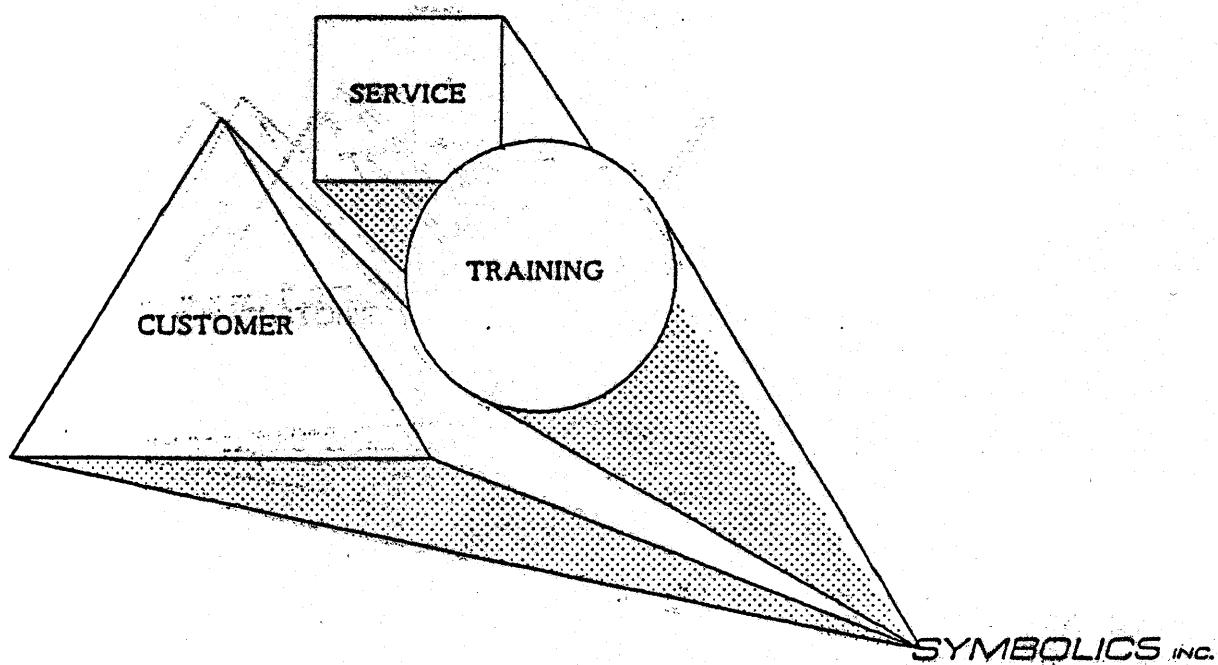


3600 SERIES

BASIC FIELD MAINTENANCE

STUDENT GUIDE



**CUSTOMER SERVICE
STUDENT HANDOUT MATERIAL**

**This document was prepared by the Customer Service Technical Training Group of
Symbolics, Inc.**

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Printed in the USA.

symbolics

Technical Training Center

General Student Information for Training Courses

On Arrival at LA International

Take the Van Nuys fly-away bus
to terminal at Van Nuys Airport
7610 Woodley Ave., Van Nuys, CA

Class Room Hours

8:15 am to 12:00 noon
1:00 pm to 5:00 pm
Monday through Friday

Take taxi to motel; or take rental
car to motel. (see attached map).

Round trip fly-away cost approximately
\$8.00. One way approximately \$4.50

Emergency Telephone Numbers

Technical Training Mgr. - Paul Dyer
Symbolics - (818) 998-3600, Ext. 561
Home - (818) 712-0761

Motel Locations Preferred

(Billed to Co. for Symbolics students)
TOPANGA INN, 9817 Topanga Canyon Blvd.
Chatsworth, CA 91311
(818) 709-7054

Emergency Medical Facilities

National Industrial Med. Clinic Inc.
21317 Devonshire St.
Chatsworth, CA 91311
(818) 998-3008

Alternate

COUNTRY SQUIRE
7631 Topanga Canyon Blvd.
Chatsworth, CA 91311
(818) 883-0240

Automobiles (Symbolics Students)

Hertz Rental (Corporate Account)
Compact Size
(Billed to Symbolics)
(No Insurance Coverage)
NOTE: Driver must be 25 years of
age or over

Class Room Locations

9320 Deering Avenue
Chatsworth, CA 91311
(818) 998-3600, Extension 560

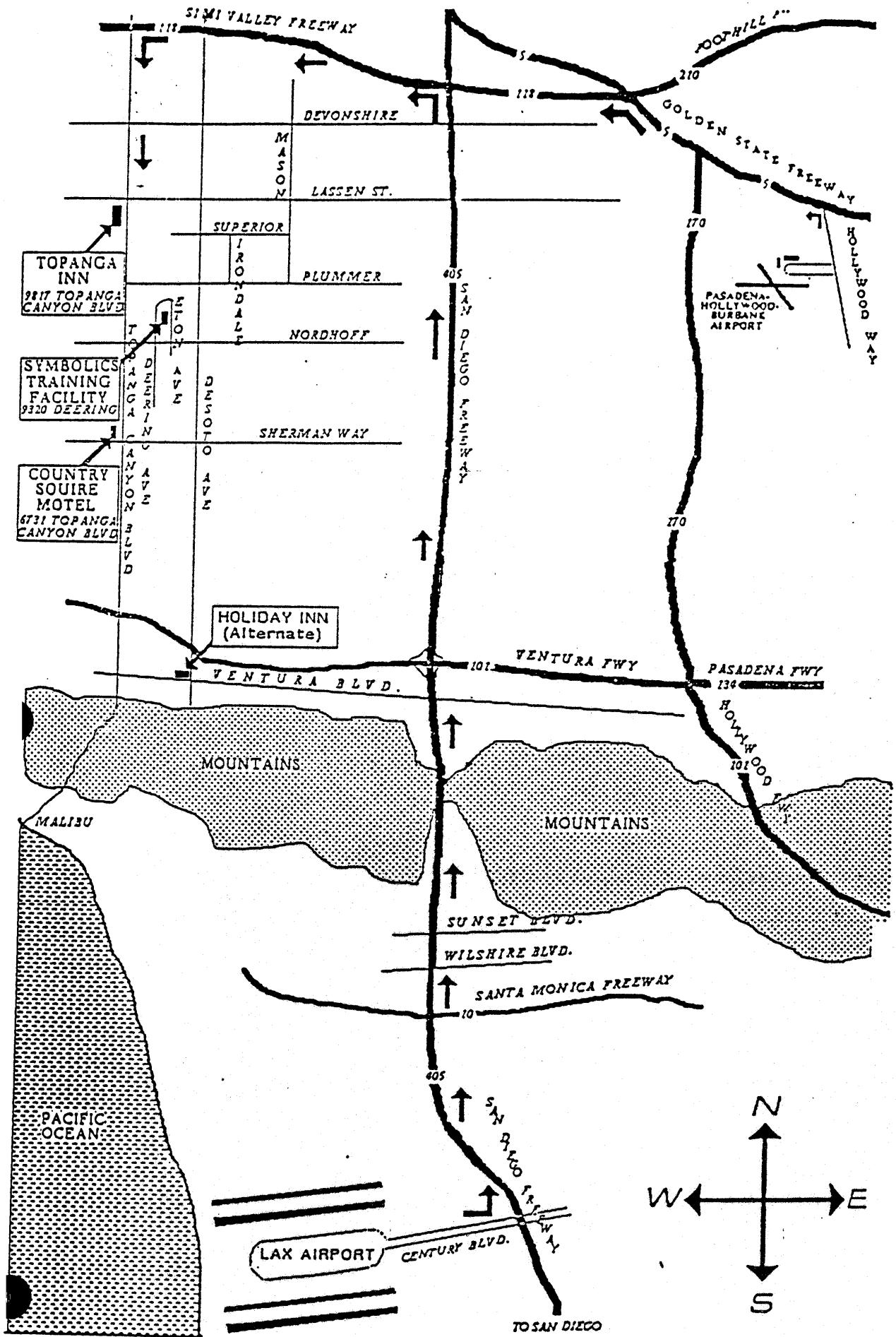
Company Apartment

10159 De Soto Ave., Unit #217
Corner Devonshire & De Soto Ave.
Chatsworth, CA 91311
(818) 882-9203

Motel and Meal Expenses

Students who are not Symbolics employees are responsible for arranging and paying all costs for travel, hotel accommodations, and automobile rental. Commercial rates at Topanga Inn or Country Squire are approximately \$49/day (single/queen size bed) plus \$6 tax.

Symbolics students who do not have a permanent advance will be paid a sufficient advance to defray the cost of food, telephone calls, laundry, etc. upon arrival (Monday) at Chatsworth. Students who have a permanent advance are expected to pay expenses out of that advance. All long-distance telephone charges, dry cleaning, etc. must be paid by students at the time of check-out. Expense Reports will be submitted weekly while in training. The final expense Report will be mailed back to the Training Manager at Chatsworth for approval.



Basic Field Maintenance Training Course Outline

Symbolics, Inc., July 1986

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PREREQUISITES:

1. Formal 30 week electronics training course, or equivalent.
2. Formal training in micro-processor theory and operation.
3. Minimum of three weeks attached to a Symbolics field office, with at least five days accompanying a qualified CSE in the field.
4. Be able to use standard test equipment, such as oscilloscopes and multimeters.
5. Knowledge of proper use of hand tools and soldering equipment.
6. Speak and read English fluently.

OBJECTIVES:

Upon completion of this training course, the student will be able to:

1. Install, configure, and verify proper operation of the Symbolics 3600, 3640, and 3670 systems hardware.
2. Install standard software and set site for Symbolics 3600, 3640, or 3670.
3. Verify 3600, 3640, or 3670 system malfunctions, trouble isolate the problem, repair system, and verify proper system operation.
4. Determine if malfunctions are software related and gather necessary information to communicate effectively with software support personnel.
5. Install, checkout, and adjust the DC Power Supplies in the 3600, 3640, or 3670 systems.
6. Install, checkout, and adjust both black and white or color monitors
7. Communicate effectively with customer personnel and promote good customer relations.

Basic Field Maintenance Training Course Outline

Symbolics, Inc., July 1986

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COURSE LENGTH:

15 Days (3 weeks).

8 Hours/day, with one 10 minute break per hour.

NOTE: For detailed breakdown, see attached Course/Class Schedule

PHASE I INTRODUCTION TO COURSE

1. Class Routine.
2. Course Outline.
3. Student Handout Material.
4. Student Evaluation.

PHASE II INTRODUCTION TO SYSTEM

1. General System Information.
2. Standard And Optional Features.
3. System Walk-Around - Major Assemblies.
 - a. 3600.
 - b. 3670/75.
 - c. 3640/45.
 - d. 3600 Series Consoles.

PHASE III FEP OPERATIONS

1. FEP File System.
2. FEP Commands.
3. Booting Files And Operation.
4. FEP Operational Exercises.

PHASE IV LISP OPERATIONS

1. The Window System.
2. The LISP Window.
3. The ZMACS Window.
4. The FILE SYSTEM MAINTENANCE Window .
5. The DOCUMENT EXAMINER Window.
6. LISP Operational Exercises.

Basic Field Maintenance Training Course Outline

Symbolics, Inc., July 1986

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PHASE V AC AND DC POWER

1. General Description.
2. 3600 AC and DC Power.
3. 3670/75 AC and DC Power.
4. 3640/45 AC and DC Power.
5. Power Supply Adjustments.

PHASE VI DETAILED SYSTEM BLOCK DIAGRAMS

1. LISP System Block Diagram.
2. Detailed Block Diagrams.
3. Mainframe disassembly laboratory.

PHASE VII MONOCHROME MONITORS

1. Black and White Monitors.
2. Black and White Monitor alignment.

PHASE VIII COLOR MONITORS

1. Color Monitors and the Color System.
2. Color Monitor Alignment.
3. Color Console Monitor Alignment.

PHASE IX NETWORKS AND NAMESPACE

1. Local Area Network - Hardware Architecture.
2. Local Area Network - Software Architecture.
3. Local Area Network - Communication.
4. Window Operations Related To Networks and Namespace.

PHASE X RS232C AND MODEMS

1. Remote area networks.
2. RS232C interface to modems and printers.
3. Symbolics' modems.

Basic Field Maintenance Training Course Outline

Symbolics, Inc., July 1986

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PHASE XI DMP-1 PRINTER

1. Standard features and performance specifications.
2. Operator controls and indicators.
3. Theory of operation.
4. Major assemblies.

PHASE XII LGP-2 PRINTER

1. Standard features and performance specifications.
2. Operator controls and indicators.
3. Theory of operation.
4. Major assemblies.

PHASE XIII LGP-1 PRINTER

1. Standard features and performance specifications.
2. Operator controls and indicators.
3. Theory of operation.
4. Major assemblies.

PHASE XIV PRINTER LABORATORY

1. Printer software installation.
2. Location of printer sub-assemblies.
3. Printer hardware installation and preventative maintenance (laboratory).

PHASE XV TAPE DRIVES

1. Fundamentals of magnetic storage media.
2. Features and performance specifications of 3600 SERIES tape drives.
3. Tape drive operator controls and indicators.
4. Tape drive installation and preventative maintenance (laboratory).

Basic Field Maintenance Training Course Outline

Symbolics, Inc., July 1986

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PHASE XVI DISK DRIVES

1. Fundamentals of disk drives.
2. Features and performance specifications of 3600 SERIES disk drives.
3. Disk drive operator controls and indicators.
4. Disk drive installation and preventative maintenance (laboratory).

PHASE XVII FUJITSU DISK DRIVES

1. Major assemblies and theory of operation of M2284 & M2294.
2. Major assemblies and theory of operation of M2351.
3. Fujitsu disk drive disassembly, adjustment, installation, and preventative maintenance.

PHASE XVIII SYSTEM INSTALLATION

1. Site Planning.
2. Hardware Installation.
3. Software Installation.
4. Operational Exercises (Laboratory).
 - A. Creating an IFS tape.
 - B. Writing and reading FEP files to/from tape.
 - C. Writing and reading LMFS files to/from tape.
 - D. Disk formatting.
 - E. Initial file system restoration.
 - F. Setting site.
 - G. Initializing LMFS.
 - H. Loading simple software systems.
 - I. Saving the World.

PHASE XVIII DIAGNOSTICS

1. Loading.
2. Utilization.
3. Practical Application.

Basic Field Maintenance Training Course Outline

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PHASE XIX TROUBLE ISOLATION (LABORATORY)

1. 3670.
2. 3640.

PHASE XX CUSTOMER RELATIONS

1. Principles.
2. Role Playing.

PHASE XXI EXAMINATION

1. Examination (Open Book).
2. Review of Examination.

PHASE XXII COURSE CONCLUSION

1. Course Review.
2. Forms.
3. Procedures.

BASIC FIELD MAINTENANCE TRAINING COURSE

7-22-86

| | | | | | |
|-------|---------------------------|----------------------------|----------------------------|----------------------------------|----------------------------------------------------------|
| 08:00 | INTRODUCTION TO COURSE | | | | MONOCHROME CONSOLE THEORY OF OPERATION |
| 09:00 | | LISP OPERATIONS | LISP OPERATIONS LABORATORY | MAINFRAME POWER DISTRIBUTION | MONOCHROME CONSOLE DISASSEMBLY AND ADJUSTMENT LABORATORY |
| 10:00 | INTRODUCTION TO SYSTEM | | | MAINFRAME POWER LABORATORY | |
| 11:00 | | | | | |
| 12:00 | LUNCH | LUNCH | LUNCH | LUNCH | LUNCH |
| 13:00 | | | | MAINFRAME THEORY OF OPERATION | COLOR SYSTEM OVERVIEW |
| 14:00 | FEP OPERATIONS | | LISP OPERATIONS LABORATORY | | |
| 15:00 | | LISP OPERATIONS LABORATORY | | | COLOR MONITOR ADJUSTMENT LABORATORY |
| 16:00 | FEP OPERATIONS LABORATORY | | | MAINFRAME DISASSEMBLY LABORATORY | |
| 17:00 | | | | | |

WEEK ONE

BASIC FIELD MAINTENANCE TRAINING COURSE 7-22-86

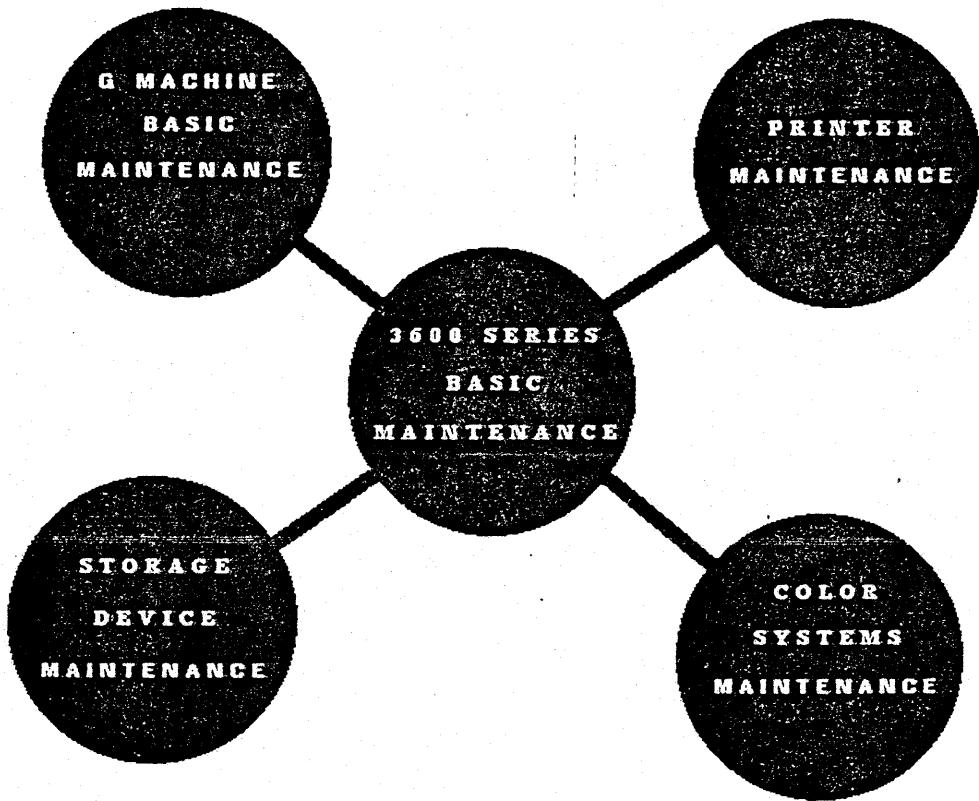
| | | | | | |
|-------|------------------------------|--------------------------------|---------------------------|--------------------------------------|--------------------------------------|
| 08:00 | | | | | |
| 09:00 | NETWORKS AND NAMESPACE | TAPE DRIVES | | | |
| 10:00 | RS232C AND MODEMS | | FUJITSU DISK DRIVES | SYSTEM INSTALLATION | SYSTEM INSTALLATION LABORATORY |
| 11:00 | DMP-1 PRINTER | TAPE DRIVES LABORATORY | | | |
| 12:00 | LUNCH | LUNCH | LUNCH | LUNCH | LUNCH |
| 13:00 | LGP-2 PRINTER | SURVEY OF DISK DRIVES | | | |
| 14:00 | LGP-1 PRINTER | | FUJITSU DISK DRIVES | SYSTEM INSTALLATION LABORATORY | SYSTEM INSTALLATION LABORATORY |
| 15:00 | | | LABORATORY | | |
| 16:00 | PRINTER LABORATORY | DISK DRIVES LABORATORY | | | |
| 17:00 | | | | | |

WEEK TWO

BASIC FIELD MAINTENANCE TRAINING COURSE 7-22-86

| | | | | | |
|-------|---------------------------|-----------------------------------|-----------------------------------|-----------------------|------------------------------------------------------------|
| 08:00 | | | | | |
| 09:00 | DIAGNOSTICS | | | | |
| 10:00 | | TROUBLE SHOOTING LABORATORY | TROUBLE SHOOTING LABORATORY | CUSTOMER RELATIONS | CUSTOMER RELATIONS |
| 11:00 | DIAGNOSTICS LABORATORY | | | | |
| 12:00 | LUNCH | LUNCH | LUNCH | LUNCH | LUNCH |
| 13:00 | | | | | |
| 14:00 | | | | | FINAL EXAMINATION |
| 15:00 | DIAGNOSTICS LABORATORY | TROUBLE SHOOTING LABORATORY | TROUBLE SHOOTING LABORATORY | CUSTOMER RELATIONS | REVIEW OF EXAMINATION AND COURSE CONCLUSION |
| 16:00 | | | | | |
| 17:00 | | | | | |

WEEK THREE



SYMBOLICS CUSTOMER SERVICE TRAINING CURRICULUM

3600 BASIC FIELD MAINTENANCE TRAINING COURSE

- 1. This course is for new hires or for field personnel who have not been previously been trained by the Customer Service Training Department.**
- 2. The course objective is to train field maintenance personnel to perform installation, performance testing, trouble analysis, and repair of all 3600 Series systems.**
- 3. The course covers the following items:**
 - A. Operation of the 3600 Series LISP machines.**
 - B. Hardware and software installation.**
 - C. AC Power distribution and DC power generation and distribution.**
 - D. Detailed system block diagrams.**
 - E. Trouble isolation procedures and practice.**
 - F. Peripheral equipment.**
 - G. Paper work.**
 - H. Customer relations.**
- 4. Course length - 3 Weeks (15 instructional days).**

G MACHINE FIELD MAINTENANCE TRAINING COURSE

- 1. This course is for experienced Symbolics field personnel who have attended the 3600 Basic Maintenance Training Course.**
- 2. The course objective is to train field maintenance personnel to perform installation, performance testing, trouble analysis, and repair of all G Machines.**
- 3. The course covers the following items:**
 - A. Operation of the G Machines.**
 - B. Hardware and software installation.**
 - C. AC Power distribution and DC power generation and distribution.**
 - D. Detailed system block diagrams.**
 - E. Trouble isolation procedures and practice.**
- 4. Course length - 1 Week (5 instructional days).**

PRINTER FIELD MAINTENANCE TRAINING COURSE

- 1. This course is for field personnel who have previously attended the 3600 Basic Maintenance Training Course.**
- 2. The course objective is to train field maintenance personnel to perform installation, performance testing, trouble analysis, and repair of LGP-1, LGP-2, and DMP-1 printers.**
- 3. The course covers the following items on each of the three printers:**
 - A. Operation of the machines.**
 - B. Hardware installation and software requirements.**
 - C. AC Power distribution and DC power generation and distribution.**
 - D. Detailed system block diagrams.**
 - E. Adjustments and preventive maintenance.**
 - F. Module and component replacement.**
 - G. Trouble isolation procedures and practice.**
- 4. Course length - 1 Week (5 instructional days).**

STORAGE DEVICE FIELD MAINTENANCE TRAINING COURSE

- 1. This course is for field personnel who have previously attended the 3600 Basic Maintenance Training Course.**
- 2. The course objective is to train field maintenance personnel to perform installation, performance testing, trouble analysis, and repair to the field replaceable unit level of the Century Data T-306 disk drive.**
- 3. The course covers the following items on the T-306 disk drive.**
 - A. Drive specifications.**
 - B. Operation of the disk drive.**
 - C. Hardware installation and software requirements.**
 - D. FRU level maintenance.**
 - E. Trouble isolation.**
- 4. Course length - 1 Week (5 instructional days).**

COLOR SYSTEM MAINTENANCE COURSE

- 1. This course is for experienced Symbolics field personnel who have attended the 3600 Basic Field Maintenance Course.**
- 2. The course objective is to train field maintenance personnel to perform operation, installation, performance testing, trouble analysis, and repair of 3600 series color system options.**
- 3. The course covers the following items:**
 - A. Basic video theory.**
 - B. Theory of operation of Symbolics' color monitors.**
 - C. Theory of operation of the Color Console unit.**
 - D. Theory of operation of the Standard Color System.**
 - E. Theory of operation of the Broadcast Resolution Color System.**
 - F. Theory of operation of the Cad-Buffer Color System.**
 - G. Color System installation.**
 - H. Color System adjustment and alignment.**
 - I. Color System diagnostics.**
 - J. Operation of S PAINT, S GEOMETRY, S DYNAMICS, and S RENDER.**
 - K. Trouble isolation in the Color System.**
- 4. Course length - 2 weeks (10 instructional days).**

3600 SHARED - MAINTENANCE TRAINING COURSE

- 1. This course is for customer maintenance personnel.**
- 2. The course objective is to train customer maintenance personnel in trouble analysis and repair of all 3600 Series Systems.**
- 3. The course covers the following items:**
 - A. Operation of the 3600 Series LISPs machines.**
 - B. AC power distribution and DC power generation and distribution.**
 - C. Detailed system block diagrams.**
 - D. Trouble Isolation procedures and practices.**
 - E. Survey of peripheral equipment.**
- 4. Course Length - 2 Weeks (10 instructional days).**

G MACHINE SHARED - MAINTENANCE TRAINING COURSE

- 1. This course is for customer maintenance personnel.**
- 2. The course objective is to train customer maintenance personnel in trouble analysis and repair of all G-Machine Systems.**
- 3. The course covers the following items:**
 - A. Operation of the G-Machines.**
 - B. AC power distribution and DC power generation and distribution.**
 - C. Detailed system block diagrams.**
 - D. Trouble isolation procedures and practices.**
 - E. Survey of peripheral equipment.**
- 4. Course Length - 2 Weeks (10 instructional days).**

| STUDENT EVALUATION | O | U | S | N | S | A | T | I | S | U | NAME _____ |
|--------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|------------------|
| | U | T | E | S | X | C | F | A | S | A | |
| | | | | | | | | | | | DATE _____ |
| | | | | | | | | | | | CLASS _____ |
| | | | | | | | | | | | INSTRUCTOR _____ |
| | G | P | T | | | | | | | | REMARKS |
| | I | O | O | | | | | | | | |
| | N | O | O | | | | | | | | |
| | G | T | D | R | | | | | | | |
| 1. Personal Relations | | | | | | | | | | | |
| 2. Ability to work with others | | | | | | | | | | | |
| 3. Technical knowledge | | | | | | | | | | | |
| 4. Knowledge and use of hand tools | | | | | | | | | | | |
| 5. Personal appearance and grooming | | | | | | | | | | | |
| 6. Ability to communicate with others orally | | | | | | | | | | | |
| 7. Ability to communicate in writing | | | | | | | | | | | |
| 8. Attitude | | | | | | | | | | | |
| 9. Self-motivation | | | | | | | | | | | |
| 10. Ability to troubleshoot logically and methodically | | | | | | | | | | | |
| 11. Amount of time taken to isolate malfunctions | | | | | | | | | | | |
| 12. Result of written examination | | | | | | | | | | | |
| 13. Asks for and accepts assistance when needed | | | | | | | | | | | |
| 14. Pays attention in class | | | | | | | | | | | |
| 15. Observance of safety precautions | | | | | | | | | | | |

STUDENT EVALUATION

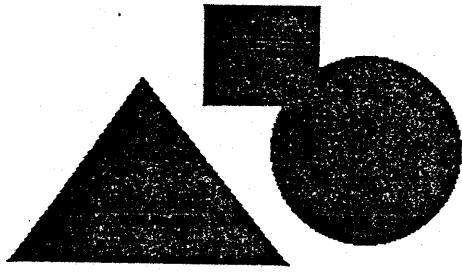
3600 SERIES
BASIC FIELD MAINTENANCE

STUDENT GUIDE

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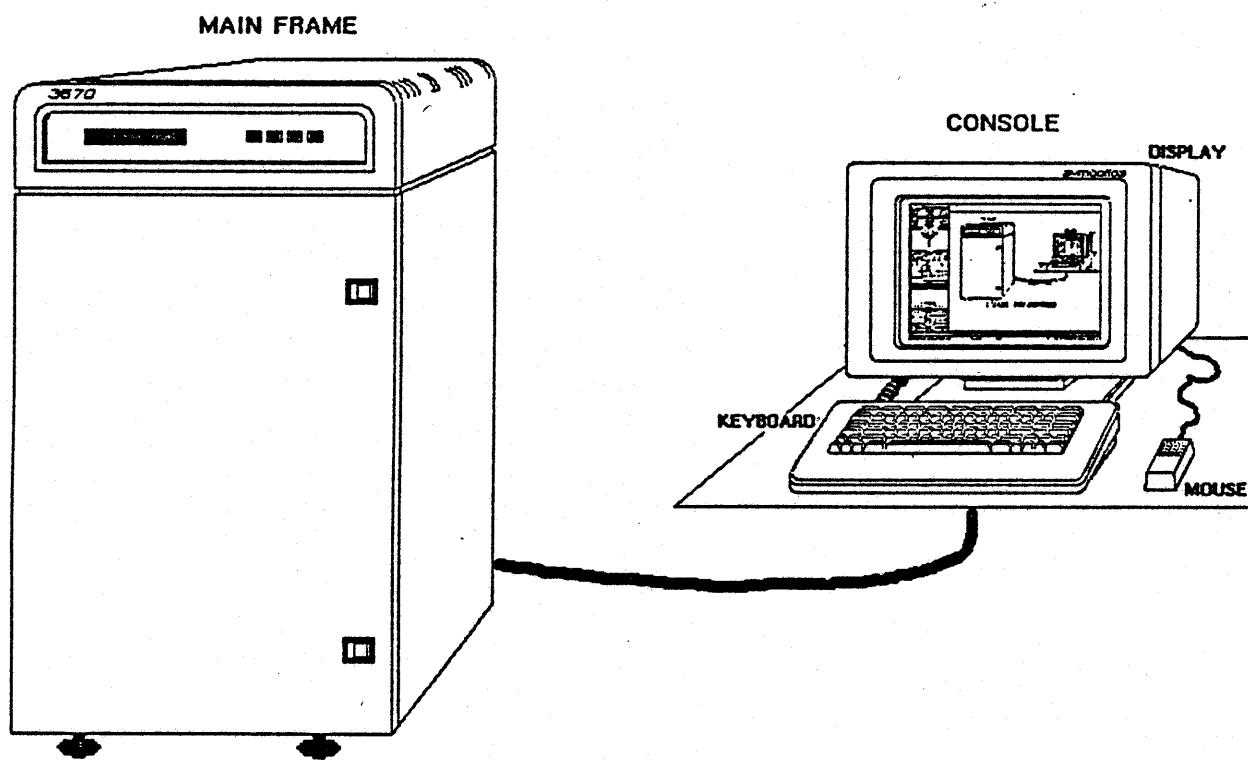
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| LISP-LEVEL OPERATION | 3 |
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| AC & DC POWER DISTRIBUTION | |
| FUNCTIONAL BLOCK DIAGRAMS | |
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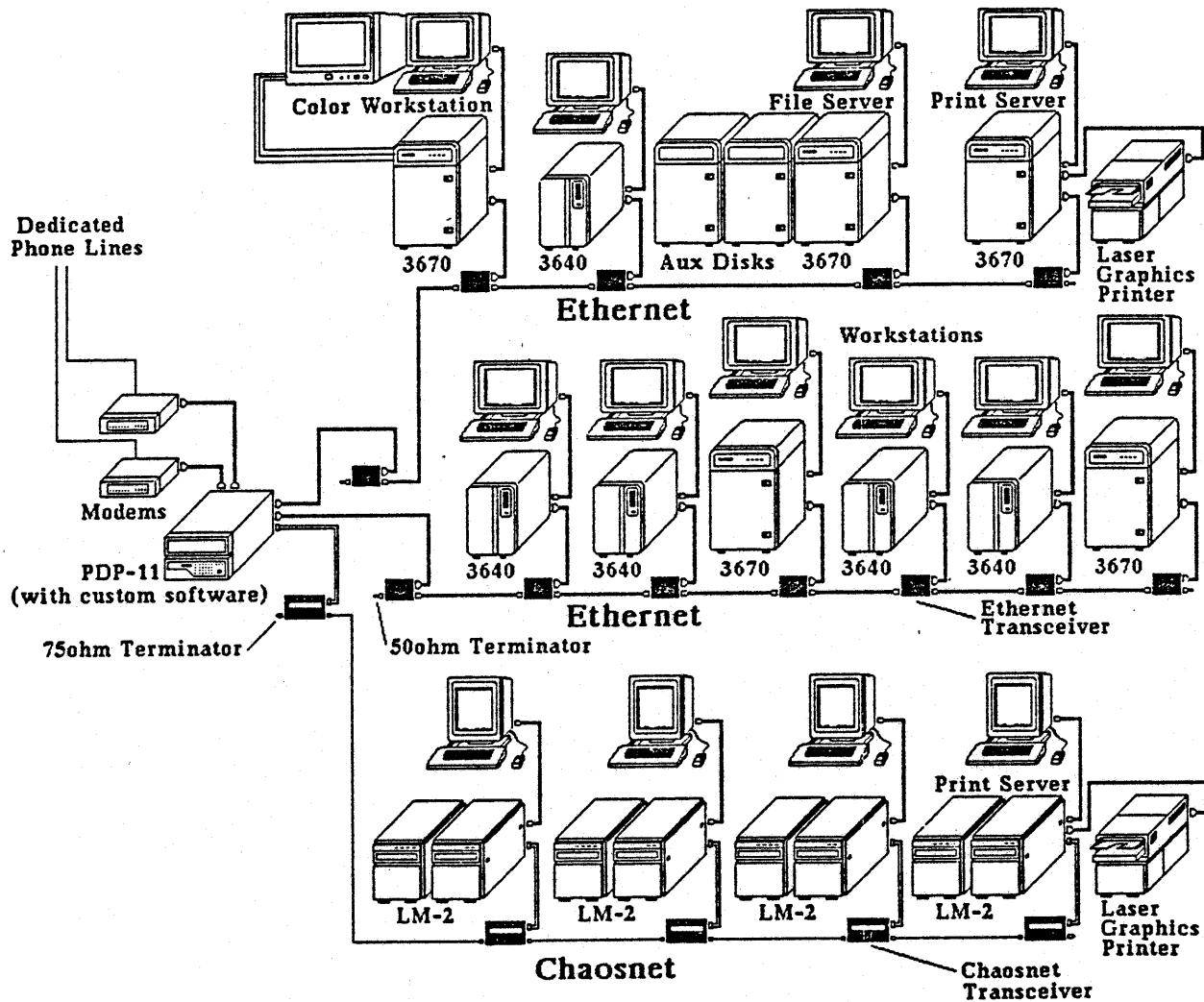


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**3600 SERIES
SYMBOLIC PROCESSORS**



3600 SERIES NETWORKS

MAIN FRAME

FRONT END PROCESSOR (FEP)

LISP PROCESSOR

1/2 Mword MEMORY WITH ECC

STANDARD SERIAL AND PARALLEL I/O

ETHERNET LOCAL AREA NETWORK INTERFACE

DISK DRIVE

LISP WORLD SOFTWARE PACKAGE

CONSOLE

DISPLAY

KEYBOARD

MOUSE

3600 SERIES STANDARD FEATURES

ADDITIONAL MEMORY

ENHANCED PERFORMANCE OPTION

FLOATING POINT ACCELERATOR

INTERFACE TO OTHER SYSTEMS

OPTIONAL COMPUTER LANGUAGE INTERPRETERS

ADDITIONAL PROGRAM SYSTEMS

COLOR SYSTEM OPTIONS

ADDITIONAL DISK DRIVES

TAPE DRIVES

MODEMS

PRINTERS

AUXILLIARY MATCHING CABINET

3600 SERIES OPTIONAL FEATURES

CONFIGURATION CHART

MAIN FRAME

| | LM-2 | 3600 | 3640/45 | 3670/75 |
|------------|---------------------------------------|------|---------|---------|
| <hr/> | | | | |
| PERIPHERAL | VMI | X | | |
| | PHILIPS-LEMO | | X | |
| CONSOLE | MONITERM-LEMO | X | | |
| DISPLAY | PHILIPS-OLD PEV | | (1) | X |
| | MONITERM-OLD PEV | | (1) | X |
| | SYMBOLICS-NEW PEV | | (1) | X |
| CONSOLE | HALL EFFECT | X | X | X |
| KEYBOARD | CAPACITIVE | X | X | X |
| CONSOLE | D CONNECTOR | X | X | |
| MOUSE | PEV MODULAR | | | |
| | CONNECTOR | | (1) | X |
| | HITACHI | X | X | X |
| COLOR | AMTRON | | X | X |
| MONITORS | MITSUBISHI | | X | X |
| | SYMBOLICS | | X | X |
| | CAD-AMTRON | | X | X |
| | CAD-TEKTRONIX | | X | X |
| REMOVABLE | | | | |
| MEDIA | CDS T300 300MB | X | | |
| DISK | CDS T306 315MB | | X | X |
| DRIVES | CDC PA8A2 368MB | | | |
| | CDC PA5N2 515MB | | (2) | X |
| WINCHESTER | FUJITSU M2284 169MB | | | X |
| DISK | FUJITSU M2294 335MB | | X | X |
| DRIVES | FUJITSU M2351 474MB | | X | X |
| | NEC D2257 167MB | | X | (2) |
| | MAXTOR XT-1140 143MB | | | (3) |
| | MAXTOR XT-2190 190MB | | | (3) |
| | PRIAM P807 340MB | | X | (2) |
| CARTRIDGE | SYMBOLICS 20MB | | X | |
| TAPE | MODEL #TD-20 | | | |
| DRIVES | ARCHIVE 45MB | | X | |
| | MODEL #5945 | | | X |
| | ARCHIVE 45MB | | | |
| | MODEL #9045 | | | |
| REEL | | | | |
| -TO- | KENNEDY 9000 | X | | |
| REEL | CYPHER TD-80 | | X | X |
| TAPE | | | X | X |
| DRIVES | | | | |
| PRINTERS | LGP-1 (CANON 10 and CANON 10II) | X | X | X |
| | LGP-2 (APPLE) | X | X | X |
| MODEMS | RACAL VEDIC | | (4) | |
| | CDS 224 | X | X | X |

NOTES-

X DENOTES MAIN FRAMES THAT MAY BE EQUIPPED WITH DESIGNATED PERIPHERAL

(1) AVAILABLE TO UPGRADED 3600 MACHINES ONLY

(2) AVAILABLE TO 3640 MACHINES EQUIPPED WITH OPTIONAL SMD INTERFACE ONLY

(3) AVAILABLE TO 3640 MACHINES EQUIPPED WITH STANDARD ST506 INTERFACE ONLY

(4) UNIT IS BUILT-IN TO 3600 MACHINE

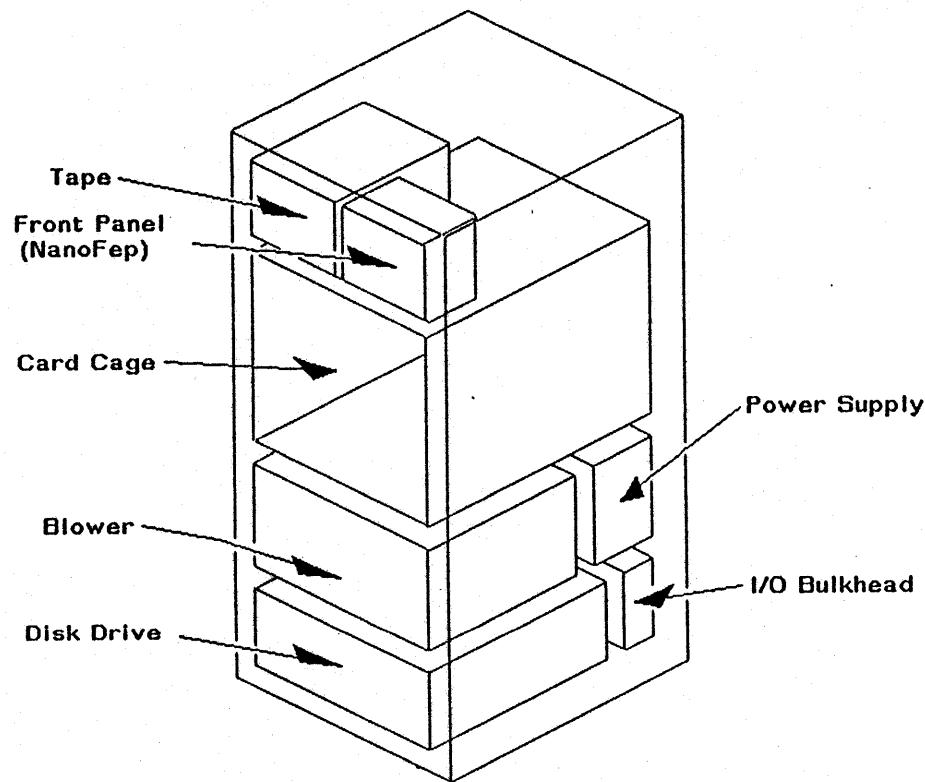
3600 SERIES

SYSTEM SUPPORT LEVELS

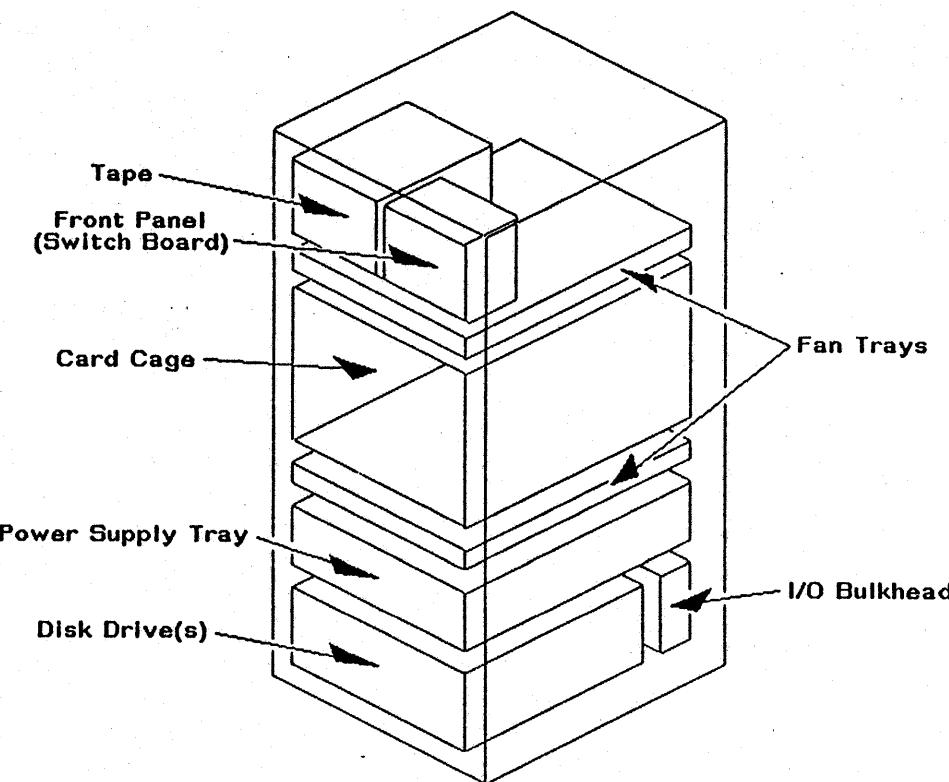
| EQUIPMENT | INSTALLATION | ADJUSTMENT | FRU LEVEL | |
|--------------------|--------------|------------|---------------------------|--------------------------------|
| | | | WHOLE UNIT REPLACEMENT | SUB-ASSY REPLACEMENT (1) |
| MAIN FRAMES | | | | |
| 3600 | X | X | | X |
| 3640 | X | X | | X |
| 3645 | X | X | | X |
| 3670 | X | X | | X |
| 3675 | X | X | | X |
| CONSOLES | | | | |
| B/W | X | X | | X |
| COLOR | X | X | X | |
| PRINTERS | | | | |
| DMP-1 | X | X | X | |
| LGP-1 | X | X | | X |
| LGP-2 | X | X | | X |
| DISK DRIVES | | | | |
| CDC PA8A2 368MB | X | | X | |
| CDC PA5N2 515MB | X | | X | |
| CDS T306 | X | X | | X |
| FUJITSU M2284 | X | X | | X |
| FUJITSU M2294 | X | X | | X |
| FUJITSU M2351 | X | X | | X |
| MAXTOR XT-1140 | X | | X | |
| MAXTOR XT-2190 | X | | X | |
| NEC D2257 | X | | X | |
| PRIAM 807 | X | | X | |
| TAPE DRIVES | | | | |
| ARCHIVE 5945 | X | | X | |
| ARCHIVE 9045 | X | | X | |
| SYMBOLICS TD20 | X | | X | |
| SYMBOLICS TD80 | X | (2) | X | (2) |
| MODEMS | | | | |
| CDS 224 | X | | X | |
| RACAL-VADIC VA3450 | X | | X | |
| OTHER | | | | |
| INTERLAN EN-11 | (3) | | (3) | |

NOTES:

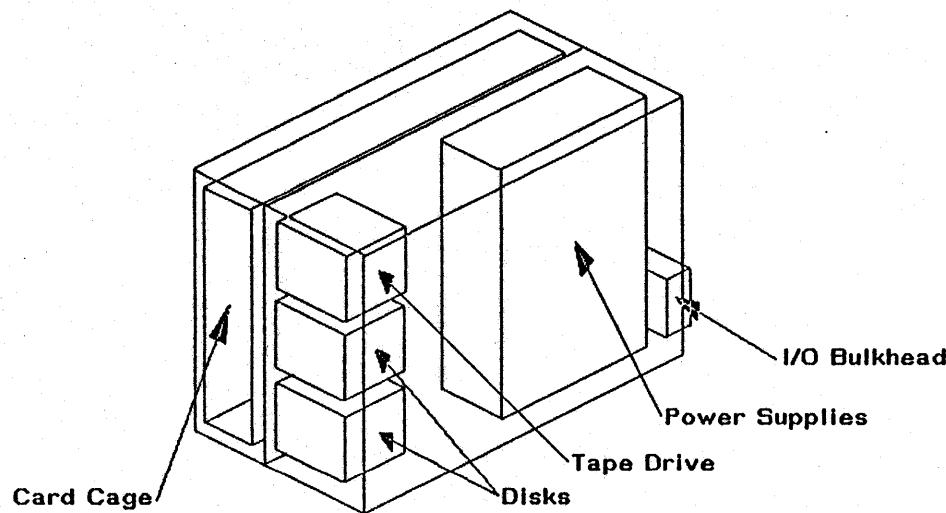
- (1) - WHOLE UNIT REPLACEMENT OF EQUIPMENT DESIGNATED FRU-(SUB-ASSY)
REQUIRES MUR (MAJOR UNIT REPLACEMENT) FACTORY AUTHORIZATION
- (2) - PROPOSED
- (3) - INSTALLATION AND SERVICE PERFORMED IN CONJUNCTION WITH DEC



3600 MAJOR ASSEMBLIES

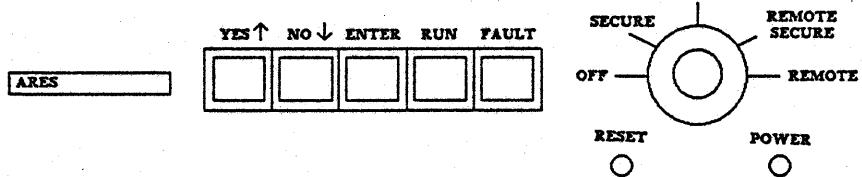


3670 MAJOR ASSEMBLIES



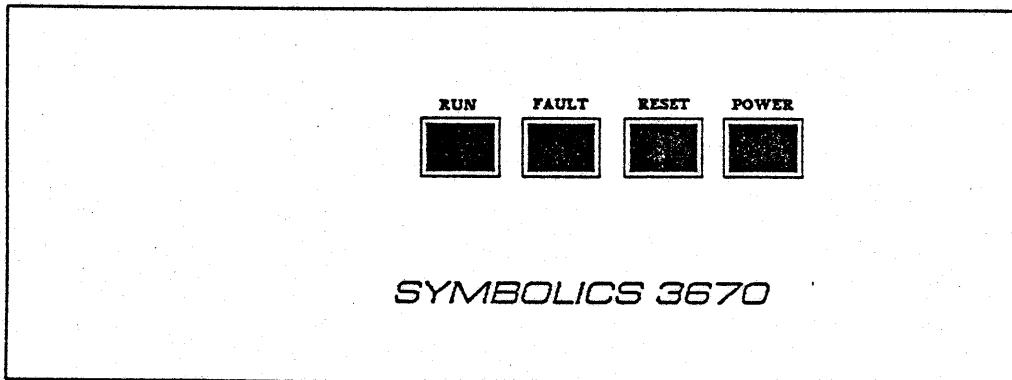
3640 MAJOR ASSEMBLIES

symbolics inc.

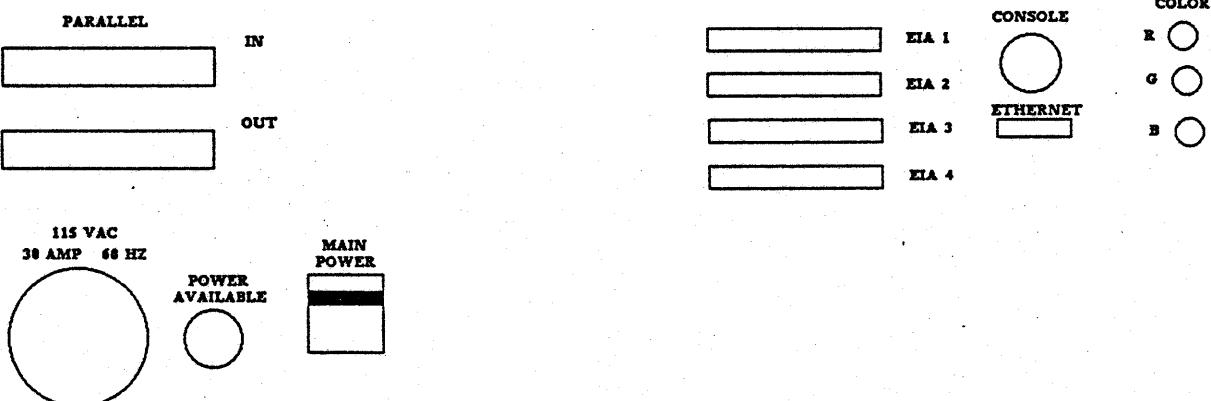


SYMBOLICS 3600 FRONT PANEL

symbolics inc.

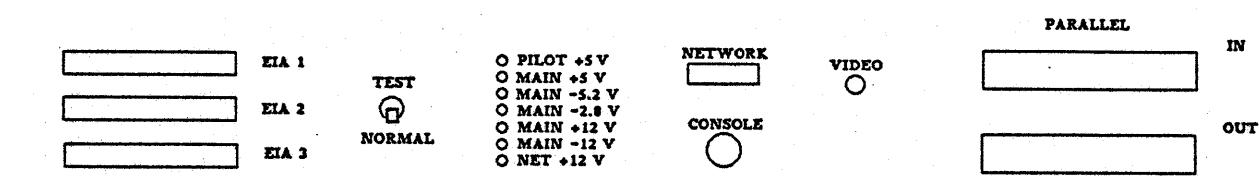


SYMBOLICS 3670 AND 3640 FRONT PANEL



3600 I/O BULKHEAD

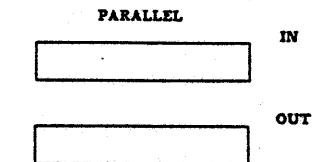
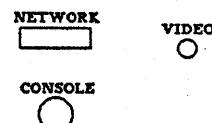
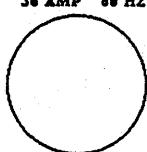
symbolics inc.



POWER CONTROL
OUTPUT



115 VAC
30 AMP 60 HZ

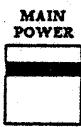
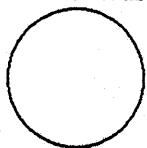


AC ON



3670 I/O BULKHEAD

115 VAC
20 AMP 60 HZ

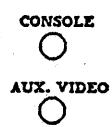
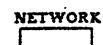
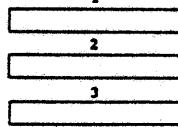


POWER BUS



- PILOT +5 V
- MAIN +5 V
- MAIN -5.2 V
- MAIN -2.8 V
- MAIN +12 V
- MAIN -12 V
- NET +12 V

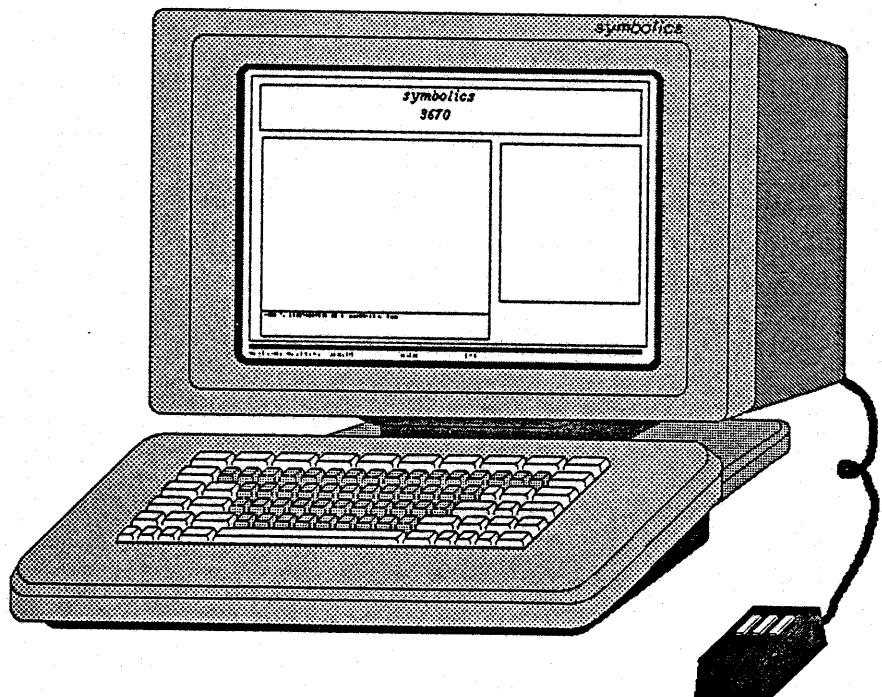
SERIAL
PORTS



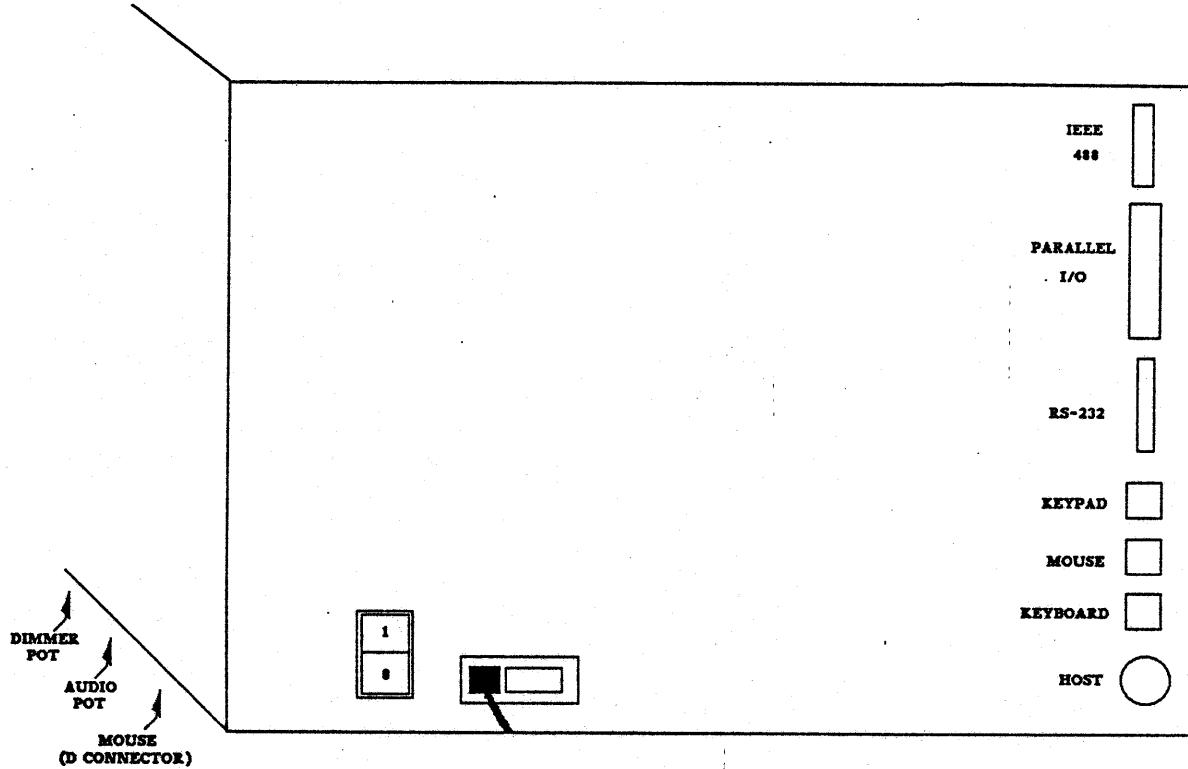
NORMAL

3640 I/O BULKHEAD

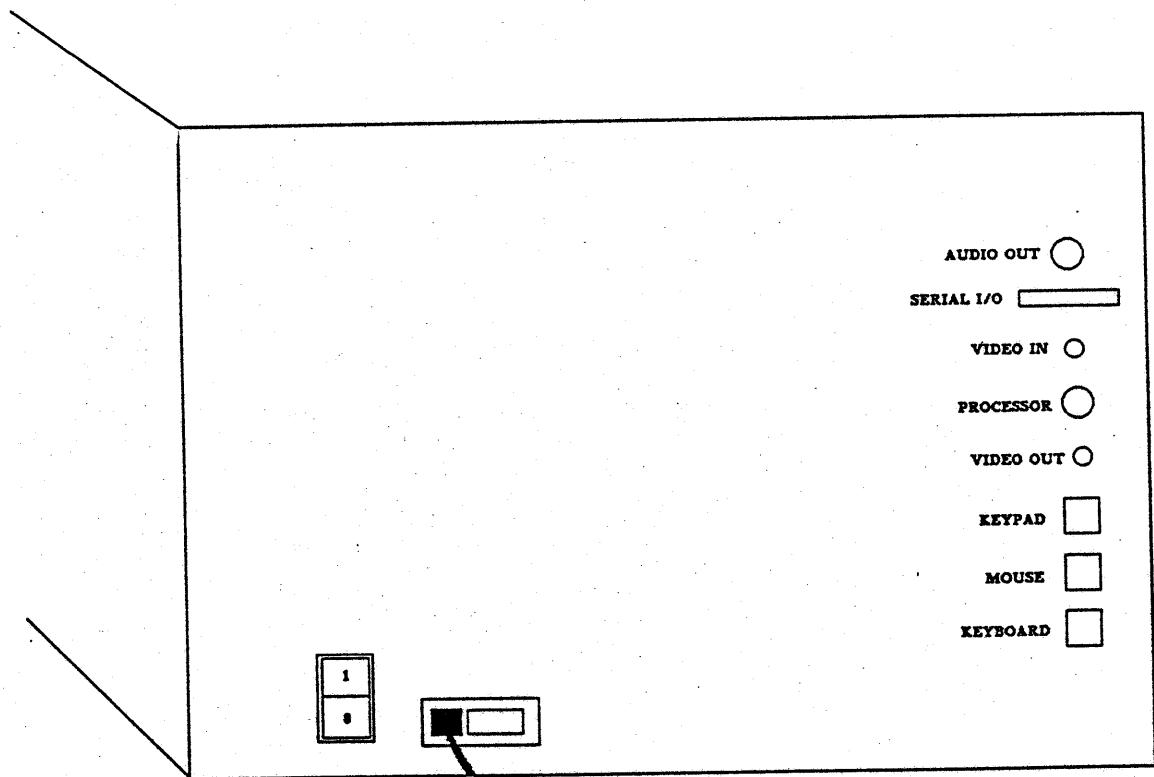
symbolics inc.



3600 SERIES CONSOLE

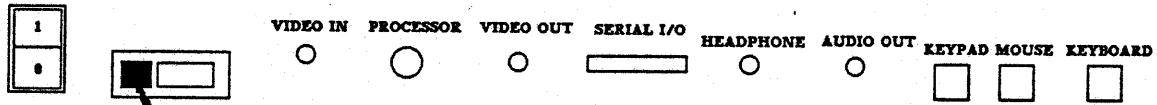


LEMO REAR PANEL



PEV REAR PANEL

symbolics inc.



SYMBOLICS REAR PANEL

symbolics inc.

FEP

LISP

THE TWO LEVELS OF SYSTEM COMMAND

```
FEP0:>*.*.  
869 free, 109291/110160 used (99%)  
109,273 blocks in the files listed  
BAD-BLOCKS.FEP.1 83 0(8) @ 07/26/85 11:15:39 [File of bad blocks] Doug Evans  
boot.boot.8 1 206(8) 09/30/85 14:48:49 [] paul  
DISK-LABEL.FEP.1 24 0(8) @ 07/26/85 11:15:38 [The disk label] Doug Evans  
FREE-PAGES.FEP.1 12 0(8) @ 07/26/85 11:15:38 [Free pages map] Doug Evans  
large.boot.9 1 277(8) 10/10/85 17:19:36 [] paul  
imrs.file.1 33000 0(8) @ 10/01/85 14:43:13 [] paul  
Moniterm-io4.sync.4 2 1725(8) 04/18/84 15:25:54 [moniterm sync] Zippy  
page.page.1 30000 32653440(8) 09/04/85 16:44:47 [Rel 6.0 Exp MUSIC 10.0] Zippy  
Philips-io4.sync.1 2 1797(8) 06/21/84 18:47:29 [philips sync] Zippy  
rel-6-1-sch-support.load.3 45000 38899584(8) 10/10/85 16:30:08 [] Zippy  
Reserve.FEP.1 1000 0(8) @ 07/26/85 11:15:40 [Reserved for future use] Doug Evans  
ROOT-DIRECTORY.DIR.1 1 DIRECTORY @ 07/26/85 11:15:38 [His highness] Doug Evans  
sequence-number.fep.1 1 0(8) @ 09/04/85 16:51:58 [] Zippy  
tmc5-io4-st506-mic.mic.336 110 125644(8) 09/09/85 11:03:32 [TMC5-IO4-ST506-MIC 336] paul  
trash.file.1 0 0(8) 10/10/85 16:44:12 [] paul  
V24-2MW.fload.1 2 1684(8) 04/08/85 14:47:31 [loads 1 or 2 mw bd] Zippy  
V24-debug.fload.1 30 33710(8) 07/20/84 14:40:26 [debug program] Zippy  
V24-unibus.fload.1 4 3604(8) 07/20/84 14:38:23 [unibus program] Zippy
```

FEP FILE SYSTEM DIRECTORY

```
Load fep >v24-2mu.fload  
Reset Video  
Clear Machine  
Load Sync-Program >Moniterm-I04.sync  
Load Microcode FEP0:>tmc5-io4-st506-nic.nic.336  
Load World FEP0:>rel-6-1-sch-support.load  
Set Chaos-Address 21070  
Start
```

```
ZMACS (Fundamental) boot.boot > FEP0: (8)  
Reading FEP0:>boot.boot.8 ... 206 characters
```

BOOT.BOOT

```
load fep >v24-2mw.flop
Reset Video
Clear Machine
Load Sync-Program >Monitor-I04.sync
Load Microcode FEP0:>tmc5-i04-st506-mic.mic.336
Load World FEP0:>rel-6-1-sch-support.load
mount 1
add paging-file fep1:>page.page
add paging-file fep1:>aux.page
Set Chaos-Address 21070
Start
```

```
ZMACS (Fundamental) large.boot > FEP0: (9)
Reading FEP0:>large.boot.9 ... 277 characters
```

LARGE.BOOT

```
FEP> clear machine <RETURN>
FEP> load microcode (default: FEP0:>Microcode1.nic)>TMCS-I04-MIC.MIC.319<RETURN>
FEP> load world (default: FEP0:>World1.load)>Release-6-0.load<RETURN>
FEP> set chaos 21070<RETURN> (chaos address as required - in octal)
FEP> start<RETURN>
```

MANUAL COLD BOOTING COMMANDS

FEPO:>*.*.*
823 free, 146857/146880 used (99%)
146,034 blocks in the files listed

| | | | |
|-------------------------------|-------------------|---------------------------------------------------------------------|------|
| aux.page.1 | 30000 34560000(8) | 01/21/86 14:57:26 [] | paul |
| BAD-BLOCKS.FEP.1 | 112 0(8) | 0 12/19/85 00:03:18 [File of bad blocks] System | |
| boot.boot.9 | 1 137(8) | 02/04/86 15:28:30 [] | paul |
| DISK-LABEL.FEP.1 | 24 0(8) | 0 12/19/85 00:03:18 [Disk label] System | |
| FREE-PAGES.FEP.1 | 16 0(8) | 0 12/19/85 00:03:18 [Free pages map] System | |
| fspt.fspt.1 | 1 18(8) | 02/04/86 10:49:17 [] | paul |
| fspt.fspt.2 | 1 37(8) | 03/03/86 09:12:52 [] | JOHN |
| hello.boot.1 | 1 231(8) | 0 12/19/85 07:45:55 [Standard Hello command file] System | |
| hello.boot.2 | 1 235(8) | 01/21/86 14:47:44 [] | paul |
| IFU-I04-ST506-XSQ-MIC.MIC.336 | 200 136163(8) | 09/17/85 16:16:34 [IFU-I04-ST506-XSQ-MIC 336 (Rel-6-1)] System | |
| large.boot.3 | 1 200(8) | 01/18/86 16:17:29 [] | paul |
| lnfs.file.1 | 15000 0(8) | 0 01/18/86 16:06:46 [] | paul |
| PAGE.PAGE.1 | 60000 0(8) | 12/19/85 00:03:19 [Main paging area] System | |
| rel-6-1-sch-training.load.1 | 40000 33276672(8) | 01/18/86 15:51:42 [Rel 6.1 Exp PED 4.0] paul | |
| Reserve.FEP.1 | 500 0(8) | 0 12/19/85 00:03:22 [Reserved for future use] System | |
| ROOT-DIRECTORY.DIR.1 | 2 DIRECTORY | 0 12/19/85 00:03:18 [The Root] System | |
| SEQUENCE-NUMBER.FEP.1 | 1 0(8) | 0 12/19/85 07:41:46 [FEP FS sequence nos] System | |
| V127-DEBUG.FLOD.1 | 48 54613(8) | 0 10/05/85 16:07:47 [Lisp debugger for Fep V127] System | |
| V127-DISK.FLOD.4 | 27 30698(8) | 0 11/14/85 11:39:27 [Disk utilities for Fep V127] System | |
| V127-INFO.FLOD.2 | 12 13074(8) | 0 10/07/85 13:33:25 [Information commands for Fep V127] System | |
| V127-LISP.FLOD.2 | 42 47434(8) | 0 10/07/85 13:32:12 [Lisp interface for Fep V127] System | |
| V127-LOADERS.FLOD.3 | 34 38184(8) | 0 11/05/85 12:11:12 [World / microcode loaders for Fep V127] System | |
| V127-TESTS.FLOD.2 | 10 10843(8) | 0 10/07/85 13:34:02 [Hardware diagnostics for Fep V127] System | |

ZMACS (Dired) *Dired-2* (R0) FEPO:>*.*.* (Q to exit)

:No edit buffer active for current window. Press M-x to edit. P:Menu, E:EditWindow menu.
03/03/86 11:48:06 JOHN

USER: Ty1

symbolics inc.

```
Scan FEP0:>V127-Loaders.flod
Scan FEP0:>V127-Lisp.flod
Scan FEP0:>V127-Info.flod
Scan FEP0:>V127-Debug.flod
Initialize Hardware Tables
```

ZMACS (Fundamental) hello.boot > FEP0: (2) *

03/03/86 11:50:42 JOHN USER: 1y1

symbolics inc.

F E P C O M M A N D S

BOOT - executes commands in the boot file specified. unspecified = default.

SHOW

CONFIGURATION - displays hardware configuration.
DIRECTORY - displays the contents of the FEP file system.
DISK LABEL - displays the label of the disk unit specified.
FILE - displays the contents of specified boot file.
STATUS - displays the internal status of machine. used following failure.
VERSION - displays the version number of loaded FEP software.

ADD

DISK TYPE - defines a disk type to FEP.
PAGING FILE - adds a paging file in addition to PAGE.PAGE

CLEAR

DISK TYPE - clears all disk types declared with add disk command
MACHINE - clears the internal states of machine registers & memories
SCREEN - clears the console's screen
PAGING FILES - clears all paging file designations.

CONTINUE - continues machine processes from where they left off.

DISK

FORMAT - formats the disk - overwriting and partitioning disk
RESTORE - transfers data on tape to disk

DISMOUNT - logically disconnects disk drive from system.

HALT - halts the FEP (to restart, push the reset button on the main frame)

LOAD

MICROCODE - loads microcode into LISP machine from tape
FEP - loads program supplied from tape into FEP
SYNC PROGRAM - loads sync program into LISP machine I/O for monitor sync
WORLD - loads LISP world

MOUNT - reads the disk label of the specified disk drive

RESET

CART - resets cartridge tape drive
CLOCK - resets the processor clock
DISK - selects, fault clears, recalibrates specified disk drive.
FEP - master clears FEP, restarts FEP program
L-BUS - resets the L-BUS
MOST - resets clock, L-BUS, sequencer, video, and disks
SEQUENCER - resets sequencer in LISP processor
VIDEO - clears the console screen's sync program

RETURN-KEYBOARD-TO-LISP - returns control of keyboard to LISP processor

SET

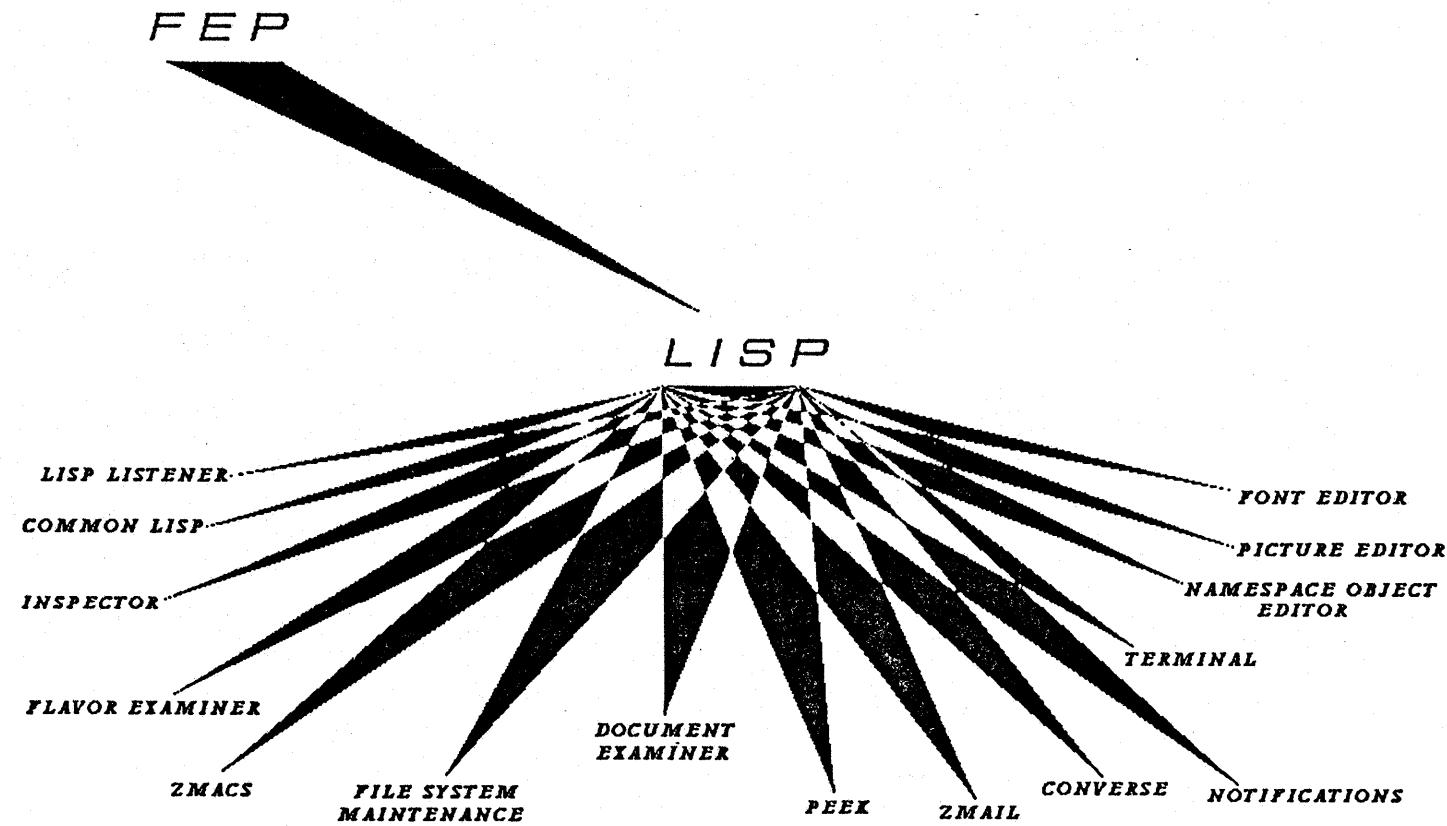
CHAOS ADDRESS - sets the machine's network address
DEFAULT-DISK-UNIT - sets the disk unit to respond to subsequent commands
DISK-TYPE - used to define disk ID information to FEP after mounting
MICROCODE-NAME-AND-VERSION - sets microcode after world is loaded

START - runs loaded world

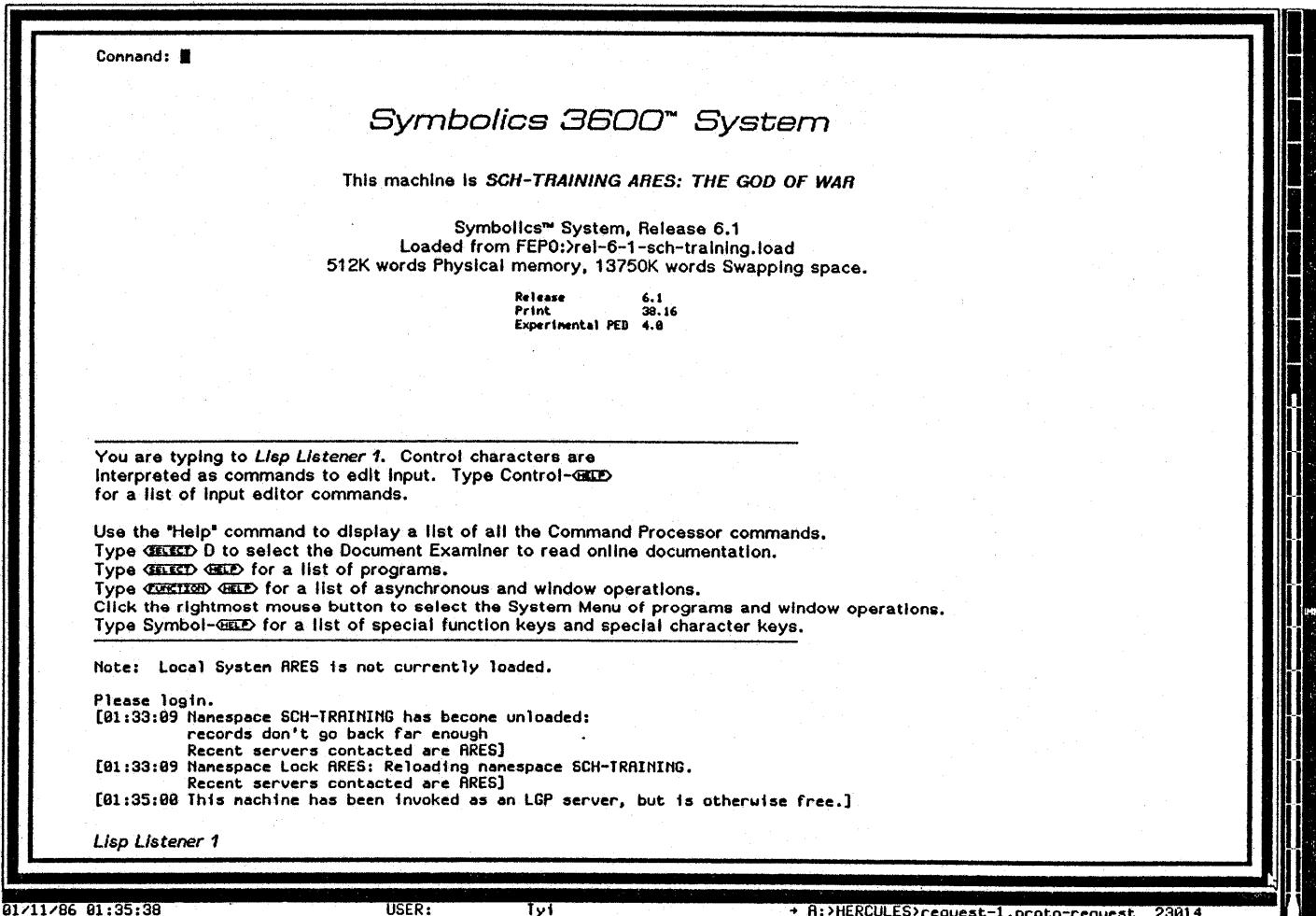
TEST

MAIN MEMORY - tests address and data paths of each memory board
A-MEMORY - tests A-memory on the data path board in the LISP processor
DISK - not used at this time - program flaws will destroy disk software

symbolics inc.



THE LISP WORLD



LISP WINDOW

Type Select followed by one of these letters to select the corresponding program:

A Common Lisp
C Converse
D Document Examiner
E Editor
F File system maintenance
G Picture Editor
I Inspector
L Lisp
M Zmail
N Notifications
O Namespace Object Editor
P Peek
T Terminal
X Flavor Examiner

Hold down the Control key to create a new one.
Type Rubout after Select to do nothing (if you typed Select by accident).

Type a space to refresh the screen:

The System Menu

| Windows | This window | Programs |
|----------------------|-------------|-------------------|
| Create | Attributes | Lisp |
| Select | Refresh | Edit |
| Split Screen | Bury | Inspect |
| Layouts | Kill | Mail |
| Edit Screen x | Reset | Font Edit |
| Set Mouse Screen | Arrest | Trace |
| | Un-Arrest | Emergency Break |
| | | Namespace |
| | | Flavor Examiner |
| | | Document Examiner |
| | | Hardcopy |
| | | File System |
| | | Picture Editor |

Edit a screen. Left edits screen the mouse is on, right button gives menu of frames.
01/13/86 15:00:46 PAUL USER: Tty1

SELECT-HELP AND THE SYSTEM MENU

Special function keys:

| | | | |
|--------------|-------------------------------|-------------|---------------------------------|
| Abort | Throw to command level | Suspend | Get read-eval-print loop |
| c-Abort | To command level immediately | c-Suspend | Suspend immediately |
| n-Abort | Throw out of all levels | n-Suspend | Get to the debugger |
| c-n-Abort | Out of all levels immediately | c-n-Suspend | Debugger immediately |
| Function | Asynchronous commands | Resume | Continues from break/error |
| Select | Select a program | Return | Carriage return |
| Refresh | Refresh the screen | Line | Next line and indent (editor) |
| Clear-Input | Erase typein | End | Terminate input |
| Network | Telnet commands | Help | Print documentation |
| Escape | Miscellaneous editor commands | Symbol-Help | Pop up this display |
| Complete | Completion of partial input | Scroll | Scrolling (not yet implemented) |
| c-n-Function | Keyboard macros (editor) | | |

h-c-Function stops the machine and connects you to the FEP.
 Local-G rings the bell (press the Local and G keys simultaneously).
 Local-D makes the screen dimmer, Local-B makes it brighter.
 Local-n Local-C (where n is a digit from 1 to 4) changes the contrast.
 Local-Q makes the audio quieter, Local-L makes it louder.
 Square, Circle, Triangle, and Hyper are reserved for users.

Special-character keys:

| | | | |
|-----------------------------|----------------|-------------------------------|----------------|
| • Center-Dot | Symbol-' | ↓ Down-Arrow | Symbol-h |
| α Alpha | Symbol-shift-A | ↑ Up-Arrow | Symbol-shift-B |
| ^ And-sign | Symbol-q | ↶ Not-sign | Symbol-- |
| ε Epsilon | Symbol-shift-E | ↷ Pi | Symbol-shift-P |
| λ Lambda | Symbol-shift-L | ♂ Gamma | Symbol-shift-G |
| δ Delta | Symbol-shift-D | ↑ Up-Arrow | Symbol-g |
| ± Plus-Minus | Symbol-: | ● Circle-Plus | Symbol-+ |
| ∞ Infinity | Symbol-i | ◎ Partial-Delta | Symbol-p |
| ◀ Left-Horseshoe | Symbol-t | ○ Right-Horseshoe | Symbol-y |
| ▶ Up-Horseshoe | Symbol-e | □ Down-Horseshoe | Symbol-r |
| forall Universal-Quantifier | Symbol-u | exists Existential-Quantifier | Symbol-o |
| • Circle-X | Symbol-* | ‡ Double-Arrow | Symbol-l |
| ← Left-Arrow | Symbol-j | → Right-Arrow | Symbol-k |
| * Not-Equals | Symbol-= | ◆ Lozenge | Symbol-Escape |
| ≤ Less-Or-Equal | Symbol-, | ≥ Greater-Or-Equal | Symbol-. |
| ≡ Equivalence | Symbol-` | ∨ Or-sign | Symbol-w |
| ∫ Integral | Symbol-/ | | |

Type a space to refresh the screen: ■

Keyboard documentation

01/13/86 14:20:53 PAUL

USER: Tyt

+ A:>HERCULES>request-11.request.1 792 198848

Typing Function followed by:

| | |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rubout | Does nothing. (Use this to cancel function if you typed it by accident.) |
| 0-9, - | Specifies a numeric argument to the command that follows |
| Clear-Input | Discards type-ahead |
| Refresh | Clears and rediscards all windows |
| End | Insert an EOF indicator into the currently selected I/O buffer |
| A | Arrests process in the status line (minus means unarrest) |
| B | Buries the selected window |
| C | Toggles black-on-white state of whole screen. An argument of 1 means white-on-black; 0 means black-on-white. |
| Control-C | Toggle black-on-white state of the selected window. Args like C. |
| Meta-C | Toggle black-on-white state of the mouse documentation line. Args like C. |
| F | Displays list of ("fingers") users logged in to ARES. 0 prompt, 1 local Lisp Machines. |
| H | Shows status of CHAOSnet hosts. With an argument, prompts for hosts. |
| M | Toggles global **MORE** processing. An argument of 1 turns it on; 0 turns it off. |
| Control-M | Toggles **MORE** for the selected window. An argument of 1 turns it on; 0 turns it off. |
| O | Selects another exposed window |
| Q | Hardcopies the screen on HERCULES. |
| Control-Q | Hardcopies the selected window on HERCULES. |
| Meta-Q | Hardcopies the screen, without the status line, on HERCULES. |
| S | Selects the most recently selected window. With an argument, selects the nth previously selected window and rotates the top n windows. (Default arg is 2). With an arg of 1, rotates through all the windows. With a negative arg rotates in the other direction. With an argument of 0, selects a window that requires attention, e.g. to report an error. |
| T | Controls the selected window's notification properties. Toggles output notification, making input notification the same as output. 0 Input and output notification off 1 Input and output notification on 2 Input off, output on 3 Input on, output off 4 Input on, output proceeds deexposed 5 Input off, output proceeds deexposed (You can also use the Attribute command in the Screen Editor.) |
| W | Switches which process the status line reports. Default is just to refresh it. 1 means selected-window's process, 2 means freeze on this process, 3 means rotate among all processes, 4 means rotate other direction, 0 gives a menu of all processes |
| Escape | Assistance with window problems such as "Output Hold" or "Sheet Lock" |
| Control-A | Arrests all processes except the status line one (minus unarrests them) |
| Suspend | Gets to cold-load stream (use with caution) |
| Control-I | Flushes temporary windows (use with caution) |
| Control-Clear-Input | Clears window-system locks (use with caution) |

Press Symbol-Help at any time for a display of special function keys and extended graphic characters.

Type a space to refresh the screen: ■

Keyboard documentation

01/13/86 14:18:56 PAUL

USER: Ty1

+ A:>HERCULES>request-11.request.1 672 161312

FUNCTION-HELP

Input Editor Commands:
Control-number, Control-minus and Control-U provide numeric arguments.

| | | | |
|---------------------|----------------------|-----------------|-------------------------------|
| Refresh | Refresh Window | Control-O | Open Line |
| Page | Erase Typeout | Control-D | Quote Character |
| Meta-< | Beginning Of Buffer | Control-C | Yank Input |
| Meta-> | End Of Buffer | Meta-C | Yank Pop |
| Clear-Input | Clear Input | Control-J | Set Default Font |
| Control-F | Forward Character | Meta-J | Set Font Map |
| Control-B | Backward Character | Help | Display Documentation |
| Control-D | Delete Character | Control-Help | Display Commands |
| Rubout | Rubout Character | Meta-Help | Display Internal State |
| Control-T | Exchange Characters | Escape | Display Input History |
| Control-A | Beginning Of Line | Control-Escape | Display Kill History |
| Control-E | End Of Line | Control-Y | Yank |
| Control-P | Previous Line | Meta-Y | Yank Pop |
| Control-N | Next Line | Control-Meta-Y | Yank Input |
| Control-K | Kill Line | Control-W | Kill Region |
| Meta-F | Forward Word | Meta-W | Save Region |
| Meta-B | Backward Word | Control-Space | Set Mark |
| Meta-D | Delete Word | Control-< | Mark Beginning |
| Meta-Rubout | Rubout Word | Control-> | Mark End |
| Meta-T | Exchange Words | Control-Shift-A | Describe Arguments |
| Control-Meta-F | Forward Parentheses | Control-Shift-V | Describe Variable |
| Control-Meta-B | Backward Parentheses | Control-Shift-F | Describe Flavor |
| Control-Meta-K | Delete Parentheses | Control-Shift-D | Document Symbol |
| Control-Meta-Rubout | Rubout Parentheses | Meta-Shift-A | Lookup Function Documentation |
| Line | New Line | Meta-Shift-V | Lookup Variable Documentation |
| Back-Space | Backward Character | Meta-Shift-F | Lookup Flavor Documentation |
| Control-L | Refresh Window | | |

Lisp Listener 1

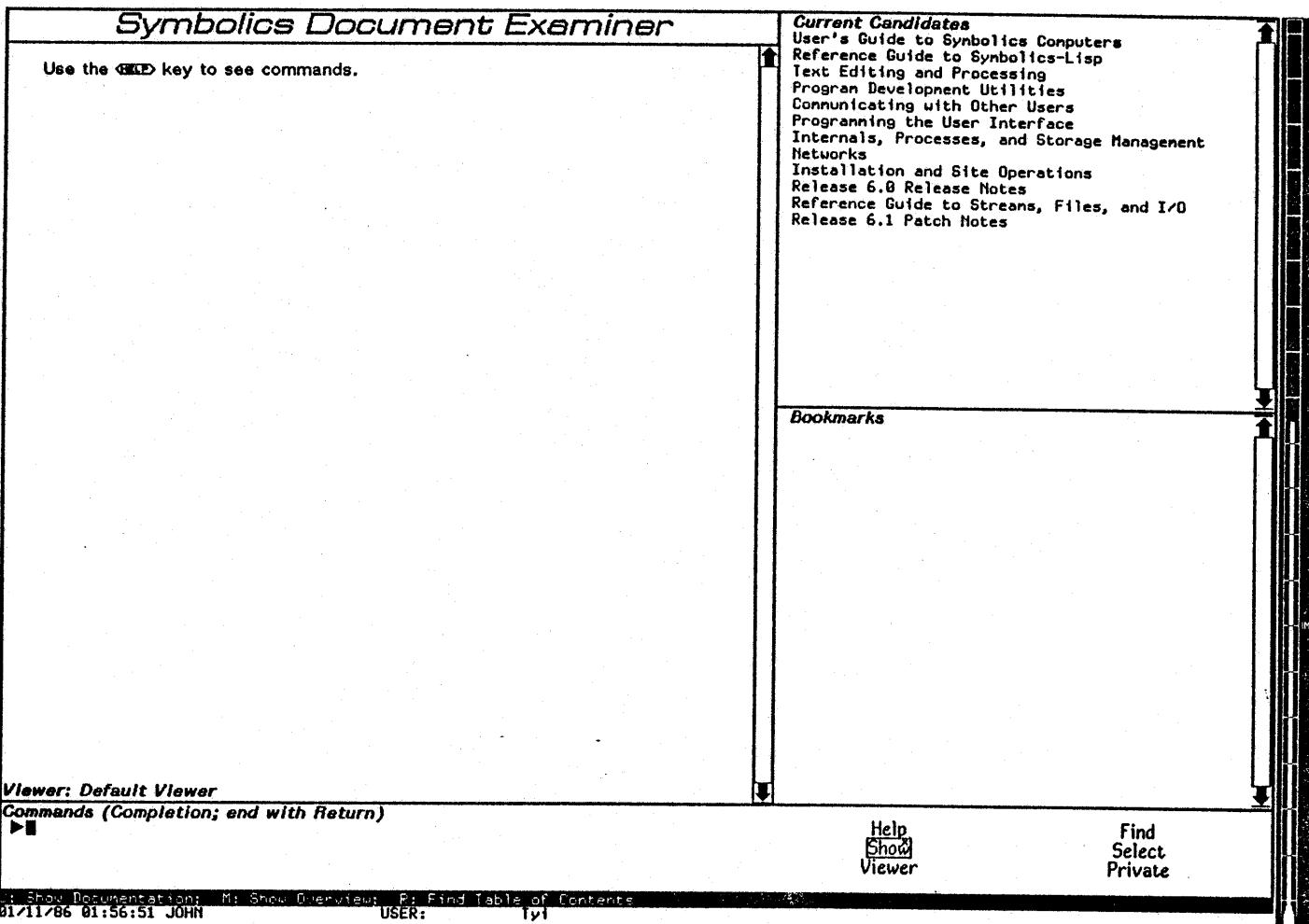
01/13/86 14:23:24 PAUL

USER:

Tyt

* A:>HERCULES>request-15.proto-request 3408

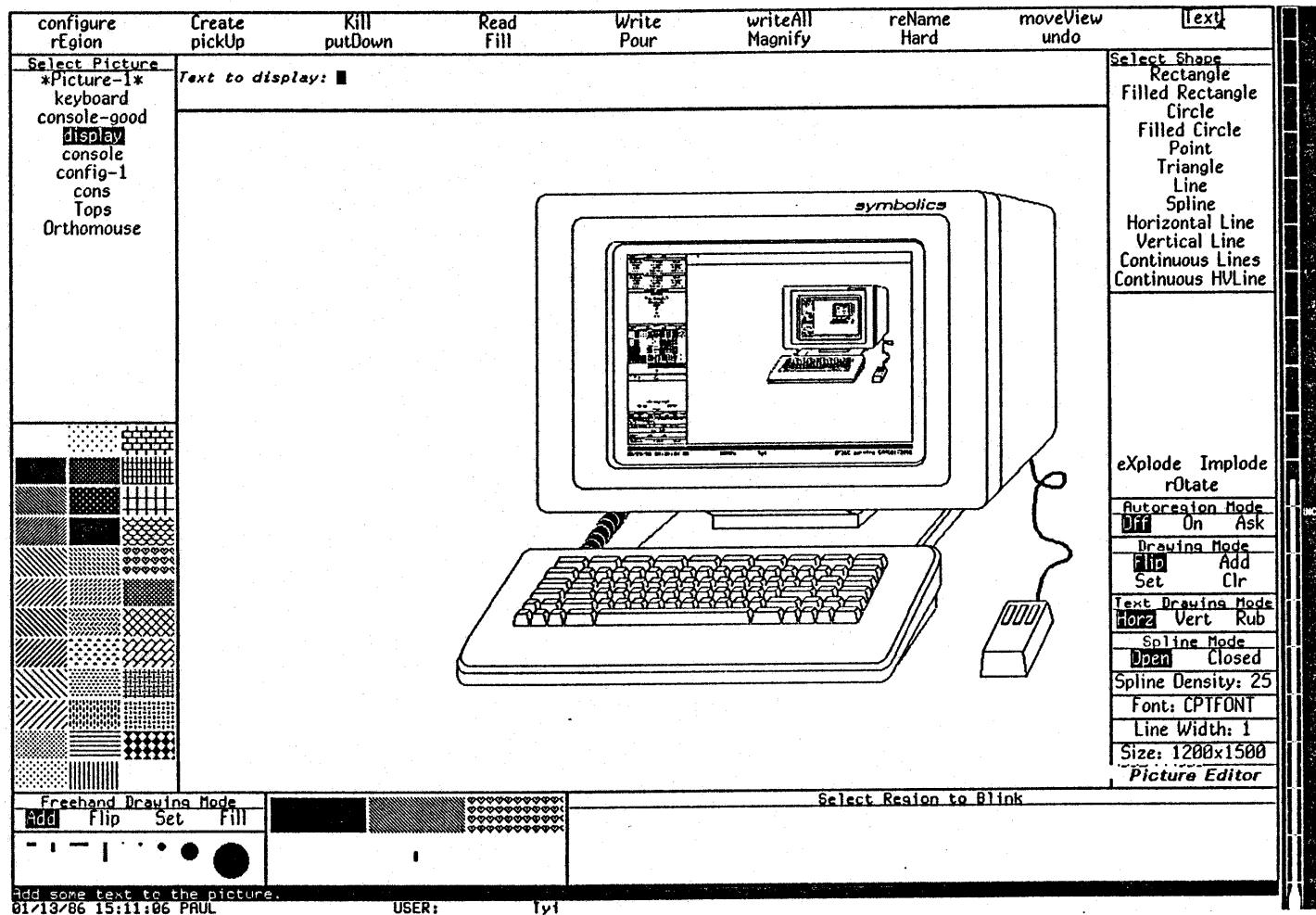
CONTROL-HELP



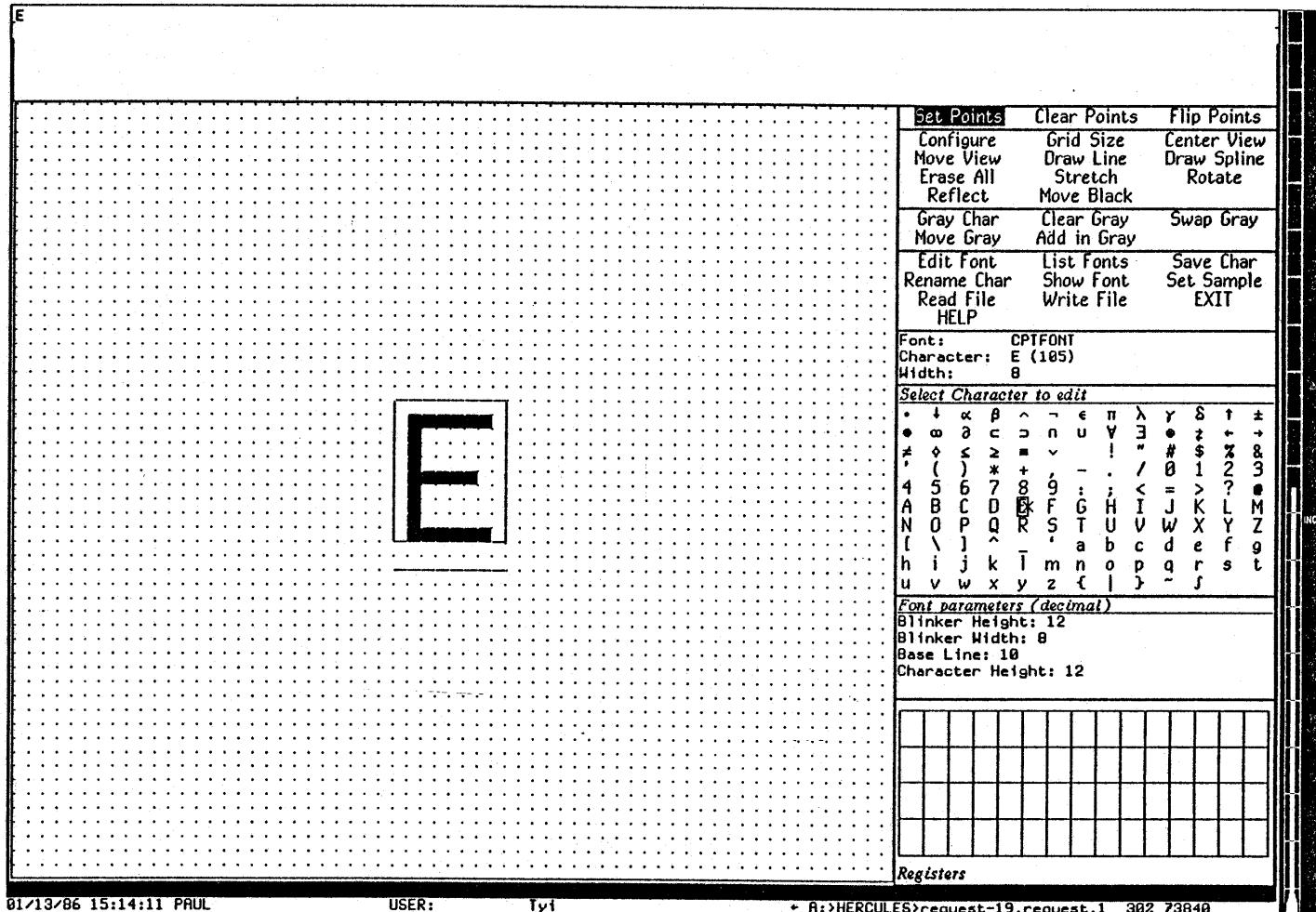
DOCUMENT EXAMINER WINDOW

| File System Editing Operations | | Tree Edit Any | | Tree Edit home dir | | Lisp Window | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------|----------------|---------------------------|--------------|----------------------------|--|--|--|
| Tree Edit Root | | Help | | Local LMFS Operations | | | | | |
| Level 2: Local File System Control Operations | | | | | | | | | |
| Incremental Dump | | Complete Dump | | Consolidated Dump | | Read Backup Tape | | | |
| Find Backup Copies | | Display Tape Map | | List Backup Tape | | Compare Backup Tape | | | |
| List FEP FS Root | | Free Records | | Flush Free Buffer | | Close All Files | | | |
| Expunge local LMFS | | Server Shutdown | | Server Errors | | Exit Level 2 | | | |
| LMFS Maintenance Operations | | | | | | | | | |
| Level 3: Potentially Dangerous Server and Maintenance operations | | | | | | | | | |
| Salvage | Initialize | Check Records | Grow Partition | Remove Partition | Exit Level 3 | LMFS Internal Tools | | | |
| These tools are potentially dangerous! If used improperly, you can damage the local Lisp Machine File System (LMFS), and data might be lost irretrievably. Do NOT use these tools unless you are knowledgeable about file system issues, and fully understand the purpose of these tools and the problems they are trying to solve. To exit the Level 3 Menu, click on [Exit Level 3]. | | | | | | | | | |
| If you have any questions, please call Symbolics Software Support. Command: ■ | | | | | | | | | |
| Lisp Interaction Window Enter Level 3 FSMaint menu, containing Local File System maintenance tools for expert use. 01/13/86 14:15:58 PAUL USER: 1y1 * A:>HERCULES>request-11.request.1 102 26128 | | | | | | | | | |

FILE SYSTEM MAINTENANCE WINDOW



PICTURE EDITOR



FONT EDITOR

```
15:37:52 GC: About to flip. Dynamic space=2,165,349, Static space=7,915,147, Free space=7,002,112.  
15:37:45 GC: Flushing oldspace. 2,987,930 words collected into 2,127,599 words.  
15:33:50 Request for PAUL at ARES of 15:14 on HERCULES completed.  
15:22:22 GC: About to flip. Dynamic space=2,987,899, Static space=7,915,191, Free space=8,017,928.  
15:18:31 Request for PAUL at ARES of 15:11 on HERCULES completed.  
15:06:25 Request for PAUL at ARES of 15:08 on HERCULES completed.  
14:54:49 Request for PAUL at ARES of 14:24 on HERCULES completed.  
14:49:47 Request for PAUL at ARES of 14:19 on HERCULES completed.  
14:44:55 Request for PAUL at ARES of 14:19 on HERCULES completed.  
14:39:57 Request for PAUL at ARES of 14:20 on HERCULES completed.  
14:34:58 Request for PAUL at ARES of 14:20 on HERCULES completed.  
14:30:01 Request for PAUL at ARES of 14:16 on HERCULES completed.  
14:23:37 Request for PAUL at ARES of 14:11 on HERCULES completed.  
14:20:15 Device "HERCULES" is operating again.  
14:20:14 Irrecoverable error on device "HERCULES": irrecoverable device error  
14:15:22 Request for PAUL at ARES of 14:04 on HERCULES completed.  
13:51:45 Request for PAUL at ARES of 13:41 on HERCULES completed.  
13:36:33 Request for PAUL at ARES of 13:33 on ACHILLES completed.  
13:15:53 Request for PAUL at ARES of 13:15 on ACHILLES completed.  
13:15:14 Printing of R:>paul>TRAINING>current-class-schedule-chron.text.9 has been sent to ACHILLES.  
12:58:13 Request for PAUL at ARES of 12:57 on ACHILLES completed.  
12:57:34 Printing of R:>paul>TRAINING>current-class-schedule-chron.text.8 has been sent to ACHILLES.  
12:14:00 Request for PAUL at ARES of 12:13 on ACHILLES completed.  
12:13:22 Printing of R:>paul>TRAINING>current-class-schedule-chron.text.7 has been sent to ACHILLES.  
11:01:27 Request for PAUL at ARES of 11:00 on ACHILLES completed.  
10:54:15 Request for PAUL at ARES of 10:50 on ACHILLES completed.  
10:40:08 Request for PAUL at ARES of 10:38 on ACHILLES completed.  
10:35:55 Request for PAUL at ARES of 10:33 on HERCULES completed.  
10:14:23 Namespace Lock ARES: Reloading namespace SCH-TRAINING.  
Recent servers contacted are ARES  
10:14:23 Namespace SCH-TRAINING has become unloaded:  
records don't go back far enough  
Recent servers contacted are ARES
```

Notification Scroll Window

01/13/86 15:42:07 Keyboard

USER: Function:

NOTIFICATIONS WINDOW

-- Fonts: CPTFONT, DT-TR12, DT-TR12B, DT-HL12, DT-HL12B, DT-HL12I, DT-HL19B --

A B C D E F

```
(si:hardcopy-text-file "px:>paul>training>press-basic-lesson-04.text"
  :si:*default-hardcopy-device*
  :interpret-font-changes t
  :fonts 'fonts:(fix9 dp-tr12 dp-tr12b dp-hl12 dp-hl12b dp-hl12i dp-hl19b)
  :page-headings n#1)
```

~~PAGE~~

Basic Field Maintenance Training Course Outline

Symbolics, Inc., April 1985

Page 1

PREREQUISITES:

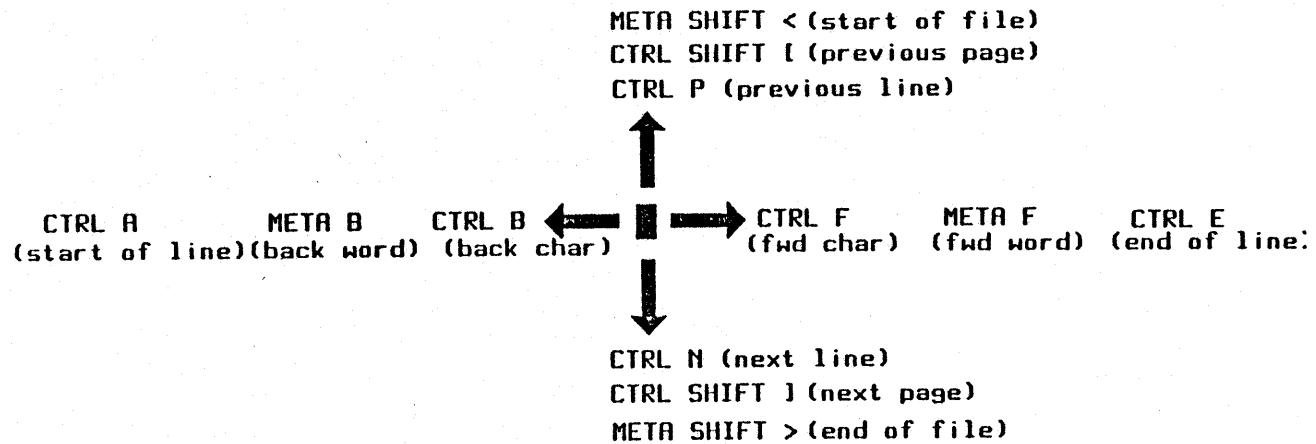
1. Formal 30 week electronics training course, or equivalent.
2. Formal training in micro-processor theory and operation
3. Minimum of three weeks attached to a Symbolics field office, with at least five days accompanying a qualified CSE in the field
4. Be able to use standard test equipment, such as oscilloscopes and multimeters
5. Knowledge of proper use of hand tools and soldering equipment

ZMACS (Text Fill) BASIC-LESSON-OUTLINE.TEXT >paul>TRAINING PX: (10) Font: D (DT-HL12) * [More below]

notices.
ks of Symbolics, Inc.

