60456530

CONTROL DATA

MSL 15X
OFF-LINE MAINTENANCE
SOFTWARE LIBRARY
REFERENCE MANUAL

CDC® COMPUTER SYSTEM:

CYBER 170 MODELS 815, 825, 835
845, AND 855
CYBER 180 MODELS 810, 830, 835, 840,
845, 850, 855, 860, 960, 962, 990, 990E,
992, 994, AND 995E

REVISION RECORD

REVISION	DESCRIPTION
A (11-04-80)	Manual released on microfiche.
B (04-15-81)	Manual revised to release R01 L124. Revision includes an update to CTI/HVS. Miscellaneous corrections are also made.
C (09-02-81)	Manual revised to include procedure for CYBER 170 Model 825. Miscellaneous corrections are also made.
D (12-18-81)	Manual revised to release L132. Revisions include documentation of CAU utility and enhancements to HDP, CDT and TDX. Revision includes addition of the former DEMOT reference manual in section 5. Due to extensive changes, change bars and dots are not used and each page reflects the current revision.
E (06-18-82)	Manual revised to release L137. Manual includes procedures for CYBER 170 Model 855 Computer System. Revision includes addition of VP, VC, and VK commands, on-line edit utility, and miscellaneous corrections. This revision is a printed manual that obsoletes all previous microfiche editions of this manual.
F (11-22-82)	Manual revised to release L143. Manual includes procedures for CYBER 170 model 815 Computer System. Revision includes addition of power-on initialization procedures and miscellaneous corrections. This edition obsoletes all previous editions.
G (05-02-83)	Manual revised to release L149. Manual includes a description of automatic PP assignment, revised CMSE PP displays, MSL 15X name modification, and miscellaneous corrections.
H (11-18-83)	Manual revised to MSL release L156; CIP release L001. Manual includes procedures for CYBER 170, Models 810, 830, and 845 Computer Systems. Revision includes support of the 834 (ISD) Disk Subsystem, revised installation procedures, and miscellaneous corrections. The revision also deletes descriptions of CTI displays from section 2. This edition obsoletes all previous editions.
J (05-15-84)	Manual revised to MSL release L161; CIP release L002. Manual includes support of C180 Models 810, 830, 835, 845, and 855, support of 721 and 752-Compatible Consoles, support of 639 intelligent small tape (ISMT) unit, and miscellaneous corrections. This revision obsoletes all previous editions of this manual.
K (12-03-84)	Manual revised to MSL release L167; CIP release L003. Changes include support of models 840, 850, and 860; support of dual CPU and shadow memory; revisions to control store and maintenance channel commands; revisions to DEMOT displays; and miscellaneous corrections. This revision also deletes documentation of the EDIT On-Line Utility.
L (05-03-85)	Manual revised to MSL release L173; CIP release L004. Changes include addition of Disk Format Utility (DFU) and deletion of Remote Terminal Driver (RTD). (LR command replaces RTD.)
M (11-22-85)	Manual revised to MSL release L179; CIP release L005. Changes include addition of command buffer editing utility (CBU), CMSE area of CM, support of C180 Model 990, CTI support I4, CMSE disk driver changes, and miscellaneous changes, additions, and corrections.
N (05-13-86)	Manual revised to MSL release L186; CIP release L006. Changes include addition of capture buffer dump utility (CBD), I4 mode support of I4 IOU, and miscellaneous corrections.
P (04-21-87)	Manual revised to MSL release L678; CIP release L007. Changes include, replacement of VLEX routine with VEXC and miscellaneous corrections.
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Address comments concerning this manual to:

Control Data
Technical Publications ARH219
4201 North Lexington Avenue
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or use Comment Sheet in the back of this manual.

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T (06-01-88)	Manual revised to MSL release L704; CIP release CV009. Changes include support of I4 dual IOU, I4C IOU, CYBER 180 Model 960, and miscellaneous changes.
U (09-01-88)	Manual revised to MSL release L710; CIP release CV009. Changes include support of dedicated load device.

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LIST OF EFFECTIVE PAGES

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PREFACE

ORGANIZATION

The CONTROL DATA® Maintenance Software Library (MSL) 15X described in this reference manual consists of a set of tests and diagnostics that aid in the checkout and isolation of defective components in the CDC® CYBER 170 Model 815, Model 825, Model 835, Model 845, and Model 855 Computer Systems, and CYBER 180 Model 810, Model 830, Model 835, Model 840, Model 845, Model 850, Model 855, Model 860, and Model 990 Computer Systems and CYBER 990E, 995E, 992, and 994 Computer Systems.

The MSL includes the common maintenance software executive (CMSE), which controls the execution of diagnostics, tests, and utilities, as directed by the operator.

AUDIENCE

This manual contains a description of MSL for use by Control Data customer engineers.

RELATED PUBLICATIONS

Descriptions of the tests and diagnostics are provided in the following related publications:

Control Data Publication	Publication Number
MSL 15X Model Independent Maintenance Software Reference Manual	60469390
MSL 151 CYBER 170 Models 815 and 825, CYBER 180 Models 810 and 830 Maintenance Software Reference Manual	60469400
MSL 152 CYBER 170/180 Model 835 Maintenance Software Reference Manual	60469410
MSL 153 CYBER 170/180 Models 840, 845, 850, 855, and 860 Test Procedures Maintenance Software Reference Manual	60459140
IOU2 - MSL 153 Test Description	60460000
ACT3 - MSL 153 Test Description	60460010
ANT3 - MSL 153 Test Description	60460020
BPT3 - MSL 153 Test Description	60460030
CMT3 - MSL 153 Test Description	60460040
CST3 - MSL 153 Test Description	60460050
CTT3 - MSL 153 Test Description	60460060
ICT3 - MSL 153 Test Description	60460070

Control Data Publication	Publication Number
IFT3 - MSL 153 Test Description	60460080
LMT3 - MSL 153 Test Description	60460090
MCT3 - MSL 153 Test Description	60460100
MDT3 - MSL 153 Test Description	60460110
OIT3 - MSL 153 Test Description	60460120
PDT3 - MSL 153 Test Description	60460130
SMT3 - MSL 153 Test Description	60460140
MAT3 - MSL 153 Test Description	60460150
MSL 155 CYBER 180 Model 990 Test Procedures Maintenance Software Reference Manual	60461110
ACT5 - MSL 155 Test Discription	60461120
BPT5 - MSL 155 Test Description	60461130
CMT5 - MSL 155 Test Description	60461140
EPT5 - MSL 155 Test Description	60461150
FPT5 - MSL 155 Test Description	60461160
IDT5 - MSL 155 Test Description	60461170
IFT5 - MSL 155 Test Description	60461180
IGT5 - MSL 155 Test Description	60461190
LST5 - MSL 155 Test Description	60461200
MAT5 - MSL 155 Test Description	60461210
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OCT5 - MSL 155 Test Description	60461230
PAT5 - MSL 155 Test Description	60461240
SCT5 - MSL 155 Test Description	60461250
VAT5 - MSL 155 Test Description	60461260
IOU4 - MSL 155 Test Description	60461920

The following documents contain information pertaining to the MSL library.

Control Data Publication	Publication Number
Assembly Buffer Utility Reference Manual	60469330
CML Reference Manual	60455980
CYBER Initialization Package (CIP) Reference Manual	60457180
CYBER 170/180 Models 835, 840, 845, 850, 855, 860, and 990, CYBER 990E, 995E, and 994 (CYBER 170 State) Hardware Reference Manual	60469290
CYBER 180 Model 990, CYBER 990E, 995E, 992 and 994 (Virtual State) Hardware Reference Manual, Volume 1	60462090
CYBER 170/180 Models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, and 990, CYBER 990E, 995E, 992, and 994 (Virtual State) Hardware Reference Manual, Volume 2	60458890
CYBER 170 Models 815 and 825 (CYBER 170 State) Hardware Reference Manual	60469350
CYBER 180 Models 810 and 830 (CYBER 170 State) Hardware Reference Manual	60469420
Intelligent Small Magnetic Tape (ISMT) Subsystem Reference Manual	60461090
MALET Reference Manual	60456020
MSL 100 Off-Line Maintenance System Library Reference Manual	60455770
MSL 100/140 Instant Manual	60456900
MSL 15X CMSE Command Card	60456600
CDC 721-21/31 Owner's Manual	62950101
CDC 19003 (CC598-A/B) System Console Operations and Maintenance Guide	60463610
CYBER Systems Peripheral Diagnostic Reference Manual	60000144

DISCLAIMER

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FIGURES

TABLES

The Maintenance Software Library (MSL) 15X is a set of tests, diagnostics, and utilities that perform isolation of malfunctions, testing of system components, and monitoring of machine states. The MSL is divided into the following parts:

- Common test and initialization (CTI) programs
- Common maintenance software executive (CMSE) programs
- Interface routines
- Hardware initialization and verification software (HIVS)
- Tests and diagnostics
- Utility routines
- Command buffers

CYBER INITIALIZATION PACKAGE (CIP)

A unique release tape, called the CYBER Initialization Package (CIP), is created for each model of computer system. Microcode, EI, CTI, SCD, MDD, CMSE, and selected MSL programs, command buffers, and utility routines are distributed on the CIP tape to sites with a maintenance contract. Sites without a maintenance contract receive a CIP tape that contains microcode, EI, CTI, CMSE, and a subset of MSL tests and utilities called HIVS.

COMMON TEST AND INITIALIZATION (CTI)

CTI performs hardware intialization and represents a standardized human interface to the deadstart process. CTI consists of a set of displays from which you select the desired method for deadstarting. The CTI process includes some input/output unit (IOU) testing and hardware initialization. The initial displays and options offered by CTI are described in the CIP User's Handbook.

CMSE

CMSE provides an off-line monitor capability. Monitoring can be done from either a local or remote console. CMSE also provides display facilities, a keyboard command structure, a loading capability, and diagnostic sequencing. CMSE may be initialized following a short or long deadstart and an extended deadstart.

INTERFACE ROUTINES

The MSL contains routines that interface between tests and utility programs. Three routines (VLEX, EXC, and DEMOT) are described in this manual because they contain portions (parameters, error messages, and so on) that are visible to you.

TESTS AND DIAGNOSTICS

The MSL 15X library contains a set of tests for correct operation as well as diagnostics that isolate system faults. The MSL library is used as a source library for creating MSL binary tapes for each computer system model. The MSL 152, for example, is applicable to the model 835, and the MSL 151 is applicable to the models 810, 815, 825, and 830. The MSL 153 is applicable to the models 840, 845, 850, 855, 860, and 960. The MSL 155 is applicable to model 990. A list of tests and diagnostics available on each MSL binary tape is provided in appendix E of this manual. The term MSL 15X, as used in this manual, refers to the MSL 15X library and any of its subsets, unless otherwise noted. Descriptions of each test or diagnostic are not contained in this manual, but are contained in separate manuals. For further information, refer to the MSL fault detection and isolation maintenance software reference manuals listed in the preface.

HARDWARE INITIALIZATION AND VERIFICATION SOFTWARE (HIVS)

The hardware initialization and verification software (HIVS) is a basic subset of MSL tests that performs confidence testing of the system. The HIVS module exists on the HIVS CIP tape and is distributed to sites without a maintenance contract.

The hardware verification sequencer (HVS) is initiated by CTI and runs tests under control of CMSE.

UTILITY ROUTINES

The utility routines provide features not available in standard tests. Two types of utilities exist in the MSL; those that are part of CMSE, which are usually overlays and are executed by a CMSE command, and stand-alone utilities, which may require a supporting system to perform their function.

COMMAND BUFFERS

Command buffers are useful tools enabling you to load and execute a series of tests and to set parameters. Methods for constructing command buffers and examples of their use are described in section 4 of this manual.

A command buffer is a series of keyboard (CMSE and program) commands residing on the MSL disk that are executed as a group by CMSE. Each command buffer is assigned a unique name to identify it on the disk. Command buffers may be read in from a card reader or input interactively from a terminal. Refer to section 4 for a more detailed description.

This section describes the CIP deadstart and initialization procedures used by NOS, NOS/BE, and MSL on the models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, 960, and 990 computer systems. The procedure supports deadstarts from an 834 or 836 Intelligent Small Disk Subsystem (ISD), an 844 Disk Unit, an 885 Fixed Module Drive (FMD) disk device, an 895 Disk Unit, a 639 Intelligent Small Tape Unit (ISMT), a 66X Magnetic Tape Subsystem (MTS) device, a 67X Advanced Tape Subsystem (ATS) device, or a 698 CYBER Magnetic Tape Subsystem (CMTS) device.

Following are the minimum hardware requirements for CTI:

- One central processor unit (CPU)
- Central memory (CM) (1 megabyte)
- One input/output unit (IOU) (16-bit)
- One CC545 Display connected to channel 10, or a CC634B console connected to a two-port multiplexer, or a 752-compatible terminal connected to a two-port multiplexer, or a CC598A/CC598B console connected to a two-port multiplexer
- One library device (magnetic tape)

DEADSTART PROCEDURES

There are two types of deadstart procedures: warmstart and coldstart. The warmstart procedure assumes that the necessary controlware has already been loaded into the tape or disk controllers that are to be used for the deadstart operation. The coldstart procedure loads the controlware into the tape or disk controllers before performing the deadstart sequence.

In general, the procedure you use most often to deadstart is warmstart. Warmstart from mass storage or a CDC 639/667/669/698 Magnetic Tape Unit is possible after the disk controller or tape controller to be used is loaded with the proper controlware, and the controlware is functioning. Warmstart is always possible from CDC 677/679 Magnetic Tape Units.

WARMSTART PROCEDURE (MODELS 810, 815, 825, AND 830)

The following steps are performed when deadstarting models 810, 815, 825, or 830 from a 639, 66X or 67X Tape Unit or an 834/836, an 844, or an 885/895 Disk Unit. The required controlware is assumed to be loaded and functioning properly (warmstart).

1. Load the CIP/MSL 151 tape or disk.
2. Press the deadstart button on the CC545 display console, or, if a CC634B display terminal is being used as the primary console, perform the following steps to bring up the initial display:

    a. Press the RESET button to reinitialize the console.

b. Hold down the CTRL key while pressing the G key.

c. When the message *OPERATOR ACCESS ENABLED appears, hold down the CTRL key while pressing the R key.

3. For models 810 and 830, the first display you will see is the Deadstart Options display shown in figure 2-1.

```
            DEADSTART OPTIONS

      S     SYSTEM LOAD OPTIONS
      M     MAINTENANCE OPTIONS

     (CR) - SYSTEM LOAD OPTIONS



     PROGRAM n SELECTED
```

Figure 2-1. Deadstart Options Display for Models 810 and 830

If the program selected is the desired warmstart program, type an S. The system performs a short deadstart and brings up the CTI Initial Options display. The initial displays and options offered at this point are described in the CIP Reference Manual.

If the program selected is not the desired warmstart program, type an M to bring up the Maintenance Options display shown in figure 2-1.1 (for models 815 and 825 this is the first display you will see). Then perform the following steps.

```
      MAINTENANCE OPTIONS
          (REV. 03)
                               PROGRAM 0

XX YYYYY-CHANGE DS PRG         01 001402
XX+YYYYY-CHANGE DS PRG INC     02 007303
      S-SHORT DS               03 000017
      L-LONG DS                04 007503
      H-HELP                   05 007703
                               06 000301
                               07 007403
    PPM CONF = 00              10 007103
    BRL CONF = 0               11 007301
    DLY LOOP = 0               12 000710
    LDS ADDR = 6000            13 000376
    CLK FREQ = NORMAL          14 000000
CM RECONF SW3 = C              15 000000
  SW4 = C SW5 = C              16 000000
                               17 000000
                               20 007112
```

Figure 2-1.1. Maintenance Options Display for Models 810, 815, 825, and 830

4. If the warmstart program is already stored in the microprocessor random access memory (RAM):

   a. Retrieve the warmstart program by typing GP n, followed by a carriage return. n is the RAM program number (0 to 2 octal).

   b. Skip steps 5 and 6.

5. Enter the warmstart program using the console keyboard. (Refer to Warmstart Program settings.) This is done by typing xx yyyyyy, followed by a carriage return. xx (1 to 20 octal) is the location and yyyyyy (octal) is the instruction. The first two digits of the instruction should be zeros. However, leading zeros, both in the location and in the instruction, do not have to be typed. If the system is to add an increment to the location automatically, type xx+yyyyyy. When the automatic increment is in effect, the system displays the next location after accepting the previous entry. Next, type only the instruction. To terminate the automatic increment, press the left blank (erase) key after the location appears.

6. Type SP n if the program in RAM is to be stored for future use. n (0 to 2 octal) is the RAM program number.

NOTE

Store the warmstart program as RAM program number 3 if the system is to automatically retrieve the program and initiate a long deadstart sequence when system power is applied to a model 810, 815, 825, or 830 mainframe. If this power recovery deadstart feature is not desired, store 000300 as the first word of RAM program 3. This instruction puts PP0 into a loop when power is applied to the mainframe. No deadstart activity occurs and no display appears on the screen. Return to step 2 to continue the deadstart process.

7. Warmstart the system by typing either S or L followed by a carriage return. Normally an L is typed.

   S Short deadstart. No testing of the IOU is performed.

   L† Long deadstart. Testing of the IOU is performed.

The CTI package initializes the system and an Initial Options display appears on the screen. The initial displays and options offered at this point are described in the CIP Reference Manual.

† When L is selected, bit 20 (rightmost bit) of word 12 of the warmstart program should also be set to allow all IOU testing to be done.

WARMSTART PROCEDURE (MODELS 835, 840, 845, 850, 855, 860, 960, AND 990)

The following steps are performed when deadstarting a model 835, 840, 845, 850, 855, 860, 960, or 990 from a 66X or 67X Tape Unit, or an 844 or 885 Disk Unit. The required tape or disk controlware is assumed to be loaded and functioning properly (warmstart).

1. Load the CIP/MSL 152 tape or disk for a model 835. Load the CIP/MSL 153 tape or disk for a model 840, 845, 850, 855, or 860. Load the CIP/MSL 155 tape or disk for a model 990. Load the CIP/MSL 960 tape or disk for a model 960.

2. Set the switches on the deadstart panel (refer to Warmstart Program settings, later in this section).

3. Push the deadstart button (located under display screen on a CC545), except use the CC598B console for model 960.

NOTE

Deadstart from a CC634B terminal is not normally supported for models 835, 840, 845, 850, 855, 860, 960, and 990. Refer to the CIP Reference Manual for limited CC634B terminal support of these models.

On systems with a dual I4 IOU configuration, a CC598B must be used as the primary console. Complete the following steps to bring up the DEADSTART OPTIONS display.

a. Press the CTRL, ALT, and DEL keys simultaneously to reinitialize the console. The DEADSTART OPTIONS display will appear.

b. HOLD down the CTRL key while pressing the F2 key and release.

A second deadstart options display will appear, figure 2-1.2. This allows you to select which IOU, IOU0 or IOU1. Operating system deadstart is only supported from IOU0 and a deadstart load of CMSE is only supported for IOU1.

When deadstarting from IOU0, the CTI package initializes the system and a CTI Initial Options display appears on the screen. The initial displays and options offered at this point are described in the CIP Reference Manual. If M is pressed on the CTI Initial Options display, the CMSE display in figure 2-2 is presented.

Deadstarting from IOU1 is selected by pressing M on Console Main Menu display, 1 on Maintenance Options display, and S on Maintenance Options - IOU1 display. The display in figure 2-1.3 is presented and then followed by the display in figure 2-2.

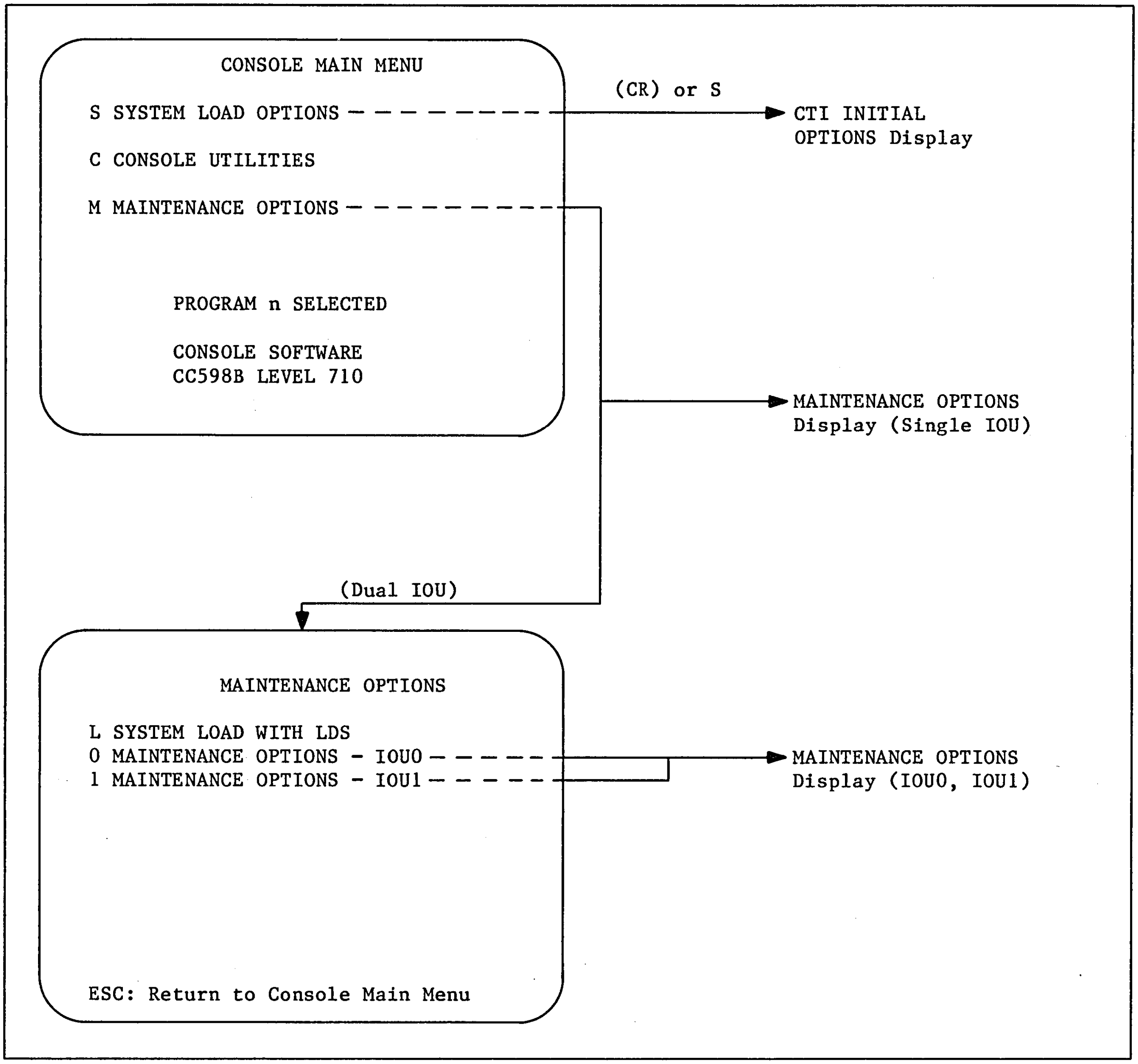

Figure 2-1.2. Dual I4 IOU Deadstart Options Display

WARMSTART PROCEDURE (MODELS 962 AND 992, I4C IOU)

The following steps are performed when deadstarting a model 962 or 992 from a CC598A System Console. Refer to the 19003 (CC598-A/B) System Console Operations and Maintenance Guide listed in the Preface. The required tape controlware is assumed to be loaded and functioning properly. Refer to the procedure in the CIP Reference Manual listed in the Preface..

1. Load the CIP/MSL 962 tape for a model 962. Load the CIP/MSL 992 tape for a model 992.

2. Deadstart the system with the CC598A System Console according to the procedure in the CIP Reference Manual listed in the Preface.

3. Perform steps 4 through 6 for IOU1 and steps 7 and 8 for IOU0.

4. Press M on Console Main Menu display to select Maintenance Options display.

5. Press M on Maintenance Options display to select IOU1. The display in figure 2-1.3 is presented as the initial CMSE display.

6. Enter a carriage return. The display in figure 2-1.4 is presented as the second CMSE display. Standalone programs or CMSE are loaded from this display.

7. Press S on Console Main Menu display to select CTI Initial display.

8. Press M on CTI Initial display to select IOU0. Only the CMSE display in figure 2-1.4 is presented.

```
                    *** WARNING ***

IF CENTRAL MEMORY IS TO BE USED FROM IOU1 FOR ANY
REASON COMMAND BUFFER EN2IOU MUST FIRST BE RUN FROM
IOU0.


ENTER A RETURN TO CONTINUE.
```

Figure 2-1.3. CMSE Warning Display

```
OPERATOR ENTRIES
MNE(CR) LOAD STAND-ALONE PROGRAM
N.YY(CR) CHANGE CONFIG. PARAM (N) TO (YY)
(CR) LOAD MAINT. SYSTEM
MR(CR) TOGGLE MAINT. REG. (MR) DISPLAY
* KP+KC+CE               CE(CR) CLR MR
KP(CR) CLR PP MEM        KC(CR) CLR CM

1.  SYSTEM TYPE                                            =  962
2.  CM SIZE                                                = XXXX
    ENTER SIZE IN MEGABYTES (DECIMAL)
3.  NO. OF CPU'S                                           =   XX
4.  NO. OF PP'S (DECIMAL)                                  =   XX
5.  MON PP/DIS PP                                          = XXXX
6.  DP/CM                                                  =   02


                    DEFAULT CONFIGURATION PARAMETERS USED


    KYBD            ERROR              MR ERROR            SS =   XX
```

KYBD - keyboard entry line (12 characters maximum)
ERROR = error message area (20 characters maximum)
MR ERROR = maintenance register error message
(displayed only if a MR error is detected)
SS = IOU status summary register contents
** = DP (Deadstart PP) Flag bit 2**1

Figure 2-1.4. CMSE Standalone Display

CMSE Standalone Display Commands

CE - Clear Errors

This command is used to clear all errors in the IOU maintenance registers.

KP - Clear PP

This command is used to enter all PP memory locations with zeros except the first ten locations which may contain a PP idle package.

KC - Clear Central Memory

This command is used to clear memory locations 0 through the last memory address as defined in the central memory size parameter command.

MR - Toggle Maintenance Register Display

This command toggles the maintenance register display. If a maintenance register error condition exists, the command cannot turn off the display. The error must be cleared before the display can be turned off.

