[redacted]

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MODELS: PC-S1-3
PC-S2-3
PC-S3-3
PC-S4-3
PC-XC1-3
PC-XC2-3
PC-XC3-3
PC-XC4-3

[redacted]

WANG

1506

# CUSTOMER ENGINEERING SERVICE HANDBOOK

## PROFESSIONAL COMPUTER

**MODELS:** PC-S1-2
PC-S2-2
PC-S3-2
PC-S4-2
PC-XC1-2
PC-XC2-2
PC-XC3-2
PC-XC4-2



741-1658

## Preface

The Professional Computer Service Handbook gives concise information to assist customer engineers in rapid information retrieval for the majority of Professional Computer service needs at customer sites.

## First Edition (May 1985)

Original issue

**PROFESSIONAL COMPUTER**
**TABLE OF CONTENTS**

**TITLE** **PAGE**

**MONITORS**

# REFERENCE DOCUMENTS

| WLI No. | Title |
|---|---|
| 729-1114-A | MNL CE Reprint for Flexible Disk Drive 51/52 Maintenance |
| 729-1167 | MNL Tandon TM-100-1/-2 Reprint |
| 729-1282 | MNL Microwinchester ST406/412 |
| 729-1324 | MNL Winchester Disk Drive |
| 729-1324-1 | PSN Update to 729-1324 |
| 741-1190 | MNL Professional Computer |
| 741-1190-1 | PUB to 741-1190 |
| 741-1190-2 | PUB to 741-1190 |
| 741-1190-3 | PUB to 741-1190 |
| 741-1241 | MNL Professional Computer Schematic |
| 741-1241-1 | PUB to 741-1241 |
| 741-1241-2 | PUB to 741-1241 |

# OPERATING SYSTEM SOFTWARE PACKAGES

| Name | WLI No. |
|---|---|
| MS-DOS Operating System plus Interpretive BASIC | 195-2326-9 |

# DIAGNOSTIC PACKAGES

| WLI No. | Title |
|---|---|
| 195-2459-9 | PC Diagnostic System Package |
| 732-0022 | Program Diskette |

# SERVICE EQUIPMENT

| WLI No. | Description |
|---|---|
| 726-8068 | Floppy disk alignment diskette |

# MODEL DIFFERENCES

| Model | Description |
|---|---|
| PC-S1-2* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-S2-2* | Five-slot chassis base unit with 256KB of memory, two diskette drives (360KB each), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-S3-2* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), keyboard, 10MB Winchester drive (with controller), and MS-DOS Operating System plus Interpretive BASIC |
| PC-S4-2* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), 30MB Winchester drive (with controller), keyboard, and MS-DOS Operating System plus Interpretive BASIC |

*Monitor configured separately.

# MODEL DIFFERENCES

| Model | Description |
|---|---|
| PC-XC1-2* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC2-2* | Expanded chassis base unit with 256KB of memory, two diskette drives (360KB each), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC3-2* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), 10MB Winchester drive (with controller), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC4-2* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), 30MB Winchester drive (with controller), keyboard, and MS-DOS Operating System plus Interpretive BASIC |

*Monitor configured separately.

# MODEL DIFFERENCES

**NOTE**

Model numbers on pages PC-7 through PC-9 can no longer be ordered and are provided for informational purposes only.

| Model | Description |
|---|---|
| PC-001* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-002* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), monochrome monitor board, keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-003B* | Five-slot chassis base unit with 256KB of memory, two diskette drives (360KB each), monochrome monitor board, keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-004A* | Five-slot chassis base unit with 256KB of memory, two diskette drives (360KB each), monochrome monitor board, graphics board, keyboard, and MS-DOS Operating System plus Interpretive BASIC |

*Monitor not included in prepackaged system — configured separately.

# MODEL DIFFERENCES

| Model | Description |
|---|---|
| PC-005* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), monochrome monitor board, graphics board, 10MB Winchester disk, keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-006* | Five-slot chassis base unit with 256KB of memory, one diskette drive (360KB), monochrome monitor board, graphics board, 30MB Winchester disk, keyboard, and MS-DOS Operating System plus Interpretive BASIC |

*Monitor not included in prepackaged system — configured separately.

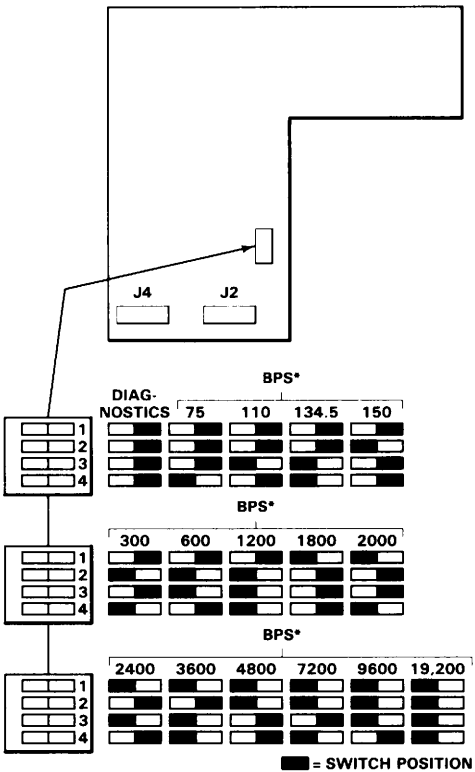
# MODEL DIFFERENCES

| Model | Description |
|---|---|
| PC-XC1* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC2* | Expanded chassis base unit with 256KB of memory, two diskette drives (360KB each), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC3* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), 10MB Winchester drive (with Winchester controller PCB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |
| PC-XC4* | Expanded chassis base unit with 256KB of memory, one diskette drive (360KB), 30MB Winchester drive (and Winchester controller PCB), keyboard, and MS-DOS Operating System plus Interpretive BASIC |

*Monitor not included in prepackaged system — configured separately.

# SWITCH SETTINGS/JUMPERS

## CPU/SYSTEM PCB
## WLI NOs. 210-8221A/9221A/9521A

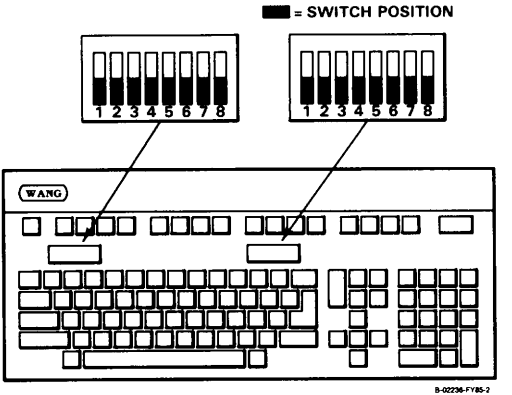



*SET SWITCHES ACCORDING TO DATA TRANSMISSION RATE (DETERMINED BY PROTOCOL).

