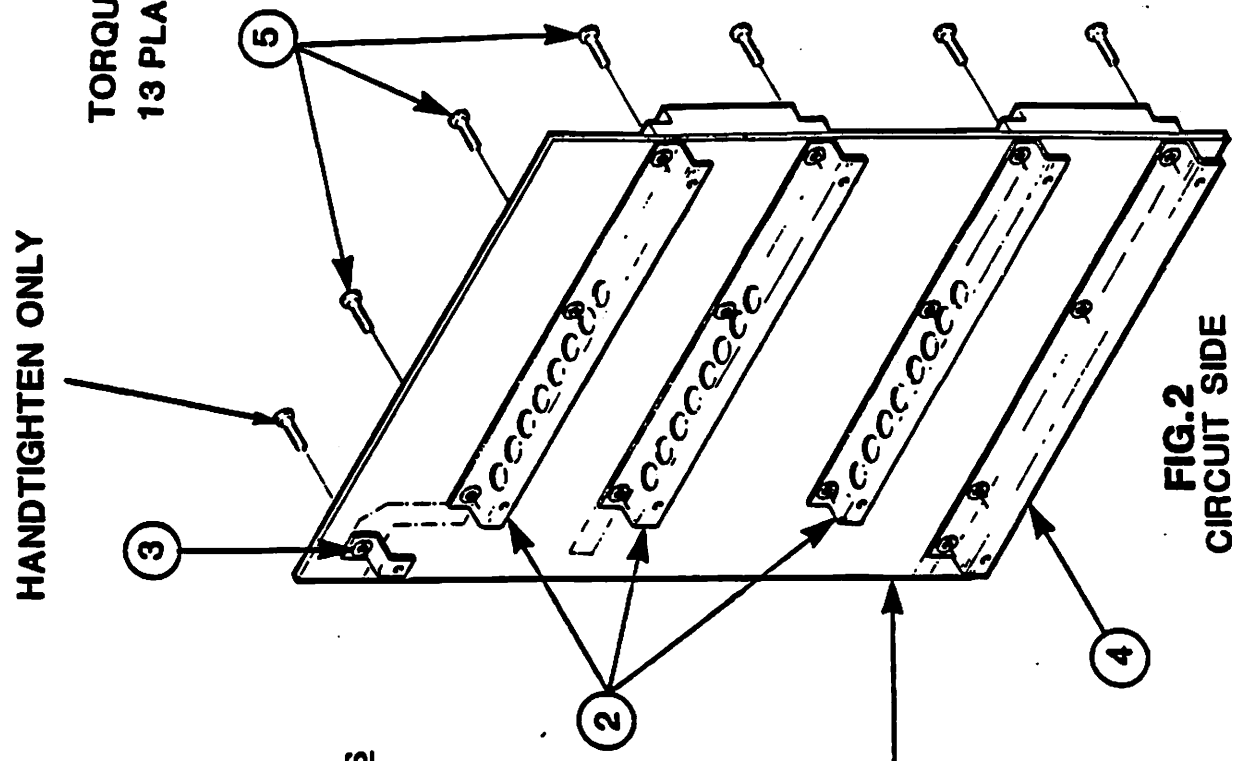


FIG. 2
CIRCUIT SIDE

ASSEMBLY SHEET

WANG
LABORATORIES INC.

SHT. / 3 OF 28

ISSUE

REV.

TYPE

PART NO. 279-0873 **DESCRIPTION** CS-D/N CABINET SUB-ASSEMBLY

OPER. NO. 7.0 **OPERATION** SECURE MOTHER BOARD TO CHASSIS

- B. 1. 650-3080 SCR, 6-32 x 1/4" SEMS (5)

POSITION CS MOTHER BOARD (210-9560 REF.) AS SHOWN AND HOOK THE SUPPORTS ON THE CIRCUIT SIDE OF THE MOTHER BOARD TO THE BRACKETS ON THE CENTER PANEL OF THE CS CHASSIS (458-3899 REF.).

USING THE HARDWARE AS SHOWN, SECURE THE MOTHER BD. ASSEMBLY TO THE CHASSIS. DO NOT TIGHTEN SCREWS AT THIS TIME.

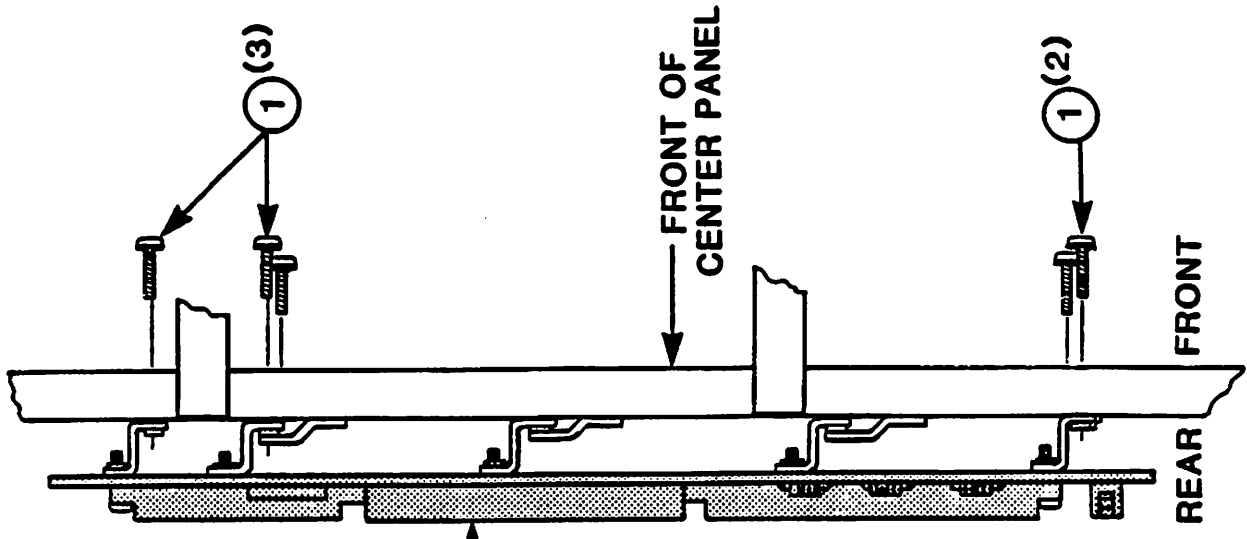
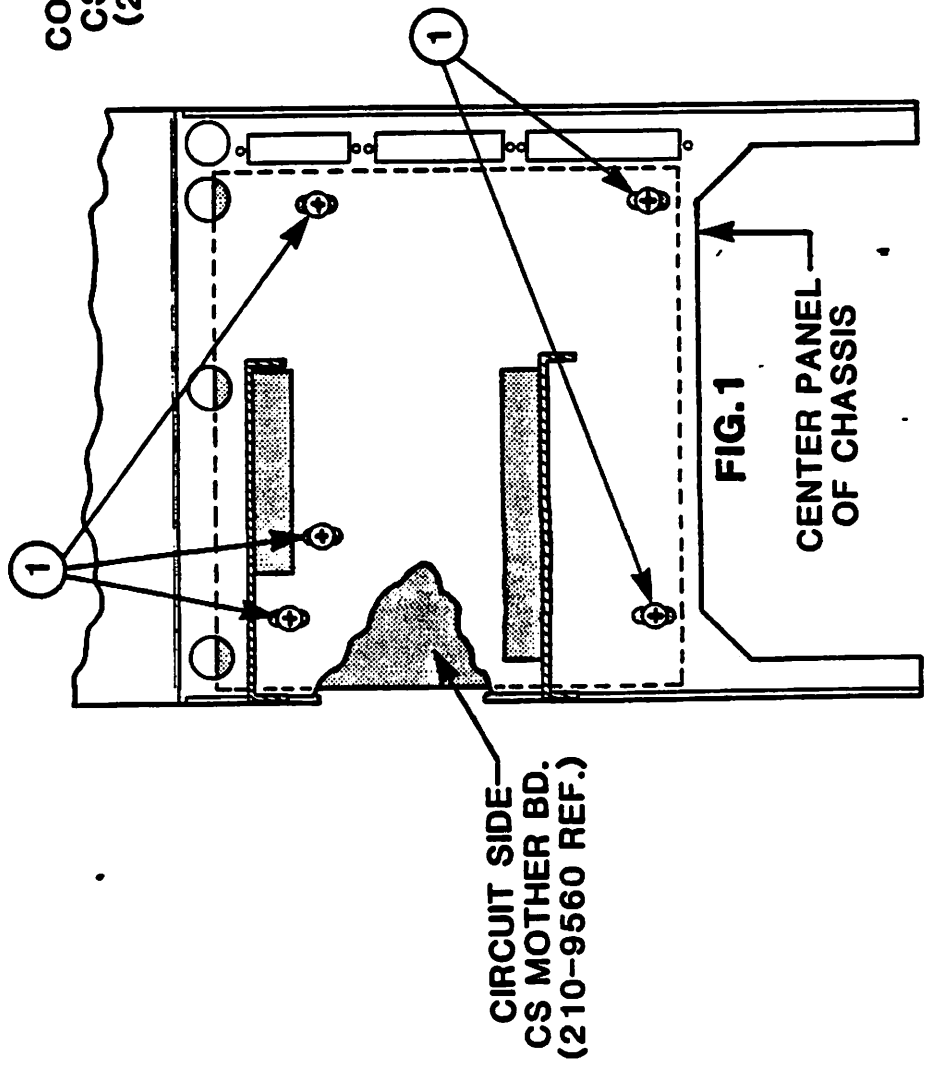


FIG. 2

FIG. 1

WANG ASSEMBLY SHEET

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SHT. 14 OF 19
OPER. NO. 7.0	OPERATION SECURE MOTHER BOARD TO CHASSIS	ISSUE
		REV.
		TYPE

- C.
1. 220-3707 CABLE, TAPE DRIVE
 2. 220-3708 CABLE, FLOPPY DRIVE
 3. 220-3709 CABLE, WINCHESTER CONTROL
 4. 650-2160 SCR, 4-40 x 1/2" SEMS (6)

USING THE HARDWARE AS SHOWN, SECURE THE THREE (3) FLAT CABLES TO THE CUT-OUTS ON THE CENTER PANEL OF THE CHASSIS, HANDTIGHTEN SCREWS ONLY.

5. 654-1286 CABLE CLAMP, FLAT (2)

DRESS FLAT CABLES AS SHOWN AND SECURE USING ADHESIVE BACKED FLAT CABLE CLAMPS AT POSITION AS SHOWN.

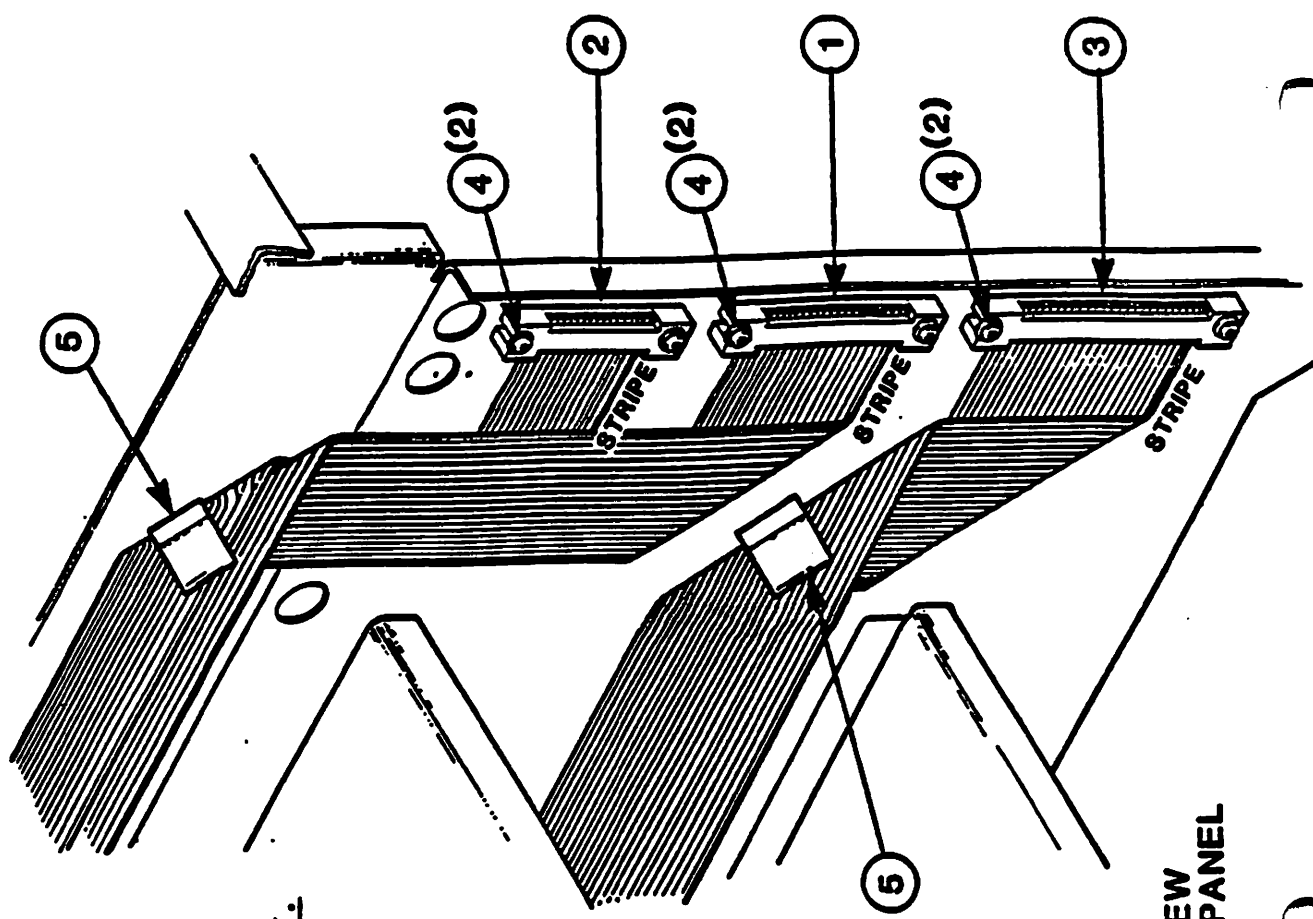


FIG.1
INSIDE VIEW
OF CENTER PANEL

PART NO. 279-0873

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

SHT. 15 OF 28

OPER. NO. 7.0

OPERATION SECURE MOTHER BOARD TO CHASSIS

ISSUE

REV.

TYPE

D. USING ALIGNMENT FIXTURE PF xxxxx , ADJUST CS MOTHER BOARD (210-9560 REF.) ON CENTER PANEL OF THE CS CHASSIS (458-3899 REF.). SECURE THE CS MOTHER BOARD, USING HARDWARE AS SHOWN.

- a) 650-3080 SCR, 6-32 x 1/4" SEMS (5) REF.
- b) 650-2203 SCR, 4-40 x 5/8" SEMS (1) REF FROM PAGE 12.
- c) 650-2160 SCR, 4-40 x 1/2" SEMS (6) REF FROM PAGE 14.

VERIFY TORQUE OF 6-32 HARDWARE TO 9 INCH/LBS.

VERIFY TORQUE OF 4-40 HARDWARE TO 5 INCH/LBS.

(WANG) ASSEMBLY SHEET

LABORATORY INC.

SMT. 16 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

PART NO. 279-0873

ISSUE REV. TYPE

OPER. NO. 8.0 OPERATION MOUNT/SECURE CABLES

- A. 1. 220-2850 POWER HARNESS [1].
- 2. 220-2851 POWER HARNESS [2].
- 3. 220-2852 POWER EXTENSION CABLE
- 4. 654-1274 CABLE CLAMP ADH. BACK (2)

PLUG-IN THE TWO (2) POWER HARNESS CABLES AND THE POWER EXTENSION CABLE TO THE POWER SUPPLY HARNESS AT POSITIONS, AS SHOWN. DRESS THE TWO (2) POWER HARNESS CABLES AS SHOWN AND SECURE USING ADHESIVE BACKED CABLE CLAMPS AT LOCATIONS SHOWN.

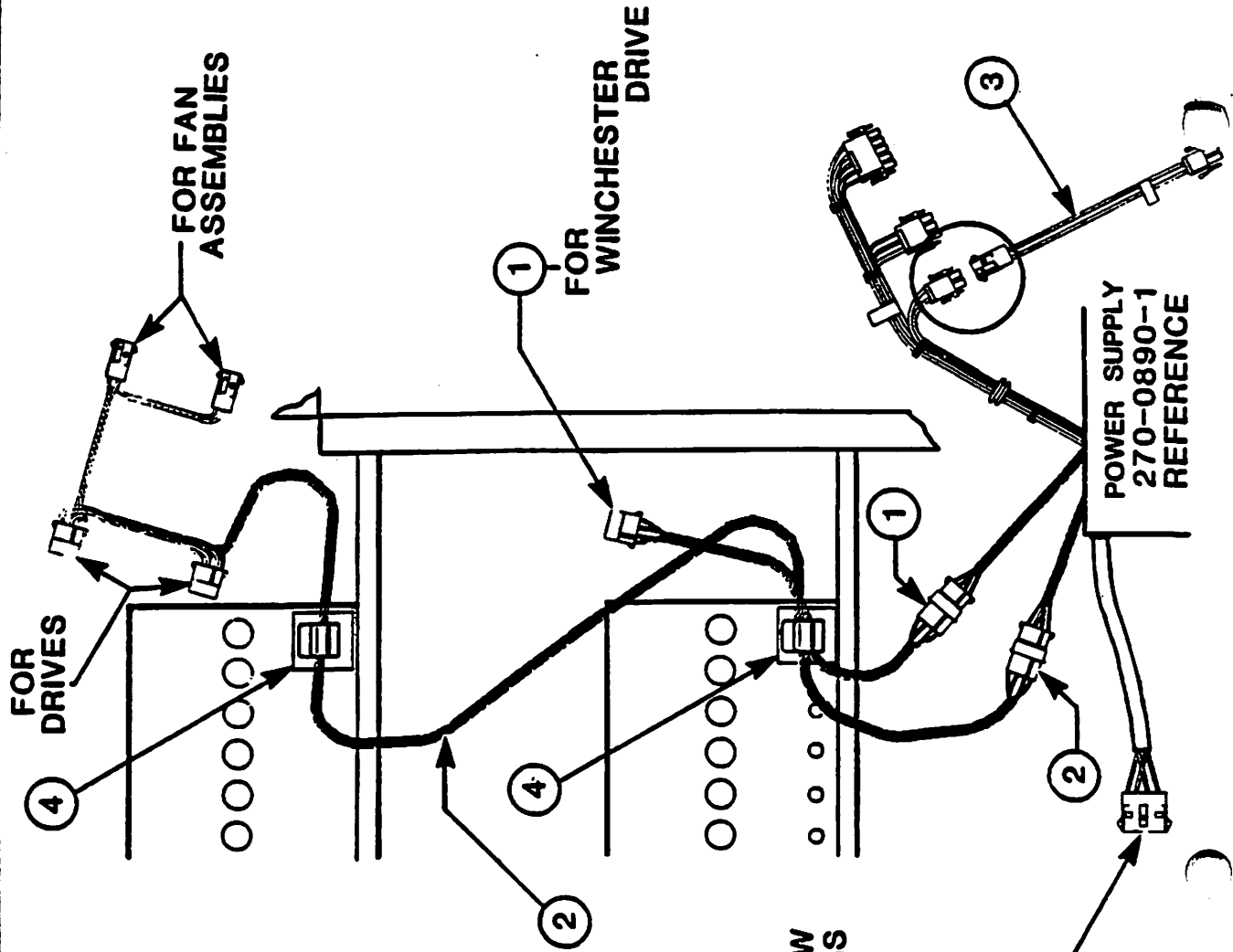


FIG.1
INSIDE VIEW
OF CHASSIS

TO SWITCH CABLE
(220-2057 REF.)

(WANG) ASSEMBLY SHEET

LABORATORIES INC.

SMT. 17 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

PART NO. 279-0873

ISSUE **REV.** **TYPE**

OPER. NO. 8.0 **OPERATION** MOUNT/SECURE CABLES

- B. 1. 654-1274 CABLE CLAMP ADH. BACK
- PLUG-IN THE 2 POSITION HOUSING CAPS FROM THE POWER HARNESS (220-2851 REF.) INTO THE CUT-OUTS ON THE TOP OF THE CHASSIS CENTER PANEL.
- PLUG-IN THE TWO (2) CONNECTORS OF THE DC FAN (1049) ASSEMBLY (270-3483 REF.) INTO THE HOUSING CAPS OF THE POWER HARNESS CABLE, AS SHOWN. SECURE THE DC FAN CABLES TO THE CHASSIS CENTER PANEL USING ONE (1) ADHESIVE BACKED CABLE CLAMP.
- a) 220-2851 POWER HARNESS [2] REF.
 - b) 270-3483 DC FAN (1049) ASS'Y (2) REF.

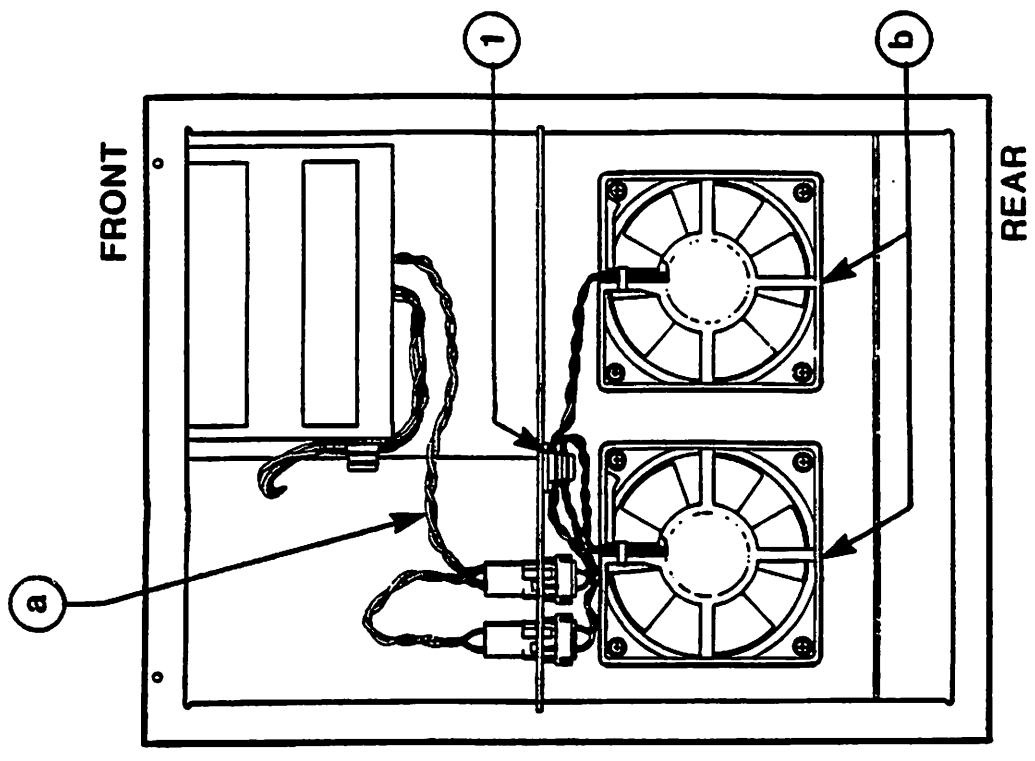


FIG.1
TOP VIEW OF CHASSIS

(WANG) ASSEMBLY SHEET

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SNT. 18 OF 28
OPER. NO. 8.0	OPERATION MOUNT/SECURE CABLES	ISSUE REV. TYPE

C. PLUG-IN THE POWER HARNESS FROM THE POWER SUPPLY AND THE POWER EXTENSION CABLE (220-2852 REF.) TO THE BOTTOM OF THE MOTHER BOARD (210-9560 REF.) AT POSITIONS J22, J23, & J24 AS SHOWN ON ILLUSTRATIONS BELOW.

- a) 210-9560 PCA, MOTHER BOARD REF.
- b) 220-2852 POWER EXTENSION CBL REF.

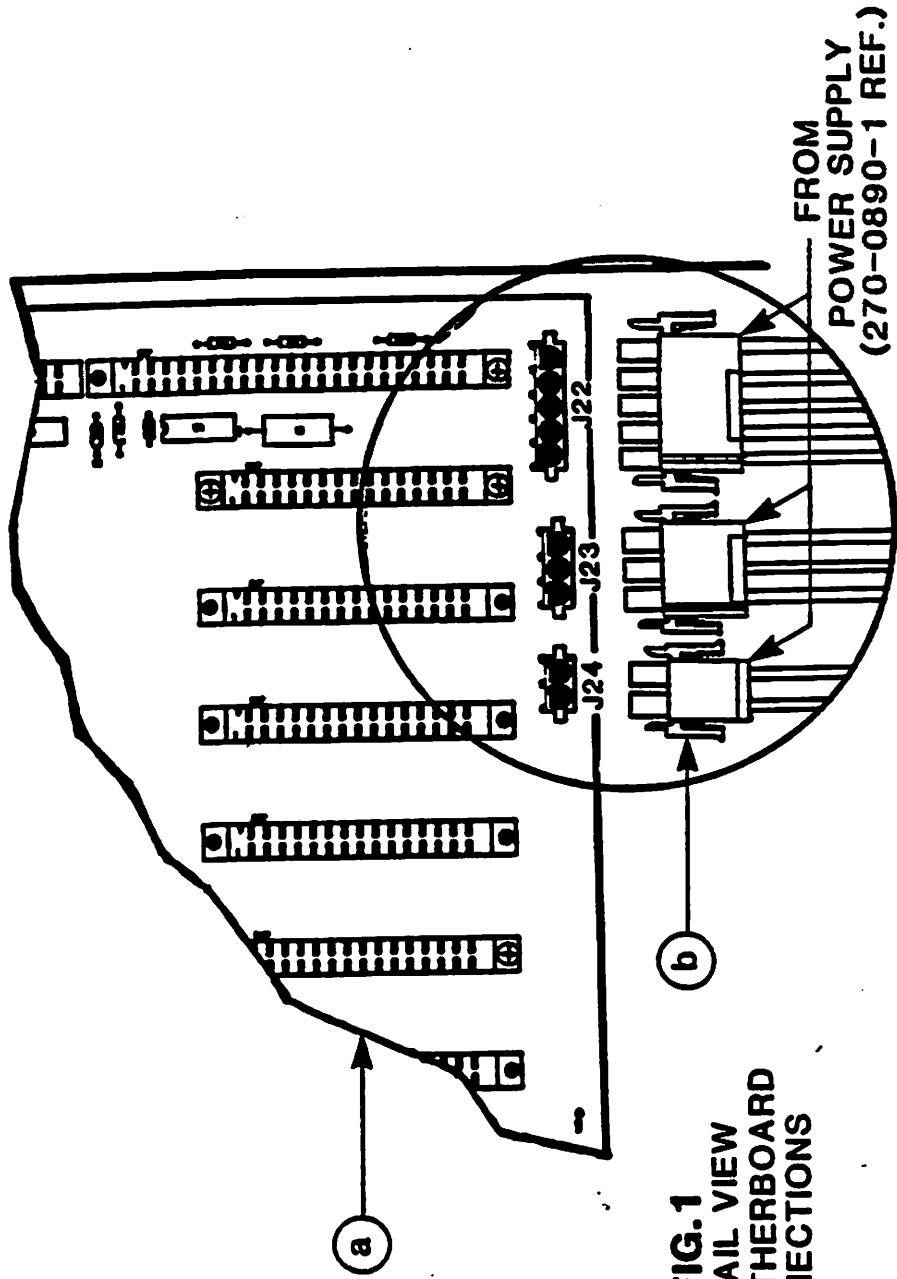


FIG.1
DETAIL VIEW
OF MOTHERBOARD
CONNECTIONS

PART NO. 279-0873

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

SHT. 19 OF 28

OPER. NO. 8.0

OPERATION MOUNT/SECURE CABLES

ISSUE

REV.

TYPE

- D. 1. 605-1004 CABLE TYE, PAN-TY
 - 2. 654-1296 BASE, CABLE TYE MOUNT
- PLUG-IN THE 5 POS. CONNECTOR OF THE SWITCH CABLE (220-2057 REF.) TO THE 5 POS. CONNECTOR OF THE POWER SUPPLY CABLE (220-2156 REF.).
 SECURE THE SWITCH CABLE TO THE FRONT INSIDE PANEL OF THE CHASSIS, USING CABLE TYE AND ADHESIVE BASE, AS SHOWN.

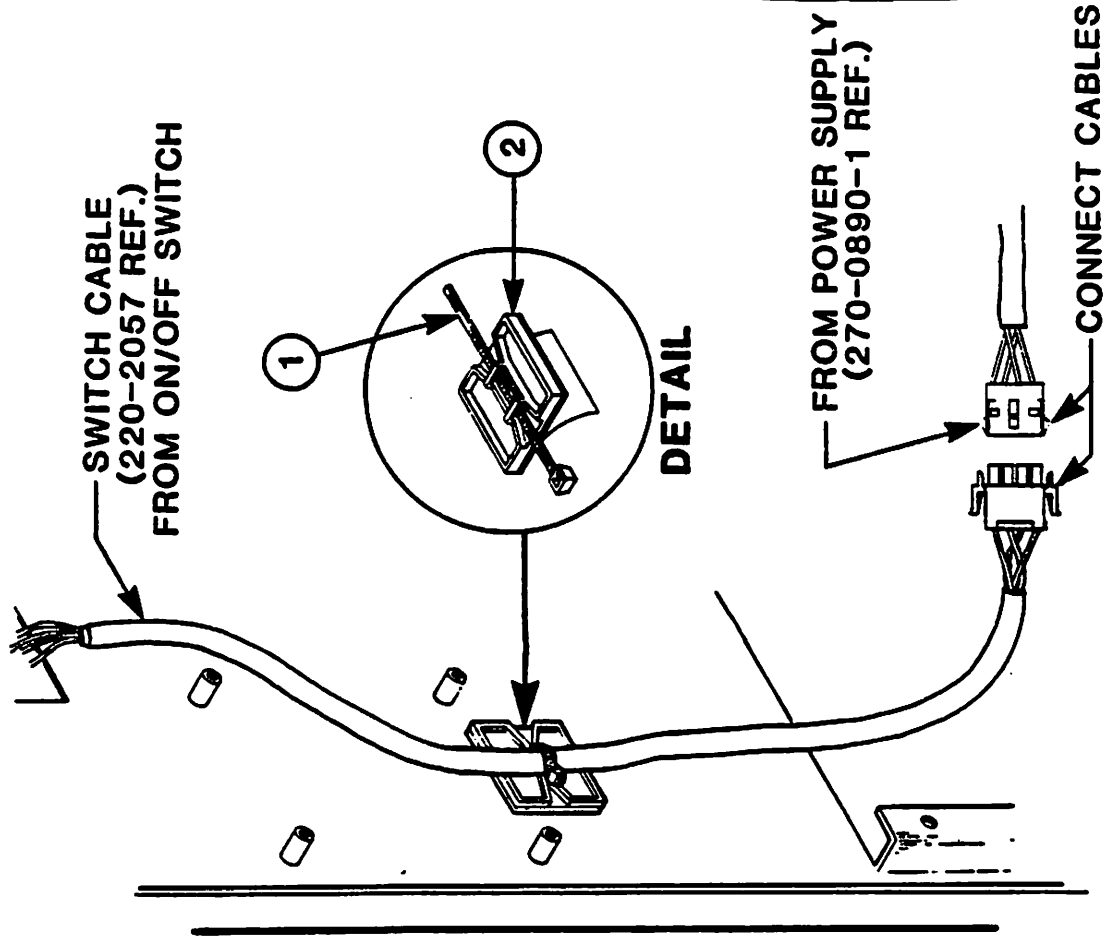


FIG. 1
INSIDE VIEW
OF FRONT PANEL

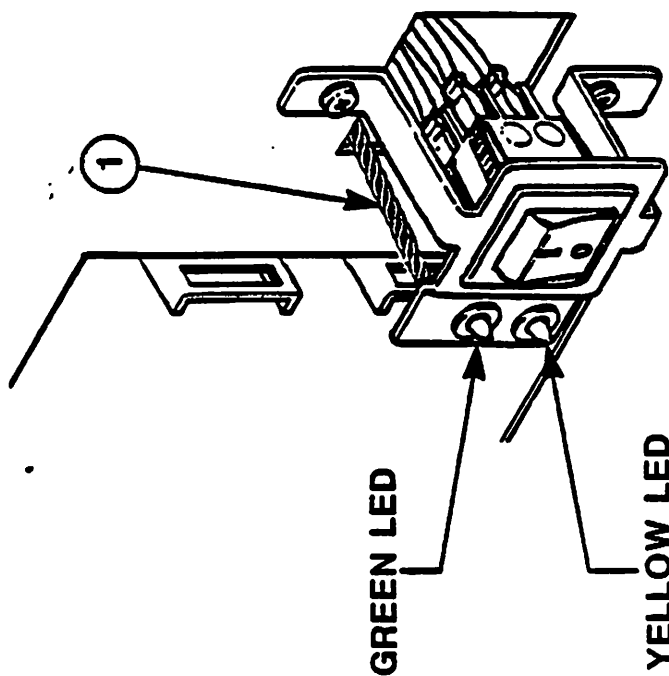
(WANG) ASSEMBLY SHEET

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SHT. 20 OF 28
OPER. NO. 8.0	OPERATION MOUNT/SECURE CABLES	ISSUE REV. TYPE

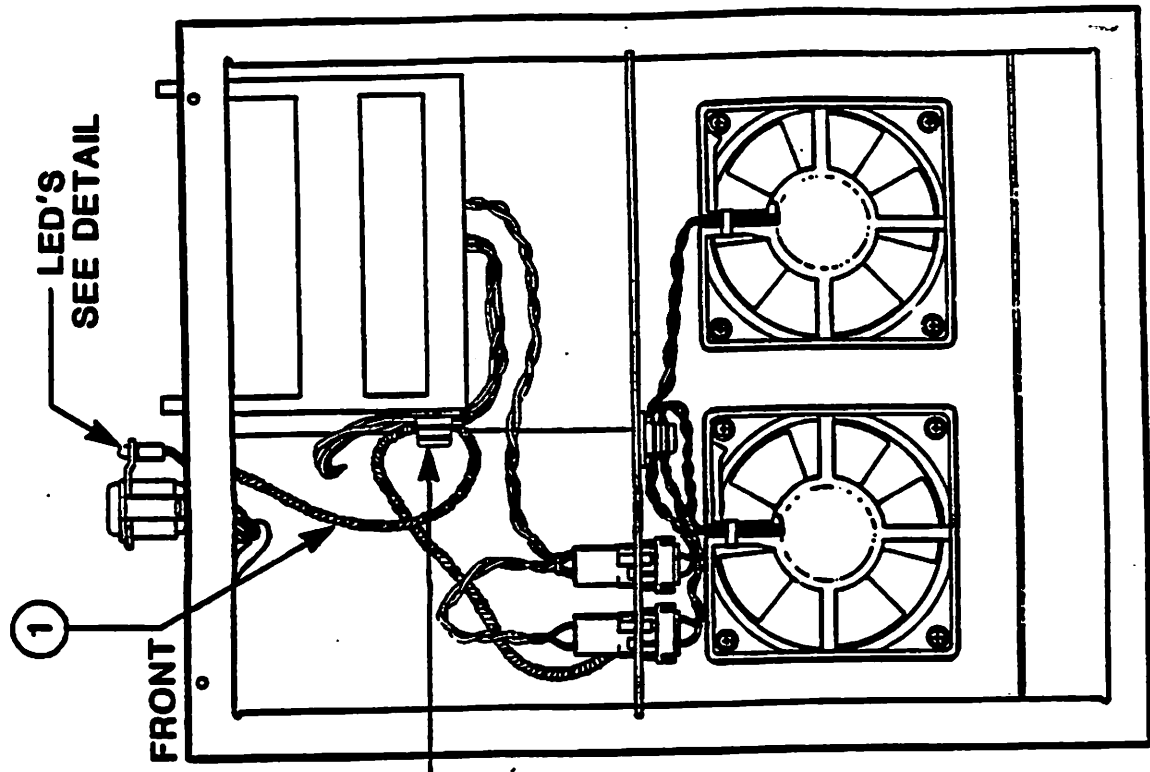
E. 1. 220-2849 CABLE, INDICATOR

PLUG-IN THE LED END OF THE INDICATOR CABLE FROM THE INSIDE OF THE CHASSIS TO THE SWITCH BRACKET. PUSH LED'S INTO 3/16 RUBBER GROMETS (654-1204 REF.) GREEN LED ON TOP, YELLOW LED ON BOTTOM.

SECURE INDICATOR CABLE TO CABLE CLAMP, AT POSITION AS SHOWN.



**DETAIL
OUTSIDE FRONT PANEL
OF CHASSIS**



**SECURE CABLE
TO CABLE CLAMP
(654-1274 REF.)**

**FIG. 1
TOP VIEW OF CHASSIS**

REAR

(WANG) ASSEMBLY SHEET

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SNT. 21 OF 28
OPER. NO. 8.0	OPERATION MOUNT/SECURE CABLES	ISSUE REV. TYPE

F. 1. 654-1288 BUSHING, SNAP

PRESS THE SNAP BUSHING INTO THE SECOND HOLE OF THE CHASSIS CENTER PANEL ABOVE THE FLAT CABLES. PASS THE CONNECTOR END OF THE INDICATOR CABLE (220-2849 REF.) THRU THE SNAP BUSHING AND SECURE THE CABLE TO THE TOP OF THE MOTHER BOARD (210-9560 REF.) AT POSITION J25, AS SHOWN.

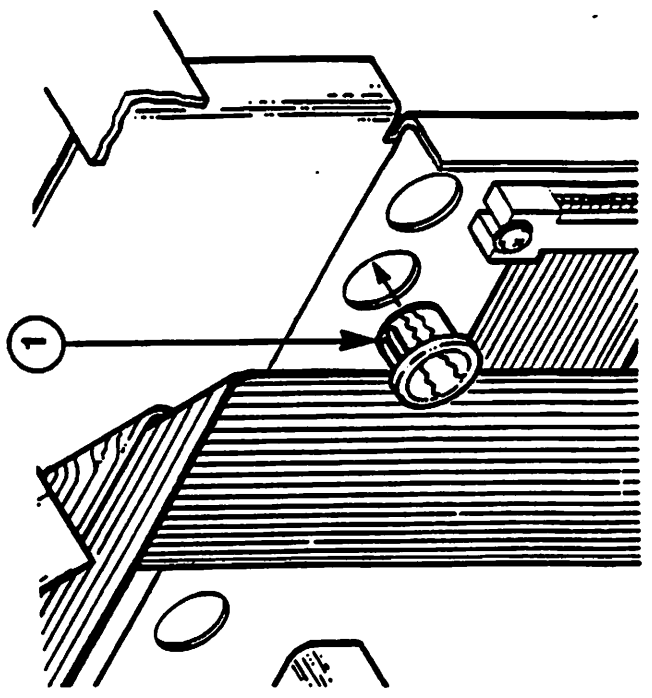


FIG. 1
INSERT BUSHING

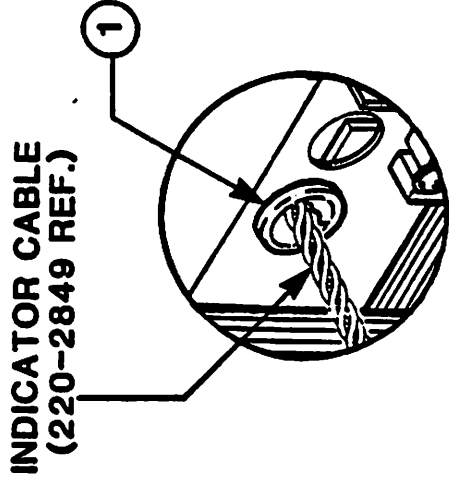


FIG. 2
INSERT CABLE
THRU BUSHING

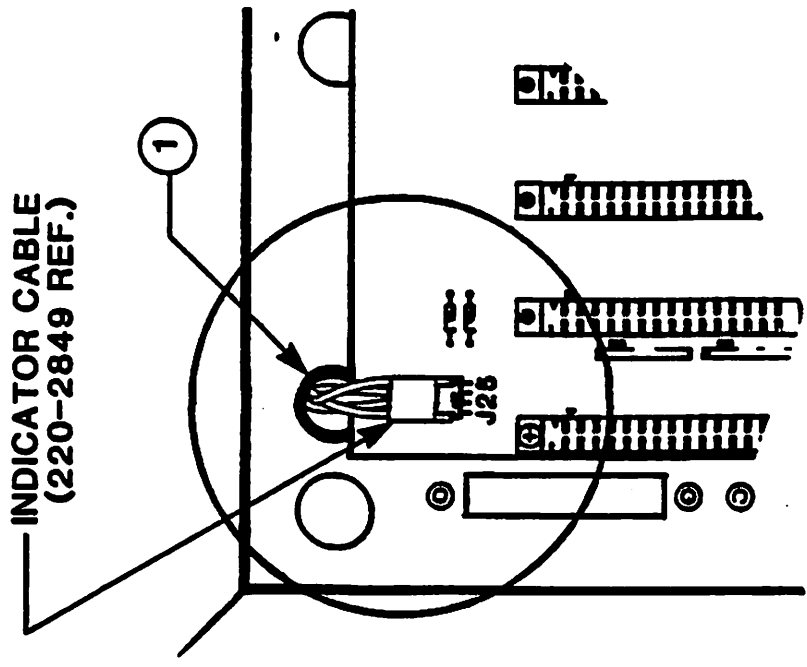


FIG. 3
SECURE CABLE
TO MOTHERBOARD

ASSEMBLY SHEET



PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SMT. 22 OF 28
OPER. NO. 9.0	OPERATION MOUNT/SECURE BLANK BRACKETS	ISSUE REV. TYPE

- A. 1. 455-0093 BRACKET, BLANK (7)
2. 650-4120 SCR, 8-32 x 3/8" SEMS (14)

USING THE HARDWARE AS SHOWN, SECURE THE SEVEN (7) BLANK BRACKETS TO THE REAR OF THE CHASSIS AT POSITIONS AS SHOWN.

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.

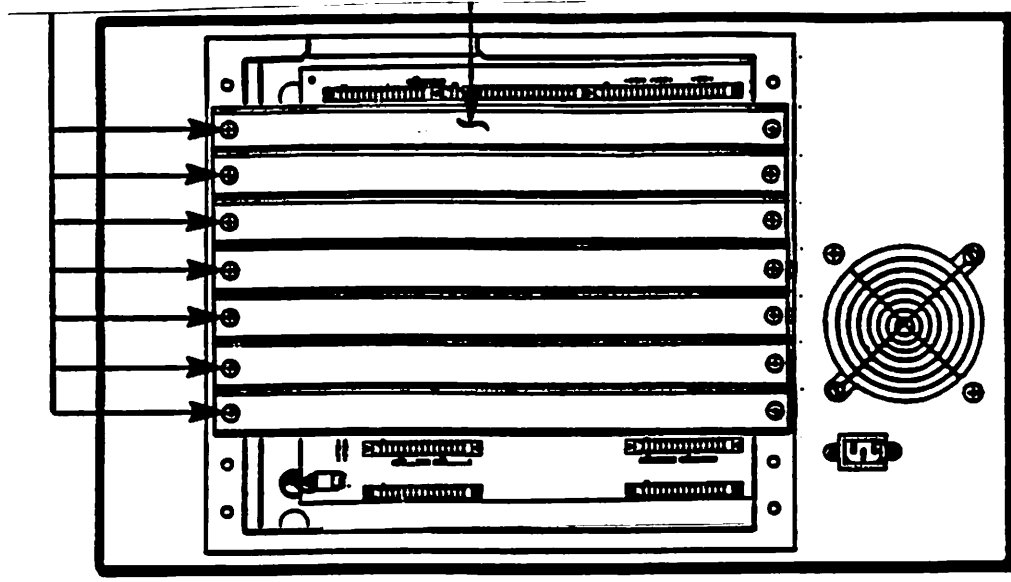


FIG.1
REAR VIEW OF CHASSIS

ASSEMBLY SHEET

WANG
LABORATORY INC.

SMT. 23 OF 28

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

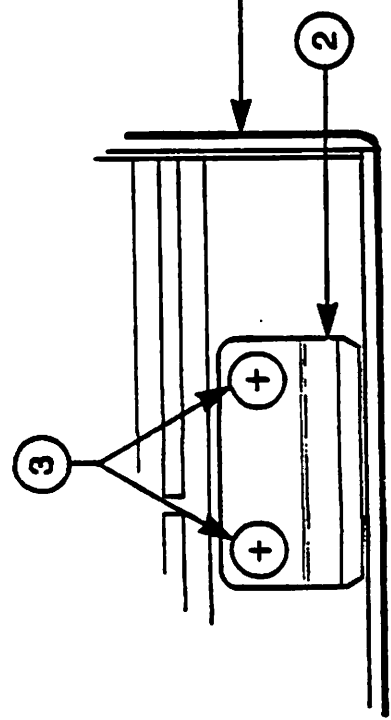
PART NO. 279-0873

ISSUE REV. TYPE

OPER. NO. 10.0 OPERATION ASSEMBLE/MOUNT FRONT BEZEL

- A. 1. 449-1577 BEZEL, FRONT
- 2. 458-2275 BRACKET, HOOK (2)
- 3. 651-0021 SCR, #8 x 1/2 SELF TAP (4)

USING THE HARDWARE AS SHOWN, SECURE THE HOOK BRACKETS TO THE INSIDE BOTTOM OF THE FRONT BEZEL.
VERIFY TORQUE OF #8 HARDWARE TO 18 INCH/LBS.



DETAIL
ASSEMBLY TYPICAL
2 PLACES

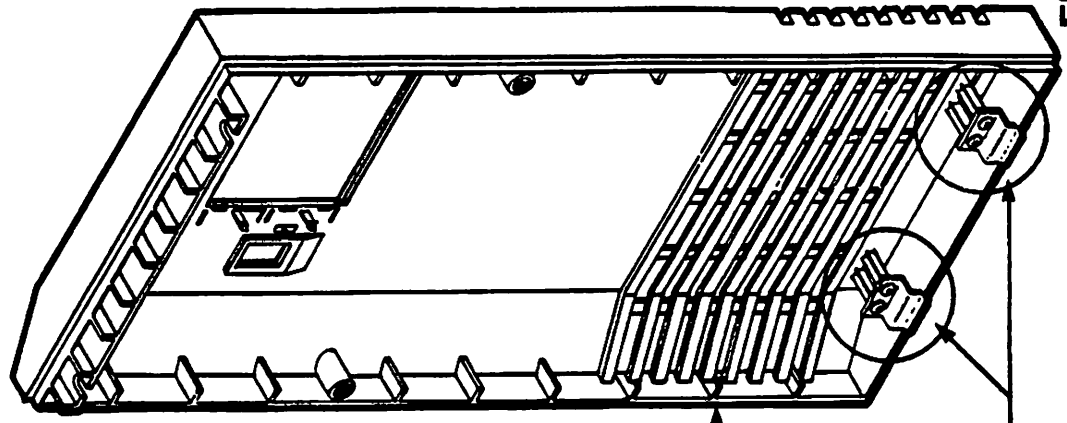


FIG.1
INSIDE VIEW

(WANG) ASSEMBLY SHEET

LABORATORIES INC

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	ISSUE	REV.	SHT. 24 OF 28
OPER. NO. 10.0	OPERATION ASSEMBLE/MOUNT FRONT BEZEL	ISSUE	REV.	TYPE

- B. 1. 449-1274 PANEL, BLANK (2)

MOUNT THE PANEL BLANKS TO THE INSIDE OF THE FRONT BEZEL (449-1577 REF.) BY SNAPPING INTO POSITION AS SHOWN. MOUNT THE BOTTOM BLANK PANEL IN FIRST, WITH THE LOWER LIP OF THE BLANK PANEL TOWARDS THE BOTTOM. MOUNT THE REMAINING BLANK PANEL THE SAME AS THE FIRST.

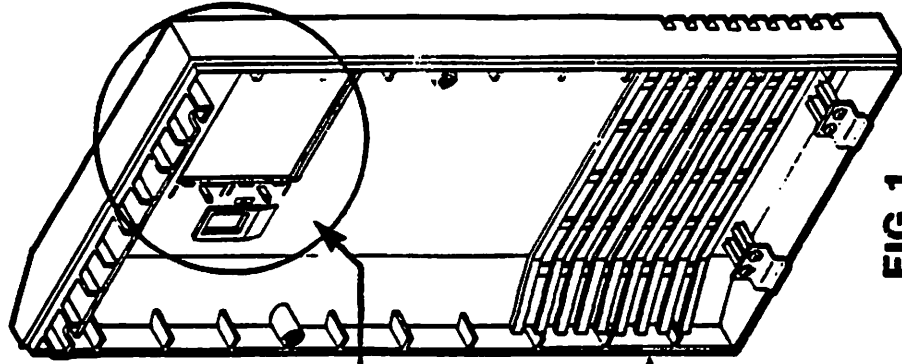
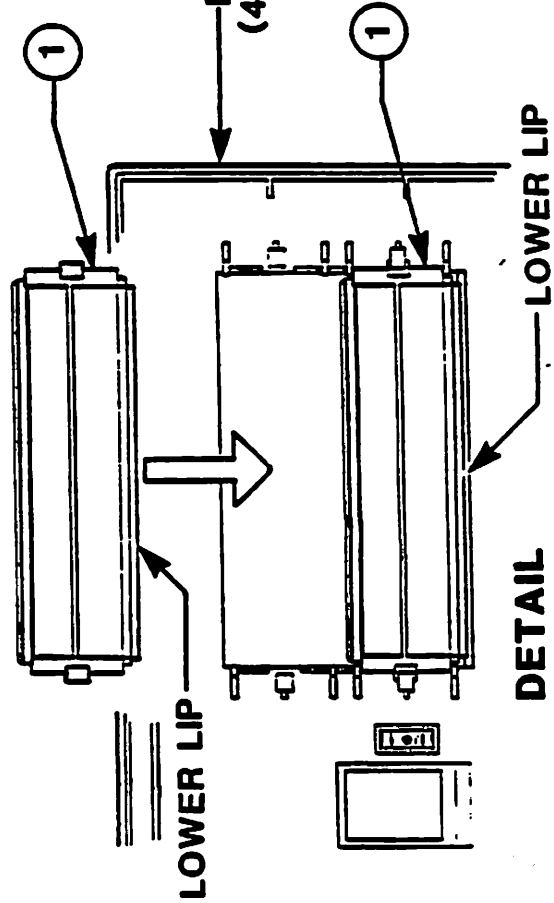


FIG. 1
INSIDE VIEW
OF FRONT BEZEL

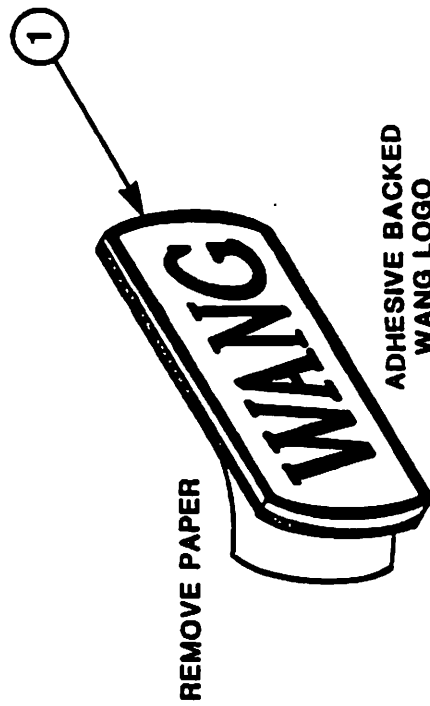
ASSEMBLY SHEET



PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SHT. 25 OF 28
OPER. NO. 10.0	OPERATION ASSEMBLE/MOUNT FRONT BEZEL	ISSUE REV. TYPE

C. 1. 451-3727 NAMEPLATE, WANG LOGO

APPLY THE ADHESIVE BACKED WANG LOGO TO THE UPPER LEFT CORNER (RECESSED AREA) OF THE FRONT BEZEL (449-1577 REF.) AS SHOWN ON ILLUSTRATION.



DETAIL

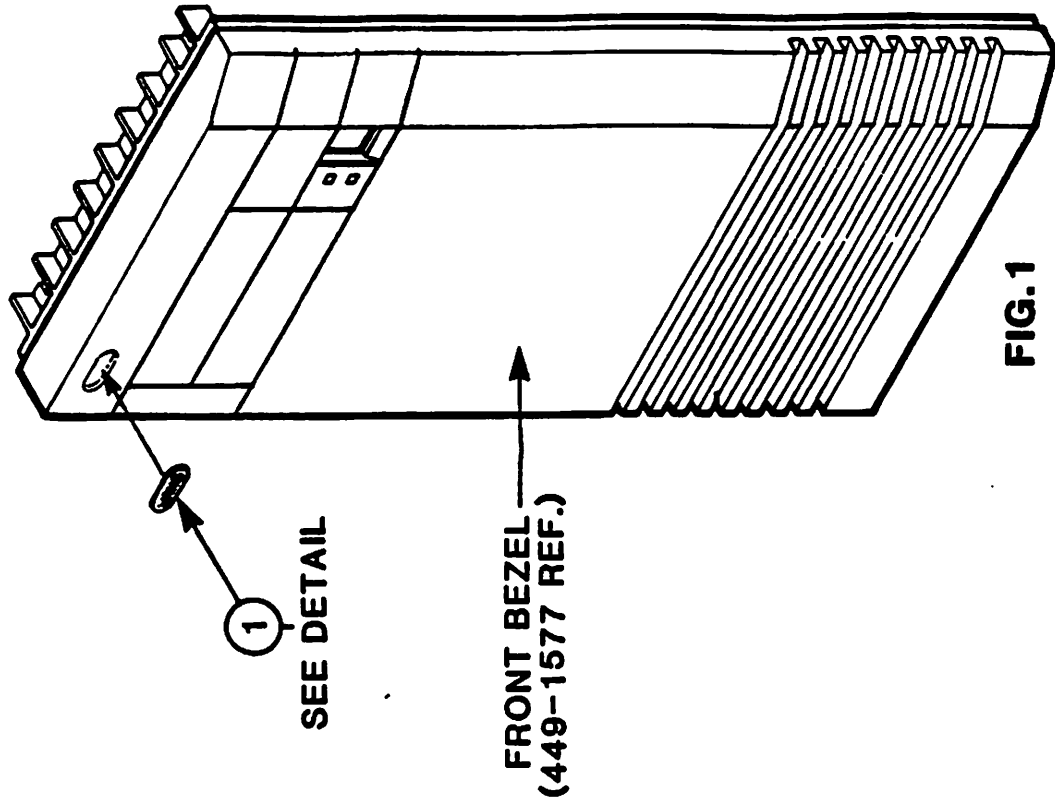


FIG. 1

ASSEMBLY SHEET

WANG
LABORATORIES INC.

PART NO. 279-0873

DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY

SHT. 26 OF 28

OPER. NO. 10.0

OPERATION ASSEMBLE/MOUNT FRONT BEZEL

ISSUE

REV.

TYPE

D. 1. 651-0329 FSTNR, TREE-LK MINI (2)

SECURE THE TWO (2) TREE LOCK FASTENERS TO THE OUTSIDE FRONT OF THE CHASSIS, BY PRESSING THEM IN, AS SHOWN.

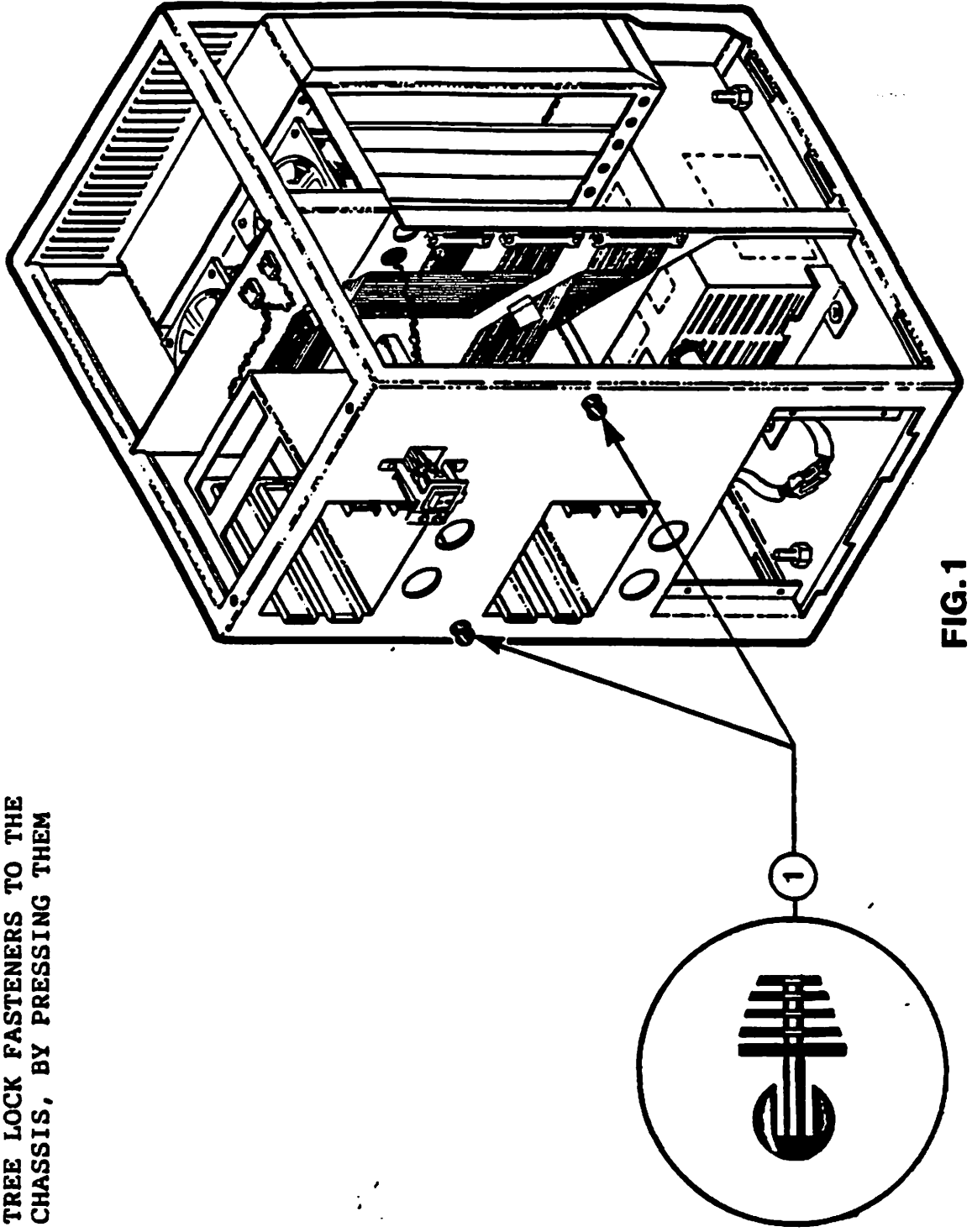


FIG.1
FRONT VIEW OF CHASSIS

WANG ASSEMBLY SHEET

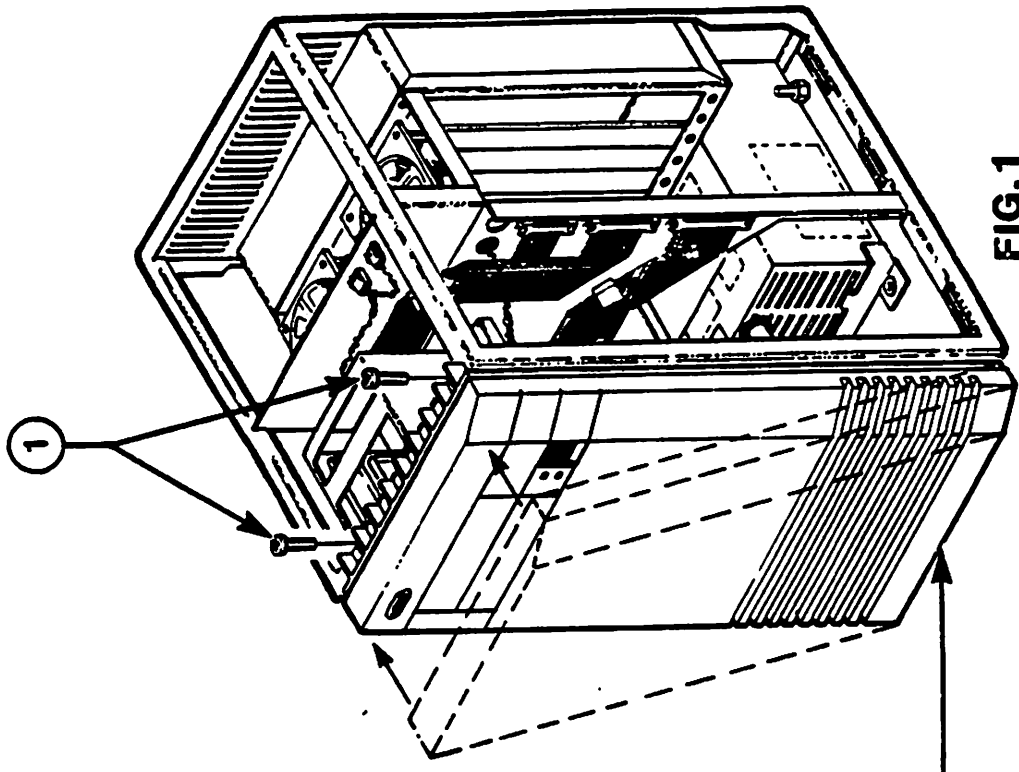
LABORATORIES INC.