System Type

This command modifies the system type parameter causing a corresponding change in the monitor name for CMSE loading.

Command Format:

01,xxx or 1,xxx

xxx = CYBER 900 series model number.

Central Memory Size

This command changes the amount of central memory that will be available for CMSE use. The central memory size must be a decimal count of the desired number of megabytes.

Command Format:

02,xxxx or 2,xxxx

xxxx = Number of megabytes of central memory.

Number of CPUs

This command changes the number of CPUs available for use by CMSE.

Command Format:

    03,xx or 3,xx

        xx = Number of CPUs in the system.

Number of PPs

This command changes the decimal number of PPs available for use by CMSE.

Command Format:

    04,xx or 4,xx

        xx = Number of PPs in the system.

Monitor/Display Driver PP Numbers

This command defines which PPs are used for loading the CMSE monitor and display driver.

Command Format:

    05,mmdd or 5,mmdd

        mm = Monitor PP number.
        dd = Display driver PP number.

Deadstart PP Flag

This command either selects or deselects deadstarting the PPs when CMSE is brought up and/or causes the CMSE monitor to load its overlays to central memory.

Command Format:

    06,xx or 6,xx

        xx = 01 - CMSE monitor loads its overlay into central memory.
        xx = 02 - Initializes the PPs.
        xx = 03 - CMSE monitor loads its overlay into central memory and initializes the PPs.

DEADSTART PANEL

The switches contained on the models 835, 840, 845, 850, 855, 860, 960, and 990 deadstart panel are indicated in table 2-1.

Table 2-1. Deadstart Panel Switches

Name	Number of Switches	Purpose
PP Select	5	Indicates peripheral processor (PP) contents to be displayed at the maintenance panel.
Register Select	2	Indicates register selected: 00 - P 01 - Q 10 - K 11 - A
Lamp Test	1	Tests all backpanel lights.
Clear Auto	1	Allows manual clearing of environment control register (ECR) bit 34 and examination of PP registers after a failure.
Frequency Margins	1	Allows fast, normal, or slow margins to be selected during deadstart. Margins apply to PPUs only.
Reconfiguration Switches	5	Specifies barrel (2) and peripheral processor memory (PPM) (3).
Deadstart Sequence	1	Specifies long or short deadstart sequence.
Deadstart	1	Specifies fast (250 microseconds) or slow (4 milliseconds) repetitive deadstart.

WARMSTART PROGRAM

The deadstart program for warmstarts from RMS, MTS, and ATS devices are shown in table 2-2. A warmstart assumes the controlware is running in the respective disk or tape controller. Refer to Coldstart Procedure later in this section for an explanation of how to load the controlware.

The maintenance deadstart panel contains 20_8 16-bit words. If the deadstart device is on a channel associated with a PP doing a block input at deadstart time (for example, PP5/channel 5), the active channel deadstart program must be used. If the deadstart device is on a channel not associated with a PP at deadstart time (channels 12_8, 13_8, 32_8, and 33_8), the inactive channel deadstart program must be used.

Table 2-2. Warmstart Program (Sheet 1 of 3)

Active Channel			Inactive Channel		
Word	Octal Setting	PP Mnemonic	Word	Octal Setting	PP Mnemonic
01	1402	LDN	01	0000	PSN
02	73cc	OAM	02	0000 ⑤	PSN
03	0017	(fwa)	03	0000 ⑤	PSN
04	75cc ⑥	DCN	04	75cc ⑤⑥	DCN
05	77cc	FNC	05	77cc	FNC
06	eeee ①	(fnc)	06	eeee ①	(fnc)
07	74cc	ACN	07	74cc	ACN
10	71cc	IAM	10	71cc	IAM
11	7301	(fwa)	11	7301	(fwa)
12	000f ②	(parms)	12	000f ②	(parms)
13	rpxx ③	(parms)	13	rpcc ③	(parms)
14	ffff ④	(parms)	14	ffff ④	(parms)
15	0000	(zeros)	15	0000	(zeros)
16	0000	(zeros)	16	0000	(zeros)
17	0000	(zeros)	17	0000	(zeros)
20	7112	IAM	20	0000	(zeros)

Code	Description
cc	Channel number
fnc	Function
fwa	First word address
parms	Parameters

① eeee is set to one of the following depending on the deadstart device:

Device	Setting
639	e12u
66X	e26u
67X	e12u
FSC Tape	e12u
834 or 836 (Execute self-diagnostic)	05cu
834/835 (Do not execute self-diagnostic)	03cu
844	03uu
885	03uu
895	33uu

Table 2-2. Warmstart Program (Sheet 2 of 3)

e Equipment number (0 through 7).

c Control module (0 through 7).

u Unit number:

0 through 1	(for 63X)
0 through 7	(for 66X)
0 through 17	(for 67X)
0 through 17	(for FSC tape)
0 through 3	(for 834/836)
0 through 7	(for 844)
40 through 57	(for 885)
0 through 17	(for 895)

2 The 000f parameter is defined for CMSE as follows:

f The rightmost bit of f, if set, selects extended deadstart (EDS) when the long deadstart switch is set. Setting this bit could destroy the contents of some PPs. Refer to the E option of the Utilities Display in the CIP Reference Manual for further explanation.

The leftmost bit, if set, specifies that the deadstart displays will appear on a CC634B or CC598A/CC598B console connected to port 0 of models 845 through 860 and 960. Deadstart is initiated by pressing the deadstart button on a CC545 or by using the switch on the deadstart panel. If the leftmost bit is clear, the displays appear on the CC545.

Table 2-2. Warmstart Program (Sheet 3 of 3)

③ The rpxx parameter is used as follows:

r Indicates an initialization or recovery level used by the operating system and CTI/HVS (hardware verification sequence) as follows:

$\geq$ 3 Indicates operating system may recover central memory. HVS field length is determined by using operating system common deck COMPCMA.

< 3 Indicates operating system has no requirement for central memory integrity. Memory initialization program (MIP) executes central memory testing.

p Reserved for future use.

xx Indicates the central memory resident (CMR DECK) number. xx can be obtained from the site systems analyst.

④ Reserved field for use by the operating system or maintenance system.

⑤ If a 6681 Data Channel Converter is the first equipment on the deadstart channel, set words 2 through 4 as follows:

02	75cc ⑥	DCN
03	77cc	FNC
04	2100	(fnc)

To coldstart a 7155 Disk Controller or a 7152 Tape/Disk Controller (disk controller only), set words 2 through 4 as follows:

02	75cc ⑥	DCN
03	77cc	FNC
04	qqqq	(fnc)

qqqq The proper coldstart function.

⑥ The disconnect channel number (DCN) is 75cc where cc has the following bit pattern:

1xxxxx

xxxxx Represents the channel number in binary (0 through 31 decimal).

COLDSTART OF 834 DISK FROM DISK UNIT

The following steps are used for the coldstart of a model 810, 815, 825, or 830 using an 834 disk subsystem. A coldstart loads controlware, which has been installed onto the disk drive, into the disk adapter and control module.

1. If a CC634B display terminal is to be used as the primary console, initialize the console as described under CC634B Console Initialization Procedure later in this section.

2. Press the deadstart button on the CC545 display console to bring up the Maintenance Options display as shown in figure 2-1.1.

   If a CC634B display terminal is being used as the primary console, perform the following steps to bring up the initial display:

   a. Press the RESET button to reinitialize the console.

   b. Hold down the CTRL key while pressing the G key.

   c. When the message *OPERATOR ACCESS ENABLED appears, hold down the CTRL key while pressing the R key.

3. For models 810 and 830, the first display you will see is the Deadstart Options display shown in figure 2-1.

   If the program selected is the desired warmstart program, type an S. The system performs a short deadstart and brings up the CTI Initial Options display. The initial displays and options offered at this point are described in the CIP User's Handbook.

   If the program selected is not the desired warmstart program, type an M to bring up the Maintenance Options display shown in figure 2-1.1 and perform the following steps.

4. If the coldstart program is already stored in the microprocessor RAM:

   a. Retrieve the coldstart program by typing GP n followed by a carriage return. n is the RAM program number (0 through 2 octal).

   b. Skip steps 5 and 6.

5. Enter the following coldstart program using the console keyboard.

Word	Octal Instruction	Description
01	75cc	DCN. cc is the channel number of the disk subsystem.
02	77cc	FNC. cc is the channel number of the disk subsystem.
03	01ud	FNC. u is the control module number (0 through 7). d is the unit number of the disk (0 through 3).
04	0300	Parameter.

   Program entry is done by typing xx yyyyyy followed by a carriage return. xx (1 through 20 octal) is the location and yyyyyy (octal) is the instruction. The first two digits of the instruction should be zeros; however, leading zeros, both in the location and in the instruction, do not have to be typed. If you want the system to add an increment to the location automatically, type xx+yyyyyy. When the automatic increment is in effect, the system displays the next location after accepting the previous entry. Then type only the instruction. To terminate the automatic increment, press the erase key after the location appears.

6. Type SP n if you want to store your program in RAM for future use. n (0 through 2 octal) is the RAM program number.

7. Coldstart the disk controller by typing either S or L, followed by a carriage return.

The screen goes blank and remains blank. To determine whether coldstart occurred, perform the following steps.

1. Press the deadstart button on the CC545 display console to again bring up the Maintenance Options display.

   If a CC634B display terminal is being used as the primary console, perform the following steps to again bring up the Maintenance Options display:

   a. Hold down the CTRL key while pressing the G key.

   b. When the message *OPERATOR ACCESS ENABLED appears, hold down the CTRL key while pressing the R key.

2. For models 810 and 830, type an M to bring up the Maintenance Options display.

3. Type CH to bring up the channel status display. Coldstart is complete when the channel used for the coldstart goes inactive.

COLDSTART OF 639 TAPE UNIT FROM TAPE

The following steps are used for the coldstart of a 639 Intelligent Small Tape Unit (ISMT) on a model 810 or 830. A coldstart loads peripheral microcode (controlware) from the CIP tape into the tape unit adapter. Once the tape unit has been coldstarted, the warmstart procedure, described previously, should be followed.

1. Apply power to the system and to the 639 tape unit.

2. Mount the CIP tape on the tape unit.

3. Ensure that the tape unit is placed on line.

4. If the system console is a CC634B display terminal, press the RESET button to reinitialize the system console. If the CC634B console has never been initialized, perform the steps provided later in this section to initialize the console.

5. Perform the following steps to bring up the Deadstart Options display shown in figure 2-1. When using a CC634B console:

   a. Hold down the CTRL key while pressing the G key.

   b. When the message *OPERATOR ACCESS ENABLED appears, hold down the CTRL key while pressing the R key.

   Press the Deadstart button on the console when using a CC545 console.

6. Type an M to bring up the Maintenance Options display shown in figure 2-1.1.

7. If the coldstart program is already stored in microprocessor RAM:

   a. Retrieve the coldstart program by typing GP n followed by a carriage return. n is the RAM program number (0 through 2 octal).

b. Skip steps 8 and 9.

8. Enter the coldstart program in table 2-2.1 using the console keyboard.

   Program entry is done by typing xx yyyyyy followed by a carriage return. xx (1 through 20 octal) is the location and yyyyyy (octal) is the instruction. The first two digits of the instruction should be zeros; however, leading zeros, both in the location and in the instruction, do not have to be typed. If you want the system to add an increment to the location automatically, type xx+yyyyyy. When the automatic increment is in effect, the system displays the next location after accepting the previous entry. Then type only the instruction. To terminate the automatic increment, press the erase key after the location appears.

9. Type SP n if you want to store your program in RAM for future use. n (0 through 2 octal) is the RAM program number.

10. Coldstart as follows when using a CC634B console:

    a. Hold down the CTRL key while pressing the G key.

    b. Hold down the CTRL key while pressing the R key.

    c. Enter the letter S to coldstart the tape unit. Upon receipt of the 60u function the tape unit adapter:

       - Executes internal diagnostics,

       - Connects to the 639 streaming tape unit.

       - Rewinds the tape unit.

       - Reads the 639 microcode record from tape.

       - Verifies the microcode ID and revision level.

       - Performs a checksum of the microcode.

       - Executes the microcode diagnostics.

       - Rewinds the tape if all of the above execute properly.

To verify proper loading of the microcode or to identify the cause of a bad load, perform the following steps.

1. Wait for tape motion to stop or wait about 10 seconds if the tape never moved. Then, bring up the Deadstart Options display shown in figure 2-1. When using a CC634B console:

   a. Hold down the CTRL key while pressing the G key.

   b. Hold down the CTRL key while pressing the R key.

   Press the Deadstart button on the console when using a CC545 console.

2. Type an M to bring up the Maintenance Options display shown in figure 2-1.1.

3. Type PR followed by a carriage return to bring up the PP Register display.

4. Examine the PP 00 line of the display. If P equals 0016, type PM and a carriage return to bring up the PP Memory display. If location 0030 equals 1000, the microcode is loaded and initialized correctly and the tape unit is ready to use.

NOTE

The PP Register display shows the contents of PP registers for barrel 0. Press the + key to display the PP registers for barrel 1 if you have reconfigured PPs using the RB command.

If P does not equal 0016 on the PP Register display, or location 0030 does not equal 1000 on the PP Memory display, perform step 5 (an error has occurred).

5. Reexamine the PP 00 line of the PP Register display. If P equals 0012, the cause could be the wrong channel number, a 60u function parity error, a bad CYBER channel, a bad adapter channel interface, ROM diagnostic failure, or RAM memory test failure.

   If P equals 0014, the cause could be a 012 function parity error, bad adapter interrupt logic, or a bad adapter channel interface.

   If location 0030 does not equal 1000:

Contents of Location 0030	Possible Failing Condition
5220	Bad microcode ID.
5221	Bad microcode checksum.
5222	Bad microcode initialization.
5223	Microcode diagnostics error.
5226	Cannot find the microcode on the tape.
5227	Unrecoverable error on the microcode record.
5243	Cannot connect to the tape unit.
5244	Cannot rewind the tape unit.

   If the contents of location 0030 are not shown above, refer to appendix E of the Intelligent Small Magnetic Tape (ISMT) Subsystem Reference Manual for a full description of the general status codes.

Table 2-2.1. 639 Tape Coldstart from Tape Program

Active Channel			Inactive Channel		
Word	Octal Setting	PP Mnemonic	Word	Octal Setting	PP Mnemonic
01	1402	LDN	01	0000	PSN
02	73cc	OAM	02	0000	PSN
03	0017	(fwa)	03	0000	PSN
04	75cc	DCN	04	75cc	DCN
05	77cc	FNC	05	77cc	FNC
06	060u	(fnc)	06	060u	(fnc)
07	1500	LCN	07	1500	LCN
10	3430	STD	10	3430	STD
11	77cc	FNC	11	77cc	FNC
12	0012	(fnc)	12	0012	(fnc)
13	74cc	ACN	13	74cc	ACN
14	71cc	IAM	14	71cc	IAM
15	0030	(fwa)	15	0030	(fwa)
16	0300	UJN	16	0300	UJN
17	0000	(zeros)	17	0000	(zeros)
20	7112	IAM	20	7112	IAM

Code	Description
cc	Channel number.
fnc	Function code.
fwa	First word address.
u	Tape unit number (0 through 3).

COLDSTART OF 66X/7152 TAPE CONTROLLER FROM TAPE

The following steps are used for the coldstart of a 66X tape unit and 7152 controller when the peripheral microcode (controlware) is on tape. Once the tape unit has been coldstarted, the warmstart procedure, described previously, should be followed.

1. Load the coldstart tape.

2. Set the switches on the deadstart panel or enter the coldstart program. (Refer to the coldstart program in table 2-2.2.)

3. Coldstart the tape controller by pressing the deadstart button on a CC545, or by typing S or L while displaying the Maintenance Options display on a model 810, 815, 825, or 830.

Table 2-2.2. 66X/7152 Tape Coldstart from Tape Program

Active Channel			Inactive Channel		
Word	Octal Setting	PP Mnemonic	Word	Octal Setting	PP Mnemonic
01	1402	LDN	01	75cc†	DCN
02	73cc	OAM	02	1701	(delay
03	0013	(fwa)	03	0576	loop)
04	75cc	DCN	04	2400††	(pass)
05	1701	(delay	05	2400††	(pass)
06	0576	loop)	06	77cc	FNC
07	2400†	(pass)	07	007u	
10	2400†	(pass)	10	0300	(hang)
11	77cc	FNC	11	0000	(zeros)
12	007u		12	0000	(zeros)
13	0000	(zeros)	13	0000	(zeros)
14	0300	(hang)	14	0000	(zeros)
15	0000	(zeros)	15	0000	(zeros)
16	0000	(zeros)	16	0000	(zeros)
17	0000	(zeros)	17	0000	(zeros)
20	0000	(zeros)	20	0000	(zeros)

Code	Description
cc	Active (assigned) MTC channel number (1 - 7, 11, or 20 - 31). Inactive (unassigned) MTC channel number (0, 12, 13, 32, or 33).
u	Second octal digit of tape drive unit number (10 - 17_8).

COLDSTART OF 844/7152 DISK CONTROLLER FROM DISK PACK

The following steps are used for the coldstart of a 844 tape unit and 7152 controller when the peripheral microcode (controlware) has been prerecorded on an 844 disk pack using utility LDC.

Once the disk unit has been coldstarted, the warmstart procedure, described previously, should be followed.

1. Load the disk pack containing the peripheral microcode.

2. Set the switches on the deadstart panel or enter the coldstart program. (Refer to the coldstart program in table 2-2.3.)

3. Coldstart the disk controller by pressing the deadstart button on a CC545, or by typing S or L while displaying the Initial Deadstart Display on a model 810, 815, 825, or 830.

†If the channel cc equals zero, this instruction must be 7540.
††If a 6681 or 6684 DCC or a CYBER 170 DCC is on the channel, these two instructions should be:

$\left.\begin{array}{l}\text{77cc}\\ \text{2100}\end{array}\right\}$ Deselect DCC.

Table 2-2.3. 844/7152 Disk Coldstart from Disk Pack Program

Active Channel			Inactive Channel		
Word	Octal Setting	PP Mnemonic	Word	Octal Setting	PP Mnemonic
01	1402	LDN	01	75cc	DCN
02	73cc	OAM	02	77cc	FNC
03	0007	(fwa)	03	01uu	
04	75cc	DCN	04	0300	(hang)
05	77cc	FNC	05	0000	(zeros)
06	01uu		06	0000	(zeros)
07	0000	(zeros)	07	0000	(zeros)
10	0300	(hang)	10	0000	(zeros)
11	0000	(zeros)	11	0000	(zeros)
12	0000	(zeros)	12	0000	(zeros)
13	0000	(zeros)	13	0000	(zeros)
14	0000	(zeros)	14	0000	(zeros)
15	0000	(zeros)	15	0000	(zeros)
16	0000	(zeros)	16	0000	(zeros)
17	0000	(zeros)	17	0000	(zeros)
20	0000	(zeros)	20	0000	(zeros)

Code	Description
cc	Active (assigned) 844 channel number (1 - 7, 11, or 20 - 31). Inactive (unassigned) 844 channel number (0, 12, 13, 32, or 33).
u	Second octal digit of 844 disk drive unit number (00 - 03) with prerecorded peripheral microcode (controlware) pack.

COLDSTART OF 66X, 885, OR 844 FROM CARD READER

The following steps are used for the coldstart of a model 835, 840, 845, 850, 855, 860, 960, or 990 using a 66X Magnetic Tape System (MTS) or 885 or 844-7X54 Disk System. A coldstart loads the controlware into the MTS, 885 or 844 from the card reader. Once coldstarted, the warmstart procedure previously described should be followed.

1. Load the CIP/MSL 152 tape or disk for a model 835. Load the CIP/MSL 153 tape or disk for a model 845 or 855. Load the CIP/MSL 155 tape or disk for a model 990.

2. Set the switches on the deadstart panel (refer to the coldstart program settings in table 2-3).

3. Push the deadstart button (located under the display screen on a CC545).

4. Insert the controlware card deck in the card reader and activate the card reader as follows:

    a. Press MOTOR POWER.

    b. Select AUTO MODE.

c. Press RELOAD MEMORY.

d. Press READY.

The CTI module initializes the system and the Initial Options display appears on the screen. The initial displays and options offered at this point are described in the CIP User's Handbook.

Two deadstart programs can be used for coldstart of a 66X Magnetic Tape Subsystem (MTS) or an 885 or 844-7X54 disk system from a card reader. The coldstart programs are described in table 2-3.

Table 2-3. 66X, 885, 844 Coldstart from Card Reader Program (Sheet 1 of 2)

Disk Controller from Card Reader			7021/7152 Tape Controller from Card Reader		
Word	Octal Instruction	PP Mnemonic	Word	Octal Instruction	PP Mnemonic
01	75cc	DCN	01	75cc	DCN
02	77cc	FNC	02	77cc	FNC
03	f000	(fnc)	03	f000	(fnc)
04	0000	(zeros)	04	0000	(zeros)
05	77cc	FNC	05	77cc	FNC
06	1400	(fnc)	06	1400	(fnc)
07	74cc	ACN	07	74cc	ACN
10	71cc	IAM	10	71cc	IAM
11	7664	(fwa)	11	7664	(fwa)
12	00tt	(parms)	12	00tt	(parms)
13	rpxx	(parms)	13	rpxx	(parms)
14	e3uu	(parms)	14	e2uu	(parms)

Code	Description
cc	Channel number used to access the card reader from which controlware is to be read.
e	Controller number to which deadstart unit is connected (0 through 7).
f	Controller number to which card reader is connected (4, 5, 6, or 7).
fnc	Function.

Table 2-3. 66X, 885, 844 Coldstart from Card Reader Program (Sheet 2 of 2)

Code	Description
fwa	First word address.
parms	Parameters.
rpxx	This parameter is used as follows: r Indicates an initialization or recovery level used by the operating system and CTI/HVS (hardware verification sequence). Refer to Warmstart Program earlier in this section. p Contains a PPO Save Switch (bit 2^7 of word 13). If set, PPO memory is written to central memory before loading the full express deadstart dump (EDD) package allowing dumping of PPO memory contents. The remainder of the p field may be used by the operating system to hold other deadstart parameters that may not be modified by the operator. xx Indicates the central memory resident (CMRDECK) number. xx can be obtained from the site systems analyst.
tt	Channel number used to access deadstart tape or disk equipment.
u	Unit number on which deadstart tape or disk pack is mounted. 0 through 7 (for the 66X) 0 through 17 (for the 67X) 0 through 7 (for the 844) 40 through 57 (for the 885)

An MTS tape subsystem or 844 disk subsystem controlware deck must be available when performing a coldstart from a card reader.

The following coldstart deck structure is used by NOS/BE.

CEJ	One binary card record (unprefixed)
7/8/9	EOR
CEY	Binary deck (unprefixed)
7/8/9	EOR
MTS/844	Controlware (unprefixed)
7/8/9	EOR
6/7/8/9	EOF

CEJ is read from the card reader by the deadstart panel. This card checks the PPO SAVE switch on the panel and saves the contents of PPO in CM if the switch is not set. The first binary card of segment CEY is then read and executed. CEJ must be exactly one binary card long. The CEJ and CEY cards must be obtained from NOS/BE for that site.

The following coldstart deck structure is used by NOS.

ABC	Three binary card record (unprefixed)
7/8/9	EOR
MTS/844	Controlware (unprefixed)
7/8/9	EOR
6/7/8/9	EOF

The ABC cards must be obtained from NOS for that site.

OFF-LINE MAINTENANCE

Typing M and a carriage return while the Initial Options display appears loads the common maintenance software executive (CMSE) test loader program. The test loader presents the initial CMSE display shown in figure 2-2. The test loader responds to the following list of keyboard commands. Unless the command is a single carriage return or *, all commands are terminated by a carriage return.

Command	Description
carriage return	Load CMSE from the designated library device.
right blank or +	Load CMSE from the designated library device. Also increments the line number of the initial CMSE display by one. The parameter is cleared and the command is ready for parameter input. If right blank or + key is entered repeatedly with no parameter input, the line number is incremented without command execution.
mne	Load the stand-alone program named mne from the deadstart library device into PP 0 and initiate the program at address 0001 in the PP.
TDX	Load the tape-to-disk stand-alone routine (TDX) into PP0 to dump the MSL binary tape to an 844 or 855 disk. All operating instructions for this dump are displayed by TDX. Refer to TDX description in section 6, Utility Programs.
KP	Clear all PP memories.
KC	Clear CM.
*	Clear PP memories, and CM.
CE	Clear all error bits in maintenance register.
MR	Toggles maintenance register display. Attempts to turn off display if an error condition exists, but display is again presented because of the error condition. The error must be cleared before the display can be turned off.
nn.pp	Change the system configuration parameter (pp) for line number (nn) on the system configuration display entries.

```
OPERATOR ENTRIES
MNE(CR) LOAD STAND-ALONE PROGRAM
N.YY(CR) CHANGE CONFIG. PARAM (N) TO (YY)
(CR) LOAD MAINT. SYSTEM
MR(CR) TOGGLE MAINT. REG. (MR) DISPLAY
* KP+KC+CE            CE(CR) CLR MR
KP(CR) CLR PP MEM     KC(CR) CLR CM

 1.  SYSTEM TYPE                                  =  XXX
 2.  CM SIZE                                      = XXXX
     ENTER SIZE IN MEGABYTES (DECIMAL)
 3.  EM SIZE
     INVALID ENTRY FOR THIS SYSTEM TYPE
 4.  NO. OF CPUS                                  =   XX
 5.  NO. OF PPS (DECIMAL)                         =   XX
 6.  MON PP/DIS PP                                = XXXX
 7.  PP COMM CH                                   =   XX
 8.  D/S PP / USE CM                              =   02
 9.  MSL CYL NO.                                  = XXXX

KYBD        ERROR                 MR ERROR        SS =  XX
```

D/S PP=(Deadstart PP) Flag bit 2**1. CM=Usage flag bit 2**0 must be enabled for CIO PPs.
B = This line is not be displayed when the display is from the tape driver.
KYBD = keyboard entry line (12 characters maximum).
ERROR = error message area (20 characters maximum).
MR ERROR = maintenance register error message (displayed only if a MR error is detected).
SS = IOU status summary register contents.

Figure 2-2. Initial CMSE Display

CAUTION

The KC command fails when bringing up CMSE from tape after an initial power-on. This problem occurs on CYBER 170 Models 815/825, CYBER 180 810/810A, 830/830A computer systems. After a power-on, the following CMSE commands must be executed before central memory reads and writes can be performed.