B-02236-FY85-1

# SWITCH SETTINGS/JUMPERS

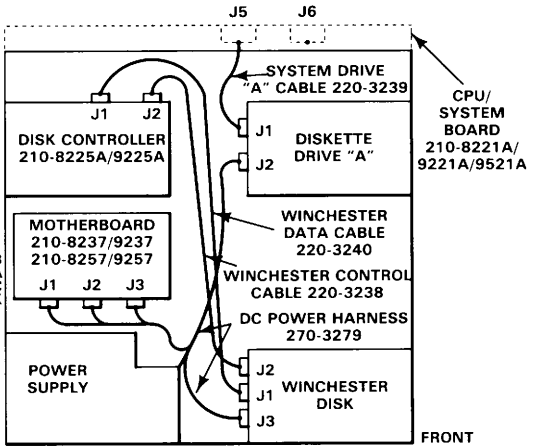
## KEYBOARD PCB
## WLI NOs. 279-2042-US* /2047-US*



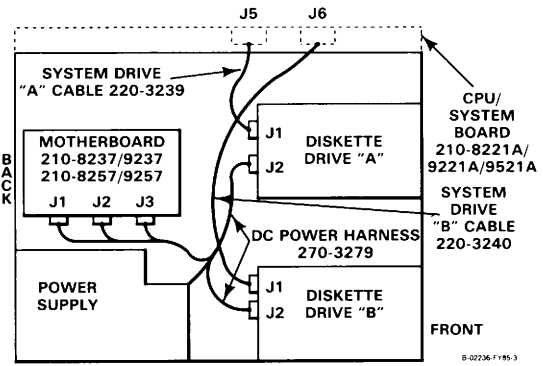

*U.S. only; other suffixes for other countries.

# CABLING

## SINGLE DISKETTE DRIVE WITH WINCHESTER DISK CABLING CONFIGURATION

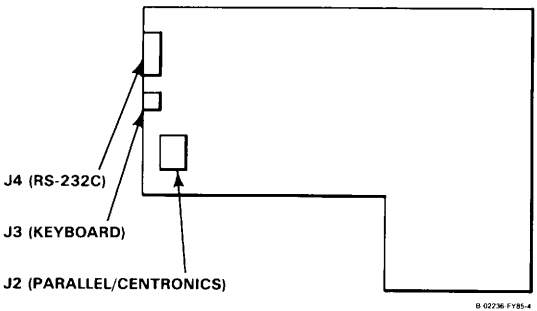



## DUAL DISKETTE DRIVE CABLING CONFIGURATION



# CABLING

## CPU/SYSTEM PCB CONNECTORS WLI NOs. 210-8221A/9221A/9521A



# PROMS

| Description | Load PCB 210- | Prom No. | Position |
|---|---|---|---|
| CPU/System PROM | 8221A/9221A/9521A | 379-0000-R2 | L78 |
| CPU/System PROM | 8221A/9221A/9521A | 379-0001-R2 | L97 |

# MAJOR FUNCTIONS ON BOARDS

## CPU/SYSTEM PCB
## WLI NOs. 210-8221A/9221A/9521A

- 8086 microprocessor and 8087 co-processor
- Controls main program and coordinates DMA requests
- Controls numeric data processing operations and monitors operation codes
- Contains system clocks
- 24 MHz crystal to drive microprocessors
- Wait state logic for synchronization of memory access during read- and write-data operations
- RAM control logic and parity generator/check logic
- Contains 128K (8221A/9221A only)/256K (9521 only) of RAM memory
- Controls power-up diagnostics and boot PROM

## KEYBOARD
## WLI NOs. 279-2042-US* /2047-US*

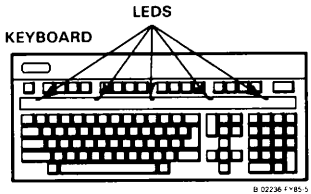
- Single-component, 8-bit microprocessor with:
  - 128K x 8-bit RAM
  - Internal oscillator and timing circuit for data synchronization
  - Full-duplex, serial port UART
  - Serial to parallel/parallel to serial conversion capabilities
- 4 MHz, crystal-generated clock for 8031 timing with board's other components
- Programmable sound generator circuitry

*U.S. only; other suffixes for other countries.

# ERROR CODES

### Fatal Errors

- If any keyboard LEDs remain illuminated 60 seconds after the CPU is powered-on, a fatal error has occurred; check for:
  - Defective CPU/System PCB*
  - Defective power supply*
  - Faulty option board or motherboard




### Non-Fatal Errors

- If a non-fatal error occurs, a message will appear on the console (for a list of non-fatal error codes, refer to the Professional Computer Maintenance Manual, order no. 741-1190).

*If LED is illuminated on rear of CPU/System PCB 3 seconds after power-up, check for defective CPU/System board and power supply.

# LATEST PCB E-REV LEVELS

| PCB No. | Highest Revision Level | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 210-8221A | | | | | | | | | | | | | | X | |
| 210-9221A | | | | | | X | | | | | | | | | |
| 210-9521A | | | | | X | | | | | | | | | | |

# COMMONLY USED PARTS

| WLI No. | Description |
|---|---|
| 210-8221A/9221A | CPU/System PCB |
| 210-8232A/9232A* | Remote Telecommunications Controller |
| 210-8233/9233 | Graphics Display Adapter |
| 210-8237/9237 | Motherboard (5-slot chassis) |
| 210-8245A/9245A | Datalink PCB (Local Communications Option) |
| 210-8246A/9246A | CPU PCB (Local Communications Option) |
| 210-8251A/9251A | Multiport Communications Controller |
| 210-8289A/9289A | Local Interconnect Option PCB |
| 210-8257/9257 | Motherboard (8-slot chassis) |
| 210-8222A/9222A | Color/Graphics (Low-Resolution) Adapter |
| 210-8242/9242 | Expanded Memory PCB (128K) |
| 210-8242-1/9242-1 | Expanded Memory PCB (256K) |
| 210-8242-2/9242-2 | Expanded Memory PCB (512K) |
| 210-8343A/9343A | Character Display (Medium-Resolution) Adapter |
| 210-8244/8344 | Monitor Board |

*210-8252A/9252A (X.21 interface) used outside U.S.

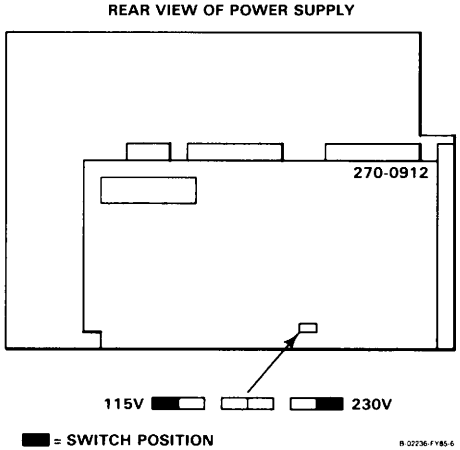
# COMMONLY USED PARTS

| WLI No. | Description |
|---|---|
| 210-8225A/9225A | Winchester Controller |
| 210-8248A/9248A | CP/M-80 Emulator PCB |
| 210-9521A | CPU/Memory PCB (256K) |
| 220-3238 | Winchester Control Cable |
| 220-3239 | System Drive "A" Cable |
| 220-3240 | System Drive "B" Cable/ Winchester Data Cable |
| 220-3281 | Local Communications Interconnect Cable |
| 270-3279 | Power Harness Assy (SPS-200) |
| 270-0912 | SPS-200 Power Supply |
| 270-0890 | SPS-255 Power Supply |
| 278-4026 | 5 1/4-inch, DSDD Diskette Drive |
| 278-4030 | 10MB Winchester Drive |
| 278-4033 | 5 1/4-inch, DSDD Diskette Drive (half-height) |
| 278-4034 | 30MB Winchester Drive |
| 279-2042-US* | Low-profile Keyboard (Class A only) |
| 279-2047-US* | Low-profile Keyboard (Class B) |
| 289-0302 | IBM 3278 Emulation PCB |
| 421-0001 | Monitor Cable |

*U.S. only; other suffixes for other countries.