PART NO. 279-0873	DESCRIPTION CS-D/N CABINET SUB-ASSEMBLY	SMT. 27 OF 28
OPER. NO. 10.0	OPERATION ASSEMBLE/MOUNT FRONT BEZEL	ISSUE
		REV.
		TYPE

- E. 2. 650-4120 SCR, 8-32 x 3/8" SEMS (2)

SECURE THE FRONT BEZEL (449-1577 REF.) TO THE CHASSIS BY THE BOTTOM HOOK BRACKETS (458-2275 REF.) FIRST. TILT FRONT BEZEL IN, TO MAKE CONTACT WITH THE TREE FASTENERS (651-0329 REF.) ON THE FRONT OF THE CHASSIS. SECURE THE TOP OF THE FRONT BEZEL WITH SCREWS AT LOCATION AS SHOWN.

VERIFY TORQUE OF 8-32 HARDWARE TO 18 INCH/LBS.



SECURE BOTTOM OF FRONT BEZEL FIRST

FIG.1
FRONT VIEW OF CHASSIS

152

WANG ECO

CONTROL NO 59333

PRIORITY 1 X
PHASE-IN 2
DOCUMENTATION 3

ORIGINATOR: Michael Riley DEPT: 70524 EXT: 014-690 M/S: 014-690 DATE: 08/05/91 SHEET 1 OF

PART(S) AFFECTED: 210-9560
P/N DESCRIPTION: CS-D Mother Board
MODEL(S) AFFECTED: CS-D/CS-N CHARACT: 210-9560
DWG(S) AFFECTED: 210-9560

DESCRIPTION OF CHANGE:
Change L1 From 376-0224 (74LS03) to 376-0556 (74S03)
Change L2 From 376-0155 (74LS74) to 376-0202 (74S74)

PRELIMINARY

Note: Remove history information from 210 assembly drawing, and REV from schematic to support PCA configuration document.

ECO TO BE

SEP 11 1991

REVIEWED

REASON/SYMPOM FOR CHANGE:
This will fix a problem with the CS-D using 240VAC and a VLIS CPU board... INTERMITTENT CONTROL MEMORY AND/OR DATA MEMORY ERRORS ON POWER UP, ESPECIALLY WITH HEAVILY LOADED I/O SECTIONS.

DISPOSITION CODES:

1-Use As is	2-Rework	3-Scrap	4-Next Order	5-See Remarks
Cust. Units	Field Spare	Field Ret.	Field Goods	Field Fin.
1	2	2	1	1
2	2	2	1	2
2	2	2	1	2

EFFECTIVITY DATE: CONFORMANCE DATE

REMARKS:

CURRENT BUILD SITE INFORMATION	PB X IR	PKWD TAI	ME AU	WPR MX
--------------------------------	---------	----------	-------	--------

APPROVALS SIGNATURE DATE

ECO CHAIRPERSON

PROGRAM MGR. *Michael Riley* 8/21/91

DESIGN ENG. *Michael Riley*

COMPLIANCE ENG. *Michael Riley* 8/21/91

SECURE SYSTEMS

ORIGINATOR *Michael Riley*

ECO ANALYST *P. Dargatzis* 8/14/91

OTHER

TSO PRODUCT SUPPORT IMPACT REVIEW CHECKLIST

WANG ECO# 59333 OEM ECO# _____ P# _____

1. WANG MODEL #s AFFECTED: CS-D, CS-N

2. WANG FRU(s) #s AFFECTED: 210-9560

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (If NO, go to 7) YES NO

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS _____ SOME UNITS

5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____	INTERMITTENT <input checked="" type="checkbox"/>	ENHANCEMENT _____
FCC COMPLIANCE _____	HARD FAILURE _____	RELIABILITY <input checked="" type="checkbox"/>
TEMPERATURE INTEG. _____	CATASTROPHIC _____	OTHER (See 7) _____

6. PFR DATA: Unit Population	Product Failure Data			Parts Related To ECO/PS			
	last 12 mo.	Total Calls	Total Fails	Fails per Year	Total Used	Reduction by ECO/PS	Reduced FFY
<u>599</u>	<u>12 mo.</u>	<u>235</u>	<u>266</u>	<u>.32</u>	<u>3</u>	<u>2</u>	<u></u>

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSM required	<input checked="" type="checkbox"/>
Level C	FCO required	_____

FCO requirements Next Call _____ Est. installation time _____
 Immediate _____ Est. # of units to FCO _____

8. FSC REQUIREMENTS: ^{REPAIR CTR}

Level A	Information only	_____
Level B	Upgrade on failure only	<input checked="" type="checkbox"/>
Level C	Upgrade all assy's (MIR)	_____

9. LOGISTICS REQUIREMENTS:

Level A	Information only	_____
Level B	Future purchases	<input checked="" type="checkbox"/>
Level C	Purge stock (FSC rework)	_____

ANY OTHER INFO TO CLARIFY IMPACT: (S/W range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

PROBLEM ONLY SEEMS TO AFFECT 50 Hz, 240 VAC MACHINES. THE MORE
BOARDS IN THE I/O SECTION THE WORSE A PROBLEM.

REVIEWER'S SIGNATURE: Michael Balui

DATE: 7/9/91

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK

1/5 2

WANG ECO

CONTROL NO 59333

PRIORITY 1
PHASE-IN 2 X
DOCUMENTATION 3

ORIGINATOR: Michael Riley

DEPT: 70524

M/S: 014-690

SHEET 1 OF

DATE: 08/05/91

PART(S) AFFECTED:
210-9560

P/N DESCRIPTION:
CS-D Mother Board

MODEL(S) AFFECTED:
CS-D/CS-N CHANGES

DWG(S) AFFECTED:
210-9560

DESCRIPTION OF CHANGE:

Change L1 From 376-0224 (74LS03) to 376-0556 (74S03)
L2 From 376-0155 (74LS74) to 376-0202 (74S74)

PRELIMINARY

Note: Remove history information from 210 assembly drawing, and
EREV from schematic to support PCA configuration document.

ECO TO BE

SEP 11 1991

REVIEWED

REASON/SYMPOM FOR CHANGE:

This will fix a problem with the CS-D using 240VAC and
a VLIS CPU board... INTERMITTENT CONTROL MEMORY AND/OR
DATA MEMORY ERRORS ON POWER UP, ESPECIALLY WITH HEAVILY LOADED
I/O SECTIONS.

DISPOSITION CODES:

1-Use As is 2-Rework
3-Scrap 4-Next Order 5-See Remarks

Cust. Units	Field Spare	Field Ret.	Field Goods	Field Fin.	Field WIP	Next Order	Remarks
1	2	2	1	1	2	2	

EFFECTIVITY DATE

CONFORMANCE DATE

REMARKS:

CURRENT BUILD SITE INFORMATION

PB	PKWD	ME	WPR
X			
TR	TAI	AU	MX

APPROVALS SIGNATURE DATE

ECO CHAIRPERSON

PROGRAM MGR. *Michael Riley* 8/21/91

DESIGN ENG. *Michael Riley*

COMPLIANCE ENG. *Michael Riley*

SECURE SYSTEMS

ORIGINATOR *Michael Riley*

ECO ANALYST *P. Dargatzis* 8/14/91

OTHER

TSO PRODUCT SUPPORT IMPACT REVIEW CHECKLIST

WANG ECOS 59333 OEM ECOS _____ PMS _____

1. WANG MODEL #s AFFECTED: CS-D, CS-N

2. WANG FRU(s) #s AFFECTED: 210-9560

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (If NO, go to 7) YES NO

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS _____ SOME UNITS

5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____	INTERMITTENT <input checked="" type="checkbox"/>	ENHANCEMENT _____
FCC COMPLIANCE _____	HARD FAILURE _____	RELIABILITY <input checked="" type="checkbox"/>
TEMPERATURE INTG. _____	CATASTROPHIC _____	OTHER (See 7) _____

6. PFR DATA:

Unit Population	Product Failure Data			Parts Related To ECO/PMS			
	last 12 mo.	Total Calls	Total Fails	Fails per Year	Total Used	Reduction by ECO/PMS	Reduced PFR
<u>599</u>		<u>235</u>	<u>266</u>	<u>.32</u>	<u>3</u>	<u>2</u>	

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSM required	<input checked="" type="checkbox"/>
Level C	FCO required	_____

FCO requirements Next Call _____ Est. installation time _____
 Immediate _____ Est. # of units to FCO _____

8. ^{REPAIR CTR} PSC REQUIREMENTS:

Level A	Information only	_____
Level B	Upgrade on failure only	<input checked="" type="checkbox"/>
Level C	Upgrade all assy's (NIB)	_____

9. LOGISTICS REQUIREMENTS:

Level A	Information only	_____
Level B	Future purchases	<input checked="" type="checkbox"/>
Level C	Purge stock (PSC rework)	_____

ANY OTHER INFO TO CLARIFY IMPACT: (S/W range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

PROBLEM ONLY SEEMS TO AFFECT 50 Hz, 240 VAC MACHINES. THE CME
BOARDS IN THE I/O SECTION THE WERE A PROBLEM.

REVIEWER'S SIGNATURE: Michael Balin

DATE: 7/9/91

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK



ECO

ECO NO. 56218
SHEET 1 OF 2

ORIGINATOR Paul Pitts DEPT 002
WRITTEN BY

M/S 018-12C
M/S

EXT. 67549
EXT.

DATE 1/15/89
DATE

PART NO.	455-0093	DESCRIPTION
DWG NO.	455-0093	BLANK BRACKET
MODEL NO.	CS-D CP4-220 0	PEP #
CLASS	I (II) III	

DESCRIPTION OF CHANGE

ADD: Note 4. Parts shall be individually marked in designated area with Wang Part No., revision level and Vendor Identification Per Wang Spec. 10-527.

JAN 05 1990

REASON/SYMPOM FOR CHANGE

Required for proper identification of Part, Rev. Level and Vendor

DOCUMENTS	REVISIONS	
	FROM	TO
HISTORY SHT. 510		
HISTORY SHT. 210		
ARTWORK		
E-REV.		
ASSY. DWG.		
DRILL DWG.		
SCHEM DWG.		
MECH. DWG.	Ø	1
CBL DWG.		
SPI.		
SPECIFICATION		

CONFORMING AREA	CF	REMG	DIST.	FINAL ASSY AREA	SUB ASSY AREA	INFO ORDER
						X

CONFORMANCE DATE N/A

APPROVALS

APPROVALS	DATE
ECO CHAIRPERSON Paul Pitts 1/15/89	
DES. ENGRG.	
CUST. ENGRG.	
MFG.	
MTO	
PP&M	
F.C.C.	
PROD. SAFETY	
SECURE SYS.	
ORIGINATOR Paul M Pitts 1/15/89	
OTHER	

NOTE:

1. DEBURR AND BREAK ALL SHARP EDGES.
2. INSIDE BEND RADIUS TO BE .03 MAX.
3. FINISH: BRIGHT ZINC PLATE TYPE II, CLASS III PER WANG SPEC SPI 10-626

ADD: 4. PARTS SHALL BE END VIEW ONLY MARKED IN
 DISCRETE AREAS WITH WING FORMING, REVISIONS
 UNLESS ALSO MARKED IDENTIFICATION PER A.W. ANALY
 SPEC. 10-5-2011
 0.40
 (2PL)

13.94

13.250

ECO NO 56218

SHT 2 OF 2

1.18

ZONE: B-E, 1-5 0.59

(2PL)

SEE NOTE 4

DWG C 455-0093 REV 0/1



ECO

ECO NO. 55875

SHEET 1 OF

ORIGINATOR Michael Riley Dept 217 M/S 014-690 EXT. 70524 DATE 10/20/89

WRITTEN BY M/S EXT.

PART NO.	DESCRIPTION	REVISIONS	
		FROM	TO
209/210-9558-A			
DWG NO. 9558	DS PROM	4	5
MODEL NO. 2200	PEP #		
CLASS I II III	CSD CABINET		

DESCRIPTION OF CHANGE

Change the parts list and Sample board as follows:
 Change L76 From IC 27256-2 DS E PROM (379-8500-R2)
 To IC 27256-2 DS E PROM (379-8500-R3)

Change BOM 210-9558-A as follows:
 WLI# DESCRIPTION VM TYPE QTY TYPE QTY
 Delete: 379-8500 R2 IC 27256-2 DS EPROM EA 5P 1 1
 ADD: 379-8500 R3 IC 27256-2 DS EPROM EA 5P 1 1

REWORK EXISTING REVISIONS:
 100 BOARDS ARE IN PROCESS:

COMPANY CONFIDENTIAL

REASON/SYMPATOM FOR CHANGE

1. Enable the 150M Tape Drive To Work With The DS.
2. Fixes The Cache Overflow Problem.

CUSTOMER SATISFACTION ISSUE PER PP&M.

DOCUMENTS

HISTORY SHT. 510			
HISTORY SHT. 210			
ARTWORK			
E-REV.			
ASSY. DWG.			
DRILL DWG.			
SCHEM DWG.			
MECH. DWG.			
CBL DWG.			
S.P.I.			
SPECIFICATION			

CONFORMING AREA

RF	XX	XX	XX	XX	XX	XX
CONFORMANCE DATE						

APPROVALS

ECO CHAIRPERSON						
DES. ENGRG.	<i>M. Riley</i>	<i>D. B. W.</i>				
CUST. ENGRG.						
MFG.						
MTO	<i>Gregory Gumbel</i>					
PP&M						
F.C.C.						
PROD. SAFETY						
SECURE SYS.						
ORIGINATOR	<i>M. Riley</i>					
OTHER						

**TSO PRODUCT SUPPORT
IMPACT REVIEW CHECKLIST**

WANG ECO# 55875 OEM ECO# _____ PN# _____

1. WANG MODEL #s AFFECTED: CSD
2. WANG FRU(s) #s AFFECTED: 210.9558A
3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (IF NO, go to 7) YES NO
4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS SOME UNITS
5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____ INTERMITTENT _____ ENHANCEMENT _____
 FCC COMPLIANCE _____ HARD FAILURE _____ RELIABILITY _____
 TEMPEST INTEG. _____ CATASTROPHIC _____ OTHER (See 7)

6. PLR DATA:

Unit Population	Product Failure Data			Parts Related To ECO/PN		
	last	Total	Total	Total	Reduction	Reduced
	no.	Calls	Fails	Used	by ECO/PN	FPY
<u>500 APPROX</u>	<u>12</u>	<u>144</u>	<u>38</u>	<u>25</u>	<u>8%</u>	<u>2</u>

7. FIELD REQUIREMENTS:
- Level A Information only _____
 Level B TSB required
 Level C FCO required

FCO requirements Next Call IMMEDIATE ✓ Est. installation time MINIMUM 10 min
 Immediate _____ Est. % of units to FCO APPROX 10%

8. FSC REQUIREMENTS:
- Level A Information only _____
 Level B Upgrade on failure only _____
 Level C Upgrade all assy's (MUB)

9. LOGISTICS REQUIREMENTS:
- Level A Information only _____
 Level B Future purchases _____
 Level C Purge stock (FSC rework)

ANY OTHER INFO TO CLARIFY IMPACT: (S/N range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

PROBLEM CAN CAUSE CACHE TO RUN SLOW. SYSTEM MAY NEED TO BE REBOOTED TO CLEAR. ALL BOARDS SHOULD BE UPDATED. MUST HAVE ROM 3 PROM TO USE 150 MB TAP6 DRIVE WHICH MAY ALREADY BE SHIPPING.

REVIEWER'S SIGNATURE: W. J. D. B. [Signature] DATE: 10/25/89

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK



ECO

10

ECO NO. 5381

SHEET 1 OF

ORIGINATOR	Mike Riley Dept 217	EXT. 70524	DATE	04/25/89
WRITTEN BY	Carol Sullivan	EXT. 74312	DATE	04/25/89
PART NO.	209/210-9558-A	DOCUMENTS		
DWG NO.	9558	HISTORY SHT. 510	FROM	TO
MODEL NO.	2200	HISTORY SHT. 210	2	3
CLASS	I (II) III	ARTWORK		
		E-REV.		
		ASSY. DWG.		
		DRILL DWG.		
		SCHEM DWG.		
		MECH. DWG.		
		CBL DWG.		
		S.P.I.		
		SPECIFICATION		
		CONFORMING AREA		
		FORMING		
		DIST.		
		TEST ASSY		
		ASSY		
		ORDER		
		INFO ONLY		
		CONFORMANCE DATE		
		APPROVALS		
		ECO CHAIRPERSON		
		DES. ENGRG.	GIN Long Sub. 4/28/89	
		CUST. ENGRG.		
		MFG.		
		MTO		
		PP&M		
		FCC.	Michael Butcho 4/28/89	
		PROD. SAFETY	AD 5/1/89	
		SECURE SYS.		
		ORIGINATOR	Michael Riley	
		OTHER		

M/S	019-890	EXT.	70524
M/S	012-18B	EXT.	74312
DESCRIPTION	CSD ^{DPU} FROM		
PEP #	H F		

DESCRIPTION OF CHANGE

PRELIMINARY

Change the part list and sample board as follows:

Change L76 from IC 27256-2 DS E PROM (379-8500-RL) to IC 27256-2 DS E PROM (379-8500-R2)

Change BOM 210-9558-A as follows:

WLI#	DESCRIPTION	UM	COMP TYPE	QTY	QTY TYPE
Delete: 379-8500-RL	IC 27256-2 DS PROM	EA	5P	1	1
Add: 379-8500-R2	IC 27256-2 DS E PROM	EA	5P	1	1

ECO TO BE

MAY 17 1989

REASON/SYMPOTM FOR CHANGE

REVIEWED

1. Allow internal disk to tape transfers greater than 256 sectors.
2. Write-protect/enable platters through software commands.
3. Added diagnostic commands to "Flush Cache" and to "re-run Power-on Diagnostics".

SEE PAGE 2

WANG

**ENGINEERING CHANGE ORDER
CONTINUATION SHEET**

DOCUMENT NO.

SHT

ECO NO.

OF

2

53898

THIS ECO SHT, WHEN ATTACHED TO DOCUMENT OF
PREVIOUS REV CONSTITUTES THE LATEST DOC.

DOCUMENT TITLE:

DESCRIPTION OF CHANGE:

CONTINUED.

4. Corrected problem where unit would hang during tape backup.
5. Corrected problem with I90 errors when connected to a 2275MUX.
6. Corrected problem with \$FORMAT not writing all sectors.
7. Added byte to status command to reflect Write Protect/Enable status of drive.
8. Improved restore time of removable Winchester.
9. Corrected tape drive reset so that drive is reset only if a command is in progress.

ISO PRODUCT SUPPORT
IMPACT REVIEW CHECKLIST

WANG ECO# 53898 OEM ECO# _____ PN# _____

1. WANG MODEL #s AFFECTED: CSD

2. WANG FRU(s) #s AFFECTED: 210-9558A

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (If NO, go to 7) YES NO

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS _____ SOME UNITS

5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____	INTERMITTENT <input checked="" type="checkbox"/>	ENHANCEMENT _____
FCC COMPLIANCE _____	HARD FAILURE _____	RELIABILITY <input checked="" type="checkbox"/>
TEMPEST INTEG. _____	CATASTROPHIC _____	OTHER (See 7) _____

6. PLR DATA: <u>Unit Population</u>	last 12 mo.	<u>Product Failure Data</u>			<u>Parts Related To ECO/PN</u>		
		Total Calls	Total Fails	Fails per Year	Total Used	Reduction by ECO/PN %	Reduced FPY
<u>50</u>							

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSB required	<u>YES</u>
Level C	FCO required	_____

FCO requirements Next Call _____ Est. installation time _____
Immediate _____ Est. % of units to FCO _____

8. FSC REQUIREMENTS:

Level A	Information only	_____
Level B	Upgrade on failure only	_____
Level C	Upgrade all assy's (MUB)	<u>YES</u>

9. LOGISTICS REQUIREMENTS:

Level A	Information only	_____
Level B	Future purchases	_____
Level C	Purge stock (FSC rework)	<u>YES</u>

ANY OTHER INFO TO CLARIFY IMPACT: (S/N range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

SHOULD WRITE TSB STATING TO UPDATE PROM WITH PROM PART #.
THIS WOULD ELIMINATE NEED FOR FCO.

REPAIRER'S SIGNATURE: [Signature] DATE: 5 / 16 / 89

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK

WANG**FIELD CHANGE ORDER**

FCO NO.

1376

COMPANY CONFIDENTIAL

Equipment Affected 2200 CS-DFCO Class Problem Only/Next CallFCO Kit No. 728-0387Page 1 of 5Documentation Class Code 4103FCO Doc. No. 729-1825

Approval Date:

Est. Install Time 15 MinutesRef. ECO No. 55875**1. REASON FOR CHANGE**

1. To allow 150M Tape Drive to function with ~~DS~~ CS-D.
2. To correct "Cache Overflow" problem.

2. DESCRIPTION OF CHANGE

One E-PROM is replaced on the 210-9558 Disk Processing Unit (DPU) Mother Board.

3. DOCUMENTATION AFFECTED

N/A

4. PREREQUISITE (S)

A. Hardware

N/A

B. Software

N/A

Field Support Ops

Logistics 11/9/89Originator 11/9/89

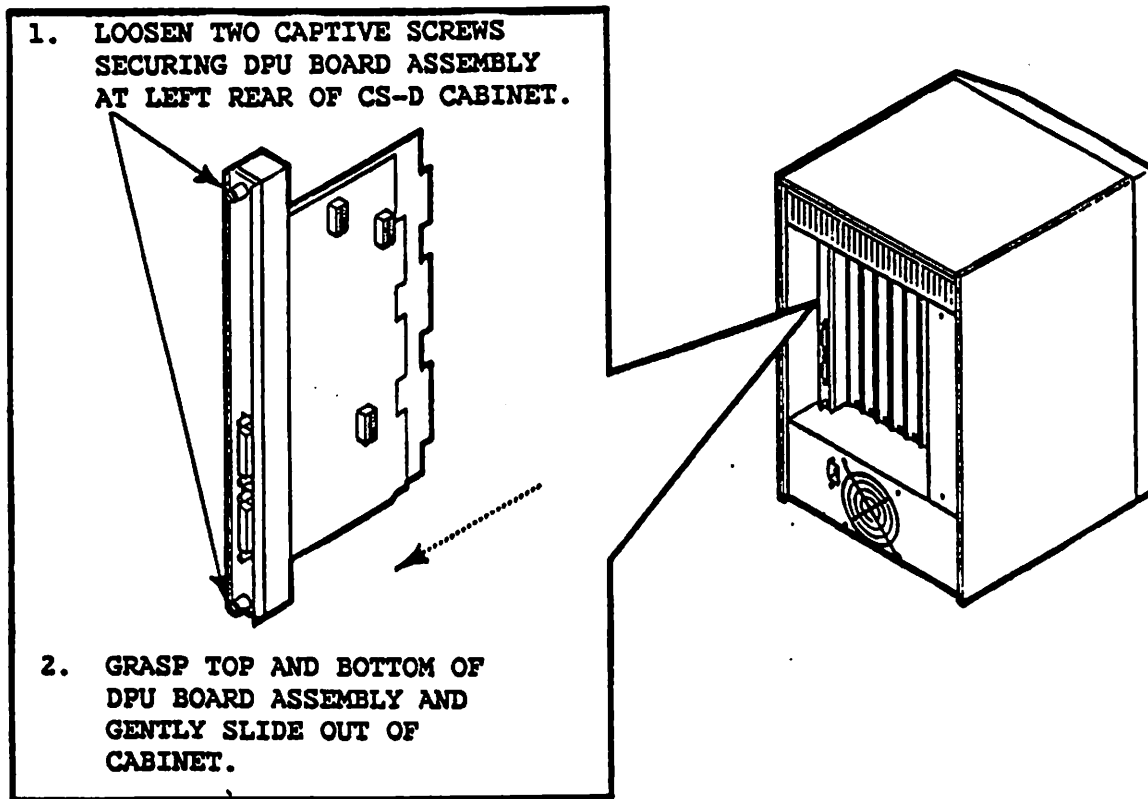
ECO Support Mgr.

*Tom [Signature]**SC Blais*

5. INSTALLATION PROCEDURE

- A. Power off. Remove AC power cord from source outlet. Refer to Section 4.2 of the Customer Engineer Product Maintenance Manual, "Wang Computer System" (741-1769), for power-down procedure.
- B. Remove the 212-7113 DPU Board Assembly as follows: (Figure 1)
 1. Loosen two captive screws securing DPU Board Assembly at left rear of CS-D Cabinet.
 2. Grasp the top and bottom of DPU Board Assembly and gently slide out from rear of Cabinet.

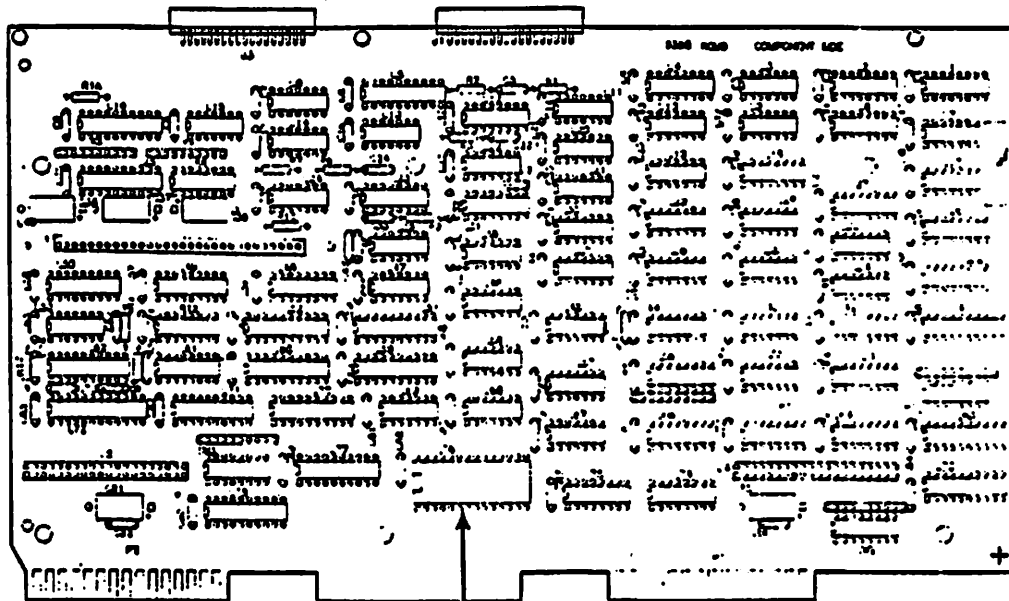
FIGURE 1



C. Rework the 210-9558 DPU Mother board as follows: (Figure 2)

1. Remove the E-PROM from location L76 and replace with E-PROM (379-8500-R3) contained in Kit.

FIGURE 2: 210-9558 DPU MOTHER BOARD (COMPONENT SIDE)



REMOVE E-PROM FROM LOCATION L76
AND REPLACE WITH E-PROM (379-8500-R3)
CONTAINED IN KIT.

- D. Reassemble unit by reversing Step B.
- E. To complete installation of FCO, fill in applicable information on the Field Change History tag. (Part #615-3299). The tag should be mounted to right of fan at rear of Cabinet.

NOTE: The Field Change History tags can be obtained by placing a routine order through the Logistics Order Processing System.

- F. Perform check-out procedure described in Section 6.
- G. Document installation of this FCO by completing a Call Report or Activity Report.

6. CHECK-OUT PROCEDURE

Power up. Verify all disks. Run disk diagnostics. Observe normal operation.

7. FCO KIT PARTS LISTING

KIT #728-0387

<u>Item</u>	<u>Qty</u>	<u>Item Description</u>
729-1825	1	FCO Document 1376
379-8500-R3	1	E-PROM

8. FCO KIT AVAILABILITY DATE

NOTE:

When determining kit requirements, be aware that manufacturing has cut this change into this product as of October 31, 1989. Products shipped/installed after this date will contain this FCO.

8. FCO KIT AVAILABILITY DATE CONTINUED)

FCO Kit #728-0387 will be available November 27, 1989 and can be obtained by placing a special order. Special orders for FCO kits are exempt from the established approval loop. They should be mailed directly to:

Logistics Order Processing
Wang Laboratories
836 North Street
Tewksbury, MA 01876

Att'n: Order Services
M/S 025-290

Dealers may obtain the FCO Kit by completing a Dealer Parts Sales form and sending it to:

Dealer Distribution Center
Wang Laboratories
836 North Street
Tewksbury, MA 01876

Att'n: Order Services
M/S 025-290

9. REMOVED PARTS DISPOSITION

Recycle removed E-PROM thru your FSC.

10. MISCELLANEOUS

N/A

WANG FIELD CHANGE ORDER

COMPANY CONFIDENTIAL

FCO NO.
1351

Equipment Affected 2200 CS-D

FCO Class Problem Only/Next Call FCO Kit No. 728-0361 Page 1 of 5

Documentation Class Code 4103 FCO Doc. No. 729-1800 Approval Date: **JUN 20 1989**

Est. Install Time 15 Minutes Ref. ECO No. 53898

1. REASON FOR CHANGE

1. To allow internal disk to tape transfers greater than 256 sectors.
2. To write-protect/enable platters through software commands.
3. To add diagnostic commands to "Flush Cache" and to "re-run power-on diagnostics".
4. To prevent unit "hang" problem during tape backup.
5. To correct "I90" errors when connected to 2275 MUX.
6. To correct "\$FORMAT" problem of not writing all sectors.
7. To add byte to status command to reflect Write Protect/Enable status of drive.
8. To improve restore time of removable Winchester.
9. To correct tape drive reset to allow reset of drive only if a command is in progress.

2. DESCRIPTION OF CHANGE

One E-PROM is replaced on the 210-9558 Disk Processing Unit (DPU) Mother Board.

3. DOCUMENTATION AFFECTED

N/A

4. PREREQUISITE (S)

A. Hardware

N/A

B. Software

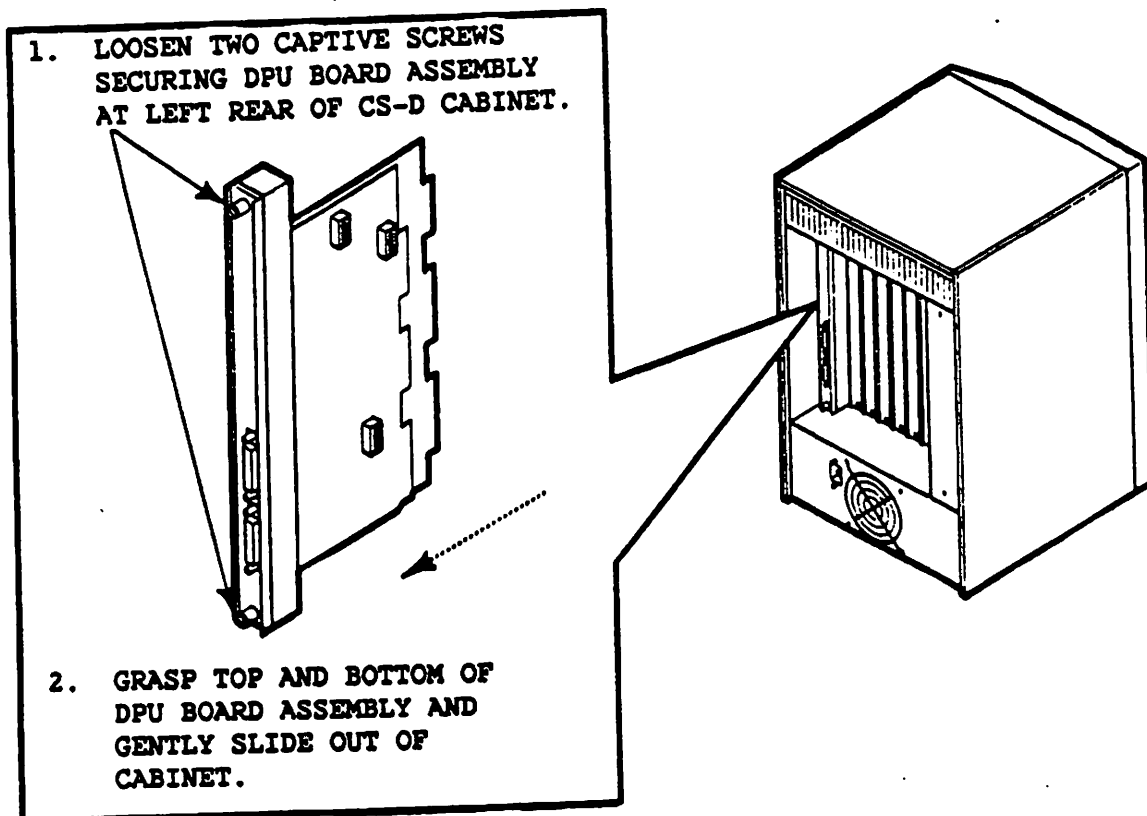
N/A

Field Support Ops <i>[Signature]</i>	Logistics <i>[Signature]</i>	Originator <i>6/14/89</i> <i>[Signature]</i>	ECO Support Mgr. <i>[Signature]</i>
---	---------------------------------	---	--

5. INSTALLATION PROCEDURE

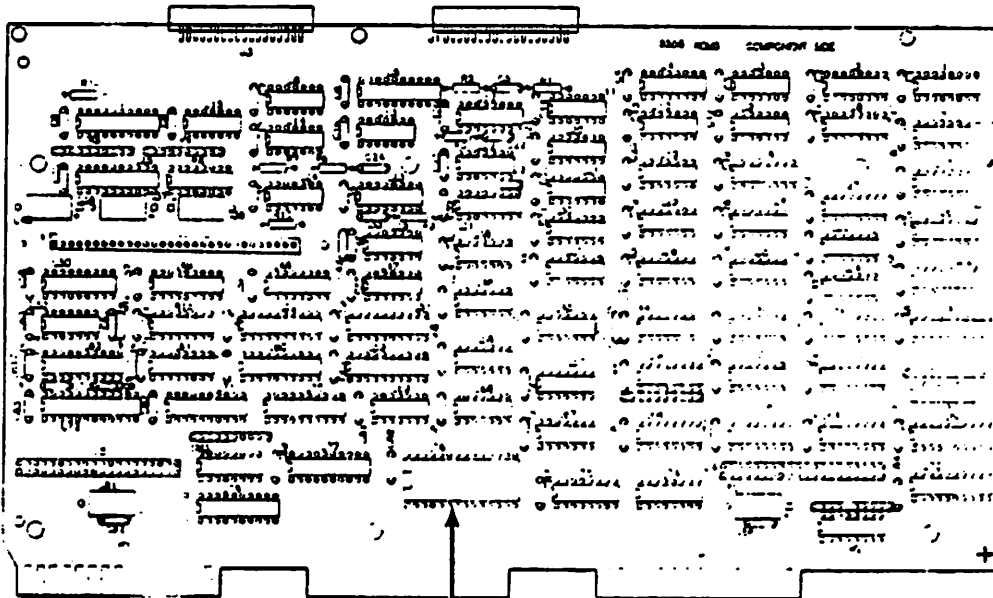
- A. Power off. Remove AC power cord from source outlet. Refer to Section 4.2 of the Customer Engineer Product Maintenance Manual, "Wang Computer System" (741-1769), for power-down procedure.
- B. Remove the 212-7113 DPU Board Assembly as follows: (Figure 1)
 1. Loosen two captive screws securing DPU Board Assembly at left rear of CS-D Cabinet.
 2. Grasp the top and bottom of DPU Board Assembly and gently slide out from rear of Cabinet.

FIGURE 1



- C. Rework the 210-9558 DPU Mother board as follows: (Figure 2)
1. Remove the E-PROM currently in location L76 and replace with 379-8500-R2 PROM contained in Kit.

FIGURE 2: 210-9558 DPU MOTHER BOARD (COMPONENT SIDE)



**REMOVE E-PROM CURRENTLY IN LOCATION
L76 AND REPLACE WITH 379-8500-R2 PROM
CONTAINED IN KIT.**

FCO 1351

- 3 -

COMPANY CONFIDENTIAL

D. Reassemble unit by reversing Step B.

E. To complete installation of FCO, fill in applicable information on the Field Change History tag. (Part #615-3299). The tag should be mounted to right of fan at rear of Cabinet.

NOTE: The Field Change History tags can be obtained by placing a routine order through the Logistics Order Processing System.

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

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

6. CHECK-OUT PROCEDURE

Power up. Verify all disks. Run disk diagnostics. Observe normal operation.

7. FCO KIT PARTS LISTING

KIT #728-0361

<u>Item</u>	<u>Qty</u>	<u>Item Description</u>
729-1800	1	FCO Document 1351
379-8500-R2	1	E-PROM

8. FCO KIT AVAILABILITY DATE

NOTE:

When determining kit requirements, be aware that manufacturing has cut this change into this product as of June 13, 1989. Products shipped/installed after this date will contain this FCO.

8. FCO KIT AVAILABILITY DATE CONTINUED)

FCO Kit #728-0361 will be available July 14, 1989 and can be obtained by placing a special order. Special orders for FCO kits are exempt from the established approval loop. They should be mailed directly to:

Logistics Order Processing
Wang Laboratories
836 North Street
Tewksbury, MA 01876

Att'n: Order Services
M/S 025-290

Dealers may obtain the FCO Kit by completing a Dealer Parts Sales form and sending it to:

Dealer Distribution Center
Wang Laboratories
836 North Street
Tewksbury, MA 01876

Att'n: Order Services
M/S 025-290

9. REMOVED PARTS DISPOSITION

Recycle removed E-PROM thru your FSC.

10. MISCELLANEOUS

N/A

MICHAEL E BAHIA
PROJ# K641 (

1 COPIES)
M/S: 001-330

WANG

TECHNICAL SERVICE BULLETIN
SECTION: HardWare General

NUMBER: HWT 9449 REPLACES: _____ DATE: ^{5 22}04/27/90 PAGE 1 OF 2
MATRIX ID. 4103 PRODUCT/RELEASE# 2200 CS-D/N
TITLE: DPU Disk Port & Jumper Information/Part Number Correction

PURPOSE:

To inform the field of the purpose of the disk/mux port and jumper on the 212-7113 DPU Board which is not documented and to provide the field with the correct part numbers for the Power Supply & On/Off switch.

EXPLANATION:

Every CS-D CPU comes with a 212-7113 DPU Board used to control all internal drives. The DPU Board consists of a 210-9558 Motherboard which has two I/O connectors and a 210-9559 Daughter Board. The top connector is a standard system printer port. The bottom connector is a disk/mux port. The disk/mux port is used to allow access to the internal CS-D drives by other CPUs. This port is activated by the MUX/BUS jumper located on the 210-9558 motherboard up next to the rail between the 2 I/O connectors.

Normally this jumper will be in the BUS position. This causes the disk/mux port to be inactive allowing only the internal CPU to have access to it's drives. When the jumper is moved to the MUX position all access must be through the disk/mux port including access by the CS-D CPU itself.

In the MUX position, the drives and DPU Board should be thought of as a separate device much like the DS Cabinet or the 2275. The disk port on the 212-7113 DPU Board is the I/O connector similar to the I/O connectors on the back of the DS & 2275. Any CPU requiring access to these drives must now have a disk controller cabled to this port. Normally when in the MUX position a 2275MUX Master Board, 210-8824, would be installed in the I/O section with a cable from it's disk port to the disk/mux port of the DPU Board. This connection allows the CS-D to access the internal CS-D drives. Other CPU's (up to 16 can be mux'd) using 210-7715 boards can be cabled (100' max) to the 2275MUX Master CPU ports allowing them access to the internal CS-D drives. Of course a standard disk controller in any CPU could be cabled directly to this port, but that would limit access to only that CPU. When used in the MUX position, the disk controller in the CPU accessing the drives determines the device address via the device address switch bank on that board. This overrides the device address set on the CS-D DPU Board. This is the same way it is done on all similar 2200 disk connections. Switch settings are discussed on page 2.

GROUP: 2200 Product SupportMAIL STOP: 001-330

COMPANY CONFIDENTIAL
WANG Laboratories, Inc.

WANG

TECHNICAL SERVICE BULLETIN

SECTION: SoftWare General

NUMBER: HWT 9449

REPLACES: _____

DATE: 5 22
03/06/90 PAGE 2 OF 2MATRIX ID. 4103PRODUCT/RELEASE# 2200 CS-D/NTITLE: DPU Disk Port & Jumper Information/Part Number Correction

EXPLANATION (cont'):

Switch settings for the CS-D DPU Board can be found on a sticker on the right side panel of the CS-D cabinet. These switch settings are correct. Appendix A of the CS Maintenance Manual, 741-1769-2, covers the CS-D & CS-N CPU's and on page A-38 incorrectly shows the drive type switch settings. What is shown as ON should be OFF and vice versa. There is also added confusion as the sticker & manual do not agree on the switch labeling and the male connectors on the sticker do not match the board. Use the side panel for sw settings but beware, labeling may not match. To access, remove the top cover by removing the 2 screws in back. The side panel can then be removed by sliding it up. The correct sw settings are:

210-9558 MotherboardSW 1 - Winc Drive Type - between L8 & L13 near bottom of board

No Winc = All OFF

10 Meg Rem Winc = 5 ON only

10 Meg Winc = 6 ON only

20 Meg Winc = 5,6 ON only

32 Meg Quantum Q540 = 7 ON only

64 Meg Winc = 5,7 ON only

140 Meg Maxtor = 6,7 ON only

32/42 Mg Micropolis = 5,6,7 ON

112 Meg Maxtor = 8 ON only

SW 2 - Printer Address - next to L69 just above connector J5

215 = 1,3,5 ON only 216 = 2,3,5 ON only 217 = 1,2,3,5 ON only

SW 3 - Drive/s Device Address - between L76 & L77 at top of board

310 = 5 ON only

320 = 6 ON only

330 = 5&6 ON only

210-9559 Daughter BoardSW 1 - Factory Use Only - 8 bank sw at top of board ALL OFFSW 2 - Floppy/Tape Switch - 4 bank switch at bottom of board

1 OFF = 320 Kb Floppy

1 ON = 1.2 Meg Floppy

2 OFF = No Tape

2 ON = Tape Drive installed

3,4 = OFF (not used)

ADDITIONAL INFORMATION:

Also in Appendix A of the CS Manual, 741-1769-2, on pages A-54 and A-55 the AC On/Off Switch and the CS-D/N SPS-255 Power Supply have incorrect part numbers. The part numbers shown are for the CS. The On/Off switch is not physically compatible and although both CPU's use the same base Power Supply the harness is different. The correct part numbers are:

CS-D/N On/Off Sw 325-0105CS-D/N SPS-255 Power Supply 270-0809-1GROUP: 2200 Product SupportMAIL STOP: 001-330COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

To: Mike Bahia
From: Jerry R. Spencer
Subject: TSB HWT 9449

MS0126/LOWELL

Date: 05/24/90

Distribution:

Not Requested

Mike: Did you write TSB HWT 9449 about the 2200 CS-D DPU switch settings?
We have some some problems with the switch setting info in the TSB.
SW Bank 1 and 3 seem reversed and page A-38 in 741-1769-3 appear to have
the correct info. I dont have a CPU label to look at and I dont have page
A-38 from 741-1769-2.

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 9192 REPLACES: _____ DATE: 06/06/89 PAGE 1 OF 1

MATRIX ID. 3107 PRODUCT/RELEASE# 2200 DS/CS-D

TITLE: New CDC (Imprimus) Magnetic Peripherals 42 MB HH Winc Disk Drive

PURPOSE:

To provide the field with the necessary information to install this drive properly in the 2200 DS Disk Cabinet or in the CS-D CPU.

EXPLANATION:

A new 42 Meg drive from CDC (Imprimus) Magnetic Peripherals (MN 94205-53) is now being shipped to the field as a replacement for the 32 Meg full height drives (Quantum Q540 and the Micropolis 1323). Although the drive has 42 Meg, it is being used as a 32 Meg (2 16 Meg addresses with 65024 sectors). The following information should allow successful installation:

Drive Type Switch Settings:

	<u>same as 32 Meg Micropolis</u>
<u>DS 210-8826A DPU Brd, Sw Bk 1 &/or 2</u>	<u>8 Off, 7,6,5 On for DR1 or DR3</u>
	<u>4 Off, 3,2,1 On for DR2 or DR4</u>
<u>CS-D 212-7113 DPU Brd, Sw Bk 3</u>	<u>8 Off, 7,6,5 On (1-4 off, n/a)</u>

NOTE: The 32 Meg Quantum Q540 has different switch settings which will not work with the CDC (Imprimus) Magnetic Peripherals 42 Meg drive.

Jumpers: Drive 1 Select only in all cases. A series of 7 jumpers are located behind the A & B cable connectors. The Drive Select 1 jumper is on the end, B Cable side, farthest from the power plug.

Terminator: IN for CS-D or DR1 in DS. OUT for DR2, DR3, & DR4 in DS.
DR1/DR2/DR3/DR4 (Drive Select 1/2/3/4) refer to the connector position on the A cable. The Terminator is located behind A Cable Connector.

Addressing: 2 addresses, each with sectors 0-65023.

Part Numbers:

CDC Magnetic Peripherals MN 94205-53 Half Height 42 Meg	- 725-3493
Micropolis 1323 Full Height 32 Meg	- 725-0254
Quantum Q540 Full Height 32 Meg	- 725-0144

Once installed properly, it would be transparent to the user which winchester was being used.

GROUP: VS On-Line Support

MAIL STOP: 001-330

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

To: Mike Bahia
From: Mike Bahia
Subject: Part Numbers

MS0126/LOWELL
Date: 03/27/90

Distribution:

Not Requested

Two incorrect part #'s have been identified by the field. Addendum A to the CS Product Maintenance Manual, p/n 741-1769-2 should be corrected. On page A-54 the AC Power-On/Off Switch is listed as part # 325-0096. That # is correct for the CS but physically cannot be used in a CS-D/N. The p/n for the Power Supply is also incorrect on page A-55. From what the field has told me the harness is different. The part # given is 270-0986 which is correct for the CS Power Supply. Both the CS & CS-D/N use the SPS-255 P/S but as mentioned with different harnesses. The correct part #'s are as follows:

item 8	AC Power-On/Off Switch	325-0105	page A-54
item 13	SPS-255 DC Power Supply	270-0890-1	page A-55

The corrected part #'s were taken from the Assembly Procedure, p/n 279-0873, used by Mfg to build the CS-D/N Cabinet. A TSB will be written by me to inform the field. Please call me if you have any questions.

Regards,

Mike Bahia
Product Support
60256/60105

To:
Subject: CS-N Motherboards

Distribution:

None, this item is In Progress

To: Mike Bahia From: Alex Popp
Subject: CS-N Motherboards Date Sent: 05/16/90

Mike:

Has anyone reported problems with the CS-N motherboard (210-9560) having a power on reset problem? We have run into 2 now (1 original and 1 P-1 part) that have had the same symptom, the symptom varies a little bit but it is basically the same. You can not consistently "Mount System Platter Press Reset" sometimes just a cursor, other times various PECM, PEDM, BECM errors this is just at power up, once you get the CS-N up it works fine. Problem occurs with MXE's, MXD's, single or multiple other kinds of controllers loaded multiple CPU cards multiple power supplies, The only thing that I found in common with the two motherboards is that they have a manufacturing date code of 04-89 on both, the good replacement had a date code of 08-89.
Thanks, Alex Popp (ATS Carolina's Area 919-668-3627)

----- Reply -----

Alex,

We have had some similar type symptoms reported in the past but have never been able to identify the motherboard as a problem. In the other cases, there were problems sitting the boards. If the boards were just pushed in as opposed to visually lining up the contacts there were power up problems intermittently. Questions were also brought up concerning some connectors being too loose & in fact we had a motherboard sent in. We were unable though to find any problem with the motherboard and although some connectors were a bit looser than others, they were not found to be a problem.

My suggestion would be to visually line up the contacts on the board with those in the connectors & to verify each board is fully seated. Verify the 2 adjustable voltages (+5 & +12V) are within + or - .05 volts under full load. Be aware any board or the PS could cause these same symptoms. If the problem can be duplicated, start with a minimum hardware config, CPU brd & 1 MXE or MXD is all that is needed for initial message. If I can be of any help at all do not hesitate to call or Wang Office.

Regards,
Mike Bahia
Product Support
508-656-0256

XA0290S
00.00.00

W A N G L A B O R A T O R I E S I N C .
PROBLEM TRACKING AND REPORTING
PRODUCT COMPLETE DETAIL REPORT
H E A D E R I N F O
PRODUCT PROBLEM NUMBER P200012877

PAGE: 1
30 OCT 1991
11:27:42

PROBLEM NUMBER: P200012877 NUMBER OF RELATED
PRIORITY P3 CUSTOMER PROBLEMS: 0
PROBLEM TYPE: PROB PRODUCT PROBLEMS: 0
PRE-RELEASE PROB: LINKED TO PROBLEM:

SYSTEM MODEL NO: CS-10D ORIGINATOR NAME: BAHIA MICHAEL E
GEN SYST MODEL: 2200 CS CPU ORIG EMPLOYEE NO: 00-04238
O.S. VERSION: ORIGINATOR PHONE: - - -
HW MODEL NUMBER: CS-10D ORIGINATOR RDB: 8760
SW MODEL NUMBER:
SW VERSION:

PART NUMBER: RDB ASSIGNED: 8332
PART NUM REV: PERSON ASSIGNED: RILEY J MICHAEL

STATUS DATE: 10/29/91 17:47 DATE ENTER PTR: 11/28/89
STATUS CODE: H C 160 DATE TO R&D: 000000000
STATUS ABBREV: ECO/FCO WKDYS IN R&D:
STATUS CLOSE LVL: ALL TOT WKDYS OPEN:
STATUS DESC : ENGINEERING CHANGE ORDER/FIELD CHANGE ORDER

PROBLEM SUMMARY :BAHIA MICHAEL E DATE: 11/28/89 TIME: 10:09
CS-xD intermittently failing in Europe on power up. Instead of 'Mount System Platter' message get PECM or BEDM error. This is happening at approximately 20% of sites. In Germany where the power cord can be plugged in backwards reversing polarity, polarity does not seem to matter. The motherboards are updated with the jumper from R7 to D1. A circumvention has been found. By adding a 47 uF cap on the Power On Reset signal to lengthen the Reset pulse, the problem is eliminated. The problem seems most common with the 128K & 512K boards. Believe this change should be verified & if good incorporated. Esalation C800001597 has been open since July on this problem. Hard copy of call given to Mike Riley.

RESOLUTION TEXT :RILEY J MICHAEL DATE: 10/29/91 TIME: 17:32
This problem is fixed JMR

ASSIGNED: BAHIA MICHAEL E DATE: 10/03/91 TIME: 13:59
ECO 59333 has been written and approved. It replaces LI (74LS03) & L2 (74LS74) with 74S03 & 74S74 respectively to correct this power up PECM problem. Field has accepted fiix. This call can be closed.

ASSIGNED: BAHIA MICHAEL E DATE: 06/26/91 TIME: 14:15
Field is still waiting for this ECO. Please followup.

ASSIGNED: BAHIA MICHAEL E DATE: 05/30/91 TIME: 13:33
Still waiting on ECO. When will it be written.

ASSIGNED: BAHIA MICHAEL E DATE: 04/04/91 TIME: 16:53
Still waiting for a final solution. When will ECO be written?

ASSIGNED: BAHIA MICHAEL E DATE: 03/22/91 TIME: 10:22
When will ECO be written? Field is waiting. Please followup.

ASSIGNED: BAHIA MICHAEL E DATE: 02/11/91 TIME: 16:05
Has ECO been written yet? We need to get this done.

ASSIGNED: BAHIA MICHAEL E DATE: 11/27/90 TIME: 17:26
Germany called me today on this problem. Need to know what is happening & when we can have fix certified & an ECO written. Call is 16 months old. Need to put this to bed.

ASSIGNED: BAHIA MICHAEL E DATE: 10/26/90 TIME: 09:35
Field has reported additional info on this problem which I brought to your attention. There are 2 IC's on the motherbrd, a 74LS03 & a 74LS74. The CE has found if he replaces those ICs with 74S03 & 74S74 he can eliminate the problem. These ICs have a higher output. This problem is aggravated bu heavy I/O loading. In other words, the more I/O controllers installed the more likely the problem. Let's please try to get this problem resolved while we have the Taiwan R&D here.

ASSIGNED: BAHIA MICHAEL E DATE: 08/27/90 TIME: 16:25
Need R&D to followup on this.

ASSIGNED: FINDT ERWIN DATE: 03/26/90 TIME: 08:34
Could I have a status please?

ASSIGNED: BAHIA MICHAEL E DATE: 03/13/90 TIME: 09:00
Please update.

ASSIGNED: BAHIA MICHAEL E DATE: 01/22/90 TIME: 08:35
Waiting for update.

ASSIGNED: BAHIA MICHAEL E DATE: 12/20/89 TIME: 17:01
Do not understand last update. Do you mean the problem has been forwarded to MIS to correct the problem?

ASSIGNED: MARTIN KIMBERLEE A DATE: 12/19/89 TIME: 15:34

XA0290S
00.00.00

W A N G L A B O R A T O R I E S I N C .
PROBLEM TRACKING AND REPORTING
PRODUCT COMPLETE DETAIL REPORT
P R O B L E M D E T A I L
PRODUCT PROBLEM NUMBER P200012877

PAGE: 5
30 OCT 1991
11:27:42

ASSIGNED: MARTIN KIMBERLEE A DATE: 12/19/89 TIME: 15:34
THIS PROBLEM HAS BEEN UPDATED BY MIS, TO CORRECT DATA INTEGRITY ISSUES.

ASSIGNED: BAHIA MICHAEL E DATE: 12/13/89 TIME: 14:17
Why is no one responding? What needs to be done for a response?

ASSIGNED: BAHIA MICHAEL E DATE: 12/04/89 TIME: 15:28
WHAT IS HAPPENING ON THIS CALL. WAITING FOR SOMEONE TO PICKUP.

ASSIGNED: BAHIA MICHAEL E DATE: 11/28/89 TIME: 10:09
Use CS-D w/ prefarrably a 128K or 512K board on a 220vac, 50 Hz power &
repeatedly power up.

PROBLEM NUMBER: C800001596 CUST NAME: ALEC GMBH
PRIORITY P2 CUST NUMBER: G1 00014048003

PROBLEM TYPE: ESC CUST CONTACT: MR. PAHNE
LINK TO PROB NO: NOT LINKED CUST CONT PHONE: 00- - -
CUST ADDRESS 1: AM WESTHECK 367
CUST ADDRESS 2:
CUST ADDRESS 3:
SYSTEM MODEL NO: CS-10 CUST CITY: DORTMUND 14
GEN SYST MODEL: 2200 CS CUST ST/PROV:
O. S. VERSION: 3. 3 CUST ZIP: 4600 - CUST RDB: G2130
HW MODEL NUMBER: CS-10 CUST COUNTRY:
SW MODEL NUMBER: CS-10
SW VERSION: 3. 3

PART NUMBER: RDB ASSIGNED: 8760
PART NUM REV: PERSON ASSIGNED:
SERIAL NUMBER: 94794X ORIG NAME: FINDT ERWIN
ORIG EMPL NO: G1-04687
ORIG PHONE: - - -
ORIG RDB: G2100

CALL TRKG DATE: 07/19/89 14:00 NETWORKED: N
CALL TRKG NO: EFI0000006 RES DEPLOYED:

ORG ACT/SYM/ACN: DATE ENTER PTR: 07/19/89
STATUS DATE: 07/19/89 DATE TO R&D: 019890720
STATUS CODE: H O 628 WKDAYS IN R&D: 573.94
STATUS ABBREV: RE-INT/IPL TOT WKDAYS OPEN: 575.47
STATUS DESC: REINITIALIZE/RE-IPL/SYSTEM GENERATION

PROBLEM SUMMARY :FINDT ERWIN DATE: 07/19/89 TIME: 09:58
The new CS-XD fails sporadically during power-up-sequence. Instead of MOUNT SYSTEM PLATTER PECM or BEDM comes on the screen. But the system will start without any problems if a 47 uF capacitor will be added to the power-on-reset circuit on the motherboard. This modification makes the reset pulse longer. A wire between the cathode of a diode and a resistor is already installed. The start-up-problem occurs mostly with 128KB and 512KB Boards.

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 10/03/91 TIME: 14:44
HC160. Intermittent PECM errors on power up with 220VAC CS-D resolved with ECO 59333 signed off in September.

XAO291S
00.00.00

WANG LABORATORIES INC.
PROBLEM TRACKING AND REPORTING
CUSTOMER COMPLETE DETAIL REPORT
PROBLEM DETAIL
CUSTOMER PROBLEM NUMBER C800001596

PAGE: 4
03 OCT 1991
14:45:56

ASSIGNED: BAHIA MICHAEL E DATE: 10/03/91 TIME: 13:52
Unlinking call to enable closing as agreed.

ASSIGNED: FINDT ERWIN DATE: 10/02/91 TIME: 07:44
Okay, you can close this PTR now.

ASSIGNED: BAHIA MICHAEL E DATE: 09/26/91 TIME: 09:04
Please update. ECO is done. Can we close this call?

ASSIGNED: BAHIA MICHAEL E DATE: 09/16/91 TIME: 11:52
ECO59333 has been signed off & finalized to resolve this problem. Can this call be closed?

ASSIGNED: BAHIA MICHAEL E DATE: 08/22/91 TIME: 09:17
ECO 59333 has been written against this problem & is in the review stage. It calls for the following changes on the CS-D motherboard:
change L1 (376-0224) 74LS03 to (376-0556) 74S03
change L2 (376-0155) 74LS74 to (376-0202) 74S74
If the review goes smoothly ECO should be in place next month.

ASSIGNED: BAHIA MICHAEL E DATE: 08/07/91 TIME: 13:50
The ECO has been written up and presumably given to the ECO group. If there are no major issues we may have an actual ECO in a month or 2.

ASSIGNED: BAHIA MICHAEL E DATE: 06/26/91 TIME: 11:34
Mike Riley will be writing this ECO. Have repeatedly reminded him & will continue to do so. Might suggest someone call Mike at 508-967-0524. He has been very busy but possibly hearing this request from someone new may help. Best time to call him would be 8:15 to 8:30 AM our time, or send him a Wang Office.

ASSIGNED: FINDT ERWIN DATE: 06/26/91 TIME: 04:53
I think that now enough time was lost and we should have the ECO very soon. Please update with the really status..

ASSIGNED: CAGIRGAN TURAN DATE: 06/03/91 TIME: 13:49
we appreciate it!

ASSIGNED: BAHIA MICHAEL E DATE: 05/30/91 TIME: 13:22
Management is currently trying to clean up some of these old calls so we may have some action very shortly.

ASSIGNED: BAHIA MICHAEL E DATE: 03/11/91 TIME: 16:57
Eco still has not been written. Reminded MR field is waiting.

ASSIGNED: BAHIA MICHAEL E DATE: 02/11/91 TIME: 16:55

ASSIGNED: BAHIA MICHAEL E DATE: 02/11/91 TIME: 16:55
Readdressed this issue w/ M Riley on 2/8 again emphasizing need to follow thru so we can get this call closed.

ASSIGNED: BAHIA MICHAEL E DATE: 01/22/91 TIME: 16:37
Waiting on M Riley to write ECO. He has copy of call & is aware of all your concerns.

ASSIGNED: BAHIA MICHAEL E DATE: 12/21/90 TIME: 18:28
Have made all your comments known to R&D.

ASSIGNED: BAHIA MICHAEL E DATE: 12/17/90 TIME: 11:56
Will forward your comments to Mike Riley who will be writing the ECO.

ASSIGNED: FINDT ERWIN DATE: 12/17/90 TIME: 07:17
I think this problem must be traced to find out what the really technical solution is and we should implement this solution to all boards on stock and on a 'problem only' base in the field.

ASSIGNED: BAHIA MICHAEL E DATE: 12/14/90 TIME: 15:25
The reasoning right now is there is a good chance the existinmg motherboard used in the CS-D will become obsolete, replaced by the motherboard for the 2200 Turbo assuming the Turbo becomes reality. New chips are being used on this motherboard to prevent this type problem. Where the old motherboard should become obsolete, does it make sense to go to the added expense of the chips which in most cases will need to be done in the repair cycle or replace the capacitor which allows an FCO to be written & an easy field fix. Do you have specific reasons for not using the capacitor?

ASSIGNED: FINDT ERWIN DATE: 12/13/90 TIME: 09:16
I spoke to John Baxi. He thinks that replacing the IC's would be the right step.

ASSIGNED: BAHIA MICHAEL E DATE: 12/07/90 TIME: 19:01
Mike Riley has told me he will test the 47 ufd cap on 110VAC unit & if no problems will write the ECO.

ASSIGNED: BAHIA MICHAEL E DATE: 12/06/90 TIME: 12:49
Update acknowledged. Will get back to you as soon as possible with the decision.

ASSIGNED: FINDT ERWIN DATE: 12/06/90 TIME: 09:07
Because I don't have a schematic of the reset circuits I cannot say what's the really technical solution. I feel that the chips will have more advantage because the problem is related to the number of I/Os but I'm agree that the exchange of the capacitor is more easier. For the right decision

ASSIGNED: FINDT ERWIN DATE: 12/06/90 TIME: 09:07
I think it's necessary to monitor the reset pulse with an oscilloscope.

ASSIGNED: BAHIA MICHAEL E DATE: 12/05/90 TIME: 11:36
Pressing very hard to get an answer on this as to which way we will go. New motherboard for the 386 Turbo will have slower chips to prevent this problem, but not the same ones that were suggested in this call. We are leaning to the capacitor in theory as this would be easier to implement in the field. Is there any reason to replace the chips instead of the capacitor, or will the capacitor fix be just as reliable? Have been demanding we decide & test the fix to be used this week so that we can start the ECO. Again please let me know if you feel there is an advantage with either of the 2 fixes, the cap or the 2 chips.

ASSIGNED: BAHIA MICHAEL E DATE: 11/29/90 TIME: 14:17
We are expecting an answer on this shortly. We want to have this fix implemented on a new motherbrd needed with the new 386 Turbo now being readied for beta testing. We have to have an answer to complete documentation needed to build the board. Sorry for the delay but I expect to see approval in the next few days which will then allow us to write the ECO.