CX,M	Master Clear CMC
CE,I	Clear IOU Errors
CE,M	Clear Memory Errors
ER,M,20,0	Clear Memory Environmental Control Register
ER,M,21,0	Clear Memory Bounds Register

If deadstart is from disk, CTI performs the equivalent of the above commands before CMSE is brought into execution. During an initial installation in which you deadstart from tape the above commands should be executed.

SYSTEM CONFIGURATION DISPLAY ENTRIES

Parameters in each line of the system configuration display shown in figure 2-2 can be changed by the following keyboard commands.

1. System Type

This command modifies the system type parameter and causes a corresponding change in the monitor name for CMSE loading.

Command format:

01.xxx or 1.xxx

xxx The 800 series model number (for example, xxx=810, xxx=990).

2. Central Memory Size

This command changes the amount of central memory that is available for CMSE use. The central memory size must be a decimal count of the desired number of megabytes.

Command format:

02.xxxx or 2.xxxx

xxxx The number of megabytes of CM.

3. Extended Memory Size

This command is not valid for MSL 15X. It only appears to execute when entered.

4. Number of CPUs

This command changes the number of CPUs that CMSE recognizes as being in the system and available for use.

Command format:

04.xx or 4.xx

xx The number of CPUs in the system.

5. Number of PPs

This command changes the number of PPs available for use by CMSE. The number entered must be a decimal count of the PPs in the system.

Command format:

05.xx or 5.xx

xx The number of PPs in the system.

6. Monitor/Display Driver PP Numbers

This command changes the logical number of the PPs into which the monitor and display driver programs are loaded.

Command format:

06.xxyy or 6.xxyy

xx	The monitor program PP number or I/O driver/monitor communication channel if cm is not in use.
yy	The display driver program PP number or monitor/display driver communication channel if cm is not in use.

7. PP Communication Channel Number

This command changes the number of the channel over which pool PPs and the CMSE monitor communicate.

Command format:

07.xx or 7.xx

xx	The PP communication channel number.

8. Deadstart PP/CM Usage Flags

This command selects or deselects PP deadstart when CMSE is brought up and selects or deselects use of CM by CMSE.

Command format:

08.xx or 8.xx

xx=01	Use CM but do not initialize PPs.
xx=02	Initialize PPs but do not use CM (default parameter).
xx=03	Use CM and initialize PPs.

NOTE

For an I4 IOU, option 01 or 03 must be selected in order for CMSE to control the CIO subsystem.

9. MSL Starting Cylinder

This command changes the starting cylinder for the MSL library. It allows access to more than one copy of MSL on the disk. When the command is entered and followed by a carriage return, the driver uses the cylinder entered as starting cylinder for bringing up CMSE. This command is invalid for tape driver CMSE loads.

Command format:

09.xxxx or 9.xxxx

xxxx	The starting disk cylinder for the MSL library.

LONG DEADSTART

The long deadstart sequence (LDS) consists of confidence level tests of PP instructions. LDS checks barrel 0 (PP0 through PP4, models 835, 840, 845, 850, 855, 860, or 990; PP0 through PP9, models 810, 815, 825, or 830); therefore, information in these PPs is destroyed. LDS is selected by setting the LDS switch on the deadstart panel.

EXTENDED DEADSTART

The extended deadstart sequence (EDS) consists of tests to ensure that the IOU is stable enough to run CMSE. The tests check one barrel, some of the channels, and other hardware used by CMSE. The EDS cannot be selected unless the long deadstart sequence (LDS) has been selected. EDS is selected by setting the rightmost bit of word 12 on the deadstart program (refer to Deadstart Program Settings in this section).

POWER-ON INITIALIZATION PROCEDURES

Always perform a power-on initialization when deadstarting the computer system after applying power to the mainframe.

POWER-ON INITIALIZATION PROCEDURE (MODELS 810, 815, 825, AND 830)

The following procedures are used to initialize a model 810, 815, 825, or 830 either after applying power to the mainframe or after performing a maintenance action.

> NOTE
>
> Skip steps 1 through 3 if system deadstart program number 3 is automatically retrieved when system power is applied to the mainframe. (See Power Recovery Deadstart Program.)

1. Perform coldstart procedure for models 810, 815, 825, and 830, if necessary, to ensure controlware is installed.

2. Perform warmstart procedure for models 810, 815, 825, and 830 to bring up the Initial Options display.

3. Enter a U to bring up the Utilities display.

4. Enter the letter I while displaying the Utilities display. The Initial Options display reappears with the following message at the bottom of the display:

   ALL MAINFRAME MEMORIES WILL
   BE INITIALIZED FOR MSL/OS LOADS.

5. Enter one of the following:

CR To initialize the system (deadstart recovery level 0) and load the operating system. If the deadstart recovery level is 1, 2, or 3, the following message is displayed:

```
        OS LOAD IMPOSSIBLE
   POWER ON INITIALIZATION AND
   RECOVERY DEADSTART SELECTED
    DEADSTART AND SELECT ONLY
           ONE OPTION.
```

Reset the deadstart program for a level 0 deadstart and initiate a deadstart.

M To initialize the system and bring up the Initial CMSE display.

The following message appears:

```
ENTER EI/MICROCODE
DISK PARAMETERS

ENTER CHANNEL     00
ENTER EQUIPMENT   00
ENTER UNIT        00
```

Enter the channel, equipment number, and unit number of the disk.

NOTE

Selecting the M option after selecting the I option is allowed only when word 12 of the deadstart program directs CTI to initialize the alternate PP. If word 12 of the deadstart program directs CTI not to initialize the alternate PP, the power on initialization aborts and CTI displays the message:

```
        MS LOAD IMPOSSIBLE
   POWER ON INITIALIZATION AND
 ALTERNATE PP DISABLE SELECTED.
    DEADSTART AND SELECT ONLY
           ONE OPTION
```

6. If communication is lost with a PP during initialization, the following message is displayed:

```
PP xx NOT RESPONDING
 DEADSTART ABORTED
```

Initiate a deadstart, logically turn off the PP, and repeat the procedure.

POWER-ON INITIALIZATION PROCEDURE (MODELS 835, 840, 845, 850, 855, 860, 960, AND 990)

The following procedures are used to initialize a model 835, 840, 845, 850, 855, 860, 960, or 990 either after applying power to the mainframe or after performing a maintenance action.

1. Perform coldstart procedure for models 835, 840, 845, 850, 855, 860, 960, and 990 if necessary, to ensure controlware is installed.

2. Perform steps 1 and 2 of warmstart procedure for models 835, 840, 845, 850, 855, 860, 960, and 990.

3. Set the LONG/SHORT DEADSTART SEQUENCE switch to the long (up) position.

4. Press the DEADSTART switch to initiate a long deadstart and bring up the Initial Options display. Refer to Deadstart Procedure Summaries in section 5 of CIP Reference Manual for CC634B and CC596A terminal support.

5. Enter a U to bring up the Utilities display.

6. Enter the letter I while displaying the Utilities display. The Initial Options display reappears with the following message at the bottom of the display:

   ALL MAINFRAME MEMORIES WILL
   BE INITIALIZED FOR MSL/OS LOADS.

7. Enter one of the following:

   CR To initialize the system (deadstart recovery level 0) and load the operating system. If the deadstart recovery level is 1, 2, or 3, the following message is displayed:

   OS LOAD IMPOSSIBLE
   POWER ON INITIALIZATION AND
   RECOVERY DEADSTART SELECTED
   DEADSTART AND SELECT ONLY
   ONE OPTION.

   Reset the deadstart program for a level 0 deadstart and press the DEADSTART switch.

   M To initialize the system and bring up the MSL Deadstart display.

   The following message appears:

   ENTER EI/MICROCODE
   DISK PARAMETERS

   ENTER CHANNEL 00
   ENTER EQUIPMENT 00
   ENTER UNIT 00

   Enter the channel, equipment number, and unit number of the disk.

NOTE

Selecting the M option after selecting the I option is allowed only when word 12 of the deadstart program directs CTI to initialize the alternate PP. If word 12 of the deadstart program directs CTI not to initialize the alternate PP, the power on initialization aborts and CTI displays:

MS LOAD IMPOSSIBLE
POWER ON INITIALIZATION AND
ALTERNATE PP DISABLE SELECTED.
DEADSTART AND SELECT ONLY
ONE OPTION

8. If communication is lost with a PP during initialization, the following message is displayed:

   PP xx NOT RESPONDING
   DEADSTART ABORTED

   Press the DEADSTART switch, logically turn off the PP, and repeat the procedure.

CYBER 170 MIGRATED TEST PROCEDURES

The following command buffers allow the MSL 15X mainframe and peripheral equipment tests to be run on the models 810, 815, 825, 830, 835, 840, 845, 850, 860, 960, and 990. To run the mainframe tests, a control interface [environment interface (EI)] must be loaded.

PERIPHERAL EQUIPMENT TESTS

To run the peripheral equipment tests use the following CMSE command:

Command	Description
LT,name,,p0-p17	Load the test specified by the name parameter into the first available PP at the test load address. Store optional parameters p0 through p17 in the PP memory. Assign the test display to the PP and start the PP at address 100_8.
TL,name,,p0-p17	Load the test specified by the name parameter into the first available PP at the test load address. Store overlays in CM at address xx0000, where xx is the PP number that was loaded. Store optional parameters p0 through p17 in the PP memory. Assign the test display to the PP and start the PP at address 101_8.

MAINFRAME EQUIPMENT TESTS

Before running the MSL 15X mainframe tests, use one of the following Execute Command Buffer Commands to put the machine in a CYBER 170 environment. Then load EXC into a PP and load tests under EXC control.

Execute Command Buffer Command	Model(s)
GO,A1701	810, 815, 825, 830
GO,A1702	835
GO,A1703	840, 845, 850, 855, and 860
GO,A1705	990

CC634B CONSOLE INITIALIZATION PROCEDURE

Before a CC634B console can be configured as either a primary or secondary console, you must first establish its operational state by installing a specific subset of its parameters. Although the initial installation procedure is somewhat lengthy, once you have performed it, you can accomplish the same results by pressing the RESET button on the console.

Table 2-5 lists the parameters that require initialization.

NOTE

This procedure assumes that the CC634B display terminal with no internal options installed is connected to a two-port multiplexer and is operational.

Perform the following steps to initialize a CC634B console.

1. Turn on the console. The Mode Selection display appears on the screen. This display consists of a row of 10 lighted blocks across the bottom of the screen. If the Mode Selection display does not appear, perform step 2; if it does, go to step 3.

2. If the console has been previously configured to automatically select an operational mode, the Mode Selection display will not appear. In this situation, wait 60 seconds for a load timeout to occur. After this period of time the Mode Selection display should appear. If it does not, perform the following steps.

   a. Press the SETUP key.

   b. Then press the F10 key twice.

   The Mode Selection display should now appear.

3. Press and hold the CTRL key while you press the SETUP key. The default terminal installation parameters appear in a row of lighted blocks on the screen.

NOTE

A small blinking light appears in the F2 block. This light is a cursor. The cursor shows you where the next character you type on the keyboard will appear on the screen.

4. Press the F4 key to position the cursor under the F4 block (CONFIG).
5. Press the 1 key to set auto select enabled.
6. Press the F6 key to position the cursor under the F6 block (AS X Y).
7. Press the 1 key to select mode 1; CYBER mode.
8. Press the COPY key to write the terminal installation parameters into nonvolatile memory. This makes the changes permanent. The cursor moves to the F9 block.
9. Press the F10 key and then press the 1 key to select operating mode 1 (CYBER mode) and display the Installation Parameters.
10. Press the F2 key, if necessary, to position the cursor under the F2 block (CONFIG).
11. Enter the value 1xxxx0 in the F2 block.
    a. Press the 1 key to enable mode 1; CYBER mode.
    b. Press the space key until the cursor is under the sixth or rightmost position. Then press the 0 key to select host interface.
12. Press the F3 key, if necessary, to position the cursor under the F3 block (CONFIG).
13. Enter the value xx0110 in the F3 block.
    a. Space to the third position of the F3 block. Press the 0 key to select host to have 7 data bits.
    b. With the cursor in the fourth position, press the 1 key to select host parity enabled.
    c. With the cursor in the fifth position, press the 1 key to select host parity even/mark.
    d. With the cursor in the sixth position, press the 0 key to select host words have 1 stop bit.
14. Press the F4 key, if necessary, to position the cursor under the F4 block (CONFIG).
15. Enter the value 10xxxx in the F4 block.
    a. With the cursor in the first position, press the 1 key to select data terminal ready (DTR) signal switched off.
    b. With the cursor in the second position, press the 0 key to select request to send (RTS) signal on constantly when DTR or data set ready signals drop.

16. Press the F5 key to position the cursor under the F5 block (CONFIG).

17. Enter the value 01xxxx in the F5 block.

    a. With the cursor in the first position, press the 0 key to select pacing disabled.

    b. With the cursor in the second position, press the 1 key to select bias enabled.

18. Press the F6 key to position the cursor under the F6 block (OPR DF). Four hexadecimal characters are displayed.

19. Enter the value 0C05 in the F6 block.

20. Press the F9 key to position the cursor under the F9 block (DF T R).

21. Press the space bar twice to position the cursor under the third hexadecimal character (under the T).

22. Enter the proper transmit line speed/baud rate as follows:

Entry	Baud Rate
4	300 bps
5	600 bps
6	1200 bps
7	1800 bps
8	2400 bps
9	4800 bps
A	9600 bps
B	19,200 bps

23. With the cursor under the fourth hexadecimal character (under the R), enter the proper receive line speed/baud rate using the listing in step 22.

    The blocks that you changed should now be displayed at the bottom of the screen as follows:

F1	F2	F3	F4	F5	F6
RETURN	CONFIG 1xxxx0	CONFIG xx0110	CONFIG 10xxxx	CONFIG 010000	OPR DG 0C05

24. Press the COPY key to write the Mode Installation Parameters into nonvolatile memory. This makes the changes permanent. The cursor moves to the F10 block.

25. Press the F1 key twice to return the console to CYBER mode.

Installation of parameters required to support automatic initialization of the CC634B console is now complete.

Table 2-5. CC634B Console Initialization Parameters (Sheet 1 of 2)

TERMINAL INSTALLATION PARAMETERS

F4 Configuration (binary value)

Bit 1 = 1: Auto select enabled

F6 Auto Select Mode (octal value)

First character = 1: CYBER mode selected

CYBER MODE INSTALLATION PARAMETERS

F2 Configuration (binary value)

Bit 1 = 1: Mode execution enabled
Bit 6 = 0: Host interface

F3 Configuration (binary value)

Bit 3 = 0: Host communications to have 7 data bits (excluding parity)
Bit 4 = 1: Parity in host communications enabled
Bit 5 = 1: Parity is even/mark
Bit 6 = 0: Words in host communications to have 1 stop bit

F4 Configuration (binary value)

Bit 1 = 1: DTR switched off during local operations
Bit 2 = 0: RTS constant

F5 Configuration (binary value)

Bit 1 = 0: Pacing disabled
Bit 2 = 1: Bias enabled

F6 Operation Default Parameters (hexadecimal value)

First hexadecimal character (binary power of two representation)

Bit 2^0 = 0: Online
Bit 2^1 = 0: Printer deselected

Second hexadecimal character (binary power of two representation)

Bit 2^3 = 1: Large CYBER

Third hexadecimal character (binary power of two representation)

Bit 2^0 = 0: Background dark
Bit 2^1 = 0: Cursor line
Bit 2^2 = 0: Cursor blink

Table 2-5. CC634B Console Initialization Parameters (Sheet 2 of 2)

Fourth hexadecimal character (binary power of two representation)

Bit 2^0 = 1:	Full duplex	
Bit 2^1 = 0:	80 characters per line	
Bit 2^2 = 1:	30 lines	
Bit 2^3 = 0:	Transparent feature off	

F9 Default File Number, Transmit/Receive Baud Rate (hexadecimal value)

Third character is transmit baud rate as follows:

Value	Baud Rate	Value	Baud Rate
4	300 bps	8	2400 bps
5	600 bps	9	4800 bps
6	1200 bps	A	9600 bps
7	1800 bps	B	19200 bps

Fourth character is receive baud rate. See transmit baud rate for values.

PRIMARY AND SECONDARY CONSOLE USE

Up to two display consoles can be configured simultaneously as operator consoles in CYBER 170 800 series and CYBER 180 computer systems.

Initially, however, because one console must be used to deadstart and initialize the system, this console is designated as the primary console until another deadstart is initiated or an LR command is entered designating a different console as the primary console.

The LR command, described in the CMSE Commands section of this manual, is used for assigning both primary and secondary consoles. Use of the LR command will, in most cases, replace the use of the remote terminal driver (RTD).

The following paragraphs define the hardware requirements and procedures governing use of primary and secondary display consoles.

HARDWARE REQUIREMENTS

The CMSE display drivers support the following consoles:

- CC545 connected to channel 10_8
- CDC 721 display terminal connected to a two-port multiplexer on channel 15_8, set to baud rates of 1200 to 19,200 bps
- 752-compatible terminal connected to a two-port multiplexer on channel 15_8, set to baud rates of 300 to 19,200 bps

If no CC545 is in use on channel 10_8, CMSE supports a CDC 721 display terminal or a 752-compatible terminal as the primary console. If, however, a CC545 is in use on channel 10_8, CMSE always supports it as the primary console and supports a CDC 721 or 752-compatible terminal on a two-port multiplexer as a secondary console.

When both the primary and secondary consoles are in use, CC545 support is limited to displays that occur on the right screen. Additional information about keyboard and display use is described in the CMSE commands section of this manual.

When two consoles are in use simultaneously, the first character received from either keyboard causes the other keyboard to be locked out. CMSE then does not accept characters from the second keyboard until it receives a carriage return from the first keyboard, or until an erase code is received from the second keyboard. The erase is thus used to unlock a keyboard if the operator at a console inadvertently enters a character.

TERMINAL CONNECTION

The following procedure is used for bringing up and assigning a terminal as a primary or secondary console. For purposes of this description, this new console is initially referred to as the remote terminal.

At the remote terminal:

1. Connect the terminal and apply power.
2. Inform the user at the primary console of the need to be connected and the type of display being used.

At the primary console:

1. Connect a telephone to a two-port multiplexer.
2. Enter the LR command with the appropriate parameters. See LR command description under CMSE commands.

At the remote terminal:

1. Dial the appropriate telephone number to connect to a port of the two-port multiplexer.
2. Upon hearing a steady tone, switch the TALK/DATA switch on the modem to DATA and hang up.
3. When the connection is successful, the CH/PP display appears. See Displays in the CMSE Commands section of this manual.

While CMSE is initializing the terminal, it displays the message CMSE on the terminal screen.

At the primary console:

1. If the remote terminal fails to connect the following message appears:

   PORT x - NO DEVICE CONNECTED

   x is the port number 0 or 1.

2. Repeat the procedure until successfully connected.

If the CC545 is the primary console, successful connection of a secondary console is indicated when the only the right screen displays appear on the CC545. If the CC545 was the primary console, but both primary and secondary consoles are reassigned to 721 or 752-compatible terminals, successful connection of these terminals is indicated when the CC545 becomes inactive.

The common maintenance software executive (CMSE) provides off-line monitor capabilities for the computer system. CMSE monitors the system hardware, loads and initiates execution of maintenance software and utility programs, and loads and initiates execution of microcode as required for the CPU. The CMSE performs the following user functions:

- Transfers data between any two memories
- Loads programs from a library unit
- Displays program messages and transfers information in the keyboard buffer to a peripheral processor (PP)
- Displays errors
- Interprets keyboard commands
- Places entries in the dayfile
- Requests and releases I/O channels
- Requests lines from the display buffer

Monitoring can be accomplished from a local or remote console. CMSE supports a PP program that interfaces between CMSE and a remote console.

CMSE provides a test capability not feasible in an operating system environment and a common interface for the computer. CMSE also provides display facilities, a keyboard command structure, a loading capability, and diagnostic sequencing. CMSE executes, using the Maintenance Software Library (MSL) 15X, residing on an 885, an 834, or an 844 disk storage device. CMSE also executes, using the MSL 15X, residing on magnetic tape as an alternate or backup device.

CMSE may be initialized following the input/output unit (IOU) deadstart process (short/long deadstart and extended deadstart). This process involves the common test initialization (CTI) sequence, which includes some IOU testing and hardware initialization.

HARDWARE REQUIREMENTS

The minimum hardware requirement for CMSE is as follows:

- Three PPs
- Three I/O channels
- One local console (CC545 connected to channel 10_8 or a CDC 721 console connected to a two-port multiplexer, or a 752-compatible terminal connected to a two-port multiplexer)
- One 639, 66X, 67X, 885, 834, or 844 subsystem

CMSE requires three PPs; one each for the I/O driver, the display driver, and the executive program. PPO is always used. The other two PPs are selectable, using the initial CMSE display shown in figure 2-2. CMSE also requires three I/O channels to communicate with the I/O driver, the display driver, and the remaining PPs. The I/O driver requires the channel the MSL device is on, and the display driver requires the display channel. CMSE also requires the channel reservation flag for PP communication and program scoping loops.

For the I4C IOU, in addition to the MSL device channel and display channel, channel usage is as follows:

Channel 0	Monitor/IO driver communications
Channel 1	Monitor/display driver communications
Channel 12	Monitor/PP communications
Channel 15 flag	Program scoping loops

The remaining channels and associated channel flags are not used on the I4C IOU by CMSE.

CENTRAL MEMORY USAGE

Use of Channel Communications by the CMSE is the default condition. Central memory usage can be selected on the initial CMSE display (parameter word 8). CMSE reserves a 1-megabyte area in the uppermost part of CM. It is used by CMSE to store the monitor and I/O driver overlays, a directory of programs on the MSL device, page tables and EI, overlays for pool PP programs, and communications buffers. This area in CM is protected by CMSE and can only be used by the console operator or by a pool PP program on a restricted and controlled basis. Monitor to I/O driver communications take place in this protected area of MC.

When CMSE is using CM, the channel requirements for CMSE are reduced. Communication between the monitor and the I/O driver through CM means that the channel that was used for these communications is no longer needed.

Central memory usage can be deselected on the initial CMSE display (parameter word 8) if central memory is not working. In this case, CMSE reverts to using channel communications between the monitor and I/O driver.

When CM is in use, CMSE performance is increased because monitor and I/O driver overlays are in CM and do not have to be retrieved from the MSL device. Further, the existence of a directory of the programs on the MSL in CM increases CMSE performance, particularly when the MSL device is tape.

When CM is not in use, monitor overlays can still be stored in CM by use of the *OV command.

Use of the CMSE area of CM is controlled by the monitor. Keyboard commands which attempt to modify the CMSE area are aborted with an error message unless the area is unlocked at the console (refer to UL and LK commands).

The CMSE reserved area of CM is 400,000 octal words (1 megabyte) and is partitioned as shown in table 3-0. The following paragraphs describe the parts of CMSE area of CM.

NOTE

For I4 dual IOU operation, CMSE uses the last megabyte for IOU 0 and protects the second to last megabyte for use by IOU 1. IOU 1 uses this megabyte and protects the last megabyte for IOU 0. For a single IOU operation, only the last megabyte is protected and used.

PP OVERLAY

This part is reserved by the PP in 10,000-word blocks for use as an overlay or communications area. It can also be reserved by DEMOT in a 100,000-word block.

PP COMMUNICATIONS BUFFER

This part is used by CMSE to transfer data to and from a pool PP.

CMSE OVERLAYS

This part is used by CMSE for CM communications to pool and resident PPs, monitor overlays, I/O driver overlays, and internal CMSE communications.

MSL DIRECTORY

This part is used by CMSE and DEMOT for a directory of the programs on the MSL device.

PAGE TABLES

This part is used by CMSE for page tables and EI.

Table 3-0. CMSE Reserved Area of CM

Word 0	PP Overlay (260,000 octal words)
Word 260,000	
Word 270,000	PP Communications Buffer (10,000 octal words)
Word 320,000	CMSE Overlays (30,000 octal words)
Word 340,000	MSL Directory (20,000 octal words)
Word 377,777	Page Tables (40,000 octal words)

I4C IOU CENTRAL MEMORY USAGE

On an I4 IOU, central memory usage is selected on the initial CMSE display (parameter word 8) when CIO PPs are used. This is not necessary for an I4C IOU because internal channel 12 interconnects all PP clusters and is used for PP communications.

Other differences occur between I4 and I4C IOUs if a dedicated load device is present when central memory usage is selected for an I4C IOU. In this case, only monitor overlays and not I/O driver overlays are placed in central memory. Also, use of command *RV (revert to disk) for an I4C IOU allows dropping use of overlays in central memory. An *RV command is automatically executed by CMSE if it cannot locate a desired overlay in central memory, and the informative message CM OVERLAYS CORRUPTED, REVERTING TO DISK is displayed on the error lines. Refer to *OV and *RV commands for additional information on I4C IOU central memory usage.

COMMAND BUFFER EDITING UTILITY (CBU)

The CBU is used by CMSE to edit command buffers. It requires the use of one of the pool PPs. This PP is unavailable for other use until command buffer editing is terminated by the KE command.

CMSE loads CBU into the PP, and modification of the command buffer takes place within the PP memory. Modification and execution of command buffers is performed with either MSL tape or disk devices.

SOFTWARE RESTRICTIONS

When CMSE uses a magnetic tape for the MSL, the following capabilities are not available:

- CMSE dayfile
- Modify existing programs and save these on the library
- Add programs to the library under CMSE

CMSE does not communicate with an idle PP. Communication with an idle PP begins when a CP, TL, LT, EP, HP, MP, or RU command is executed on that PP.

Use of the channel reservation flag for inter-PP communication is not recommended for user programs. If a PP program sets a channel reservation flag, CMSE will lose communication with all of the PPs in the system. Communication can be restored only by issuing a UP,num command; where num equals the number of the PP associated with the previously set channel reservation flag. If the channel 7 flag were set by PP5, a UP,7 command must be issued to clear the channel 7 flag.

In order to use peripheral diagnostics from CIO PPs, flag bit 2**0 must be enabled.

INSTALLATION AND INITIALIZATION

A minimum requirement for an installation tape of MSL 15X consists of a seven- or nine-track tape with the following binary programs:

TDL (and overlays)	DSB
MDL (and overlays)	DSP
CEZ	DSQ
MSB	MDP (and overlays for MSL 151) or MEP (and overlays for MSL 152) or MFP (and overlays for MSL 153) or MHP (and overlays for MSL 155)
	TDX

CMSE is initialized by the CTI program.