L:Move/point, L2:Move/to point, M:Mark thing, M2:Save/Kill/Yank, R:Menu, R2:System menu
04/11/85 09:52:46 Screen Hardcopy USER: Tyf 2 active servers

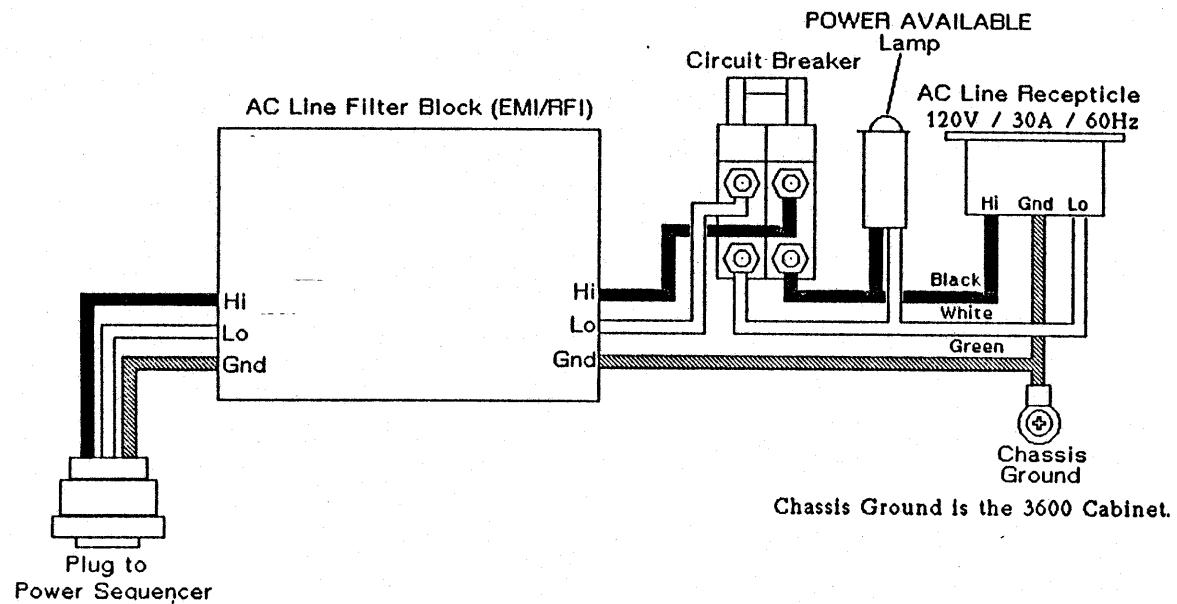
ZMACS EDITOR



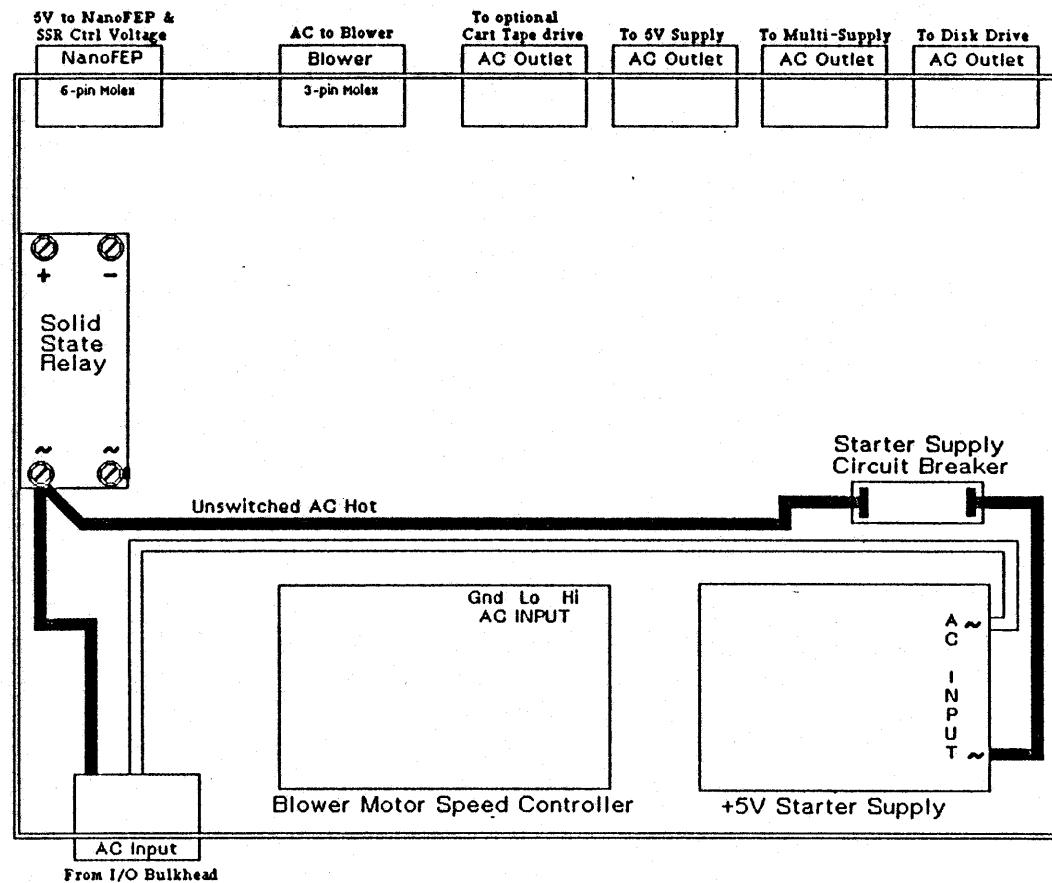
ADDITIONAL CONTROL COMMANDS

| | |
|-------------------------------------------|-------------------------------------------|
| CTRL D (deletes char under cursor) | CTRL X . CTRL S (saves buff to same name) |
| META D (deletes word fwd of cursor) | CTRL X CTRL W (saves buff to new name) |
| RUB OUT (deletes char behind cursor) | CTRL X K (kills buffer) |
| META RUB OUT (deletes word behind cursor) | ABORT (cancels existing function) |
| CTRL K (kills to end of line) | RESUME (resumes previous function) |
| META K (saves to end of line) | CTRL space (sets up marking) |
| CTRL Y (yanks 1st item) | CTRL W (saves and kills regions) |
| META Y (walks thru' kill ring) | META W (saves region w/o killing) |

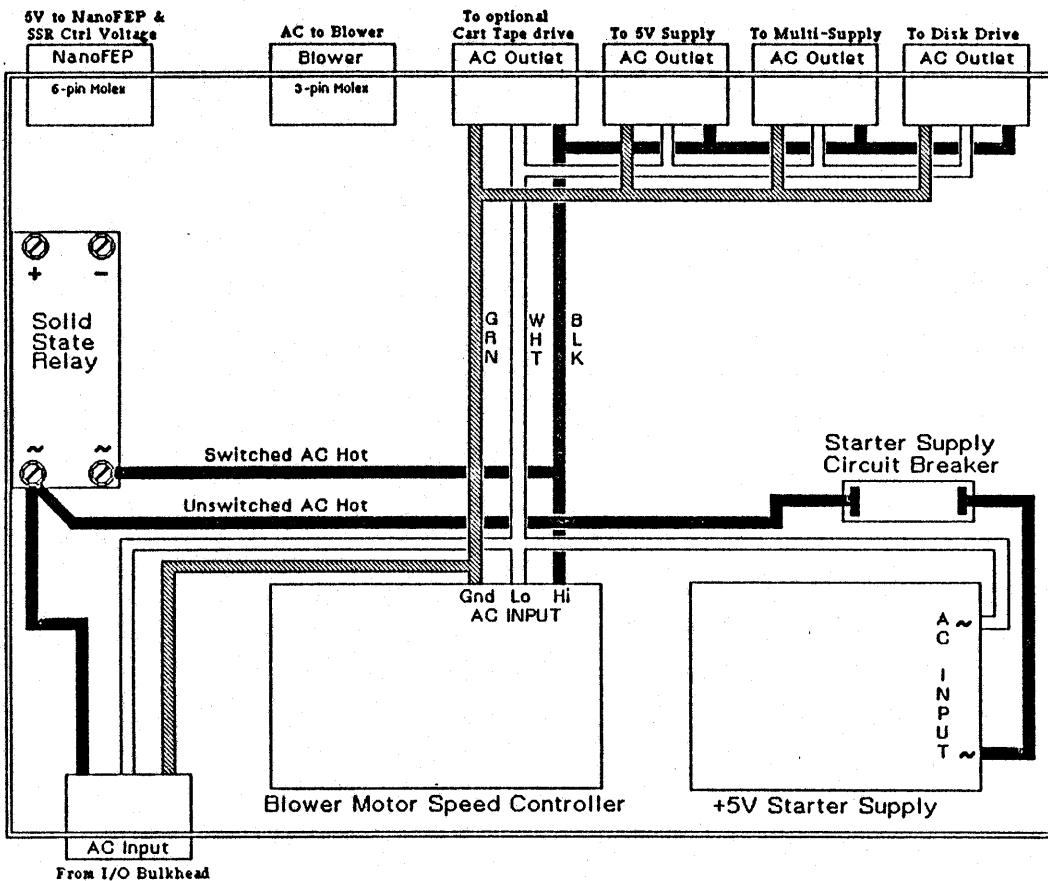
MOTION COMMANDS



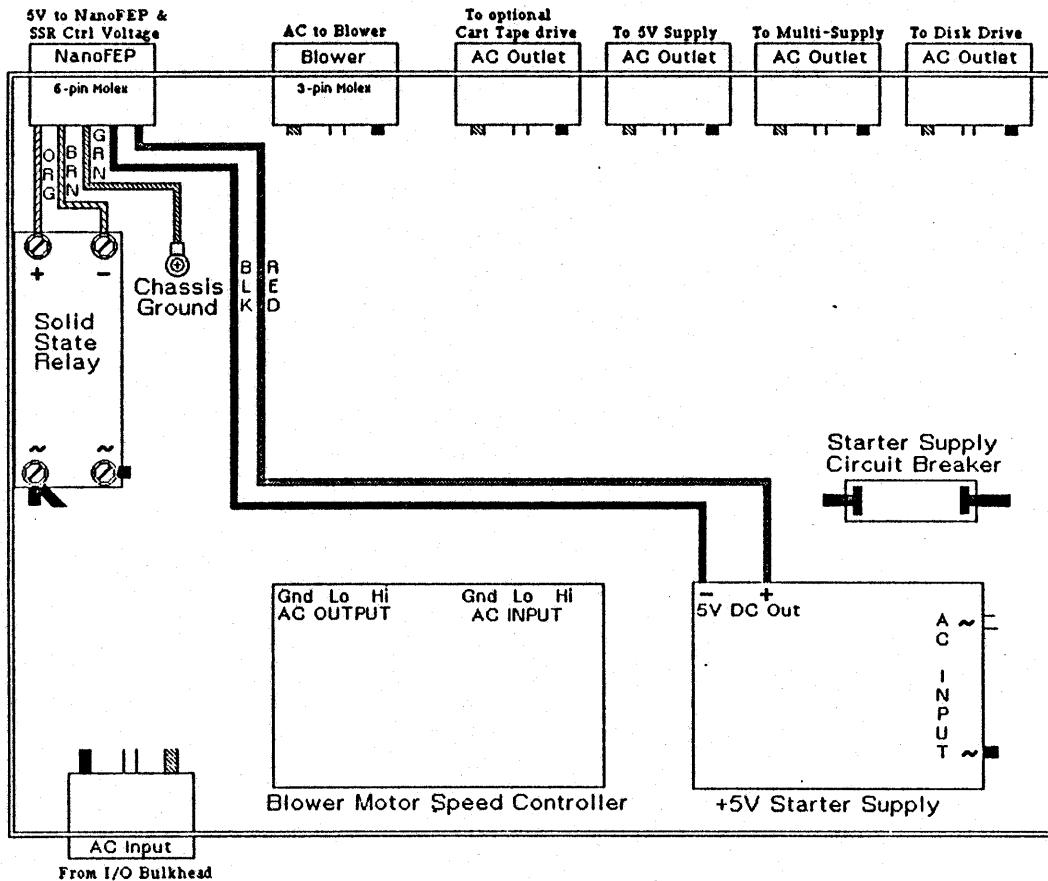
3600 I/O Bulkhead - AC Input Wiring



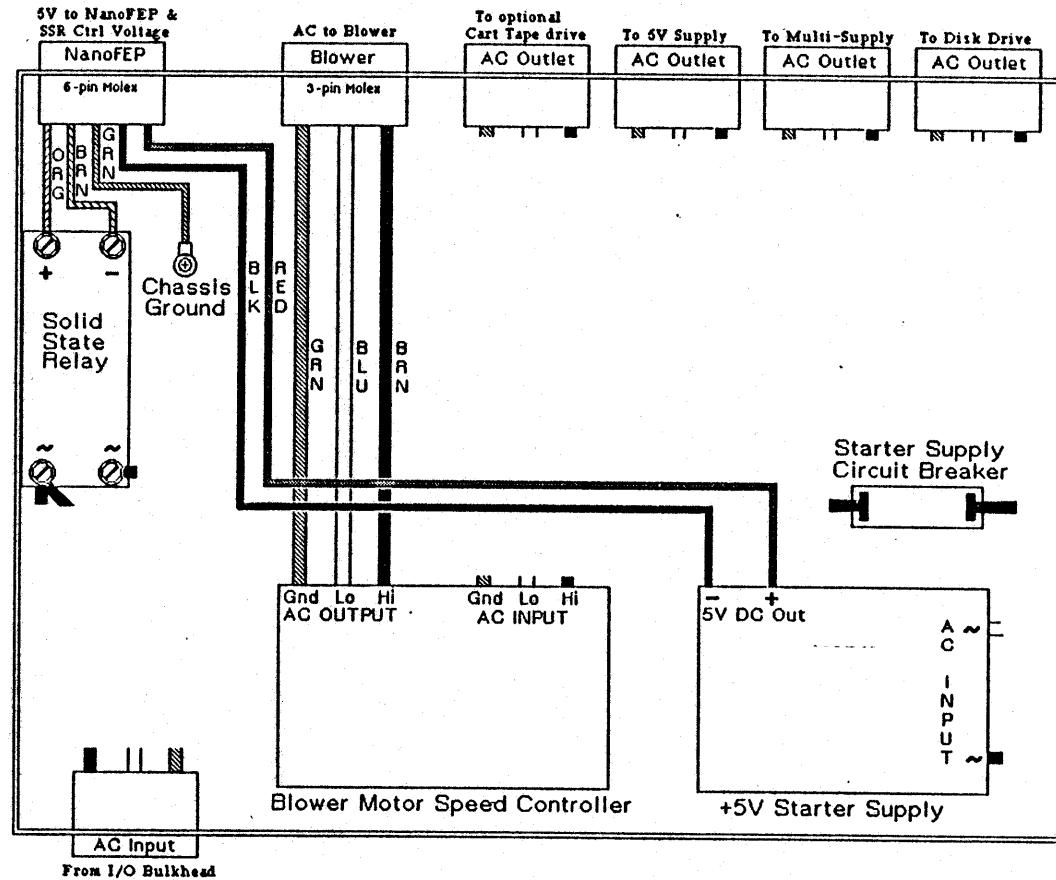
3600 Power Sequencer - AC Wiring Starter Supply



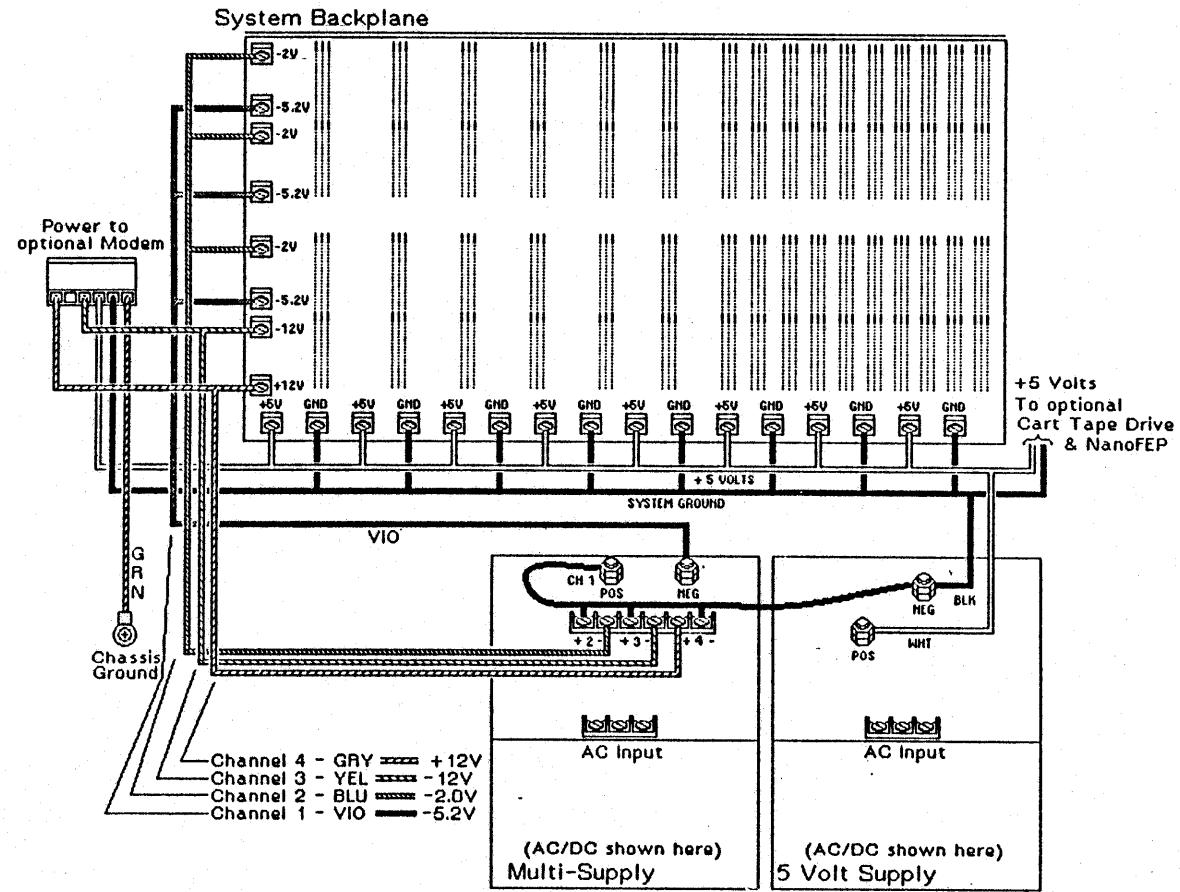
3600 Power Sequencer - AC Wiring Only



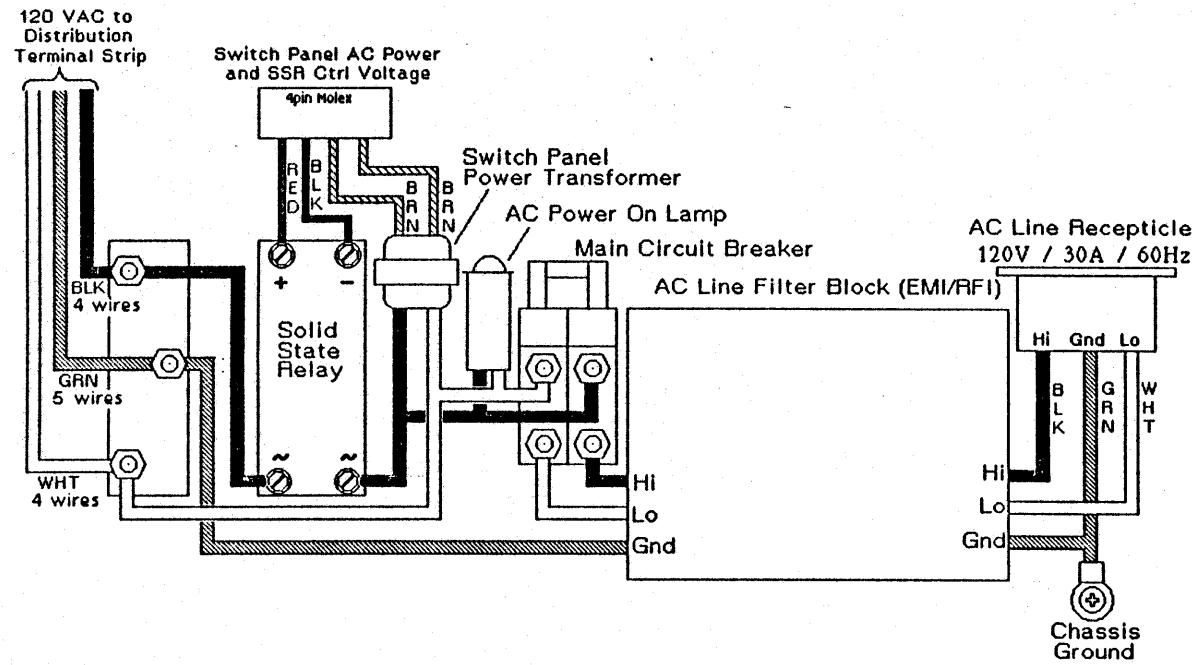
3600 Power Sequencer - DC STARTER



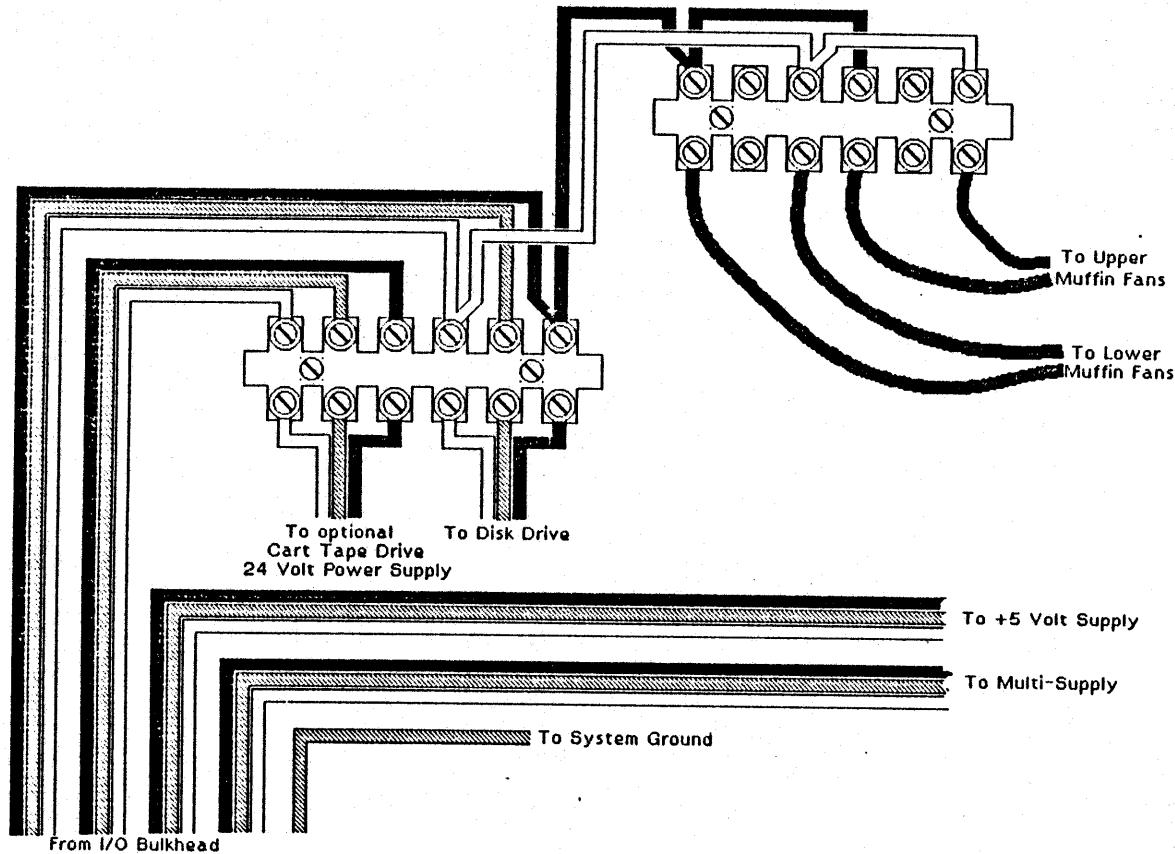
3600 Power Sequencer - DC Wiring & Blower AC Wiring



3600 DC Power Distribution

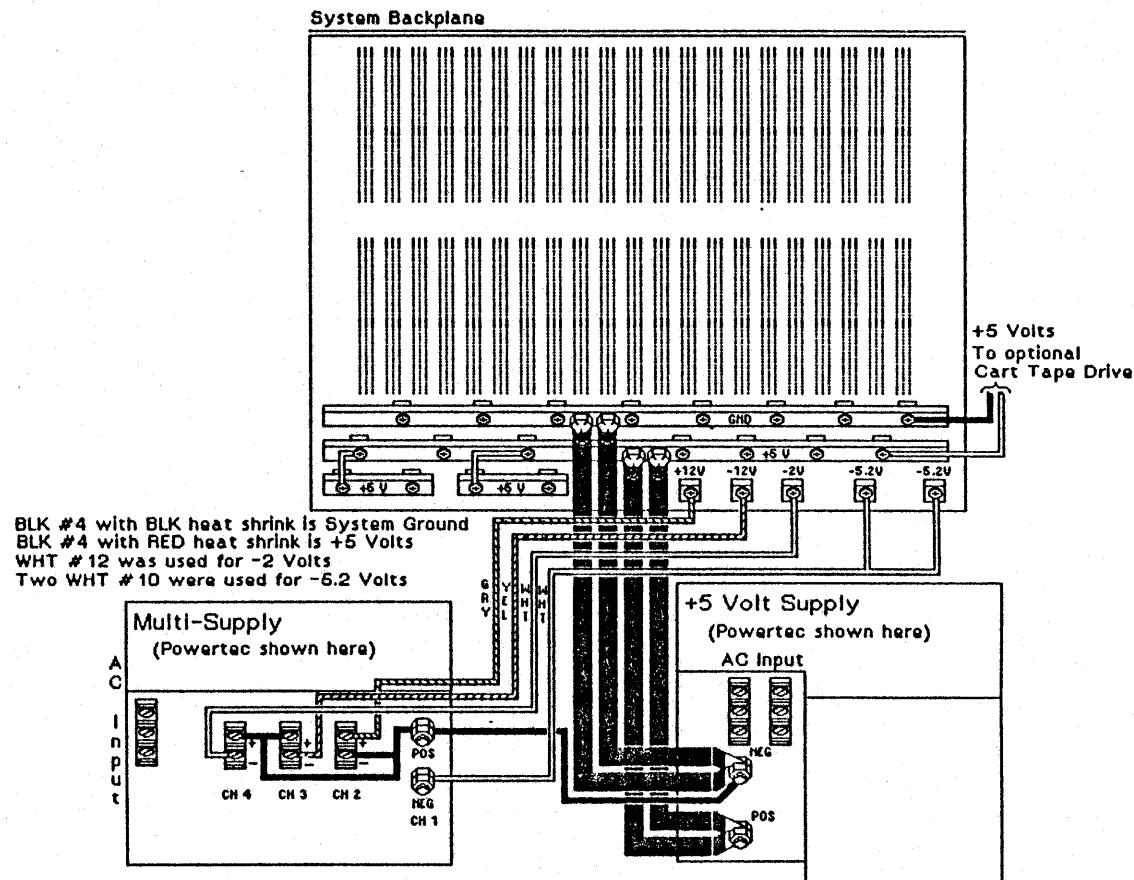


3670 I/O Bulkhead Wiring

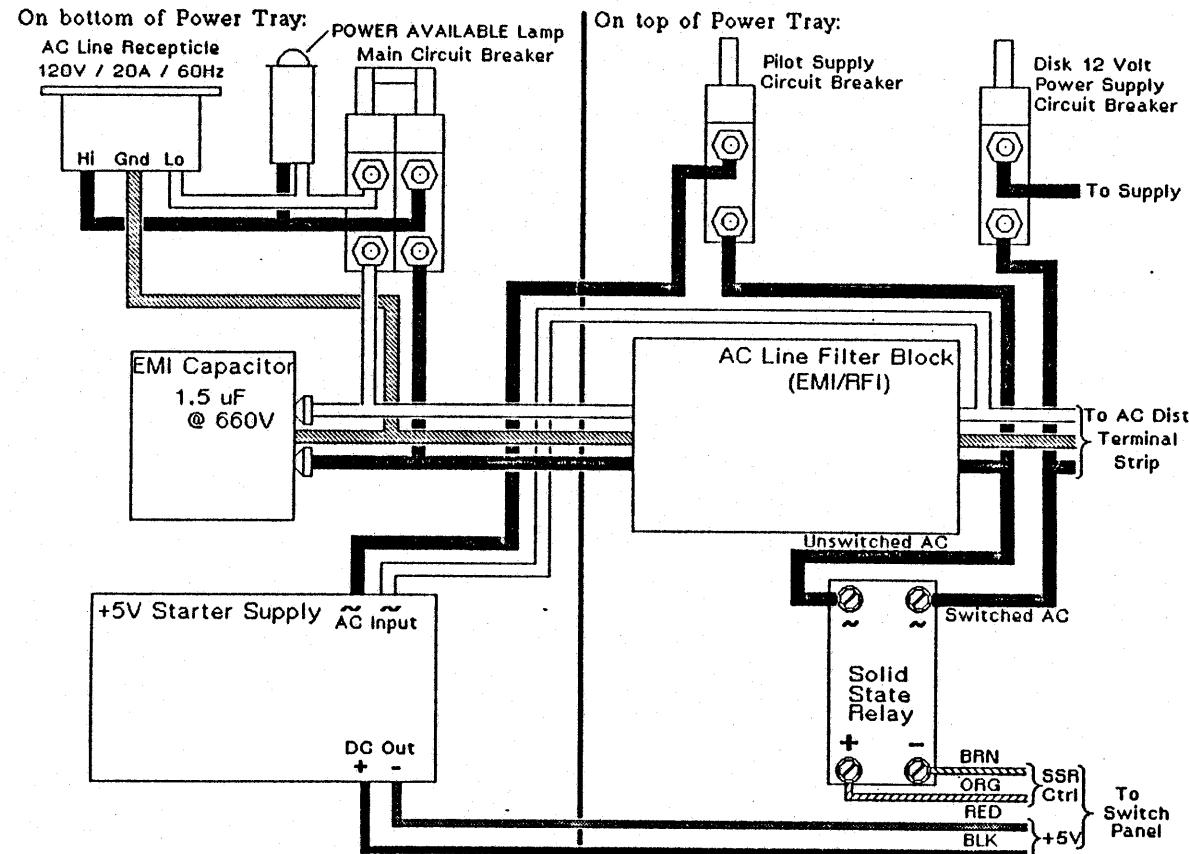


3670 AC Distribution Wiring

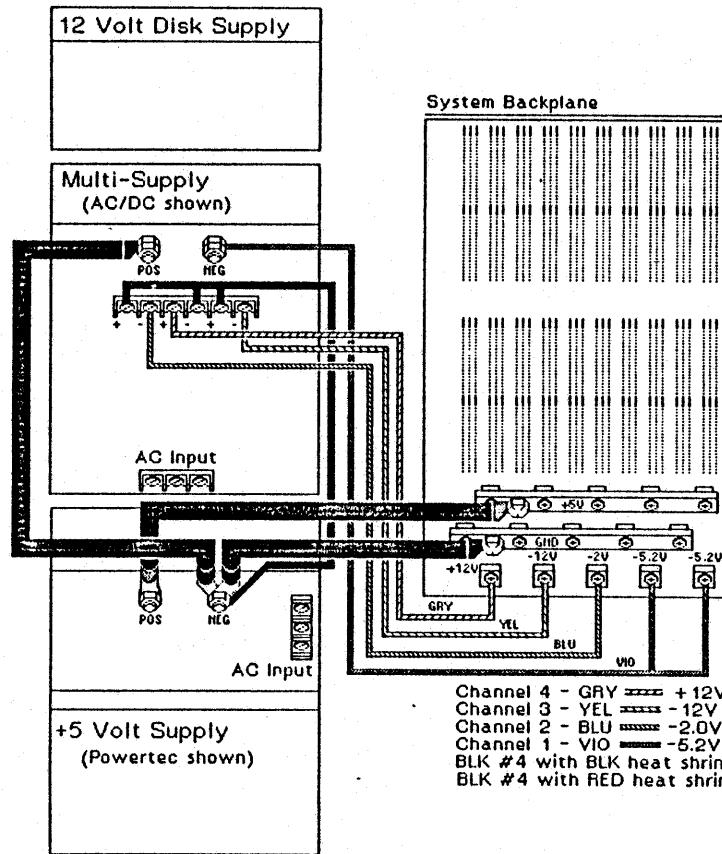
View of lower left rear corner of card cage; inside the left cover.



3670 DC Power Distribution

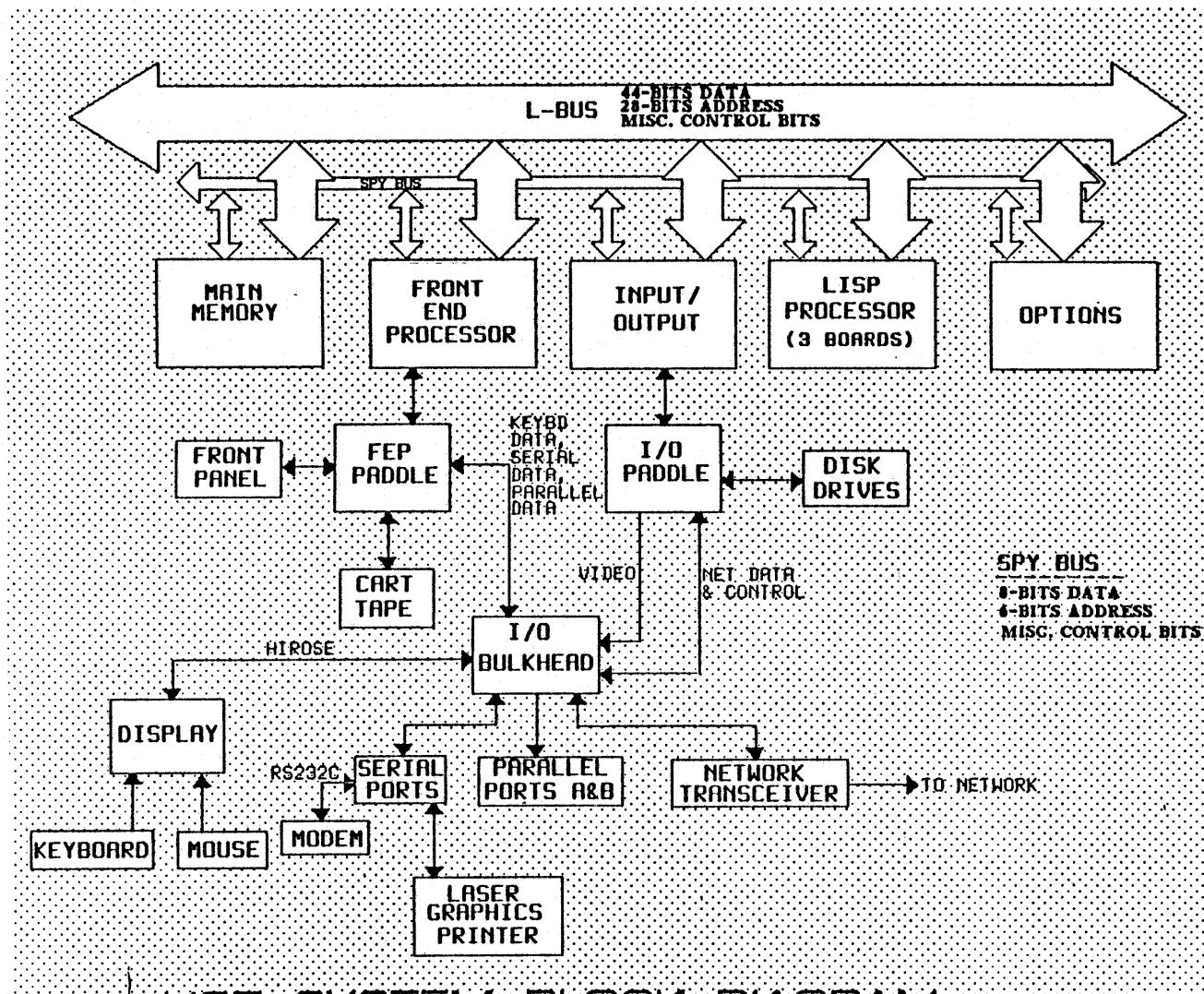


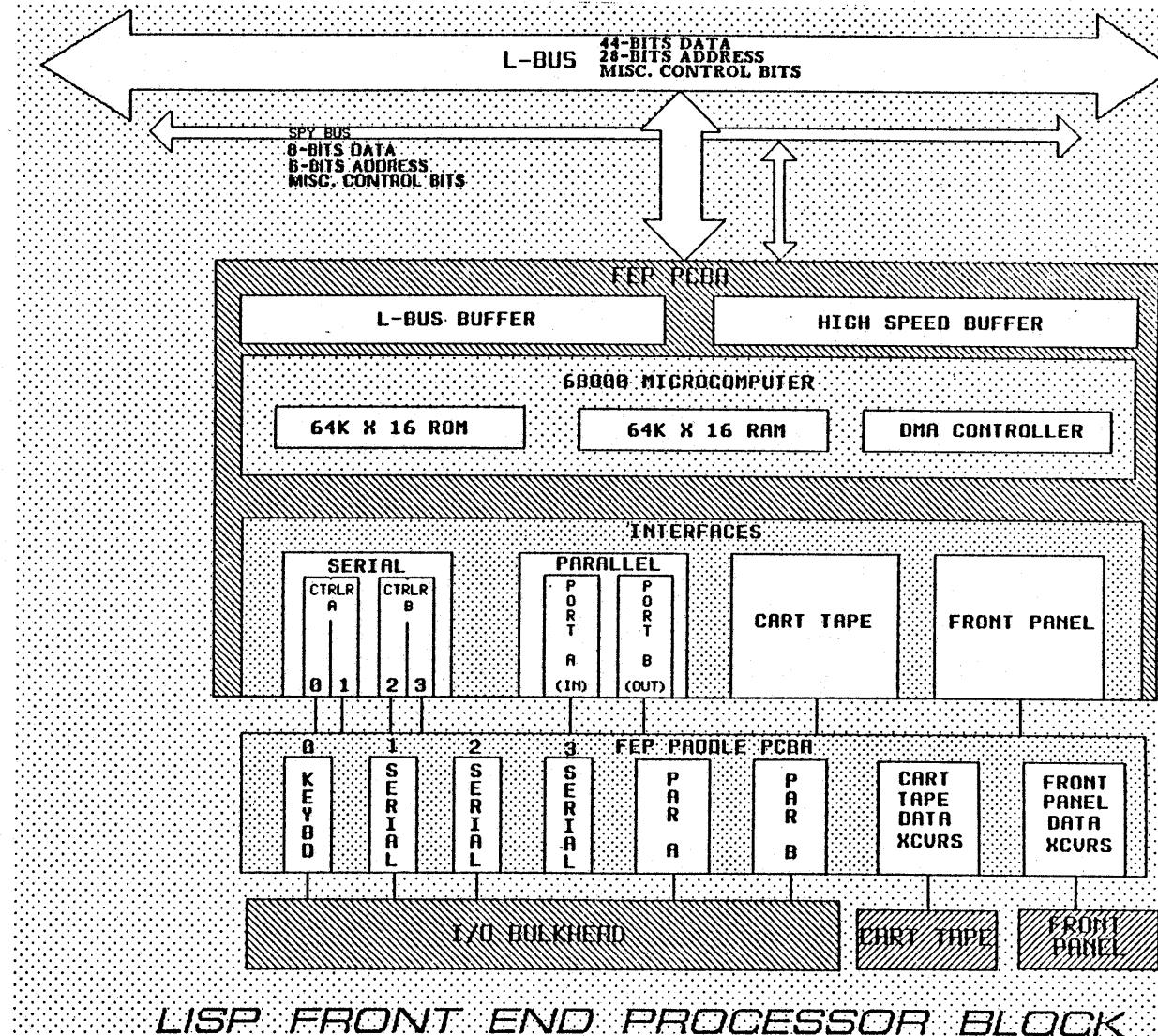
3640 I/O Bulkhead - Power Tray Wiring

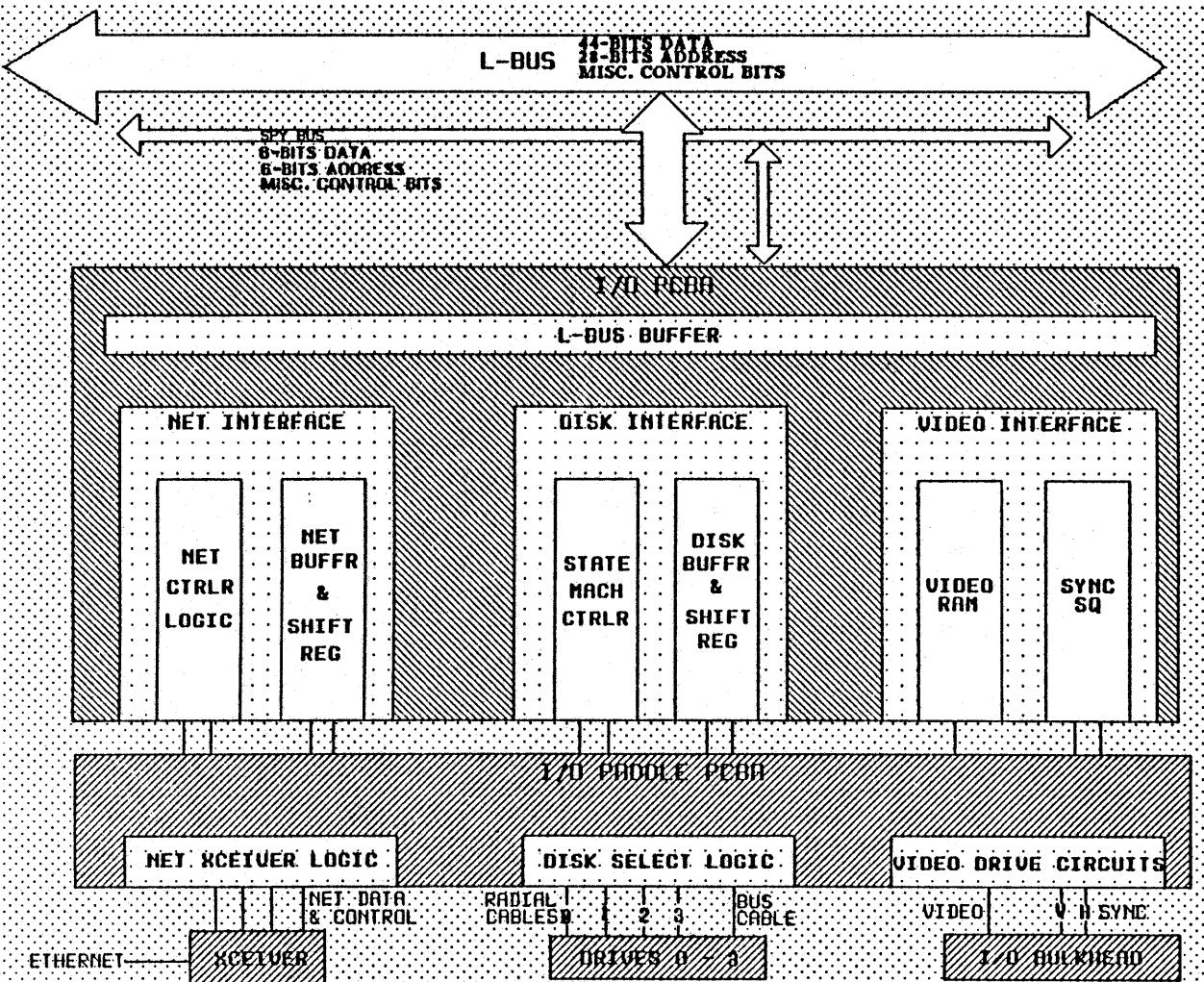


Channel 4 - GRY ----- +12V
Channel 3 - YEL ----- -12V
Channel 2 - BLU ----- -2.0V
Channel 1 - VIO ----- -5.2V
BLK #4 with BLK heat shrink is System Ground
BLK #4 with RED heat shrink is +5 Volts

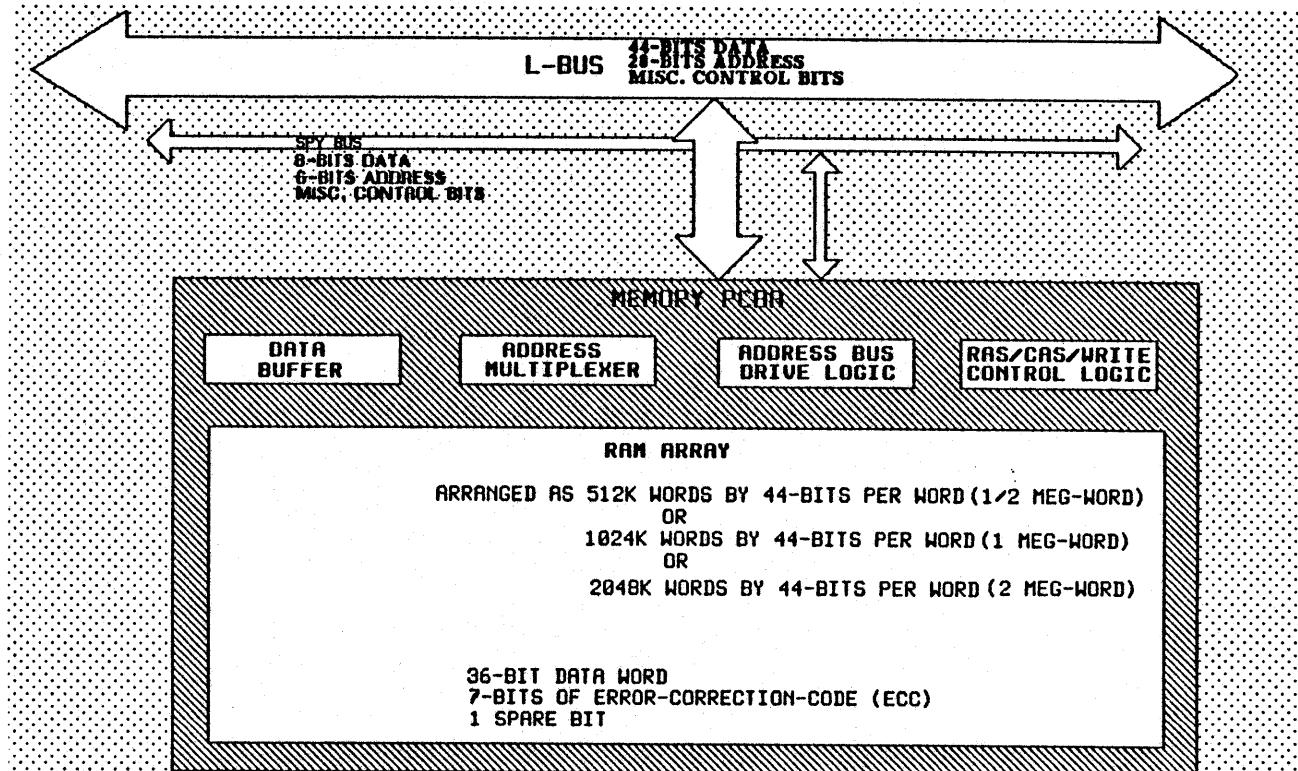
3640 DC Power Distribution



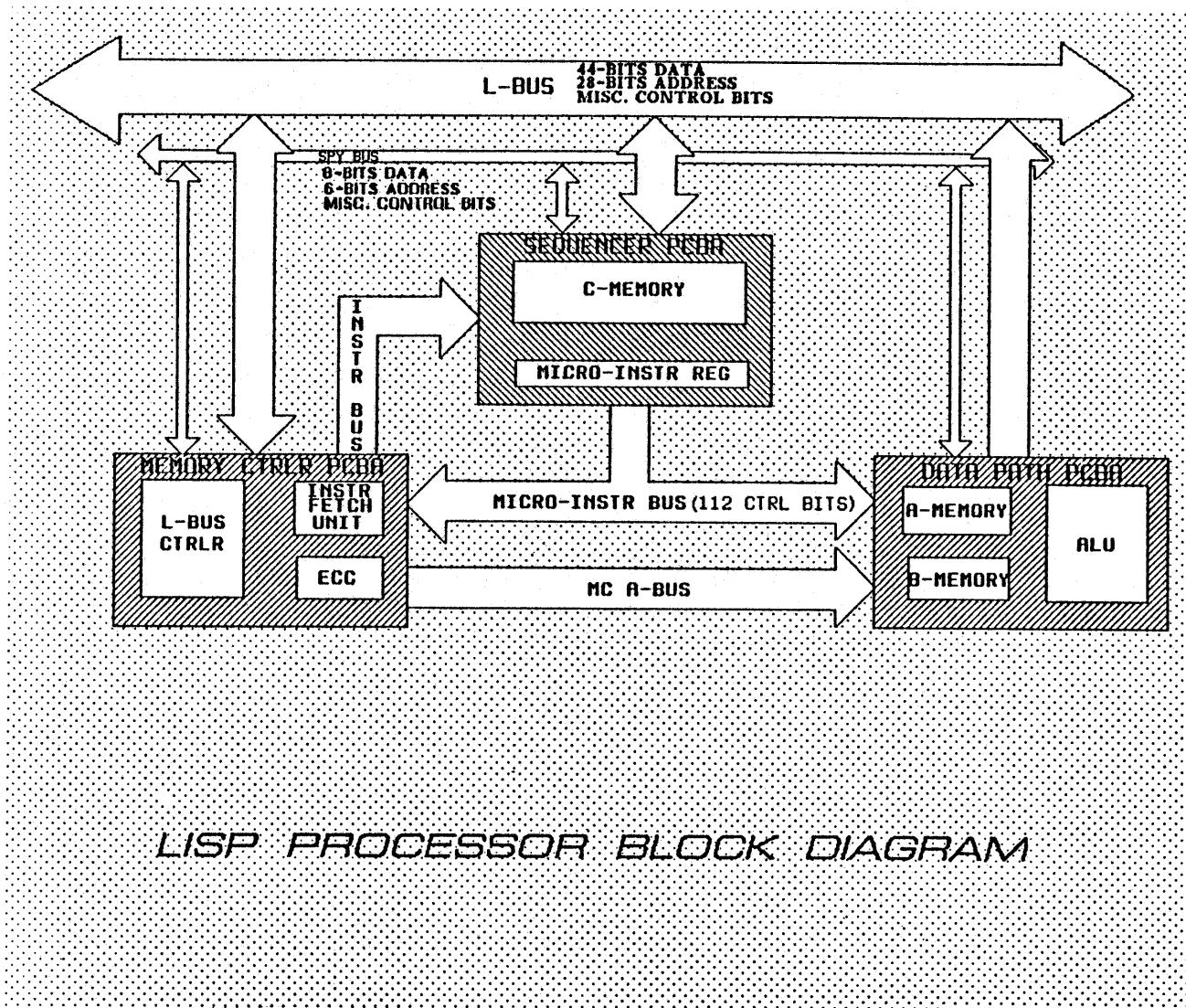




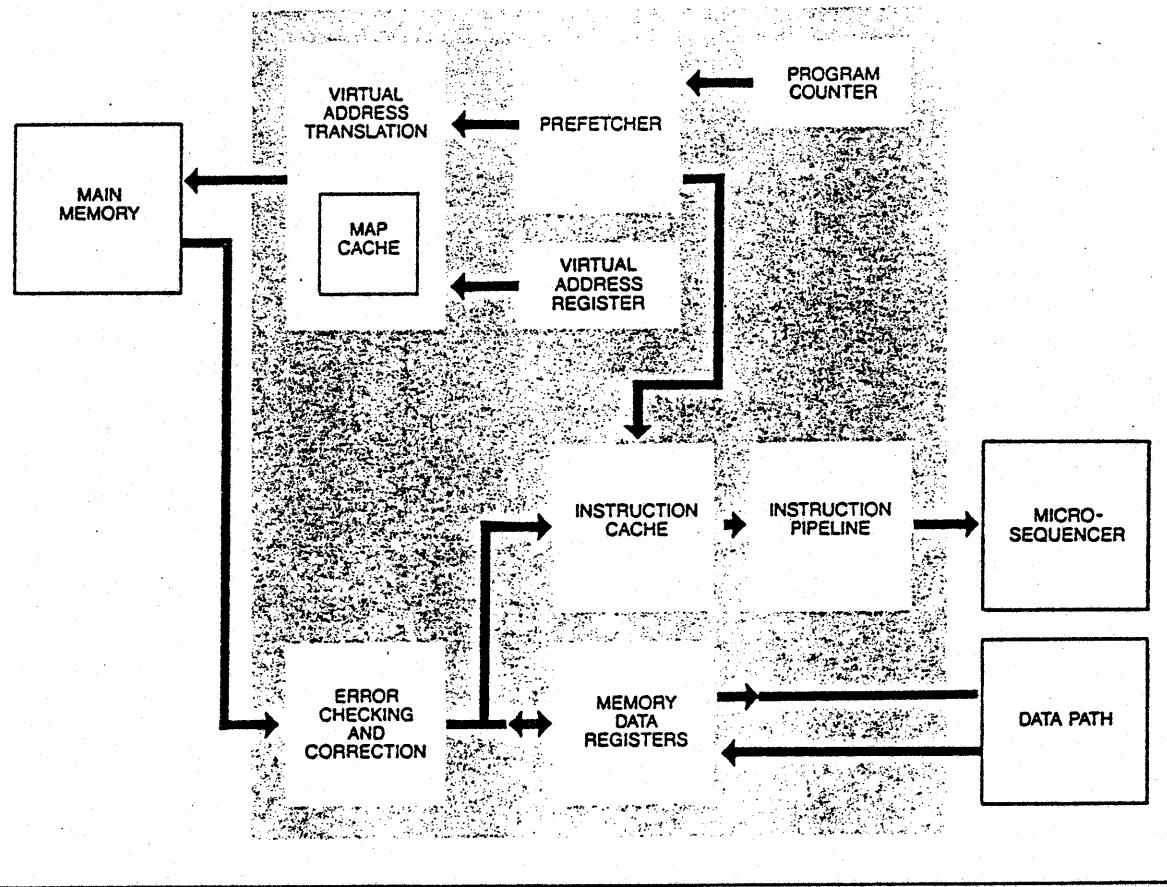
LISP I/O BLOCK DIAGRAM



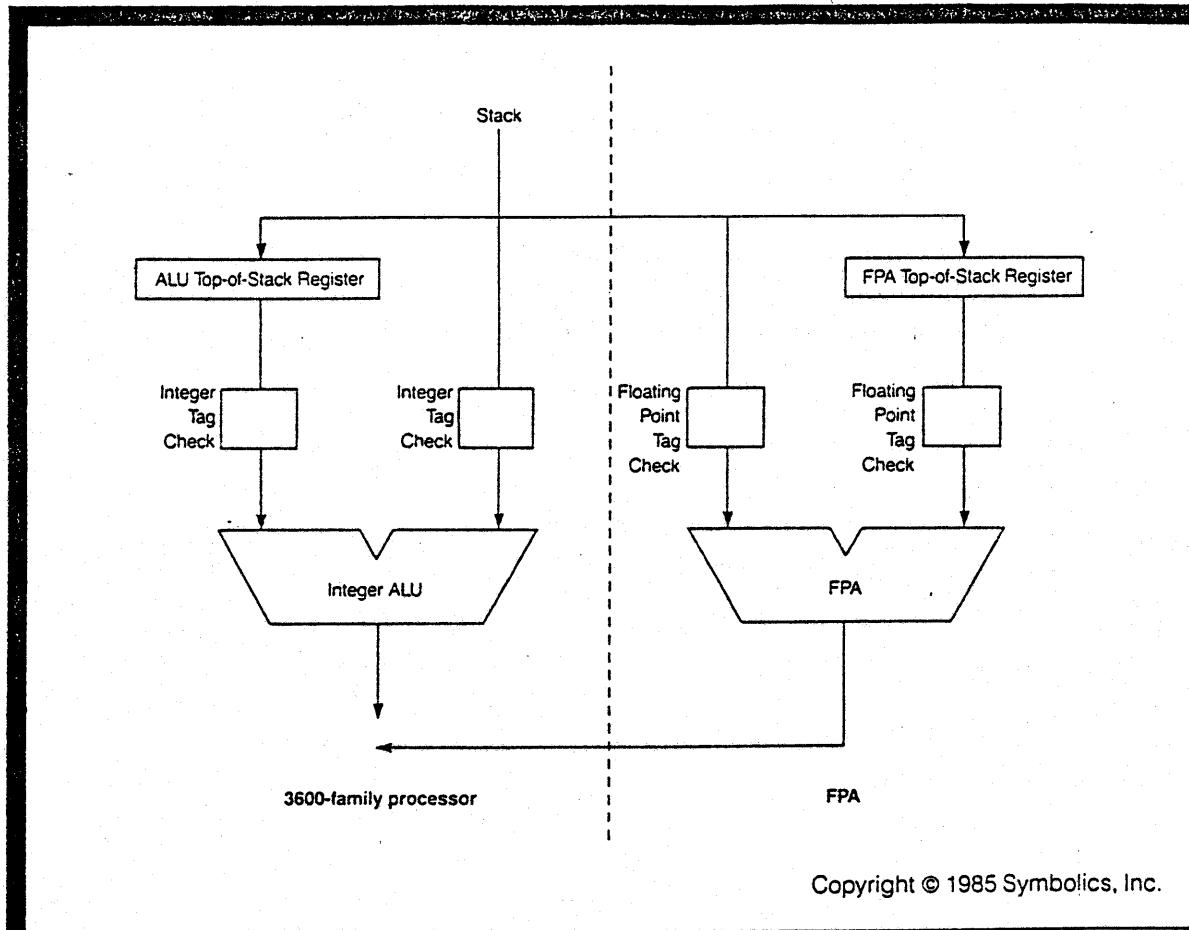
LISP MEMORY BLOCK DIAGRAM



Enhanced Performance Option

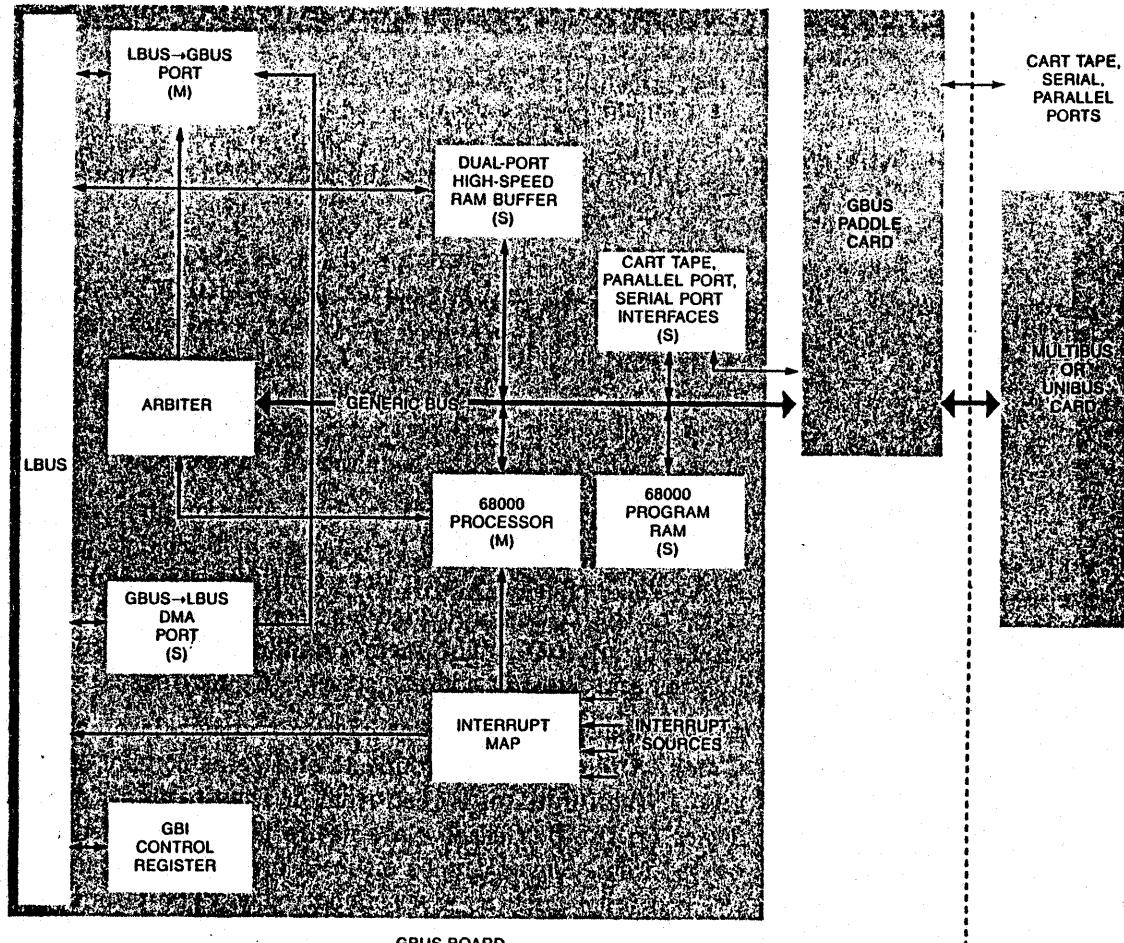


ENHANCED PERFORMANCE OPTION



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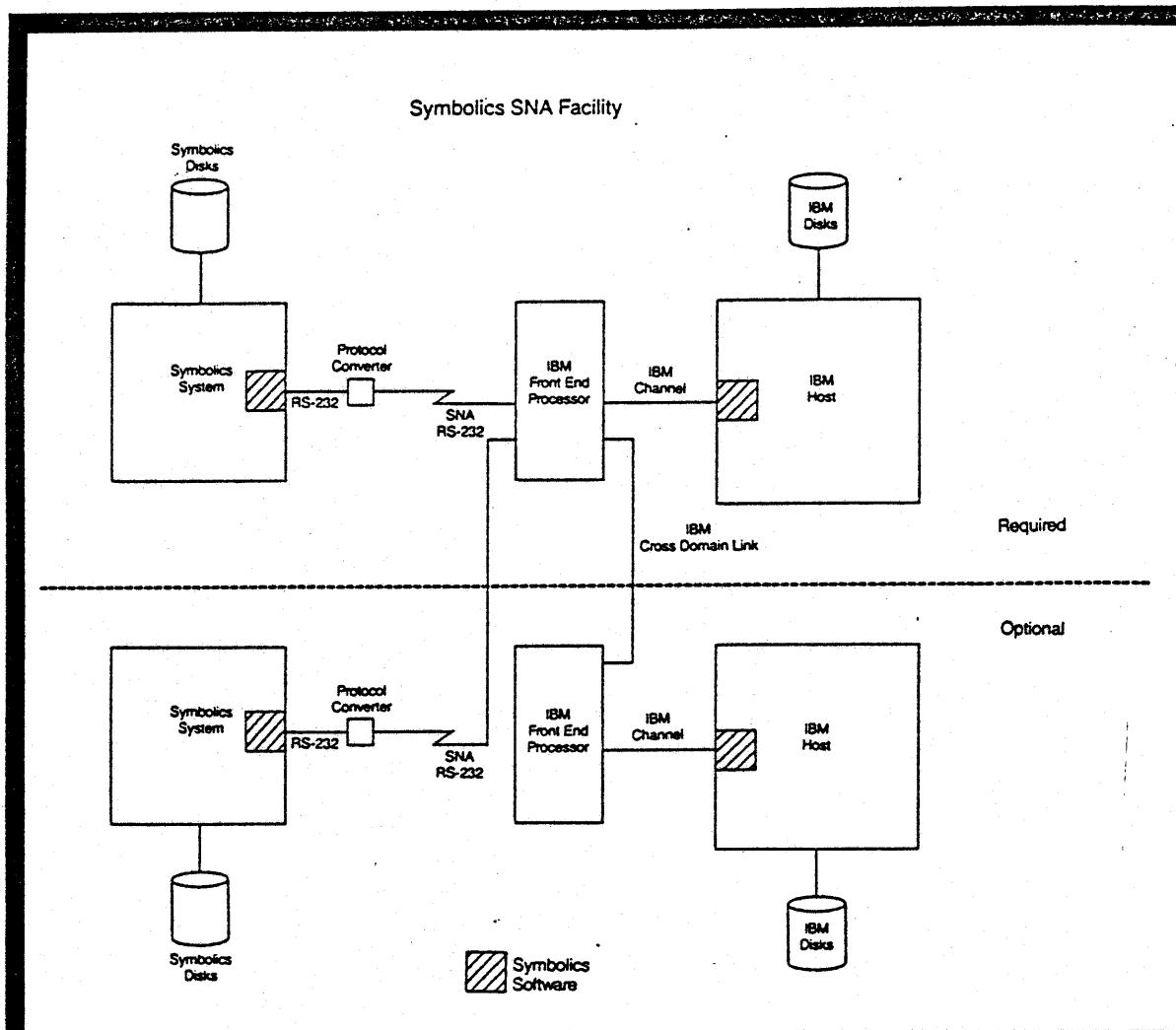
FLOATING POINT ACCELERATOR



(S) = Gbus Slave
(M) = Gbus Master

36XX CABINET

GENERIC BUS INTERFACE



SNA FACILITY

3600 SERIES BOARD COMPATIBILITY CHART

BASIC BOARD COMPLEMENT

| BOARD | P/N | VERSION | 3600 -EPO | 3600 | 3640 | 3645 | 3670 | 3675 | REMARKS |
|------------------------|--------|-----------------------|--------------|------|------|------|------|------|------------------------------------------------------------------------------------------------|
| 512K MEMORY | 170002 | | | X | X | X | X | X | S12K WORD (2 Mbytes) OF 36-BITS EACH W/ ECC |
| 1 MW MEMORY | 170473 | | | X | X | X | X | X | REQUIRES 2MW.FL0D LOADED IF NOT USED W/ NFEP |
| 2 MW MEMORY | 170309 | | | X | X | X | X | X | REQUIRES 2MW.FL0D LOADED IF NOT USED W/ NFEP |
| FEP | 170062 | W/ 976002 PAL SET | | X | - | - | - | - | WIRE-WRAP W/ V24 PROMS & HEADER PALS-DEVNFM.4 IN E21 DEVACK.4A IN C23 |
| | 170236 | W/ 976002 PAL SET | | X | - | - | - | - | ETCH W/ V24 PROMS & HEADER PALS-DEVNFM.4 IN E21 DEVACK.4A IN C23 |
| | | W/ 976003 PAL SET | | - | - | X | - | X | ETCH W/ V24 PROMS & HEADER PALS-DV2NUM IN E21 DV2ACK IN C23 |
| NFEP | 170062 | W/ 976002 PAL SET | | X | X | - | - | - | WIRE-WRAP W/ V127 PROMS & HEADER PALS-DEVNFM.4 IN E21 DEVACK.4A IN C23 |
| | 170236 | W/ 976002 PAL SET | | X | X | - | - | - | ETCH W/ V127 PROMS & HEADER PALS-DEVNFM.4 IN E21 DEVACK.4A IN C23 |
| | | W/ 976003 PAL SET | | - | - | X | X | X | ETCH W/ V127 PROMS & HEADER PALS-DV2NUM IN E21 DV2ACK IN C23 |
| FEP PADDLE | 170066 | | | X | X | - | - | - | |
| | 170069 | | | - | - | X | X | X | |
| ENHANCED FEP PADDLE | 170265 | | (a) | (a) | - | - | - | - | |
| I/O BOARD | 170082 | W/ 976001 PROM SET | | X | X | - | - | - | WIRE-WRAP / SMD INTERFACE PROMS-DISKU.2.22 IN Q29 DISKU.1.22 IN N29 DISKU.0.22 IN L29 |
| | 170157 | W/ 976000 PROM SET | | - | - | X | X | - | ETCH / ST-506 INTERFACE PROMS-SDSKU.2.1 IN E23 SDSKU.1.1 IN J15 SDSKU.0.1 IN H10 |
| | | W/ 976001 PROM SET | | (a) | (a) | X | X | X | ETCH / SMD INTERFACE PROMS-DISKU.2.22 IN E23 DISKU.1.22 IN J15 DISKU.0.22 IN H10 |
| I/O PADDLE | 170086 | | | X | X | - | - | - | SMD INTERFACE |
| | 170245 | | | - | - | X | X | - | ST-506 INTERFACE |
| | 170162 | | | (a) | (a) | X | X | X | SMD INTERFACE |

3600 SERIES BOARD COMPATIBILITY CHART

BASIC BOARD COMPLEMENT - LISP PROCESSOR

| BOARD | P/N | VERSION | 3600 -EPO | 3600 | 3640 | 3645 | 3670 | 3675 | REMARKS |
|---------------------------|--------|------------------------------|--------------|------|------|------|------|------|-----------------------------------------------------------------|
| DATA PATH | 170032 | WIRE-WRAP W/BASECTL.3 PAL | X | - | - | - | - | - | PAL IN LOCATION AA76 |
| | | WIRE-WRAP W/DPIFU.2 PAL | - | X | - | - | - | - | PAL IN LOCATION AA76 (SEE NOTE b) |
| | | ETCH W/BASECTL.3 PAL | X | - | X | - | X | - | PAL IN LOCATION U23K |
| | | ETCH W/DPIFU.2 PAL | - | X | - | X | - | X | PAL IN LOCATION U23K (SEE NOTE b) |
| SEQUENCER | 170042 | WIRE-WRAP | X | - | - | - | - | - | |
| | | ETCH | X | - | X | - | X | - | |
| MEMORY CONTROLLER | 170052 | WIRE-WRAP | X | - | - | - | - | - | |
| | | ETCH | X | - | X | - | X | - | |
| INSTRUCTION FETCH UNIT | 170260 | | - | X | - | X | - | X | (IFU) EXPANDED MEMORY CONTROLLER (SEE NOTE b) |
| EXTENDED SEQUENCER | 170299 | -1 | X | - | X | - | X | - | (XSQ) ADDITIONAL 8K C MEMORY -MC COMPATIBLE |
| | | -2 | - | X | - | X | - | X | (XSQ) ADDITIONAL 8K C MEMORY -IFU COMPATIBLE (SEE NOTE b) |

BASIC BOARD COMPLEMENT - BOARD TOTALS

| | | | | | | | | |
|------------------------------------------------|----|----|----|----|----|----|----|-------------------------------------------------------------------------------------------------------------------|
| TOTAL PADDLE PCBA'S | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| TOTAL L BUS PCBA'S EXCLUDING MEMORY | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| TOTAL MEMORY PCBA'S (MINIMUM) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| TOTAL L BUS SLOTS USED EXCLUDING MEMORY (ETCH) | 5 | 5 | 5 | 5 | 5 | 5 | 5 | PROVIDING 2 Mbytes RAM STORAGE MINIMUM MAXIMUM ADDRESSABLE MAIN MEMORY = 32 Mbytes (4 - 2 MW MEMORY PCBA'S) |
| TOTAL L BUS SLOTS USED EXCLUDING MEMORY (N/W) | 10 | 10 | - | - | - | - | - | |
| TOTAL L BUS SLOTS PROVIDED | 21 | 21 | 10 | 10 | 21 | 21 | 21 | |

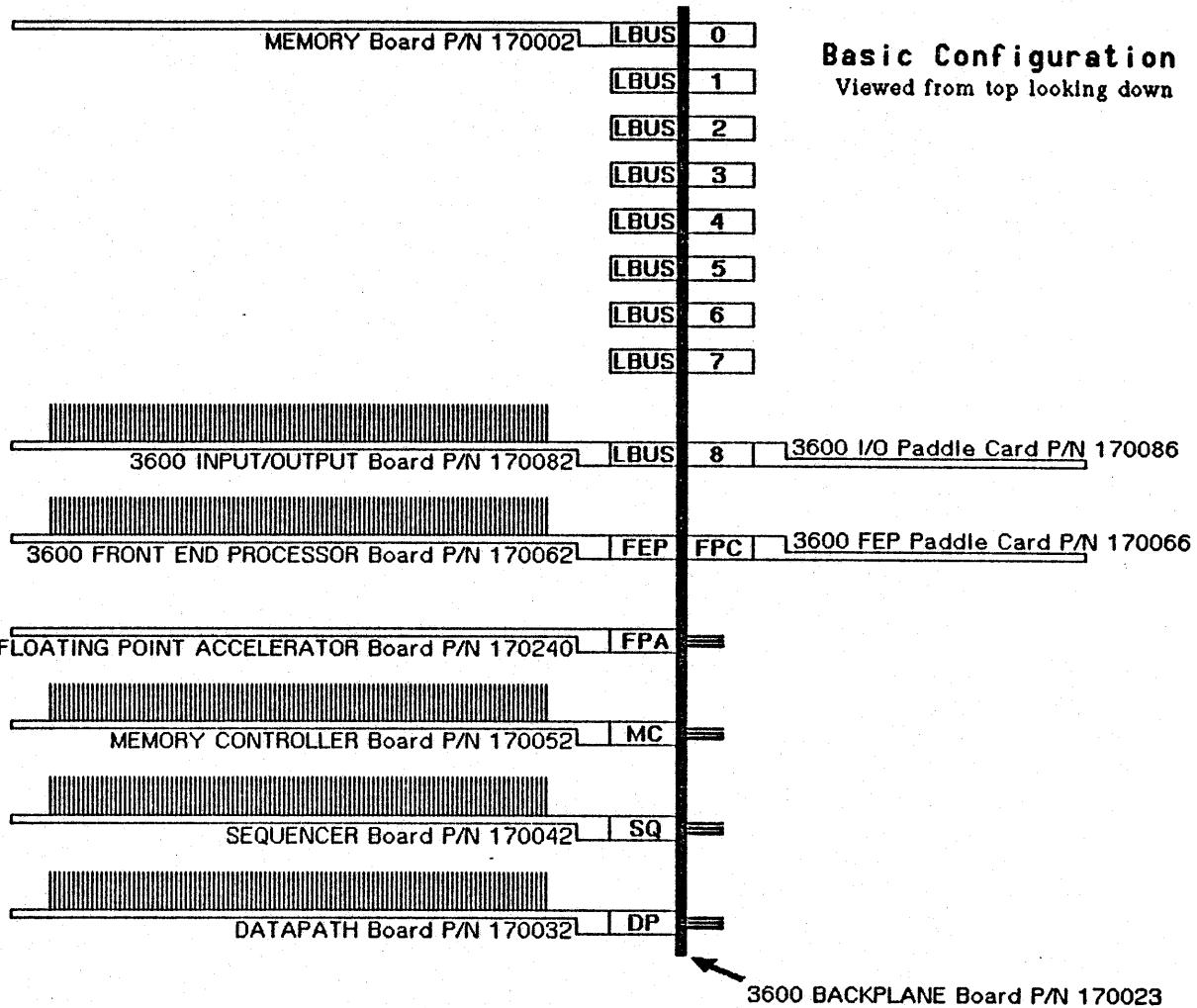
BASIC BOARD COMPLEMENT COMPATIBILITY NOTES:

- (a) FOR USE IN 3600 MACHINES WITH 3670 ENHANCEMENTS (PEV)
- (b) INCLUSION OF IFU, XSQ (170299-2), AND DATA PATH W/ DPIFU-2 PAL (170032) BOARDS CONVERT A STANDARD 3600 TO A 3600 WITH ENHANCED PERFORMANCE OPTION, A 3640 TO A 3645, OR A 3670 TO A 3675. THESE BOARDS MAY BE INSTALLED ONLY INTO MACHINES EQUIPPED WITH NEEP, 336 MICROCODE, AND 6.0 OR LATER WORDS.

OPTIONS

3600 SERIES BOARD COMPATIBILITY CHART

| BOARD | P/N | VERSION | 3600 -EPO | 3600 | 3640 | 3645 | 3670 | 3675 | REMARKS |
|--------------------------------------------------------|--------|---------|--------------|------|------|------|------|------|----------------------------------------------------------------------------------------|
| FLOATING POINT ACCELERATOR | | | | | | | | | |
| FPA | 170240 | | | X | X | X | X | X | |
| MAGNETIC TAPE INTERFACE (INCLUDES 2 BOARDS): | | | | | | | | | |
| MTI | 170176 | | | X | X | X | X | X | REQUIRED FOR TD80 |
| MTI PADDLE | 170213 | | | X | X | X | X | X | |
| DISK DRIVE MULTIPLEX | | | | | | | | | |
| AUX DISK PADDLE | 170197 | | | X | X | X | X | X | PADDLE BOARD INSERTED IN ANY UNUSED PADDLE SLOT. PROVIDES 1 TO 7 DISK DRIVE MULTIPLEX. |
| G BUS INTERFACE (INCLUDES 3 BOARDS): | | | | | | | | | |
| -MINIMAL | 170304 | -1 | | X | X | X | X | X | GENERIC BUS INTERFACE TO L-BUS |
| -POPULATED | 170304 | -3 | | X | X | X | X | X | USED FOR G BUS-SLAVE OPERATION OR USED FOR G BUS-MASTER OPERATION |
| G BUS PADDLE | 170383 | | | X | X | X | X | X | |
| UNIBUS BOARD | 170233 | | | X | X | X | X | X | G TO L-BUS INTERFACE FOR DEC OR |
| MULTIBUS BOARD | 170360 | | | X | X | X | X | X | G TO L-BUS INTERFACE FOR INTEL |
| COLOR OPTIONS | | | | | | | | | |
| STANDARD COLOR SYSTEM (INCLUDES 3 BOARD TYPES): | | | | | | | | | |
| COLOR CONTROLLER | 170140 | | | X | X | X | X | X | |
| COLOR MEMORY | 170136 | | | X | X | X | X | X | 1 TO 4 BOARDS |
| COLOR PADDLE | 170144 | | | X | X | X | X | X | FOR SYSTEMS W/O OVERLAY ONLY |
| CHROMA PADDLE | 170387 | | | X | X | X | X | X | FOR SYSTEMS W/ OR W/O OVERLAY |
| BROADCAST COLOR SYSTEM (INCLUDES 3 BOARDS): | | | | | | | | | |
| COLOR CONTROLLER | 170140 | | | X | X | X | X | X | LOW-RES ONLY |
| COLOR MEMORY | 170136 | | | X | X | X | X | X | |
| BROADCAST PADDLE | 170328 | | | X | X | X | X | X | |
| CAD SYSTEM (INCLUDES 2 BOARDS): | | | | | | | | | |
| CAD BUFFER | 170324 | | | X | X | X | X | X | HIGH-RES / NON-INTERLACED |
| CAD PADDLE | 170314 | | | X | X | X | X | X | |
| OTHER: | | | | | | | | | |
| FRAME GRABBER | 170403 | | | X | X | X | X | X | |
| F.G. PADDLE | 170281 | | | X | X | X | X | X | |
| GEN-LOCK PADDLE | 170285 | | | X | X | X | X | X | |



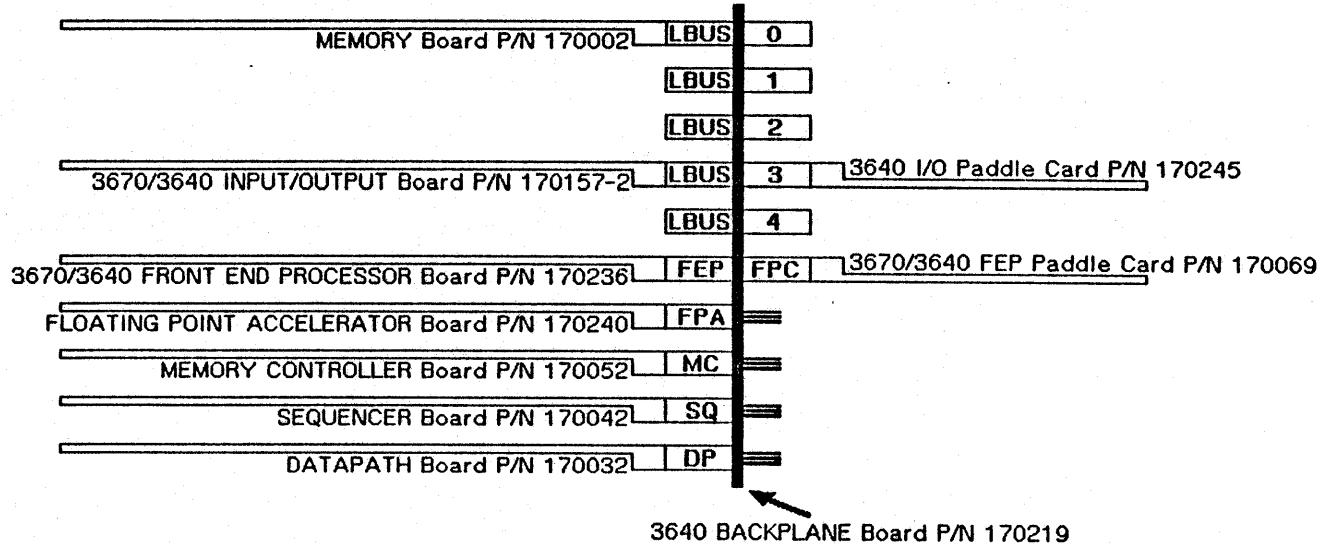
3600 BACKPLANE ASSIGNMENT

Basic Configuration
Viewed from top looking down

| | | | |
|------------------------------------------------|------|-----|--------------------------------------|
| MEMORY Board P/N 170002 | LBUS | 0 | |
| | LBUS | 1 | |
| | LBUS | 2 | |
| | LBUS | 3 | |
| | LBUS | 4 | |
| | LBUS | 5 | |
| | LBUS | 6 | |
| | LBUS | 7 | |
| | LBUS | 8 | |
| | LBUS | 9 | |
| | LBUS | 10 | |
| | LBUS | 11 | |
| 3670/3640 INPUT/OUTPUT Board P/N 170157-1 | LBUS | 12 | 3670 I/O Paddle Card P/N 170162 |
| | LBUS | 13 | |
| | LBUS | 14 | |
| | LBUS | 15 | |
| 3670/3640 FRONT END PROCESSOR Board P/N 170236 | FEP | FPC | 3670/3640 FEP Paddle Card P/N 170069 |
| FLOATING POINT ACCELERATOR Board P/N 170240 | FPA | | |
| MEMORY CONTROLLER Board P/N 170052 | MC | | 3670 BACKPLANE Board P/N 170027 |
| SEQUENCER Board P/N 170042 | SQ | | |
| DATAPATH Board P/N 170032 | DP | | |

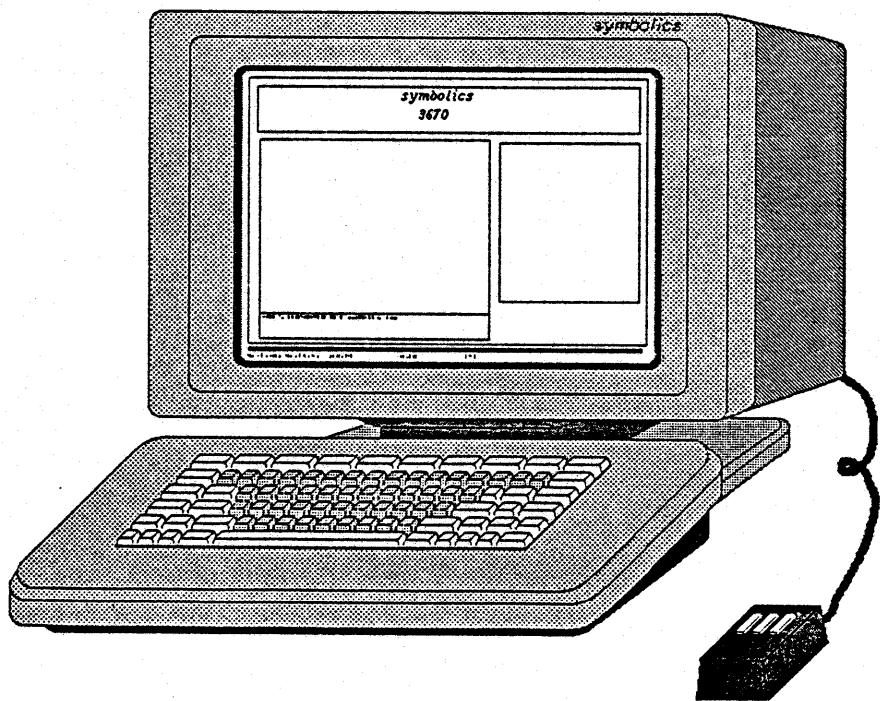
3670 BACKPLANE ASSIGNMENT

Basic Configuration
Viewed from top looking down

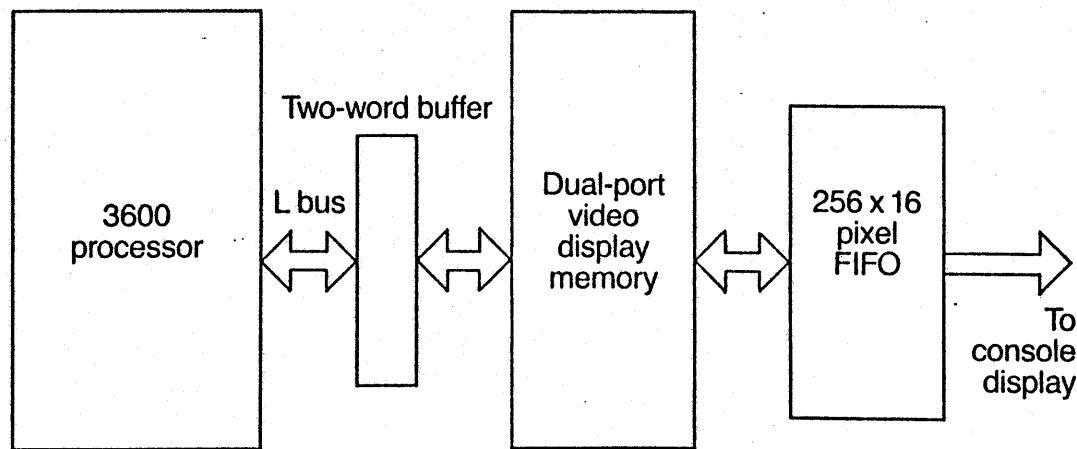


3640 Backplane Assignments

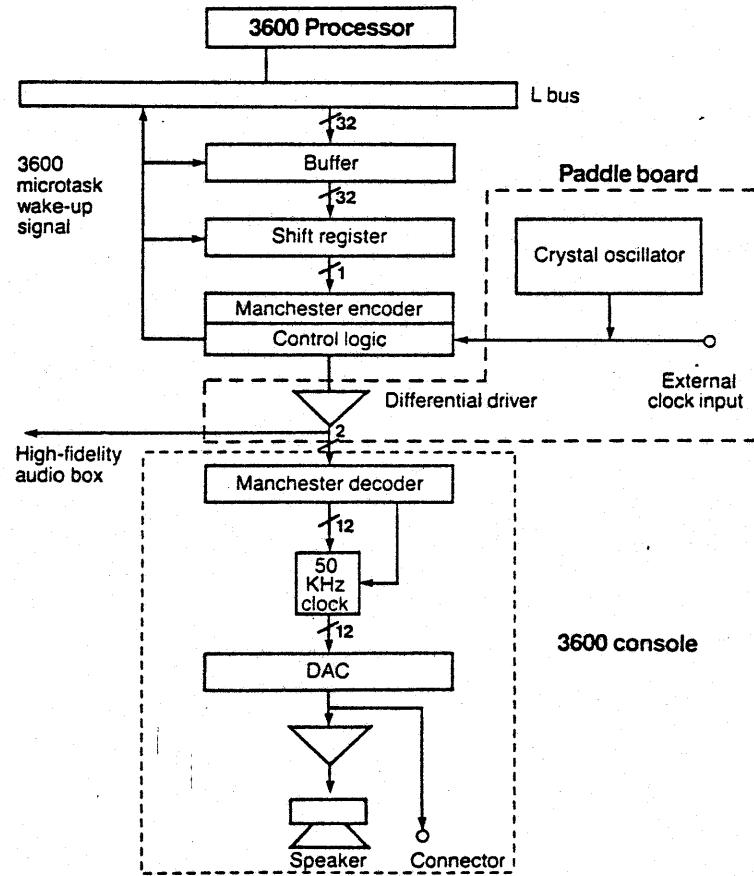
symbolics inc.



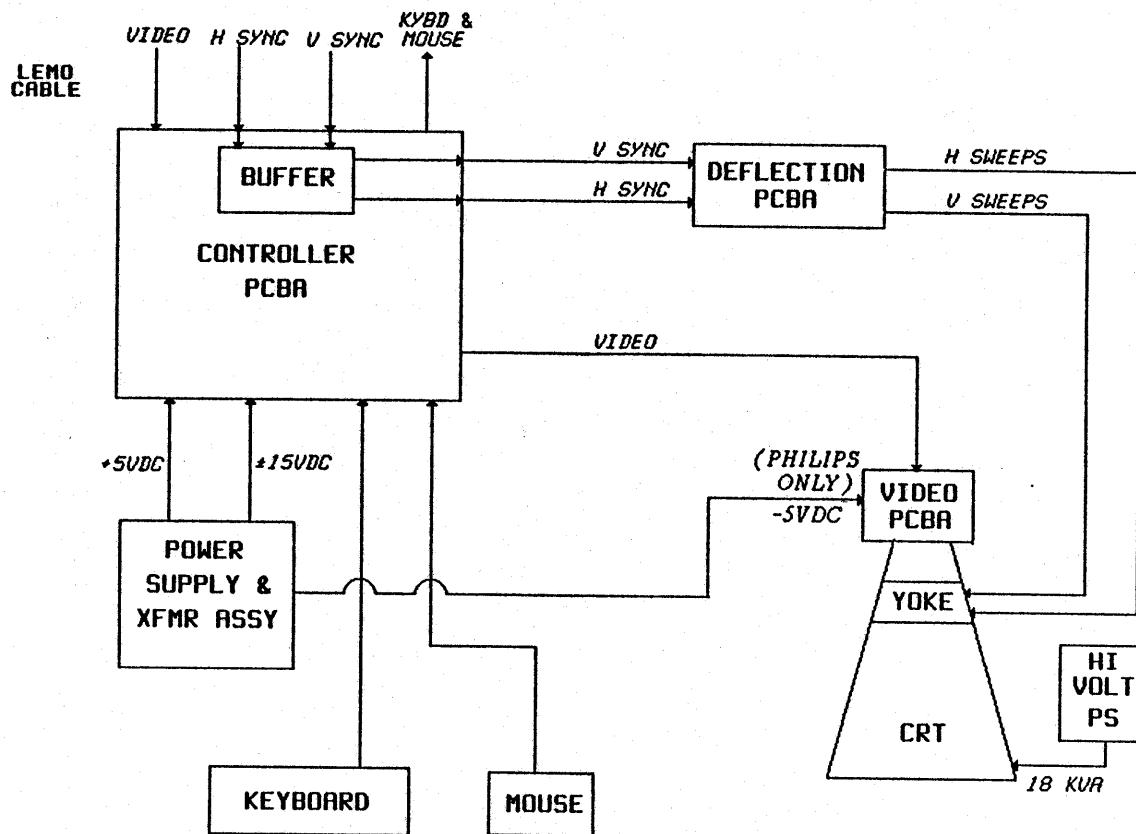
3600 SERIES CONSOLE



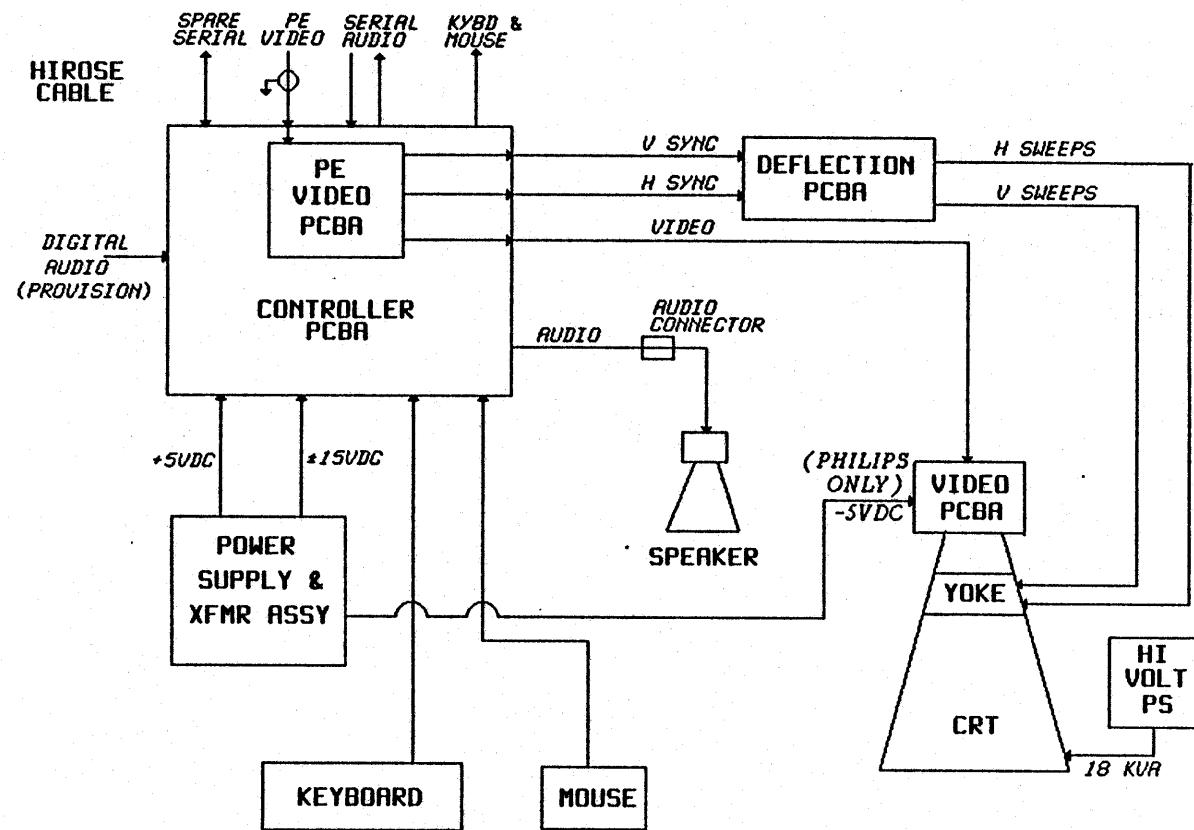
Buffered Datapath to Display



BASIC DIGITAL AUDIO OUTPUT SYSTEM

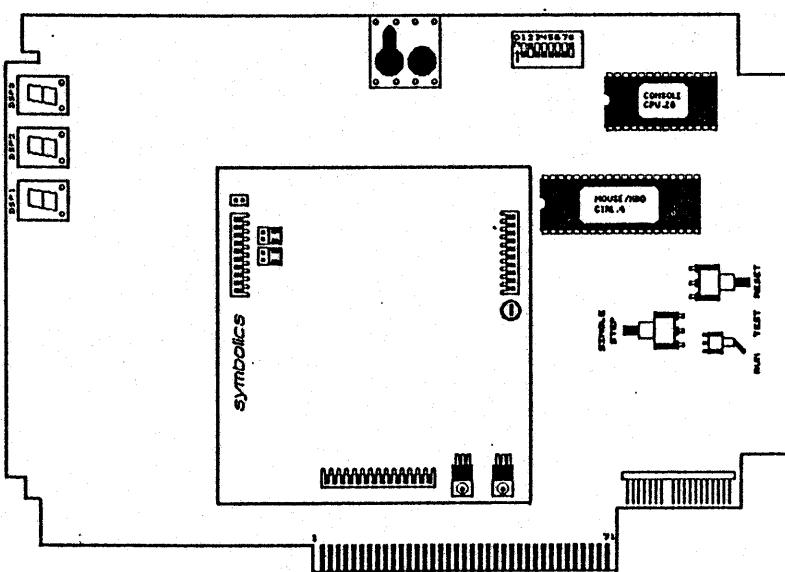
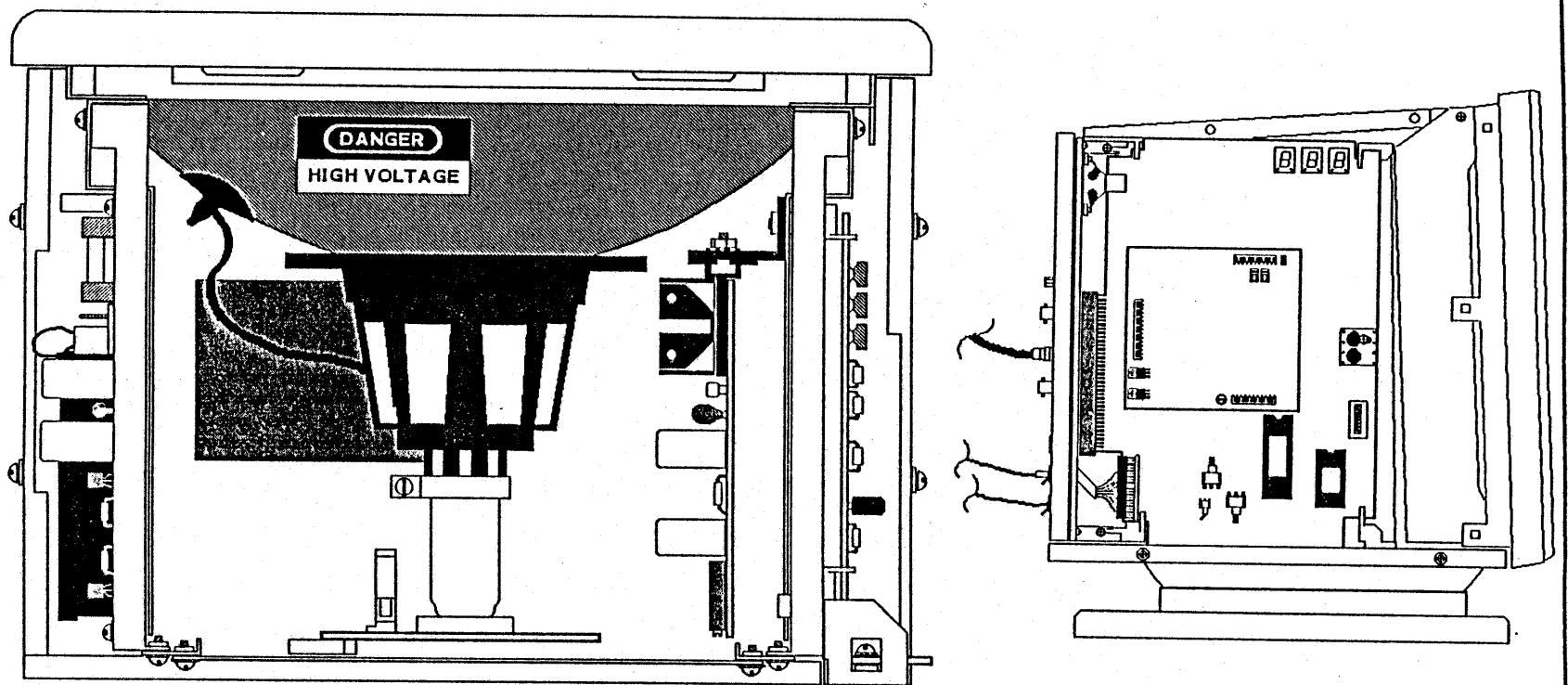


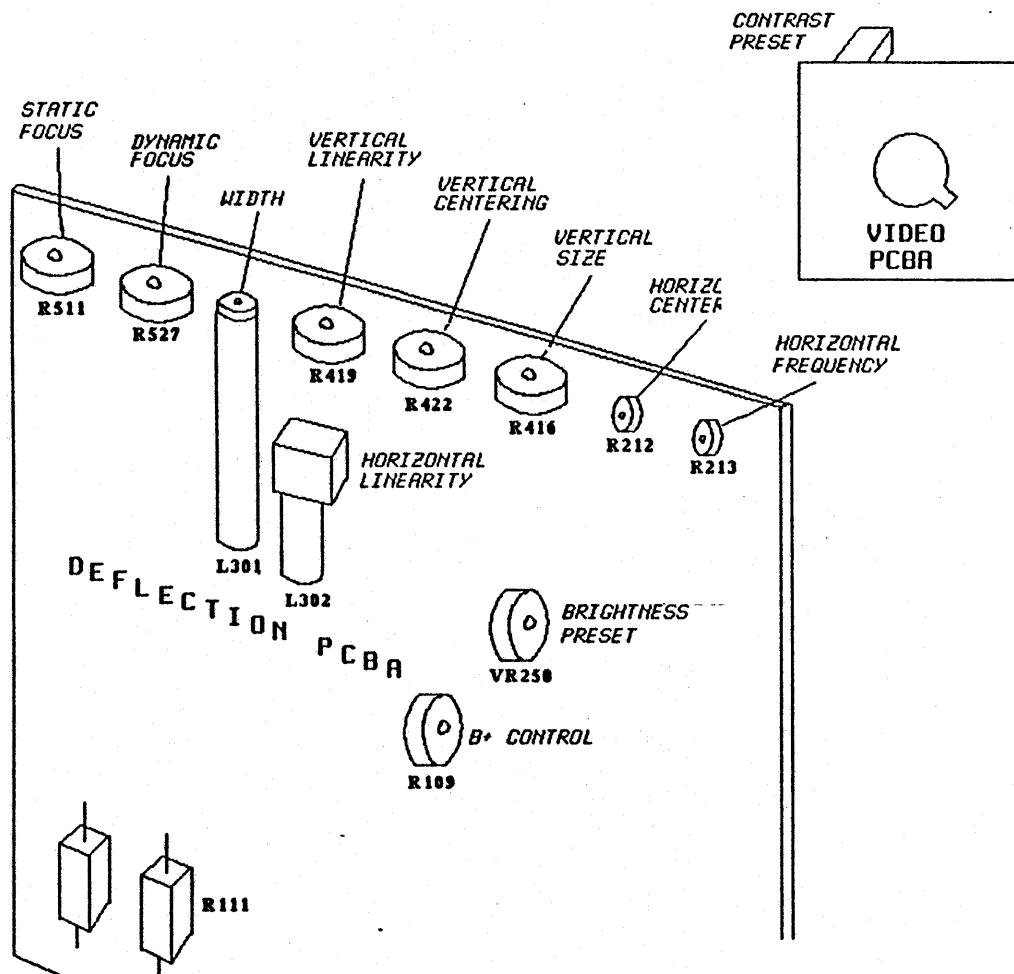
LEMO MONITOR BLOCK DIAGRAM



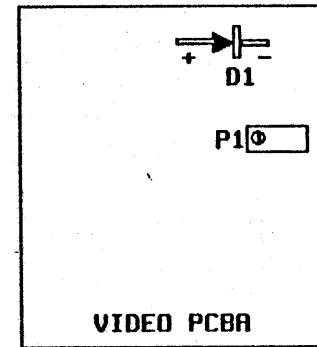
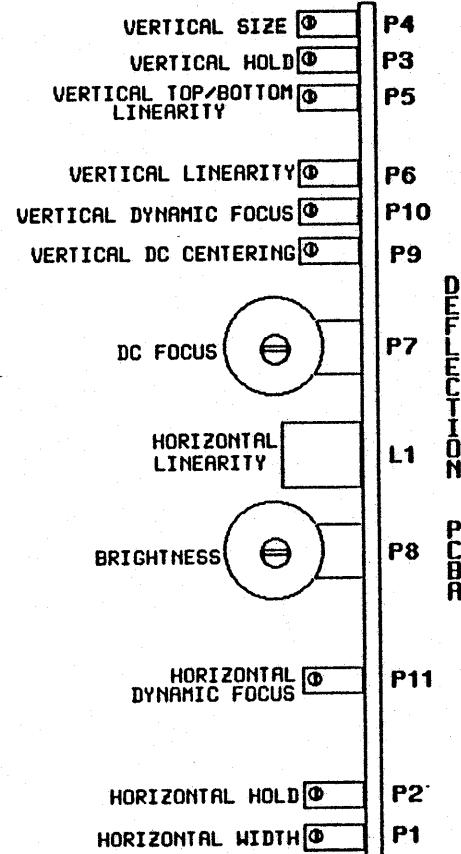
PEV MONITOR BLOCK DIAGRAM

symbolics inc.