ASSIGNED: CAGIRGAN TURAN DATE: 11/28/90 TIME: 05:23
Waiting for resolution since over 1 1/2 year.

ASSIGNED: BAHIA MICHAEL E DATE: 11/27/90 TIME: 18:06
Have asked for updated status on this call. MR to talk with Taiwan R&D to find out exactly where we stand.

ASSIGNED: BAHIA MICHAEL E DATE: 11/21/90 TIME: 15:46
Awaiting feedback on current status.

ASSIGNED: BAHIA MICHAEL E DATE: 11/13/90 TIME: 18:32
Taiwan R&D has copy of call & should be looking into this problem now. Will keep you posted.

ASSIGNED: BAHIA MICHAEL E DATE: 10/31/90 TIME: 13:51
Hardware R&D from Taiwan is now temporarily here in Lowell & we should be able to get this problem resolved. Will keep after it.

ASSIGNED: BAHIA MICHAEL E DATE: 10/26/90 TIME: 10:14
Taiwan currently here in Lowell. Will get new status if any & if not try to get this thing going.

ASSIGNED: BAHIA MICHAEL E DATE: 10/08/90 TIME: 10:11
Thanks for this new info. Will update Taiwan on this & ask for a status.

ASSIGNED: FINDT ERWIN DATE: 10/05/90 TIME: 10:55
On the motherboard there are two IC's: 74LS03 and 74LS74. The CE found out that he can fix this problem if he will replace the 'LS' chips by 'S' chips. The 'S' chips do have a higher fan out so the 74S03 can drive more I/O boards than a 74LS03. The problem is related to the number of I/O's installed so the failure rate is higher if more I/O's are installed. Maybe this fix is a real fix for that RESET problem.

ASSIGNED: BAHIA MICHAEL E DATE: 10/05/90 TIME: 08:44
Still waiting for feedback from Taiwan.

ASSIGNED: BAHIA MICHAEL E DATE: 09/10/90 TIME: 15:30
Mike Riley has asked Taiwan to look into this matter. Expect feedback from Taiwan on this problem in near future.

ASSIGNED: BAHIA MICHAEL E DATE: 08/27/90 TIME: 17:01
still waiting on R&D to test.

ASSIGNED: BAHIA MICHAEL E DATE: 07/13/90 TIME: 11:28
Have again reminded R&D this needs to be addressed.

ASSIGNED: BAHIA MICHAEL E DATE: 06/22/90 TIME: 12:22
thing new to report here.

ASSIGNED: BAHIA MICHAEL E DATE: 06/07/90 TIME: 15:44
Still waiting for R&D to test out fix.

ASSIGNED: BAHIA MICHAEL E DATE: 05/25/90 TIME: 10:17
Still waiting on R&D. On vacation next week.

ASSIGNED: BAHIA MICHAEL E DATE: 05/16/90 TIME: 11:03
Unable to update priority as requested by field. Can only update status comments. May be because call is linked. Have call into PTR group on this.

ASSIGNED: BAHIA MICHAEL E DATE: 05/10/90 TIME: 09:22
No change. Currently on back burner because of more critical issues & lack of manpower but will again remind R&D we are waiting for follow-up.

ASSIGNED: BAHIA MICHAEL E DATE: 04/18/90 TIME: 11:32
No change.

ASSIGNED: BAHIA MICHAEL E DATE: 04/11/90 TIME: 15:04
Waiting on R&D.

ASSIGNED: BAHIA MICHAEL E DATE: 03/27/90 TIME: 12:31
Call was linked back on 1/4.

ASSIGNED: BAHIA MICHAEL E DATE: 03/27/90 TIME: 12:25
Have reminded R&D this needs to be addressed in the lab.

ASSIGNED: BAHIA MICHAEL E DATE: 03/13/90 TIME: 10:01
Waiting on R&D.

ASSIGNED: FINDT ERWIN DATE: 03/12/90 TIME: 08:57
Please update that call and link it to PTR P200012877. Thanks!

ASSIGNED: BAHIA MICHAEL E DATE: 02/20/90 TIME: 16:42
Nothing new here. Still waiting for R&D to followup.

ASSIGNED: BAHIA MICHAEL E DATE: 02/07/90 TIME: 18:07
Readdressed this problem last Fri w/ R&D. Still waiting for followup.

ASSIGNED: BAHIA MICHAEL E DATE: 01/24/90 TIME: 17:11
Nothing new here. Still waiting for R&D to follow up.

ASSIGNED: BAHIA MICHAEL E DATE: 01/04/90 TIME: 17:45
PTR people have resolved problem preventing this call from being linked.
Linked call to P200012877. Have requested update from R&D.

ASSIGNED: BAHIA MICHAEL E DATE: 12/15/89 TIME: 09:31
PTR group thinks the inability to LINK is a s/w bug w/ the s/w being used
back when this call was open. They will fix it which should allow me to do t
he linking.

ASSIGNED: BAHIA MICHAEL E DATE: 12/14/89 TIME: 17:56
Joe is no longer with the company. I will talk w/ the PTR people & try to
get it straightened out.

ASSIGNED: FINDT ERWIN DATE: 12/13/89 TIME: 10:32
I'm unable to do anything. The person assigned is Joseph Scaglione in your
RDB 8760. Please talk to Joseph for sending back!

ASSIGNED: BAHIA MICHAEL E DATE: 12/08/89 TIME: 17:18
Unable to send or de-escalate as I am not the current owner. Please try to
link on your own.

ASSIGNED: BAHIA MICHAEL E DATE: 12/08/89 TIME: 17:15
Unable to link as I am not shown as the current owner. Sending back to field
per field request for linking.

ASSIGNED: FINDT ERWIN DATE: 12/07/89 TIME: 03:51
Please link that call to the product problem or send it back to me for
linking.

XA0291S
00.00.00

W A N G L A B O R A T O R I E S I N C .
P R O B L E M T R A C K I N G A N D R E P O R T I N G
C U S T O M E R C O M P L E T E D E T A I L R E P O R T
P R O B L E M D E T A I L
C U S T O M E R P R O B L E M N U M B E R C 8 0 0 0 0 1 5 9 6

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03 OCT 1991
14:45:56

ASSIGNED: BAHIA MICHAEL E DATE: 11/28/89 TIME: 11:42
Product Problem call P200012877 opened & sent to R&D on this problem
requesting 47 uF Cap be tested & verified as good fix & if so incorporated.

ASSIGNED: FINDT ERWIN DATE: 11/27/89 TIME: 10:20
The power on reset problem appears on about 20 % of CS-D installations.
It doesn't seem to be related to the polarity of the 220 VAC power.

ASSIGNED: BAHIA MICHAEL E DATE: 11/20/89 TIME: 11:56
STILL AWAITING FEEDBACK FROM MY 9/21 UPDATE. PLEASE FOLLOWUP. JOE S IS
SHOWN AS ASSIGNED ALTHOUGH I AM ACTUALLY ASSIGNED. MY PTR GURU TOLD ME THE
CALL APPEARED TO BE TIED UP ON YOUR END, HENCE MY MESSAGE.

ASSIGNED: FINDT ERWIN DATE: 11/20/89 TIME: 04:49
To: Michael Bahia (RDB 8759).
As you can see in the first screen the owner is Joseph Scaglione in RDB 8760
of TSO. G2130 is the customer RDB.

ASSIGNED: BAHIA MICHAEL E DATE: 11/16/89 TIME: 10:31
PTR IS PREVENTING ME FROM SENDING THIS CALL TO R&D AS I AM NOT THE OWNER.
CALL APPEARS TO BE SITTING IN RDB G2130. RDB G2130, PLEASE ACCEPT CALL &
ESCALATE OR SEND TO MY RDB, 8759, SO IT CAN BE FORWARDED TO R&D.

ASSIGNED: BAHIA MICHAEL E DATE: 11/16/89 TIME: 09:36
SENDING CALL TO R&D FOR GREATER EXPOSURE.

ASSIGNED: BAHIA MICHAEL E DATE: 10/23/89 TIME: 09:22
talked w/ wh. MR at HO to look into prob.

ASSIGNED: BAHIA MICHAEL E DATE: 10/16/89 TIME: 11:06
UPDATE ACKNOWLEDGED. SENT FAX TO WH FOR UPDATE FROM R&D.

ASSIGNED: FINDT ERWIN DATE: 10/10/89 TIME: 03:40
Still no feedback from the field engineer. Will update asap.

ASSIGNED: BAHIA MICHAEL E DATE: 10/06/89 TIME: 08:35
HAVE YOU RECV'D ANY FEEDBACK FROM THE SITE CE YET. PLEASE UPDATE.

ASSIGNED: BAHIA MICHAEL E DATE: 09/29/89 TIME: 16:27
UPDATE ACKNOWLEDGED.

ASSIGNED: FINDT ERWIN DATE: 09/26/89 TIME: 04:25
About your requested info I'm waiting for response from the service office.

ASSIGNED: BAHIA MICHAEL E DATE: 09/25/89 TIME: 10:40
SENT COPY OF CALL TO R&D (SC) TO EVALUATE FOR POSSIBLE ECO. MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 09/21/89 TIME: 16:46
LAST YEAR A PROBLEM WAS IDENTIFIED IN GERMANY W/ THEIR ELECTRIC POWER OUTLETS
WHERE THE POWER PLUG COULD BE PLUGGED IN 2 DIFFERENT WAYS. THE SWITCHER P/S
HAS A PROBLEM W/ THIS BECAUSE IT REVERSES POLARITY & THE POWER SUPPLY CAN
ONLY HANDLE POLARITY IN 1 DIRECTION. WHICH WAY IT MUST BE I'M UNSURE OF. IN
SOME AREAS NEUTRAL IS TIED TO GROUND & IF SO REVERSING THE POWER CORD COULD
CAUSE DAMAGE. ARE YOU AWARE OF THIS PROBLEM & COULD THIS BE A FACTOR W/ THIS
PROBLEM. IT IS VERY DIFFICULT TO DUPLICATE & AS OF NOW R&D HAS BEEN UNABLE T
O REPRODUCE YOUR PROB. WHAT PERCENTAGE OF THESE CPU'S HAVE THIS SPECIFIC
PROB & HOW OFTEN DO MACHINES THAT ARE FAILING FAIL. MIKE B

ASSIGNED: SCAGLIONE JOSEPH R DATE: 09/19/89 TIME: 10:33
called mike riley for an update joe

ASSIGNED: SCAGLIONE JOSEPH R DATE: 09/06/89 TIME: 10:32
talked w/ mike riley.
he has tried to duplicate the prob. but can't.
R & D will set up a 220v system and then try and dupe. the prob.
joe

ASSIGNED: FINDT ERWIN DATE: 08/28/89 TIME: 08:40
As I sad in my last update the motherboard is already updated with a jumper
but it doesn't solve the problem in all cases and the problem is still there.

ASSIGNED: BAHIA MICHAEL E DATE: 08/17/89 TIME: 16:01
Did not get your complete update from 7/31. This customer, ALEC GMBH does
have the motherbrd update. Does this customer still have the power up prob.
Have not heard back from R&D. MikeB

ASSIGNED: SCAGLIONE JOSEPH R DATE: 08/01/89 TIME: 10:38
THIS CALL WAS PRINTED OUT ON 7-31-89: MIKE RILEY FROM R & D TOOK IT
BACK TO R AND D ENGINEERING FOR REWIEW. JOE S

ASSIGNED: FINDT ERWIN DATE: 07/31/89 TIME: 03:38
Hi Joe. This jumper is a known modification for a power on reset problem.
It's already installed on that motherboard. But it seems to be it will not
solve all problems because we have the problem still by other customers. efi

ASSIGNED: SCAGLIONE JOSEPH R DATE: 07/24/89 TIME: 11:33
HI ! THIS IS JOE SCAGLIONE ON LINE PROD. SUPPORT/ 2200/ MIKE WILL BE ON
VACATION FOR THE NEXT 3 WEEKS. HERE IS SOME INFO. PLEASE CHECK THIS CUST
MOTHER BOARD FOR THE FOLLOWING JUMPER AND KEEP ME INFORMED:
SOME EARLY MOTHER BOARDS HAD A RUN MISSING FROM THE ART WORK
THERE SHOULD BE A SHORT BETWEEN RESISTOR R7 (END CLOSEST TO J21) TO D1
(END CLOSEST TO J21).
IF YOU DO NOT MEASURE A SHORT BETWEEN THESE TWO POINTS ADD A JUMPER.

ASSIGNED: SCAGLIONE JOSEPH R DATE: 07/24/89 TIME: 11:33
THANK YOU JOE

ASSIGNED: BAHIA MICHAEL E DATE: 07/20/89 TIME: 11:00
WILL PASS INFO ONTO R&D & GET BACK TO YOU AS SOON AS POSSIBLE. THANKS. HAVE
NOT SEEN PROBLEM PERSONALLY BUT THIS LOOKS LIKE IT COULD BE VERY HELPFUL.
MIKEB

ASSIGNED: DATE: 07/20/89 TIME: 03:36
To RDB 8753....Looks as if Germany have found a possible hardware bug. Should
R&D look at this one.

PUBLICATION UPDATE BULLETIN

DATE: 3/26/85

This PUB: 729-0584-A1

Class Code: 4103

Base Document: 729-0584-A

Previous Notice(s):

REASON FOR CHANGE:

This PUB is being written to describe the 2200 MVP-128 and 512 Systems.

INSTRUCTIONS:

Remove pages and insert attached pages as follows:

	REMOVE	INSERT
1.	Title Page/Preface	Title Page/Preface
2.	ix/x	ix/x
3.	Nothing	Appendix G
4.		
5.		
6.		
7.		
8.		
9.		
10.		

This page is to be used as a permanent record of revisions; place it directly following the title page.



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2200 Computer System

Models:

MVP

MVP-128

MVP-512

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PREFACE

This document is the Product Maintenance Manual (PMM) for the 2200 MVP, MVP-128, and MVP-512. The scope of this manual reflects the type of maintenance philosophy selected for this product (swap unit, printed circuit assembly, chip level or any combination thereof).

The purpose of this manual is to provide the Wang-trained Customer Engineer (CE) with instructions to operate, troubleshoot and repair the 2200 MVP, MVP-128, and MVP-512. It will be updated on a regular schedule.

Edition (Third)

This edition of the 2200 MVP-128 and MVP-512 Product Maintenance Manual (PMM) obsoletes document no. 729-0584-A. The material in this document may only be used for the purpose stated in the Preface. Updates and/or changes to this document will be published as Publications Update Bulletins (PUB's) or subsequent editions.

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2200 COMPUTER SYSTEM

APPENDIX G

TO

CUSTOMER ENGINEERING

PRODUCT MAINTENANCE MANUAL 729-0584-A1

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CHAPTER 1

INTRODUCTION

G1.1 SCOPE AND PURPOSE

This Addendum provides maintenance information for WANG 2200 MVP-128 and 2200 MVP-512 Computer Systems. The material is designed to supplement the standard Product Maintenance Manual (729-0584-A1) for the 2200. The information in the Addendum is presented in the form "system differences" and should be used in conjunction with standard manual 729-0584-A1 to install and maintain the 2200 Computer System in the field. The information describing the system differences should be cross referenced to the full maintenance manual whenever using the Addendum.

-----NOTE-----
Throughout the remainder of this document, statements applicable to both the 2200 MVP-128 and MVP-512 systems will be identified as such by references to the '2200 MVP-128/512 System'. In cases where the two systems differ, the references will be qualified to explicitly indicate one system apart from the other.

G1.2 RELATED DOCUMENTATION

Related Documentation for the 2200 Computer System is outlined on pages i through v of the Product Maintenance Manual.

G1.3 SYSTEM DESCRIPTION

The 2200 MVP-128/512 System is a single-board version of the existing 2200 MVP System. The new system utilizes VLSI (Very Large Scale Integration) technology to incorporate the 2200 discrete processor design into single chip form. This allows the 2200 CPU, control memory, and user memory to reside on one PC board. This new 2200 System uses Operating System 2.6, and is compatible with existing 2200 MVP software, diagnostics, and I/O options without modifications.

Two memory configurations are possible with the 2200 CPU/Memory Board; 32K Control/128K Data Memory with the MVP-128, and 32K Control/512K Data Memory with the MVP-512.

G1.4 SPECIFICATIONS

The CPU/Memory board (210-8034) is the only processor board required for operation of the 2200 MVP-128/512 system.

G1.5 SYSTEM CONFIGURATIONS

The CPU/Memory board (210-8034) duplicates all the functions of the old 2200's five board processor. As such, it is the only processor board required for operation of the system. Two versions of this board are available, depending on the Customers' needs. One version (210-8034-1A), contains 128K of Data Memory, and together with a new Motherboard (210-7498-1) and associated I/O Boards, become the 2200 MVP-128 Computer System. The other version of the board (210-8034-2A), contains 512K of Data Memory, and with the same motherboard and I/O boards as above, makes up the 2200 MVP-512 System.

-----NOTE-----
REGARDLESS OF WHICH VERSION CPU/MEMORY BOARD IS BEING
USED, IT MUST BE INSERTED IN THE MOTHERBOARD SLOT
PREVIOUSLY ALLOTTED FOR THE REGISTERS AND I/O
BOARD (REF. FIG. G4-1).

CHAPTER 2

THEORY OF OPERATION

G2.1 INTRODUCTION

This chapter provides a brief discussion of the electrical differences between the 2200 MVP and 2200 MVP-128/512 Systems. As mentioned in Chapter 1, the MVP-128/512 system requires only one PC board for processor operation. The MVP-128/512 uses Operating System 2.6 and is compatible with existing 2200 software, diagnostics, and I/O options, so that the VLSI configuration is completely transparent to the user.

G2.2 FUNCTIONAL THEORY OF OPERATION

The MVP-128/512 CPU/Memory board contains a Micro 2200 chip. This chip is a 121 pin gate-array which duplicates all the functions of the entire 2200 processor, which, in the past, was comprised of five boards. The chip requires +5 volts at VDD1-2 (pins B7 and M7) and ground at VSS1-2 (pins G2 and G12). A 5 MHz square wave at pin F1 provides the system clock.

G2.2.1 Control Memory

The CPU/Memory Board contains 32K of Control Memory. This is accomplished by loading 12 memory chips in board locations L13 through L18 and L20 through L25 (ref. Fig. G2-1).

Locations L1 through L12 of the CPU/Memory board are not loaded with memory chips. These locations are for possible future expansion.

The Control Memory is made up of 8K x 8 Static RAM configured in groups of three so that each group forms 8K of 24 bit words (one bank). Four of these groups (banks) produce 32K of control memory.

G2.2.2 Bootstrap Proms

Three 8K x 8 proms, configured to form 24 bit words, comprise the bootstrap prom. If the address decoded on the system busses is between 8000 and 83FF the bootstrap proms are enabled and chip select for the control memory store is inhibited.

G2.2.3 Data Memory

G2.2.3.1 128K Data Memory

With a 128K Data Memory configuration there are 2 banks, with 9 chips in each bank, for a total of 18 chips. Each chip contains 64K x 1 bit which produces 64K x 9 bits (8 bits data plus 1 bit parity) in each bank. Together the two banks produce 128K 8 bit bytes plus parity.

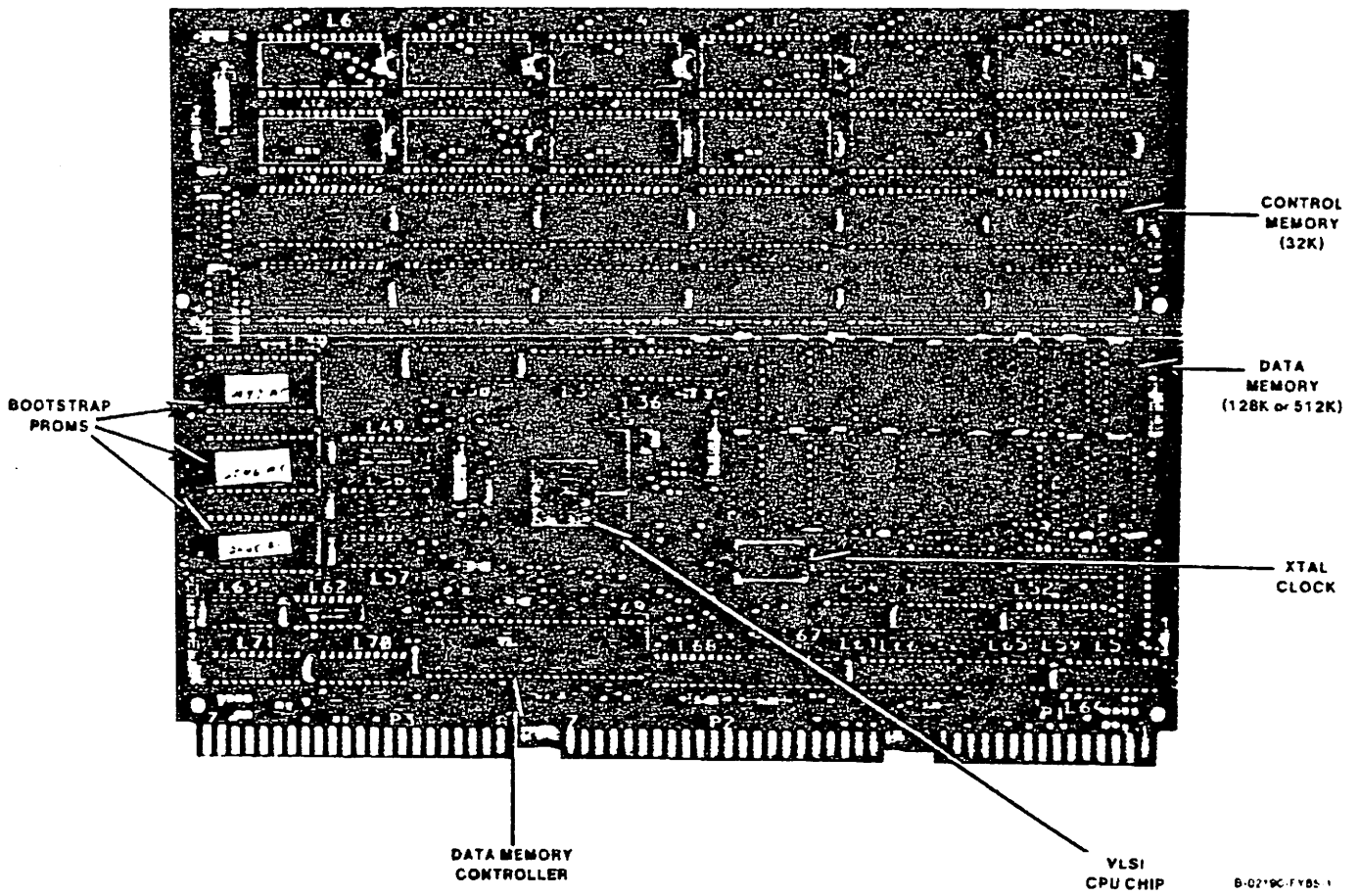


Figure G2-1 CPU/MEMORY BOARD

G2.2.3.2 512K Data Memory

With a 512K memory configuration, there are 2 banks, with 9 chips in each bank, for a total of 18 chips. Each chip contains 256K x 1 bit which produces 256K x 9 bits (8 bits data plus 1 bit parity) in each bank. Together the two banks produce 512K 8 bit bytes plus parity.

CHAPTER 3

OPERATION

G3.1 SCOPE

The operating instructions for the 2200 MVP-128/512 system are identical to the MVP operating instructions outlined in chapter 4 of the maintenance manual 729-0584-A1. Refer to chapter 4 for a description of system initialization and operational procedures.

CHAPTER 4

INSTALLATION AND CHECKOUT

G4.1 SCOPE

The majority of the information necessary to unpack, inspect, install, and verify correct operation of the 2200 MVP-128/512 system is contained in chapter 3 of the maintenance manual 729-0584-A1. This chapter of the Addendum provides the installation data which is unique to the 2200 MVP-128/512 system and depicts an internal view of the unit to highlight system differences. Refer to chapter 3 of the maintenance manual 729-0584-A1 as well as the following material for complete information to install and checkout the 2200 MVP-128/512.

G4.2 PRE-INSTALLATION SITE CHECK

Same as section 2 of the maintenance manual 729-0584-A1.

G4.3 SPECIAL TOOLS AND TEST EQUIPMENT

Same as section 7.3.1 of the maintenance manual 729-0584-A1.

G4.4 UNPACKING PROCEDURES

Same as section 3 of the maintenance manual 729-0584-A1.

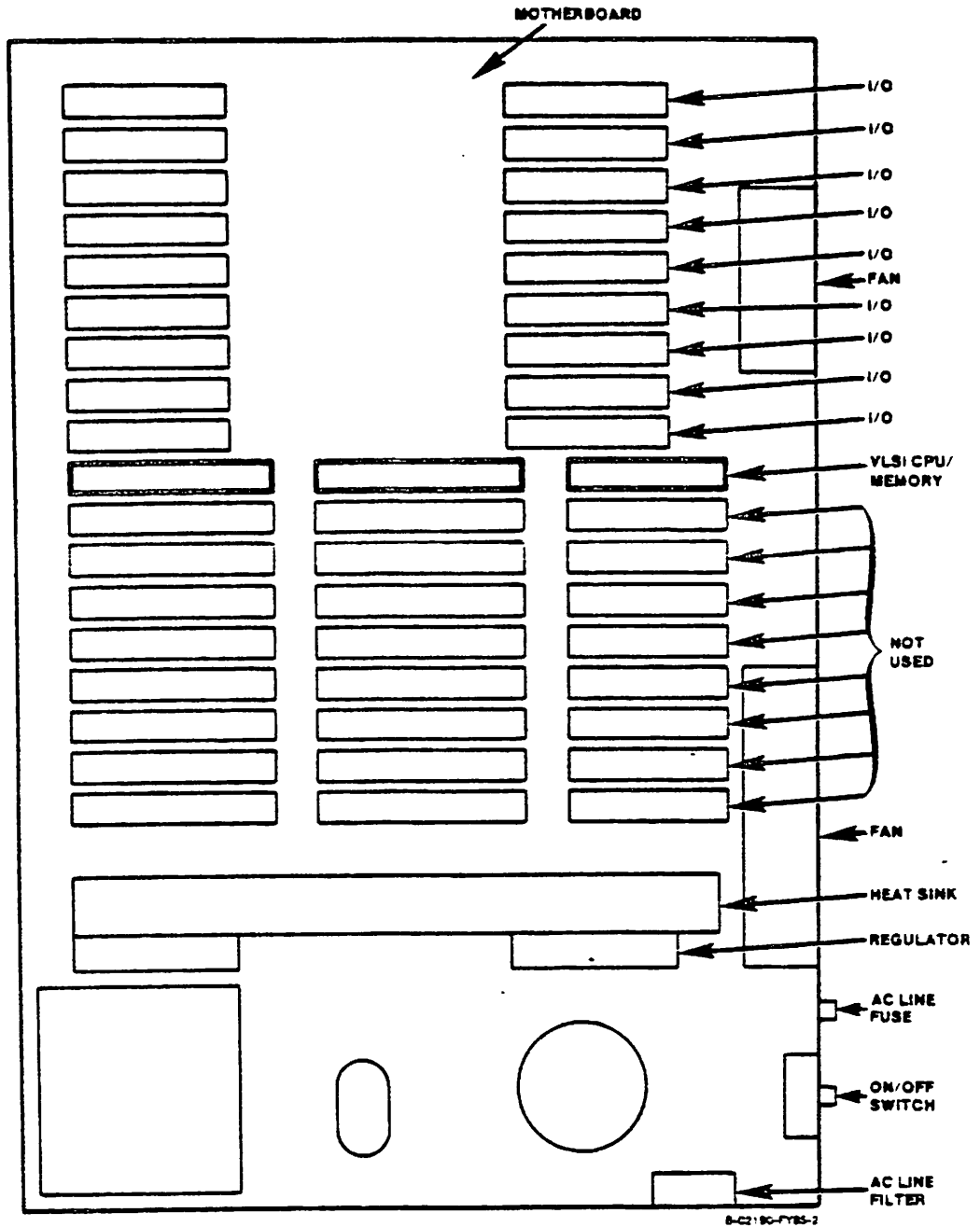
G4.5 INSPECTION

Same as section 3 of the maintenance manual 729-0584-A1.

G4.6 SYSTEM CONFIGURATION

1. Note that the proper motherboard (210-7498-1) is being used in the system.
2. Ensure that the CPU/Memory Board (210-8034-1A or 210-8034-2A) is placed into the proper motherboard slot. (Ref. Fig. G4-1.)
3. Install the applicable I/O boards as required by the customers' system configuration.

All other installation instructions and checkout procedures are identical to those outlined in section 3 of the maintenance manual 729-0584-A1.



VLSI PART NO. IDENTIFICATION

CPU/MEMORY BOARD (128K)	_____	210-8034-1A
CPU/MEMORY BOARD (512K)	_____	210-8034-2A
MOTHERBOARD	_____	210-7488-1

FIGURE G4-1 PC BOARD LOCATION

CHAPTER 5
MAINTENANCE

The maintenance instructions for the 2200 MVP-128/512 are identical to the instructions outlined in section 7.1, 7.2, and 7.3 of the maintenance manual 729-0584-A1. Refer to these sections for a description of adjustments and procedures required for the 2200 computer system.

CHAPTER 6
ILLUSTRATED PARTS BREAKDOWN

G6.1 SCOPE

The only new field-replaceable items in the 2200 MVP-128/512 are the 128K CPU/Memory Board (210-8034-1A), the 512K CPU/Memory Board (210-8034-2A), and the Motherboard (210-7498-1). All other system components are identical to the 2200 MVP components outlined in the Product Maintenance Manual 741-0584-A1.

CHAPTER 7
TROUBLESHOOTING

G7.1 SCOPE

The troubleshooting instructions for the 2200 MVP-128/512 system are identical to the instructions given in section 7.4 of the maintenance manual 729-0584-A1 with the following exceptions;

WHEN FOLLOWING THE TROUBLESHOOTING INSTRUCTIONS CONTAINED IN THE MAINTENANCE MANUAL 729-0584-A1, DISREGARD REFERENCES TO INDIVIDUAL CPU AND MEMORY BOARDS WHICH ARE NO LONGER IN THE SYSTEM. THESE BOARDS ARE;

210-6789	Memory Controller
210-6790	Instruction Counter
210-6791	Stack
210-6792	ALU
210-6793	Register I/O
210-6787	Data Memory
210-6788	Control Memory
210-7587	Data Memory
210-7588	Control Memory

WHEREVER INSTRUCTED TO REPLACE THESE BOARDS, REPLACE THE NEW CPU/MEMORY BOARD (210-8034), IN ITS' PLACE.

WHEN A MEMORY ERROR HAS BEEN DIAGNOSED, DO NOT ATTEMPT TO REPLACE THE FAILED MEMORY CHIP. THESE ARE NOT FIELD-REPLACEABLE ITEMS. REPLACE THE ENTIRE CPU/MEMORY BOARD.

CHAPTER 8
SCHEMATICS

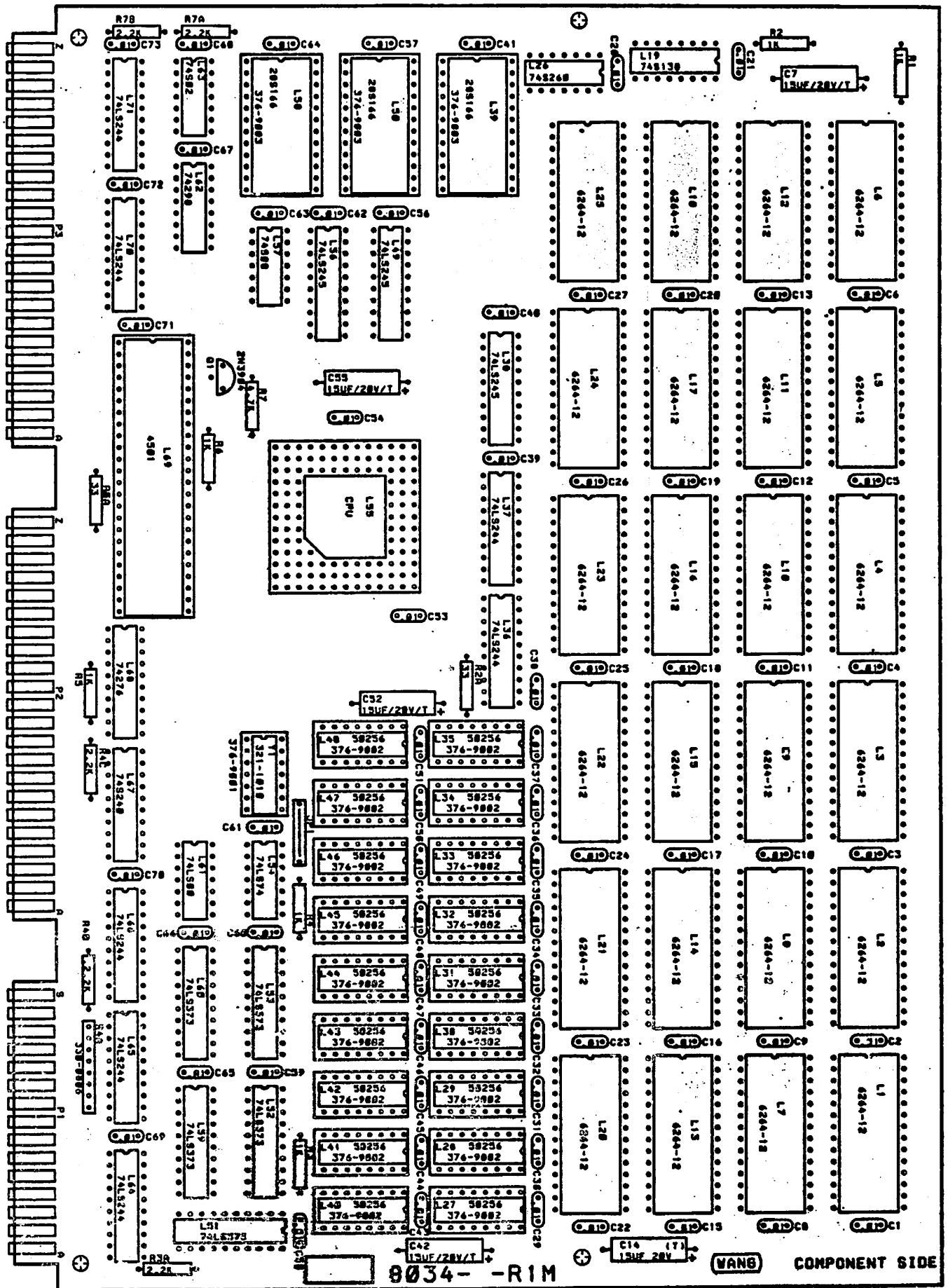
G8.1 SCOPE

This chapter contains the schematics for the CPU/Memory Board (210-8034).

22	±0V	Z	±0V
21	+5V	Y	+5V
20	±5V	X	N7B
19		V	
18		U	
17	AW	U	
16	AW	T	AW
15		S	
14	OB5	R	
13	OB4	M	OB7
12	OB4	M	OB6
11	OB2	M	OB5
10		L	
9		K	
8		J	
7		H	
6	OB1	F	TBE
5		E	
4		D	
3		C	
2		B	
1		A	

22	Z	Z
21	Y	Y
20	X	X
19	PARS	M
18		V
17		U
16		T
15		S
14		R
13		P
12		N
11		M
10		L
9		K
8		J
7		H
6		F
5		E
4	TBS	D
3	C	TBS
2	B	TBS
1	A	TBS

19	G	
18	R	
13	P	TST
12	TB4	M
11	TB4	M
10	TB5	L
9		K
8	AB5	J
7	AB5	H
6	ABY	F
5		E
4	ABZ	D
3		C
2	+5V	B
1	±0V	A



8034 - -RIM

(VANG) COMPONENT SIDE

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e e e p   e e e p   , e e   e e e e p   e e e e   e e   p e e e e e " e e e e e
" e e e   " e e e   e e"   e e e e e   e e e e e   e e   p e e e"   " e e e
e e e p   , e e e p   , e e   e e e e p   e e e e e   e e   e e e"   " e e
" e e e   e e e e e   e e"   e e " e e e   e e e e e   e e   e e e"   " e e
e e e p   , e e e e e p   , e e   e e   e e e p   e e   e e e   e e   e e e   e e e p
" e e e   e e " e e e   e e"   e e"   " e e e   e e   e e e   e e   e e e   e e e
e e e p , e e   e e e , e e   e e e e e e e e p   e e   e e e   e e   e e e   e e e
" e e e e e   " e e e e e"   e e"   " e e e   e e   e e e e e   e e e p   , e e
e e e e e   e e e e   e e   e e e p   e e   e e e e   e e e e   " e e e p   , e e
" e e e   " e e"   e e"   " e e e   e e   e e e   e e e   " e e e p p , a e e e e
e e e   e e   e e e e   e e e e e   e e e e   e e   e e e e e e e e e e

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Customer Engineering Maintenance Plan

VS/2200/PC New Products

February 15, 1985

2200 MVP-128 AND 2200 MVP-512

Halton Woods

 New Products Engineer
 Halton Woods

Ibrahim Azar

 New Products Manager
 Ibrahim Azar

Henry A. Schinnagel

 Product Line Director
 Henry A. Schinnagel

COMPANY CONFIDENTIAL

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I Product Overview

1.1 General Description:

The 2200 MVP-128/512 System will be a single board version of the existing 2200 MVP System. The new system will utilize VLSI technology to incorporate the 2200 discrete processor design into single chip form. This will allow the 2200 CPU, control memory and user memory to reside on one PC board. This single CPU/MEM board will be incorporated into to a modified version of the 2200 MVP package. Work is in progress on a new package for the VLSI system. The VLSI system the new package will be dealt with in a future maintenance plan.

The 2200 MVP-128/512 Systems will run existing 2200 MVP software, diagnostics and I/O options without modification (Operating System Rev. 2.6 or later).

There will be two versions of this system:
2200 MVP-128 with 32k Control, 128k Data Memory.
2200 MVP-512 with 32k Control, 512k Data Memory.

1.2 Market Forecast:

	Q4	Q1	Q2	Q3
2200 MVP-128	315	230	245	210
2200 MVP-512	135	100	105	90
Total	450	330	350	300

1.3 First Customer Shipment:

Domestic FCS: April 1, 1985
International FCS: April 1, 1985

II. Product Specifications

2.1 Field Replaceable Electronic Assemblies:

CPU/Memory Board
Power supply regulator board
Mother board

2.2 Field replaceable Mechanical Assemblies:

None

2.3 Media:

Not applicable

2.4 Operating System:

The 2200 MVP-128/512 systems require 2200 operating system rev. 2.6 .

2.5 Configuration:

There will be two memory configurations available for the 2200 VLSI CPU/MEM board; 32k Control-512k Data Memory and 32k Control-128k Data Memory. System and hardware configuration will follow the same guidelines as the 2200 MVP.

HARDWARE REQUIREMENTS - PX DPU SHOULD HAVE R10 PROMS

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III. Design Specifications

3.1 Specifications:

CPU: 2200VLSI processor chip(121 pin gate-array)
Memory: Control = 32K, Data = 128K or 512K

3.2 Physical Dimensions:

Width 14.5 in (36.8 cm) Height 12.1 in (30.7 cm)
Depth 21 in (53.3 cm) Weight 47 lb (21 kg)

3.3 Power and Environmental Requirements:

Input Circuit: Dedicated 20A circuit
Voltage: 115/230 VAC \pm 10%
Frequency: 50/60 HZ

Running Current:

2200 CPU 2.0 amps @115 vac
1.0 amps @230 vac

Operating Environment:

Ambient Temperature 60 to 80 degrees Fahrenheit.(15 to 28 deg C)
Relative Humidity 35% to 65% (non-condensing)

3.4 Government and Industry Standards and Approvals:

Domestic:

UL Standard 114
FCC Class A
Wang Standards; SPI 10-623 and SPI 10-708

International:

CSA Standard C22.2 NO 154
IEC 435
VDE Standard for Germany

3.5 Service Space Required

Allow 30" between wall and each unit in system.

3.6 Special Specifications

None

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IV. Maintenance

4.1 Maintenance Objectives:

The maintenance objective will be to troubleshoot failures to the optimum field replaceable unit.

The 2200 VLSI system will be supported by standard on-site service methods using existing 2200 system diagnostics.

4.2 Calls Per Month:

CPM = .08 For 2200 MVP-128

CPM = .12 For 2200 MVP-512

4.3 Mean Time To Repair:

MTTR = 1.0 hrs

4.4 Preventative Maintenance:

The CPU requires periodic cleaning, inspection and power supply voltage checks. This should be done in conjunction with preventative maintenance on disk drive attached to the system. The CPU PM will add .5 hrs to the scheduled disk drive PM.

4.5 Special Tools and Test Equipment:

Standard Customer Engineering Tool Kit and 2200 MVP Diagnostic programs will be used for field service.

V. Support

5.1 Technical Documentation:

Publication Update Bulletin (PUB) for the 2200 MVP manual.

5.2 Training:

The 2200 MVP-128/512 System will be included in the 2200 On-Line training. Previously trained 2200 Customer Engineers will be brought up to date with Technical Service Bulletin (TSB) and Publication update Bulletin (PUB).

5.3 Logistics:

Unique FRU spares to be stocked at Branch level.

5.4 Repair:

The CPU/Memory board will be repaired at all FSC'S.

5.5 Diagnostics:

Existing 2200 Diagnostics will be used.

5.6 Alpha and Beta Site Plan:

No formal Alpha test is planned, feedback from internal users will be considered alpha testing.

Beta testing will be done at Redshaw R&D LAB in Hartford Conn.

MEMORANDUM

TO: Mike Thompson
Gerry Crawford

From: Hal Woods

Date: September 26, 1985

Subject: 2200MVP-128 and 2200MVP-512 Production Information

The 2200MVP-128 and 2200MVP-512 CPU's were produced in Q4 FY85 as a replacement for the MVP in the 2200 product line. These two models were then replaced by the MicroVP-1 and MicroVP-2 in Q1 FY86.

The following information may be useful in the future if a problem should arise with these models.

Shipments:	Q4 FY85	Q1 FY86
2200MVP-128 (50HZ)	139	9
2200MVP-128 (60HZ)	173	5
TOTAL 2200MVP-128 CPU's Q4FY85=	312	Q1FY86= 14
2200MVP-512 (50HZ)	36	7
2200MVP-512 (60HZ)	82	18
TOTAL 2200MVP-512 CPU's Q4FY85=	118	Q1FY86= 25
TOTAL 2200MVP-128/512 in Q4FY85=	430	Q1FY86= 39

TOTAL 2200MVP-128 and 2200MVP-512 CPU's shipped 469

Regards,

Halton Woods

Halton Woods

VS/2200 New Products

656-0307 M/S 0.12

cc: I. Azar

For Immediate Release

FOR FURTHER INFORMATION CONTACT

Ed Clough, (617) 967-2917
Hanne Herwick, (617) 967-6405

WANG ROLLS OUT VLSI-TYPE VERSIONS OF 2200MVP COMPUTER, ANNOUNCES NEW 2200 OPERATING SYSTEM

Lowell, MA (April 18, 1985)--Wang Laboratories, Inc., today unveiled two VLSI-type versions of the company's 2200 MVP small business computer. Wang also introduced a new multi-user operating system for the entire 2200 product line.

Available in two styles--the 2200MVP and the MicroVP-- , the new versions will be especially attractive to systems houses and small businesses because they offer powerful performance, enhanced reliability, and greater ease of maintenance at an extremely competitive price, while maintaining full compatibility with existing 2200 hardware and software.

The new central processing units (CPUs) employ VLSI (very large scale integration) technology, replacing from seven to nine 8"x11" printed circuit boards with a single board that includes 32 kilobytes (KB) of control memory. The VLSI chip on which they are based is produced by VLSI Technology, Inc. (VTI) of San Jose, CA, of which Wang owns a 15-percent interest.

The VLSI-type 2200MVP combines the new CPU board with the current packaging, while the MicroVP features smaller, more streamlined packaging. The new CPUs accept nine optional peripheral controller boards and can communicate with existing 2200 option boards and peripherals, including all communication controllers. Both the 2200MVP and the MicroVP support up to 13 users.

WANG LABORATORIES, INC.

more

WANG LABORATORIES, INC.

Wang 2200

Page 2

The VLSI-type 2200MVP is available immediately. MicroVP shipments will begin in July. Both systems come with 32KB of control memory and can be ordered with either 128KB or 512KB of user memory. Four packaged configurations are available for either system. Individual CPUs are priced at \$4,950 for 128KB, an \$850 saving over previous 128KB MVP CPUs, and at \$7,300 for 512KB, a \$3,000 saving over previous 512KB MVP CPUs. "P" package configurations start at \$8,000 for a system with 128KB of memory and one terminal. Monthly maintenance for VLSI-type CPUs is 60% to 70% less than for previous non-VLSI 2200MVP CPUs.

Release 2.6 of the BASIC-2 multi-user operating system is required for VLSI-type CPUs. The new operating system is also available for all currently installed 2200 systems. The operating system features a new generalized printer driver, which allows 2200 CPUs to use the Wang Professional Computer (PC) printers model PC-PM010 and PCPM016.

With an estimated 65,000 installations worldwide and millions of lines of application code on the market, the 2200 line has demonstrated its popularity among systems houses and end users. Highly competitive selling prices resulting from the use of micro-chip technology and the ability to include low-cost Wang PC printers in configurations will now make the 2200 an even better solution-oriented product for systems houses and software vendors selling turnkey vertical solutions to small and medium-sized businesses.

-end-

MICRO VP POWER UP ECN's

8034 BRD

37410

1K R

L67 PIN 11 TO 5V

36813

REMOVE

36833

CONNECT L69 PIN 44 TO PIN 40 & R6

220-0365

PRR

2275

INTERMITTENT DISK ERRORS IN

DIRECTION



ECO

ECO NO. 36867

SHEET 1 OF 6

ORIGINATOR **Mukesh Patel** M/S 2434 EXT. 86876 DATE 05/14/85
 WRITTEN BY **Jeanine Roy** M/S 1218B EXT. 76930 DATE 05/14/85

PART NO.	DWG NO.	MODEL NO.	CLASS	DESCRIPTION	DOCUMENTS		REVISIONS	
					BOM	ARTWORK	F	T
210-7498/-1	7498	2200VPA/MVPA	I	Motherboard VLSI				
			II	PEP# H0133A				
			III	<input checked="" type="checkbox"/> HARDWARE <input type="checkbox"/> SOFTWARE				

DESCRIPTION OF CHANGE

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

Change 210-7498 and 210-7498-1 schematic parts list as follows:

- Delete @2 Wire 18 Ga Green/Yellow (600-0054)
- Delete @3 #8 Ground Lug (654-1008)
- Add W+Lug 18 Ga Gr/Y #8 ring-S+T (220-2349) QTY 1

Change BOM 210-7498 and 210-7498-1 as follows:

DELETE	ADD	WLI#	DESCRIPTION	UM	COMP TYPE	QTY	QTY TYPE
		600-0054	Wire 18 Ga Green/Yellow	FT	5P	.7500	1
		654-1008	#8 Ground Lug	EA	1	1	1
		220-2349	W+Lug 18 Ga Gr/Y #8	EA	1	1	1

Note to EDD: Correct 210 History Sheet per attached print.

REASON/SYMPOTOM FOR CHANGE

To eliminate building cable at the pcb sub-assy area. This change will allow the cable to be built at the cable assembly area.

RECEIVED
 JUN 27 1985
 PRINT ROOM

76

EFFECTIVITY	R.M. MFG.	C.E.	DIST.	FINAL ASSY AREA	SCB ASSY AREA	FUTR AREA
TO CONFORM						
USE AS IS TO PREVIOUS REV.						

APPROVALS

ECO MGR.	DES. ENGRG.	CUST. ENGRG.	MFG. ENGRG.	ORIGINATOR	DATE
	<i>J. Zidich</i>				6/26
	<i>Louis V. Conhane</i>				5/23/85
					6/24/85
					6/25/85
					4/9/85
					5/23/85



**ENGINEERING CHANGE ORDER
MANUFACTURING EFFECTIVITY AND DISPOSITION**

ECO # 36828

SHEET 2 OF 6

MATERIAL DISPOSITION

SPECIAL INSTRUCTIONS

IN STOCK VENDOR

- SCRAP
- REWORK
- USE AS IS
- NEXT BUY

WIP = (4) ; (4) c STA .50
 Q4 BUILD = 7498 (Ø); (82) IN STR.
 Q4 " = 7498-1 (55); (64) BOS IN WIP;
 (50) c STA (1),
 (1) c " (5)
 (2) c " (32)
 (11) c " (50)

DOCUMENTATION ONLY

EFFECTIVITY: MATERIAL AVAILABILITY _____

IMPLEMENTATION DATE 7/19/85

APPROVALS

COMMITTEE CHAIRPERSON

DISTRIBUTION

SITE MFG ENGINEERING A. Ross 5/24/85

CENTRAL QUALITY ENGRG [Signature]

SITE MATERIALS

DAVE LINDA 6/10/85

Calvin Archambault

RE-MANUFACTURING [Signature]

COMPONENT ENGINEER

R & D

OTHER John W. Johnson

DISTRIBUTION

ALL UNITS ON OR BEFORE

RETURN TO MFG. PRODUCT LINE FOR REWORK

NO IMPACT

SPECIAL INSTRUCTIONS



**ENGINEERING CHANGE ORDER
CUSTOMER ENGINEERING EFFECTIVITY AND DISPOSITION**

ECO 36828

SHEET 3 OF 6

<p>ALL UNITS <input type="checkbox"/></p> <p>PROB. ONLY <input type="checkbox"/></p> <p>INFO <input checked="" type="checkbox"/></p> <p>FCO REQUIRED <input type="checkbox"/></p> <p>EXP. _____</p> <p>FSC REWORK <input type="checkbox"/></p> <p>EXP. _____</p>	<p>EFFECTIVITY COMMENTS:</p> <p align="center"><i>no field impact</i></p>	<p>DOMESTIC _____</p> <p>INTERNATIONAL _____</p> <p>EST. UNIT POP. _____</p> <p>EST. SPARE POP. _____</p> <p>TOTAL _____</p>	<p>PROJECTED PART REQUIREMENT</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:60%;">PART #</th> <th style="width:10%;">QTY</th> <th style="width:30%;">EXT. COST</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td align="right" colspan="2">TOTAL</td> <td> </td> </tr> </tbody> </table>	PART #	QTY	EXT. COST				TOTAL					
PART #	QTY	EXT. COST													
TOTAL															
<p>APPROVALS _____</p> <p>DATE _____</p>	<p>PROJECTED COST IMPACT</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:60%;">MATERIAL</th> <th style="width:20%;">LABOR</th> <th style="width:20%;">TOTAL</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			MATERIAL	LABOR	TOTAL									
MATERIAL	LABOR	TOTAL													
<p>TECH OPS _____</p> <p>LOGISTICS <i>[Signature]</i></p> <p>FINAL <i>[Signature]</i></p> <p>OTHER _____</p>	<p>GENERAL COMMENTS: <i>mfg. chg.</i></p>														

210

REVISIONS

SHEET NUMBER	DESCRIPTION	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	ASSEMBLY DRAWING	5																				
	510 HISTORY SHEET REVISION																					
	SCHEMATIC	3																				
	PARTS LIST REVISION (P)	0																				
	ELECTRICAL REVISION (210)	1																				
	ELECTRICAL REVISION 210-1	1																				

Handwritten signature

210

DATE APPROVED BY DATE

BY DATE APPROVED BY DATE

DEN CAN DATE E ENGR DATE

CHE DATE E3 ENGR DATE

TITLE HISTORY SHEET

M3 VLSI BD

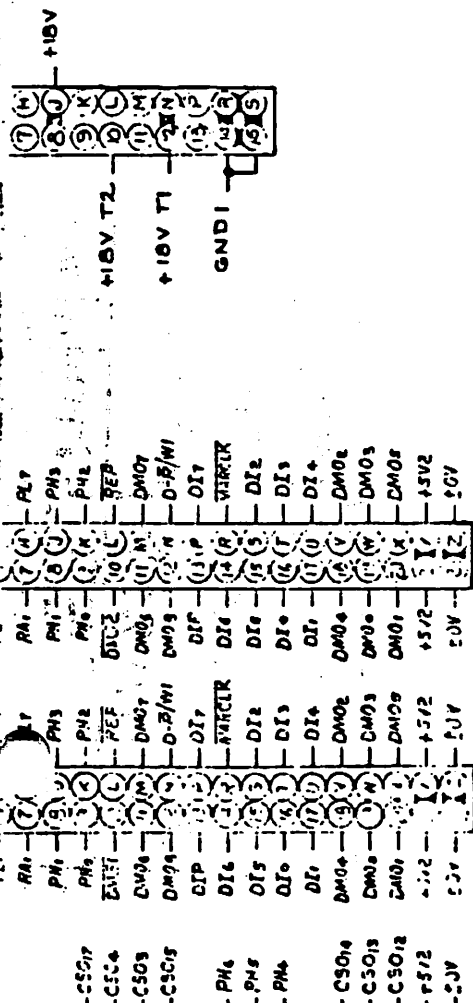
10-203

210-7408 A 7498

F.C.D. NO. (S) DATE

EDD NO 36888
SHT 4 OF 6

36309



7498-1

COMPONENT	W. L. PART #	QTY
30 PIN CONN.	350-0011	21
44 PIN CONN.	350-0021	1
44 PIN CONN.	350-0039	1

7498

COMPONENT	W. L. PART NO	QTY
30 PIN CONN.	350-0011	21
44 PIN CONN.	350-0021	1
44 PIN CONN.	350-0039	1
GND 2/5	654-1154	-
PIN-READY ASSY.	654-1194	-

ECO NO 36828

SHT 5 OF 6

Handwritten initials

-1 Verlon
E-REV

WARRANTY			MATERIAL			DISPOSITION		
DATE	BY	REASON	DATE	BY	REASON	DATE	BY	REASON

MOTHERBOARD

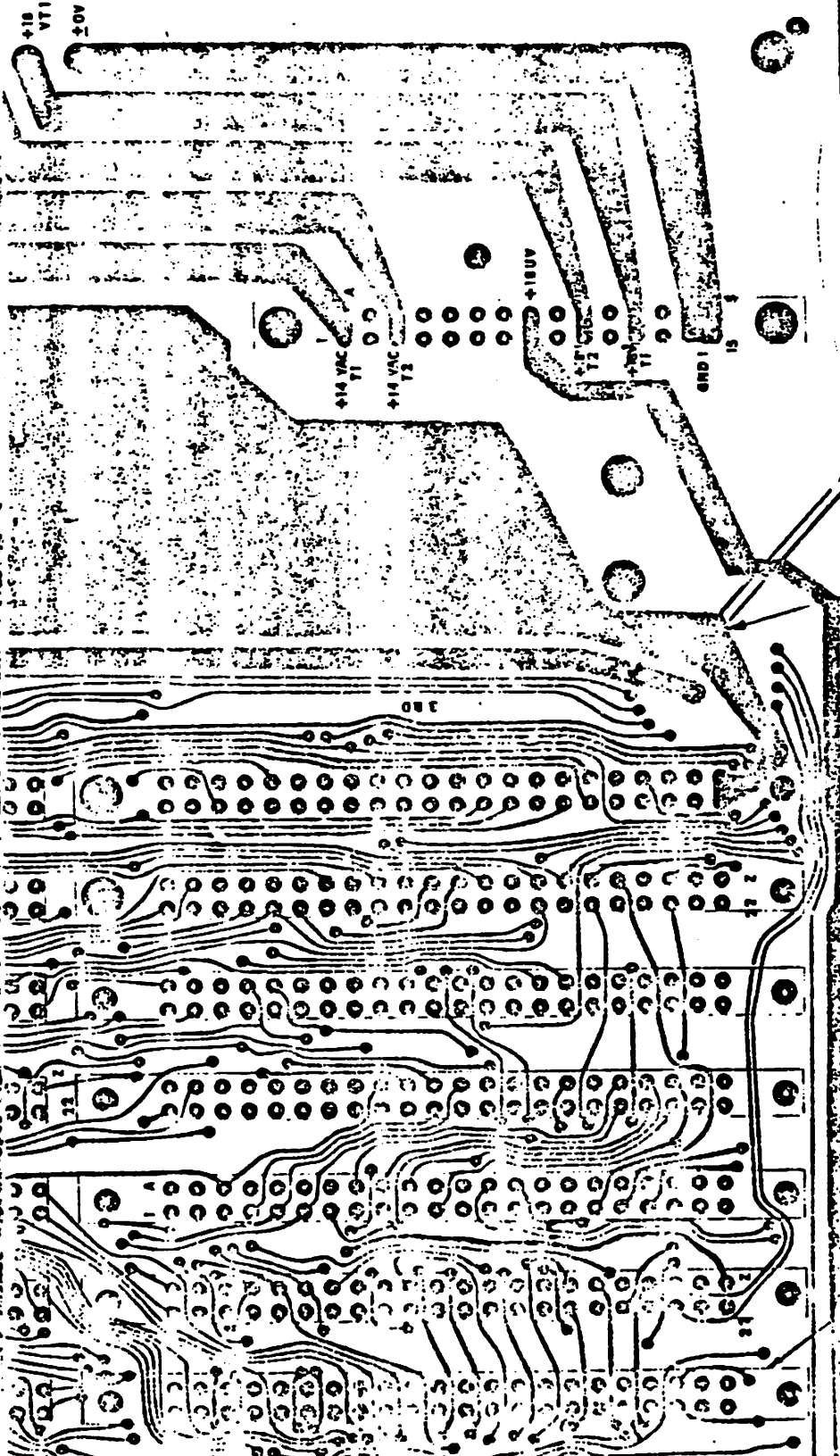
210-7498 E 7498

8.5"

11"

17"

22"



SOLDER TO ±0V

ATTACH TO COVER STANDOFF

220-2349
(Component sides)

add

ECO NO 36828

SHT 6 OF 6

AVIATION

DATE: 10/1/58

REVISION: 1

DESIGNED BY: [illegible]

APPROVED BY: [illegible]

DATE: 10/1/58

PROJECT: 220-2349

DESCRIPTION: ACCESSORY BOARD

11
5-337
18 ONLY



57/114

ECO

5/13

ECO NO. 301

SHEET 1 OF 3

ORIGINATOR JACK MANION EXT. 1-44-86796 DATE 5/13/85
 WRITTEN BY JACK MANION EXT. 1-44-86796 DATE 5/13/85

PART NO. 209-8034 / 1/2
 DWG NO. N/A
 MODEL NO. VISI CPU

DESCRIPTION 2200 VISI CPU MEM PCB
 PEP # H0133A
 TYPE HARDWARE SOFTWARE

DESCRIPTION OF CHANGE
 Change assembly drawing, schematic and sample boards as follows:
 Delete (1) 2N3904 Transistor 375-1080 at location Q1.
 (1) 4.7K Resistor 330-3048 at location R7.

PRELIMINARY

W.I. #	DESCRIPTION	UN	COMP	QTY	TYPE
375-1080	XSTR 2N 3904 TO-92	EA	1	1	1
330-3048	RES 4.7K OHM 1/4W 5% FIXE	EA	1	1	1

REASON/SYMPOTM FOR CHANGE
 The intermittent power up failure of the 8034 is the result of the timing of the POR pulse generated by the 7397 power card. The manufacturers spec. for the 4501 DRAM Controller states that the RESET input may be left open due to an internal pull up. Removing the transistor and resistor allows the 4501 to power up correctly without failure.

DOCUMENTS

BOM		F	T
ARTWORK			
E-REV	1		
SAMPLE PD	1		
ASSY DWG			
DRILL DWG			
SCHEM DWG			
MECH DWG			
CBL ASSY DWG			
S.P.I.			
MECH ASSY DWG			
COMPONENT SPEC			

EFFECTIVITY	RF MFG	CE	DIST	FINAL ASSY AREA	SUB ASSY AREA	FUTR
TO CONFORM						
USE AS IS TO PREVIOUS REV						

APPROVALS

ECO MGR						
DES ENGRG	5/13					
CUST ENGRG						
MFG ENGRG						
ORIGINATOR						
FCC						



ECO

ECO NO. 35470

SHEET 1 OF 7

ORIGINATOR: Darrell Cove M/S 1353 EXT. 76648 DATE: 01/31/85
 WRITTEN BY: Jeannine Roy M/S 1218B EXT. 76930 DATE: 01/31/85

PART NO.	DWG NO.	MODEL NO.	CLASS	DESCRIPTION	DOCUMENTS		REVISIONS	
					BOM	ARTWORK	F	T
210-7498-1	7498		I	MB VLSI				
		2200VPA/MVP	III	PEP# H0133A				
			II	<input checked="" type="checkbox"/> HARDWARE <input type="checkbox"/> SOFTWARE			04	05
							01	02

DESCRIPTION OF CHANGE

Change assembly drawing and schematic per attached prints and as follows:

Create 210-7498-1 sample board per attached prints and as follows:

- Add a wire from 6793 location, connector 1 pin N to the 6792 location connector 1 pin 12. (Zone 1J13)
- Add a wire from 6793 slot location, connector 2 pin 19 to the closest I/O slot location connector 3 pin 3. (Zone 1G13)

Create BOM# 210-7498-1 per attached sheet.

Delete Part Number 210-6798-1 from Corporate Database.

REASON/SYMPOTM FOR CHANGE

To allow 2200 VLSI compatibility utilizing existing MVP Motherboard.
 To delete part no. 210-6798-1 that was structured in error with ECO #35387.
 The correct part no. should have been 210-7498-1.

EFFECTIVITY	MFG	CR	DIST.	FINAL ASSY AREA	SCB ASSY AREA	FLTR MFG.
TO CONFORM						
USE AS IS TO PREVIOUS REV.						