# SWITCH SETTINGS/JUMPERS

## 115V/230V POWER SUPPLY SWITCH



# MAJOR FUNCTIONS ON BOARDS

## MOTHERBOARD
## WLI NOs. 210-8237/9237

- Provides common bus that connects address bus, data bus, and control bus to chassis option slots
- Contains power supply connectors, noise filter, and system clocks

# LATEST PCB E-REV LEVELS

| WLI No. | Highest Revision Level 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210-8237 |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 210-9237 |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |

# ADJUSTMENTS/TEST POINTS

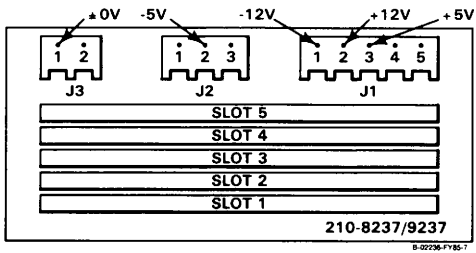
## SPS-200 POWER SUPPLY
## WLI NO. 270-0912

**WARNING**

Power supply contains extremely dangerous voltage and current levels. Extreme caution is required when performing checks on the power supply.

**Check**

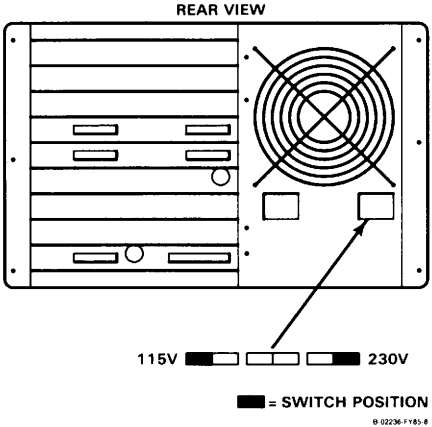
| Voltage | Positive Lead* | Negative Lead* | Voltage Level |
|---|---|---|---|
| +5 Vdc | Con. J1, Pin 3 | Con. J3, Pin 1 | +5, ± 0.25 |
| -5 Vdc | Con. J2, Pin 2 | Con. J3, Pin 1 | -5, ± 0.25 |
| +12 Vdc | Con. J1, Pin 2 | Con. J3, Pin 1 | +12, ± 0.60 |
| -12 Vdc | Con. J1, Pin 1 | Con. J3, Pin 1 | -12, ± 0.60 |



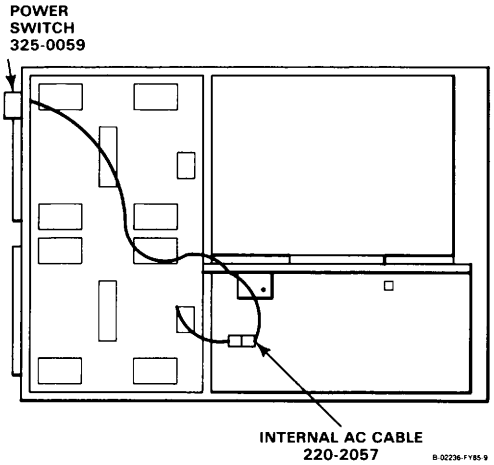

*Test points located on motherboard.

# SWITCH SETTINGS/JUMPERS

## 115V/230V POWER SUPPLY SWITCH



# CABLING


POWER
SWITCH
325-0059
INTERNAL AC CABLE
220-2057
B-02236-FY85-9

# MAJOR FUNCTIONS ON BOARDS

## MOTHERBOARD
## WLI NOs. 210-8257/9257

- Provides common bus that connects address bus, data bus, and control bus to chassis option slots
- Contains power supply connectors, noise filter, and system clocks

# LATEST PCB E-REV LEVELS

| PCB No. | Highest Revision Level | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 210-8257 | | X | | | | | | | | | | | | | |
| 210-9257 | | X | | | | | | | | | | | | | |

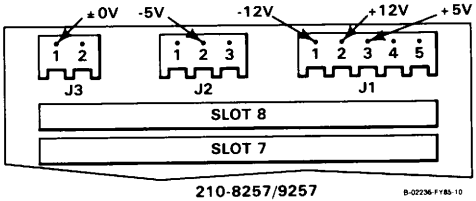
# ADJUSTMENTS/TEST POINTS

## SPS-255 POWER SUPPLY
## WLI NO. 270-0890

**WARNING**

Power supply contains extremely dangerous voltage and current levels. Extreme caution is required when performing checks or adjustments on the power supply.

| Voltage | Positive Lead* | Negative Lead* | Voltage Level |
|---|---|---|---|
| +5 Vdc | Con. J1, Pin 3 | Con. J3, Pin 1 | +5, ± 0.25 |
| -5 Vdc | Con. J2, Pin 2 | Con. J3, Pin 1 | -5, ± 0.25 |
| +12 Vdc | Con. J1, Pin 2 | Con. J3, Pin 1 | +12, ± 0.60 |
| -12 Vdc | Con. J1, Pin 1 | Con. J3, Pin 1 | -12, ± 0.60 |

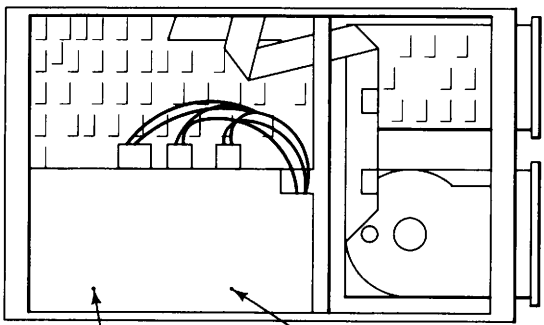



*Test points located on motherboard.

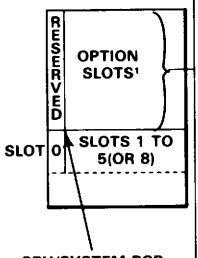
# ADJUSTMENTS/TEST POINTS

## SPS-255 POWER SUPPLY
## WLI NO. 270-0890

- Use a non-metallic screwdriver to bring voltages into tolerance.



# PCB COMPLEMENTS




**OPTION BOARDS**

- COLOR/GRAPHICS(LOW RESOLUTION) DISPLAY ADAPTER 210-8222A/9222A
- 10MB/30MB WINCHESTER CONTROLLER 210-8225A/9225A[2]
- GRAPHICS(MEDIUM RESOLUTION) DISPLAY ADAPTER 210-8233/9233[3]
- 128K MEMORY EXPANSION 210-8242/9242[4]
- 256K MEMORY EXPANSION 210-8242-1/9242-1[4]
- 512K MEMORY EXPANSION 210-8242-2/9242-2[4]
- CHARACTER DISPLAY ADAPTER 210-8343A/9343A
- REMOTE TELECOMMUNICATIONS CONTROLLER 210-8232A/9232A[5]
- DATALINK: LOCAL COMMUNICATIONS 210-8245A/9245A[6]
- CPU: LOCAL COMMUNICATIONS 210-8246A/9246A[6]
- CP/M-80 EMULATOR PCB 210-8248A/9248A
- MULTIPORT COMMUNICATIONS CONTROLLER 210-8251A/9251A
- LOCAL INTERCONNECT OPTION (LIO)PCB 210-8289A/9289A
- IBM 3278 EMULATION PCB 289-0302

[1] GENERALLY, OPTION BOARDS MAY BE PLACED IN ANY OPTION SLOT; HOWEVER, CABLING CONSIDERATIONS IMPOSE CERTAIN RESTRICTIONS.

[2] WINCHESTER CONTROLLER MUST BE SEATED IN SLOT 5 OR 8.

[3] GRAPHICS DISPLAY ADAPTER MUST BE IN A SLOT ADJACENT TO CHARACTER DISPLAY ADAPTER(210-8343A/9343A).

[4] MEMORY EXPANSION BOARD(S) SHOULD BE SEATED IN SLOT(S) AS CLOSE AS POSSIBLE TO CPU/SYSTEM BOARD(SLOT 0) TO MINIMIZE BUS TIMING ERRORS.