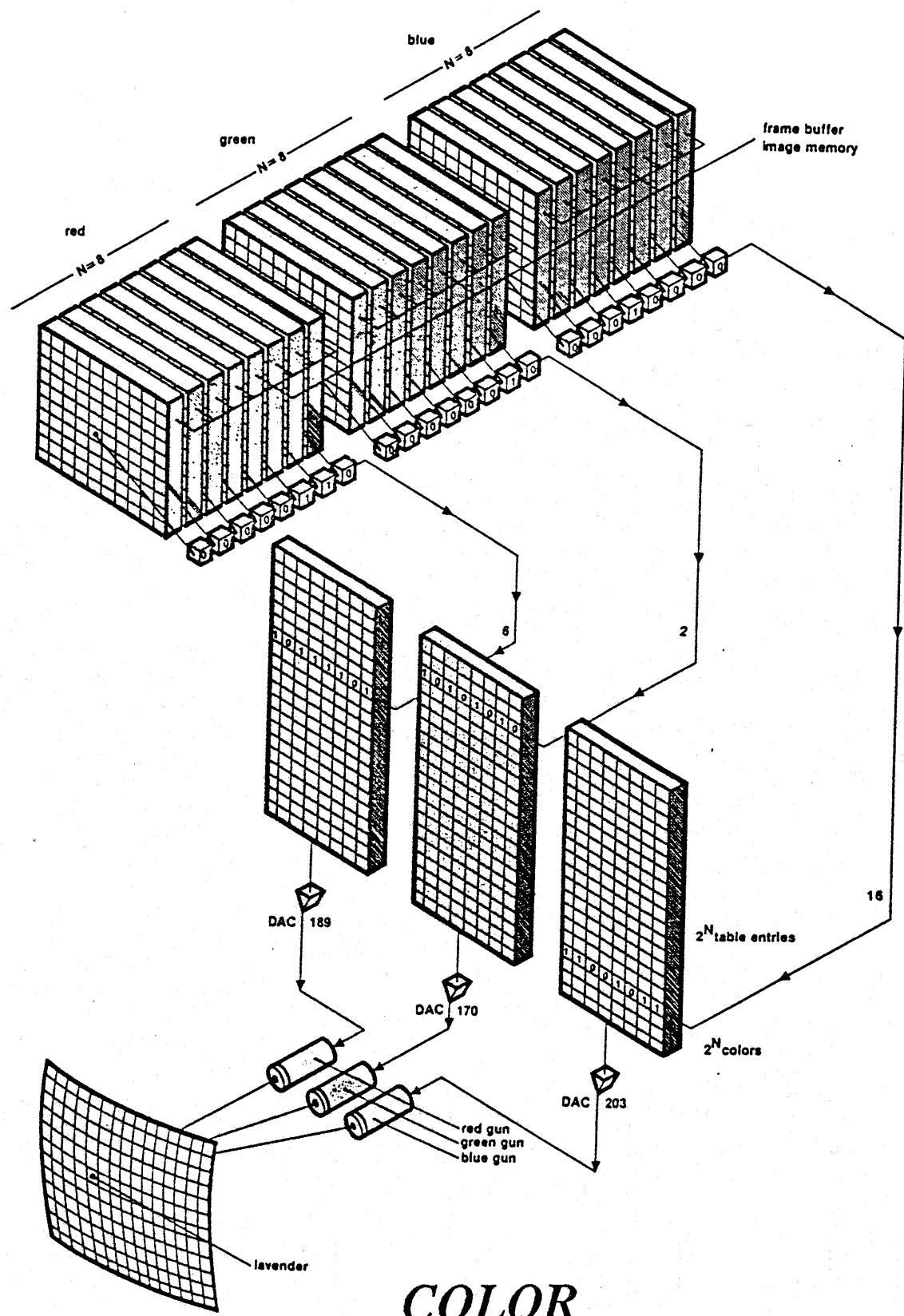




PHILLIPS DISPLAY ADJUSTMENTS



MONITERM DISPLAY ADJUSTMENTS



COLOR SYSTEM HARDWARE OPTIONS

COLOR SYSTEM

COMPONENT PCBA'S

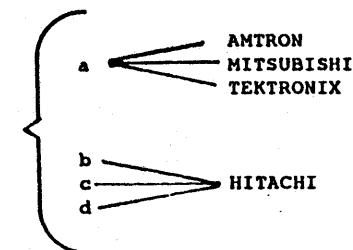
RESOLUTION

CONSOLES

| | | | | | | |
|-------------------------------|---------------------------|----------------------------|-------------------------------|---------------------------|-------------------------|--------------------------------|
| COLOR CONTROLLER 170140 | COLOR PADDLE 170144 | CHROMA PADDLE 170387 | BROADCAST PADDLE 170328 | COLOR MEMORY 170136 | CAD BUFFER 170324 | CAD BUFFER PADDLE 170314 |
|-------------------------------|---------------------------|----------------------------|-------------------------------|---------------------------|-------------------------|--------------------------------|

STANDARD

| | | | | | |
|--------|---|----------------|---|---|---|
| 8-BIT | 1 | 1 --- or --- 1 | | 1 | |
| 8+8 | 1 | | 1 | | 2 |
| 16-BIT | 1 | 1 --- or --- 1 | | 2 | |
| 16+8 | 1 | | 1 | | 3 |
| 24-BIT | 1 | 1 --- or --- 1 | | 3 | |
| 32-BIT | 1 | | 1 | | 4 |

BROADCAST
RESOLUTION

| | | | | | | |
|---------------------------------------------------|---|--|---|---|---|---------|
| ALL MODES | 1 | | 1 | 1 | b | HITACHI |
| (UP TO 24-BITS WITH 8-BIT OVERLAY) | | | | | | |

CAD BUFFER

| | | | | | | |
|-----------------|--|--|---|---|---|-----------------------------|
| 8 BITS + 1 O.L. | | | 1 | 1 | e | CAD-AMTRON CAD-TEKTRONIX |
|-----------------|--|--|---|---|---|-----------------------------|

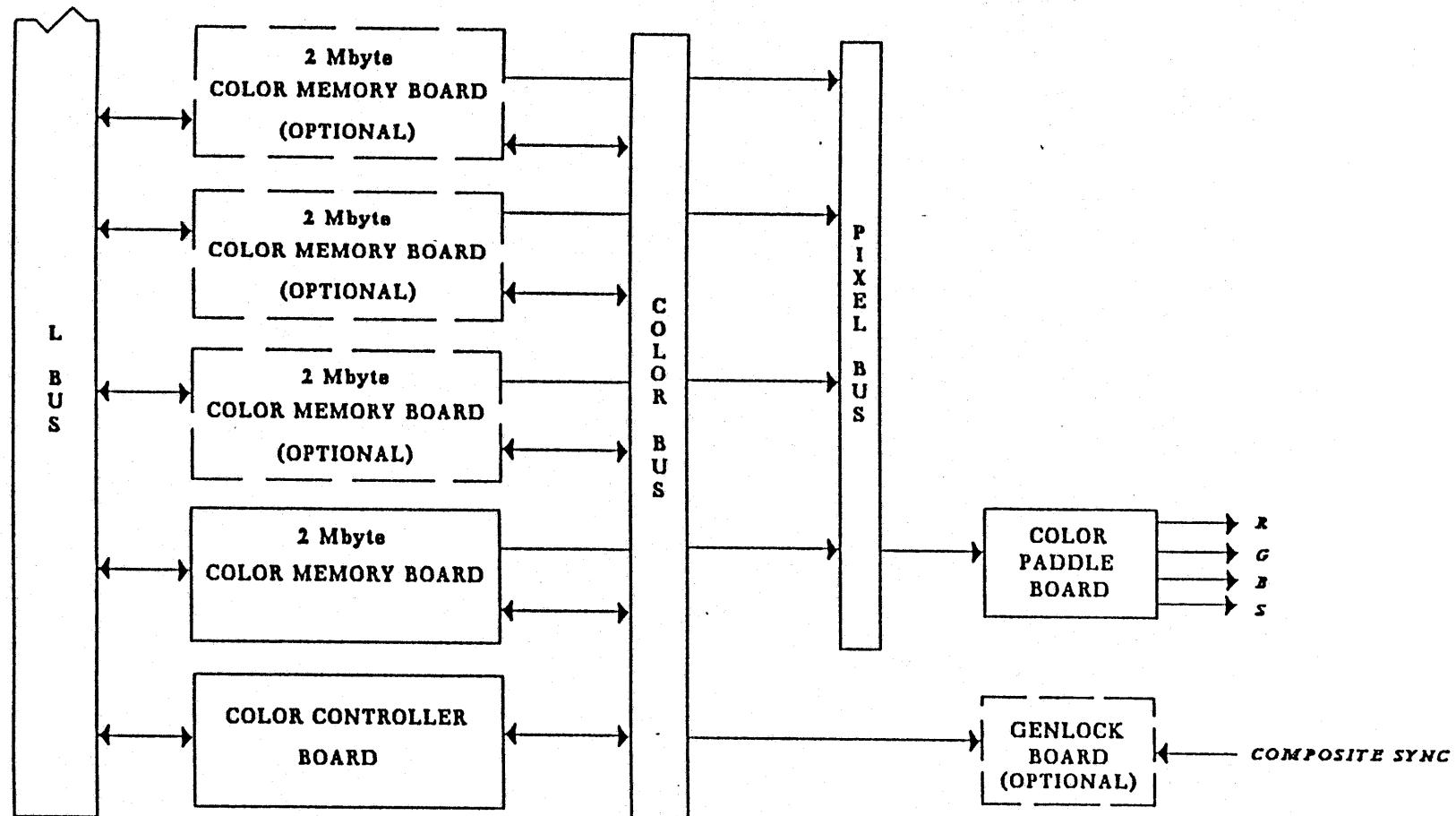
RESOLUTION NOTES:

- a - HI-RES (1280 X 1024) 30 HZ FRAME RATE - INTERLACED
- b - NTSC (640 X 480) 30 HZ FRAME RATE - INTERLACED
- c - PAL (640 X 575) 25 HZ FRAME RATE - INTERLACED
- d - PAL (865 X 575) 25 HZ FRAME RATE - INTERLACED
- e - CAD HI-RES (1024 x 1024) 60 HZ FRAME RATE - NON-INTERLACED

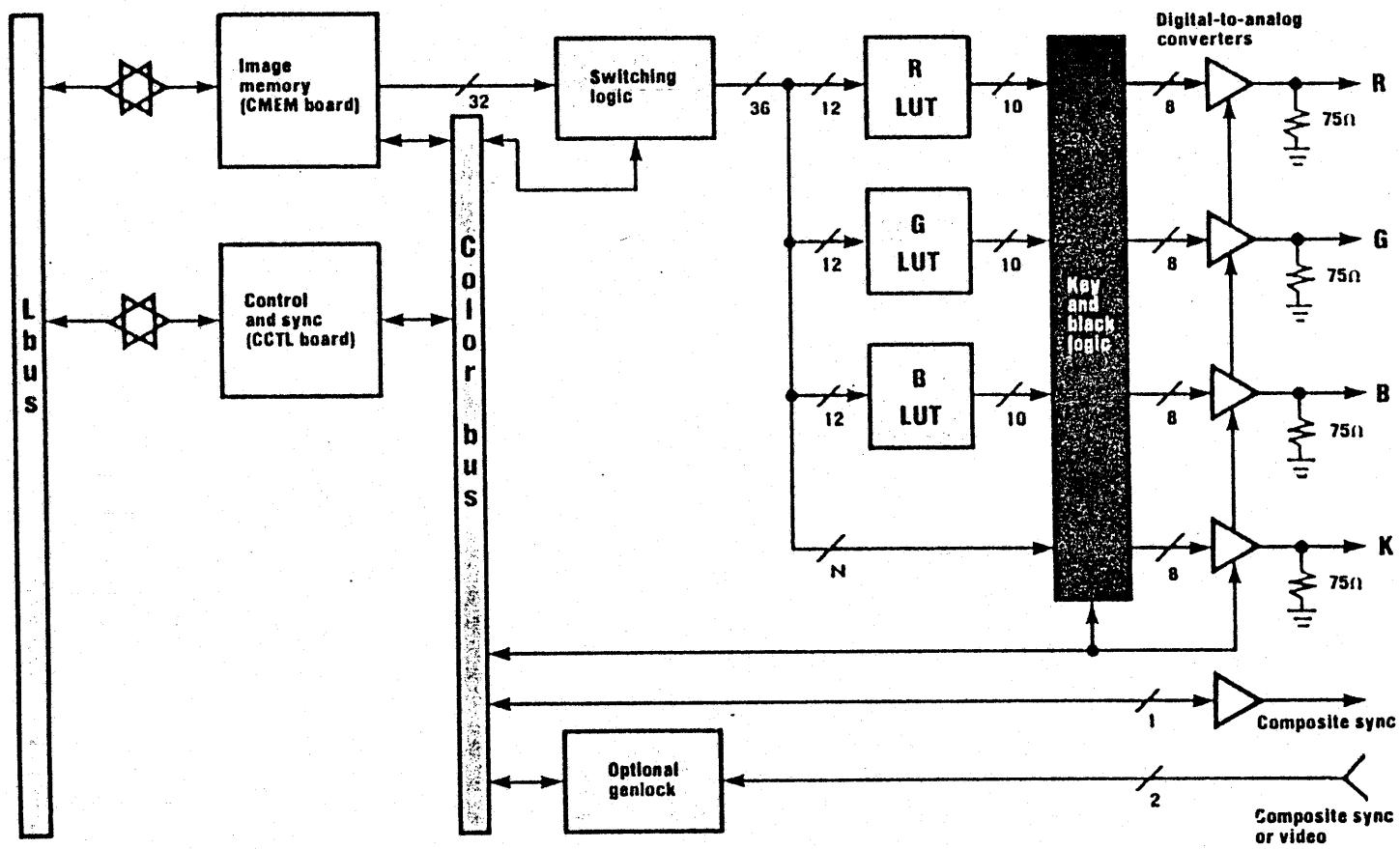
COLOR SYSTEM HARDWARE OPTIONS

| OPTION | REQUIRED PCBA'S | NOTES |
|-----------------------|-------------------------|------------------------------------------------------------|
| | FRAME GRABBER 170403 | FRAME GRABBER PADDLE 170281 |
| FRAME GRABBER | 1 | GENLOCK PADDLE 170285 |
| GENLOCK | | FUNCTIONS INDEPENDENT OF ANY COLOR SYSTEM |
| GRAPHICS TABLET | | MAY BE USED WITH STANDARD SYSTEM OR BROADCAST SYSTEM |
| SERIAL CONVERTER UNIT | 1 | MAY BE USED WITH ANY COLOR SYSTEM |
| COLOR CONSOLE UNIT | 1 | FUNCTIONS INDEPENDENT OF ANY COLOR SYSTEM |
| | | MAY BE USED WITH CAD BUFFER SYS. ONLY |
| | | REQUIRES CAD COLOR CONSOLE SOFTWARE LOADED |

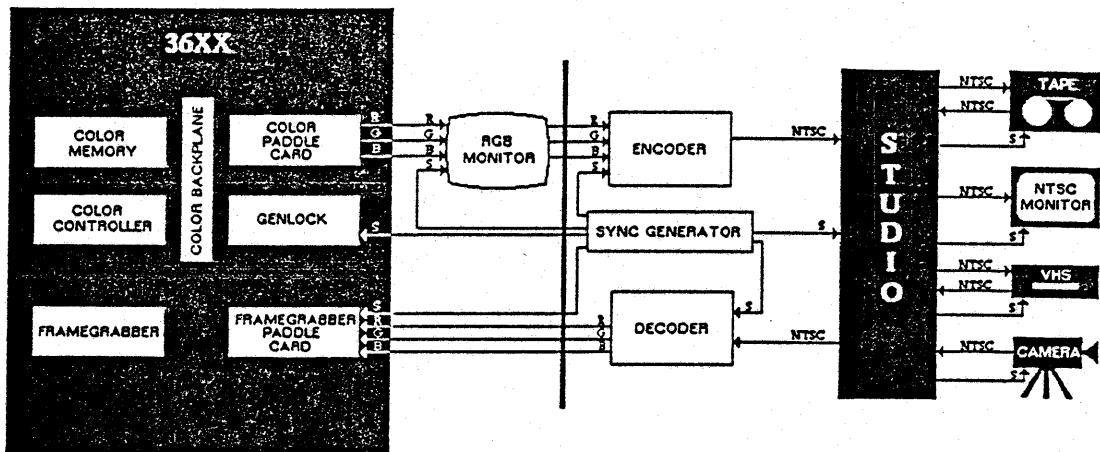
COLOR SOFTWARE OPTIONS



STANDARD COLOR SYSTEM

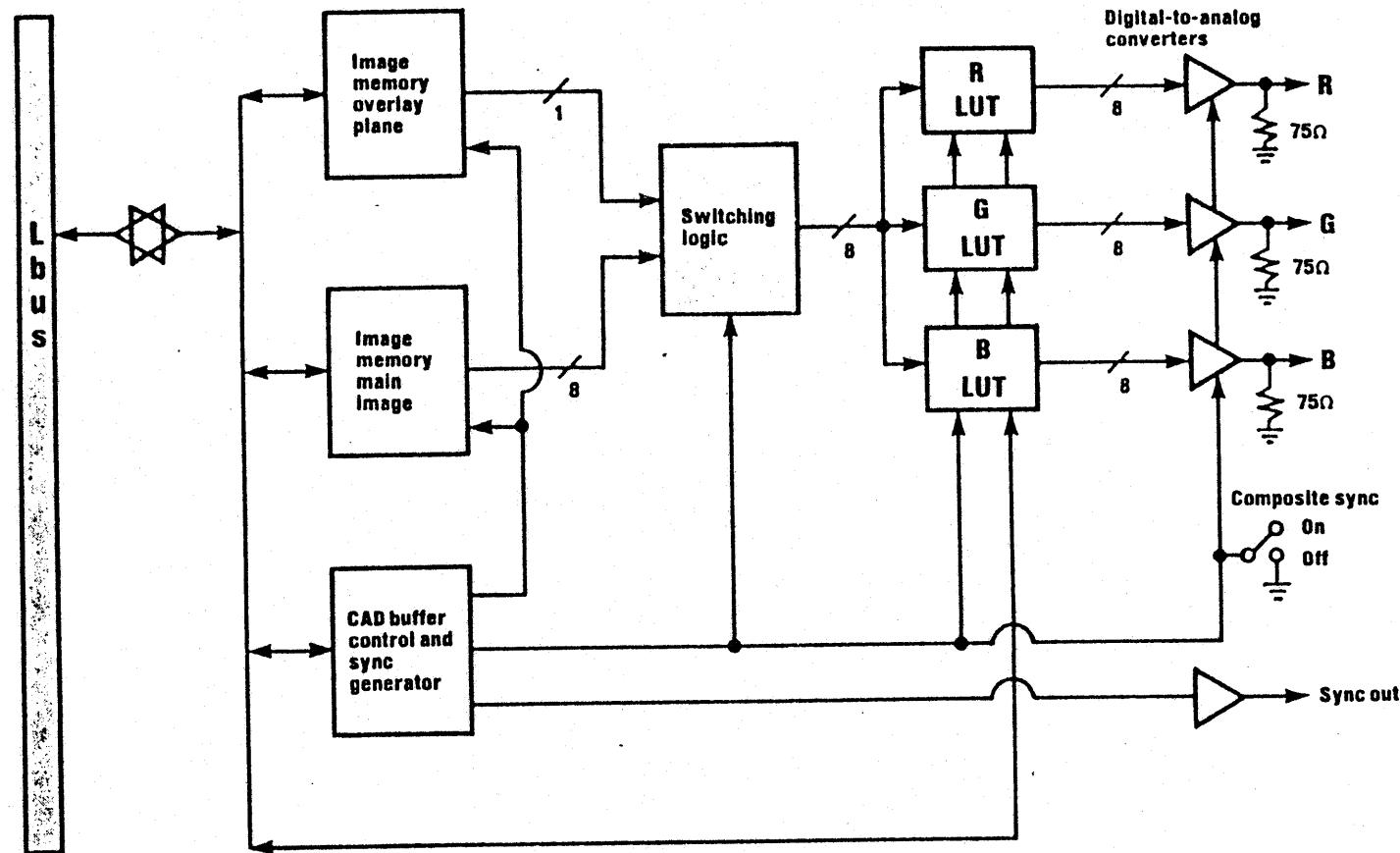


BROADCAST COLOR SYSTEM

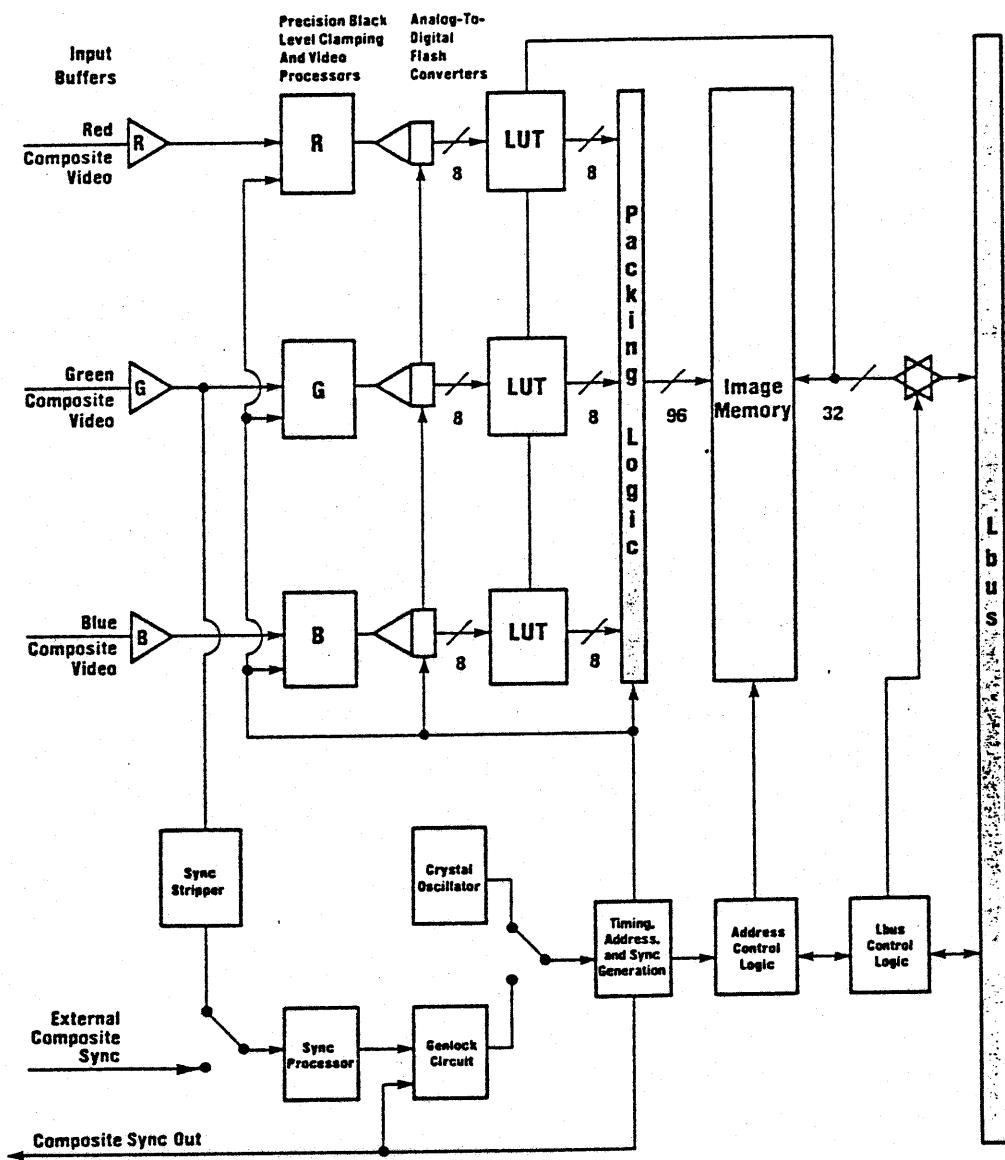


NOTE: The picture is divided in two to show customer responsibilities versus Symbolics supported hardware.

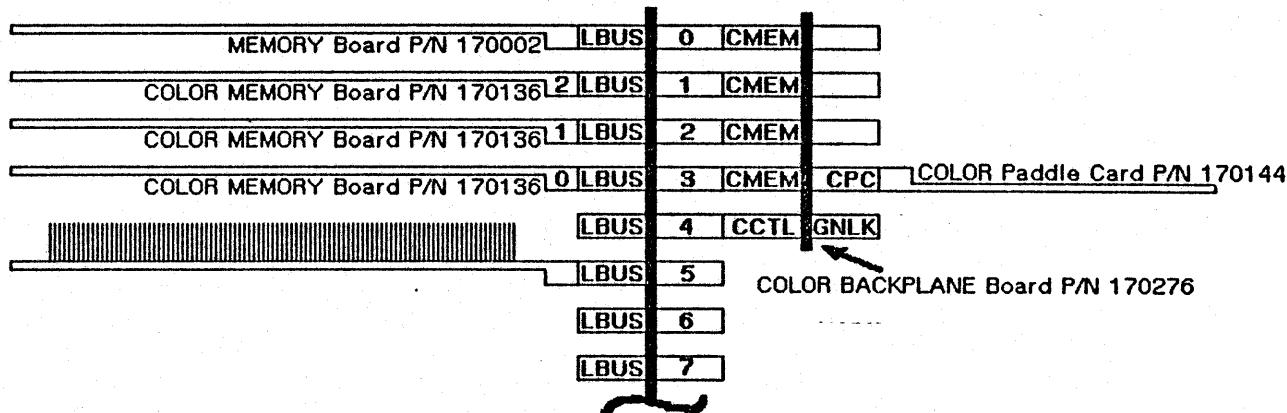
STUDIO ENVIRONMENT



CAD-BUFFER



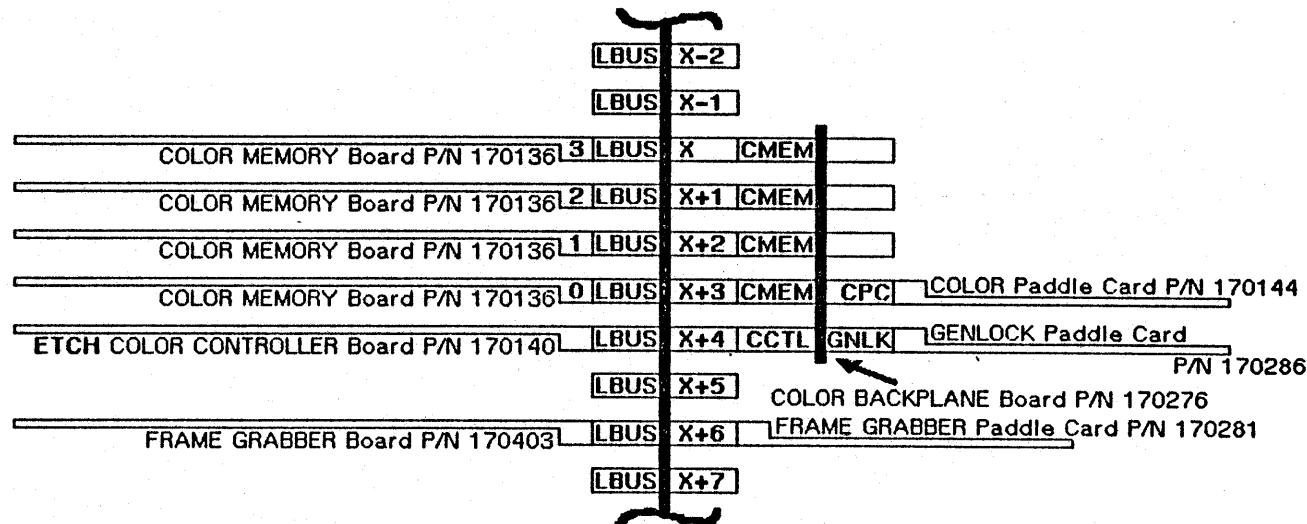
FRAME GRABBER



NOTES:

1. When using a Wire-Wrap Color Controller Board, the Color Backplane board MUST be plugged into the first 5 slots of the backplane. There MUST be WW connections between LBUS4 and LBUS5.
2. Color memory boards are plugged in, next to each other, starting with the slot to the left of the Color Controller.
3. The Color Paddle Card always goes behind the first Color Memory board.

3670/3600 Color Option Wire-Wrap Color Controller ONLY

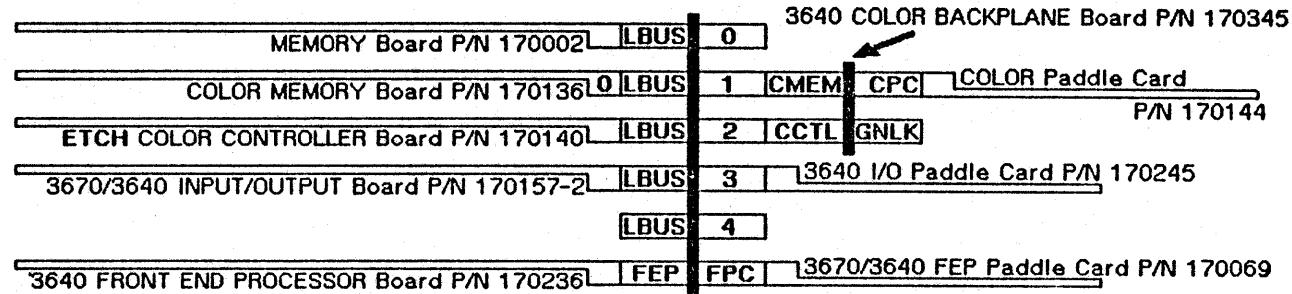


NOTES:

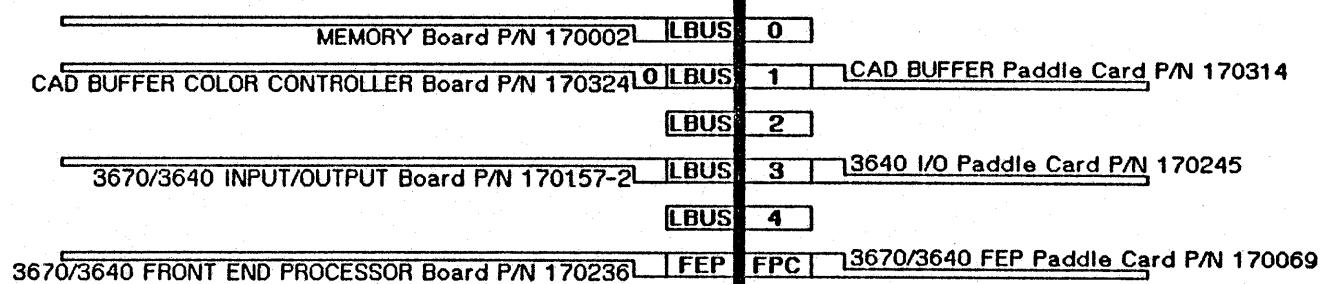
1. When using an ETC Color Controller Board, the Color Option can be placed ANYWHERE there is five (5) adjacent empty LBUS slots.
2. Color memory boards are plugged in, next to each other, starting with the slot to the left of the Color Controller.
3. The Color Paddle Card always goes behind the first Color Memory board.
4. The OPTIONAL Genlock Paddle Card ALWAYS goes behind the Color Controller Board.
5. The OPTIONAL Frame Grabber Board and its Paddle Card can plug into ANY empty LBUS slot.

3670/3600 Color Options ETC Color Controller ONLY

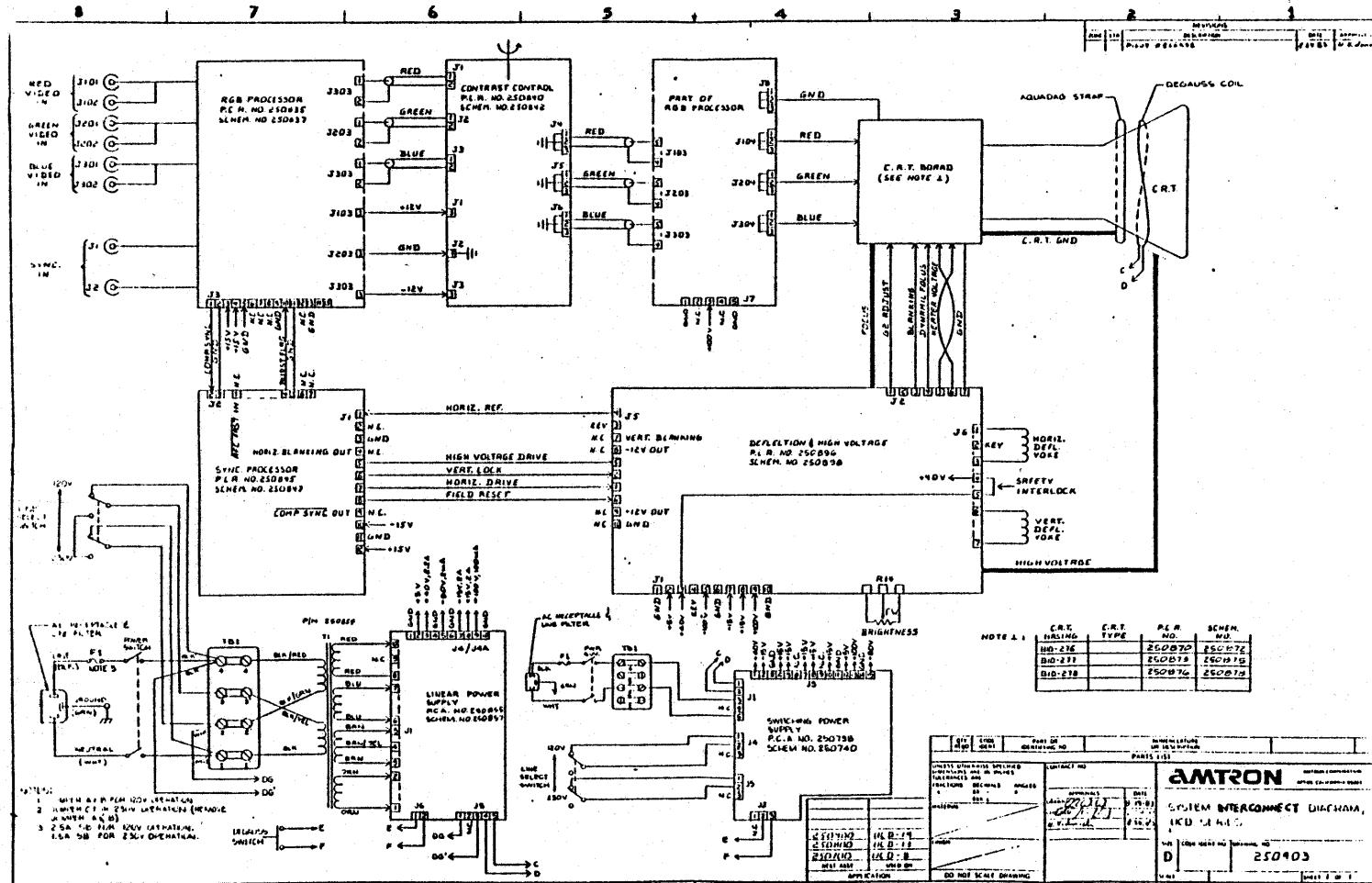
Standard 8-Bit Color Option
Viewed from top looking down

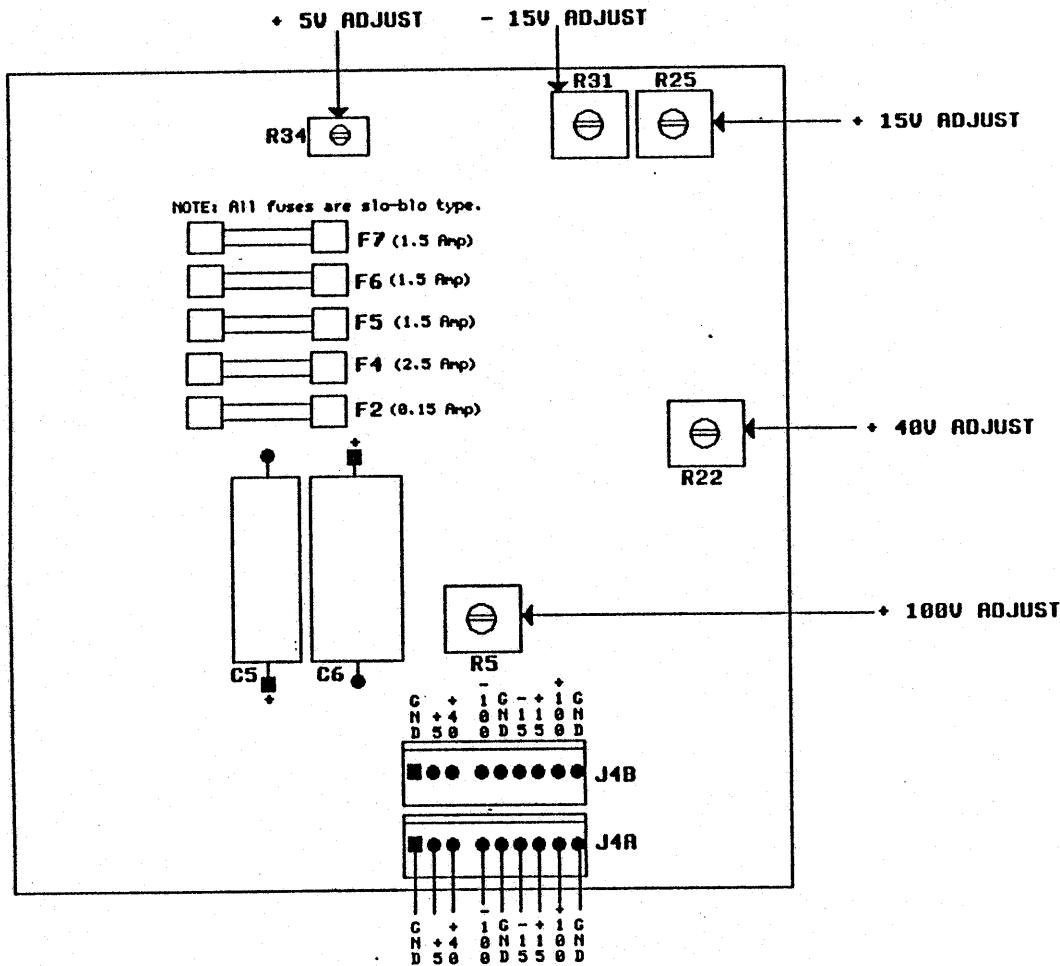


CAD Buffer Color Option
Viewed from top looking down

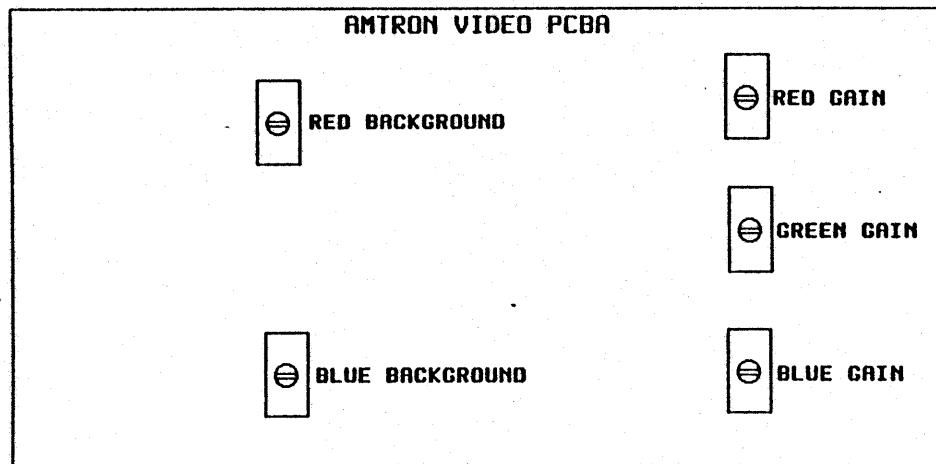


3640 Color Options

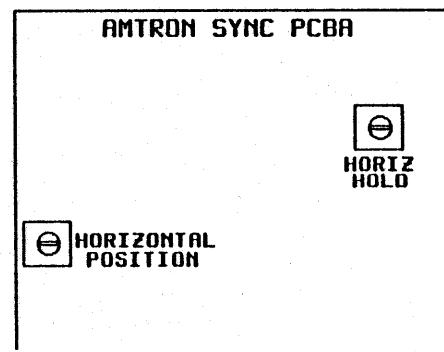
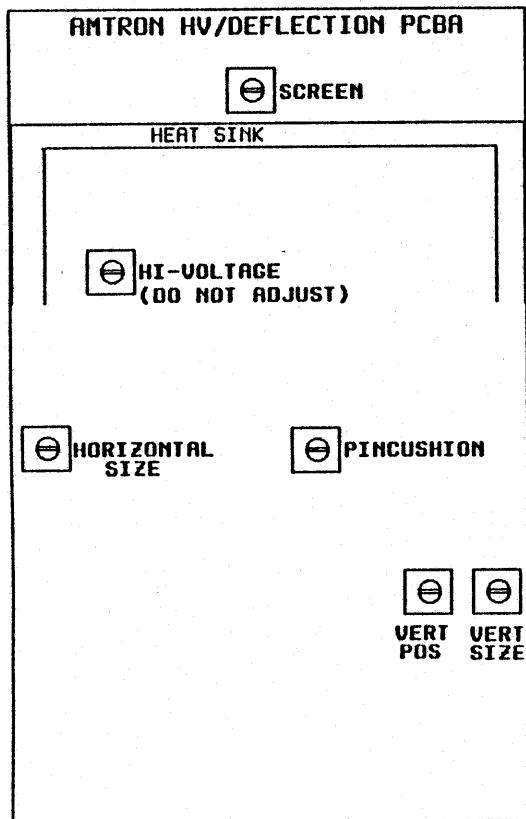




AMTRON LINEAR POWER SUPPLY

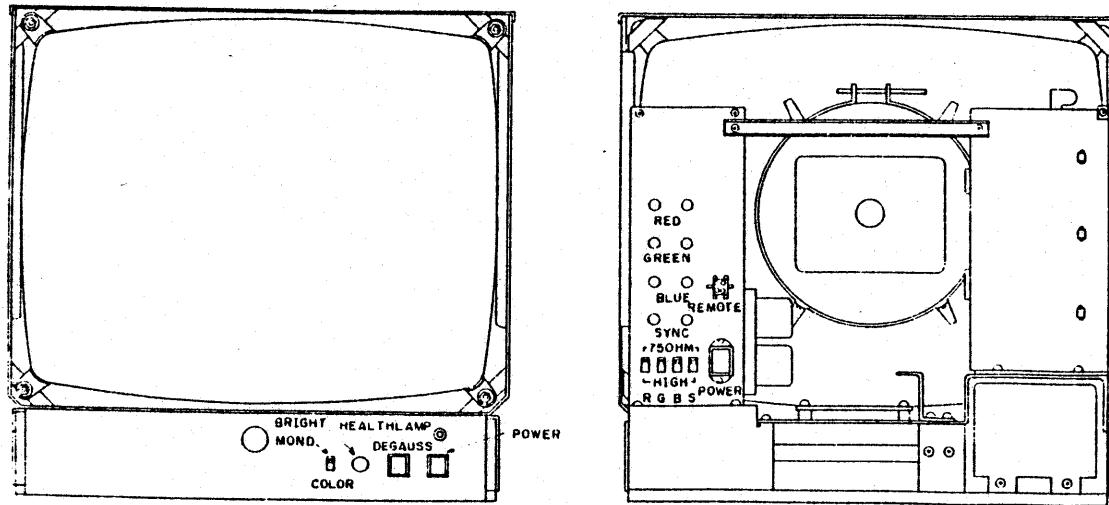


AMTRON VIDEO ADJUSTMENTS



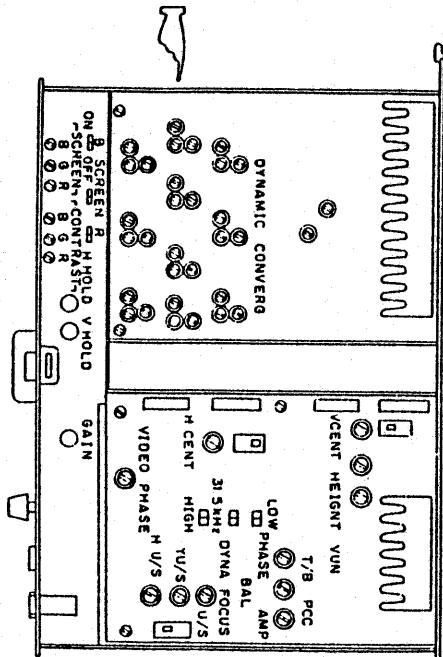
(FRONT OF MONITOR)

AMTRON DEFLECTION & SYNC ADJUSTMENTS

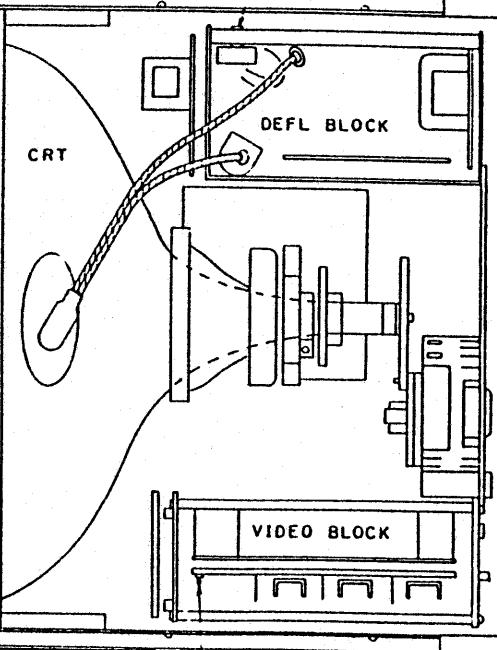


AYDIN FRONT & BACK PANELS

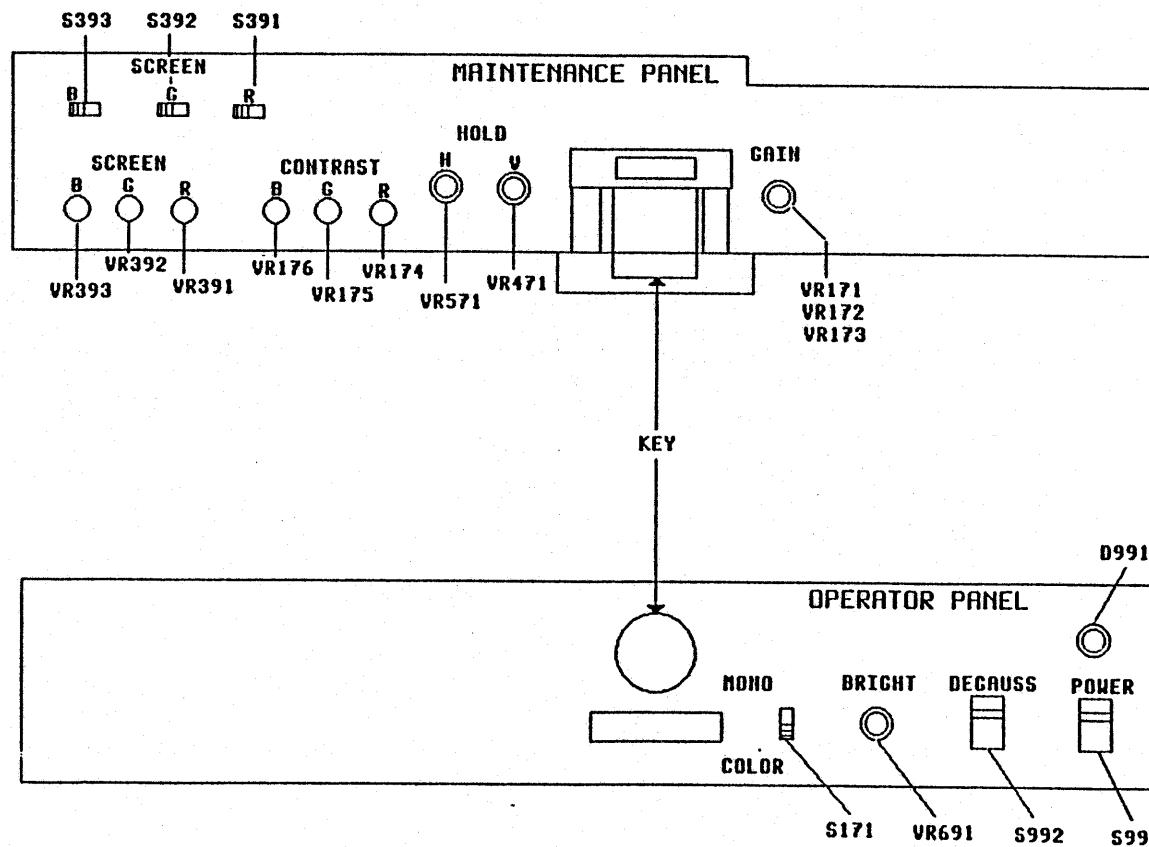
DYNAMIC CONVERGENCE CONTROLS



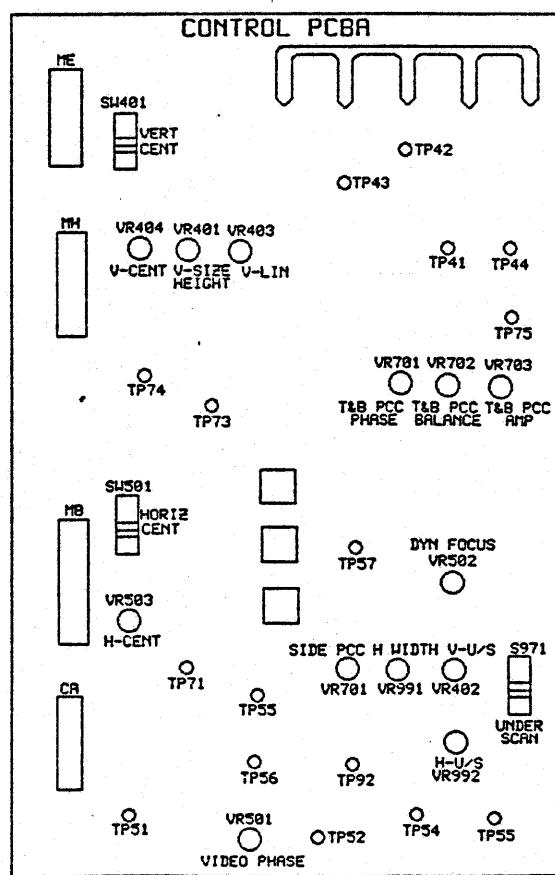
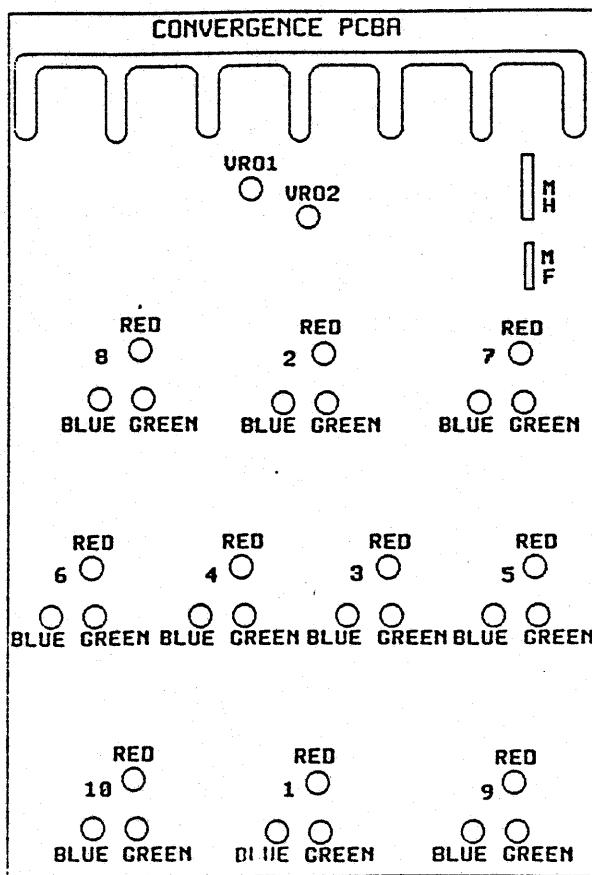
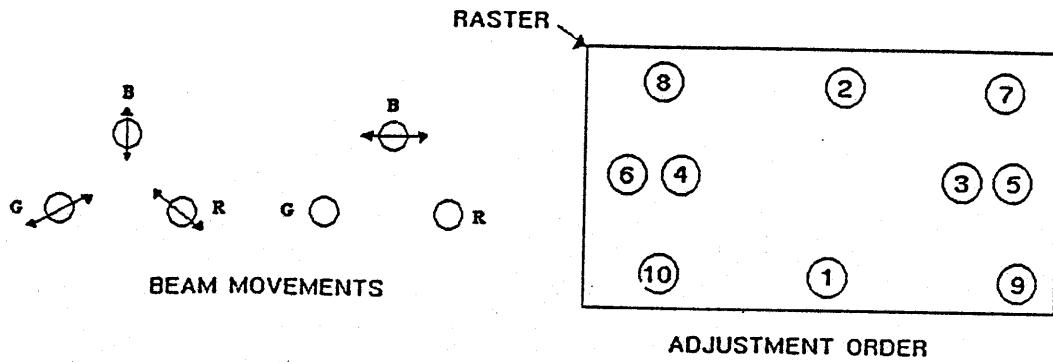
FOCUS



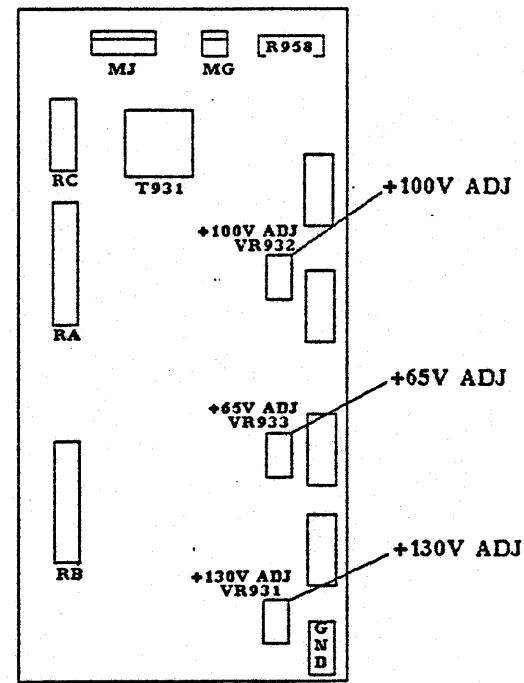
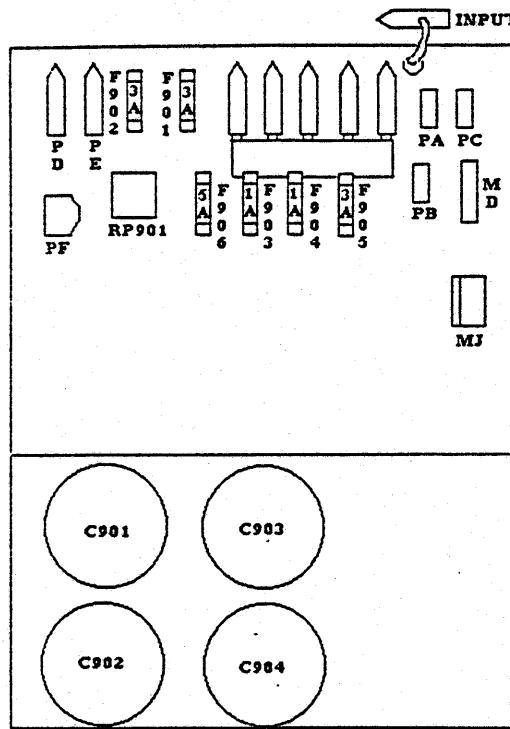
AYDIN BLOCK CONFIGURATION



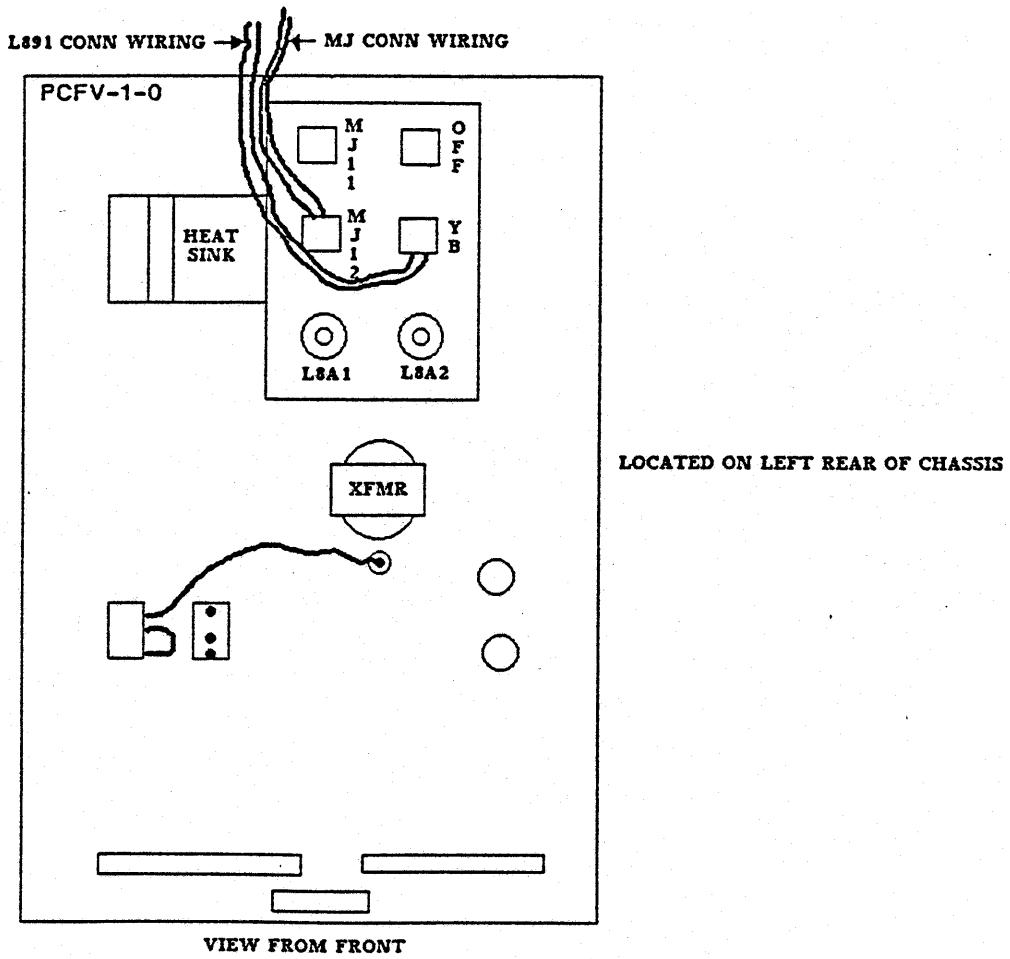
AYDIN MAINTENANCE AND OPERATOR PANEL ADJUSTMENTS



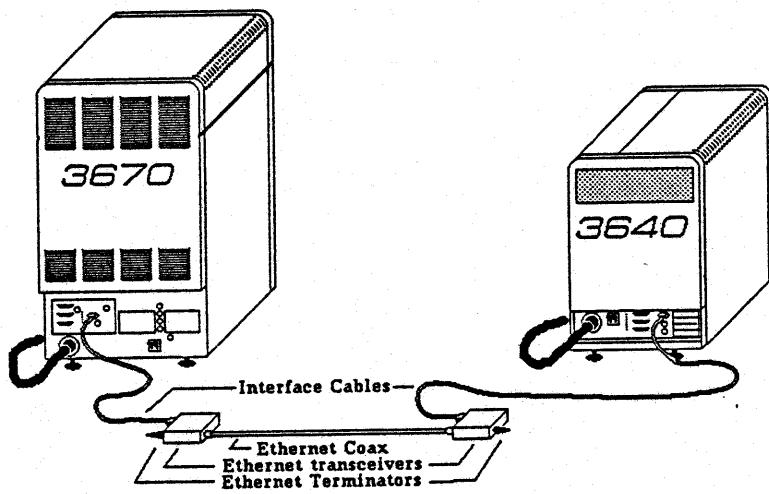
AYDIN CONVERGENCE AND DEFLECTION ADJUSTMENTS



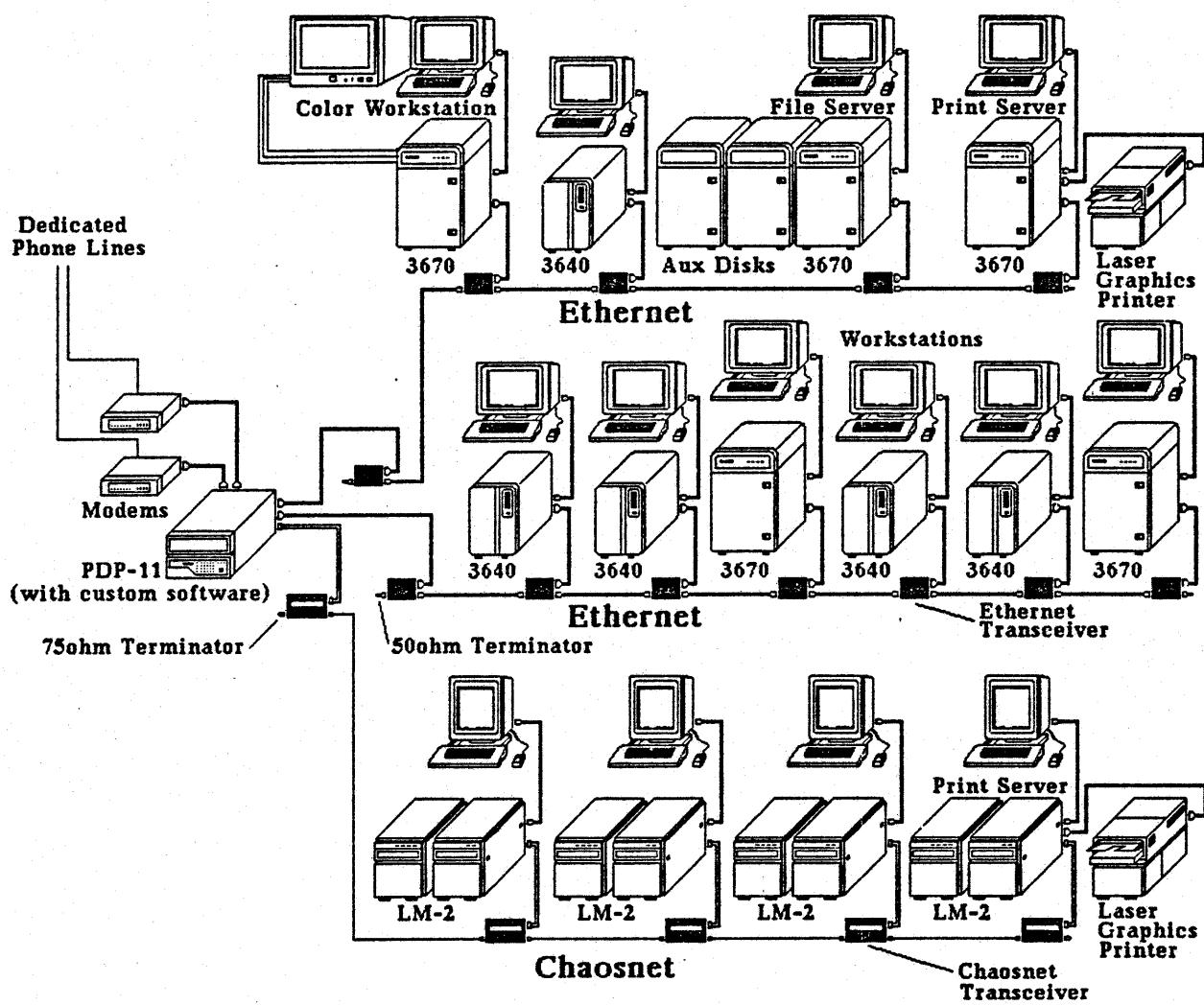
**AYDIN PCB - POWER RECT
AND PCB - POWER REG ADJUSTMENTS**



**DYNAMIC BLUD
ADJUSTMENT**

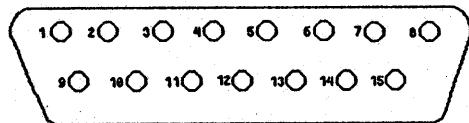


NETWORKING



symbolics Local Area Network (LAN)

symbolics inc.



| PIN | SIGNAL | PIN | SIGNAL |
|-----|----------------------|-----|----------------------|
| 1 | SHIELD | 9 | COLLISION PRESENCE - |
| 2 | COLLISION PRESENCE + | 10 | TRANSMIT - |
| 3 | TRANSMIT + | 11 | N/C |
| 4 | N/C | 12 | RECEIVE - |
| 5 | RECEIVE + | 13 | +12V |
| 6 | +12V RETURN | 14 | N/C |
| 7 | N/C | 15 | N/C |
| 8 | N/C | | |

**TRANSCEIVER CABLE CONNECTOR
AND PIN OUT**

symbolics inc.

| PREAMBLE | DESTINATION ADDRESS | SOURCE ADDRESS | TYPE | DATA | FRAME CHECK SEQUENCE | INTER-FRAME SPACING |
|----------|---------------------|----------------|---------|------------------|----------------------|---------------------|
| 64-BITS | 48-BITS | 48-BITS | 16-BITS | 46 TO 1500 BYTES | 32-BITS | 9.6 micro-seconds |

NOTE: 1 BYTE = 8-BITS

ETHERNET FRAME FORMAT

CSR SWITCH SETTINGS

| OCTAL # | 4 2 1 | 4 2 1 | 4 2 1 | 4 2 1 | 4 2 1 | 4 2 1 |
|----------------------------|-------------------|-------------|-------------|-------------|-------------|-----------|
| BIT | 17 16 15 | 14 13 12 | 11 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| CSR | 7 (HARD-WIRED) | 6 | 4 | 0 | 0 | 0 |
| BINARY | 1 1 1 | 1 1 0 | 1 0 0 | 0 0 0 | 0 0 0 | 0 0 0 |
| LOCATION (- HARD-WIRED -) | U 2 3 | U 2 2 | U 2 2 | U 2 2 | U 2 2 | JUMPERS - |
| SWITCH # | | 7 | 1 2 3 | 4 5 6 | 7 8 | |
| POSITION | | ON | OFF ON ON | ON ON ON | ON ON | |

NOTE: SWITCH ON = LOGIC 0
 SWITCH OFF = LOGIC 1

VECTOR SWITCH SETTINGS

| OCTAL # | 4 2 1 | 4 2 1 | 4 2 1 | NOTES: |
|----------|-------------------------|-------------------------|----------------|--------------------------------------------------------------------------------------|
| BIT | 8 7 6 | 5 4 3 | 2 1 0 | 1. U23-8 IS TEST/OPERATE SWITCH. ON = TEST (LOGIC 0). OFF = OPERATE (LOGIC 1). |
| VECTOR | 3 | 4 | 0 | 2. BITS 0,1, AND 2 ARE HARD-WIRED TO LOGIC 0. |
| BINARY | 0 1 1 | 1 0 0 | 0 0 0 | |
| LOCATION | U U U 2 2 2 3 3 3 | U U U 2 2 2 3 3 3 | HARD- WIRED | |
| SWITCH # | 1 2 3 | 4 5 6 | | |
| POSITION | ON OFF OFF | OFF ON ON | | |

INTERRUPT BUS REQUEST PRIORITY

JUMPER BLOCK LOCATED AT U6: FACTORY SETTING - BR LEVEL 5
 (Pins 8 & 9 connected)
 ALTERNATE SETTING - BR LEVEL 4
 (Pins 1 & 16 connected - reverse
 block 180 degrees)

INTERLAN UNIBUS ETHERNET CONTROLLER SWITCH SETTINGS

Command: (hostat)
Chaosnet host status report. Type Control-Abort to quit.
Site Name/Status Subnet #in #out abort lost crc ran bits other
401 ARES: THE GOD OF WAR 1 0 23 0 0 0 0 0 0
NIL
Command:
Command: ■

Lisp Listener 1

01/14/86 14:56:53 PAUL

USER:

Run

+ R:>HERCULES>request-20.proto-request 787

HOSTAT FUNCTION

| | | | | | | | | | |
|-----------|-------|--------|-------------|---------|---------|---------|-------------------|------|--------|
| Processes | Areas | Meters | File System | Windows | Servers | Network | Help ^X | Quit | Hostat |
|-----------|-------|--------|-------------|---------|---------|---------|-------------------|------|--------|

This is the Peek utility program. It shows a continually updating display of status about some aspect of the system, depending on what node it is in. The available nodes are listed below. Each has a name, followed by a single character in parentheses, followed by a description. To put Peek into a given node, click on the name of the node, in the command menu above. Alternatively, type the single character shown below.

Processes (P):

Show all active processes, their states, priorities, quanta, idle times, etc.

Areas (A):

Show all the areas in virtual memory, their types, allocation, etc.

Meters (M):

Show storage, disk, and GC meters.

File System (F):

Show all of our connections to various file servers.

Windows (W):

Show all the active windows and their hierarchical relationships.

Servers (S):

Show all active network servers and what they are doing.

Network (N):

Show all local networks, their state and active connections, and network interfaces.

Help (~~HELP~~):

Explain how this program works.

Quit (Q):

Bury PEEK window, exiting PEEK

Hostat (H):

Show the status of all hosts on the Chaosnet.

There are also the following single-character commands:

Z (preceded by a number): Set the amount of time between updates, in seconds.

By default, the display is updated every two seconds.

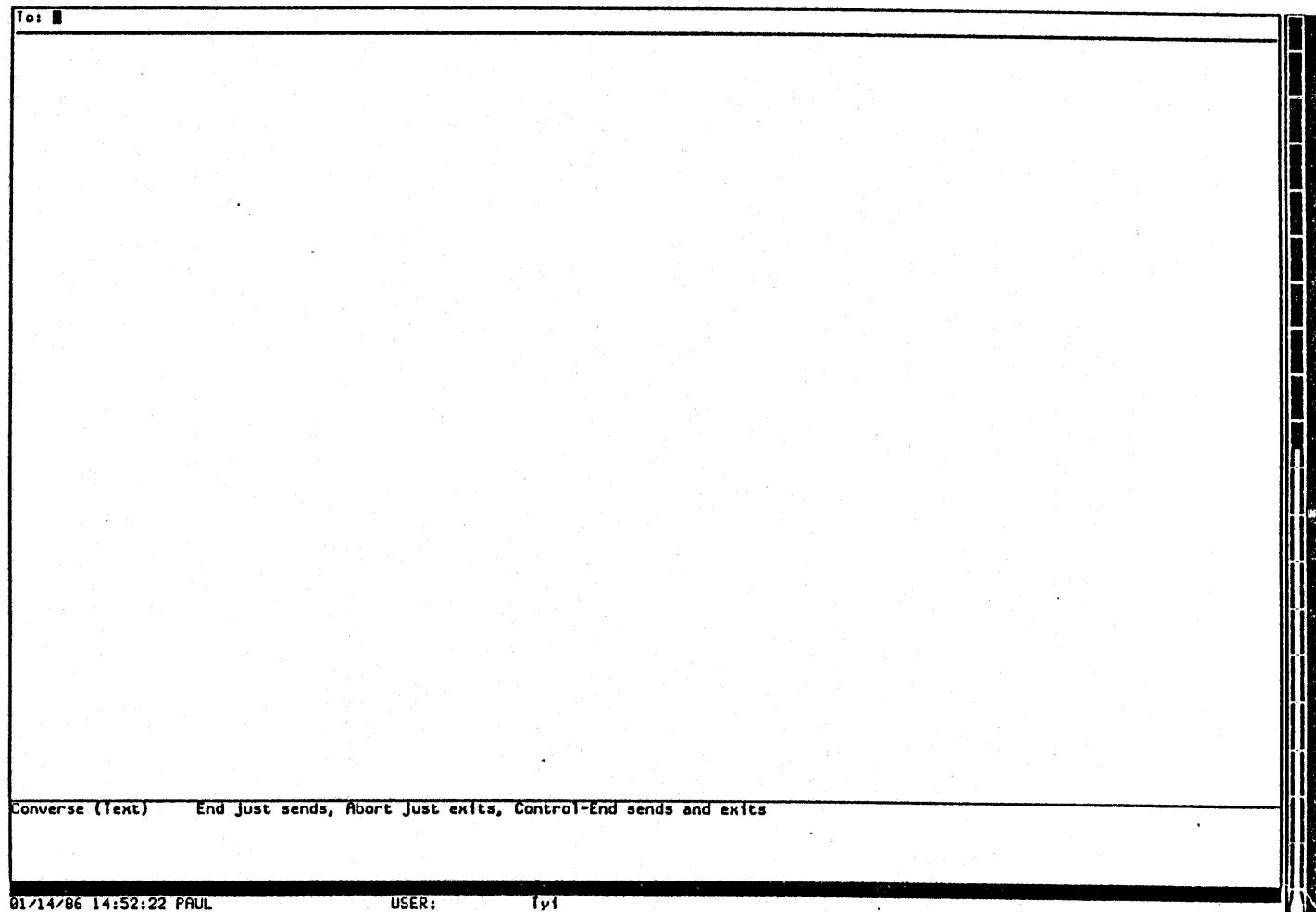
<SPACE>: Immediately update the display.

Hostat

01/13/86 16:00:58 PAUL

USER: Ty1 or Timeout

PEEK WINDOW



CONVERSE

symbolics inc.

ZMAIL

| The System Menu | | |
|-----------------|------------------|-------------------|
| | Windows | This window |
| | Create | Attributes |
| ◊ [I] | Select | Refresh |
| ◊ :l | Split Screen | Bury |
| Back | Layouts | Kill |
| ◊ :: | Edit Screen | Reset |
| Back | Set Mouse Screen | Arrest |
| ◊ [I] | | Un-Arrest |
| Back | | Emergency Break |
| ◊ :l | | Namespace |
| Back | | Flavor Examiner |
| ◊ 1 | | Document Examiner |
| Back | | Hardcopy |
| ◊ :: | | File System |
| | | Picture Editor |

[13:
[13:00:09 Performing Chorus, "Geselle (Brahms)", by Johannes Brahms]
[13:30:09 Performing Chorus, "Kommt, ihr Toechter", from the "Matthaeus-Passion", by Johann Sebastian Bach]
[13:38:37 Performing Chorus, "Wir muessen durch viel Truesbal...", from BWV 146, by Johann Sebastian Bach]
[13:45:18 Performing Fugue in E-flat, "St. Anne", by Johann Sebastian Bach]
[13:52:22 Performing Prelude in E-flat, "St. Anne", by Johann Sebastian Bach]
[15:47:11 Performing Prelude sur les Regne & 4eme Tons, by Nicolas Rieuwijk]
[15:47:50 From ARRAKIS: Request for Screen Hardcopy of 15:50 completed.]

L
O
I

Command:
Command: [Abort]
Back to Lisp Top Level in Lisp Listener 1.

Command:
Edit Stops Play Musical Selection Set Time Start GC
Enable Services Quiet Set User ID Undelete File
Expunge Directory

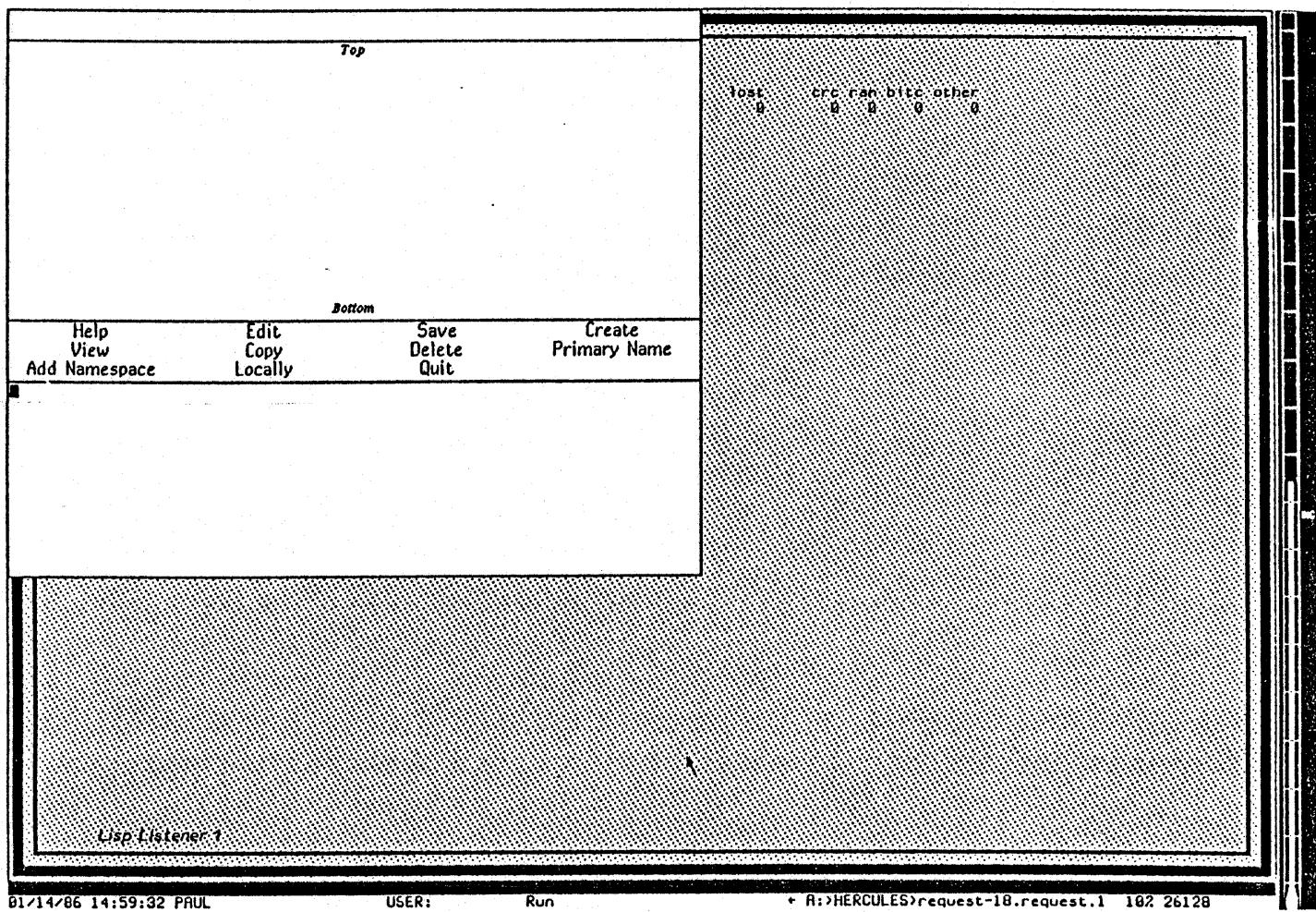
You are entering a Command Processor command.
The only possible completion of the text you have typed is Show Directory.

◊ :Show directory[Abort]
Back to Lisp Top Level in Lisp Listener 1.

◊ fep1: [Abort]
Back to Lisp Top Level in Lisp Listener 1.

◊ [Abort]
Back to Lisp Top Level in Lisp Listener 1.

◊ show [Abort]
Back to Lisp Top Level in Lisp Listener 1.
Lisp Listener 1



NAMESPACE OBJECT EDITOR

symbolics inc.

(locally)

Top

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

No current object. Click on Edit, View, or Create.

ach]
h]

ations

ZMRC5 (Fundamental) *Buffer-1*
[15:04:16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

Edit an existing object
06/18/85 15:39:31 Screen Hardcopy

USER:

Ty1

NAMESPACE EDITOR MENU

symbolics inc.

(locally)

Top

Choose the class of object to edit.

User
Printer
Network
Host
Site
Namespace

Help
View
Add Name

Create
Primary Name

ve
ete
it

[ach]
h]

ations

ZMACS (Fundamental) *Buffer-1*
[15-04-16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

06/18/85 15:40:11 Screen Hardcopy

USER:

Menu Choose

EDIT SUB - MENU

symbolics inc.

(locally)

Top

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Enter a name for the host to be edited: mercury

ZMRCS (Fundamental) *Buffer-1*
[15:04:16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

Create a new object by copying this one
06/18/85 15:40:33 Screen Hardcopy USER: Tyi

HOST NAME

Editing: Host SCH|MERCURY (locally)

More above

Service: Set: UPTIME CHAOS-SIMPLE UPTIME-SIMPLE Global-name
Service: Set: LOGIN CHAOS TELNET Global-name
Service: Set: SEND CHAOS SEND Global-name
Service: Set: MAIL-TO-USER CHAOS CHAOS-MAIL Global-name
Service: Set: NAMESPACE CHAOS NAMESPACE Global-name
Service: Set: NAMESPACE-TIMESTAMP CHAOS-SIMPLE NAMESPACE-TIMESTAMP Global-name
Service: Set: LISPM-FINGER CHAOS-SIMPLE LISPM-FINGER Global-name
Service: Set: FILE CHAOS QFILE Global-name
Service: Set: Global-name
Printer: ARAKEEN
Bitmap Printer: ARAKEEN
File Control Lifetime: 150000
Print Spooler Options: Set: Pair: Global-name Token
Spooled Printer: Pair: Printer Set: Pair: Global-name Token
Server Machine: Token

More below

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

ach1
h]

ations

ZMRC5 (Fundamental) *Buffer-1*
[15:04:16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

Bump blinker against bottom to scroll up by one line. Any button to scroll one page.
06/18/85 15:41:37 Screen Hardcopy USER: Tyi

HOST EDIT DISPLAY

symbolics inc.

Editing: User SCH|PAUL

Top

Lisp Name*: paul
Home Host*: PHOENIX
Mail Address*: *Pair*: paul PHOENIX
Personal Name*: "paul dyer"
Login Name: *Pair*: paul PHOENIX
Login Name: *Pair*: *Token Host*
Work Address: "irondale bldg chatsworth"
Work Phone: x327
Home Address: "20643 schoenborn st. canoga park, ca 91306"
Home Phone: "(818) 882-5737"
Birthday: 8-8-28
Project: "technical training"
Nickname: *Token*
Supervisor: *Token*
Affiliation: *Token*

More below

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Enter a name for the host to be edited: mercury

(Brahms), by Johannes Brahms]
aeus-Passion", by Johann Sebastian Bach]
ron BWV 146, by Johann Sebastian Bach]
en Bach]
tian Bach]
jou[[+1
ted.]

Enable Services
Expunge Directory

Quiet

Set User ID

Start GE
Undelete File

You are entering a Command Processor command.
The only possible completion of the text you have typed is Show Directory.

- :Show directory [Abort].
Back to Lisp Top Level in Lisp Listener 1.
- fepl. [Abort].
Back to Lisp Top Level in Lisp Listener 1.
- [Abort].
Back to Lisp Top Level in Lisp Listener 1.
- show [Abort].
Back to Lisp Top Level in Lisp Listener 1.
Lisp Listener 1

06/18/85 15:54:31 Screen Hardcopy

USER: Tyi

USER DISPLAY

Editing: Printer SCH|ARAKEEN

Top

Type*: LGP
Site: SCH
Pretty Name: Arakeen
Interface: DR11-C
Interface Options: Set: Pair: PROM-VERSION REV-1H Pair: Global-name Token
Host: ARRAKIS
Dplt Logo: SYMBOLICS
Fonts Widths File: Godzilla:>Rel-5>fonts>lsp-1>fonts.widths.newest
Format: Global-name
Protocol: Global-name
Default Font: Token
Header Font: Token
Character Size: Pair: Token Token
Page Size: Pair: Token Token
User Property: Pair: Global-name Token

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.



(Brahms), by Johannes Brahms]
aeus-Passion], by Johann Sebastian Bach]
ron BWV 146, by Johann Sebastian Bach]
an Bach]
tian Bach]
ional[hi
ted.]

Enable Services
Expunge Directory

Quiet

Set User ID

Start CD
Undelete File

You are entering a Command Processor command.
The only possible completion of the text you have typed is Show Directory.

- ▷ :Show directory [Abort]
Back to Lisp Top Level in Lisp Listener 1.
- ▷ fep1: [Abort]
Back to Lisp Top Level in Lisp Listener 1.
- ▷ [Abort]
Back to Lisp Top Level in Lisp Listener 1.
- ▷ show [Abort]
Back to Lisp Top Level in Lisp Listener 1.
Lisp Listener 1.

06/18/85 15:52:56 Screen Hardcopy

USER:

Tyi

PRINTER DISPLAY

Editing: Site SCH

Top

Local Namespace*: SCH
Site Directory*: Godzilla:>Rel-5>site>
Host For Bug Reports*: STONY-BROOK
Tinezone*: PST
Pretty Name: "Symbolics Chatsworth"
Default Printer: TAHOE
Default Bitmap Printer: TAHOE
Secure Subnets: *Pair*: CHAOS Set: 36 37 41 42 43 44 45 46 51 52 53 61 62 63 64
Secure Subnets: *Pair*: INTERNET Set: 192.10.38.0 192.10.41.0 192.10.43.0 Token
Secure Subnets: *Pair*: Network Set: Token
Dont Reply To Mailing Lists: Set: SCRC EAST WEST SYMBOLICS SCH SPA BBOARD DO
Other E
Choose the class of object to edit.
Terminal User SRC SPA SWW Site
Terminal Printer MACHINES Set: Host
Terminal Network HINES Set: Host
Terminal Host
Terminal Site
Add Namespace Save Create Primary Name
Quit

ext.29 of 17:00 completed.

"l-microcode-tb.text"

wapping space.

m18 dp-lpt20 dp-kbd)

**NOTE: If a new disk is being installed, before
installing the disk save all local files to
tape.**

Region evaluated,
Aborted.

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ififif.

06/21/85 10:03:38 Screen Hardcopy

USER:

Menu Choose

SITE MENU SELECTION

Editing: Site SCH

Top

Local Namespace*: SCH
Site Directory*: Godzilla:>Rel-5>site
Host For Bug Reports*: STONY-BROOK
Timezone*: PST
Pretty Name: "Symbolics Chatsworth"
Default Printer: TAHOE
Default Bitmap Printer: TAHOE
Secure Subnets: *Pairs*: CHAOS Set: 36 37 41 42 43 44 45 46 51 52 53 61 62 63 64
Secure Subnets: *Pairs*: INTERNET Set: 192.10.38.0 192.10.41.0 192.10.43.0 Token
Secure Subnets: *Pairs*: Network Set: Token
Dont Reply To Mailing Lists: Set: SCRC EAST WEST SYMBOLICS SCH SPA BBOARD DO
Other Sites Ignored In Zmail Summary: Set: SCRC SPA SWW Site
Terminal F Argument: *Triples*: NONE LOCAL-LISP-MACHINES Set: Host
Terminal F Argument: *Triples*: 0 READ Set: Host
Terminal F Argument: *Triples*: 1 LOCAL-LISP-MACHINES Set: Host
More below

Help Edit Save Create
View Copy Delete Primary Name
Add Namespace Locally Quit

Enter a name for the site to be edited: sch

ext. 29 of 17:00 completed.

"l-microcode-tp.text"

m18 dp-lpt20 dp-kbd)

swapping space.

NOTE: If a new disk is being installed, before
installing the disk save all local files to
tape.

Region evaluated.
Aborted.

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iffith.

Edit an existing object
06/21/85 10:04:06 Screen Hardcopy

USER:

Tyi

SITE DISPLAY

Editing: Printer SCH|ARAKEEN (locally)

Top

Type*: LGP
Site: SCH
Pretty Name: Arakeen
Interface: DR11-C
Interface Options: Set: Pair: PROM-VERSION REV-1H Pair: Global-name Token
Host: ARRAKIS
Dplt Logo: SYMBOLICS
Fonts Widths File: Godzilla:>Rel-5>font>lsp-1>font>fonts.widths.newest
Format: Global-name
Protocol: Global-name
Default Font: Token
Header Font: Token
Character Size: Pair: Token Token
Page Size: Pair: Token Token
User Property: Pair: Global-name Token

Choose in which namespace to edit CHADS.

| | | |
|------------|------|---------------------|
| Hel | SWW | Create Primary Name |
| Vie | SPA | |
| Add Nam | SCRC | |
| Enter a na | SCH | |

Enter a name

ZMHC5 (Fundamental) *Buffer-1*
[15:04:16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

06/18/85 15:43:55 Screen Hardcopy

USER:

Menu Choose

NAMESPACE MENU SELECTION

symbolics inc.

Editing: Namespace SCH

Top

Descriptor File*: Godzilla:>Rel-5>site>sch-namespace.text
Search Rules*: Set: SCH SCRC SWN SPA INTERNET Namespace
Primary Name Server: GODZILLA
Primary Name Server: Host
Secondary Name Server: RIVERSIDE
Secondary Name Server: WAIKATO
Secondary Name Server: RUSSIAN
Secondary Name Server: STONY-BROOK
Secondary Name Server: WHITE
Secondary Name Server: Host
Internet Domain Name: SCH.Symbolics.COM
User Property: Pair: Global-name Token

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

(Brahms), by Johannes Brahms]
aeus-Passion", by Johann Sebastian Bach]
ron BWV 146, by Johann Sebastian Bach]
an Bach]
tien Bach]
ion with
ted.]

-21-

Enable Services
Expunge Directory

Quiet

Set User ID

Start GC
Undelete File

You are entering a Command Processor command.
The only possible completion of the text you have typed is Show Directory.

- :Show directory[Abort].
Back to Lisp Top Level in Lisp Listener 1.
- fep1: [Abort].
Back to Lisp Top Level in Lisp Listener 1.
- [Abort].
Back to Lisp Top Level in Lisp Listener 1.
- show: [Abort].
Back to Lisp Top Level in Lisp Listener 1.
Lisp Listener 1.

06/18/85 15:50:08 Screen Hardcopy

USER:

Tyi

NAMESPACE DISPLAY

(locally)

Top

Bottom

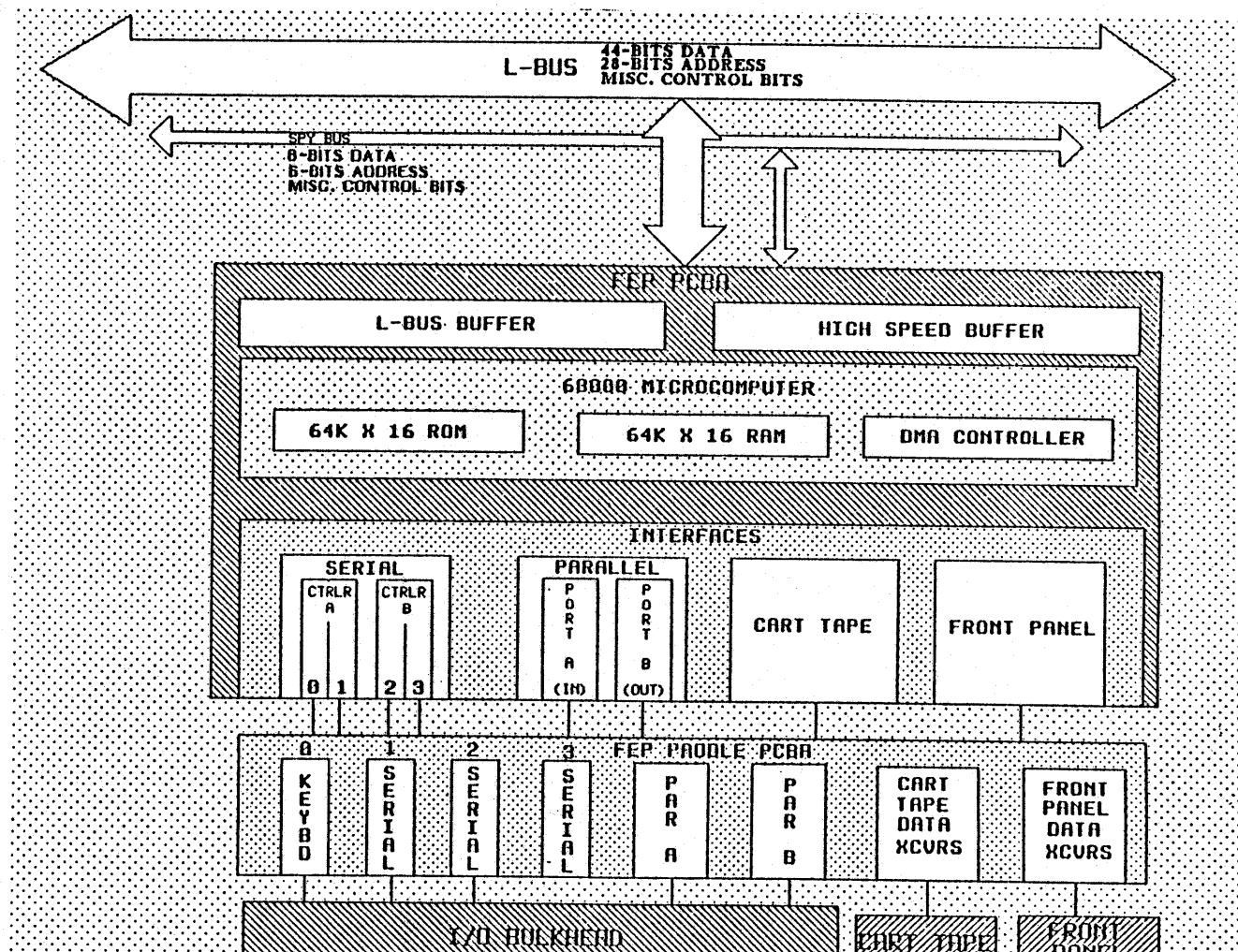
| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | [Quit] | |

No current object. Click on Edit, View, or Create.

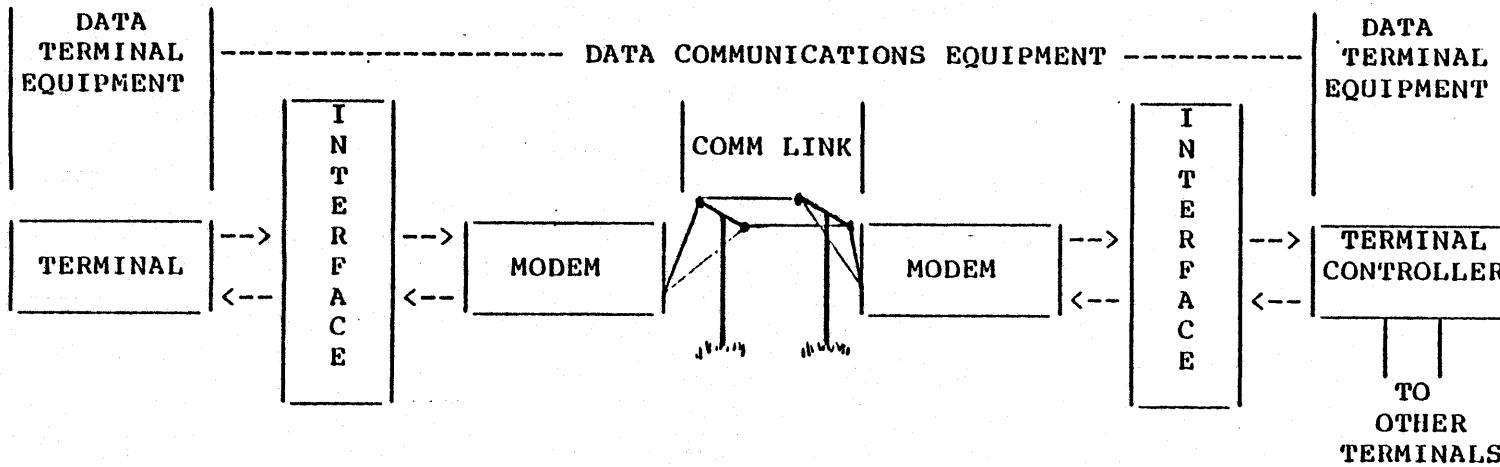
ZMRC5 (Fundamental) *Buffer-1*
[15:04:16 Performing Fugue in G major, "The Jig", by Johann Sebastian Bach]

Quitting the namespace editor, leaving current object
06/18/85 15:39:12 Screen Hardcopy USER: Tyi

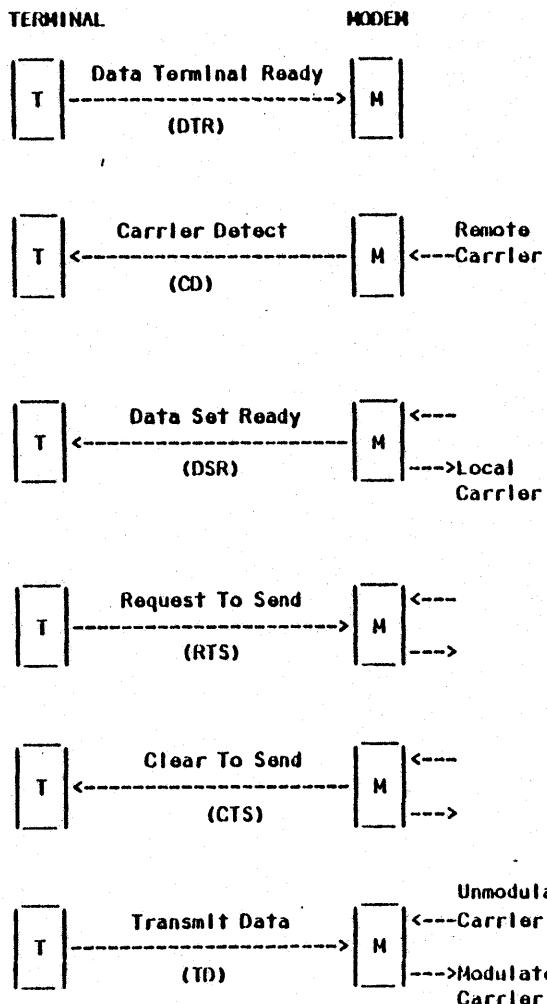
LEAVING NAMESPACE EDITOR



LISP FRONT END PROCESSOR BLOCK



SIMPLIFIED COMPONENTS OF A DATA LINK



1. When communication program is loaded, Terminal sends Modem the Data Terminal Ready signal.
2. When the data link connection is established with the remote site and the remote modem sends a carrier signal to the local Modem, the Modem sends the Terminal the Carrier Detect signal.
3. The Modem sends its carrier to the remote modem, and after a delay of approximately 150 to 300 milliseconds, it sends the Terminal the Data Set Ready signal.
4. When the Terminal wishes to transmit data, it sends the Modem the Request To Send signal.
5. The Modem connects the transmit data line to its transmit circuits and then sends the Clear To Send signal to the Terminal.
6. The Terminal sends the Transmit Data signals to the Modem, which modulates its carrier, sending the data to the remote site.

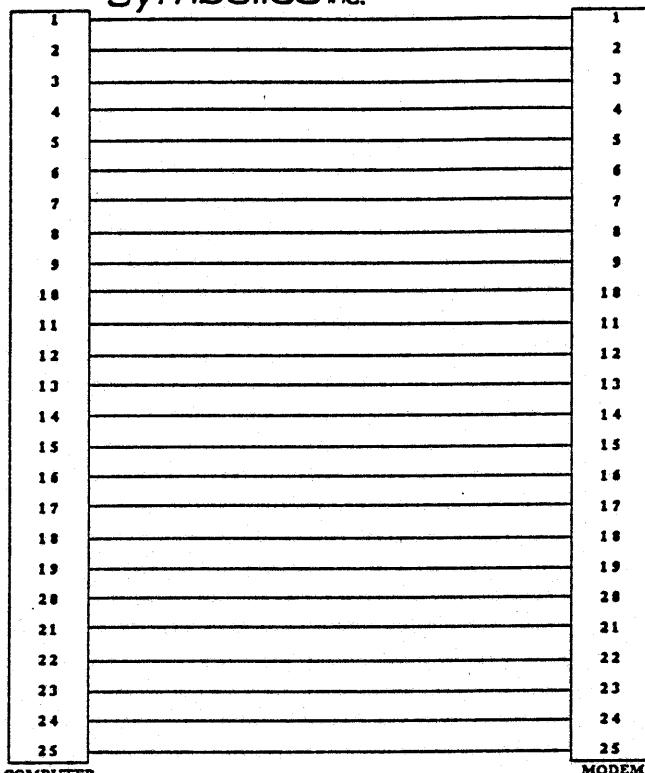
RS 232C SIMPLIFIED HANDSHAKING

Signal Type & Direction

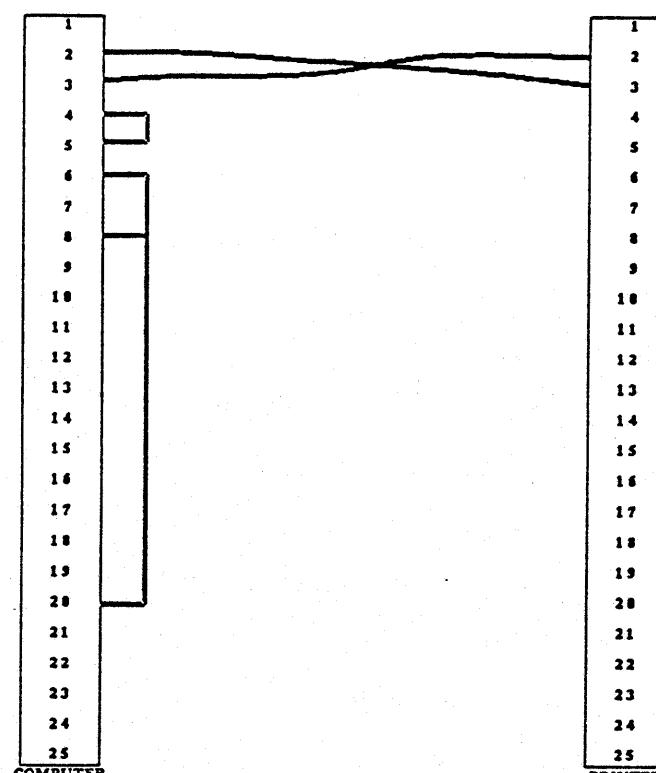
| 25 PIN | EIA- RS232C CIRCUIT | CCITT- V.24 CIRCUIT | RS232 DESCRIPTION | GND | DATA | | CONTROL | | TIMING | |
|------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-----------|-----------------------|-----------------------|-------------|-----------|
| | | | | | From DCE | To DCE | From DCE | To DCE | From DCE | To DCE |
| 1 7 | AA AD | 101 102 | Protective Ground Signal Ground/Common Return | X X | | | | | | |
| | | 102a 102b | DTE Common DCE Common | X X | | | | | | |
| 2 3 | BA BB | 103 104 | Transmitted Data Received Data | | X | X | | | | |
| 4 5 6 20 22 8 21 23 23 | CA CB CC CO CE CF CG CH CI | 105 100 107 108.2 125 109 110 111 112 | Request to Send Clear to Send Data Set Ready Data Terminal Ready Ring Indicator Received Line Signal Detector Signal Quality Detector Data Signal Rate Selector (DTE) Data Signal Rate Selector (DCE) | | | | X X X X X | y X X X X | | |
| 24 15 17 | DA DB DD | 113 114 115 | Transmitter Signal Element Timing (DTE) Transmitter Signal Element Timing (DCE) Receiver Signal Element Timing (DCE) | | | | | | X X | X |
| 14 16 | SDA SBB | 118 119 | Secondary Transmitted Data Secondary Received Data | | X | X | | | | |
| 19 13 12 | SCA SCB SCF | 120 121 122 | Secondary Request to Send Secondary Clear to Send Secondary Received Line Signal Detector | | | | X X | X | | |
| | | 141 140 142 | Local Loopback Remote Loopback Test Indicator | | | | X | X | | |
| | | 118 117 126 | Select Standby Standby Indicator Select Transmit Frequency | | | | X X | X | | |
| | | | | | | | | X X | | |

, EIA RS232C and CCITT V.24

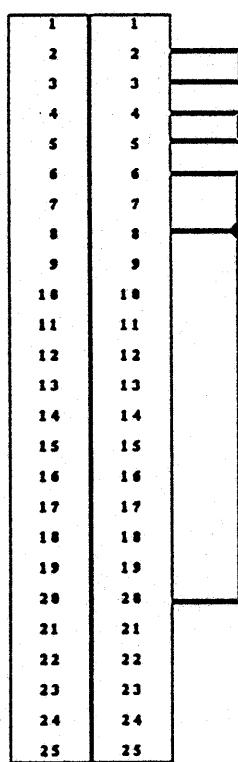
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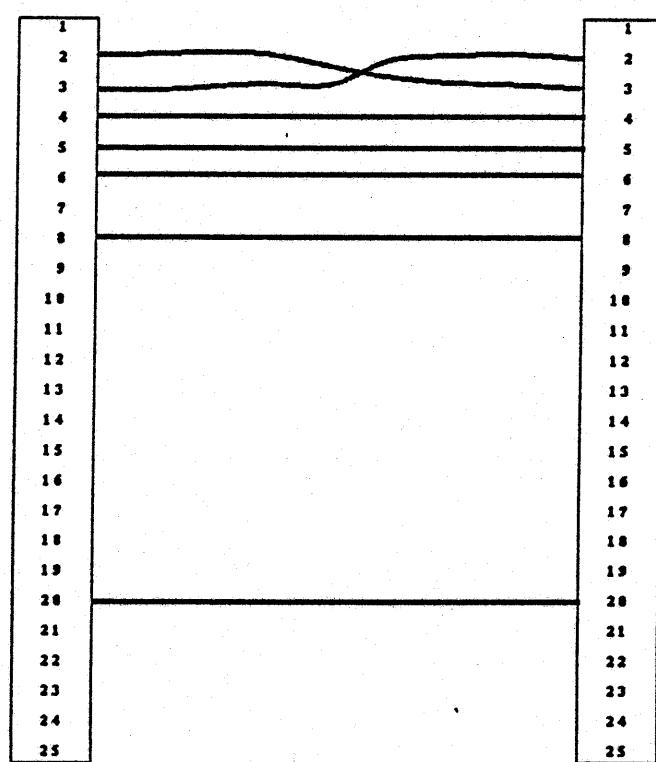
COMPUTER RS232C CABLE FROM 3600 TO MODEM



COMPUTER RS232C CABLE FROM 3600 TO DMP-1/LGP-2

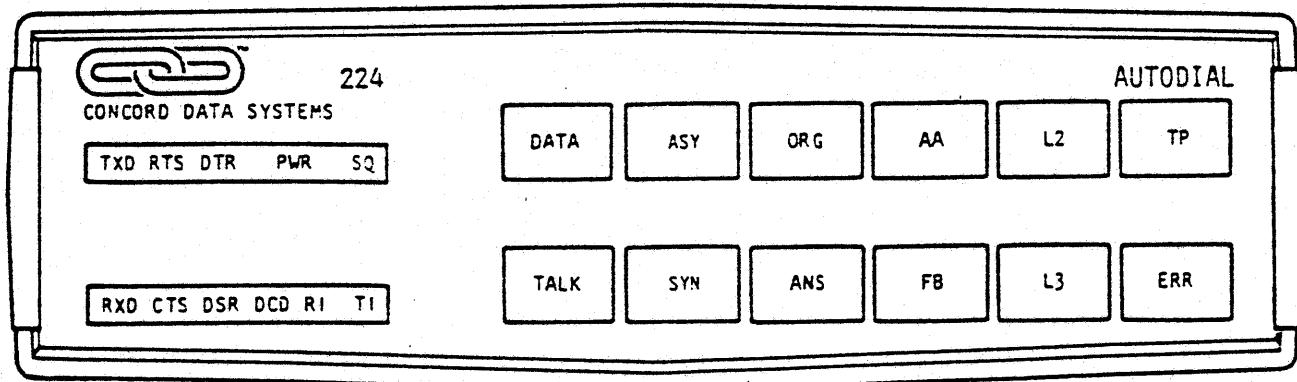
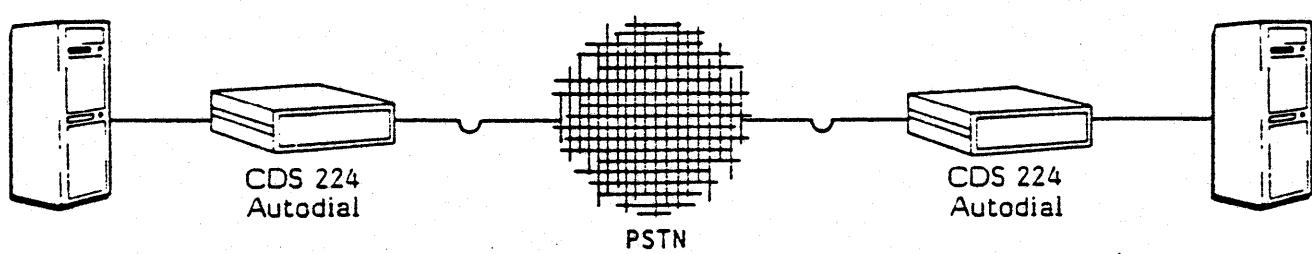


SERIAL
LOOPBACK
TEST
CONNECTOR



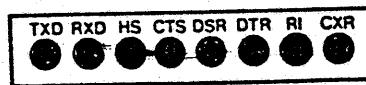
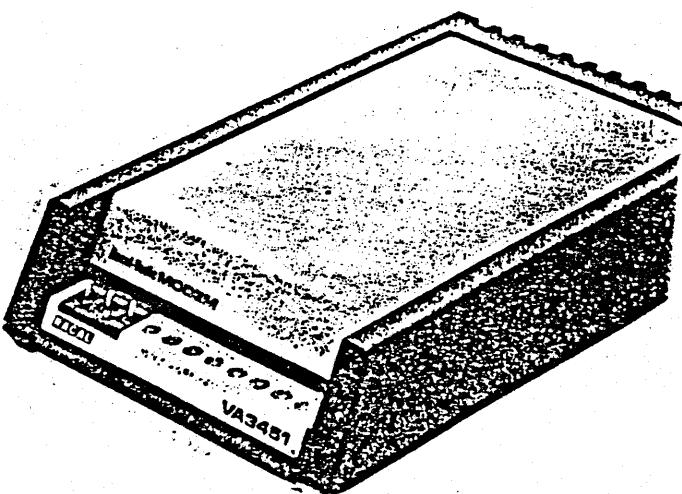
COMPUTER RS232C CABLE FROM 3600 TO LGP-1

symbolics inc.



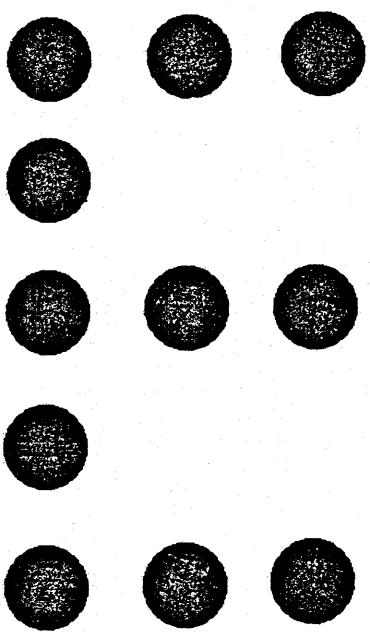
CDS MODEL 224

symbolics inc.



RACAL-VADIC MODEL VA3450 P/S/G-SERIES

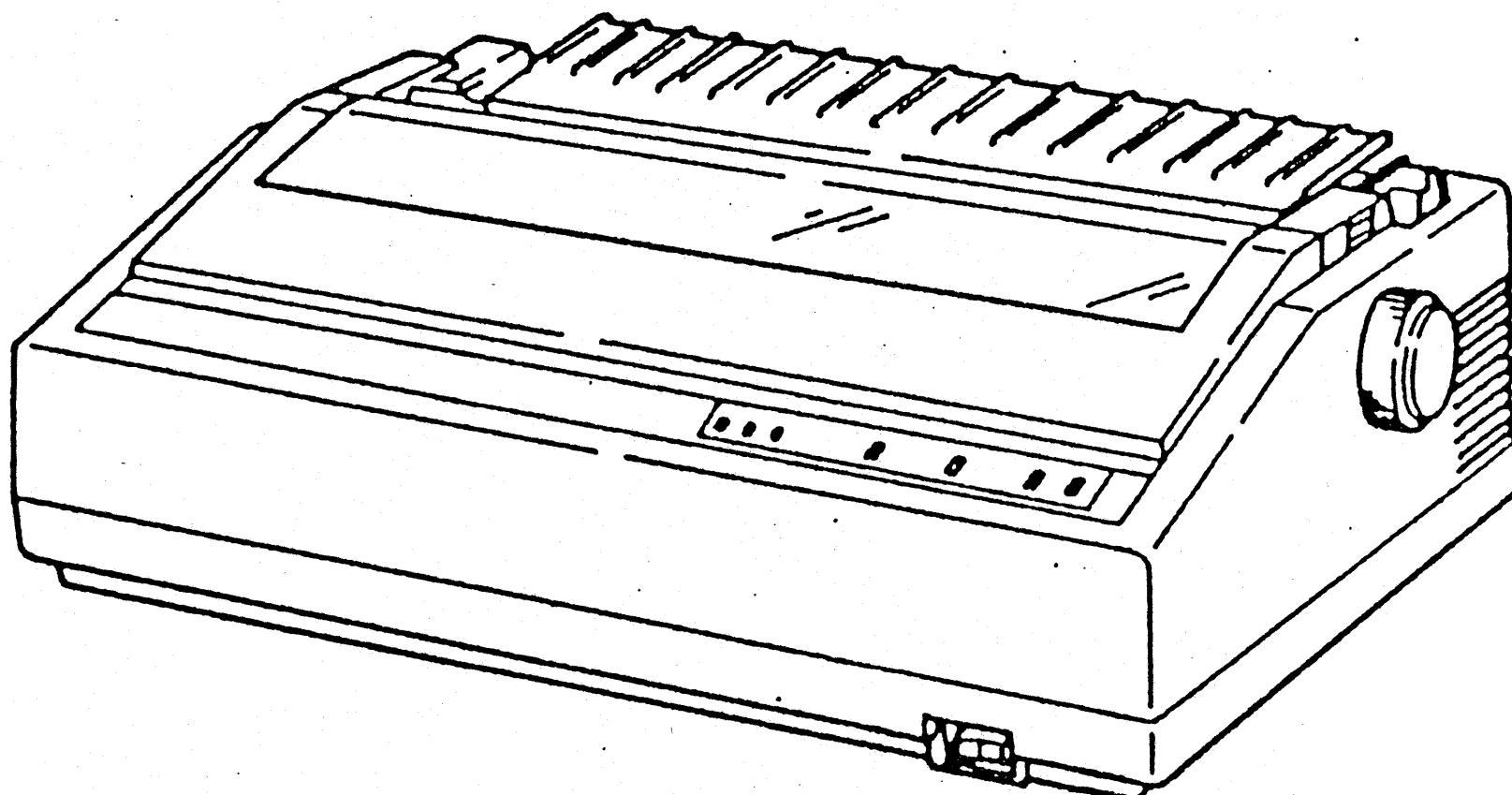
symbolics inc.



DOT MATRIX PRINTING

symbolics inc.

-2-



DPL24 DOT MATRIX PRINTER

Specifications

(1) General specifications

Printing method: 24-wire dot matrix

Bidirectional printing (shortest distance printing by automatically deciding on a forward or backward direction)

| | | |
|-----------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Dot density: | Letter mode | 1/360 × 1/180 inch |
| | Correspondence mode | 1/180 × 1/180 inch |
| | Draft mode | 1/120 × 1/180 inch |
| | Graphics mode | 1/180 × 1/180 inch and 1/90 × 1/90 inch |
| Printing speed: | Letter mode | 80 characters/second (10 cpi) 96 characters/second (10 cpi) 144 characters/second (18 cpi) |
| | Correspondence mode | 160 characters/second (10 cpi) 192 characters/second (12 cpi) |
| | Draft mode | 240 characters/second (10 cpi) 288 characters/second (12 cpi) |
| Character sets: | 96 ASCII characters | |
| | Alphabets of 7 European countries | Specified by the software or an operator's panel switch (England, Germany, France, Italy, Spain, Sweden/Finland, and Denmark/Norway) |
| Font: | Letter mode | 3 types (Courier 10, Prestige Elite, and Boldface) |
| | Correspondence mode | 1 type (Courier 10) |
| | Draft mode | 1 type |

| | |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Option (font cartridge) | Fixed font Up to 4 types (for a 96-character set) Down-loadable font up to 2 types (for a 96-character set) |
| Print line: | 126 columns at 10 cpi 163 columns at 12 cpi 244 columns at 18 cpi |
| Character pitch: | 1/10, 1/12, 1/18 inch Proportional spacing (switch selectable) 1/18 inch spacings are available only in letter mode. |
| Line spacings: | Increments of 1/180 inch |
| Line feed pitch: | 1/3, 1/6, 1/8 inch (switch selectable) |
| Line feed speed: | 50 ms (1/6 inch) |
| Form feed speed: | 4 inches/second |
| Forms: | 6 to 16 inches (width), up to 0.023 inch (thickness) |
| Multicopies: | Original + 4 copies |
| Ribbon: | Black, stationary cartridge |
| Paper feed: | Rear feed sprocket Friction platen Autoloading is possible for both rear feed sprocket and friction platen. |
| Sensors: | Paper-out detection (for continuous forms only) and open cover detection |
| Interface: | Parallel: Centronics compatible Serial: RS-232C, current loop (20 mA) |
| Noise: | 65 dBA or less (Measuring distance: Front side 1m, A scale, slow at letter quality printing) |

(2) Electrical conditions

Voltage: 100 ~ 120/220 ~ 240 VAC ± 10%
Frequency: 50/60 Hz ± 1 Hz
Insulation resistance: AC-FG 10 MΩ or more
SG-FG 5 MΩ or more
Dielectric strength: AC-FG 1 minute or more at AC 1 kV
Leakage current: 3.5 mA or less
Power consumption: Operating 150 VA
Nonoperating 70 VA

(3) Environmental conditions

Temperature: Operating 5 to 38°C (41 to 100°F)
Nonoperating -20 to 60°C (-4 to 140°F)
(Gradient must be 15°C/h or less)
Humidity: Operating 10 - 90% RH
Nonoperating 5 - 95% RH (non condensing)
Gradient: 30% RH/day or less
Max. wet bulb temperature: 29°C
Vibration: Operating 0.2 G (excluding resonant points)
Nonoperating 0.5 G (excluding resonant points)
Shock: Operating 3 G (the printer is not destroyed,
but printing quality is not
guaranteed.)
Tilt: Operating 5°
Electrostatic strength: 5 kV or more (measuring instrument: condenser
method, 100Ω 500 pF)
When executing test printing by the contact method
only (10 Hz, 3 minutes)
ULL114/478, CSAC22.2, FCC class B, VDE0871 class B

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(4) Physical specifications

Dimensions: Width 550 mm (21.7 in) Depth 380 mm (15 in)
 Height 160 mm (6.3 in)

Weight: 20 Kg (44 lb)

(5) Reliability

MTBF: 4,000 h (MTBF: operating hours include all the power on time, and operating time is 25% duty cycle and 50% page density)

MTTR: 0.5 h

Printer life 5 million lines or 5 years
span:

| | | |
|-----------------------------|------------|------------------------------------------------------------|
| Expendable supplies life | Print head | 2 hundred million strokes or more (without maintenance) |
| span: | Ink ribbon | 6 million characters |

(6) Protection functions

Processing during an overload: To protect the print head, control unit, and power supply, if any of the conditions listed below is detected the print head moves to the left or right margin, the 24 dots are divided into three parts, and unidirectional printing is performed at the mode printing speed.

- The +48 V power falls below the predetermined voltage.
 - The print head thermal sensor activates.

Overload does not occur even when printing 66 lines at 30% duty.

(7) Limitation

Print head: Do not perform continuous pattern printing at over 50% duty or for 5 or more minutes, whether overload is detected or not.