APPROVALS	DATE
ECO MGR.	
DES. ENGRG. <i>Darrell Cove</i>	1/31/85
CUST. ENGRG. <i>John Hancock</i>	2/9/85
MFG. ENGRG. <i>Michael Burtis</i>	2/1/85
ORIGINATOR <i>Darrell Cove</i>	1/31/85
F.C.C. <i>Michael Burtis</i>	2/1/85

ORIGINATOR Darrell Cove M/S 1353 EXT. 76648 DATE 04/08/85
 WRITTEN BY Valerie Goguen M/S 1218B EXT. 74313 DATE 04/08/85

PART NO.	DESCRIPTION	REVISIONS	
		F	T
210-7498-1	MB VLSI BD		
DWG NO. 7498			
MODEL NO. 2200 VPA/MVPA	PEP # PEP# H0133A	0	1
CLASS (I) II III	TYPE <input checked="" type="checkbox"/> HARDWARE <input type="checkbox"/> SOFTWARE	0	1

DESCRIPTION OF CHANGE

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

Tie a wire from 6793 location connector 1 pin N to closest I/O slot connector 3 pin L. (Zone IF13/J13)

RECEIVED

APR 17 1985

PRINT ROOM

NOTE TO EDD: Create a 210 History sheet

REASON/SYMPOTM FOR CHANGE

To allow 2200 VLSI CPU Board complete compatibility with all existing 2200 MWP configurations.
MUX of 2200 MWP VLSI CPU's presently incompatible.

81

DOCUMENTS

BOM	
ARTWORK	
E-REV	0
SAMPLE BD	0
ASSY. DWG.	
DRILL DWG.	
SCHEM. DWG.	2
MECH. DWG.	3
CBL ASSY. DWG.	
S.P.I.	
MECH ASSY. DWG.	
COMPONENT SPEC	

EFFECTIVITY	MFG	CR	DIST	FINAL	ASSY	SUB	ASSY	AREA	FUTR
TO CONFORM	X	X	X	X	X	X	X	X	
USE AS IS TO PREVIOUS REV.									

APPROVALS

APPROVALS	DATE
ECO MGR. <i>J. J. Smith</i>	4/16
DES. ENGRS. <i>John D. Chung</i>	4/9/85
CUST. ENGRG. <i>James E. Gaud</i>	4/9/85
MFG. ENGRG. <i>J. J. Smith</i>	4/16/85
ORIGINATOR <i>James E. Gaud</i>	4/9/85
<i>John D. Chung</i>	4/9/85
<i>Michael Buntow</i>	4/13/85

WANG

ECO

MAR 23 1988 **ECO NO. 48782**

PR 00391

SHEET 1 OF 25

ORIGINATOR: J.M. PENA

M/S WPR

2280

DATE 3/3/88

WRITTEN BY

M/S

EXT.

DATE

PART NO.	209-8937	DESCRIPTION	
DWG NO.	8937		CPU/MM Board
MODEL NO.	2200 CS	PEP #	
CLASS	I (II) III	HF	

DESCRIPTION OF CHANGE

Change BUMs, Part List 209-8937.

as follows:

WLI#	Description	UM	Comp TYPE	QTY	QTY	QTY
Delete: 330-1010	Res 1U OHM 1/4W 5%	EA	I	4	4	I
Add	330-1011 Res 1U OHM 1/4W 5%	EA	I	4	4	I
Change	376-9092 IC Socket 30-30P	EA	I	FRUM 8		I
				TU	4	

MAY 31 1988

MAY 31 1988

32

REASON/SYMPOM FOR CHANGE

To Conform to Actual Build

CONFIDENTIAL

DOCUMENTS

HISTORY SHT. 510	FROM	REVISIONS	TO
HISTORY SHT. 210	1		2
ARTWORK			
E-REV.			
ASSY DWG.			
DRILL DWG.			
SCHEM DWG.			
MECH DWG.			
CBL DWG.			
SPI.			
SPECIFICATION			

CONFORMING AREA	CF	REMG	DIST	FINAL ASSY AREA	SUB ASSY AREA	NEXT ORDER	INFO ONLY
CONFORMANCE DATE			6-6-88				

APPROVALS

ECO CHAIRPERSON	Paul H. [Signature]	DATE	5/25/88
DES. ENGRG	Norman [Signature]	DATE	4-14-88
CUST. ENGRG.	[Signature]	DATE	5/12/88
MFG	[Signature]		
MTO	Dora Capelle	DATE	5/25
PP&M			
F.C.C.	Michael Bantz	DATE	5/2/88
PROD. SAFETY	[Signature]	DATE	5/1/88
SECURE SYS.			
ORIGINATOR	[Signature]	DATE	3/3/88
OTHER	[Signature]	DATE	3/3/88

17

HANG LABORATORIES, INC.

RUN DATE: 11/13/87 11:14

>>>> PARTS LIST <<<<

SHEET OF PAGE 1

(FINAL PARTS LIST)

BOARD NO. & TITLE: C8937 PC 2200 MTR-RO VP CPU RD
 ASSEMBLY LEVEL & TITLE: 209 8937
 PARTS LIST REVISION (P): 0
 CREATED: 12/22/86 08:27
 LAST MODIFIED: 11/13/87 11:10 BY: SHA
 EDITING REVISION: 17
 REF. DES. * HANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

REF. DES.	HANG PART NO.	VALUE/TYPE	DESCRIPTION	DRAWING NO.	QTY.
C7 - C8	300-1833-	100N	CAP .1 UF 50V +80-20% Z5UCER MONO AXL		9
C10					
C21 - C22					
C24					
C38 - C39					
C41					
C5	300-1929-	1000N	CAP 1UF 50V +80-20% Z5U CER AXIAL		1
C2	300-2620-	10000P	CAP .01 UF 100V 10% Z5R CER MONO RDL		34
C4					
C6					
C11					
C14					
C17 - C20					
C28 - C34					
C36 - C37					
C42 - C53					
C55 - C58					
C1	300-4022-	15000N	CAP 15 UF 20V 10% TANTALUM AXIAL		14
C3					
C9					
C12 - C13					
C15 - C16					
C23					
C25 - C27					
C35					
C40					
C54					
Y1					
R11 - R14	321-1082-	10.0000	CLK OSC 10.0 MHZ .01% T-STTL		1
R1 - R7	330-1010-	10	RES 10 OHM 1/4W 5% CARBON-COMPOSITION		4
R15 - R21	330-1040-	39	RES 39 OHM 1/4W 5% METAL FILM 200 PPM		14
R10	330-2011-	100	RES 100 OHM 1/4W 5% METAL FILM 200 PPM		3
R24					

100 NO. 48782
 2003

Add: 330-1011 10 Res) ohm 1/4w 5% 70

1-4

11

11

8.5

REF. DES. * WANG PART NO. * VALUE/TYPE * DESCRIPTION * DRAWING NO. * QTY. *

REF. DES.	WANG PART NO.	VALUE/TYPE	DESCRIPTION	DRAWING NO.	QTY.
L38	376-9020-	SKT 20	IC 20PIN SOCKET DIL LOW PROFILE		4
L42 - L44					
L3	376-9070-	SKT 68	SOCKET IC CHIP CARRIER 68 POS		1
L2	376-9080-	SKT 24	IC SCKT 24 PIN DIP .300C PCB MNT		1
L1	376-9092-	SKT 60	SCKT SIMM 30/30P .1C PCLP		4
L9 - L10					8
L13 - L15					
L23 - L24					
L32	376-9098-	SKT 121	IC SKT 121P .1C PGA LIF		1
e1	510-8937-		PCB 2200 MICRO VP CPU BD		1
e7	615-2318-		LABEL, BAR CODE		1
J2	654-0104-	3 CONT	CONN HEADER. 3 .100 1ROW STR PIN		1

Change:

8.5"

11"

17"

48782
305

WANG

ENGINEERING CHANGE ORDER MANUFACTURING IMPACT SHEET

ECO NO. **48782**
SHEET **4** OF **5**

PART NO./ASSY NO.		DISPOSITION		AFFECTED SITES	
MATERIAL DISPOSITION		1. USE AS IS 2. REWORK 3. SCRAP/SALVAGE 4. NEXT ORDER 5. SEE REMARKS		TEWKS <input type="checkbox"/> BOS <input type="checkbox"/> HONG <input type="checkbox"/> PKWD <input type="checkbox"/> IR <input type="checkbox"/> MEX <input type="checkbox"/> METH <input type="checkbox"/> PR <input checked="" type="checkbox"/> LOW <input type="checkbox"/> SCOT <input type="checkbox"/> HLOK <input type="checkbox"/> AUST <input type="checkbox"/> PT BLVD <input type="checkbox"/> TW <input type="checkbox"/>	
PARTS ON HAND					
PARTS ON ORDER					
ASSEMBLIES IN PROCESS					
FINISHED SUB ASSEMBLIES					
ASSEMBLIES IN UNITS					
PREPARATION, IMPLEMENTATION COSTS					
COST OF INCORPORATION					
PRODUCT COST CHANGE PER UNIT					
PRODUCTION QUANTITY FROM MPP IN WKS _____ WKS					
PRODUCT COST CHANGE (EXTENDED)					
TOTAL COST (OR COST SAVINGS) OF ECO					
REMARKS					
<i>wpr's response 5/24 - any 6-5-88</i>					
SMS EFFECTIVITY DATE 6-3-88					
DOCUMENTATION ONLY <input type="checkbox"/>					
APPROVALS					
ECO ADMIN		<i>Duffell</i>			
MFG ENG					
QUALITY					
MATERIALS					
PROD. CONTROL					
FINANCE					
RE-MFG					
OTHER					



ENGINEERING CHANGE ORDER CUSTOMER ENGINEERING IMPACT SHEET

DATE: 4/27/88
BY: S 015

ALLIANCE	<input type="checkbox"/>
PROPERTY	<input type="checkbox"/>
HELP	<input checked="" type="checkbox"/>
REQUIRED	<input type="checkbox"/>
WANTED	<input type="checkbox"/>
IS AMBER COURED	<input type="checkbox"/>
IS AMBER WORK	<input type="checkbox"/>

IMPACT COMMENTS

NO impact

EST. UNIT POP	DOMESTIC	INTL NATIONAL
EST. SPARE POP		
TOTAL		

EST. COST IMPACT		APPROVALS	DA
MATERIAL		TECH OPS	
LABOR		LOGISTICS	<i>5/19/88</i>
TOTAL		FSC SUPPORT	
IMPLEMENTATION PERIOD		FINAL	<i>7/6</i>
ANNUAL COST		OTHER	

GENERAL COMMENTS

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5318 REPLACES: _____ DATE: 12/10/85 PAGE 1 OF 1
MATRIX ID. 4103 PRODUCT/RELEASE# MicroVP and 2200MVP-128/512
TITLE: MicroVP and 2200MVP-128/512 CPU ID Number Problem

PURPOSE:

To inform the field of a potential problem with the CPU ID Number in the bootstrap PROM used in the MicroVP and 2200MVP-128/512 CPU's.

EXPLANATION:

The CPU Identification Number feature allows software to distinguish one CPU from another. The ability to tell one CPU from another is useful in restricting software to a specific installation and in distinguishing one CPU from another when CPU's are multiplexed. The CPU ID number should be a random number between 1 and 65535. This ID number is in the code on the bootstrap PROM, part number 377-3139, location L39 on the 210-8034-1A and 210-8034-2A boards.

Reports received from the field indicate that a conflict may exist in 2200 systems using multiplexed CPU's when the CPU's have the same ID number.

If this problem is encountered the solution is to replace the bootstrap PROM's on the 210-8034 board. To insure that all three PROM's are at the same revision level, replace all three PROM's. Following are the part numbers and locations for the PROM's:

- 377-3139 at location L39 on 210-8034 board. L35 ON 210-8937w CPU BRD
- 377-3138 at location L50 on 210-8034 board.
- 377-3137 at location L58 on 210-8034 board.

These PROM's can be ordered through the normal channels using the part numbers listed above.

The following models may be effected: MicroVP-1, MicroVP-2, 2200MVP-128 and 2200MVP-512. Note that this information applies only to the models that use the single board (VLSI) CPU part number 210-8034-1A or 210-0834-2A.

THE R1 REVISION OF THE PROMS FIXES THE PROBLEM OF HAVING THE SAME CPU ID #.

GROUP: VS/2200/PC Hardware Support Group MAIL STOP: 0122

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.



TECHNICAL SERVICE BULLETIN

SECTION: HardWare Technical

NUMBER: HWT 5122 REPLACES: _____ DATE: 06/18/85 PAGE 1 OF 1

MAINTENANCE ID: 4103 PRODUCT/RELEASE: 2200MVP-128 and 2200MVP-512

APPLICABLE TO: 2200 MVP-128 and 2200 MVP-512 Board Line PROMs and numbers

Part numbers 178-2045-85, 178-2045-86, 178-2045-87, 178-2045-88, 178-2045-89, 178-2045-90, 178-2045-91, 178-2045-92, 178-2045-93, 178-2045-94, 178-2045-95, 178-2045-96, 178-2045-97, 178-2045-98, 178-2045-99, 178-2045-100 are the correct part numbers for the 1K x 8 PROMs on the new 2200 CPU.

Part numbers 177-1137, 177-1138, and 177-1139 are the correct part numbers for the new 2K x 8 PROMs on the single board CPU/VEB used in the 2200MVP-128, 2200MVP-512, MicroVPE and the MicroVP-2.

GROUP: VS/2200/PC Hardware Support Group MAIL STOP: 0122 J

COMPANY CONFIDENTIAL
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PURPOSE:

Provide information to the field about a potential problem on some of the new CPU/MEMORY boards used in the 2200MVP-128 and 512.

EXPLANATION:

Intermittent Memory Errors during power up of the CPU may occur in a few of the early 2200MVP-128 and 2200MVP-512 systems. These random errors may be caused by POR/RESET timing problem on the CPU/MEM boards (210-8034-1A and 210-8034-2A) used in these early production units.

The symptom for this problem is random data memory errors during power up. These errors are detected by the power up diagnostics.

If this symptom is noted:

- 1) Use the memory diagnostics to check the integrity of the data memory.
- 2) If the memory error is confirmed with data memory diagnostics, replace the CPU/MEM board.
- 3) If no data memory errors are found with the data memory diagnostics and the error does occur only during power up, the error may be caused by POR/RESET timing problem on the CPU/MEM boards. In this case, the error may be caused by the POR/RESET timing problem on the CPU/MEM boards.

Due to the small number of CPU/MEM boards used in the early production units, the error is planned. The error boards 210-8034-1A and 210-8034-2A are still available.

TITLE: MEMORY UPGRADING KIT FOR THE NEW 2200 MVP AND MICROVMP MODELS

PURPOSE:

Provide information to the field about the memory upgrade kit for the NEW 2200 MVP and MicroVMP MODELS.

EXPLANATION:

The April 30, 1985 FOCUS contains an article that describes the new 2200 CPU's. Information about this New Product can also be found in TSB # HWI 5081. The following information pertains to the field memory upgrades, for these new models only:

Model	Upgrade to Model	Upgrade Kit #
MicroVMP-1	MicroVMP-2	U1-5056
2200MVP-128	2200 MVP-512	U1-5056

The upgrade kits will include the new CPU/MEM (210-8034-2A) and new labels.

To install the upgrade in the 2200MVP-128 or MicroVMP-1, remove the CPU/MEM board (210-8034-1A) and install the CPU/MEM board (210-8034-2A) utilizing the PCA removal and replacement instructions in the Product Maintenance Manual, 741-0584-A1 for the 2200MVP-128 or 741-1648 for the MicroVMP-1. Then install the appropriate new label (2200MVP-512 or MicroVMP-2).

The old 2200 models (3 board CPU) are not field upgradable to either of the new models (1 board CPU). The old memory upgrade kits are still available for the old 2200 models.

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5081 REPLACES: _____ DATE: 04/16/85 PAGE 1 OF 2

MATRIX ID. 4103 PRODUCT/RELEASE# 2200 MVP-128/512

TITLE: NEW 2200 MVP-128 and 2200 MVP-512 INFORMATION

PURPOSE:

Provide information to the field about the NEW 2200 MVP MODELS.

EXPLANATION:

The 2200 MVP-128/512 System will be a single board version of the existing 2200 MVP System. The new system will utilize VLSI (Very Large Scale Integration) technology to incorporate the 2200 discrete processor design into single chip form. This will allow the 2200 CPU, control memory and user memory to reside on one circuit board. This single CPU/MEM board will be incorporated into a modified version of the 2200 MVP package. The 2200 MVP-128/512 Systems will run existing 2200 MVP software, diagnostics and I/O options without modification (Operating System Rev. 2.6 recommended).

There will be two versions of the CPU/MEMORY board; 32k Control-128K Data Memory and 32k Control-512K Data Memory. The difference between these two boards is the type of memory chip loaded in the data memory section. There are no field replaceable components on the CPU/MEM board.

Regardless of which version of the CPU/MEM board is being used, it must be inserted in the motherboard slot previously allotted for the REGISTER and I/O board (the old 210-6793 slot). This is the slot closest to the I/O slots.

There will be two new 2200 MVP models using the new CPU/MEMORY board they are: 2200 MVP-128 (128K data memory) and 2200 MVP-512 (512K data memory). The difference between the NEW MVP and the OLD MVP is the motherboard and the CPU/MEM board. The other parts are the same (power supply, etc.).

GROUP: VS/2200/PC Hardware Support Group MAIL STOP: 0122

COMPANY CONFIDENTIAL

WANG Laboratories, Inc.

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5081 REPLACES: _____ DATE: 04/16/85 PAGE 2 OF 2
MATRIX ID. 4103 PRODUCT/RELEASE# 2200 MVP-128/512
TITLE: NEW 2200 MVP-128 and 2200 MVP-512 INFORMATION

EXPLANATION (cont'):

Note that the old CPU and Memory boards will not work in the new models and the new CPU/MEM board will not work in the old models. Part number information for the new 2200 MVP-128 and 2200 MVP-512:

CPU/MEM board 128K version:	210-8034-1A
CPU/MEM board 512K version:	210-8034-2A
MOTHERBOARD for both versions:	210-7498-1
POWER SUPPLY	270-0986
MANUAL	741-1668

The troubleshooting instructions for the 2200 MVP-128/512 system are identical to the instructions given in section 7.4 of the maintenance manual for the 2200 MVP (729-0584-A) with the following exceptions;

- 1) When following the troubleshooting instructions in the maintenance manual 729-0584-A, disregard references to the individual CPU and Memory boards which are no longer in the system. These boards are:

210-6789	Memory Controller
210-6790	Instruction Counter
210-6791	Stack
210-6792	ALU
210-6793	Register I/O
210-6788	Control Memory
210-7588	Control Memory
210-6787	Data Memory
210-7587	Data Memory

- 2) Wherever instructed to replace these boards, replace the new CPU/MEMORY board (210-8034), in it's place.
- 3) When a memory error has been diagnosed, do not attempt to replace the failed memory chip. These are not field-replaceable items. Replace the entire board.

GROUP: VS/2200/PC Hardware Support Group MAIL STOP: 0122

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Randy,

I don't know if it is worth pursuing with H/O, but perhaps we should tell the other Branches to be aware when installing MicroVPs of the possibility of screws just floating loose in the CPUs. In 2 of our installations in recent months (WO# S03B5 in 7/86 and WO# AK4DW in 3/87) we found this to be the case. In both instances, by luck, the CE heard them rattling around. If they are lodged somewhere and not rattling they could cause some damage on Power Up.

Tom Powell

Intended For:
Author: Mike Bahia
Subject: P46

This Item is In Progress

To: Mike Bahia
Subject: P46

From: Anders Backner
Date Sent: 01/15/96

The customer changed the MXE0 file and have not experienced any problem after that. So we can close this case.

Thanks for your help and concern in solving this problem.

Can not beat you in snowdepth since it is raining here.
But i have seen on TV that you on the Eastcoast have got enough snow.

Reagards Anders

----- S V A R -----
Till Anders Backner Fran: Mike Bahia
Ärende: P46 and DS hangs Avsânt: 96-01-11

Anders,

We have now set a record for most snow for the entire month of January with 39 inches & we still have 3 weeks left. Just wondering if you have heard thing on the PC2200 File Transfer problem with the P46 error.

Regards, Mike

----- Reply -----
CC: Mike Bahia From: Mike Bahia
Subject: P46 and DS hangs Date Sent: 12/13/95

Thanks for the update. Incidentally, we are up on you in snow depth w/ 2" on the ground & more snow due tomorrow. It has also been very cold for this time of year.

Mike

----- Original Memo -----
To: Mike Bahia From: Anders Backner
Subject: P46 and DS hangs Date Sent: 12/13/95

Mike,

I have been in contact with the customer PROFA about the P46 error and he will try to copy EMXE0 file from 2.7. But the customer was not sure if he had any time before X-MAS to test this, so we have to wait a couples of weeks before we have a updte on this problem. I found out today that there have been an some misunderstanding about the OS version they are running at the

correct version should be 3.3. I am sorry that you have tested with another version, but we will follow the corrections you have suggested anyway.

Now to something completely different the TEAC drives.

The serial number of the drives I have received are 713298 and 713397.

The U3 chip is revision "D" on both drives.

I have sent a wang office to Jean-Marie Coppens Wang European Logistics and asked him to check other drives they have in stock.

I will keep you updated as soon as I hear any thing from Jean-Marie Coppens.

Regards, Anders

----- Reply -----

Great. Glad we could help.

Mike

Item Title: P46 error

Anders,

Not aware of this P46 error. According to my documentation, P46 is an illegal or unknown microcommand in a GIO, or an illegal escape sequence sent to a Printer Driver. What version of PC2200 do you have? I believe 2.0 is the latest.

On the O/S for the Turbo, it can be ordered through SDC, Software Distribution Control. Send an office memo to "SDC Customer Services". Include your RDB & address. They can get it out to you within a couple of days. I've attached the CSRN for Turbo Rel 1.30.01.

Friday, I received an office memo from Bjorn Franlund for a Turbo Upgrade for Wang Sweden so we have got a go-ahead on that.

Best regards,
Mike

----- Original Memo -----

To: Mike Bahia
Subject: P46 error

From: Anders Backner
Date Sent: 10/23/95

Hello Mike!

We have a customer in Sweden that are running WANG 2200 terminal-emulation from Computer Concepts Corp..

They have upgraded their operatingsystem from 2.7 to 3.5.

Since the upgrade they some times get P46 error when transferring files from 2200 to PC.

They have tested to run on 2.7 again and did not experience any problems.

The program stops on the same programline which are a GIO command.

So my question is if you have heard of any similar problem on version 3.5.

WORKS OK W/ FILES OF 50 SECTORS OR LESS.

Could you also please send me the Turbo software release 1.30.01.

Thanks in advance.

Anders Backner

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W A N G L A B O R A T O R I E S I N C .
P R O B L E M T R A C K I N G A N D R E P O R T I N G
C O M P L E T E D E T A I L R E P O R T
H E A D E R I N F O
P R O B L E M N U M B E R M800016819

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PROBLEM NUMBER: M800016819 CUST NAME: VANSTAHL INTERNATIONAL S.A.
PRIORITY P1 CUST NUMBER: B1 00100802001
PROBLEM TYPE: ESC CUST CONTACT: MRS CLAES
LINK TO PROB NO: CUST CONT PHONE: 02-460-636-7
CUST ADDRESS 1: HEIDE 17
CUST ADDRESS 2:
CUST ADDRESS 3:
SYSTEM MODEL NO: CS-5N CUST CITY: WEMMEL
GEN SYST MODEL: 2200 CS CPU CUST ST/PROV:
O. S. VERSION: 03 4 CUST ZIP: 1810 - CUST RDB: B2910
HW MODEL NUMBER: PM060 CUST COUNTRY:
SW MODEL NUMBER:
SW VERSION:

RDB ASSIGNED: 8760
PERSON ASSIGNED: BAHIA MICHAEL E
ORIG NAME: DU MONGH MICHEL
ORIG EMPL NO: B1-20069
ORIG PHONE: - - -
ORIG RDB: B2910

ALL INFO. AVAILABLE: Y

SERIAL NUMBER:

CALL TRKG DATE: 06/26/92 10:00 DATE ENTER PTR: 11/18/91
CALL TRKG NO: RES DEPLOYED:

STATUS DATE: 06/21/93 DATE TO R&D: 11/20/91
STATUS CODE: H C 577 WKDAYS IN R&D: 579.00
STATUS ABBREV: PEND-RSRCE TOT WKDAYS OPEN: 581.00
STATUS DESC: PENDING/LACK OF EQUIPMENT/RESOURCES

PROBLEM STATEMENT :DU MONGH MICHEL DATE: 11/18/91 TIME: 07:28

Intermittent characters are changed during printout on a PM060.

e.g. TOTAL becomes TOPAL
CONFIRMATION becomes COJFIRMATIOJ
COMMAND becomes COIMAND
INTERNATIONAL becomes INTERNATIOJAL

T 54 becomes 50
N 4E " 4A
M 4D " 49

We have the impression that the problem occurs after an expanded print (using the escape codes of O.S. Release 2.6.2).

What we also noticed is that it is always the character following the "O" that drops the third bit in low order.

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 06/21/93 TIME: 12:28

MC634. Customer has circumvented the problem using a PM017 printer. Call can be closed. Problem does not occur with the 386 or Turbo.

A
B
C
D
E
F
J
K
L
M
N
O

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ASSIGNED: VAN MAELE VINCENT DATE: 06/21/93 TIME: 07:23
Customer is currently working with a PM017 wich is working fine.
I already sent you a WO to tell this call could be closed.
Sorry for this delay but as Michel is not working with WANG anymore I did not
know his password . I just received an Office ..
So this call can be closed finally. regards

Christian Cauttaerts.

ASSIGNED: BAHIA MICHAEL E DATE: 06/02/93 TIME: 15:52
Please update!!

ASSIGNED: BAHIA MICHAEL E DATE: 05/14/93 TIME: 17:02
Will somebody in the field please update this call!!

ASSIGNED: BAHIA MICHAEL E DATE: 04/27/93 TIME: 10:38
Please update this call. Is this still an issue?

ASSIGNED: BAHIA MICHAEL E DATE: 03/26/93 TIME: 08:55
Please update. Can someone look into this call please. We need to find out
from the customer where this issue stands.

ASSIGNED: BAHIA MICHAEL E DATE: 03/12/93 TIME: 16:52
Please update. Respond to comment of 1/12. Is this still an issue?

ASSIGNED: BAHIA MICHAEL E DATE: 02/12/93 TIME: 08:47
Please update. See previous comment.

ASSIGNED: BAHIA MICHAEL E DATE: 01/12/93 TIME: 10:04
Please update. Workaround was being tested. Did it resolve the problem? If
so what was the workaround? Please respond.

ASSIGNED: BAHIA MICHAEL E DATE: 11/12/92 TIME: 16:00
Please update. See previous comment.

ASSIGNED: BAHIA MICHAEL E DATE: 10/30/92 TIME: 16:18
What is status at this account? Please update. A workaround was to be
tested. Did it resolve the issue? What was the workaround?

ASSIGNED: BAHIA MICHAEL E DATE: 07/10/92 TIME: 13:33
How is workaround working? On vacation for 2 weeks. Back 7/27. If need
assistance in meantime please send Wang Office to Michael Riley.

ASSIGNED: BAHIA MICHAEL E DATE: 06/03/92 TIME: 11:34
Update acknowledged.

ASSIGNED: DU MONGH MICHEL DATE: 06/03/92 TIME: 01:57

ASSIGNED: DU MONGH MICHEL DATE: 06/03/92 TIME: 01:57

Sorry for delay but I had to wait for commercial response.

At the moment we are trying a workaround with the PM017 printer, only using the printerdriver when printing french characters. Otherwise we use the print erhardware LF+CR capabilities to print w/o driver. Hope to have an answer fr om the customer within 2 weeks.

ASSIGNED: BAHIA MICHAEL E DATE: 05/01/92 TIME: 08:14

Any news?

ASSIGNED: BAHIA MICHAEL E DATE: 04/08/92 TIME: 09:07

Received Wang Office from Raoul K. Software house is looking at situation to determine if upgrade is workable solution for all concerned.

ASSIGNED: BAHIA MICHAEL E DATE: 04/02/92 TIME: 15:52

Please update call. Best solution for all concerned is to upgrade customer to a CS/386 or Turbo. Has this been discussed with the customer?

ASSIGNED: BAHIA MICHAEL E DATE: 02/13/92 TIME: 15:44

John Marten came by today. Explained current status of problem as well as suggested solution: upgrade to CS/386 or CS/386 Turbo. John has a handle on the situation and will follow through with customer on the available options. On vacation for 2 week starting 2/17. If need assistance please send Wang Office to Mike Riley.

ASSIGNED: BAHIA MICHAEL E DATE: 02/05/92 TIME: 18:32

Tested against CS/2200 3.5 and same problem. Could not reproduce the problem with the CS/386. Our best chance for resolving this would be to offer the customer a CS/386 CPU brd. As mentioned there is a command to convert programs from 'old' to 'new' format but some manual line splitting is likely to be required. There also may be some other changes required if any of their programs reference status bytes in the O/S, make calculations based on partition size or the 10th through 13th numbers to the left of the decimal po int in a mathematical calculation. See TSB SWT 9225 from 12/26/89 for additional information on software idiosyncrasies with the CS/386.

There are no resources currently available to fix bugs on the CS/2200 O/S. It will be very difficult to justify getting resources to fix a problem with the standard CS/2200 O/S unless the problem was affecting multiple users or was a P1 Critical problem.

Also tested this problem on the new Turbo & it does not fail there either. The additional speed of the Turbo makes the need to convert programs to 'new'

ASSIGNED: BAHIA MICHAEL E DATE: 02/05/92 TIME: 18:32

Comment For Last Lines Of Earlier Comment Of Old Format format less critical. Disk I/O would probably be similar to the current performance. 'New' format is reccomended though. The Turbo would require

ASSIGNED: BAHIA MICHAEL E DATE: 02/05/92 TIME: 18:32
similar s/w changes to what may be needed on the CS/386. Please address the possibility of upgrading to a 386 or Turbo. Will wait response on this.

ASSIGNED: DU MONGH MICHEL DATE: 02/04/92 TIME: 07:36
I did some more testing locally, and I found that the problem seems to be related to the '\$RELEASE TERMINAL TO' command in conjunction with the printer driver.
I followed the same sequence as mentioned on the copy sent with the diskette but I did send a normal print statement in stead of the escape sequences. This resulted in the same strange printout .

ASSIGNED: BAHIA MICHAEL E DATE: 02/03/92 TIME: 17:48
Have duplicated problem with software sent. Trying to narrow down problem. Will test against CS/2200 3.5 & also against a 386 CPU & update you hopefully tomorrow. Sorry for delay.

ASSIGNED: BAHIA MICHAEL E DATE: 01/24/92 TIME: 12:22
Software received. Will try to test out Monday.

ASSIGNED: BAHIA MICHAEL E DATE: 01/24/92 TIME: 11:43
Sorry for delay. Address is:
Wang Laboratories
1 Industrial Ave
Lowell, Ma 01851
Attn: Mike Bahia
M/S 019-690

ASSIGNED: DU MONGH MICHEL DATE: 01/20/92 TIME: 09:25
Will send you a copy of partitioning and appropriate program to regenerate the problem . Please communicate your exact address .

ASSIGNED: BAHIA MICHAEL E DATE: 01/13/92 TIME: 15:54
CONTINUED FROM PREVIOUS UPDATE. Autoloaded following program to terminal 1, partition 1:
10 SELECT PRINT 215 (132)
10 PRINT HEX(07 02 0C 02 0C 0F)
20 PRINT HEX(07 02 02 02 0F)
30 PRINT HEX(07 02 09 01 02 0C 00 0F)
35 A=0
40 PRINT HEX(07 02 0D 01 01 0E:PRINT"CONFIRMATION TOTALS"
50 PRINT HEX(0F)
60 PRINT "CONFIRMATION COMMAND INTERNATIONAL TOTALS OD";
70 A=A+1: IF A=60THEN35
80 GOTO 60
On terminals 2, 3, & 5 with the same partition # autoloaded a program

ASSIGNED: BAHIA MICHAEL E DATE: 01/13/92 TIME: 15:54
consisting of only lines 10 thru 30. Warm-booted the system 10 times with both 3.4 & 3.5 O/S and never saw a problem. Only printed 20 lines or so each

ASSIGNED: BAHIA MICHAEL E DATE: 01/13/92 TIME: 15:54
Comment For Last Lines Of Earlier Comment Of Old Format
boot. Need exact information to duplicate problem. Suggest put O/S on disk with exact configuration gen'ed which you had used to recreate problem along with program to run. The sooner I can duplicate the problem the sooner we can come up with a fix. Again the fastest alternative will probably be a 386

ASSIGNED: BAHIA MICHAEL E DATE: 01/13/92 TIME: 15:06
Unable to duplicate your problem with O/S 3.4 or 3.5. Brought system up assigning 8 terminal & 16 partitions, each partition a full size bank. On partition 1 autoloaded the following program:
10 SELECT PRINT 215(132)

ASSIGNED: BAHIA MICHAEL E DATE: 01/10/92 TIME: 17:53
Finally have a copy of 3.5 to try and dupe prob. All set to test Monday. Information to duplicate is very sketchy. Most likely this O/S will not fix nothing was done to address this type of problem in 3.5. Cannot send you .5 yet as it has not been certified. Sent Wang Office concerning using the 386 board. Good chance may not have this problem. A command is available for converting programs to 'new' or '386' format. Most likely some manual changes will need to be made. See TSB HWT 9640 from 11/5/91 announcing the Turbo, item 14 for some details on the new command. At most sites 70-75% of the programs will convert without changes. Not all programs need to be converted. However large programs and programs with a lot of overlays if in old format will load slower on the 386.

ASSIGNED: BAHIA MICHAEL E DATE: 01/07/92 TIME: 17:44
Turbo but is not on any of the current '386' O/S's. We do have it on a test release of the O/S which could be used to do the conversion. You can also convert from 'NEW' to 'OLD'. The new command is \$MOVE! which is explained in simple detail in TSB HWT 9640 from 11/5/91. See page 5, item 14. I am currently in the process of getting a copy of CS/2200 O/S 3.5 to test here & to send you a copy. We have just moved within the Towers & are in the process of getting everything setup & running again. Was hoping to get this done today but should have this week.

ASSIGNED: BAHIA MICHAEL E DATE: 01/07/92 TIME: 17:34
There is now a command to simplify the conversion of programs from OLD or existing VLSI and older format to 'NEW' or '386' format. The command is operational on the

ASSIGNED: DU MONGH MICHEL DATE: 01/06/92 TIME: 04:13

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ASSIGNED: DU MONGH MICHEL DATE: 01/06/92 TIME: 04:13
PLEASE DO SEND US THE OS 3.5 SO WE CAN TRY OUT AT CUSTOMER SITE.
SEND IT TO THE ATTENTION OFF DANIEL KOOT PLEASE.
ABOUT THE CONVERSION TO A CS/386 CPU THIS COULD GIVE SERIOUS PROBLEMS WITH THE
CONVERSION OF THE PROGRAMS.

ASSIGNED: BAHIA MICHAEL E DATE: 12/24/91 TIME: 09:41
Possibly there is an O/S bug. We are in the process of moving and with the holidays it may take a few days to try to duplicate the problem. If there is an O/S problem with 3.4 or 3.5 it may be difficult to get corrected. If the problem is non-existent with the 386 CPU board, would the customer be agreeable to upgrade to a 386 CPU board. If the old O/S is the problem, I think we should upgrade the customer free of charge. We have fixed some problems with drivers on the 386 that the customer here indicated had also occurred on the VLSI CPU although we never saw it occur on the VLSI.

ASSIGNED: DU MONGH MICHEL DATE: 12/23/91 TIME: 11:07
I did get the problem after 2days even with the escape code for the density change removed.
Now I removed all the escape sequences from the driver and using the same setup program from the 4 different partitions the printer started to print very strange characters. I thought the escape sequences should be ignored by the system.
Finally I installed a CS/386 CPU board using the driver from rel.3.4.
So far everything worked fine. Maybe the problem is in the OS and not with the driver.
I hope we can have this resolved. The customer is not happy at all for the moment.

ASSIGNED: BAHIA MICHAEL E DATE: 12/11/91 TIME: 17:39
Are you saying you are unable to duplicate the problem with the hex code to change the density removed from the driver? Have not had chance to test yet. Will wait for your response on whether removing the density hex sequence from the driver affected your ability to reproduce the problem.

ASSIGNED: DU MONGH MICHEL DATE: 12/10/91 TIME: 10:59
I am sorry but I forgot to tell you that to reproduce the symptom with the escape sequences the first hexcode that is sent is ahex(7F).
Secondly the character density selection seems to give the problem at the first printout after powerup. When I removed the 10 pitch selection via @TBLEDIT the printer stayed at his initial setting.
So far for these testings.

ASSIGNED: DU MONGH MICHEL DATE: 12/10/91 TIME: 05:06
Received diskettes today. I will try out things now.
Thanks a lot.

ASSIGNED: BAHIA MICHAEL E DATE: 12/06/91 TIME: 15:56
Will try to reproduce problem with info provided.

ASSIGNED: DU MONGH MICHEL DATE: 12/06/91 TIME: 10:10
I don't think that the 12 '' page lenght is a problem because i've had the pr
oblem with 11'' page lenght too.
I was able to regenerate problem several times (but not always) in the follow
ing way. 1.generate 16 partitions dedicated to 8 terminals.
2. after power up send the following escape sequences from at least
four different partitions. HEX(020C020C0F)
HEX(0202020F)
HEX(020901020C000F)

3.now start a normal printout starting with an expanded print comma
nd HEX(020D01010E). The following lines in normal print mode.
This is a sequence the customer follows to prevent the printer from changing
to the default 'd1' printmode when starting a listing from any screen.

ASSIGNED: BAHIA MICHAEL E DATE: 12/05/91 TIME: 17:26
O/S 3.4 is on the way via DHL Express with the printer driver editor,
@TBLEDIT. Should be there by early next week. Give me exact details on how
you duplicated the problem with the Expanded Print & I will try it here.
as the 12" form feed appear to be a factor?

ASSIGNED: DU MONGH MICHEL DATE: 12/05/91 TIME: 08:53
Please do send us the copy of both the O.S and the DRIVER EDITOR. (asap)
The address Wang Belgium
ATT. Daniel Koot
Zweefvliegstuigstraat 10,
1130 Brussels
BELGIUM

Thanks .

The printer has been changed already by a PM017 which was giving the same pro
blem.

Another problem that appears now is that when a new page starts with an expan
ded printcommand,the printer starts to print in overstrike combined with unde
rscore.The following lines are printed on top of eachother.We were able to re
generate this by sending the escape sequences for a 12pitch , 12 inch pagelen
gth , dubbelstrike mode several times from different partitions and then star
ting a normal printout,like a listing .

ASSIGNED: BAHIA MICHAEL E DATE: 12/02/91 TIME: 16:53
If the printer fails at the site and not in the office than something is diff
erent between the 2 sites. Has this printer been replaced? Has a 2nd printe
r given the same problem?
Can send you a new copy of 3.4 via mail. Please provide me with an address.
The printer driver editor is needed to change the hex sequence in the driver.

ASSIGNED: BAHIA MICHAEL E DATE: 12/02/91 TIME: 16:53

That could be sent also. Willem Sloep may have the editor. Actually it is unlikely to be the driver itself. More likely to be some type of hardware problem with the printer or possibly some strange O/S bug. Possibly there could be a problem related to special characters or language differences with the US. Where a specific character seems to change, the indications become strongly that a printer hardware problem may exist. Don't think the driver is the problem but again an O/S can be sent with the driver by express mail if you would like. Possibly the change to the O/S that does not appear correct may be the problem.

ASSIGNED: DU MONGH MICHEL DATE: 11/29/91 TIME: 07:49

I assure you that no other equipment than that listed in above comments is used. All terminals are 2236DE or 2536DW types. All our copies of OS3.4 have the same strange forecast sector. I found that in hexdump mode the first sequence that is printed after system initialisation is the following hexstring:

0D 1B 40 1B 50 1B 33 1E 1B 43 42

I would like to know how the 1B401B50 part of this string can be removed please. Or tell me who can help us with these printer drivers. To end it is of no use to replace the printer. Because WANG cannot provide us with a printer that does not require a 2200 driver. The problem can be regenerated as told before.

ASSIGNED: BAHIA MICHAEL E DATE: 11/27/91 TIME: 08:55

Are there any other printers on the system besides the 2235 and the 1 PM060? These could be terminal printers including any printers connected to PC's used as terminals at times on the system. Is there any non-Wang 2200 H/W? I'm sure if you have copies of O/S 3.4 the PM060 driver is good. Bring the system on site up on a virgin Wang O/S 3.4 using the @PM0060V0 that comes with it and try to duplicate problem. If no new information can be found, I suggest the printer be replaced.

ASSIGNED: DU MONGH MICHEL DATE: 11/25/91 TIME: 03:56

This printer never worked normally in the past. A PTR-call has been made in the past ref.nbr. C800012421. We also suspected the driver and therefore we already did install a new OS. rel 3.4 (w/ new driver) but with the same results as before. So if you think we might have a corrupted driver please send us a good one. (maybe a hardcopy 'hexdump' of what should be in the driver).

ASSIGNED: BAHIA MICHAEL E DATE: 11/22/91 TIME: 09:04

Has this printer worked normally in the past? Please test this printer with a new copy of O/S 3.4 using the PM060 driver that comes with it. It sounds like the driver used on site has been altered or somehow damaged. It is probably normal for the driver to default the

ASSIGNED: BAHIA MICHAEL E DATE: 11/22/91 TIME: 09:04
printer to the d1 font though the h/w is set for d2. The print driver would probably need to be modified to change this.

ASSIGNED: DU MONGH MICHEL DATE: 11/21/91 TIME: 05:23
1.The system is setup with 8 terminals divided over 16 partitions,all of them connected on MXE-controllers.There is 2235 printer on address 215, a PM060 on address 216 and a DS on address310.Both the DS and PM060 are connected to a Dual controller (210-7342 board).
2.All printer HW has been changed including I/O-cable.
3.The driver we use is the Wang driver purchased by OS.3.4.(see former comments)
4.The CPU-board and all controllers are also changed already.And the complete system including terminals and printers are checked for grounding.
5.We also saw that in the file '@PM060V0' the sector before the last one contains strange info .This sector looks like an indexsector.

ASSIGNED: DU MONGH MICHEL DATE: 11/21/91 TIME: 04:55
1.We also noticed that when the PM060 driver is selected off the printer is printing correctly except that we have no LineFeed.
eg.a: "SELECT DRIVER 216 OFF" outputs "total " no LF
b:"SELECT DRIVER 216 " outputs " total".
2.A second problem is that after system initialisation the first printcommand forces the PM060 printer to reset to a default font.
eg.Printer is hardware set for font d2 . After the printcommand the printer starts printing in 'd1'-mode. This can be solved by sending the appropriate escape sequence to set the printer into 'd2' mode.This can be very easy regenerated by simply rebooting the system and then sending a printcommand.

ASSIGNED: BAHIA MICHAEL E DATE: 11/20/91 TIME: 16:28
How many PM060 printers on this site?
Is this a system printer or is it connected to a terminal?
My 1st inclination based on the limited information you have supplied is there is a hardware problem with the printer, printer cable, or printer controller whether in the CPU or a terminal. Another area of concern would be the printer driver. If the problem can be duplicated on site, load a virgin Wang O/S, preferably 3.4 and set up the @PM060V0 print driver and try to duplicate the problem. Is the Wang printer driver being used? Was this printer working up until a certain time or was it just purchased? If it was working, what has been changed that may have coincided with the problem.
Need more information.

ASSIGNED: DU MONGH MICHEL DATE: 11/18/91 TIME: 07:28
We were not able to duplicate the problem in shop, we saw only the problem at customer site.

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PROBLEM NUMBER: M200016991
PRIORITY P2

CUST NAME:
CUST NUMBER:

PROBLEM TYPE: ESC
LINK TO PROB NO:

CUST CONTACT:
CUST CONT PHONE: - - -
CUST ADDRESS 1:
CUST ADDRESS 2:
CUST ADDRESS 3:

SYSTEM MODEL NO: CS-10
GEN SYST MODEL: 2200 CS CPU
O. S. VERSION: 3.3
HW MODEL NUMBER: CS-10
SW MODEL NUMBER: CS-10
SW VERSION: 3.3

CUST CITY:
CUST ST/PROV:
CUST ZIP: - CUST RDB:
CUST COUNTRY:

ALL INFO. AVAILABLE: Y

RDB ASSIGNED: 8760
PERSON ASSIGNED: BAHIA MICHAEL E
ORIG NAME: GRANT ALBERT E JR
ORIG EMPL NO: 00-10462
ORIG PHONE: - - -
ORIG RDB: 8760

SERIAL NUMBER:

CALL TRKG DATE: 00/00/00 00:00 DATE ENTER PTR: 02/08/91
ALL TRKG NO: RES DEPLOYED:

STATUS DATE: 04/02/93 DATE TO R&D: 02/08/91
STATUS CODE: S C 595 WKDAYS IN R&D: 204.00
STATUS ABBREV: PERM FIX TOT WKDAYS OPEN: 784.00
STATUS DESC: PERMANENT FIX - GENERAL RELEASE

PROBLEM STATEMENT :GRANT ALBERT E J DATE: 02/08/91 TIME: 13:25
RE: Cust PTR C800000492 - A background program printing to a terminal
printer with printer driver installed bypasses the printer driver. Charac-
ter translation is not performed and LF is not transmitted. Problem exists
with all O.S. Versions supporting a printer driver - ONLY in background
printing mode to a terminal printer. There are no problems regarding the
system printer at /215 and in foreground printing mode. (Orig Erwin Findt)

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 04/02/93 TIME: 15:19
SC595. The printer driver being ignored in the background is fixed with rel
3.5 now being beta tested. Closing call.

XA0291S
00.00.00

WANG LABORATORIES INC.
PROBLEM TRACKING AND REPORTING
COMPLETE DETAIL REPORT
PROBLEM DETAIL
PROBLEM NUMBER M200016991

PAGE: 3
02 APR 1993
15:22:55

ASSIGNED: BAHIA MICHAEL E DATE: 01/12/93 TIME: 10:08
This problem is resolved with O/S 3.5. If you would like a copy please let me know via Wang office.

ASSIGNED: BAHIA MICHAEL E DATE: 10/06/92 TIME: 16:18
This problem is resolved with CS/2200 Rel 3.5. We are now sending out for beta testing.

ASSIGNED: BAHIA MICHAEL E DATE: 09/10/92 TIME: 09:59
Q/A person no longer with us. Will need to test & release as time becomes available and set up beta sites.

ASSIGNED: BAHIA MICHAEL E DATE: 04/03/92 TIME: 15:49
When will this release be available for distribution?

ASSIGNED: BAHIA MICHAEL E DATE: 03/11/92 TIME: 18:39
Tested problem against release 3.5 of the CS O/S. Problem is resolved. Printer Driver works in background with release 3.5.

ASSIGNED: BAHIA MICHAEL E DATE: 01/31/92 TIME: 11:44
Have copy of 3.5. Will test.

ASSIGNED: BAHIA MICHAEL E DATE: 10/29/91 TIME: 10:05
Is this problem fixed in the new release from India?

ASSIGNED: BAHIA MICHAEL E DATE: 10/16/91 TIME: 08:45
Has this problem been fixed with the release from India?

ASSIGNED: BAHIA MICHAEL E DATE: 08/15/91 TIME: 10:11
Release will be 3.5.

ASSIGNED: RILEY J MICHAEL DATE: 08/09/91 TIME: 09:32
VLSI BASIC-2 Rev. 2.5 is in for final testing... Release soon...

ASSIGNED: BAHIA MICHAEL E DATE: 08/07/91 TIME: 14:15
When is fix from India expected?

ASSIGNED: BAHIA MICHAEL E DATE: 07/12/91 TIME: 16:59
When will we have a fix for this problem?

ASSIGNED: GRANT ALBERT E JR DATE: 02/08/91 TIME: 13:25
Print a report in background mode using the printer driver to a terminal printer requiring the LF character (PM016, etc). Line feeds will not be sent to the printer.

May 1990
Wang Laboratories, Inc.
One Industrial Avenue
Lowell, MA 01851

Dear Wang CS/2200/386 user,

The enclosed two diskettes represent the latest release 3.4 of the CS/2200 MVP (VLSI) operating system software. This software will shortly be sent out with every CS/2200/VLSI system replacing all CS/2200 Operating System diskettes which have previously been available. System Utilities have been modified in release 3.4 in a number of modules.

The O.S. software represents improvement over release 3.3 which has been available.

Enhancements -- Enhancements to the software are in:

- . \$PACK/\$UNPACK -- several new formats have been added,
 - 7dOy packed decimal with binary overflow format.
 - 8dOy signed binary format.
 - 9dOy unsigned binary format.
 - Alxx compressed alphanumeric format.
- . \$FORMAT -- several new field formats have been added,
 - O+xxx .dd packed decimal with binary overflow format.
 - B+xxx .dd signed binary format.
 - Bxxx .dd unsigned binary format.
 - Cxxx compressed alphanumeric format.
- . BIN and VAL statements -- where the length may be specified by a numeric variable or the digits 1,2,3 or 4.
- . \$PSTAT in the I/O in use column will in addition return the address of a device requested which may be hogged by another partition.

Known problems with this release are currently undetermined. We will try to notify you if we find there are any other problems. Please notify me if you have any problems.

Known problems within the support utilities. None.

Subsequent operating system updates will be available through the Wang Regional offices.

Sincerely,

Tyler B. Olsen.
CS/2200/386 Support
MS 014-890
Tel. 508/967-0339 Fax. 508/458-0620.

CS/2200 VLSI Operating system Release 3.4.

Diskette label: CS/2200 Multi-User BASIC-2 Release 3.4 Disk 1 of 2.
 Diskette label: CS/2200 Multi-User BASIC-2 Release 3.4 Disk 2 of 2.

Diskette 1 of 2:

Index = 7' Current End = 1208 End.Cat area = 1231

AP = 19 Used Free

@BACKUP	01/09/89	55	0
* @BOOT	03/27/90	4	0
@CLOC	05/09/86	24	0
* @FORMAT	03/20/90	53	0
* @GENPART	04/12/90	90	0
* @INSTALL	03/21/90	27	0
@MENU	02/01/85	25	0
* @MODSYSF	07/17/89	15	0
* @MOVE1	02/02/90	39	0
* @MOVEFIL	02/02/90	29	0
* @PSTAT	02/12/90	13	0
@RECOVER	01/09/89	54	0
* @SYSMPB	01/25/90	5	0
* @TO.CREO	04/13/90	6	0
* @TO.CREF	04/13/90	54	0
* @TO.DISK	04/09/90	22	0
* @TO.SUBS	04/09/90	41	0
* @TOIMAGE	04/09/90	24	0

START 3 0

AD = 13

.STARTD 3 0

@@ 56 0

@DATE 3 0

@DM50/VO 11 0

@LASRJV1 10 0

* @MVP 349 0

Multi-User BASIC-2 Release 3.4
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 All rights reserved.

* @MXEO 75 0

2236MXE DEV RLS 3.10 (BASIC II)

@PM01OV2 9 0

@PM016V3 9 0

@PM017V3 12 0

@PM018V3 10 0

@PM06OVO 9 0

* @SYSFILE 35 18

Diskette 2 of 2:

Index = 7 Current End = 430 End.Cat area = 1231

AP = 3

@DAVFU 05/09/86 55 0 Moved from disk 1 of 2.

@DG 02/01/85 4 0

@MRTIAN 08/15/89 70 0

AD = 7

@A 107 0

@B 55 0

@C 56 0

@D 55 0

@E 7 0

@P 5 0

@(backslash) 7 3

KA0291S
30.00.00

WANG LABORATORIES INC.
PROBLEM TRACKING AND REPORTING
CUSTOMER COMPLETE DETAIL REPORT
HEADER INFO
CUSTOMER PROBLEM NUMBER C80000891

PAGE: 1
12 NOV 1990
17:28:23

FORWARDED COPIES
TO TYLER & MIKE
11/13/90

PROBLEM NUMBER: C80000891 CUST NAME: WANG DEUTSCHLAND, PRODUCT SUPP
PRIORITY P3 CUST NUMBER: G1 00015956025
PROBLEM TYPE: ESC CUST CONTACT: ERWIN FINDT
LINK TO PROB NO: P210001581 CUST CONT PHONE: 06-9/6-675- 295
CUST ADDRESS 1: LYONER STR. 26
CUST ADDRESS 2:
CUST ADDRESS 3:
SYSTEM MODEL NO: CS-10 CUST CITY: FRANKFURT/M.
GEN SYST MODEL: 2200 CS CUST ST/PROV:
O. S. VERSION: 3.3 / 3.4 CUST ZIP: 6000 - CUST RDB: G2100
HW MODEL NUMBER: CS-10 CUST COUNTRY:
SW MODEL NUMBER: CS-10
SW VERSION: 3.3
RDB ASSIGNED: 8760
PERSON ASSIGNED:
PART NUMBER: ORIG NAME: FINDT ERWIN
PART NUM REV: ORIG EMPL NO: G1-04687
SERIAL NUMBER: ORIG PHONE: - - -
ORIG RDB: G2100
ICALL TRKG DATE: 06/14/89 11:00 NETWORKED: N
ICALL TRKG NO: EF10000002 RES DEPLOYED:
IORG ACT/SYM/ACN: DATE ENTER PTR: 06/14/89
I STATUS DATE: 06/14/89 DATE TO R&D: 019890615
I STATUS CODE: S O 637 WKDAYS IN R&D: 210.81
I STATUS ABBREV: REPEAT PRB TOT WKDAYS OPEN: 368.41
I STATUS DESC: REPEAT PROBLEM

PROBLEM SUMMARY :FINDT ERWIN DATE: 06/14/89 TIME: 06:41
The system generation program @GENPART of basic-2 vers. 3.3 has problems to display the correct number of sectors available for ramdisk and to show the whole memory banks.

Detailed description and solution:

1. In some circumstances where the program jumps from line 2630 to 2640 and 2635 will be skipped the value of available sectors for ramdisk is wrong and must be decremented by one. The following changes will remove the problem: Delete 'N8=N8-1' in line 2635.
Change 'PRINT N8' to 'PRINT N8-1' in line 2640.
2. To support 8MB CPU change 'M2=16*64*4' to 'M2=128*16*4' in line 2620.
3. If /340 is not in the device table the SF'00 function 'CLEAR PARTITIONS' displays only the available memory banks which are used by the loaded configuration.

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 11/12/90 TIME: 17:24
This problem has been fixed in Rev. 3.4 of BASIC-2 O.S. JMR
SC410. Problems 1 & 2 referring to # of sectors available in RAM Disk & 8 Mb of memory corrected with 3.4 O/S.
Problem displaying correct amount of memory when running @GENPART while sys is up when all memory is partitioned and address 340 is in Device Table is anomaly. Problem will be looked at if & when a release 3.5 or equivalent is necessary. Sending call back to field to be closed as agreed.

ASSIGNED: BAHIA MICHAEL E DATE: 11/12/90 TIME: 17:25
Transferring calling back to field to be closed as agreed.

ASSIGNED: FINDT ERWIN DATE: 11/01/90 TIME: 09:18
Because it happens only if the system is already configured and not during
the configuration after booting the system I'm agree to close this problem.

ASSIGNED: BAHIA MICHAEL E DATE: 10/31/90 TIME: 11:51
I have duplicated your problem both on an LVP & a VLSI. Apparently this
problem shows up anytime you have a non-386 CPU and all memory is partitioned
to terminals and address 340 is in the device table. Then if the system
is up & @GENPART is loaded and you key SF'00 to Clear Partitions an extra ban
k is shown. This will probably happen on any memory size up to 1 Meg. As
this is a somewhat insignificant problem there are no plans to fix it unless
a new non-386 O/S comes out. The fix you offered would have to be fully test
ed before they can implement it. The job is a bit complicated now where
@GENPART must now work with both the VLSI & 386 CPU's. Can we close this
call?

ASSIGNED: BAHIA MICHAEL E DATE: 10/04/90 TIME: 08:04
Have not been able to reproduce this problem with any of the single brd CPU's
. This appears to only be a problem with the old multi-board MVPs & LVPs.
Trying to locate hardware to test the 192K configuration.

ASSIGNED: BAHIA MICHAEL E DATE: 10/01/90 TIME: 16:18
Update acknowledged. Will test out.

ASSIGNED: FINDT ERWIN DATE: 10/01/90 TIME: 11:20
I found this problem on my LVP with 192K. The number of terminals is three.
The number of partitions is also three. Each partition is using the whole
bank because all memory is devided by using SF'2. Ram disk address /340 is
in the device table.
I boot the cpu with this configuration and and run @GENPART. If I press SF'0
for Clear Partitions I get four memory banks displayed but there are only
three. This happens only if /340 is configured. If /340 is not there the
defined three banks will be listed.

ASSIGNED: BAHIA MICHAEL E DATE: 09/28/90 TIME: 08:27
Tried to duplicate the memory problem you listed as number 3 in your last up
date & could not. Could you provide me with details, memory size & how system
is partition so that I can duplicate the problem.

ASSIGNED: BAHIA MICHAEL E DATE: 09/26/90 TIME: 09:04
Update acknowledged.

ASSIGNED: FINDT ERWIN DATE: 09/25/90 TIME: 07:53

ASSIGNED: FINDT ERWIN DATE: 09/25/90 TIME: 07:53
Problem 1: has been fixed in O/S 3.4
Problem 2: has been fixed in O/S 3.4
Problem 3: SF'00 displays displays only the available memory used by the
 loaded configuration. This is correct, because SPACEK can find
 the whole system memory only if the system is still not configured
 But if all banks of system memory have been configured for parti-
 tions and /340 is defined SF'00 shows you one additional bank. That's wrong
 and can be solved by deleting 'IF N9/256 >B1' in line 2450 of @GENPART.
Problem 4: has been fixed.
The solution for problem 3 should be included in the next version of
@GENPART and this PTR should be closed.

ASSIGNED: BAHIA MICHAEL E DATE: 09/18/90 TIME: 14:02
Mailed O/S 3.4 with R1.K prom in same package yesterday. Misc Ship Order #
318875, Bill of Lading 357614. Please update call when received.

ASSIGNED: BAHIA MICHAEL E DATE: 09/17/90 TIME: 16:37
Mailed O/S 3.4 to you with the R1.K prom for PTR C8/2347. Please update as
soon as received.

ASSIGNED: BAHIA MICHAEL E DATE: 09/17/90 TIME: 14:18
Will have O/S 3.4 sent again to you.

ASSIGNED: FINDT ERWIN DATE: 09/17/90 TIME: 02:28
Not received until now.

ASSIGNED: BAHIA MICHAEL E DATE: 09/14/90 TIME: 13:03
3.4 O/S was resent to you. Have you received it?

ASSIGNED: BAHIA MICHAEL E DATE: 09/12/90 TIME: 11:18
Update acknowledged. Will verify correct O/S is sent out.

ASSIGNED: FINDT ERWIN DATE: 09/11/90 TIME: 06:44
Received WO data for O/S 3.4 from Mike Riley today but in fact it was
CS/386 vers. 0.16. Did sent memo to mike to get the corrected data.

ASSIGNED: BAHIA MICHAEL E DATE: 09/10/90 TIME: 14:26
Sorry for delay. Between moving to new building, short holiday week, &
inaccessability of PTR due to software upgrade, just getting to this. Will W
either Wang Office you 3.4 or mail it to you this week. Please provide
mailing address in case unable to Wang Office promptly.

ASSIGNED: BAHIA MICHAEL E DATE: 08/28/90 TIME: 15:34
Do not have the facilities to send 3.4 via Wang Office myself. May be able
to have it sent to you next week via Wang Office. This O/S should have alrea

ASSIGNED: BAHIA MICHAEL E DATE: 08/28/90 TIME: 15:34
dy been distributed thru to all normal channels just as VS S/W would. Please
try these channels or Willem Sloep from the PRC in the Netherlands may be
able to help. Otherwise will not be able to send out to you until at least
next week.

ASSIGNED: FINDT ERWIN DATE: 08/28/90 TIME: 09:14
Please send me O/S 3.4 by WO. Thanks!

ASSIGNED: BAHIA MICHAEL E DATE: 08/27/90 TIME: 16:00
Please test with 3.4 for these problems & let me know your findings. These problems should be fixed.

ASSIGNED: BAHIA MICHAEL E DATE: 07/31/90 TIME: 12:28
These problems have been corrected or made moot with O/S 3.4. The RAM Disk sector count has been corrected. The other 2 problems should no longer be valid. Please test against 3.4 & let me know your findings.

ASSIGNED: FINDT ERWIN DATE: 07/13/90 TIME: 02:14
Now this PTR is there again. The problem was that I had linked that PTR and after that it had the status 'ownership tranfered YES' but I was still assigned. Please link it for me to P210001581.

ASSIGNED: COLLETTE RICHARD L DATE: 12/15/89 TIME: 15:54
update acknowledged. ptr will be transfered to you for linking.

ASSIGNED: FINDT ERWIN DATE: 12/13/89 TIME: 10:20
Please respond to my update of the 1th of december and send the call back for linking now. Thank you!

ASSIGNED: FINDT ERWIN DATE: 12/01/89 TIME: 06:14
Please transfer the call back for linking now. Thank you.

ASSIGNED: BLAISE RUTH ANN DATE: 11/20/89 TIME: 13:15
Per J. Bucsi's memo of July 1989, the responsibility of linking is done by the field, district, region etc when product ptr has been generated. If you do not have access to do the linking then please contact your ptr administrator.

ASSIGNED: FINDT ERWIN DATE: 11/20/89 TIME: 05:03
Because I'm unauhorized for Customer Link I send this call to you again so you are able to do the link.

ASSIGNED: FRUNZ DUANE F DATE: 11/07/89 TIME: 11:08
Erwin: see Status comment dated 11/03.

ASSIGNED: BAXI KIRIT DATE: 11/07/89 TIME: 08:35
Germany deals directly with TSO

ASSIGNED: FRUNZ DUANE F DATE: 11/03/89 TIME: 08:57
Our link product PTR number is: P210001581
Our new PTR policy says that after we create the product problem that we transfer the call back for the RSC/field to link to Product problem.