KEYBOARD USAGE (CC545 ONLY)

When used with CMSE, the CC545 console keyboard keys function as defined in table 3-1:

Table 3-1. CC545 Console Keyboard Usage

Key	Function
Erase (blank, left of =)	Clear keyboard line.
Equal (=)	Switch the B (right screen) display from a test display to a memory display or vice versa.
Backspace (BKSP)	Delete last character entered.
Plus (+)	Increment the base address, index, or ordinal associated with the current A (left screen) display.
Left parenthesis (()	Same as (+), for B (right screen) display.
Minus (-)	Decrement the base address, index, or ordinal associated with the current A (left screen) display.
Right parenthesis ())	Same as (-), for B (right screen) display.
Forward (blank, right of =)	Execute the command, increment the address parameter, and clear the data parameter. If a data entry is repeated without entering data, no data is stored.
Carriage return (CR)	Execute the command entered. An initial entry of (CR) causes a single byte of zeros for a test command.
Comma, period, or space	Accepted as a command separator.
Consecutive commas	When used in a command entry, zeros are entered for the parameter not entered.
Slash (/)	Substitute the last automatically assigned PP number.

CMSE supports only the following characters:

A through Z	/
0 through 9	,
(	.
)	=
+	$
-	
*	

KEYBOARD USAGE (721, CC598A/CC598B, AND 752-COMPATIBLE CONSOLES)

When used with CMSE, the 721 console, CC598A/CC598B console, or 752-compatible console keyboard keys function as defined in table 3-2.

Table 3-2. 721, CC598A/CC598B, and 752-Compatible Console Keyboard Usage (Sheet 1 of 2)

Key			Function
721 Console	CC598A/CC598B Console	752-Compatible Console	
ESC or ERASE	ESC or DEL	ESC	Clear keyboard line.
Equal (=) or F3	Equal (=) or F3	Equal (=)	Switch from a test display to a memory display or vice versa.
Left arrow (←) or CTRL and H	Left arrow (←) or CTRL and H	Left arrow (←) or CTRL and H	Delete last character entered.
Plus (+), left parenthesis ((), or DOWN	Plus (+) or left parenthesis (()	Plus (+) or left parenthesis (()	Increment the base address, index, or ordinal associated with the current display.
Minus (-), right parenthesis ()), or UP	Minus (-) or right parenthesis ())	Minus (-) or right parenthesis ())	Decrement the base address, index, or ordinal associated with the current display.
Percent (%) or FWD	Percent (%) or PGDN	Percent (%)	Execute the command, increment the address parameter, and clear the data parameter. If a data entry is repeated without entering data, no data is stored.
Carriage return (CR) or NEXT	Carriage return (CR) or NEXT	Carriage return (CR)	Execute the command entered. An initial entry of (CR) causes a single byte of zeros for a test command.
Comma, period, or space	Comma, period, or space	Comma, period, or space	Accepted as a command separator.
Consecutive commas	Consecutive commas	Consecutive commas	When used in a command entry, zeros are entered for the parameter not entered.
Slash (/)	Slash (/)	Slash (/)	Substitute the last automatically assigned PP number.
Dollar sign ($) or F2	Dollar sign ($) or F2	Dollar sign ($)	Select CH/PP display.
Pound sign (#) or F1	Pound sign (#) or F1	Pound sign (#)	Select other half of current display.

Table 3-2. 721, CC598A/CC598B, and 752-Compatible Console Keyboard Usage (Sheet 2 of 2)

Key			Function
721 Console	CC598A/CC598B Console	752-Compatible Console	
CTRL and I	CTRL and I	CTRL and I	Initialize terminal. Manually establish operating characteristics of the console. Used whenever the terminal parameters appear to have been damaged.
F4 or HELP	F4	CTRL and Y	Display an introduction to the information displays and how to access the displays. See HELP display under the description of the Display Help Information (AI, BI) command later in this section.

CMSE supports the following characters:

A through Z

a through z (displayed as A through Z)

0 through 9

(	/
)	,
+	.
-	=
*	$
#	

Except as noted above, function keys on the 721 and CC598A/CC598B console are not supported. On the 721 and CC598A/CC598B console, an alarm (beep) sounds when a key other than those shown in this table is pressed.

TEST/DIAGNOSTIC KEYBOARD COMMANDS

To provide operator control of tests and diagnostics, the following commands are used:

Command	Description
S	Stop execution.
R	Restart/reset execution from beginning.
D	Drop program currently executing.
(space)	Start/continue execution.
HELP	For tests and diagnostics, a display and brief description of all commands unique to an individual test or diagnostic is provided. Refer to the individual test or diagnostic description for more information; review manuals listed in preface.

DISPLAYS (CC545 Only)

Both the left and right side of the CC545 screen (A and B displays) contain status information. These displays are divided into three parts: the header, the memory or register display area, and the keyboard and message area.

NOTE

If a secondary console is in use when the CC545 is the primary console, only right screen displays (B displays) appear on the CC545 screen.

A DISPLAY

The left side of the screen (A display) contains CPU and PP status. The display header appears in figures 3-1 through 3-1.2. The display shows the physical PP numbers if deadstart is from barrel 0 PP0. If deadstart is not from barrel 0 PP0 (for example, barrel 0 PP1 or barrel 2 PP21), the PPs are displayed as logical PP numbers. The PPs used by CMSE are not necessarily 0, 1, and 2, as shown in figures 3-1 and 3-1.1. Nonexisting or down PPs do not appear in the display header.

```
          DCPO PP  03  04  P05  06  07  10  11          CM IN USE
NWNW       T*E     D*E P    I   D*  I   F   I           CM   LCKD
IMPP       CP1 PP  20  21   22  23  24  25  26  27  30  31
A=0000     OFF     I   I    I   I   I   I   I   I   I   I
```

Figure 3-1. A Display Header

```
          DCPO NP 03  04  P05  06  07  10  11          CM IN USE
NWNW       T*E    D*E P    I   D*  I   F   I           CM
IMPP       CP1 NP 20  21   22  23  24  25  26  27  30  31
A=0000     OFF    I   I    I   I   I   I   I   I   I   I
               CP 00  01   02  03  04  05  06  07  10  11
                  I   *    F   F   F   F   F   F   F   F
```

Figure 3-1.1 A Display Header (I4 IOU Only)

```
          DCPO PP 03  04  P05  06  07  10  11          CM IN USE
NWNW       T*E    D*E P    I   D*  I   F   I           CM   LCKD
IMPP       CP1 PP 20  21   22  23  24  25  26  27  30  31
           OFF    I   I    I   I   I   I   I   I   I   I
A=177777
```

Figure 3-1.2 A Display Header (I4C IOU Only)

The following status characters may appear in the A display header.

Character	Description
*	PP or CP is active and in contact with CMSE.
A	PP which was last automatically assigned.
D	PP or CP is requesting test display.
E	PP or CP has identified an error condition.
F	CMSE unable to contact PP in 4096 attempts.
I	PP is idle, available for use, and not in contact with CMSE.
P	PP has parity error status.
IMPP	Displayed when error logging is turned on.
NWNW	Clock margins; narrow (N) and wide (W) for IOU, memory, CPU 0, and CPU 1, respectively. For model 960 only; narrow (N) or wide (W) for IOU, narrow (N) or wide (W) for CMC and CPUs, and fast (F) or slow (S) for CMC and CPUs, respectively.
NP	NIO subsystem PP.
CP	CIO subsystem PP. The CPP line and following line are displayed only if the CM IN USE bit is selected on the initial display.
A=	Indicates contents of pseudo A register. A 12-bit value is displayed, except an I4C IOU displays a 16-bit value.
CP0	CPU 0.
D	Next to CP0 or CP1, the D means that the CPU is the default CPU. All CPU commands that do not specify a CPU number will be applied to the CPU identified with the D. Not applicable to single CPU systems.
T	For dual CPU systems, indicates when a CPU is assigned to the test display. A CPU must be assigned to the test display for its display calls to be accepted. See CU command.
OFF	CMSE is not monitoring for calls in central memory. See CN and CF commands.
CM IN USE	Upper part of CM is being used for storage by CMSE during default.
CM LCKD	Upper part of CM in use by CMSE is locked out for modification by keyboard commands. If it reads CM UNLCKD, modification is allowed. Refer to LK and UL commands.

Detailed descriptions of each display can be found in this section.

The PPs that do not exist, and those not available for maintenance, do not appear in the header display.

The keyboard area consists of the bottom five lines of the A display. These lines contain the following information:

Active Command Buffer Name line	Contains the name of an active command buffer, if any, issuing commands in place of the keyboard commands.
Keyboard Error line	This line may contain an error or informative message (refer to appendix B). For an I4 dual-IOU system only, this line is preceded by an IOU=0 or IOU=1 message.
Keyboard Entry line	Contains the type of MSL system and version number followed by the current keyboard entry.
Previous Keyboard Entry line	Displays the last keyboard entry accepted.
Error Message line	Displays hardware errors (if LE on and errors are encountered).

B DISPLAY

The right side of the B display screen contains system error and I/O channel status information. The display header is shown in figures 3-2 and 3-2.0.

```
CH00  01  02  03  04  05  06  07  10  11  12  13  15  17
 E00 -00  -   F00 -   -10 -   -   F00 -   -   -   P   -
CH20  21  22  23  24  25  26  27  30  31  32  33
 -    -   -   -   F07 -   -   -   -   -   -   -

ST   SS  SB  SC  SE  LE  RT  RS  RB  RC  SM  QL  DR  DE
```

Figure 3-2. B Display Header

```
NCH00  01  02  03  04  05  06  07  10  11  12  13  15  17
  E00 -00  -   F00 -   -10 -   -   F00 -   -   -   P   -
NCH20  21  22  23  24  25  26  27  30  31  32  33
  -    -   -   -   F07 -   -   -   -   -   -   -
CCH00  01  02  03  04  05  06  07  10  11

ST    SS  SB  SC  SE  LE  RT  RS  RB  RC  SM  QL  DR  DE
```

Figure 3-2.0 B Display Header (I4 IOU Only)

The following status information may appear in the B display header:

-	Channel inactive when interrogated by CMSE.
F	Channel full when interrogated by CMSE.
E	Channel empty when interrogated by CMSE.
P	Channel contains parity error status. This is displayed only if the error logging for IOU is turned on.
NCH	NIO subsystem channel
CCH	CIO subsystem channel. The CCH line is displayed only if the CM IN USE bit is selected on the initial display.
ST, SS, etcetera	Indicates selected parameter conditions. Refer to Program Control Commands later in this section.

A number may follow the hyphen, E, or F channel activity indicators. This number represents the number of the PP for which the channel is reserved. If the number is 00, the channel is reserved for CMSE use.

DISPLAYS (721 AND 752-COMPATIBLE CONSOLES)

The A display header and the B display header described for the CC545 displays are combined into a single operator-selectable display on 721 and 752-compatible consoles. This display, called the CH/PP display is shown in figure 3-2.1. Entry of a dollar sign ($) on either console for the F2 key on the 721 console selects this display.

```
CR OFF *CP0 PP 01  04  05  08  07  10  11
        OFF     I   I   I   I   I   I   I
        CP1 PP 20  21  22  23  24  25  26  27  30  31
A=0000  OFF     I   I   I   I   I   I   I   I   I   I


CH00  01  02  03  04  05  06  07  10  11  12  13  15  17
  -   -00 E00 F00 E00 E   E   E   F   E   E   -   -   -
CH20  21  22  23  24  25  26  27  30  31  32  33
  E   E   E   E   E   E   E   E   E   E   E   E






                                                   PAGE 3
```

Figure 3-2.1 CH/PP Display

The right screen or B displays as described for the CC545 are divided into two 20-line segments for display on 721 and 752-compatible consoles.

Examples of the first and second halves of the AP or BP command displays as they appear on a 721 console are shown in figures 3-2.2 and 3-2.3

Pressing the pound sign key (#) on either keyboard or an F1 key on the 721 keyboard selects the half of the display currently not being shown.

Displays throughout this manual are shown for the CC545, the rules defined above for the 721 and 752-compatible terminals apply to all CMSE displays.

```
PP00  STATUS 000
-0000  -0010  -0020  -0030  -0040  -0050  -0060  -0070
004252 004016 000220 000000 006376 000000 000000 000000
000036 001020 007777 000030 006376 000000 000000 000000
003600 000000 000036 000000 000000 000024 000000 000000
000001 000000 000052 000000 000000 000000 000000 000000
000000 000014 000024 000000 000003 000000 000000 000004
000000 000015 000000 000003 000001 000010 000000 000002
000000 000000 000000 007776 000000 000000 007777 000024
000000 000060 000000 000000 000000 000000 000060 006376

-0100  -0110  -0120  -0130  -0140  -0150  -0160  -0170
000200 000200 000302 003403 000707 007500 000703 000216
000125 002511 002122 001416 001704 001013 000100 001501
005600 000200 000100 003423 000430 000761 000230 001601
007505 001643 000100 000336 001702 001001 005623 003477
001202 000200 000100 003623 000767 000657 007426 003023
000507 004614 000102 001720 001712 003023 001005 003422
000200 000200 003003 000775 000655 000100 000645 005022
002247 002077 001101 001712 005023 003247 000100 007500

L161   -
BP

                                                  PAGE 1
```

Figure 3-2.2 AP or BP Command Display (First Half)

```
-0200  -0210  -0220  -0230  -0240  -0250  -0260  -0270
000200 000200 000302 003403 000707 007500 000703 000216
000125 002511 002122 001416 001704 001013 000100 001501
005600 000200 000100 003423 000430 000761 000230 001601
007505 001643 000100 000336 001702 001001 005623 003477
001202 000200 000100 003623 000767 000657 007426 003023
000507 004614 000102 001720 001712 003023 001005 003422
000200 000200 003003 000775 000655 000100 000645 005022
002247 002077 001101 001712 005023 003247 000100 007500




L161   -
BP

                                                  PAGE 2
```

Figure 3-2.3 AP or BP Command Display (Second Half)

CDC 721 console displays only also include a definition of the active function keys at the bottom of the screen. Figure 3-2.4 shows the function keys display. These keys are defined in detail in table 3-2.

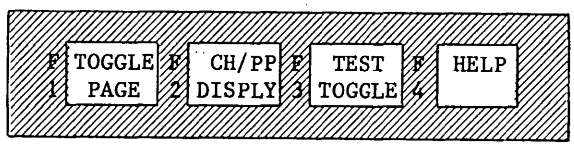

Figure 3-2.4 Function Key Display (721 Console Only)

COMMAND TYPES

CMSE contains five types of commands; display, alter, load, execute, and library commands. The system consists of the following functional areas, which use these command types.

- Peripheral processor
- Central memory
- Control store
- Maintenance channel
- Command buffer
- Disk library manipulation

The CMSE commands are two characters in length, except for the library commands and some utility commands, which are two characters prefixed by an asterisk (*).

All keyboard entries are checked for correct format and arguments. If incorrect, an appropriate error message is displayed. Refer to A Display earlier in this section.

DISPLAY COMMANDS

The first character of a display command is either an A or B indicating the side of the screen to display the information. For 721 and 752-compatible consoles, the A or B entry is ignored and all entries are treated as B entries. These commands display portions of selected memory, program, register, or library information by writing the information into the A or B display buffer in the display driver.

ALTER COMMANDS

The alter commands write information into the selected memory address, register, or microcode location.

LOAD COMMANDS

The load commands write program information into the selected memory from the MSL peripheral device or the card reader.

Load from the Common Disk Area

A common disk area on the disk device allows the CTI, MSL, and operating systems to read the same versions of system microcode, environment interface (EI), and other programs. The common disk area normally exists on all disk devices that contain software for CYBER 180 mainframes. It does not necessarily exist on the sites that choose to install software in manual mode using CTI, CIP, or TDX.

CMSE reads only system microcode and EI from the common disk area. Other programs and an error log in the common disk area are not read or used by CMSE.

System microcodes are programs with 7-character names. The first character is an M, the next four characters are alphanumeric and denote which memory the program is loaded into, and the last two characters are a version level.

Any load request for CMSE to load system microcode (CK, VK, CT, VT, or CS command) where the name of the program to be loaded is specified as four characters, causes CMSE to search a list of all system microcode names for a match between the four characters given on the load request and the second through fifth characters of the microcode names. If there is a match, CMSE searches the common disk area for the microcode, and loads the microcode from the common disk area if it exists there.

If there is a match but the microcode does not exist in the common disk area, CMSE adds an M to the front of the 4-character name given in the load request and searches the MSL library for a program name whose first five characters match the 5-character name including the M. If this second search finds a match, the first program whose name matches is loaded to the memory from the MSL area. If there is no match, CMSE does not search the common disk area but attempts to find and load the program with the 4-character name from the MSL area.

Any request to load EI to CM (CC command) causes CMSE to load EI from the common disk area if it exists there and from the MSL area if it cannot be found in the common disk area.

A load request to CMSE to load peripheral microcode (controlware) via the CW command, where the name of the peripheral microcode file is five characters or less, will cause CMSE to search the common disk area of the disk for the requested peripheral microcode file. If the file is not found in the common disk area, the MSL area will be searched. For microcode file names of six characters or greater, only the MSL area of the disk will be searched.

Any program which cannot be found in the common disk area or the MSL area causes the usual error message to be displayed.

There is no capability within CMSE to write data to the common disk area. All programs are installed in the common disk area by CTI.

EXECUTE COMMANDS

The execute commands cause PP or CPU code execution to begin at the selected address.

LIBRARY COMMANDS

The library commands read, write, or delete information from the MSL disk device.

MESSAGE DISPLAYS

Informative messages consist of two parts. The format of the first part (a) is common to all tests and diagnostics. The format of the second part (b) is optional or unique to each test. The messages appear on line 2 of the test display area (B display), as shown in figure 3-3. Some tests do not use this format. Refer to manuals containing the individual tests to determine the specific format used.

```
line 1 |                              |                              |
line 2 |<------------ a ------------->|<------------ b ------------->|

       name op PCxxxx Sxxxx SBxxxx Cxxxx - (optional message)
```

Figure 3-3. Test and Diagnostic Message Display

The message display has the following meaning:

name — Name of test (four-character mnemonic).

op — Type of operation performed:

- RU — Running message
- SMC — Scope mode condition
- SMI — Scope mode iteration
- SP — Set parameters/stopped for parameters
- Sx
  - x=C — Stop at condition end
  - L — Stop at loop
  - B — Stop at subsection end
  - S — Stop at section end
  - T — Stop at test end
  - E — Stopped on error
  - I — Stop at iteration end. Report iteration

```
Rx
 x=C      Repeating condition
   L      Repeating loop
   B      Repeating subsection
   S      Repeating section
   T      Repeating test
   I      Stop at iteration end.  Report iteration
```

PCxxxx   Pass count (hexadecimal or decimal).

Sxxxx   Current section number (hexadecimal or decimal).

SBxxxx   Current subsection number (hexadecimal or decimal).

Cxxxx   Current condition number (hexadecimal or decimal).

The optional message area is used for additional information provided by the test.

As each test is loaded a stop for parameters is done. One of the following displays appears on the screen:

```
name SP PCxxxx Sxxxx SBxxxx Cxxxx - PA=x--x yy/mm/dd

                or

name SET PARAMS PA=x--x yy/mm/dd
```

PA   The parameter buffer address.

yy/mm/dd   The year/month/day of the last test revision.

Once a test has started, a running message is displayed as follows:

```
name RU PCxxxx Sxxxx SBxxxx Cxxxx - (optional message)
```

If an error condition is encountered by a test, a message is displayed along with other information available from the test. The display appears as follows:

```
NAME SE PCxxxx Sxxxx SBxxxx Cxxxx - (optional message)

EC1=pqrs EC2=xxxx TE=xxxx RN=xxxx
```

EC1   Error code 1.

EC2   Error code 2 (refer to test descriptions).

TE   Total number of errors.

RN   Last random number seed used (optional).

Error code 1 has a set of predefined error codes with the format pqrx:

p Indicates the failing element:

0	IOU
1	Processor 1
2	Processor 2
3-5	Not used
6	Central memory
7	Shared memory
8	Extended memory
9	Peripherals
A,B	Not used
D	PMF
E	Not used
F	Miscellaneous

q Indicates the functional area of the failure:

For p=0

0	Unexpected
1	IOU control
2	PP memory
3	PP register
4	Channel
5	Memory access
6	Operating system bounds register
7	R register
8	Maintenance channel
9-F	Not used

For p=1, 2

0	Cache
1	Map
2	Business data processor (BDP)
3	Arithmetic/Boolean
4	Shift
5	Floating point
6	Multiply
7	Divide
8	Registers
9	Control store
A	Microcode control
B	Instruction fetch
C	Maintenance channel
D	Address control
E,F	Not used

For p=6, 7, or 8

0	Port
1	Distributor
2	Bank
3	Storage unit
4-F	Not used

For p=9

0	Mass storage
1	Magnetic tape
2	Communication/multiplexer
3	Card reader
4	Card punch
5	Line printer
6	Terminal
7	Console
8	Paper tape
9	Optical card reader
A	Plotter
B	SPAM/MAP (sum of products algorithm module/matrix algorithm processor)
C-F	Not used

For p=f

0	Manual operation
1	Information
2	Operator error
3	Undefined error
4-F	Not used

r Indicates the type of failure:

0	Status error
1	Data error✓
2	Function error
3	Interrupt error
4	Instruction error
5	Address error
6	Error check hardware error
7	Other
8	Multiple failure
9-F	Not used

x Indicates reserved.

For example, EC1=835X indicates an address error on the extended memory storage unit. A code of EC1=F17X indicates an information-only message.

PERIPHERAL PROCESSOR COMMANDS

The following commands pertain to PPs. The deadstart PP (DP) command must be executed on a PP which has failed (status F) before that PP can act upon any other command except the select PP dump display (AU) command.

CMSE does not communicate with an idle PP. Communication with an idle PP begins when a CP, TL, LT, EP, HP, MP, or RU command is executed on that PP. PP command parameters and displays are in octal format except for the PP and EH commands which use octal format for the address and hexadecimal for the data.

For I4 IOU only, the peripheral processor commands must use different formats to select NIO and CIO subsystems. Use xx or Nxx for num to select a PP in an NIO subsystem. Use Cxx for num to select a PP in a CIO subsystem.

For I4C IOU only, the peripheral processor commands may use xx, Nxx, or Cxx for num to select a PP. The N or C is significant only for PP load commands CP, LT, and TL.

AUTOMATIC PP ASSIGNMENT

The lowest numbered available PP is automatically assigned to the CP, TL, or LT command when a PP is not specified. A PP is considered available for assignment if it has an I or IDLE status. All PPs present on a system default to idle when CMSE is loaded. If the D/S PP parameter in ordinal 8 of the left screen initial display (refer to figure 2-2) is cleared prior to bringing up CMSE, the idle package does not load, making all PPs unavailable for automatic assignment.

When automatic assignment occurs on a CP, TL, or LT command, the letter A appears on the left screen header immediately to the left of the PP assigned and the message

    CP,mne LOADED INTO PPxx

appears on the previous keyboard line of the left screen display. If either the AA or BA display is active when the automatic load occurs, the message

    mne LOADED

appears next to the PP number which was loaded.

After an automatic assignment has occurred, any subsequent PP command to the assigned PP may be made substituting a / for the PP number. For example, the command

    EP,/,addr,data

causes CMSE to load data into the automatically assigned PP.

If a / is used and a PP has not been automatically assigned, the message

    NOT AUTO ASSIGN

appears on the error line. The automatically assigned PP number only changes when another automatic assignment is made.

PP DISPLAY COMMANDS

The following are the display commands associated with PPs.

Display PP Memory (AP, BP, PP)

The AP and BP command writes 300_8 words of PP memory into the specified display buffer in octal. The PP command accepts the same parameter entries as the AP or BP commands, but displays memory in hexadecimal format. Addressing remains in octal format and the display uses the B display buffer.

Command format:

    AP,num,fwa or AP,/,fwa

        or

    BP,num,fwa or BP,/,fwa

        or

    PP,num,fwa or PP,/,fwa

num One- or two-digit PP number.

/ Substitute the last automatically assigned PP number.

fwa The first word address of memory to be displayed, one to four octal digits. If omitted, the previous fwa value is used. If no previous fwa exists, 0 is assumed.

Examples of AP and PP command displays as they appear on a CC545 console below the A or B headers are respectively shown in figures 3-4 and 3-5.

```
PP05 STATUS 000


-0000  -0010  -0020  -0030  -0040  -0050  -0060  -0070
007643 000100 007777 007777 007777 007777 007777 007777
007636 000000 007777 007777 007777 007777 007777 007777
007305 000000 007777 007777 007777 007777 007777 007777
000000 007777 007777 007777 007777 007777 007777 007777
000000 000000 007777 007777 007777 007777 007777 007777
000000 007777 007777 007777 007777 007777 007777 007777
000000 007777 007777 007777 007777 007777 007777 007777
000000 007777 007777 007777 007777 007777 007777 007777

-2200  -2210  -2220  -2230  -2240  -2250  -2260  -2270
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777

-2300  -2310  -2320  -2330  -2340  -2350  -2360  -2370
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
007777 007777 007777 007777 007777 007777 007777 007777
```

Figure 3-4. AP Command Display

```
PP01 STATUS 000

-0000 -0010 -0020 -0030 -0040 -0050 -0060 -0070
 0FA3  0000  0000  0FFF  0FFF  0FFF  0FFF  0FFF
 0F9E  00C0  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 0401  0401  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 0000  0000  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 0000  0F21  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 0E4A  0E41  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 0000  0000  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF
 00C0  00C0  0FFF  0FFF  0FFF  0FFF  0FFF  0FFF

-0100 -0110 -0120 -0130 -0140 -0150 -0160 -0170
 0D51  0080  004B  0609  060C  0340  0080  0400
 004A  0067  0708  0E91  0E91  0E51  004B  00A9
 0DD1  0040  00F7  0608  0D91  0000  060A  0709
 004A  0040  0040  0E91  0062  0040  0909  0080
 0E11  00F3  004A  060A  0F71  004A  0789  004B
 0105  0400  0305  0E91  00ED  050D  04C0  060A
 0B00  0040  03C1  060B  0040  030D  0040  0909
 0049  0B00  017E  0E91  004A  0709  0178  0789

-0200 -0210 -0220 -0230 -0240 -0250 -0260 -0270
 04C1  070B  00C3  0809  0175  006E  0FFF  0FFF
 0000  06CA  0040  070B  060A  0FFF  0FFF  0FFF
 0178  070C  004D  06CA  04C0  0FFF  0FFF  0FFF
 030D  0146  0400  070C  0FFF  0FFF  0FFF  0FFF
 0709  0789  00A9  0174  070A  0FFF  0FFF  0FFF
 0080  04C0  0709  0789  0142  0FFF  0FFF  0FFF
 004B  0040  0080  04C1  00EA  0FFF  0FFF  0FFF
 0809  0175  004B  0000  0040  0FFF  0FFF  0FFF
```

Figure 3-5. PP Command Display

Change PP Display Block (DI)

This command allows selection of the first address of each of the three 100-word sections of PP memory written to the display buffer.