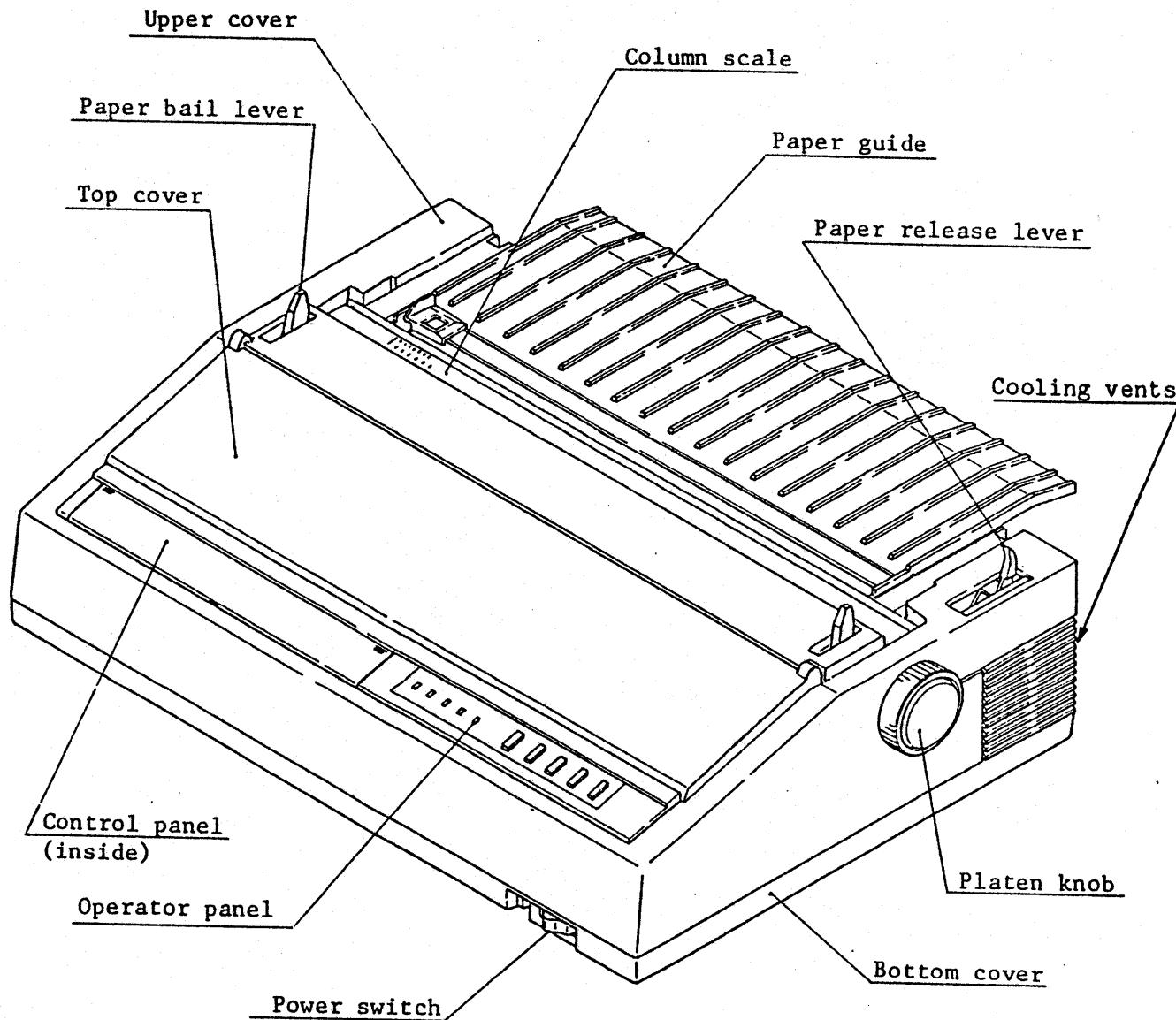


Fig. 4.2 DPL24 basic parts, outside view

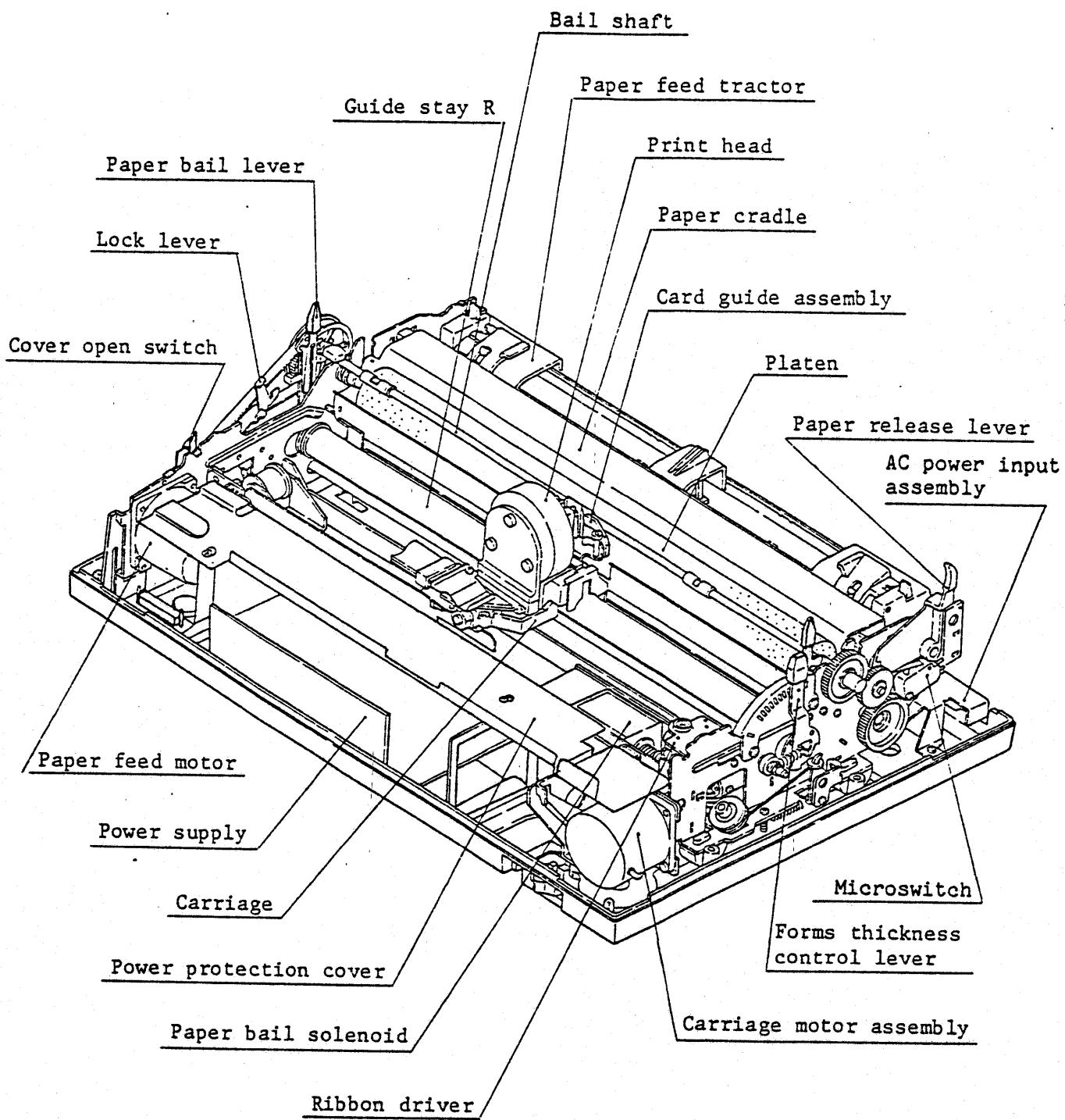


Fig. 4.3 DPL24 basic parts, inside view

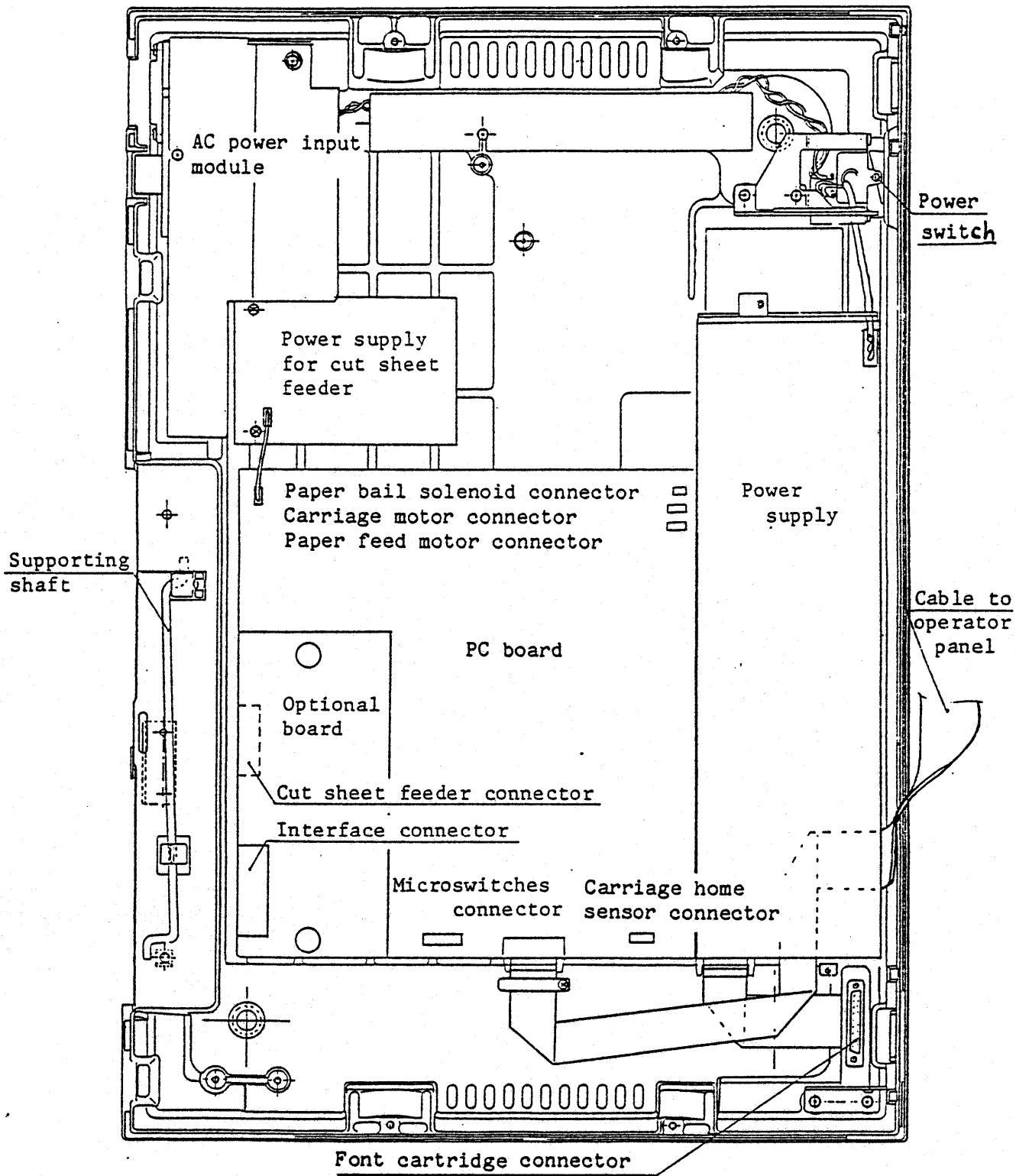
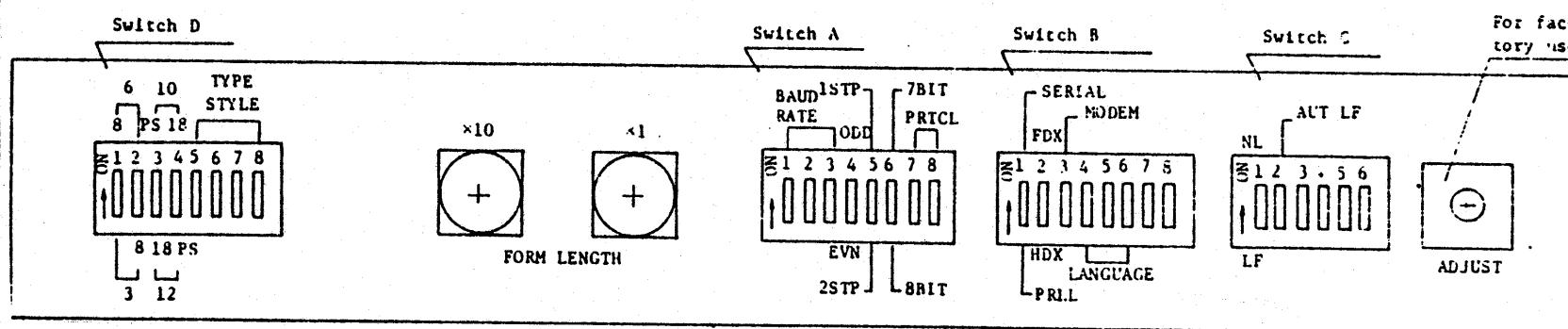
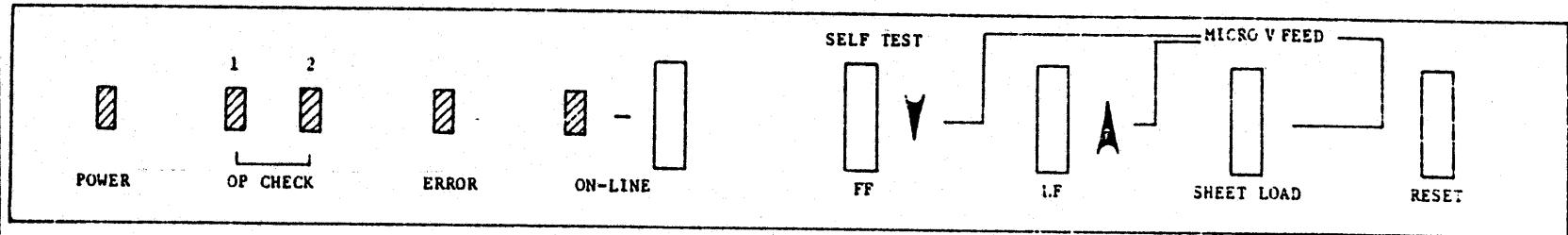
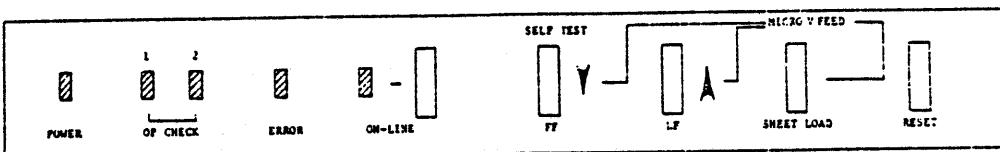


Fig. 4.4 DPL24 basic parts, inside base unit



Control Panel



| Action | Function | ONLINE switch | FF switch | LF switch | SHEET LOAD switch | RESET switch |
|-------------------------|--------------------------------------------------------------------------------------------------------------------|---------------|-----------|-----------|-------------------|--------------|
| Offline/pause | Switches the printer status from online/operating (ONLINE indicator lit) to offline/pause (ONLINE indicator off). | 0 | | | | |
| Online/pause reset | Switches the printer status from offline/pause (ONLINE indicator off) to online/restart (ONLINE indicator lit). | 0 | | | | |
| Form feed | Feeds the paper up to the next top of form (or top margin if one is set). | | 0 | | | |
| Line feed | Feeds the paper up the number of lines specified as the line spacing. Hold the switch down for continuous feeding. | | | 0 | | |
| Auto sheet loading | Loads a form inserted at the back of the platen and aligns it at the first printing line. | | | | 0 | |
| Micro line feed | Feeds the paper up 1/180th inch. Hold the switches down for continuous micro line feeding. | | | 0 | 0 | |
| Reverse micro line feed | Feeds the paper down (backward) 1/180th inch. Hold the switches down for continuous reverse micro line feeding. | | 0 | | 0 | |
| Self test | Performs test printing. This test takes effect only when the printer is powered on. | | | 0 | | |

Table 3.1 Operator panel switch functions

| Action | Function | ONLINE switch | FF switch | LF switch | SHEET LOAD switch | RESET switch |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|-----------|-------------------|--------------|
| Stop self test | Stops self test printing | | | | | o |
| Printer initialize | <ul style="list-style-type: none"> - When no data is in the receive buffer, initializes the printer immediately. - When data is in the receive buffer, notifies the operator of the state by blinking the ONLINE indicator. To initialize the printer, press the RESET switch again. To not initialize and print the contents of the receive buffer, press ONLINE. - This switch is only valid during the OFFLINE state. | | | | | o |
| Error clearing | Clears a communication error in the serial interface | | | | | o |

3.3 Operator Panel Indicators

There are five indicators and an audio alarm on the operator panel, which are described in this section.

3.3.1 Audio alarm

The audio alarm notifies the operator that one or more errors has occurred. The alarm sounds for about 1/2 second if any of the following operator check states or a circuit or mechanism error (check condition) occurs:

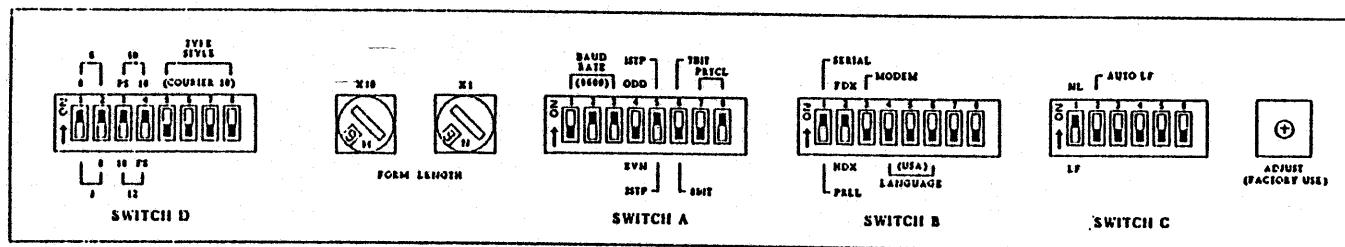
- Cover open
- Paper out
- Sheet feeder empty or jammed

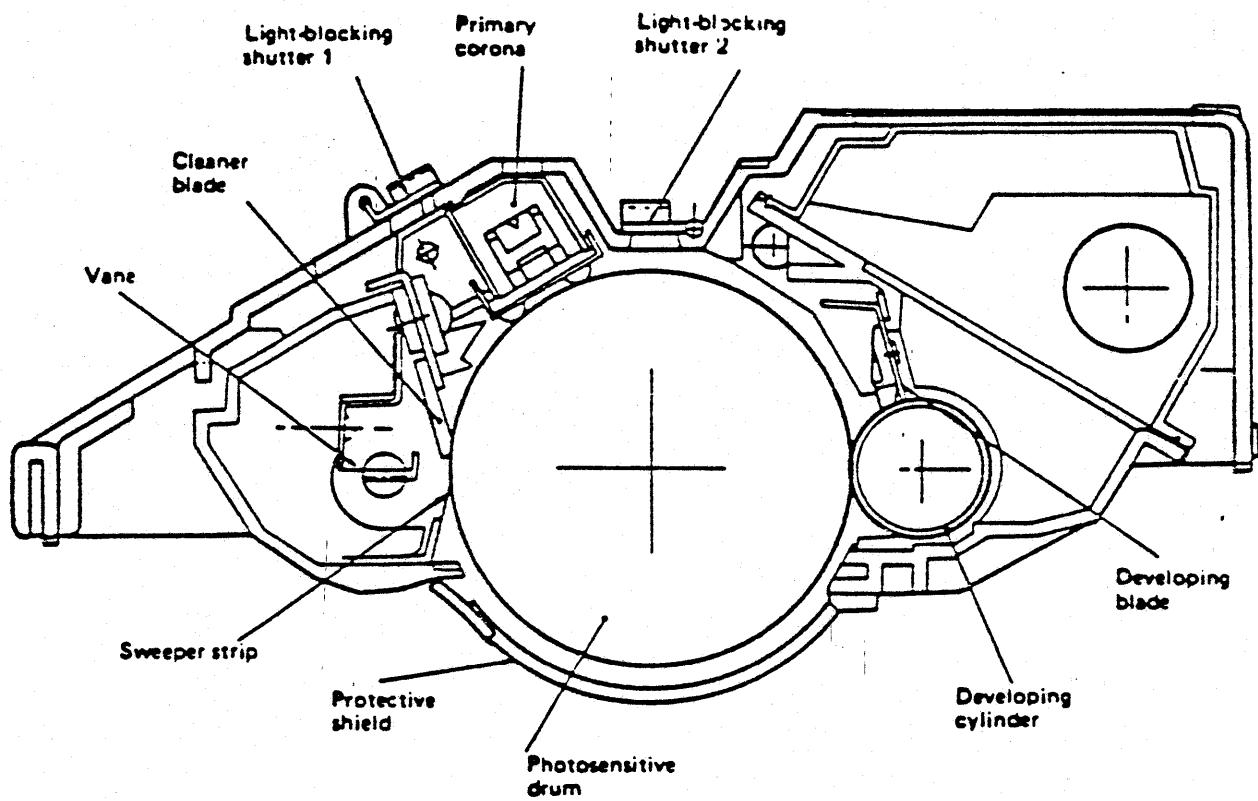
Table 3.1 Operator panel switch functions - continued

symbolics

DMP-1

(SWITCH SETTINGS FOR NORMAL OPERATIONS)

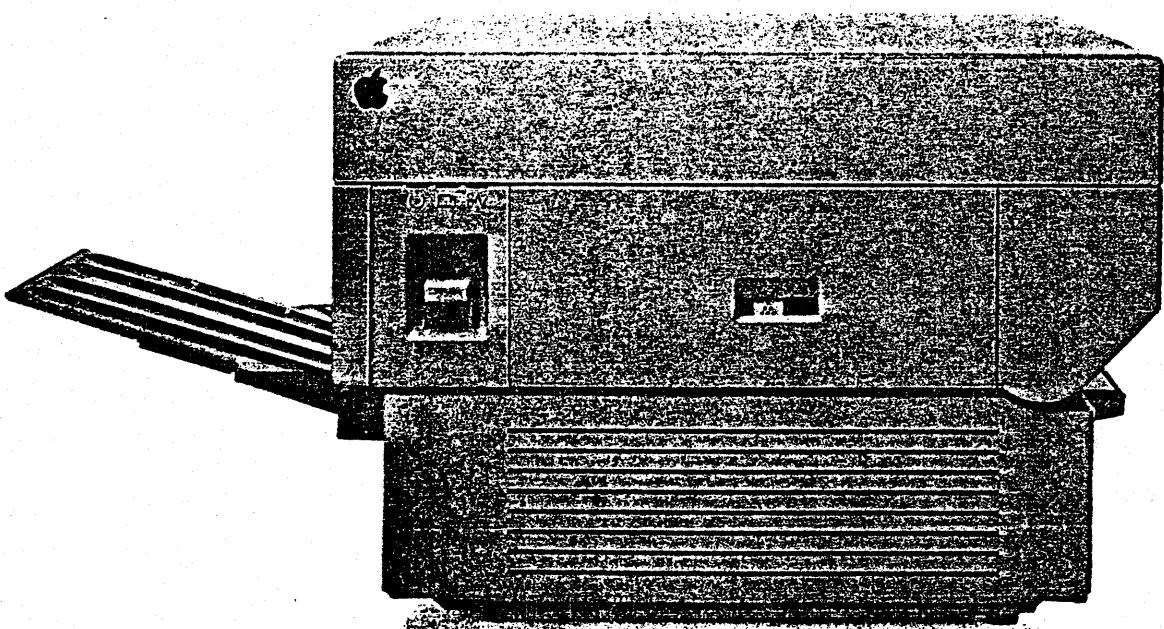




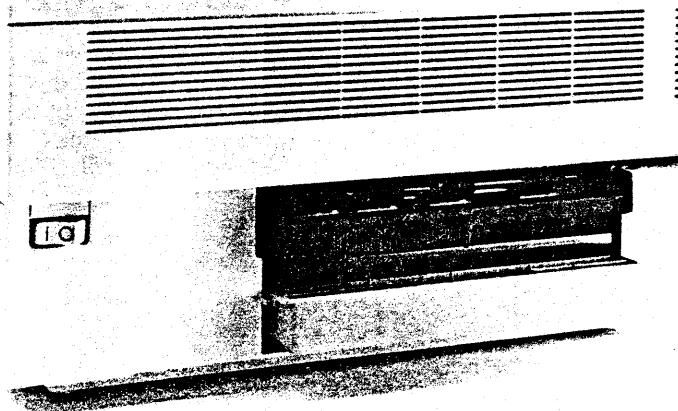
LASER PRINTING

symbolics inc.

LaserWriter



Laser Graphics Printer (LGP2)



Symbolics offers a table top Laser Graphics Printer (LGP2) for use with the 3600 family of symbolic processing systems. This printer is an Apple™ LaserWriter, ideal for applications requiring quality, cost-effective printing. The LGP2 provides professional-looking text and graphics. In addition, Symbolics software allows total support of our hardcopy environment, including compatibility with the Symbolics Document Examiner.™

Utilizes powerful microprocessor

Built into every LaserWriter is a 12 MHz MC 68000 microprocessor. It controls 1½ megabytes of RAM and ½ megabyte of ROM. LaserWriter's software is PostScript,™ the compact, versatile programming language that's becoming a standard in the printing industry.

Art-department-quality documents

LaserWriter's resolution is 90,000 dots per square inch. Even the smallest type is crisp and clear, and graphics can be incredibly detailed. LaserWriter can print full resolution graphics on the entire page.

A typestyle for every application

LaserWriter's diverse type styles give you the versatility you need, from six-point fine print for business forms and spreadsheets, to inch-high headlines for presentation overheads. Some of the world's most popular fonts are built right in: Times,™ Helvetica,™ and Courier. There's even a symbol font for scientific applications. You can also download additional fonts to give your documents their own personalized style.

Prints on a wide range of materials

LaserWriter prints on copier paper, bond, or letterhead in letter, legal, or international sizes. Or use LaserWriter with transparencies, labels, or envelopes.

Specifications

Marking engine: Canon LBP-CX laser-xerographic engine

Controller hardware contains: 12 MHz 68000, ½ Mb of ROM, 1½ Mb of RAM, AppleTalk™ and RS-232C interfaces

Support: Full support of multifont software environment including screen dump support and Document Examiner output.

Print Quality: All text and graphics printed at 300 dots per inch.

Built-In Fonts: Times, Helvetica, and Courier in roman, bold, italic, and bold italic styles plus a Symbolics font. Minimum size 4 points. Underline, Shadow and Hollow styles for the above fonts can also be generated (available from Symbolics).

Printing Protocols Supported: Postscript™ and a subset of Diablo® 630 command set.

Printing Materials: 8–34 lb. single side copier, letterhead, colored and overhead transparency stock. Envelopes and labels supported via manual feed.

Printing Material Sizes: Letter, Legal, A4 and B5

Width: 18.5 inches

Depth: (body only) 16.2 inches

Depth: (with trays) 28.2 inches

Height: 11.5 inches

Weight: 77 pounds

Ordering Information

LGP2-A
High Resolution laser graphics printer

LGP2-SW
Hardcopy/Document Examiner software interface for LGP2-A

LGP2-B
Package includes both LGP2-A and LGP2-SW

Laserwriter Spec Sheet

Order M0160

I. Technical Specifications

1. Hardware:

- A. Marking engine: Canon LBP-CX laser-xerographic engine
- B. Controller:
 - a. Microprocessor: 12 MHz MC68000
 - b. Read only memory (ROM): .5 Megabytes
 - c. Random access memory (RAM): 1.5 Megabytes
- C. Interfacing interconnects:
 - a. AppleTalk
 - b. RS-232-C via PostScript
 - c. Special Diablo 630

2. Software:

- A. Printing protocols supported:
 - a. PostScript
 - b. Diablo 630 (a daisy-wheel printer) Emulation with a subset of the Diablo command set
- B. Fonts:
 - a. Resident:
 - Medium and Bold: Times, Helvetica, and Courier
 - Italic and Bold Italic: Times
 - Oblique and Bold Oblique: Helvetica and Courier
 - Symbol: Greek and Scientific characters
 - b. Sources:
 - Allied Corporation: Times and Helvetica
 - PostScript: Symbol
 - c. Styles: Underline, Shadow, Hollow
 - d. Point sizes:
 - Range: 3 to 720 points
 - Limitations
 - 1. Small: Resolution of printer
 - 2. Large: Size of paper
- C. Other Input:

All graphics and Macintosh and international character sets are treated as downloaded bitmaps

3. Printing materials:

A. From Automatic cassette:

a. Optimum: Single sheet photocopy bond from 16 to 20 lb.

b. Range: Letterhead and color stock from 8 to 34 lb.

c. Cassette sizes:

Size Order

Legal M0182

Letter M0181

A4 M0183

B5 M0184

d. Cassette capacity: 100 sheets

B. From manual single sheet feed:

a. Stock:

--Sheet Paper: Copier, Letterhead, and Color

--Transparency

--Envelopes

--Labels

b. Sizes:

--Letter

--Legal

--A4

--B5

c. Weight: 8 to 34 lb.

4. Performance

A. Output tray capacity: 20 sheets

B. Maximum printable surface:

| | Letter | Legal | A4 | B5 |
|-----------------|--------|-------|------|------|
| Width (inches) | 8.0 | 7.0 | 7.5 | 7.0 |
| Length (inches) | 10.9 | 12.5 | 10.5 | 10.0 |

C. Print quality: text and graphics:

a. 300 dots per inch

b. 90,000 dots per square inch

c. over 8 million dots per page

D. Speed

a. Initial: 2 to 4 pages per minute

b. Thereafter, the LaserWriter can produce copies of the initial page at a rate of 8 pages per minute.

c. Actual performance depends on the application and document.

E. Recommended duty cycle: Less than 4000 pages per month.

5. Physical:

| | inches |
|--------------------|-----------|
| Width | 18.5 |
| Depth (body only) | 16.2 |
| Depth (with trays) | 28.2 |
| Height | 11.5 |
| Weight | 77 pounds |

6. Electrical

US Model M0156 115 VAC (+/- 10 percent) 60 Hz
European Model M0156Z 220 VAC (+/- 10 percent) 50 Hz
 240 VAC (+/- 10 percent) 50 Hz

7. Safety and Environmental Compliance

- UL 660F listed
- CSA LR49439 certified
- FCC Class B
- BRH certified Class I laser product

II. Documentation

Inside Laser Writer from Apple Computer

III. Service

1. Every 2,000 to 3,000 pages: Replace toner cartridge (Order M0180)
2. 100,000 pages (2.5 years given a rate of 3,000 pages per month):
 - Major service

symbolics inc.

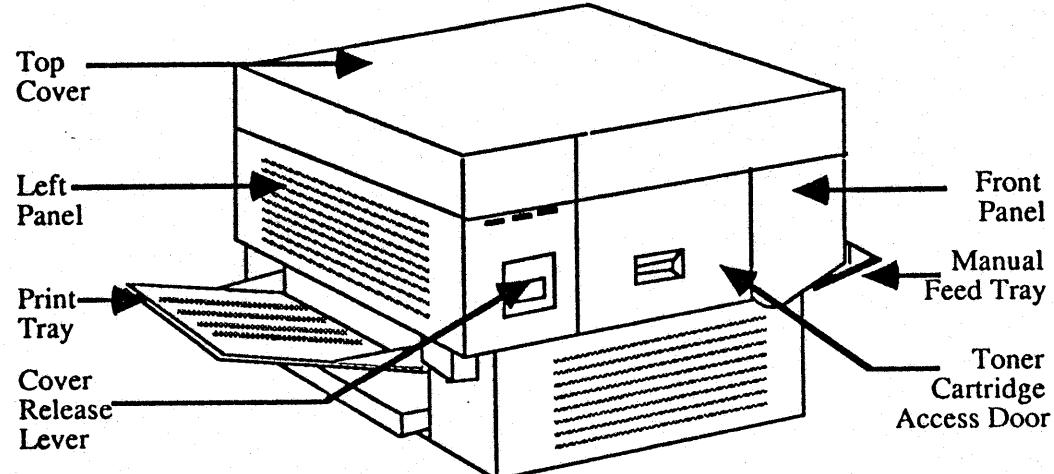


FIGURE 2-3: FRONT VIEW

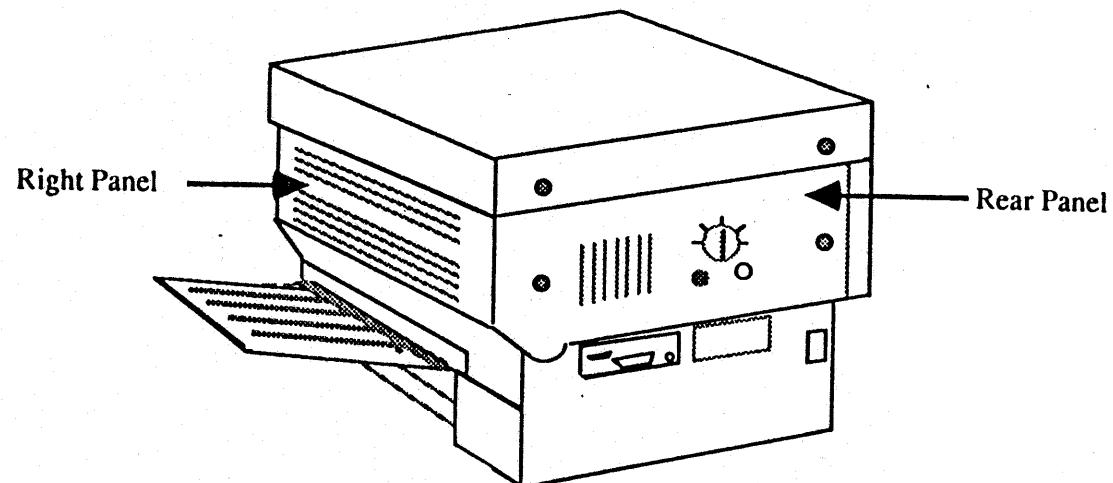


FIGURE 2-4: REAR VIEW

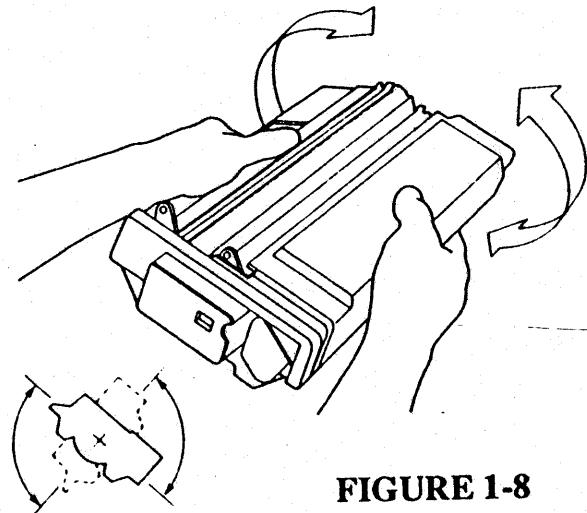


FIGURE 1-8

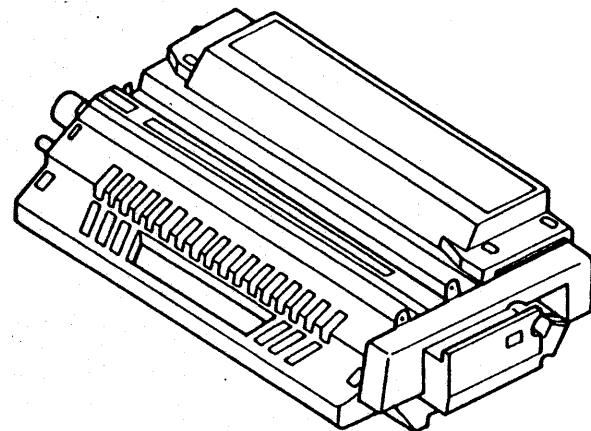


FIGURE 1-6
TONER CARTRIDGE,
EXTERNAL VIEW

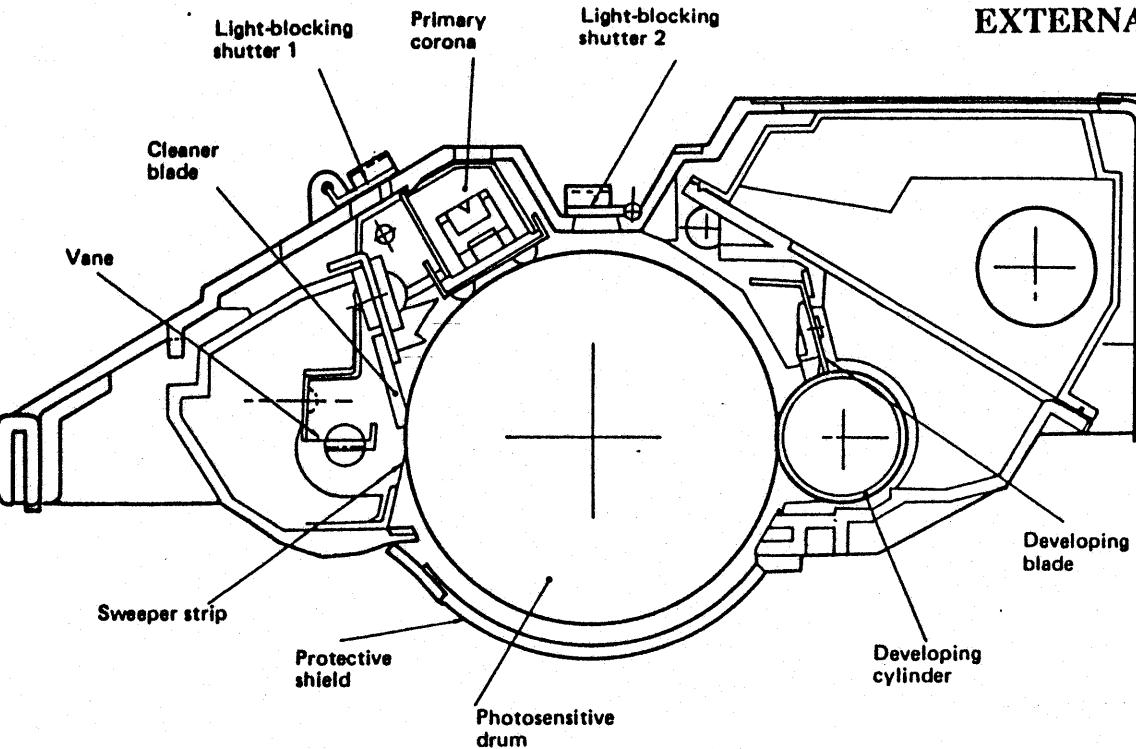


FIGURE 1-7: TONER CARTRIDGE (CROSS SECTION)

Slide the cartridge into the printer

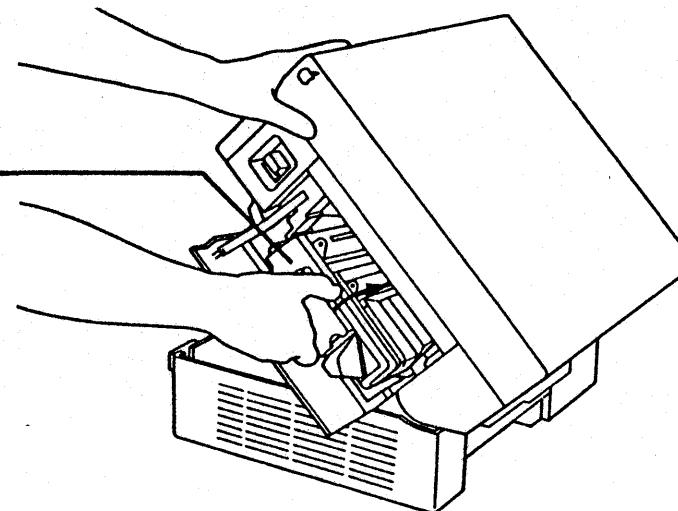


FIGURE 5-9

Flex the black tab until it breaks loose

Pull out the tab and the attached tape

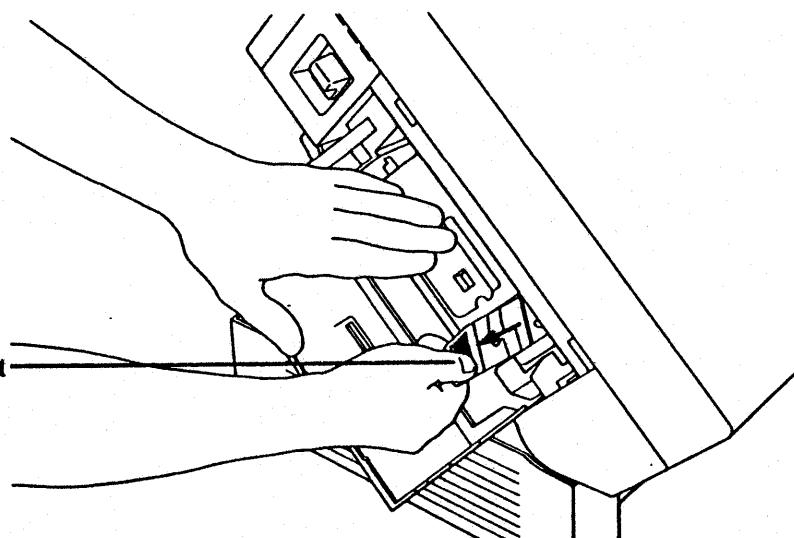


FIGURE 5-10

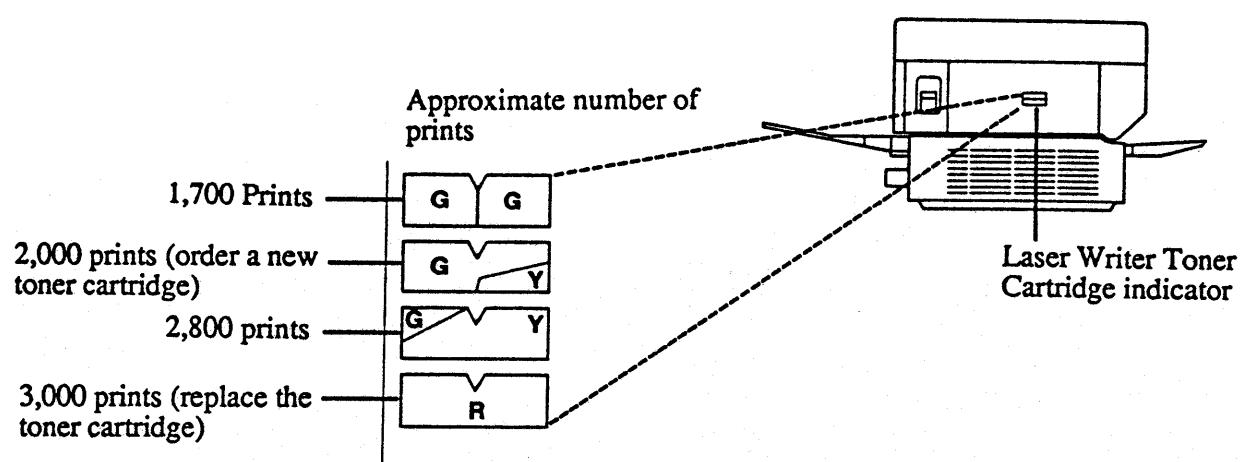


FIGURE 5-5: CARTRIDGE INDICATOR

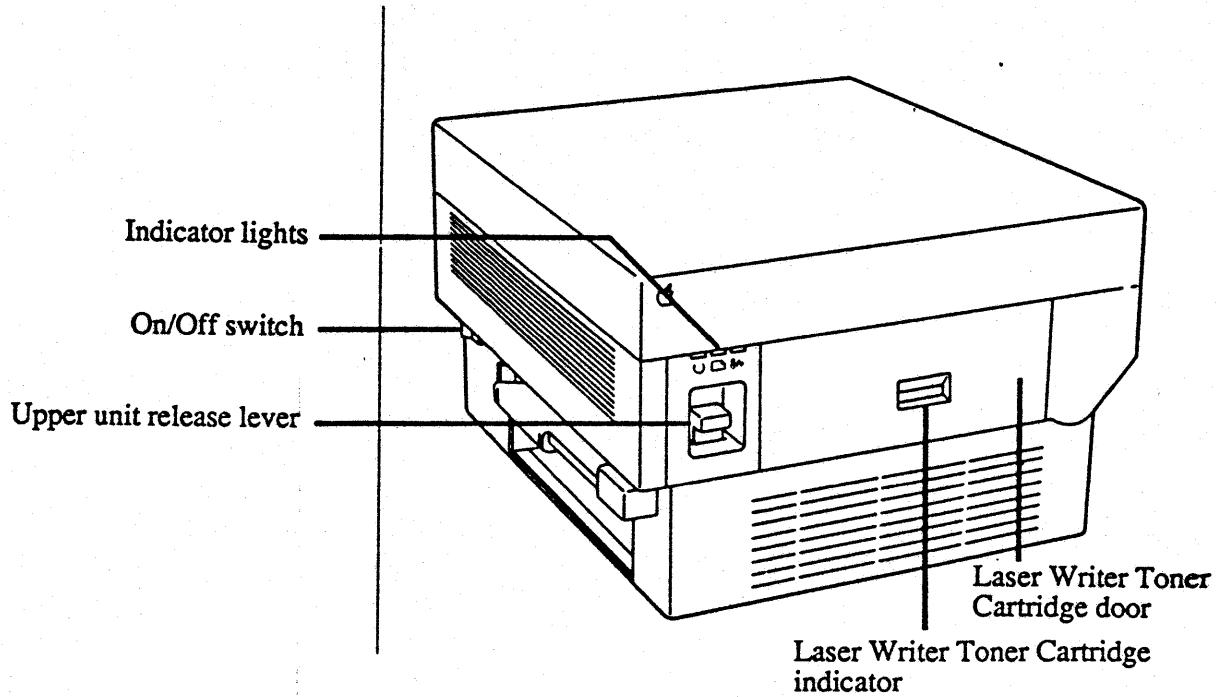


FIGURE 5-6

symbolics inc.

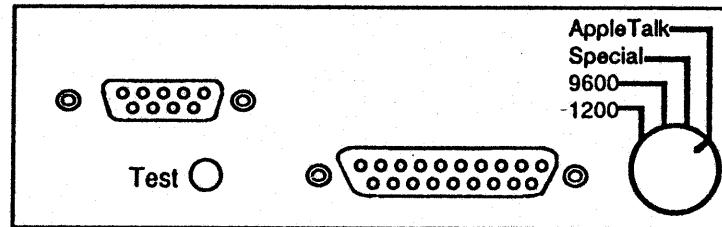


FIGURE 1-9: REAR (I/O) CONNECTOR PLATE

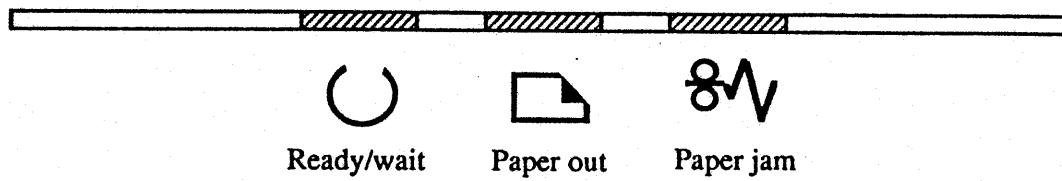


FIGURE 1-10: DISPLAY PANEL LEDs

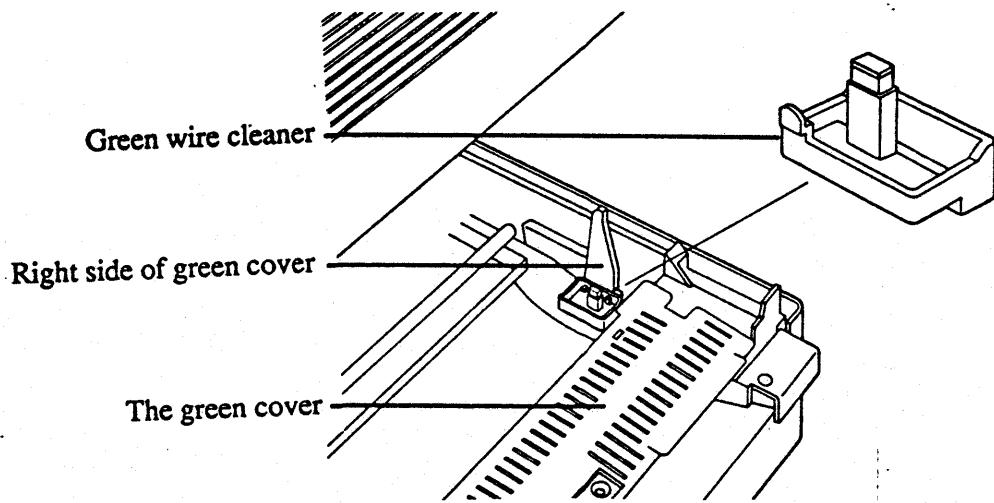


FIGURE 5-16: PRIMARY CORONA WIRE CLEANER

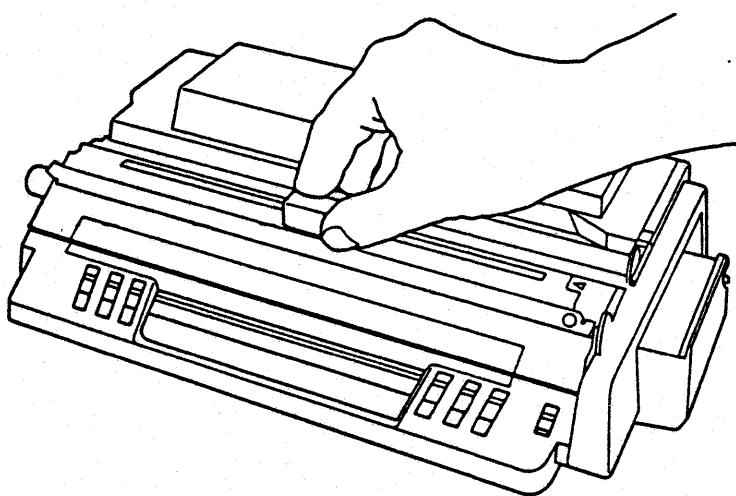


FIGURE 5-17: PRIMARY CORONA CLEANER SLOT

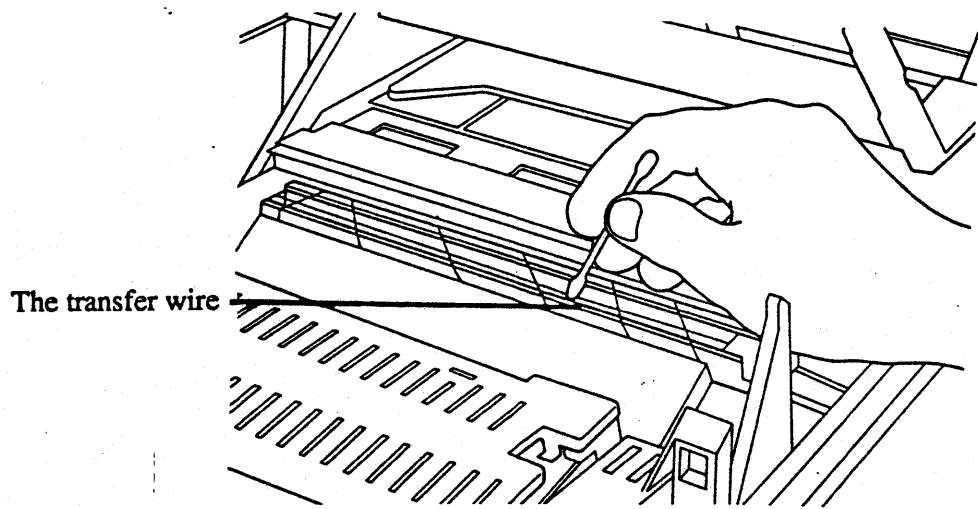


FIGURE 18: TRANSFER CORONA WIRE

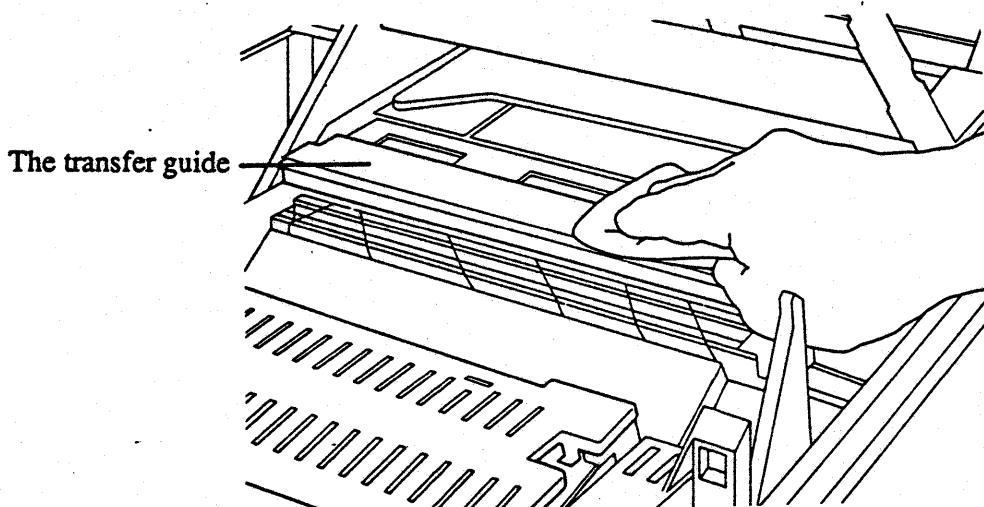


FIGURE 19: TRANSFER GUIDE

LaserWriter

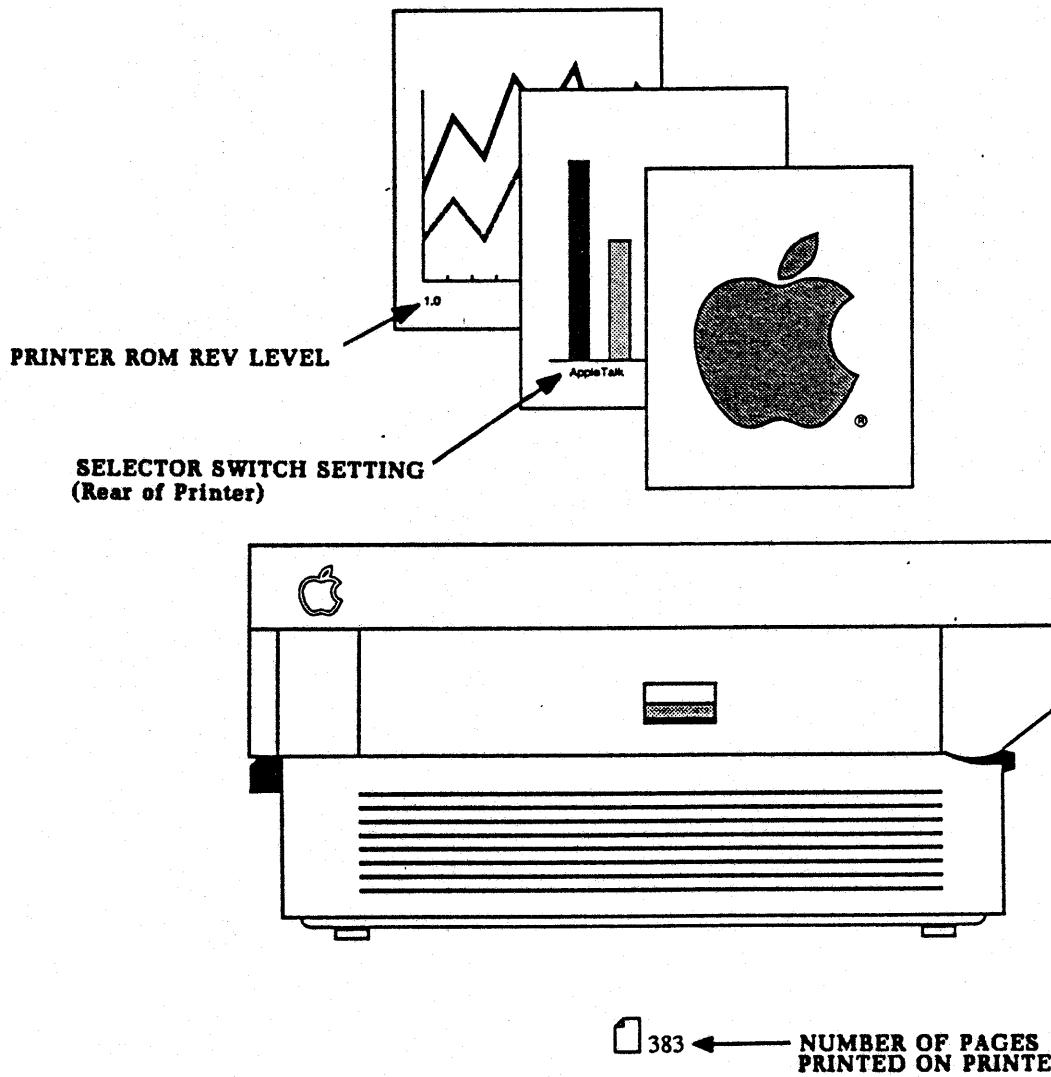
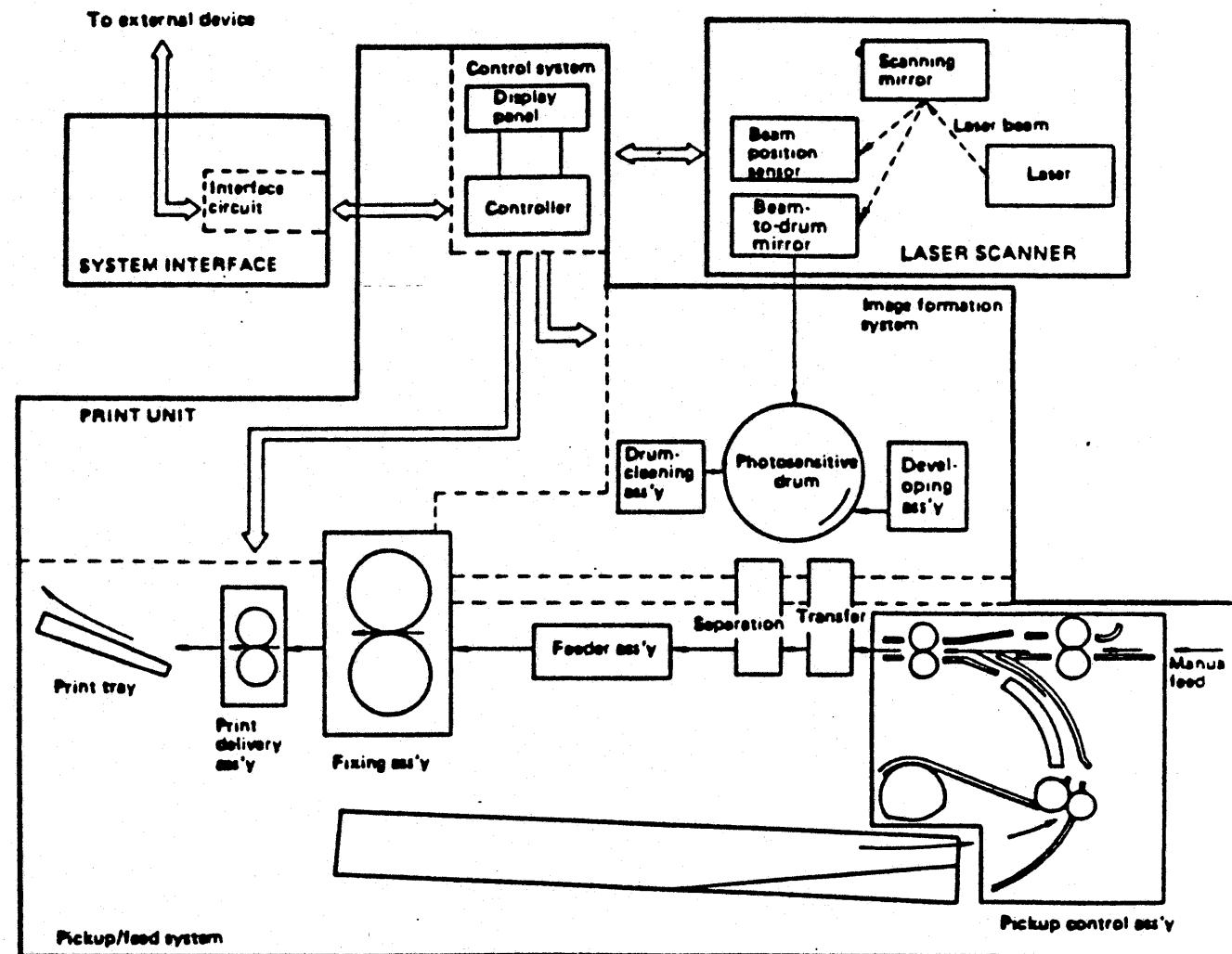


FIGURE 1-5: USER TEST PRINT



Overall Function Block Diagram

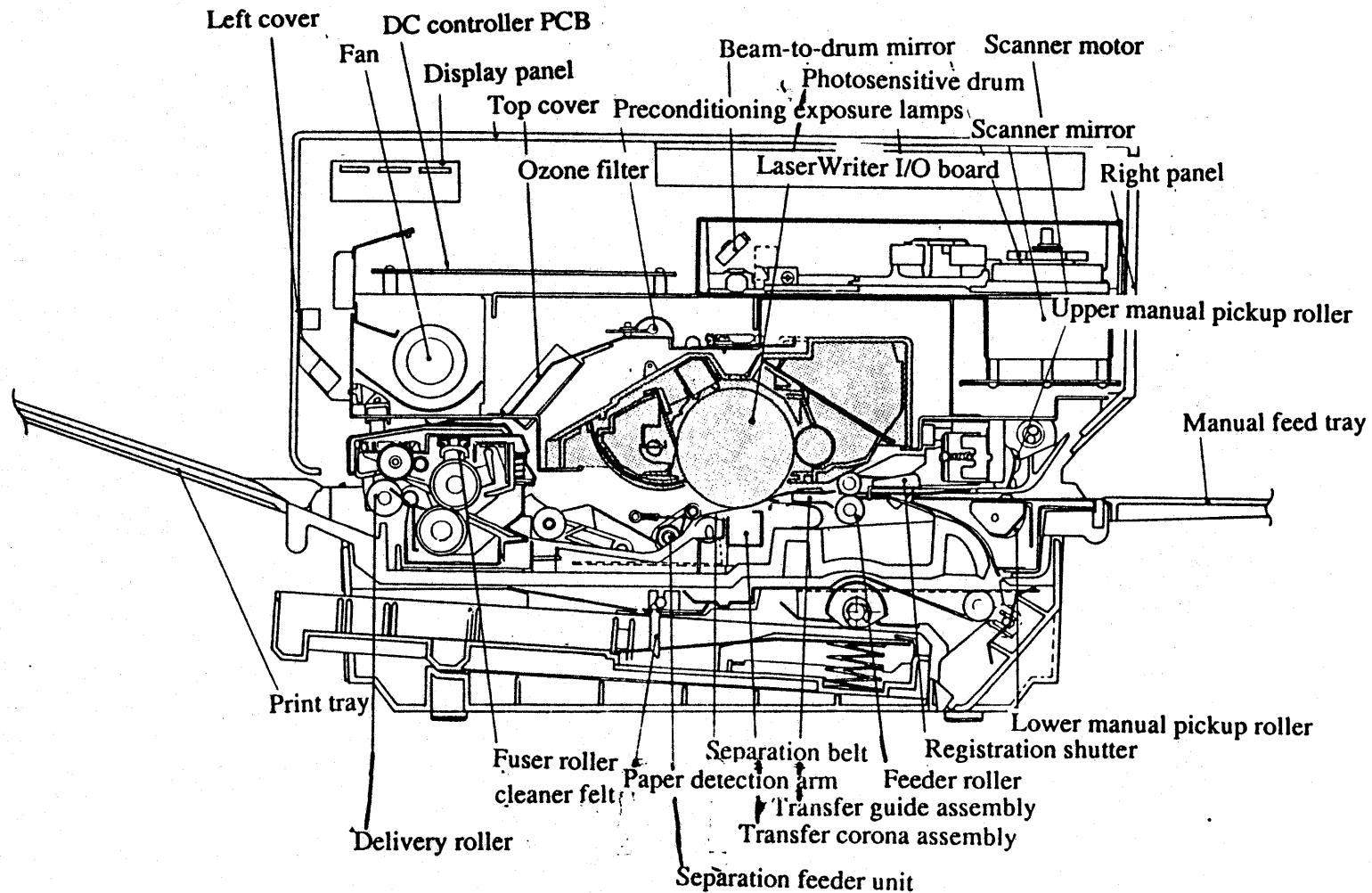
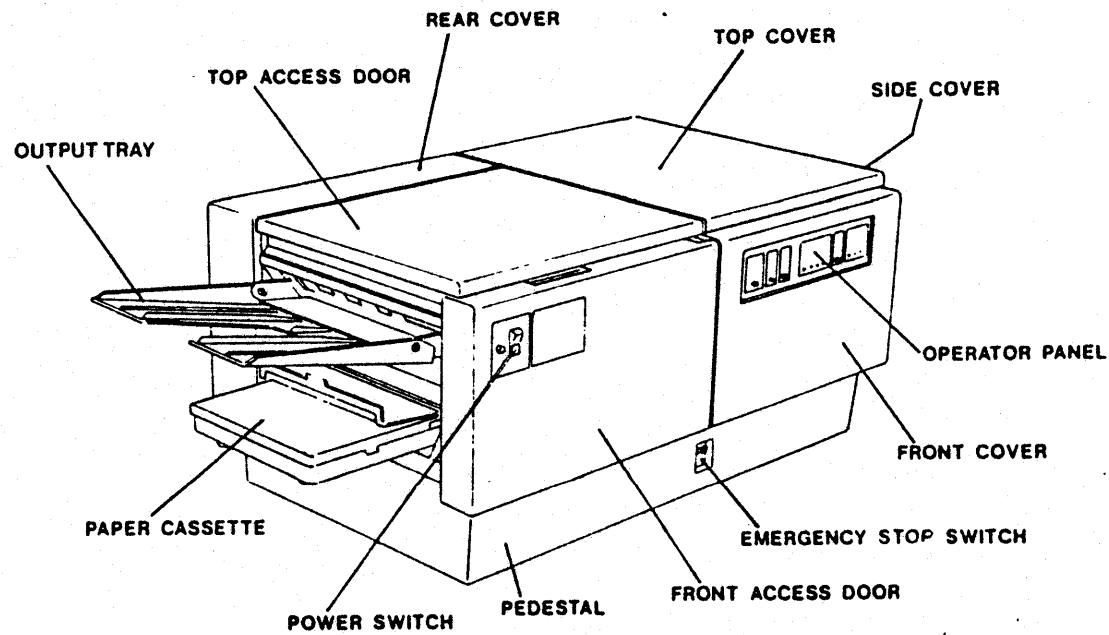
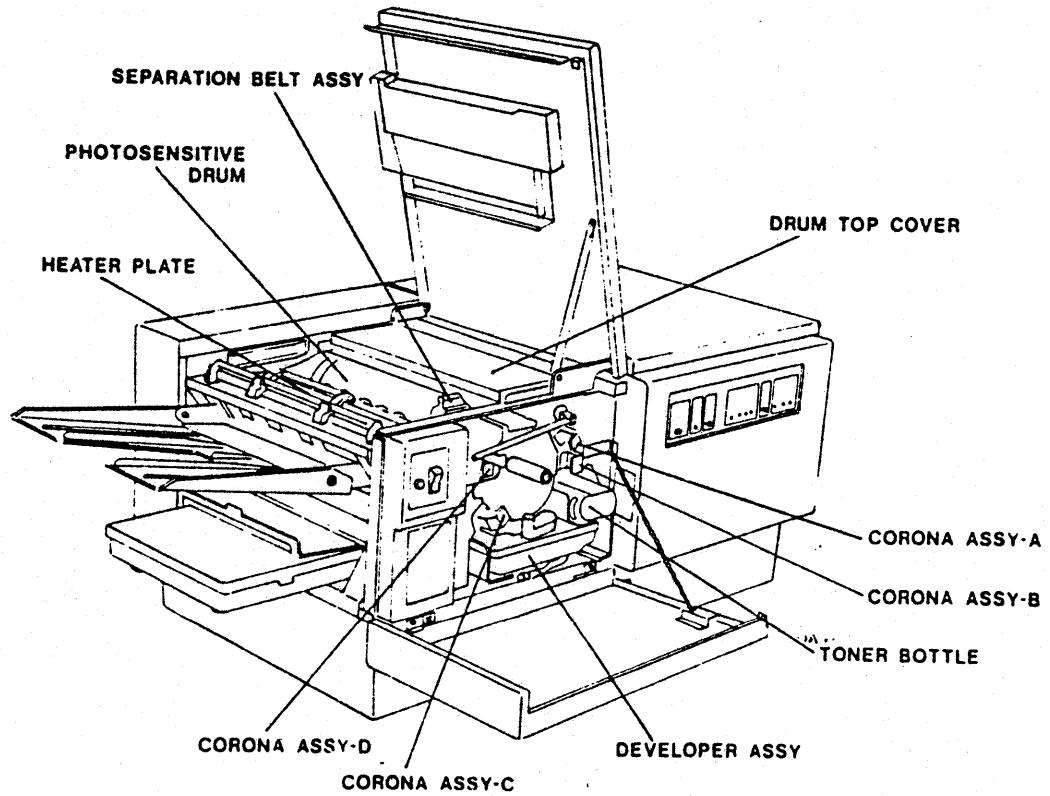


FIGURE 1-2: CROSS SECTION OF THE PRINTER (FRONT VIEW)



EXTERNAL VIEW OF THE LGP-1



INTERNAL VIEW OF THE LGP-1

Diagram

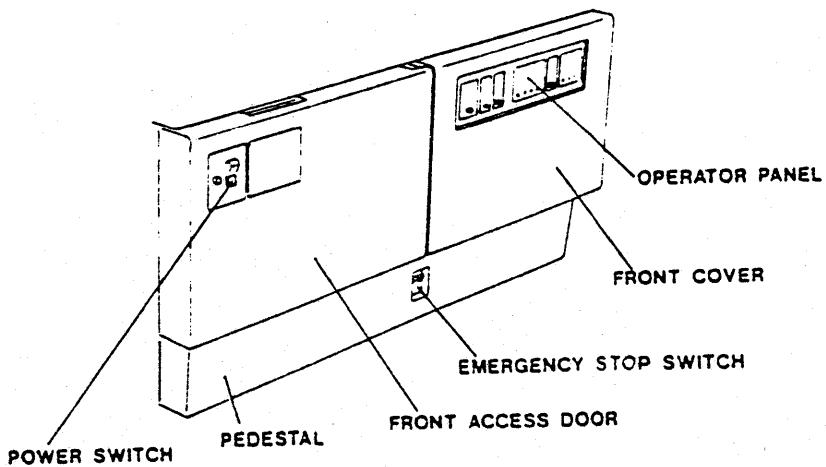
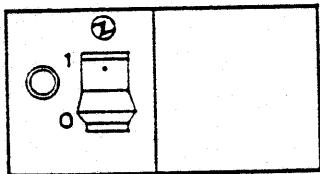


Figure 3. Switches and indicators on the front of the LGP-1.

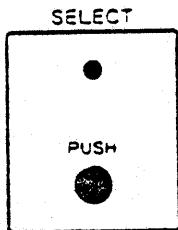
Power Switch



- When set to 1 (the upper portion of the switch is depressed), power is supplied to the entire printer.
- When set to 0 (the lower portion of the switch is depressed), power is turned off to all components except the environment conditioning circuits.

Operator Panel

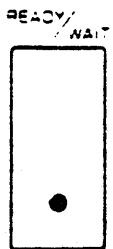
SELECT Button & indicator



The Select button has not been implemented in this release of the LGP-1.

SWITCHES AND INDICATORS

**READY/WAIT
indicator**



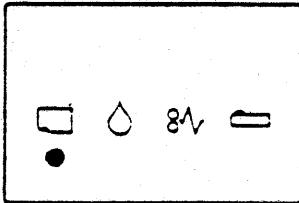
- When the Ready/Wait indicator flashes green, the printer is warming up, and you must wait for the printer to indicate that it is ready.
- When the Ready/Wait indicator is lit continuously, the printer is ready to accept your print command.

**TEST button
& indicator**



- When the Test button (labelled PUSH) is depressed ONCE, the test indicator is lit red and the LGP-1 prints a prestored pattern continuously; in this way the printer evaluates its own internal functioning.
- When the Test button is depressed AGAIN once it is on, then the red test indicator goes off and the LGP-1 stops printing test patterns.

**PAPER OUT
indicator**

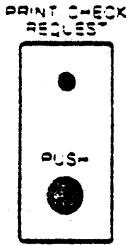


When the Paper Out indicator flashes red, the paper cassette is empty, missing, or installed incorrectly.

After determining the cause of the problem, see How to Load Paper, page 17, or How to Install the Paper Cassette, page 21.

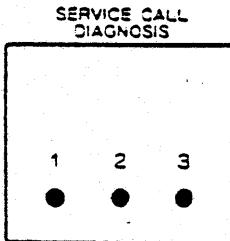
SWITCHES AND INDICATORS, cont'd.

**PRINT CHECK
REQUEST
indicator &
RESTART button**



The Print Check indicator and the Restart button have not been implemented in this release of the LGP-1.

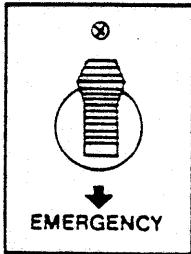
**SERVICE CALL
DIAGNOSIS
indicators**



When any of the three indicators is lit, the printer requires the attention of a trained technician.

Call your serviceperson immediately; be sure to tell him or her which indicators are illuminated.

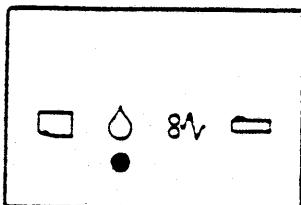
**Emergency
Stop Switch**



- When the Emergency Stop switch is flipped up, the switch is functioning. This switch should be kept on at all times.
In the event of an accident, such as fire, smoke, sparks, the Emergency Stop switch shuts off ALL electric power inside the printer.
- When the Emergency Stop switch is flipped down, the switch is not functioning. This switch should be turned off ONLY in an emergency.

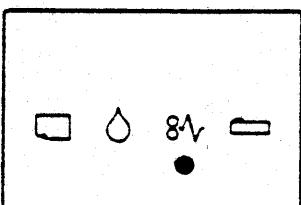
SWITCHES AND INDICATORS. *cont'd.*

**PREMIX OUT
indicator**



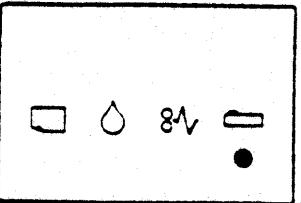
When the Premix Out indicator flashes red, the level of developer liquid is low. Add more premix. See How to Add Premix, page 22.

**PAPER JAM
indicator**



When the Paper Jam indicator flashes red, a paper jam has occurred. See How to Clear a Paper Jam, page 33.

**TONER OUT
indicator**



When the Toner Out indicator flashes red, the toner bottle is empty or the toner is clogging the attached black valve.

Open the front access door. Turn the toner bottle counterclockwise and pull it out carefully.

- If the toner bottle is empty, see How to Add Toner, page 23.
- If not, see How to Clear a Clogged Toner Valve, page 47.

Counter

The Counter, located on the right side of the printer, records the total number of pages printed. It cannot be reset.

SWITCHES AND INDICATORS. cont'd.

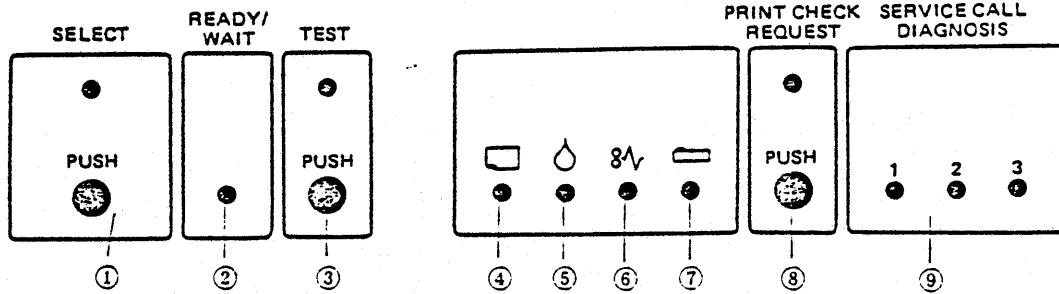


Figure 1 - 8 Control panel

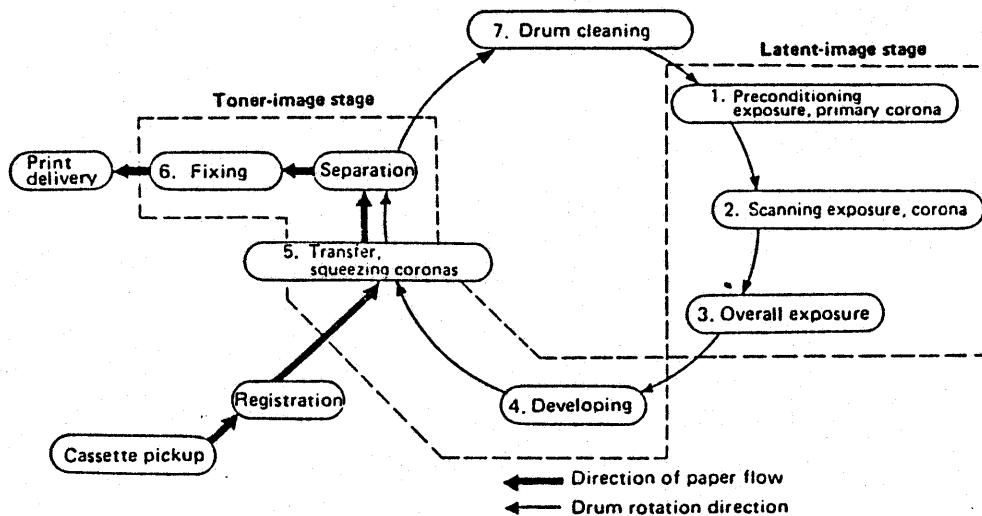
The colors of the LEDs for the LBP-10 are given first; those for the LBP-10II are given in parentheses.

- 1) SELECT switch and indicator
yellow (green)
This switch is usually used to control the linkage to an external device. The yellow (green) LED lights steadily when the linkage is engaged.
- 2) READY/WAIT indicator
green (green)
This green LED flashes when the LBP-10/10II is in the WAIT state and lights steadily when the printer is ready to operate.
- 3) TEST switch and indicator
red (green)
This switch is usually used to test LBP-10/10II components and functions.
- 4) PAPER OUT indicator
red (orange)
This red (orange) LED flashes if the cassette is empty or not installed. Printing is not possible if this indicator is flashing.
- 5) DEVELOPER OUT indicator
red (orange)
This red (orange) LED flashes if the amount of developer in the developing assembly drops below the specified minimum. Printing is not possible when this indicator is flashing. Once this indicator has flashed, the printer will not reset until the developer supply has been replenished.
- 6) JAM indicator
red (orange)
This red (orange) LED flashes if paper has jammed inside the printer. Printing is not possible until the jammed paper is removed.
- 7) TONER OUT indicator
red (orange)
This red (orange) LED flashes if the toner supply runs out. Printing is not possible when this indicator is flashing.
- 8) PRINT CHECK REQUEST indicator
and RESTART switch
red (orange)
This red (orange) LED flashes and the printer is switched to the WAIT state if an image problem occurs during printing. Pressing the RESTART button after the problem has been corrected turns the LED off and switches the printer back to the READY state.
- 9) SERVICE CALL DIAGNOSIS indicators
x3, red (orange)
These LEDs flash alone or in combination to indicate the general location of a malfunction detected by the diagnostic program. The location code is as follows:

| | LED 1 | LED 2 | LED 3 | Malfunction Location |
|---|-------|-------|-------|---------------------------------------------------------------------------------------------------------------------|
| 1 | • | | | Laser driver PCB, laser unit |
| 2 | | • | | Scanner driver PCB, scanner unit |
| 3 | • | • | | Horizontal sync generator (incl. stationary mirror), laser driver PCB, laser unit, scanner driver PCB, scanner unit |
| 4 | | | • | AC driver PCB, DC controller PCB (fixing control) |
| 5 | • | | • | Drum clock PCB, main motor |
| 6 | | • | • | DC controller clock (LBP-10 only) |

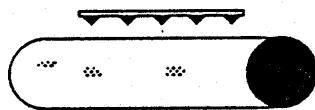
Note: "•" means the indicator is lit.

Table 1-1 Service call LEDs



The Printing Process

STEP 1: PRE-CONDITIONING EXPOSURE

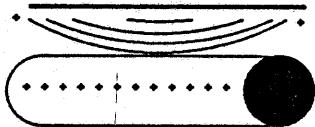


FUNCTION: TO LOWER RESISTANCE OF DRUM

FAILURE MODES AND EFFECTS:

LAMP(S) FAILURE -> DARK SPECKS ON PAGE

STEP 2: PRIMARY CORONA A DISCHARGE



FUNCTION: TO DEPOSIT POSITIVE CHARGES ON DRUM

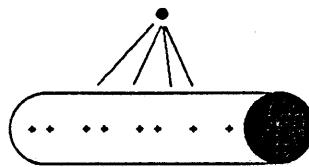
FAILURE MODES AND EFFECTS:

CORONA A UNDERCHARGING -> DARKENED/BLACK PAGE

CORONA A OVERCHARGING -> PRINT DROP-OUT

LGP-1 IMAGE FORMATION

STEP 3: LASER EXPOSURE



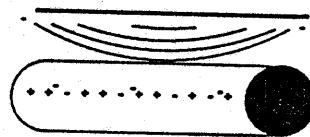
FUNCTION: TO DISCHARGE SPECIFIED AREAS OF DRUM

FAILURE MODES AND EFFECTS:

LASER UNDEREXPOSURE -> LIGHTENED/BLANK PRINT

LASER OVEREXPOSURE -> SHORTENED LASER LIFE

STEP 4: SCANNING CORONA B DISCHARGE



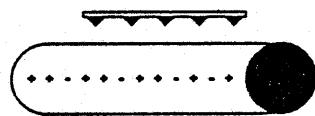
FUNCTION: TO SPRAY NEGATIVE CHARGES ON TO DRUM

FAILURE MODES AND EFFECTS:

CORONA B UNDERCHARGING -> LIGHT/BLANK PRINT

CORONA B OVERCHARGING -> OVER-BOLD PRINT/DARKENED PAGE

STEP 5: OVERALL EXPOSURE

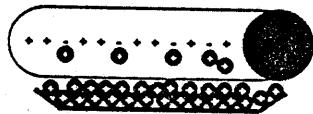


FUNCTION: TO REMOVE FREE NEGATIVE CHARGES FROM DRUM

FAILURE MODES AND EFFECTS:

LAMP(S) FAILURE -> OVER-BOLD PRINT/DARKENED PAGE

STEP 6: TONER APPLICATION



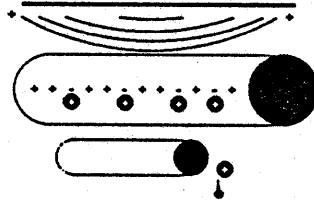
FUNCTION: TO APPLY TONER TO DRUM

FAILURE MODES AND EFFECTS:

TONER UNDER-APPLICATION -> LIGHTENED PRINT

TONER OVER-APPLICATION -> OVER-BOLD PRINT

STEP 7: SQUEEZING CORONA C DISCHARGE AND ELECTRODE ROLLER



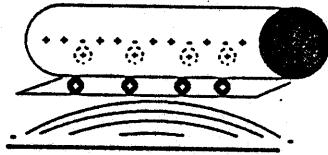
FUNCTION: TO REMOVE EXTRA TONER FROM DRUM

FAILURE MODES AND EFFECTS:

CORONA C UNDERCHARGING -> OVER-BOLD PRINT/DARKENED PAGE

CORONA C OVERCHARGING -> PRINT DROP-OUT

STEP 8: TRANSFER CORONA D DISCHARGE



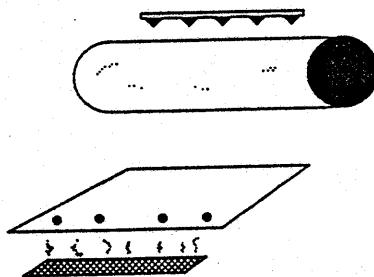
FUNCTION: TO PULL TONER FROM DRUM TO PAPER

FAILURE MODES AND EFFECTS:

CORONA D UNDERCHARGING -> PRINT DROP-OUT

CORONA D OVERCHARGING -> OVER-BOLD PRINT/TONER NOT FIXED

STEP 9: POST-EXPOSURE AND FIXING

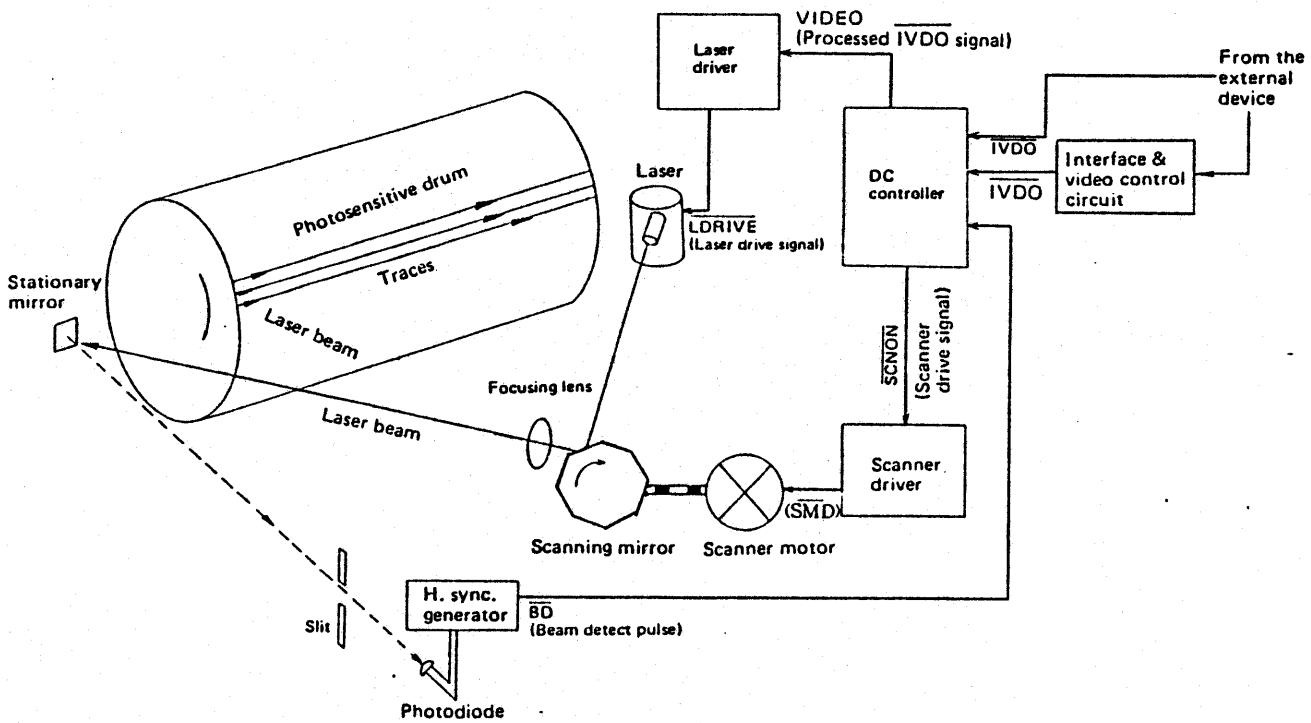


FUNCTION: TO DISCHARGE DRUM AND FIX TONER TO PAPER

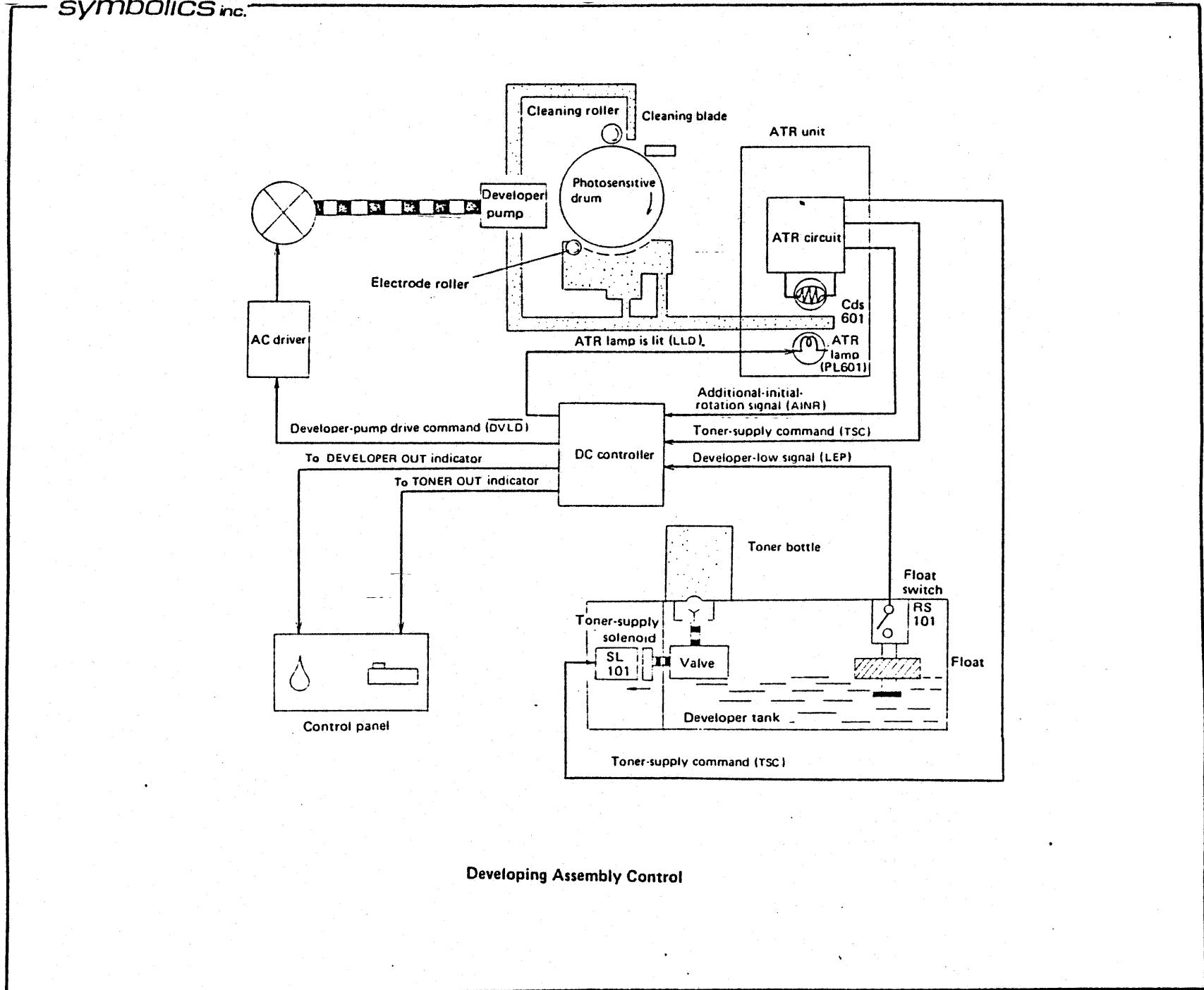
FAILURE MODES AND EFFECTS:

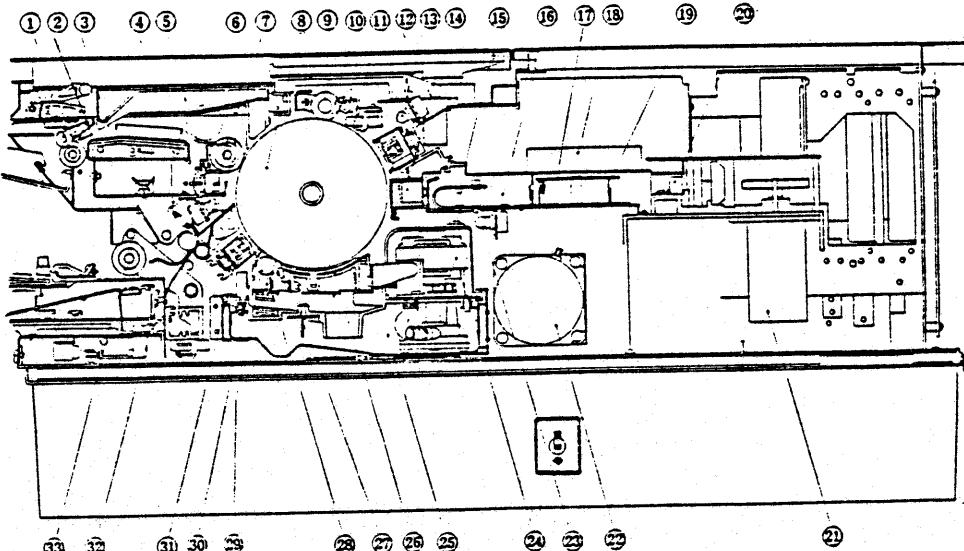
LAMP(S) FAILURE -> GHOST IMAGES APPEAR ON PAGE

FIXING HEATER FAILURE -> PRINT SMEARS WHEN TOUCHED



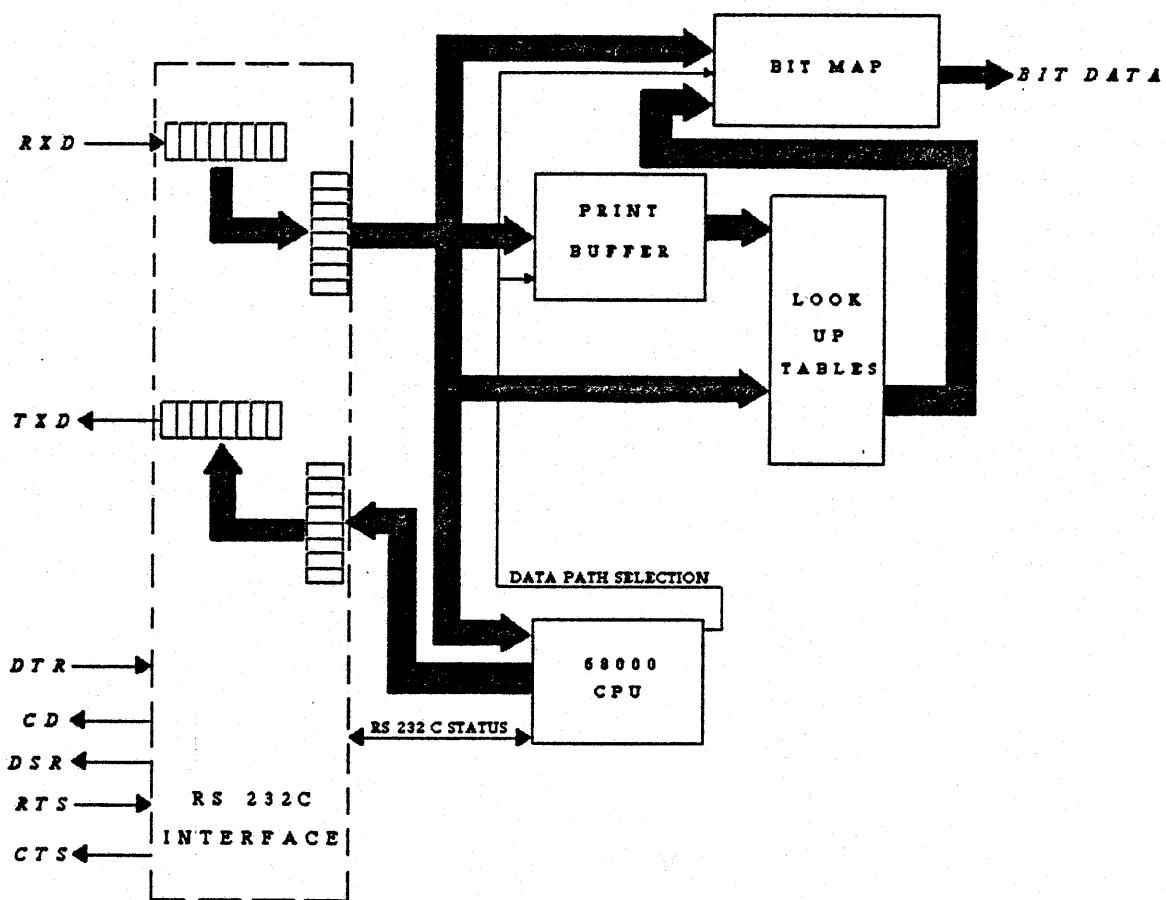
LASER SCANNER





- | | |
|------------------------------------------|--------------------------------------------------------|
| 1. Paper detection roller | 18. Anti-dust fan for the scanning corona assembly (B) |
| 2. Delivery roller | 19. ND filter |
| 3. Fixing heater | 20. Focusing lens |
| 4. Paper delivery guide | 21. Scanner unit |
| 5. Post-exposure lamps | 22. Main motor |
| 6. Transfer corona assembly (D) | 23. Overall-exposure lamps |
| 7. Separation roller | 24. Developer pump |
| 8. Photosensitive drum | 25. Developing assembly |
| 9. Drum cover | 26. Developing tray |
| 10. Cleaning roller | 27. Main scraper |
| 11. Cleaning blade (photosensitive drum) | 28. Cleaning blade (for electrode roller) |
| 12. Primary corona assembly (A) | 29. Electrode roller |
| 13. Preconditioning-exposure lamps | 30. Secondary scraper |
| 14. Scanning corona assembly (B) | 31. Squeezing corona assembly (C) |
| 15. Stationary mirror | 32. Paper pickup guide |
| 16. Light guide | 33. Pickup rollers |
| 17. H. sync generator PCB | |

LBP-10II Cross sectional view



| Switch | Function | IF switch | THEN |
|------------|-------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| #1 & #2 | Sets baud rate on the serial interface | #1 = ON & #2 = ON #1 = OFF & #2 = ON #1 = ON & #2 = OFF #1 = OFF & #2 = OFF | Baud rate = 300. Baud rate = 1200. Baud rate = 9600. Baud rate = 19200 |
| | | | <i>Note:</i> The software currently expects to use 9600 baud. |
| #3 | Sets host interface to use | #3 = ON #3 = OFF | Host uses serial interface. Host uses parallel interface |
| #4 | Sets printing format | #4 = ON #4 = OFF | Printing is in landscape mode (157 columns by 66 lines). Printing is in portrait mode (113 columns by 80 lines). |
| #5 | Unused | | |
| #6 | Sets printer resolution | #6 = ON #6 = OFF | Print is in standard resolution: 240 x 240 dots/inch. Print is in high resolution: 480 dots/inch vertical. |
| | | | <i>Note:</i> #6 MUST always be on. |
| #7 | Sets debug mode | #7 = ON #7 = OFF | Normal operation: no debug. Debugging information is provided over serial line. |
| | | | <i>Note:</i> #7 MUST always be on. |
| #8 | Unused | | |

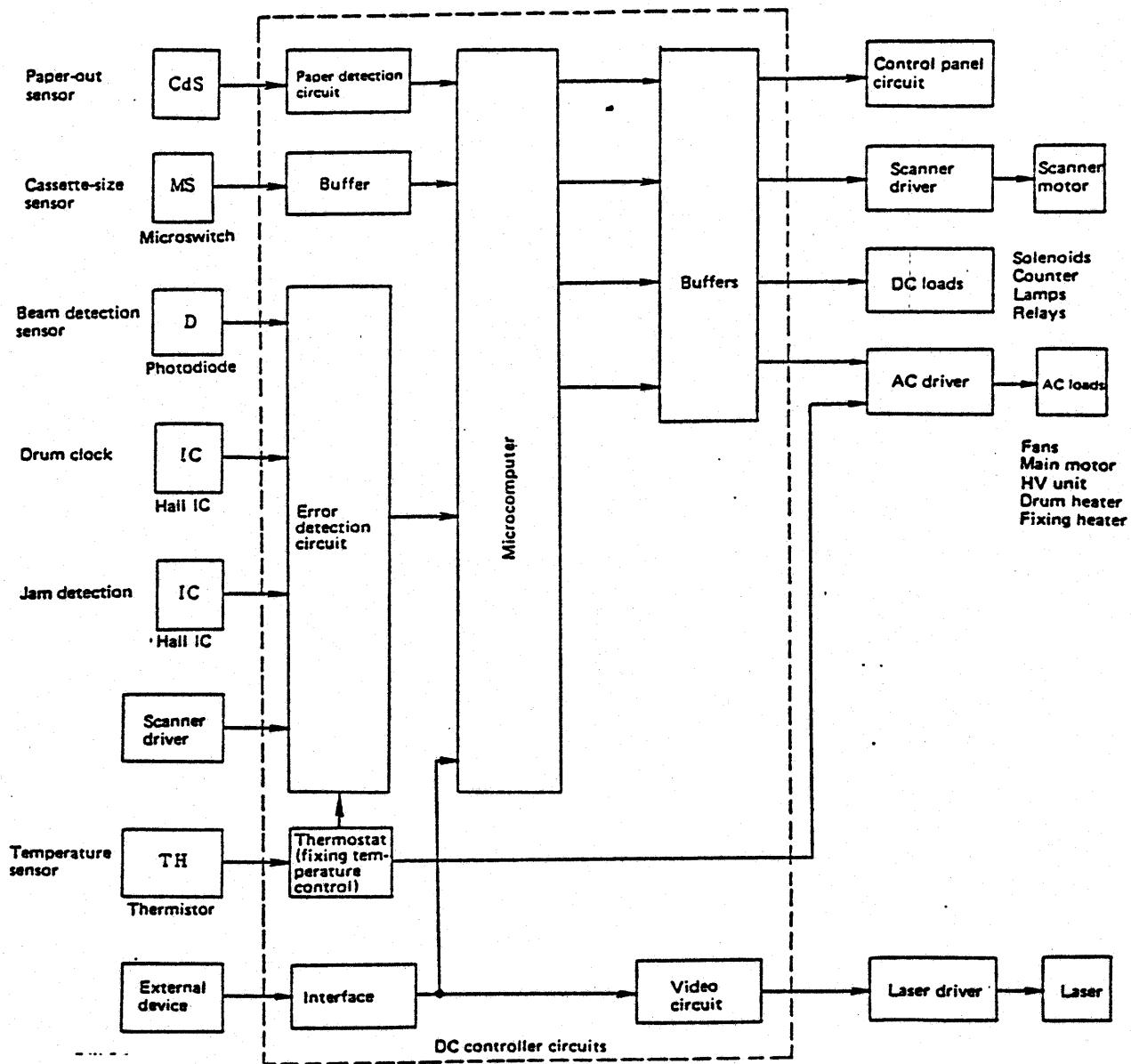
Note on ON and OFF settings: You might occasionally encounter rocker switches that are numbered on one side and blank on the other. In this case:

- to set the switch ON, depress the labelled side
- to set the switch OFF, depress the blank side

SWITCH SETTINGS ON THE CONTROLLER BOARD

(MEMORY PCBA SWITCH SETTINGS SPECIFY BOARD CONFIGURATION. THE ONLY SUPPORTED CONFIGURATION REQUIRES SW. 2 - ON; ALL OTHERS - OFF.)