ASSIGNED: STETSON DONALD P DATE: 06/27/89 TIME: 09:53
No Customer problems to R&D please.

ASSIGNED: DATE: 06/14/89 TIME: 08:28
To USA....Please action this PTR on behalf of Wang Germany.

ASSIGNED: FINDT ERWIN DATE: 06/14/89 TIME: 06:41
4. If you change a old configuration under certain circumstances 'save configurations' creates ERR S17 in line 928 because the value of Q2\$(I) is HEX(000000). The problem depends of the prefilled printer driver area. Sometimes Q2\$(I) is Hex(202020) or HEX(000000). The solution is:
Replace "IF Q2\$(I) = ' ' THEN 930" by "IF Q2\$(I)=HEX(000000) OR Q2\$(I) = HEX(202020) THEN 930":

PRODUCT INFORMATION

NEW CS SYSTEM PACKAGE AND OPERATING SYSTEM ENHANCEMENTS

Wang Laboratories, as part of our continuing commitment to the new CS product line, announces another CS-S packaged system and enhancements to Release 3.1 of the Operating System. The new "S" package, designated the CS-S12, contains a 1MB CPU, a 2275MUX disk multiplexer, a 22C80 disk multiplexing controller, a 2236MXE terminal controller, and two workstations.

The Generalized Printer Driver (GPD), contained within release 3.1 of the Operating System (OS), now supports the LCS15-DSK laser printer and the new DM50/300 dot-matrix printer.

HIGHLIGHTS

- . Encourages existing MICROVP and CS users to order a second CPU by providing a system package (CS-S12) that contains all the necessary components to multiplex a second CPU to their existing disk storage system.
- . Increases the price/performance ratio of the CS by adding a multiplexed CPU.
- . The GPD now supports laser printers which expect ASCII escape sequences instead of hexadecimal.

PRODUCT DESCRIPTION

CS-S12

The new "S" package, designated the CS-S12, contains a 1MB CPU, a 2275MUX, a 22C80, a 2236MXE, and two workstations. In order for a MICROVP or CS user to add a second CPU that can be multiplexed to their data storage cabinet, a series of components (which the user may or may not be familiar with) have to be ordered in addition to a CPU. The CS-S12 is so configured that upon receipt of the CS-S12, the 2275MUX is inserted in CPU one and cable-connected to the 22C80 in CPU two. By connecting the DS (Data Storage Cabinet) to the disk controller port on the 2275MUX (if using a 2280 Phoenix, connect the 22C14 DPU to the 2275MUX disk port), both CPUs can now share common disk files.

Operating System

Release 3.1 of the OS provides support for up to 8MB of main memory, four enhancements over release 3.0 and correcting six known anomalies in release 3.0. When FCS commences (1/15/88), release 3.1 will contain the following additional enhancements.

Printer Drivers: The Generalized Printer Driver (GPD) has the following enhancements:

- . Supports laser printers which expect ASCII escape sequences instead of hexadecimal. @LASRJVO is a new printer driver table supporting the LCS15-DSK printer.

- . @DM50/VO is a new printer driver table that supports the new DM50/300 dot-matrix printer.
- . Further optimization of the driver logic has improved output performance for printers not directed through a printer driver.

Anomalies: The following are additional known anomalies in 3.0, corrected in release 3.1:

- . Entering a program line that is too long is now flagged with the appropriate error.
- . A partition put to sleep with \$BREAK can now be wakened by an \$ALERT from another partition.
- . Certain \$GIO sequences now release the hogged disk at the end of a sequence.
- . Output to the null device, /OOO is now faster.
- . The @MXEO microcode has been modified to correct two problems:
 - In TC mode, when sending 6-bit or 5-bit data, if a character was shifted relative to the previous character sent to the MXE, the shift code was transmitted but the character itself waited until another character was sent to the MXE. Now all characters are transmitted as sent to the MXE.
 - When using a 2436WP terminal, under certain conditions the print stream to the local printer (device 204) would stop and not resume until the 2200/CS was re-booted. This has been fixed.

PRODUCT STRATEGY

Wang has an answer for the CS/MICROVP user with the need for more workstations, partitions, etc., than a single CPU can support - multiplexing. Two or more CS CPUs multiplexing a DS can be an effective answer, and in some cases, more effective than a non-Wang CPU that supports more than 16 workstations. Disk multiplexing allows two to 16 MICROVPs/CSs to share a disk drive or combinations of disk drives (up to three). The multiplexer enables all systems to have concurrent access to the disk(s). Multiplexing of a disk or disks provides the following benefits:

- . By distributing the workload to multiple processors, users increase their total system's program and user capacity and individual CPU throughput.
- . Multiple systems can share a common disk drive or drives to reduce total systems costs.
- . Multiple systems have access to common disk files, eliminating the need for redundant files.

TO: MIKE BAHIA MS0126/LOWELL
FRDM: SI CHJNG
SUBJECT: 2200 OS 3.1 RESAVE: DATE: 05/31/88

DISTRIBUTION:
CC: JJE SCAGLIONE

F.Y.I.

WHEN YOU LOAD A PROGRAM AND ENLARGE IT (WITHOUT FREE SPACE) AND THEN TRY TO RESAVE IT, THE RESAVE WILL FIRST SCRATCH THE PROGRAM AND THEN IN TRYING TO SAVE IT, YOU WILL GET A D81 (FILE FULL). AT THIS POINT, IF YOU CLEAR MEMORY AND TRY TO RELOAD IT, YOU WILL GET A D82 (FILE NOT FOUND) SINCE IN THE CATALOG, IT IS SCRATCHED. THIS IS AN FAD. THE PROBLEM IN OS 3.0 WAS THAT YOU WERE GETTING THE D81 BUT THE PROGRAM APPEARED TO BE OK IN THE CATALOG WHEN INTERNALLY, IT WAS SCRATCHED. THIS WAS CORRECTED IN OS 3.1.

Wang Laboratories, Inc.
1 Industrial Ave.
Lowell, Mass. 01851.



Wang Multi-user BASIC-2 for beta site testing resides on two diskettes. (1 if red label DSDD).

Diskette 1. Labelled Wang Multi-user BASIC-2 1 of 2 Rel. 3.0.13.
Diskette 2. Labelled Wang Multi-user BASIC-2 2 of 2 2/12/87.

As a result of beta tests reported thus far, 4/30/87, several problems have been addressed in the Wang Multi-user BASIC-2 beta site release diskettes.

- . @BACKUP -- Disk address callout and \$CLOSE to free hogged devices.
- . @GENPART -- Improved code, removed bell on device address entry
Added display of "'F" (function keyed) and improved exit to main menu.
- . @INSTALL -- fixed names of printer driver modules; see @MOVE1.
- . @MOVE1 -- improved disk address callout.
- . @MOVEFIL -- default of Move all prompt changed to "N"; see @MOVE1.
- . @RECOVER -- improved disk address callout.
- . @MVP -- Microcode file
 - 1 A problem with \$ RELEASE TERMINAL caused a hangup. This problem occurred most often when using systems with MXD controllers.
 2. \$ RELEASE TERMINAL TO "name"
ERROR X77: Invalid Partition Reference
 3. \$OPEN 100, /340
 4. VERIFY of a 2275 diskette was slow.
 5. Halt/step TRACE into another partition showed ERR A06 protected program.
 6. (.07) Loading a protected program gave a D88 error, if copied via ISS.
 7. (.08) \$OPEN addr, /ddd now will test disk for 16 ms.
 8. (.09) \$FORMAT DISK T /340 allowed.
 9. (.09) \$PSTAT = ALL(00), was cleared to spaces.
 10. (.09) LIST DT added /Axx-xxx items.
 11. (.10) A\$ = SELECT TC / TERMINAL
 12. (.11) Print driver
 13. (.12) LOAD ! unprotected sectors. Load of a program using the old scramble technique will now allow mix of scrambled and unscrambled code.
 14. (.13) reassembly of @MVP ucode to incorporate new printer driver files.
- . @PM010V2 , @PM016V2, @PM017V2, @PM018V2, and @LCS15V0 modified in 3.13.

Tyler B. Olsen
Beta site coordinator 617-967-0339.

FAILURE USING MVP3.0 w/ 1 MEG or HIGHER BOARDS

FAILS BEFORE GENPART SCREEN w/ ERROR P56 ON LINE 165.

```
165 IF J <= 0 THEN RETURN: B = B + 1: A(B) = MIN(J, 56):  
J = J - 56: GOTO 165
```

FIX - EDIT/RECALL 165 & CHANGE AS FOLLOWS:

```
165 IF J <= 0 THEN RETURN: B = B + 1: B = MIN(B, 8): A(B) =  
MIN(J, 56): J = J - 56: GOTO 165
```

☆☆☆ ATTEMPTING TO USE ANY MEMORY BEYOND 512K
COULD CAUSE A FATAL SYSTEM ERROR, PEDM or PECM.
THIS IS A TEMPORARY FIX WHICH WILL ALLOW A
1 MEG OR GREATER BRD TO WORK WITH 3.0 UNTIL
3.1 IS AVAILABLE TO THE CUSTOMER. MUST HAVE
3.1 TO ACCESS MEMORY BEYOND 512K.

JERRY SWIGNEY, SANDY SHARRON, TYLER OLSEN, HARRIS GATES

MVP 3.0 OPERATING SYSTEM

REQUIRES 28K CONTROL MEMORY

HAS RAM DISK - ADDRESS 340 (MUST BE IN GENPART)

GETS ALL DATA MEMORY NOT GEN'D TO TERMINALS

WORKS OUT TO 56K / BANK = 224 SECTORS

Release 3.0 for Multiuser BASIC-2 Available; Answers to Data Storage

by Tyler Olsen
Wang Labs, Inc.

The latest version (Release 3.0) of the Wang Multiuser BASIC-2 Operating System is now available. Release 3.0 OS will operate on any CS or any 2200 CPU with 28K of control memory. The software is shipped with the new CS units; it is available as a WSS automatic update; or may be ordered individually by calling WangDirect. The release contains the software on diskette, and four documents: "2200 Programming in BASIC," "BASIC-2 Utilities Reference Manual," "Customer Service Release Notice for 3.0," and "Multiuser BASIC-2 Reference Manual."

Model Number	Media Code
195-0049U-X	3, 5, 9
Product Name	
Wang Multiuser BASIC-2 Operating System 3.0	

There have been many questions about the Wang Data Storage (DS) cabinet for the Wang CS or 2200 system. The DS can be cabled to either a disk, disk/printer, or triple (disk/printer/terminal) controller in an I/O slot of the CPU. If a DS is multiplexed with other CS or 2200 CPUs, it can plug into the 2275MUX controller board.

The DS cabinet contains four compartments, each designed to hold two half-height or one full-height devices. The upper two visible compartments are accessible from openings in the front panel; the lower two interior compartments are covered by the front panel. (Figure 1.)

The DS cabinet contains cables for a streaming tape cassette drive (STCD), a floppy drive, a Winchester removable, and a daisy chain cable to handle up to four Winchester drives (four fixed or three fixed and one removable). Two eight position switches are used for assignment of

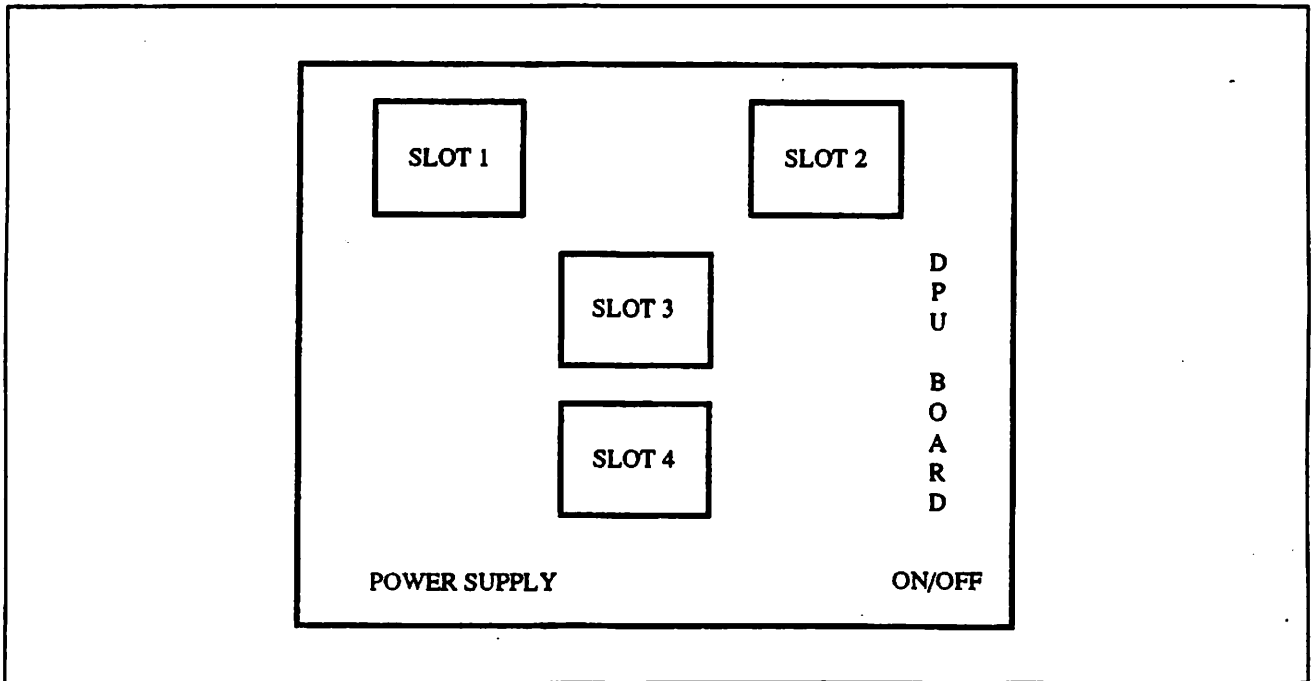


Figure 1. The Data Storage Cabinet for the CS/2200

addresses to the fixed disks. SW.1 is used for drives 1 and 2; SW.2 for drives 3 and 4. The maximum number of logical disk surfaces for SW.1 and SW.2 is 14 each. Table 1 shows how device addressing on the CS works.

The fixed drive in the data storage cabinet uses one address per logical disk surface; e.g., four surfaces would use four addresses. Table 2 shows the amount of storage available for the fixed Winchester disks for the Data Storage Cabinet. k

Table 1. DS Addressing on the CS

DEVICE		UNIT 10	UNIT 20	UNIT 30
Master Devices - 40 bit off				
Diskette		/D10	/D20	/D30
SW.1	Fixed	/D11	/D21	/D31
	Hard	thru	thru	thru
	Disk	/D1E	/D2E	/D3E
Removable				
	Hard	/D1F	/D2F	/D3F
	Disk			
Slave Addresses - 40 bit on				
DPU RAM Disk		/D50	/D60	/D70
SW.2	Fixed	/D51	/D61	/D71
	Hard	thru	thru	thru
	Disk	/D5E	/D6E	/D7E
Streaming				
Tape	(STCD)	/D5F	/D6F	/D7F
Cassette	Disk			

Table 2. Table of fixed Winchester storage capacities

Data Storage Type	#Available Logical Disk Surfaces	Amount of Available Storage Per Surface	Total Available Storage
DS-20	2	10 mg	20 mg
DS-32	2	16 mg	32 mg
DS-64	4	16 mg	64 mg
DS-112*	7	16 mg	112 mg
DS-140	14	10 mg	140 mg

*DS-112 is a DS-140 with SW.1 or SW.2 switches set by installing CE for DS-112 operation.

LARGEST ALPHA VARIABLE = DIM A\$(65535)65535
65535/256 = 256

Summary of BASIC-2 enhancements w/ MVP 3.0

PROGRAM ENTRY AND DEBUGGING

Upper/lower case program entry

Programs can be entered using either upper or lower case characters. BASIC-2 words are automatically translated to uppercase when the line is entered.

Descriptive error messages

Descriptive error messages are displayed whenever the system detects a program error during entry or execution.

STOP

Immediate mode STOP sets a program breakpoint so that execution will stop just before the specified line is to be executed.

TRACE

TRACE output has been enhanced to show line numbers and statement separators for statements traced. Also, alphanumeric values are displayed in hex, as well as in Ascii.

LIST DT

The information displayed by LIST DT is now in a readable format.

LIST ERROR -- LISTS ALL ERRORS WITH MEANINGS
LIST hex literals

The listing of hex literals has been improved by separating pairs of hex digits by spaces.

LIST COM/DIM

LIST COM/DIM statement lists the currently defined variables and their current values.

LIST S

The LIST S option is assumed for list output to the CRT.

LIST V -- LISTS ALL VARIABLES IN PROGRAM

PROGRAM STATEMENTS AND FUNCTIONS

BIN and VAL functions

The BIN and VAL functions have been enhanced to handle larger binary values. Now these functions can deal with 3 and 4 byte binary values.

DO groups

A group of statements can be specified for conditional execution in IF, ELSE, or ERROR statements.

IF THEN DO:

IF TRUE DOES FOLLOWING STATEMENTS TILL
COMES TO AN 'END DO', THEN RETURNS TO
'IF THEN DO'.

IF NOT TRUE WILL GO TO ^{NEXT} 'ELSE DO' STATEMENT.

SELECT function

The SELECT function allows the current device selections to be assigned to alpha variables.

ERR\$ function

The ERR\$ function returns the descriptive error message for a specified error code.

DISK OPERATIONS

RAMdisk

The unused portion of data memory can be allocated for use as a high-speed logical disk device.

LIST DC

LIST DC has been enhanced to optionally only list a specified subset of files. The subset to be listed is specified by file type or file name mask.

SAVE

Programs saved with SAVE <N> are saved more efficiently and typically occupy less disk space than those saved in the old SAVE format. Programs saved with SAVE <N> can only be loaded by Multiuser BASIC-2 Release 3.0, or later.

Scrambled programs saved with SAVE <N> ! can only be loaded by Multiuser BASIC-2 Release 3.0, or later.

LIST of a protected program will now list REM! statements. REM! statements can be used for essential program documentation, such as, titles, instructions, and copyright messages.

RESAVE

RESAVE facilitates updating program files by combining the SCRATCH and SAVE statements.

RENAME

RENAME changes the name of a file.

DATALOAD/SAVE BM

DATALOAD BM and DATASAVE BM allow for reading or writing more than one sector in Absolute Sector Address mode. ACCORDING TO SIZE OF VARIABLE.

MOVE

The MOVE statement has been enhanced to allow one to specify the size of the index and catalog area to be created on the destination platter.

PRINTER DRIVER

The printer driver has been improved to use less CPU time and enhanced to support other print options.

Corrected Anomalies

- o Partitions put to sleep by \$BREAK! would sometimes be awoken if the \$BREAK! statement were located soon after a KEYIN statement with two line numbers or the beginning of a program.
- o If an error occurred during the execution of a MOVE platter statement between two different disk units, one of the disk units could remain hogged.
- o Download of the MXE code during Master Initialization could fail if the MXE file contained data beyond the trailer record in the @MXEO file.
- o The underlines in a LINPUT field wrapping from one screen line to the next would sometimes not be erased when the LINPUT was completed.
- o \$OPEN use with multiplexed disk units has been improved. \$OPEN with the line number option will now branch to the specified line if the multiplexed disk to be opened is in use by another CPU. Previously, the \$OPEN statement would wait until the disk became available, even though the line number option had been specified.

Wang Laboratories, Inc.
1 Industrial Ave.
Lowell, Mass. 01851.

THIS Upgrade 3.0.5 got 2-16-87 -

WANG

3.0.5 - DK

Wang Multi-user BASIC-2 for beta site testing resides on two diskettes. (1 if red label DSDD).

Diskette 1. Labelled Wang Multi-user BASIC-2 1 of 2 Rel. 3.0.05.
Diskette 2. Labelled Wang Multi-user BASIC-2 2 of 2 2/12/87.

As a result of beta tests reported thus far, 3/12/87, several problems have been addressed in the Wang Multi-user BASIC-2 beta site release diskettes.

The following problems were addressed and fixed in 3.0.02.:

1. File "@INSTALL" line 810 update of file names for printer drivers.

1 File "@MVP". A problem with \$ RELEASE TERMINAL caused a hangup. This problem occurred most often when using systems with MXD controllers.

2. File "@MVP".
\$ RELEASE TERMINAL TO "name"
ERROR X77: Invalid Partition Reference

The following additional problems in file "@MVP" have been fixed in 3.0.05.:

3. \$IF ON 100, /340

4 VERIFY of a 2275 diskette was slow.

5. Halt/step TRACE into another partition showed ERR A06 protected program.

Tyler B. Olsen
Beta site coordinator 617-967-0339.

TABLE OF CONTENTS

Section

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1.0 RELEASE ABSTRACT

Customer release 2.7 corrects known anomalies with the 2200 MVP BASIC-2 Operating System and system utilities. The functionality and user interface of the @FORMAT utility were enhanced to provide support for the new generation of disk drives. Support was added to the operating system for the 2258 (2200/VS 928 Data Link) and to support the PM017 and PM018 printers.

2.0 PRE-REQUISITES

A. Hardware

A 2200 LVP, SVP, or MVP with at least 28Kb of control memory.

B. Software

None.

3.0 RESTRICTIONS & SPECIAL CONSIDERATIONS

None.

4.0 ENHANCEMENTS

file @MVP

The disk operations have been enhanced to support the 2258 (2200/VS 928 Data Link).

file @FORMAT

The format utility has been rewritten to provide additional functionality and a better user interface.

file @PM017V1

This file has been added so that the PM017 (400 CPS Epson Matrix) printer may be supported by the Generalized Printer Driver.

file @PM018V1

This file has been added so that the PM018 (60 CPS Juki Daisy Wheel) printer may be supported by the Generalized Printer Driver.

3.0 PROBLEMS CORRECTED

<u>PROBE</u>	<u>PROBLEM</u>
.....	The Generalized Printer Driver incorrectly prints hex literals.
.....	Multiple GPD table loads cause D82's in \$INIT.
.....	The Generalized Printer Driver associates terminal printers with partitions and not terminals.
.....	Random P48 errors with TC \$GIO.
.....	The Generalized Printer Driver incorrectly rounds the results when calculating lines per inch.
F008620	@MOVEFIL does not span files correctly.
F008843	Restricting disks to single partitions did not work.
F008844	INPUT statement errors 'eating' user memory.
F008852	\$BREAK! does not work.
F009320	@GENPART error when deleting 15th printer driver table entry.
F009363	\$INIT command errors with 6 printer driver tables entries specified.
F009401	@MOVEFIL gets I98 error with green table diskettes.
F009496	\$RELEASE TERMINAL TO #,STOP does not halt destination partition.
F010815	The LIST' command does not report all DEFFN' subroutines.
F010820	Operations involving globally defined matrix statements cause unexpected errors and hangs.
F010827	@INSTALL does not install file @DG.
F011037	MXE port #16 was not usable as a TC port
F011039	SELECT TC statement generated P48 errors
F224306	Specifying 0 partitions in bank 1 caused @GENPART to fail.
F224307	@GENPART allowed devices to be specified more than once.
F224308	The diagnostics menu was moved to the second diskette.
F224325	@GENPART allowed illegal printer addresses to be specified.
F224403	@FORMAT had P48 errors when disks were in use.
F224407	@FORMAT had P34 errors when illegal index sizes were used.
F224417	The GPD did not support underscored lower case 'z'.
F224419	@FORMAT has P34 errors if the index size was larger than the catalog size.
F224433	@FORMAT had X75 errors.
F224479	@BACKUP could fail to verify good diskettes.
F224496	@MOVEFIL wrote trailers incorrectly when recombining @SPAN files.
F300593	@MOVEFIL did not move files that were after the first @SPAN file in the catalog index.
F400067	The MXE deleted all null characters during TC communications.
F400162	LIST DC wildcards not functioning properly.
F500301	When listing the catalog to a terminal printer from the 16th partition, only every 16th entry is printed.

6.0 KNOWN ANOMALIES

file @MXEO
PROBE

PROBLEM

..... Hitting HALT while in a LINPUT statement where the receiver variable is prefilled with more than 80 underscored characters may result in underscore of characters beyond the 80th position not to be erased.

F009073 When exiting MXE command mode on a terminal whose baud rate was set under software control the first line of console input is lost.

F010244 When using the extended 29 byte CCV, and setting XON/XOFF as the flow control mode, the whole MXE can hang.

F300319 When exiting MXE command mode on a terminal whose baud rate is less than 19.2, the first line of console input is lost. This is releasted to PROBE F009073.

7.0 MEDIA CONTENTS

The 2200 MVP BASIC-2 system software is available on three types of media: 8" double sided double density diskette (one diskette), 8" single sided single density (two diskettes), 5 1/4" double sided double density diskette (two diskettes). One sample of each kind of media has been provided.

8" double sided double density diskette:

Part Number: 195-0049-5
Diskette Number: 731-0058-E

8" single sided single density diskettes:

Part Number: 195-0049-3
Diskette Numbers: 701-2294-V (Diskette 1 of 2)
701-2767-B (Diskette 2 of 2)

5 1/4" double sided double density diskettes:

Part Number: 195-0049-9
Diskette Numbers: 731-8009-B (Diskette 1 of 2)
731-8010-B (Diskette 2 of 2)

Item Subject: CS-D/CS-X DIAG FS,ENG PLN

CS-D Disk controller - Diagnostic Functional Specification

Diagnostic Functional Specification

Documentation Release: xxxx
Documentation Part No: 760-xxxx

Software Release: xxxx
Software Part Number: 7xx-xxxx

PROM Part Number: 379-xxxx

Product Name: CS-D Disk Controller

Originator: W.J Lo

Date: March 16 1988

Tables of Contents

- 1.0 Reference Documentation
- 2.0 Configuration Requirements
- 3.0 Program Description
- 4.0 Load Procedure
- 5.0 Operating Instruction
- 6.0 Miscellaneous
- 7.0 Program Revision History
- Appendix A - Test and error table

Engineering Service Department
Wang Computer (Taiwan) Ltd.

1.0 Reference Documentation

2275F/R Disk Unit for the 2200
Software functional specification
Author: Dave Barrett
CS-D/CS-N Hardware Specification. Rev. A

2.0 Configuration Requirements

2.1 Hardware

Minimum required configuration for the BIT portion of the diagnostic consists of a 2200 CS-D Disk Controller (210-XXXX), chassis and a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT. The minimum required configuration for the Burn-In portion of the diagnostic consists of a 2200 CS-D disk controller(210-XXXX), chassis, a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT, and a chip with a LED on it, that gets attached to the chip at location LXXX (for Mfg. only). The minimum required configuration for the repair aids portion of the diagnostic consists of a 2200 CS-D Disk Controller (210-XXXX), chassis, a PROM containing the latest version of firmware linked along with the latest version of the diagnostic BIT, a 5 1/4" floppy drive, a 20 M_g winchester disk drive, a TEAC cassette tape drive and a Z-BUG Emulator. In addition, a diskette with the file "DATTEST" on it and a 2200 system is needed in order to be able to on the optional interface test.

2.2 Software

A 32k PROM loaded with the latest revision of diagnostic and operating system code located at LXXX of the (210-XXXX) board. Also a 5 1/4" diskette with a basic program on it called "DATTEST" is needed to run the optional interface test.

3.0 Program Description

3.1 Applications

To test hardware locate on the 2200 CS-D Disk Controller (210-XXXX) and clear a path for the 2200 operating System. There is also a board repair diagnostic included in the PROM code, as well as, an optional interface test. These additional tests are designed to provide Manufacturing with a more complete diagnosis of the hardware and give them Burn-In capabilities.

3.3 Hardware Tested

The hardware on the board consists of a 32K PROM, 16K of RAM, 256K of bank selectable RAM (16K banks), Z80 CPU chip, CTC, 765 Floppy Disk Controller chip, 2010 Winchester Controller chip and a QIC-02 Interface.

3.4 Tests in the Program

<u>Name of Test</u>	<u>Hardware Tested</u>
1. Cache Data Lines Shorts Test	Data lines of all Cache banks
2. Data Line Stuck Test	Data lines of RAM
3. Address Lines Test	RAM address lines
4. Address Line Test	Cache address lines
5. Bank Select Test	Cache bank select hardware
6. Push/Pop Memory Test	RAM & Cache
7. Reverse Parity & Parity GEN. Test	Parity circuitry
8. CTC Control, Data, & Addr. Test	CTC
9. CTC Downcounter & Timer Mode Test	CTC
A. CTC Interrupt Test	CTC
B. DMA Clear Test	DMA, temporary register
C. DMA Channel Addressing Test	DMA
D. DMA Current Address Reg. Test	DMA, current address register
E. DMA Verify Transfer Test	DMA, EOP
F. 765 FDD Chip Test	UPD765 FDC chip
10. 2010 Wini Controller Chip Test	WD2010 chip
11. QIC-02 Interface Test	QIC-02 Interface

3.4.1 Program Jump Table

A program jump table at the beginning of the program gives user the ability to go directly to a test routine and execute from that point on. The procedure for doing this is as follows. Using the Z-Bug emulator set the Program Counter (PC) to X'6050' and load the accumulator with the test routine desired using the hex value of the test routine that precedes each test in the table of tests above. This is a function of the Board Repair portion of the diagnostic.

4.0 Load Procedures

Refer to the 2200 DS Disk Processing Unit (DPU) BIT, June 24, 1987

5.0 operating instructions

Refer to the 2200 DS Disk Processing Unit (DPU) BIT, June 24, 1987

6.0 Miscellaneous

None

Appendix A

TEST AND ERROR TABLE

As described earlier in section 3.2 of this document the Z-Bug emulator may be halted on an error and viewing of the Z80 prime registers will contain specific fault isolation information. This means that without a Z-bug emulator error information cannot be retrieved from the diagnostic. Error codes are left in the 'B' register for all tests except test 6. For test 6 the error code will be left in 'A' the address at fault will be in register 'BC'. Depending on what test is running determined what the other prime registers are holding for information. The following is a listing of tests with the error codes associated with it. Further information may be found in the listing test headers.

<u>TEST ROUTINES</u>	<u>ERROR CODES</u>
1. Cache Data Lines Shorts Test	01
2. Data Line Stuck Test	02
3. Address Lines Test	03
4. Address Line Test	04
5. Bank Select Test	05
6. Push/Pop Memory Test	06
7. Reverse Parity & Parity GEN. Test	07
8. CTC Control, Data, & Addr. Test	08
9. CTC Downcounter & Timer Mode Test	09
A. CTC Interrupt Test	0A
B. DMA Clear Test	0B
C. DMA Channel Addressing Test	0C
D. DMA Current Address Reg. Test	0D
E. DMA Verify Transfer Test	0E
F. 765 FDD Chip Test	0F Thru 15
10. 2010 Wini Controller Chip Test	16 Thru 19
11. QIC-02 Interface Test	1A Thru 23

Proj Ct1#:

Assy#: 2109560 Desc1: PCA CSR MOTHER BOARD Stat: 2 Rev: AD Assy Level: 1
Desc2: Last Modified: 00/00/0000 By: Last Auto Update: 00/00/0000

Component Item/ Description	Item Status	No-Wang Ind	Qty Per Assy	U M	Qty Type	Comp Type	ECO Number	CQVL Ind	Value Type	Ref Desg From	Ref Desg To
3001966 CAP .047UF 50V-50% Z5U	2		2.0000	EA	1	1	RA	0	47000P	C2	C3
3004034 CAP .47 UF 20V 10% TANTALU	2		1.0000	EA	1	1	RA	0	47000N	C1	
3302023 RES. 220 OHM 1/4W 5% METAL	2		2.0000	EA	1	1	52889D	0	220	R1	R2
3303011 RES 1.1K OHM 1/4W 5% METAL	2		4.0000	EA	1	1	52889D	0	1K	R3	R6
3303023 RES 2.2K OHM 1/4W 5% META	2		4.0000	EA	1	1	52889D	0	2.2K	R7	R10
3330912 RES NET 2.2K OHM TYPE. 10/	2		1.0000	EA	1	1	52889D	0	2.20KN	RP1	
3500011 CON EG-CD 15-15P .156X.14	2		19.0000	EA	1	1	RA	0	30 CONT	J1	J19
3500021 CON EG-CD 22-22P .156X.14	2		1.0000	EA	1	1	RA	0	44 CONT	J21	
3500039 CON EG-CD 22-22P .156X.14	2		1.0000	EA	1	1	RA	0	44 CONT	J20	
3500216 CON UNIV PMR RCPT 2P .25C	2		1.0000	EA	1	1	RA	0	2 CONT	J24	
3500217 CON PMR UNIV RCPT 3P	2		1.0000	EA	1	1	RA	0	3 CONT	J23	
3500238 CON UNIV PMR RCPT 5P .25C	2		1.0000	EA	1	1	RA	0	5 CONT	J22	
3500310 CON HDR 4P .100C R/A PCB	2		1.0000	EA	1	1	RA	0	4 CONT	J25	
3500224-376-05562 IC 74LS03 QUAD 2-IMP NAND	2		1.0000	EA	1	1	RA	R	74LS03 74503	L1	

59323
SMT 3 OF

Proj Ctl#: _____

Assy#: 2109566

Desc1: PCA CSD MOTHER BOARD
 Desc2:

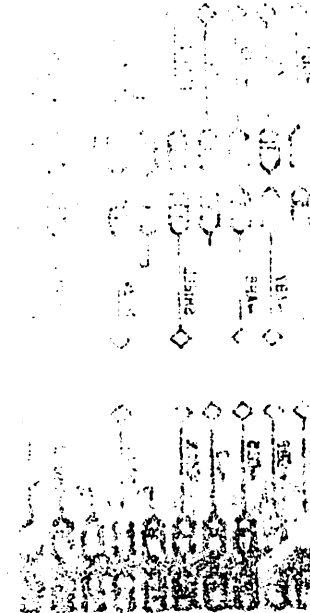
Stat: 2 Rev: AD
 Last Modified: 00/00/0000

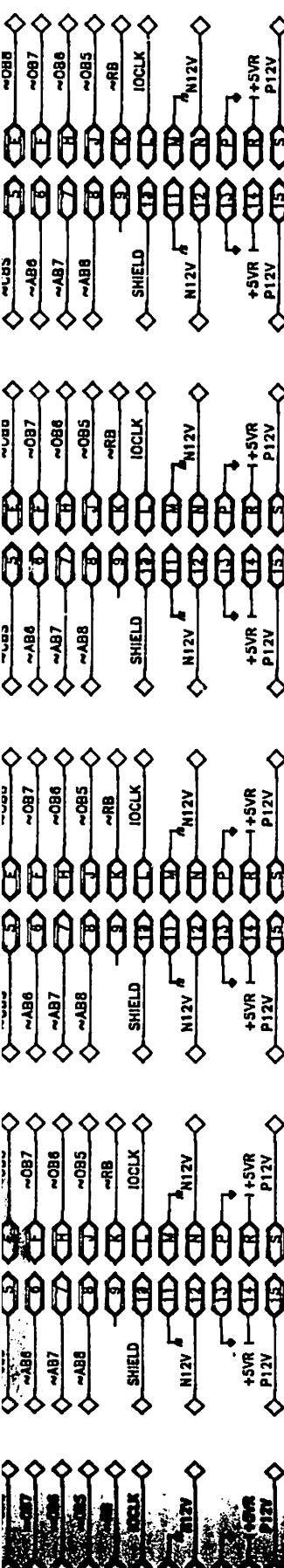
By: _____
 Last Auto Update: 00/00/0000
 Assy Level: 1

Component, Item/ Description	Item Status	No-Wang Ind	Qty Per Assy	U M	Qty Type	Comp Type	ECO Number	CQVL Ind	Value Type	Ref Desg From	Ref Desg To
3760737-3760262 IC: 74ALS74 DL D FF POS-	2		1.0000	EA	1	1	RA	0	74ALS74- 74S74	L2	
3804000 DIO RECT 400V 1A D041	2		1.0000	EA	1	1	RA	0	1N4004	D1	
5109560 PCB CSD MOTHER BOARD	2		1.0000	EA	1	1	RA	0		@0000001	
6152318 LABEL, BARCODE	2		1.0000	EA	1	1	RA	0		@0000002	
6541192 TERMINAL TURRET SOLDER	2		5.0000	EA	1	1	RA	0	TERMINAL	TP1	TP5

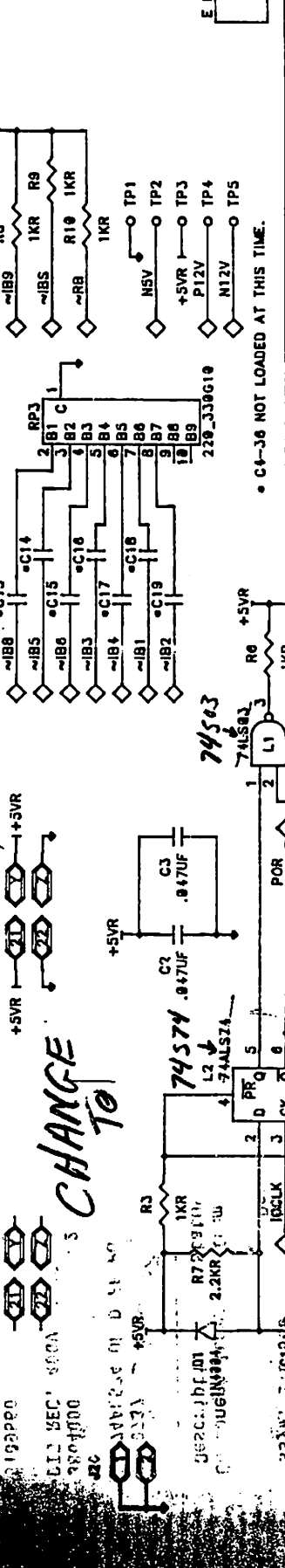
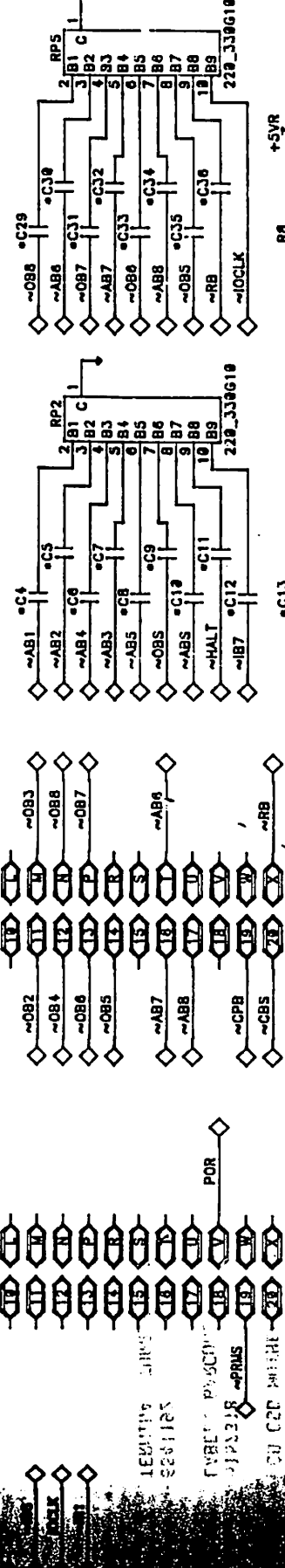
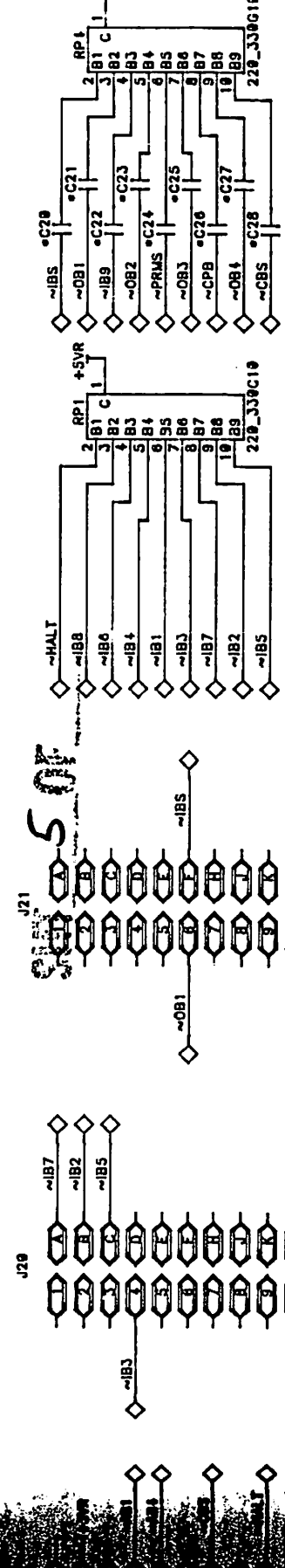
0000 59333

CH 4 OF

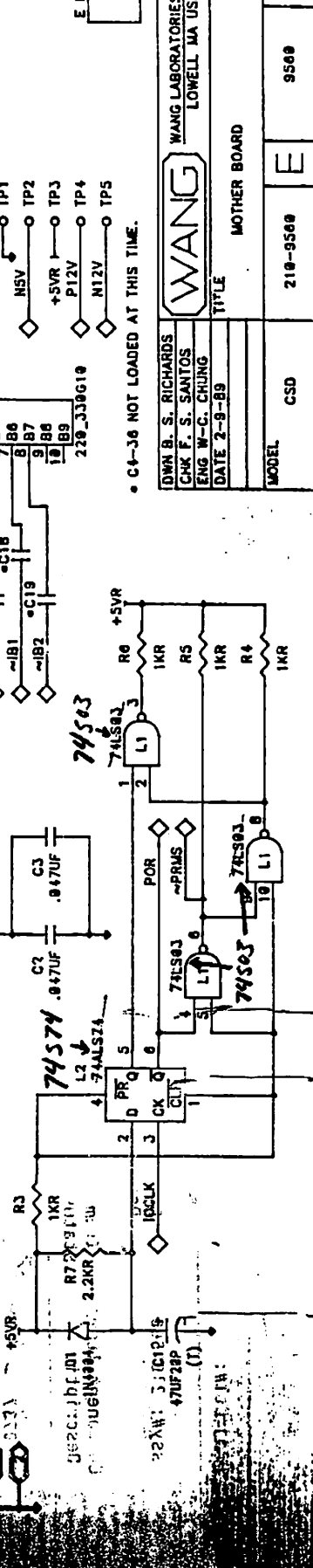




59333



CHANGE TO



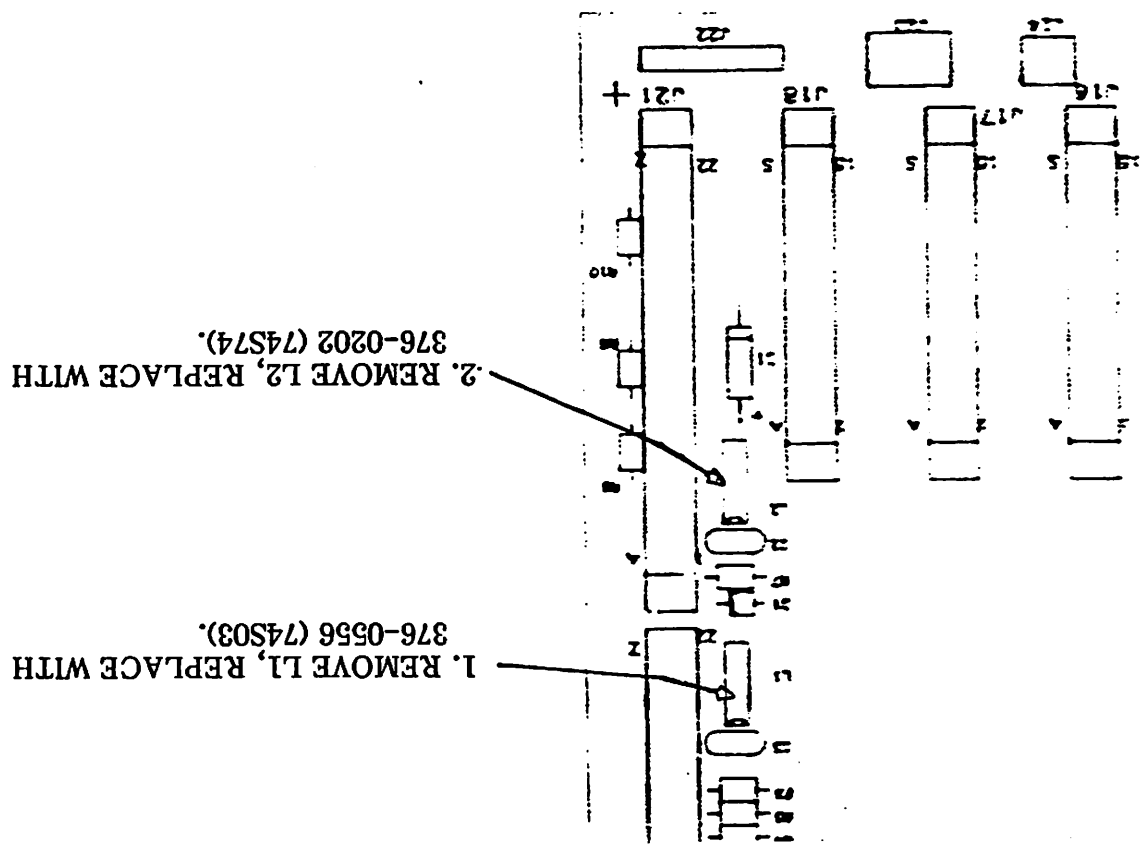
DWA B. S. RICHARDS		WANG LABORATORIES INC.	
CHK F. S. SANTOS		LOWELL MA USA	
ENG W.-C. CHUNG		TITLE	
DATE 2-8-89		MOTHER BOARD	
MODEL	CSD	PART NUMBER	210-9560
SHEET 1 OF 1	1	SIZE	E 9560
DRAWING NUMBER		REV	

* C4-36 NOT LOADED AT THIS TIME.

PAGE 2
ECO 59333
210-9560-R1

59333

6



2. REMOVE U2, REPLACE WITH
376-0202 (74S74).

1. REMOVE U1, REPLACE WITH
376-0556 (74S03).

CE

To: Mike Bahia
From: Marshall Barnes
Subject: 2200

MS0126/LOWELL
Date: 02/21/90

Distribution:

Not Requested

THANKS VERY MUCH !!!!!

MARSHALL

----- Reply -----
To: Marshall Barnes From: Mike Bahia
Subject: 2200 Date Sent: 02/21/90

Marshall,

Talked with Tyler & he did not know of the strap but both he & I also heard something like this from another field source. Called Manufacturing in Puerto Rico & now have the answer. There is a new Rear Panel Assembly for the CS for use with the 386 for FCC purposes. The part # is 458-5026. There are also 2 gaskets used on the side panels part # 656-0145. Talked with Sue & will be sending her 9 keyboard foils via Fed Xpress tonite.

Regards,
Mike

----- Reply -----
To: Mike Bahia From: Marshall Barnes
Subject: 2200 Date Sent: 02/21/90

The customer tells us that they are talking to a Tyler Olsen in HO. He is the one telling the customer about this strap. He has also told the customer that they need certain Revs of boards for there 386 upgrade that we cannot find. Do you know who Tyler is and maybe he can let us know.

----- Original Memo -----
To: Marshall Barnes From: Mike Bahia
Subject: 2200 Date Sent: 02/20/90

Marshall,

Have checked FCO listing for the CPU strap & there is no such FCO. Also checked ECO's & could not find anything & R&D was unaware of any ECO's. Made arrangements for the keyboard foils & expect to pick them up tomorrow.

Regards,
Mike

SELECTION CRITERIA

```

-----
PTR NUMBER -          START: C200001668                      END: C200001668
PRIORITY:             ALL
PROBLEM TYPE:        ALL
RDB -                ASSIGN RDB: ALL          CUST RDB: ALL      ORIG RDB: ALL
HW/SW INDICATOR:    ALL
STATUS TYPE:         0
STATUS CODE:         ALL
-----

```

```

PROBLEM NUMBER:  C200001668      CUST NAME:      NORTHSIDE INSURANCE
PRIORITY         P3              CUST NUMBER:    00 00002790384

```

```

PROBLEM TYPE:     INFO          CUST CONTACT:   MIKE THERMAN
PRODUCT PROB NO: NOT LINKED    CUST CONT PHONE: -404-751-7919
                                CUST ADDRESS 1:  11111 HOUZ RD
                                CUST ADDRESS 2:
                                CUST ADDRESS 3:
SYSTEM MODEL NO:  CS-10        CUST CITY:      ROSWELL
GEN SYST MODEL:   2200 CS      CUST ST/PROV:   GA
O. S. VERSION:    O. S.        CUST ZIP:       30076-0000
HW MODEL NUMBER:  CS-10        CUST COUNTRY:

```

```

SW MODEL NUMBER:  RDB ASSIGNED: 8760
SW VERSION:       PERSON ASSIGNED: BAHIA MICHAEL E
PART NUMBER:      ORIG NAME:      BAHIA MICHAEL E
PART NUM REV:     ORIG PHONE:     - - -

```

```

CALL TRKG DATE:  00/00/00      NETWORKED:      N
CALL TRKG NO:
ORG ACT/SYM/ACN:
STATUS DATE:     02/03/89      RES DEPLOYED:
STATUS CODE:     H O 495       DATE ENTER PTR: 02/03/89
STATUS ABBREV:   NEW PROBLM    DATE TO R&D:
                                WKDYS IN R&D:      23.09
                                TOT WKDYS OPEN:     23.09

```

PROBLEM SUMMARY : BAHIA MICHAEL E DATE: 02/03/89 TIME: 11:49
 2200CS OPER: MARI X66355
 Concerning intermittent I91 erros using Red shaw software. specifically regarding the chip at location at L2 and the manufacturer of that chip.

ASSIGNED: BAHIA MICHAEL E DATE: 03/07/89 TIME: 08:44
 LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 02/03/89 TIME: 17:21
 CE HAS REDSHAW CUST GETTING AN I91 ERROR DURING A SORT PROGRAM. REDSHAW SAYS PROBLEM IS CHIP L2 IF IT IS TEXAS INS MANUFACTURE. DID HAVE 1 SITE IN SC WHERE THUIS WAS SUPPOSED TO BE THE PROB BUT WE NEVER WERE ABLE TO VERIFY AS CHIPS WERE NEVER SENT IN. CE TO FIND A BRD W/ A NON-TI CHIP AT L2 & REPLACE THAT CHIP AT THE SITE. IF PROB GOES AWAY CE TO SEND CHIP IN. OTHERWISE MOST LIKELY HAS A DISK PROBLEM. (25MIN) MIKEB

ASSIGNED: RAMSDALL MARI-ANNA DATE: 02/03/89 TIME: 11:49

SELECTION CRITERIA

PTR NUMBER -	START: C200001668	END: C200001668	
PRIORITY:	ALL		
PROBLEM TYPE:	ALL		
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL	ORIG RDB: ALL
HW/SW INDICATOR:	ALL		
STATUS TYPE:	0		
STATUS CODE:	ALL		

PROBLEM NUMBER:	C200001668	CUST NAME:	NORTHSIDE INSURANCE
PRIORITY	P3	CUST NUMBER:	00 00002790384

STK HAD A TI CHIP & DID NOT WANT TO BE ORDERING BRDS TO FIND 1 W/ A MMI CHIP.
CUST HAD RELOADED S/W & PROB DISAPPEARED. THE PROBLEM OR WHAT WAS THOUGHT TO
BE THE SAME PROB CAME BACK & THE DRIVE WAS REPLACED AND AFTER RELOADING S/W
HAS NOT HAD PROBLEM. CUST IS WORKING ERROR FREE AT THIS TIME. CLOSE CALL
/CE. (20MIN) MIKEB

Wang Office Electronic Mail

11/16/88 09:54 am Page: 1

CC: Mike Bahia
From: Harvey A. Worthington
Subject: 210-8937/redshaw

MS0126/LOWELL
Date: 11/11/88

Distribution:
Mike Riley

We had a CS/DS failing with I91 running a sort application using Redshaw OS and their software. Three boards gave us the same problem. They runned our diagnostics without any failure. We got two additional boards and they runned the Redshaw software. After looking for causes of failure I changed the chip at location L2 with PAL from MMI all the boards that were failing they runned fine. It looks that the PALS 20L8 from TI (150 ns) are not fast enough. Can you check the specification from this vendor.

The chip that works have the following info
MMI PAL20L8BCNS TEXAS INSTRUMENT BAD
733788

Redshaw knows how we fixed this problem, I talked to Henry.
Keep in touch. Harvey

Wang Office Electronic Mail

11/16/88 09:54 am Page: 1

CC: Mike Bahia
From: Harvey A. Worthington
Subject: REDSHAW - Correction

MS0126/LOWELL
Date: 11/11/88

Distribution:
Mike Riley

I checked the speed of the PALS from TI AND MMI AND THEY ARE 15ns. Better have the ingeneer check why the boards are failing using the redshaw software with the TI PALS. HARVEY

FORM FEED PROBLEMS w/ CENTRONICS PRINTERS

Marty, I was on site today at Wisenberg in Houston Texas, with the CE who services the centronics printer. He replaced the "personality" pcb (which is similar to the interface/Datalink card in Wang PRT's). On testing the errors reoccurred. He then disabled the APS (Auto Perforation Skip) option via Bit one of a 5 bit switch located next to the control panel. This seemed to eliminate the form feed errors. We tested for about 1 hour and the only thing noticed was that at times we had to set TOF twice when we changed to a different size form. Thereafter all worked well. The CE will change the CPU pcb as he feels the command codes may not be clearing before the new codes come in for the new size form.

I am heading back to Austin today but all is documented. call me if I can help in any way.

Wisenberg is on Elite Advantage Software.

Louis Lugo
SCE

TAC

Information Call

Control Number 08307015

Contact Name LEWIS LUGO Position SCE
Rdb # 3515 Tdx # Phone # 713 968 7810 Ext #

System Type 2200CS Device Type CPU
Utility Name Software Level

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

Use the following area to describe the site that created this request
Cust/Office Name WINEBURG Phone #
Address 2K12 City State
On Site Contact Name

Question (*) / Answer (+)

*EMP 20602

*DISPATCH 245210

*HAVING PROBLEM WITH SYNTRONIC PRINTER USING REDSHAW SOFT
*WARE THIS IS A HARDWARE ISSUE.

11/2/88: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
>DTS CALLED IN. REDSHAW CUST USING A CENTRONICS
PRINTER. W/ 1 PARTICULAR APPLICATION THEY HAVE
INTERMITTENT TOP OF FORM PROBLEMS. HAS TRIED
DIFFERENT CONTROLLERS BUT NO CHANGE. PROBLEM DOES
NOT APPEAR TO HAPPEN FROM W/S PRINTER PORTS. TOP
OF FORM IS A FUNCTION OF THE PRINTER. THIS IS A
NON-SUPPORTED PRINTER. SUGGESTED LENDING CUST A
2245 EPSON TO SHOW EQUIP IS PROPERLY WORKING. DTS
TO TALK W/ REDSHAW & HAVE THEM GET IN TOUCH W/ ME
IF NEED BE. (20MIN) MIKEB

11/02 STEVE TAVO DSM IN MGR @#713-968-7801 N/C/B. 12:18 CH
>CALLED DSM. HAS ARRANGED W/ REDSHAW TO HAVE PRIN-
TER PEOPLE ON SITE TOMORROW W/ WANG. TOLD THEM I
WILL BE AVAILABLE FOR SUPPORT MOST OF THE DAY
EXCEPT FOR 9-10 AM DURING GROUP MEETING. (10MIN)MB

11/3/88: JUST RCV'D A 2ND CALL W/ SAME PROB. CALL DTS &
INFORMED. LOOKS LIKE REDSHAW O/S MAY BE RELATED.
SEE CALL 08308052. NOW RUNNING ON A DUAL CONTROLL-
ER. SEEMS TO WORK A FEW DAYS AFTER CHANGING BRD
THEN STARTS FAILING AGAIN. DOES NOT BELIEVE O/S
HAS BEEN UPDATED HERE. GOING ON SITE TOMORROW W/
EPSON & CENTRONICS REP. (15MIN) MIKEB

11/18/88: HAVE NOT HEARD OF ANY PROBLEMS IN AT LEAST 2 WKS.
FOUND A SW (#5) IN PRINTER HAVING TO DO W/ AUTO
PERFORATION SKIP IN WRONG POSITION & SEEMS OK

SINCE. WILL CHECK BACK W/ CUST & CALL BACK.

(10MIN) MIKEB

+PROB CORRECTED. CORRECTING THE AUTO PERFORATION SW IN PRTR
+CORRECTED PROB W/ TOP OF FORM ON 1 JOB. 2ND PROB W/ FORM
+FEED CORRECTED BY FIXING SOMETHING IN PRINTER. CLOSE CALL.

11/28/88 (10MIN) MTKFR

TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 8079 REPLACES: _____ DATE: 05/16/88 PAGE 1 OF 1

MATRIX ID. 4103 PRODUCT/RELEASE# CS, MICROVP, MVP128/512

TITLE: PROBLEM with the 1 MEG CPU/MEMORY BOARD (210-8937C) and GENERAL BOARD INFORMATION

PURPOSE:

To inform the field of a problem with the 1 Meg CPU/Memory board and the resolution. To provide other general information on the 210-8937 board.

EXPLANATION:

A problem has been found with the 1 Meg version only of the new 210-8937 CPU/Memory board usable in any single board 2200 CPU. When more than 8 terminals are used, or if greater than 512K memory is used the system may fail with PEDM errors (Parity Error in Data Memory). The problem has been found to be a Motorola chip, MC74F539N, sometimes used at L45. If L45 is something other than this specific Motorola chip, the board should be good.

CORRECTIVE ACTION:

The problem chips have been purged from manufacturing so all boards now being made will not have the problem. If you have a bad board with the MC74F539N Motorola chip, send it back identifying L45 as the problem. The chip is soldered in so it is not recommended to replace it in the field.

OTHER INFORMATION:

There are 6 versions of the 8937 board, each with it's own specific programmable array logic chip (PAL) at location L2 as shown below. Operating System 3.1 is required. Lower operating systems may fail during initial system IPL even if only 512K or less of memory is to be used. Use the new 2200 Diagnostics, p/n 195-2956-0, to properly test these boards.

Part #	Mem Size	PAL at L2	SIMM Modules Size	JUMPERS	
				J1	J2
210-8937A	128K	377-3483	2 256K	in	2-3
210-8937B	512K	377-3484	2 256K	in	2-3
210-8937C	1Meg	377-3485	4 256K	in	2-3
210-8937D	2Meg	377-3486	2 1Meg	in	1-2
210-8937E	4Meg	377-3487	4 1Meg	in	1-2
210-8937F	8Meg	377-3488	8 1Meg	in	1-2

} P56 AT LINE 165
ON LOAD OF 0/5
MUST USE 0/5 2.1

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

COMPANY CONFIDENTIAL
WANG Laboratories, Inc.

DS w/ 2 64 MEG DRIVES AT
DRIVE SELECT 1 + 2.

CE SET JUMPERS ON DRIVES TO
DS1 + DS2 RESPECTIVELY.

WHEN COPIED FLOPPY ~~TO~~ TO DX1,
ALSO GOT COPIED TO DX5.

SET BOTH DRIVE JUMPERS TO DS1
& NO PROBLEMS.

PUBLICATION UPDATE BULLETIN

TITLE: Wang Computer System (CS)

DATE: 5/13/88

This PUB affects: 741-1769

Color: Yellow

Previous Notice(s): None

REASON FOR CHANGE:

This PUB. provides updated information to the appropriate sections of the Wang CS Computer System Product Maintenance Manual.

INSTRUCTIONS:

Remove and insert attached pages and/or microfiche as follows:

	REMOVE PAGES	INSERT PAGES
1.	Cover	Cover
2.	Title Page/Preface Page	Title Page/Preface Page
3.	vii/viii/ix/Blank	vii/viii/ix/x/xi/xii
4.	1-1/1-2	1-1/1-2
5.	6-11/6-12	6-11/6-12
6.	6-25/6-30	6-25/6-30
7.	Sect. 9 Contents Page/Blank	Sect. 9 Contents Pages
8.	9-35/Blank	9-35/9-57/Blank
9.	Sect. 10 Contents Page/Blank	Sect. 10 Contents Page/Blank
10.	10-1/10-2	10-1/10-2
11.	10-5/10-6/10-7/10-8	10-5A/5B/10-6A/6F/10-7/10-8
12.	-	10-13A/Blank
13.	12-1/Blank	12-1/12-2/12-3/Blank

	REMOVE FICHE	INSERT FICHE
1.	Fiche 1	Fiche 1
2.	Fiche 2	Fiche 2
3.	Fiche 3	Fiche 3
4.		S1

This page constitutes a permanent record of revisions; place it directly following title page.



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741-1769-1

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Roy Bynum	Software Analyst ^{2200/ys}	Western Region Support Center	214 869 311 EX 41
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Jim O'Connell	RTS	WASH DC	301-657-509
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GARY LOPER	RTS	CHICAGO ^(Schaumburg)	312-397-66
MARTY DUSHARM	DTS	BALTIMORE	301-625-5
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MIKE BAHIA	PRODUCT SUPPORT	HO	656-0256
JOHN BAKI	EUROPEAN SUPP.	LONDON	011 441 568 921 X 3133

ADDITIONS TO THE FAMILY

What's new for the CS line

BY EUGENE S. SCHULZ

The 2200 has filled a niche in the BASIC-2 marketplace for years, but as the needs of that marketplace mature, system demands change. In response, Wang announced the VLSI-based CS small business computer, a replacement for the 2200 and MicroVP, and the DS, their next-generation disk storage cabinet, last March. And in October, the following additions and changes to the CS line were announced.

CS-10/20/40/80. The new CS CPUs—the CS-10 (1Mb), CS-20 (2Mb), CS-40 (4Mb) and CS-80 (8Mb)—have 32K of control memory, nine I/O slots, support 16 users and can utilize existing CS-2/5 and 2200/MicroVP option boards, peripherals and communications controllers. Complete hardware and software compatibility with existing CS-2/5, 2200 and MicroVP systems is provided. However, in order to address memory greater than 512K, Release 3.1 of the multi-user operating system is required.