Command format:

DI,z,fwa

z	The number of the block to be changed, 0 through 5. The A display blocks are numbered 0, 1, and 2. The B display blocks are numbered 3, 4, and 5.
fwa	The first word address of the display blocks, one to four octal digits. If omitted, zero is assumed.

Select PP Dump Display (AU, BU)

This command dead-dumps 300_8 words of PP memory to the display buffer, using the hardware capability, enabling the PP to output the content of the PP on a selected channel. This command differs from the PP display commands in that these commands require a program to be running in the PP in communication with CMSE. The PP is in an idle state following execution of this command.

Command format:

AU,num,fwa

or

BU,num,fwa

num	One- or two-digit PP number.
fwa	The first word address of memory to be displayed (one to four octal digits). If omitted, zero is assumed.

An example of the AU command display as it appears below the A header is shown in figure 3-6.

DUMP PPU 05

0000	0010	0020	0030	0040	0050	0060	0070
000003	000100	007777	007777	007777	007777	007777	007777
001500	000000	007777	007777	007777	007777	007777	007777
007305	000000	007777	007777	007777	007777	007777	007777
000000	007777	007777	007777	007777	007777	007777	007777
000000	000000	007777	007777	007777	007777	007777	007777
000000	007777	007777	007777	007777	007777	007777	007777
000000	007777	007777	007777	007777	007777	007777	007777
000000	007777	007777	007777	007777	007777	007777	007777

0100	0110	0120	0130	0140	0150	0160	0170
006525	000200	000113	003011	003014	001500	000200	002000
000112	000147	003410	007225	007225	007125	000113	000251
006725	000100	000367	003010	006625	000000	003012	003411
000112	000100	000100	007225	000142	000100	004411	000200
007025	000363	000112	003012	007565	000112	003611	000113
000405	002000	001405	007225	000355	002415	002300	003012
005400	000100	001701	003013	000100	001415	000100	004411
000111	005400	000576	007225	000112	003411	000570	003611

0200	0210	0220	0230	0240	0250	0260	0270
002301	003413	000303	004011	000565	000156	007777	007777
000000	003312	000100	003413	003012	007777	007777	007777
000570	003414	000115	003312	002300	007777	007777	007777
001415	000506	002000	003414	007777	007777	007777	007777
003411	003611	000251	000564	003412	007777	007777	007777
000200	002300	003411	003611	000502	007777	007777	007777
000113	000100	000200	002301	000352	007777	007777	007777
004011	000565	000113	000000	000100	007777	007777	007777

Figure 3-6. AU Command Display

PP ALTER COMMANDS

The following are the alter commands associated with PPs.

Enter PP Memory (EP)

This command enters octal data into a PP at the address specified.

Execution of this command causes CMSE to begin communicating with the designated PP, making it unavailable for automatic assignment.

Command format:

```
EP,num,adrs,data or
EP,/,adrs,data
```

num	One- or two-digit PP number.
/	Substitute the last automatically assigned PP number.
adrs	The address where the data is to be entered (one to four octal digits).
data	The right-justified octal data to be entered (one to six octal digits).

Enter PP Memory Hexadecimal Data (EH)

This command enters hexadecimal data into a PP at the address specified.

Execution of this command causes CMSE to begin communicating with the designated PP, making it unavailable for automatic assignment.

Command format:

```
EH,num,adrs,data or
EH,/,adrs,data
```

num	One- or two-digit PP number.
/	Substitute the last automatically assigned PP number.
adrs	The octal address where data is to be entered (one to eight characters).
data	The right-justified hexadecimal data to be entered (one to four hexadecimal characters).

Clear PP Memory (KP)

This command enters data into a PP from the first word address to the last word address. If the command is entered with only the num parameter, memory is cleared from location 3 to location 7577_8.

Command format:

KP,num,fwa,lwa+1,data,incr or
KP,/,fwa,lwa+1,data,incr

or

KP,num or KP,/

num	One- or two-digit octal PP number.
/	Substitute the last automatically assigned PP number.
fwa	The first word address of the PP memory (one to four characters).
lwa+1	The last word address plus one of the PP memory (one to four characters).
data	The right-justified data to be entered (one to four characters). If no data is entered, memory is set to zero.
incr	Amount data is incremented for successive PP words.

Move PP Memory (MP)

This command copies the contents of a source PP to a designated PP from location 3 to 7577_8.

Execution of this command causes CMSE to begin communicating with the designated PP, making it unavailable for automatic assignment.

Command format:

MP,spp,dpp or MP,/,dpp

spp	The source PP number (one or two digits).
/	Substitute the last automatically assigned PP number.
dpp	The destination PP number (one or two digits).

PP LOAD COMMAND

Associated with PPs is the following load command.

NOTE

Because of the requirement to make program length end on 12-, 16-, 60-, 64-bit word boundaries, up to 60 bits of data may appear at the end of a program loaded into memory.

Load PP Program from MSL Device (CP)

This command loads the selected program into a PP from the MSL device. For 12-bit PP programs, parameters p0 through p17 replace program code beginning at PP memory location 5, if used. For 16-bit PP programs, parameters p0 through p17 replace program code beginning at the address in location 5 after the program is loaded. CMSE detects 16-bit programs by examining the type code in the program 7700 table for an H display code.

If the PP number is not specified with this command, the first available (idle) PP is automatically assigned. An A appears immediately to the left of the assigned PP number in the left screen header.

If no parameters are entered after the program name, the program is loaded, beginning with the address specified in the program table.

Command format:

```
CP,num,name,fwa,p0-p17 or CP,name,fwa,p0-p17

      or

CP,num,name,,p0-p17 or CP,name,,p0-p17

      or

CP,num,name or CP,name

      or

CP,Nxx,name,fwa,p0-p17 or CP,Cxx,name,fwa,p0-p17 (I4 IOU only)
```

num	One- or two-digit PP number.
name	The program name (one to seven alphanumeric characters).
fwa	The first word address of the program.
p0-p17	Optional test parameters stored starting at location 5 of PP memory for 12-bit programs and at the address contained in location 5 of PP memory for 16-bit programs. Commas or spaces must separate parameters. Each parameter is a four-digit octal value for a 12-bit PP load, or a six-digit octal value for a 16-bit PP load.
Nxx	Selects PP in an NIO subsystem of I4 IOU. If only N is supplied, the first available NIO PP is automatically assigned.
Cxx	Selects PP in a CIO subsystem of I4 IOU. If only C is supplied, the first available CIO PP is automatically assigned.

NOTE

When the CP, LT, or TL command uses Cxx to select a PP in an I4C IOU, the PP load is performed as if the PP is a CIO PP in an I4 IOU.

Call Test into PP and Use Library Overlays (LT)

This command loads the test specified by the name parameter to a PP at address fwa. The test display is assigned to the specified PP and the PP is started at address 100_8.

If the PP number is not specified with this command, the first available (idle) PP is automatically assigned. An A appears immediately to the left of the assigned PP number in the PP display.

Command format:

LTxx,name,fwa,p0-p17 or LT,name,fwa,p0-P17

or

LT,Nxx,name,fwa,p0-p17 or LT,Cxx,name,fwa,p0-p17 (I4 IOU only)

xx	One- or two-digit PP number.
name	Name of test (three or four characters).
fwa	First word address (default is test load address).
p0-p17	Optional test parameters to be stored starting at location 5 of PPxx memory for 12-bit programs and at the address contained in location 5 of PP memory for 16-bit programs. Each parameter is a four-digit octal value for a 12-bit PP load, or a six-digit octal value for a 16-bit PP load. Commas or spaces must separate parameters. No punctuation indicates no parameters are stored. These parameters overide parameters in the library file.
Nxx	Selects PP in an NIO subsystem of I4 IOU. If only N is supplied, the first available NIO PP is automatically assigned.
Cxx	Selects PP in a CIO subsystem of I4 IOU. If only C is supplied, the first available CIO PP is automatically assigned.

Call Test into PP and Use CM Overlays (TL)

This command loads the test specified by the name parameter to a PP at address fwa. The test display is assigned to the specified PP and the PP is started at address 101_8.

If the PP number is not specified with this command, the first available (idle) PP is automatically assigned. An A appears immediately to the left of the assigned PP number in the PP display.

This entry is for loading tests when running from a tape library.

Command format:

TLxx,name,fwa,p0-p17 or TL,name,fwa,p0-p17

or

TL,Nxx,name,fwa,p0-p17 or TL,Cxx,name,fwa,p0-p17 (I4 IOU only)

xx	One- or two-digit PP number. Also, the first two digits of the central memory address into which overlays are loaded.
name	Name of test (three or four alphanumeric characters).
fwa	First word address; defaults to test load address.
Nxx	Selects PP in an NIO subsystem of I4 IOU. If only N is supplied, the first available NIO PP is automatically assigned.
Cxx	Selects PP in a CIO subsystem of I4 IOU. If only C is supplied, the first available CIO PP is automatically assigned.
p0-p17	Optional test parameters to be stored starting at location 5 of PPxx memory for 12-bit programs and at the address contained in location 5 of PP memory for 16-bit programs. Each parameter is a four-digit octal value for a 12-bit PP load or a six-digit octal value for a 16-bit PP load. When fewer than four digits are specified, data enters right-justified. Commas or spaces must separate the parameters. No punctuation indicates that no parameters are stored. These parameters override parameters in the library file.

PP EXECUTE COMMANDS

Associated with PPs are the following execute commands.

Deadstart PP (DP)

This command performs a software deadstart of a PP using the hardware capability to place a PP in a deadstart condition on a specified channel. It then loads the PP resident program into the PP address locations 7600_8 through 7777_8 and starts executing in the idle loop portion of that program. This command releases any channels reserved by this PP and makes the PP available for automatic assignment (status is idle).

NOTE

If the PP selected has reserved channel 17 (maintenance channel), it is possible for this command to hang the IOU, or cause other unpredictable results and may require a hardware deadstart.

Command format:

DP,num or DP,/

num	One- or two-digit PP number.
/	Substitute the last automatically assigned PP number.

Execute PP Program (RU)

This command causes the selected PP to begin executing instructions at the address specified.

Execution of this command causes CMSE to begin communicating with the designated PP, making it unavailable for automatic assignment.

Command format:

RU,num,adrs or RU,/,adrs

num	One- or two-digit PP number.
/	Substitute the last automatically assigned PP number.
adrs	The address where program execution starts (one to four characters).

The following two commands are special purpose RU commands that control individual tests.

RUx,100 Start or continue PPx, and load overlays from the library.

RUx,101 Start PPx putting overlays in central memory.

Halt PP Program Execution (HT)

This command causes the selected PP to remain in the idle loop portion of the resident code the next time resident code is executed. Programs halted using this command can usually be continued by entering an RU command with an adrs parameter value of 7603_8.

Command format:

HT,num or HT,/

num	One- or two-digit PP number.
/	Substitute the last automatically assigned PP number.

Repetitive Deadstart (RP)

This command uses the PP deadstart capability to repetitively download up to 10 PP instructions to a selected PP, and allows enough time for each instruction to execute before repeating the process. This command remains in the keyboard buffer and executes until another keyboard entry is made.

Command format:

RP,num,p1,p2,...,p10

num	One- or two-digit PP number.
p1-p10	One to 10 PP instructions to be executed during each deadstart. Each parameter is one instruction word in machine language and is a four-digit octal value for a 12-bit PP load, or a six-digit octal value for a 16-bit PP load.

PP LIBRARY COMMAND

The following library command is associated with PPs.

Write PP Program to MSL Disk (*WP)

This command allows the contents of the PP, beginning with the first word address and continuing to the last word address, to be written on the MSL disk. The PP programs written to disk using this command are always written as 16-bit programs.

Command format:

```
*WP,base,num,name,fwa,lwa+1
```

base	Indicates the data format: Omitted Hexadecimal H Hexadecimal O Octal
num	One- or two-digit PP number.
name	The name of the program to be written to disk (one to seven characters).
fwa	The first word address of the program to be written to disk (one to four characters). If omitted, zero is assumed.
lwa+1	The last word address plus one of the program to be written to disk (one to four characters). If omitted, 7600 is assumed.

CENTRAL MEMORY COMMANDS

The following commands pertain to the central memory (CM). Except for the display commands, the CM commands default to hexadecimal format for all address and data entries. For octal entries, the base parameter must be used. All numerical entries following the base parameter are in that base. The two modes (octal and hexadecimal) may not be mixed.

CM DISPLAY COMMANDS

Associated with CM are the following display commands.

Display Octal Central Memory (AC, BC, AD, BD)

This command causes 40_8 words of CM to be written in the display buffer.

Command format:

AC,fwa or AC,fwa1,fwa2

or

BC,fwa

or

AD,fwa

or

BD,fwa

fwa	The first word (absolute) address of memory to be displayed in octal (zero to eight characters).
fwa1,fwa2	The first word (absolute) address of memory to be displayed in octal (zero to eight characters). When two first words are specified, 20_8 words are displayed for each word.
C	Indicates four columns of five octal digits each are to be displayed.
D	Indicates five columns of four octal digits each are to be displayed.

Examples of AC and AD displays are respectively shown in figures 3-7 and 3-8.

AC*00000000

00000000	00010	00000	00000	00130
00000001	00050	00400	04000	40134
00000002	00110	01000	10001	00140
00000003	00150	01400	14001	40144
00000004	00210	02000	20002	00150
00000005	00250	02400	24002	40154
00000006	00310	03000	30003	00160
00000007	00350	03400	34003	40164
00000010	00410	04000	40004	00170
00000011	00450	04400	44004	40174
00000012	00510	05000	50005	00200
00000013	00550	05400	54005	40204
00000014	00610	06000	60006	00210
00000015	00650	06400	64006	40214
00000016	00710	07000	70007	00220
00000017	00750	07400	74007	40224

Figure 3-7. AC Command Display

AD*00001000

00	0020	0000	0000	0000	0020
01	0000	0000	0000	0000	0000
02	0020	0000	0002	0000	0030
03	0000	0000	0000	0000	0000
04	0020	0000	0004	0000	0040
05	0000	0000	0000	0000	0000
06	0020	0000	0006	0000	0050
07	0000	0000	0000	0000	0000
10	0020	0000	0010	0000	0060
11	0000	0000	0000	0000	0000
12	0020	0000	0012	0000	0070
13	0000	0000	0000	0000	0000
14	0020	0000	0014	0000	0100
15	0000	0000	0000	0000	0000
16	0020	0000	0016	0000	0110
17	0000	0000	0000	0000	0000

Figure 3-8. AD Command Display

Display Hexadecimal Central Memory, Byte Address (AB, BB)

This command causes 20 hexadecimal words of CM to be written to the display buffer with real memory byte addresses, beginning with the CM word containing the first byte address.

Command format:

AB,fba or AB,fba1,fba2

or

BB,fba

fba — First byte address of CM written to the display buffer (one to seven characters). If omitted, the previous fba value is used. If no previous fba value exists, zero is assumed.

fba1,fba2 — First byte address of CM written to the display buffer (one to seven characters). When first two words are specified, 10 hexadecimal words are displayed for each word.

Examples of the AB and BB displays as they appear below the A and B headers are respectively shown in figures 3-9 and 3-10.

```
AB*0007000

0007000 1AFF 3D00 E948 38C0
0007008 00AB 06C0 00AB 07C0
0007010 A900 0020 1801 DF31
0007018 0098 3D01 1AFF 3D00
0007020 E948 38C0 00AB 06C0
0007028 0019 07C0 A900 0020
0007030 1801 DF31 00A0 3D01
0007038 1AFF 3D00 E948 38C0

0007040 0019 07C0 00AB 06C0
0007048 A900 0020 1801 DF31
0007050 00A8 3D01 2E0F 0000
0007058 0000 0000 0000 0000
0007060 0000 0000 0000 0000
0007068 0000 0000 0000 0000
0007070 0000 0000 0000 0000
0007078 0000 0000 0000 0000

0007080 0000 0000 0000 0000
0007088 0000 0000 0000 0000
0007090 0000 0000 0000 0000
0007098 0000 001F 4000 0000
00070A0 0000 001F 4000 0000
00070A8 0000 001F C000 0000
00070B0 0000 0000 0000 0000
00070B8 0000 0000 0000 0000

00070C0 0000 0000 0000 0000
00070C8 0000 0000 0000 0000
00070D0 0000 0000 0000 0000
00070D8 0000 0000 0000 0000
00070E0 0000 0000 0000 0000
00070E8 0000 0000 0000 0000
00070F0 0000 0000 0000 0000
00070F8 0000 0000 0000 0000
```

Figure 3-9. AB Command Display

```
BB*0007000

0007000 1AFF 3D00 E948 38C0
0007008 00AB 06C0 00AB 07C0
0007010 A900 0020 1801 DF31
0007018 0098 3D01 1AFF 3D00
0007020 E948 38C0 00AB 06C0
0007028 0019 07C0 A900 0020
0007030 1801 DF31 00A0 3D01
0007038 1AFF 3D00 E948 38C0

0007040 0019 07C0 00AB 06C0
0007048 A900 0020 1801 DF31
0007050 00A8 3D01 2E0F 0000
0007058 0000 0000 0000 0000
0007060 0000 0000 0000 0000
0007068 0000 0000 0000 0000
0007070 0000 0000 0000 0000
0007078 0000 0000 0000 0000

0007080 0000 0000 0000 0000
0007088 0000 0000 0000 0000
0007090 0000 0000 0000 0000
0007098 0000 001F 4000 0000
00070A0 0000 001F 4000 0000
00070A8 0000 001F C000 0000
00070B0 0000 0000 0000 0000
00070B8 0000 0000 0000 0000

00070C0 0000 0000 0000 0000
00070C8 0000 0000 0000 0000
00070D0 0000 0000 0000 0000
00070D8 0000 0000 0000 0000
00070E0 0000 0000 0000 0000
00070E8 0000 0000 0000 0000
00070F0 0000 0000 0000 0000
00070F8 0000 0000 0000 0000
```

Figure 3-10. BB Command Display

Display Hexadecimal Central Memory (AH, BH)

This command causes 20 hexadecimal words of CM to be written to the display buffer.

Command format:

AH,fwa or AH,fwa1,fwa2

or

BH,fwa

fwa	The first word address (absolute) of CM to be displayed in hexadecimal (one to eight digits). If omitted, the display starts either at the address previously entered or at zero.
fwa1,fwa2	The first word address (absolute) of CM to be displayed in hexadecimal (one to eight digits). When first two words are specified, 10 hexadecimal words are displayed for each word.

An example of the AH display is shown in figure 3-11.

```
AH*000200

000200    9010    0000    0000    0010
000201    0000    0000    0000    0000
000202    9010    0000    0200    0018
000203    0000    0000    0000    0000
000204    9010    0000    0400    0020
000205    0000    0000    0000    0000
000206    9010    0000    0600    0028
000207    0000    0000    0000    0000

000208    9010    0000    0800    0030
000209    0000    0000    0000    0000
00020A    9010    0000    0A00    0038
00020B    0000    0000    0000    0000
00020C    9010    0000    0000    0040
000200    0000    0000    0000    0000
00020E    9010    0000    0E00    0048
00020F    0000    0000    0000    0000

000210    9010    0000    1000    0050
000211    0000    0000    0000    0000
000212    0000    0000    0000    0000
000213    0000    0000    0000    0000
000214    0000    0000    0000    0000
000215    0000    0000    0000    0000
000216    0000    0000    0000    0000
000217    0000    0000    0000    0000

000218    0000    0000    0000    0000
000219    0000    0000    0000    0000
00021A    0000    0000    0000    0000
00021B    0000    0000    0000    0000
00021C    0000    0000    0000    0000
00021D    0000    0000    0000    0000
00021E    0000    0000    0000    0000
00021F    0000    0000    0000    0000
```

Figure 3-11. AH Command Display

Display Virtual Memory (AV, BV)

This command causes up to 20 hexadecimal words of central memory to be displayed. Parameter values not supplied in the command will be read from the process state registers unless otherwise noted. The RMA value displayed will be adjusted to a byte address ending in zero or eight. An asterisk (*) will be displayed above the actual starting byte. The increment/decrement keys +, - will adjust the displayed PVA and cause a new PVA to RMA translation. Real memory data will be displayed only for valid PVAs. If PVA to RMA translation is not possible, an error message indicating the invalid condition will appear below the display header.

NOTE

> Only one V display at a time is allowed (AV or BV). If a second V command is entered, the current V display become a Byte Address CM display.

Command format:

```
AV,pva,sta,pta,psm,ptl,stl
AV,Pnum,pva,J
AV,Pnum,pva,M
AV,Pnum,pva
AV,Pnum

      or

BV,pva,sta,pta,psm,ptl,stl
BV,Pnum,pva,J
BV,Pnum,pva,M
BV,Pnum,pva
BV,Pnum
```

num — Optional CPU select code for obtaining Process State Register values. If omitted default CPU is assumed.

pva — Optional processor virtual address (12 hexadecimal digits).

sta — Optional segment table address (eight hexadecimal digits).

pta — Optional page table address (eight hexadecimal digits).

psm — Optional page size mask (7 bits).

ptl — Optional page table length (four hexadecimal digits). The ptl is 8 bits, except for model 960 where it is 14 bits.

stl — Optional segment Table Length (three hexadecimal digits)

J — sta and stl are obtained from the Job Process Exchange package. Remaining parameter values obtained from Process State Registers.

M — sta and stl are obtained from the Monitor Process Exchange package. Remaining parameter values obtained from Process State Registers.

An example of the BV display as it appears below the B header is shown in figure 3-12.

```
PVA=B00740000000 STA=00002400 PTA=00001000 PSM=00
                 STL=009      PTL=0000
                  *
RMA    00021C00     0000 0000 0002 1C00
       00021C08     FFFF FFFF FFFF FFFF
          .                  .
          .                  .
          .                  .
       00021CF8     FFFF FFFF FFFF FFFF
```

Figure 3-12. BV Command Display

Display CM in Exchange Package Format (AX, BX)

This command displays the contents of an area of central memory (CM) beginning at fwa in exchange package format.

Command format:

AX,fwa

or

BX,fwa

fwa	First word (absolute) address of central memory to be displayed in octal (zero to eight characters).

An example of the AX display as it appears below the A header is shown in figure 3-13.

```
AX*001000

00  -P-  00  001300  000000  000000
01  RA-  00  000000  000000  000000
02  FL-  00  777777  000000  000000
03  EM-  00  200000  000000  000000
04  RAE  00  000000  000000  000000
05  FLE  77  777777  000000  000000
06  MA-  00  001000  000000  000000
07       00  000000  000000  000000

10  0000    0000    0000    0000    0000
11  0000    0000    0000    0000    0000
12  0000    0000    0000    0000    0000
13  0000    0000    0000    0000    0000
14  0000    0000    0000    0000    0000
15  0000    0000    0000    0000    0000
16  0000    0000    0000    0000    0000
17  0000    0000    0000    0000    0000

20  -P-  00  001336  000000  000000
21  RA-  00  000000  000000  000000
22  FL-  00  777777  000000  000000
23  EM-  00  200000  000000  000000
24  RAE  00  000000  000000  000000
25  FLE  77  777777  000000  000000
26  MA-  00  001020  000000  000000
27       00  000000  000000  000000

30  0000    0000    0000    0000    0000
31  0000    0000    0000    0000    0000
32  0000    0000    0000    0000    0000
33  0000    0000    0000    0000    0000
34  0000    0000    0000    0000    0000
35  0000    0000    0000    0000    0000
36  0000    0000    0000    0000    0000
37  0000    0000    0000    0000    0000
```

Figure 3-13. AX Command Display

CM ALTER COMMANDS

Associated with CM are the following alter commands.

Enter Byte of CM Data (EB)

This command alters up to one CM word of data, one character at a time, starting at the byte address of the data.

Command format:

```
EB,badrs,data
```

badrs	The byte address of the data to be altered (one to seven characters).
data	The data to be entered, 1 to 16 hexadecimal digits (left-justified). If omitted, there is no change to byte address.

Enter Word of CM Data (EC)

This command enters data into a specified CM address. The mode selected (octal or hexadecimal) is determined by the base parameter. This command does not purge cache if the base is octal.

Command format:

```
EC,base,adrs,data
```

or

```
EC,adrs,data
```

base	Indicates the data format: Omitted Hexadecimal H Hexadecimal O Octal
adrs	The address where the data is to be entered (one to eight characters).
data	The right-justified data (1 to 20 octal or 1 to 16 hexadecimal characters). If omitted, there is no change to CM address.

Set/Clear Block of CM (KC)

This command enters data into CM beginning at the value of the fwa parameter. If the data parameter is omitted, zeros are entered. This command purges cache if the base is octal.

Command format:

```
KC,base,fwa,lwa+1,data,incr
```

base	Indicates the data format: Omitted — Hexadecimal H — Hexadecimal O — Octal
fwa	The first word address of the data entry (one to eight characters).
lwa+1	The last word address plus one of the data entry (one to eight characters).
data	The right-justified data (1 to 20 octal or 1 to 16 hexadecimal characters). If omitted, zero is assumed. Any blank space appearing in the data is interpreted as a delimiter and the subsequent data is assumed to be the incr value.
incr	Data increment for successive CM words (1 to 20 octal or 1 to 16 hexadecimal characters).

CAUTION

The KC command fails when bringing up CMSE from tape after an initial power-on. This problem occurs on CYBER 170 Models 815/825, CYBER 180 810/810A, 830/830A computer systems. After a power-on, the following CMSE commands must be executed before central memory reads and writes can be performed.

CX,M	Master Clear CMC
CE,I	Clear IOU Errors
CE,M	Clear Memory errors
ER,M,20,0	Clear Memory Environmental Control Register
ER,M,21,0	Clear Memory Bounds Register

If deadstart is from disk, CTI performs the equivalent of the above commands before CMSE is brought into execution. During an initial installation in which you deadstart from tape the above commands should be executed.