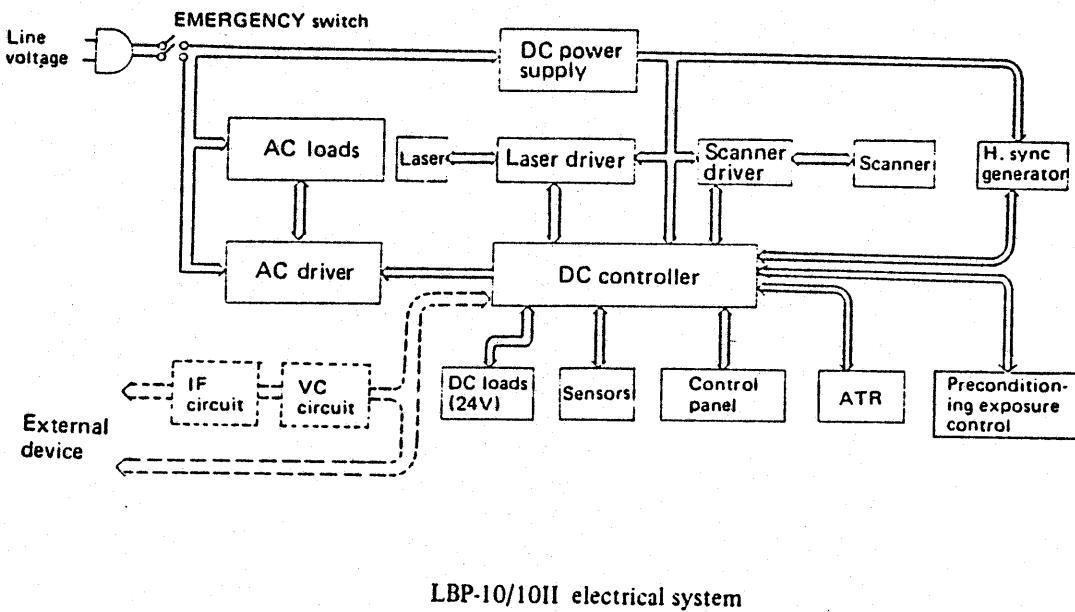
LGP-1 SWITCH SETTINGS



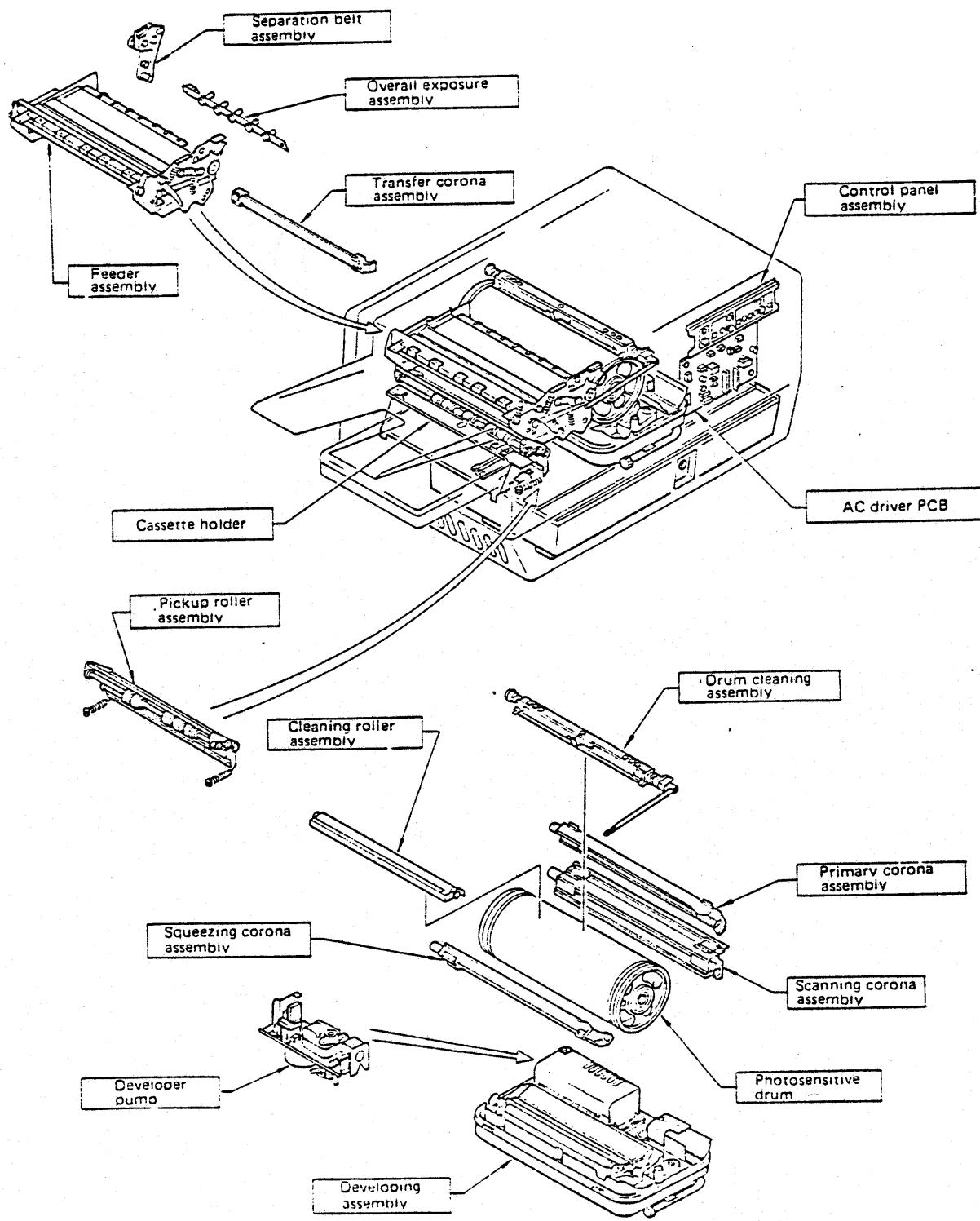
| PCB | LED | Reason for lighting |
|----------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC controller | LED501 | The fixing heater is operating (<u>FSRD</u> is TRUE). |
| | LED502 | The high-voltage power supplies, motor, and developing assembly are operating (<u>HVD_C</u> (LBP-10), <u>HVPR</u> (LBP-10II), <u>DVLD</u> , and <u>DRMD</u> are TRUE). |
| | LED503 | The ATR lamp (L601) is ON (LLD is TRUE). |
| | LED504 | +5V DC is available. |
| Laser driver | LED701 | The temperature of the laser chip is correct (<u>LRDY</u> is TRUE). |
| Scanner driver | LED301 | The scanner motor is rotating at the correct speed (<u>SCNRDY</u> is TRUE). |
| ATR | LED601 | The concentration of toner in the developer is too low (<u>TSC</u> is TRUE). |

F. PCB List

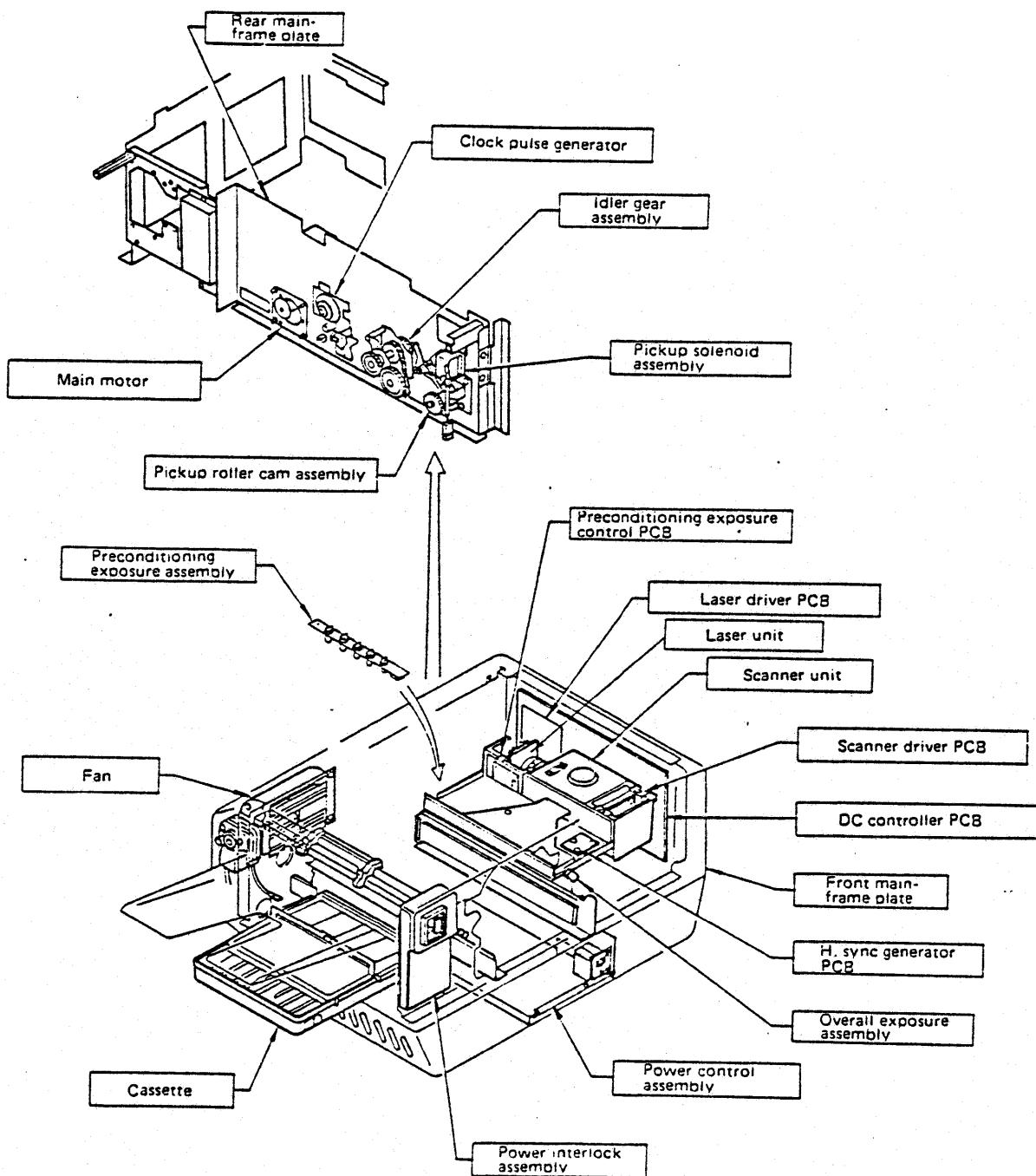
1. DC controller
2. AC driver
3. Control panel
4. Laser driver
5. Scanner driver
6. Horizontal sync generator
7. ATR
8. Preconditioning exposure
9. Overall- and post-exposure
10. Drum clock, paper-detection
11. Preconditioning exposure



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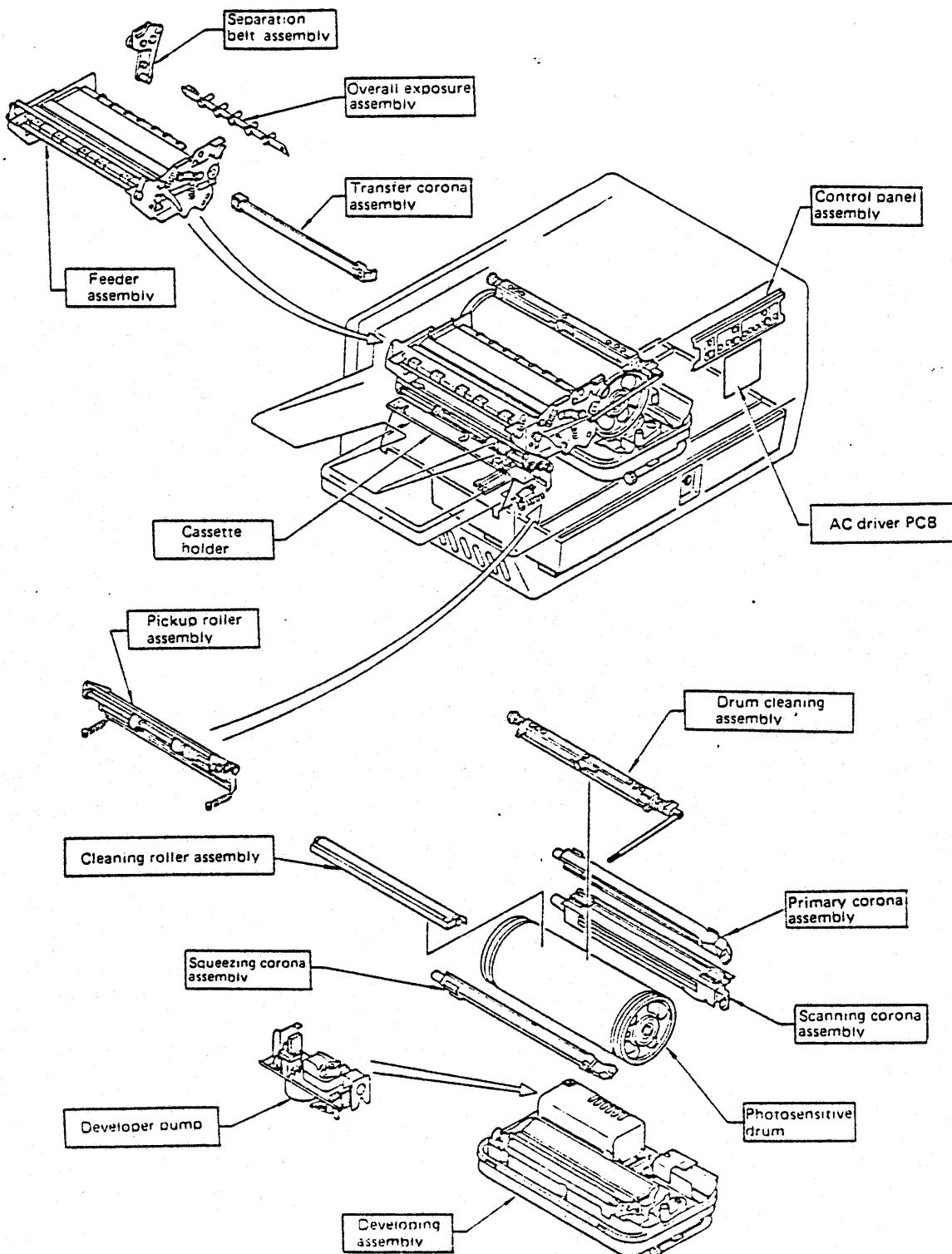


LOCATIONS OF ASSEMBLIES, UNITS FOR LBP-10 (1 of 2)

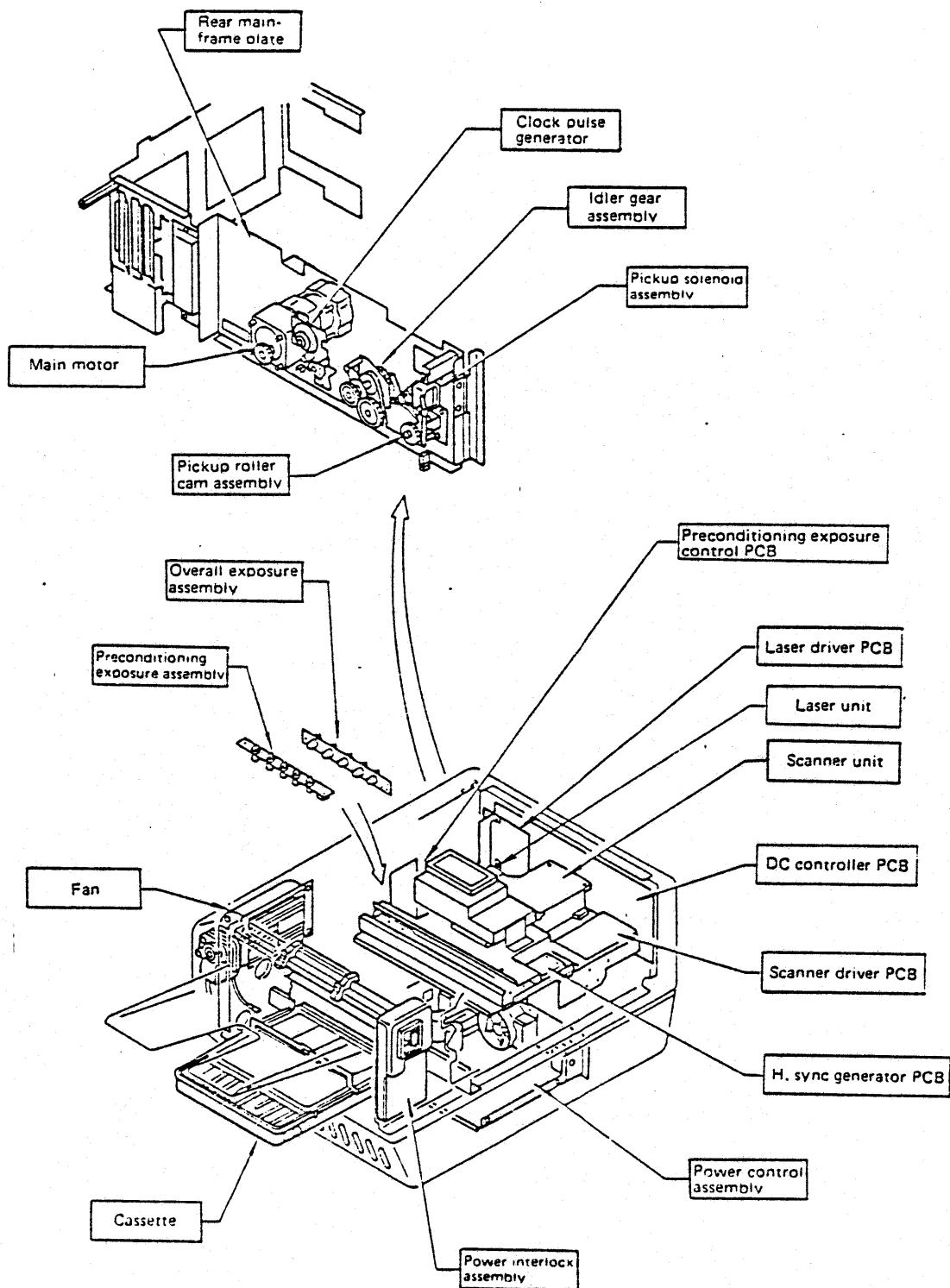


LOCATIONS OF ASSEMBLIES, UNITS FOR LBP-10 (2 of 2)

symbolics inc.

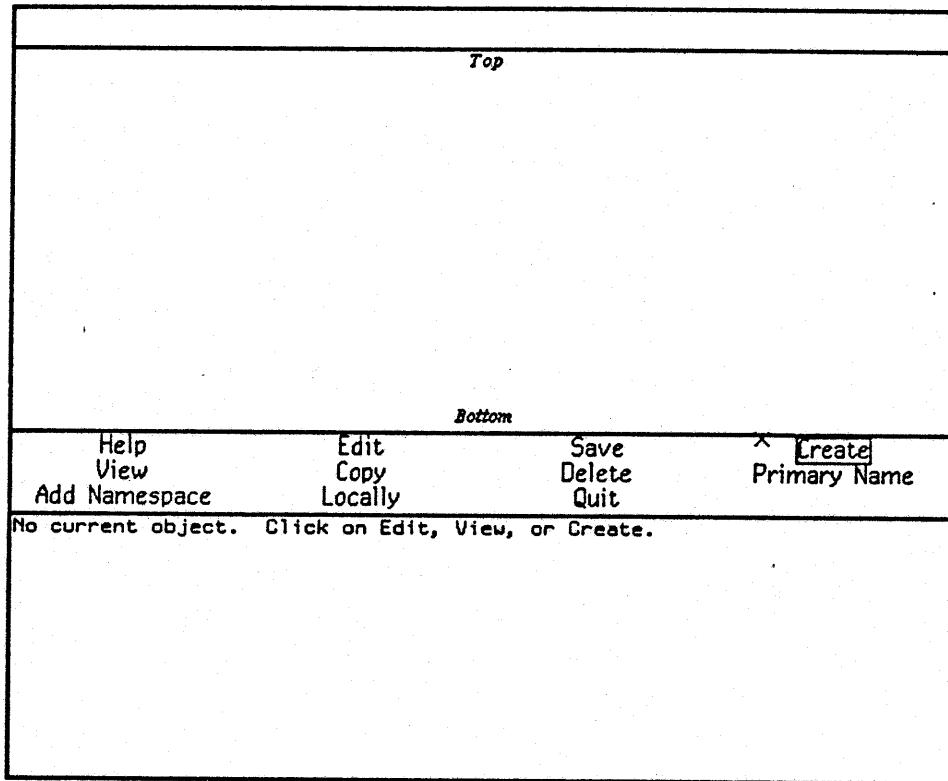


LOCATIONS OF ASSEMBLIES, UNITS FOR LBP-10II (1 of 2)

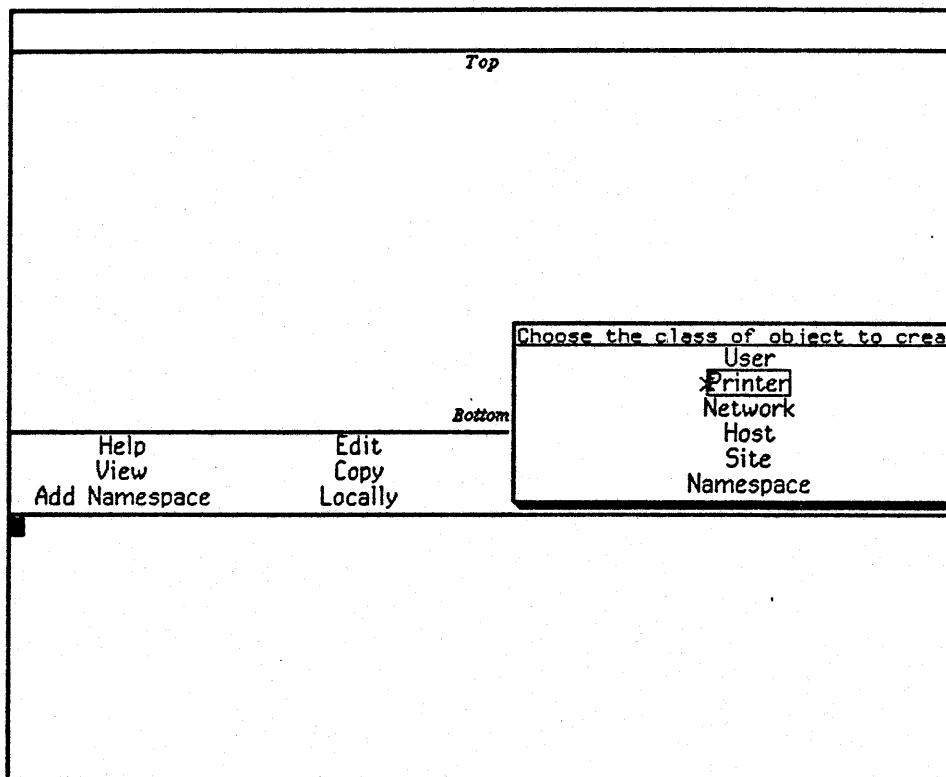


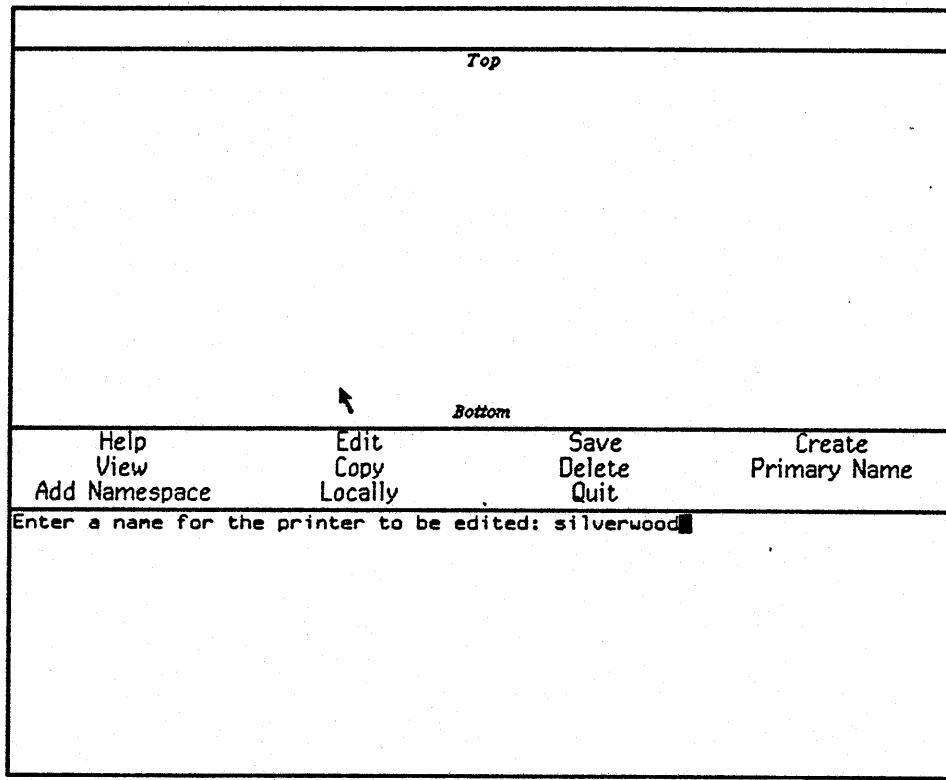
LOCATIONS OF ASSEMBLIES, UNITS FOR LBP-10II (2 of 2)

symbolics inc.



PRINTER INSTALLATION





Editing: Printer SCH|SILVERWOOD

Top

Type: LGP2
Site: SCH-SUPPORT
Pretty Name: "silverwood lake"
Interface: SERIAL
Interface Options: Set: *Pair: BAUD 9600* Pair: UNIT 1 Pair: Global-name Token
Host: MERCURY
Format: Global-name
Protocol: Global-name
Default Font: Token
Header Font: Token
Dplt Logo: Global-name
Character Size: Pair: Token Token
Page Size: Pair: Token Token
Fonts Widths File: Token
User Property: Pair: Global-name Token

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

Editing: Printer SCH|SILVERWOOD

Top

Type*: LGP2
Site: SCH-SUPPORT
Pretty Name: "silverwood lake"
Interface: SERIAL
Interface Options: Set: **Pair:** BAUD 9600 **Pair:** UNIT 1 **Pair:** Global-name Token
Host: MERCURY
Format: Global-name
Protocol: Global-name
Default Font: Token
Header Font: Token
Dplt Logo: Global-name
Character Size: **Pair:** Token Token
Page Size: **Pair:** Token Token
Fonts Widths File: Token
User Property: **Pair:** Global-name Token

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

Editing: Printer SCH|SILVERWOOD

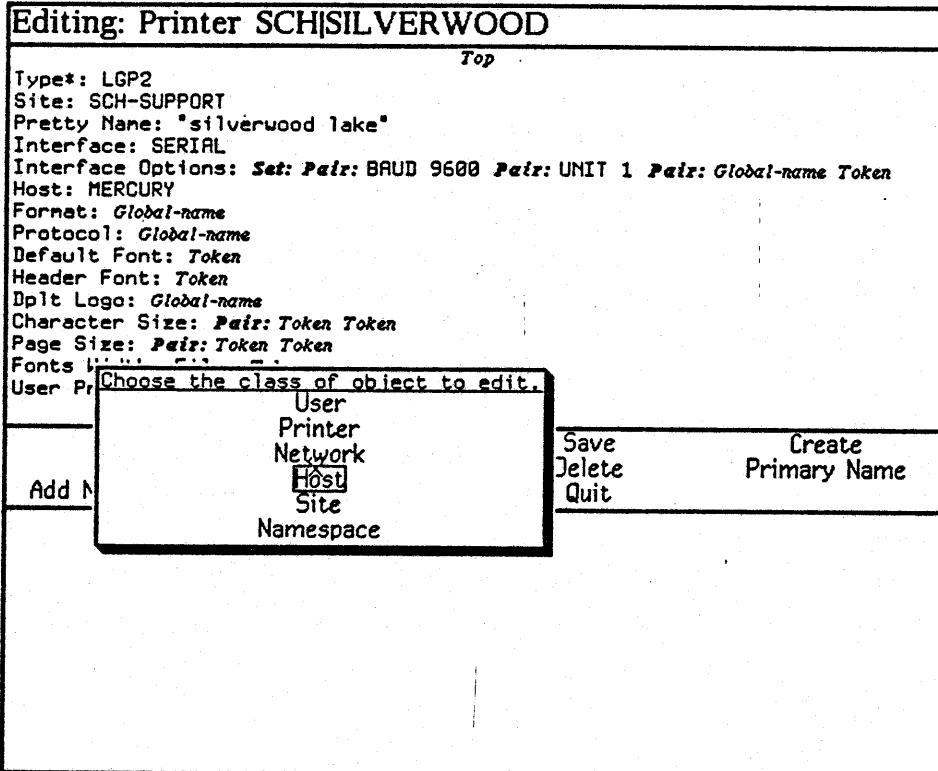
Top

Type*: LGP2
Site: SCH-SUPPORT
Pretty Name: "silverwood lake"
Interface: SERIAL
Interface Options: Set: Pair: BAUD 9600 Pair: UNIT 1 Pair: Global-name Token
Host: MERCURY
Format: Global-name
Protocol: Global-name
Default Font: Token
Header Font: Token
Dplt Logo: Global-name
Character Size: Pair: Token Token
Page Size: Pair: Token Token
Fonts Widths File: Token
User Property: Pair: Global-name Token

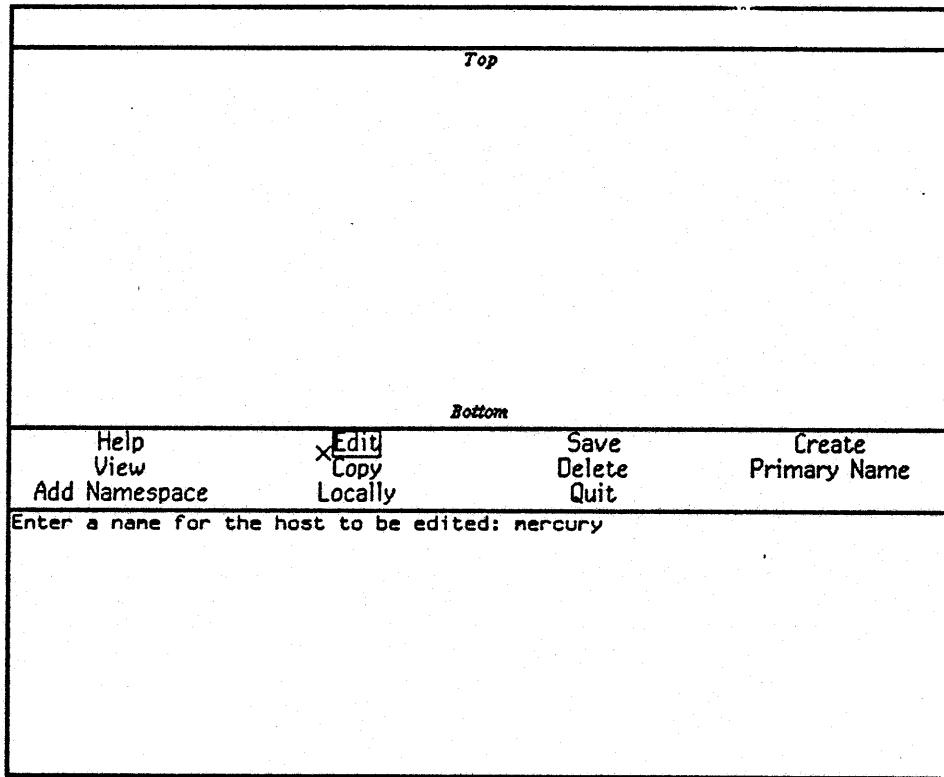
Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.



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Editing: Host SCH|MERCURY

Top

System Type*: LISP
Short Name: MY
Short Name: *Name*
Site: SCH-SUPPORT
Nickname: SCH-MERCURY
Nickname: *Name*
Machine Type: 3640
Address: *Pair*: CHAOS 21070
Address: *Pair*: Network Token
Pretty Name: MERCURY
Finger Location: "Corporate Tech Support"
Location: *Pair*: SCH 2
Service: Set: CHAOS-STATUS CHAOS-SIMPLE CHAOS-STATUS *Global-name*
Service: Set: SHOW-USERS CHAOS NAME *Global-name*
Service: Set: TIME CHAOS-SIMPLE TIME-SIMPLE *Global-name*

More below

| | | | |
|---------------|---------|--------|--------------|
| Help | XEdit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

Editing: Host SCH|MERCURY

More above

Services: Set: LISPM-FINGER CHAOS-SIMPLE LISPM-FINGER Global-name
Service: Set: FILE CHAOS QFILE Global-name
Service: Set: HARDCOPY CHAOS LGP Global-name
Service: Set: HARDCOPY-STATUS CHAOS LGP-STATUS Global-name
Service: Set: Global-name
Printer: SILVERWOOD
Bitmap Printer: ~~SILVERWOOD~~
File Control Lifetime: 150000
Spooled Printer: Pair: SILVERWOOD Set: Pair: HOME-DIRECTORY my:>silverwood P
Spooled Printer: Pair: Printer Set: Pair: Global-name Token
Print Spooler Options: Set: Pair: Global-name Token
Server Machine: Token
Peripheral: Pair: Global-name Set: Pair: Global-name Token
Default Secondary Name Server: Token
User Property: Pair: Global-name Token

Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.

| | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------|--------------|
| Editing: Host SCH MERCURY | | | | |
| <i>More above</i> | | | | |
| <p>Service: Set: LISPM-FINGER CHAOS-SIMPLE LISPM-FINGER Global-name Service: Set: FILE CHAOS QFILE Global-name Service: Set: HARDCOPY CHAOS LGP Global-name Service: Set: HARDCOPY-STATUS CHAOS LGP-STATUS Global-name Service: Set: Global-name Printer: SILVERWOOD Bitmap Printer: SILVERWOOD File Control Lifetime: 150000 Spooled Printer: Pair: SILVERWOOD Set: Pair: HOME-DIRECTORY my:>silverwood P Spooled Printer: Pair: Printer Set: Pair: Global-name Token Print Spooler Options: Set: Pair: Global-name Token Server Machine: Token Peripheral: Pair: Global-name Set: Pair: Global-name Token Default Secondary Name Server: Token User Property: Pair: Global-name Token</p> | | | | |
| <i>Bottom</i> | | | | |
| Help | | Edit | Save | Create |
| View | | Copy | Delete | Primary Name |
| Add Namespace | | Locally | Quit | |
| Click on an attribute entry to replace (L), delete (M) or edit (R) it. | | | | |

Editing: Host SCH|MERCURY

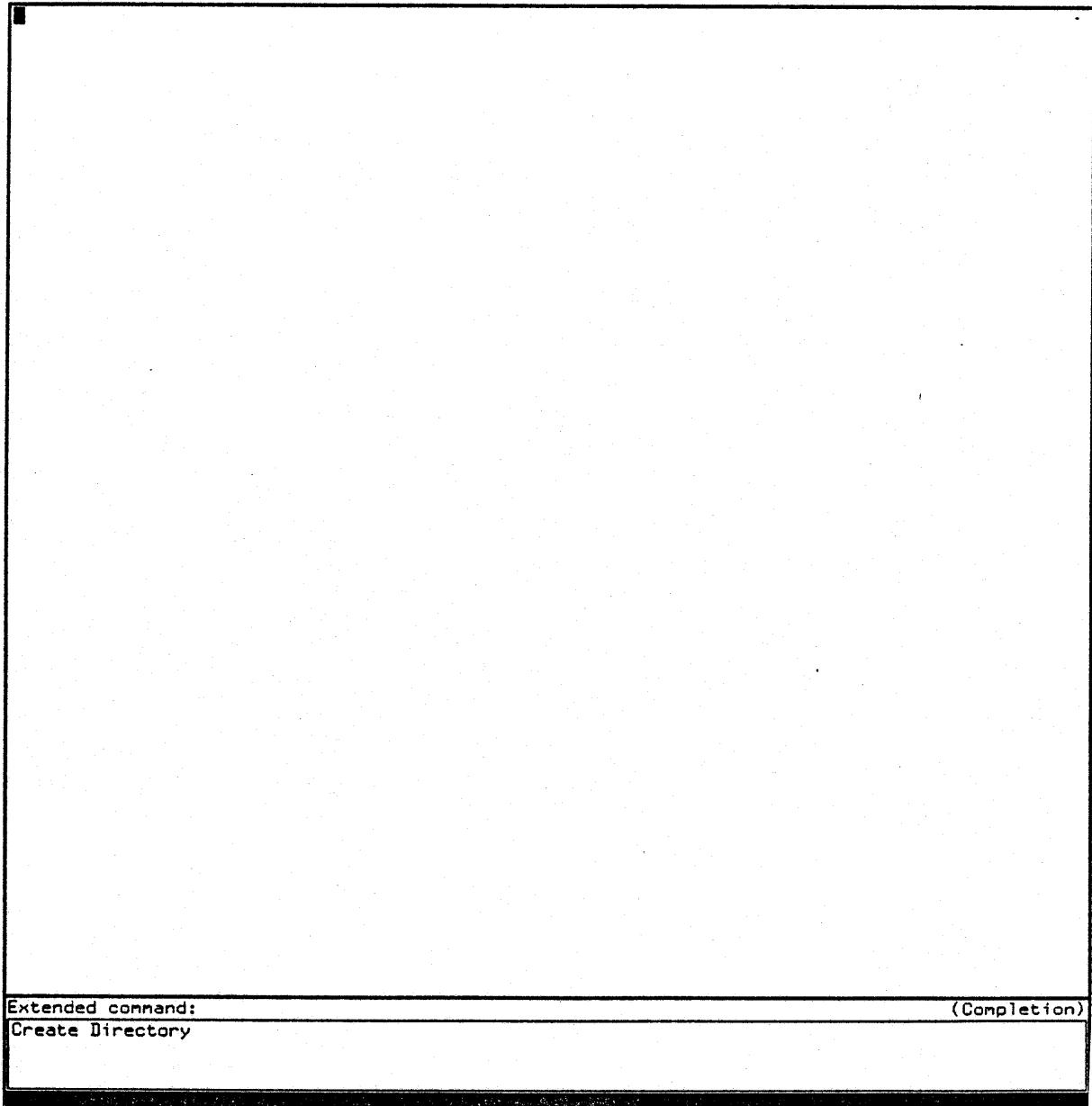
More above

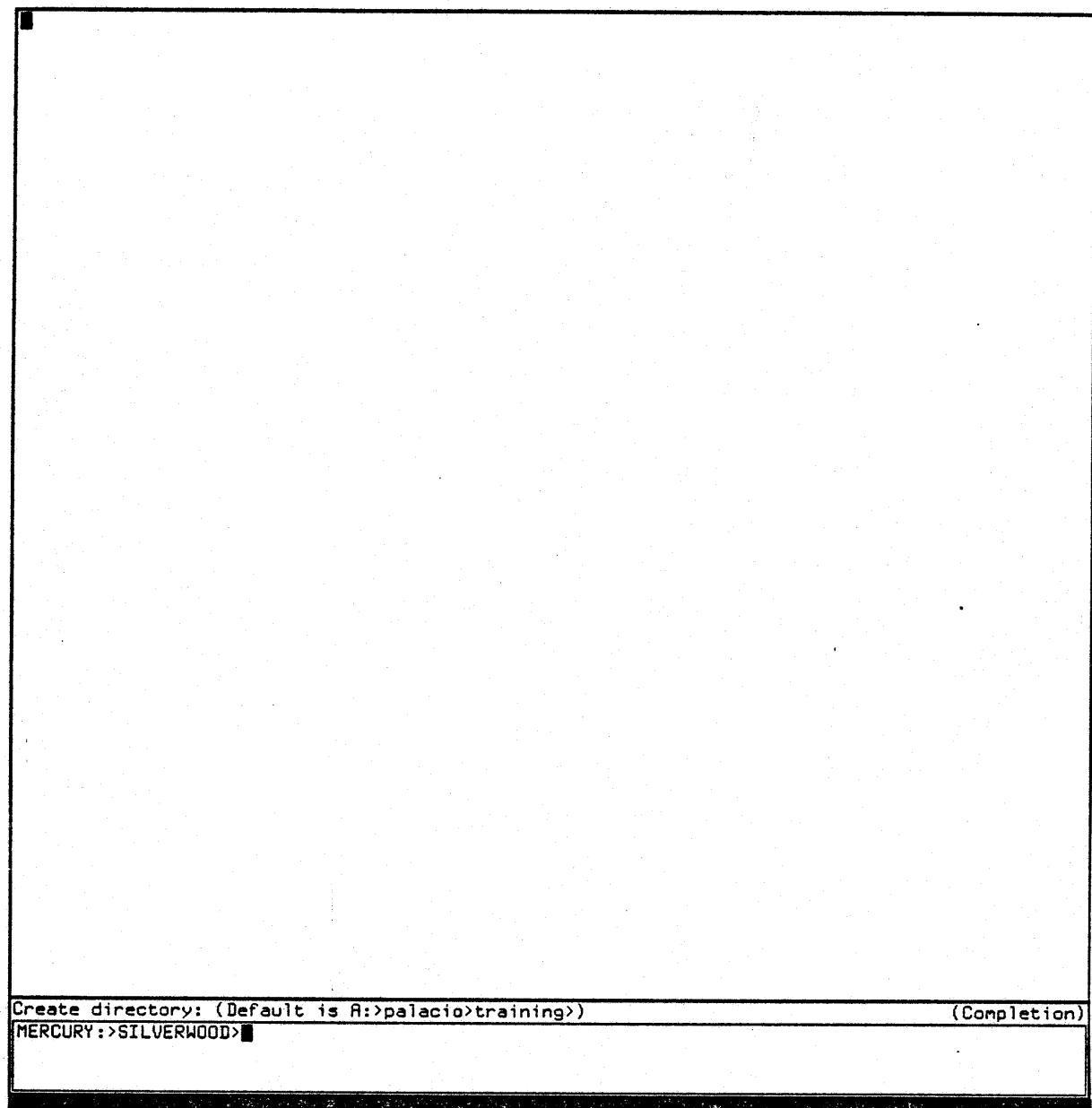
Service: *Set: LISPM-FINGER CHAOS-SIMPLE LISPM-FINGER Global-name*
Service: *Set: FILE CHAOS QFILE Global-name*
Service: *Set: HARDCOPY CHAOS LGP Global-name*
Service: *Set: HARDCOPY-STATUS CHAOS LGP-STATUS Global-name*
Service: *Set: Global-name*
Printer: SILVERWOOD
Bitmap Printer: SILVERWOOD
File Control Lifetime: 150000
Spooled Printer: *Pair: SILVERWOOD Set: Pair: HOME-DIRECTORY my:>silverwood P*
Spooled Printer: *Pair: Printer Set: Pair: Global-name Token*
Print Spooler Options: *Set: Pair: Global-name Token*
Server Machine: *Token*
Peripheral: *Pair: Global-name Set: Pair: Global-name Token*
Default Secondary Name Server: *Token*
User Property: *Pair: Global-name Token*

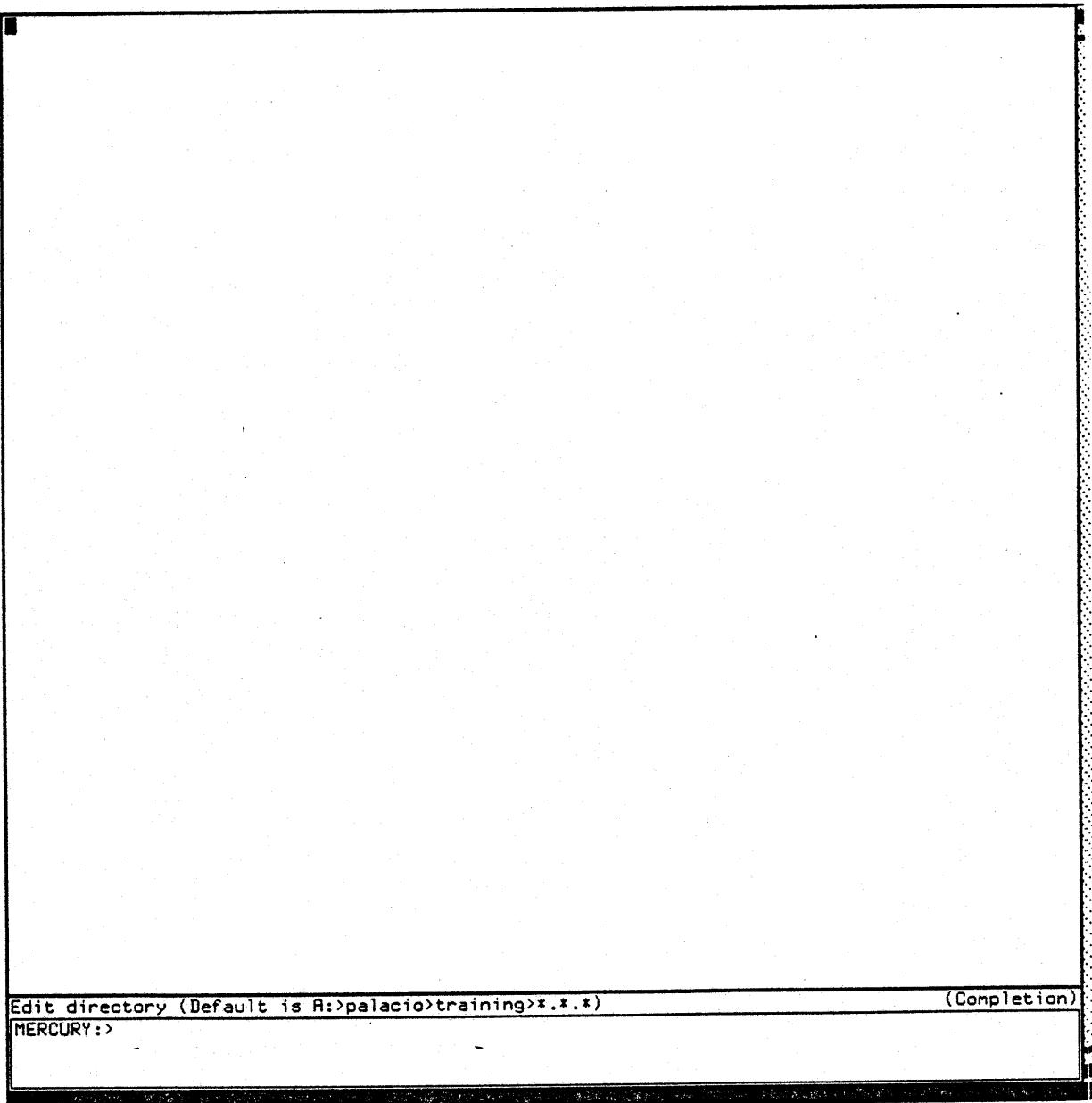
Bottom

| | | | |
|---------------|---------|--------|--------------|
| Help | Edit | Save | Create |
| View | Copy | Delete | Primary Name |
| Add Namespace | Locally | Quit | |

Click on an attribute entry to replace (L), delete (M) or edit (R) it.







◇ :Edit Namespace Object

◇ :Edit Namespace Object

[11:50:10 From PHOENIX: Request for Screen Hardcopy of 11:28 on Firelake completed.]

◇ :Edit Namespace Object

[11:56:06 From PHOENIX: Request for Screen Hardcopy of 11:29 on Firelake completed.]

[11:58:07 From PHOENIX: Request for Screen Hardcopy of 11:29 on Firelake completed.]

◇ :Help

The following commands are available:

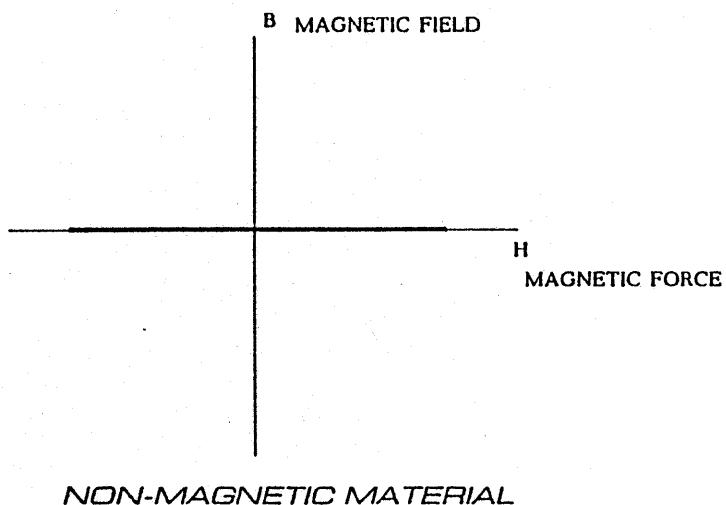
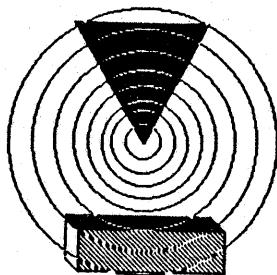
| | | | |
|----------------------------|----------------------------|-----------------------|-------------------------------|
| Compile File | Expunge Directory | Rename File | Show Command Processor Status |
| Compile System | Find Symbol | Replay Composed Song | Show Directory |
| Compose Song | Halt GC | Report Bug | Show Disabled Services |
| Copy File | Halt Machine | Reset Network | Show Documentation |
| Copy Microcode | Hardcopy File | Save File Buffers | Show FEP Directory |
| Copy World | Hardcopy Musical Selection | Save Mail Buffers | Show File |
| Create Directory | Help | Save World | Show Font |
| Create FEP File | Initialize Mail | Select Activity | Show GC Status |
| Create Link | Initialize Mouse | Serenade | Show Herald |
| Delete File | Initialize Time | Set Base | Show Hosts |
| Describe Musical Selection | Inspect | Set Calendar Clock | Show Legal Notice |
| Disable Services | Load File | Set Command Processor | Show Mail |
| Edit Definition | Load Patches | Set Input Base | Show Notifications |
| Edit Directory | Load System | Set Output Base | Show Object |
| Edit File | Login | Set Package | Show System Modifications |
| Edit Font | Logout | Set Site | Show Users |
| Edit Namespace Object | Music | Set Time | Start GC |
| Edit Stops | Play Musical Selection | Set User ID | Undelete File |
| Enable Services | Quiet | | |

◇ █

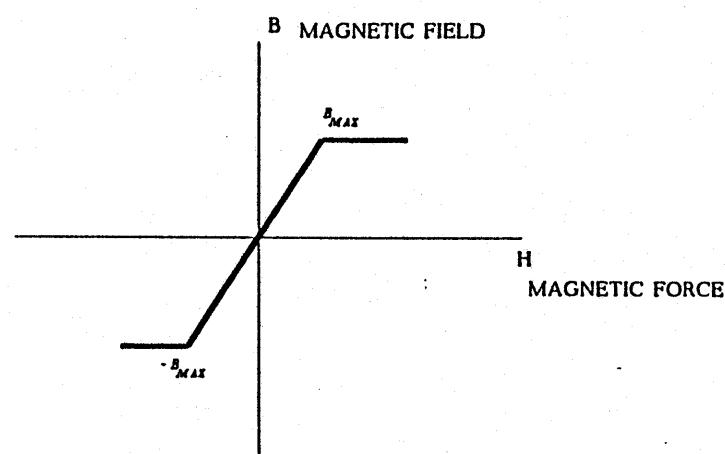
⇒ :Create Directory (Pathname [default MY:>*,*,*,>*,*,*]) mercury:>silverwood>

```
MY:>*.*.*  
8118 free, 122/8240 used (12)  
2 blocks in the files listed  
■ paul.directory.1 1 DIRECTORY ! 10/01/85 14:46:29 X=10/01/85 paul  
silverwood.directory.1 1 DIRECTORY ! 10/01/85 14:46:12 X=10/01/85 paul
```

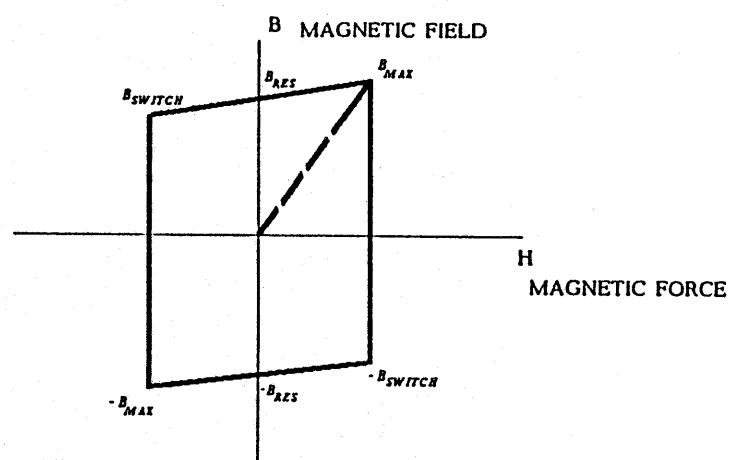
```
ZMACS (Dired) *Dired-5* (R0) MY:>*.*.* (Q to exit)
```



NON-MAGNETIC MATERIAL

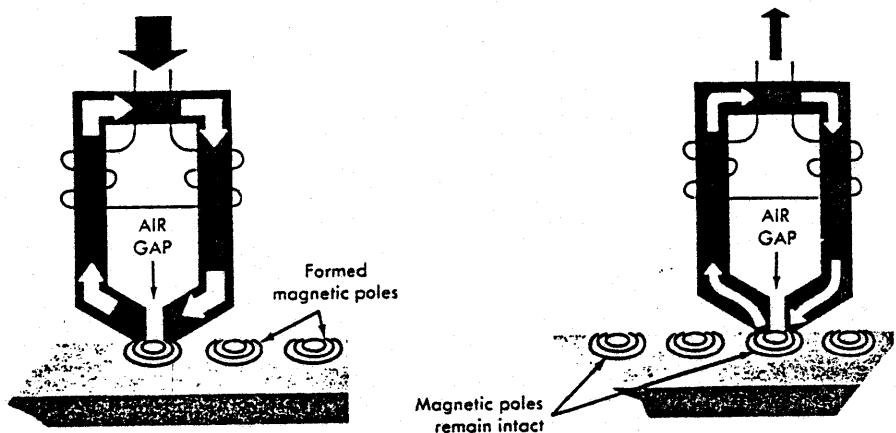


PARA-MAGNETIC MATERIAL



FERRO-MAGNETIC MATERIAL

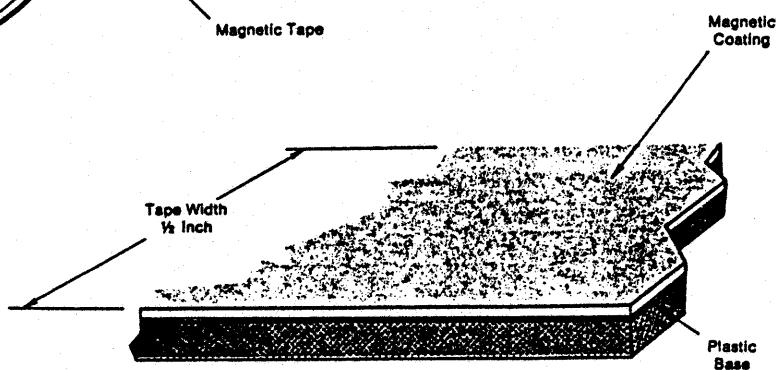
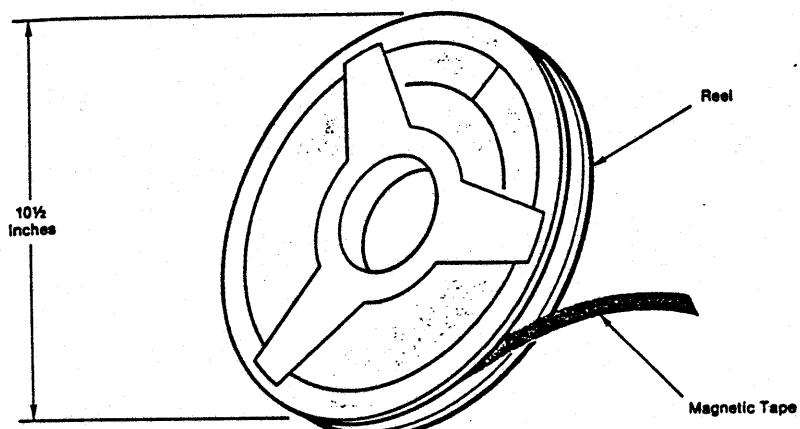
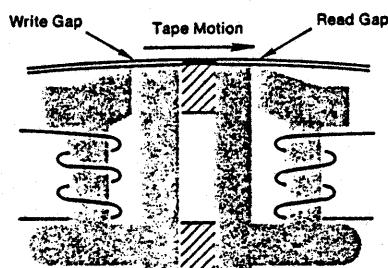
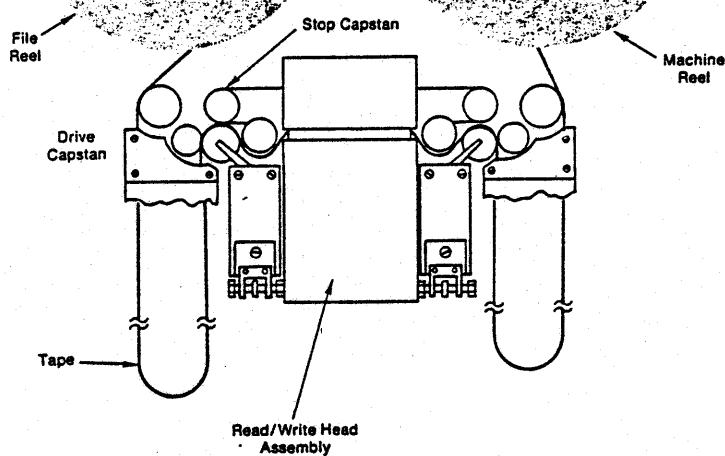
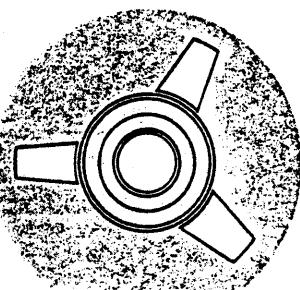
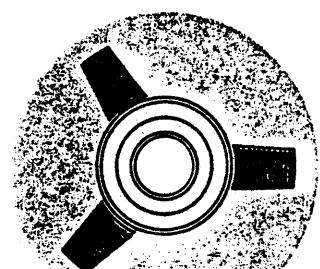
MAGNETIC STORAGE FUNDAMENTALS



1010111011000010010101

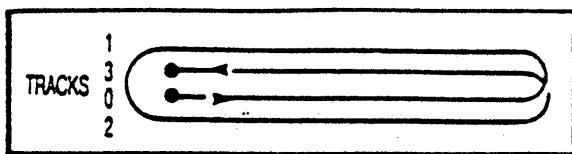
MAGNETIC STORAGE FUNDAMENTALS

symbolics inc.



Tape Length
up to 2400 Feet per Reel

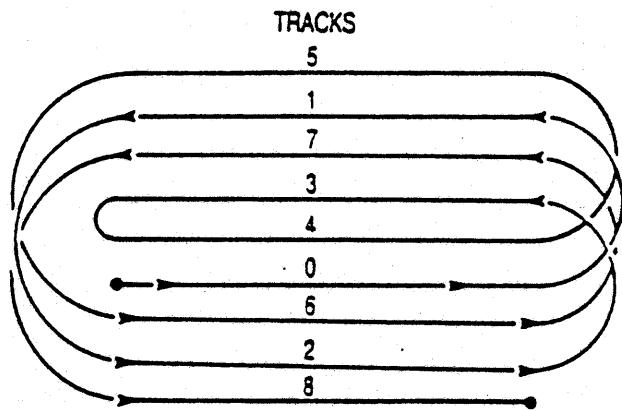
TAPE STORAGE



B.O.T.(PHYSICAL)
E.O.M.(LOGICAL)

E.O.T.(PHYSICAL)

A. Four track recording

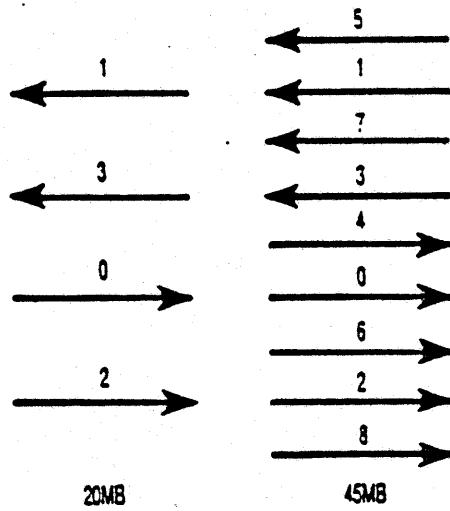


B.O.T.(PHYSICAL)

E.O.T.(PHYSICAL)
E.O.M.(LOGICAL)

B. Nine track recording

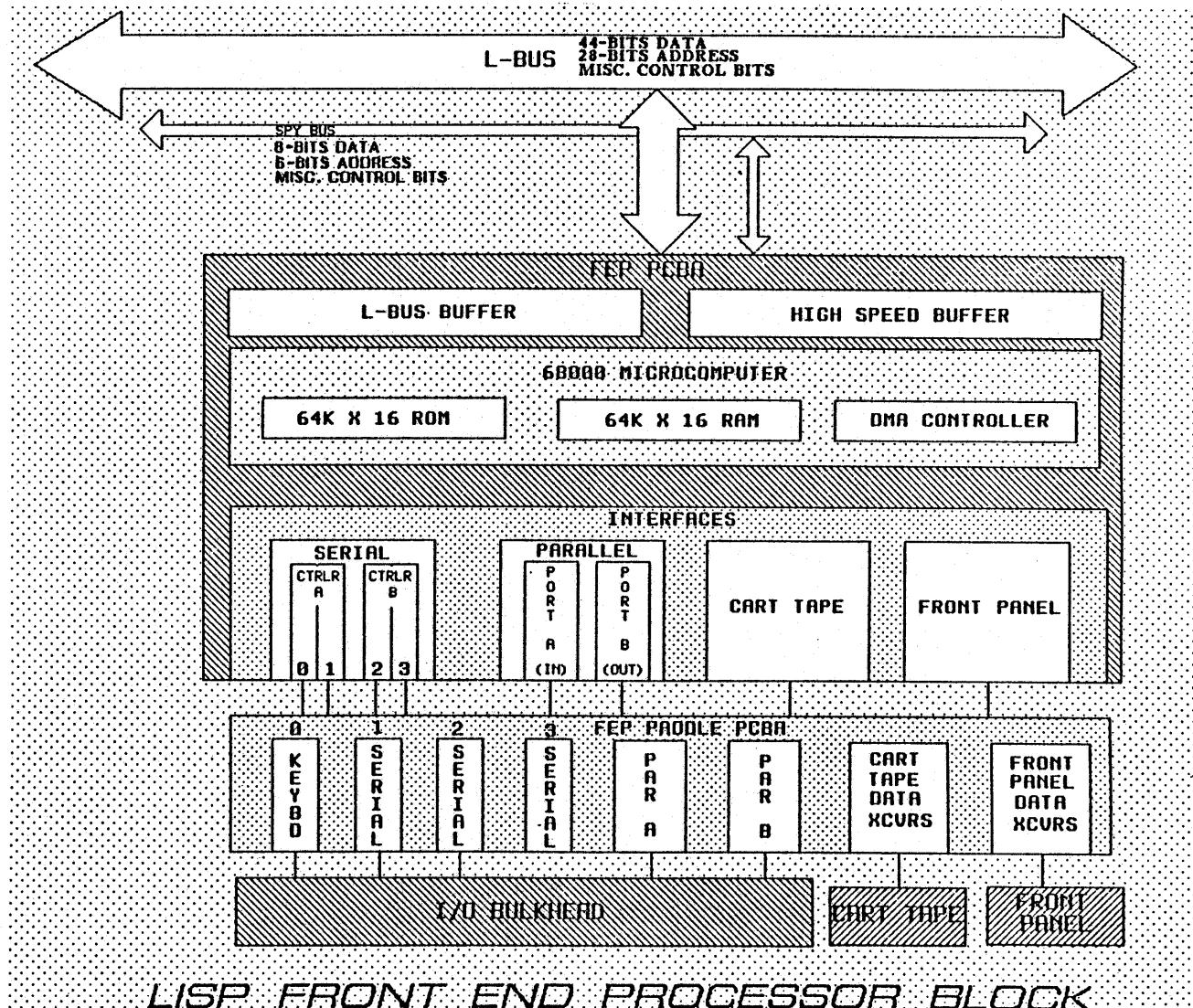
Serpentine Recording

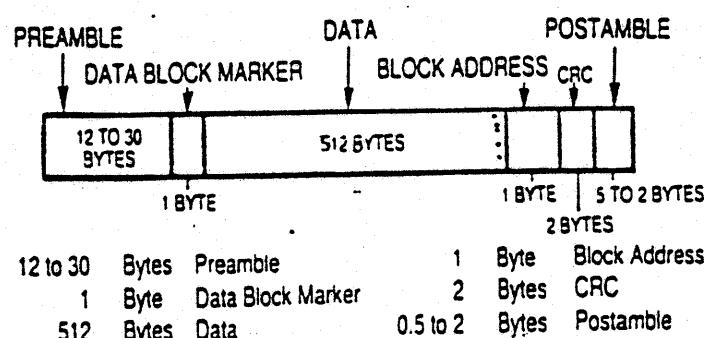
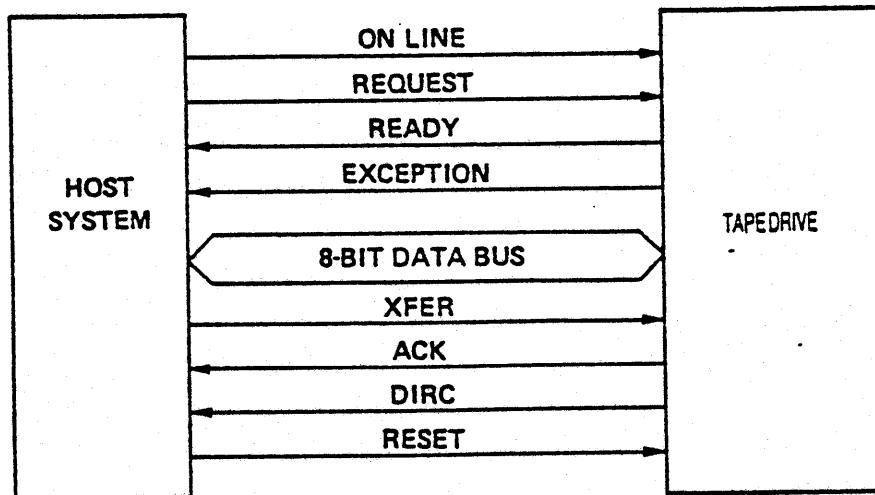


Comparative Track Layout

TAPE DRIVE SPECIFICATIONS

| TAPE DRIVE | TYPE | TAPE SPEED | RECORDING DENSITY | TAPES AVAILABLE | TAPE LENGTHS (FEET) | STORAGE PER TRACK (APPROX.) | TRACKS | TOTAL STORAGE |
|-------------------------------------------------------|-----------------------|------------|-------------------|-----------------|---------------------|-----------------------------|--------|---------------|
| ARCHIVE MODEL 5945 (SCORPION) | 1/4 INCH CART TAPE | 90 IPS | 8000 BPI | DC300XL | 450 | 5.0 MB | 9 | 45 MB |
| | | | | DC600A | 600 | 6.6 MB | 9 | 60 MB |
| ARCHIVE MODEL 9045 (SIDEWINDER) | 1/4 INCH CART TAPE | 90 IPS | 8000 BPI | DC300XL | 450 | 5.0 MB | 9 | 45 MB |
| | | | | DC600A | 600 | 6.6 MB | 9 | 60 MB |
| SYMBOLICS TD 20 (CIPHER QUARTERBACK) | 1/4 INCH CART TAPE | 90 IPS | 8000 BPI | DC300XL | 450 | 5.0 MB | 4 | 20 MB |
| | | | | DC600A | 600 | 6.6 MB | 4 | 26 MB |
| SYMBOLICS TD 80 (CIPHER F880) (10.5" REELS) | 1/2 INCH REEL-TO-REEL | 100 IPS | 1600 BPI | 1.5 MIL | 2400 | 5.1 MB | 9 | 46 MB |
| | | 50 IPS | 3200 BPI | 1.5 MIL | 2400 | 10.2 MB | 9 | 92 MB |
| | | 100 IPS | 1600 BPI | 1.0 MIL | 3000 | 6.8 MB | 9 | 61 MB |
| | | 50 IPS | 3200 BPI | 1.0 MIL | 3000 | 13.5 MB | 9 | 122 MB |





QIC-11 1/4-Inch Streaming Tape Format

I/4 INCH TAPE DRIVE INTERFACE

CABLE Descriptions & Related PART NUMBERS

Cartridge Tape

| | |
|----------|-----------------------------------------------------------|
| 102382 | Cartridge Tape Data Cable 3600 System |
| 102420 | Cartridge Tape Data Cable 3670 System |
| 102441-1 | 6 ft. External Auxillary Cabinet TD-80 Cypher Tape Cable |
| 102441-2 | 11 ft. External Auxillary Cabinet TD-80 Cypher Tape Cable |
| 102509 | Cartridge Tape Data Cable 3640 System |

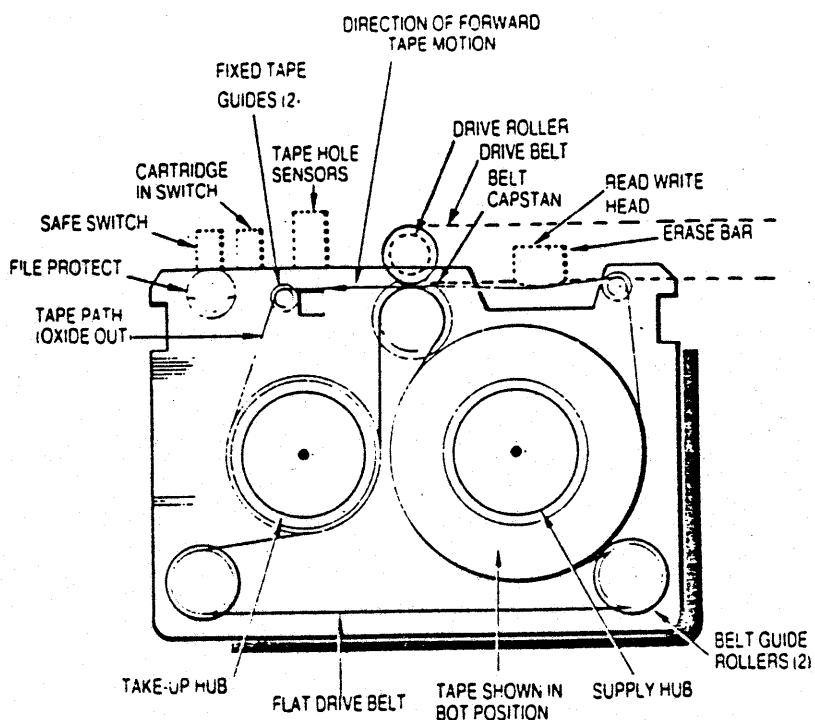
Disk

| | |
|----------|----------------------------------------------------------------|
| 102340 | (T300) Disk Radial Cable LM-2 System |
| 102341 | (T300) Disk Bus Cable LM-2 System |
| 102363 | (T300) Braided Disk Ground Cable LM-2 System |
| 102367 | SMD Disk A-Cable Bus Internal LM-2 System |
| 102368 | SMD Disk B-Cable Radial Internal LM-2 System |
| 102369 | SMD Jumper Cable (SMD to DC) LM-2 System |
| 102376 | (T306) 6 ft. SMD Disk A-Cable Bus Internal 3600/70 Systems |
| 102376-2 | (T306) 20 ft. SMD Disk A-Cable Bus Internal 3600/70 Systems |
| 102377 | (T306) 6 ft. SMD Disk B-Cable Radial Internal 3600/70 Systems |
| 102377-2 | (T306) 20 ft. SMD Disk B-Cable Radial Internal 3600/70 Systems |
| 102408 | (Nec D2257) SMD Disk A-Cable Bus Internal 3640/70 Systems |
| 102409 | (Nec D2257) SMD Disk B-Cable Radial Internal 3640/70 Systems |
| 102439-1 | 6 ft. External Auxillary Cabinet Disk Cable |
| 102439-2 | 11 ft. External Auxillary Cabinet Disk Cable |
| 102448 | 6 ft. SMD Disk A-Cable Bus Internal 3600/40/70 Systems |
| 102451 | 6 ft. SMD Disk B-Cable Radial Internal 3600/40/70 Systems |
| 102501 | Disk Ground Cable 3640 System |
| 102507 | (Maxtor XT1140) 6 ft. Disk A-Cable Bus Internal 3640 System |
| 102508 | (Maxtor XT1140) 6 ft. Disk B-Cable Radial Internal 3640 System |
| 102523 | (Priam) 6 ft. SMD Disk A-Cable Bus Internal 3640 System |
| 102524 | (Priam) 6 ft. SMD Disk B-Cable Radial Internal 3640 System |

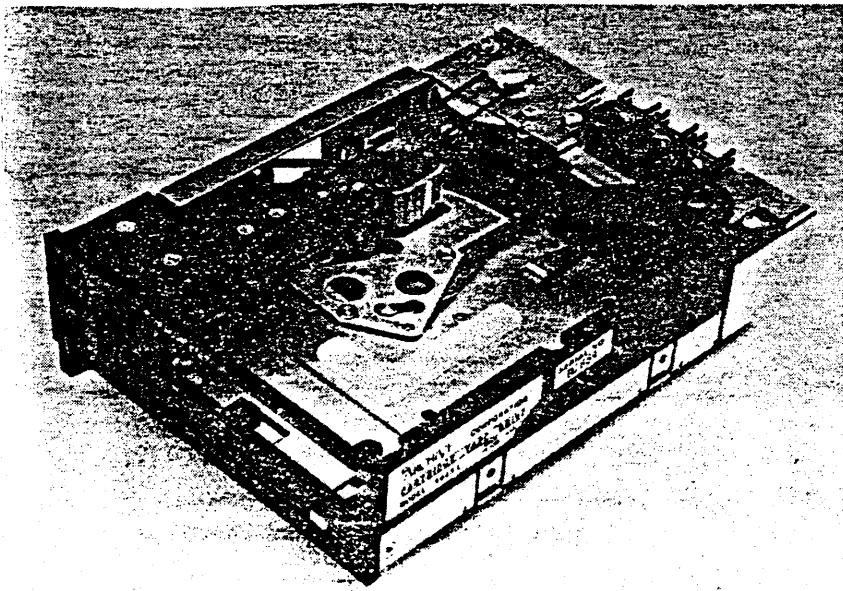
Power

| | |
|----------|-----------------------------------------------------------|
| 102331 | (LM-2) Main Power Cable |
| 102378 | (LGP1) AC Power Cable |
| 102381 | (Cartridge Tape) AC Power Cable |
| 102396-1 | (3600/70) 12 ft. Main Power Cable 60 Hz. 50 Amp. |
| 102396-2 | (3600/70) 12 ft. Main Power Cable 50 Hz. (minus plug end) |
| 102425-1 | (Auxillary Cabinet) 6 ft. Main Power Cable |
| 102425-2 | (Auxillary Cabinet) 11 ft. Main Power Cable |
| 102434 | (NEC D2257) AC Disk Power Cable |
| 102502 | (3640) Main Power Cable 60 Hz. 20 Amp. |
| 102502-1 | (3640) 10 ft. Main Power Cable 60 Hz. 20 Amp. |
| 102502-2 | (3640) 10 ft. Main Power Cable 50 Hz. 20 Amp. |
| 127008 | (LM-2 Console) AC Power Cable |
| 129052 | (3600/40/70 Consoles) AC Power Cable |

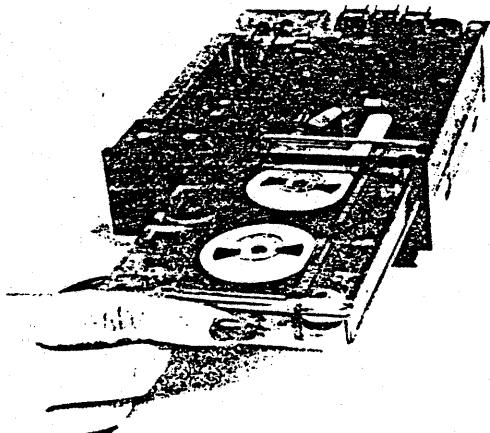
symbolics inc.



Internal Construction 1/4-Inch Tape Cartridge



Scorpion Basic Tape Drive



Cartridge Insertion

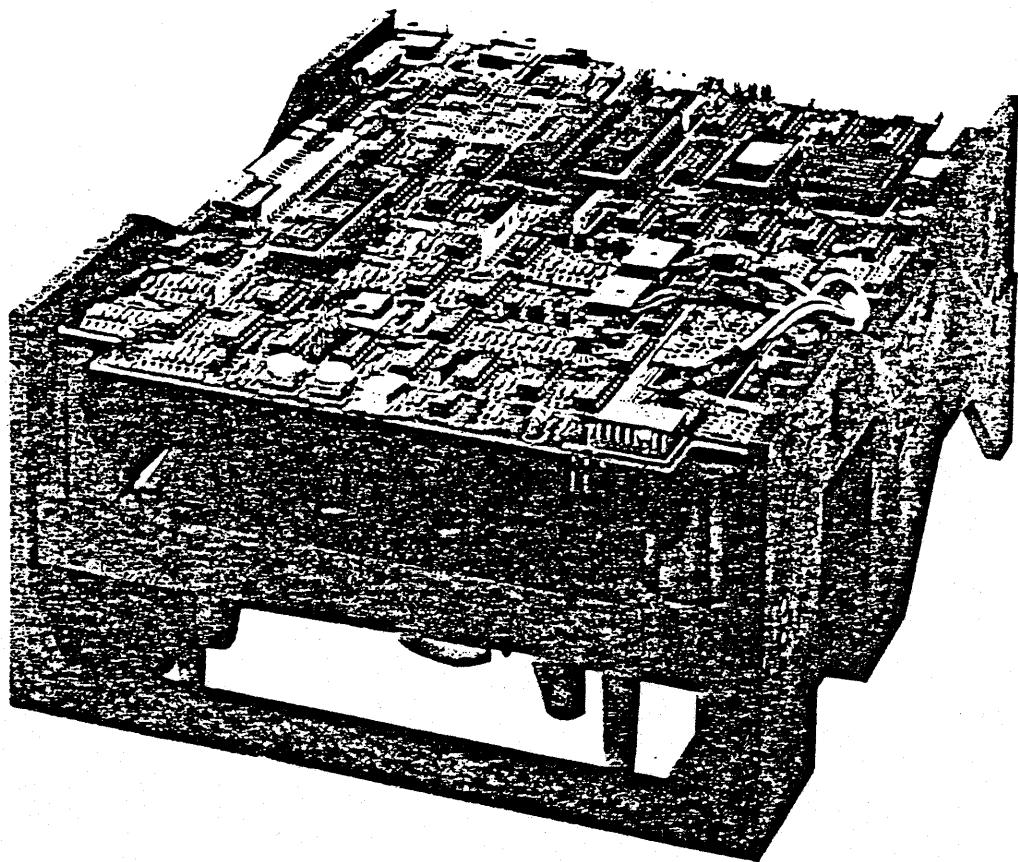
ARCHIVE MODEL 5945 (SCORPION)

| Jumper | Description |
|----------------------------|----------------------------------------------------------------------------------------------------|
| A or B to Common | PLL Feedback for Speed Selection • A to Common Jumper = 30 IPS • B to Common Jumper = 90 IPS |
| A1, A2 and A3 | Always A1 to A2 |
| B1, B2 and A3 | Always B1 to B2 |
| C | Test Jumper for PLL Gain Adjustment • Removed for Operation |
| K | Gain Setting of Read Circuit • Jumper Present = 30 IPS • Jumper Removed = 90 IPS |
| R | Read Data Pulse One Shot Timing • Jumper Present = 90 IPS • Jumper Removed = 30 IPS |
| T | Run in Phase Clip • Used by Manufacturing Only Removed for Operation |
| U | Always Present |
| Y | Track Number Selection • Jumper Present = 9 Track • Jumper Removed = 4 Track |
| Location between 7B and 8B | Phase for Stepper Motor Set by Archive Manufacturing Do not change from factory setting |

| Jumper | Description |
|--------|------------------------------------------------------------------------------------------------------------------------------|
| AA/BB | Always open |
| CC | Power-On Default Format Select • Jumper Present = QIC-24 Format • Jumper Removed = QIC-11 Format |
| DD | Speed Definition for Microprocessor • Jumper Present = 30 IPS • Jumper Removed = 90 IPS |
| EE | Interface Parity • Jumper Present = Parity Enabled • Jumper Removed = Parity Disabled (Not supported at this time) |
| FF | Loop on Error Used by Archive Engineering for troubleshooting. |
| HH | Test Configuration Used by Archive Manufacturing only |
| KK | Power on Confidence Test • Jumper Present = Test run at power on or on reset pulse • Jumper Removed = Test Disabled |
| ZZ | Defines to the Microprocessor application program that there is an external memory. • Jumper always present |

ARCHIVE TAPE DRIVES JUMPER CONFIGURATION

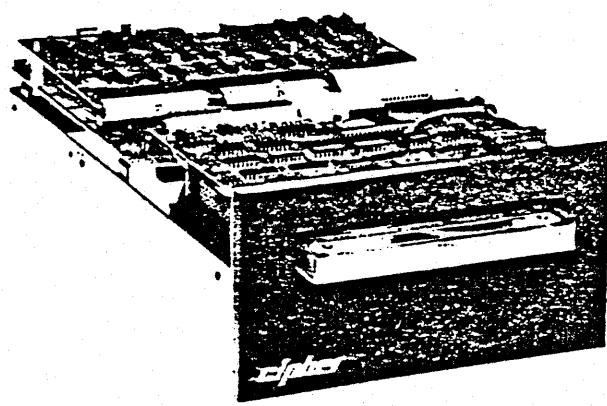
symbolics inc.



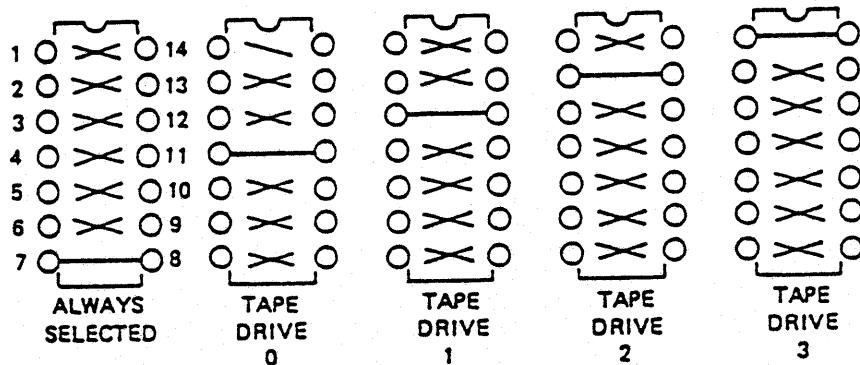
Sidewinder 1/4-Inch Cartridge Streaming Tape Drive

ARCHIVE MODEL 9045 (SIDEWINDER)

symbolics inc.



SYMBOLICS MODEL TD20 (CIPHER QUARTERBACK)



Multiple Tape Drive Address Shunt

LOCATION 2B ON MAIN PCB

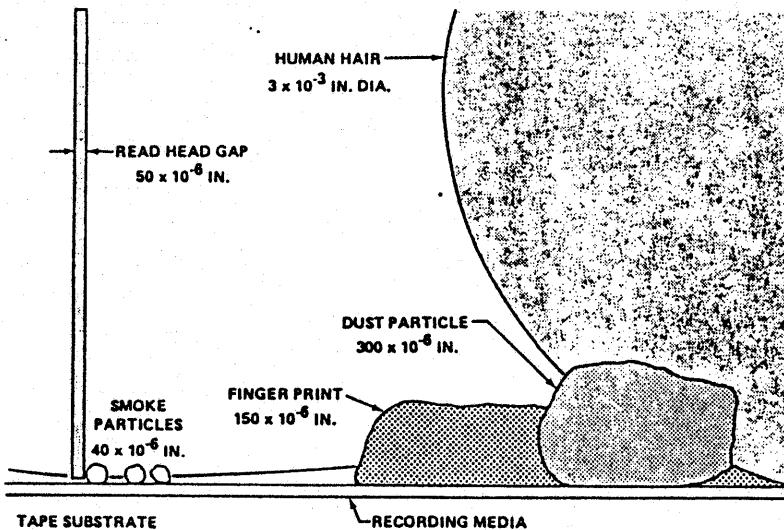
LOCATION 5C ON MAIN PCB

1 2 3 4 1 2 3 4

| |

**JUMPER INSTALLED
BY FACTORY**

TD 20 JUMPER CONFIGURATION

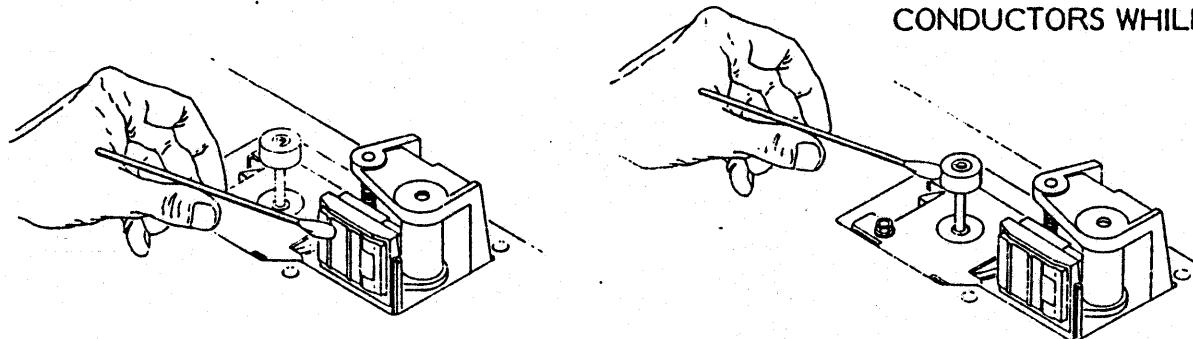


Contamination Particle Sizes in Relation to
Width of Read Head Gap

| Maintenance Task | Interval (In Operating Hours) |
|----------------------------------------------|----------------------------------|
| Clean head and tape cleaner | 8 |
| Clean and check condition of capstan surface | 8 |
| Eliminate Tape Tension | As required |

WARNING

VERIFY POWER IS OFF BEFORE CLEANING.
ELECTRICAL SHOCK OR EQUIPMENT
DAMAGE MAY OCCUR IF BODY PARTS OR
JEWELRY TOUCHES ELECTRICAL
CONDUCTORS WHILE POWER IS ON.

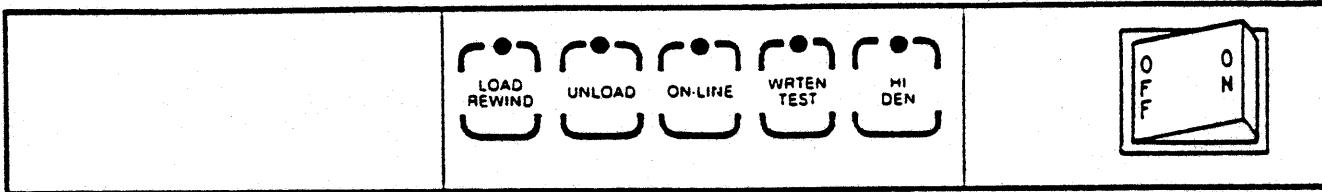
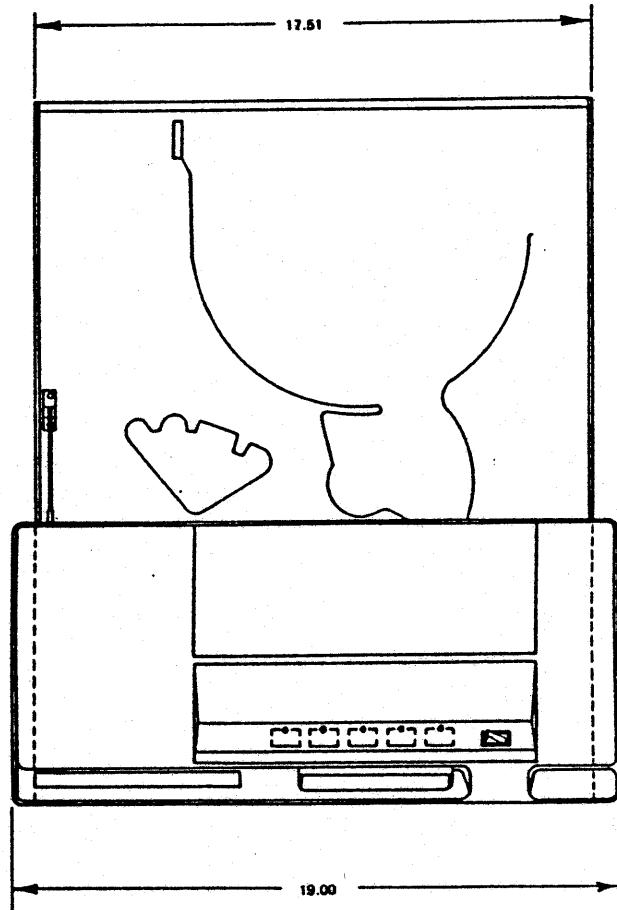


Head Assembly and
Tape Cleaner Cleaning

Capstan Cleaning

PREVENTATIVE MAINTENANCE

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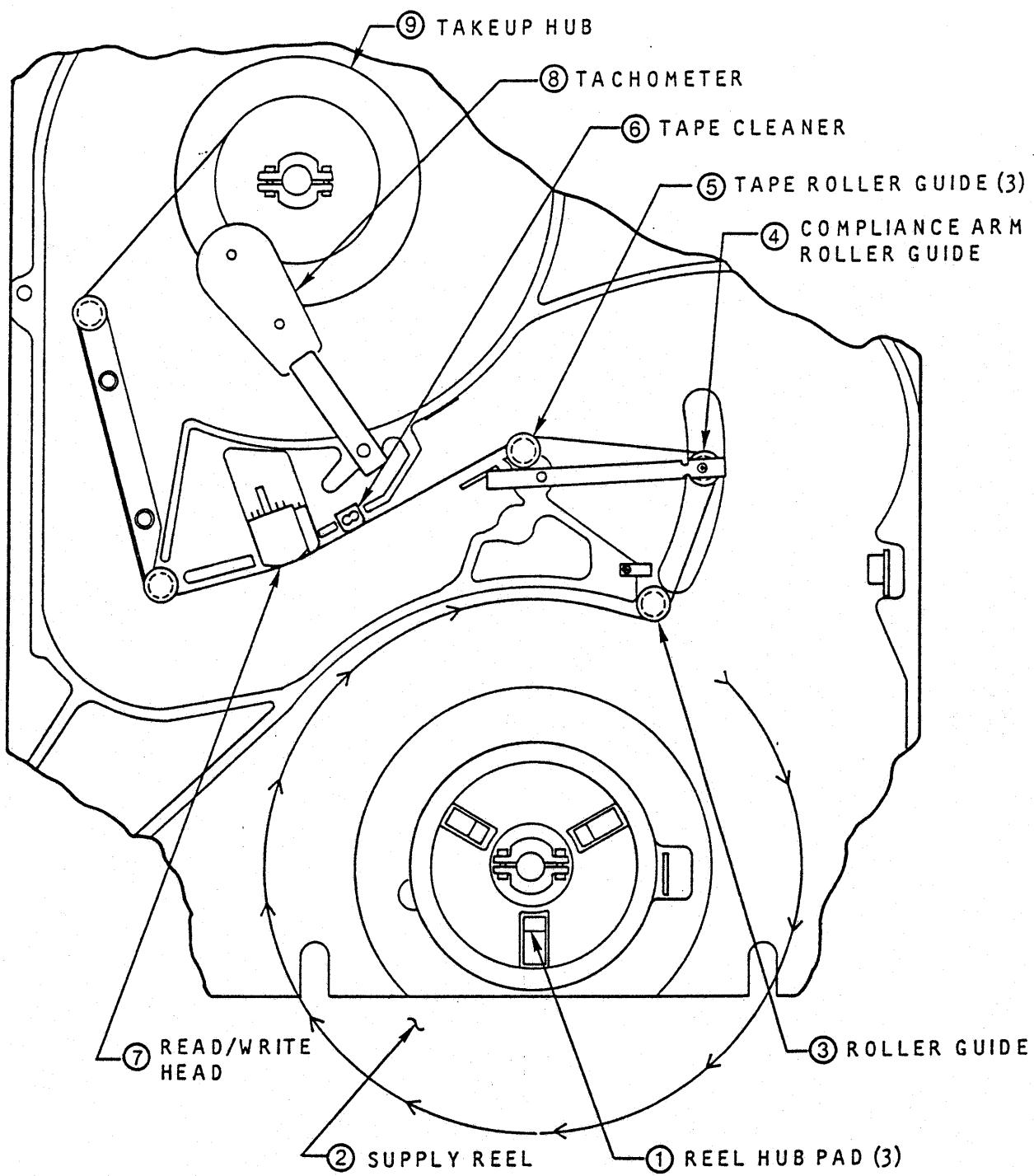
SYMBOLICS MODEL TD80 (CIPHER MODEL F880)

| CONTROL/ INDICATOR | TYPE | FUNCTION | CONDITIONS |
|-----------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POWER | ON/OFF Rocker Switch and Indicator | Switches line power on and off. | Fuse installed. Line cord connected. |
| LOAD REWIND | Tactile Switch and indicator | Loads tape to BOT marker. Rewinds tape to BOT marker. Illuminates to indicate BOT tab is positioned at photo- sensor. When pulsing, transport is executing a load or a rewind sequence. | Tape inserted in front panel door. Top cover and front panel door closed. Transport in off-line mode (ON- LINE indicator not illuminated). |
| UNLOAD | Tactile Switch and Indicator | Unloads tape from any point. UNLOAD indi- cator flashes during unload se-quence, then remains illuminated. | Transport in off-line mode. (ON-LINE indi- cator not illuminated.) |
| ON-LINE | Tactile Switch and Indicator | Switches transport to on-line mode. Illumi- nates to indicate transport is on line. Second actuation switches transport off line. Indicator extin- guished to indicate transport is off line. | During load sequence actuation of ON-LINE switch will place transport on line when BOT marker is sensed. Transport is in on-line mode. (ON-LINE indi- cator illuminated.) |
| TEST | Tactile Switch | Selects alternate operational mode for other switches. | Refer to paragraph 3-3. |
| WRT EN (Write Enable) | Indicator | Illuminates to indicate write function may be performed. | Tape reel write enable ring installed mounted on supply hub and tape loaded. |
| HI DEN (High Density) | Tactile Switch and Indicator | First actuation (indi- cator illuminated): high-density mode, 3200 bpi; second actuation (indicator extinguished): lower density, 1600 bpi. | 3200 bpi transport must be in off-line mode (ON-LINE indi- cator extinguished.) |

| INDICATION | ERROR CONDITION |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All indicators flashing | After four automatic retries the transport did not successfully complete the load sequence. The tape leader should be checked for excessive damage. If a second attempt at loading fails the unit must be manually loaded. |
| All indicators except LOAD flashing | The BOT marker was not detected within the first 35 feet of tape. |
| All indicators except UNLOAD flashing | Tape reel was inserted upside-down. Write ring must be down. |
| All indicators except ON-LINE flashing | A load operation was attempted with the front-panel door or top cover in the open position. |
| All indicators except TEST flashing | A load operation was attempted without a reel of tape inserted in the unit. |

| INDICATION | CONDITIONS |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------|
| LOAD indicator flashing | Not Used |
| UNLOAD indicator flashing | Not Used |
| LOAD and UNLOAD indicators flashing | The Model F880 detected more than 3700 feet of tape beyond the BOT marker. |
| ON-LINE indicator flashing | The tension arm swing exceeded the range of normal operation during the load sequence. |
| LOAD and ON-LINE indicators flashing | The Model F880 received an interface command prior to completion of the previous command. |
| UNLOAD and ON-LINE indicators flashing | The Model F880 received a write command with a write-protected reel of tape loaded on the transport. |
| LOAD, UNLOAD, and ON-LINE indicators flashing | An illegal or undefined command was received by the Model F880. |
| TEST indicator flashing | A failure of the supply hub locking mechanism occurred. |
| LOAD and TEST indicators flashing | Not Used |
| UNLOAD and TEST indicators flashing | The auto-zero function of the digital-to-analog converter failed during the power-up sequence. |
| LOAD, UNLOAD, and TEST indicators flashing | Not Used |
| ON-LINE and TEST indicators flashing | Supply reel was not seated on hub, or a failure of the file protect circuit occurred. |
| LOAD, ON-LINE, and TEST indicators flashing | Supply reel did not remain unlocked during tape unload operation. |

| INDICATION | CONDITIONS |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UNLOAD, ON-LINE, and TEST indicators flashing | Because of a controller error, tape travel beyond the EOT marker exceeded 18 feet. |
| LOAD, UNLOAD, ON-LINE, and TEST indicators flashing | Not Used |
| HI DEN indicator flashing | Not Used |
| LOAD and HI DEN indicators flashing | The supply servo tension arm has exceeded its free travel limits during any operation except those functions of the load and unload sequence where tape tension is not under arm control. |
| UNLOAD and HI DEN indicators flashing | Tape speed variations in excess of the ANSI maximum of $\pm 10\%$ deviation from the normal operating speed occurred. This test is also performed as part of the power-up diagnostic routine and may be bypassed to allow access to other diagnostic tests by depressing the TEST switch for 5 seconds during power up. |



TD80 TAPE

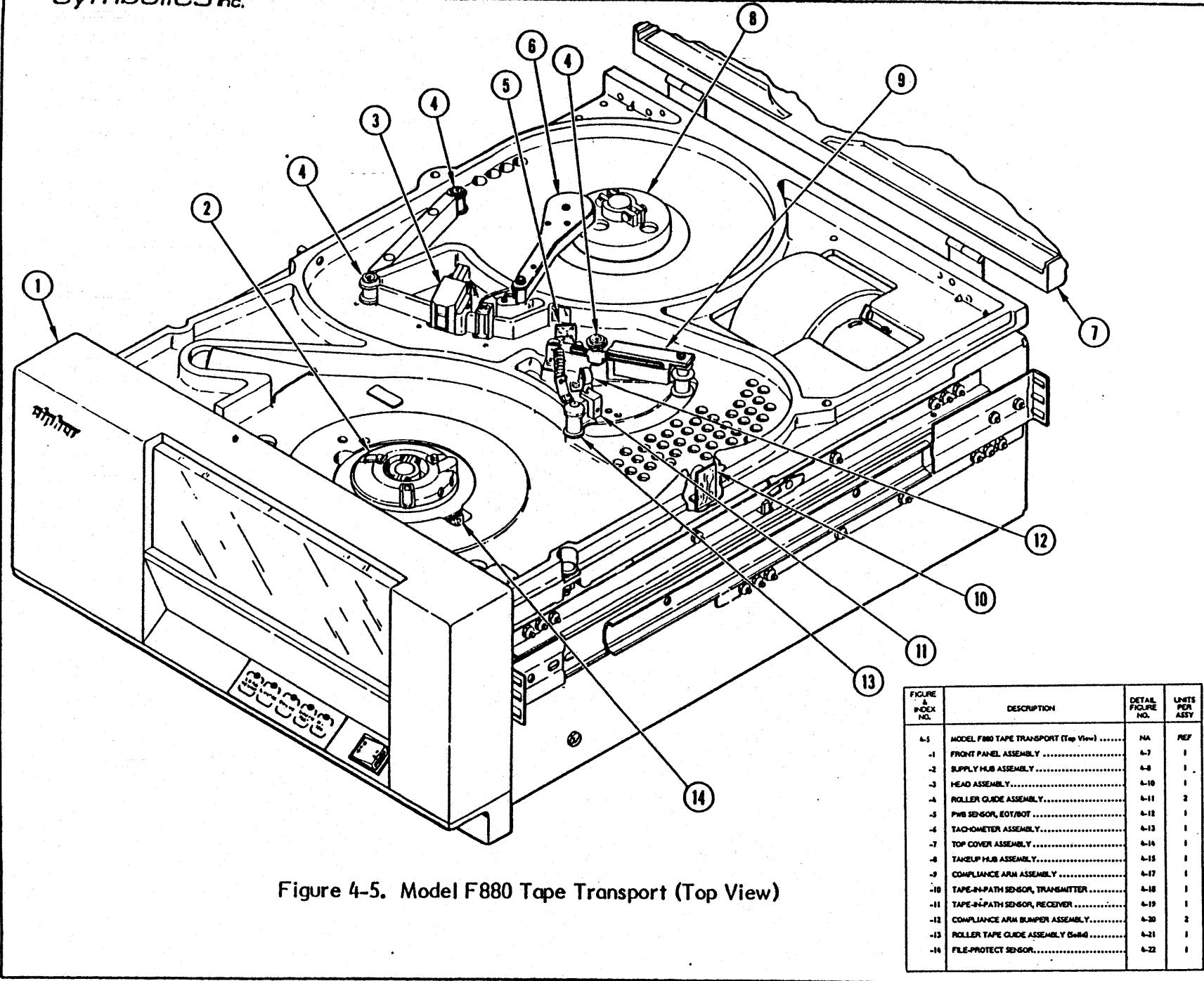


Figure 4-5. Model F880 Tape Transport (Top View)

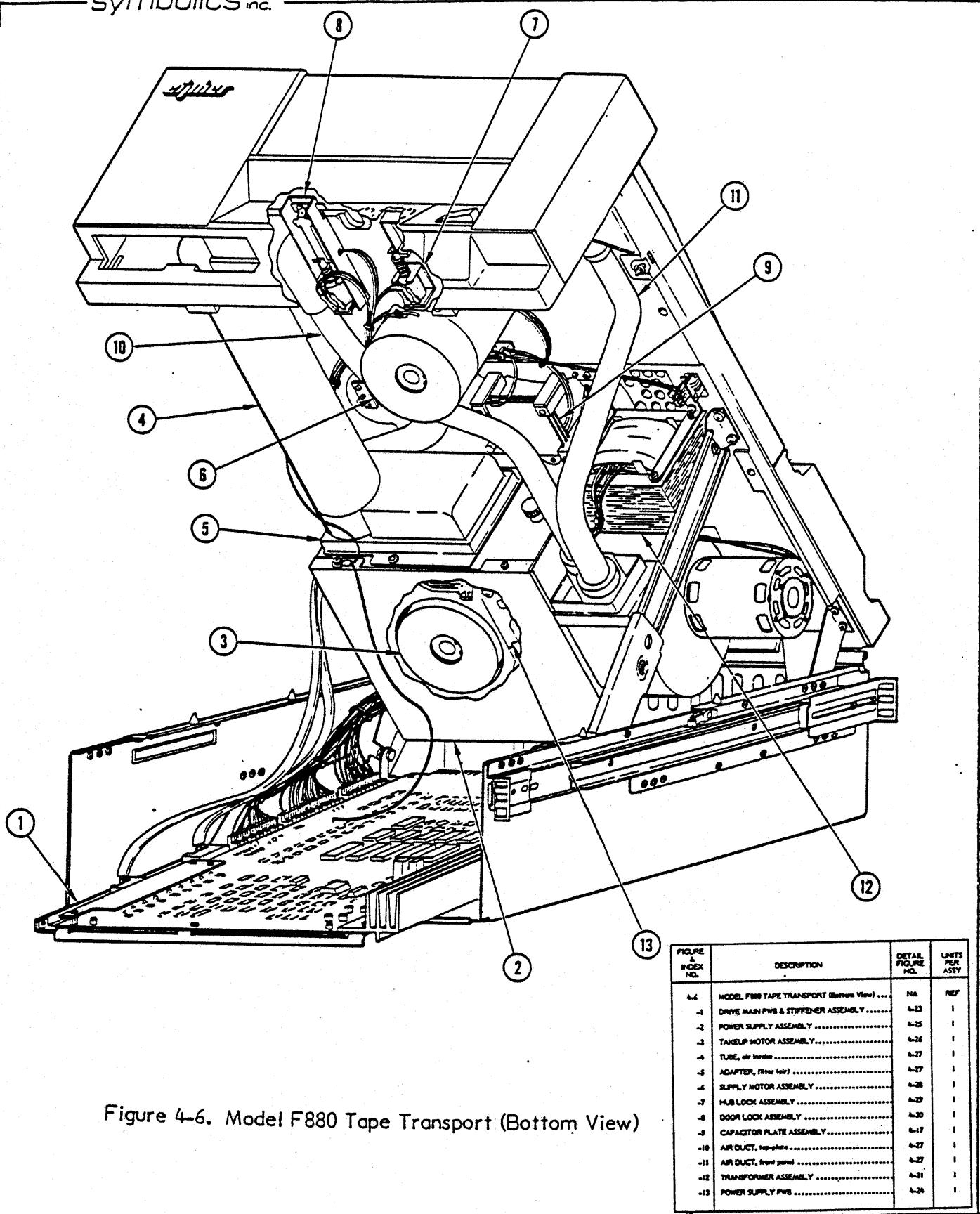


Figure 4-6. Model F880 Tape Transport (Bottom View)

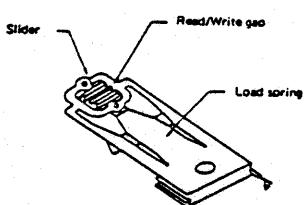
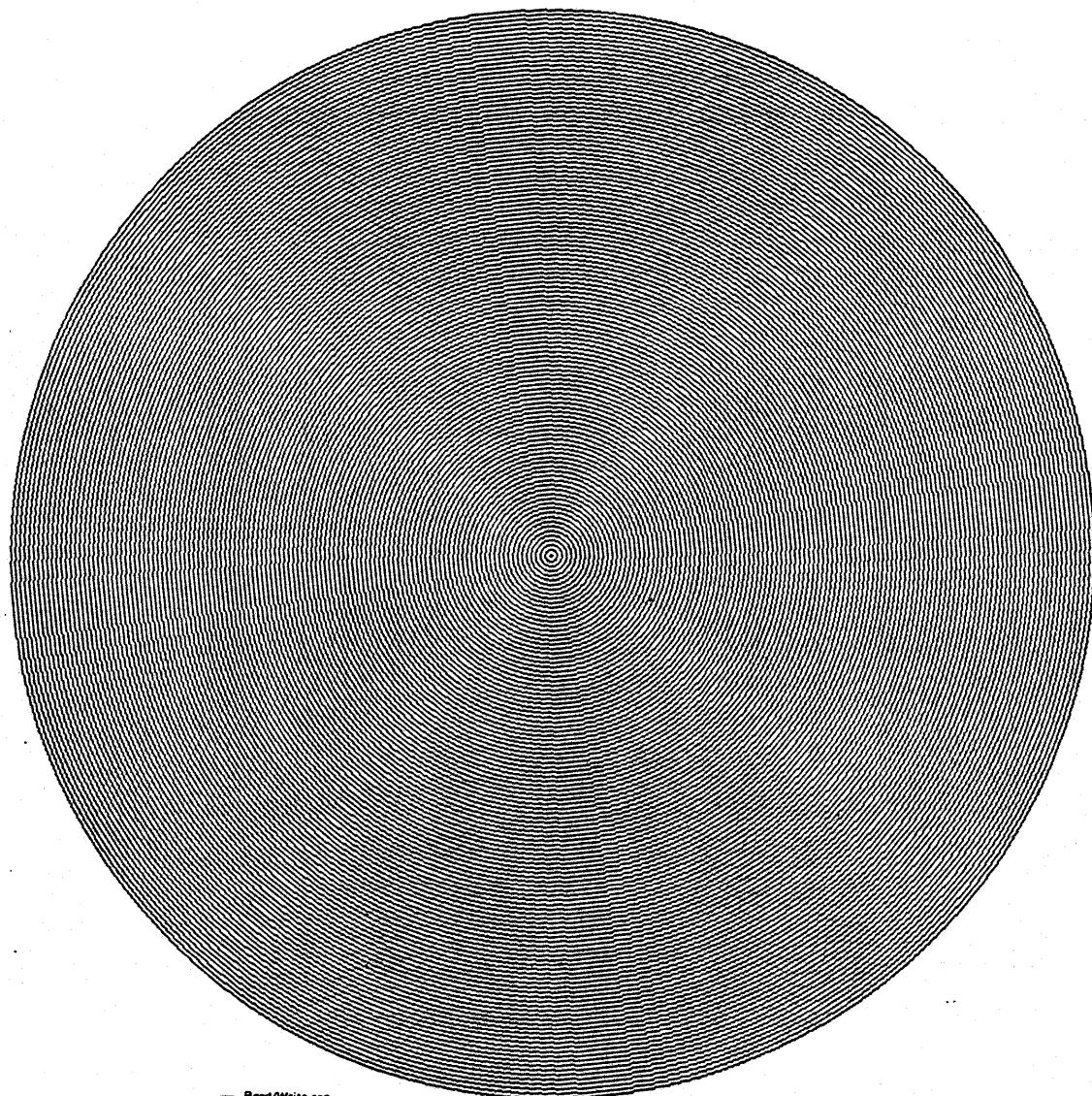
| VOLTAGE | SELECTION CARD | AMPERES | FREQUENCY |
|-----------|----------------|---------|-----------|
| 85 - 110 | 100 | 3.0 | 50/60 Hz |
| 102 - 132 | 120 | 3.0 | 50/60 Hz |
| 187 - 242 | 220 | 1.5 | 50/60 Hz |
| 204 - 264 | 240 | 1.5 | 50/60 Hz |

Operating Voltage Selection

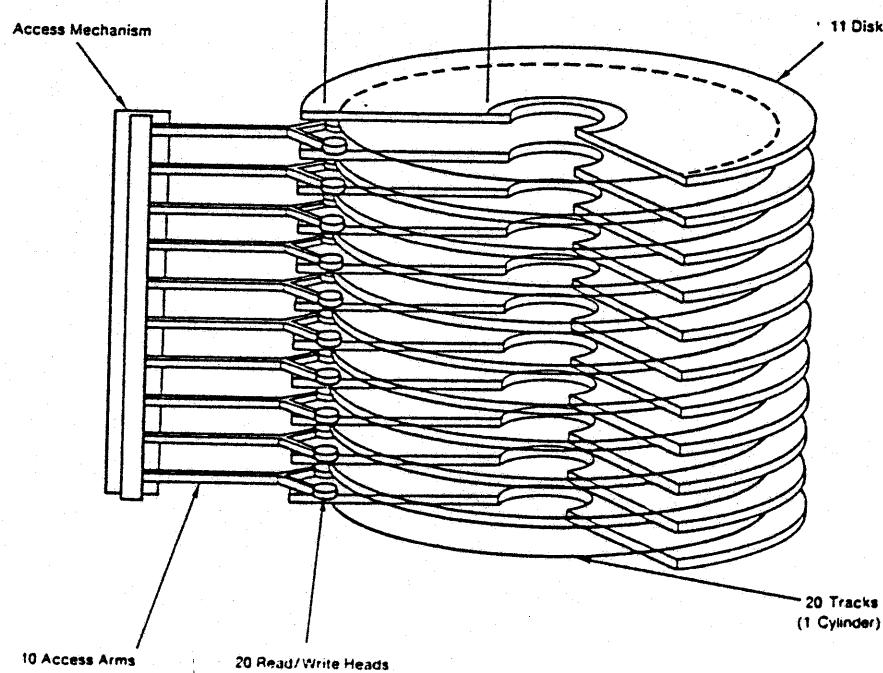
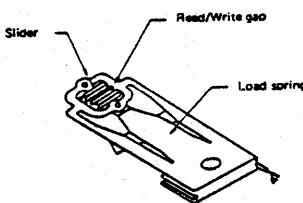
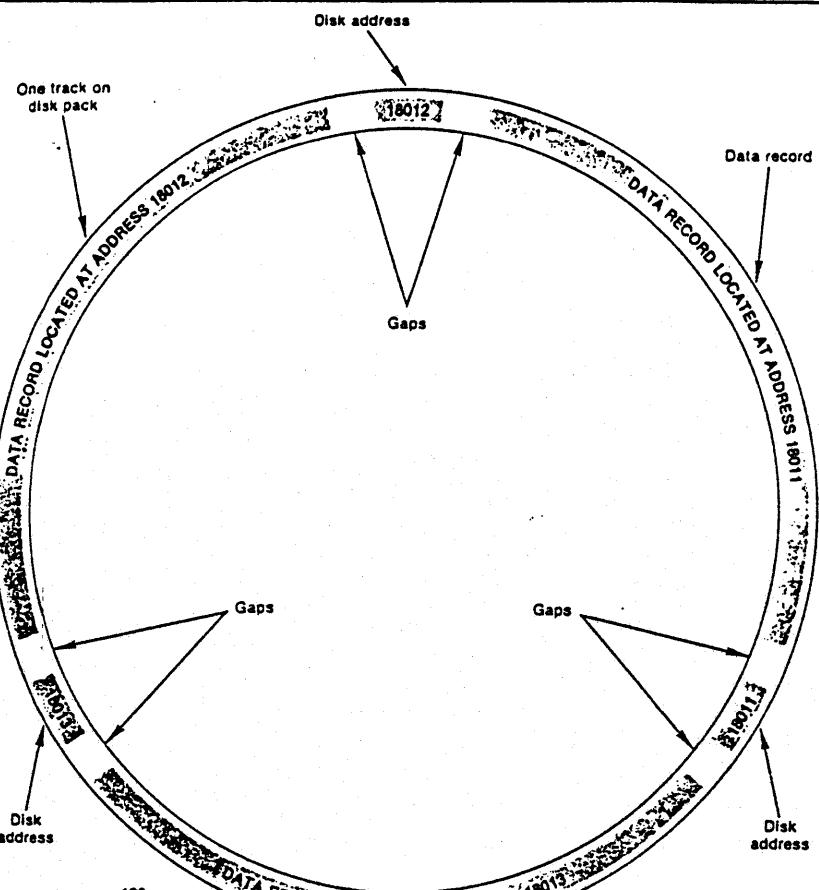
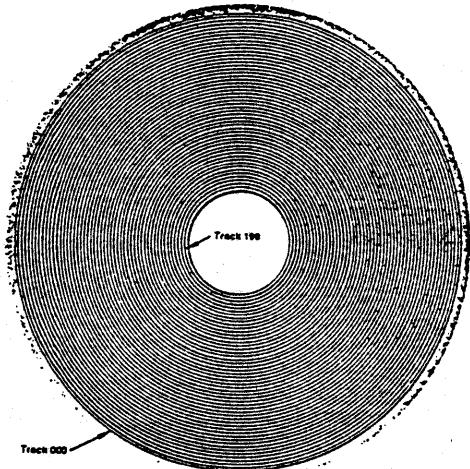
| ADDRESS | IFAD | ITAD 0 | ITAD 1 | S1 | S2 | S4 |
|---------|------|--------|--------|----|----|----|
| 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 3 | 0 | 1 | 1 | 1 | 0 | 0 |
| 4 | 1 | 0 | 0 | 0 | 1 | 1 |
| 5 | 1 | 0 | 1 | 0 | 1 | 0 |
| 6 | 1 | 1 | 0 | 0 | 0 | 1 |
| 7 | 1 | 1 | 1 | 0 | 0 | 0 |

0 = False Interface Level 0 = Open
 1 = True Interface Level 1 = Closed

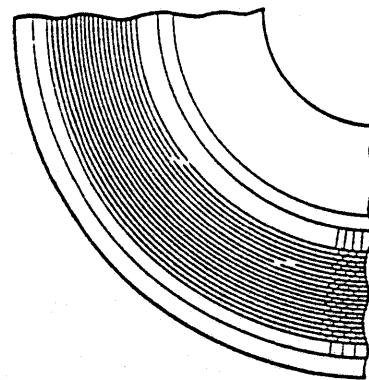
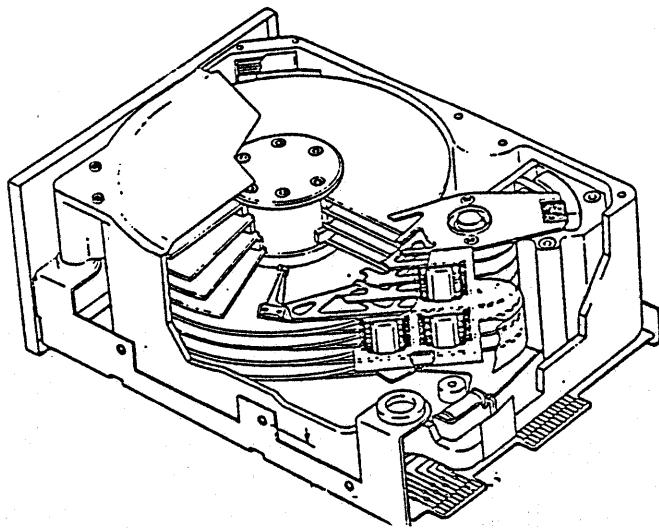
Address Line Decoding



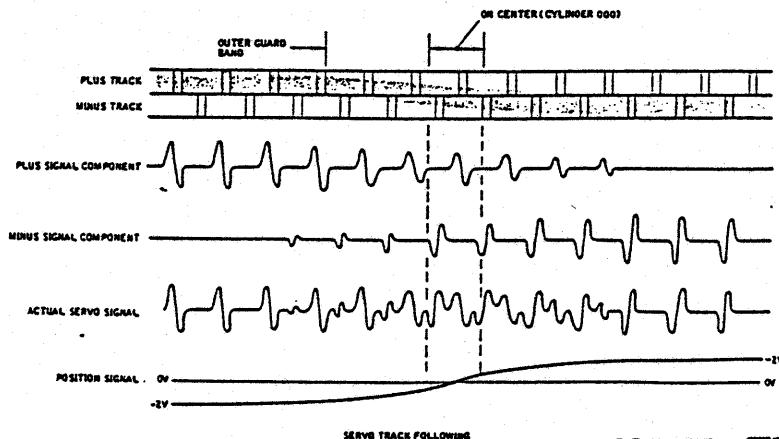
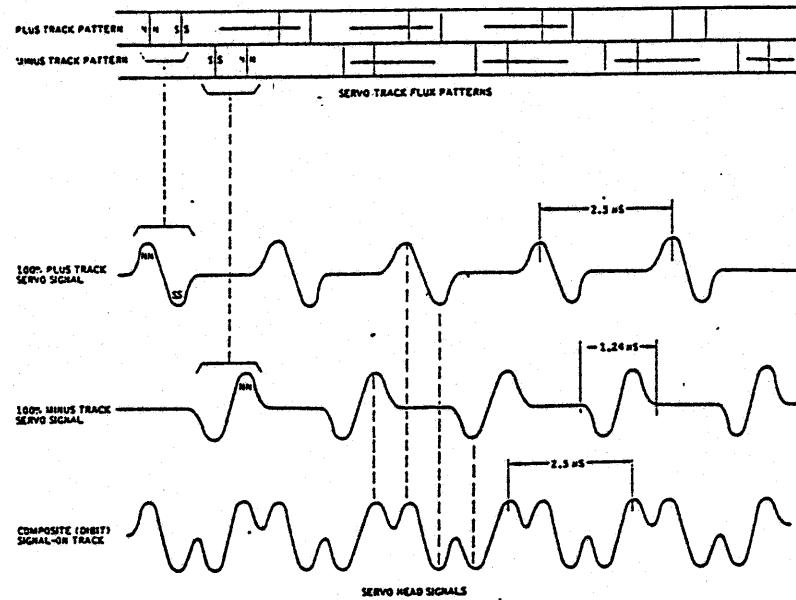
DISK STORAGE