Release 3.1. This enhanced operating system supports the new 1Mb/2Mb/4Mb/8Mb CPUs and VLSI CPU upgrades. Changes include:

Memory support in excess of 512K: Up to 1Mb can be allocated to program partitions; partition 1 can be 61K, the remaining 15 partitions 56K. Unused memory can be allocated to RAMDISK. Therefore, on an 8Mb CPU, up to 1Mb can be allocated to partitions and 7Mb to RAMDISK. Any unused portion of the 1Mb also can be allocated to RAMDISK.

LIST DT. The number of available device table entries has been increased from 16 to a maximum of 256. Thus, the infor-



mation display in OS Release 3.0 has been modified to display any unused device table entries.

FILE#. Up to 256 file numbers are now allowed (#0 through #255). To use file numbers greater than #15, the user must include a **SELECT #n** statement in the BASIC-2 program (where n is an integer specifying the largest file number to be used). During Resolution phase, the system determines the largest file number specified. It then allocates memory from the user partition for each file number from #16 through the largest, effectively reducing the partition size for each file number is allocated 2 bytes of memory. When a **CLEAR** or **LOAD UNIT** is executed, the memory allocated for file numbers is released back to the partition.

LIST DC TW. When the W option is invoked, only the names of the files on the specified disk are displayed across the display or printer line. No index size information or detailed file information (such as start and end sectors) is provided. This option can be used with the file name and file mask options.

LIST COM/DIM. In 3.0, **LIST COM/DIM** lists the currently defined variables and their current values. In 3.1, it lists both

the common and noncommon variables, their defined length and values in the order of definition.

Printer drivers. The Generalized Printer Driver has the following enhancements:

- Supports laser printers that accept ASCII escape sequences instead of hexadecimal. **@LASRJO** is a new printer driver table supporting the LCS15-DSK printer.
- **@DM50/VO** is a new printer driver table that supports the DM50/300 dot-matrix printer.
- Further optimization of the driver logic has improved output performance for printers not directed through a printer driver.

The following are known anomalies in OS Release 3.0 that are corrected in Release 3.1:

RESAVE. Announced in 3.0, **RESAVE** updates program files by combining **SCRATCH** and **SAVE**. In 3.1, the existing file is marked as scratched prior to attempting to save the program. For cases when the new file requires more sectors, the file is marked as scratched and an error

CS/2200 TIPS

D81 (File Full) is generated. In 3.0, the appropriate D81 error message was generated but didn't mark the file as scratched.

RENAME. Scratched files can now be renamed.

MOVE. Now generates the appropriate error message when the user-specified limits on the destination platter are to be exceeded.

MOVE FR. In Release 3.0, this statement wouldn't properly move the catalog from the source to the destination platter.

DATA LOAD BA/BM. In 3.0, there was a weakness in the syntax-checking logic. For example, DATA LOAD B AT (space between the B and A), wasn't properly handled. The syntax is now checked.

IF THEN ELSE. The statement wasn't properly handled in Immediate Mode.

Other anomalies corrected in Release 3.1 include flagging too-long program lines with the appropriate error; a partition put to sleep with \$BREAK can now be awakened by an \$ALERT from an-

other partition; \$GIO CLEAR now releases the hogged disk; and faster output to null device /000.

The @MXEO microcode has been modified to correct two problems:

- When sending 6- or 5-bit character data to the MXE in TC mode, using the shift key caused the system to hang. Now all characters are transmitted as sent to the MXE.
- Under certain conditions, a 2436WP terminal's print stream to the local printer (device 204) would stop and not resume until the 2200/CS was rebooted. This has been corrected.

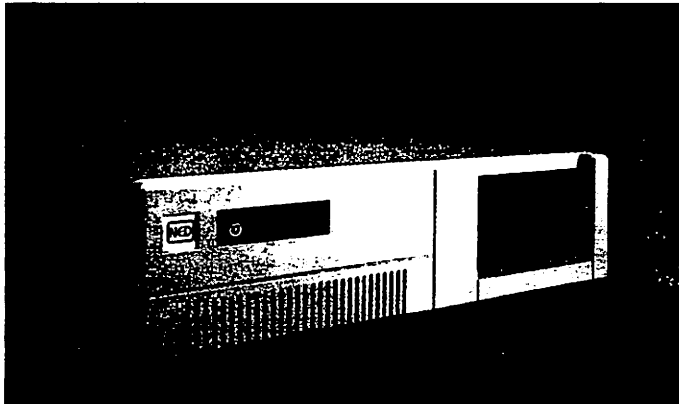
DS-140. This is a fixed-disk Winchester for the DS. Through switch settings on the Disk Processing Unit board, the user has the option of having either seven 16Mb platters (112Mb) or 14 10Mb platters (140Mb). The cabinet, ordered separately, can accommodate a 320K or 1.2Mb half-height removable diskette, 10Mb removable Winchester disk drive, a 45Mb tape streamer and a 20Mb/32Mb/-64Mb/140Mb fixed Winchester. With the

DS-140, users can configure a DS with up to 316Mb of fixed disk compared to the previous maximum of 192Mb. A CS will support three DSs, for a total fixed-disk capacity of 948Mb.

Memory upgrades. There are two types of memory upgrades available. The first allows existing VLSI CPUs to be field upgraded to 1Mb/2Mb/4Mb/8Mb by swapping out the existing 128K or 512K CPU board. The second type allows existing 1Mb/2Mb/4Mb CPU board users to upgrade to 2Mb/4Mb/8Mb by adding a 1Mb Single Inline Memory Module to their existing CPU board.

At Technetron '87, Miguel Brazao, Wang's director of the 2200/CS, noted that future issues to be addressed include performance, removing many of the CS's restrictions (such as 65K partitions) and increasing the number of users. Just as it created the need for the CS products announced in 1987, the marketplace will no doubt continue to demand these and further improvements. ■

TURBO POWER RAM DISK SUBSYSTEM



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Quantity discounts available.
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FASTEST DISK I/O AVAILABLE

- Up to 210MB hard disk
- Up to 80MB RAM disk

OPTIONS

- 40MB tape drive
- 1.2MB floppy drive
- 16MB removable disk
- Automatic Battery Backup

COMPATIBILITY

- Supports all 2200 and CS systems
- Uses Standard Wang disk I/O
- Supports 2275 MUX

Pricing

- Starts at \$1950
- Leasing available



NORTHEAST DIGITAL CORPORATION

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TWX: 324903

MEMORANDUM

TO: Mike Riley
FROM: Joseph R. Scaglione Ex 60249
DATE: Nov. 1, 1989
SUBJECT: PTR # C512895 2200 printer problems with VLSI and partition 1 memory

Mike;

Here it is the 2nd case where the customer has had printer problems with his 2200 system. I collected as much information as I could, should more become available I will send it along. Keep me informed of your findings.

Customer: Lykins Oil Co. Milford, Ohio 513-831-8820

DTS: Martial Barnes Columbus, Ohio 614-885-9599
CE: Mike Byron Cincinnati Ohio 513-786-8250

Hardware: 2200 Micro VP with 512K of data memory O.S. 3.1
(3) 210-7342 (3) PM017 printers @ 215 / 216 / 217

Software: Factor Software Oklahoma -oil distribution softw

Background: This customers hardware and software never changed. The problem seemed to surface one day. I suggested they replace the OS. So the DTS told the CE to go from the customers 2.7 up to 3.1 which was done, but did not help! Genpart setup was the same from both 2.7 and 3.1.
Customer experiences the problem within 2-5 min and other times after hours have past.

Problem: Intermittently from the 1st workstation or any terminal attached to partition #1.

Any printing from partition #1 to any one of the three printers will cause the paper to stop line feeding and print over the same line OR printer will underscore all printed text.

Rebooting the CS is the only way to clear this condition.

All 3 printer addresses do it 215 / 216 / 217.

They tried PM 017V1 and PM 017V3 no change.

Jobs printed from other partitions are ok. Even when the printer @215 @ partition #1 is experiencing a problem.

Genpart: Genpart looked liked this when they had the problem.

Terminal # 1 Part.# 1 24 K
Terminal # 2 Part.# 2 37 K
Terminal # 3 Part.# 3 28 K
Terminal # 4 Part.# 4 28 K
Terminal # 5 through 10 has 56 K each

In closing: The CE has the customer on 3.1 -Terminal #1 Part. #1 has 61 K
Terminals 2-9 now have 56 K each- all is working fine - no problems reported since.

MEMORANDUM

TO: Mike Riley
FROM: Joseph R. Scaglione Ex 60249
DATE: Nov. 1, 1989
SUBJECT: PTR # C410002139 2200 printer problems with VLSI and partition 1 memory

Mike;

Here it is the outline below is 1 case where the customer has had printer problems with his 2200 system. I collected as much information as I could and will send more as it becomes available. We should have enough information to recreate, understand and possibly fix or document this problem in a TSB. Let me know if you need more info I do have another instance where this happened. I'll collect that info and send it.

Customer: Mac Neill Eng. Co. Marlborough, Ma. 508-481-8830

DTS: Yuri Petriv EE# 16904 Burlington, Ma. Ex. 1-39184

Hardware: 2200 CS-10 PM017 @ 215 / 2235 @ 216 / HP Laser @ 217
O.S. 3.1

Software: Tom Speed 2.3 / 3500 WP /BMB Softw. (Joe Malone) 617-383-0540

Background: This problem seemed to surface after the customer went to 1 Meg. of memory and 3.1 was installed. Customer experiences the problem once a month to a couple of times a week.

Problem: Intermittently the printer @ 215 over prints lines (NO LINE FEED) also prints at random "/". When printing from Partition 1.

Once the PM017 printer had the problem the I/O cable was moved to a 2235 and that printer performed the same way.

Rebooting the CS is the only way to clear this condition from printer 215.

Address 216 seems to be ok.

Jobs printed from other partitions seem to be ok. Even when the printer @215 @ partition #1 is experiencing a problem.

In closing: The CE did say the vendor reported " partition 1 had an AUTO BOOT attached without sufficient memory to support it. Auto boot has been removed"

Question: What the Genpart looked liked when the customer was on 2.7 and what it got changed to with 3.1 and the extra memory added, I don't have answers for - I called BMB Software in Burlington, Mass. and ask for Genpart before and after.
Still waiting for response.

MEMORANDUM

TO: Mike Riley
FROM: Joseph R. Scaglione Ex 60249
DATE: Nov. 4, 1989
SUBJECT: PTR # C410002139 2200 printer problems / Genpart Information

Mike;

I TALKED WITH THE SOFTWARE VENDOR - THE FOLLOWING IS THE GENPART SETUP WHEN THE CUSTOMER WAS HAVING THE PRINTER PROBLEMS.

PARTITION #1 had 5K (common sub-routines used by the software package not dedicated to print functions.)

PARTITION #2 had 56K Note: Part #1 and 2 were for terminal #1

Genpart was changed to the following and printer problems were resolved..

PARTITION #1 had 61K Terminal #1

PARTITION #2 had 56K Terminal #2
Still waiting for response.

Simm in loc L45

HUNG ON IPL w/ SRAM 256KB, DRAM 4096

"

Simm in loc L43

BLANK

HUNG w/ SRAM 256KB, DRA

"

"

"

L31

HUNG w/ SRAM 256KB, DRAM 4096 KB

"

L27

HUNG w/ SRAM 256KB, DRA

L13

BLANK -

SRAM 256KB, DRAM 4096 KB

"

L10

BLANK -

SRAM 256KB, DRA

"

"

2200

A) ORIGINATING SITE : PARKWOOD/DICK LIU
 B) PURGE NOTICE # : 6106
 C) PART #/DESCRIPTION : 377-0768/ 32KX8 SRAM 85NS (TOSHIBA & MOTOROLA).
 D) AFFECTED HIGHER ASSY : N/A TOSHIBA TC55257APL-85
 E) CSO IMPACT : -----
 F) INITIAL DISPOSITION : PURGE STOCK, STOCK PREP, KITS AND SORT FOR TOSHIBA AND MOTOROLA PARTS. SEND ALL AFFECTED TOSHIBA & MOTOROLA PARTS TO MRB FOT DISPOSITION. RETURN ALL HITACHI AND IDT PARTS TO STOCK.
 G) PURGE ORIGINATOR/EXT : DICK LIU/78454
 H) REVISION /DATE CODE : -----
 I) REASON FOR PURGE : TOSHIBA & MOTOROLA PARTS DO NOT MEET SPECIFICATION. HITACHI AND IDT PARTS ARE GOOD.
 J) DATE ISSUE : 10/02/89

SINGLE LEVEL WHERE-USED

Date 10/25/89
 Page 4 of 5

Options: Item 3770768 Effectivity 4 Date

COMPONENT ITEM	ITM TYP	ITM CLS	ITM STA	ENG UM	MFG REV	DEM CTL	ISS CTL	DSGN SRCE	DRAWING SIZE/NUMBER			
377-0768 IC 32KX8 CMOS SRAM 28 PIN 85 NS	1		2	EA		1	1		/			
C5386												
FIND NO.	PARENT ITEM	LIQ SST	QUANTITY	UM	T	U	M	S	OP SC G	EFFECT	REV LVL	ECO NUMBER
001	210-9426-A PCA MAC BRIDGE-TOP	1 1	6.0000	EA	1	1	1	00	00	I01/22/88	AB	RA
002	210-9426-A PCA MAC BRIDGE-TOP	1 1	4.0000	EA	1	1	1	00	00	I05/11/88	AC	RA
000	210-9561-A PCA CPU BD	2 1	8.0000	EA	1	1	1	00	00	I10/20/88	AA	RA
000	210-9561-B PCA CS-386 CPU BD	2 1	8.0000	EA	1	1	1	00	00	I02/07/89	AA	RA
000	210-9561-C PCA CS-386 CPU BD	2 1	8.0000	EA	1	1	1	00	00	I02/07/89	AA	RA

(1)OPTIONS, (3)NEW PG (5)NXT PG, (7)NEXT REC/PARTIAL, (15)PRT SLBM, (16)EX

POSSIBLE LOCATIONS ON 9561 - L2, L3, L4, L5, L21, L22, L23, L24

SINGLE LEVEL WHERE-USED

Date 10/25/89
 Page 5 of

Options: Item 3770768 Effectivity 4 Date

COMPONENT ITEM	ITM TYP	ITM CLS	ITM STA	ENG UM	MFG REV	DEM CTL	ISS CTL	DSGN SRCE	DRAWING SIZE/NUMBER			
377-0768 IC 32KX8 CMOS SRAM 28 PIN 85 NS	1		2	EA		1	1		/			
FIND NO.	PARENT ITEM	LIQ SST	QUANTITY	UM	T	U	M	S	OP SC G	EFFECT	REV LVL	ECO NUMBER
000	210-9561-D PCA CS-386 CPU BD	2 1	8.0000	EA	1	1	1	00	00	I02/07/89	AA	RA

**TSO PRODUCT SUPPORT
IMPACT REVIEW CHECKLIST**

WANG ECO# _____ OEM ECO# _____ P/N# 6106

1. WANG MODEL #s AFFECTED: ~~210-9561~~ MICROVP's, CS's, CS-D's, & CS-N's w/ 386 CPU

2. WANG FRU(s) #s AFFECTED: 210-9561

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (If NO, go to 7) YES _____ NO X

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS _____ SOME UNITS _____

5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____	INTERMITTENT _____	ENHANCEMENT _____
FCC COMPLIANCE _____	HARD FAILURE _____	RELIABILITY _____
TEMPEST INTEG. _____	CATASTROPHIC _____	OTHER (See 7) _____

6. P/R DATA: <u>Unit Population</u>	<u>Product Failure Data</u>			<u>Parts Related To ECO/PN</u>			
	last	Total	Total	Fails	Total	Reduction	Reduced
_____	12 mo.	Calls	Fails	per Year	Used	by ECO/PN	FPY
_____	_____	_____	_____	_____	_____	_____	_____

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSB required	_____
Level C	FCO required	_____

FCO requirements Next Call _____ Est. installation time _____
 Immediate _____ Est. % of units to FCO _____

8. FSC REQUIREMENTS:

Level A	Information only	_____
Level B	Upgrade on failure only	_____
Level C	Upgrade all assy's (MUB)	<u>X</u>

9. LOGISTICS REQUIREMENTS:

Level A	Information only	<u>X</u>
Level B	Future purchases	_____
Level C	Purge stock (FSC rework)	_____

ANY OTHER INFO TO CLARIFY IMPACT: (S/N range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

SPOKE w/ JOHN TIGHE. ON THIS PROBLEM. HE FELT IT WAS MINOR &
MAY NOT AFFECT PERFORMANCE, BUT DO NOT KNOW THAT FOR A
FACT. THERE SHOULD ONLY BE POSSIBLY 25 BLOS w/ THESE CHIPS.

REVIEWER'S SIGNATURE: Michael Behr DATE: 11 / 21 / 89

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK

SELECTION CRITERIA

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-----
PTR NUMBER -          START: C200009360          END: C200009360
PRIORITY:             ALL
PROBLEM TYPE:        ALL
RDB -                ASSIGN RDB: ALL          CUST RDB: ALL          ORIG RDB: ALL
HW/SW INDICATOR:     ALL
STATUS TYPE:         0
STATUS CODE:         ALL
-----

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PROBLEM NUMBER: C200009360    CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY: P3                  CUST NUMBER: 00 00000358135

PROBLEM TYPE: INFO          CUST CONTACT: MARSHALL BARNES
PRODUCT PROB NO: NOT LINKED CUST CONT PHONE: -614-885-9599
                                CUST ADDRESS 1: WINTERS BANK TOWER STE 2480
                                CUST ADDRESS 2:
                                CUST ADDRESS 3:
SYSTEM MODEL NO: CS-10      CUST CITY: DAYTON
GEN SYST MODEL: 2200 CS     CUST ST/PROV: OH
O. S. VERSION:              CUST ZIP: 45424-0000
HW MODEL NUMBER: DS        CUST COUNTRY:

SW MODEL NUMBER:           RDB ASSIGNED: 8760
SW VERSION:                PERSON ASSIGNED: BAHIA MICHAEL E
PART NUMBER:               ORIG NAME: BAHIA MICHAEL E
PART NUM REV:              ORIG PHONE: - - -

CALL TRKG DATE: 00/00/00    NETWORKED: N
CALL TRKG NO:              RES DEPLOYED:
ORG ACT/SYM/ACN:           DATE ENTER PTR: 07/13/89
STATUS DATE: 07/13/89      DATE TO R&D:
STATUS CODE: H O 495        WKDYS IN R&D:
STATUS ABBREV: NEW PROBLM   TOT WKDYS OPEN:

```

PROBLEM SUMMARY :BAHIA MICHAEL E DATE: 07/13/89 TIME: 09:09
D.E. CAREN EE# 04513 DSP# N/A
NEED INFO ON CALL USING A DIFFERENT CUSTOMER. PROBLEM WITH THE DISK 3
HANGING.

ASSIGNED: BAHIA MICHAEL E DATE: 07/13/89 TIME: 12:06
DTS ON SITE YESTERDAY. MANY ENVIRONMENTAL PROBS.
CPU 1, SER # VL3174, SEEMS TO HAVE BULK OF HANGS.
CPU 7, SER # VL 3182, IS ALSO DIRECTLY CONNECTED.
DS 3, SER # VQ1416, IS THE DS IN QUESTION. FOUND FOLLOWING PROBLEMS & MADE
CORRECTIONS AS SHOWN IN LIMITED TIME WAS ABLE TO LOOK AT SYSTEM:

DS 3. 1. PROM UPGRADED TO R2.
2. I/O CABLE LOOSE DUE TO SHORT SCREWS. ABLE TO CREATE I90 BY WIG-
GLING. REPLACED I/O CABLE & SECURELY FASTENED.

CPU 1. 1. 7715'S IN THIS CPU AT E-REV 6. UPGRADED TO E-REV 10.
2. 8 OF 10 W/S'S HAD GRND PROB. .8-1.3V N TO GRND. CUST TO FIX.
3. 2 CHAINTRAINS. 1 HAD NO GRND PRONG. LOOSE I/O CABLES. 2V N-GRND.
CE TO CORRECT CABLE PROBS, CUST GRND PROB.

SELECTION CRITERIA

```

-----
PTR NUMBER -      START: C200009360                END: C200009360
PRIORITY:         ALL
PROBLEM TYPE:    ALL
RDB -            ASSIGN RDB: ALL                CUST RDB: ALL        ORIG RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE:     0
STATUS CODE:     ALL
-----

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PROBLEM NUMBER:  C200009360      CUST NAME:      CH DEAN & ASSOCIATES INC
PRIORITY         P3              CUST NUMBER:   00 00000358135

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4. 2275MUX NOT SCREWED IN. CORRECTED.
 CPU 7. 1. 2 7715'S, AT E-REV 2 & 3. UPGRADED TO 10.
 SCHEDULED FOR FULL DAY ON 7/19. WILL CONTINUE THRU ON ACTION PLAN UP REV'G
 BRDS & SECURING ALL CABLING. CUST USING TP BALUNS FOR W/S'S. MAY BE A PROB
 THAT MAY NEED TO BE ADDRESSED. BM TO INFORM CUST OF THIS POSSIBILITY.
 (35MIN) MIKEB

ASSIGNED: BAHIA MICHAEL E DATE: 07/13/89 TIME: 11:43
 7/10. DISCUSSED SITUATION W/ DTS. CUST HAS 8 CPU'S & 7 DS'S. DS 3 HANGS 3
 TO 5 TIMES A WEEK. USUALLY IF RESET TERM OK BUT IF UNSURE WHICH TERM SHUTS O
 FF DS & OK WHEN POWER BACK ON. THE 2 DRIVES IN THE HANGING DS WERE PUT IN A
 DIFFERENT CAB WHICH IS NOW DS 3 & STILL THE HANGS CONTINUE. ACTION PLAN:
 1. CUST TO DOC EA HANG, TERM, CPU, DS & PROG.
 2. CHECK CPU & DS V'S & RIPPLE IN ALL UNITS TIED TO HANGING DS.
 3. VERIFT PROPER CABLING IS USED & SECURELY CONNECTED.
 4. VERIFY CABLING W/IN DISTANCE SPEC, 12' DISK TO MUX, 100' MUX TO CPU MAX.
 5. UPGRADE PROM IN DS TO R2 FOR ANY DS THAT MAY HAVE PROB.
 6. VERIFY 7715 BRDS AT E-REV 10. E-REV 8 IS PASSABLE. NO E-REV 9.
 7. GAVE CE CORRECT SW SETTINGS FOR MXE. CE TO VERIFY.
 8. ALL GROUNDS TO BE CHECKED ON EQUIP IN QUESTION. SHOULD BE < .5V N TO GRD.
 9. CHECK TERMINATION & CABLING IN DS. RECONNECT CABLES, ISOLATE DATA & POWR.
 10. USE LINE ANALYZER ON CPU & DS IN QUESTION. MUST HAVE CONNECTED DURING
 HANG TO DETERMINE IF CORRELATION BETWEEN HANG & POWER. (1HR) MIKEB

ASSIGNED: HOULE CARENMARIE DATE: 07/13/89 TIME: 09:09

TO: Jim Cunningham
FROM: Michael Riley
DATE: May 27, 1988
SUBJ: Trip Report to Europe on CS/DS Problems.

REASON FOR THE TRIP

In the last three to four months at least seventeen VARs and Vendors from Europe have complained that the 2200 CS and DS have not been as reliable as past 2200 systems. Most of the dissatisfaction came from German VARs and Vendors which lead in CS/DS sales in Europe.

PROBLEM

Collectively, the German VARs and Vendors had reported four major problems. 1. The CS and DS power supply failed quite often causing computer down time. 2. The DS tape Drive hangs in the middle of a backup and the new backup requires all of the DS's access time. 3. The 2275 MUX generates I90 and I92 Errors causing computer down time. 4. The German electric power outlets do not have a fixed hot and neutral polarity which causes systems failures.

The Wang 2200/CS customers in England are not getting any support information or fixes for problems that have been solved already.

TRIP

May 16 1988: John Baxi (European Support) and I met with Germany's Marketing and CSO Managers to discuss some of the 2200/CS problems they have seen. One problem I did discover was that the German's 2200/CS support person had been sick for the last four months and all the CS/DS fixes and information did not get to the field which caused delays in getting our customers systems fixed correctly.

May 17 to 23 1988: John and I visited Infor Data GmbH which is experiencing CS power supply problems causing circuit breakers to go out. The CS's power plug can go in the power outlet in either polarity in Germany. This causes problems in the switcher power supply because the supply requires the power to be in ONLY one polarity direction. They were still having DS tape problems that we fixed months ago. Also they gave us some ideas on new features they would like to see on the CS/DS system.

G&G Henninger & Wollweber had CS and DS power supply problems. They also wanted to know when we were going to update the IDEAS II package to support the DS.

CP Computer Partner had power polarity problems which causes system failures.

Audatex Computer Sysms GmbH had tape drive and CS/DS power supply problems. They install their own systems and the floppy jumpers were configured for a PC not a DS.

SpanSet had 2275MUX problems that were fixed a month ago and a power conditioner that generated a split phase power not a reference power that the CS/DS needs.

BDB Buro KG is the software company that is working on the programs for the Shell project. They had power supply problems and DS errors or system hang problems. We may need to go out again to check out their system if the local CSO can not fix there problem.

(MOP) Management Organiss Partner is another large seller of CS/DS systems. They had CS/DS systems causing circuit breaker to go out and tape backup problems. Also wanted the new terminal to have black on white and white on black capabilities. The PM017 can not be set up for 12" page length default.

Easydent GmgH had 2436 monitor alignment problems and the DE German character PROM is not correct. The CS/DS cable screws are not correct length. Power supply problems were reported once again.

Kerridge by contract from Wang UK is the only 2200/CS Sales and Service company in the UK. Kerridge is not getting any support from Wang UK and therefore our customer are not getting any service. If we are going to help our 2200 customers this problem needs to be resolved. They had 2275MUX and tape backup problems.

TRIP SUMMARY The most frequent complaint was the CS and DS power supply failures. QA at Limerick will check out several bad supplies for common failing parts. Another complaint was that problem corrections took too long to get out to the customer. This was a real problem in Germany where our fixes sat on a desk for several months and did not get out to the field. In England, the lack of cooperation between Kerridge and Wang UK is causing all types of customer problems. The power polarity situation in Germany will be addressed by updating the installation procedures.

CONCLUSION John and I met with manufacturing and Quality Assurance in Limerick Ireland that ships CS/DS systems to Europe. We generated an action plan for these problems. By the end of June we will update our progress on resolving the outstanding problems in the Report on 2200 CS/DS Problems Being Experienced in Europe. This report will be furnished upon request.

Wang Support
John Baxi, European Support

cc Migual Brazao
0119m

Reference; your memo to Jim Cunningham; Trip Report To Europe On CS/DS Problems dated May 27, 1988.

In relation to the Power Supply failure of German CS/DS 2200 Systems, we investigated the Switching Power Supplies and the following were our findings relative to the information you provided us;

1. The CS/DS 2200 Systems leave our plant wired for the Domestic market, (U.S.A.), assembled with a power cord with 3 leads (hot, neutral and mechanical ground).
2. If the neutral and hot polarity is reversed there is no problem. However if the mechanical ground and the neutral are connected together (for a two lead power cord like the one used in Germany) and then the the polarity is reversed; this will connect hot to the chasis thus burning at least the capacitors. This will definitely cause a functional failure.
3. Another possible source of Power Supply failure is the ON/Off switch connected incorrectly while reconfiguring to the specific country power requirements.

We agree with your statement that the power polarity situation in Germany must be addressed revising the installation procedures.

Please feel free to contact us for any help, including sending us bad Power Supplies for analisis.

Best regards,
Jose'

REPORT ON 2200 CS/DS

PROBLEMS BEING EXPERIENCED IN EUROPE.

Contents :

1. Summary Report as presented to
Mike Riley and John Baxi
(This is broken into 4 sections)

2. Minutes of meeting held on
Tuesday and Wednesday 24th & 25th of May.

PREPARED BY : VINCE SHIELS, QUALITY ASSURANCE

: PATRICK HANNAN, QUALITY ASSURANCE

FOR : LIMERICK QUALITY ASSURANCE DEPARTMENT.

DATE : 27/05/1988

PART # 1.

SUMMARY REPORT ON 2200 CS/DS

PROBLEMS BEING EXPERIENCED IN EUROPE.

PREPARED BY : PATRICK HANNAN, QUALITY ASSURANCE

FOR : LIMERICK QUALITY ASSURANCE DEPARTMENT.

DATE : 23/05/1988

2200 CS/DS EQUIPMENT PROBLEMS.



Over the past number of weeks Quality Assurance in Limerick Manufacturing have responded to complaints on the quality of 2200 CS/DS/TS equipment by requesting information on their performance from the European Subsidiaries. The following report will give details of our findings and will also give details of feedback received from Wang Puerto Rico, who actually manufacture this equipment.

The first section consists of a breakdown of the reports sent to Limerick by the subsidiaries. This breakdown will give details of the type of problems being experienced and the fixes that were used (in some cases only) in the field.

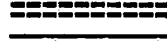
The second section is a pareto of the reported defects.

The third section consists of a report on board repairs that have taken place in WESA.

The fourth section gives details of the reply to some of these problems by Angel Flores of Wang Puerto Rico.

Some countries have not yet replied to requests for information. As soon as these do so a further report will be issued.

SECTION 1.



SUMMARY OF REPORTS RECEIVED IN LIMERICK
FROM EUROPEAN SUBSIDIARIES.

=====

NOTE : In the section marked WPR ACTION TAKEN, * denotes corrective action being taken

Illegal width.

Printout terminated by system.

Gentlemen:

The following information is related to Wang Puerto Ricc manufacturing operations for the 2200 CS/DS product lines and its corresponding switching power supplies actually in transfer from Pawtucket Boulevard. The package contains information from various dependencies in terms of quality improvements and results obtained based on previous or on-going investigations.

Focusing in detailed failures as reported from Europe:

1. Rafael Gutierrez, Product Safety Engineer for WPR took over the action item of investigation and generation of the corresponding ECO for the I/O disk cable with screws reported as too short.

STATUS: He has completed his investigation and is in the process of writing the ECO. The cable is from an outside vendor (AMP). The screws are indeed too short to tie a CS and a DS.

2. A problem was reported with the card cage making almost impossible to install the interface pcb's in the unit.

STATUS: Investigation revealed that it is quite difficult to install interface pcb's. There are no card guides and vision is obstructed when installing. No problem found that could lead to measurement errors in the mechanical design. We are looking for additional assistance.

3. Different ground potential between the controller, p/s, and chassis.

STATUS: All three parts are attached to the same reference ground level. This could have been a p/s failure as well. Please inform if this problem was repetitive because it shouldn't.

4. Rear panel fan cables with reverse polarity.

STATUS: A test to check correct assembly as well as correct fan operation will be incorporated within our process. Note: The panel with the fan installed is a buy item, therefore our supplier will be checked.

5. Power Supply reincident failures.

STATUS: Richard Lane (support from PB), is working on the 3H Power Supply Tester. He is currently verifying and fine tuning the programs as well as hardware used by the 3H to test the p/s units that WPR is taking over.

Note: The tests for the 270-1094 (DS), and 270-0986 (CS) are already in place. WPR has just begun testing these two p/s.

6. Winchester upgrades missing parts.

STATUS: This problem is not related to our operations.

Thanks to the effort of our engineers and technicians (as well as WLI's) ECO # 48051 was written for the 270-1094 p/s. This eco corrects a -12V line ripple.

Additionally, ECO # 48919 was written by Gilles Carrier based on a request for investigation from our Senior Technician Juan Pena, to correct a problem with the 22C80 MUX Controller (210-7715) card. (Both are recent eco's). It improved quality on the card eliminating hang problems and reduced cost.

Products at the field are most likely to be without these changes.
I strongly suggest a thorough verification of the MUB's for the 2200 line.

For both p/s the pre-test station has already been set in our process to assure the units are within specifications before their burn-in process.

From the report by Martin Davies, Technical Operations Mgr. we were able to trace back serial # 69453P, and 492950. Serial numbers with prefixes VK or VQ were not found in our files.

The first unit failed for a p/s for which I have been reporting already, and the second failed due to a 210-8034-2A. Actually this pcb is being replaced with the 210-8937.

Since the power supply operation has been troublesome (high failure rate reported), we are assuring that power cycling (on-off tests every 15 min.) is given to p/s within the 24 hr. burn-in period.

We have been informed that some changes were made to a prom in the tape streammer to correct backup errors. By copy of this report to Gilles Carrier I am requesting verification of such, or any other additional information that could benefit our people in the field. Errors reported were T 23 and T 27.

On software problems like I 91 and I 93, I am requesting assistance from PB (Mike Gushue), while in house covering the possibility of correcting some I 91 failures if the Shuggart is damaged.

In terms of configuration WPR does not configure the 2200 DS; Anyway if I can be of help, please advise.

We will be concentrating on increasing the quality of the power supplies as we take over the product. Improvements have already taken place and more are to come.

Please see attached memos as well.
If I can be of further assistance, please advise.

Best Regards,

Angel Flores
WPR QA Adm.

ANGEL:

Radames request from me to write a W/O mentioning process improvements done at SPS manufacturing operations. Here are most of them:

- a- Preforming of PCB components, assures perfect fitting at manual assembly and holding of component through all the material handling previous wave solder.
- b- Automatic Insertion-VCD, fixture design to process set of boards pertaining to one SPS product at the same time.
- c- Push-A-Long concept implemented for all boards.
- d- Dual set-up at PAL for two different boards at the same time.
- e- New design on Chopper to feed dual lines of PAL at the same time.
- f- PCB Cart new design allowing feeding from both sides, and in match pairs to be used later at wave solder.
- g- Wave Solder fixtures that allows processing of pairs of matching boards per SPS at the same time, having same parameters and process condition for both.
- h- In-System test done by pairs. This will keep test result matched to product parity avoiding mismatch performance between set of boards.
- i- Improvements done on BURN-IN rack controls.
- j- Unit packaging is done at manufacturing cell.
- k- All sub-assemblies are build at the same manufacturing cell and quality feedback is enforced.
- l- Complete manufacturing of an SPS unit is controlled under one Production Supervisor and Cost Center(except wave solder).

Gentlemen;

Here is some additional information regarding the 2200 CS/DS family:

1. ECO # P.R. 00406 has just been written by Rafael Gutierrez, one of our supporting engineers correcting the length of the screws for the cables 220-0364 and 220-0365 for CS/DS installations.
2. Juan Pena, from our Product Support group reported the following information as not related to our operations:
 - a. 278-4055: Neither built nor installed.
 - b. 379-2052: " " " " .
 - c. 2436EP-DW& WPR builds only the controller (8577) for the keyboard.
2436EP-DE: Need more information on Azerty Proms. We do not ship them.
 - d. 726-6418: Neither built nor installed.
 - e. 210-7203: " " " " .
 - f. 279-900-62: " " " " .
 - g. 210-0753: " " " " .
 - h. 210-7592A: " " " " .
3. The new 8937 pcb design is supposed to correct the problems of the 8034 including the PEDM error.
4. A test was put into place at our site (assy. line), to assure correct installation on the fans.
5. I have not receive feedback from Gilles Carrier regarding tape streamers backup errors.
6. Software errors were forwarded to the attention of Mike Riley. (I91,93).

Included is the trip report from Mike Riley to Europe for further reference.

Please forward feedback regarding the pending action items from the meeting at Wang Limerick. Will appreciate.

Best Regards,
Angel Flores
WPR QA Adm.

QUESTIONS FOR Q&A

MIKE
1. MIKE DURING YOUR DEMO OF THE DS INSTALLATION I THOUGHT I HEARD YOU SAY THAT THE DS CAN SUPPORT SEVEN DEVICES IS THAT CORRECT.

→ NOT EXACTLY, THERE ARE 7 DIFFERENT WINCHESTER SWITCH CONFIGURATIONS, BUT THE DS PHYSICALLY CAN ONLY SUPPORT A MAX OF 6 DEVICES, UP TO 4 HALF HEIGHT UNITS IN THE TOP SLOTS + 2 MORE FIXED WINCHESTERS IN THE LOWER SLOTS.

2. MIKE DURING OUR FIRST DS INSTALLATION OF THE 20 MEG FIXED WINCHESTER YOU SAID THAT IN THIS EXAMPLE THE DRIVE WOULD BE CONNECTED TO DS#3 COULD IT HAVE BEEN CONNECTED TO ANOTHER DRIVE SELECT CONNECTOR

MIKE
→ YES IT COULD HAVE BEEN CONNECTED TO DRIVE SELECT #4. HOWEVER THE ADDRESS OF THE DRIVE PLATTERS WOULD HAVE CHANGED FROM 51 AND 52 FOR THE 20 MEG ^{WHEN} CONNECTED TO ~~THE~~ DRIVE SELECT #3 TO 55 AND 56 ~~IF~~ ^{WHEN} ~~CONNECTED~~ CONNECTED TO DRIVE SELECT #4. AT THE SAME TIME THE ADDRESS OF THE 64 MEG WOULD HAVE CHANGED ~~FROM~~ FROM 53, 54, 55, AND 56 WHEN CONNECTED TO DRIVE SELECT #4 TO 51, 52, 53, AND 54 IF ~~CONNECTED~~ CONNECTED TO DRIVE SELECT #3

3. WHAT VOLTAGES ARE ADJUSTIBLE ON THE DS AND WHERE ARE THE ADJUSTMENTS LOCATED IN THE DS CABINET.

MIKE
→ ANS. TO ACCESS THE ADJUSTABLE VOLTAGES ON THE DS YOU WOULD FIRST HAVE TO REMOVE THE FRONT COVER. ON THE BASE OF THE CABINET ^{IN FRONT} ~~YOU~~ THERE ARE 2 SCREWS. REMOVE THE SCREWS, PULL THE BOTTOM OF THE COVER FORWARD, & LIFT UP. YOU WOULD THEN BE ABLE TO SEE THE TWO ADJUSTMENT POTS. AS YOU LOOK

THRU THE VENT ON THE FRONT OF THE DS.

RIGHT POT IS THE +12 VOLT ADJUSTMENT.

4. THERE ARE TWO 32 MEG DRIVES LISTED IN THE REFERENCE MATERIAL
WHAT IS THE DIFFERENCE?

MIKE

ANS ^{BUT TAB SW SETTINGS,} LOGICALLY THERE IS NO DIFFERENCE, BUT THERE IS AN ERROR IN THE DOCUMENTATION.
^{BOTH THE} 32 MEG ^{AND} QUANTUM Q540 DISK

~~ADDRESSIBLE PLATTERS~~ THE MICROPOLIS 1323 ^{HAVE} TWO ~~ADDRESSIBLE PLATTERS~~

ADDRESSIBLE PLATTERS. I WOULD LIKE THE MEMBER OF THE AUDIENCE TO
CORRECT THE NUMBER OF PLATTERS ^{& LAST SECTOR} ASSIGNED TO THE ~~MEMBER OF THE AUDIENCE~~ ALTERNATE 32MB
DRIVE ON THE SHEET MARKED ^{DISK DRIVE FEATURES.} ~~MEMBER OF THE AUDIENCE~~

CHANGE IT TO ² ADDRESSIBLE PLATTERS + ALSO THE ^{# OF} ~~LAST~~ SECTORS TO 65024.
THIS SAME ERROR IS IN THE DS MAINT MNL ON PG 11-1. PLEASE BEWARE.

5. HOW DO YOU IDENTIFY THE DRIVE SELECT CABLE CONNECTORS.

MIKE

ANS: THERE ARE TWO WAY YOU CAN IDENTIFY WHICH CONNECTOR IS 1,2,3
OR 4. FIRST THE WRAPPING AROUND EACH OF THE DRIVE CONNECTORS IS
MARKED EITHER DRIVE SELECT #1,2,3,OR 4. ALSO YOU WILL SEE THAT
THERE~~X~~ IS ONLY ONE PLUG AT ONE END OF THE CABLE THAT IS ABLE TO
BE CONNECTED WITH CONNECTOR J4 ON THE DS PCB. ONCE YOU HAVE
IDENTIFIED THIS CONNECTOR THEN YOU WILL SEE THAT THE CONNECTOR
THE FURTHER~~EST~~ AWAY FROM THAT CONNECTOR IS ^{THE} CONNECTOR FOR DRIVE
SELECT #1, ~~THE~~ OTHER 3 FOLLOW IN SEQUENCE.

JUSTIN

6. JUSTIN, IF YOU UPGRADE AN MVP TO A CS CPU AND YOU USE THE
CUSTOMERS EXISTING PCBS IS THERE ANYTHING THAT THE CE HAS TO DO
TO COMPLETE THE UPGRADE

ANS: INSTALL THE CONTROLLER AS USUAL AND SET THE ADDRESS SWITCH SETTING THEN IF YOU HAVE BLACK PLASTIC SEPARATORS THEN YOU MUST REPLACE THEM WITH NEW METAL ONES.

7. IF A CE ARRIVES ON SITE AND BEGINS TO WORK ON A DS THAT HE OR SHE MIGHT NOT HAVE INSTALLED, IS THERE ANY WAY THAT THEY CAN DETERMINE WHAT TYPE OF DRIVE CONFIGURATION THEY ARE WORKING WITH.

MIKE

→ ANS: YES THERE IS. FIRST THEY CAN CHECK THE SWITCH SETTING ON SW#1 AND SW#2 ON THE DS PCB. SECOND THEY CAN CHECK THE MODEL NUMBERS ON THE DRIVES THEMSELVES AND THIRD ^{& WHAT WOULD BE EASIEST} THEY CAN RUN THE DISK UTILITY, DISK.

Follow up Question:

COULD YOU TELL ME A LITTLE MORE ABOUT THIS DISK UTILITY

THE DS UTILITIES DISK IS SENT OUT WITH EVERY DS. THE P/N IS 731-8015.

THE DISK IS SIMPLE TO USE. INSERT THE DISKETTE IN THE DS FLOPPY.

CLEAR MEMORY ON YOUR TERM. LOAD PROGRAM "START" FROM THE DISK.

THIS WILL GIVE YOU THE DS UTILITY MENU. WITH THE CURSOR NEXT TO DS CONFIGURATION

THE NEXT SCREEN WILL ASK FOR THE BASE ADDRESS OF THE DS, D10, D20, OR D30

INSERT THE ADDR & KEY RETURN THE NEXT SCREEN WILL SHOW WHAT DRIVES ARE INSTALLED

OF PLATTERS

8. WE HAVE TALKED ABOUT THE WINCHESTER DRIVE ATTACHED TO DRIVE

SELECT #1 AND THE FLOPPY DRIVE NEEDING TO BE TERMINATED BUT DOES

THE TAPE DRIVE NEED TO BE TERMINATED. DOES THE FLOPPY DRIVE NEED

TO BE TERMINATED?

THE TAPE DRIVE COMES W/ THE TERMINATOR SOLDERED IN AT THE CORNER OF THE BOARD WHERE THE DATA CABLE ATTACHES.

9. IS THERE A DIFFERENCE BETWEEN RAM DISK IN THE CS CPU AND THE DS DATA STORAGE CABINET?

JUSTIN

DS CONFIGURATION
ADDR
DRIVES INSTALLED
PLATTERS
ADDR
SECTORS

ADDR'S OF THE PLATTERS
OF SECTORS/
ALSO GIVE FROM
WHERE REV OF
FROM IN OF BLD

DS CONFIGUR
T
N
K
E
Y
R
U
N

(10) WHEN REVIEWING THE CS DOCUMENTATION HAVE YOU COME ACROSS ANY

DS MAINT MNL 741-1806

JUSTIN ERRORS

Pg 940. SW SETTINGS FOR THE WINCHESTER DRIVES IS WRONG IN MNL.
USE DOCUMENTATION PKG PROVIDED TODAY OR THE DIAGRAM

Pg 11-1 ALT 32 MEG 2 PLATTERS, NOT 4 SECTORS 65024, NOT 32512

11. IS THERE ANY SPECIAL HANDLING REQUIREMENTS WHEN POWERING UP/DOWN OF 10 MEG REMOVEABLE AND DOES THE REMOVEABLE CARTRIDGE REQUIRE ANY SPECIAL HANDLING REQUIREMENTS.

TO OPEN DRIVE w/ OUT POWER MOVE LITTLE WHITE SW. IN WINDOW NEAR TO LATCH TOWARD LED'S & THEN TURN LATCH.

MIKEB

WHEN THE 10 MEG REM IS UP & READY THE GREEN LITE WILL BE ON STEADY. TO REMOVE THE DISK CARTRIDGE, PRESS THE BUTTON ABOVE THE RED & GREEN LED'S, THE GREEN LITE SHOULD START TO FLASH INDICATING THE DRIVE IS SPINNING DOWN. ONCE IT STOPS SPINNING ALL LITES ON THE DRIVE SHOULD BE OUT. LIFT THE LATCH STRAIGHT UP THIS UNLATCHES THE UNIT & ALLOWS YOU TO PULL THE DRIVE OUT FORWARD APPROX 3 1/2 - 4". OPEN THE FRONT DOOR BY

12. REVIEW WHAT CONNECTOR WILL BE USED ON THE DS PCB IF DRIVE PLACING THUMB ON SELECT #1 IS ATTACHED TO A REMOVEABLE WINCHESTER DRIVE AND WHEN OPENING FORWARD & TO THE RIGHT. THE CARTRIDGE CAN NOW BE PULLED OUT TO INSERT

REM WINC J7
FIXED J2, J9, J10 ALL COMMON

Follow up question:

1. SLIDE IN CART w/ HUB TO RIGHT SIDE
2. SHUT DOOR. 3. CLOSE LATCH.
4. SLIDE DRIVE BACK IN TILL LATCHES IN
5. PRESS BUTTON ABOVE LED'S TO BRING DRIVE UP TO OPERATE

B CABLE CONNECTORS MAY NEED SOME CLARIFICATION.

J2, J9, J10 ARE ALL COMMON B CABLE CONNECTORS FOR FIXED WINC DRIVES.

13. REVIEW THAT SLOTS 1&2 IF NOT USED FOR HALF HEIGHT COULD BE USED TOGETHER FOR FULL HEIGHT FIXED WINCHESTER.

THE TOP LEFT VERTICAL ^{POSITION} SLOTS, SLOTS 1 & 2 CAN HOUSE 1 OR 2 HALF HEIGHT DEVICES. IF THESE SLOTS ARE NOT NEEDED FOR HALF HEIGHT DEVICES, ANY FULL HEIGHT WINCHESTER COULD BE INSTALLED THERE.

14. WHAT IF NO DRIVE IS CONNECTED TO THE DRIVE SELECT CABLE HOW ARE THE SWITCHES SET ON SW#1 AND SW#2 ON THE DS PCB.

SW SETTINGS FOR NO DRIVE IS ALL OFF, SO THE 4 SW'S OF THE 8 TOTAL ON SW BANK 1 OR 2 ASSOCIATED WITH EACH DRIVE SELECT WOULD BE SET TO OFF. IF THERE WERE NO WINCHESTER DRIVES, ALL SW'S ON SW BK'S 1 & 2 WOULD BE OFF.

1. NOT EXACTLY

• 7 DIFFERENT WING SW SETTINGS

PHYSICALLY 6 DEVICES MAX

UP TO ^{MAX} 4 HH DEVICES IN TOP VISIBLE VERTICAL SLOTS

UP TO MAX 2 DEVICES IN LOWER ² HORIZ SLOTS

2. 20 MEG IF DS4 - DS5/DS6

64 MEG IF DS3 - DS1-DS4

3. REMOVE FRONT COVER

UNSCREW PULL OUT & LIFT

+5V ON RIGHT

+12V ON LEFT

4. LOGICALLY NO DIFFERENCE BUT SW SETTINGS

ERROR IN BOTH YOUR PACKAGE & THE MANUAL

PLEASE CORRECT # PLATTERS } ALT 32 MEG
LAST SECTOR

SHGET DISK DRIVE FEATURES.

Pg 11-1 DS MNL.

5. WRAPPING

CONNECTOR TO J4 DIFFERENT

FURTHBST DS1

7. DS UTILITY DISK

• SW'BK 1 & 2

DRIVE MODEL #'S

731-8015

START UTIL MENU

DS CONFIG RUN

BASE ADDR RETURN

1. DRIVES INSTALLED 2 # PLATTERS 3 ADDR'S 4 # SECTORS

1 K = 8 SECTORS

512 = 4096

1 MEG = 8192

6 MIN BACKUP

3 MIN SETUP

11. 10 MEG REM

GREEN READY

RED ERROR

TO REMOVE CARTRIDGE WHEN READY

1 SW ABOVE LED'S

GREEN FLASHES / SPINNING DOWN

LITES OUT

2 LIFT LATCH ↑ - UNLOCKS

3 PULL 3½" - 4" OUT

4 OPEN DOOR & REMOVE

TO INSTALL

1 SLIDE IN CART W/ HUB RIGHT

2 SHUT DOOR

3 CLOSE LATCH

4 SLIDE UNIT BACK TILL LATCHES

5 PRESS SW

GREEN READY

12. J2/J9/J10 Common FIXED

13. SLOTS 1 & 2

IF NO HH, 1 FIXED

14. ALL OFF

SW 1 & 2

w/out POWER TO OPEN
MOVE LITTLE WHITE SW
CLEAR WINDOW
NEXT TO LATCH
TOWARD LED'S
TURN LATCH

DS INSTALLATION PROBLEM

Our customer was so satisfied with the performance and support of their DS that is being discussed during this edition of TECH TALK that they decided to purchase and install a second unit. If the customer purchased the following DS components, how would you set up the unit?

You and other members of your team can answer this question and let the folks on TECH TALK know your answer right on the air. So, put on your thinking caps and answer the questions below and be the first group to call in with your answers. The customer purchased:

- A. One 320 K floppy drive
- B. One 32 Meg Quantum full height fixed Winchester drive
- C. No Streaming tape drive
- D. Two 64 Meg fixed Winchester drives

Assume that the second DS is connected to disk controller in the CS whose address is set for 320.

Also assume that the two 64 Meg fixed Winchester drives are positioned in the horizontal internal slots of the unit.

QUESTIONS:

- A. What drive will be connected to drive select plug #1?
- B. To what connector on the DS board will the B cable of the Winchester connected to Drive Select #1 be connected?
- C. To what connector on the DS board will the floppy drive be connected?

Assume that the 32 Meg Quantum drive is connected to Drive select #1 on the A cable; that the one of the 64 Meg winchesters is connected to Drive Select #3 on the A cable and the other 64 Meg drive is connected to Drive Select #4 on the A cable when answering the remaining questions:

- D. What will be the switch settings of switch bank #1.
- E. What will be the switch settings of switch bank #2.
- F. What will be the switch settings of switch bank #3.?
- G. What will be the command to select the address of the third platter of the drive connected to drive select three.
- H. What will be the command to select the address of the fourth platter of the drive connected to drive select four.
- I. Which drives will have a terminator and which drives will not?
- J. To what connector on the DS board will the power cable be connected?

LOSING TIME

Mike, Sorry it has taken me so long to reply, but I was in Hawaii on vacation and then in Lawrence for UPS class. The customer had received 3.3 on the wrong media, so he re-ordered it, but in the meantime he moved the remote printers and his problem went away. As soon as he gets the 3.30S he will try it with the printers attached. Thanks, Gary Loper

----- Reply -----

To: Gary Loper
Subject: MircoVP and Remotes

From: Mike Bahia
Date Sent: 05/17/89

There is a problem where I believe if a lot of printing is being done on the 4th w/s it may affect the time. The fix is to upgrade to O/S 3.3. Let me know if this applies.

Regards,
Mike

----- Original Memo -----

To: Mike Bahia
Subject: MircoVP and Remotes

From: Gary Loper
Date Sent: 05/16/89

Mike, A customer of ours has a MVP with all local terminals, a CS with a mix of local and remote terminals, and a Micro VP with 7 Remotes and 1 local. This Micro VP loses about 15-20 minutes a week, and the others hardly lose any time at all. The MXE has been changed many times, and we have checked them out here in the office just running a clock program with no loss of time. It appears that the more remotes on the system, the more time is lost. Have you heard of anything like this before? The customer depends upon this clock to keep the time a user starts work every day. Any ideas would be appreciated.

Thanks, Gary



ECO

ECO NO. 52361

SHEET 1 OF 8

ORIGINATOR: Gilles Carrier Dept 167 M/S 014-390 EXT 74478 DATED 01/13/89

WRITTEN BY: Carol Sullivan M/S 012-188 EXT 74312 DATED 01/13/89

PART NO.	209/210-8937/A/B/C/D/E/F	DESCRIPTION	CS CPU CARD
DWG NO.	8937	PEP #	
MODEL NO.	CS CPU		
CLASS	I II III		HF

DESCRIPTION OF CHANGE

PRELIMINARY

Change parts list and sample board per attached sheets and as follows:

Change BOM 210-8937-A, 210-8937-B, 210-8937-C, 210-8937-D, 210-8937-E and 210-8937-F as follows:

WLI#	DESCRIPTION	UM	COMP TYPE	QTY	TYPE
Delete: 377-3490	IC PAL 16R4	EA	I	1	I
Add: 377-3490-R1	IC PAL 16R4	EA	I	1	I

CHANGE PAL AT LOCATION L42.
Delete the part number and product structure for 377-3490. **DO NOT**

FEB 08 1989

REASON/SYMPTOM FOR CHANGE

To correct memory sizing problem. 84

FIXES PROBLEM WHEN PARTITIONING SCREEN SHOWS 512K MEMORY AVAILABLE & LETS YOU PARTITION IT WHEN ONLY HAVE 128K BOARD WHEN PARTITION MORE THAN 128K RESULTS IN A PECM ERROR.

CONFORMING AREA	CONFORMANCE DATE	CONFORMING AREA	CONFORMANCE DATE
RENTG		RENTG	
DST		DST	
FINAL ASSY AREA		FINAL ASSY AREA	
SCB ASSY AREA		SCB ASSY AREA	
ASSEMBLY AREA		ASSEMBLY AREA	
ORDER		ORDER	
INFO ONLY		INFO ONLY	

DES. ENGRG.	DATE
CUST. ENGRG.	
MFG.	
MTO	
PP&M	
FCC.	Michael Buxton 1/23/89
PROD. SAFETY	1/27/89
SECURE SYS	
ORIGINATOR	
OTHER	

IMPACT REVIEW CHECKLIST

WANG ECO# 52361 OEM ECO# _____ PN# 210-8937A

1. WANG MODEL #s AFFECTED: CS, MICROVP, MYP128

2. WANG FRU(s) #s AFFECTED: 210-8937A

3. IS THERE AN IMPACT ON WANG INSTALLED BASE? (If NO, go to 7) YES NO

4. OF MODEL #s IMPACTED - UNIT FAILURES EXPECTED?: ALL UNITS SOME UNITS

5. HOW ARE THESE UNITS IMPACTED? (Check any that apply):

SAFETY _____	INTERMITTENT _____	ENHANCEMENT _____
FCC COMPLIANCE _____	HARD FAILURE _____	RELIABILITY <input checked="" type="checkbox"/>
TEMPEST INTEG. _____	CATASTROPHIC _____	OTHER (See 7) <input checked="" type="checkbox"/>

6. PLR DATA: <u>Unit Population</u>	Product Failure Data			Parts Related To ECO/PN		
	Total Calls	Total Fails	Fails per Year	Total Used	Reduction by ECO/PN %	Reduced FPY
last 12 mo.	_____	_____	_____	_____	_____	_____

7. FIELD REQUIREMENTS:

Level A	Information only	_____
Level B	TSB required	<input checked="" type="checkbox"/>
Level C	FCO required	<input checked="" type="checkbox"/>

FCO requirements Next Call Immediate Est. installation time 10 min
Est. % of units to FCO _____

8. FSC REQUIREMENTS:

Level A	Information only	_____
Level B	Upgrade on failure only	_____
Level C	Upgrade all assy's (MUB)	<input checked="" type="checkbox"/>

9. LOGISTICS REQUIREMENTS:

Level A	Information only	_____
Level B	Future purchases	<input checked="" type="checkbox"/>
Level C	Purge stock (FSC rework)	<input checked="" type="checkbox"/>

ANY OTHER INFO TO CLARIFY IMPACT: (S/N range, documentation (i.e. Product Maintenance Manual, Service Handbook, etc.), configurations, repair/test process(es), tooling, etc.)

ONLY THE 210-8937A BOARD NEEDS TO BE ECO'D AS IT IS THE ONLY
CONFIGURATION WHERE A PROBLEM EXISTS. ALL NEW BOARDS, 210-8937A/B/C/D
F/F SHOULD BE BUILT WITH THIS CHIP AS THE SAME CHIP IS USED ON
ALL BOARDS.

REVIEWER'S SIGNATURE: Michael Bahia DATE: 1/31/89

(OVER FOR DEFINITIONS)
WRITE CLEARLY AND USE BLACK INK

Question:

I have switched to the DS and my applications seem to run slower.

Answer 1: You may have replaced Phoenix drives on two disk controllers with a single DS cabinet. You now have one channel to the CPU instead of two.

Answer 2: The raw speed of the Phoenix is faster than a DS. If your software does not take advantage of the cache memory available it may well run slower. However, the DS has a cache memory of up to 1K sectors. On some reads to disk as many as 32 sectors are brought into cache. The Phoenix has a much smaller cache of 8 sectors.

Answer 3: One VAR has found that the time for an expected response could drop from 2 seconds to 20 seconds. If you move files to the DS surfaces properly this slowness will not occur.

1. Optimize the index size,
2. Use the new hash algorithm,
3. Move heavily used files close to the index area.

-- 1. Optimize the index size,
Determine how many files will eventually be on the disk surface.

Set an index of a size that will be used to 75-80 % capacity.

A full index uses 16 file names per sector, 15 in sector 0. 75% of capacity would be 12 names per sector. A 10 sector index is saturated with 159 names, comfortable with 120. A default index of 24 sectors has room for 383 file names.

-- 2. Use the new hash algorithm,

When you move files to the DS cabinet it may pay to use the new disk index hashing algorithms. A description of the differences was detailed in an article for TechKnowledge in September 1987. The old "hash" algorithm "hashed" items to every third sector in the index and then. The new algorithm "hashes" more equitably to every sector. The new algorithm also uses a look-ahead rather than a look-behind feature.

-- 3. Move heavily used files near the index area.

Files should also be moved so that the heavily used files occur close to the index sectors to minimize head movement.

Index Structuring: A Better Way

by Tyler Olsen

The CS/2200 computer uses disks as a primary media for program and data storage. Its BASIC-2 operating system has a built-in catalog mode for accessing logical disk surfaces so that users can find program and data files automatically. For each logical disk surface, the assigned catalog disk area includes space for index sectors and space for programs and data storage.

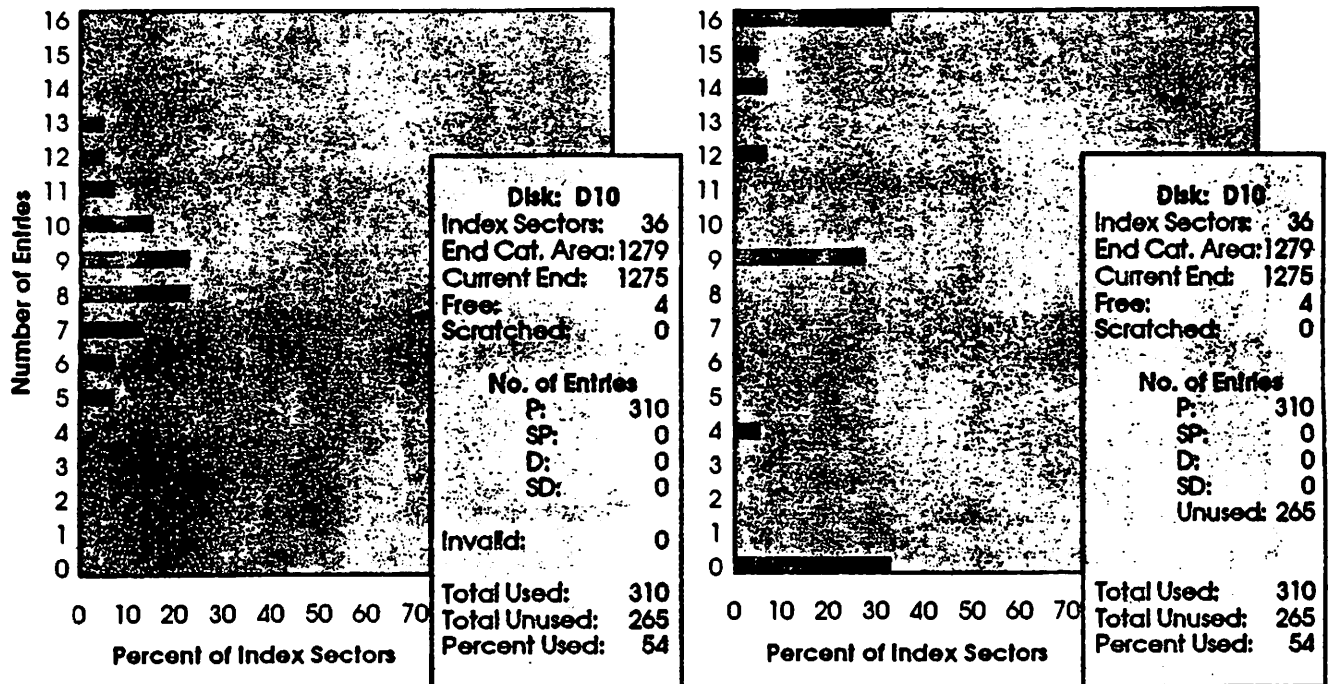
The catalog index lists file names, types, and locations in the storage sectors of the disk surfaces. The index area begins in sector zero and continues through a user-requested number of sectors; that is, the user chooses how much of the catalog disk area will be dedicated to index sectors as well as how

large the catalog disk area for that surface will be. The balance of the catalog disk area is left over for program and data storage.