[5] REMOTE TELECOMMUNICATIONS CONTROLLER 210-8252A/9252A (X.21 INTERFACE) USED OUTSIDE U.S.

[6] DATALINK: LOCAL COMMUNICATIONS BOARD MUST BE IN A SLOT ADJACENT TO CPU: LOCAL COMMUNICATIONS BOARD.

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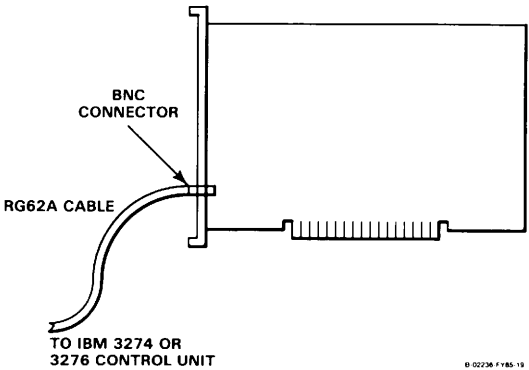
# CABLING

## IBM 3278 EMULATION PCB
## WLI NO. 289-0302



# PROMS

| Description | Load PCB 210- | Prom No. | Position |
|---|---|---|---|
| Winchester Controller PROM | 8225A/9225A | 378-9040-R6 | L19 |

# MAJOR FUNCTIONS ON BOARDS

## CHARACTER DISPLAY ADAPTER WLI NOs. 210-8343A/9343A

- Contains CRT controller logic and attribute control logic
- Controls superscript and subscript functions
- Font table (4K x 10-bit) defines 256 characters/symbols
- Includes frame buffer memory (2k words) with up to 2000 characters of text

## GRAPHICS DISPLAY ADAPTER WLI NOs. 210-8233/9233

- Contains two banks of dynamic RAM for storage of pixels required to map CRT screen
- Includes timing support, RAS, CAS, and chip enable circuitry required by memory

## COLOR/GRAPHICS (LOW RESOLUTION) DISPLAY ADAPTER WLI NOs. 210-8222A/9222A

- Contains MC6845-1 video timer and controller chip to drive low-resolution displays
- 32k-word, low-resolution video memory space
- Scroll Register for horizontal and vertical control of display window in video memory

# MAJOR FUNCTIONS ON BOARDS

## WINCHESTER CONTROLLER WLI NOs. 210-8225A/9225A

- Z80A based controller with 8086 interface logic
- Command Register for interpreting 8086 instructions, transmitting DMA requests, and transferring data bytes over DMA channels

## REMOTE TELECOMMUNICATIONS CONTROLLER WLI NOs. 210-8232A/9232A*

- Contains Z80A microprocessor, multi-channel DMA controller, and 60K bytes of RAM
- Supports RS-232C and Automatic Calling Unit interfaces
- Enables PC communication with RS-232C or X.21 interfaces
- 4k bytes of EPROM for bootstrap loading and diagnostics

## DATALINK PCB: LOCAL COMMUNICATIONS WLI NO. 210-8245A/9245A

- Contains 64K of dynamic RAM shared by Z80A and 8086 microprocessors, and the datalink
- Contains 16K of dynamic CRT RAM for character and attribute storage
- Contains memory arbitration and refresh logic
- Datalink interface circuitry and 17 MHz crystal

*210-8252A/9252A (X.21 interface) used outside U.S.

# MAJOR FUNCTIONS ON BOARDS

## CPU PCB: LOCAL COMMUNICATIONS WLI NO. 210-8246A/9246A

- Z80A microprocessor
- 8086 bus interface and I/O control circuitry
- Contains interrupt circuitry for control of Z80A and 8086 interrupts
- Contains keyboard simulation logic

## CP/M-80 EMULATOR PCB WLI NOs. 210-8248A/9248A

- Contains Z80A microprocessor and 64k bytes of RAM
- Allows PC to read disk data formatted in 8 bits and then transfers data to main memory using 16-bit format; also supports conversion of 16-bit data to 8-bit format

## MULTIPORT COMMUNICATIONS CONTROLLER WLI NOs. 210-8251A/9251A

- Contains 3 RS-232C ports for support of asynchronous, synchronous, and bit-level transmission
- Contains slot decode logic and I/O port decode logic
- Clock generation circuitry for control of system clock used by Serial I/O Controller (SIO) and Dual-Channel Asynchronous Receiver/Transmitter (DART)
- Function Register for decoding of data bus bit patterns and for determining encoding technique and interrupt priority level

# MAJOR FUNCTIONS ON BOARDS

## MULTIPORT COMMUNICATIONS CONTROLLER WLI NOs. 210-8251A/9251A (CONT)

- 2 baud rate generators for control of SIO and DART bit rate patterns
- Status Register for CPU monitoring of condition of RS-232C ports

## LOCAL INTERCONNECT OPTION PCB WLI NOs. 210-8289A/9289A

- Permits interconnection of 255 (maximum) PC systems in a network

## IBM 3278 EMULATION PCB WLI NO. 289-0302

- Permits PC to emulate an IBM 3278 workstation

## EXPANDED MEMORY PCBs WLI NOs. 210-8242/9242

- 128K, 256K, or 512K bytes of extended RAM
- Parity generator/checker helps ensure data integrity
- Contains memory parity error LED
- Data transceiver bidirectional buffers for buffering of system data bus to memory data bus during write-data operations plus buffering of memory bus to system bus during read-data operations
- Address comparator analysis of Boundary Register contents for enabling/disabling of RAM banks

# LATEST PCB E-REV LEVELS

| PCB No. | Highest Revision Level 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210-8222A | | | | | | | | | | X | | | | | |
| 210-9222A | | | | | X | | | | | | | | | | |
| 210-8225A | | | | X | | | | | | | | | | | |
| 210-9225A | X | | | | | | | | | | | | | | |
| 210-8232A | | | | | | | | | X | | | | | | |
| 210-9232A | | | | | X | | | | | | | | | | |
| 210-8233 | | | | X | | | | | | | | | | | |
| 210-9233 | | X | | | | | | | | | | | | | |
| 210-8242 | | X | | | | | | | | | | | | | |
| 210-9242 | | X | | | | | | | | | | | | | |
| 210-8242-1 | | X | | | | | | | | | | | | | |
| 210-9242-1 | | X | | | | | | | | | | | | | |
| 210-8242-2 | | X | | | | | | | | | | | | | |
| 210-9242-2 | | | | X | | | | | | | | | | | |

# LATEST PCB E-REV LEVELS

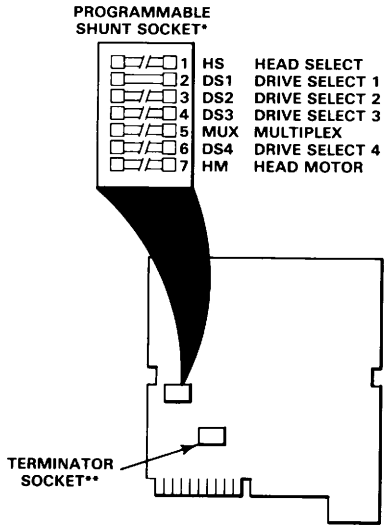
| PCB No. | Highest Revision Level | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| 210-8245A | | | X | | | | | | | | | | | | | |
| 210-9245A | | X | | | | | | | | | | | | | | |
| 210-8246A | | | | | X | | | | | | | | | | | |
| 210-9246A | X | | | | | | | | | | | | | | | |
| 210-8248A | | X | | | | | | | | | | | | | | |
| 210-9248A | X | | | | | | | | | | | | | | | |
| 210-8251A | | | | X | | | | | | | | | | | | |
| 210-9251A | | | X | | | | | | | | | | | | | |
| 210-8252A* | X | | | | | | | | | | | | | | | |
| 210-9252A* | | | X | | | | | | | | | | | | | |
| 210-8289A | | X | | | | | | | | | | | | | | |
| 210-9289A | | X | | | | | | | | | | | | | | |
| 210-8343A | | | | X | | | | | | | | | | | | |
| 210-9343A | | X | | | | | | | | | | | | | | |

*210-8252A/9252A (X.21 interface) used outside U.S.