Move Central Memory (MC)

This command copies the number of CM words specified by the nmbr parameter beginning at a source address and ending at a destination address. This command purges cache if the base is octal.

Command format:

MC,base,sadr,dadr,nmbr

base	Indicates the data format: Omitted Hexadecimal H Hexadecimal O Octal
sadr	The source address where the data is to be copied (one to eight characters).
dadr	The destination address or last address where the data is to be copied (one to eight characters).
nmbr	The number of words to be copied.

Set A Register Position at CM Address f to d (XA)

This command stores d into bits 35 through 18 (C170 exchange package A field) of the specified CM word. The other fields of the word are unchanged. When fewer than six octal digits are entered, the data stores in the lower-order bits of the field.

Command format:

XAf,d

f CM address; one to six octal digits. Leading zeros are not required.

d Value to be set into A register field; as many as six octal digits.

Set B Register Position at CM Address f to d (XB)

This command stores d into bits 17 through 0 (C170 exchange package B field) of the specified CM word. The other fields of the word are unchanged. When fewer than six octal digits are entered, the data stores in the lower-order bits of the field.

Command format:

XBf,d

f CM address; one to six octal digits. Leading zeros are not required.

d Value to be set into B register field; as many as six octal digits.

Set P Register Position at CM Address f to d (XP)

This command stores d into bits 59 through 36 (C170 exchange package P field) of the specified CM word. The other fields of the word are unchanged. When fewer than eight octal digits are entered, the data stores in the lower-order bits of the field. When entering other CP registers (RA, FL, EM, RAE, FLE, and MA) use the XP command and the actual CM address.

Command format:

XPf,d

f	CM address; one to six octal digits. Leading zeros are not required.
d	Value to be set into P register field; as many as eight octal digits.

CM LOAD COMMAND

Associated with CM are the following load commands. The programs are loaded 64 bits per word to a hexadecimal address if the type parameter in the program 7700 table is set to H. Otherwise, the program is loaded 60 bits per word to an octal address.

NOTE

Because of padding to make program lengths end on 12-, 16-, 60-, or 64-bit word boundaries, up to 60 bits of data may appear at the end of a program loaded into memory.

Load CM Program from MSL Device (CC)

This command loads the specified program beginning at the specified address.

Command format:

CC,name,fwa

name	The program name (one to seven characters).
fwa	The first word address where the program is to be loaded (one to eight characters). If omitted, the program is loaded at the address designated in the program tables.

NOTE

Several diagnostic programs are loaded into central memory in a compressed format with large contiguous blocks of zeros removed. The CMSE contains a PP utility program that expands these compressed diagnostics to their executable format. The utility program displays an error message if it is unable to expand the diagnostic.

The compressed format and utility program reduce MSL space requirements and the time required to load the diagnostic into central memory.

CM EXECUTE COMMANDS

Associated with CM are the following execute commands.

Monitor CM for CMSE Calls (CN)

This command causes CMSE to monitor the CM address for communication with a CM based program. A program making a CMSE call starts the call block at this address.

Command format:

```
CN,Pnum,base,adrs

    or

CN,Pnum,base
```

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
base	Indicates the data format: Omitted Hexadecimal H Hexadecimal O Octal
adrs	The address in CM to be monitored (17 bits maximum). If the adrs parameter is missing, zero is used.

Stop Monitoring CM for CMSE Calls (CF)

This command negates the effect of the CN command. CMSE does not monitor CM for communication with CM based programs.

Command format:

```
CF,Pnum
```

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

CM LIBRARY COMMANDS

Associated with CM are the following library commands.

Compare Hexadecimal Data in CM (CH)

This command compares data from two data blocks in CM. The compare is done on one CM word at a time until an error is encountered or the end of memory is reached. At termination of compare, the number of words compared with no errors is displayed on the previous entry line of the A display in the following format:

CH,fwa1,fwa2,xxx

xxx	Compare word count or blanks (if end of memory is reached without encountering any compare errors).

Command format:

CH,adrs1,adrs2

adrs1	First word address of first data block in CM.
adrs2	First word address of the second data block in CM.

Write CM Program to MSL Disk (*WC)

This command causes the contents of CM to be written to the MSL disk, beginning at fwa and continuing until lwa.

Command format:

*WC,base,name,fwa,lwa+1

base — Indicates the data format:

Omitted	Hexadecimal
H	Hexadecimal
O	Octal

name	The program name (one to seven alphanumeric characters).
fwa	The first word address of the CM to be written (one to eight characters).
lwa+1	The last word address plus one of the CM to be written (one to eight characters).

CENTRAL PROCESSOR COMMANDS

Following are the commands related to the CPU.

Assign Job Display to a CPU (CU)

This command informs CMSE of which CPUs Call Block Area in Central Memory from which to accept display calls for displaying on the test display (B screen). This command also causes the Central Memory C display on the B screen to be displayed and then to be replaced by the display call when one is received. The Call Block location for a CPU-based program is defined by the CN command.

Command format:

```
CU,Pnum
```

num	CPU number selection. num is the CPU number.

Assign the Default CPU (PD)

This command assigns the default processor; the CPU number to be used as the default CPU for all subsequent CPU commands that do not specify a CPU number.

Command format:

```
PD,Pnum
```

num	CPU number selection. num is the CPU number.

CONTROL STORE COMMANDS

Associated with control store (CS) are the following commands. All control store command parameters are in hexadecimal format.

CONTROL STORE DISPLAY COMMAND

Associated with CS is the following display.

Select Control Store Display (AK, BK)

This command causes 20 hexadecimal locations of CS to be written to the display buffer.

Command format for models 810, 815, 825, 830, 835, 840, 845, 850, 855, and 860 only:

```
AK,Pnum,My,fwa

      or

BK,Pnum,My,fwa
```

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

y — Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Display primary.
1	Display shadow (except 845 and 855).
Omitted	Display the memory selected by shadow select bit (bit 32 of DEC).

fwa — The first word address of the locations of CS to be written (zero to four digits). Default is to whatever value currently exists in the address buffer.

For model 960 only, it determines lower or upper areas of CS. Address ranges are:

Lower primary (M=0)	000_{16} to $7FF_{16}$
Upper primary (M=0)	800_{16} to FFF_{16}
Lower shadow (M=1)	000_{16} to $7FF_{16}$
Upper shadow (M=1)	800_{16} to FFF_{16}

An example of the AK command display as it appears under the A header is shown in figure 3-14.

```
AK CPO 000834

000834  3D0000DA E11B0825 350000DB 011AE825
000835  A225311F FAF48900 200001E0 C0070610
000836  C2813810 80109E05 01000000 00000000
000837  C2813810 80109E05 00200000 00000000
000838  C2813810 80109E05 00100000 00000000
000839  C2813810 80109E05 00080000 00000000
00083A  C2813810 80109E05 00040000 00000000
00083B  020000C0 00148000 1382C000 00148000
00083C  820000D2 1EBEAD00 80180000 30000000
00083D  A282C01E B67EA900 80380000 18000000
00083E  828408C0 00148000 018001E0 0004002E
00083F  C7000840 121E1585 04000000 00000000
000840  070000C2 921E6995 0785F01E 121EA981
000841  070000C2 B21EA995 0785F01E 121E6981
000842  A2890012 12034D80 80380000 38000000
000843  C787A800 12035585 03FF0000 00000000
000844  C787C800 12035585 07FF0000 00000000
000845  C787C800 12035585 F8000000 00000000
000846  C768D800 1216D585 00000000 00DEADC6
000847  C768D800 1216D585 00000000 00DEADC7
000848  070000C2 B2034981 0787A012 12036D81
000849  070000C2 B2034981 0787C012 12036D81
00084A  C768D800 1216D585 00000000 0CDEADAA
00084B  A2857002 811E6816 42380020 00D00000
00084C  C7890800 12035585 07FF0000 00000000
00084D  C7890800 12035585 F8000000 00000000
00084E  C7890800 12035585 03FF0000 00000000
00084F  C7890800 12035585 00000000 00000000
000850  A2851000 00148000 000001E0 0004002E
000851  B7853002 811E8816 42380020 01D00000
000852  820000C2 B21EA994 80380000 38000000
000853  B3855002 A11EC816 42380020 01D00000
```

Figure 3-14. AK Command Display for Models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860 and 960

Command format for model 990 only:

AK,Pnum,L,fwa

or

BK,Pnum,L,fwa

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
L	Logical display. In logical format, bits read from memory are arranged in logical groups for display purposes instead of sequentially as in physical format. Physical format results when L is omitted.
fwa	The first word address of the locations of CS to be written (zero to four digits). Default is to whatever value currently exists in the address buffer.

Examples of physical and logical formats of the AK command displays as they appear under the A or B header are shown in figures 3-14.1 and 3-14.2.

```
AK CP0 000

000     0101 0101 0101 0101 0080 0000 0000 0000
        1818 1818 1818 1818 0000 0000 0000 0000
001     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
002     0101 0101 0101 0101 0440 0000 0000 0004
        1818 1818 1818 1818 0000 0000 0000 0000
003     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
004     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
005     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
006     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
007     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
008     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
009     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00A     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00B     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00C     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00D     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00E     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00F     0000 0000 0000 0000 BFC0 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
```

Figure 3-14.1. AK Command Display for Model 990

AK CPO 000

000	0080	0000	0000	0000	0000	0001	0000	0000
001	BFC0	0000	0000	0000	0000	0000	0000	0000
002	0440	0000	0000	0004	0000	0001	C000	0000
003	BFC0	0000	0000	0000	0000	0000	0000	0000
004	BFC0	0000	0000	0000	0000	0000	0000	0000
005	BFC0	0000	0000	0000	0000	0000	0000	0000
006	BFC0	0000	0000	0000	0000	0000	0000	0000
007	BFC0	0000	0000	0000	0000	0000	0000	0000
008	BFC0	0000	0000	0000	0000	0000	0000	0000
009	BFC0	0000	0000	0000	0000	0000	0000	0000
00A	BFC0	0000	0000	0000	0000	0000	0000	0000
00B	BFC0	0000	0000	0000	0000	0000	0000	0000
00C	BFC0	0000	0000	0000	0000	0000	0000	0000
00D	BFC0	0000	0000	0000	0000	0000	0000	0000
00E	BFC0	0000	0000	0000	0000	0000	0000	0000
00F	BFC0	0000	0000	0000	0000	0000	0000	0000
010	0080	0000	0000	0000	0000	0001	C000	0000
011	BFC0	0000	0000	0000	0000	0000	0000	0000
012	BFC0	0000	0000	0000	0000	0000	0000	0000
013	BFC0	0000	0000	0000	0000	0000	0000	0000
014	BFC0	0000	0000	0000	0000	0000	0000	0000
015	BFC0	0000	0000	0000	0000	0000	0000	0000
016	BFC0	0000	0000	0000	0000	0000	0000	0000
017	BFC0	0000	0000	0000	0000	0000	0000	0000
018	BFC0	0000	0000	0000	0000	0000	0000	0000
019	BFC0	0000	0000	0000	0000	0000	0000	0000
01A	BFC0	0000	0000	0000	0000	0000	0000	0000
01B	BFC0	0000	0000	0000	0000	0000	0000	0000
01C	BFC0	0000	0000	0000	0000	0000	0000	0000
01D	BFC0	0000	0000	0000	0000	0000	0000	0000
01E	BFC0	0000	0000	0000	0000	0000	0000	0000
01F	BFC0	0000	0000	0000	0000	0000	0000	0000

Figure 3-14.2. AK,L Command Display for Model 990

CONTROL STORE ALTER COMMAND

Associated with CS is the following alter command.

Enter Control Store (EK)

This command sends a master clear function to the selected element and causes data to be written into a specified location in CS. Data is entered from left to right. For example, if 7F is entered at address 834, only byte zero is altered.

Command format for models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, and 960 only:

```
EK,Pnum,My,adrs,byteno,data
```

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

y — Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Enter primary.
1	Enter shadow (except 845 and 855).
Omitted	Enter both memories, if both memories exist.

adrs — The address where the data is to be written (hexadecimal, one to four characters).

For model 960 only, it determines lower or upper areas of CS. Address ranges are:

Lower primary (M=0)	000_{16} to $7FF_{16}$
Upper primary (M=0)	800_{16} to FFF_{16}
Lower shadow (M=1)	000_{16} to $7FF_{16}$
Upper shadow (M=1)	800_{16} to FFF_{16}

byteno — Byte number (0 through F) at which data entry will begin. If omitted, byte zero is assumed.

data — The data to be entered (1 to 32 hexadecimal digits).

Command format for model 990 only:

```
EK,Pnum,L,adrs,byteno,data
```

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

L — Logical enter. In logical format, bits entered into memory are arranged into logical groups instead of sequentially as in physical format. Physical format results when L is omitted.

adrs — The address where the data is to be written (hexadecimal, one to four characters).

byteno — The number (0 through 17) at which data entry will begin. If omitted, byte zero is assumed.

data — Logically formatted data to be entered.

CONTROL STORE LOAD COMMANDS

Associated with CS are the following load commands.

Load CS Program from MSL Device (CK)

This command sends a master clear function to the selected element and loads the specified program to CS, starting at the value of the fwa parameter. If only the first four characters of the program name are specified, the program loads from the common disk area (CDA). If all seven characters are specified, the program loads from the MSL library. If the fwa parameter is not specified, the program is loaded at the address designated in the program tables.

Command format:

```
CK,Pnum,My,name,fwa

     or

CK,Pnum,My,name
```

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
y	Control store memory select for models 840, 845, 850, 855, 860, and 960 only. 0 Load primary. 1 Load shadow (except 845 and 855). Omitted Load both memories, if both memories exist.
name	The name of the program. If first four characters are specified, program loads from common disk area (CDA). If all seven characters are specified, program loads from the MSL library.
fwa	The first word address where the program is to be loaded (zero to four characters). If omitted, the entry in program tables is used. If no entry in the program tables exists, zero is assumed. For model 960 only, it determines lower or upper areas of CS. Address ranges are: Lower primary (M=0) 000_{16} to $7FF_{16}$ Upper primary (M=0) 800_{16} to FFF_{16} Lower shadow (M=1) 000_{16} to $7FF_{16}$ Upper shadow (M=1) 800_{16} to FFF_{16}

Load CS Program from MSL Device and Verify (VK)

This command loads the specified program into control store from the MSL device. Before each word is written to CS, a 32-bit checksum is generated. After CS is loaded, the words are read back from CS and another 32-bit checksum is generated. The two checksums are then compared and an error message is displayed if the checksums do not compare.

Command format:

```
VK,Pnum,My,name,fwa

    or

VK,Pnum,My,name
```

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
y	Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Load and verify primary.
1	Load and verify shadow (except 845 and 855).
Omitted	Load and verify both memories, if both memories exist.

name	The name of the program (one to seven alphanumeric characters).
fwa	The first word address where the program is to be loaded (zero to four characters). If omitted, the entry in program tables is used. If no entry in the program tables exists, zero is assumed.

For model 960 only, it determines lower or upper areas of CS. Address ranges are:

Lower primary (M=0)	000_{16} to $7FF_{16}$
Upper primary (M=0)	800_{16} to FFF_{16}
Lower shadow (M=1)	000_{16} to $7FF_{16}$
Upper shadow (M=1)	800_{16} to FFF_{16}

CONTROL STORE EXECUTE COMMANDS

Associated with the control store are the following execute commands.

Deadstart Control Store (DK)

This command starts microcode execution, beginning at the CS address specified.

Command format:

DK,Pnum,My,adrs

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

y — Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Deadstart primary.
1	Deadstart shadow (except 845 and 855).
Omitted	Deadstart memory selected by shadow select bit (bit 32 of DEC). Also, CS extended memory bit (bit 46 of DEC) for model 960 only.

adrs — The starting address for microcode execution (zero to four characters). If omitted, execution starts at the last halt address.

Halt Microcode Execution (HK)

This command issues a stop processor function (00) to the CPU.

Command format:

HK,Pnum

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

Repetitive Deadstart Control Store (RK)

This command halts the CS processor, and restarts it at the address specified. A delay of approximately 1 microsecond for each delay count. This command remains in the keyboard buffer and executes until another keyboard entry is made.

Command format:

RK,Pnum,My,adrs,delay,C

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
y	Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Repetitive deadstart primary.
1	Repetitive deadstart shadow (except 845 and 855).
Omitted	Repetitive deadstart memory selected by shadow select bit (bit 32 of DEC). Also, CS extended memory bit (bit 46 of DEC) for model 960 only.

adrs	The CS address where execution is to begin (one to four digits).
delay	The delay count (one to three characters).
C	Master clear CMC for model 990 only.

CONTROL STORE LIBRARY COMMAND

Associated with CS is the following library command.

Write Control Store to MSL Disk (*WK)

This command copies CS from fwa to lwa to the MSL disk device.

Command format:

*WK,Pnum,My,name,fwa,lwa+1

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
y	Control store memory select for models 840, 845, 850, 855, 860, and 960 only.

0	Copy from primary.
1	Copy from shadow (except 845 and 855).
Omitted	Copy from memory selected by shadow select bit (bit 32 of DEC).

name	The program name (one to seven alphanumeric characters).
fwa	The first word address of the CS data (one to four characters).
lwa+1	The last word address plus one of the CS data (one to four characters).

For model 960 only, fwa/lwa determines lower or upper areas of CS. Address ranges are:

Lower primary (M=0)	000_{16} to $7FF_{16}$
Upper primary (M=0)	800_{16} to FFF_{16}
Lower shadow (M=1)	000_{16} to $7FF_{16}$
Upper shadow (M=1)	800_{16} to FFF_{16}

For model 960 only, the upper address bit that determines lower or upper CS is not included in the load address that is written to disk.

SOFT CONTROL MEMORY COMMANDS

The following commands perform operations with the soft memory.

Select Soft Control Memory Display (AS,BS)

This command displays a portion of the selected memory starting at the specified address.

Command format for model 990 only:

AS,Pnum,mem,adrs

or

BS,Pnum,mem,adrs

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

mem — Memory identifier (two to four characters).

IMAP	170 and 180 map
PM0	Page map set 0
PM1	Page map set 1
PM2	Page map set 2
PM3	Page map set 3
SM0	Segment map set 0
SM1	Segment map set 1
M2	Soft control M2
M3	Soft control M3
M4	Soft control M4
BDP	Business data processor
OCA	Operand cache
OCC	Fifo, prefetch, validity, tag
OCD	Data memory
RGA	A registers
RGX	X registers
LSU	Load/store unit
EPN	Error processing network
HF	History file
PMF	Maintenance register 22

adrs — The relative first word address of data to be displayed. If omitted, display starts at address zero.

Examples of the AS command as it appears under the A or B header are shown in figures 3-14.3 through 3-14.14.

Load Soft Control Memory from MSL (CS)

This command sends a master clear function to the system processor and loads the named program to the selected soft memory.

Command format for models 840, 845, 850, 855, 860, and 960 only:

CS,Pnum,name,t,fwa

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
name	Program name (one to seven alphanumeric characters).
t	Maintenance channel type code of soft memory to be loaded (three to seven). Type code 7 is used for register file access.
fwa	First word address where program is to be loaded. If omitted, program is loaded starting at assembly address.

The following command loads the named program to the selected memory starting at the specified address.

Command format for model 990 only:

CS,Pnum,mem,adrs

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
name	Program name (one to seven alphanumeric characters).
mem	Memory identifier (one to seven alphanumeric characters).

IBS	Instruction buffer stack
IMAP	170 and 180 map
PM0	Page map set 0
PM1	Page map set 1
PM2	Page map set 2
PM3	Page map set 3
SM0	Segment map set 0
SM1	Segment map set 1
M2	Soft control M2
M3	Soft control M3
M4	Soft control M4
BDP	Business data processor
OCA	Operand cache
OCC	Fifo, prefetch, validity, tag
OCD	Data memory
RGA	A registers
RGX	X registers
LSU	Load/store unit
EPN	Error processing network
HF	History file
PMF	Maintenance register 22

adrs	The relative hexadecimal address where program is to be loaded. If omitted, program is loaded at absolute MAC address in program load table.

```
IMAP CPO
000   0000 0000 0000 0000
001   0000 0000 0000 0000
002   0000 0000 0000 0000
003   0000 0000 0000 0000
004   0000 0000 0000 0000
005   0000 0000 0000 0000
006   0000 0000 0000 0000
007   0000 0000 0000 0000
008   0000 0000 0000 0000
009   0000 0000 0000 0000
00A   0000 0000 0000 0000
00B   0000 0000 0000 0000
00C   0000 0000 0000 0000
00D   0000 0000 0000 0000
00E   0000 0000 0000 0000
00F   0000 0000 0000 0000
010   0000 0000 0000 0000
011   0000 0000 0000 0000
012   0000 0000 0000 0000
013   0000 0000 0000 0000
014   0000 0000 0000 0000
015   0000 0000 0000 0000
016   0000 0000 0000 0000
017   0000 0000 0000 0000
018   0000 0000 0000 0000
019   0000 0000 0000 0000
01A   0000 0000 0000 0000
01B   0000 0000 0000 0000
01C   0000 0000 0000 0000
01D   0000 0000 0000 0000
01E   0000 0000 0000 0000
01F   0000 0000 0000 0000
```

Figure 3-14.3. AS, IMAP Command Display for Model 990

```
PMO CPO
000    F000 0000 0000 0000
001    F000 0000 0000 0000
002    F000 0000 0000 0000
003    F000 0000 0000 0000
004    F000 0000 0000 0000
005    F000 0000 0000 0000
006    F000 0000 0000 0000
007    F000 0000 0000 0000
008    F000 0000 0000 0000
009    F000 0000 0000 0000
00A    F000 0000 0000 0000
00B    F000 0000 0000 0000
00C    F000 0000 0000 0000
00D    F000 0000 0000 0000
00E    F000 0000 0000 0000
00F    F000 0000 0000 0000
010    F000 0000 0000 0000
011    F000 0000 0000 0000
012    F000 0000 0000 0000
013    F000 0000 0000 0000
014    F000 0000 0000 0000
015    F000 0000 0000 0000
016    F000 0000 0000 0000
017    F000 0000 0000 0000
018    F000 0000 0000 0000
019    F000 0000 0000 0000
01A    F000 0000 0000 0000
01B    F000 0000 0000 0000
01C    F000 0000 0000 0000
01D    F000 0000 0000 0000
01E    F000 0000 0000 0000
01F    F000 0000 0000 0000
```

Figure 3-14.4. AS, PMO Command Display for Model 990

```
SMO CPO
000   F00F FF00 0000 0000
001   F00F FF00 0000 0000
002   F00F FF00 0000 0000
003   F00F FF00 0000 0000
004   F00F FF00 0000 0000
005   F00F FF00 0000 0000
006   F00F FF00 0000 0000
007   F00F FF00 0000 0000
008   F00F FF00 0000 0000
009   F00F FF00 0000 0000
00A   F00F FF00 0000 0000
00B   F00F FF00 0000 0000
00C   F00F FF00 0000 0000
00D   F00F FF00 0000 0000
00E   F00F FF00 0000 0000
00F   F00F FF00 0000 0000
010   F00F FF00 0000 0000
011   F00F FF00 0000 0000
012   F00F FF00 0000 0000
013   F00F FF00 0000 0000
014   F00F FF00 0000 0000
015   F00F FF00 0000 0000
016   F00F FF00 0000 0000
017   F00F FF00 0000 0000
018   F00F FF00 0000 0000
019   F00F FF00 0000 0000
01A   F00F FF00 0000 0000
01B   F00F FF00 0000 0000
01C   F00F FF00 0000 0000
01D   F00F FF00 0000 0000
01E   F00F FF00 0000 0000
01F   F00F FF00 0000 0000
```

Figure 3-14.5. AS, SMO Command Display for Model 990

M2	CPO			
000	0000	2000	0000	0000
001	0020	2000	0000	0000
002	0000	2000	1000	0000
003	0000	2000	0000	0000
004	0000	2000	0000	0000
005	0000	2000	0002	0000
006	0000	0000	0000	0000
007	0020	0000	0000	0000
008	0480	0200	8440	0900
009	8000	0000	0000	0000
00A	0480	0200	8240	0000
00B	8000	0000	0000	0000
00C	0000	0000	1000	0000
00D	0000	0000	1000	0000
00E	0000	2000	0000	0000
00F	0000	0000	1000	0000
010	0000	2000	0000	0000
011	0000	0000	1000	0000
012	0000	0000	1000	0000
013	0000	0000	0000	0000
014	0000	2000	0000	0000
015	0000	2000	0000	0000
016	0000	2000	1002	0000
017	0000	0000	1002	0000
018	0000	0000	1000	0000
019	0000	0000	1000	0000
01A	0180	0000	A080	1B00
01B	A780	0200	4000	1C00
01C	8000	2200	0000	0000
01D	0480	0200	0000	1E00
01E	2000	0000	0000	0000
01F	0004	0000	0000	0000

Figure 3-14.6. AS, M2 Command Display for Model 990

BDP	CPO							
000	0000	0000	0000	0000	0000	0000	0000	0000
001	0000	0000	2010	0000	0000	0000	0000	0000
002	0800	0120	2040	0300	0002	0040	0000	0300
003	0400	00A0	2040	0400	0002	0002	0000	0400
004	D354	5118	7000	0500	1250	0090	0200	0500
005	0001	1020	2040	0600	0000	0000	8200	0600
006	0001	0020	2040	0700	0010	0000	0000	0700
007	0000	0000	2040	0800	C004	1400	0000	0800
008	0000	0000	2040	0900	0000	0000	0200	0900
009	0000	0000	2040	0A00	0004	0000	0000	0A00
00A	0000	0000	0000	0A00	0000	0000	0200	0A00
00B	0008	0000	2040	0C00	0000	0002	0200	0C00
00C	13C0	0000	40A0	0E00	1000	0080	0200	0E00
00D	0000	0000	2040	0A00	0000	0000	0200	0A00
00E	0000	0000	0040	0F00	0000	0000	0200	0F00
00F	0000	0000	0040	1000	0000	0000	0200	1000
010	0000	0000	0040	1100	0000	0000	0200	1100
011	0000	0000	0040	1200	0000	0000	0200	1200
012	0000	0000	0040	1300	0000	0000	0200	1300
013	0000	0000	0040	0D00	0040	0000	0000	0D00
014	0000	0000	2040	0B00	0000	0000	0200	0B00
015	0000	0000	2010	0000	0000	0020	0000	0000
016	0000	0000	2010	0000	0000	0020	0000	0000
017	0000	0000	2010	0000	0000	0020	0000	0000
018	0000	0000	2010	0000	0000	0020	0000	0000
019	0000	0000	2010	0000	0000	0020	0000	0000
01A	0000	0000	2010	0000	0000	0020	0000	0000
01B	0000	0000	2010	0000	0000	0020	0000	0000
01C	0000	0000	2010	0000	0000	0020	0000	0000
01D	0000	0000	2010	0000	0000	0020	0000	0000
01E	0000	0000	2010	0000	0000	0020	0000	0000
01F	0000	0000	2010	0000	0000	0020	0000	0000