ASSIGNING SPACE

By applying the SCRATCH DISK command to a specific disk surface, the user establishes the form and size of the catalog index area as well as the maximum size of the program and data area. The initial assignment is by a BASIC-2 command such as

SCRATCH DISK T /D25 , LS = 50, END = 38000



New versus old index structuring: The new CS/2200 hashing method (left) distributes entries among index sectors more efficiently than the old (right).

Since the 2200 series was introduced in the early 1970s, two hashing (index-structuring) techniques based on BASIC-2 commands such as this one have been introduced. The new hash method was introduced as a more efficient way of assigning index sector usage and managing disk accesses as an option in release 2.5 of the CS/2200 BASIC-2 operating system. All subsequent releases of the operating system support both the old and new hashing methods.

THE CRITICAL DIFFERENCE

The first index sector contains disk-surface data and up to 15 file pointers; subsequent index sectors contain up to 16 file pointers. The hashing algorithm used by the operating system points to a specific sector in the index area.

The old hashing method is invoked with this command:

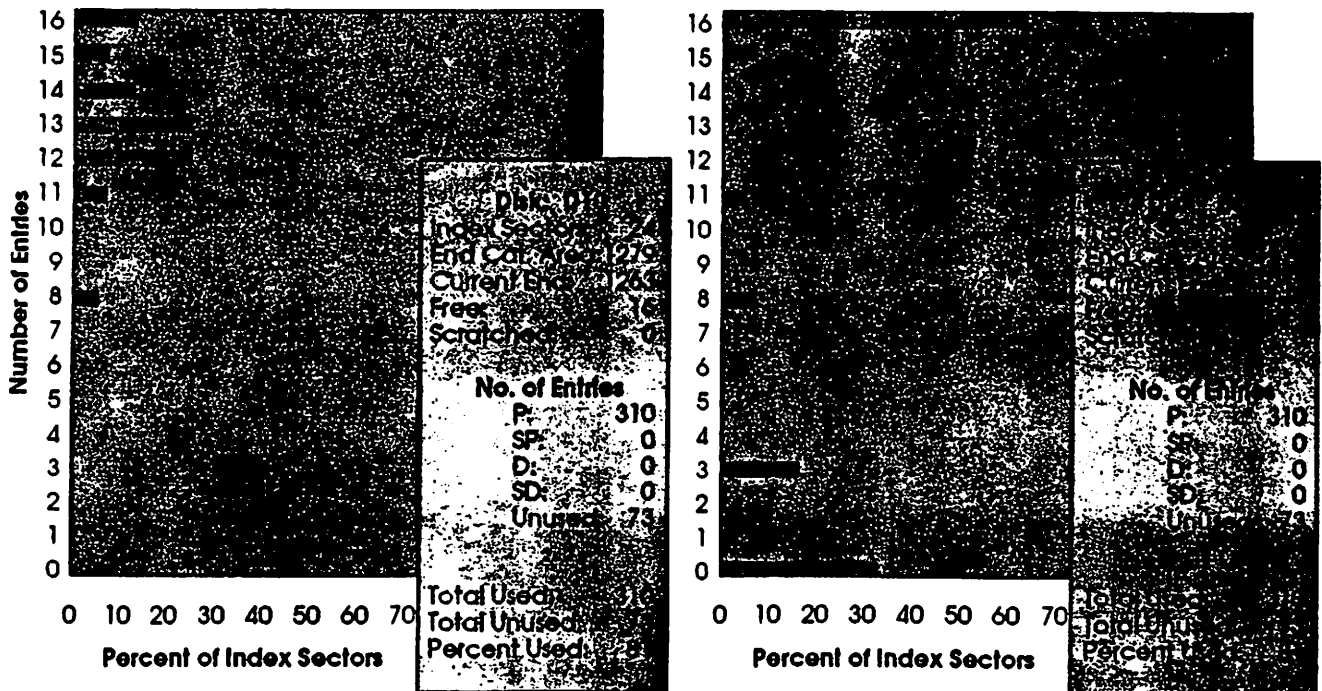
```
SCRATCH DISK T /D25 , LS = 50, END = 38910
```

while the new hashing method is invoked with

```
SCRATCH DISK ' T /D25 , LS = 50, END = 38910
```

where the prime symbol invokes the new hashing method, /D25 identifies the specific logical disk surface, LS = ii designates the size in sectors of the index area, and END = nnnnn designates the maximum number of sectors in the catalog area.

The hashing algorithm used by the operating system quickly points to a specific sector in the



Though both the old (right) and new (left) hashing methods use 81 percent of the index area, the old hashing algorithm leaves 66 percent filled to capacity, suggesting substantial backward overflow. What little overflow the new method yields is forward overflow, facilitating caching by the data processing unit to reduce the number of performance-crippling disk accesses.

CS/2200 Disk access comparisons
All times in milliseconds

Disk Model	Sequential Access Times	Random Access Times over entire Platter	Sequential access Times over 1st 2000 Sectors	Typical Sequence Average Access Time
2270 Diskette	52.7	391.6	329.0	98.5
2275 Diskette	24.6	329.4	313.3	132.9
DS 320KB	19.6	110.3	84.9	17.7
LVP diskette	18.9	282.3	190.0	66.5
DS 1.2 MB	15.2	161.6	93.3	36.3
2275 10MB	7.9	133.0	67.0	15.8
2275 32MB	6.8	66.3	48.5	14.6
LVP 32MB	6.6	89.4	45.5	14.0
DS 10MB	6.0	141.5	36.3	18.1
DS 20MB	5.0	90.8	23.4	10.1
DS 64MB	4.9	42.5	15.1	7.7
DS 32MB	4.8	59.5	21.1	8.0
DS 140MB	4.7	46.3	14.3	7.7
2280 80MB	4.2	43.1	23.8	10.2
DS RAM disk	3.4	3.4	3.4	3.4
CS RAM disk	1.5	1.5	1.5	1.5
<u>Diskettes</u>				
2270 Diskette	52.7	391.6	329.0	98.5
2275 Diskette	24.6	329.4	313.3	132.9
DS 320KB	19.6	110.3	84.9	17.7
LVP diskette	18.9	282.3	190.0	66.5
DS 1.2 MB	15.2	161.6	93.3	36.3
<u>Hard disks</u>				
2275 10MB	7.9	133.0	67.0	15.8
2275 32MB	6.8	66.3	48.5	14.6
LVP 32MB	6.6	89.4	45.5	14.0
DS 10MB	6.0	141.5	36.3	18.1
DS 20MB	5.0	90.8	23.4	10.1
DS 64MB	4.9	42.5	15.1	7.7
DS 32MB	4.8	59.5	21.1	8.0
DS 140MB	4.7	46.3	14.3	7.7
2280 80MB	4.2	43.1	23.8	10.2
DS RAM disk	3.4	3.4	3.4	3.4
CS RAM disk	1.5	1.5	1.5	1.5

index area based upon a mathematical calculation on the eight-byte file name being referenced. The difference between the old and new hashing methods is in this search algorithm and what happens when there is a file-reference overflow from one index sector to another. An overflow occurs when a hashing calculation points to an index sector that already contains its full complement of 16 items. The old hashing method looked to the prior sector for the overflow; the new method looks to the next sector. To understand how the two methods achieve such different results, let's look at how the CS/2200 manages forward data overflow storage.

The new Wang data storage (DS) cabinets [see March 22, 1987 (711-1311) *TechKnowledge*, p. 10] come with a data processing unit (DPU) which has a given amount of fast storage buffer, or cache, memory. Up to 1,024 sectors of cache memory are available. If a requested sector is within the DPU cache memory, no real disk access has to be made for the data; consequently, information in cache can be transferred to the CPU much faster. The DPU caches to requested disk sectors using a modified least-recently-used algorithm. Such sector caching, therefore, reduces disk accesses. Running the DS utility @HITRATE will show the cache hit efficiency.

GRAPHIC DIFFERENCES

Two sets of index-usage results illustrate the efficiency differences between the old and new hashing methods. For both sets, a program was written to randomly name and open 310 files on a single diskette.

In the first case, the old hashing algorithm left 33 percent of the index sectors empty and filled another 33 percent to capacity. By contrast, the new hashing method distributed data much more evenly and logically among the index sectors, yielding a consolidated bell curve when usage was plotted against number of entries per sector.

The difference is even more striking in the second set of index-usage results. In this set, both

the old and new hashing algorithms used 81 percent of a 24-sector index area. The old hashing method filled 66 percent of the sectors to capacity, suggesting substantial backward overflow. Again, the new hashing method yielded a bell-curve distribution around 12 to 16 items per sector, suggesting little forward overflow. What overflow there is, is handled by the DS cache technique so that performance is not greatly affected.

BEST USE

The savings that can be realized using the new hashing method are especially noticeable when programs or program overlays are loaded. A disk surface that is primarily for program storage might be organized to use the new hashing method in a minimum number of index sectors. When programs are moved to this surface, the most-often referenced programs and program overlays might be moved first, grouping them nearer to the index.

If data files are opened and closed repeatedly, they might also benefit by being assigned to a location on the disk surface by the new hashing method. With release 3.1 of the CS/2200 operating system, the number of files that can be opened concurrently within a partition has increased from 16 to 256 so that conversion of data-file disk surfaces to the new hashing method might not be necessary to increase access efficiency. Some applications, however, may have been written requiring the old hashing method. Code can be added to these applications to make them compatible with either method.

Expanded main CPU memory in the MicroVP and CS/2200 computers [see October 1987 (711-1324) *TechKnowledge*, p. SW-12] put a potential of 8MB of CPU RAM disk at the user's disposal. The disk is accessible as disk 340, a totally separate disk address. While the CPU RAM memory is fast, it is also volatile and easily lost on a power outage. Still, it remains the ideal medium for easily recovered files such as programs or sort work areas.



Tyler Olsen

is a principal software engineer for Wang Laboratories' (Lowell, MA) CS/2200 Product Group.

Disk Drive Specifications

	320-KB Diskette	1-MB Diskette	20-MB Hard Disk	32-MB Hard Disk	64-MB Hard Disk	140-MB Hard Disk
Disk Platters	1	1	2	2	4	14 or 7
Capacity/ Platter	320-KB (360-KB for PC)	1-MB (1.2-MB for PC)	10-MB	16-MB	16-MB	10-MB or 16-MB
Sectors/ Platter	1,280 (1,440 for PC)	4,160 (4,800 for PC)	38,912	65,024	65,024	38,912 or 65,024
Bytes/ Sector	256 (512 for PC)	256 (512 for PC)	256	256	256	256
Average Access Time	100 ms	100 ms	68 ms	45 ms	27 ms	27 ms
Data Transfer Rate	250 KB/sec	500 KB/sec	5 MB/sec	5 MB/sec	5 MB/sec	5 MB/sec

Extending the Life and Performance of Your 2200

by

Tim VeArd

Tens of thousands of organizations are wondering what to do about that old Wang 2200 that's been sitting in the corner for years. Why is this old dinosaur still being used? Because it's reliable and still works! In fact, many of its users have never experienced a major problem with it.

The 2200 is the second most successful minicomputer ever built - only the IBM System 34 had more users. But, unlike IBM 34 users, 2200 users have choices available when it comes time to replace their computers. Data and software from a 2200 can be transferred as is to many machines. In addition to Wang's own replacement for the 2200, the CS/DS, BASIC-2 programs and data can be moved to at least 120 other computers by using either Niakwa Management Systems' BASIC-2C, Spectrix's BASIC-3 or CCI's BASIC-K.

Perhaps another reason for the 2200 still being used by so many people is that maybe now there are too many choices to analyze. While many have successfully replaced their 2200, others have discovered that moving data and software to another manufacturer may not have been the best choice for them. In some cases, the newer hardware wasn't faster, was less reliable, had limited growth paths and it wasn't as easy to use as the 2200.

What do you do? While I have my own list of favorite replacements for the 2200, there are just too many choices for one to be "right" for everyone. Making the correct choice is not just a simple matter of picking another computer. You should consider the availability and cost of maintenance; will the system be as easy to use; will it be as fast; will it "hold up" as well for many years; can you use any of your existing peripherals; will you need special power or air conditioning; can you get software support; is the manufacturer financially stable and do they have a history of "upward migration". Very few companies are as committed as Wang is at providing a growth path for existing users to newer products. Some users have their 12 year old multi-user 2200MVPs (upgraded from single user 2200VPs) working with new Wang DS cabinets. I'm using a 14 year old disk drive with a CS.

There are new options being announced every month and rumors of spectacular developments coming soon. For some, the best course of action today could be to wait until tomorrow. As long as your 2200 still performs or can be made to perform better, waiting might be a good choice. There are several things you can do to improve the performance and extend the life of your current hardware. Your options range from investing a few weekend hours to spending a couple thousand dollars. These strategies involve rearranging data on your disks, reconfiguring your hardware, adding a few new or used components, completely replacing some hardware or modifying programs.

Reconfiguring Data Disks

Many 2200 owners use Phoenix or Winchester disk drives with multiple platters. Drives with multiple platters have separate heads to read or write data on each platter, but these heads are "ganged" (all heads move together). To visualize this, picture a head glued to the tip of each finger on your right hand. Now imagine that the fingers of your left hand are disk platters. Put the fingers of one hand in between the fingers of the other and move your right hand back and forth. Like the finger tips of your moving hand, the heads for all platters always move together.

2, 5, 9, 10

REVISED
MIKE BANHA
5/6/88

Pretend that on platter #1 (the top finger of your left hand) there is a data file positioned at the beginning of the platter (near your finger tip) and another file located at the end of the platter (near the joint of the two fingers). When two people use these files at the same time, the heads are constantly flying from one end of the platter to the other to retrieve data. If these two files were closer together, the heads won't have to move as far to service both users - thus operations become faster.

Complicate this picture (are your fingers tired yet?) with another file on platter #4 (your baby finger). Let's put this file near the middle of the platter (by your knuckle). When a third person asks for data from that file, the heads really begin to fly. Remember, the heads for all platters move together. So, now you have the top head moving from end to end and taking the bottom head (who wants to stay in the middle) with it. It's no wonder that your drive often sounds like an out-of-balance washing machine.

You can reduce some of the movement of the heads by rearranging the data files on your disk. LIST all of your disks to find out what area of each platter, by sector address, your files occupy. Analyze which files are used most often by the most number of people. Backup and reformat all platters. Using your analysis, copy files back one at a time. Your goal is to position the most active files on separate platters and in the same relative areas on each platter (preferably, near the center of each). Start by moving some of your least used files. Then, as a platter becomes full enough, move one of your most active files so that it now occupies the center, then finish by moving the remaining files back.

You can use BASIC-2 commands (COPY or MOVE) or utilities (like @MOVEFIL). But, some software systems (like AIMS) require that you use their utilities to successfully move a file and its companion work files. Be patient, because this procedure takes time. Don't take too much time trying to get it absolutely perfect, because at best, it only improves performance by about 15% on Phoenix drives and up to 30% on Winchesters. The real payoff comes from making the drive operate smoother, thus extending its life. Anyway, who wants to listen to an out-of-balance washing machine all day?

Reconfiguring Hardware

Spreadout Users and Data - A few years ago, this option was too expensive to even consider. Now, with so much used hardware available, you can achieve tremendous gains in performance for just a few hundred dollars. It's possible to buy a used 2200 or Phoenix disk drive for under \$1,000 (I've seen them for as low as \$500 each). It's possible for well under \$2,000 to double your system "through put" (the amount of work that can be done in any given period of time) by simply adding another CPU and disk drive. First, make sure that your software is able to handle "logical" terminals before trying to use multiple CPUs.

Rearranging your most active files on separate disk drives, instead of just separate platters, yields a dramatic boost in performance. Also, as many have discovered, adding a ninth user "brings a 2200 to its knees". There are a few reasons for not putting more than eight terminals on a 2200, but mainly it's because only one terminal at a time can do anything. The 2200 shares its time among all users, in 30 millisecond periods called "time slices". The more users a 2200 has to poll, the less number of time slices each user gets. Thus, each user gets more time slices by having less users on each 2200. You can share up to four disk drives with up to four 2200's. With a little effort, it's possible to have up to 32 terminals sharing data and performing just as well as an 8 terminal system.

UP TO 12 WING DRIVES OR
OR 6 ~~WINCH~~ PX DRIVES
W/ UP TO 16 CPU'S

Organize Users by Function - When you do have multiple CPUs, you will also have a few other options. You can analyze what types of jobs are being performed and then arrange users on those CPUs to make your critical tasks faster. For example, most word processing software packages available for the 2200 slow down all other users. When a terminal runs word processing software, it completely uses each time slice. Other types of software can use INPUT/LINPUT or versions of KEYIN statements that put a terminal "to sleep" in between keystrokes. When a terminal is not truly busy, it gives up its time slice. Therefore, at any given time, most terminals (except for word processors) are "asleep" and the 2200 is free to dedicate most of its time to servicing the currently active users. However, all software systems have some peak use periods when they will also consume all of their available time slices (for example, an accounting system closing a month).

You can experiment by confining all word processors to one CPU and leaving another CPU to just service accounting operators. Or you can balance your system by evenly distributing word processors and accounting across all available CPUs. You can even manage (swap terminal plugs) your resources on a daily basis to get the best "through put" for the scheduled work load.

Adding New Components

There are several "add on" devices that can improve the performance of your system, such as additional core memory and RAM disks. A word of warning, some of these devices cannot be used with another manufacturer's hardware should you later decide to replace your CPU. You should also take the time to be sure that the benefits are cost justified.

Additional Memory - Depending upon the software and the CPU you are using, additional memory can yield two benefits. First, some software can take advantage of having additional memory available. Years ago, an "unwritten" standard was adopted by many software authors to not use more than 28K bytes of memory per terminal. Now that memory is cheaper, some authors rewrote their packages to give better performance (my own system is now 65% faster if there is more memory). Contact your supplier and ask if there is a new release of your software that improves performance if you have 56K of memory per terminal available. If you write your own software, later in this article you will find a few suggestions (some requiring more memory) that may help you make your own code faster. Second, the Wang CS (and a 2200 using extended memory supplied by Southern Data Systems in Raleigh, NC), can configure additional memory not used by terminals as RAM disk.

RAM Disk - RAM (Random Access Memory) disks are a form of additional electronic memory that can be used just like a regular disk drive. There are two types of RAM disk, internal (extended main memory) and external (attached to the CPU's I/O bus like another disk drive). Unlike regular disk drives, there are no mechanical parts like spinning platters and moving heads, therefore these electronic disks are very fast. Compare the access rate of a Winchester drive of 27ms to a RAM disk's 1.5ms (internal) or 3.4ms (external) - a RAM disk is obviously many times faster.

Unlike regular disk drives, when the power is turned off, internal RAM disks send what is written on them to the "bit bucket" (data heaven). One safe configuration is to put only programs on a RAM disk. My research shows that an average program loads about 0.25 seconds faster from a RAM disk. If your software constantly loads other programs or overlays pieces of programs, you'll see screens "pop up" faster. My system used to load 5 programs in a row in over 6 seconds. With RAM disk, it now does it under 5 seconds or about 22% faster. But, if your system only loads one program and then uses that same program for hours, you will see no benefit at all.

You can also put work or reference files that are not written to on the RAM disk. This way, if power does fail, then nothing can be lost. But, it generally requires changes in your software to configure and use a file in this fashion. If you try to copy an entire disk to an internal RAM disk, you may run into other problems in addition to losing data. Many software systems test a disk to make sure that it is really there and ready to use. That test uses a \$GIO statement because a \$IF ON is not always reliable. You will usually get an I92 error (time out) when using \$GIO on internal RAM disks. Another problem is that internal RAM disks use a unique, fixed address that some software packages written many years ago won't recognize.

External RAM disks are better when you have multiple CPUs, since terminals on one CPU cannot share programs or data on another CPU's internal RAM disk. Also, some external RAM disks (like Northeast Digital Corporation of Southhampton, PA) let you pick the address to use, support the \$GIO test and automatically backups everything written on the RAM disk to a built-in Winchester disk drive during a power failure or normal shut down.

My tests indicate that RAM disks really begin to "pay off" when you have many users sharing the same sets of programs and work files. With just a few users or shared files, there are only small gains (about 15-25%) in performance. Where as, you may see higher gains (around 40-50%) when 8 terminals are using a properly configured RAM disk. Unless you have many programs that are frequently loaded and heavily used or shared work files, you may not experience enough benefits to cost justify a RAM disk. Also, more is not always better. You don't need a large internal RAM disk if you are just putting programs and work files on it. I used Wang's 2 meg (about 7,500 sectors) RAM disk and got great results, but increasing its size to 4 meg or 8 meg did not really increase performance much more, until investing weeks rewriting my software to perform sorts on the bigger RAM disk.

Replacing Some Existing Hardware

Carefully selecting new or replacement disk drives, terminals and CPUs can really help you improve the performance and extend the life of the rest of your hardware. In some cases, you can actually build a "bridge" to another computer system, while still using your existing hardware.

Terminals - You can implement several strategies when replacing or adding new terminals. If you are heavily using word processing on your Wang CS or 2200, consider using Wang's new 2436WP terminal. The 2436WP does the word processing and gives up its time slices on the 2200 while doing it. There are 6 "windows" that let you start, monitor or switch jobs on the 2200 while doing word processing. We measured an increase in system performance of about 12% by switching just one word processing user to a 2246WP.

If you are planning to replace your CPU later, there are some terminals (Spectrix Microsystems of Markham, Canada) that can be used on your 2200 and later be used by other CPUs. Of course, there are a few replacement CPUs that can also use your existing 2200 terminals, so you can still buy Wang terminals and have options later. You can also use IBM PC clones as terminals on your 2200 by using software (Southern Data System's 2536PC or MacSoft of Bakersfield, CA) that makes the PC emulate a 2200 terminal.

Disk Drives - If you must replace an existing disk drive, it's a golden opportunity to truly enhance the performance of your system. Don't just buy a new drive without planning for growth. Investigate the many features that you can also get for very little extra when buying a new drive. Even if you plan to migrate to another CPU, there are choices that let you use the drive now on your 2200 and then later on another CPU.

To illustrate what you should now expect from any new disk drive, look at Wang's DS. In addition to getting a disk drive, you also get cache memory (which can also be configured as a RAM disk). It's almost like buying a hamburger, because you can "have it your way". Buy an empty cabinet and add on more drives as your budget permits. Drives range from slower 10 and 20 megs, all the way up to faster 64 and 140 meg drives. You can have several drives in the same cabinet or connect several cabinets together. Best of all, anyone can pick up the entire DS cabinet and carry it anywhere.

CANNOT CONNECT CABINETS TOGETHER. 3 CABINETS / CPU MAX.

~~CAUTION SHOULD BE TAKEN MOVING A CABINET. THE CABINET IS NOT DESIGNED TO BE MOVED W/ DRIVES INSTALLED.~~ Another important feature to look for in any new disk drive is how do you backup? Like Wang's DS, some manufacturers (like Magna Computer Corp. of Manchester, NH) now offer you choices between built-in tape drives or small removeable disk cartridges. Some manufacturers can offer things like built-in cache memory, RAM disk and backup systems - others cannot. Most of the disk drive systems now available will work as well as your existing drives. But, some of the replacement drives will not be faster because they do not have those extras. ~~Even though Wang's DS is designed to work with their new Wang CS, you will also see improved "through put" on a 2200 because~~ of its cache memory and external RAM disk.

PROVIDE WITH PROPER

USE

Southern Data Systems makes a disk drive that has a built-in RAM disk, cache memory and removeable backup, but can also be used with other CPUs. For example, your Wang 2200, Wang CS, Wang PC and dozens of other IBM PC clones can all share the same disk drive. In fact, SDS even lets your 2200 emulate certain MS/DOS commands and read MS/DOS files. This drive lets you "network" a 2200 with many non-Wang CPUs and directly exchange data.

CPUs - You can keep most of your existing hardware and just replace your CPU. Most of a computer system's cost is in its peripherals (terminals, disks and printers), not the CPU. With a 2200, there are several options that may let you have the best of both worlds. Most users like their 2200 and really don't want to completely replace it. Some people are required to have some MS/DOS or UNIX capability and are planning to replace their 2200 to meet those corporate goals. By integrating an MS/DOS or UNIX based CPU with your 2200, you not only achieve the ability to communicate with those other computers, you also make your existing 2200 perform better by spreading out some of its current work load. If you purchase components wisely, both CPUs can share the same resources (like terminals, printers and even disk drives) in case of emergencies or hardware failures.

MYP L/P/SVP MICROVP

The cleanest and simplest way to replace your 2200 is with Wang's new CS. You do not have to buy a DS or any new peripherals to use a CS. The CS uses ^{almost} every device that a 2200 uses, ~~without exception~~ - even non-Wang items like SDS's Extended BASIC-2 language, terminals, printers and disks. The CS has low maintenance costs (low enough to almost pay for it by just what is saved on your 2200's maintenance). The CS is smaller, quieter and generates less heat. However, replacing a 2200 with a CS will not increase your overall system performance yet (don't forget Wang's commitment of "upward migration" and rumors now being heard), unless you also buy extra memory for RAM disk or a DS. A CS and DS together are about 20% faster than a 2200 for most users, mainly because of the cache memory in the DS.

(WITHOUT EXCEPTION IF USING A)

You can also buy another CPU and integrate it with your existing CS/2200. Using one of the BASIC compilers, you can exchange data with the 2200 and the new CPU. Data can be exchanged between many different CPUs (including the 2200) using Niakwa's BASIC-2C compiler and a floppy diskette. You can directly share data between a large variety of CPUs using both Southern Data System's disk drive and Niakwa's BASIC-2C. With Spectrix's BASIC-3 or CCI's BASIC-K you can connect a wire between CPUs and transfer entire disk platters back and forth, without conversion (but taking some time).

? BETWEEN WHAT & WHAT

Modifying Software to Increase Performance

If you purchased software, contact your supplier to see if there are new releases offering performance enhancements. Wang's BASIC-2, SDS's Extended BASIC-2, Niakwa's BASIC-2C, Spectrix's BASIC-3 and CCI's BASIC-K have all included several new verbs in their recent releases that can improve the performance of software. As a result, many software authors are making major improvements to their packages now to take advantage of those verbs.

If you write your own software, you can use those new verbs and also learn to generate more efficient code. It would be impossible to cover in this article all of the "tricks" that I've accidentally stumbled over during the years to make code faster. But, without giving away too many trade secrets, I can share some ideas that show you how to start developing your own techniques. I categorize most improvements as belonging to one of three basic groups: (1) structure, (2) save-a-byte and (3) save-a-second.

Structure: This refers to how a program is organized. The 2200 is stack oriented. All variables and internal values are put into "push down, linked electronic lists". A "push down" stack means that the last used (or referenced) value is put on top of a list. "Linked" means that there are several entry points into a stack. For example, there are 26 entry points into the variable stack - one for each letter of the alphabet.

```
10 DIM A$64 ,B$12 ,N$24 ,C$32 ,C1$20 ,C2$10 ,C(10) ,C$(2)5
```

In the statement above, C\$ is referenced first, so it's on the bottom of the list of C's. When your program needs the value held in C\$, the 2200 jumps to the "C stack" and asks the first variable "are you C\$?", to which the stack says "No, I'm C\$()". The 2200 moves down the list until it finds C\$ at the bottom before it retrieves the value stored in it. If C\$ is used a lot by your program, you will improve over all "through put" if C\$ is DIMensioned after all the other variables that start with the letter C. Spreadout variables to take advantage of the 26 entry points, because if they all start with the same letters, your program will be slower.

Generally putting your most frequently used subroutine at the top of your program makes it faster. To prevent the 2200 from scanning every line starting from the top of a program with each GOSUB or GOTO, line numbers are divided into 16 groups. In the statement "GOSUB 9000", the 2200 jumps to a starting line number stored in memory for that group of lines and then scans the lines from that entry point to find out where line #9000 is in memory, before it can execute the routine you put there. If you add more code to your program, a subroutine may move from the top of one entry point to the bottom of another. If your subroutine is used thousands of times, put it at the top of the program and it will probably run faster. If all DEFFN X(v)'s (defined functions) are put together in the same area (like the top) of a program, instead of sprinkled through out, they will also execute faster. Since the 2200 only maintains 16 line number references for user defined subroutines, other GOSUB'XXs will be slower.

Since most versions of BASIC automatically print spaces between verbs and syntax when LISTing code, many programmers develop a bad habit of inserting spaces as they write code. The 2200 takes extra time to analyze the blanks (and extra disk space and memory is wasted). 2200 programs are resolved before running. Variables are assigned to stacks, verbs are turned into machine code (atomized) and other housekeeping chores are done. Programs resolve faster if there are no imbedded blanks found in your statements. Imbedded spaces also impede the overall program execution. You can automatically eliminate imbedded blanks by using the "<S>" parameter the next time you SCRATCH and SAVE your program: SAVE <S> T\$() "program".

Save-a-byte: These techniques can be used to do the same things with less code, and often as a result, less time. To illustrate some "tricks" not found in manuals, I'll list some statements and their shorter equivalents:

<u>Normal Statement</u>	<u>Short Version doing the same thing</u>
STR(A\$,1,20)=STR(B\$,1,20)	STR(A\$,,20)=B\$ - '1' is assumed as the default and string for B\$ isn't needed
STR(A\$(1),20,6)=STR(B\$(1),40,6)	STR(A\$(),20,6)=STR(B\$(),40) - again, 1 is assumed and length for B\$ isn't needed
IF K\$="N" OR K\$="Y" THEN 200	IF POS("YN"=K\$) > 0 THEN 200 - POS is shorter and faster
A=POS(A\$=HEX(0D))	A=POS(A\$=0D) - HEX is assumed
IF POS(HEX(0102)=STR(A\$,1,1)) THEN. A=VAL(STR(A\$,1,1))	IF POS(HEX(0102)=A\$) THEN .. A=VAL(STR(A\$,1)) -or- A=VAL(A\$) - Only 1st referenced byte of A\$ is actually checked or used
A\$=" " .. or .. A\$=HEX(20)	A\$=Z\$ - DIM Z\$1. If used alot, saves core and time(imbedded blanks)

There are literally dozens of similiar gimicks that save memory. My love affair with looking for "save-a-byte" gimicks started by accident fifteen years ago when I was desperately looking for ways to avoid A01 (memory overflow) errors. I was puzzled when I didn't get an error message when entering the first statement shown above and by mistake omitted a '1'. BASIC verbs require rigid syntax (rules and structured format). Therefore, the 2200 expects to find certain values assigned. With many verbs, if the value is not supplied, the 2200 assigns a default value.

Some gimicks, like combining short program lines together, saves both space in memory and time. The smaller a program is, the faster it loads and resolves. Every line number that is eliminated, saves 4 bytes of memory (and may result in less lines for GOSUBs to fall through).

Also use LIST V and look for variables that are not used very often. If these identified variables are just temporary work variables, meaning that their values are not needed later, they can be combined. Reuse one variable over and over again as a temporary work variable. For every numeric variable that you eliminate, you will save 12 bytes of core memory.

Save-a-second: Another set of techniques involves replacing code with verbs that do the same thing, but faster. Every BASIC verb takes a unique amount of time to execute. Years ago, I formed the habit of starting each work day by spending a few minutes looking for ways to do things faster and with less code. It resulted in creating a list of ratios used to compare how long a verb takes to execute. You can develop your own list by writing a simple one line program that executes a verb at least one million times using a FOR/NEXT loop and then time how long each verb takes. I'll share part of my list with you. The verbs are listed in time order, with the fastest on top and the slowest at the bottom of the list. The list compares each verb to the REM verb.

<u>BASIC-2 Verb or Statement</u>	<u>Number of Times Slower</u>
REM	1.0
GOTO	2.1 times longer
A=1	3.3 times longer
ADD (+) or SUBTRACT (-)	5.3 times longer
ON A GOTO	5.4 times longer
MULTIPLY (*)	5.6 times longer
IF A\$=HEX(20) (alpha to HEX)	5.9 times longer
IF A\$=B\$ THEN (alpha to alpha)	6.9 times longer
IF A=1 THEN (numeric)	7.2 times longer
CONVERT STR(A\$,1,1) TO A	7.7 times longer
DIVIDE (/)	14.6 times longer
STR(A\$,1,16)=STR(B\$,1,16)	14.6 times longer

As you can see, every statement in a program takes time to execute, even a REM statement that does nothing. In repetitive routines, when a group of lines are used thousands of times, eliminate statements that are not really needed. When sorting 50,000 records, a REM can cost minutes. A common mistake is to imbed a statement like "A=1" in the middle of heavily used routines. As the table shows, setting "A=1" takes 3.3 times longer than a REM. If the "A=1" can be moved outside of that frequently used routine, your program will be faster. Now using the table, let's substitute verbs that do the same thing, but execute faster. Consider these examples:

<u>Normal Statement</u>	<u>Faster Version doing the same thing</u>
IF A=1 THEN 200	ON A GOTO 200 - ON is 25% faster than an IF and ON is also shorter
IF A=3 THEN 20: IF A=4 THEN 30	ON A-2 GOTO 20, 30 - Replace 2 IF's with 1 ON is 38% faster and much shorter
A=A*2	A=A+A - ADD is faster than MULTIPLY

As you can see, these investigations can result in vastly more efficient code. Let me share a few other general observations with you:

- Alphanumeric comparisons are always faster than numeric comparisons
- Comparing a HEX code is faster than comparing an alphanumeric
- Eliminating extra variables from your program not only saves memory, it also saves time because it makes scanning the stacks a little faster for all verbs that use variables.

Finally, there are a few new verbs in all versions of the BASIC-2 language that can also make your programs somewhat faster. Most notably is:

DATA LOAD/SAVE BM T(A) A\$()

This verb can replace the BA (block address) LOAD/SAVE statements in your programs. With it, you can build large data buffers to load a track (24 sectors) of data at a time. It can dramatically reduce the number of "disk hits" your program uses to retrieve or save data, thus eliminating "traffic jams" for those overworked disk heads. By simply using this verb, I was able to reduce the "disk hits" from 839 down to merely 52 when sorting 836 records. Reducing the total number of disk hits made the sort about 10% faster when only 1 terminal was in use. But, when 4 terminals were in use, the sort was 36% faster. Just like a RAM disk, the more users involved, the better your response time will be as you adjust how a disk is used.

Miscellaneous Tips

While these tips probably won't give your computer a sudden burst of speed, they might help you avoid costly "down times" and also help extend its life. Any computer system works better and lasts longer if it is properly maintained and used with a little care.

Environment - Most computers will function properly even at the higher temperatures now found in many of today's offices. But rapid changes in temperature and humidity ~~will shorten your hardware's life.~~ ^{can} ~~shorten~~ ^{be affected by} ~~your hardware's~~ ^{peaks or troughs} ~~life.~~ The temperature range recommended by most manufacturers is 65 to 80 degrees Fahrenheit (18 to 27 degrees Celsius). Humidity should be from 40% to 60%. Some computers will tolerate different ranges, but most experience some problems when the temperature changes by more than 2 degrees per hour. The humidity should also not vary by more than 2% per hour.

Perhaps the most neglected element is humidity. Too much humidity and moisture leaves residue ^{which can shorten your hardware's life} ~~or causes electrical shorts.~~ High humidity causes paper to expand, which can jam some printers. Too little humidity and you get static electricity which causes dust build-up, reduced disk ^{or tape} ~~life,~~ excessive wear ^{of printer heads} ~~and random data~~ ^{problems} ~~on disk write/read heads.~~ If possible, CPUs and disk drives should not be placed on carpets, unless they are anti-dust and anti-static computer carpets.

↳ PAPER CAN BE POSSIBLY CAUSE JAMS OR IMPROPER PRINT

Maintenance - Several years ago, many users abandoned their maintenance contracts. They felt it would be cheaper to pay "by the call" or use a third party maintenance organization. Some users said they could save enough money on maintenance costs to buy another system when their existing system no longer worked. In practice, some people did save some money for awhile - during the years when Wang maintenance was high. Today, Wang maintenance prices are realistic, especially on the CS and DS.

There are several disadvantages to not being on a maintenance contract. Obviously, when an emergency does occur and you do need service, you have a lower priority than those other companies who are on maintenance. This is true regardless of who you use for maintenance, either Wang or one of the third party companies. Second, like the self service gas stations of today, relatively little preventative maintenance is being done by many users. For example, ^{can} filters are not being cleaned or replaced on Phoenix disk drives (which ^{can} cause as much down time as electronic failures).

Some third party maintenance companies "repair to the part" or use boards that have been repaired before. They simply cannot afford to carry a large stock of parts, nor do they even have the latest engineering changes (ECNs) that may be applicable to your hardware. Quite often, manufacturers swap defective boards or complete systems. ~~with brand new components.~~ It's not unusual for a customer on maintenance to have their complete CPU replaced when several problems occur at once. While how quickly a problem is fixed is an important measurement of how well maintenance is being done, having old components being replaced with new ones can have a hidden benefit of extending the overall life of your system. One study that examined the effect of swapping boards versus replacing the exact part, suggests that you might get several more years of use from hardware where swaps are made.

MOST CASES REPLACING PARTS ARE 4 TIMES MORE THAN MULTIPLE PARTS CAN INTRODUCE MORE PROBLEMS THAN REPLACING THE 1 PROBLEM PART

With today's more realistic maintenance prices, you may be better off with a service contract. But, actively monitor preventative maintenance. Place a tag on the front of each piece of your equipment. Record the dates that each was last serviced, particularly noting when the filters were last replaced or cleaned. Make a habit of routinely checking the tags and when your customer engineer visits, be sure the filters are cleaned if needed.

Daily Operations - Obviously, you should avoid raising dust or smoking near the CPU, disk drives and disk platter storage areas. The clearance between some disk platters and the heads flying over them is 100 micro inches. A partical of cigarette smoke is 250 micro inches. One human hair is 4,000 micro inches. Since they won't fit in between the platters and heads, you might get a "head crash" and lose everything on the drive. Vacuum cleaners or other machinery with large electric motors should not be operated near the CPU or disk drive - and certainly, never while they are running.

Many users come to work early in the morning to do backups. The hardware is powered on, and almost immediately they start coping disks or performing other disk intensive operations. This is the worst time of the day to do a backup. Not only is the hardware still warming-up, so is the air around it. Most offices are not fully heated or cooled at night, thus in the morning the temperatures are usually changing by more than two degrees per hour. If possible, let the hardware warm-up for at least several minutes (I wait at least 15 minutes) before doing backups. Just like an expensive sports car, let it warm-up before racing it. Also, monitor the temperature changes during this period. If the air temperature varies a lot during this warm-up period, see if you can either adjust when the building starts heating or cooling, or else do backups during a period when temperatures and humidity are not changing (the end of the work day is usually best).

IT IS IMPORTANT TO NOTE THAT DATA SHOULD NOT BE WRITTEN TO A DISK AT A TEMPERATURE

Disaster Planning - Most users backup their data and programs. But, most do not keep a "grandfather" backup that is different than today's backup, just in case the current backup was made when ^{glw} errors existed that you were not aware of. You should keep a daily backup and a backup that is at least a week old (many keep a backup for last month and last year). You should also keep one backup "off site" in case of a disaster like a flood, fire or other natural disaster. One disaster that occurs more often than a natural catastrophe is damage caused by disgruntled employees. If they destroy things you can see, it's easier to recover from than having someone insert or delete subtle changes to your data that you may not see for weeks or months. Keeping several sets of backups off site can help if this occurs.

SIGNIFICANTLY DIFFERENT THAN THE TEMPERATURE AT WHICH IT WILL BE READ, 15° F IS USUALLY A SAFE RANGE OVER 20° F CHANGE SHOULD DEFINITELY BE AVOIDED. DISK PLATTERS EXPAN & CONTRACT W/ TEMP & CHANGE IN TEMP BETWEEN WRITING & READING OF > 20° F MAY LIKELY CAUSE PROBLEMS READING.

Disaster planning should not be limited to just off site backups. Ask yourself, if your computer was completely destroyed by fire, how long would it take you to get back into business? How long did it take to get your current system after you ordered it? It could take months before you can get new hardware to even load that "off site" backup on a drive. You can join forces with other local users and simply agree to share each other's hardware (after hours, for example) until the other receives new hardware. Some groups have created a joint pool of hardware that members can use during a disaster, or borrow whenever one piece of equipment is out of service while waiting for repair parts. Some companies offer Disaster Contracts that guarentee that you can be processing again within 24 hours.

Summary

You do have several inexpensive options that will help extend the life of your hardware. But, sooner or later, you will need to replace most of your system. ^{most} electronic and mechanical devices eventually wear out. After all, how long do you expect your car or TV to last? A life cycle model I did suggests that mechanical devices like printers and disks are usually replaced within 4 to 6 years, while CPUs can last from 8 to 10 years. (This article was not intended to convince you that you can indefinitely extend the life of your hardware. You should view it as extending the time in which you have to form a long-ranged plan for future growth. With a little planning, you may never have to stop using one system and then start using another, but rather, just gradually replace components as they wear out.

THE KEY TO THE LIFE CYCLE OF MOST DEVICES IS A LONG REPAIRMENT PARTS WILL BE AVAILABLE.

TAC

Problem Call

Control Number 08237035

Contact Name LARRY HORNIBROOK Position CE
Rdb # 3522 Tdx # Phone # 405 848 9852 Ext #

System Type 2200CS Device Type DS
Utility Name Software Level

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

Use the following area to describe the site that created this request

Cust/Office Name OMEGA INSURANCE Phone # 405 769 6701
Address 2K08 City CHOCPAU State OK
On Site Contact Name

Problem (*) Solution (+)

*EMP 28543

*DISPATCH 20A206898

*HAVING CS GETTING PEDM ERROR WHILE BOOTING UNSURE WHETHER
*HARDWARE OR SOFTWARE

8/24/88: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
>REDSHAW ACCOUNT USING THE NEW SIMMS CPU BRDS W/
128K MEM. GETTING PEDM ERROR CONSISTENTLY ON BOOT.
TRIED ANOTHER BRD & NO CHANGE. TESTED W/ O/S 3.1 &
NO PROB. REDSHAW MUST EITHER UPGRADE THE CUST O/S
TO 3.1 OR MUST DOWNGRADE TO A NON-SIMM BRD. CE TO
TALK W/ CUST & CALL BACK. (15MIN) MIKEB

8/25 4:29 CE CALLED AND SAID THANKS FOR YOUR HELP. HE SAID
IF YOU WANT YOU CAN CALL RUTH AT 1-800-999-1115 AT REDSHAW
ACCOUNT D WHITE

8/26/88: CALLED RUTH AT REDSHAW. WAS NOT AVAILABLE. LEFT
MESSAGE TO CALL. LEFT MESSAGE FOR CE TO CALL.
(10MIN) MIKEB

>RUTH CALLED BACK. RT NOW WILL NEED TO USE THE
OLDER SINGLE BRD CPU CARDS TO ALLEVIATE THE COMPAT
PROB. WILL TALK TO R&D ABOUT STEPS TO TAKE. LEFT
MESSAGE FOR MR TO CALL. (20MIN) MIKEB

8/26 11:06 CE WILL C/B VSP

8/26 1:35 CALLED AND NEEDS A C/B ON HIS BEEPER @ # 405-686-
3286 CAREN 1:35

8/26/88: TALKED W/ CE. NEED TO CHECK CHIP L45 TO INSURE IT
IS NOT A MOTOROLA MC74F539N. IF IT IS, NEED TO TEST
W/ A BRD W/ A DIFFERENT L45 CHIP. IF FAILS W/ GOOD
CHIP WILL NEED TO TEST W/ 8 PARTITIONS OR MORE ON
O/S'S 2.7 & 3.0. IF CAN'T CHECK WILL REQUEST BRD
SENT IN. (20MIN) MIKEB

8/29/88: BRD HAS GOOD CHIP AT L45. CE TO SEND IN BRD FOR TESTING W/ OUR 2.7 & 3.0. (10MIN) MIKEB

9/2/88: RCV'D BRD. OUR MVP 2.7 IS NOT RECOGNIZING THE PAL CHIP & AS A RESULT IT WILL ALLOW YOU TO GEN 512K MEM. GEN'G BEYOND 128K WILL CAUSE A PEDM ERROR. R&D LOOKING INTO SITUATION. PROB LOOKS TO ONLY EXIST ONLY W/ 128K BRDS. R&D TO TEST A 512K W/ OUR 2.7. (1HR) MIKEB

9/6 CALLED AND WILL CALL BACK LATER. CAREN 11:15
FLASHED

12:15 CALLED CE. CUST NOW HAVING ANOTHER PROB, CAN'T ACCESS DISK. CE GOING ON SITE TODAY. TOLD CE THERE IS A PROB W/ 2.7 USING THE NEW BRDS AS 2.7 WILL NOT READ THE PAL & THINKS 128K BRD HAS 512K. WAITING FOR WORD BACK FROM R&D ON FIX. ALSO WANTS TO KNOW IF OLD & NEW BRDS LOGISTICALLY INTER-CHANGEABLE. (1HR) MIKEB

9/12/88: BRDS ARE LOGISTICALLY INTERCHANGEABLE /JC. CALLED CE. INSTALLED O/S BRD. LEAVING CALL OPEN AS POSSIBLE BETA SITE FOR NEW PAL. (10MIN) MIKEB

10/17/88: CE TO CHECK W/ CUST TO SEE IF WILLING TO BETA TEST NEW CHIP. WILL CALL BACK. (10MIN) MIKEB

10/18/88: CE CALLED IN. CUST RELUCTANT TO BETA UNTIL END OF MONTH. WILL CHECK FOR OTHER BETA SITES WHICH COULD TEST EARLIER & USE THIS SITE AS A BACKUP IF NEEDED. (10MIN) MIKEB

10/19 9:05 CALL BACK TO OFC VSP

10/20/88: TALKED W/ CE. REDSHAW DOES NOT WANT US BETA TESTING CHIP AT SITE. REDSHAW WILL BETA TEST AT THEIR HO. RUTH MOORE IS CONTACT AT REDSHAW, 1-800-999-1115. WILL CHECK W/ R&D THEN CALL REDSHAW. (5MIN) MIKEB

12/12/88: IN TRAINING TILL 12/26. LEFT MESSAGE. (5MIN) MIKE

12/27/88: TALKED W/ CE. WILL SEND OUT CHIP FOR BETA TESTING TODAY. (5MIN) MIKEB
>CHIP SENT OUT FED XPRESS, AIR BILL 1069820735. CE TO CALL BACK WHEN INSTALLED & TESTED. (10MIN) MB

12/28/88: RCV'D BETA CHIP BUT INSTALLED AT SITE ON 512K BRD. NEEDS TO PUT ON 128K BRD & VERIFY AT PARTITIONING SCREEN ONLY SHOWING 128K. CE TO CORRECT & TEST. (10MIN) MIKEB

+INSTALL NEW CHIP AT L42 & WORKING PERFECTLY. CLOSING CALL. 1/4/88 (10MIN) MIKEB

TAC

Information Call

Control Number 08307041

Contact Name MIKE COOPER Position ACE
Rdb # 3436 Tdx # Phone # 803 571 5534 Ext #

System Type 2200CS Device Type DS
Utility Name Software Level

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

Use the following area to describe the site that created this request

Cust/Office Name MAPAS INS AGENCY Phone #
Address 2K01 City State
On Site Contact Name

Question (*) / Answer (+)

*EMP 34744

*DISPATCH 0147761

*HAVING PROBLEM WITH REDSHAW HARDWARE NOT ENOUGH MEMORY

*TO CONTROL WORKSTATION

11/2/88: TRYING TO UPGRADE FROM O/S 128K BRD TO N/S 512K
BRD. BOTH BRDS FAIL W/ THE SAME PECM ERROR. CE TO
GET 3RD N/S BRD, AN O/S 512 BRD, & A WANG O/S. IF
3RD N/S 512 BRD FAILS WANT CE TO TEST ALL 3 W/
WANG O/S & LET ME KNOW RESULTS. MAY NEED BRD SENT
IN. WILL ALSO HAVE O/S BRD IF NEEDED. (15MIN) MIKE

11/28/88: LEFT MESSAGE AT OFFICE TO CALL. (5MIN) MIKEB
+HAD 5 BRDS. 3 BRDS FAILED & 2 WORKED. THE 3 THAT FAILED ALL
+HAD TI CHIPS AT L2 WHILE THE 2 THAT WORKED HAD MMI CHIPS.
+ONLY FAILED 1 SORT PROG W/ A PECM ERROR. INSTALLED 512K BRD
+W/ MMI CHIP AT L2 & NO PROB SINCE. CLOSE CALL.

12/20/88 (10MIN) MIKEB

Gene, Based on your request for information regarding reported problems with CS units in Europe, The following information is provided:

PART NUMBER 270-1094, Board Number 210-9363 Failed components are. L6 & L& (376-0973) Cap # 35 (300-1931). Board # 210-8961 XfMR T1 (410-0303) 8 AMP Fuze (360-1154. Board 210-9362 T1 & Q4 (375-1167, Diode 12 & 13 (380-4030), RES R19 & 20 (330-1048), T3 (320-1024), Diode 3 & 4 (380-4033) and Diode 8 & 9 (380-4022). WPR reports that the 270-1094 cable is a major problem, The problem seems to be "How we Crimp the Cable), They have to replace most cables (270-3439).

PART NUMBER 270-0986, Board Number 210-8399, Q1 & Q2, 210-8499 L3, Q3, Q4. They report that on the 210-8399 Q1 & Q2 are replaced 75% of the time during repair. On the 210-8499 L3, Q3 and Q4 are replaced 75 to 80% of the time.

While this is not my project. I would recommend that you have some one follow this up with R&D. If I can of any help please feel free to call me.

Jerry.

MEMORANDUM

TO: Aissa Betancourt
FROM: Gilles Carrier
DATE: May 2, 1988
SUBJECT: CS ¹ Meg CPU Card Memory Problem

A memory error problem was reported on the 210-8⁹³~~47~~ CS ¹ Meg CPU card, by Mike Riley. The errors would only happen when using 256K simms. Errors occurred when using a Motorola, MC74F539N IC at L45. These IC's have been taken off the QVL by Charlie Scribner (see attached sheets). All boards coming into the repair center should have L45 replaced if the Motorola part is used. Signetics or Fairchild 74F539 IC's can be used as replacements.

Thank You,


Gilles Carrier

CC: Rob Clark
Rheal Leblanc
Mike Riley

NEW PRODUCT STATUS

2200 8 MEGABYTE CPU PCB

Domestic FCS	Product is shipping
International FCS	Product is shipping
Alpha Test	N/A
Beta Test	Testing at 5 sites

Current Status: 210-8937

Logistics:

This new 2200 CPU PCB will be packaged in six versions 128KB, 512KB, 1MB, 2MB, 4MB, and 8MB.

Fail data provided.

210-8937

CPU/MEM PCB

MTBF: 21013 HRS

Technical Documentation:

Publication update bulletins to the CS, MicroVP, and MVP-128/512 product maintenance manuals have been reviewed and approved.

Tech. Writer: Curt Stein

New Product TSB distributed (HWT 8003, 02/09/88).

TEE/FSC:

Repair plan number is 611-0.

Diagnostic Support:

The current version of 2200 Boot Proms do not support testing of the increased memory. Although the boot proms test the added memory addressing restrictions make the error reporting incorrect.

The increased memory on the new PCB will be supported by revision 179E of the memory diagnostic. The diagnostic is included in package number 195-2956-0.

Technical Training Center:

2200 training is conducted as demand warrants. Training on the new CPU PCB will be provided in future classes. CE's currently trained to service MVP-128/512, MicroVP-1/2, and CS-2/5 can be familiarized with the new CPU board through PUB's to existing Product Maintenance Manuals and a TSB.

CSO **WANG**

EDUCATION

TECH TALK

POWER SUPPLY VOLTAGE ADJUSTMENTS

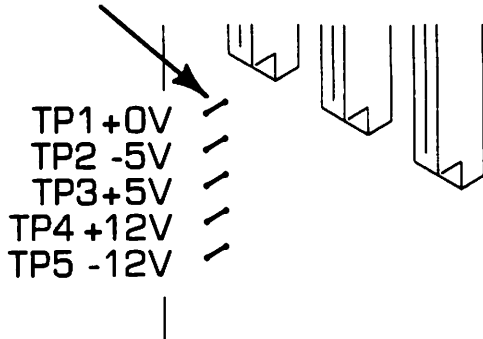
- 5 Remove left-most blank panel, or PC board from that slot
- 6 Locate motherboard voltage test point indicators

NOTE

It may be necessary to remove a second PC board or blank panel to access the test points.

- 7 Power-up the CS

- 8 Connect common lead of DVM to TP1 on motherboard

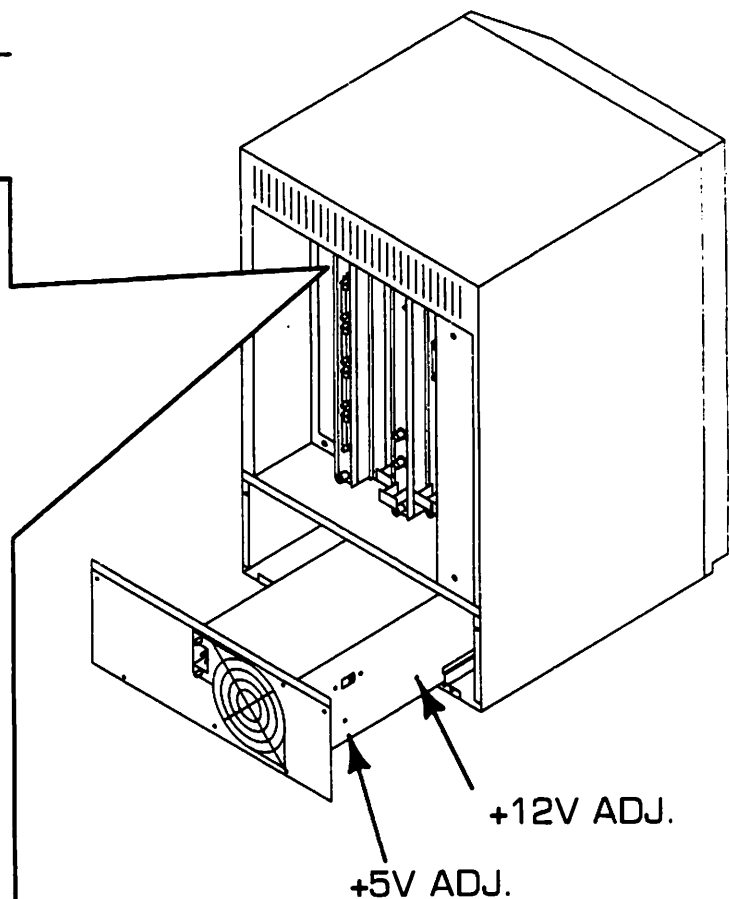


TP1 +0V
TP2 -5V
TP3 +5V
TP4 +12V
TP5 -12V

The diagram shows a series of five test points on a motherboard, labeled TP1 through TP5. TP1 is at 0V, TP2 is -5V, TP3 is +5V, TP4 is +12V, and TP5 is -12V. Arrows point from the text to the corresponding test points.

- 9 Connect DVM to TP1 - TP5 on motherboard to verify DC limits.

Test Point	Voltage	Limits (VDC)
TP2	-5V(fixed)	-4.95V to -5.05V
TP3	+5V(adj) (see fig.)	+4.95V to +5.05V
TP4	+12V(adj) (see fig.)	+11.95V to +12.05V
TP5	-12V (fixed)	-11.95V to -12.05V



POWER SUPPLY VOLTAGE ADJUSTMENTS

WARNING

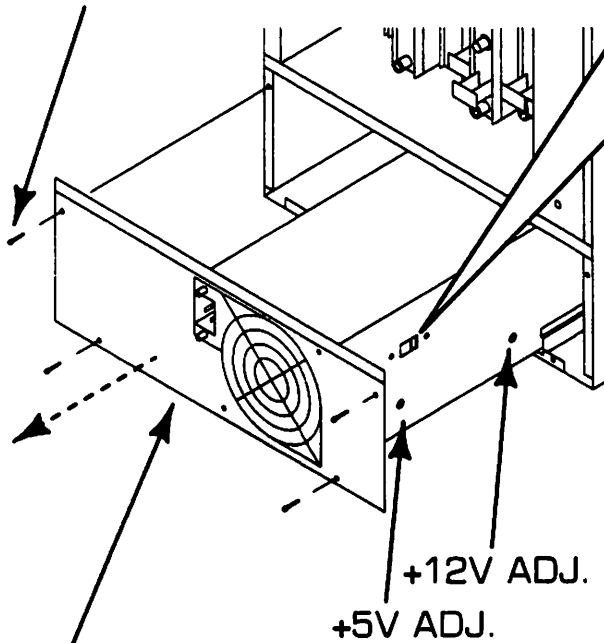
Do not open the switching power supply under any circumstance. Extremely dangerous voltage (in excess of 300 volts DC) and unlimited current are present within the power supply. Do not attempt to repair the supply; it is field replaceable only.

Tools and test equipment required:

- Fluke DVM (or equivalent).
- Small flat-blade plastic screwdriver.

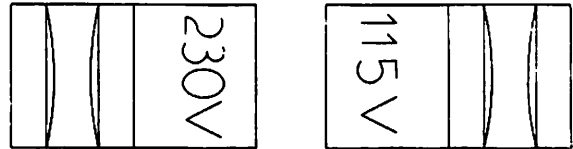
1 Power down CS and disconnect AC power cord from outlet

2 Remove four power supply screws.



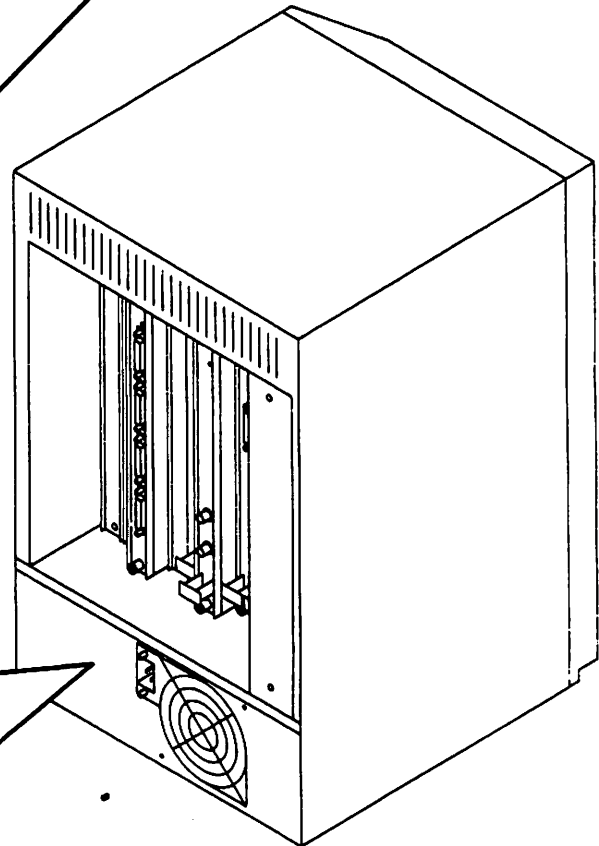
3 Slide power supply out far enough to gain access to + 5V and + 12V adjustment pots.

4 Set AC voltage select switch to correct voltage available at site.

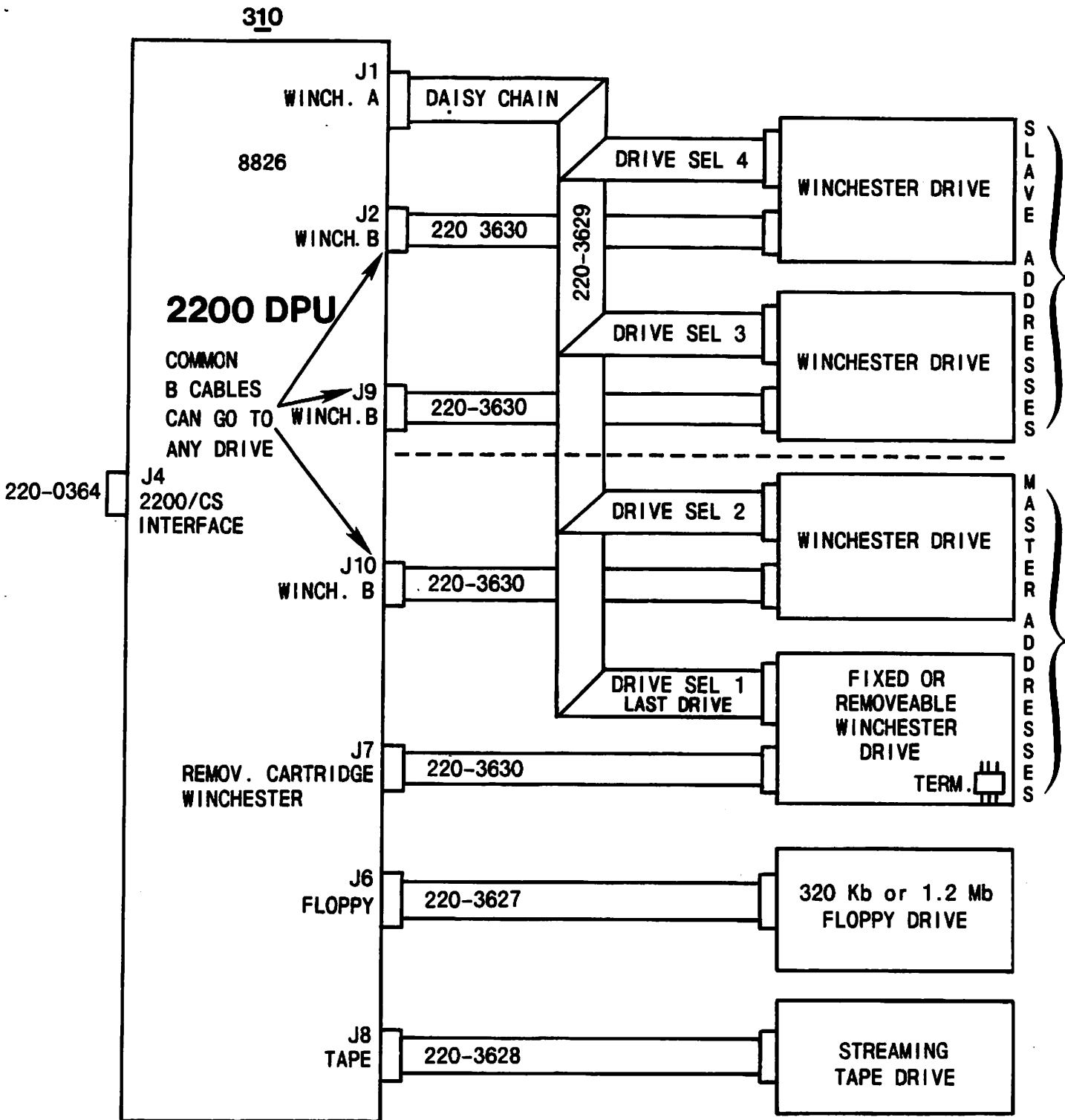


Set for
220 VAC, 50 Hz
operation

Set for
115 VAC, 60 Hz
operation



DRIVE CABLE DIAGRAM



NOTES:

1. IF A REMOVABLE CARTRIDGE WINCHESTER IS USED, ITS 'B' CABLE MUST BE CONNECTED TO J7.
2. TERMINATING RESISTORS OF DRIVES 2, 3, AND 4 MUST BE REMOVED. DRIVE 1 TERMINATOR MUST BE INSTALLED.