# SWITCH SETTINGS/JUMPERS

***Tandon***

## TANDON DRIVE JUMPER CONFIGURATION WLI NO. 278-4026




* JUMPER PLUG OFFSET BY ONE PIN (PIN 1 EMPTY).

** ONE TERMINATOR PER SYSTEM; TERMINATOR SHOULD BE IN DRIVE A IN TWO-DRIVE SYSTEM.

B-02236-FY85-22

# ADJUSTMENTS/TEST POINTS

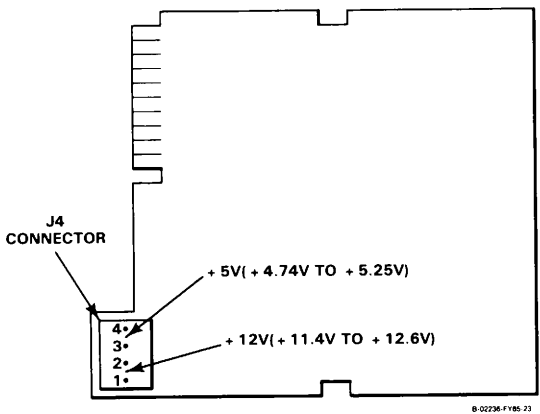
***Tandon***

## FLOPPY DRIVE VOLTAGE CHECK

- Measure voltage levels at J4 power connector on drive:

  Pins 1,2 for +12V ± 5% (+11.4 Vdc to +12.6 Vdc)

  Pins 3,4 for +5V ± 5% (+4.74Vdc to +5.25 Vdc)



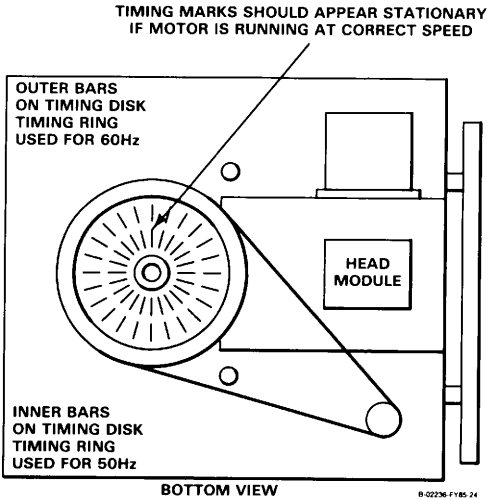
# ADJUSTMENTS/TEST POINTS

***Tandon***

## MOTOR SPEED CHECK/ADJUSTMENT

### Check

- Put alignment diskette 726-8068 into Drive A.
- Power-on unit and wait for BIT to complete; press"M" key to obtain maintenance menu.



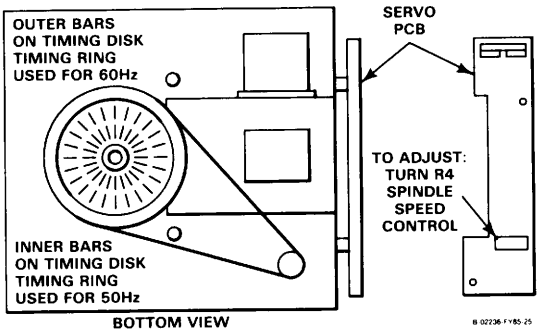
# ADJUSTMENTS/TEST POINTS

***Tandon***

## MOTOR SPEED CHECK/ADJUSTMENT (CONT)

### Adjustment

- Using an insulated screwdriver, turn R4 speed control pot on servo board until timing marks appear stationary.

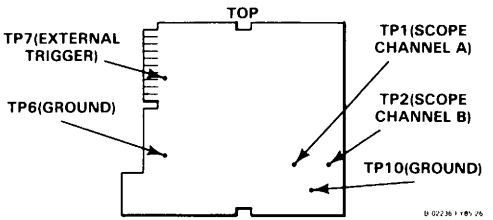


# ADJUSTMENTS/TEST POINTS

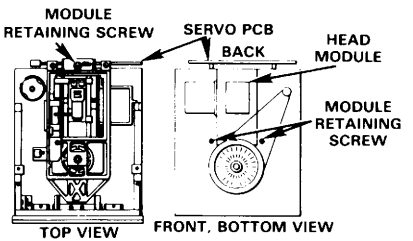
*Tandon*

## RADIAL TRACK ALIGNMENT

- Set up scope.




- Insert alignment diskette into drive.
- Power-on unit and wait for BIT to complete; then press M key to enter maintenance menu.
- Loosen module retaining screws 1/2 turn (3 screws).

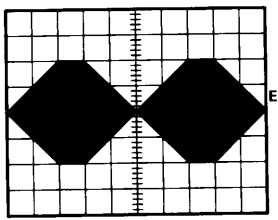


# ADJUSTMENTS/TEST POINTS

*Tandon*

## RADIAL TRACK ALIGNMENT (CONT)

- Access track 16 and adjust scope to CAT EYE pattern (amplitude of CAT EYES should be within 80% of each other; record values).



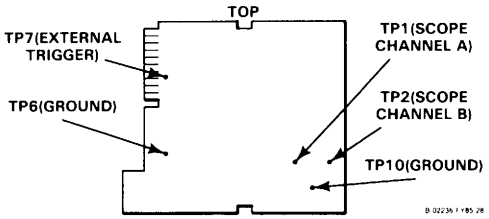

- Recalibrate; access track 16 (record CAT EYE amplitudes)
- Access track 40 (record amplitudes); access track 16 (record amplitudes).
- Adjust cam screw so CAT EYES are equal in amplitude.
- Tighten module retaining screws.

# ADJUSTMENTS/TEST POINTS

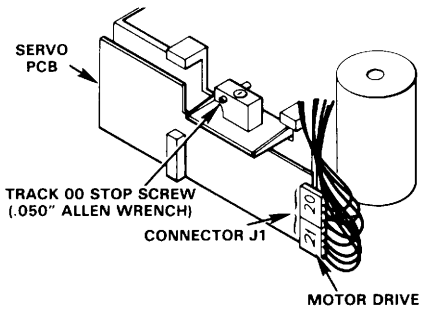
***Tandon***

## TRACK 00 END-STOP

- Set up scope.




- Press "1" on keyboard to recalibrate diskette.
- Turn track 00 stop screw 2 turns counterclockwise.



# ADJUSTMENTS/TEST POINTS

*Tandon*

## TRACK 00 END-STOP (CONT)

- Turn stop-screw clockwise until scope signal from TP1/TP2 decreases.
- Turn stop-screw counterclockwise until amplitude stops increasing; add 1/8 additional counterclockwise turn.