DISK STORAGE



Servo Surface Format

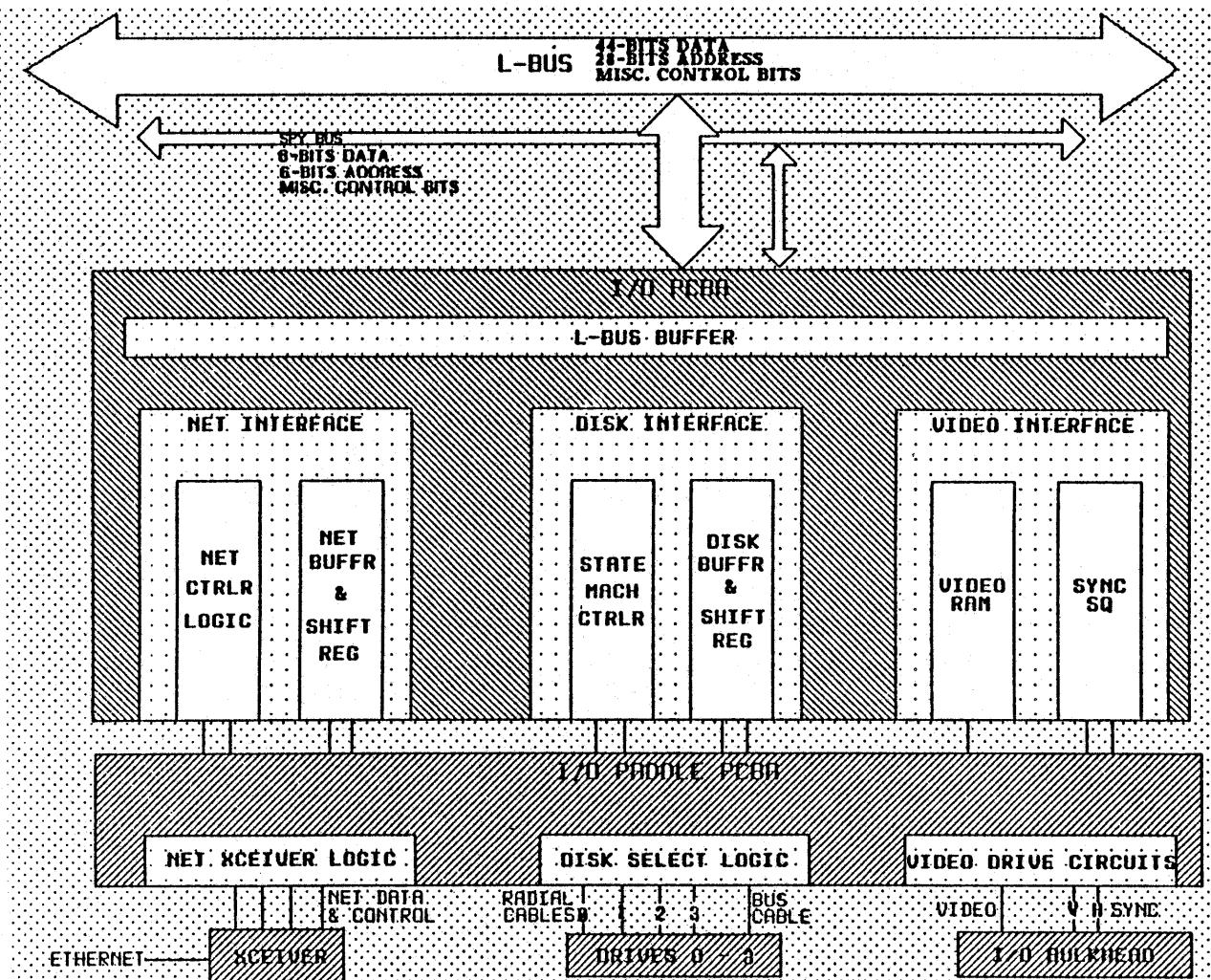


CYLINDER TRACKING

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D I S K D R I V E S P E C I F I C A T I O N S

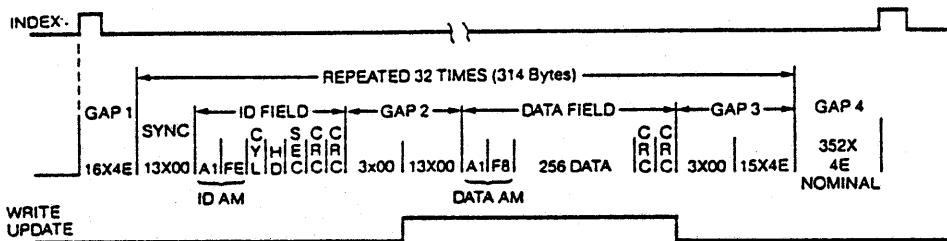
| DISK DRIVE | TOTAL STORAGE | HEADS | CYLINDERS | SECTORS/CYLINDER | TOTAL SECTORS | g1 | g2 | g3 | fast |
|----------------|---------------|-------|-----------|------------------|---------------|----|----|----|------|
| CDC EMD368 | 368.0 MB | 10 | 1217 | 24 | 292080 | 27 | 31 | 32 | 1 |
| CDC EMD515 | 515.0 MB | 24 | 711 | 24 | 409536 | 27 | 31 | 32 | 1 |
| CDS T306 | 315.0 MB | 19 | 823 | 16 | 250192 | 27 | 31 | 32 | 0 |
| FUJITSU M2284 | 168.5 MB | 10 | 823 | 16 | 131680 | 27 | 31 | 52 | 0 |
| FUJITSU M2294 | 335.0 MB | 16 | 1024 | 16 | 262144 | 27 | 31 | 52 | 0 |
| FUJITSU M2351 | 474.0 MB | 20 | 842 | 22 | 370480 | 32 | 34 | 44 | 1 |
| MAXTOR XT-1140 | 143.0 MB | 15 | 918 | 8 | 110160 | 49 | 31 | 49 | 0 |
| MAXTOR XT-2190 | 191.5 MB | 15 | 1224 | 8 | 146880 | 49 | 31 | 49 | 0 |
| NEC D2257 | 167.0 MB | 8 | 1024 | 16 | 131072 | 27 | 31 | 52 | 0 |
| PRIAM 807 | 340.0 MB | 11 | 1552 | 16 | 273152 | 26 | 14 | 50 | 0 |



LISP I/O BLOCK DIAGRAM

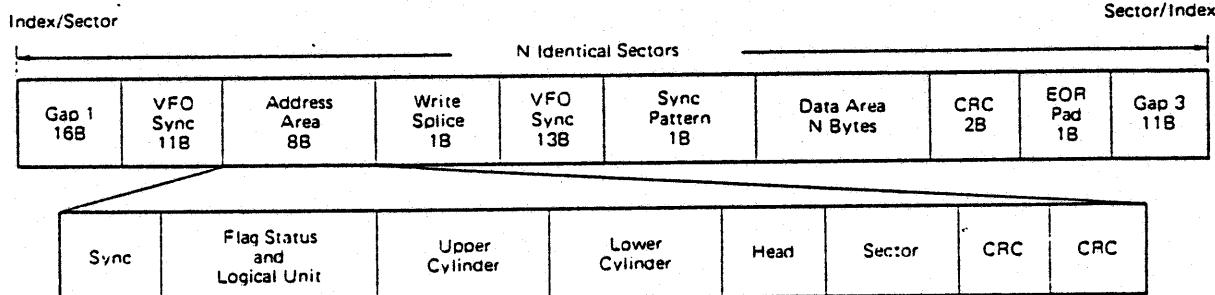
A CABLE (BUS CABLE)

| SIGNAL | FROM PROCESSOR TO DISK DRIVE | FROM DISK DRIVE TO PROCESSOR |
|-------------------------------------------------------------------------------------------|---------------------------------|------------------------------|
| UNIT READY WRITE PROTECTED | | X X |
| PICK HOLD | X X | |
| UNIT SELECT 1 UNIT SELECT 2 UNIT SELECT 4 UNIT SELECT 8 SELECT | X X X X X | |
| ON CYLINDER SEEK ERROR FAULT INDEX SECTOR CYL TAG HEAD TAG BUS 0 - 9 | X X X X X X X | X X X X X |



- NOTES:
1. NOMINAL TRACK CAPACITY = 10416 BYTES UNFORMATTED
 2. TOTAL DATA BYTES/TRACK = 256 x 32 = 8,192
 3. SECTOR INTERLEAVE FACTOR IS 4. SEQUENTIAL ID FIELDS ARE SECTOR NUMBERED 0, 8, 16, 24, 1, 9, 17, 25, 2, 10, 18, 26,...ETC.
 4. DATA FIELDS CONTAIN THE BIT PATTERN 0000 AS SHIPPED
 5. CRC FIRE CODE = $x^{16}+x^{12}+x^5+1$
 6. BIT 7 OF HEAD BYTE ID FIELD EQUALS 1 IN A DEFECTIVE SECTOR (CYLINDER 0 IS ERROR FREE)
 7. BIT 6 OF HEAD BYTE IS CYLINDER 2^8 BIT
 8. BITS 5 OF HEAD BYTE IS CYLINDER 2^9 BIT
 9. BIT 4 OF HEAD BYTE IS RESERVED FOR CYLINDER 2^{10} BIT
 10. BIT 0-3 OF HEAD BYTE ARE HEAD 2^0 TO HEAD 2^3 RESPECTIVELY

ST-506 INTERFACE (MAXTOR 1140)



SMD INTERFACE (FUJITSU M2284)

CABLE Descriptions & Related PART NUMBERS

Cartridge Tape

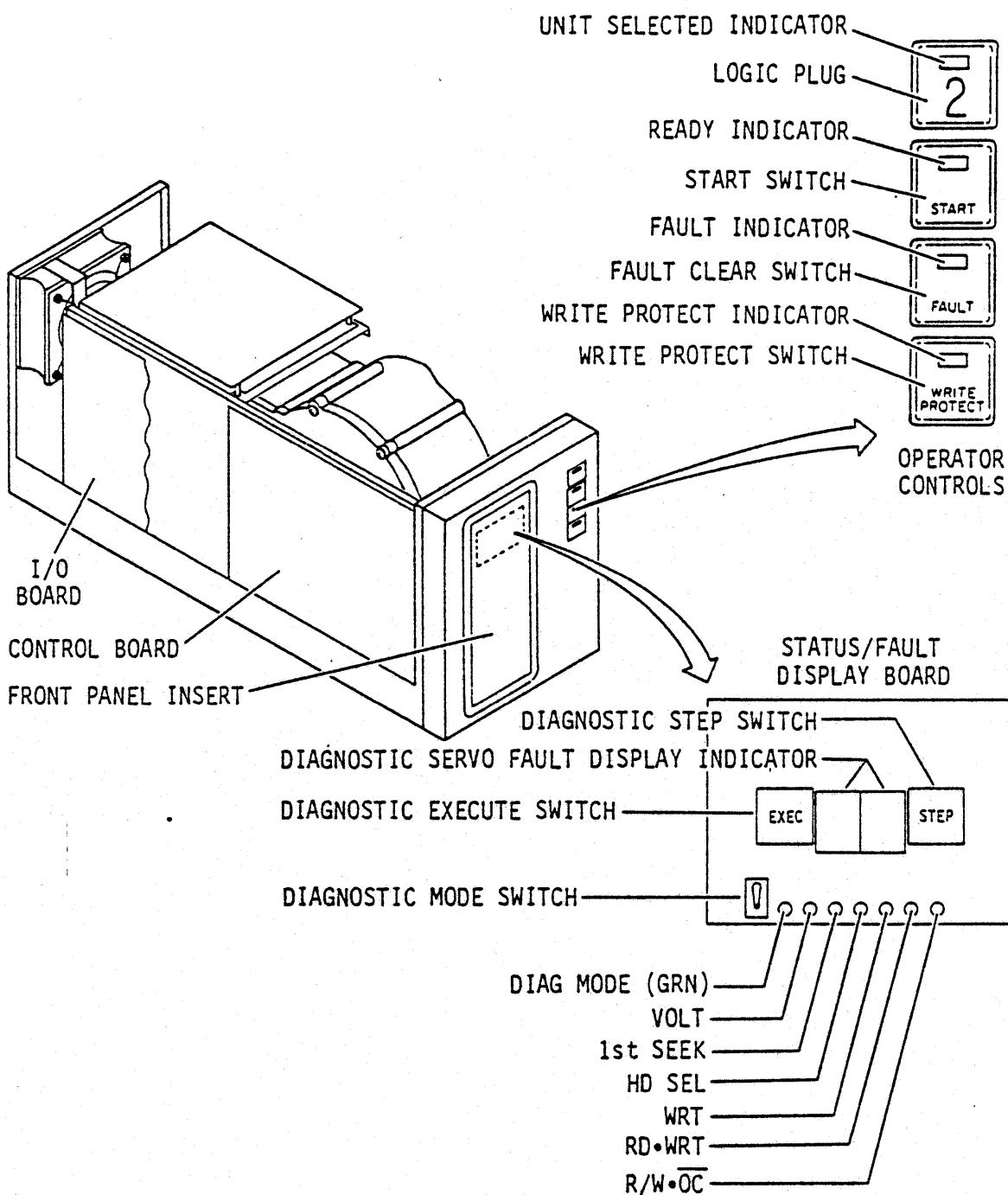
| | |
|----------|-----------------------------------------------------------|
| 102382 | Cartridge Tape Data Cable 3600 System |
| 102420 | Cartridge Tape Data Cable 3670 System |
| 102441-1 | 6 ft. External Auxillary Cabinet TD-80 Cypher Tape Cable |
| 102441-2 | 11 ft. External Auxillary Cabinet TD-80 Cypher Tape Cable |
| 102509 | Cartridge Tape Data Cable 3640 System |

Disk

| | |
|----------|----------------------------------------------------------------|
| 102340 | (T300) Disk Radial Cable LM-2 System |
| 102341 | (T300) Disk Bus Cable LM-2 System |
| 102363 | (T300) Braided Disk Ground Cable LM-2 System |
| 102367 | SMD Disk A-Cable Bus Internal LM-2 System |
| 102368 | SMD Disk B-Cable Radial Internal LM-2 System |
| 102369 | SMD Jumper Cable (SMD to DC) LM-2 System |
| 102376 | (T306) 6 ft. SMD Disk A-Cable Bus Internal 3600/70 Systems |
| 102376-2 | (T306) 28 ft. SMD Disk A-Cable Bus Internal 3600/70 Systems |
| 102377 | (T306) 6 ft. SMD Disk B-Cable Radial Internal 3600/70 Systems |
| 102377-2 | (T306) 28 ft. SMD Disk B-Cable Radial Internal 3600/70 Systems |
| 102488 | (Nec D2257) SMD Disk A-Cable Bus Internal 3640/70 Systems |
| 102489 | (Nec D2257) SMD Disk B-Cable Radial Internal 3640/70 Systems |
| 102439-1 | 6 ft. External Auxillary Cabinet Disk Cable |
| 102439-2 | 11 ft. External Auxillary Cabinet Disk Cable |
| 102448 | 6 ft. SMD Disk A-Cable Bus Internal 3600/40/70 Systems |
| 102451 | 6 ft. SMD Disk B-Cable Radial Internal 3600/40/70 Systems |
| 102501 | Disk Ground Cable 3640 System |
| 102507 | (Maxtor XT1140) 6 ft. Disk A-Cable Bus Internal 3640 System |
| 102508 | (Maxtor XT1140) 6 ft. Disk B-Cable Radial Internal 3640 System |
| 102523 | (Priam) 6 ft. SMD Disk A-Cable Bus Internal 3640 System |
| 102524 | (Priam) 6 ft. SMD Disk B-Cable Radial Internal 3640 System |

Power

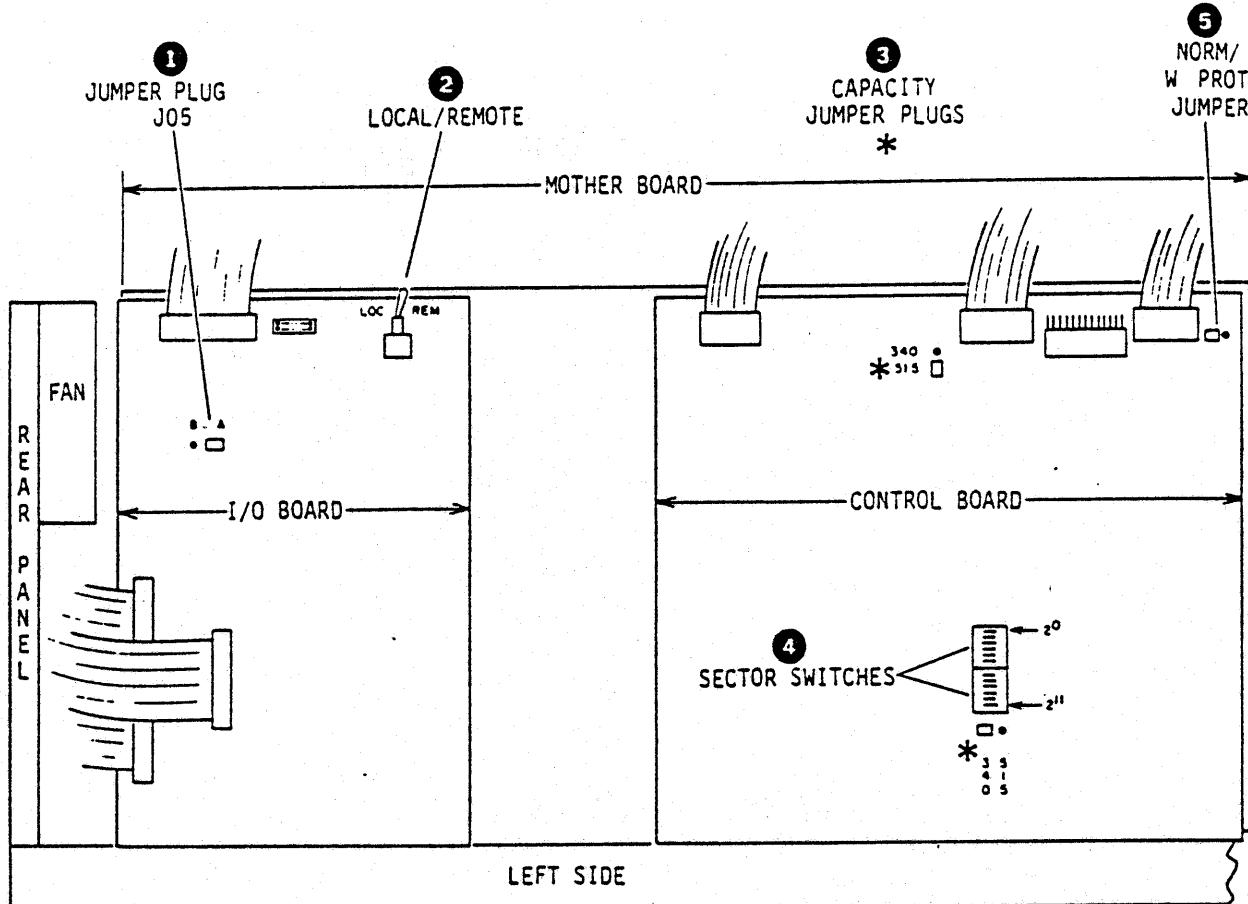
| | |
|----------|-----------------------------------------------------------|
| 102331 | (LM-2) Main Power Cable |
| 102370 | (LGP1) AC Power Cable |
| 102381 | (Cartridge Tape) AC Power Cable |
| 102396-1 | (3600/70) 12 ft. Main Power Cable 60 Hz. 50 Amp. |
| 102396-2 | (3600/70) 12 ft. Main Power Cable 50 Hz. (minus plug end) |
| 102425-1 | (Auxillary Cabinet) 6 ft. Main Power Cable |
| 102425-2 | (Auxillary Cabinet) 11 ft. Main Power Cable |
| 102434 | (NEC D2257) AC Disk Power Cable |
| 102502 | (3640) Main Power Cable 60 Hz. 20 Amp. |
| 102502-1 | (3640) 18 ft. Main Power Cable 60 Hz. 20 Amp. |
| 102502-2 | (3640) 10 ft. Main Power Cable 50 Hz. 20 Amp. |
| 127008 | (LM-2 Console) AC Power Cable |
| 129052 | (3600/40/70 Consoles) AC Power Cable |



STATUS/FAULT DISPLAY BOARD IS LOCATED
BEHIND FRONT PANEL INSERT AND FILTER.

CDC EMD515

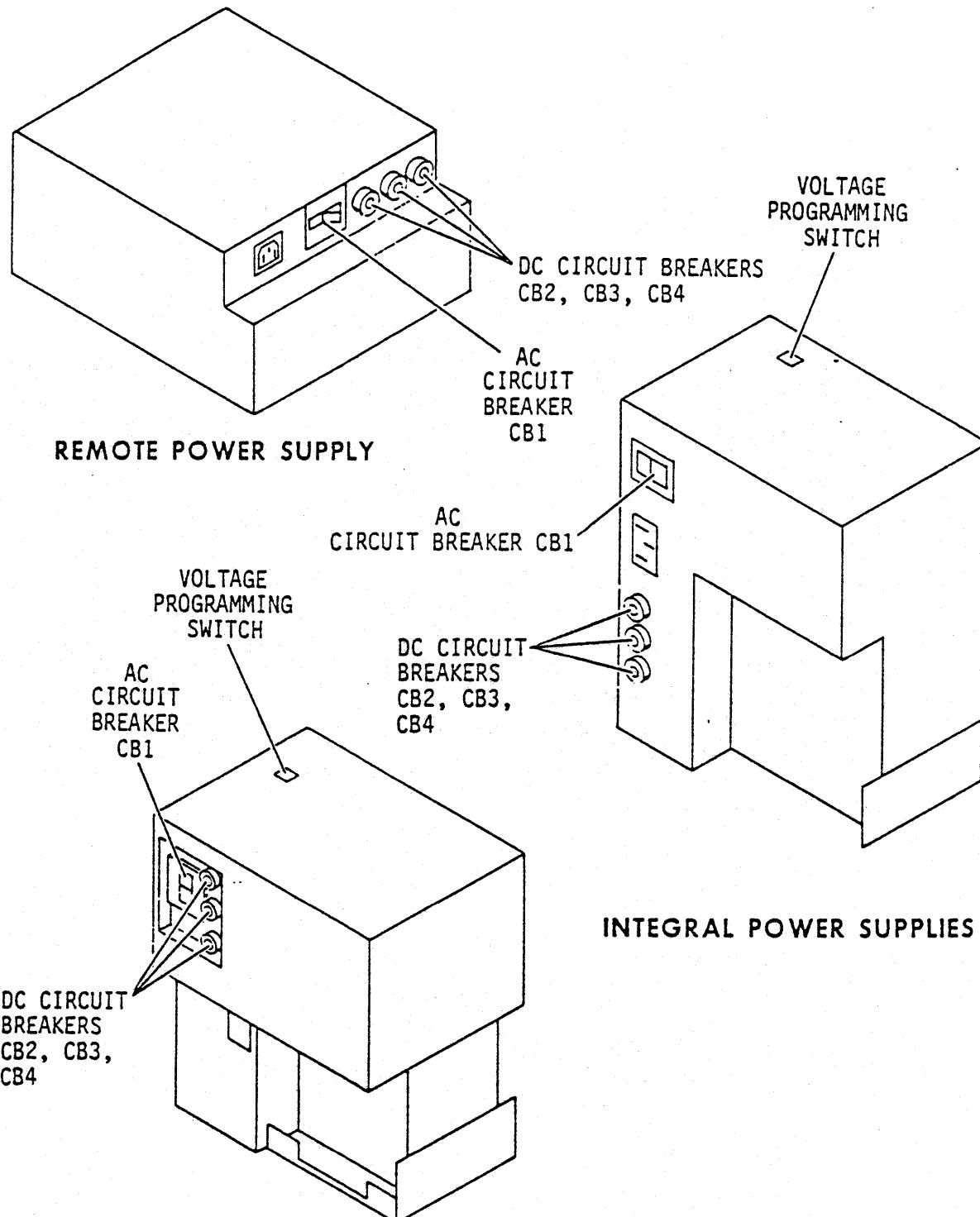
SINGLE CHANNEL DRIVES



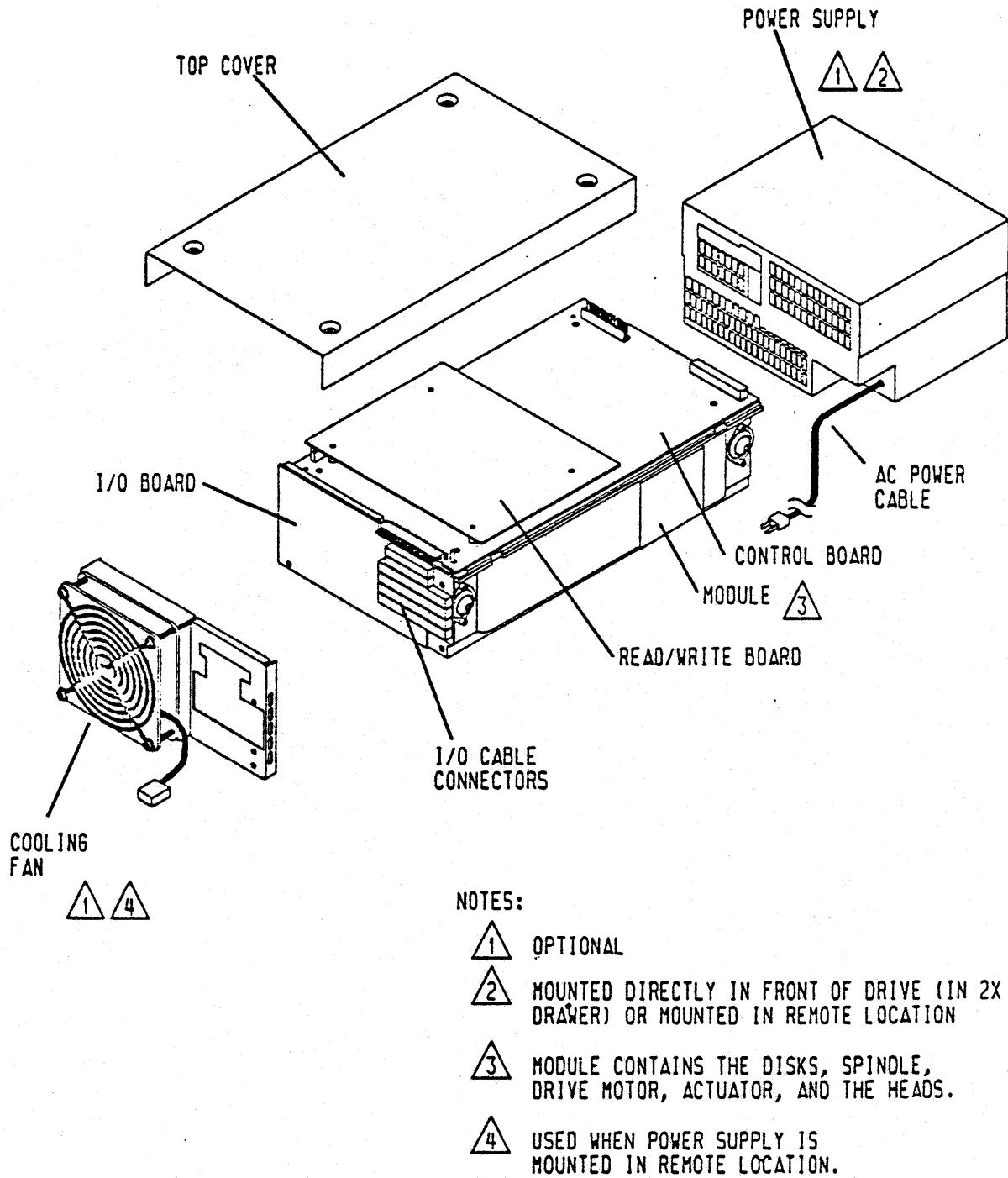
| INDEX | SWITCH | SETTING |
|-------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON I/O BOARD: | | |
| ① | INDEX/SECTOR JUMPER PLUG | LEAVE J05 IN "A" POSITION FOR INDEX/SECTOR IN "A" CABLE OR PLACE IN "B" POSITION FOR INDEX/SECTOR IN "B" CABLE. WITH JUMPER REMOVED, INDEX AND SECTOR IS IN "A" AND "B" CABLES. |
| ② | LOCAL/REMOTE | LOCAL: DRIVE POWER UP INDEPENDENT OF CONTROLLER. REMOTE: DRIVE POWER UP INDEPENDENT OF CONTROLLER. |
| ON CONTROL BOARD: | | |
| ③ | DRIVE CAPACITY JUMPER PLUGS 340/515 | PRESET IN FACTORY ACCORDING TO CURRENT CONFIGURATION. |
| ④ | SECTOR SWITCHES | SEE DISCUSSION ON SETTING CIRCUIT BOARD SWITCHES. |
| ⑤ | NORM/W PROT JUMPER PLUG | NORM |

CDC EMD515 SWITCH SETTINGS

symbolics inc.



CDC EMD515 POWER SUPPLY

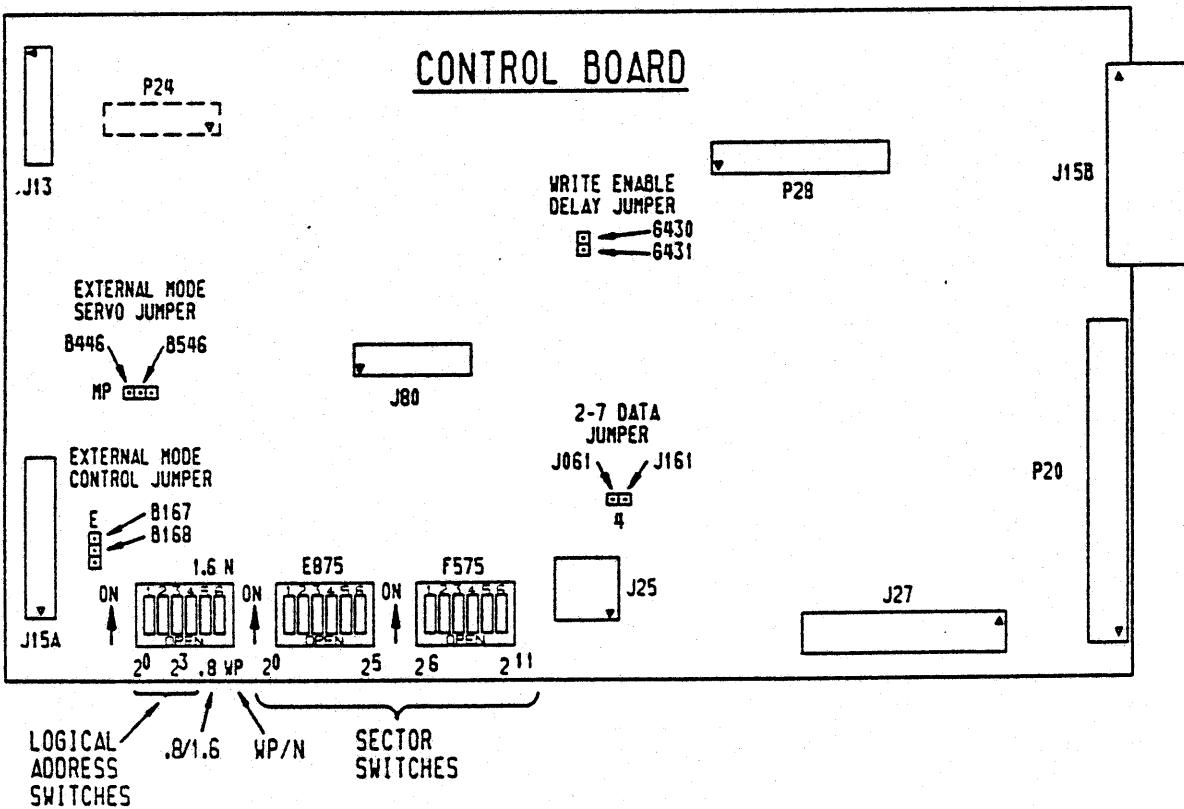
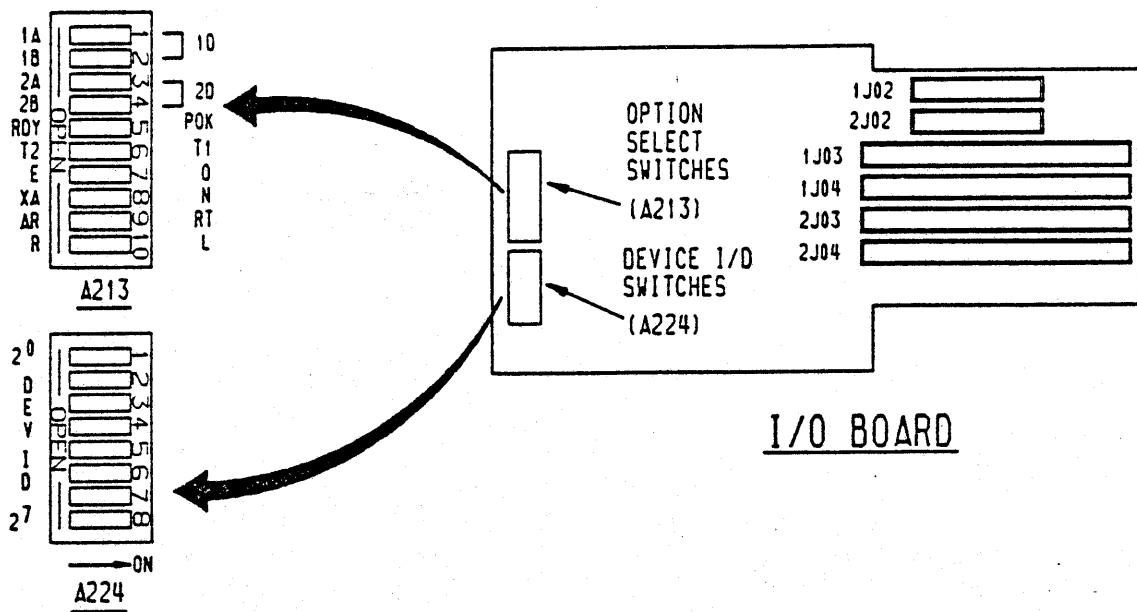


NOTES:

- 1 OPTIONAL
- 2 MOUNTED DIRECTLY IN FRONT OF DRIVE (IN 2X DRAWER) OR MOUNTED IN REMOTE LOCATION
- 3 MODULE CONTAINS THE DISKS, SPINDLE, DRIVE MOTOR, ACTUATOR, AND THE HEADS.
- 4 USED WHEN POWER SUPPLY IS MOUNTED IN REMOTE LOCATION.

CDC EMD368

symbolics inc.



CDC EMD368 SWITCH SETTINGS

I/O BOARD SWITCH SETTINGS

| SWITCH | SETTING | DESCRIPTION |
|----------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1A/1D, 1B/1D | | Enable/Disable CH 1 and select an option for sending Index & Sector to CH 1 controller. The four combinations of switch settings are as follows: |
| 1A/1D 1B/1D | 1A 1D | This pair of switch settings enables CH 1 & sends I & S on A cable only |
| 1A/1D 1B/1D | 1D 1B | This pair of switch settings enables CH 1 & sends I & S on B cable only |
| 1A/1D 1B/1D | 1A 1B | This pair of switch settings enables CH 1 & sends I & S on A and B cables |
| 1A/1D 1B/1D | 1D 1D | This pair of switch settings disables CH 1 |
| 2A/2D, 2B/2D | | Enable/Disable CH 2 and select an option for sending Index & Sector to CH 2 controller (see description of CH 1 switches) |
| RDY/POK | RDY | Normal I/O Ready status (Up to speed, heads loaded and no fault exists) |
| | POK | POK (Power OK) line active: In addition to above conditions (when switch is in RDY), Ready status also indicates ac input voltage to the power supply is present. |

Table Continued on Next Page

I/O BOARD SWITCH SETTINGS (Contd)

| SWITCH | SETTING | DESCRIPTION |
|-----------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | POK (Power OK) line inactive: Indicates a loss of ac input voltage. The Ready line will go inactive (immediately). The +Voltage Fault line will remain inactive for a minimum of 850 microseconds (after the POK line goes inactive). |
| T2/T1 | T2 | Enables Extended Cylinder Address bits 2^{10} and 2^{11} , via Tag 2 (Head Select). |
| | T1 | Enables Extended Cylinder Address bit 2^{10} , via Tag 1 (Cylinder Select). |
| E/O | E | SMD-E mode |
| | O | SMD-O mode |
| XA/N | XA | Extended Cylinder Address (cylinders 0-1217) |
| | N | Normal Cylinder Address (cylinders 0-1023) |
| AR/RT | AR | Absolute Release (Dual CH) |
| | RT | Release Timer (Dual CH) |
| R/L | R | Remote power up |
| | L | Local power up |
| DEV ID 20-27 | (Closed) | Set according to customer requirements. |

CONTROL BOARD SWITCH SETTINGS

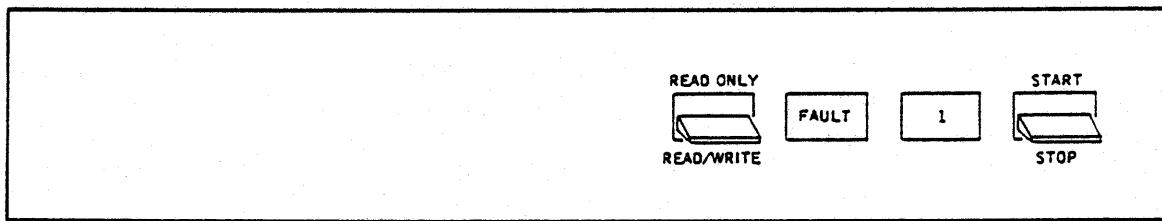
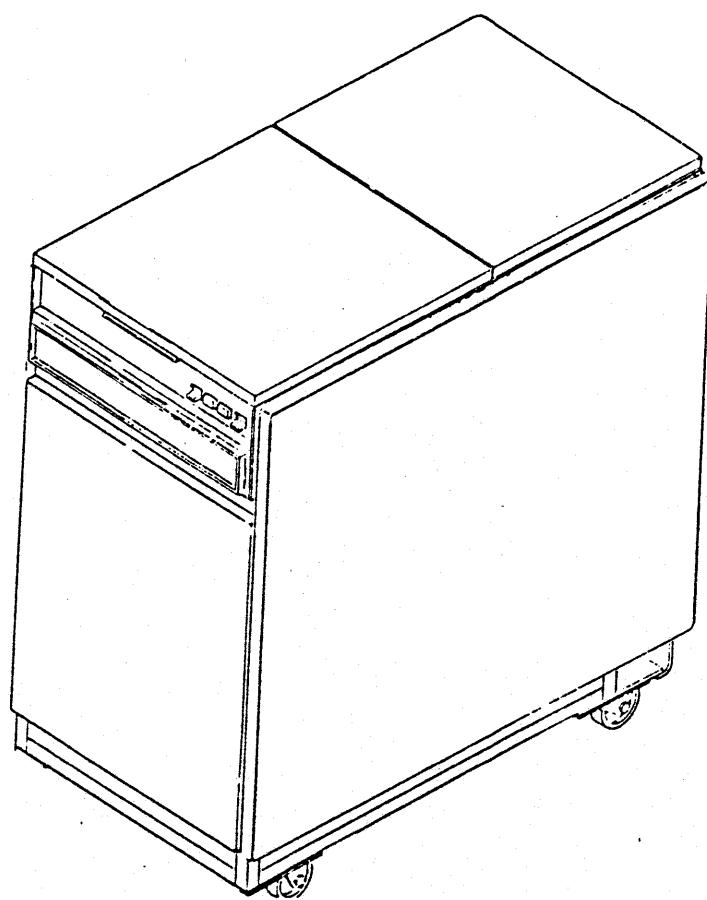
| SWITCH | SETTING | DESCRIPTION |
|------------------------------|---------|------------------------------------------------------------------------------------------------|
| Sector Switches | | See discussion on Setting Circuit Board Switches. |
| Logical Address Switches | | Used on drives without status/control panel. See discussion on Setting Circuit Board Switches. |
| .8/1.6 | .8 | 806 kHz Sector Clock |
| | 1.6 | 1.6 MHz Sector Clock |
| WP/N | WP | Write Protect |
| | N | Normal |
| 2-7 Data Jumper | 4 | Jumper preset during manufacturing between J061 and J161. |
| Write Enable Delay Jumper | | Jumper preset during manufacturing between G430 and G431. |
| External Mode Control Jumper | E | Jumper preset during manufacturing between B167 and B168. |
| External Mode Servo Jumper | MP | Jumper preset during manufacturing between B446 and B546. |

CONTROL BOARD LOGICAL ADDRESS SWITCH SETTINGS

| Logical Address | Switch (Binary Value) * | | | |
|-----------------|-------------------------|-------|-------|-------|
| | z^0 | z^1 | z^2 | z^3 |
| 0 | C | C | C | C |
| 1 | O | C | C | C |
| 2 | C | O | C | C |
| 3 | O | O | C | C |
| 4 | C | C | O | C |
| 5 | O | C | O | C |
| 6 | C | O | O | C |
| 7 | O | O | O | C |
| 8 | C | C | C | O |
| 9 | O | C | C | O |
| 10 | C | O | C | O |
| 11 | O | O | C | O |
| 12 | C | C | O | O |
| 13 | O | C | O | O |
| 14 | C | O | O | O |
| 15 | O | O | O | O |

* O = Open (Off). C = Closed (On)

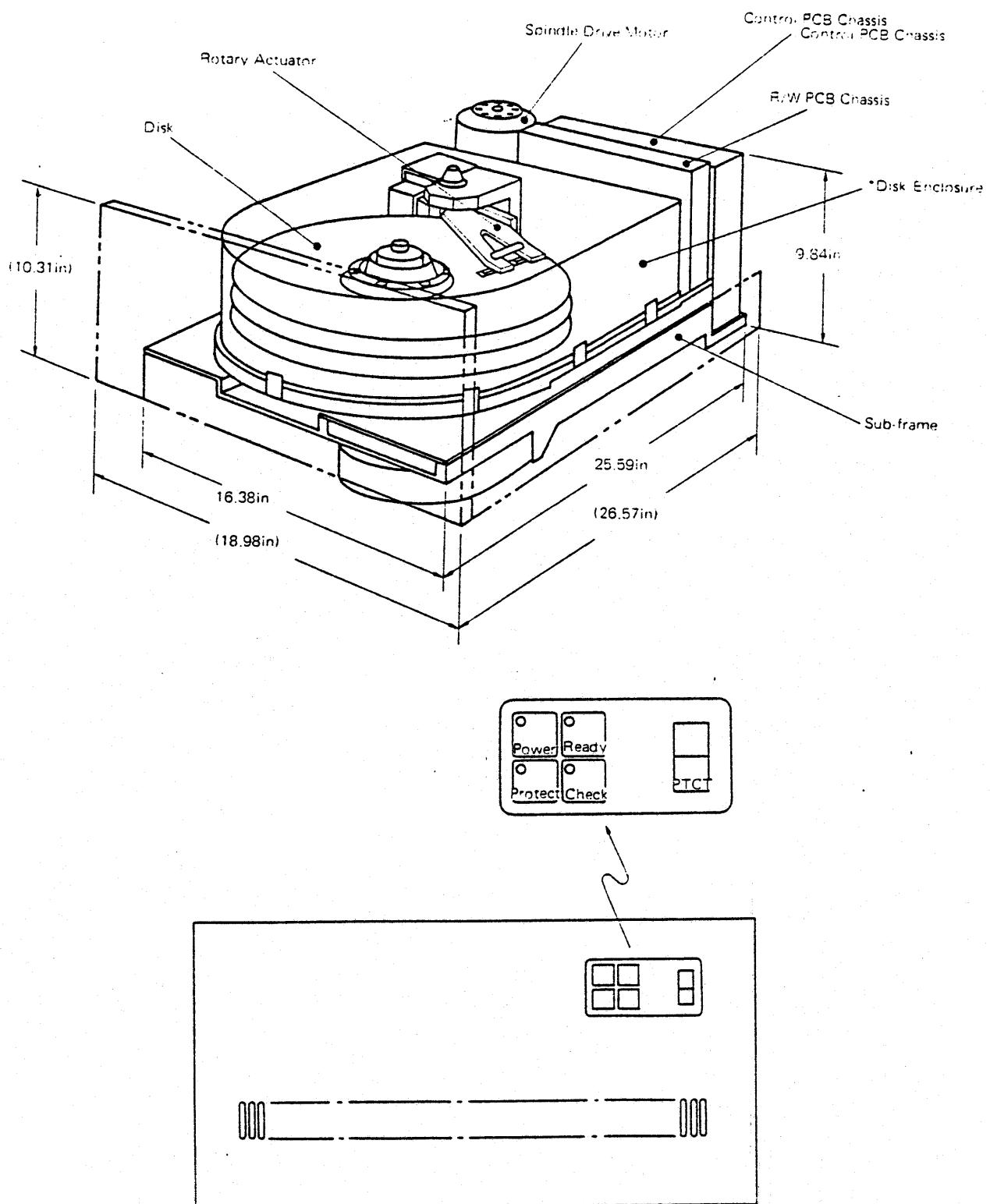
symbolics inc.



SINGLE-ACCESS CONTROL PANEL

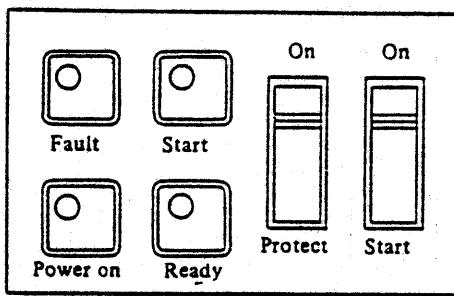
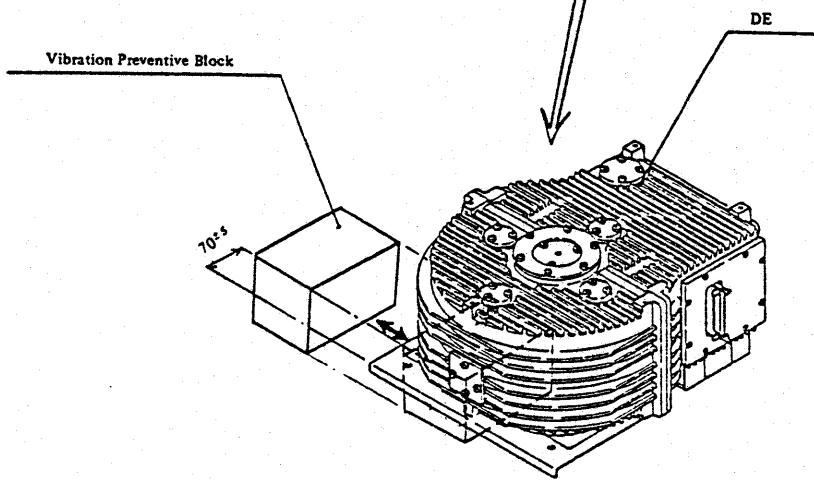
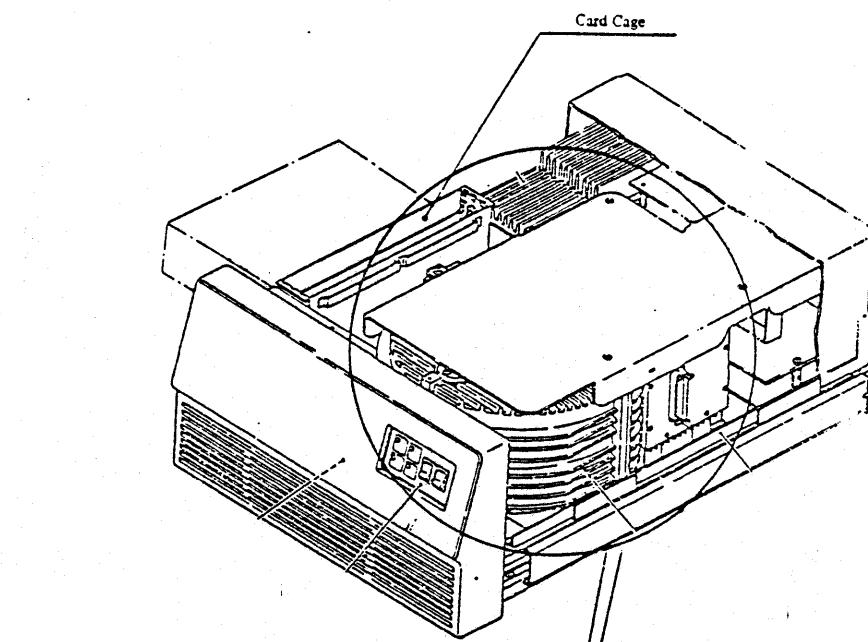
CDS MODEL T306

symbolics inc.

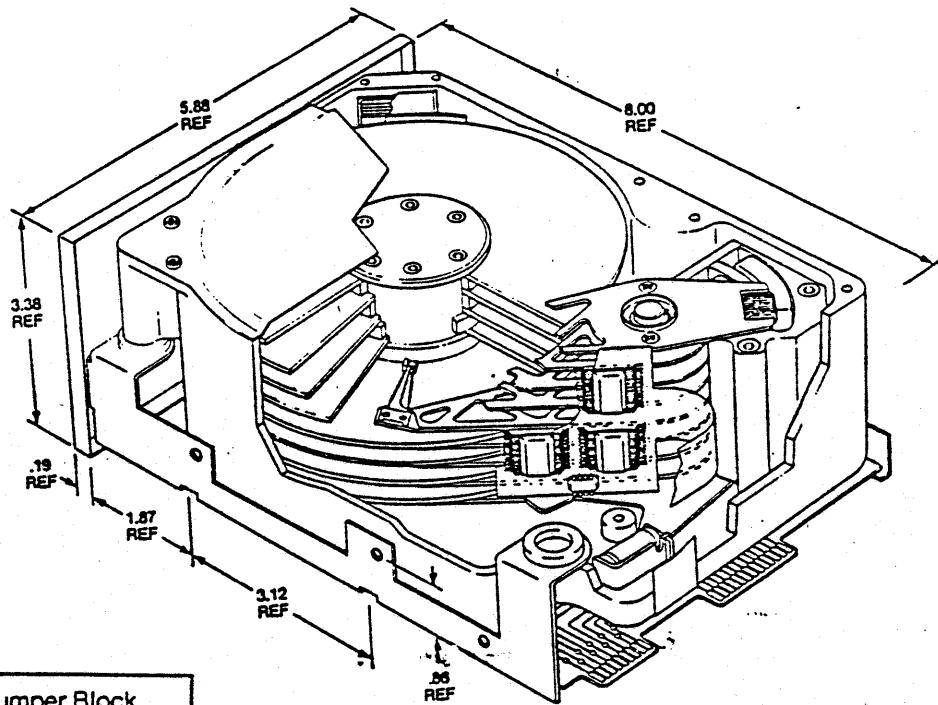


FUJITSU MODELS M2284 AND M2294

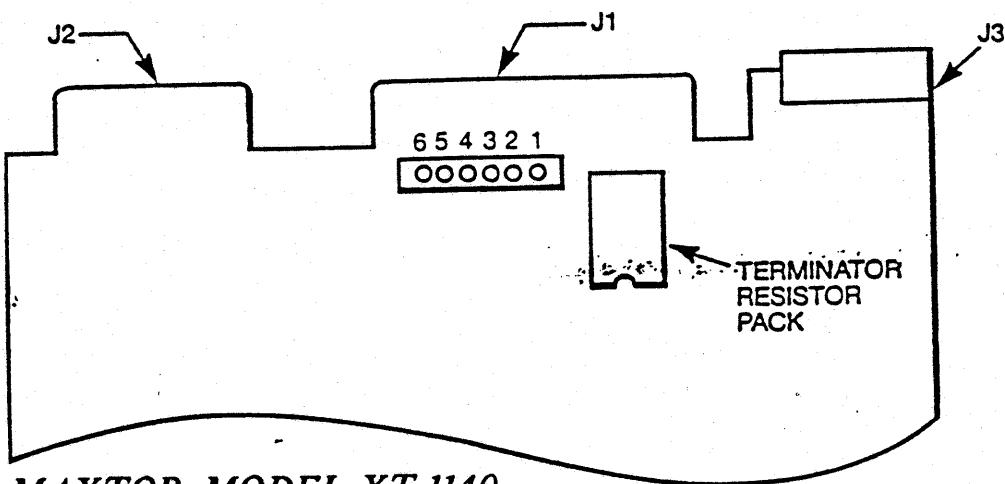
symbolics inc.



FUJITSU MODEL M2351

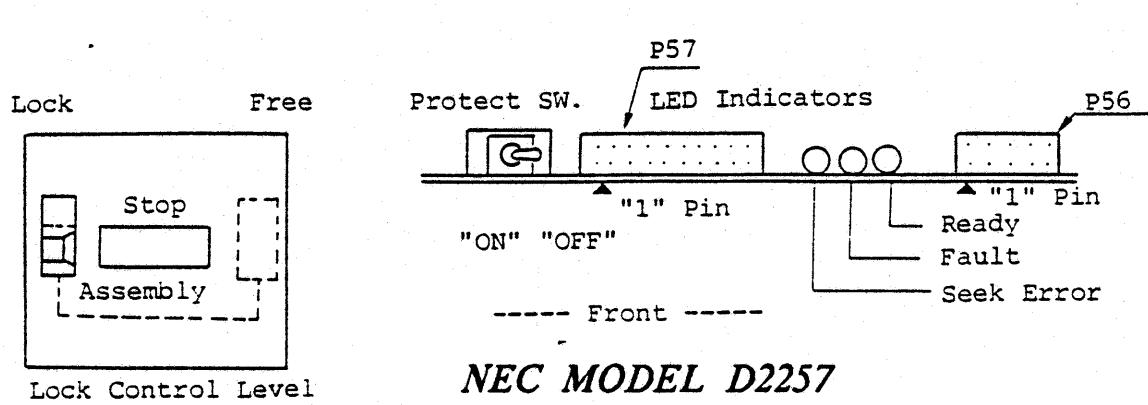
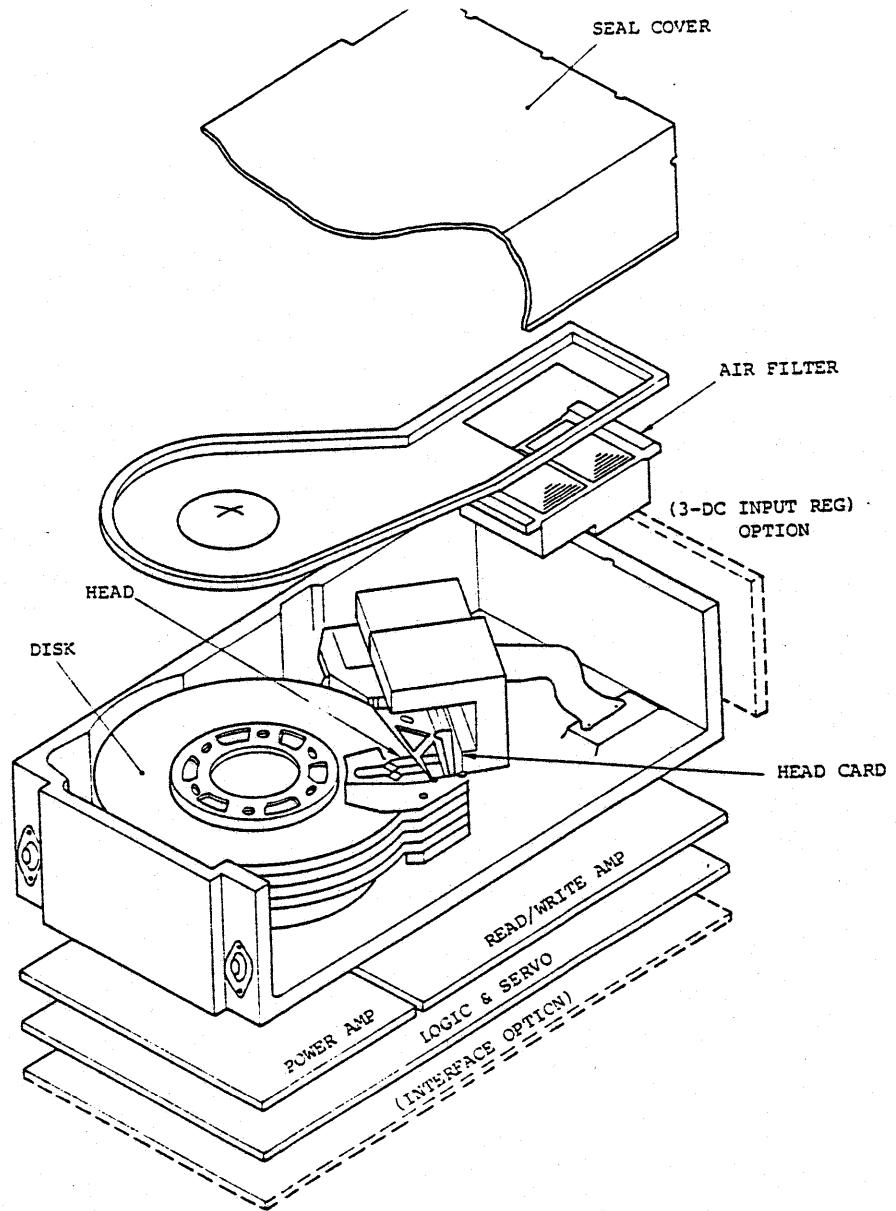


| Function | Jumper Block Pin Numbers |
|----------------|--------------------------|
| Drive Select 0 | 1, 2 |
| Drive Select 1 | 2, 3 |
| Drive Select 2 | 4, 5 |
| Drive Select 3 | 5, 6 |



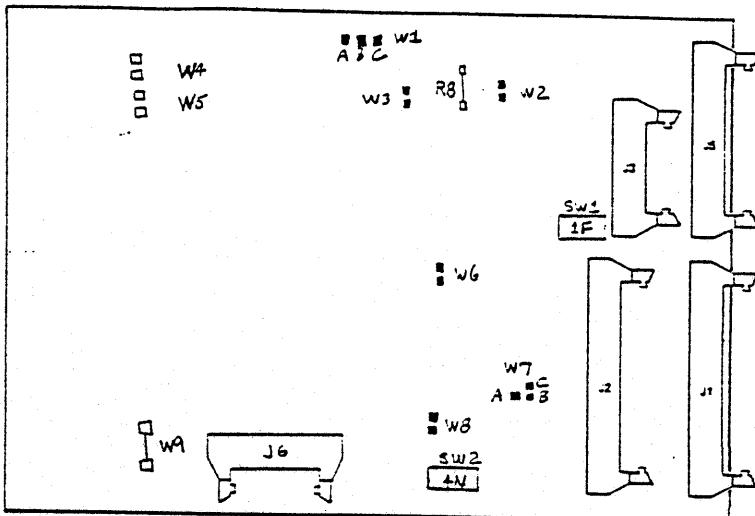
MAXTOR MODEL XT-1140

symbolics inc.



NEC MODEL D2257

symbolics inc.



SMD R/W PCB ASSEMBLY

PCB ASSEMBLY P/N DRIVE MODEL NUMBER
200834-2 806-2X
200835-2 807-2X

BB • CONDUCTIVE TAG
GC • WIRE OR TRACE

JUMPER SETTINGS

SHIPPING
CONFIGURATION

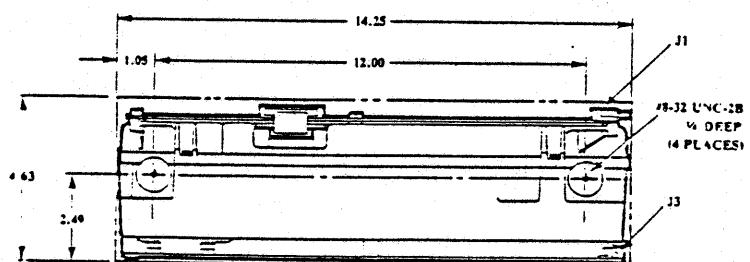
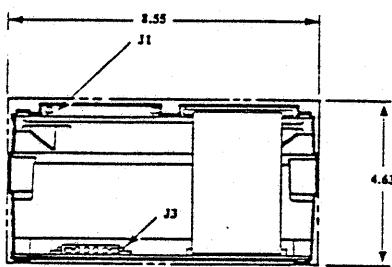
| | | |
|----|-------------------------------------------------------------------------------------------|-----|
| W1 | B-C | 3-C |
| W2 | IN = ENABLE SECTOR AT INDEX | OUT |
| W3 | IN = AUTOMATIC PICK AND HOLD | IN |
| W4 | IN | IN |
| W5 | IN | IN |
| W6 | OUT = READ IS NOT DISABLED AT INDEX OR SECTOR IN = READ IS DISABLED AT INDEX OR SECTOR | OUT |
| W7 | A-B = ENABLE BIT 10 B-C = DISABLE BIT 10 | B-C |
| W8 | OUT = FAULT SETS NOT-READY IN = READY IS INDEPENDENT OF FAULT | IN |
| W9 | IN = DISABLE SHORT SECTOR OUT = ENABLE SHORT SECTOR | IN |
| | IN = 806 OUT = 807 | |

SWITCH SETTINGS

SHIPPING
CONFIGURATION

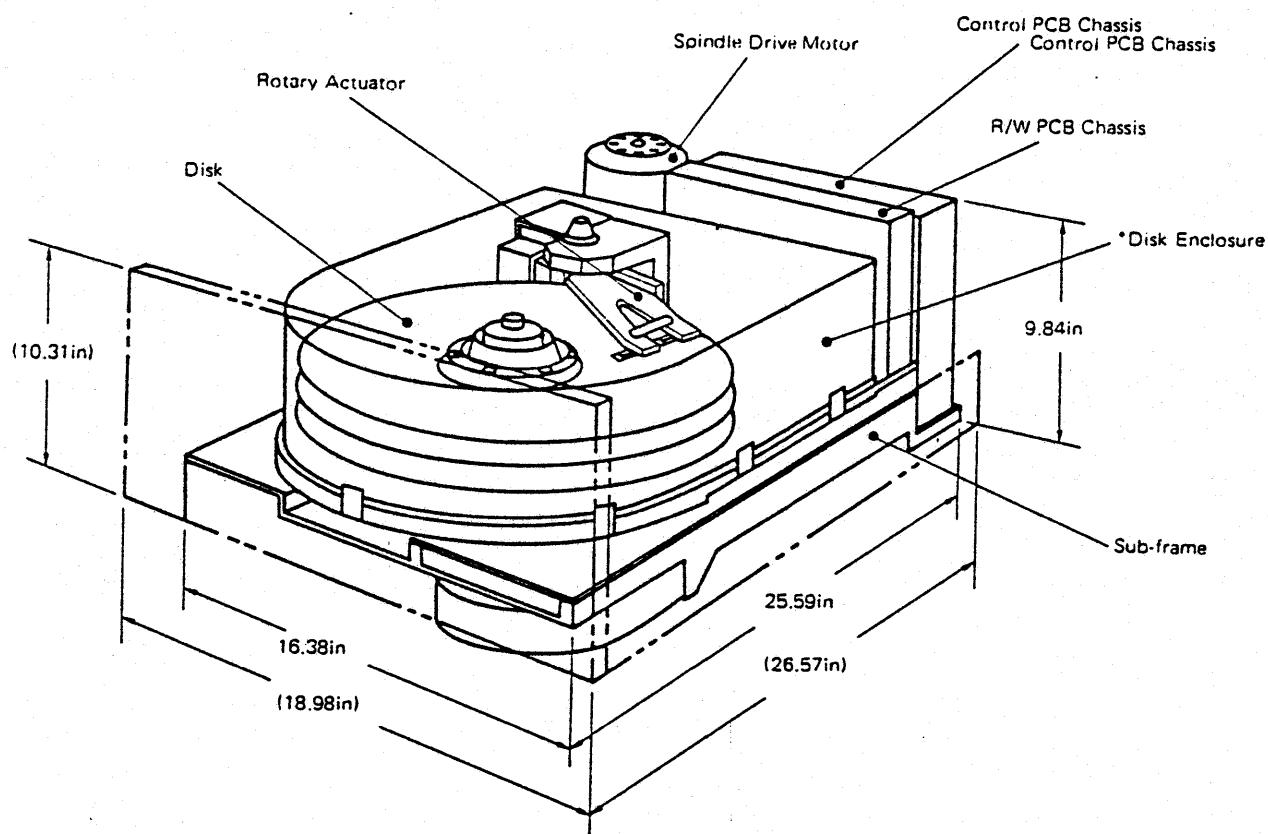
| SWITCH LOCATION | | 4N (SW-2) | |
|-----------------|---|------------------------------------------|-----|
| NUMBER | 1 | DRIVE SELECT 1 | ON |
| | 2 | DRIVE SELECT 2 | OFF |
| | 3 | DRIVE SELECT 4 | OFF |
| | 4 | DRIVE SELECT 3 | OFF |
| AND | 5 | Not Used | OFF |
| FUNCTION | 5 | Not Used | OFF |
| | 7 | IN = DELAYED READ GATE | OFF |
| | 8 | IN = WRITE PROTECT | OFF |
| SWITCH LOCATION | | 1F (SW-1) | |
| NUMBER | 1 | 1 S/T 10 A/S | ON |
| | 2 | 2 | OFF |
| | 3 | 3 | OFF |
| | 4 | 4 | OFF |
| AND | 5 | 5 | OFF |
| FUNCTION | 5 | 5 | OFF |
| | 6 | 6 | OFF |
| | 7 | 7 | ON |
| | 8 | OFF = SECTORS/TRACK ON = BYTES/SECTOR | OFF |

PCBA P/N 200834/5-2 Switch and Jumper Settings



PRIAM MODEL 807

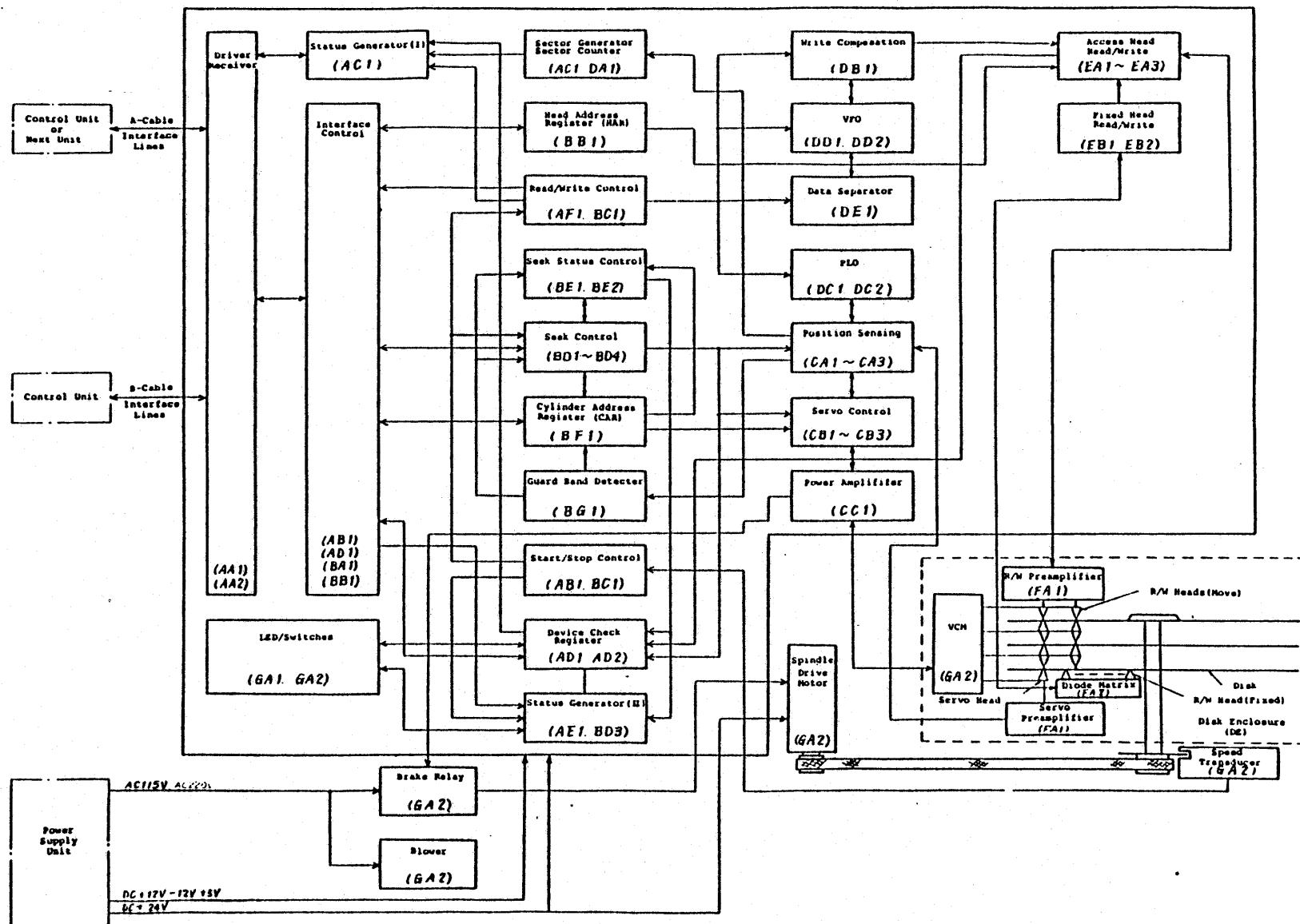
Priam 8-Inch Disc Drive Dimensions and Mounting



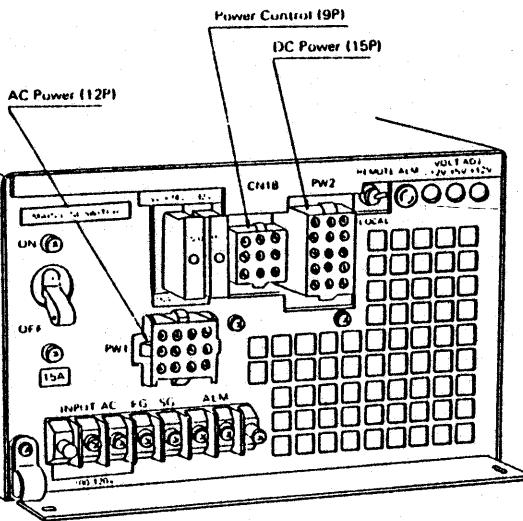
FUJITSU MODELS M2284 & M2294

2284 and 2294 OPERATIONAL SPECIFICATIONS

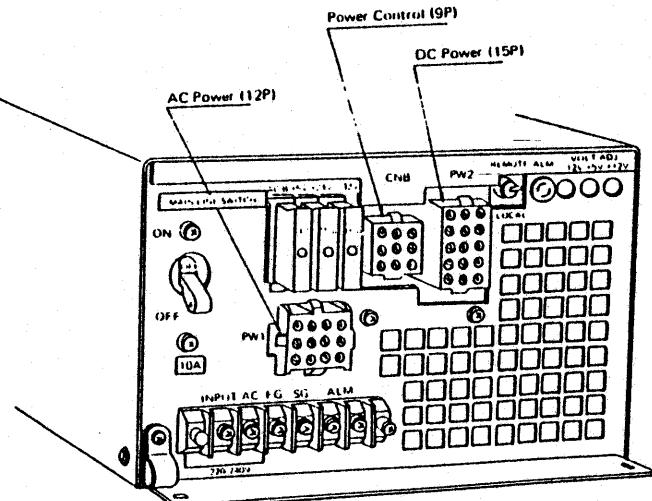
| ITEM | 2284 SPECIFICATION | 2294 SPECIFICATION |
|-------------------------------|--------------------|--------------------|
| UNFORMATTED STORAGE CAPACITY | 168.5 MB | 335.5 MB |
| HEADS | 10 | 16 |
| UNFORMATTED TRACK CAPACITY | 20,480 BYTES | 20,480 BYTES |
| SINGLE TRACK POSITIONING TIME | 6 ms | 6 ms |
| AVERAGE POSITIONING TIME | 27 ms | 27 ms |
| MAXIMUM POSITIONING TIME | 55 ms | 55 ms |
| ROTATIONAL SPEED | 2,964 RPM | 2,964 RPM |
| AVERAGE LATENCY TIME | 10.12 ms | 10.12 ms |
| BIT DENSITY | 6,500 BPI | 6,500 BPI |
| TRACK DENSITY | 793 TPI | 793 TPI |
| TRANSFER RATE | 1,012 KB/S | 1,012 KB/S |
| RECORDING CODE | MFM | MFM |
| INTERFACE CODE | NRZ | NRZ |
| START TIME | 40 SEC NOMINAL | 40 SEC NOMINAL |
| STOP TIME | 30 SEC NOMINAL | 30 SEC NOMINAL |



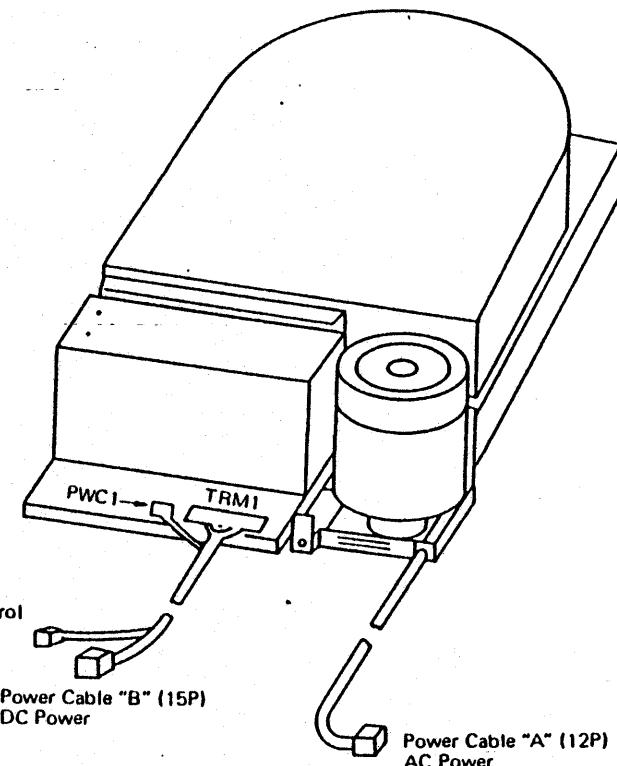
symbolics inc.

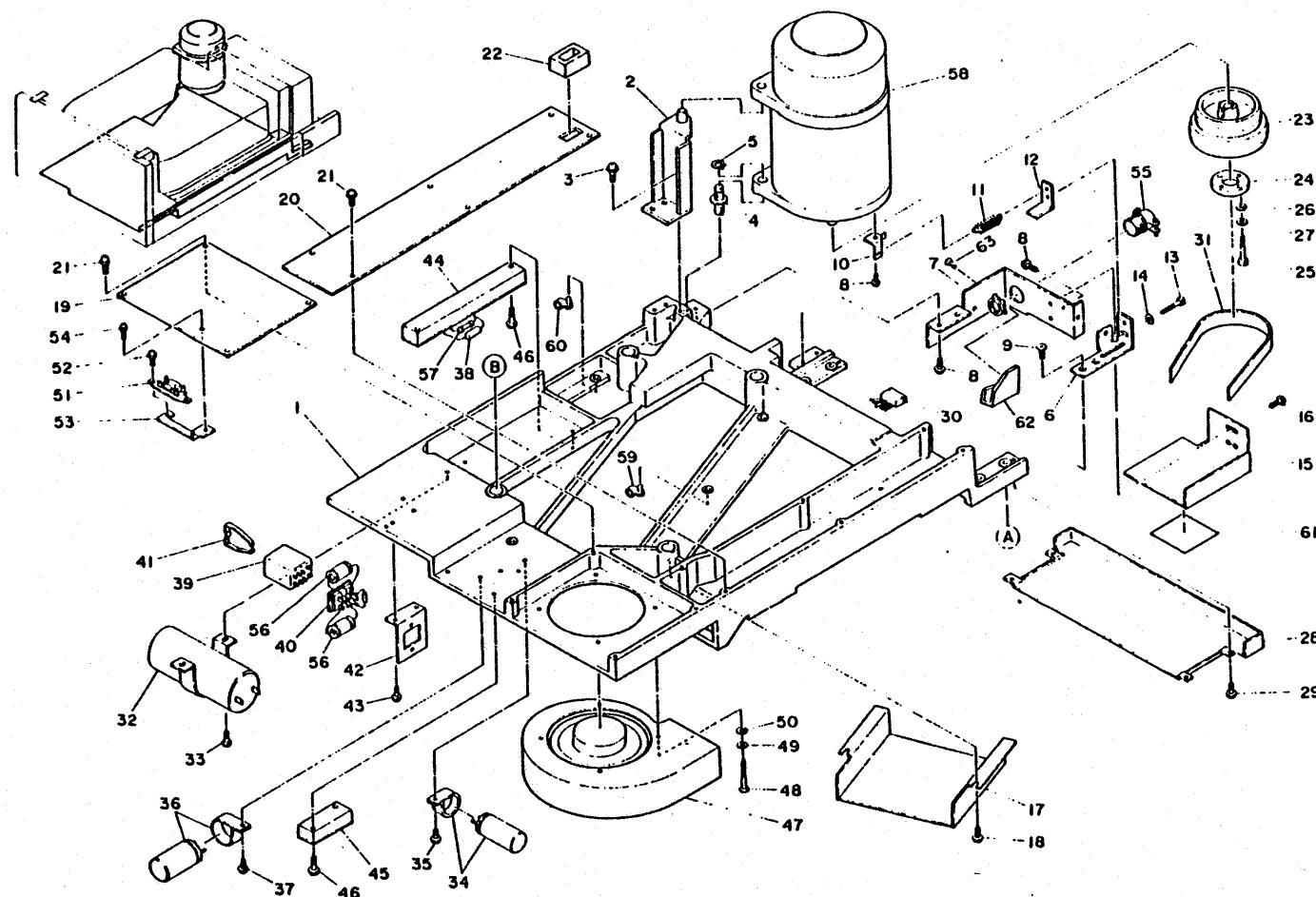


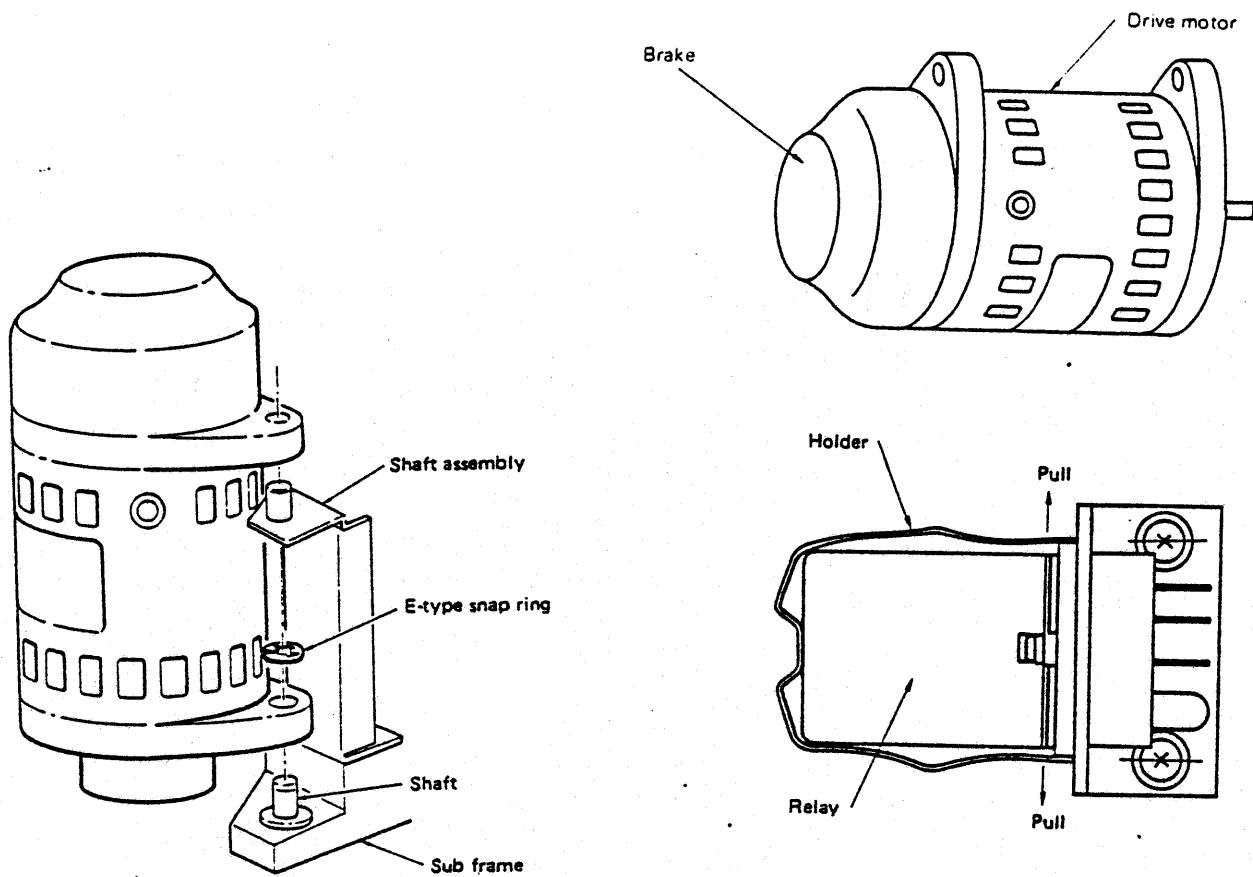
(1) USA Version Power Supply Unit



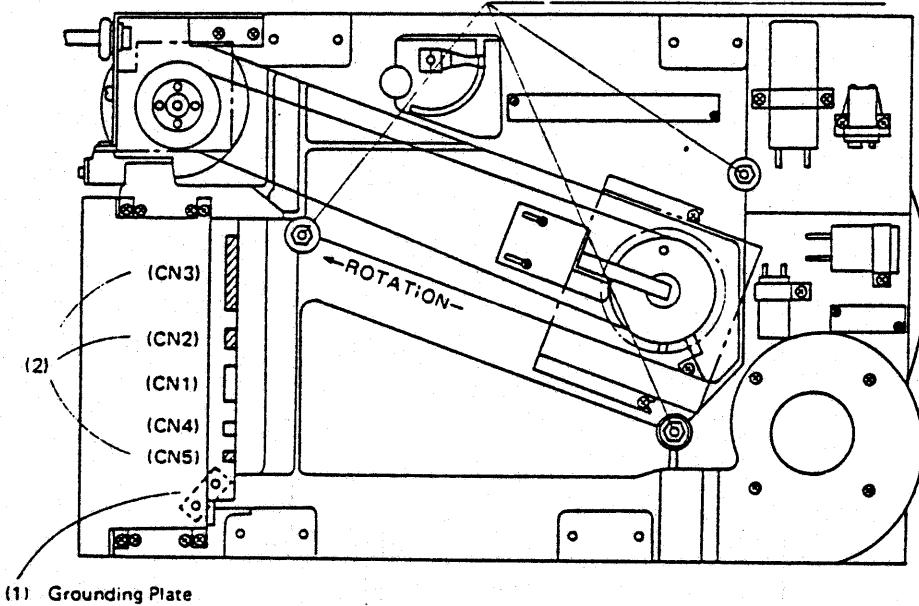
(2) European Version Power Supply Unit

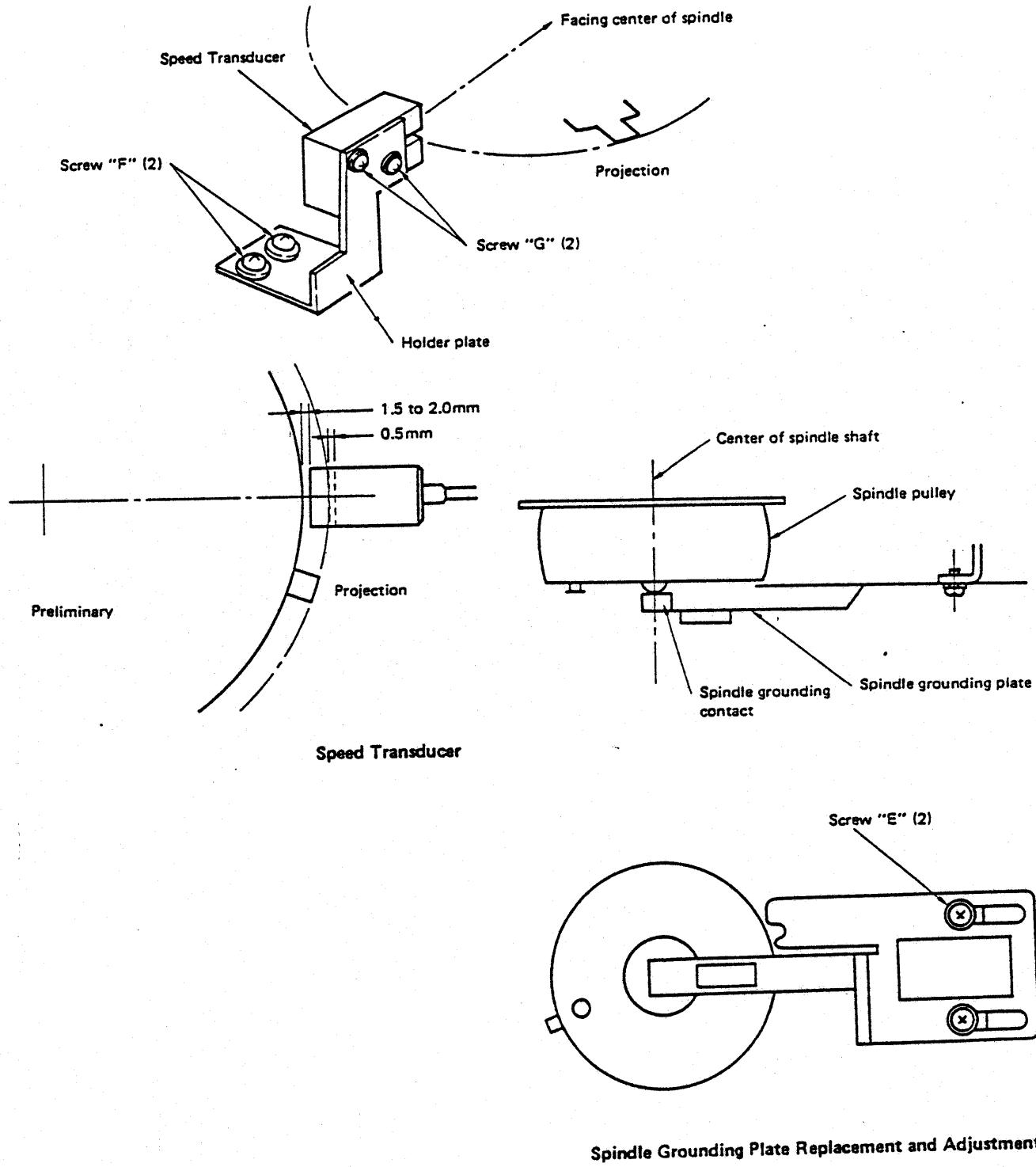


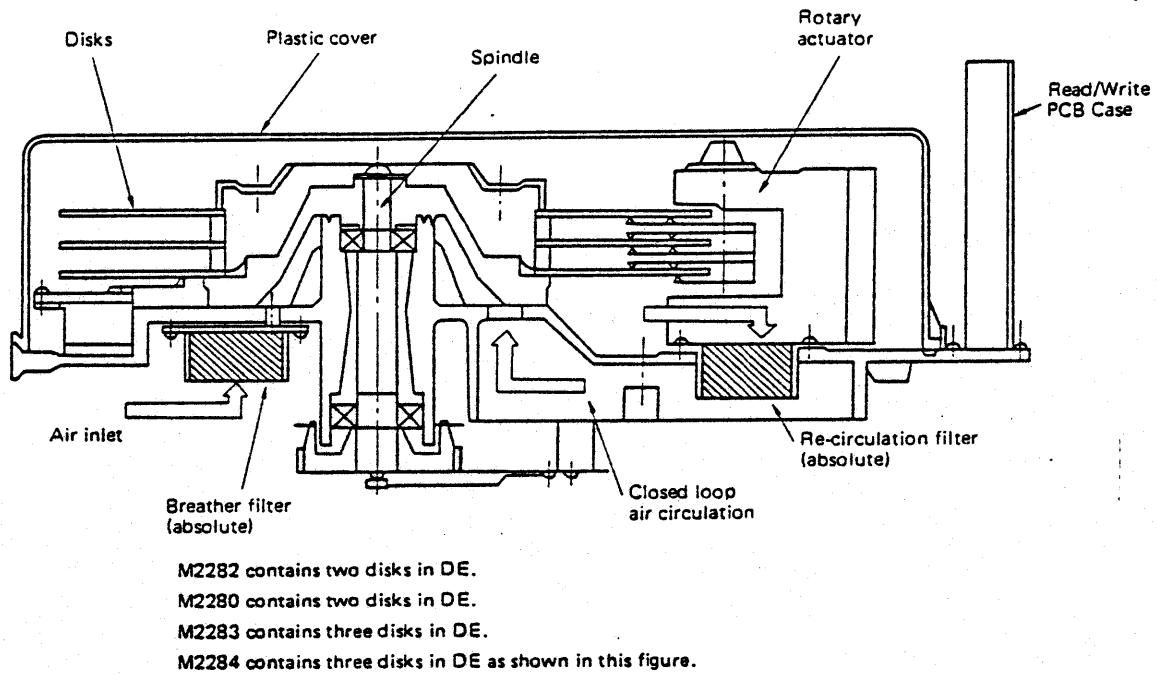




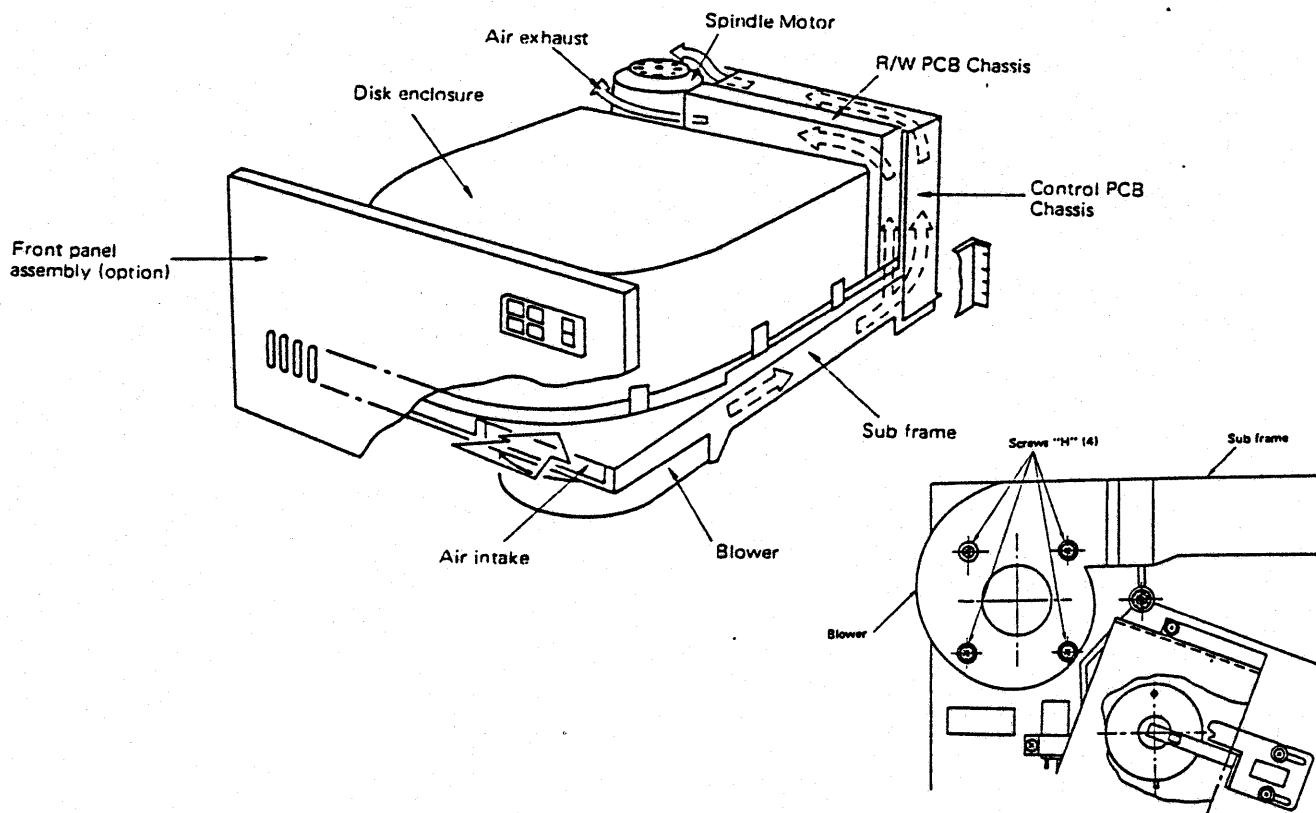
Remove these three nuts and replace DE.

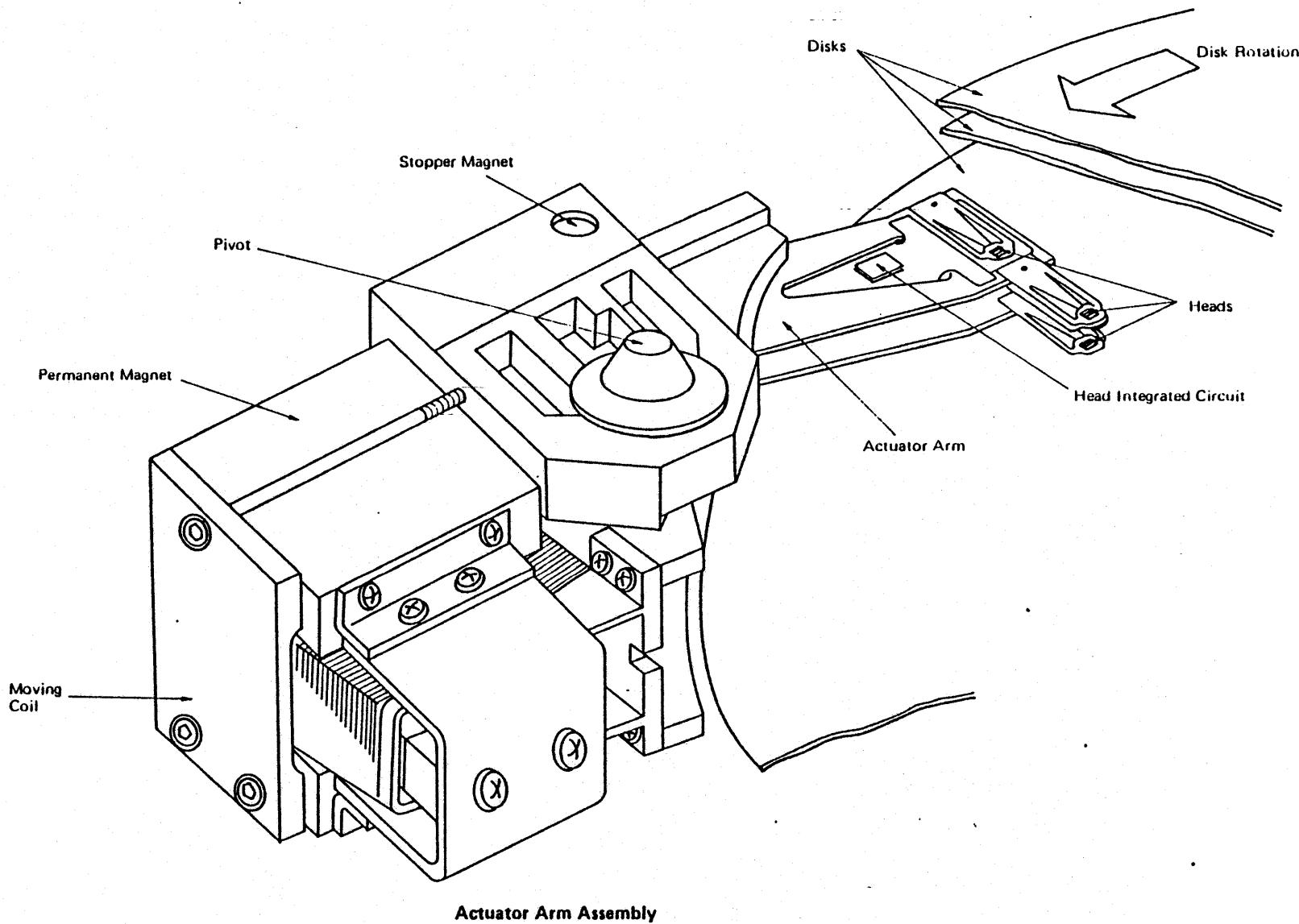


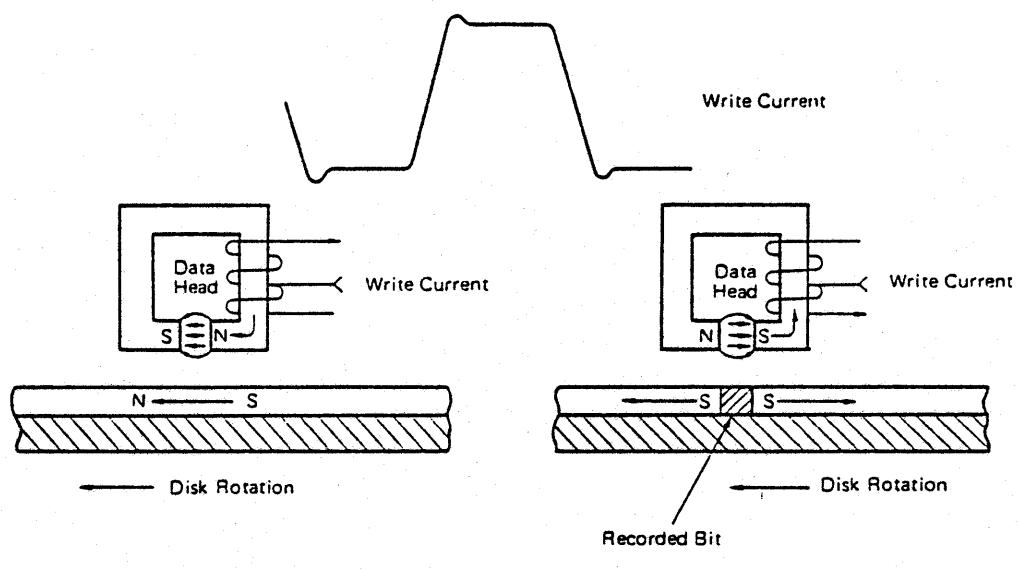




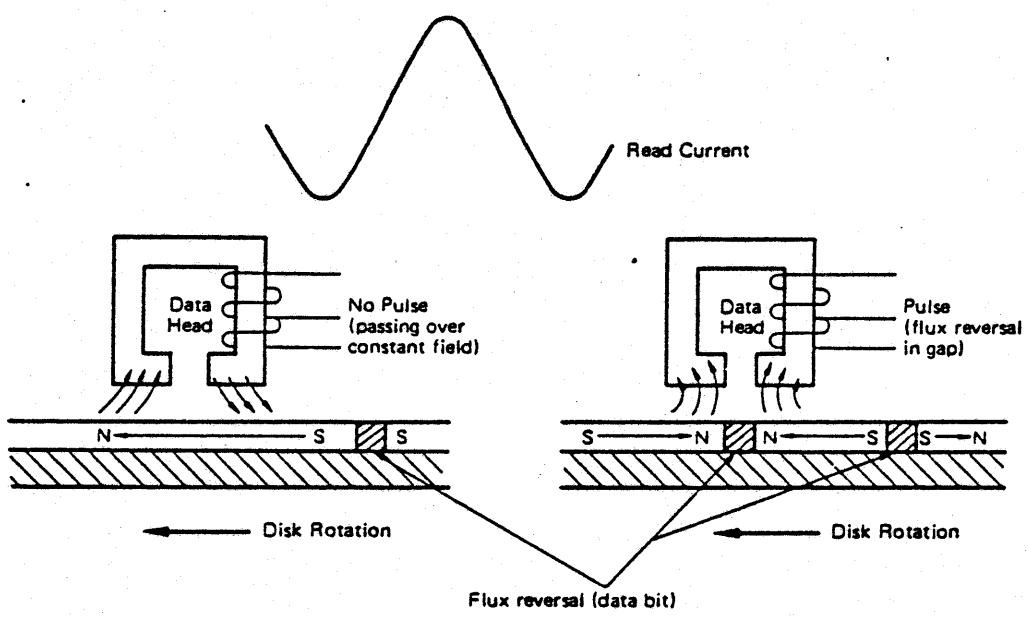
Air Circulation inside DE





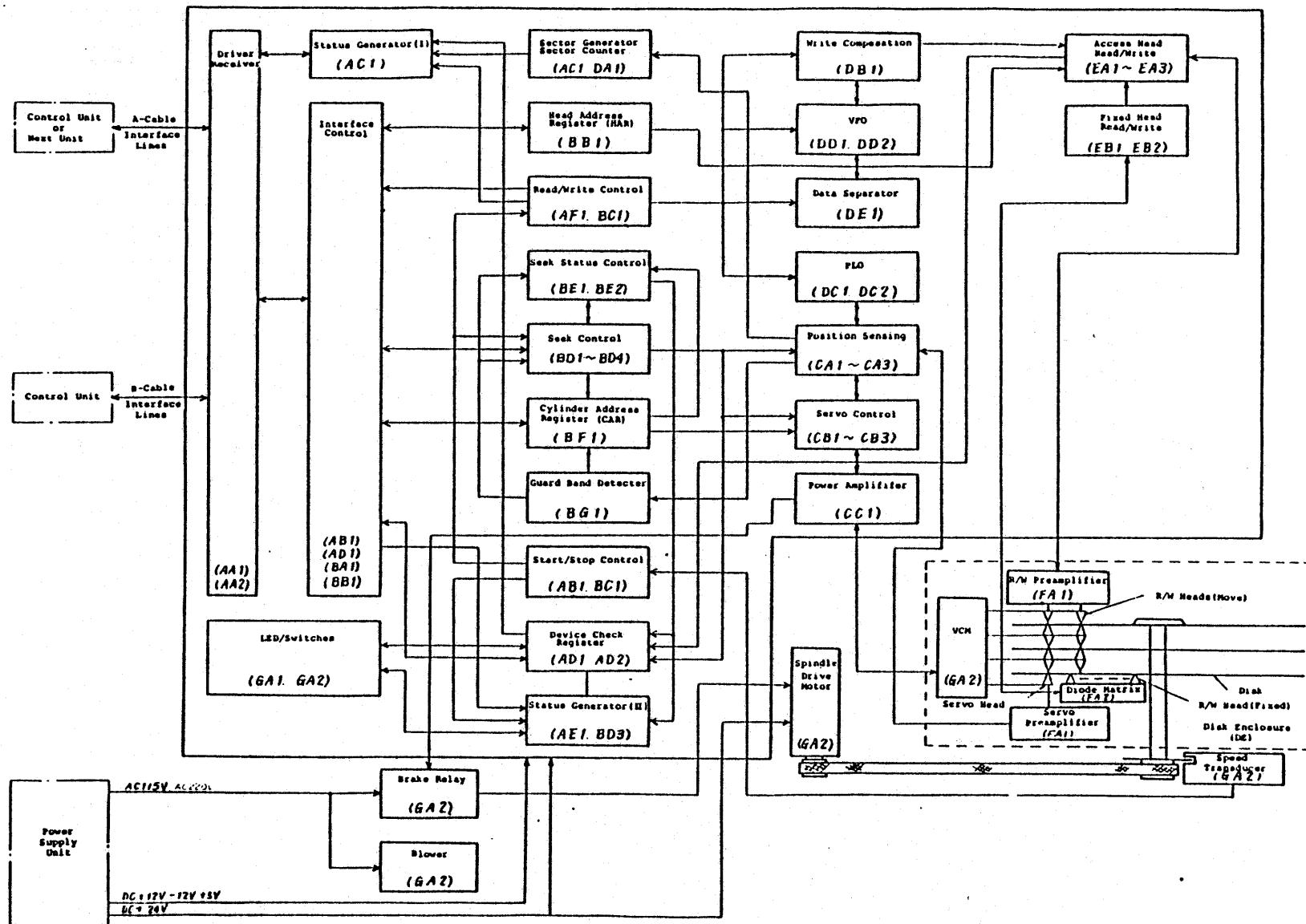


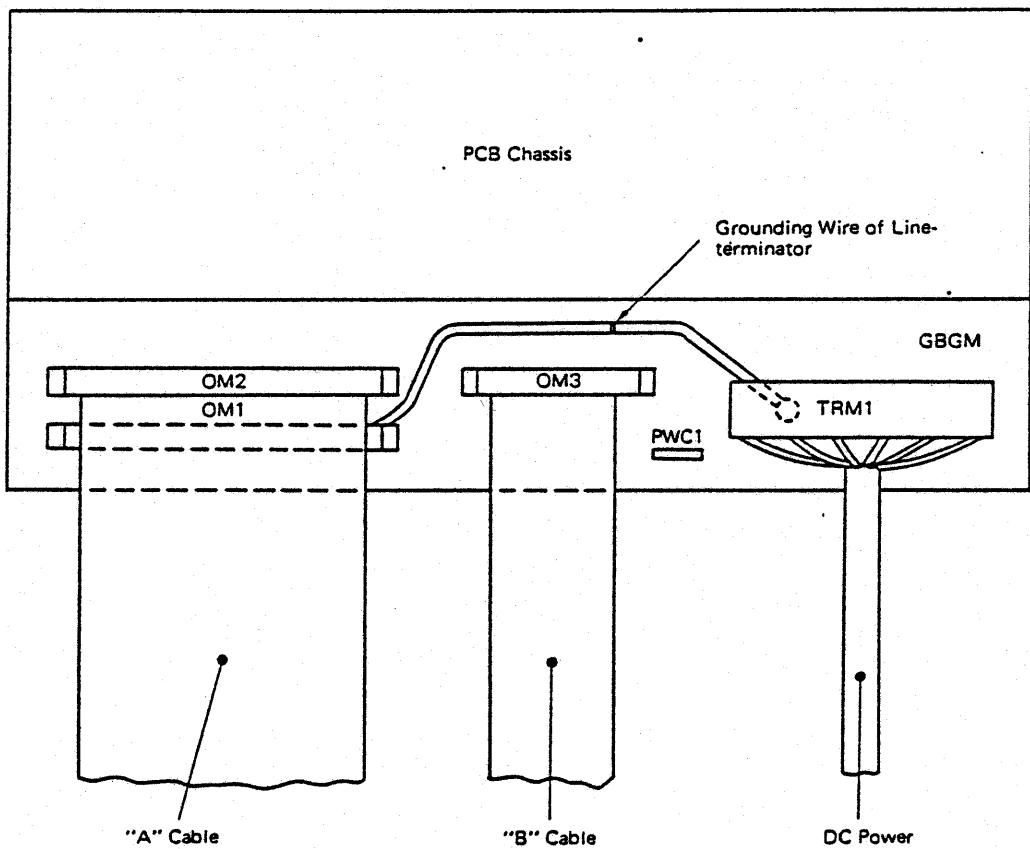
Data Write



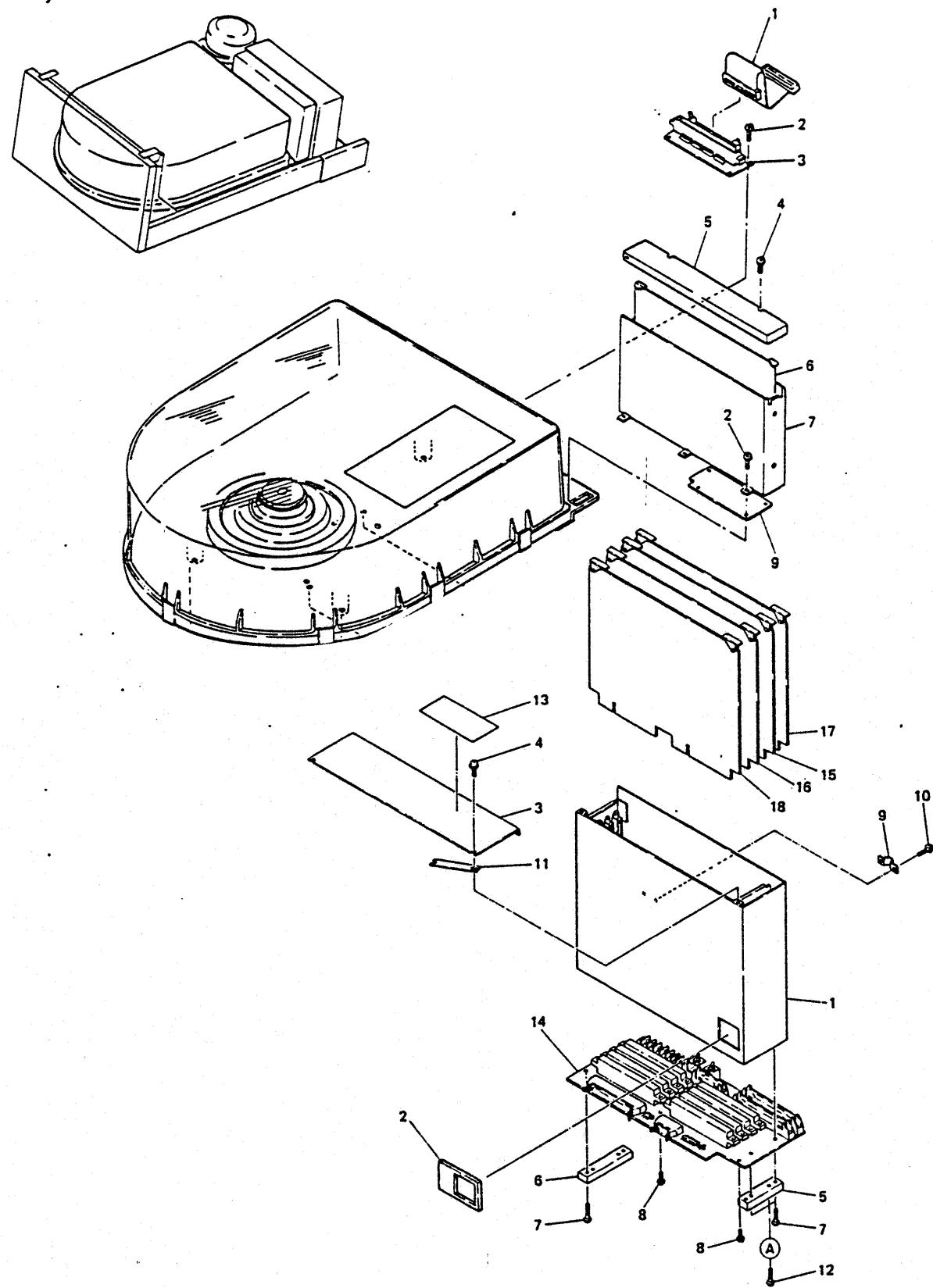
Data Read

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Interface Cabling (Single Port)



6.6 PCB ASSEMBLY REPLACEMENT/ADJUSTMENT

6.6.1 PCB Assembly Arrangement

The following Printed Circuit Board assemblies are mounted in the PCB chassis. To remove these PCB's, remove the top cover of the PCB chassis by loosening the screws, and then pull the levers on the PCB assemblies.