2200 INTERFACE (TO HOST)

J4

J9 WINCH B

J10 WINCH B

320Kb OFF ON
1.2 Mb TAPE
SW3

MSB LSB MSB LSB
SW 1 8 7 6 5 4 3 2 1
LDR 1 LDR 2

J7

WINCH REMOVABLE

FLOPPY J6

POWER

J2 WINCH B

J1 WINCH A

SWITCH SETTING	MSB	LSB	DISK DRIVE TYPE	NO. OF ADDRESSES USED
0 0 0 0			NO DRIVE PRESENT	
0 0 0 1			10 MB REM. CARTRIDGE WINCH.	1
0 0 1 1			20 MB WINCHESTER	2
0 1 0 0			32 MB WINCHESTER	2
0 1 0 1			64 MB WINCHESTER	4
0 1 1 0			140 MB MAXTOR. 14 X 10 MB	14
0 1 1 1			32 MB MICROPOLIS WINCH.	2
1 0 0 0			112 MB MAXTOR 7 X 16 MB	7
			MAXTOR 7 X 16	

MSB LSB MSB LSB
SW 2 8 7 6 5 4 3 2 1
LDR 3 LDR 4

J8 TAPE

DSPCB

DEVICE ADDRESSES

DEVICE ADDRESSES ARE:

	MASTER	SLAVE
Floppy	D x 0 (hex)	D x 0 + 40 (hex) RAM Disk
	D x 1 (hex)	D x 1 + 40 (hex) see Note 9
	D x 2 (hex)	D x 2
	D x 3 (hex)	D x 3
	D x 4 (hex)	D x 4
	D x 5 (hex)	D x 5
	D x 6 (hex)	D x 6
	D x 7 (hex)	D x 7
	D x 8 (hex)	D x 8
	D x 9 (hex)	D x 9
	D x A (hex)	D x A
	D x B (hex)	D x B
	D x C (hex)	D x C
	D x D (hex)	D x D
	D x E (hex)	D x E
Removeable Winchester	D x F (hex)	D x F + 40 (hex) Streaming Tape Drive

NOTES (Drive Addressing):

1. Switch settings on the Disk Controller PCB (in CPU) control the master base addressing.
2. The slave address is master address plus 40 (hex).

MAGNETIC DEVICES

	Wang Part No.
5 1/4" HH 360KB Floppy	278-4033
5 1/4" HH 1.2MB Floppy	278-4055
5 1/4" HH Cassette Tape	725-1481
10 MB HH Removeable Disk	278-4049
20 MB HH Winchester	278-4062
32 MB FH Winchester	278-4034
32 MB FH Winchester	278-4069
64 MB FH Winchester	278-4054
112 MB FH Winchester	TBD
140 MB FH Winchester	TBD

CABLES

	Wang Part No.
1/0 Cable	220-0364
Winchester A Cable	220-3629
Winchester B Cable	220-3630
Floppy Cable	220-3627
Cassette Cable	220-3628

DISK DRIVE FEATURES

	No. of Platters/ Addresses	Capacity/ Platter	Sectors/ Platter	Average Access Time
320-KB Diskette (half height)	1	320 KB	1280 1440 (PC)	100 ms
1.2-MB Diskette (half height)	1	1.2 MB	4160 4800 (PC)	100 ms
Removable Hard Disk (half height)	1	10 MB	38912	95 ms
20-MB Hard Disk (half height)	2	10 MB	38912	68 ms
32-MB Hard Disk (full height) QUANTUM Q540	2	16 MB	65024	45 ms
Alternate 32-MB Drive (full height)	X 2	16 X MB	32512 65024	45 ms
64-MB Hard Disk (full height)	4	16 MB	65024	27 ms
112-MB Maxtor (full height)	7	16 MB	65024	27 ms
140-MB Maxtor (full height)	14	10 MB	38912	27 ms

Bytes per sector, all drives: 256

Data Transfer Rate

320-KB Diskette: 250 KB per
second
 1.2-MB Diskette: 500 KB per
second
 All hard-disk drives: 5 MB per
second

DS INSTALLATION PROBLEM

Our customer was so satisfied with the performance and support of their DS that is being discussed during this edition of TECH TALK that they decided to purchase and install a second unit. If the customer purchased the following DS components, how would you set up the unit?

You and other members of your team can answer this question and let the folks on TECH TALK know your answer right on the air. So, put on your thinking caps and answer the questions below and be the first group to call in with your answers. The customer purchased:

- A. One 320 K floppy drive
- B. One 32 Meg Quantum full height fixed Winchester drive
- C. No Streaming tape drive
- D. Two 64 Meg fixed Winchester drives

Assume that the second DS is connected to disk controller in the CS whose address is set for 320.

Also assume that the two 64 Meg fixed Winchester drives are positioned in the horizontal internal slots of the unit.

QUESTIONS:

- A. What drive will be connected to drive select plug #1?
- B. To what connector on the DS board will the B cable of the Winchester connected to Drive Select #1 be connected?
- C. To what connector on the DS board will the floppy drive be connected?

Assume that the 32 Meg Quantum drive is connected to Drive select #1 on the A cable; that the one of the 64 Meg winchesters is connected to Drive Select #3 on the A cable and the other 64 Meg drive is connected to Drive Select #4 on the A cable when answering the remaining questions:

- D. What will be the switch settings of switch bank #1.
- E. What will be the switch settings of switch bank #2.
- F. What will be the switch settings of switch bank #3.?
- G. What will be the command to select the address of the third platter of the drive connected to drive select three.
- H. What will be the command to select the address of the fourth platter of the drive connected to drive select four.
- I. Which drives will have a terminator and which drives will not?
- J. To what connector on the DS board will the power cable be connected?

TRAINING QUESTIONNAIRE

Program Title _____ Site _____ Date _____

Job Title _____

In a continuing effort to improve the training products presented to CSO personnel we are asking for your help in evaluating the current training programs. This Training Questionnaire is one means by which you can provide us with feedback on training. At the same time we would like to know how the training prepared you to do your job.

PLEASE USE THE SCALE BELOW FOR COMPLETION OF PART 1
RATE EACH ITEM BY SELECTING THE NUMBER WHICH BEST REPRESENTS YOUR LEVEL OF SATISFACTION.

	0	1	2	3	4	5	6	7	8	9	10	
COMPLETELY DISSATISFIED	↑		↑		↑		↑		↑		↑	COMPLETELY SATISFIED
STRONGLY DISSATISFIED			↑		↑		↑		↑		↑	STRONGLY SATISFIED
SOMEWHAT DISSATISFIED					↑		↑		↑		↑	SOMEWHAT SATISFIED

PART 1 - Satisfaction With Training

1. _____ Overall, I feel that the video broadcast instruction enabled me to work more effectively in my job.
2. _____ The instruction and materials received in training enabled me to effectively install and support the product.

3. _____ Are there specific topics or subjects which you believe should be added or deleted?

WHY _____

4. _____ Considering your field responsibilities, what information or topics presented during training were the MOST useful, and which were the LEAST useful?
MOST USEFUL: _____

LEAST USEFUL: _____

5. _____ Did each segment of the broadcast hold my interest?
Comments _____

6. _____ Was the program the right length? If not, was it too long or short?
Comments _____

QUALITY

7. _____ The video and audio quality was good.

PUBLICITY

8. _____ I received sufficient notification for the broadcast.
Comments _____

9. _____ What future topics could be aired on Wang TV that would help you in your job?

WANG

Wang Labs, Inc.
CSO Education
437 South Union Street
Lawrence, MA 01843
M/S 082-260

DS INSTALLATION PROBLEM

Our customer was so satisfied with the performance and support of their DS that is being discussed during this edition of TECH TALK that they decided to purchase and install a second unit. If the customer purchased the following DS components, how would you set up the unit?

You and other members of your team can answer this question and let the folks on TECH TALK know your answer right on the air. So, put on your thinking caps and answer the questions below and be the first group to call in with your answers. The customer purchased:

- A. One 320 K floppy drive
- B. One 32 Meg Quantum full height fixed Winchester drive
- C. No Streaming tape drive
- D. Two 64 Meg fixed Winchester drives

Assume that the second DS is connected to disk controller in the CS whose address is set for 320.

Also assume that the two 64 Meg fixed Winchester drives are positioned in the horizontal internal slots of the unit.

QUESTIONS:

- A. What drive will be connected to drive select plug #1? ANY WINCHESTER
- B. To what connector on the DS board will the B cable of the Winchester connected to Drive Select #1 be connected? J2, J9, or J10
- C. To what connector on the DS board will the floppy drive be connected? J6

Assume that the 32 Meg Quantum drive is connected to Drive select #1 on the A cable; that the one of the 64 Meg winchesters is connected to Drive Select #3 on the A cable and the other 64 Meg drive is connected to Drive Select #4 on the A cable when answering the remaining questions:

- D. What will be the switch settings of switch bank #1. 7 ON ONLY
- E. What will be the switch settings of switch bank #2. 1,3,5,7 ON ONLY
- F. What will be the switch settings of switch bank #3? All Off
- G. What will be the command to select the address of the third platter of the drive connected to drive select three. SELECTDISK/D63 or SELECTDISK D63
- H. What will be the command to select the address of the fourth platter of the drive connected to drive select four. SELECTDISK/D68 or SELECTDISK D68
- I. Which drives will have a terminator and which drives will not? FLOPPY + 32 MEG
- J. To what connector on the DS board will the power cable be connected? J3

CENTRAL

WEST

HM - 193

HARDWARE FUNCTIONAL SPECIFICATIONS
F O R
THE 2200 CPU WITH EXPANDED MEMORY

MOHAMED MAKHLOUF
M.S. 014-390.

INTRODUCTION

This document describes the hardware of the 2200 Central Processing Unit (CPU) with expanded memory.

This product is an enhancement of the 2200 Micro VP in that it increases the data (user) memory to eight megabytes maximum in the same board space as the former CPU. Memory modules, SIMMs will be used to conserve board space. Control memory will remain at a maximum of 64kx24 bits. Data memory uses 256 kbits x 9 or one Megabits x 9 Dynamaic Random Access Memory, DRAM and control memory uses 32 kbytes Static Random Access Memory, SRAM.

The new version will be loaded with 32 kwords or 64 kwords of control memory and one of the following DRAM options:

- 0.5 Megabytes
- 1.0 Megabytes
- 2.0 Megabytes
- 4.0 Megabytes
- 8.0 megabytes

SPECIFIC HARDWARE FEATURES

The hardware of this product consists of the following components.

1. The Central Processing Unit, CPU.
2. The DRAM Controller.
3. The Bootstrap PROMs.
4. The Control Memory.
5. The Data Memory.
6. Support Logic.

The CPU

This product uses a proprietary Very Large Scale Integration, VLSI chip, WL2200 as the processor. This chip is packaged in ceramic, and supports 120 pins for its different buses and signals as described below:

NOTE: Signals prefixed with a slash are active low.

<u>SIGNAL</u>	<u>DIRECTION</u> <u>referenced to</u> <u>CPU.</u>	<u>DESCRIPTION</u>
POR:	Input.	Power On Reset must be held high for 1.2 microseconds in order to guarantee proper operation. It may be held high indefinitely for testing purposes. When asserted, this signal causes the next instruction to be fetched from location 8003H in control memory.
RESET:	Input.	Reset is similar to POR with respect to timing and use. It causes the next instruction to be fetched from location 8001H in the control memory. Reset has lower priority than either POR or PEDM (Parity Error in Data Memory) and thus will be ignored while either of these conditions exist.
CMWR:	Output.	Control Memory WRITE. Initiates writing to control memory with a pulse of 200 nSeconds. It occurs after the control memory address CA15 -CA0 has been stabilized.
CA15-CA0:	Output.	Control memory Address lines.
CD23-CD0:	Input or Output--	Control memory Data lines. Carry the twenty four bits wide program instructions.
DMWR:	Output.	Data Memory WRITE. Initiates writing operations to data memory. It occurs and becomes stable before ALE.
ALE:	Output.	Address Latch Enable. Initiates memory operations by causing the DRAM controller to latch the address lines at the rising edge of ALE. At the falling edge of ALE, the DRAM controller issues the Row Address Strobe, RAS and the Column Address Strobe, CAS for memory access.
WAIT:	Input.	The Wait signal is issued by secondary logic when the DRAM controller begin DRAM refreshing.

DA18-DA0: Output. Data memory Address lines designated as follows:

DA0=1 means the Least Significant Byte, LSB of a word is selected for writing. ie the even byte.

DA0=0 means the Most Significant Byte, MSB of a word is selected for writing. ie the odd byte.

DA18-DA1 select one of 256 kwords (16 bits of data and two bits of parity in each word) for writing as dictated by DA0 above. During reading, the same address bits select one of 256 kwords without regard to DA0. It should be noted here that the CPU writes in byte portions and reads in word portions.

DD17- DD0 Input or output. Data memory Data lines. These eighteen data lines carry data between the CPU and DRAM, include two parity bits and are designated as follows:

DD8 - DD0 carry the byte delivered to DRAM during writing and carry the LSB of the word read from DRAM. DD17 - DD9 carry the MSB of the word read from DRAM ie do not participate in writing operations. DD17 and DD8 are the parity bits for the MSB and LSB respectively.

/ABS Output. Address Bus Strobe indicates that a valid device address is present on /AB8 - /AB1. All devices except the addressed device should stop interacting with the processor. this pulse has a duration of 5 microseconds.

/AB8-/AB1 Output. Peripheral devices Address Bus. Device 00 is not allowed.

/CBS Output. Command Bus Strobe. A 5 microsecond pulse that indicates to the addressed peripheral device that the byte on the /OB bus should be interpreted as a command.

/OBS Output. Output Bus Strobe. A 5 microseconds pulse that indicates to the addressed peripheral device that the byte on the /OB bus should be interpreted as a data byte.

/OB8- OB1 Output. Output Bus. Carries data to peripheral devices.

/R or B Input. Ready or Busy respectively. Indicates to the CPU wether the selected peripheral is willing to accept data or commands from the CPU.

/CPB Output. Central Processor Busy. This signal will be asserted low when the CPU is handling internal data that must not be interrupted by peripherals delivering data to the CPU. When false, high level, it signals the selected device to generate /IBS (Input Bus Strobe). See next item. /CPB will be asserted automatically when /IBS is received; the program should deassert it to permit another input event.

/IBS Input. Input Bus Strobe. This signal is asserted by the selected peripheral if /CPB is high, and indicates to the CPU that the data on the /IB lines, Input Bus is valid.

/IB9-/IB1 Input. Input Bus. This bus carries the data byte transferred to the CPU. The ninth bit, called "ENDI" is not a parity bit analogous to bit 9 on the DD bus; rather it is used by different peripherals to mean different things and is interpreted accordingly by the program.

HALT Input. A pulse longer than 1.2 microsecond on the Halt line will cause program execution to stop. The signal originates at the keyboard and is used in single stepping program execution.

DRAM Controller and Memory Organization.

The new board, identified by drawing 8937, will utilize a one Megabyte Dynamic RAM Controller chip, National Semiconductors part number DP8429V-70, WLI 377-5055.

From a system's perspective the design will provide a maximum of 128 (one Hundred Twenty Eight) memory segments (banks). Each bank is 64 kbytes wide for a maximum of 8 (Eight) Meagabytes. Hardware realization of this objective is as follows:

Since the 'natural' address of the processor, 19 bits covers 512 kbytes only, the Operating System provides a seven bit register named "Bank Selection Register" BSR which expand the actual address to 26 bits (three bits are duplicates) four of which augment the natural address to 23 bits covering 8 Megabytes.

The Data Address, DA22 - DA01 is derived from the eighteen 'natural' address bits from the CPU plus four bits derived from the Bank Selection Register. DA0 is used to select the Odd or Even byte during memory write operations. The twenty two bits are organized as follows:

DA22 - DA21 will be decoded to select four blocks of memory when the 1 Megabyte SIMMS are loaded and DA20 - DA19 will be decoded to select four blocks of memory when the 256 kbytes SIMMS are loaded. Each block is contained in two SIMMS.

DA20 - DA11 feed into the Column Address while DA10 -DA01 feed into the Row Address of the DRAM Controller.

The Operating System will provide the hardware with a byte containing address expansion information as follows:

The Address Bus AB8-AB1 will signal address expansion when it carry 80H.

The address expansion proper will be carried on the Output Bus OB8-OB1 with the following designation.

OB8 = 0 will mean DA18 - DA16 will be derived from the 'natural' corresponding bits. (Upper three bits of the SL register).

OB8 = 1 will mean that DA18 - DA16 will be derived from the lower three bits of the Bank Selection Register, "BSR".

The remaining seven bits of the address expansion byte are designated as follows:

OB7 - OB4 = DA22 - DA19 respectively

OB3 - OB1 = DA18 - DA16 respectively when OB8 =1 as indicated above

The hardware provides a jumper to distinguish between 256 kbyte SIMMs and 1 Megabyte SIMMs.

When the former SIMMs are installed; maximum of eight, eighteen address lines are needed. Hence DA20 - DA19 will be decoded to provide four blocks each of which comprises eight 64kbytes banks. Thus:

4 blocks X 8 banks/block X 64K/bank = 2048 K = 2 Megabytes.

when the 1 Megabytes SIMMs are installed; maximum of eight, twenty address lines are needed. Hence DA22 - DA21 will be decoded to select four blocks each of which comprises thirty two 64 kbytes banks. Thus:

4 blocks X 32 banks/block X 64 k/bank = 8192 K = 8 megabytes.

To : Dr. Wang
Horace Tsiang
Don Dunning
Miguel Brazao

From: Gene Schulz

Subj: Business Plan For The MICROVP 2MB VLSI CPU Card

Date: June 19, 1987

This document outlines the proposed business plan for the 1/2/4/8MB CPU card for the new CS and existing VLSI CPUs, e.g., the MVP-128/512 and the MICROVP-1/2. Elements of this proposal include the new CS models, one new CS "S" package, VLSI CPU memory upgrade pricing and a new 140MB fixed Winchester for the DS.

Below are the objectives of the attached plan:

- . To provide a 128KB, 512KB, 1MB, 2MB, 4MB and 8MB version of the new CS.
- . To provide a memory upgrade path to existing VLSI CPU users, e.g., MVP-128/512, MICROVP-1/2 and CS-2/5 users, and 8MB capable new CS users who wish to expand 1, 2 or 4MB systems.
- . To increase the amount of available program memory from 512KB to 1MB.
- . To increase the amount of available memory for RAMDISK (under REL. 3.0) up to a maximum of 7MB..
- . To increase the maximum size of each partition from 28KB to 56KB for all 16 partitions.
- . To make Wang memory options cost/competitive with the Wang "look-a-likes"
- . To give present non-VLSI CPU users an additional reason to upgrade to the CS.
- . To provide a 140MB fixed Winchester option for the DS.

This business plan covers PEP H0245B.

INTRODUCTION

As a result of the release of the CS, new life has been born into the 2200 product line. Our CS/2200 VARs (Value Added Resellers), have evolved into the prime distribution channel for the CS and are very pleased with the current state of the product line. As a further enhancement to the CS, we need to increase the amount of main memory available for programmes and RAMDISK. Under a 512KB system, the maximum partition size, if using all 16 partitions is 28KB. Increasing main memory to 1MB, will increase the maximum partition size to 56KB. Under REL. 3.0 of the latest operating system, all unused main memory can be allocated to RAMDISK. To fully utilize this feature, an 8MB memory board will provide up to 7MB of RAMDISK.

The new 1, 2, 4 and 8MB memory boards, will offer our users and VARs the following benefits:

- . Twice the amount of program capacity.
- . An efficient RAMDISK of up to 7MB that can provide for a 20-70% increase in throughput.

The DS-140 is a fixed Winchester for the DS that can either be seven 16MB platters (112MB) or fourteen 10MB platters (140MB). With the addition of the DS-140, our end-users now have the flexibility to configure a DS with up to 316MB of fixed disk compared to the previous maximum of 192MB. A CS will support three DSs, for a total fixed disk capacity of 948MB.

Hardware

Modify the existing VLSI CPU card to support up to 8MB of data memory and 64KB of control memory. This board will not replace the existing 128 and 512KB version. CS models to be available are as follows:

. CS-2	128KB
. CS-5	512KB
. CS-10	1MB
. CS-20	2MB
. CS-40	4MB
. CS-80	8MB

The DS-140, through switch settings on the DPU board, gives the end-user the option of having either seven 16MB platters (112MB) or fourteen 10MB platters (140MB). The data storage cabinet is ordered separately and a 320KB or 1.2MB half-height removable diskette, 10MB removable winchester disk drive, a 45MB tape streamer, and 20, 32 or 64MB fixed winchesters can be inserted into the cabinet. With the addition of the DS-140, our end-users now have the flexibility to configure a DS with up to 316MB of fixed disk compared to the previous maximum of 192MB. A CS will support three DSs, for a total fixed disk capacity of 948MB.

Software

Release 3.0 Operating System to support the additional data memory.

Market Analysis

There are estimated to be 45,000 to 67,000 current users worldwide and we are currently selling on the average 150 new CS systems per month. The low selling price, modern appearance and increased capabilities of the new CS and DS, will encourage existing users to update their present system to the new CPU and add new disk drives. Increased program capability and RAMDISK, will encourage 2200 VARs to sell larger configurations to new users.

With lower prices for increased storage, increased flexibility in back-up, a modern looking and renamed CPU and low cost multiplexing, we will be able to effectively leverage the corporate Installed Base Program to sell upgrades to existing users.

Market Requirements

New CS Models

The following are the current and proposed new CS CPU models:

<u>MODEL</u>	<u>MEMORY</u>	<u>COST</u>	<u>SELL</u>	<u>GPM</u>
CS-2	128KB	992	4,950	80.0
CS-5	512KB	1,015	6,400	84.1
CS-10*	1MB	1,307	7,500	82.6
CS-20*	2MB	1,439	8,500	83.1
CS-40*	4MB	1,704	9,500	82.1
CS-80*	8MB	2,234	11,500	80.6

* New Models

Recommended New "S" Package

To go from either a 128KB or 512KB CPU to 1/2/4/8MB system, requires a CPU board swapout. This means that under the current CS-S0 through CS-S10+2 package structure, if a VAR or end user orders a factory system with a memory upgrade to 1MB or greater, the CPU board would either have to be switched at the factory or at time of installation. To simplify this process, an additional package should be created that includes at least a 1MB CPU board. Additional memory updates would then only require adding a memory chip for each 1MB.

<u>PACKAGE</u>	<u>MFG COST</u>	<u>TOTAL COST</u> <u>(+Auto Enc.)</u>	<u>SELL</u>	<u>GPM</u>
<u>CS-S11 (A/B)</u>				
CS-10	\$1,494.00	\$1,494.00	\$7,500	80.1%
22C11	44.00 X1	44.00	300	85.3%
2236MXE	287.00 X1	287.00	800	64.1%
2436DE	444.52 X2	889.00	2,590	65.7%
DS	1,129.00 X1	1,129.00	2,500	54.8%
TOTAL		3,843.00	13,690	71.9%
		DISCOUNT (10%)	1,365	
		SUGGESTED SELLING PRICE	12,325	68.8%
UJ-5068(1MB to 8MB)	1,056.00	1,056.00	4,500	76.5%
DS-1.2	112.00	112.00	200	44.0%
DS-10R	881.00	881.00	1,800	51.1%
DS-64	1,030.00	1,030.00	2,500	58.8%
		6,922.00	21,325	67.5%

140MB Fixed Winchester

The following is the proposed pricing for the new DS-140. The DS-140 is a fixed Winchester that can either be formatted as either 7 X 16MB platters (112MB) or 14 X 10MB platters (140MB):

<u>MODEL</u>	<u>DESCRIPTION</u>	<u>COST</u>	<u>SELL</u>	<u>GPM</u>
DS-140	112/140MB fixed Winchester	2,254	5,500	59.0
DS-140	With 12% adder	2,525	5,700	55.7
DS-140A	112/140 fixed Winchester field upgrade	2,254	5,700	60.5
DS-140A	With 12% adder	2,525	6,000	57.9

Sample Configurations:

DS, DS-1.2, DS-10R, DS-140 (without adder)	4,370	10,000	56.3
DS, DS-1.2, DS-TS, DS-140, DS-140 (without adder)	6,174	14,700	58.0

The following are the proposed field upgrades for MVP-128/512, MICROVP-1/2 and CS-2/5 VLSI CPUs:

<u>MODEL</u>	<u>DESCRIPTION</u>	<u>COST</u>	<u>SELL</u>	<u>GPM</u>
<u>Board Replacements</u>				
UJ-5056	128KB to 512KB*	440	2,400	81.7
UJ-5057	128KB to 512KB	440	1,900	76.8
UJ-5065	128KB to 1MB	621	3,000	79.3
UJ-5066	128KB to 2MB	726	4,000	81.9
UJ-5067	128KB to 4MB	991	5,000	80.2
UJ-5068	128KB to 8MB	1,521	7,000	78.3
UJ-5069	512KB to 1MB	621	2,000	69.0
UJ-5070	512KB to 2MB	726	3,000	75.8
UJ-5071	512KB to 4MB	991	4,000	75.2
UJ-5072	512KB to 8MB	1,521	6,000	74.7

* For pricing consistency, the current UJ-5056 (\$3,000) for the MICROVP and MVP-128/512 should be repriced to \$2,400 for MVP-128 and MICROVP-1 VLSI CPUs.

Additional Memory Chips Only

UJ-5059	1MB to 2MB	264	1,500	82.4
UJ-5060	1MB to 4MB	528	2,500	78.9
UJ-5061	1MB to 8MB	1,056	4,500	76.5
UJ-5062	2MB to 4MB	264	1,500	82.4
UJ-5063	2MB to 8MB	792	3,500	77.4
UJ-5064	4MB to 8MB	528	2,500	78.9

Competition (Northeast Digital)

<u>NE MODEL</u>	<u>NE PRICE</u>	<u>WANG MODEL</u>	<u>WANG PRICE</u>	<u>DIFF</u>	<u>% +/-</u>
2000-8 2MB	3,000	UJ-5066 (128KB to 2MB)	4,000	1,000	25.0
		UJ-5070 (512KB to 2MB)	3,000	-	-
2000-32 8MB	5,500	UJ-5059 (1MB to 2MB)	1,500	1,500	(50.0)
		UJ-5068 (128KB to 8MB)	7,000	1,500	27.3
		UJ-5072 (512KB to 8MB)	6,000	500	9.1
		UJ-5061 (1MB to 8MB)	4,500	(1,000)	(18.2)
		UJ-5063 (2MB to 8MB)	3,500	(2,000)	(36.4)
		UJ-5064 (4MB to 8MB)	2,500	(3,000)	(54.5)

Note: All Northeast Digital RAMDISK is treated as a disk controller and occupies an I/O slot. Memory can not be utilized for programs.

Our major disadvantage is going from 128KB to 2 or 8MB. In all other cases we are either slightly higher or below NE in price.

Forecasts

U.S. Forecast

<u>MODEL</u>	<u>Q1 FY'88</u>	<u>Q2 FY'88</u>	<u>Q3 FY'88</u>	<u>Q4 FY'88</u>	<u>TOTAL</u>
CS-2	100	100	100	100	400
CS-5	100	100	100	100	400
CS-10	50	50	50	50	200
CS-20	25	25	25	25	100
CS-40	25	25	25	25	100
CS-80	25	25	25	25	100

INT. Forecast

<u>MODEL</u>	<u>Q1 FY'88</u>	<u>Q2 FY'88</u>	<u>Q3 FY'88</u>	<u>Q4 FY'88</u>	<u>TOTAL</u>
CS-2	50	50	50	50	200
CS-5	100	100	100	100	400
CS-10	100	100	100	100	200
CS-20	25	25	25	25	100
CS-40	25	25	25	25	100
CS-80	25	25	25	25	100

<u>NEW MODEL /PACKAGE</u>	<u>SELL</u>	<u>MAINT.</u>
CS-80	11,500	101
CS-S11 (A/B)	11,600	107
DS-140	5,500	35
DS-140A	5,700	35
UJ-5056	2,400	5
UJ-5057	1,900	5
UJ-5065	3,000	10
UJ-5066	4,000	17
UJ-5067	5,000	31
UJ-5068	7,000	59
UJ-5069	2,000	5
UJ-5070	3,000	12
UJ-5071	4,000	26
UJ-5072	6,000	54
UJ-5059	1,500	7
UJ-5060	2,500	21
UJ-5061	4,500	49
UJ-5062	1,500	14
UJ-5063	3,500	42
UJ-5064	2,500	28

Announcements

	<u>U.S.</u>	<u>INT.</u>
Announcement Date	7/31/87	7/31/87
FCS	8/31/87	8/31/87
Volume	9/30/87	9/30/87

SELECTION CRITERIA

PTR NUMBER -	START: C41W352004	END: C41W352004
PRIORITY:	ALL	
PROBLEM TYPE:	ALL	
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL
HW/SW INDICATOR:	ALL	ORIG RDB: ALL
STATUS TYPE:	0	
STATUS CODE:	ALL	

PROBLEM NUMBER: C41W352004	CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY P2	CUST NUMBER: 00 00000358135
PROBLEM TYPE: ESC	CUST CONTACT: DARRELL FULTON
PRODUCT PROB NO: NOT LINKED	CUST CONT PHONE: 00-513-222-9531
	CUST ADDRESS 1: WINTERS BANK TOWER STE 2480
	CUST ADDRESS 2:
	CUST ADDRESS 3:
SYSTEM MODEL NO: CS-80	CUST CITY: DAYTON
GEN SYST MODEL: 2200 CS	CUST ST/PROV: OH
O. S. VERSION: 03 01	CUST ZIP: 45424-0000
HW MODEL NUMBER: DS	CUST COUNTRY:

SW MODEL NUMBER:	RDB ASSIGNED: 8760
SW VERSION:	PERSON ASSIGNED: BAHIA MICHAEL E
PART NUMBER:	ORIG NAME: HEAL JOSEPH H
PART NUM REV:	ORIG PHONE: - - -

CALL TRKG DATE: 00/00/00	NETWORKED: N
CALL TRKG NO:	RES DEPLOYED: DTSE
ORG ACT/SYM/ACN:	DATE ENTER PTR: 12/18/87
STATUS DATE: 03/22/89	DATE TO R&D:
STATUS CODE: H 0 495	WKDYS IN R&D:
STATUS ABBREV: NEW PROBLM	TOT WKDYS OPEN: 434.53

PROBLEM SUMMARY :HEAL JOSEPH H DATE: 03/22/89 TIME: 10:45
 * KNOWN PROBLEM ON 2275 MUX BOARD AND DS. INTERMITTENT I-90
 * ERRORS. REF HO TAC #07341054.

ASSIGNED: BARNES MARSHALL E DATE: 08/11/89 TIME: 13:06
 The customer has no futher problems with "hangs" since work was performed on 7/28. It would appear that the items that we corrected at that time have taken care of the problem. It would appear that we are ready to close this call if there are no objections. M Barnes.

ASSIGNED: BARNES MARSHALL E DATE: 08/04/89 TIME: 13:33
 The customer has informed the CE that since we performed our work on 4/28 they have had NO hangs on there DS cabinet or CPU. The system was hanging 3 to 5 times per week. We will monitor this site to make sure customer resolves his power problems. We would like to keep this call open till 8/25.

ASSIGNED: BARNES MARSHALL E DATE: 07/31/89 TIME: 10:28
 We took system and checked each DS/CS/Micro apart. We had to upgrade EVERY

XA0112R
00.05:00
01:01:00

WANG LABORATORIES INC.
PROBLEM TRACKING AND REPORTING
CUSTOMER ACCOUNT DETAIL REPORT

PAGE: 2
18 AUG 1989
09:09:10

SELECTION CRITERIA

PTR NUMBER: C41W352004
START: C41W352004
END: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB - JIA: ALL CUST RDB: ALL ORIG RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY P2 CUST NUMBER: 00 00000358135

210-7715 and 210-8824 in each system. We also found power supplies with excess ripple in the DS that has been hanging (VG1416) and in the micro that has had the most hangs (VL3174) We checked the customers power for every outlet that had Wang equipment on it. The customer has a major problem with excessive voltage between neutral and ground and neutral to ground shorts. the customer was given a list of these outlets and he will correct.

ASSIGNED: BAHIA MICHAEL E DATE: 07/21/89 TIME: 11:46
UPDATE ACKNOWLEDGED. MIKEB

ASSIGNED: BARNES MARSHALL E DATE: 07/18/89 TIME: 09:36
Customer has delayed giving the system up until 7/27. We now have all update prompts for the DS cab. and updated 210-7715 for the CPU's.

ASSIGNED: BARNES MARSHALL E DATE: 07/13/89 TIME: 13:29
Went on site 7/12/89, found problems with down-rev 210-7715 boards. found problems with power connection to cpu and workstation. found bad/no connection on cables between DS cab. and cpu's. will take entire sys. 7/19 to correct the balance of problem.

ASSIGNED: BARNES MARSHALL E DATE: 07/13/89 TIME: 13:09
Picking up problem from Joe Heal.

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

>>> START OF OLD TAC DATA <<<

12/18/87 CUSTOMER SITUATION IS GETTING HOT! THEY WILL BE WILLING TO BE "BETA" FOR ANYTHING THAT MAY HELP WITH THIS PROBLEM. CUST IS CURRENTLY A BETA SITE FOR 3.1 SOFTWARE. THIS WAS AN H.O. REQUEST TO ESCALATE THIS CALL VIA REGIONAL TAC SYSTEM. REGION ACCEPTED AND SENT TO H.O. FOR DISPOSITION. JOE HEAL/MIKE WASIELEWSKI

&! UPDATE QUEUED TO FIELD OFFICE

*CALL SUCCESSFULLY SENT TO HOST SYSTEM

\$12/18/87: HAVE REQUESTED CE VERIFY PROBLEM ALSO OCCURS W/ A SUPPORTED O/S SUCH AS 3.0. IF HAPPENS W/ 3.0 CE TO TEST MUX'S W/ SORT PROGRAM GIVEN & IF THAT ALSO

SELECTION CRITERIA

SELECTION CRITERIA
END: C41W352004
PRIORITY:
PROBLEM TYPE:
ORIG RDB: ALL-
HW/SW INDICATOR
STATUS TYPE
STATUS CODE

PTR NUMBER - START: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB - ASSIGN RDB: ALL CUST RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES, INC
PRIORITY P2 CUST NUMBER: 00 00000358135

\$ FAILS WILL RUN TEST ON STANDARD CONTROLLER.
\$ REQUESTED THIS DONE OVER PHONE W/ CE ON 12/17. ALL
\$ TESTING MUST BE DONE W/ SUPPORTED O/S. MIKEB
\$12/22/87:CE CALLED IN. HAS 1 MUX THAT SEEMS TO PASS TEST &

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ 1 FAILING. WILL TEST 3RD BRD. MUST TEST W/ 3.0.
\$ WILL TRY TO GET 1 OR 2 BETA BRDS AS NEEDED. WAIT-
\$ ING FOR TEST RESULTS. MIKEB

\$12/30/87:CE CALLED IN. RETESTED MUX. 1 BRD FAILED ON 3RD
\$ PASS & 2ND ON 4TH PASS W/ O/S 3.0. NO PROB W/
\$ STRAIGHT CONTROLLER. REQUESTED 2 BRDS SENT IN.
\$ HOPEFULLY WILL HAVE SOMETHING NEXT WEEK TO SEND
\$ OUT. MIKEB

\$1/14/88: STILL WAITING FOR BRDS TO BE SENT IN FROM FIELD.
\$ NEED BRDS TO HAVE SOMETHING TO UPDATE. TESTING OUT
\$ BETA BRDS NOW JUST RCV'D FROM R&D BUT NEED BRDS
\$ FROM FIELD. PLEASE SEND 2 BRDS ASAP. MIKEB

\$1/14/88: BOTH BRDS FAILED TESTING. STILL WAITING FOR BRDS.
\$ PLEASE SEND BRDS IN FOR UPDATING. CALLED CE TO
\$ GIVE STATUS & AGAIN REQUEST BRDS BE SENT IN. CE
\$ WAS TOLD BY HIS BM, JC OF NEW PRODUCTS WOULD BE
\$ SENDING THE CUST 2 2275MUX & 1 TO CE. UNAWARE OF

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ JC SENDING ANY BRDS. WILL FIND OUT STATUS IN AM AS
\$ JC GONE FOR DAY. MIKEB

\$1/15/88: TALKED W/ JC. JC HAD TALKED W/ BM CONCERNING BETA
\$ TESTING THE 8 MEG CPU BRDS AT CH DEAN, NOT THE
\$ 2275 MUX. CALLED BM & EXPLAINED SITUATION. MIKEB

\$1/18/88: HAVE NEW BETA MUX BRDS. HAD BEEN TESTING ALL DAY
\$ OK, BUT WHILE AWAY GOT ERROR ON 1 BRD. WILL RUN
\$ TEST OVERNITE TO INSURE DON'T HAVE PROBLEM &
\$ SHOULD BE SHIPPING OUT TOMORROW. CALL BM W/
\$ STATUS. WILL CALL TOMORROW TO VERIFY SHIPMENT.
\$ MIKEB

\$1/19/88: 2 NEW BETA BRDS (TEST23 & TEST24) SENT OUT FED
\$ XPRESS THIS PM, AIRBILL # 475253371. TEST23 RAN 99

SELECTION CRITERIA

 PTR NUMBER - START: C41W352004 END: C41W352004
 PRIORITY: ALL
 PROBLEM TYPE: ALL
 RDB - ASSIGN RDB: ALL CUST RDB: ALL ORIG RDB: ALL
 HW/SW INDICATOR: ALL
 STATUS TYPE: 0
 STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
 PRIORITY P2 CUST NUMBER: 00 00000358135

\$ ERROR FREE PASSES SINCE MONDAY & TEST24 234 PASSES
 \$ & THEN ANOTHER 79 AFTER AN ERROR OF UNDETERMINED
 \$ CAUSE OCCURRED. PLEASE UPDATE AS SOON AS BRDS
 \$ INSTALLED & USE MUXTEST TO VERIFY GOOD AT INSTALL.

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.
 \$ STILL WAITING FOR BRDS TO BE RETURNED. NEED IMMEDIATELY
 \$ IATELY TO HAVE MORE BRDS TO UPDATE. MIKEB
 \$2/10/88: RCV'D 2 BRDS BACK FROM FIELD. WHAT IS STATUS OF
 \$ THIS CUST? IS SITE RUNNING ERROR-FREE? MIKEB
 \$03/30/88: I'M SURPRISED THIS CALL HAS NOT BEEN CLOSED. JOE
 & HEAL SAYS ACCORDING TO THE CE, LOCKUPS ARE STILL
 & OCCURRING AS OF 3/21 & CE WAITING ON MORE DETAILS
 & REGARDING WHEN PROBLEM OCCURS (IT'S INTERMITTENT).
 & CUST IS BEING VERY COOPERATIVE AND IS GATHERING
 & AS MUCH INFO AS THEY CAN FOR US. IF THERE ARE NO
 & ADDITIONAL UPDATES IN THIS CALL BY 4/9/88, PLEASE
 & CLOSE! (HEAL/MCMENEMY)
 \$3/30/88: ARE THE BETA BRDS WORKING PROPERLY. IF THERE ARE
 \$ PROBLEMS W/ THE BETA BRDS THEY MUST BE COMMUNICATED.
 \$ MIKEB
 \$4/4/88: HAS 1 CS THAT HANGS THE SYSTEM A FEW TIMES A DAY
 \$ WHEN CLEARING MESSAGES TO 1 PARTICULAR DS. THIS

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.
 \$ CPU IS A SLAVE ON THIS DS & SEEMS TO WORK FINE TO
 \$ A DS IT IS MASTER TO. CE GOING ON SITE TOMORROW.
 \$ WILL MAKE THE FAILING CPU THE MASTER W/ PROBLEM
 \$ DS. TO CLEAR MESSAGES A GIO STATEMENT IS USED.
 \$ WHICH HOGS & UNHOGS DS. CE WILL ALSO GET GIO
 \$ STATEMENT AS THERE COULD BE A S/W PROB. MIKE
 \$04/22/88: I WENT ON SITE WITH STEVE WRIGHT AND JOHN PERDUE
 & THE FIRST THING WE DID WAS RE-ROUTE THE AC POWER
 & CORDS AND ARRANGE THEM SO THAT EACH CS WAS PLUGGED
 & IN WITH A DS. 2ND FOUND THAT CS3 WAS FAILING THE
 & MOST AND ALSO CS5 FAILED OCCASSIONALLY IN WP. CS3
 & AND CS5 WERE BOTH PLUGGED INTO THE SAME 2275. MUXE
 & SO WE MOVED CS3 TO WHERE CS4 WAS CONNECTED.

SELECTION CRITERIA

PTR NUMBER -	START: C41W352004	END: C41W352004
PRIORITY:	ALL	ALL
PROBLEM TYPE:	ALL	ALL
RDB -	ASSIGN RDB: ALL	CUST RDB: ALL
HW/SW INDICATOR:	ALL	ALL
STATUS TYPE:	0	0
STATUS CODE:	ALL	ALL

PROBLEM NUMBER: C41W352004	CUST NAME: CH DEAN & ASSOCIATES, INC	PROBLEM NUMBER: 00000358135
PRIORITY: P2	CUST NUMBER: 00 00000358135	PRIORITY: 00

& 3RD WE CHECKED REVS ON THE CS AND MICROS ALSO WE
 & MOVED THE DISK CONTROLLER IN CS3 FROM SLOT 8 TO
 & SLOT 4 CLOSER TO THE CPU. ON 4/29/88 RECEIVED A
 & CALL FROM JOHN PERDUE AND HE SAID THAT CS4 HAD A

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
 CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

& HANG ON 4/27/88 WHILE IN WP. WE ARE GOING TO MOVE
 & CS4 TO A SPARE SLOT ON THE OTHER 2275 MUX. I
 & THINK THAT THE CUSTOMER IS PUSHING THE LIMITS OF
 & THE 2275 MUX % MUXE. THEY JUST ADDED THE 7TH CS
 & AND THE 6TH DS TO THERE SYSTEM. THE 2275 MXE HAS
 & BEEN REPLACED EARLIER BUT I WILL REPLACE IT AGAIN
 & IF THE PROBLEM STAYS WITH THE PORT. (J.HEAL)
 \$4/29/88: UPDATE ACKNOWLEDGED. HOW BUSY THE MUX IS SHOULD
 \$ NOT PRESENT A PROBLEM OTHER THAN SLOW DOWN ACCESS
 \$ TIME. THIS MUX SET UP IS DESIGNED TO SUPPORT UP TO
 \$ 16 CPU'S WHICH COULD HAVE 16 W/S'S EACH ALTHOUGH
 \$ THAT IS NOT A LIKELY SETUP. INSURE CUSTOMER DOCU-
 \$ MENTS EA PROBLEM AS DETAILED AS POSSIBLE. LOOKS
 \$ LIKE A FLAKEY MUX EXT WHICH WAS ASSOCIATED W/ CS3
 \$ & CS5 & NOW HAS CS4 ATTACHED. MIKEB

\$5/09/88 I WILL BE GOING TO C.H. DEAN AND WILL LET YOU KNOW
 \$ WHAT WE DO. PROBABLY WE WILL CHANGE THE 2275 E.

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
 CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ IF WE HAVE ONE AVAILABLE BY 5/12/88.
 \$5/13/88: SPOKE W/ JOE HEAL. MOVED CS4 TO AN OPEN PORT ON
 \$ THE 2275MUX YESTERDAY & NO PROB SINCE. CS3 & CS4
 \$ ARE BOTH NOW ATTACHED TO THE 2275MUX BUT CS5 IS
 \$ STILL ATTACHED TO THE MUX EXT BUT HASN'T FAILED
 \$ RECENTLY. LOOKS LIKE THAT 1 PORT IS DEFINITELY BAD
 \$ & SHOULD BE MARKED. BRD IS TO BE REPLACED IN NEAR
 \$ FUTURE. MIKEB

\$5/31/88: STATUS PLEASE. HAS MUX EXT BEEN REPLACED? MIKEB
 \$6/24/88: PLEASE UPDATE. HAS MUX EXT BEEN REPLACED? MIKEB
 \$6/29/88: CE SW LEFT COMPANY. CUST STILL EXPERIENCING
 \$ INTERMITTENT PROBLEMS ONCE OR TWICE A WEEK WHICH
 \$ THEY SEEM TO BE LIVING WITH. THIS PROBLEM SHOULD

SELECTION CRITERIA
 PTR NUMBER: 00052M14
 PRIORITY: ALL
 PROBLEM TYPE: ALL
 RDB: ALL
 HW/SW INDICATOR: ALL
 STATUS TYPE: ALL
 STATUS CODE: ALL

PROBLEM NUMBER: 00000358135
 PRIORITY: 00

ASSIGNED: HEAL JOSEPH H
 CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

IF WE HAVE ONE AVAILABLE BY 5/12/88.

\$5/13/88: SPOKE W/ JOE HEAL. MOVED CS4 TO AN OPEN PORT ON THE 2275MUX YESTERDAY & NO PROB SINCE. CS3 & CS4 ARE BOTH NOW ATTACHED TO THE 2275MUX BUT CS5 IS STILL ATTACHED TO THE MUX EXT BUT HASN'T FAILED RECENTLY. LOOKS LIKE THAT 1 PORT IS DEFINITELY BAD & SHOULD BE MARKED. BRD IS TO BE REPLACED IN NEAR FUTURE. MIKEB

\$5/31/88: STATUS PLEASE. HAS MUX EXT BEEN REPLACED? MIKEB
 \$6/24/88: PLEASE UPDATE. HAS MUX EXT BEEN REPLACED? MIKEB
 \$6/29/88: CE SW LEFT COMPANY. CUST STILL EXPERIENCING INTERMITTENT PROBLEMS ONCE OR TWICE A WEEK WHICH THEY SEEM TO BE LIVING WITH. THIS PROBLEM SHOULD

SELECTION CRITERIA

PTR NUMBER: START: C41W352004 END: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB: ASSIGN RDB: ALL CUST RDB: ALL ORIG RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY: P2 CUST NUMBER: 00 00000358135

\$ BE RESOLVED. NEED TO HAVE CUST DOCUMENT EXACTLY
\$ WHAT HAPPENS WHEN FAILS, TERM, CPU, & DS INVOLVED.
\$ WITH THIS INFO, AFTER A FEW ERRORS WE SHOULD HAVE
\$ A GOOD IDEA WHERE THE PROBLEM IS. TALKED W/ BM &

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ HE WILL FOLLOWUP ON THIS. MIKEB

\$7/7/88: LEFT MESSAGE AT OFFICE FOR DTS TO CALL ME. NEED
\$ STATUS. MIKEB

\$7/7/88: DTS CALLED IN. ALL ERRORS SEEMED TO BE ASSOCIATED
\$ W/ CS5 GOING THRU A SPECIFIC MUX EXTENDER PORT.
\$ THIS WAS THE SAME EXTENDER BRD WITH THE BAD PORT
\$ THAT CS4 WAS FAILING WITH. WHEN CS4 WAS MOVED TO
\$ ANOTHER PORT THE PROBLEMS W/ CS5 SEEMED TO GO
\$ AWAY, BUT IT IS NOW FAILING AGAIN. REPLACED MUX
\$ EXT YESTERDAY & MONITORING. MIKEB

\$7/21/88: STATUS PLEASE? CALLED DTS' OFFICE & LEFT MESSAGE
\$ TO CALL. MIKEB

\$7/21/88: DTS CALLED BACK & LEFT MESSAGE. BOTH CP4 & CP5
\$ HUNG TWICE THIS WEEK. 1ST PROBLEMS SINCE REPLACING
\$ MUX EXT A FEW WEEKS BACK. DTS TO GET DETAILS FROM
\$ CE. COULD THESE PROBLEMS HAVE BEEN WEATHER
\$ RELATED? MIKEB

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$8/16/88: UPDATE PLEASE. WHAT IS PRESENT STATUS? MIKEB

\$8/31/88: PLEASE UPDATE? WHAT IS CURRENT STATUS? MIKEB

\$9/8/88: CALLED DTS'S OFFICE & LEFT MESSAGE FOR HIM TO CALL
\$ ME DIRECT. MIKEB

\$9/13/88: CALLED DTS. CUST HAS NOT BEEN COMPLAINING ALTHOUGH
\$ STILL HANGING A COUPLE TIMES A WEEK. WAS UNDER
\$ IMPRESSION CUST DEALING DIRECT W/ WANG & BEING
\$ TAKEN CARE OF. TO IS CUST CONTACT BELIEVE. STILL
\$ NEED TO ISOLATE H/W. LEFT MESSAGE FOR TO TO CALL
\$ ME. DTS TO CHECK W/ CUST TO FIND OUT CURRENT
\$ SITUATION. CUST NOW HAS 7 CPU'S & 6 DS'S ALL
\$ MUX'D. BELIEVE PROB ONLY W/ 1 OR 2 CPU'S. CUST IS
\$ DOCUMENTING PROB SO SHOULD BE ABLE TO ISOLATE PROB

SELECTION CRITERIA

PTR NUMBER - START: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB - ASSIGN RDB: ALL CUST RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

END: C41W352004

ORIG RDB: ALL

PROBLEM NUMBER: C41W352004
PRIORITY P2

CUST NAME:
CUST NUMBER:

CH DEAN & ASSOCIATES INC
00 00000358135

\$ IF ONLY 1 OR 2 CPU'S FAILING. DTS TO FIND OUT
\$ SITUATION & CALL BACK. MIKEB
\$9/13/88: DTS CALLED BACK. TALKED W/ CUST. GOING ON SITE END
\$ OF NEXT WEEK. PROBLEMS SEEM CONFINED TO CS5 & CS7

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ ONLY & JUST 1 TERMINAL ON 1. DTS TO INSPECT SYSTEM
\$ FOR CABLING, GROUNDING, E-REV'S ON MUX BRDS. WILL
\$ TRY TO ISOLATE BY SWAPPING ASSY BETWEEN WORKING &
\$ FAILING SETUPS. MIKEB

&10/06/88: I WILL BE GOING TO THE CUSTOMER TOMORROW AND LET
YOU KNOW WHAT WE GET DONE. (J.HEAL)

&10/11/88: REPLACED A LOT OF SHORT SCREWS IN SEVERAL CONTROL
& ERS. NOTED HANGS & NOTED PHYSICAL LOC OF I/O PCBS

&10/21/88: WE WILL BE GOING TO C.H. DEAN ON 10/25 AND 10/27.
& THE CUSTOMER WILL LET US HAVE THE SYSTEM FOR ABOUT
& T 2 HOURS. WE ARE GOING TO WORK ON CS 7 & CS 5
& AND D.S. 3. CHECK RIPPLE IN ALL 3 UNITS AND
& CONNECTOR CONTACTS. ALSO GOING TO MOVE THE MXE'S
& CLOSER TO THE CPU AND MAYBE MOVE SOME WORKSTATION
& AROUND DEPENDING ON THEIR ERROR LOG. (HEAL)

\$10/13/88: CE TO CK THAT ALL I/O'S ARE SCREWED INTO PLACE.
\$ TALKED ABOUT RIPPLE ON 5,12 AND -12V -ALSO TO CK

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.

\$ MOLEX CONNECTORS MAKING SURE ALL WIRES ARE LOCKED
\$ INTO PLACE. WILL KEEP US INFORMED JOE S.

\$10/24/88: CALLED DTS'S OFFICE & LEFT MESSAGE TO CALL. MIKEB
\$10/26/88: DTS CALLED IN. ON SITE YESTERDAY. SINCE SEPTEMBER

\$ 1ST THERE HAVE BEEN 8 HANGS ON CP7 (RECENTLY
\$ ADDED), 7 ON CP5, & 1 ON CP4 ALL W/ DS 330. DS 330
\$ IS THE MOST HEAVILY USED & MOST LIKELY THAT IS WHY
\$ THE FAILURES OOUR HERE: ALSO W/S 3 ON CP7 & W/S 4
\$ ON CP5 SEEM TO BE THE BIG CULPRITS BUT AGAIN IT
\$ MAY BE BECAUSE OF THEIR INTENSIVE USE OF DISK AS
\$ THEY ARE CONSTANTLY USED FOR WP. YESTERDAY ALL
\$ CONTROLLERS WERE MOVED UP NEXT TO THE CPU BRDS &
\$ CABLES WERE SECURELY CONNECTED & GROUNDED. IF PROB

SELECTION CRITERIA

PTR NUMBER: C41W352004 START: C41W352004 END: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB - ASSIGN RDB: ALL CUST RDB: ALL ORIG RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY: P2 CUST NUMBER: 00 0000358135

PERSISTS WILL SWAP OUT W/S. ALSO SUGGESTED ISOLATING PHYSICAL LOCATION. IF PROBS CONTINUE WANT ENTIRE CPU W/ I/O CONTROLLERS SWAPPED W/ WORKING CPU AT SITE. CUST ALSO HAS SOME TYPE OF ROTARY SW

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN. INTER-CONNECTED & THIS COULD POSSIBLY BE A PROB. THIS SW IS NOT A SUPPORTED FEATURE. MIKEB

10/31/88: WENT BACK ON SITE END OF LAST WEEK. STILL FAILING MOSTLY W/ W/S 3 ON CP7 TO DS330. MOVED THE 2275MUX & THE MUX EXT FOR DS3 FROM CP2 TO CP5. ALSO SWAPPED W/S 3 W/ A WORKING W/S & WHEN FAILED AGAIN PUT IT ON PORT 2 BUT STILL FAILED. WILL BE GOING BACK THIS WEEK TO SWAP THE MUX MASTER FOR DS 330 W/ 1 THAT HAS NOT FAILED & TO MOVE CP7 FROM THE MUX EXTENDER FOR DS 3 TO THE NEW MASTER. WILL ALSO LOOK INTO THE CABLE FOR THE W/S TO SEE IF ROUTED THRU ANY PROBLEM AREAS. ALSO FOUND 40 MILV RIPPLE ON -12V ON DS3 & REPLACED THE PS. RIPPLE NOW AT 7 MILV. ALSO REPLACED THE DATA CABLE TO DS3. MIKEB

11/1/88: DTS CALLED IN. TODAY THEY MOVED DS3 FROM THE 3RD PORT ON THE MUX EXT TO THE 1ST PORT ON THE MASTER. HAD REQUESTED THE DTS SWAP THE MUX MASTER PREVI-

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45

CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN. USUALLY W/ A WORKING MUX MASTER BUT THIS WILL NOW BE DONE ON THE NEXT TRIP. MOST FREQUENT FAILING USER (W/S 3/CP7) HAS ALSO BEEN ASKED TO TRY WORKING FROM A DIFFERENT W/S TO ISOLATE ENVIRONMENT & WILL TRY TO COMPLY. MIKEB

12/8/88: STATUS PLEASE. WHAT'S CURRENTLY HAPPENING HERE? MIKEB

12/9/88: IN THE LAST FEW WEEKS PROBLEMS SEEM TO BE ISOLATED TO W/S 7 ON CPU INTERMITTENTLY HANGING & SEVERAL HANGS & I90'S TO DS3 FROM CPU'S 1,3 & 4. HAS SWAPPED PORTS, MUX BRDS, & W/S'S FOR THE W/S PROB & THE PROB DID NOT MOVE. HAD OPERATOR USE ANOTHER W/S & NO PROB. APPEARS TO HAVE BAD CABLE. FOR THE

SELECTION CRITERIA

PTR NUMBER -	START: C41W352004	END: C41W352004
PRIORITY:	ALL	
PROBLEM TYPE:	ALL	
RDB -	ASSIGN RDB: ALL	CUST_RDB: ALL
HW/SW INDICATOR:	ALL	ORIG RDB: ALL
STATUS TYPE:	0	
STATUS CODE:	ALL	

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
 PRIORITY: P2 CUST NUMBER: 00 00000358135

\$ DS3 PROB, CPU'S 3&4 ARE ON THE 2275 MUXMASTER & CPU 1 ON THE SLAVE. WILL SWAP OUT THE MUXMASTER EXISTING WORKING 1 & PUT CPU 1 ON ANOTHER PORT. MB. STATUS PLEASE. ARE WE WORKING ON THIS? MIKEB.

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
 CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.
 \$1/23/89: THIS IS SUPPOSE TO BE AN ESCALATED CALL. IT IS NOW 13 MONTHS OLD & THE ONLY MUX SITE EXPERIENCING PROBLEMS THAT HAS NOT BEEN RESOLVED. IF A RESPONSE IS NOT FORTH COMING A CALL WILL NEED TO BE MADE TO THE REGION. AT ANOTHER SITE THE SW SETTINGS ON THE MUX EXPANDER BRDS WERE ALL SET TO OFF & THIS CAUSED VERY INTERMITTENT ERRORS. PLEASE CHECK THE SW SETTINGS & LET ME KNOW WHAT WAS FOUND. SW SETTINGS SHOULD BE: 1 ON ONLY ON 1ST MUX EXTENDER. 4 ON ONLY ON THE 2ND MUX EXTENDER. ALL OFF ON 3RD MUX EXTENDER. MIKEB.

&02/06/89: WENT TO CH DEAN AND INSTALLED A LINE MONITOR AND TEMP/HUM GAUGE. CHECKED OUT 9 OF THE WORKSTATIONS THAT WERE HANGING. FOUND GROUNDS TO BE GOOD ON ALL WORKSTATIONS BUT ABOUT 3 NEEDED THERE VOLTAGE ADJUSTED. THE MAIN TERMINAL CPU 1 TERM#-1 IS A 2436 WITH R 0101 PROM & 8577B RO. THIS IS TERMINAL 1 ON

ASSIGNED: HEAL JOSEPH H DATE: 12/18/87 TIME: 10:45
 CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.
 & 4 OTHER SYSTEMS. ON THE MUX-E WE MOVED CPU 1 WITH CPU 6 (6 NEVER HANGS) - WE ALSO INVENTORIED ALL THE CPU'S CARDS AND CABLES. THE SWITCHES WERE OK ON THE MUX-E PCB'S. (HEAL)

\$2/10/89: PLEASE RESEND LAST UPDATE. ONLY A PORTION OF THE OF THE UPDATE WAS RCVD. MIKEB

&02/14/89: MIKE I HOPE THIS WORKS. IF YOU DON'T GET THE UPDATE, CALL ME. MICHAEL KIRCHGESTNER 513/786-8112

\$2/17/89: WE REQUESTED THAT THE SWITCH SETTINGS ON THE MUX EXTENDER (8825) BD BE CHECKED. WHERE IS THAT RESPONSE? WHAT ARE THE SWITCHES SET TO?

\$2/22/89: 3 RD REQUEST FOR SWITCH SETTINGS STATED ON 2/17/89 AND 1/89 - WHY CAN'T WE GET AN ANSWER ON THIS?

THIS UPDATE WAS NOT

XAO112R
00.05.00

WANG LABORATORIES INC.
PROBLEM TRACKING AND REPORTING
CUSTOMER ACCOUNT DETAIL REPORT

PAGE: 10
18 AUG 1989
09:09:10

SELECTION CRITERIA

PTR NUMBER: START: C41W352004 END: C41W352004
PRIORITY: ALL
PROBLEM TYPE: ALL
RDB: ASSIGN RDB: ALL CUST RDB: ALL ORIG RDB: ALL
HW/SW INDICATOR: ALL
STATUS TYPE: 0
STATUS CODE: ALL

PROBLEM NUMBER: C41W352004 CUST NAME: CH DEAN & ASSOCIATES INC
PRIORITY: P2 CUST NUMBER: 00 00000358135

\$3/2/89: PLEASE UPDATE. HAVE SW SETTINGS BEEN CHECKED? MB
\$3/8/89: PLEASE RESPOND. WHAT IS HAPPENING? THIS CALL IS
\$ ASSIGN ESCALATED. LET'S GET THIS FINISHED. HAVE THE SW
\$ CONVERT SETTINGS BEEN CORRECTED. MIKEB

ASSIGNED: HEAL JOSEPH H. DATE: 12/18/87 TIME: 10:45
CONVERTED TAC DATA LOCATED ON THE DETAIL SCREEN.
>>> END OF OLD TAC DATA <<<

RESOLUTION TEXT :BAHIA MICHAEL E DATE: 08/18/89 TIME: 08:58
HC 160 IN CLOSING - THIS CUSTOMERS HANGS SEEM TO BE UNDER CONTROL
YES WE CAN CLOSE THIS CALL- ANY OUTSTANDING PROBS ON WORKSTATIONS
(2536DW) AND PRINTERS WILL CONTINUE TO BE HANDLED ON CALL C510001445
JOE S.

No problem after securely connecting all cables, updating all 7215's & 8824's
to latest e-ry's, 10 & 4 respectively. Also had ripple prob w/ ps in most
frequently failing MicroVP & w/ 1 DS. Sys has not hung since these correctio
ns were made although power problem were identified on several outlets where
voltage between neutral & ground was too high. Customer to correct. DTS in
training. Back after Labor Day. MikeB