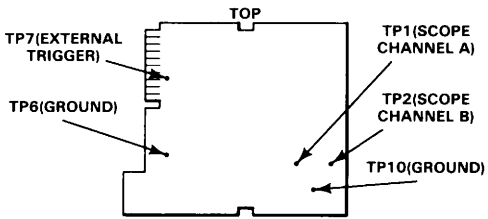
# ADJUSTMENTS/TEST POINTS

*Tandon*

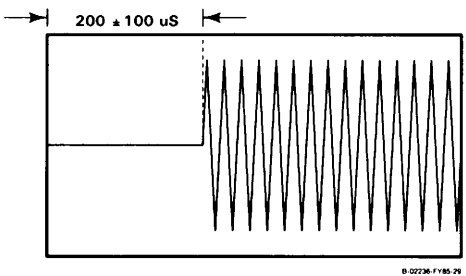
## INDEX-TO-DATA ALIGNMENT

### Check

- Set up scope.




- Insert alignment diskette.
- Press "2" key to access track 1; check oscilloscope pattern for proper tolerance.



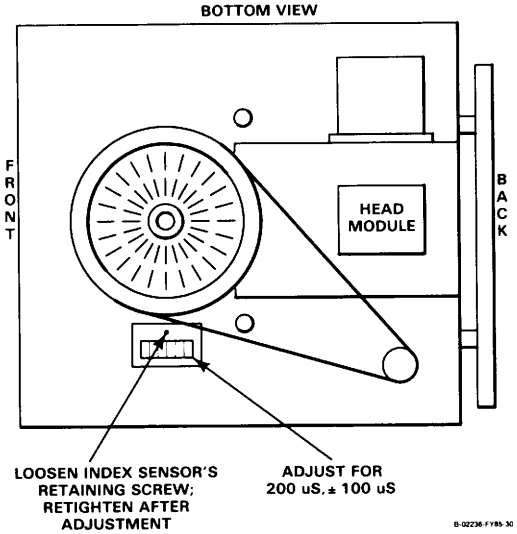
# ADJUSTMENTS/TEST POINTS

*Tandon*

## INDEX-TO-DATA ALIGNMENT (CONT)

### Adjustment

- If pattern is not in tolerance:

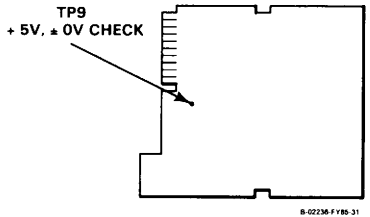


# ADJUSTMENTS/TEST POINTS

***Tandon***

## WRITE-PROTECT SWITCH CHECK/ ADJUSTMENT

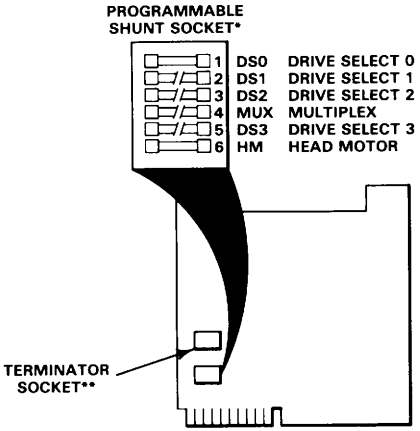
- Insert non-write protected diskette halfway into drive (activate switch); TP9 should be +5V.
- Insert the diskette fully into drive and close door (deactivate switch); TP9 should be 0V.
- If either reading is incorrect, replace drive.



# SWITCH SETTINGS/JUMPERS

*MPI*

## MPI DRIVE JUMPER CONFIGURATION
## WLI NO. 278-4026




* JUMPER PLUG OFFSET BY ONE PIN (PIN 1 EMPTY).

** ONE TERMINATOR PER SYSTEM; TERMINATOR SHOULD BE IN DRIVE A IN TWO-DRIVE SYSTEM.

B-02236-FY85-32

# ADJUSTMENTS/TEST POINTS

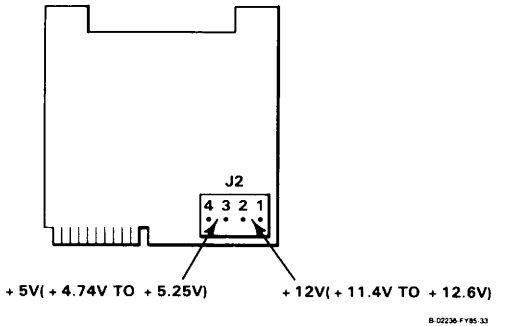
*MPI*

## FLOPPY DRIVE VOLTAGE CHECK

- Measure voltage levels at connector J2:

  Pins 1,2 for +12V ± 5% (+11.4 Vdc to +12.6 Vdc)

  Pins 3,4 for +5V ± 5% (+4.74 Vdc to +5.25 Vdc)



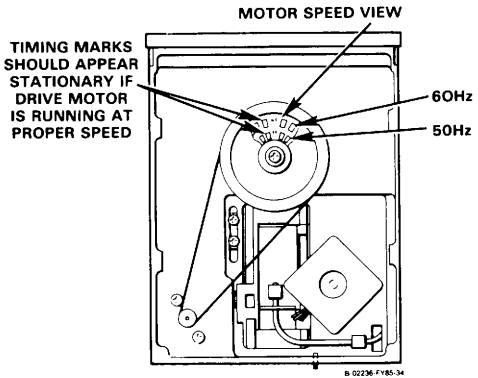
# ADJUSTMENTS/TEST POINTS

*MPI*

## MOTOR SPEED CHECK/ADJUSTMENT

### Check

- Put alignment diskette 726-8068 into Drive A.
- Power-on unit and wait for BIT to complete; press "M" key to obtain maintenance menu.



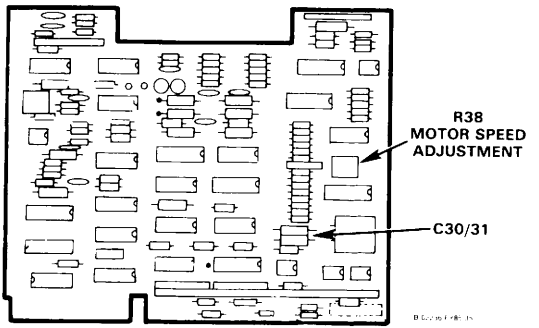
# ADJUSTMENTS/TEST POINTS

*MPI*

## MOTOR SPEED CHECK/ADJUSTMENT (CONT)

### Adjustment

- Turn R38 until marks appear stationary.

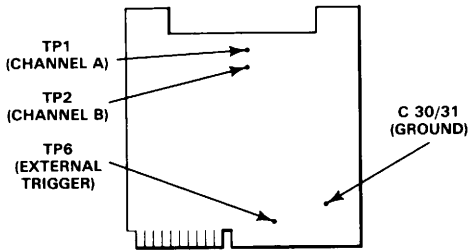


# ADJUSTMENTS/TEST POINTS

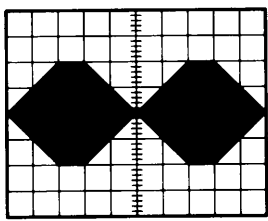
*MPI*

## RADIAL TRACK ALIGNMENT

- Set up scope.




- Insert diskette, power-on the unit, and wait for BIT to complete; then press M key to enter maintenance menu.
- Access track 16 and adjust scope to CAT EYE pattern (amplitude of CAT EYES should be within 80% of each other; record values).




TIME SCALE = 20ms/Div

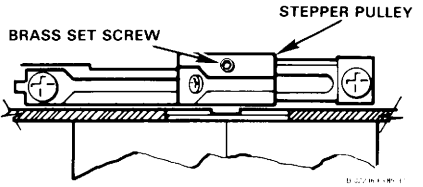
B-02236-FY85-36

# ADJUSTMENTS/TEST POINTS

*MPI*

## RADIAL TRACK ALIGNMENT (CONT)

- Recalibrate; access track 16 (record CAT EYE amplitudes).
- Access track 40 (record amplitudes); access track 16 (record amplitudes).
- Loosen setscrew in stepper pulley; position pulley so scope pattern shows peaks of equal amplitude.