The PCB arrangement of the FDU M228X is shown in Table 6-6-1.

Table 6-6-1 PCB Arrangement

| | M2282 M2280 M2283 M2284 | M2286 M2289 M2287 M2288 | Function |
|-------------|----------------------------------|----------------------------------|--------------------|
| PCB Chassis | RQWM | RQVM | Read/Write Circuit |
| PCB Chassis | SDIM | | Servo Circuit |
| | CMIM | | Seek Control |
| | VOFM | | PLO/VFO |
| | CQFM/CMKM | | Interface Control |
| | | | |

6.6 PCB ASSEMBLY REPLACEMENT/ADJUSTMENT

6.6.1 PCB Assembly Arrangement

The following Printed Circuit Board assemblies are mounted in the PCB chassis. To remove these PCB's, remove the top cover of the PCB chassis by loosening the screws, and then pull the levers on the PCB assemblies.

The PCB arrangement of the FDU M2294 is shown in Table 6.6.1.

Table 6.6.1 PCB Arrangement

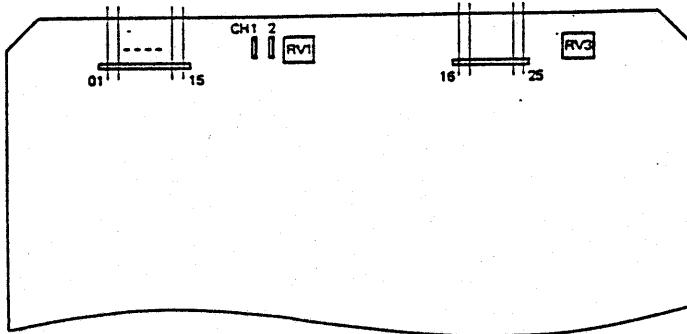
| | M2294 | Function |
|-------------|-------|--------------------|
| PCB Chassis | ROTM | Read/Write Circuit |
| PCB Chassis | SDQM | Servo Circuit |
| | CWWM | Seek Control |
| | VOHM | PLO/VFO |
| | CQFM | Interface Control |
| | | |

6.6.2 Test Point Arrangement on the PCB

Each PCB assembly is provided with test points and potentiometers to check and/or adjust the circuit functions.

(1) RQVM/RQWM PCB

The test points and potentiometers are located on the RQVM/RQWM PCB assembly as shown in Fig. 6-6-1.



Note: No Adjustments are required when the PCB is replaced.

Figure 6-6-1 RQVM/RQWM PCB Test Points

Table 6-6-2 RQVM/RQWM PCB Test Points

| TP No. | Abbreviation | Signal Name | Schematic Page Code | |
|--------|--------------|-------------------------|---------------------|-----|
| 1 | *DIGLT | Diag Latch | EA1 | |
| 2 | Not Used | - | - | |
| 3 | PLSH 1 | Pulse Shaper 1 | EA2 | |
| 4 | PLSH 2 | Pulse Shaper 2 | EA2 | |
| 5 | SMPCK | Sample Clock | EA2 | |
| 6 | RAWDT 1 | Raw Data 1 | EA2 | |
| 7 | RAWDT 2 | Raw Data 2 | EA2 | |
| 8 | INTLT 1 | Integrator Latch 1 | EA2 | |
| 9 | INTLT 2 | Integrator Latch 2 | EA2 | |
| 10 | DFRDT 1 | Differentiator Output 1 | EA2 | |
| 11 | DFRDT 2 | Differentiator Output 2 | EA2 | |
| 12 | AGCOT 1 | AGC Output 1 | EA2 | |
| 13 | AGCOT 2 | AGC Output 2 | EA2 | |
| 14 | PROT 1 | Pre-Amp. Output 1 | EA2 | |
| 15 | (CH2) | PROT 2 | Pre-Amp. Output 2 | EA2 |
| 16 | MLTSL | Multi-Selected | EA3 | |
| 17 | PWRDY | Power Ready | EA3 | |
| 18 | AHWC A | AHD Write Current A | EA1 | |
| 19 | AHWC B | AHD Write Current B | EA1 | |
| 20 | *UNSF | Unsafe | EA1 | |
| 21 | Not Used | - | - | |
| 22 | FHPRT | FHD Protect | EB1 | |
| 23 | FHWC A | FHD Write Current A | EB1 | |
| 24 | FHWC B | FHD Write Current B | EB1 | |
| 25 | *SQCHG | Squelch Gate | EA2 | |

The RQVM/RQWM PCB assembly is provided with two/one potentiometers, however, no adjustments are required when the PCB is replaced. Each potentiometer function is shown in Table 6-6-3.

Table 6-6-3 RQVM/RQWM Potentiometer Function

| Pot No. | Function/Adjustment | Reference TP |
|---------|---------------------------|----------------|
| RV1 | Access Head Write Current | TP18/TP19 |
| *RV3 | Fixed Head Write Current | TP22/TP23/TP24 |

* This potentiometer is for only, RQVM, however, is not adjustable in field.

(2) SDIM PCB

The test points, potentiometers, and switches are located on SDIM PCB assembly as shown in Fig. 6-6-2.

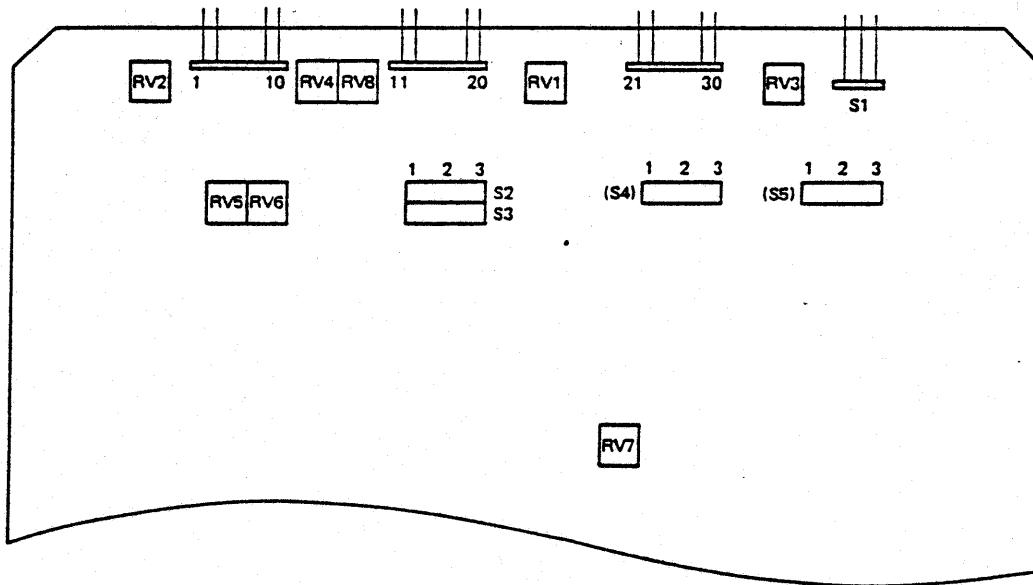


Figure 6-6-2 SDIM PCB Test Points

Each test point function is shown in Table 6-6-4.

Table 6-6-4 SDIM PCB Test Points

| TP No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|----------------------|---------------------|
| 1 | SERVO | Servo Signal | CA1 |
| 2 | *ODG | Odd Gate | CA3 |
| 3 | *EVG | Even Gate | CA3 |
| 4 | AGC | AGC Control | CA1 |
| 5 | OOP | Odd Peak | CA3 |
| 6 | EVP | Even Peak | CA3 |
| 7 | +POS | Position Signal | CA3 |
| 8 | VCX1 | Control Voltage 1 | CA2 |
| 9 | Not Used | - | - |
| 10 | SVPWD | Servo Pulse Window | CA1 |
| 11 | SVSLT | Servo Slice Out | CA1 |
| 12 | SVPL | Servo Pulse | CA1 |
| 13 | PLOSS | PLO Single Shot | CA1 |
| 14 | PLOLT | PLO Latch | CA2 |
| 15 | 1/8 F | 1/8 Frequency | CA2 |
| 16 | EIX | Even Index | CA2 |
| 17 | TRFL | Track Follow | CB1 |
| 18 | TXPL | Track Crossing Pulse | CB1 |
| 19 | DRLM | Drive Linear Motor | CB1 |
| 20 | FWDD | Forward Drive | CB1 |
| 21 | CMAG | Current Magnitude | CB2 |

Table 6-6-4 SDIM PCB Test Points (Continued)

| TP No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|-----------------|---------------------|
| 22 | PER | Position Error | CB2 |
| 23 | FUNC | Function | CB3 |
| 24 | VEL | Velocity | CB2 |
| 25 | SMTH | Smoother | CB2 |
| 26 | DA | DA Convertor | CB3 |
| 27 | TVEL | Tach Velocity | CB2 |
| 28 | -CSNS | Current Sense | CC1 |
| 29 | VER | Velocity Error | CB3 |
| 30 | PADR | Power Amp Drive | CB3 |

The SDIM PCB is provided with eight potentiometers and five selecting switches, however, only the three potentiometers (RV1, RV2 and RV4) must be adjusted when the PCB is replaced.

The potentiometer and switch functions are shown in Table 6-6-5 and 6-6-6.

Table 6-6-5 SDIM Potentiometer Function

| Pot No. | Function/Adjustment | Reference TP/S |
|---------|-----------------------|----------------|
| RV1 | Positioning Time* | TP19 |
| RV2 | Position Signal Gain* | TP7 |
| RV3 | Function Offset | TP23 |
| RV4 | Over-shoot* | TP24 |
| RV5 | PLO Free Frequency | TP15, S2, S3 |
| RV6 | PLO Phase | TP13 |
| RV7 | DA Output | TP26 |
| RV8 | Servo Pulse Window | TP10 |

* The potentiometer RV1, RV2 and RV4 require adjustment when the SDIM PCB is replaced.

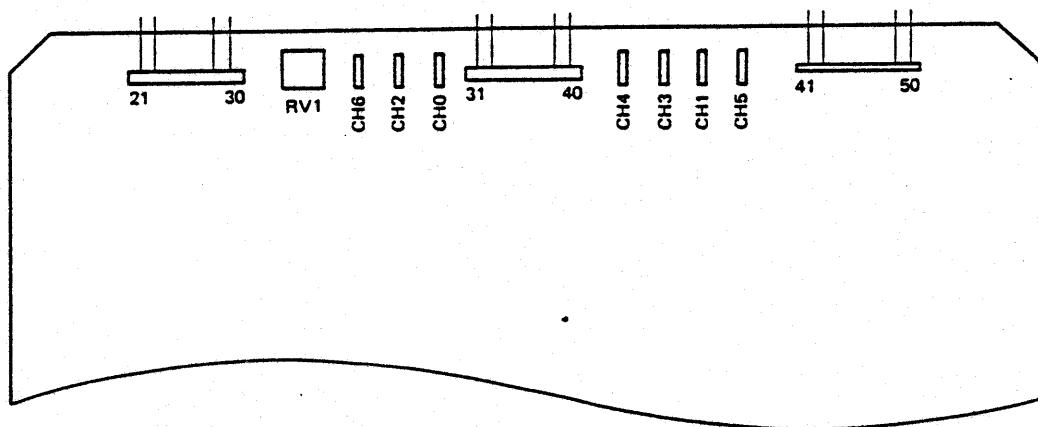
Table 6-6-6 SDIM Switch Function

| Switch No. | Function | Reference TP |
|------------|----------------------|--------------|
| S1 | Power Amp. Drive Cut | None |
| S2, S3 | VCO Select | TP15 |

Note: S4 and S5 functions are not used.

(3) CMIM PCB

The test points, check terminals and a potentiometer are located on CMIM PCB assembly as shown in Fig. 6-6-3.



Note: No adjustments are required when the CMIM PCB assembly is replaced.

Figure 6-6-3 CMIM PCB Test Points

Each test point function is shown in Table 6-6-7 and 6-6-8.

Table 6-6-7 CMIM Check Terminals

| CH No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|---------------------|---------------------|
| 0 | GND | Ground | - |
| 1 | VFOFS | VFO Fast Sync | BC1 |
| 2 | STL 1 | Settling 1 | BE1 |
| 3 | STL 2 | Settling 2 | BE1 |
| 4 | STL 3 | Settling 3 | BE1 |
| 5 | OVCYTM | Over Cylinder Timer | BE2 |
| 6 | GBTM | Guard Band Timer | BE2 |

Table 6-6-8 CMIM Test Points

| TP No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|--------------------|---------------------|
| 21 | GND | — | — |
| 22 | OG8 | Outer Guard Band | BG1 |
| 23 | IGB 1 | Inner Guard Band 1 | BG1 |
| 24 | IGB 2 | Inner Guard Band 2 | BG1 |
| 25 | — | — | — |
| 26 | SKEND | Seek End | BE2 |
| 27 | ONCYL | On Cylinder | BE2 |
| 28 | URDY | Unit Ready | BE2 |
| 29 | SKERR | Seek Error | BE2 |
| 30 | SKC | Seek Complete | BE1 |
| 31 | GND | — | — |
| 32 | SUBEN | Sub Enable | BD4 |
| 33 | EVEN | Even | BD4 |
| 34 | PSDR | Position Drive | BD4 |
| 35 | LNMD | Linear Mode | BD4 |
| 36 | — | — | — |

Table 6-6-8 CMIM Test Points (Continued)

| TP No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|---------------------|---------------------|
| 37 | DRLM | Drive Linear Motor | BD4 |
| 38 | LSPD | Low Speed | BD4 |
| 39 | FWDD | Forward Drive | BD3 |
| 40 | *OVTXPL | Over Track Crossing | BD2 |
| 41 | GND | — | — |
| 42 | TMOTP | Time Out Pulse | BD2 |
| 43 | RTRM | Retract Mode | BD1 |
| 44 | SEKM | Seek Mode | BD1 |
| 45 | GTZM | Go To Zero Mode | BD1 |
| 46 | *PLO 1B | PLO 1 Byte Clock | BD1 |
| 47 | — | — | — |
| 48 | *OFACT | Offset Active | BB1 |
| 49 | AHDSL | Access Head Select | BB1 |
| 50 | USLD | Unit Selected | BB1 |

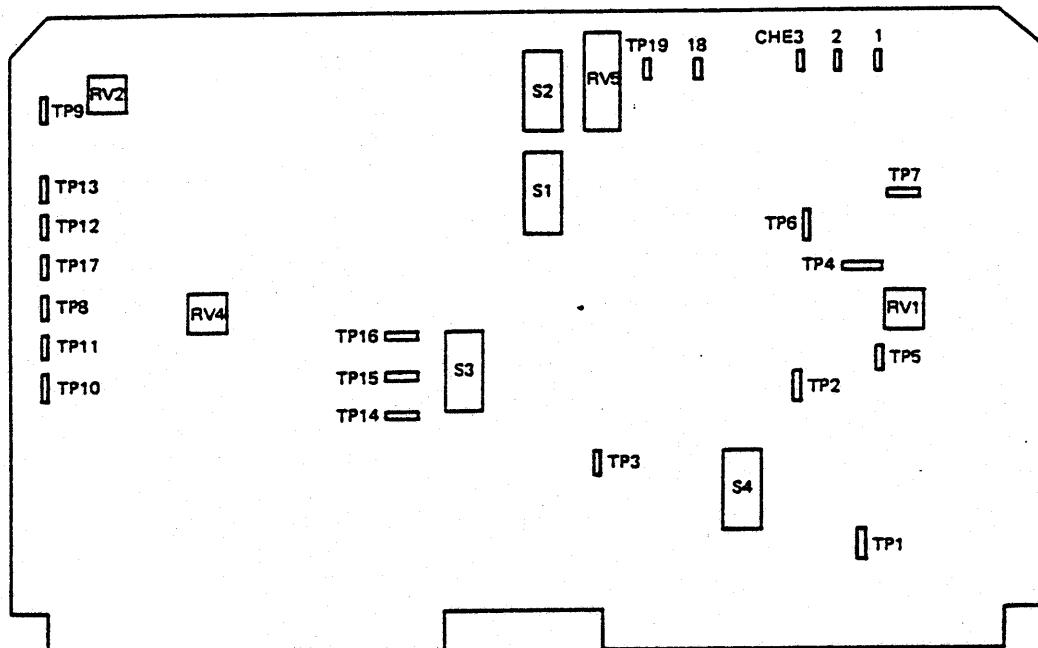
The CMIM PCB is provided with a potentiometer (RV 1), however, no adjustment is required when the PCB is replaced. The potentiometer function is shown in Table 6-6-9.

Table 6-6-9 CMIM Potentiometer Function

| Pot No. | Function/Adjustment | Reference CH |
|---------|---------------------|--------------|
| RV 1 | Settling Time 1 | CH2 |

(4) VOFM PCB

The check terminals, switches, and potentiometers are located on the VOFM PCB assembly as shown in Fig. 6-6-4.



Note: S1 and S2 must be selected when the PCB is replaced.

Figure 6-6-4 VOFM PCB Test Points

Each test point function is shown in Table 6-6-10.

Table 6-6-10 VOFM Check Terminals

| TP No. | Abbreviation | Signal Name | Schematic Page Code |
|--------|--------------|---------------------|---------------------|
| 1 | VFOSS | VFO Single Shot | DD1 |
| 2 | VFODIF | VFO Difference | DD1 |
| 3 | TRDT | Trigger Data | DD1 |
| 4 | VC VFO | Control Voltage VFO | DD2 |
| 5 | VCOT | VCO Output | DD2 |
| 6 | FLTCNT | Filter Control | DD2 |
| 7 | FLTSQH | Filter Squelch | DD2 |
| 8 | PLOSS1 | PLO Single Shot 1 | DC1 |
| 9 | *1/16 FP | 1/16 F Pulse | DC1 |
| 10 | DLTP | Delta Positive | DC2 |
| 11 | DLTN | Delta Negative | DC2 |
| 12 | FLTOT | Filtered Out | DC2 |
| 13 | VC PLO | Control Voltage PLO | DC2 |
| 14 | 2F EY | 2F Early | DB1 |
| 15 | 2F OT | 2F Ontime | DB1 |
| 16 | 2F LT | 2F Late | DB1 |
| 17 | PLOSS 2 | PLO Single Shot 2 | DC1 |
| 18 | SCT | Sector | DA1 |
| 19 | INX | Index | DA1 |

Table 6-6-10 VOFM Check Terminals (Continued)

| No. | Abbreviation | Signal Name | Schematic Page Code |
|-------|--------------|---------------------|---------------------|
| CHE 1 | DTSMP | Data Sample | DE1 |
| CHE 2 | DTWD | Data Window | DE1 |
| CHE 3 | VC VFO | Control Voltage VFO | DD2 |

The VOFM PCB assembly is provided with potentiometers and switches, however, no adjustments except SW1 and SW2 are required when the PCB is replaced. These functions are shown in Table 6-6-11.

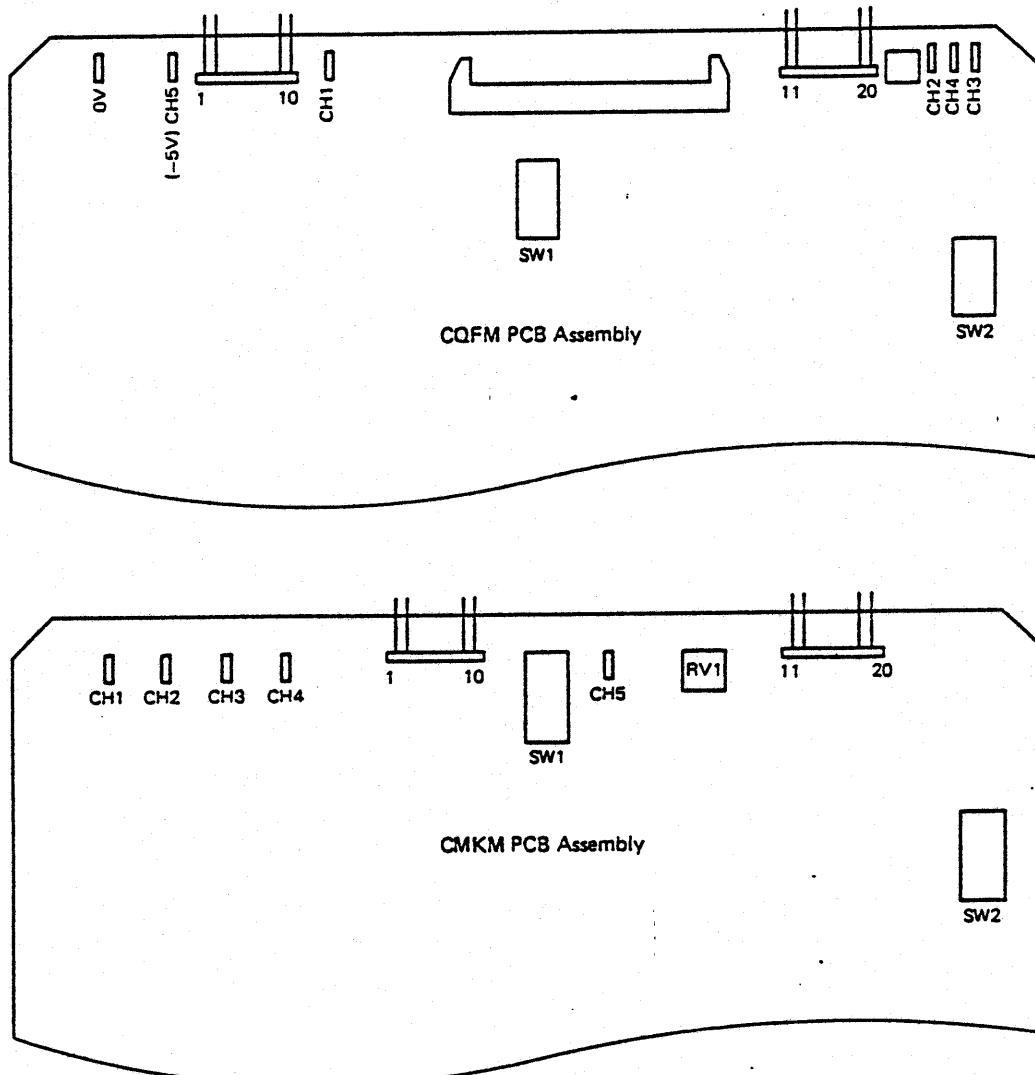
Table 6-6-11 VOFM Potentiometer/Switch Function

| No. | Function/Adjustment | Reference TP |
|-----|-------------------------|----------------|
| RV1 | VFO Frequency | TP4 |
| RV2 | PLO Frequency | TP13 |
| RV4 | PLO SS2 | TP17 |
| RV5 | Time Margin Measurement | CHE1/CHE2 |
| S1 | Sector Counting 1 | TP18/TP19 |
| S2 | Sector Counting 2 | TP18/TP19 |
| S3 | VFO Single Shot | TP1 |
| S4 | Write Compensation | TP14/TP15/TP16 |

(5) CQFM/CMKM PCB

CQFM PCB assembly is for an interface control logic to support dual port or single port function, and CMKM PCB assembly is only to support single port function.

The test points and potentiometers are located on the CQFM/CMKM PCB assembly are shown in Figure 6-6-5. Each test point function is shown in Table 6-6-12.



Note: No potentiometer adjustment is required when the PCB is replaced, however, the switch selecting should be performed to meet the customer's configuration.

Figure 6-6-5 CQFM/CMKM PCB Test Points

Table 6-6-12 CQFM/CMKM Test Points

| No. | Abbreviation | Signal Name | Schematic Page Code |
|------|--------------------|---------------------------------------|---------------------|
| TP1 | GND | - | - |
| TP2 | LPLO | Lock to PLO | AF1 |
| TP3 | LDATA | Lock to Data | AF1 |
| TP4 | AMFD | AM Found | AF1 |
| TP5 | RG | Read Gate | AF1 |
| TP6 | PWRCNF | Power Conflict | AD2 |
| TP7 | VCMHT | VCM Heat | AD2 |
| TP8 | - | - | - |
| TP9 | INTMOT | Initial Time Out | AD2 |
| TP10 | DVCK | Device Check | AD2 |
| TP11 | GND | - | - |
| TP12 | WENB | Write Enable | AD2 |
| TP13 | AHDSL | Access Head Select | AD1 |
| TP14 | INX | Index | AC1 |
| TP15 | SCT | Sector | AC1 |
| TP16 | START | Start | AB1 |
| TP17 | GBENB | Guard Band Enable | AB1 |
| TP18 | SPOK | Speed OK | AB1 |
| TP19 | - | - | - |
| TP20 | CHAENB/ CHENB 2 | Channel A Enable/ Channel Enable Z | AB1 |
| CH1 | SPSG | Speed Signal | AB1 |
| CH2 | SPTM | Speed Timer | AB1 |
| CH3 | INHECH | Inhibit Echo | AD2 |
| CH4 | DLWG | Delayed Write Gate | AD2 |
| CH5 | -5V | -5V | AA3/AA2 |

The CQFM/CMKM PCB is provided with a potentiometer (RV1) and switches. These functions are shown in Table 6-6-13.

Table 6-6-13 CQFM/CMKM Potentiometer/Switch Function

| No. | Function | Reference CH |
|-----|---------------------------------|--------------|
| RV1 | Speed Timer | CH2 |
| SW1 | Disk Address | |
| SW2 | Device Type/Sector Mode/TAG 4/5 | |

2.3.2 PCB Chassis

The unit contains a PCB chassis with Maintenance Aid Display (LED's), a Device Check Clear switch and File-protect switch.

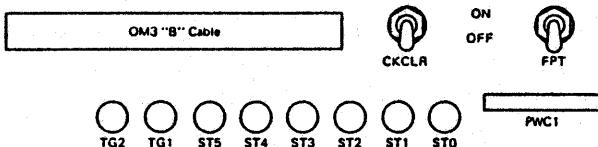


Figure 2-3-2 Maintenance Aid Display and Switches

- (1) CKCLR (Check Clear) switch: (momentary)
This switch resets a Device Check status.
- (2) FPT (File Protect) switch
This switch inhibits the write operation. When an optional operator panel is installed on the unit, this switch should be in the OFF position.
- (3) TG1, 2 (Status Tag 1, 2) LED's: Red
Two LED's indicate four basic disk conditions in binary coded decimal, which are Not-Ready status, Device-Check status, Unit status and Seek-Check status.
- (4) ST0 to ST5 (Status 0 to 5) LED's: Red
Six status conditions are displayed for each Status Tag 1 and 2 combination as shown in Table 2-3-1.

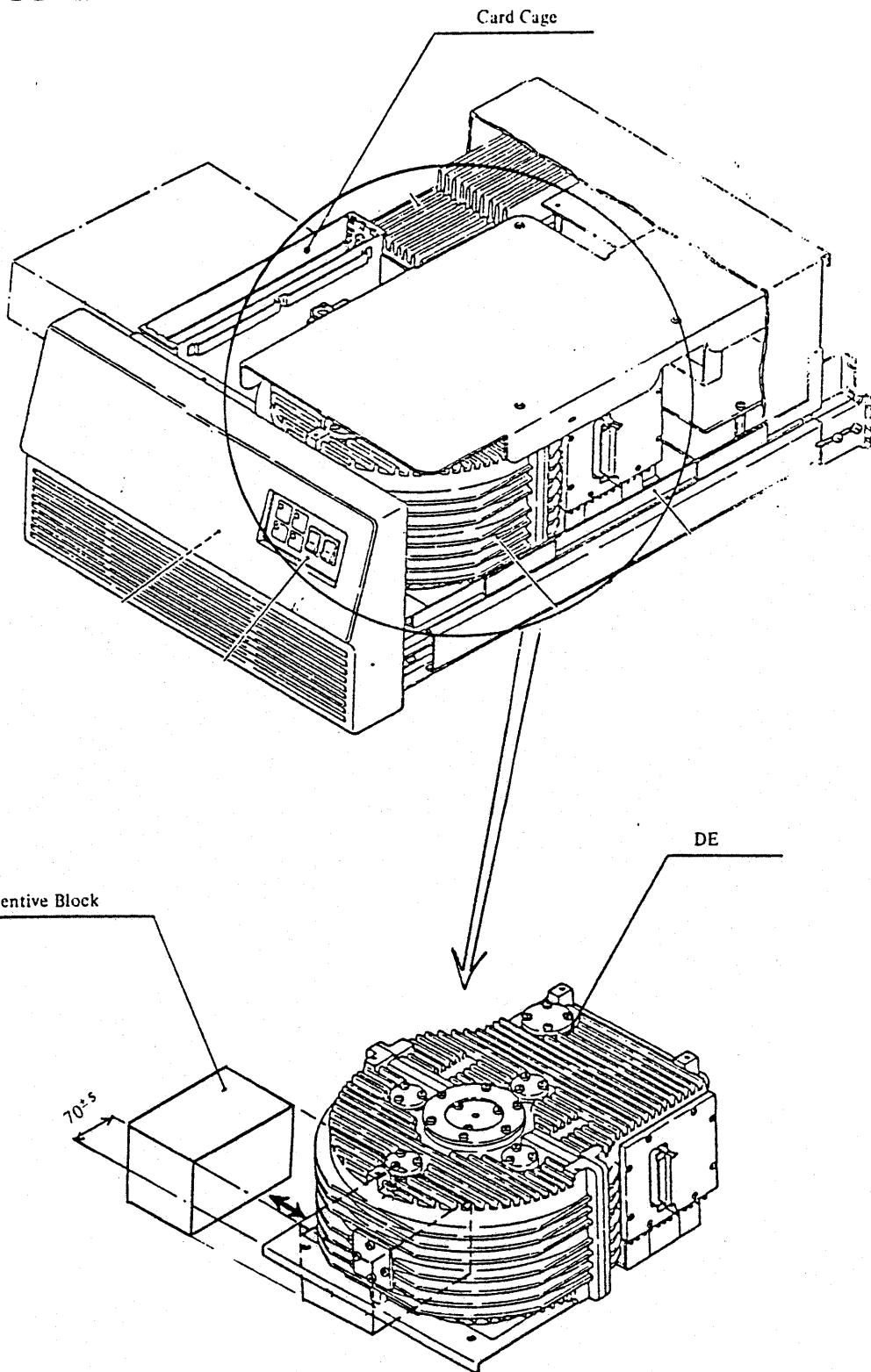
Table 2-3-1 Maintenance Aid Display Conditions

| TQ | Tag Decode 0 | Tag Decode 1 | Tag Decode 2 | Tag Decode 3 |
|----|----------------------|--------------------|----------------------|---------------------------|
| ST | Not Ready | Device Check | Unit Status | Seek Check |
| 0 | Power Ready | Control Check 1 | Unit Selected | RTZ or Seek Timeout |
| 1 | Channel Ready | Control Check 2 | Fixed Sector Mode | Seek Guard Band |
| 2 | Speed OK | Read/Write Check 1 | On Cylinder | Linear Mode Guard Band |
| 3 | Start 1 (GBENB) | Read/Write Check 2 | File Protected | RTZ Outer Guard Band |
| 4 | Start 2 | Read/Write Check 3 | Busy | Over Track Crossing Pulse |
| 5 | Initial Seek Timeout | Read/Write Check 4 | Access Head Selected | Illegal Cylinder |

- (1) Not Ready Status
 - (a) Power Ready
Indicates that +5V, ±12V DC power is up to nominal voltage.
 - (b) Channel Ready
Indicates the Channel Ready signal is true.

- (c) Speed OK
Indicates that the rotational speed is up to 2,370 RPM (80%).
- (d) Start 1
Indicates that the Start Counter has output the GBENB (Guard Band Enable) signal.
- (e) Start 2
Indicates that the Start Counter has output the STARTP (Start Pulse) to initiate the Initial Seek sequence.
- (f) Initial Seek Time Out
Indicates that the Initial Seek sequence was not accomplished within 640 ms after the STARTP signal.
- (2) Device Check Status
 - (a) Control Check 1
Indicates that a read/write instruction was issued during Busy Status.
 - (b) Control Check 2
Indicates that Write Gate was issued during a fault condition.
 - (c) Read/Write Check 1
Indicates that Write Gate was issued during an off-track status or VCM-overheating has occurred.
 - (d) Read/Write Check 2
Indicates that write current to the data head did not flow during a write operation or that write current flows without a write gate command.
 - (e) Read/Write Check 3
Indicates that Write Gate was issued during file-protected status.
 - (f) Read/Write Check 4
Indicates that Read or Write Gate was issued during a multi-head-selected condition.
- (3) Unit Status
 - (a) Unit Selected
Indicates that the unit is selected.
 - (b) Fixed Sector Mode
Indicates the fixed sector mode is selected.
 - (c) On Cylinder
Indicates On Cylinder status.
 - (d) File Protected
Indicates Write-protected status.
 - (e) Busy
Indicates that the heads are in motion.
 - (f) Access Head Selected
Indicates that an access head is selected.
- (4) Seek Check Status
 - (a) RTZ Time Out
Indicates that an RTZ sequence was not terminated within 640 ms.
 - (b) Seek Guard Band
Indicates that a Guard Band was detected during a direct seek operation.
 - (c) Linear Mode Guard Band
Indicates that a guard band was detected during a linear mode operation.
 - (d) RTZ Outer Guard Band
Indicates that an outer guard band was detected during an RTZ operation.
 - (e) Over Track Crossing Pulse
Indicates that the head overshot the new cylinder address during settling time (2.5ms).
 - (f) Over Cylinder
Indicates that an illegal cylinder address (823< CYL<895) was specified by the control unit.

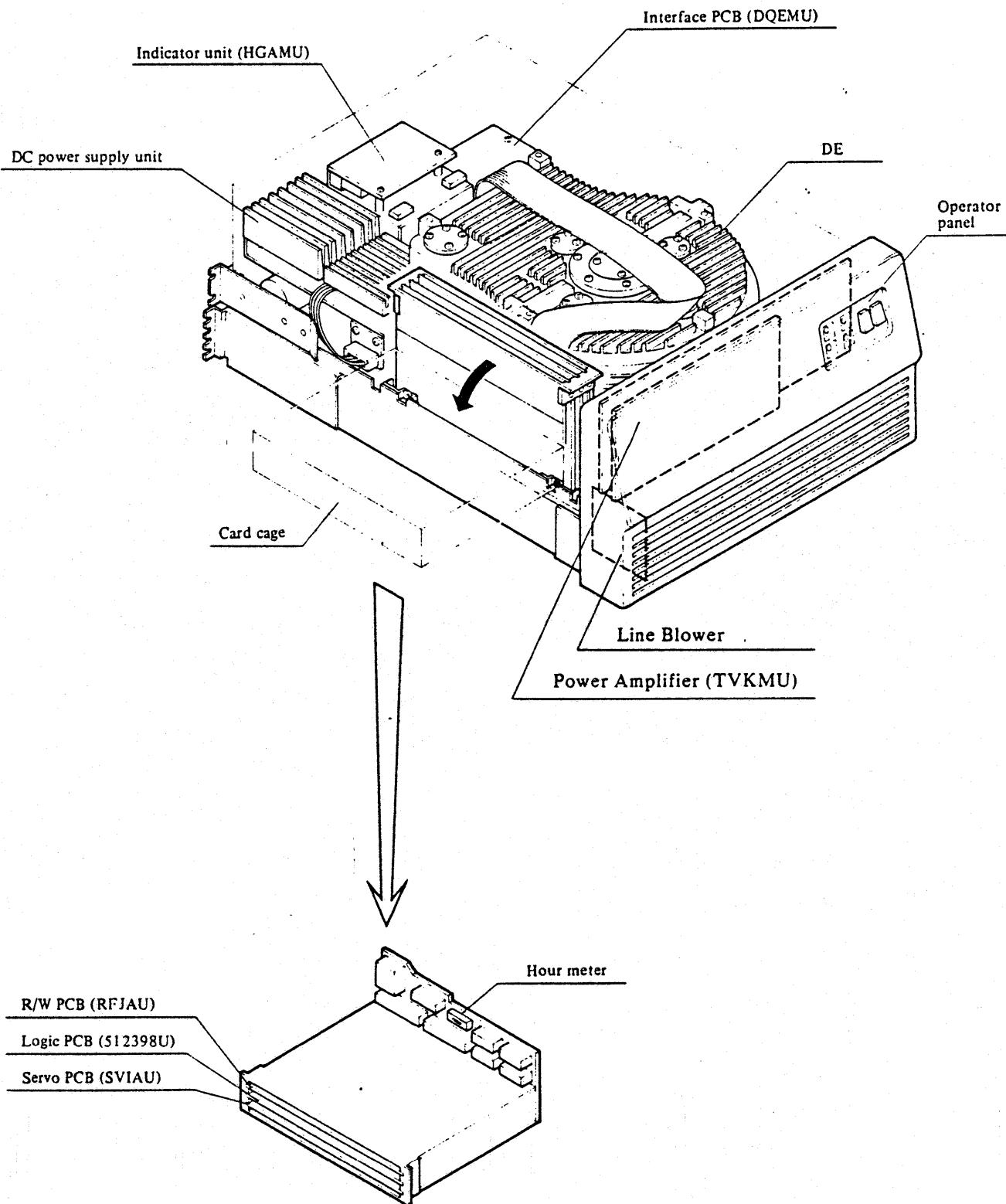
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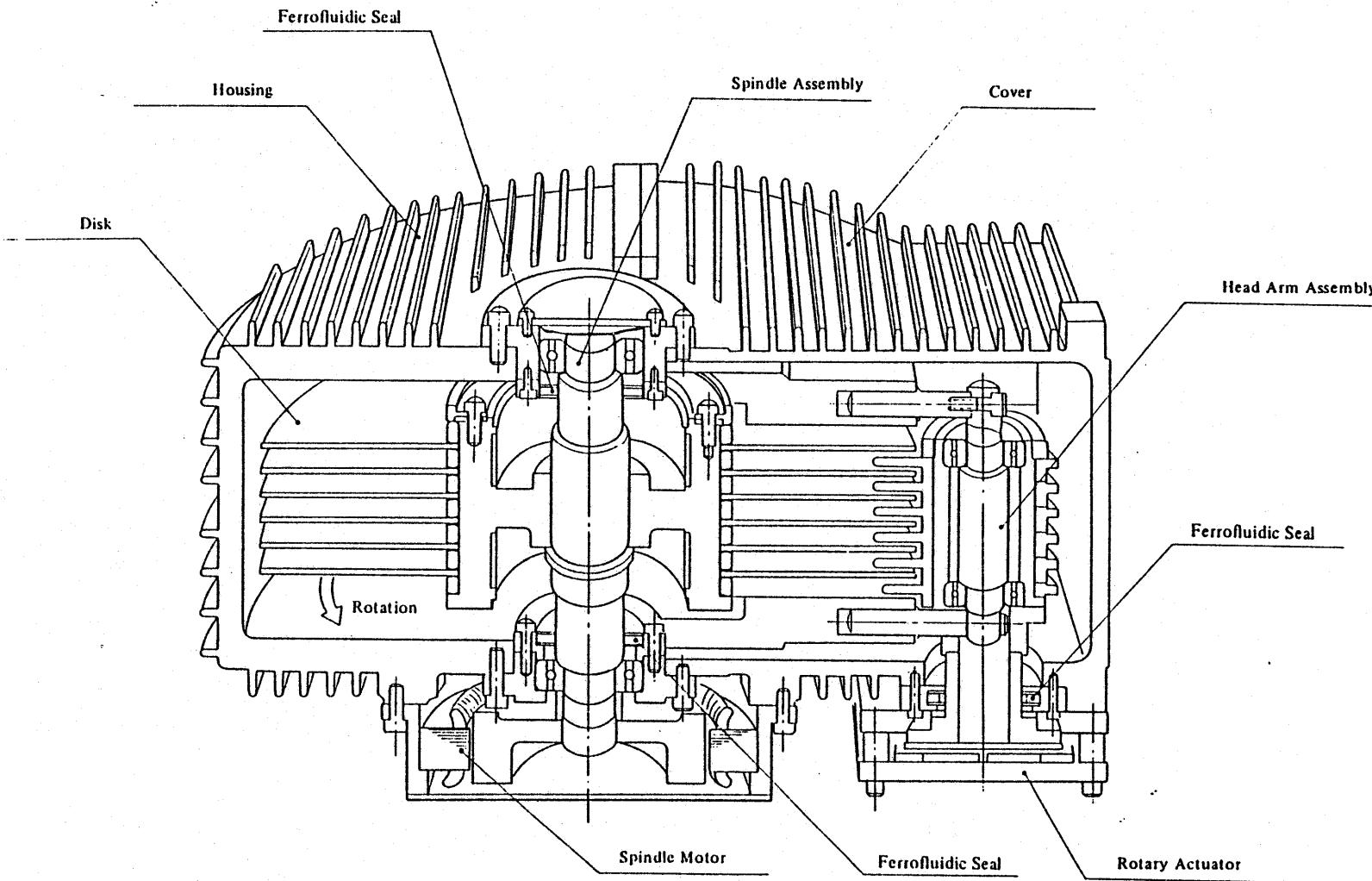


FUJITSU MODEL M2351

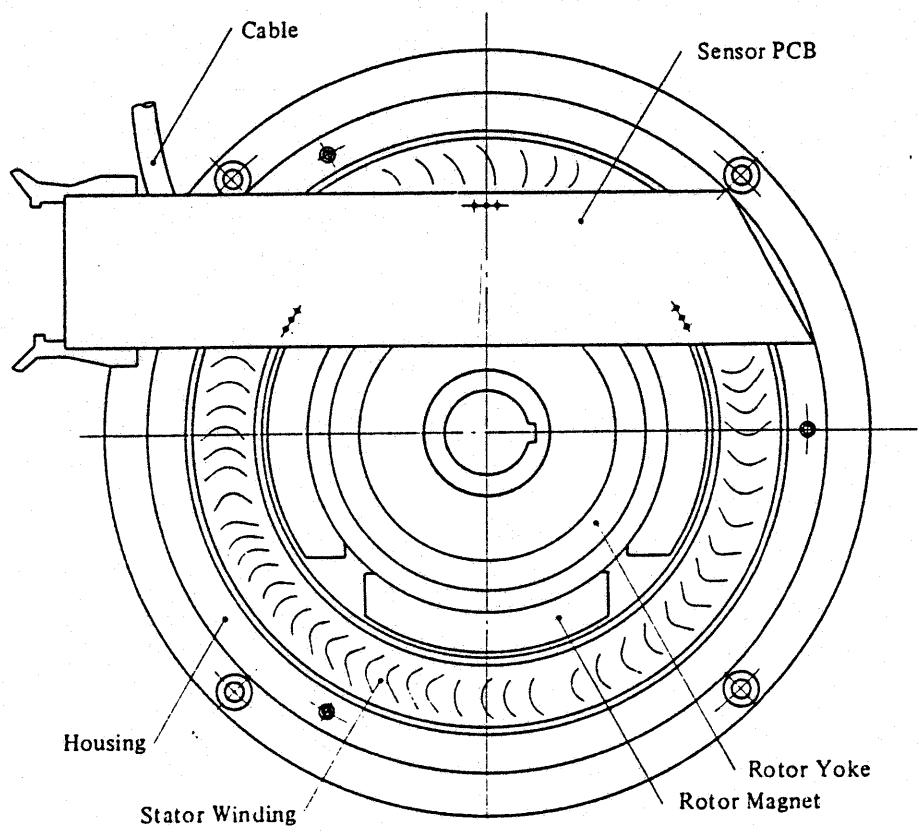
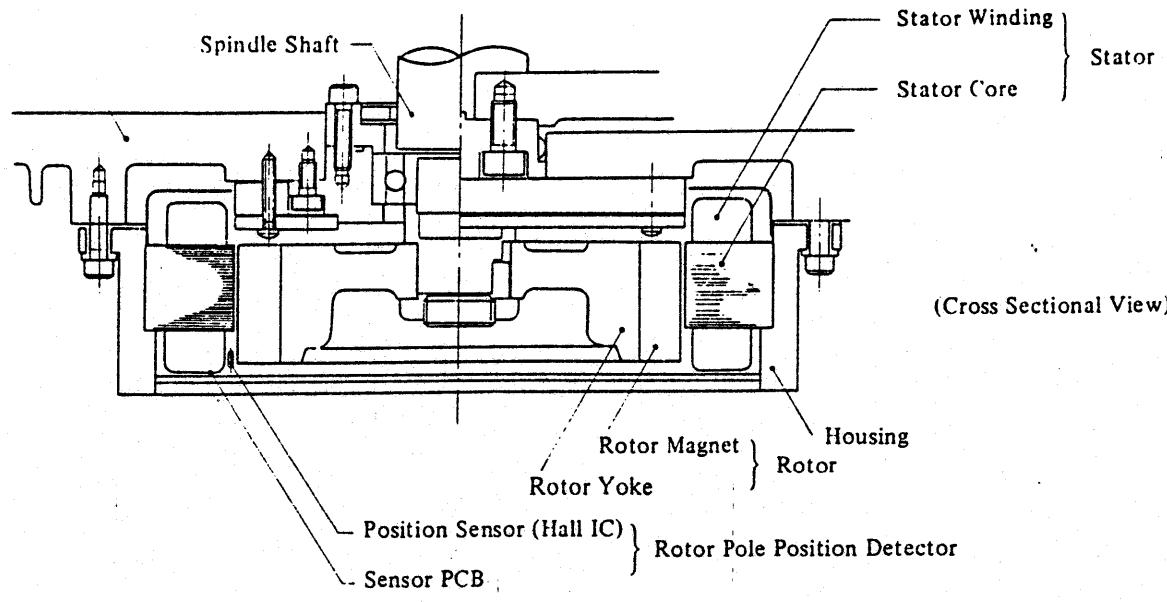
Specifications

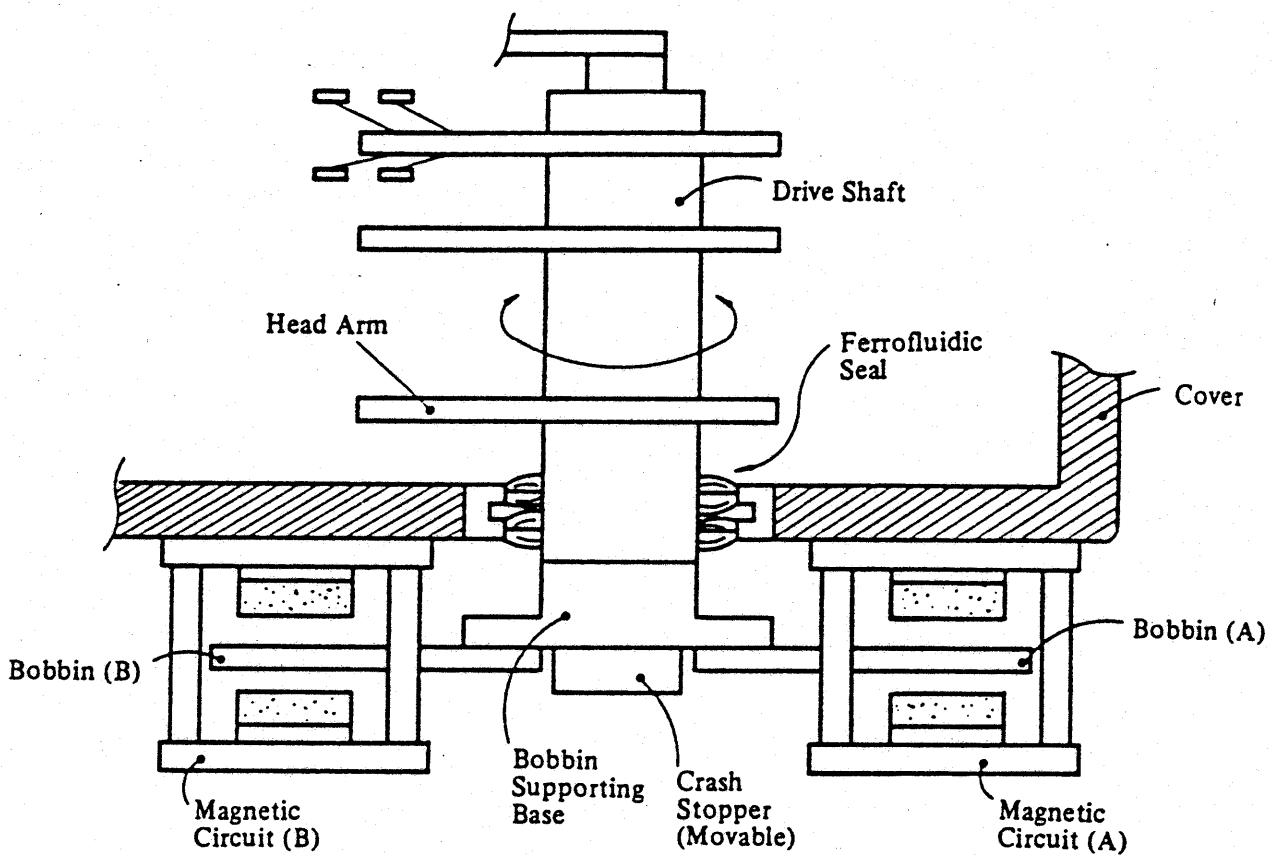
| | | |
|----------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacity | /Drive (MB) | 474.2 (Unformatted) |
| | /Track (KB) | 28.160 (Unformatted) |
| Configuration of Disks and Heads | | <p>The diagram illustrates the disk head configuration. It shows 6 vertical lines representing cylinders. Each cylinder has 19 horizontal lines representing tracks. The tracks are grouped into 20 heads per cylinder. The heads are labeled from top to bottom as 1 through 19. The first 18 heads are labeled 'Data heads' and the last two are labeled 'Servo head'. A small circle with a triangle inside is positioned above the cylinder lines.</p> |
| Fixed Head (M2351AF Only) | Tracks | 60 (3 Cylinders) |
| | Capacity (MB) | 1.69 (Unformatted) |
| Rotational Speed (RPM) | | 3,961 |
| Latency (ms) | | 7.5 |
| Disk | Diameter (Inch) | 10.5 |
| | Number | 6 |
| Heads | /Drive | 20 + 1 (Servo) |
| | /Surface | 2 |
| Cylinders | | 842 |
| Data Transfer Rate (MB/sec) | | 1.859 |
| Positioning Time (ms) | Maximum | 35 |
| | Average | 18 |
| | Minimum | 5 |
| Track Density (TPI) | | 880 |
| Bit Density (BPI) | | 12,800 |
| Data Coding | on interface | NRZ |
| | on disk surface | MFM |



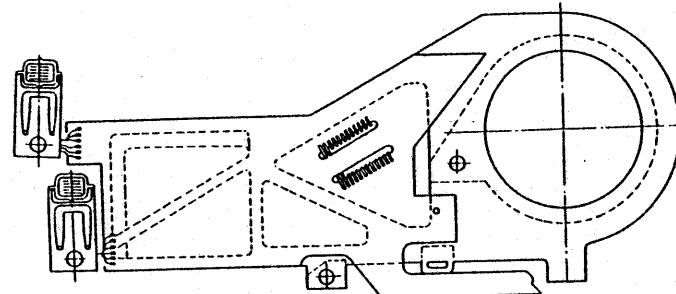


Housing

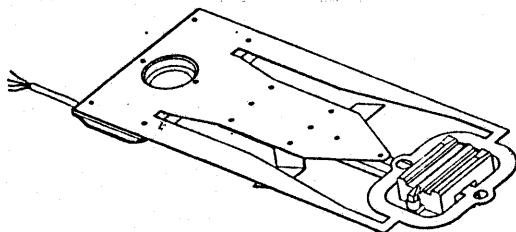




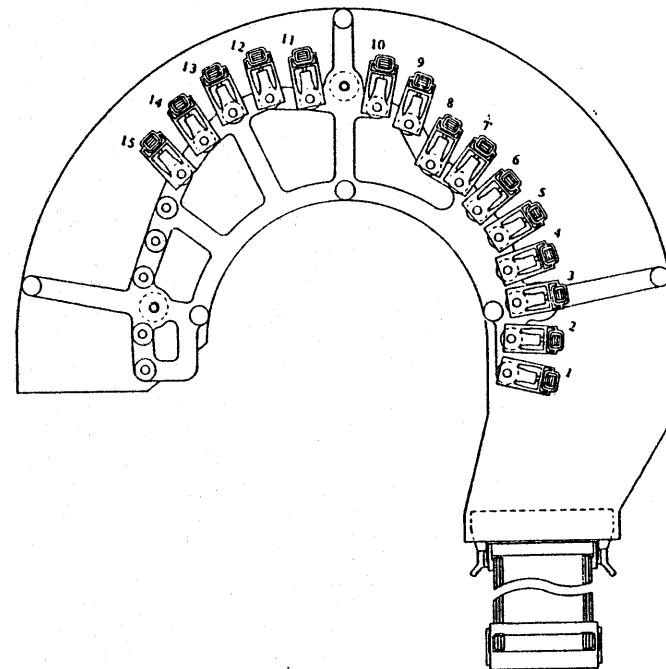
Construction of the Actuator



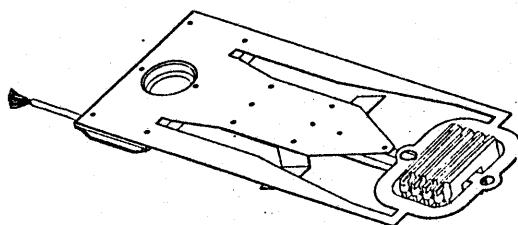
Moving Head Arm Assembly



Moving Head



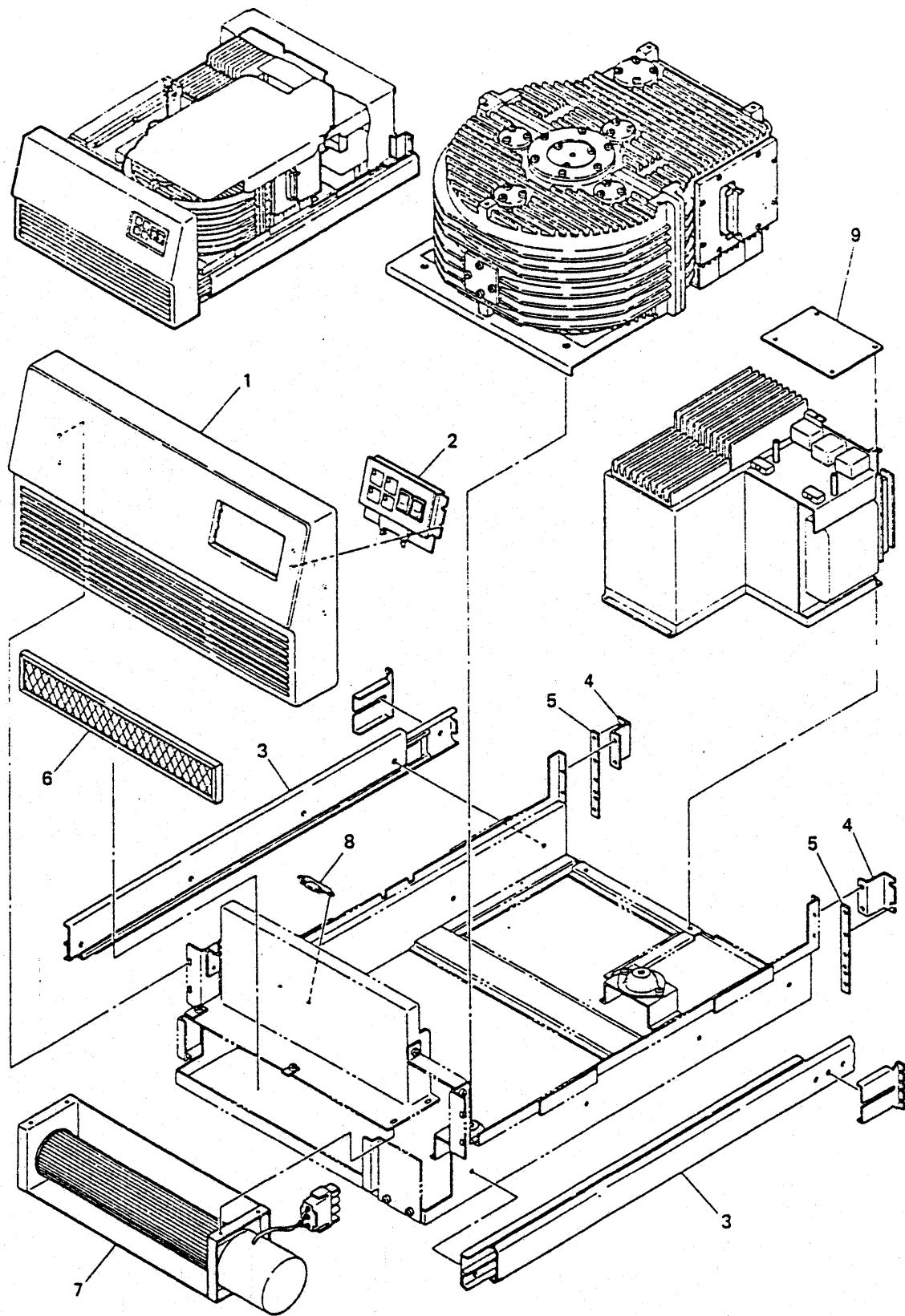
Fixed Head Block

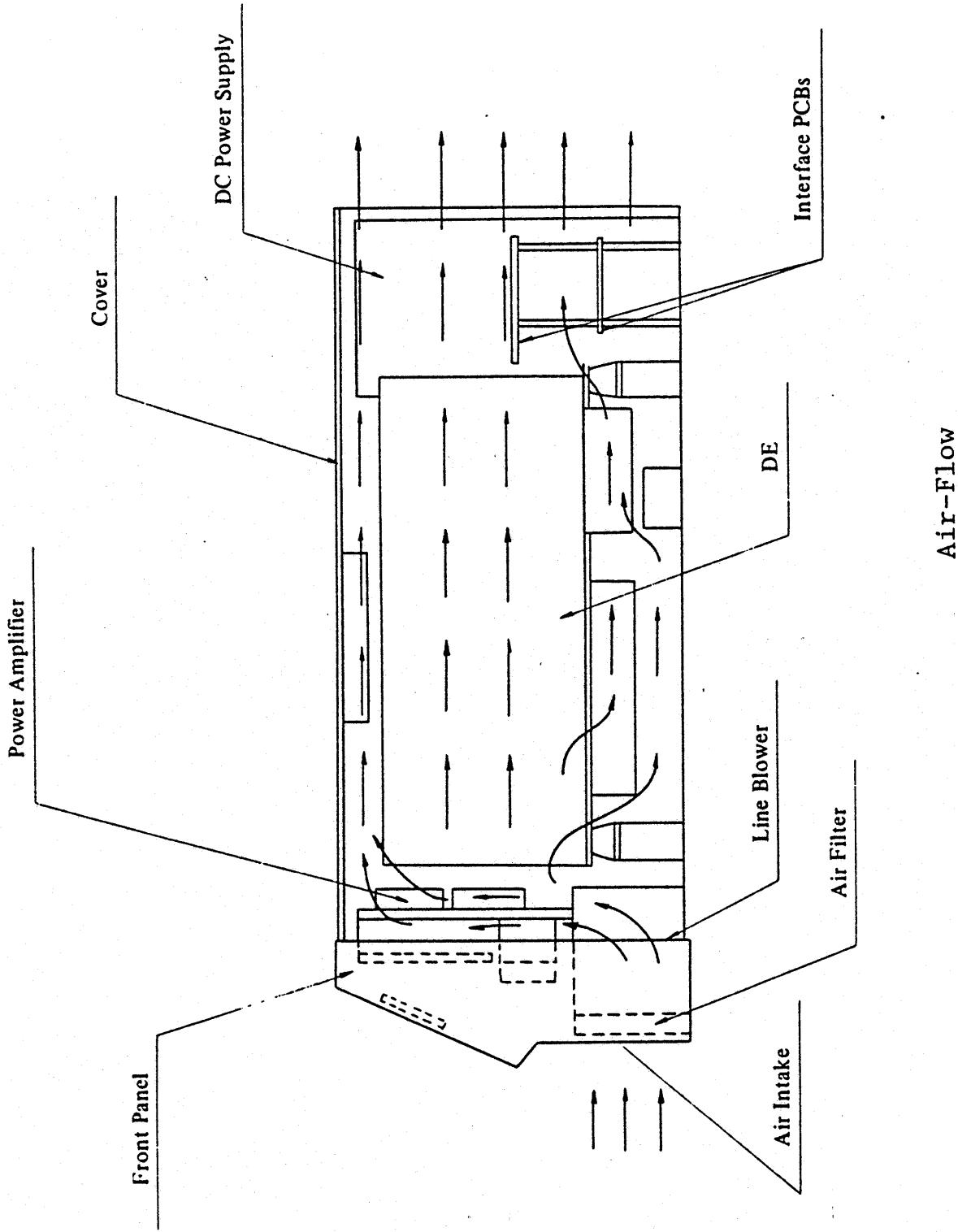


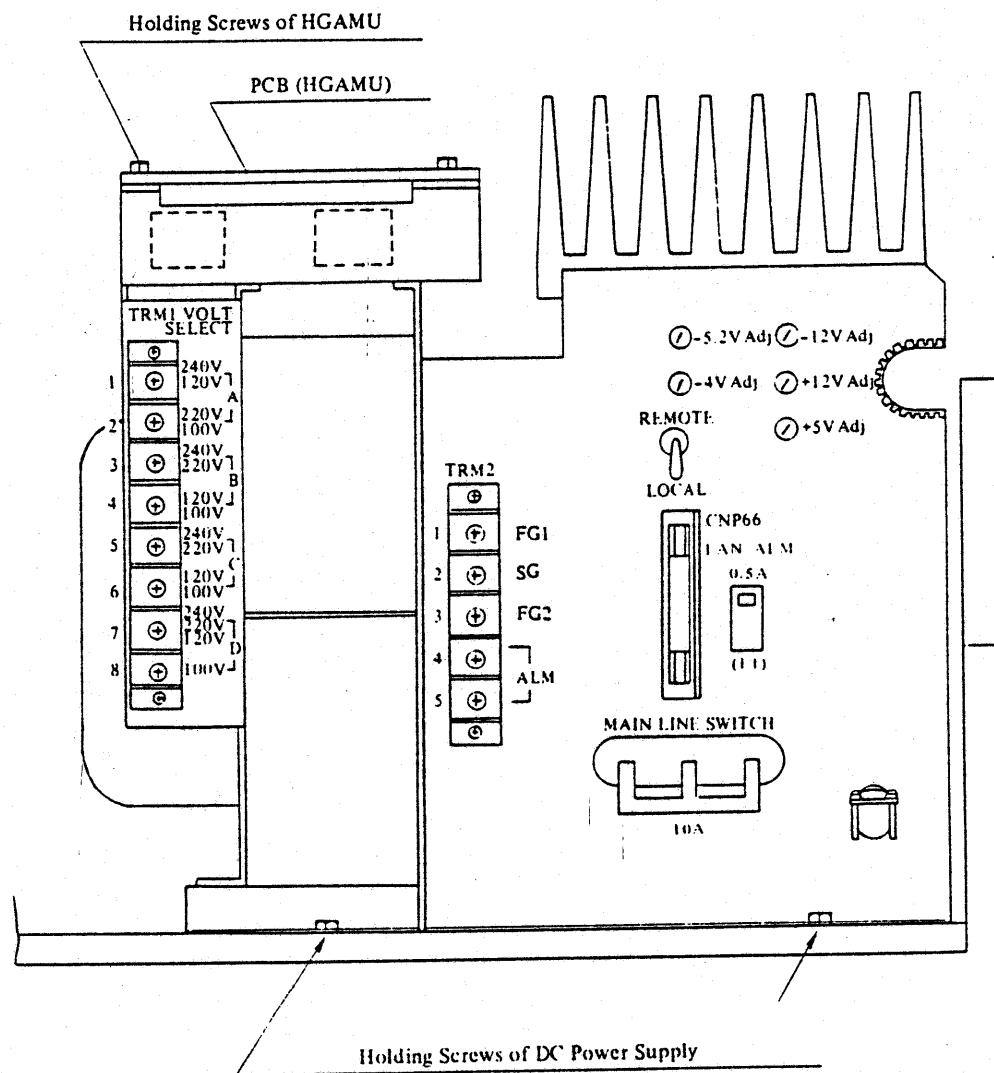
Fixed Head

Slider No. Vs. Cylinder/Head Address

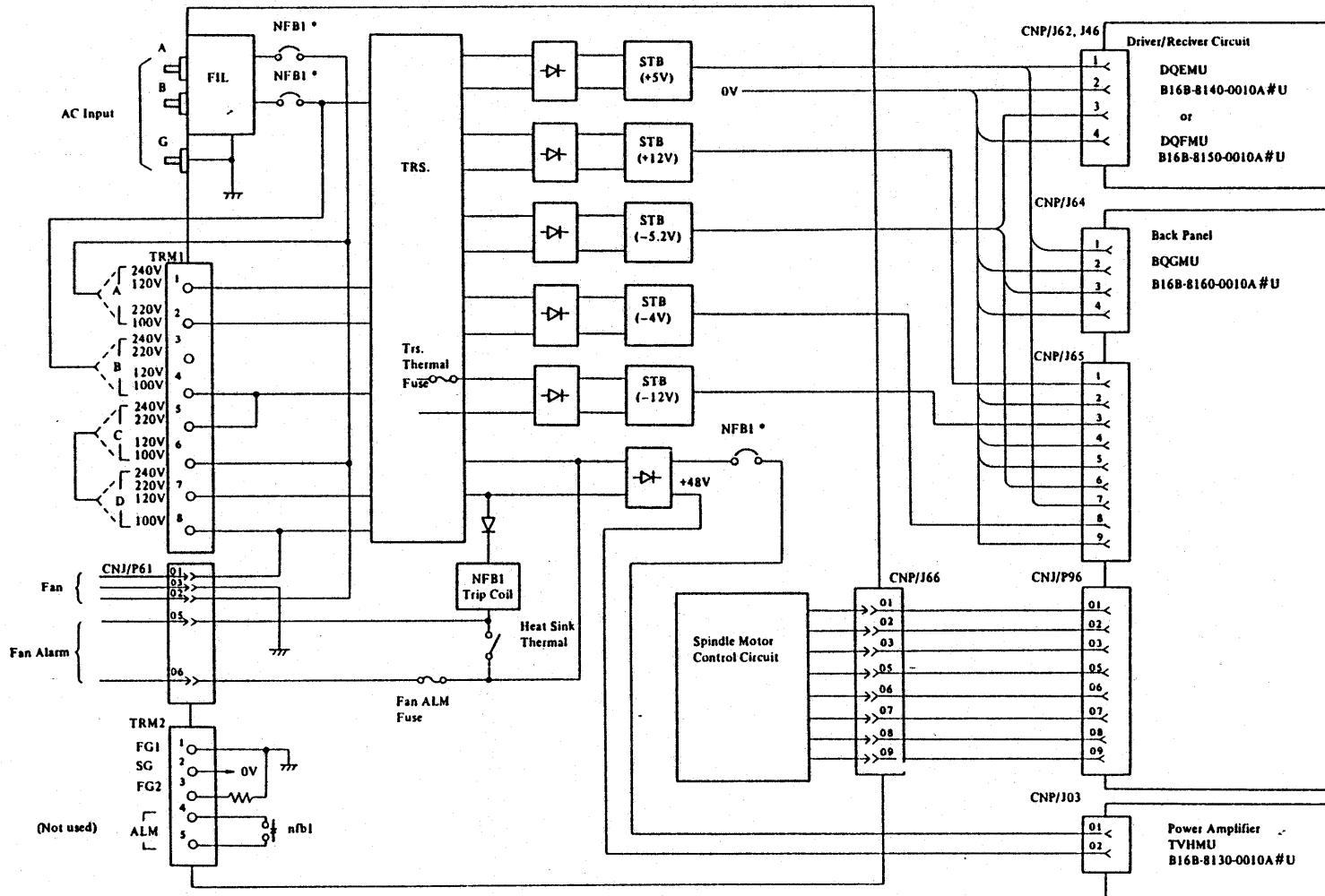
| Slider No. | Address | | Slider No. | Address | | Slider No. | Address | |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| | CYL | HD | | CYL | HD | | CYL | HD |
| 1 | 897 | 08 ~ 11 | 6 | 896 | 08 ~ 11 | 11 | 898 | 00 ~ 03 |
| 2 | 897 | 04 ~ 07 | 7 | 896 | 12 ~ 15 | 12 | 898 | 04 ~ 07 |
| 3 | 897 | 00 ~ 03 | 8 | 896 | 16 ~ 19 | 13 | 898 | 08 ~ 11 |
| 4 | 896 | 00 ~ 03 | 9 | 897 | 12 ~ 15 | 14 | 898 | 12 ~ 15 |
| 5 | 896 | 04 ~ 07 | 10 | 897 | 16 ~ 19 | 15 | 898 | 16 ~ 19 |



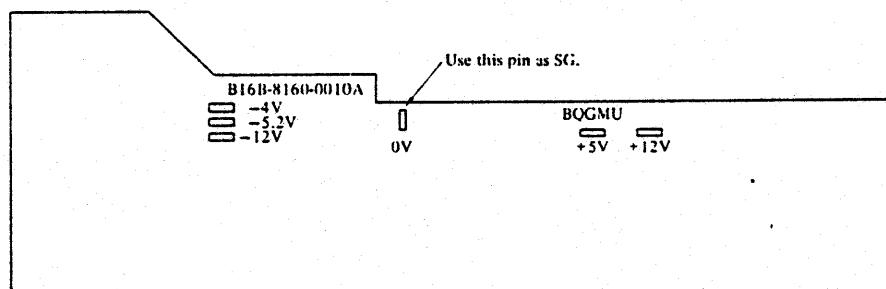
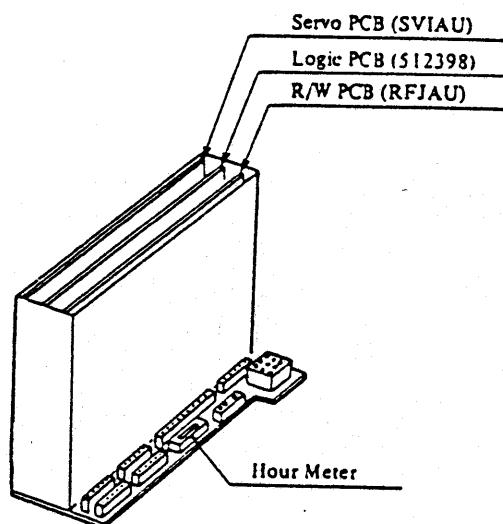




DC Power Supply Unit



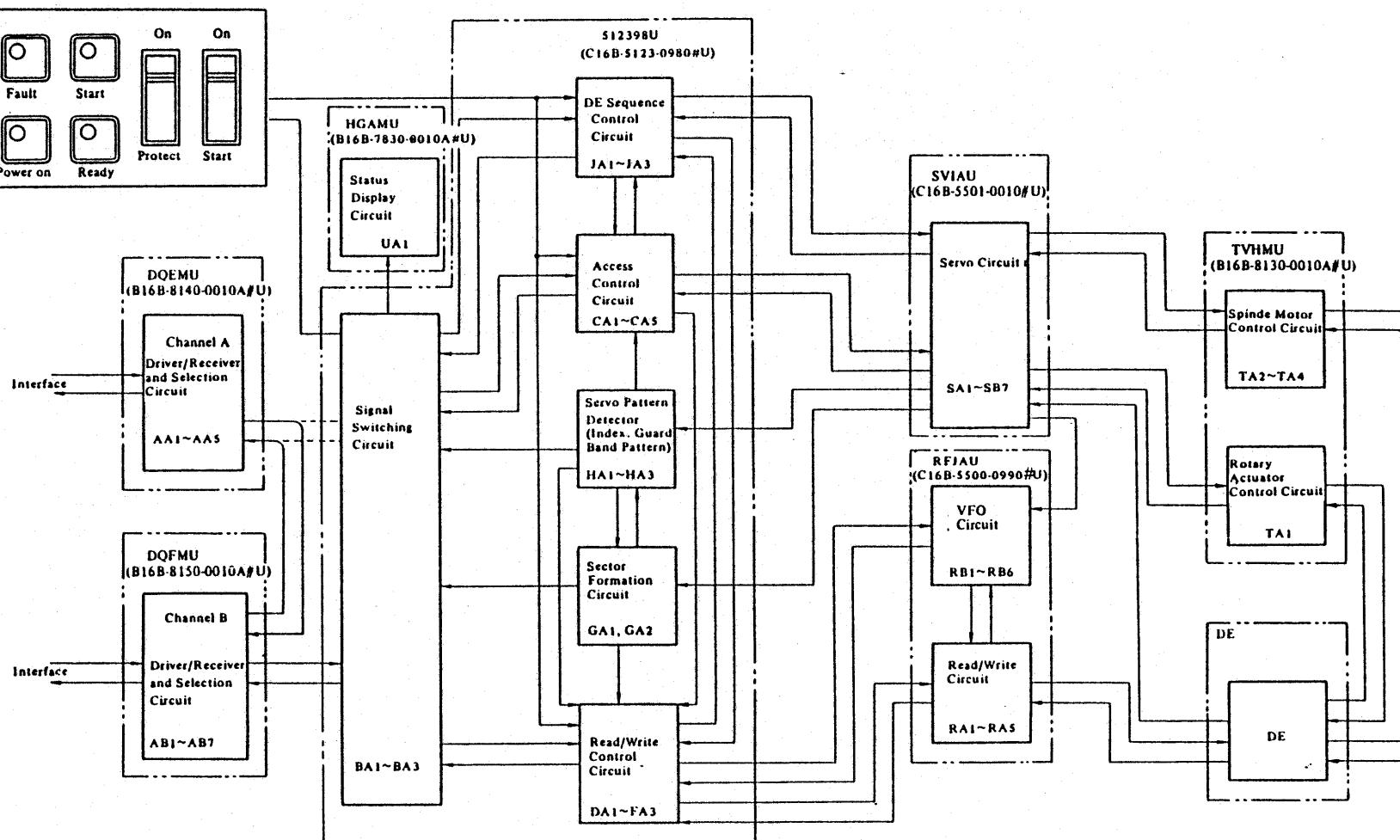
Functional Block Diagram of the DC Power Supply Unit



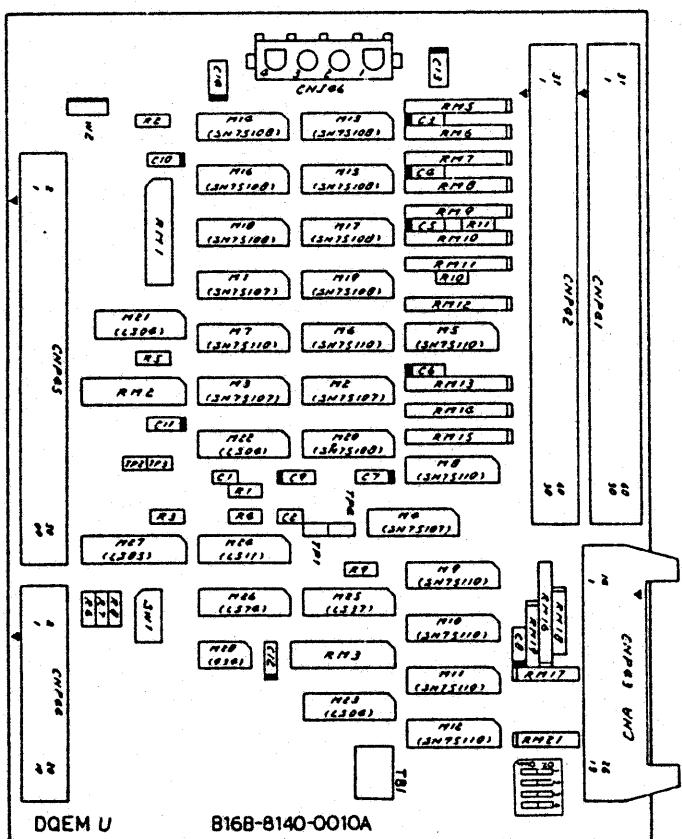
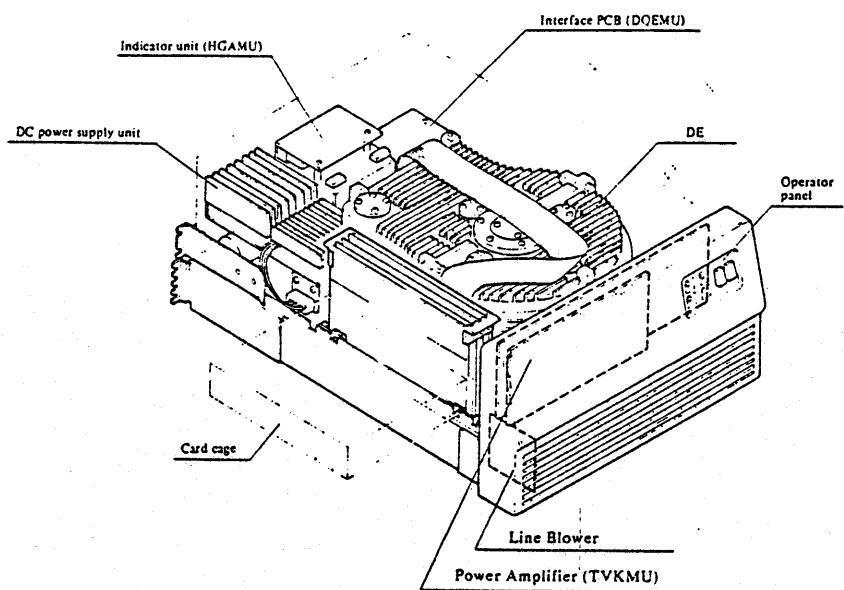
Top View of Back Panel

Acceptable Range of DC Voltages

| DC Voltage | Acceptable Range |
|------------|------------------|
| +12 V | 11.4 ~ 12.6 V |
| +5 V | 4.75 ~ 5.25 V |
| -4 V | -3.8 ~ -4.2 V |
| -5.2 V | -4.94 ~ -5.46 V |
| -12 V | -11.4 ~ -12.6 V |

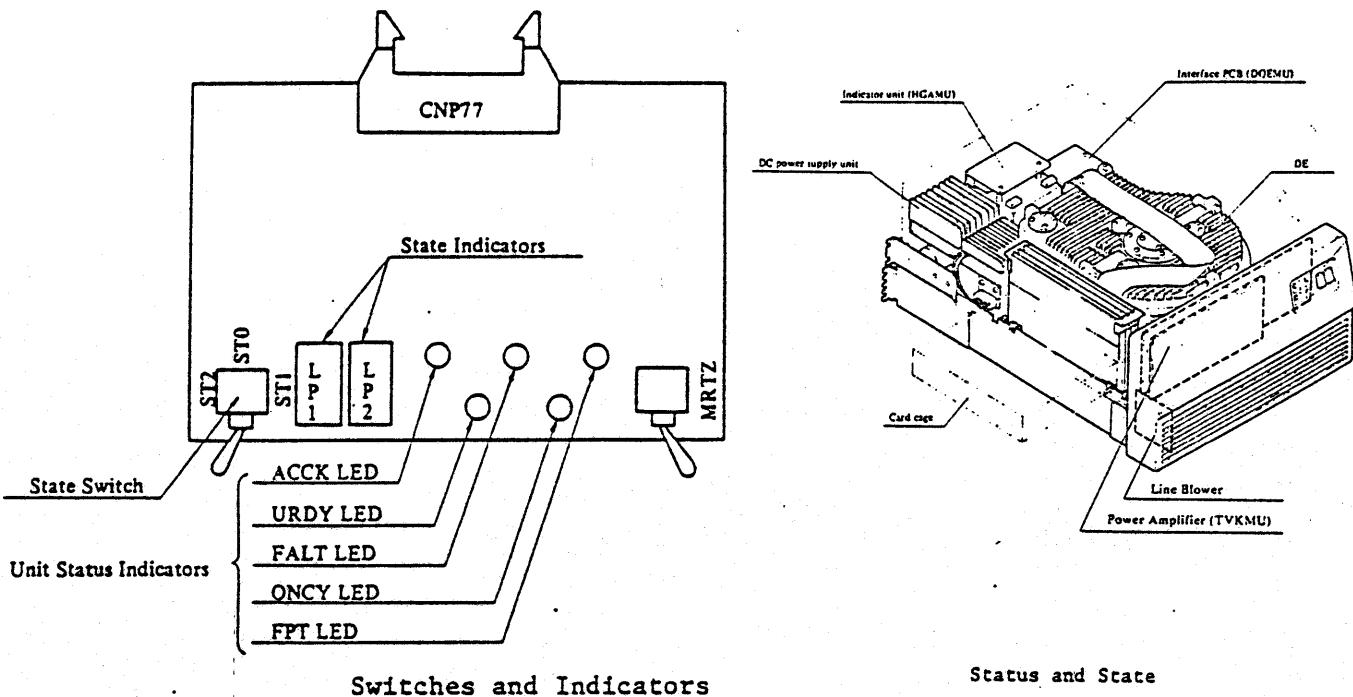


Drive Circuit Configuration Diagram (Included Dual Channel Option)



Drive Addressing

| Drive Address | Switch Position | | | |
|---------------|-----------------|-----|-----|----------|
| | 1 | 2 | 3 | 4 |
| 0 | OFF | OFF | OFF | Not Used |
| 1 | ON | OFF | OFF | |
| 2 | OFF | ON | OFF | |
| 3 | ON | ON | OFF | |
| 4 | OFF | OFF | ON | |
| 5 | ON | OFF | ON | |
| 6 | OFF | ON | ON | |
| 7 | ON | ON | ON | |



| State Switch Position | Center (ST 0) | | Right (ST 1) | Left (ST 2) |
|-----------------------|---------------|-------------------------|-----------------------------|----------------------|
| | STATE Bit | DE Sequence State | Write/Read Check State | Access State |
| LP1 | 1 | DE Sequence Latch 1 | Index Check | DE Sequence Check |
| | 2 | DE Sequence Latch 2 | Control Check | Access Timeout Check |
| | 4 | DE Sequence Latch 4 | Multi Head Check | Over Shoot Check |
| | 8 | Hall Alarm | Head Short Check | Rezero Mode Latch |
| | 1 | Motor At Speed | Write Current on Read Check | Servo Latch |
| | 2 | Inhibit DE Seq. Recycle | Write Transition Check | Linear Mode Latch |
| | 4 | Unit Ready | Delta I Write Check | Control Latch |
| | 8 | Access Busy | Servo Off-Track | Wait Latch |

Unit Status Indicators

| Name of LED | Color of LED | Content |
|-------------|--------------|--------------------------------|
| URDY | Green | Unit Ready |
| ONCY | Green | On Cylinder |
| ACCK | Red | Seek Error (Access Check) |
| FALT | Red | Fault |
| FPT | Yellow | Write Protected (File Protect) |

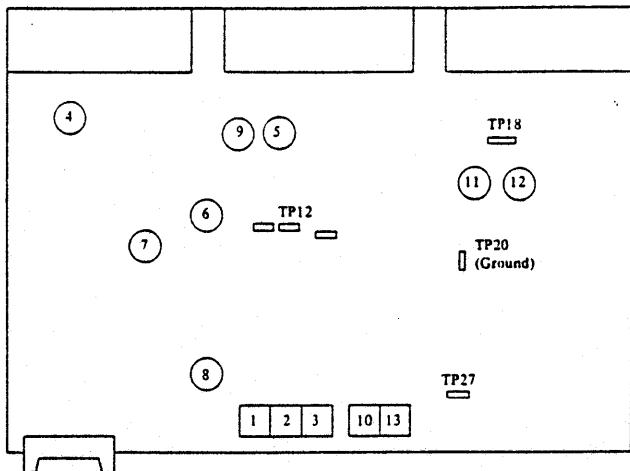
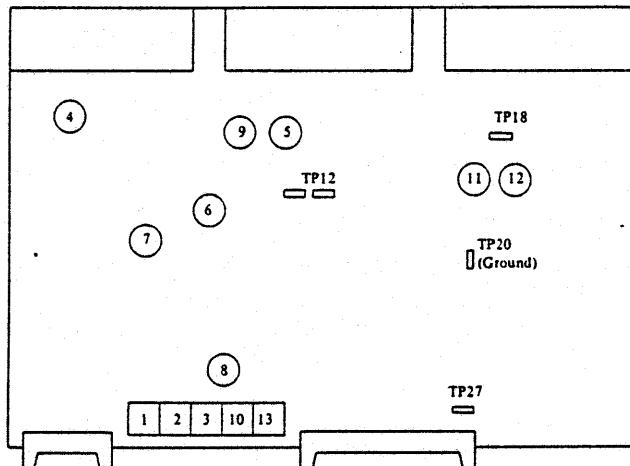
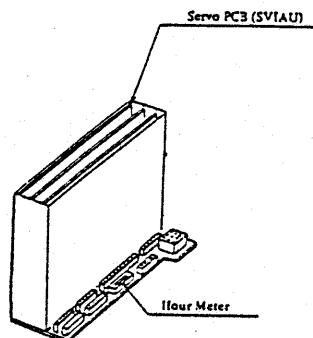


Figure 14.2-1 RVs and TPs on PCB SVIAU/01



RVs and TPs on PCB SVIAU/02



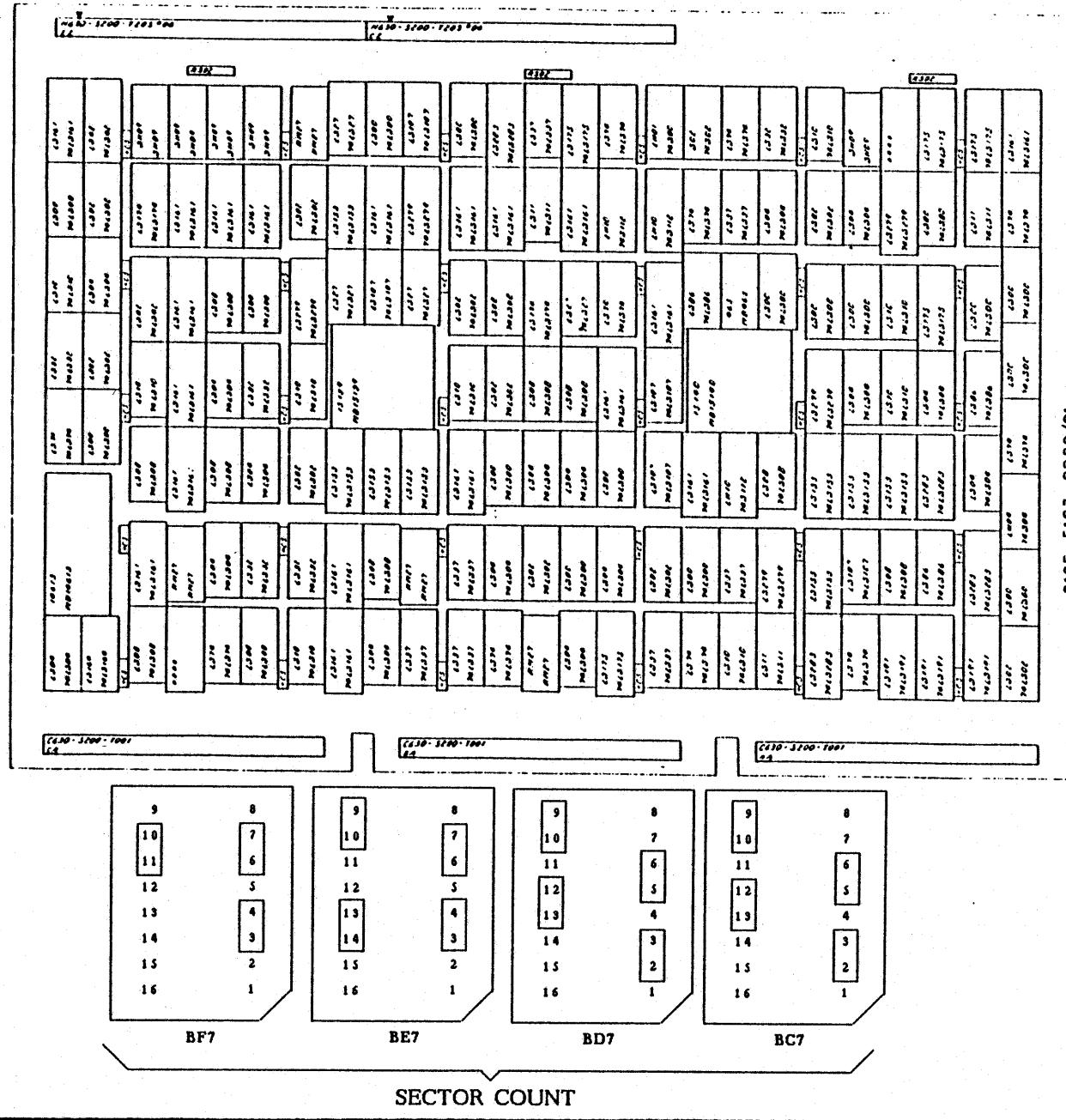
Function of RVs

| RV No. | Function/Adjustment | Sealed |
|--------|----------------------------------------------|--------|
| 1 | AGC Amplifier gain | No |
| 2 | User - shooting | No |
| 3 | Access time | No |
| 4 | -4V | Yes |
| 5 | Offset voltage of the desired velocity curve | Yes |
| 6 | VCU free - running frequency | Yes |
| 7 | Timer - Gate pulse width | Yes |
| 8 | Sync. - Gate timing | Yes |
| 9 | D/A Converter gain | Yes |
| 10 | Velocity offset | No |
| 11 | Access Time Out pulse width | Yes |
| 12 | Track Following Timer pulse width | Yes |
| 13 | Settling In Fine Control | No |

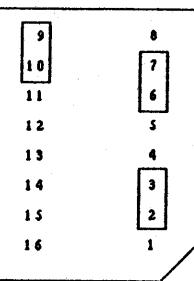
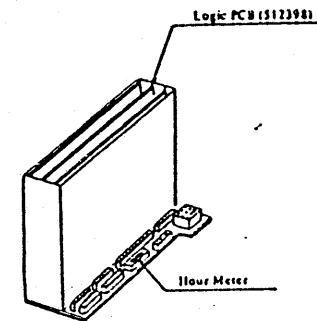
* Do not touch the sealed RVs unless adjustments are required.

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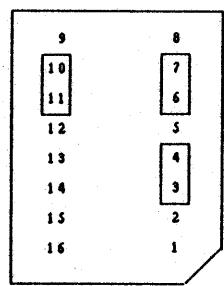


C16B-5125-00860/010

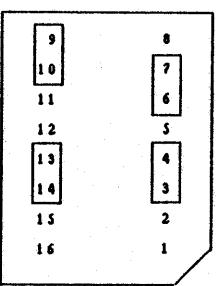


INTERFACE

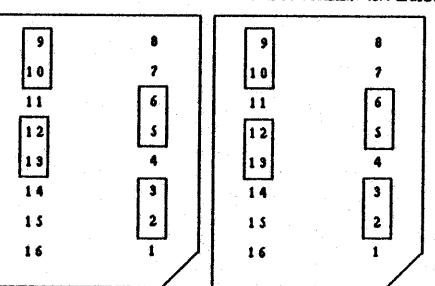
SECTOR COUNT



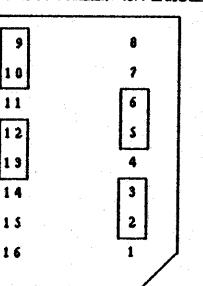
BF7



BE7



BD7



BC7

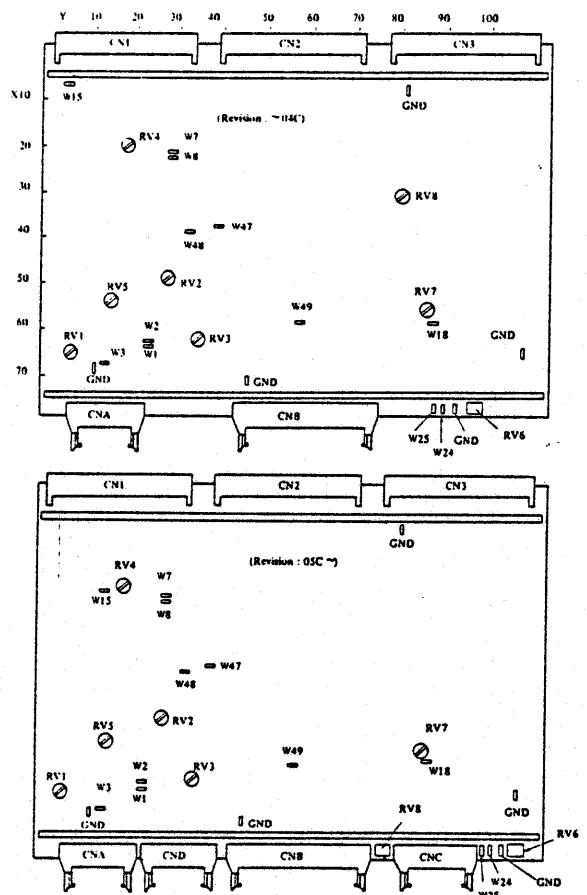
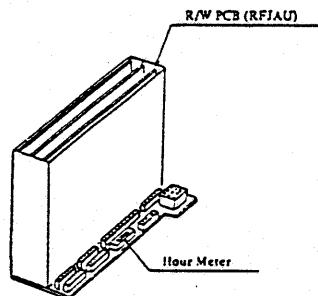
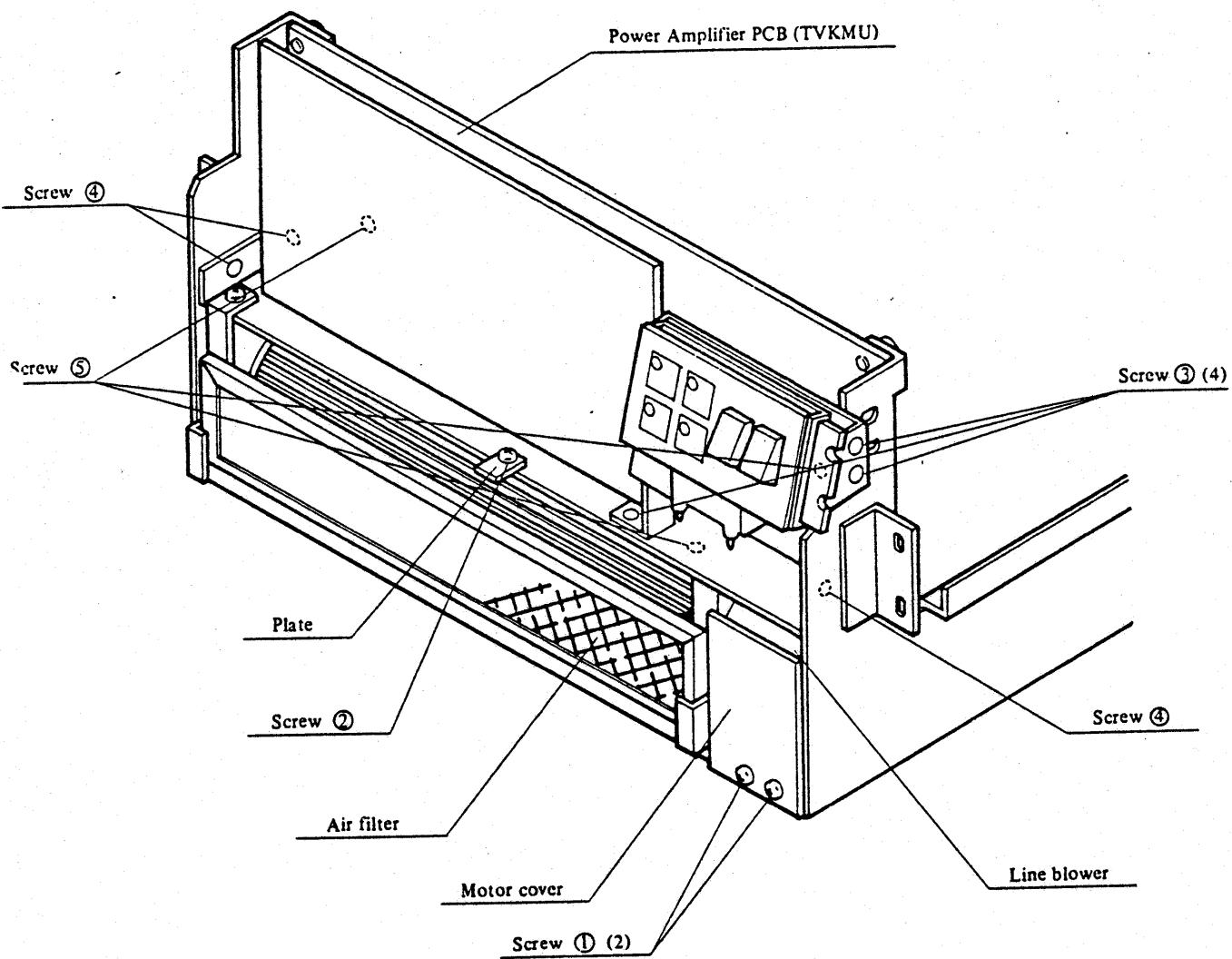


Figure 14.3-1 Variable Resistors on PCB RFJAU



Variable Resistors in Read/Write Circuit

| Item | RV No. | Test point | Specification |
|------------------------|--------|---------------------------|---------------|
| -5.2V (DC Voltage) | RV1 | AB2 (or W3) | -5.2V±0.2V |
| +6V (DC Voltage) | RVS | W15 | +6V±0.2V |
| Balance of Read Signal | RV2 | U7 W8 (ADX, AEX) | Refer to (1) |
| Write Current | RV3 | W1 W2 | Refer to (2) |
| Jitter of Read Signal | RV4 | W49 | Refer to (3) |



SYSTEM INSTALLATION

- 1. DETERMINE PHYSICAL LOCATION OF MACHINES**
- 2. DETERMINE SITE ELECTRICAL AND ENVIRONMENTAL REQUIREMENTS**
- 3. DETERMINE CABLE TYPES, CONFIGURATION, AND LENGTHS**
- 4. DETERMINE SITE NAME**
- 5. DETERMINE HOST NAMES AND CHAOS ADDRESSES**
- 6. DETERMINE NAMESPACE, FILE, AND PRINT SERVERS**
- 7. DETERMINE PRIMARY USERS**
- 8. INSTALL HARDWARE**
- 9. INSTALL SOFTWARE**
- 10. SET SITE ON NAMESPACE SERVER**
- 11. SET UP NAMESPACE ASSIGNMENTS**
- 12. SET SITE ON BALANCE OF NETWORK**

SOFTWARE INSTALLATION

-WHEN A PRIMARY DISK NEEDS REFORMATTING, SOFTWARE IS INSTALLED ON TO THE DISK FROM TAPES-

TAPES

IFS TAPE - contains microcode, disk label, root directory (headers), free pages, and bad blocks. One IFS tape is shipped with each disk.

V.24 FORMATTING TAPE - used to erase and repartition disk. Applicable for 3640 only or anytime disk cannot be formatted by disk format fep command.

DISTRIBUTION WORLDS (2 EACH)-

5.2 DISTRIBUTION WORLD - 5.2 world and 296 microcodes
6.0 DISTRIBUTION WORLD - 6.0 world and 319 microcodes
6.1 DISTRIBUTION WORLD - 6.1 world and 336 microcodes

SOURCES - lisp source code for insertion to lmfs

DOC & EXAMPLES - 11 volume symbolics document for insertion to lmfs and demos

LGP-2/DMP-1 support - printer software package

PROLOG - prolog interpreter

INTERLISP - interlisp interpreter

IP/TCP - network software

FORTRAN '77 - fortran interpreter

PASCAL - pascal interpreter

COLOR - color option software

V.24 files tape - V.24 debug., fload, V.24 Unibus fload, V.24 2MW fload, etc.
(made up by CE's)

BREATH OF LIFE (B.O.L.) - Contains NFEP overlay files for loading to FEP RAM and world microcodes for loading to LISP processor.
Used to bring to life NFEP units with defective disks.

NFEP OVERLAY FILES - V.127 files for NFEP formatted for transfer to file server.

DIAGNOSTICS - system check out

FORMATS

STREAM FORMAT - conventional format of FORMATTING tapes and the microcode on IFS tapes, this format is used for data transferred from tape directly into an area of lisp machine (eg. microcode transferred from IFS tape to C memory). Stream format tapes are read at FEP level via specific commands (eg. LOAD MICROCODE or LOAD FEP) and are written via operations contained in the disk tools program.

IFS FORMAT - back up tapes of disk image, this is the conventional format of distribution worlds and the balance of files on IFS tape. IFS format tapes are read at FEP level via DISK RESTORE command and written at LISP via lisp command - (TAPE: WRITE-FEP-FILES-TO-TAPE)

DISTRIBUTION FORMAT - format for storing programs or files such as SOURCES for loading into LMFS. Distribution format tapes are created via a distribution dump which pulls files relevant to a program system or text library from various places in LMFS and stores them on tape. DISTRIBUTION format tapes are read from LISP via lisp command - (DIS: LOAD-DISTRIBUTION-TAPE) and are written from LISP via lisp command - (DIS: WRITE-DISTRIBUTION-TAPE). A menu allows selection of systems for storing.

CARRY FORMAT - format for storing programs or files for loading into LMFS. Carry format tapes are created via a carry dump which pulls only specified files from LMFS. CARRY format tapes are read from LISP via lisp command - (TAPE: CARRY-LOAD) and are written from LISP via lisp command - (TAPE: CARRY-DUMP) specifying files to be saved.

LMFS FORMAT - format for storing back-ups for restoration to LMFS. LMFS format tapes are both read and written from the FILE SYSTEM MAINTENANCE window via menu.

**SOFTWARE INSTALLATION
CASE I**

PRE-NFEP

COMPLETE FEP FILE SYSTEM IN PLACE ON DISK AND CORRECT MICROCODE ON DISK

1. Boot machine
2. Set site
3. Load any other software system required (e.g., print)
4. Run garbage collection
5. Save world into another area on disk
 - A. Rename aux.page to custom world name
 - B. Rename old world to aux.page
 - C. Save world
 - D. Revise boot.boot and large.boot files
6. Return system to FEP and verify system operation

SOFTWARE INSTALLATION
CASE II

PRE-NFEP

COMPLETE FEP FILE SYSTEM IN PLACE ON DISK AND INCORRECT MICROCODE ON DISK

1. Insert WORLD distribution tape (5.2, 6.0, or 6.1). Type "DISK RESTORE".
2. Load microcode from WORLD distribution tape into existing header in FEP FILE SYSTEM on disk.
3. Boot machine
4. Set site
5. Load any other software system required (e.g., print)
6. Run garbage collection
7. Save world into another area on disk
 - A. Rename aux.page to custom world name
 - B. Rename microcode header to correct name
 - C. Rename old world to aux.page
 - D. Save world
 - E. Revise boot.boot and large.boot files
8. Return system to FEP and verify system operation

SOFTWARE INSTALLATION
CASE III

PRE-NFEP

NO FEP FILE SYSTEM IN PLACE ON DISK

1. Insert IFS tape
2. Clear machine
3. Load microcode tape:(return)
-The microcode is loaded into Lisp processor
4. Reformat disk
 - A. Reformatting a 3640 or any problem unit
 1. Insert formatting tape
 2. Type:Load fep()tape:(return)
-Special formatting tape is loaded into FEP
 3. Type "DISK FORMAT"
 - B. Reformatting all others - type "DISK FORMAT"
5. Re-insert IFS tape
6. Type "DISK RESTORE"
 - A. In response to "Is there a microcode to skip?", type "YES"
 - B. The IFS is loaded to the Fep file system on disk
7. Insert WORLD distribution tape (5.2, 6.0,or 6.1). Type "DISK RESTORE".
8. Load microcode from WORLD distribution tape into header provided in FEP FILE SYSTEM on disk
9. Load WORLD (Transferring data from tape to FEP FILE SYSTEM on disk)
10. Manually boot machine
11. Set site
12. Load any other software system required (e.g., print)
13. Initialize LMFS
14. Run garbage collection
15. Save world into another area on disk
 - A. Rename aux.page to custom world name
 - B. Rename microcode header to correct name
 - C. Rename old world to aux.page
 - D. Save world
 - E. Revise boot.boot and large.boot files
16. Return system to FEP and verify system operation

M I C R O C O D E A P P L I C A B I L I T Y

| MICROCODE PATHNAME COMPONENT | APPLICABILITY |
|------------------------------|---------------------------------------------------------------------------------------------------------------------|
| -tmc5- | FOR USE WITH A MEMORY CONTROLLER PCBA ONLY |
| -ifu- | FOR USE WITH AN INSTRUCTION FETCH UNIT PCBA ONLY. |
| -st506- | FOR USE WITH STANDARD 3640 (MAXTOR) INTERFACE ONLY |
| -io4- | FOR USE WITH REV 6 OR LATER I/O PCBA ONLY. (WHEN THIS IS NOT IN THE PATHNAME IT IS USED FOR REV 2A I/O OR EARLIER.) |
| -fpa- | FOR USE WITH FLOATING POINT ACCELERATOR |
| -egc-diag- | FOR USE AS A DIAGNOSTIC TO CHECK GARBAGE COLLECTION ASSISTED HARDWARE |
| -prolog- | FOR USE WITH THE PROLOG LANGUAGE. EXTENDED SEQUENCER NEEDED FOR LARGE MICROCODES. |
| -xsq- | FOR USE WITH THE EXTENDED SEQUENCER |
| -noxsq- | FOR USE WITH PROLOG AND NO EXTENDED SEQUENCER PCBA. |

| VERSION | APPLICABILITY |
|---------|--------------------|
| .296 | RELEASE 5.2 WORLDS |
| .319 | RELEASE 6.0 WORLDS |
| .336 | RELEASE 6.1 WORLDS |

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LOADING AND STARTING SELECTED SYSTEMS SUMMARY

-HOW TO LOAD SOFTWARE SYSTEMS TO HOSTS FROM FILE SERVER-
-HOW TO START SYSTEM OPERATION-

I. PREREQUISITES

- A. SOFTWARE SYSTEM IS RESIDENT IN THE FILE SERVER
- B. SERVICES ARE ENABLED IN THE FILE SERVER
- C. HOST IS EQUIPPED WITH A 6.0 OR LATER WORLD

II. SYSTEM LOADING AND STARTING PROCEDURE SUMMARY FOR SELECTED SYSTEMS

A. PRINT SYSTEM

1. PRINT SYSTEMS NEED ONLY BE LOADED INTO PRINT SERVERS.
2. IF NOT DONE, CONFIGURE NAMESPACE FOR HOST(S) AND PRINTER(S).
3. TO LOAD PRINT SYSTEM-

IN LISP WINDOW, ENTER COMMAND PROCESSOR COMMAND:

LOAD SYSTEM PRINT

4. TO START THE PRINT SPOOLER-

IN LISP WINDOW, ENTER LISP COMMAND:

(PRINT:INITIALIZE-PRINT-SPOOLER)

5. ENABLE SERVICES ON PRINT SERVER TO ALLOW OTHER HOSTS ACCESS TO PRINTER.

B. EXPERIMENTAL PICTURE EDITOR SYSTEM (PEDS)

1. TO LOAD PEDS-

IN LISP WINDOW, ENTER COMMAND PROCESSOR COMMAND:

LOAD SYSTEM PED

2. TO START PEDS OPERATION, DEPRESS <SELECT> G

3. IN CASE OF IRRECOVERABLE ERROR DURING PED OPERATION,
TO RECONSTRUCT THE PED FRAME-

IN LISP WINDOW, ENTER LISP COMMAND:

(PICTURE-EDITOR:MAKE-PED-FRAME)

C. COLOR DEMONSTRATION SYSTEM

1. TO LOAD COLOR SOFTWARE WITH COLOR DEMO SYSTEM-

IN LISP WINDOW, ENTER COMMAND PROCESSOR COMMAND:

LOAD SYSTEM COLOR-DEMO

2. TO START COLOR-DEMO OPERATION-

IN LISP WINDOW, ENTER LISP COMMAND:

(COLOR:DEMO)

D. DIAGNOSTICS SYSTEM

1. THE DIAGNOSTICS SYSTEM SHOULD ONLY BE RESIDENT ON
FILE SERVERS WITHIN SYMBOLICS COMPANY SITES.

2. TO LOAD DIAGNOSTICS SYSTEM-

IN LISP WINDOW, ENTER COMMAND PROCESSOR COMMAND:

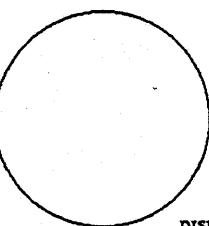
LOAD SYSTEM DIAGNOSTICS

3. TO START DIAGNOSTICS OPERATION-

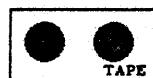
IN LISP WINDOW, ENTER LISP COMMAND:

(LOAD "SYS:DIAGNOSTICS;LISPM-INIT")

symbolics inc.