Figure 3-14.7. AS, BDP Command Display for Model 990

OCA   CPO   COLUMN=00   FIFO= 8

SET	P	SVA-TAG	MDOCA	V	DATA
0	0	0000 1FFF E000	1000	1	FFFF FFFF FFFF FFFF
			1400	1	FFFF FFFF FFFF FFFF
			1800	1	FFFF FFFF FFFF FFFF
			1C00	1	FFFF FFFF FFFF FFFF
1	0	0000 0000 0000	1100	1	FFFF FFFF FFFF FFFF
			1500	1	FFFF FFFF FFFF FFFF
			1900	1	FFFF FFFF FFFF FFFF
			1D00	1	FFFF FFFF FFFF FFFF
2	0	0000 1FFF E000	1200	1	FFFF FFFF FFFF FFFF
			1600	1	FFFF FFFF FFFF FFFF
			1A00	1	FFFF FFFF FFFF FFFF
			1E00	1	FFFF FFFF FFFF FFFF
3	0	0000 0000 0000	1300	1	FFFF FFFF FFFF FFFF
			1700	1	FFFF FFFF FFFF FFFF
			1B00	1	FFFF FFFF FFFF FFFF
			1F00	1	FFFF FFFF FFFF FFFF

Figure 3-14.8. AS, OCA Command Display for Model 990

```
OCC CPO
000    0000 4100 001F FFE0
001    0000 4100 001F FFE0
002    0000 4100 001F FFE0
003    0000 4100 001F FFE0
004    0000 4100 001F FFE0
005    0000 4100 001F FFE0
006    0000 4100 001F FFE0
007    0000 4100 001F FFE0
008    0000 4100 001F FFE0
009    0000 4100 001F FFE0
00A    0000 4100 001F FFE0
00B    0000 4100 001F FFE0
00C    0000 4100 001F FFE0
00D    0000 4100 001F FFE0
00E    0000 4100 001F FFE0
00F    0000 4100 001F FFE0
010    0000 4100 001F FFE0
011    0000 4100 001F FFE0
012    0000 4100 001F FFE0
013    0000 4100 001F FFE0
014    0000 4100 001F FFE0
015    0000 4100 001F FFE0
016    0000 4100 001F FFE0
017    0000 4100 001F FFE0
018    0000 4100 001F FFE0
019    0000 4100 001F FFE0
01A    0000 4100 001F FFE0
01B    0000 4100 001F FFE0
01C    0000 4100 001F FFE0
01D    0000 4100 001F FFE0
01E    0000 4100 001F FFE0
01F    0000 4100 001F FFE0
```

Figure 3-14.9. AS, OCC Command Display for Model 990

```
RGA  CPO
000   0000 0000 0000 0000
001   0000 0000 0000 0001
002   0000 0000 0001 8000
003   0000 0000 0000 0000
004   0000 0000 0000 0001
005   0000 0000 0000 0000
006   0000 0000 0000 0001
007   0000 0000 0000 0000
008   0000 0000 0000 0000
009   0000 0000 0000 0000
00A   0000 0000 0000 0000
00B   0000 0000 0000 0000
00C   0000 0000 0000 0000
00D   0000 0000 0000 0000
00E   0000 0000 0000 0000
00F   0000 0000 0000 0000
```

Figure 3-14.10. AS, RGA Command Display for Model 990

LSUP	CPO			
000	0000	0000	0000	0000
001	0000	0004	0000	0000
002	0000	0004	0000	0000
003	0000	0004	0000	0000
004	0000	0004	0000	0000
005	0000	0004	0000	0000
006	0000	0004	0000	0000
007	0000	0004	0000	0000
008	0000	0004	0000	0000
009	0000	0004	0000	0000
00A	0000	0004	0000	0000
00B	0000	0004	0000	0000
00C	0000	0004	0000	0000
00D	0000	0004	0000	0000
00E	0000	0004	0000	0000
00F	0000	0004	0000	0000
010	0000	0004	0000	0000
011	0000	0004	0000	0000
012	0000	0004	0000	0000
013	0000	0004	0000	0000
014	0000	1A70	0000	0000
015	0000	0004	0000	0000
016	0000	0004	0000	0000
017	0000	0004	0000	0000
018	0000	0004	0000	0000
019	0000	0004	0000	0000
01A	0000	0004	0000	0000
01B	0000	0004	0000	0000
01C	0000	0004	0000	0000
01D	0000	0004	0000	0000
01E	0000	0004	0000	0000
01F	0000	0000	0000	0000

Figure 3-14.11. AS, LSU Command Display for Model 990

EPN	CPO			
000	4000	4300	4000	4300
001	0003	C200	0003	C200
002	0008	0000	0008	0000
003	0008	0000	0008	0000
004	0008	0000	0008	0000
005	0008	0000	0008	0000
006	0008	0000	0008	0000
007	0008	0000	0008	0000
008	0008	0000	0008	0000
009	0008	0000	0008	0000
00A	0008	0000	0008	0000
00B	0008	0000	0008	0000
00C	0008	0000	0008	0000
00D	0008	0000	0008	0000
00E	0008	0000	0008	0000
00F	0008	0000	0008	0000
010	0008	0000	0008	0000
011	0008	0000	0008	0000
012	0008	0000	0008	0000
013	0008	0000	0008	0000
014	0008	0000	0008	0000
015	0008	0000	0008	0000
016	0008	0000	0008	0000
017	0008	0000	0008	0000
018	0008	0000	0008	0000
019	0008	0000	0008	0000
01A	0008	0000	0008	0000
01B	0008	0000	0008	0000
01C	0008	0000	0008	0000
01D	0008	0000	0008	0000
01E	0008	0000	0008	0000
01F	0000	0000	0000	0000

Figure 3-14.12. AS, EPN Command Display for Model 990

```
HF    CPO
000   BAD0 BAD1 BAD2 BAD3 0000 0000 0000 0000
      BCD0 8000 0000 0000 0000 0000 0000 0000
001   BAD0 BAD1 BAD2 BAD3 0000 0000 0000 0000
      BCD0 8000 0000 0000 0000 0000 0000 0000
002   D000 0000 0000 0000 0000 0000 0000 0000
      8CD0 8000 0000 0000 0000 0000 0000 0000
003   0000 0000 0000 0000 0000 0000 0000 0000
      0000 0000 0000 0000 0000 0000 0000 0000
004   0000 0000 0000 0000 0000 0000 0000 0000
      0000 0000 0000 0000 0000 0000 0000 0000
005   0000 0000 0000 0000 0000 0000 0000 0000
      0008 0000 0000 0000 0000 0000 0000 0000
006   0000 0000 0000 0000 0000 0000 0000 0000
      0000 0000 0000 0000 0000 0000 0000 0000
007   0000 0000 0000 0000 0000 0000 0000 0000
      0000 0000 0000 1000 0000 0000 0200 1000
008   0000 0000 0000 1100 0000 0000 0200 1100
      0000 0000 0000 1200 0000 0000 0200 1200
009   0000 0000 0000 1300 0000 0000 0200 1300
      0000 0000 0000 0D00 0040 0000 0000 0D00
00A   0000 0000 0000 0B00 0000 0000 0200 0B00
      0000 0000 0000 0000 0000 0020 0000 0000
00B   0000 0000 0000 0000 0000 0020 0000 0000
      0000 0000 0000 0000 0000 0020 0000 0000
00C   0000 0000 0000 0000 0000 0020 0000 0000
      0000 0000 0000 0000 0000 0020 0000 0000
00D   0000 0000 0000 0000 0000 0020 0000 0000
      0000 0000 0000 0000 0000 0020 0000 0000
00E   0000 0000 0000 0000 0000 0020 0000 0000
      0000 0000 0000 0000 0000 0020 0000 0000
00F   0000 0000 0000 0000 0000 0020 0000 0000
      0000 0000 0000 0000 0000 0020 0000 0000
```

Figure 3-14.13. AS, HF Command Display for Model 990

```
PMF    CPO
000    00 00 00 00 00 00 00 00
008    0F 0F 1F 1F 1F 1F 1F 1F
010    00 00 00 00 00 00 00 00
018    00 00 00 00 00 00 00 00
020    00 00 00 00 00 00 00 00
028    00 00 00 00 00 00 00 00
```

Figure 3-14.14. AS, PMF Command Display for Model 990

Alter Soft Control Memory (ES)

This command sends a master clear to the processor and alters the selected location.

Command format for models 840, 845, 850, 855, and 860 only:

```
ES,Pnum,t,adrs,data
```

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
t	Maintenance channel type code of soft memory to be altered (three to seven). Type code 7 is used for register file access.
adrs	Address to be altered.
data	Hexadecimal data to be inserted (one to eight digits for soft memory, or 1 to 16 digits for register file).

The following command sends data into a byte or bytes of the selected memory.

Command format for model 990 only:

```
ES,Pnum,mem,adrs,byte,data
```

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

mem — Memory identifier (two to four characters). If BP3 is specified, all bytes of specified address which are not entered will be zeros.

IBS	Instruction buffer stack
IMAP	170 and 180 map
PM0	Page map set 0
PM1	Page map set 1
PM2	Page map set 2
PM3	Page map set 3
SM0	Segment map set 0
SM1	Segment map set 1
M2	Soft control M2
M3	Soft control M3
M4	Soft control M4
BDP	Business data processor
BP3	P3 part of BDP
OCA	Operand cache
OCC	Fifo, prefetch, validity, tag
OCD	Data memory
RGA	A registers
RGX	X registers
LSU	Load/store unit
EPN	Error processing network
HF	History file
PMF	Maintenance register 22

adrs — The relative address to be altered. Omitted for PMF.

byte — The starting hexadecimal byte number of data to be entered. If omitted, byte 0 is selected. Each byte is eight bits. Byte 0 corresponds to the highest order eight bits. Use the following byte numbers.

BDP	0 through F
HF	0 through 1F
PMF	0 through 2F
All other mem	0 through 7

data — Hexadecimal data to be entered starting at the specified byte number and proceeding to the lower order bits. If one character of data is entered, it is right-justified with a padded zero in the specified byte.

Write Soft Control Memory to MSL Disk (*WS)

This command copies the specified memory from fwa to lwa to the MSL disk as a file under the specified program name.

Command format for model 990 only:

*WS,Pnum,name,mem,fwa,lwa+1

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

name — Program name (one to seven alphanumeric characters).

mem — Memory identifier (two to four characters). BP3 are write only memories and cannot be read and then written to disk.

IBS	Instruction buffer stack
IMAP	170 and 180 map
PM0	Page map set 0
PM1	Page map set 1
PM2	Page map set 2
PM3	Page map set 3
SM0	Segment map set 0
SM1	Segment map set 1
M2	Soft control M2
M3	Soft control M3
M4	Soft control M4
BDP	Business data processor
BP3	P3 part of BDP
OCA	Operand cache
OCC	Fifo, prefetch, validity, tag
OCD	Data memory
RGA	A registers
RGX	X registers
LSU	Load/store unit
EPN	Error processing network
HF	History file
PMF	Maintenance register 22

fwa — The relative first word address from which program starts to be written to disk.

lwa+1 — The relative last word address plus one at which program to be written to disk will end.

SPECIAL MEMORY COMMANDS

Associated with special memory are the following commands.

SPECIAL MEMORY DISPLAY COMMANDS

Associated with special memory are the following display commands.

Select Special Memory Display (AR,BR)

The following command displays the contents of the CIR or EIT memory.

Command format for model 990 only:

AR,Pnum,mem

or

BR,Pnum,mem

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
mem	Memory identifier (two or three characters).

CIR	Current instruction register
EIT	Error information table

An example of an AR command display as it appears under the A or B header is shown in figure 3-14.15.

The following command displays the contents of an A or X scratch register.

Command format or model 990 only:

AR,Pnum,SCR,name,reg

or

BR,Pnum,SCR,name,reg

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
name	Name of display register.

A	A register
X	X register

reg	The register number to be displayed.

EIT	CPO			
000	0000	0000	0000	F200
001	0000	0000	0101	F210
002	0000	0000	0202	F220
003	0000	0000	0303	F230
004	0000	0000	0404	F240
005	0000	0000	0505	F250
006	0000	0000	0606	F260
007	0000	0000	0707	F270
008	0000	0000	0808	F280
009	0000	0000	0909	F290
00A	0000	0000	0A0A	F2A0
00B	0000	0000	0B0B	F2B0
00C	0000	0000	0C0C	F2C0
00D	0000	0000	0D0D	F2D0
00E	0000	0000	0E0E	F2E0
00F	0000	0000	0F0F	F2F0

Figure 3-14.15. AR, EIT Command Display for Model 990

Select Special Memory Display (AS,BS)

The following command displays the contents of the instruction buffer stack in hexadecimal or octal format starting at the specified address.

Command format for model 990 only:

AS,Pnum,IBS,base,adrs

or

BS,Pnum,IBS,base,adrs

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

base — Format of data.

- O — Octal format
- H — Hexadecimal format

adrs — The first word address of the data from which to start the display.

An example of the AS,IBS command display as it appears under the A or B header is shown in figure 3-14.16.

Control Word Display (AT,BT)

This command displays the contents of the control word memory in logical or physical format. In logical format, bits read from memory are arranged in logical groups for display purposes instead of sequentially as in physical format. Logical format is arranged logically to match the microcode remedy listing.

IBSO	CPO			
000	34400	02203	00000	02203
001	00000	00000	00000	00000
002	52000	00000	00000	00000
003	00000	00000	00000	00000
004	52400	00000	00000	00000
005	00000	00000	00000	00000
006	53000	00000	00000	00000
007	00000	00000	00000	00000
008	53400	00000	00000	00000
009	00000	00000	00000	00000
00A	54000	00000	00000	00000
00B	00000	00000	00000	00000
00C	54400	00000	00000	00000
00D	00000	00000	00000	00000
00E	55000	00000	00000	00000
00F	43600	00000	00000	00000
010	34400	02203	00000	02203
011	00000	00000	00000	00000
012	40600	00000	41400	00000
013	00000	00000	00000	00000
014	00000	00000	00000	00000
015	00000	00000	00000	00000
016	00000	00000	00000	00000
017	00000	00000	00000	00000
018	00000	00000	00000	00000
019	00000	00000	00000	00000
01A	00000	00000	00000	00000
01B	00000	00000	00000	00000
01C	00000	00000	00000	00000
01D	00000	00000	00000	00000
01E	00000	00000	00000	00000
01F	00000	00000	00000	00000

Figure 3-14.16. AS, IBS Command Display for Model 990

Command format for model 990 only:

AT,Pnum,disp,adrs

or

BT,Pnum,disp,adrs

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
disp	Type of display.
	L — Logical
	Omitted — Physical
adrs	The first word address of the data from which to start the display.

Examples of physical and logical formats of the AT command displays as they appear under the A or B header are shown in figures 3-14.17 and 3-14.18.

Move Capture Buffer to CM for Display (MX)

This command transfers the 512-word capture buffer to CM beginning at the address specified. The 512-word block of CM is set to all Fs prior to the transfer.

If K is entered for the address portion of the command, the capture buffer is cleared by issuing a zero pattern function.

Command format for model 990 only:

MX,adrs

or

MX,K

adrs	The hexadecimal central memory address where data is to be written.
K	Causes the capture buffer to be cleared.

AT	CPO 000							
000	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
001	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
002	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
003	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
004	38A0	2A00	000B	2800	C000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
005	38A0	4A00	0008	E800	C000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
006	38A0	2AD0	000B	2800	8000	3000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
007	38A0	4AD0	0008	E800	8000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	1000
008	0000	0800	0000	2000	0008	2000	0000	0000
	1000	0000	0000	0000	0000	0000	0100	0000
009	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0001	0000
00A	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0068	0000
00B	38A0	4A00	0008	E800	9000	2000	0000	0A00
	0000	0000	0000	0000	0000	0000	0000	1000
00C	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	0000	0000
00D	38A0	2AD0	000B	2800	A000	3000	0000	0500
	0000	0AD0	0000	0000	0000	0000	0000	0000
00E	BF10	AA00	2003	2400	8010	2000	A400	0000
	1000	0000	0200	0000	0042	0000	0100	0000
00F	0000	0800	0000	2000	0000	2000	0000	0000
	0000	0000	0000	0000	0000	0000	00C0	0000

Figure 3-14.17. AT Command Display for Model 990

```
ATL   CP0  000
000     0000 0001 0C00 0000 0000 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
001     0000 0001 0C00 0000 C000 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
002     0000 0001 0C00 0000 0040 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
003     0000 0001 0C00 0000 0000 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
004     0000 0008 3800 0000 0008 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
005     0000 0009 0800 0000 0000 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
006     0000 0001 2C00 0000 0028 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
007     0000 0001 0C00 0000 8013 FC00 0000 0000
        0000 0000 0000 1000 0000 0000 0000 0000
008     0000 0001 0C00 0000 0040 0000 0000 0000
        0000 0000 0000 0004 0000 0000 0000 0000
009     0000 0001 0C00 0000 0000 0000 0000 0000
        0000 0000 0000 0500 0000 0000 0000 0000
00A     38A0 2018 872F 00AC 0040 0000 0000 0000
        0000 0000 0000 0004 0000 0000 0000 0000
00B     38A0 2019 B72D 00AC 0008 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00C     0000 0081 0C00 0002 8043 8401 0000 1000
        0000 0000 0000 1500 0000 0000 0000 0000
00D     38AC 4001 0CED 0150 0000 0000 0000 0000
        0000 A000 0000 0000 0000 0000 0000 0000
00E     38A0 2081 0F2D 00AD 0000 0000 0000 0000
        0000 0000 0000 0000 0000 0000 0000 0000
00F     0000 0001 0C00 0000 0100 0000 0000 0040
        2000 0000 0000 0000 0000 0000 0000 0000
```

Figure 3-14.18. AT,L Command Display for Model 990

CONTROL WORD ALTER COMMAND

Associated with control word is the following alter command.

Enter Control Word (ET)

This command enters data into a byte or bytes of control word memory in logical or physical format. In logical format, bits are arranged in logical groups instead of sequentially as in physical format.

Command format:

```
ET,Pnum,L,adrs,byte,data
```

num — CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.

L — Logically formatted data for model 990 only.

adrs — Relative hexadecimal memory address to be altered.

byte — The starting hexadecimal byte number of data to be entered. If omitted, byte 0 is selected. Byte 0 corresponds to the highest order eight bits. Valid byte numbers are 0 through 1F.

data — Hexadecimal data to be entered starting at the specified byte number and proceeding to the lower order bits. If one character of data is entered, it is right-justified with a padded zero in the specified byte.

CONTROL WORD LOAD COMMAND

Associated with the control word is the following load command.

Load Control Word Program from MSL (CT,VT)

This command loads the selected program into control word memory from MSL.

The VT command also verifies the loaded data. Before each word is written to control word, a 32-bit checksum is generated. After control word is loaded, the words are read back to the monitor and another checksum is generated. If the checksums differ, an error message is issued.

Command format:

CT,Pnum,name,adrs

or

VT,Pnum,name,adrs

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
name	The program name (one to seven characters).
adrs	The relative hexadecimal address where program is to be loaded. If omitted, program is loaded at absolute MAC address in program load table.

CONTROL WORD LIBRARY COMMAND

Associated with the control word is the following library command.

Write Control Word to MSL Disk (*WT)

This command copies control word memory from fwa to lwa to the MSL disk as a file under the specified program name.

Command format:

*WT,Pnum,name,fwa,lwa+1

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
name	The program name (one to seven characters).
fwa	The relative first word address in the control word from which program starts to be written to disk.
lwa+1	The relative last word address plus one in the control word at which program to be written to disk will end.

MAINTENANCE CHANNEL COMMANDS

The following commands are associated with the maintenance channel (MCH).

MAINTENANCE CHANNEL DISPLAY COMMAND

The following display command is associated with the MCH.

Select Maintenance Register Display (AR, BR)

Depending on the command format and the parameters entered, the R display shows one of three levels of register detail.

Level 1 command format:

AR

or

BR

This format causes a nondynamic display of the status summary registers of the PP, CM, and CP system elements. There is a descriptive line for each failure bit or informative bit set. A descriptive line is also displayed for each group of bits (for example, an address) regardless of the set condition. The line contains the bit number, bit name, and bit value.

Level 2 command format:

AR,el,S

or

BR,el,S

el	Selection of mainframe element.	
	Numeric	
	0	IOU
	1	Memory
	2	CPU 0
	Alphabetic	
	C	CEM
	I	IOU
	M	Memory
	P	Processor
	Pnum	CPU num selected. If num is omitted, the default is assumed.
S	Selection of soft register displays (CPU register display only).† If omitted, hard registers are displayed.	

This format displays all the registers of the selected element. The display format is: register number, four groups of four hexadecimal digits of dynamic date, and register name. If the CPU register display is selected, an additional parameter allows displaying of the soft registers. If the parameter is omitted, only the actual CPU register information is displayed.

Level 3 command format:

AR,el,reg

or

BR,el,reg

el	Mainframe element selection.	
	Numeric	
	0	IOU
	1	Memory
	2	CPU 0
	Alphabetic	
	C	CEM
	I	IOU
	M	Memory
	P	Processor
	Pnum	CPU num selected. If num is omitted, the default is assumed.
reg	Register number to be displayed (one or two hexadecimal digits). Default to level 2 if reg is omitted.	

†Microcode must be running to display soft registers.

This format displays the nondynamic contents of a specified hard register. A descriptive line is displayed for each failure bit or informative bit that is set as well as for each group of bits (for example, an address) regardless of the set condition.

NOTE

If control store is halted, all zeros are returned for a read of the soft registers. The register display shows all zeros. If control store is hung, no data is returned for a read of the soft registers and the display is blank.

Examples of the AR command display are shown in figures 3-15, 3-15.1, and 3-15.2.

```
              I2    STATUS SUMMARY = 14

BIT 59 - SUMMARY STATUS          = 1
BIT 61 - UNCORRECTED ERROR       = 1

              M5    STATUS SUMMARY = 04

BIT 61 - UNCORRECTABLE ERR       = 1

              P5    CP0 STATUS SUMMARY = 2C

BIT 58 - C180 MONITOR MODE       = 1
BIT 60 - PROCESSOR HALTED        = 1
BIT 61 - UNCORRECTABLE ERR       = 1

              P5    CP1 STATUS SUMMARY = 2C

BIT 58 - C180 MONITOR MODE       = 1
BIT 60 - PROCESSOR HALTED        = 1
BIT 61 - UNCORRECTABLE ERR       = 1
```

Figure 3-15. AR Level 1 Command Display

```
P5 CPO REGISTER DATA

      0 1  2 3  4 5  6 7
13    0000 0000 0000 C000    VIRT MACH CAPABLTY
40    0000 0000 FFFF FFFF    PROGRAM ADDRESS
41    0000 0000 0000 0000    MON PROCESS STATE
42    0000 0000 0000 984E    MONITOR CONDITION
43    0000 0000 0000 4039    USER CONDITION
44    0000 0000 0000 0000    UNTRANSLATABLE PTR
45    0000 0000 0000 0000    SEGMENT TBL LENGTH
46    0000 0000 0000 0000    SEGMENT TBL ADRS
47    0000 0000 0000 0000    BASE CONSTANT
48    0000 0000 0000 1000    PAGE TABLE ADDRESS
49    0000 0000 0000 0000    PAGE TABLE LENGTH
4A    0000 0000 0000 0000    PAGE SIZE MASK
50    0000 0000 0000 0000    MODEL DPNDNT FLAGS
51    0000 0000 0000 0000    MODEL DPNDNT WORD
60    0000 0000 0000 0000    JOB PROCESS STATE
61    0000 0000 0000 0000    JOB PROCESS STATE
62    0000 0000 FFFF FFFF    SYS INTERVAL TIMER
63    0000 0000 0000 0000    KEYPOINT BUFFER POINTER
C0    0000 0000 0000 0000    TRAP ENABLE
C4    0000 0000 0000 0000    TRAP POINTER
C5    0000 0000 0000 0000    DEBUG LIST POINTER
C6    0000 0000 0000 0000    KEYPOINT MASK
C9    0000 0000 FFFF FFFF    PROCESS INTRVL TME
E0    0000 0000 0000 0000    CRITICAL FRAME FLG
E2    0000 0000 0000 0000    ON CONDITION FLAG
E4    0000 0000 0000 0000    DEBUG INDEX
E5    0000 0000 0000 0000    DEBUG MASK
E6    0000 0000 0000 FE00    USER MASK
```

Figure 3-15.1. AR Level 2 Command Display

```
                        P5 CPO REGISTER 10
                        ELEMENT ID
                        0000 0000 0040 0102

BIT 32-39 ELEMENT NUMBER        = 00
BIT 40-47 MODEL NUMBER          = 40
BIT 48-63 CPU SERIAL NUMBER     = 0102
```

Figure 3-15.2. AR Level 3 Command Display

MAINTENANCE CHANNEL ALTER COMMAND

Associated with the maintenance channel is the following alter command.

Enter Maintenance Register Data (ER)

This command enters data into the selected IOU, memory, or processor maintenance register.

The ER command performs the following steps:

1. Reads the contents of the selected register.
2. Logically ANDs the register contents with the mask.
3. Logically ORs the result of step 2 with the data parameter.
4. Enters the result of step 3 into the register.

Omitting the mask causes the 64 bits of data in the register to be replaced with the data parameter supplied in the command.

Command format:

```
ER,el,reg,data,mask

    el      Mainframe element selection.

                0 or I      IOU
                1 or M      Memory
                2           CPU 0
                Pnum        CPU num selected.  If omitted, the default CPU is assumed.

    reg     The register to be altered (one or two digits).

    data    1 to 16 hexadecimal characters, right-justified.

    mask    1 to 16 hexadecimal character mask.  If omitted, 0 is assumed.
```

MAINTENANCE CHANNEL EXECUTE COMMANDS

Associated with the maintenance channel are the following execute commands.