- Tighten setscrew to 2 inch-lbs of torque.

# ADJUSTMENTS/TEST POINTS

***MPI***

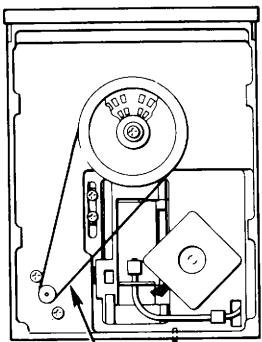
## TRACK 00 END-STOP

### Check

- Press "1" to recalibrate diskette; carriage to be within 0.010" from end-stop.

### Adjustment

- Adjust end-stop setscrew until carriage is 0.010" from setscrew.



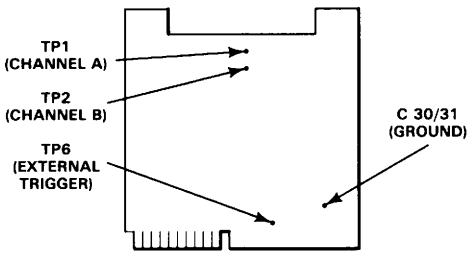
# ADJUSTMENTS/TEST POINTS

*MPI*

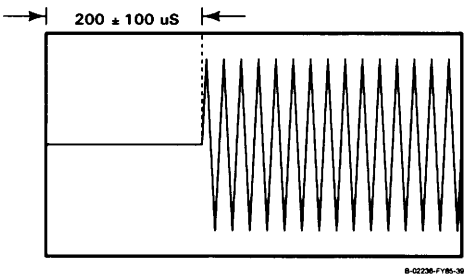
## INDEX-TO-DATA ALIGNMENT

### Check

- Set up scope.




- Verify radial track alignment.
- Press "2" key; check oscilloscope pattern for proper tolerance.

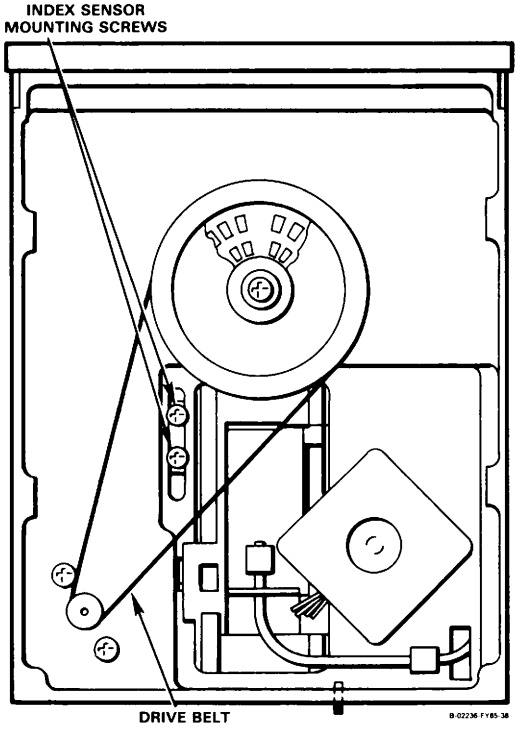


# ADJUSTMENTS/TEST POINTS

*MPI*

## INDEX-TO-DATA ALIGNMENT (CONT)

- Loosen sensor mounting screws and slide sensor assembly until scope shows correct pattern, then tighten sensor mounting screws.

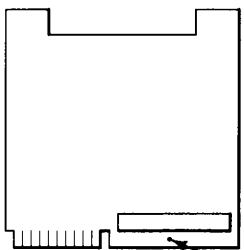


# ADJUSTMENTS/TEST POINTS

*MPI*

## WRITE-PROTECT CHECK

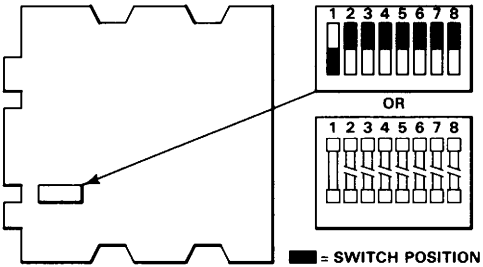
- Insert non-write protected diskette; J4 Pin 16 at logic 0 (ground).
- Insert write-protected diskette; J4 Pin 16 at logic 1 (+5V).
- If either reading is incorrect, replace drive.



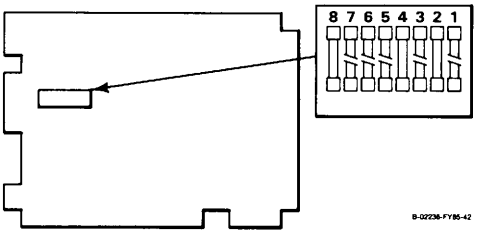
# SWITCH SETTINGS/JUMPERS

## 10MB DRIVE
## WLI NO. 278-4030

### IMI

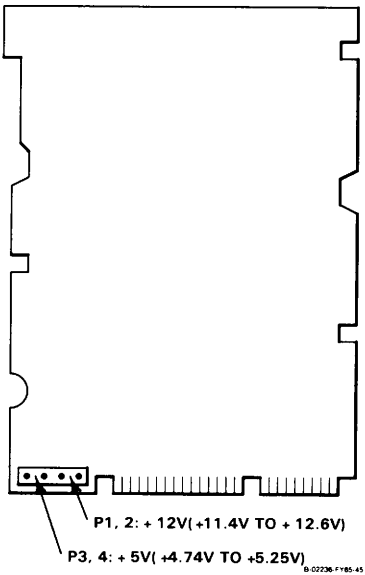



### Seagate



# ADJUSTMENTS/TEST POINTS

## 30MB DRIVE
## WLI NO. 278-4034



# MAJOR FUNCTIONS ON BOARDS

*Wang*

## MONITOR PCB 210-8244/8344

- Horizontal linearity, width, hold, and phase control
- Vertical linearity, size, and hold
- Focus control and adjustment
- Character brightness and contrast

# LATEST PCB E-REV LEVELS

**Wang**

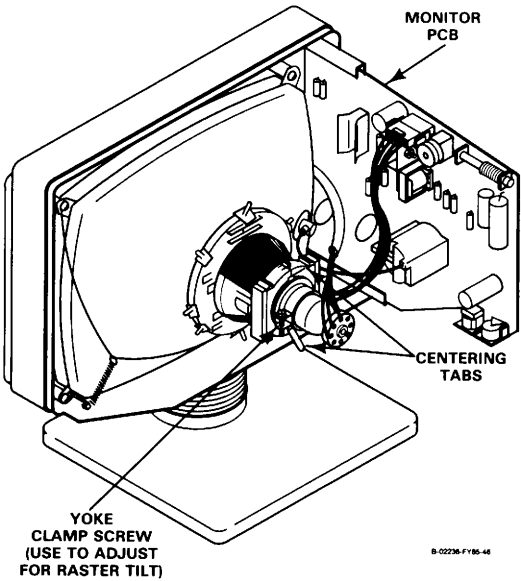
| PCB No. | Highest Revision Level 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210-8244 | | | | | | X | | | | | | | | | |
| 210-8344 | | | | | | X | | | | | | | | | |

# ADJUSTMENTS/TEST POINTS

*Wang*

## VIDEO MONITOR ALIGNMENTS

- Insert diagnostic diskette (732-0022) into floppy drive A; power-on system.
- Select and execute Wang Monitor Attributes Test ("HO" characters).
- Check for raster tilt; rotate yoke assembly if required.