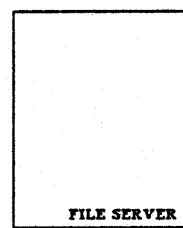
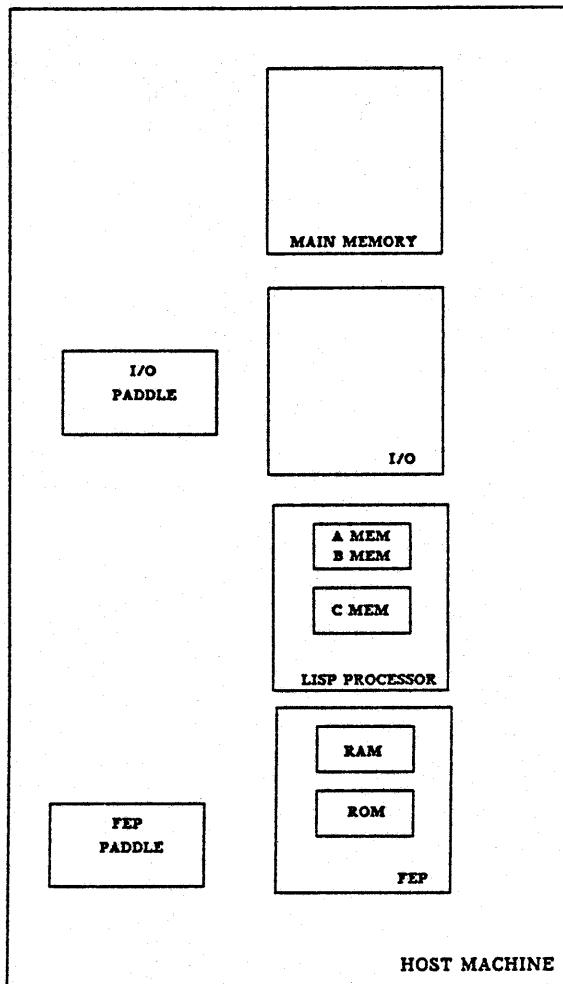
DISK



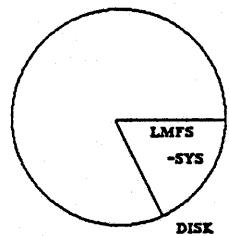
TAPE



KEYBOARD

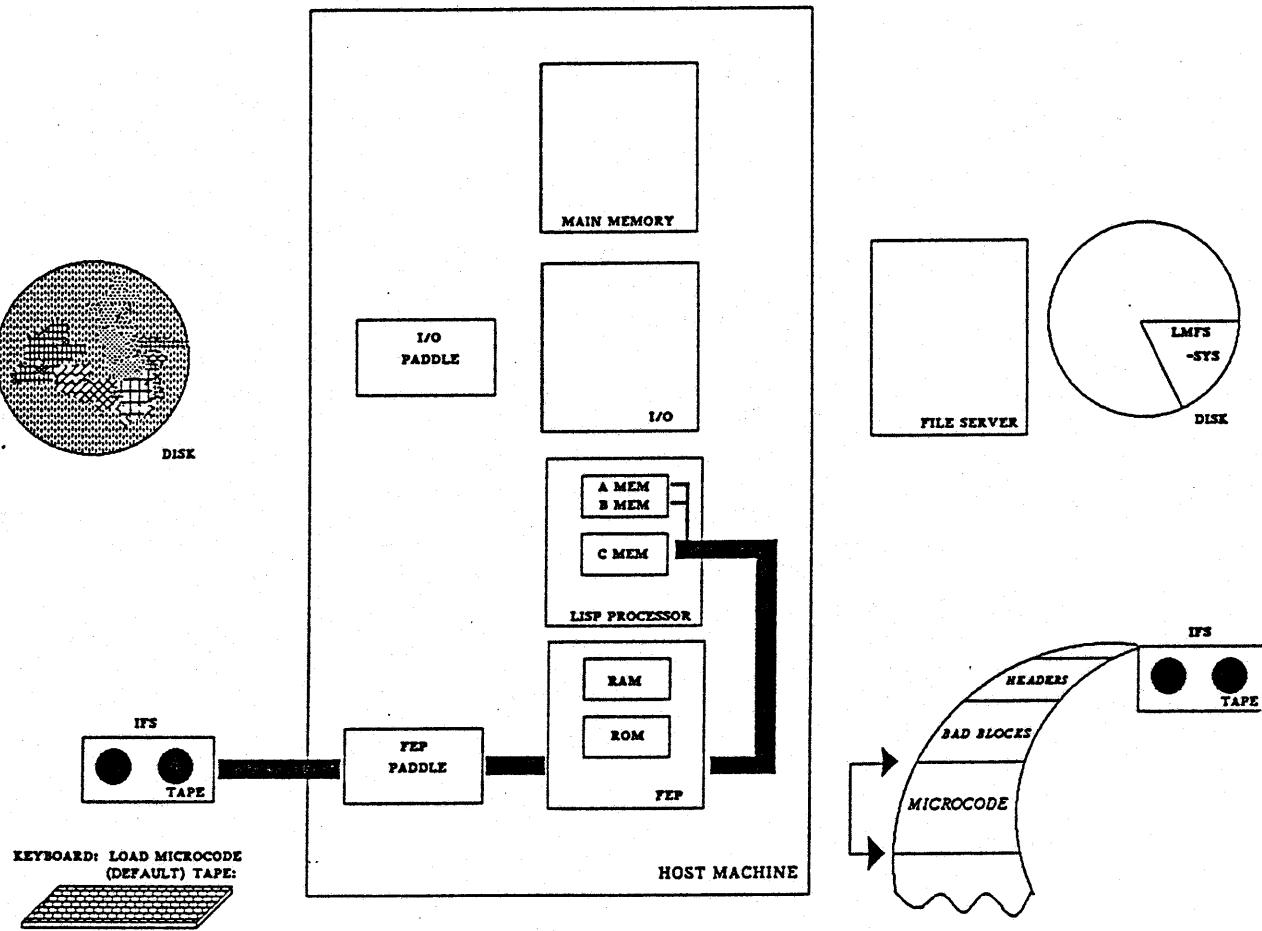


FILE SERVER



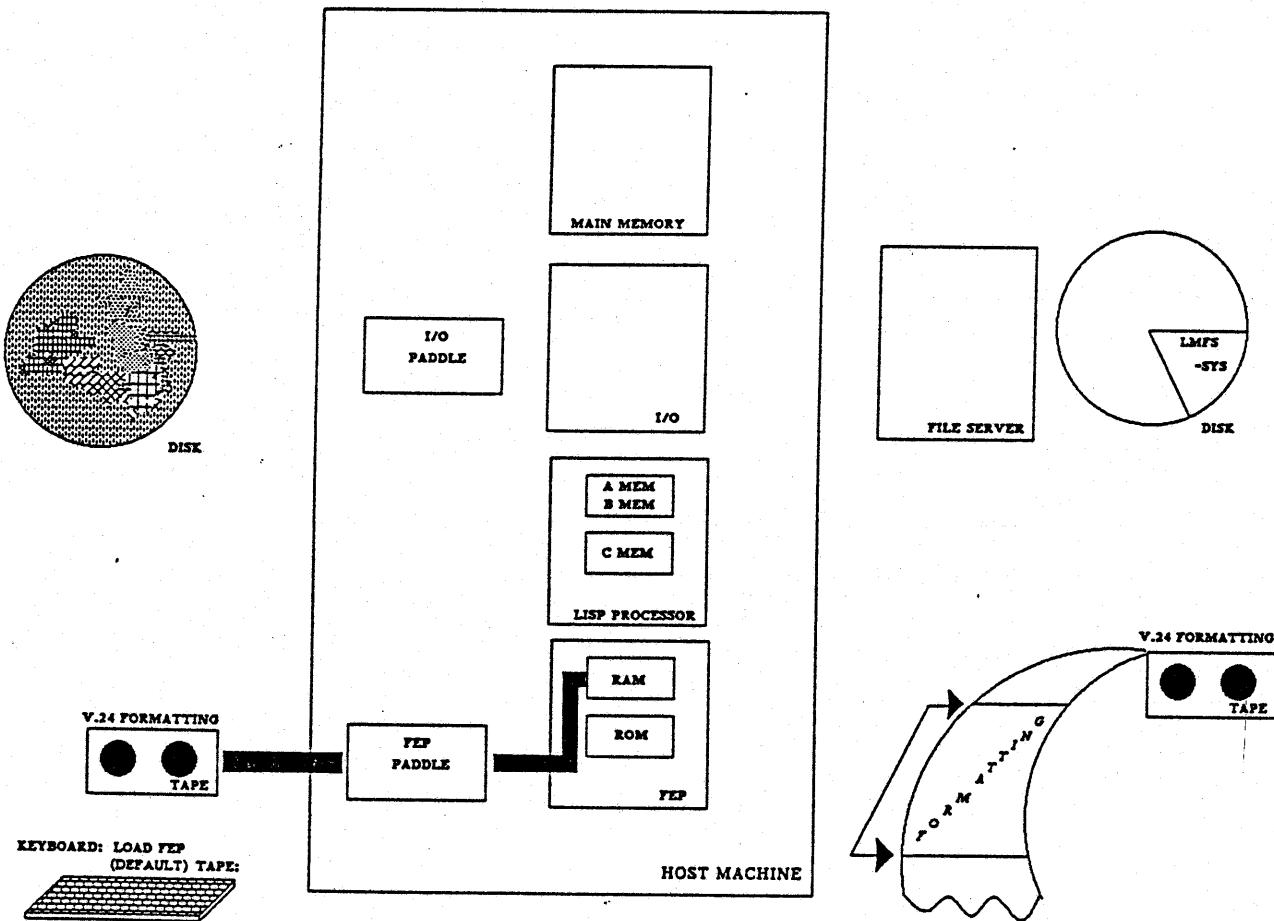
DISK

SOFTWARE INSTALLATION HIGHLIGHTS



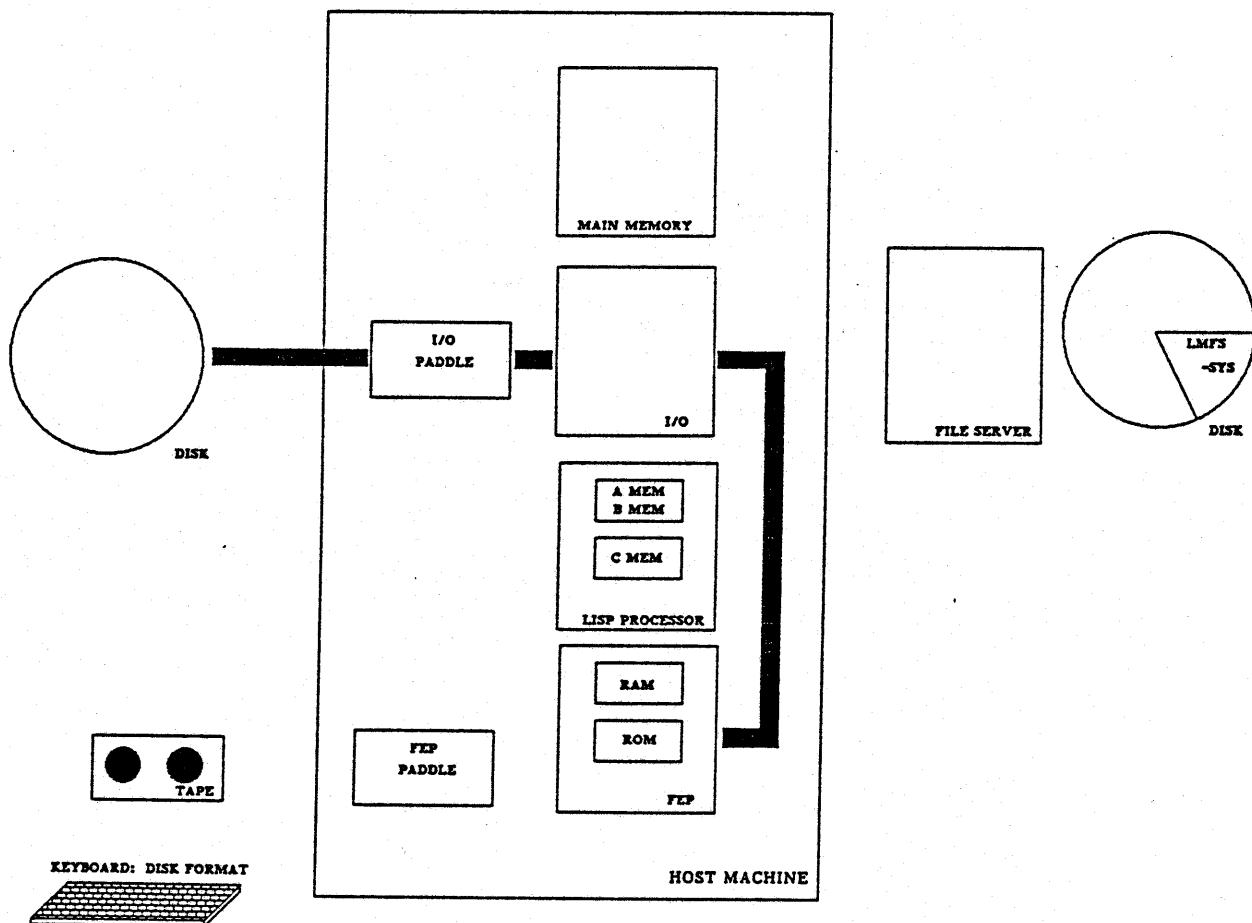
**STEP 1: TRANSFER MICROCODE FROM IFS TAPE TO LISP PROCESSOR
ALLOWING DISK WRITES AT THE FEP LEVEL**

PRE-NFEP SOFTWARE INSTALLATION



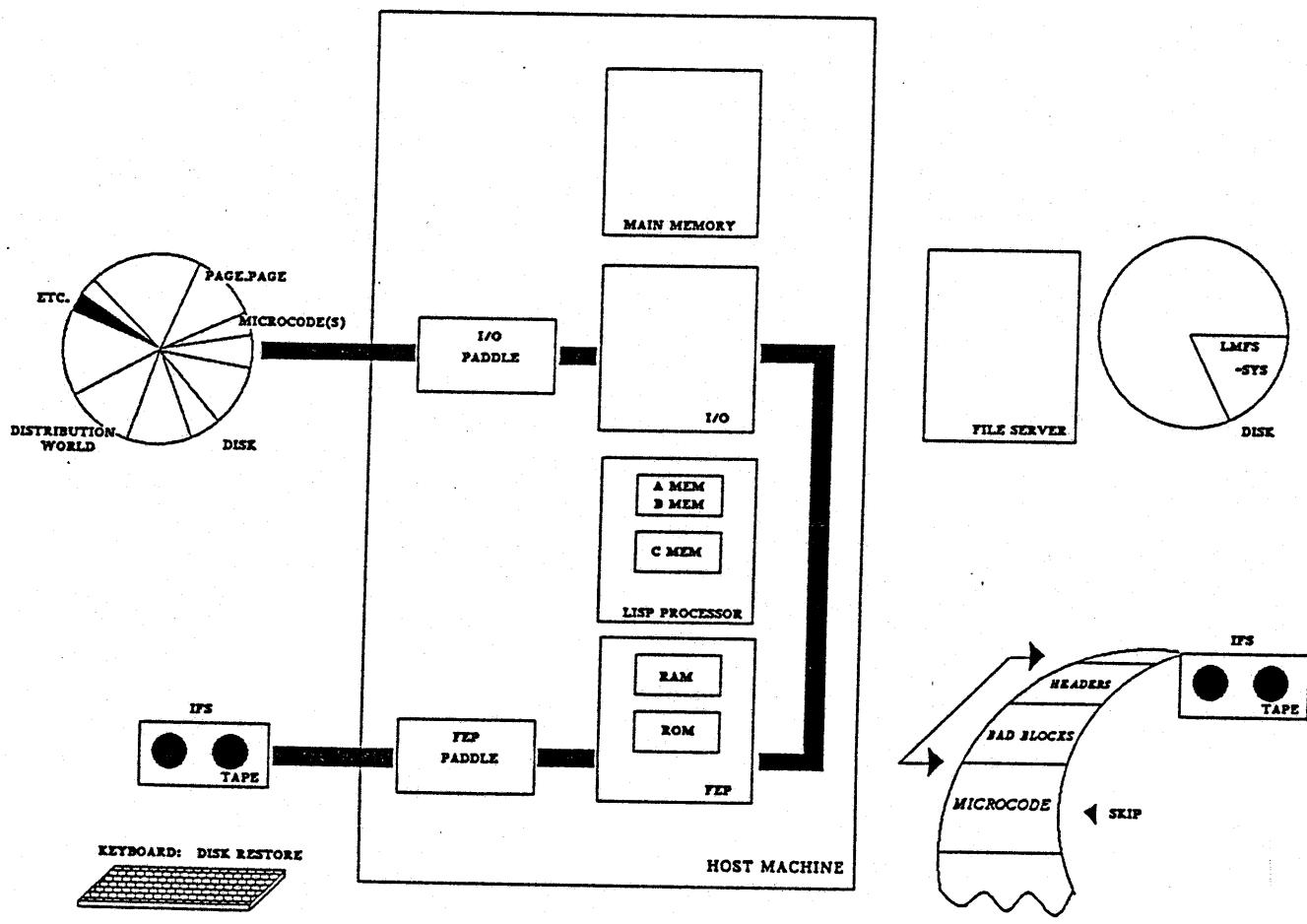
**STEP 2: LOAD V.24 FORMATTING PROGRAM TO FEP RAM
(APPLICABLE FOR 3640 OR ANY UNIT OUTSIDE OF RESIDENT FEP FIRMWARE CAPABILITIES)**

PRE-NFEP SOFTWARE INSTALLATION



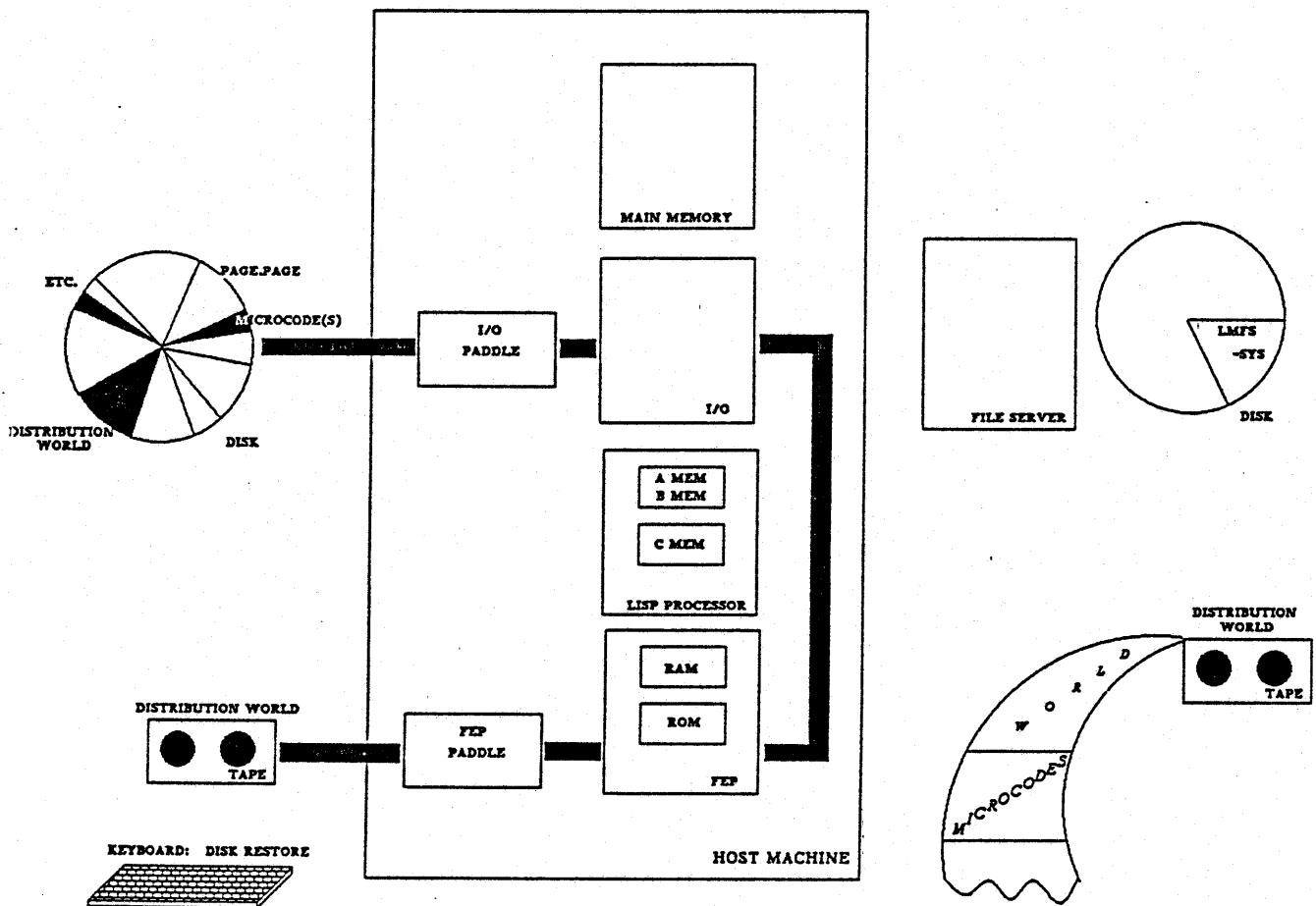
STEP 3: FORMAT DISK

PRE-NFEP SOFTWARE INSTALLATION



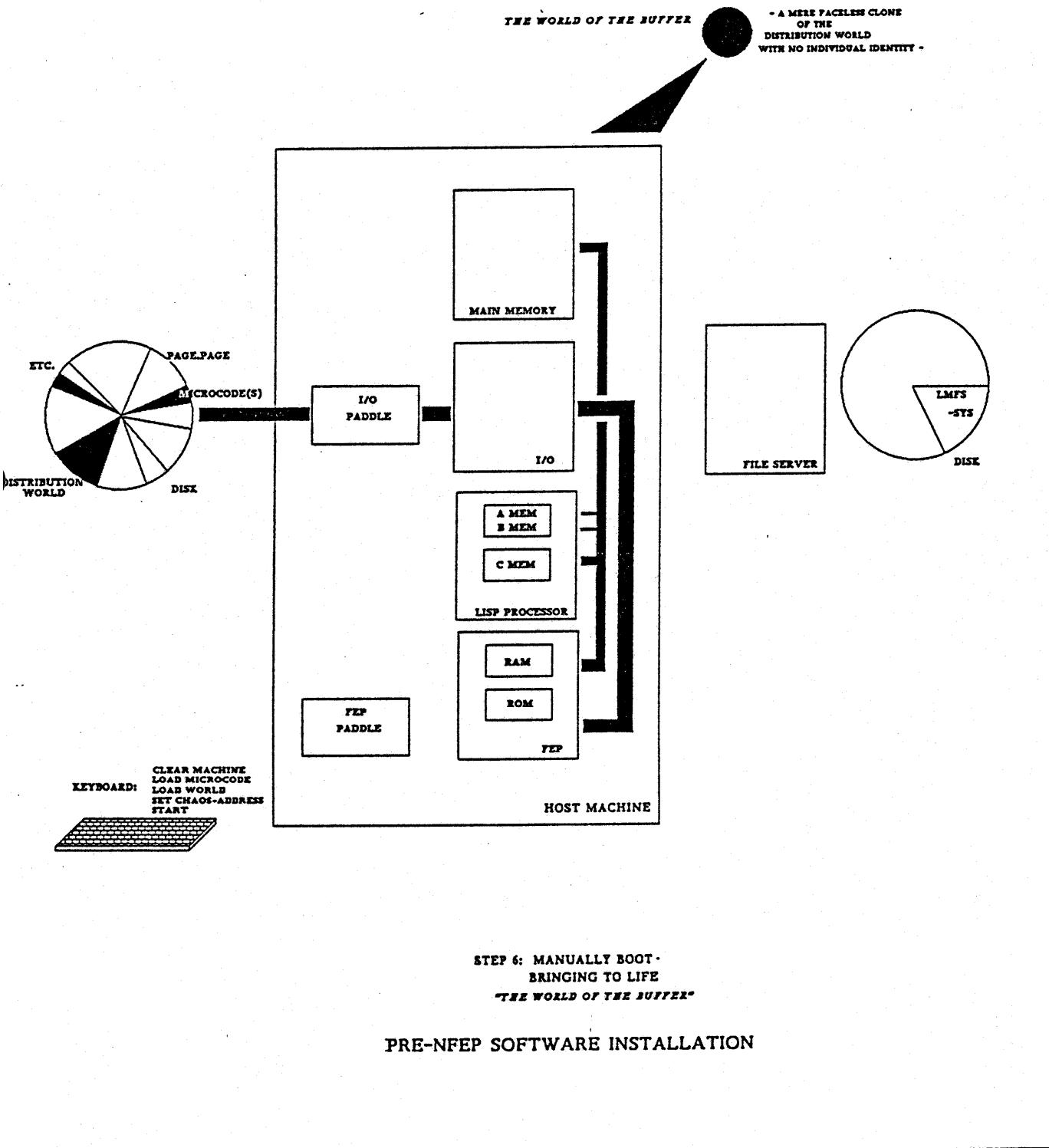
STEP 4: TRANSFER HEADERS AND BAD BLOCKS FROM IFS TAPE TO DISK

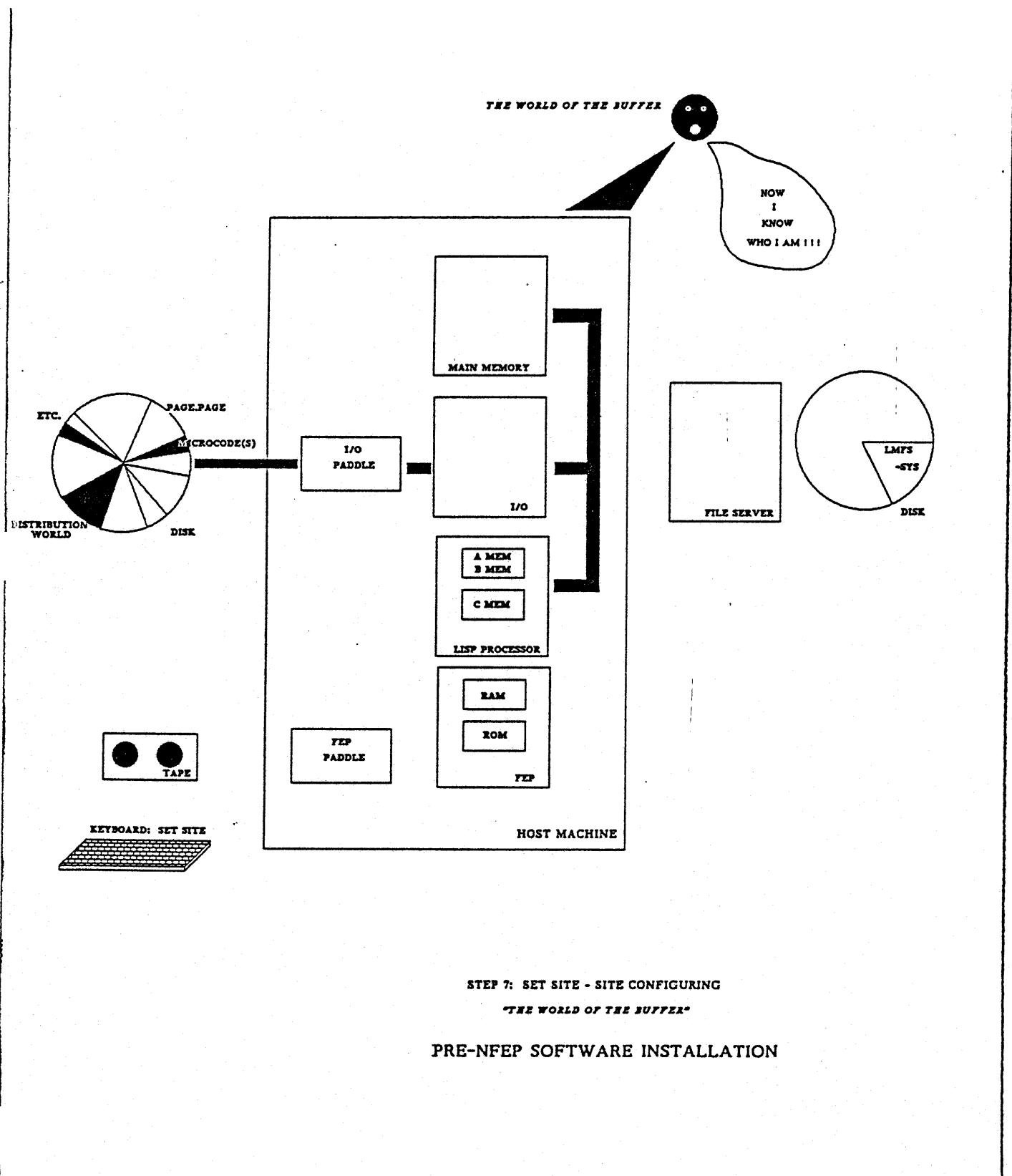
PRE-NFEP SOFTWARE INSTALLATION

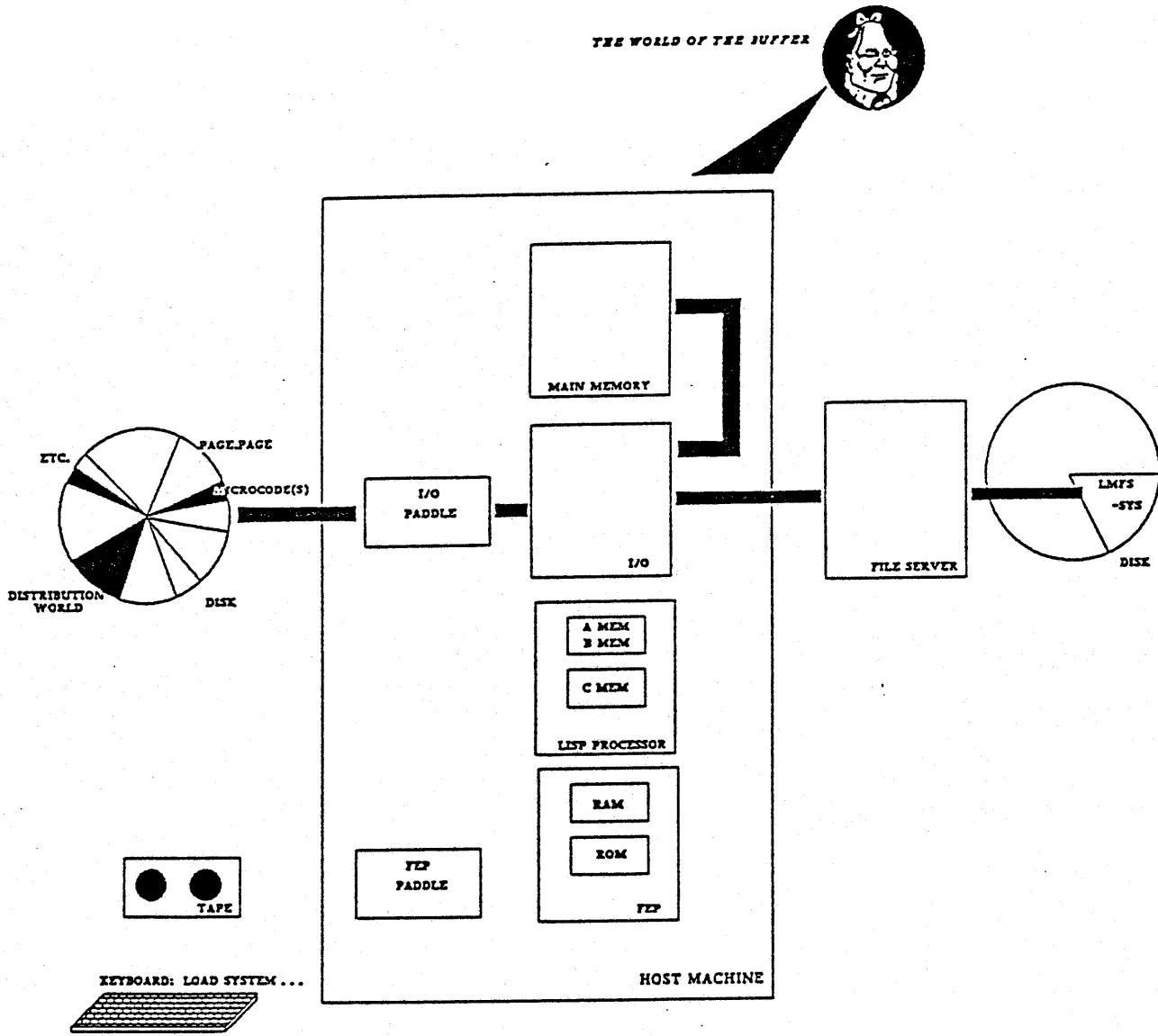


**STEP 5: TRANSFER MICROCODE(S) AND WORLD
FROM DISTRIBUTION WORLD TAPE TO DISK UNDER HEADERS PROVIDED**

PRE-NFEP SOFTWARE INSTALLATION



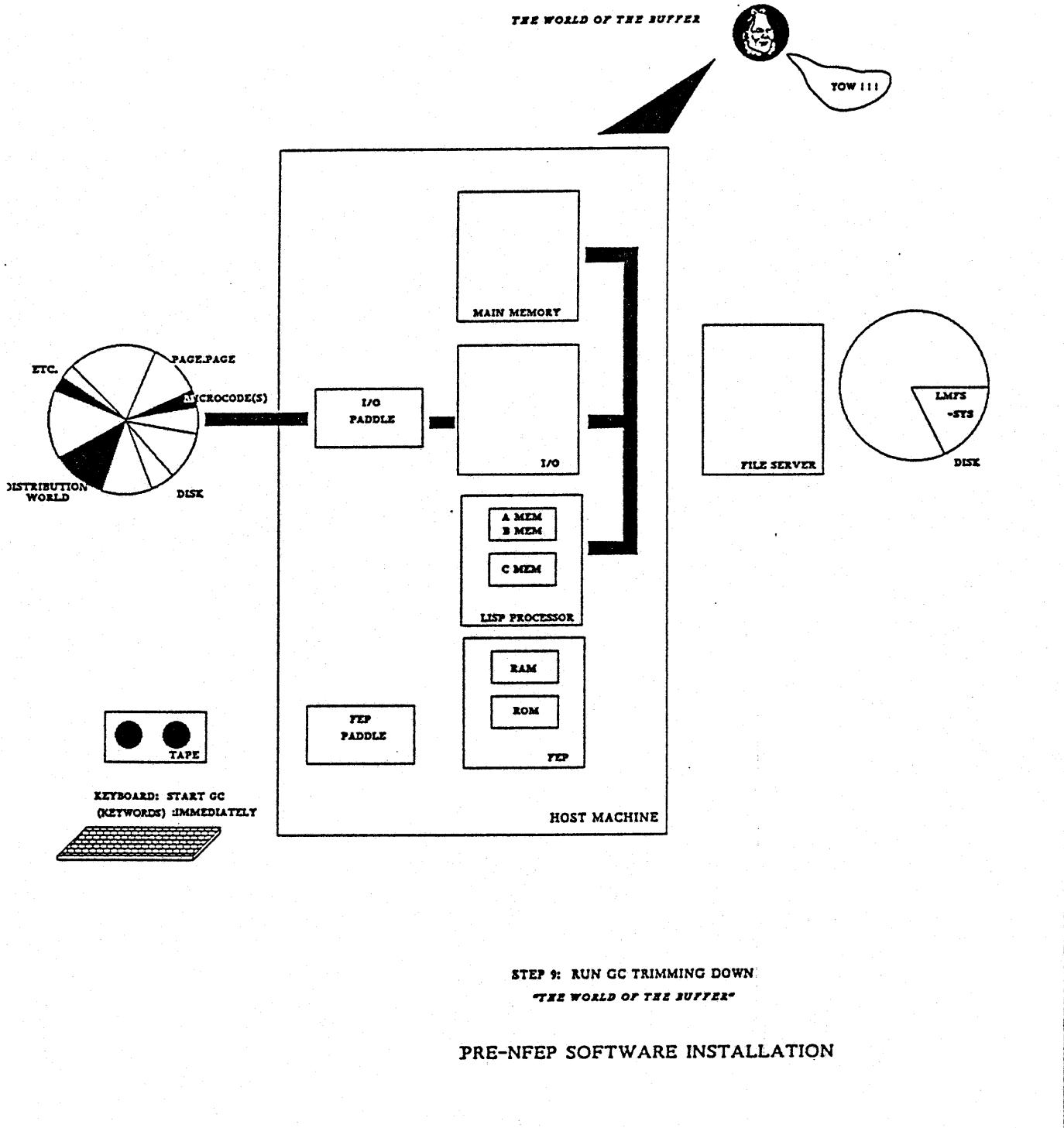


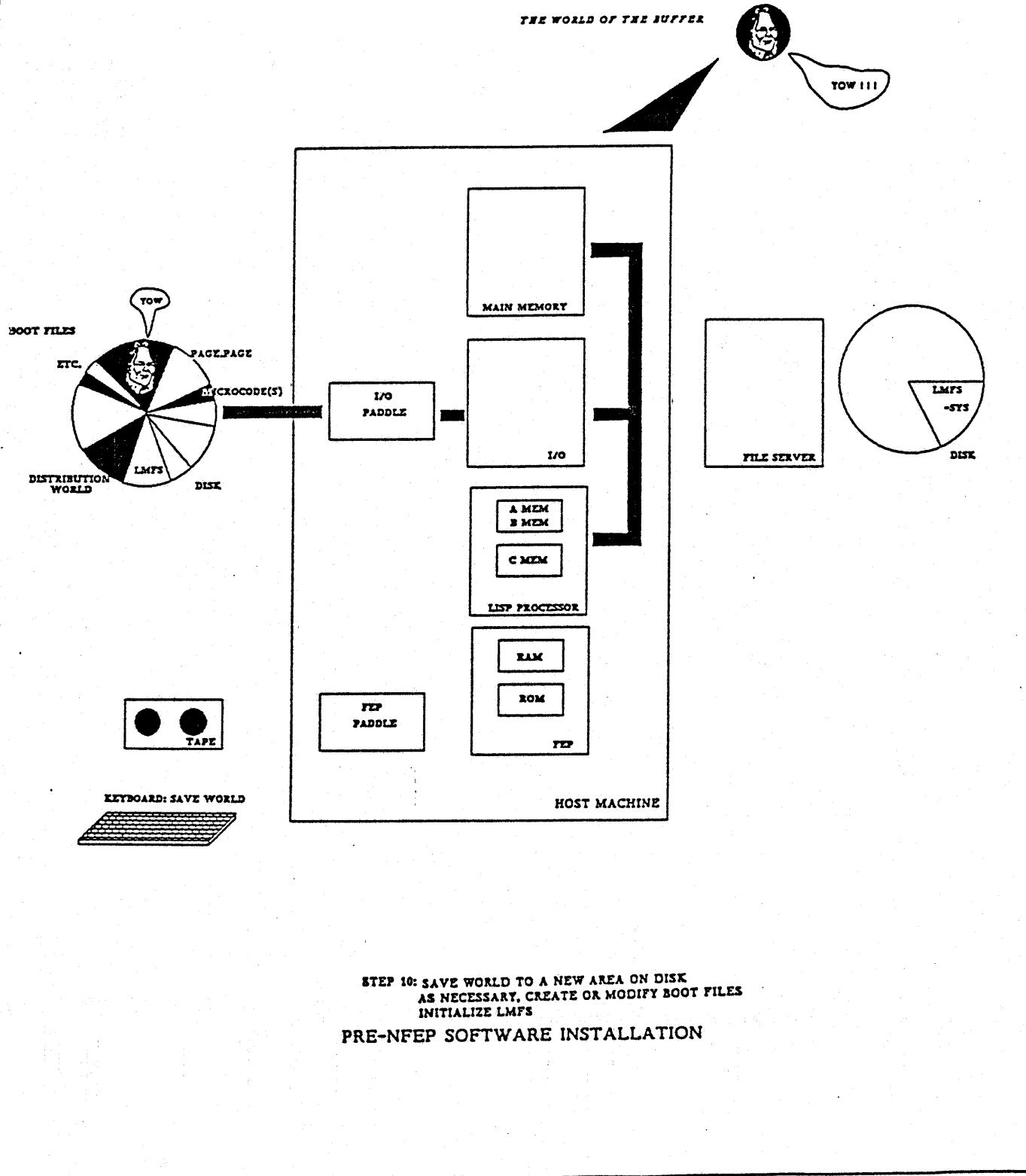


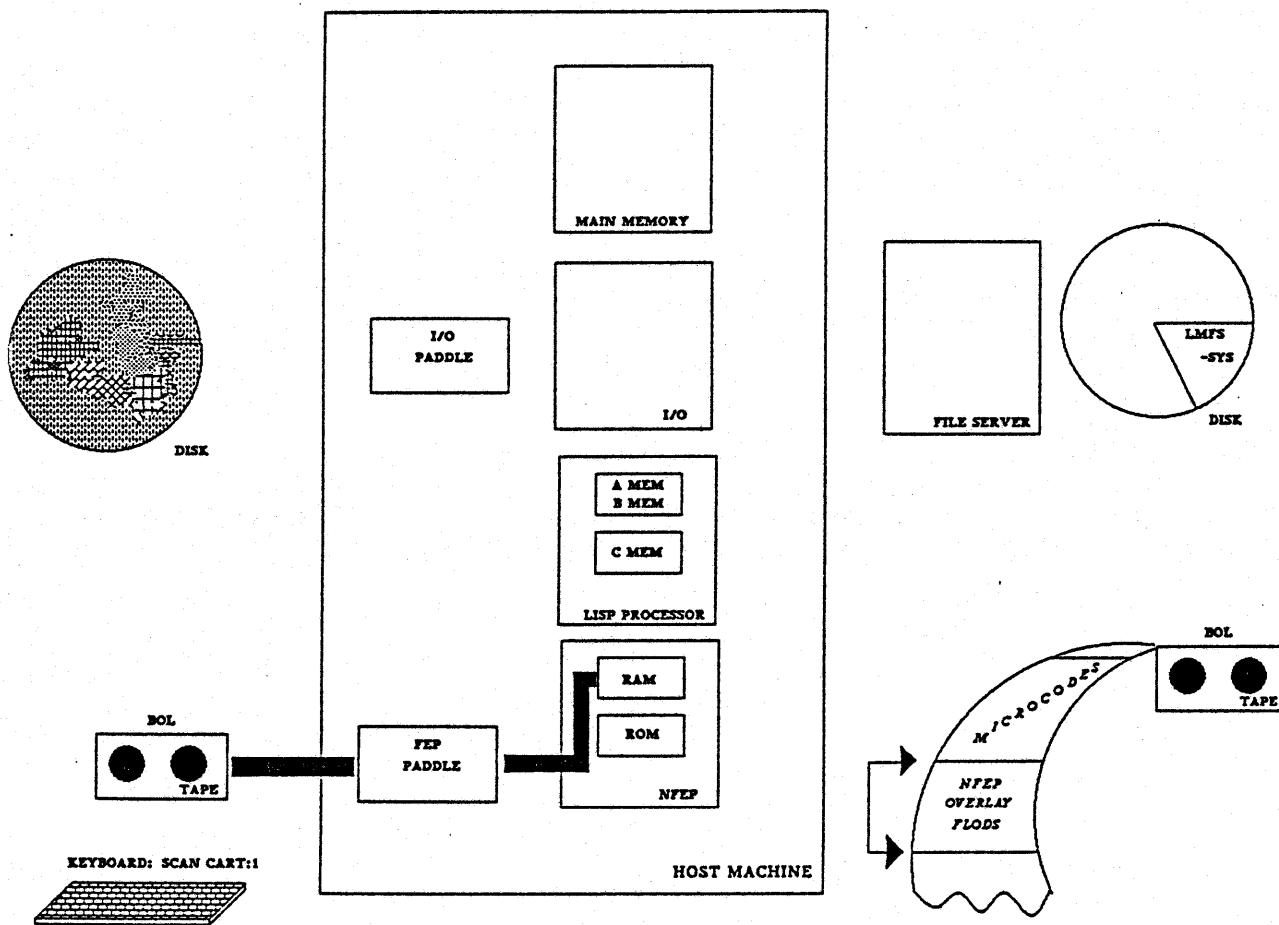
STEP 8: LOAD APPLICABLE SOFTWARE SYSTEMS FURTHER INDIVIDUALIZING

"THE WORLD OF THE BUFFER"

PRE-NFEP SOFTWARE INSTALLATION

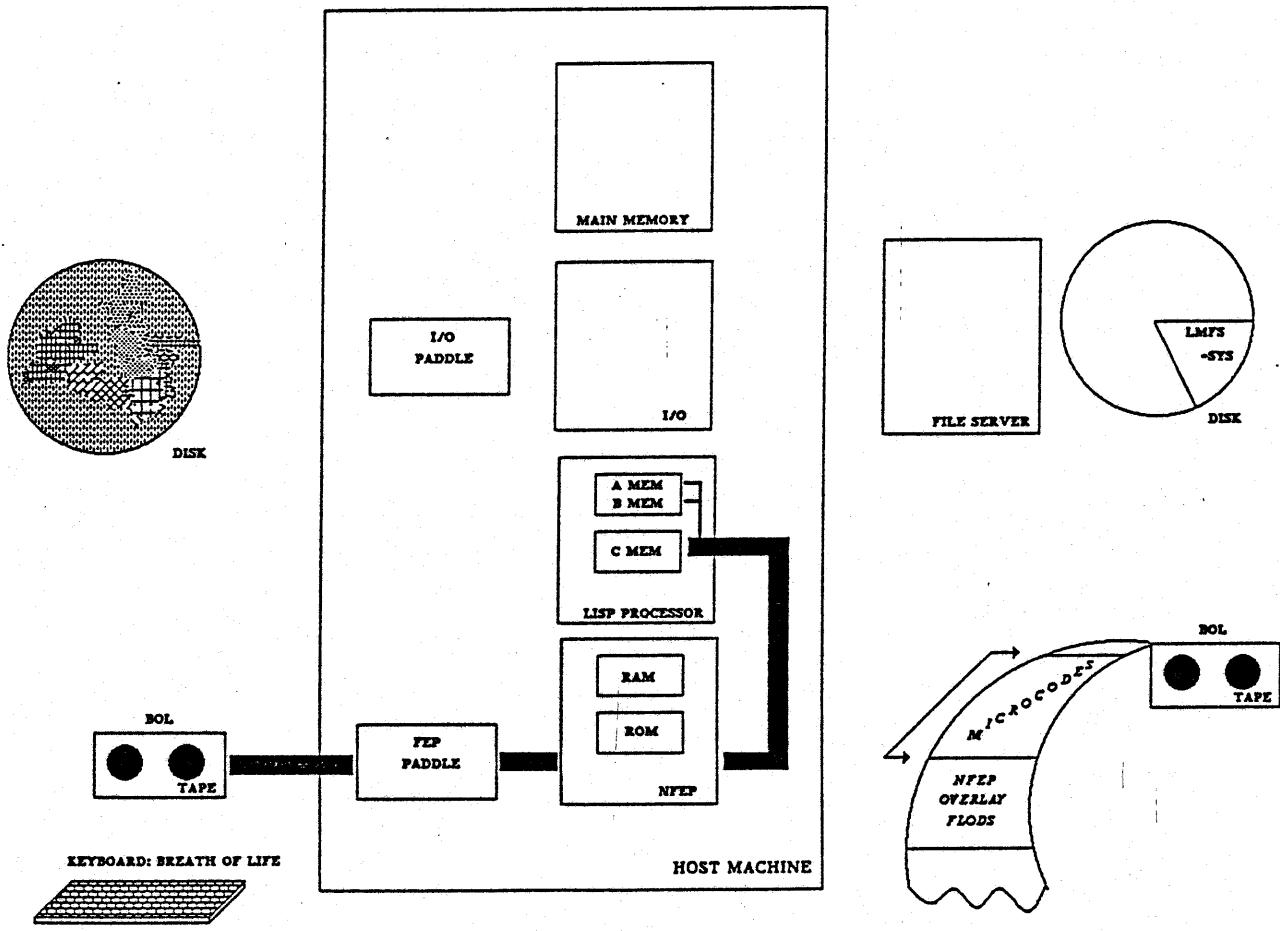






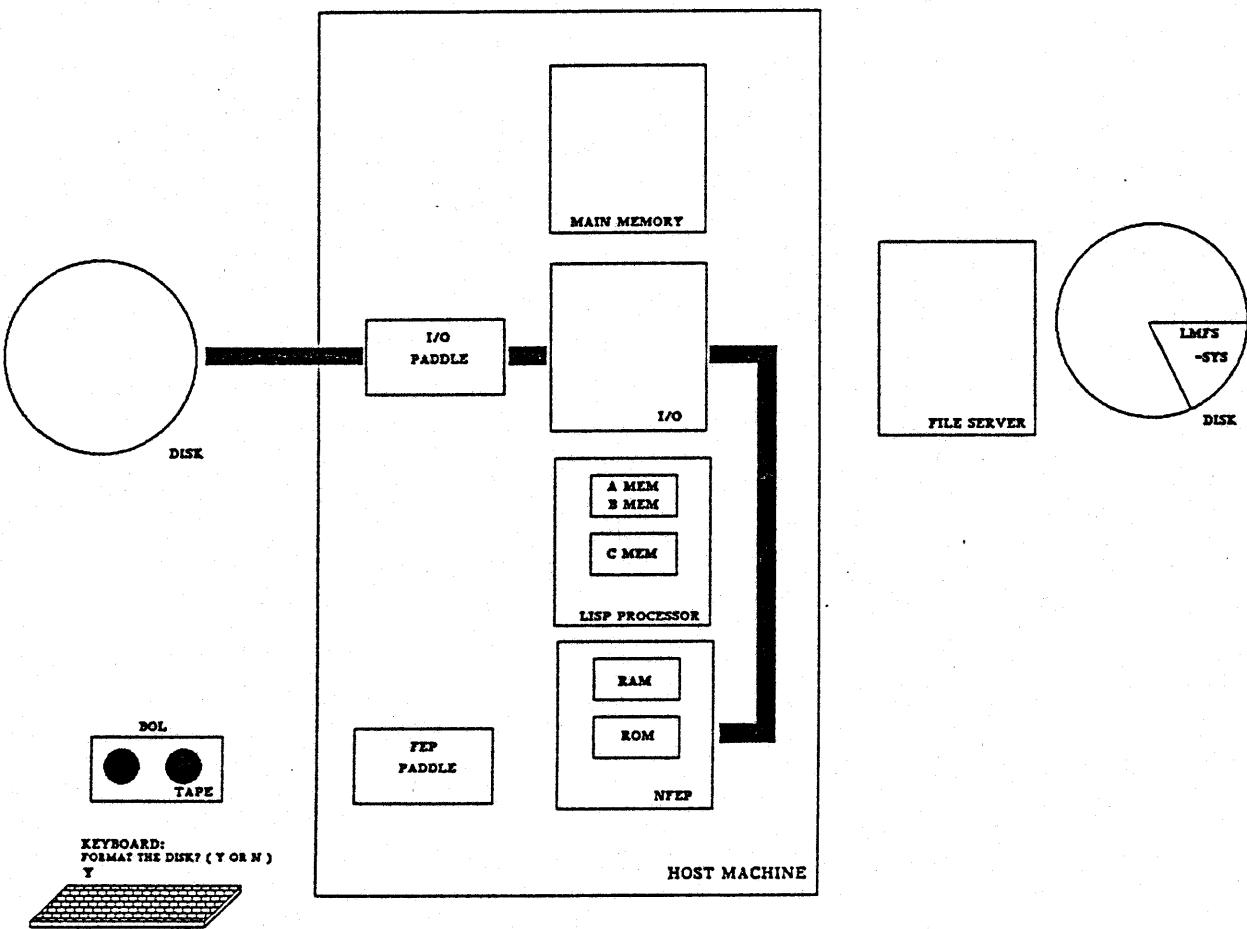
**STEP 1: TRANSFER NFEP OVERLAYS FROM BOL TAPE TO NFEP RAM
EXPANDING NFEP COMMAND CAPABILITIES**

NFEP SOFTWARE INSTALLATION



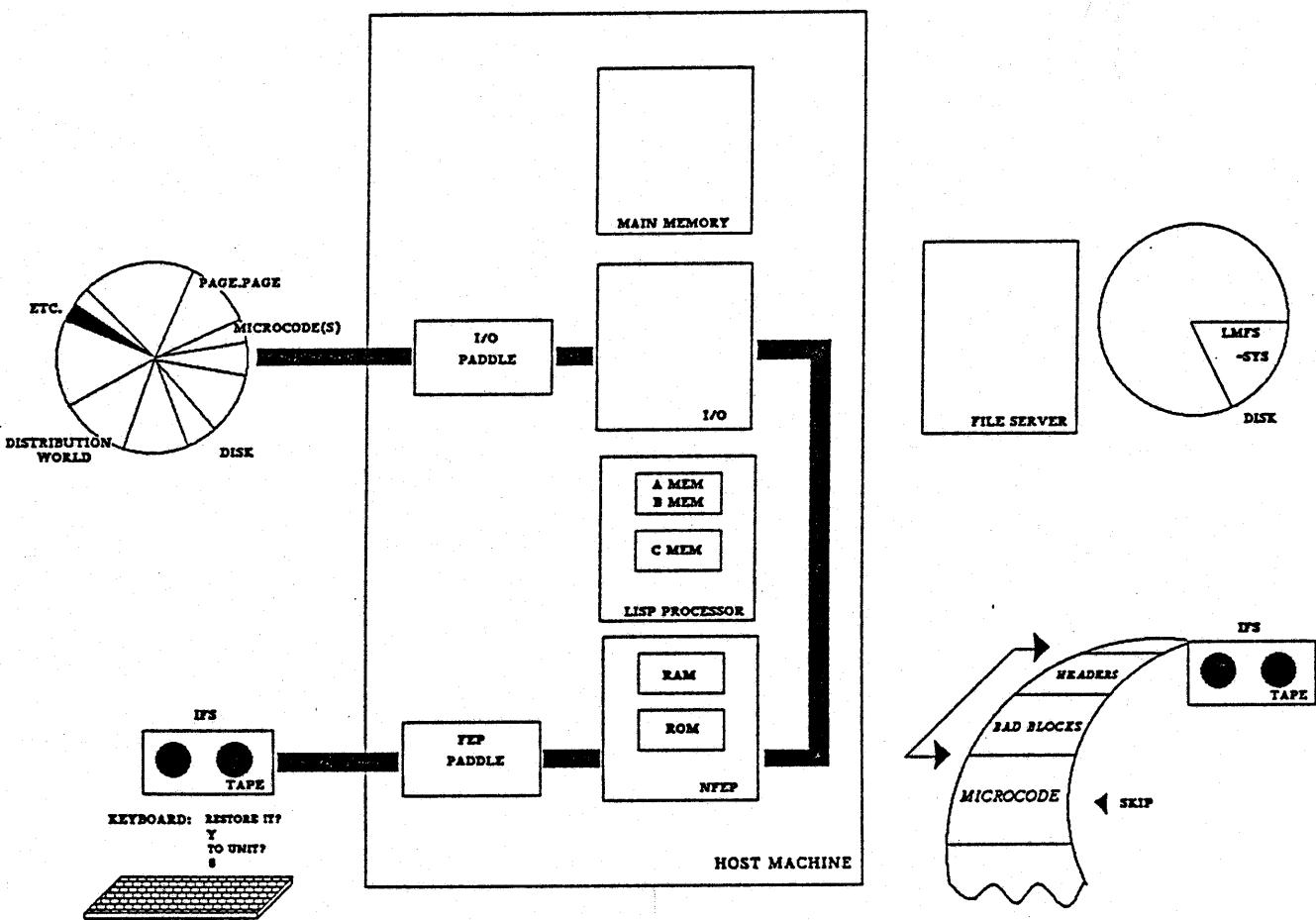
**STEP 2: TRANSFER MICROCODE FROM BOLTAPE TO LISP PROCESSOR
ALLOWING DISK WRITES AT THE FEP LEVEL**

NFEP SOFTWARE INSTALLATION



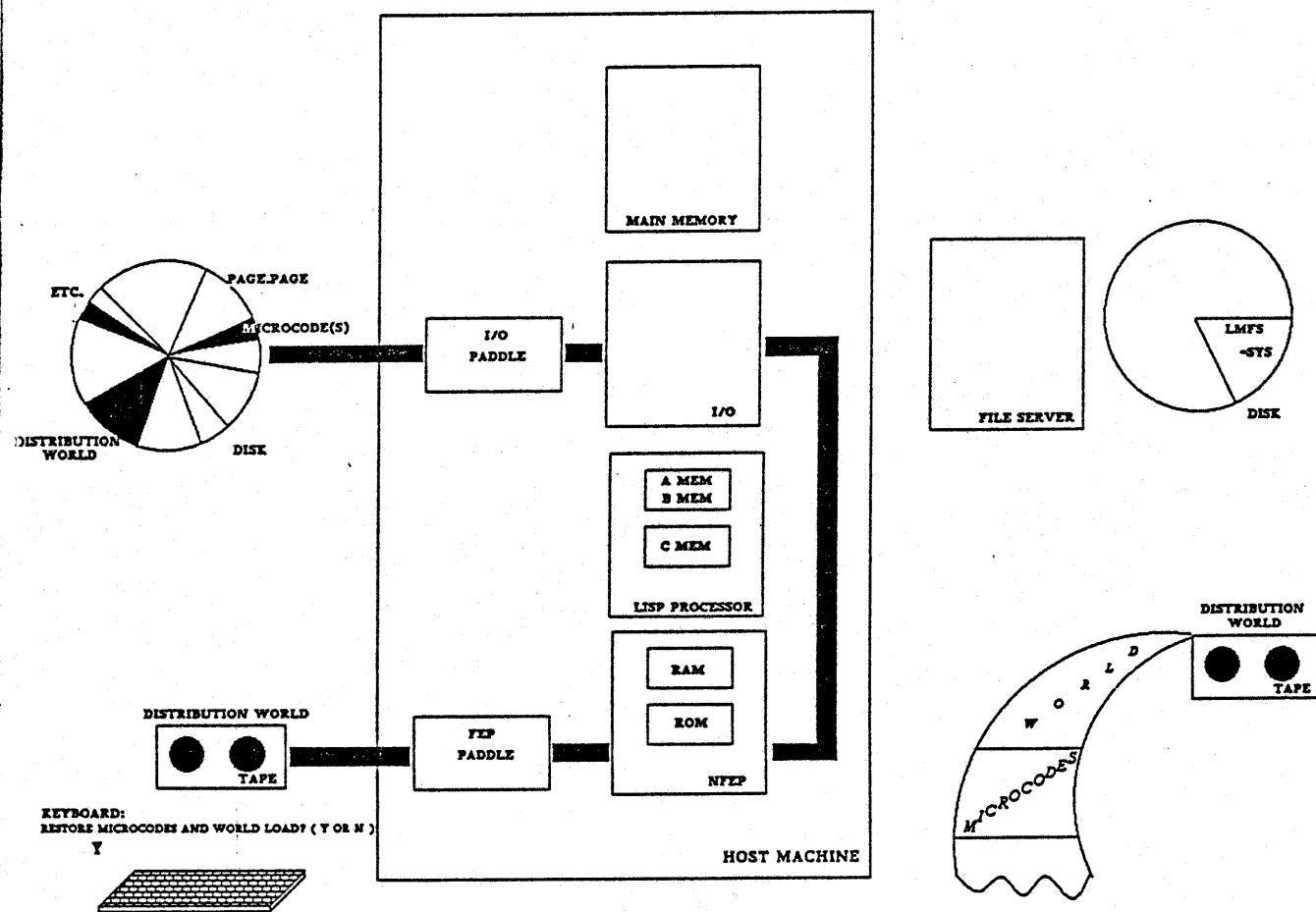
STEP 3: FORMAT DISK

NFEP SOFTWARE INSTALLATION



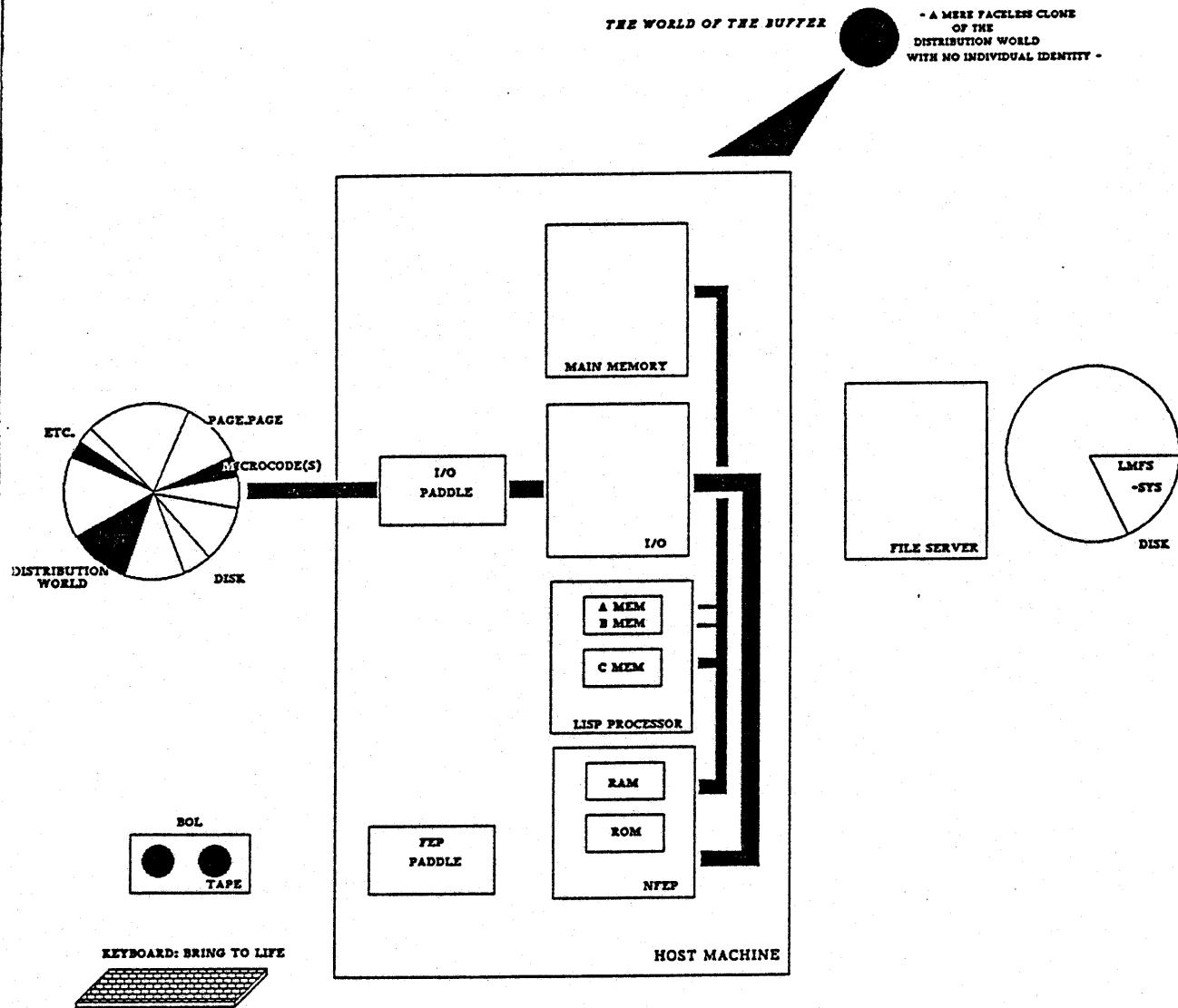
STEP 4: TRANSFER HEADERS AND BAD BLOCKS FROM IFS TAPE TO DISK

NFEP SOFTWARE INSTALLATION



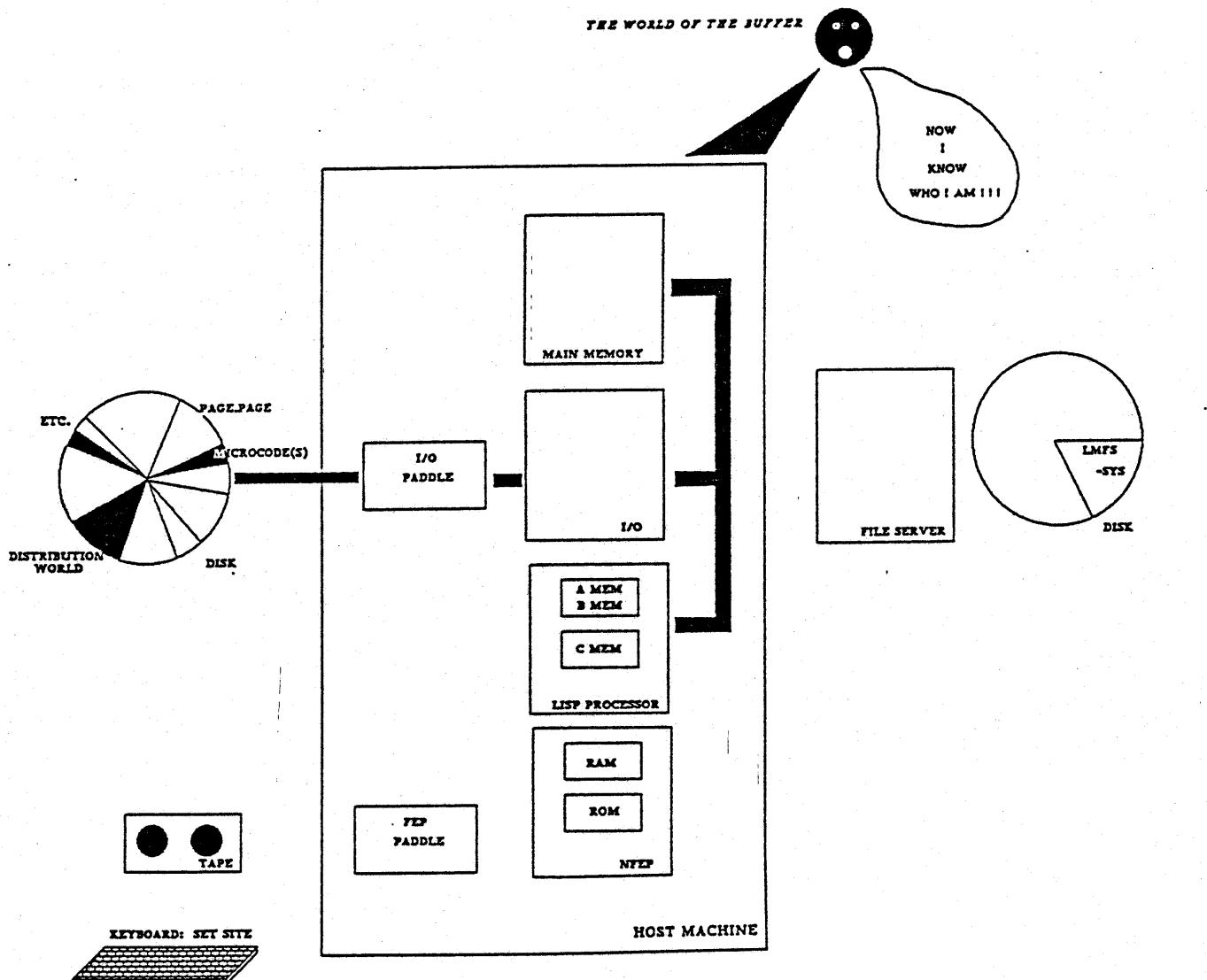
STEP 5: TRANSFER MICROCODE(S) AND WORLD
FROM DISTRIBUTION WORLD TAPE TO DISK UNDER HEADERS PROVIDED

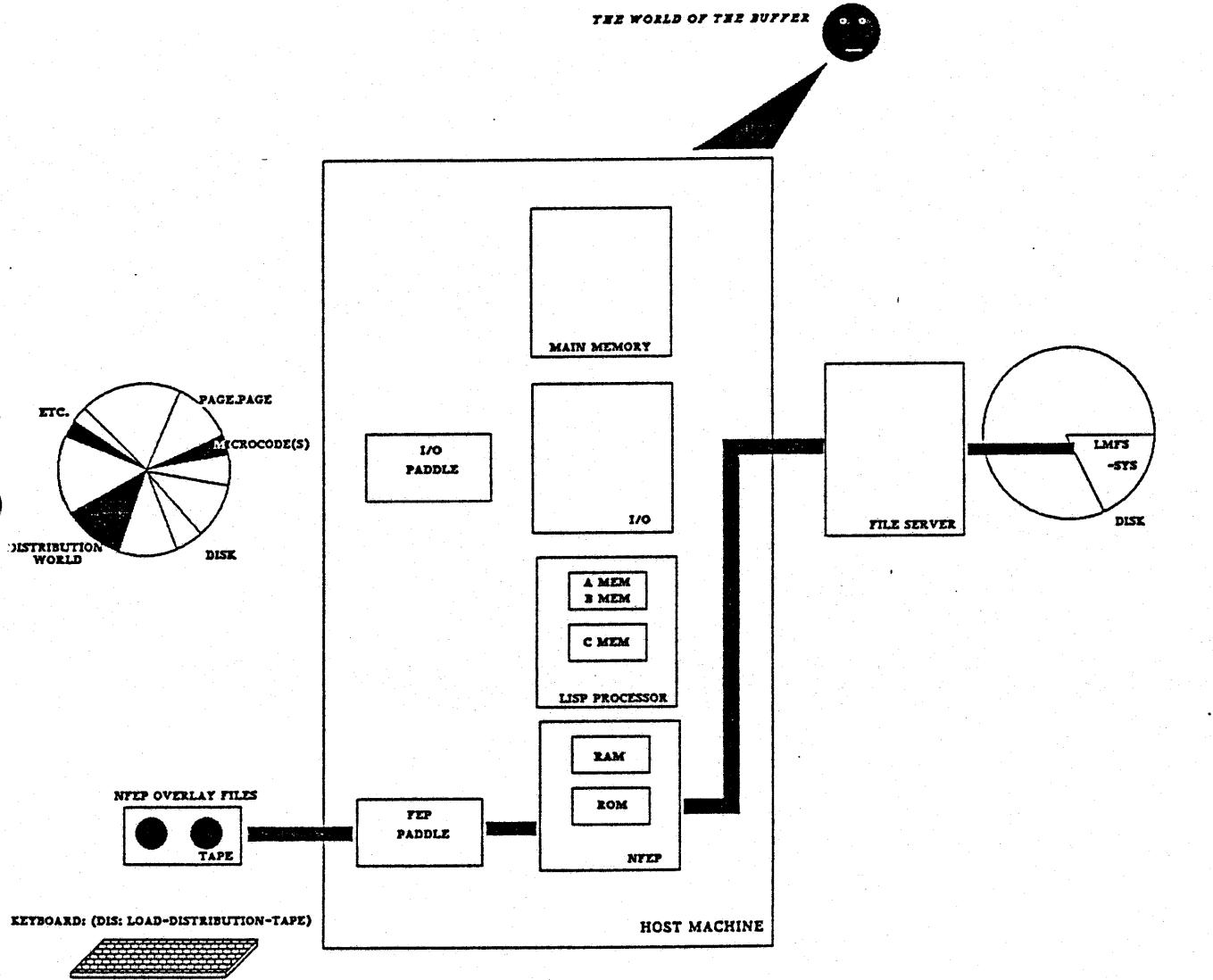
NFEP SOFTWARE INSTALLATION



STEP 6: BOOT THE MACHINE WITH A "BRING TO LIFE" COMMAND
BRINGING TO LIFE
"THE WORLD OF THE BUFFER"

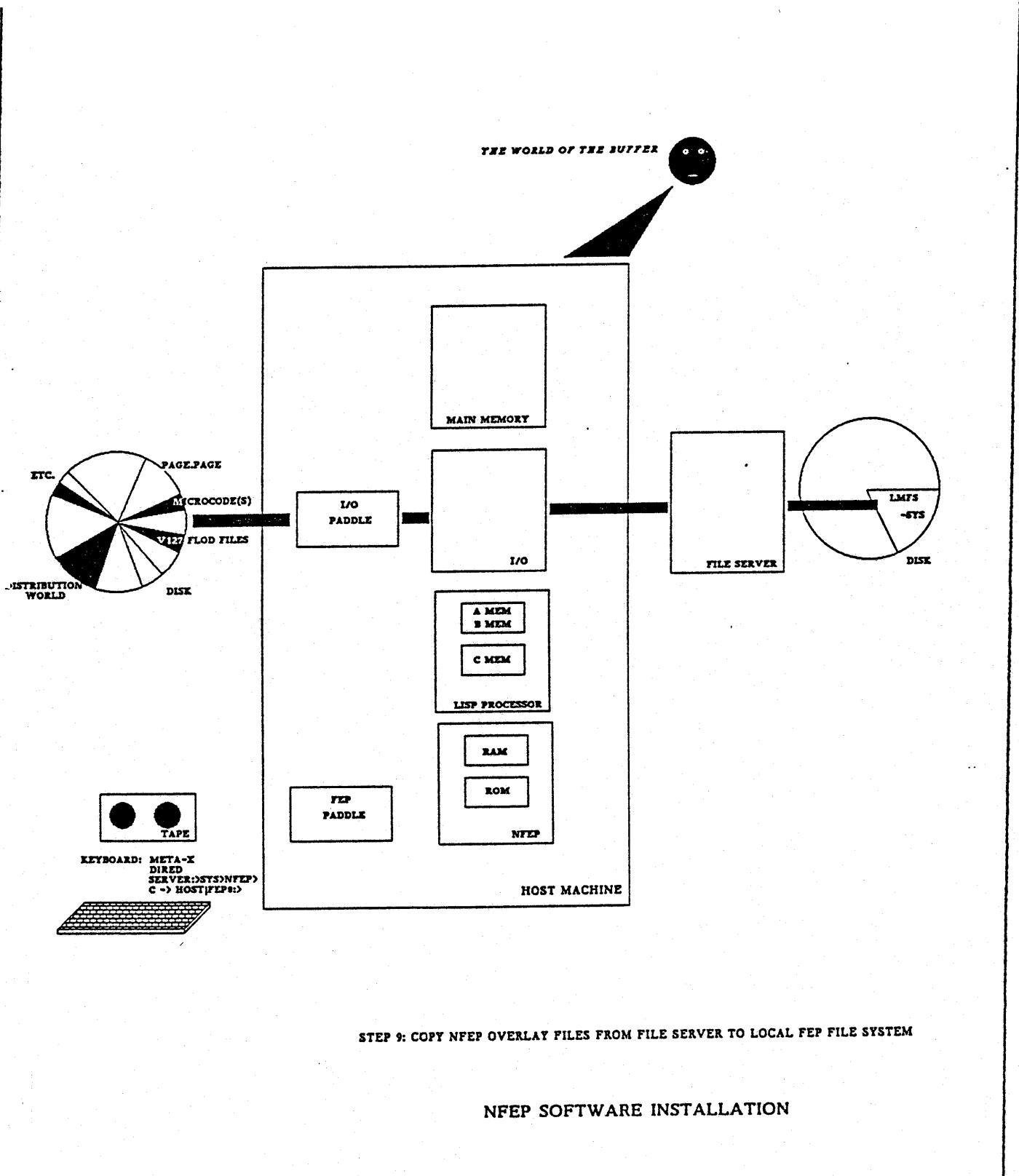
NFEP SOFTWARE INSTALLATION

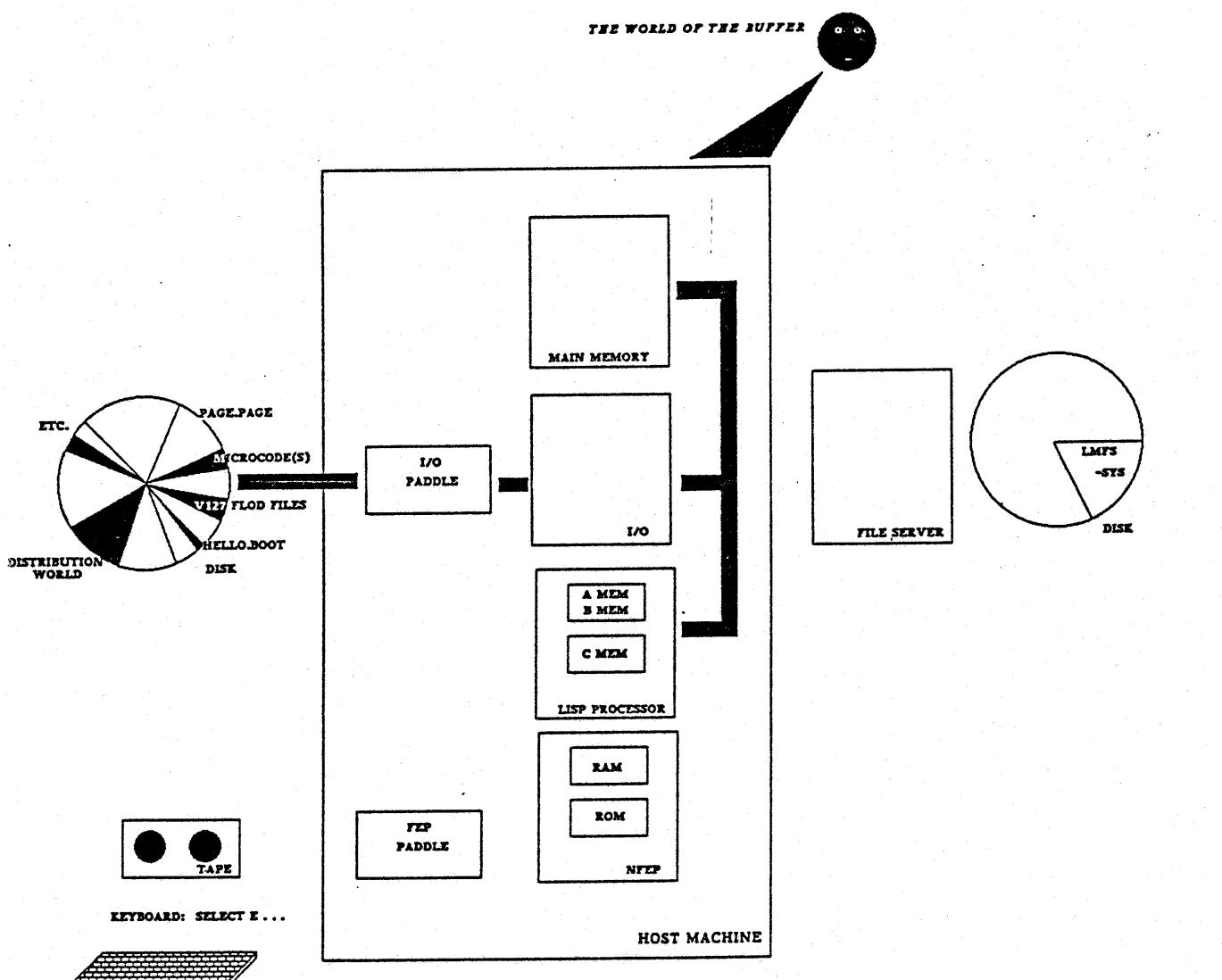




STEP 3: IF THE FILE SERVER DOES NOT ALREADY HOLD NFEPE OVERLAY FILES
TRANSFER NFEPE OVERLAY FILES FROM TAPE TO FILE SERVER

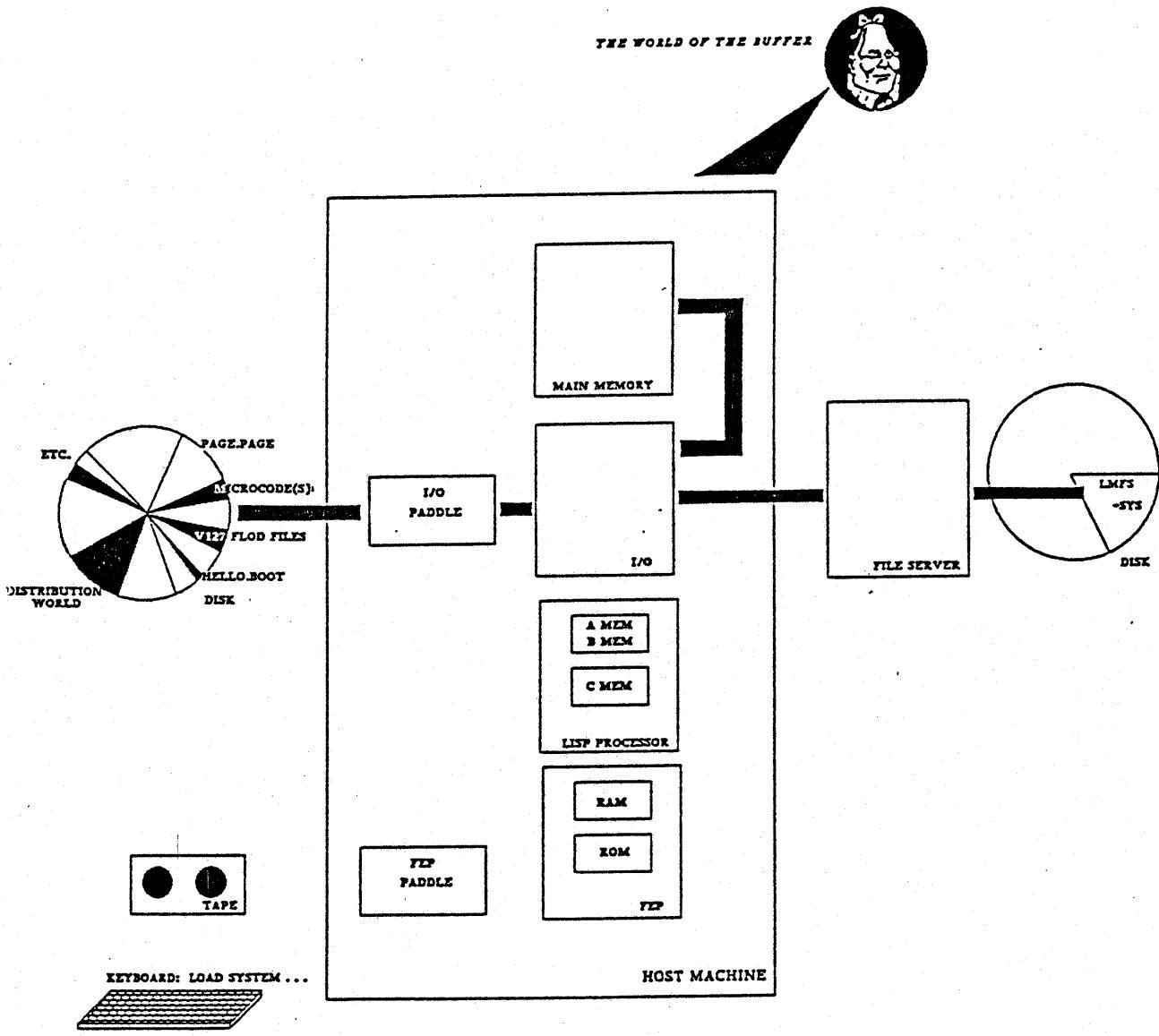
NFEPE SOFTWARE INSTALLATION





STEP 10: USING THE EDITOR WRITE A HELLO.BOOT FILE

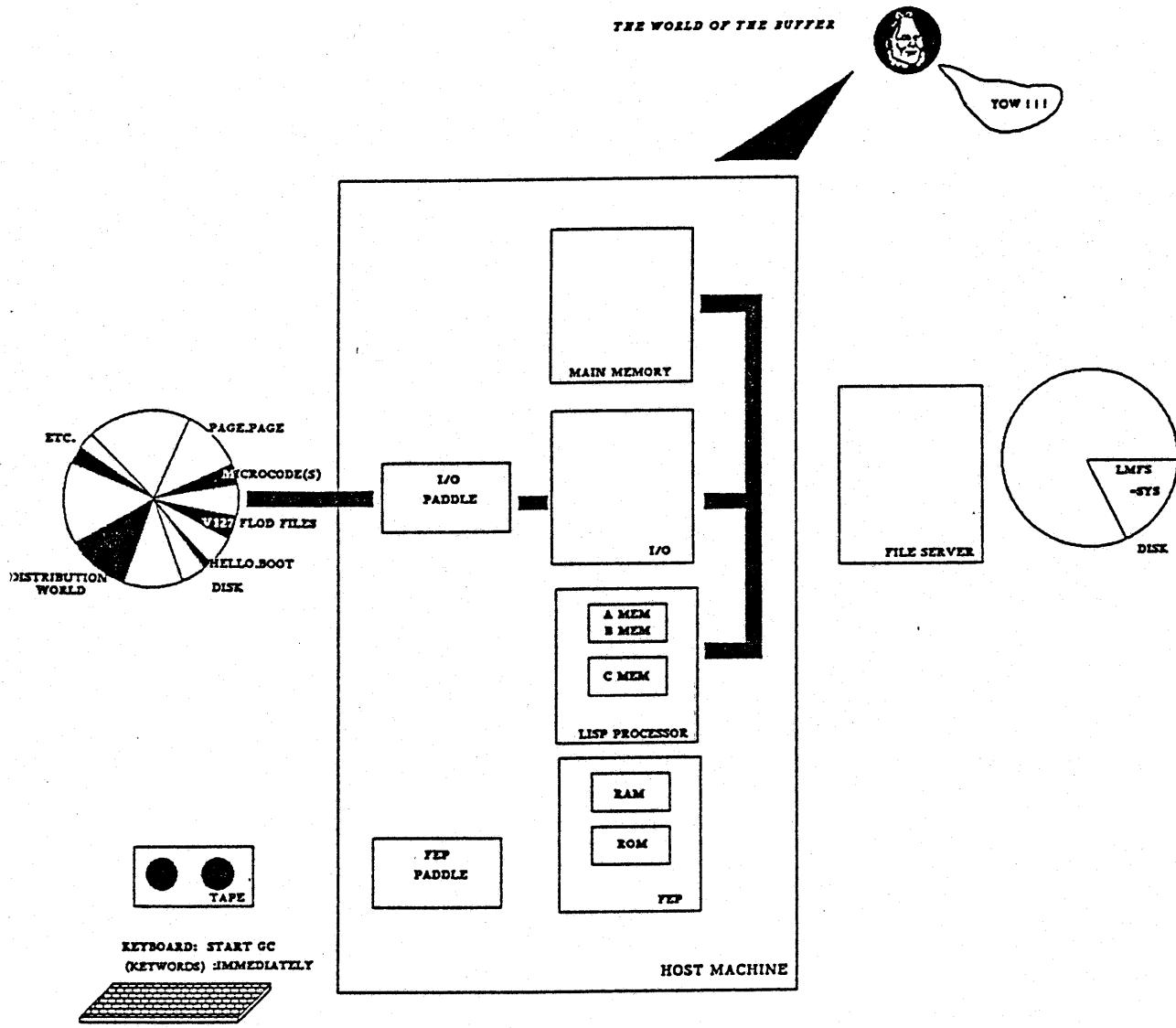
NFEP SOFTWARE INSTALLATION



STEP 11: LOAD APPLICABLE SOFTWARE SYSTEMS FURTHER INDIVIDUALIZING

"THE WORLD OF THE BUFFER"

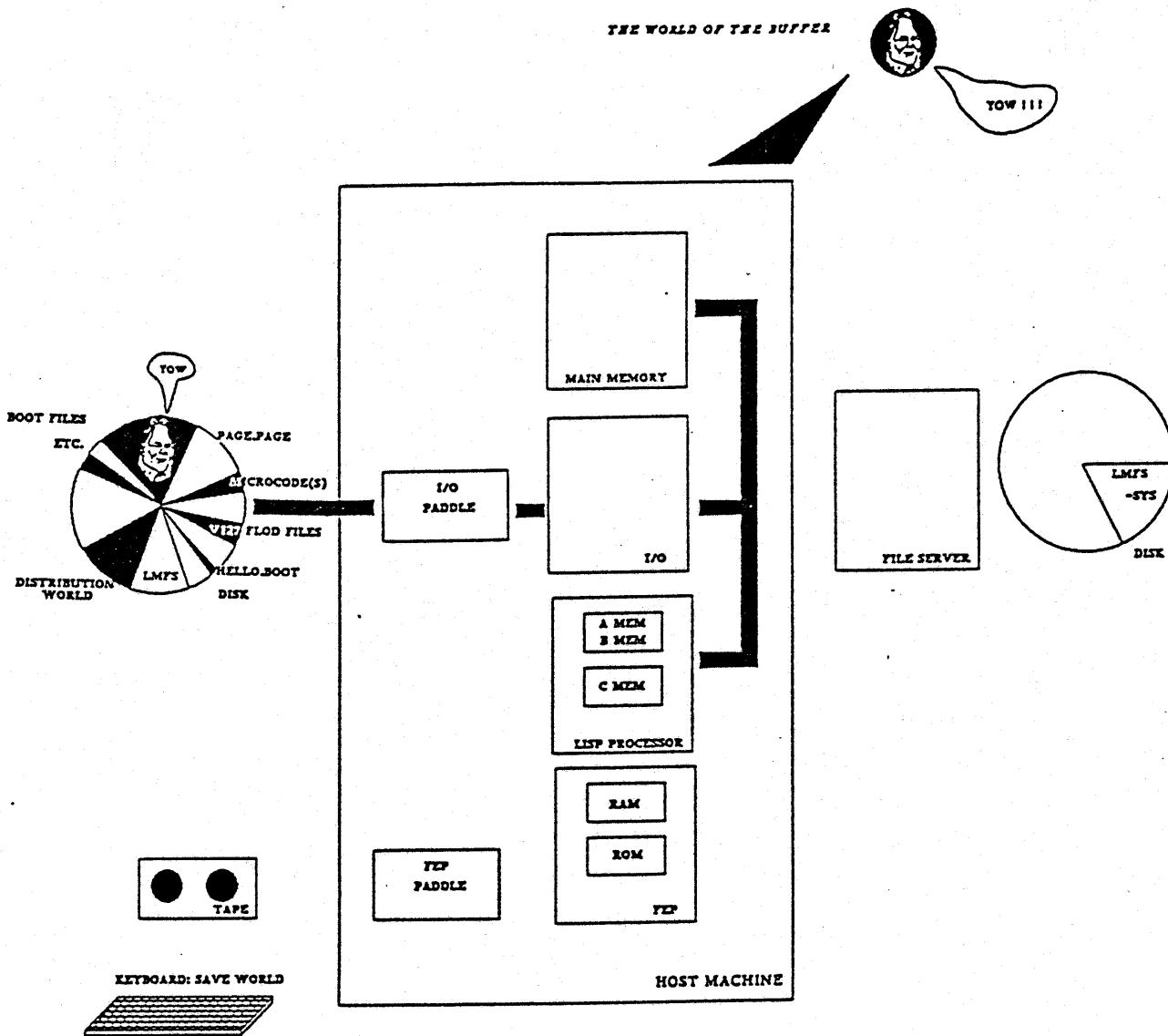
NFEP SOFTWARE INSTALLATION



STEP 12: RUN GC TRIMMING DOWN

"THE WORLD OF THE BUFFER"

NFEP SOFTWARE INSTALLATION



STEP 13: SAVE WORLD TO A NEW AREA ON DISK
AS NECESSARY, CREATE OR MODIFY BOOT FILES
INITIALIZE LMFS

NFEP SOFTWARE INSTALLATION

PRE-NFEP FILE TRANSFER
TRANSFERRING FEP FILES FROM TAPE TO DISK

a) Prerequisites

1) Valid microcode is loaded into host C memory

In order to write to disk a valid microcode must be loaded into the host C memory.
- a microcode may be loaded into a host C memory from the tape with the FEP command-

fep> LOAD MICROCODE (default is >microcode.lmic) TAPE: [RETURN]

2) Disk is formatted correctly

- a)) Reformat 3600 and 3670 disk via the FEP command- fep0>DISK FORMAT
- b)) Reformat 3640 non-NFEP disk or any other non-NFEP disk for which
DISK FORMAT does not work by loading formatting program
from formatting tape with the FEP command-

fep> LOAD FEP (default is >fep.flod) TAPE: [RETURN]

and then enter FEP command- fep0>DISK FORMAT

3) FEP files headers are in place and allocated with proper space.

- a)) In order to write to disk initially the disk must have a bad blocks file,
free page file, and FEP file headers in place and allocated with proper space.
Place the initial file system on to disk from IFS tape with the FEP command-

fep>DISK RESTORE

b)) Additional FEP files may be created and allocated with proper space

1)) To create a FEP file prior to 6.1 use LISP commands-

(WITH-OPEN-FILE (A "FEP0:>filename" :direction :output)
(SEND A :ALLOCATE file-size-in-blocks.))

-substitute appropriate entries for filename and file-size-in-blocks-
-substitute appropriate FEP # in place of FEP0:> as necessary-
-a period after the file size in blocks number indicates number is decimal-

-or-

Create a new file with c-x, c-f in the ZMACS editor
and save the empty file to the FEP FILE SYSTEM via c-x, c-s

Grow the zero-size FEP file to a larger size, use the following LISP commands-

(DEFUN GROW-FEP-FILE(NAME LENGTH)
(WITH-OPEN-FILE (STREAM NAME :DIRECTION :BLOCK :IF-EXISTS :OVERWRITE)
(SEND STREAM :ALLOCATE LENGTH)))

then input the command-

(GROW-FEP-FILE "FEP0:>filename"file size in blocks.)

-substitute appropriate entries for filename and file-size-in-blocks-
-substitute appropriate FEP # in place of FEP0:> as necessary-
-a period after the file size in blocks number indicates number is decimal-

2)) To create a 6.1 FEP file use command processor command- :CREATE FEP FILE

b) FEP files (WORLD, etc) are transferred from tape into pre-created
files with the DISK RESTORE FEP command

PRE-NFEP FILE TRANSFER

TRANSFERRING FEP FILES FROM DISK TO DISK

a) Prerequisites

- 1) Lisp worlds are loaded in both the transmitting and receiving hosts
- 2) Enough total free space exist on disk to accept new files; FEP file headers, however, need not be in place nor individually allocated with enough space.
- 3) The host machine is not doing an intra-host transfer running 5.2 software (it does not work, 5.2 machines must be loaded from tape).

b) Transferring FEP files from disk to disk

- 1) Transfer 5.2 FEP file between disks within a host or 6.0 FEP files either inter- or intra-host via LISP COMMAND-
*(SI:RECEIVE-BAND "transmitting-machine-name""transmitting-machine-file-name"
"receiving-machine-file-name")*
- 2) Transfer 6.1 FEP files via command processor.command :COPY FILE or :COPY WORLD
(files names from host are formatted- HOST/FEP0:>file name)

TRANSFERRING FEP FILES FROM DISK TO TAPE

a) Prerequisites

- 1) FEP files exist
- 2) Tape installed in cart tape

b) FEP files are written to tape from the Lisp world level via the LISP command- *(TAPE:WRITE-FEP-FILES-TO-TAPE)*

PRE-NFEP FILE TRANSFER

TRANSFERRING LMFS FILES FROM TAPE TO DISK

a) Prerequisites

- 1) LISP world is in place on host machine
- 2) Initial LMFS file is initialized

The LMFS file is initialized from the FILE SYSTEM MAINTENANCE window by clicking left on LOCAL LMFS OPERATIONS in level 1, LMFS MAINTENANCE OPERATIONS in level 2, and INITIALIZE in level 3

NOTE: Auxilliary LMFS file partitions (eg. on additional disks) may be initialized by clicking left on LOCAL LMFS OPERATIONS in level 1, clicking left on LMFS MAINTENANCE OPERATIONS in level 2, and clicking right on INITIALIZE in level 3

Click left on and input file name following "PARTITION FEP FILE"

Click left on "AUXILLIARY PARTITION"

Following prompt, input file size in blocks

An auxilliary partition is created and zeroed and an fspt.fspt file is automatically created on the initial disk linking the auxilliary partition to the initial LMFS file

- b) LMFS files in DISTRIBUTION format are transferred from tape to disk from the LISP window via lisp command - (DIS: LOAD-DISTRIBUTION-TAPE)
- c) LMFS files in CARRY Format are transferred from tape to disk from the LISP window via lisp command - (TAPE: CARRY-LOAD)
- d) LMFS files in LMFS format are transferred from tape to disk from the FILE SYSTEM MAINTENANCE window by clicking on LOCAL LMFS OPERATIONS in level 1 and READ BACKUP TAPE in level 2

TRANSFERRING LMFS FILES FROM DISK TO DISK

a) Prerequisites

- 1) LISP world is in place on both hosts
 - 2) LMFS file is initialized
- b) LMFS files are copied from disk to disk via ZMACS operations and wildcards
 - 1) Wildcards are asterisks used in place of directory or file names
 - 2) Wildcard example:

A:>**>*.**

specifies host /directories/files/types/versions

TRANSFERRING LMFS FILES FROM DISK TO TAPE

- a) DISTRIBUTION format LMFS files are transferred from disk to tape from LISP via lisp command (DIS: WRITE-DISTRIBUTION-TAPE)
- b) CARRY format LMFS files are transferred from disk to tape from LISP via lisp command (TAPE: CARRY-DUMP)
- c) LMFS format LMFS files are written to tape from the FILE SYSTEM MAINTENANCE window by clicking on LOCAL LMFS OPERATIONS in level 1 and COMPLETE DUMP or INCREMENTAL DUMP in level 2

3600 SERIES PREVENTATIVE MAINTENANCE PROGRAM

THE FOLLOWING IS A RECOMMENDED PREVENTATIVE MAINTENANCE PROGRAM FOR 3600 SERIES SYSTEMS.
PM'S FOR EQUIPMENT LISTED IN ENTRIES II. THROUGH VI. ARE EXCERPTED FROM APPLICABLE VENDOR MANUALS. PM
FREQUENCY FOR ITEMS MARKED "AS REQUIRED" ARE DISCRETIONARY (i.e., MAY BE SET BY INDIVIDUAL FIELD OFFICES).

| EQUIPMENT | RECOMMENDED FREQUENCY |
|-----------------------------------------------------------------------------------------|-----------------------|
| I. 3600/3640/3645/3670/3675 SYMBOLIC PROCESSING UNITS | |
| A. CLEAN SPU EXTERIOR WITH WINDEX OR OR EQUIVALENT COMMERCIAL GRADE PLASTIC CLEANER | AS REQUIRED |
| B. CLEAN SPU INTERIOR OF DUST | AS REQUIRED |
| C. CLEAN MOUSE WITH 95% ISOPROPYL ALCOHOL OR EQUIV. | AS REQUIRED |
| D. OPTIONALLY CHECK DC VOLTAGES AND ADJUST TO 0.5% ACCURACY | AS REQUIRED |
| II. B & W AND COLOR CONSOLES | |
| A. CLEAN INSIDE OF CHASSIS OF DUST | AS REQUIRED |
| B. CLEAN SCREEN WITH OCLI CLEANER (P/N 128295). WIPE AND DRY. | AS REQUIRED |
| C. CLEAN CHASSIS EXTERIOR WITH WINDEX OR OR EQUIVALENT COMMERCIAL GRADE PLASTIC CLEANER | AS REQUIRED |
| D. OPTIONALLY CHECK DC VOLTAGES AND ADJUST TO 0.5% ACCURACY | AS REQUIRED |
| E. INSPECT PICTURE QUALITY AND PERFORM ANY ADJUSTMENTS INDICATED | AS REQUIRED |

III. TAPE DRIVES

A. CIPHER TD 20 (3600)

1. CLEAN HEAD ASSEMBLY AND TAPE CLEANER
WITH CLEAN, LINTLESS COTTON SWAB DAMPENED WITH IBM HEAD CLEANING SOLUTION
OR 95% ISOPROPYL ALCOHOL (TAPE HEAD CLEANER P/N 180142, REFILL 180148) 8 HOUR INTERVALS IN NORMAL USE
2 HOUR INTERVALS WHEN USING
NEW TAPE CARTRIDGES
2. CLEAN CAPSTAN WITH CLEAN, LINTLESS COTTON SWAB
MOISTENED WITH DISTILLED WATER WHILE MANUALLY ROTATING CAPSTAN.
DO NOT TOUCH CAPSTAN WITH FINGERS. 8 HOUR INTERVALS IN NORMAL USE
2 HOUR INTERVALS WHEN USING
NEW TAPE CARTRIDGES

B. ARCHIVE #5945 SCORPION (3640)

1. CLEAN HEAD ASSEMBLY AND TAPE HOLE SENSOR WITH CLEAN, LINTLESS COTTON SWAB
DAMPENED WITH IBM HEAD CLEANING SOLUTION OR 95% ISOPROPYL ALCOHOL 8 HOUR INTERVALS IN NORMAL USE
2 HOUR INTERVALS WHEN USING
NEW TAPE CARTRIDGES

C. ARCHIVE #9045 SIDEWINDER (3670)

1. CLEAN HEAD ASSEMBLY AND TAPE HOLE SENSOR WITH CLEAN, LINTLESS COTTON SWAB
DAMPENED WITH IBM HEAD CLEANING SOLUTION OR 95% ISOPROPYL ALCOHOL 8 HOUR INTERVALS IN NORMAL USE
2 HOUR INTERVALS WHEN USING
NEW TAPE CARTRIDGES

D. CIPHER TD 80

1. CLEAN HEADS
USING LINT-FREE COTTON SWAB MOISTENED WITH TRICLOROETHANE OR EQUIV HEAD CLEANER DAILY
2. CLEAN HOUSING WITH WINDEX OR EQUIVALENT PLASTIC CLEANER AS REQUIRED
3. CLEAN TACHOMETER ROLLER AND GUIDES
USING LINT-FREE COTTON SWAB MOISTENED WITH TRICLORO-TRIFLUOROETHANE DAILY
4. CLEAN TAPE CLEANER MOISTENED WITH TRICLOROETHANE OR EQUIV HEAD CLEANER DAILY
5. CLEAN REEL-HUB PADS
USING LINT-FREE COTTON SWAB MOISTENED WITH TRICLORO-TRIFLUOROETHANE DAILY
6. REPLACE REEL MOTORS AFTER 5000 HOURS OF NORMAL USE
7. CLEAN FILTER (BLOW OFF LOOSE DIRT) AFTER 1000 HOURS OF NORMAL USE

IV. DISK DRIVES

A. CDS T300 AND T306

1. CLEAN EXTERNAL CABINET SURFACES WITH WINDEX OR EQUIV. BI-MONTHLY
2. EXTEND HEADS INTO DISK PACK NO MORE THAN 3/8-INCH. INSPECT READ-WRITE HEADS FOR DAMAGE OR CONTAMINATION. REPLACE OR CLEAN WITH LINT-FREE CLOTH DAMPENED WITH FREON TF AS NECESSARY. BI-MONTHLY
3. INSPECT AND CLEAN CARRIAGE AND WAY ASSEMBLY RAILS FOR POSSIBLE DUST, DIRT, OR CONTAMINATION BI-MONTHLY
4. WIPE THE INSIDE OF THE AIR SHROUD WITH A LINT-FREE CLOTH DAMPENED WITH ALCOHOL. WIPE DRY AND REMOVE RESIDUE. CLEAN THE INSIDE OF THE PACK ARE LID WITH ALCOHOL DAMPENED CLOTH. WIPE DRY AND REMOVE RESIDUE. INSPECT LID GASKET AND WIPE CLEAN WITH ALCOHOL-DAMPENED CLOTH. CLEAN THE SPINDLE SURFACE WITH 30% SOLUTION ALCOHOL. USE ALCOHOL-MOISTENED Q-TIP TO CLEAN CLEAN THREADS OF SPINDLE HOLE - WIPE DRY WITH SWAB. BI-MONTHLY
5. INSPECT AND CLEAN SPINDLE GROUNDING BRUSH.
(RESISTANCE BETWEEN BRUSH AND SPINDLE SHOULD BE LESS THAN 0.5 OHMS.) BI-MONTHLY
6. INSPECT SPINDLE DRIVE BELT FOR FRAYING OR DAMAGE. REPLACE AS NECESSARY. BI-MONTHLY
7. INSPECT INTAKE FILTER. CLEAN WITH VACCUUM. REPLACE IF BADLY CLOGGED. BI-MONTHLY
8. INSPECT AIR SYSTEM BOOT FOR DETERIORATION. REPLACE AS NECESSARY. BI-MONTHLY
9. CLEAN INTERNAL CABINET SURFACES WITH SOFT BRUSH OR VACCUUM. SEMI-ANNUALLY
10. CHECK DC VOLTAGES (EXCEPT + OR - 50 V). ADJUST TO 0.5% ACCURACY AS NECESSARY. SEMI-ANNUALLY
11. CHECK HEAD ALIGNMENT. SEMI-ANNUALLY
12. CHECK PROPER OPERATION OF ALL MICROSWITCHES. ADJUST OR REPLACE AS NECESSARY. SEMI-ANNUALLY.
13. CHECK PROPER OPERATION OF SPINDLE DRIVE SYSTEM. ADJUST AS NECESSARY. SEMI-ANNUALLY
14. REPLACE ABSOLUTE AIR FILTER. ANNUALLY

B. FUJITSU M2284

-NO ROUTINE PM REQUIRED

C. FUJITSU M2294

-NO ROUTINE PM REQUIRED

D. FUJITSU M2351

1. REPLACE AIR FILTER

ANNUALLY OR AS NECESSARY

E. NEC D2257

-NO ROUTINE PM IS REQUIRED.

F. MAXTOR XT-1140

-NO ROUTINE PM IS REQUIRED.

G. MAXTOR XT-2190

-NO ROUTINE PM IS REQUIRED.

H. PRIAM P807

-NO ROUTINE PM IS REQUIRED.

I. CDC EMD368

-NO ROUTINE PM NECESSARY

J. CDC EMD515

-NO ROUTINE PM NECESSARY

V. PRINTERS

A. DMP-1

1. WIPE OUT INK RIBBON DEBRIS AT TIP OF PRINT HEAD AND CARD GUIDE ASSY. AS REQUIRED
2. CLEAN THE PLATEN WITH FEDRON OR TYPEWRITER PLATEN CLEANER. AS REQUIRED
3. CLEAN THE PRINTER CASE WITH WINDEX OR EQUIV. AS REQUIRED
4. INSPECT PRINT QUALITY AND PERFORM ANY ADJUSTMENTS INDICATED AS REQUIRED

B. LGP-1

1. REPLACE THE FOLLOWING ASSEMBLIES:

| | |
|--------------------------------------------------------------------|---------------|
| SEPARATION BELT CLEANER | 8,000 PRINTS |
| SEPARATION BELT | 24,000 PRINTS |
| CASSETTE SIDE RETAINERS | 48,000 PRINTS |
| CORONA WIRES | 48,000 PRINTS |
| SCRAPER | 48,000 PRINTS |
| SECONDARY SCRAPER | 48,000 PRINTS |
| CLEANING BLADE, ELECTRODE ROLLER | 48,000 PRINTS |
| PUMP FILTER | 96,000 PRINTS |
| AIR FILTER | 96,000 PRINTS |
| ANTI-DUST AIR FILTER (LBP10II ONLY) | 96,000 PRINTS |
| SEPARATION ROLLER | 96,000 PRINTS |
| CLEANING BLADE, PHOTOSENSITIVE DRUM | 96,000 PRINTS |
| EXPOSURE LAMP | 96,000 PRINTS |
| CLEANING ROLLER | 96,000 PRINTS |
| BUSHING | 96,000 PRINTS |
| SPACER ROLLER | 96,000 PRINTS |
| 2. CHECK AND CLEAN CORONAS | AS REQUIRED |
| 3. CHECK AND CLEAN SEPARATION BELT ASSY. | AS REQUIRED |
| 4. CHECK AND CLEAN EDGE OF CLEANING BLADE FOR THE ELECTRODE ROLLER | AS REQUIRED |
| 5. CHECK AND REPLACE AS NECESSARY THE TONER-SUPPLY VALVE | AS REQUIRED |
| 6. CHECK AND CLEAN TWO DRAIN HOLES IN DEVELOPER TRAY | AS REQUIRED |
| 7. REMOVE ACCUMULATED TONER ON THE DRUM FLANGE | AS REQUIRED |
| 8. INSPECT PRINT QUALITY AND PERFORM ANY ADJUSTMENTS INDICATED | AS REQUIRED |

C. LGP-2

1. INSPECT THE FOLLOWING ITEMS AND REPLACE IF NECESSARY:

| | |
|------------------------|----------------|
| SEPARATION BELT | 50,000 PRINTS |
| FUSING ASSY | 100,000 PRINTS |
| PRE-EXPOSURE UNIT | 100,000 PRINTS |
| TRANSFER CORONA ASSY | 100,000 PRINTS |
| SEPARATION/FEEDER UNIT | 100,000 PRINTS |
| FEED ROLLER | 100,000 PRINTS |
| PAPER FEED ROLLER | 100,000 PRINTS |
| PAPER PICKUP ROLLER | 100,000 PRINTS |

2. INSPECT THE LIGHT BLOCKING SHUTTER AND REPLACE IF NECESSARY.

3. CLEAN THE FOLLOWING ITEMS:

| | |
|------------------------------------------|-------------|
| SEPARATION CLAWS | AS REQUIRED |
| DELIVERY GUIDE | AS REQUIRED |
| SEPARATION GUIDE | AS REQUIRED |
| PAPER GUIDE | AS REQUIRED |
| TONER FEED ROLLERS | AS REQUIRED |
| TRANSFER GUIDES | AS REQUIRED |
| TRANSFER CORONA ASSEMBLY | AS REQUIRED |
| SEPARATION BELT | AS REQUIRED |
| SEPARATION ROLLER | AS REQUIRED |
| SEPARATION GUIDE | AS REQUIRED |
| FUSING FEED ROLLER | AS REQUIRED |
| PRIMARY CORONA WIRE | AS REQUIRED |
| PROTECTIVE SHEILD OF PHOTOSENSITIVE DRUM | AS REQUIRED |
| PHOTOSENSITIVE DRUM SURFACE | AS REQUIRED |

4. INSPECT PRINT QUALITY AND PERFORM ANY ADJUSTMENTS INDICATED

VI. MODEMS

A. RACAL VEDIC VA 3450 P/S/G-SERIES

-NO ROUTINE PM IS REQUIRED.

B. CONCORD 224

-NO ROUTINE PM IS REQUIRED.