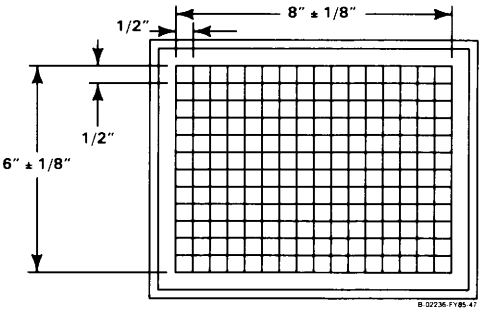


# ADJUSTMENTS/TEST POINTS



## VIDEO MONITOR ALIGNMENTS (CONT)

- Select grid pattern for alignment.




- Perform board adjustments.

**WARNING**

High voltage present on component side of monitor board. Adjustments (except horizontal hold) are made through access holes from the non-component side of the board.

# ADJUSTMENTS/TEST POINTS

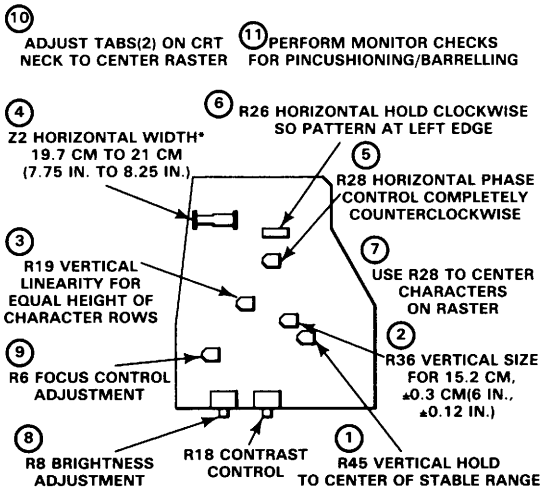
*Wang*

## VIDEO MONITOR ALIGNMENTS (CONT)

**Adjustments — WLI NO. 210-8244**

**WARNING**

High voltage present on component side of monitor board. Adjustments (except horizontal hold) are made through access holes from the non-component side of the board.




*FACTORY ADJUSTMENT; IN MOST CIRCUMSTANCES, SHOULD NOT REQUIRE ADJUSTING BY CUSTOMER ENGINEER.

B-02236-FY85-48

# ADJUSTMENTS/TEST POINTS

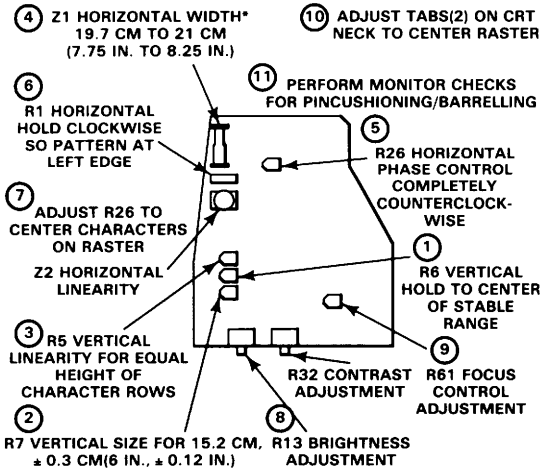
*Wang*

## VIDEO MONITOR ALIGNMENTS (CONT)

### Adjustments – WLI NO. 210-8344

**WARNING**

High voltage present on component side of monitor board. Adjustments (except horizontal hold) are made through access holes from the non-component side of the board.




*FACTORY ADJUSTMENT; IN MOST CIRCUMSTANCES, SHOULD NOT REQUIRE ADJUSTING BY CUSTOMER ENGINEER.

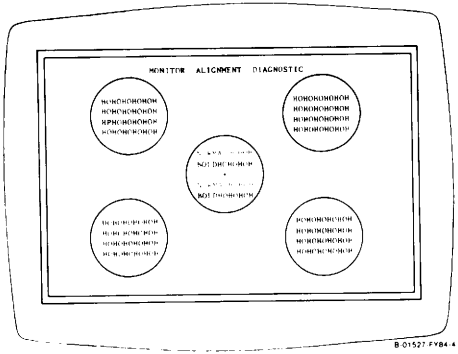
B-02236-FYB5-49

# ADJUSTMENTS/TEST POINTS

*Wang*

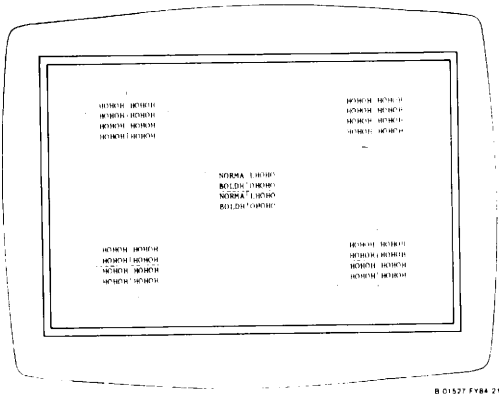
## VIDEO MONITOR CHECKS

### Monitor Alignment — Circles




B 01527 FY84 4

### Monitor Alignment — Squares



B 01527 FY84 21

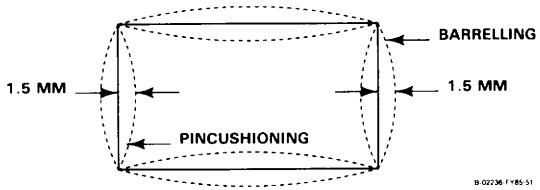
# ADJUSTMENTS/TEST POINTS



## VIDEO MONITOR CHECKS (CONT)

### Pincushioning/Barrelling Check

- Margin check: margins should be straight to within ± 1.5mm (± 0.063 in.).




- Adjust magnet(s) around yoke if margins are not within proper tolerance; if necessary, replace magnet with one having greater gauss value.

**NOTES**

210-4025 APC Winchester
Controller

10 M all off
no jumper

20 M 1+4 off, 2+3 on

(~~J1-J2~~)

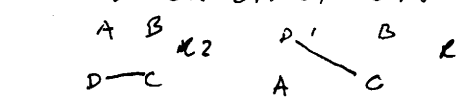
30 M 1+3+4 off 2 on
(J3.2 - J4.2)

67 M 2+4 off, 1+3 on
(J3.1 - J4.1)

J3 ● ● 1
J4 ● ● 2 1

Part no. Floppy w/ Hybrid
for 5¼" 210-4033
or 449-0837

30M Micropolis Rom 11
SW on off off off



**NOTES**

control Data

2 7 8 - 4 0 2 6 ~~Hdwy~~ Hdwy

for CIS

Jumper set 4, 5, 2

Bright red wire jacket switch

to 2 connector board.

switch for NEC Monitor.

Sw-1: Icon not off

Sw-2: all on

Sw-3: all on

**NOTES**

Expanded memory

1 enable 8000

2 enable A000

3 enable C000

4 enable E000

1.2MB Floppy 278-4055

360KB -"- 278-4033

Test at 9521

512K: 1000:2000 to 7000:FFFF

IRT: 1000 2000 to F000:FFFF

**NOTES**

Serial loop back

Pn. 420-1040:

for binary legende

2-3

4-5-23

6-8-20

11-12-15-17

Programmed CPU

0000-L97

0001 L78

Keyboard printplade

725-2739

NOTES

Kabel for internal
Workstation 15pol

HUN stik ved skærm

HAN stik ved CPU

—— " ——

67MByte
278 - 4054

—— " ——

Ingen forbindelse i AP<
mellem sidekabel:

18 + 19 + 24 + 27

—— " ——

NOTES

Test of 9521:

256K
1000:2000 to 3000:FFFF

512K
1000:2000 to 7000:FFFF

128
1000:2000 to 1000:FFFF

My clock chip
377-0774
ECO 41419

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