Master Clear Via Maintenance Channel (CX)

This command causes a master clear function to be executed on the selected maintenance channel access.

Command format:

```
CX,el

    el      Mainframe element selection.

                0 or I      IOU
                1 or M      Memory
                2           CPU 0
                Pnum        CPU num selected.  If omitted, the default CPU is assumed.
```

Clear Error Via Maintenance Channel (CE)

This command causes a clear error to be executed on the selected maintenance channel access.

Command format:

CE,el

el Mainframe element selection.

0 or I	IOU
1 or M	Memory
2	CPU0
Pnum	CPU num selected. If omitted, the default CPU is assumed.

COMMAND BUFFER COMMANDS

The following commands pertain to command buffers. These commands are available with the disk library only.

Through entering one command, command buffers allow the saving and easy execution of a string of CMSE and/or program commands. The CMSE and/or program commands are necessary to execute a particular diagnostic sequence.

COMMAND BUFFER DISPLAY COMMANDS

Associated with command buffers are the following display commands.

Display Command Buffer (AE, BE)

This command places a selected command buffer into the command buffer editing utility (CBU) PP for display and modification. The IN, DE, GO, and *WB commands affect the command buffer that is placed in the CBU PP. If CBU was not loaded into a PP by a previous AE command, the AE command also causes CBU to be loaded into a PP before the command buffer to be edited is loaded. If no name was given in the first AE command, CBU attempts to recover the command buffer that was originally loaded in the PP memory.

Command format:

AE,name,num

or

BE,name,num

name The name of the command buffer to be displayed (one to seven alphanumeric characters). If omitted, the command buffer currently in the CBU PP is displayed.

num The number of the first command to be displayed. If omitted, the display will start with the first command.

Two examples of the AE command display as they appear below the A header are shown in figures 3-16 and 3-17.

```
EDIT   COMMAND BUFFER
0000   *MCODE
0001   *CK U2JUN20
0002   *EK,835,A285 2000 0014 8000 0000
        01E0 0004 002E
0003   *EK,852,E287 7000 0014 8000 0000
        01E0 0004 002E
0004   *EK,853,A283 C000 0014 8000 0000
        01E0 0004 002E
0005   *EK,871,E287 7000 0014 8000 0000
        05E0 0004 002E
0006   *EK,873,E287 7000 0014 8000 0000
        05E0 0004 002E
0007   *EK,875,E287 7000 0014 8000 0000
        05E0 0004 002E
0010   *EK,699,A269 E612 00E1 AE78 0000
        05E0 0004 002E
0011   *EK,366,8200 00DA FB1B 2902 4238
        2000 45ED 0005
0012   *EK,382,A038 801A F21E 0981 0238
        0000 07BC 8006
0013   *EK 38C 8200 00DA F21E 0981 0238
        0000 07BC 8006
0014   *EK,388,A039 601C F21D 2983 0238
        0000 00D9 8381
```

Figure 3-16. AE Command Display (Example 1)

```
EDIT   COMMAND BUFFER
0000   *DMP
0001   *DP10
0002   *LT10,DMP,,1305
```

Figure 3-17. AE Command Display (Example 2)

Display Command Buffer Name Table (AG, BG)

This command displays up to 200 command buffer names beginning with the first command buffer name in the library or beginning at the index.

Command format:

```
AG,indx

  or

AG

  or

BG,indx

  or

BG
```

indx   Offset from the first name in the table (one to four octal digits). If omitted, the display begins at the first name.

An example of the AG command display as it appears below the A header is shown in figure 3-18.

```
COMMAND BUFFER NAMES  INDEX 0000
CMT       CMT2      LTREK     IM2
LTRAP     LRCT3C    EXN       EXNCT3
CT3PK     LTREKC    XNCT3C    LNOSC
LNOSC1    LNSALX    PATCH     LXCALX
CDMP      464SP     JA1OFX    MEMOVE
LOPHCS    LOOK      LFCT2P    LTREK1
LTREK1C   HCSCAT    LTREKP    LTREKPC
LNOSCU1   LCT3C     LCT3      FEB28FX
LOPHCSC   LHCS1     HCSINFO   LOPHCS1
LHCSC1P   LHCSBUF   HCSIDEA   TREKFIX
JFS1      JANIDEA   LHCSCA    EXNCU1
ASS       SNAP      SNAPA     SNAPB
KLEAN     LHCSC11   LHCSC2    LHCSC4
LHCSC1    LTEST     ASS3      LHCST
MONITOR   LHCST1    BKUP      IOUTEST
DMP       CALL      END
```

Figure 3-18. AG Command Display

COMMAND BUFFER ALTER COMMANDS

The following alter commands are associated with command buffers.

Insert Command in Command Buffer (IN)

This command inserts a command following the specified command. Continuous entries may be made by using the right space key (forward key), which increments the entry number and positions the keyboard line for the command entry. Refer to Keyboard Usage, section 3.

Command format:

IN,num,cmnd

num	The number of the command preceding the location where the new command is to be inserted. The commands are numbered in octal.
cmnd	The command to be inserted.

Delete Command in Command Buffer (DE)

This commands deletes or replaces the specified command.

Command format:

DE,num

or

DE,num,cmnd

num	The number of the command to be deleted or replaced.
cmnd	The command to replace the deleted command.

COMMAND BUFFER EXECUTE COMMANDS

The following execute commands are associated with command buffers.

Execute Command Buffer (GO)

This command causes the commands in the command buffer to be executed sequentially. If the command is entered without a name, the next command in a halted command buffer is executed. If an asterisk (*) is used, the command buffer currently residing on the edit track is executed. Command buffer execution may be halted by pressing the erase key.

Command format:

GO,name

or

GO,*

name	The name of the command buffer, one to seven alphanumeric characters.

Terminate Command Buffer (TB)

This command terminates the current active command buffer.

Command format:

TB

These commands terminate all active or waiting command buffers.

Command Format:

TB* or TB,*

Temporarily Halt Command Buffer Sequence (SQ)

This command halts the execution of the command buffer until the value of adrs is greater than or equal to the value of tshld.

If the sequence address is unknown or does not exist, use the alternate format. The alternate format halts execution until the number of passes through the monitor, specified by monpass, have been completed.

Command format:

SQ,base,adrs,tshld,mem or SQ,base,adrs,count,17

base — Indicates the command buffer format:

Omitted	Hexadecimal
H	Hexadecimal
0	Octal

adrs — The address to be monitored for the command buffer status (one to eight characters).

tshld — The threshold to be monitored for command buffer status (16 bits maximum).

mem — The type of memory to be monitored. If omitted, 16 is assumed. A slash (/) will cause automatic PP to be substituted.

00-11	PPs
16	CM
20-31	PPs (C0 through C11 for I4 CIO PPs)

or

SQ,adrs,count,17 or SQ,H,0,nonpass,17

adrs — The address must be zero.

count — Monitor pass count (1 through 7777_8)

monpass — The octal number of passes through the monitor (1 through 7777_8).

Display Comment

A command buffer entry with a blank in the first column halts command buffer execution until a GO command is entered. The remainder of the entry is displayed until this occurs.

Command format:

(blank in first column) comment

Send Space Command (SP)

This command is translated as a space bar entry from the keyboard for use as a program execution command for command buffers.

Command format:

SP

Return Jump To Command Buffer (RJ)

This command causes the current command buffer sequence to be interrupted. The alternate command buffer specified by the name parameter is executed, beginning with the first command. When the alternate command buffer is completed, control is returned to the original command buffer at the command after the RJ command. Primary command buffers can call secondary command buffers, and secondary command buffers can return jump to third-level command buffers, but third-level command buffers cannot return jump to other command buffers.

Command format:

RJ,name

name — Name of command buffer to jump to (one to seven characters).

Drop Command Buffer Editing Utility (KE)

This command causes CMSE to drop CBU and make its PP available for other purposes.

Command format:

    KE

Display Message on A or B Screen (AM,BM)

This command displays a message on the A or B screen on the specified line. If the screen is currently displaying messages from AM or BM commands, the message is added to the screen on the specified line overwriting any message on that line. If the screen is displaying any other display, the screen is cleared and the message is displayed on the specified line. This command is used in command buffers to display important messages related to the execution of a command buffer.

Command format:

```
AM,linenum,msg
  or
BM,linenum,msg
```

linenum	Hexadecimal line number 0 through 13 on screen where message is to be displayed. This limits the display to the size of a 721 terminal screen.
msg	The message to be displayed.

Command Buffer Comment Line (.)

Any command buffer command which begins with a period is treated by CMSE as a comment line and is not examined as a command for execution. This provides a means of putting comment lines into command buffers without forcing CMSE to look at more than one character to decide if the line is a command or a comment line. A comment line is not executed when the command buffer is executed but shows up on command buffer displays.

Command format:

    .

COMMAND BUFFER LIBRARY COMMANDS

The following library commands are associated with command buffers. Section 4 contains a description of the procedures required to manipulate command buffers and programs on the disk library.

Write Command Buffer to MSL Disk (*WB)

This command causes the contents of the edit track to be written to the command buffer area of the disk.

Command format:

    *WB

Delete Command Buffer from Disk Library (*DB)

This command deletes a specified command buffer from the disk library. If the form *DB * is used, all command buffers are deleted. The *DB * format should be used to initialize the command buffer area after MSL is loaded to the disk.

Command format:

    *DB,name

      or

    *DB *

name	The name of the command buffer to be deleted (one to seven alphanumeric characters).

CAUTION

The *DB * form of this command deletes all command buffers from the connected disk.

CMSE DISK LIBRARY COMMANDS

The following commands pertain to the CMSE disk library.

DELETE PROGRAM FROM MSL DISK (*DP)

This command deletes a specified program from the disk library. A special form of this command purges the dayfile.

Command format:

*DP,name

name	The name of the program to be deleted (one to seven alphanumeric characters).

DELETE DAYFILE (*DP,*DF)

This command purges the dayfile from the disk.

Command format:

*DP,*DF

DISPLAY PROGRAM NAME TABLE (AF, BF)

This command displays up to 200 program names, beginning with the first program in the library (default), or beginning at the index.

Command format:

AF,indx

or

BF,indx

indx	Offset from the first name in the table (one to four octal digits). If omitted, the display begins with the first name.

An example of the AF command display as it appears below the A header is shown in figure 3-19.

```
PROGRAM NAMES    INDEX 00000
CEY       CET        CEX       CE1
DDS       MSB        DSB       DO1
DO2       DO3        DO4       DO5
DO6       DO7        BIF       MEP
MEP000    MEP001     MEP002    MEP003
MEP004    MEP005     MEP006    MEP007
MEP010    MEP011     MEP012    MEP013
MEP014    MEP015     MEP016    MEP017
MEP020    MEP021     MEP022    MEP023
MEP024    MEP025     MEP026    MEP027
MEP030    MEP031     MEP032    MEP033
MEP034    MEP035     MEP036    MEP037
MEP040    MEP041     MEP042    MEP043
MEP044    MEP045     MEP046    MEP047
MEP050    MEP051     MEP052    MEP053
MEP054    MEP055     MEP056    MEP057
DMP       BCS        BCF       FMD
FIRM66X   TDX        DSP       RMD
RCT1000   CDT        9XI       9PT
9PD       9CD        9CT       U2APR02
EI        DXX        DDD       ODDD
CLK       PSP        PMM       QLT2
CMT2      CMT20V0    CM01      CM02
CM03      CM04       CM05      CM06
CM07      CM08       CM09      CM10
CM11      CM12       CM13      CM14
CM15      CM16       CM17      CM18
CM19      CM20       CM21      CM22
CM23      CM24       CM25      CM26
M2ET      CM30       EDS2      EXC
9AX       9AY        CPR       CM6
CT3       CMC        EJP       3D1
```

Figure 3-19. AF Command Display

DISPLAY DAYFILE (AY, BY)

This command displays the contents of the dayfile beginning with the entry number. If the indx parameter is omitted, the display begins with the first entry.

AY,indx

or

BY,indx

indx Entry number (one to four octal digits). Default is zero.

An example of the AY display as it appears below the A header is shown in figure 3-20.

```
DAYFILE INDEX 0000
MONITOR SOFT ERROR  P = 0000B00800001770  MCR = 0002

          PFS0 = 4000000004000000         PFS1 = 0000

          PFS2 = 0000000000000000         PFS3 = 0000

          PFS4 = 0000000000000000 =       PFS5 = 0000

          PFS6 = 0000000000000000         PFS7 = 0000

          PFS8 = 0000000000000000         PFS9 = 0000

MONITOR SOFT ERROR P = 0000B00800001C58 MCR = 0002

          PFS0 = 16MONITOR SOFT ERROR P = 0000B00B008000013C4 MCR = 0042

          PFS0 = 16MONITOR SOFT ERROR P = 0000B00800001CA8 MCR = 0002

          PFS0 = 16MONITOR SOFT ERROR P = 0000B008000013C4 MCR = 0042

          PFS0 = 16MONITOR SOFT ERROR P = 0000B008000013C4 MCR = 0042
```

Figure 3-20. AY Command Display

ENTER DAYFILE COMMAND (ED)

This command adds the message or creates and adds the message to a file named *DF. The message appears on either the AY of BY display following the mnemonic KYBD, which indicates that it originated from the keyboard. To purge the dayfile, use the command *DP,*DF.

Command format:

ED,msg

msg The message to be entered (up to 64 alphanumeric characters).

CMSE UTILITY COMMANDS

The following commands pertain to CMSE utilities.

DISPLAY ACTIVE REQUESTS (AA, BA)

This command displays the first line of display requests issued by the PPs or the CPUs.

Command format:

```
AA

or

BA
```

An example of the AA command display is shown in figure 3-21.

```
CR   OFF    CPO  PP 03    04    05    06    07    10    11
             *      D*    F     D*    D*    D*    D*    I
                 PP 20    21    22    23    24    25    26    27    30    31
A=0000              D*    D*    D*    D*    D*    D*    D*    D*    D*    D*


CP

PP

00     CE1
01     MEP
02     DSP
03     PCX RUNNING
04     HUNG
05     PCX RUNNING
06     PCX RUNNING
07     PCX RUNNING
10     PCX RUNNING
11     IDLE
20     PCX RUNNING
21     PCX RUNNING
22     PCX RUNNING
23     PCX RUNNING
24     PCX RUNNING
25     PCX RUNNING
26     PCX RUNNING
27     PCX RUNNING
30     PCX RUNNING
31     PCX RUNNING
```

Figure 3-21. AA Command Display

DISPLAY HELP INFORMATION (AI, BI)

This command displays a directory of CMSE command groups, commands within a group, or information about a specific command.

Command format:

AI,x

or

BI,x

The x parameter indicates the type of information to be shown as follows:

x	Description
DIR or ommitted	Display directory of the CMSE Information file. Figures 3-22 and 3-22.1 are examples of the directory as it appears below the A header.
command	Display information about the command specified. The command entry is any two or three letter mnemonic from one of the CMSE command groups shown in figures 3-22 and 3-22.1.

```
HELP INDEX 0000
  **   DIR    CMSE INFORMATION FILE   **

EXAMPLE- ENTER (AI,DMCH) FOR MAINTENANCE CHANNEL COMMANDS
DPP  - DIRECTORY OF PERIPHERAL PROCESSOR COMMANDS
DCM  - DIRECTORY OF CENTRAL MEMORY COMMANDS
DCS  - DIRECTORY OF CONTROL STORE COMMANDS
DSCM - DIRECTORY OF SOFT CONTROL MEMORY COMMANDS
DSPM - DIRECTORY OF SPECIAL MEMORY COMMANDS
DMCH - DIRECTORY OF MAINTENANCE CHANNEL COMMANDS
DCB  - DIRECTORY OF COMMAND BUFFER COMMANDS
DLIB - DIRECTORY OF DISK LIBRARY COMMANDS
DUTL - DIRECTORY OF UTILITY COMMANDS
DPCC - DIRECTORY OF PROGRAM CONTROL COMMANDS
KEY  - SPECIAL KEY USAGE
HELP - HOW TO USE INFORMATION FILE (I DISPLAY)
```

Figure 3-22. AI Command HELP Display

```
HELP INDEX 0000
  **   DIR    CMSE INFORMATION FILE    **

EXAMPLE- ENTER (AI,DMCH) FOR MAINTENANCE CHANNEL COMMANDS
DPP  - DIRECTORY OF PERIPHERAL PROCESSOR COMMANDS
DCM  - DIRECTORY OF CENTRAL MEMORY COMMANDS
DCS  - DIRECTORY OF CONTROL STORE COMMANDS
DSCM - DIRECTORY OF SOFT CONTROL MEMORY COMMANDS
DSPM - DIRECTORY OF SPECIAL MEMORY COMMANDS
DMCH - DIRECTORY OF MAINTENANCE CHANNEL COMMANDS
DCB  - DIRECTORY OF COMMAND BUFFER COMMANDS
DLIB - DIRECTORY OF DISK LIBRARY COMMANDS
DUTL - DIRECTORY OF UTILITY COMMANDS
DPCC - DIRECTORY OF PROGRAM CONTROL COMMANDS
CONS OR TERM OR PC - KEYBOARD USAGE
HELP - HOW TO USE INFORMATION FILE (I DISPLAY)
I4C - NOTES ON I4C DIFFERENCES
```

Figure 3-22.1. AI Command HELP Display (I4 and I4C IOU only)

DISPLAY REGISTER FILE (AS, BS)

This command causes 20 hexadecimal words, beginning at reg of the register file, to be displayed on either the left or right screen. The register file data is displayed in either hexadecimal or octal format, whichever is specified. If control store is not running, zeros will be displayed.

Command format for models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, and 960 only:

AS,Pnum,base,reg

or

BS,Pnum,base,reg

num	CPU number selection. num is the CPU number. If omitted, the default CPU is assumed.
base	Indicates the data format: Omitted — Hexadecimal H — Hexadecimal O — Octal
reg	The first register to be displayed.

An example of the AS or BS command display as it appears below the A or B header is shown in figure 3-23.

```
REGISTER FILE CPO
00  00000000 00000000
02  00000000 00000000
03  00000000 00000000
04  00000000 00000000
05  00000000 00000000
06  00000000 00000000
07  00000000 00000000
08  00000000 00000000
09  00000000 00000000
0A  00000000 00000000
0B  00000000 00000000
0C  00000000 00000000
0D  00000000 00000000
0E  00000000 00000000
0F  00000000 00000000
10  00000000 00000000
11  00000000 00000000
12  00000000 00000000
13  00000000 00000000
14  00000000 00000000
15  00000000 00000000
16  00000000 00000000
17  00000000 00000000
18  00000000 00000000
19  00000000 00000000
1A  00000000 00000000
1B  00000000 00000000
1C  00000000 00000000
1D  00000000 00000000
1E  00000000 00000000
1F  00000000 00000000
```

Figure 3-23. AS Command Display for Models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, and 960

NULL DISPLAY (AN, BN)

This command clears the specified display below the header information and does not refresh that portion of the selected display until another display is selected. This enables CMSE to execute faster because it is not constantly sending memory information to the display buffer.

Command format:

AN

or

BN

DO NOT MONITOR PP (DN)

This command deletes the selected PP from the CMSE system. CMSE does not monitor the downed PP nor accept any command other than UP for the PP. If the command is entered without a parameter, it is a no operation command.

For an I4C IOU, channel 15 flag is cleared by the DN command. The UP command sets channel 15 flag as a signal that PP programs can again communicate with CMSE.

Command format:

DN

or

DN,num or DN,/

num	One- or two-digit PP number of the selected PP. If omitted, the command is accepted, but no action is taken.
/	Substitute the last automatically assigned PP number.

MONITOR PP (UP)

This command informs CMSE of the existence of the selected PP and clears the associated channel flag. It may be used to indicate that communication between the downed PP and CMSE is again possible. CMSE monitors and accepts commands for this PP if it is not idle.

For an I4C IOU, channel 15 flag is used rather than the associated channel flag, and the flag is set by the UP command.

Command format:

UP,num or UP,/

num	One- or two-digit PP number of the selected PP.
/	Substitute the last automatically assigned PP number.

AUTOLOAD BUFFER CONTROLLER WITH CONTROLWARE FROM THE LIBRARY DEVICE (CW)

This entry causes controlware to be read from the library device and be autoloaded to the buffer controller on the channel specified by the command. The library device must not be on the same channel as the buffer controller to be autoloaded. The device being autoloaded cannot be placed on one of the channels corresponding to a PP or on one of the channels being used by CMSE. See Load from the Common Disk Area in this section for information on where microcode is being accessed for loading.

Command format:

CW,name,ch

name	Name of the controlware binary on library. Three to seven alphanumeric characters.
ch	Number of channel to which buffer controller to be autoloaded is connected. For an I4 IOU, the CIO channel is not supported.

CLOCK MARGINS (CM)

This command sets the appropriate bit in the selected register to apply or remove the clock margins.

Command format for models 810, 815, 825, 830, 835, 840, 850, 855, 860, and 990 only:

CM,Pnum,el,mgn

Pnum — CPU num selected. If omitted, the default CPU is assumed.

el — Mainframe element selection.

0 or I	IOU
1 or M	Memory
2	CPU0

mgn — Determines the type of clock margins:

N	Narrow clock pulse width
W	Wide clock pulse width
blank	Normal margins

Command format for model 960 only:

CM,el,mgn

el	Mainframe element selection.	
	0 or I	IOU
	1 or M	Memory and CPUs
mgn	Determines these types of clock margins with 0 or I selected:	
	N	Narrow clock pulse width
	W	Wide clock pulse width
	blank	Normal margins
	Determines these types of clock margins with 1 or M selected:	
	N	Narrow clock pulse width, normal rate
	W	Wide clock pulse width, normal rate
	F	Normal margins, fast rate
	S	Normal margins, slow rate
	NF	Narrow clock pulse width, fast rate
	NS	Narrow clock pulse width, slow rate
	WF	Wide clock pulse width, fast rate
	WS	Wide clock pulse width, slow rate
	blank	Normal margins, normal rate

LOG ERRORS (LE)

This command causes critical errors detected in the selected element to be displayed and written to the dayfile. The el parameter selects which mainframe element errors are to be logged when error logging is enabled. If el is omitted, errors are logged for all elements.

Command format:

LE,el,cond

el	Mainframe element selection. If omitted, errors are logged for all elements.	
	0 or I	IOU
	1 or M	Memory
	2	CPU0
	Pnum	CPU num selected. If omitted, the default CPU is assumed.
cond	Status of error logging.	
	ON	Enable error logging.
	OFF	Disable error logging.

ACTIVATE CHANNEL (*AC)

This command activates a channel.

Command format:

*ACn

n   Channel number. On an I4 IOU, the CIO channel is not supported.

DEACTIVATE CHANNEL (*DC)

This command deactivates a channel.

Command format:

*DCn

n   Channel number. On an I4 IOU, the CIO channel is not supported.

SEND FUNCTION TO CHANNEL (*FC)

This command sends a specified function on a channel.

Command format:

*FCn,f

n   Channel number. On an I4 IOU, the CIO channel is not supported.

f   Function to be sent on channel (one through four octal digits). Default value is 0.

NOTE

A function of 1700 is a 6681 master clear function.

INPUT TO PSEUDO-A REGISTER (*IA)

This command inputs a data word to pseudo-A register from channel n. Pseudo-A register is displayed on the third line of the right-screen display header.

Command format:

*IAn

n   Channel number. On an I4 IOU, the CIO channel is not supported.

OUTPUT DATA WORD ON CHANNEL (*OA)

This command outputs a data word on channel n.

Command format:

*OAn, x

n	Channel number. On an I4 IOU, the CIO channel is not supported.
x	Data word output (one to four characters, right-justified). For I4C IOU only, one to six characters, right-justified.

LOAD MONITOR OVERLAYS TO CM (*OV)

This command reads the monitor overlays from the disk or tape library and writes them into CM beginning at address adrs. The monitor then uses the overlays from CM to speed up CMSE execution. This command is not executed if CM is already in use by CMSE. If the overlays cannot be read from CM, a deadstart is required.

For an I4C IOU only, CMSE automatically reverts to disk to obtain overlays if overlays loaded to CM by the *OV command are wiped out. A CM OVERLAYS CORRUPTED, REVERTING TO DISK message is sent by CMSE. If a dedicated load device is present, the *OV command is accepted regardless of CM usage option selection. If the CM usage option is enabled and a *OV command entered with the adrs field blank, overlays are reloaded to their original position in the protected upper megabyte of CM.

Command format:

*OV,base,adrs

base	Omitted	Hexadecimal
	H	Hexadecimal
	O	Octal
adrs	First word address in CM for the monitor overlays.	

NOTE

Only the first word of an overlay is checked for validity when it is read from CM. Therefore, caution must be taken when using this feature so as not to overwrite part of a monitor overlay.

LOAD PRIMARY/SECONDARY CONSOLE DRIVER (LR)

This command loads a display driver for primary or secondary consoles from the disk or tape library and writes it to PP memory. CMSE installs or replaces the current display driver with either the CC545 display driver (DSP), the 721 and 752-compatible display driver (DSQ), or the CC598 display driver as specified in the command. The LR command can specify one or two display consoles.

Command format:

LR,ntp

LR,ntp,ntp

n Channel number (10_8 or 15_8).

t Terminal type.

0	721, CC545, or CC598A/CC598B
1	752-compatible

p Port number.

0	CC545
0 or 1	721, 752, or CC598A/CC598B

The two-port multiplexer is assumed to be equipment 7 on channel 15_8. The CC545 is assumed to be on channel 10_8. If the current primary console is not a CC545 and if a CC545 is specified anywhere in the LR command, it automatically becomes the primary console. Otherwise, the first ntp parameter in the LR command defines the primary console.

LOCK CMSE AREA OF CM FROM KEYBOARD COMMANDS (LK)

This command causes CMSE to lock out the area of CM reserved for CMSE use from any modification with a keyboard command. Any keyboard command attempting to enter data into the protected area of CM is aborted and an error message is displayed on the keyboard error message line. If CM is not in use by CMSE, an informative message is displayed.

Command format:

LK

UNLOCK CMSE AREA OF CM FOR KEYBOARD COMMANDS (UL)

This command causes CMSE to allow processing of keyboard commands which enter data into the CMSE area of CM when CM is in use. If CM is not in use, an informative message is displayed.

Command format:

UL

REVERT TO MONITOR OVERLAYS FROM DISK (*RV)

This command drops use of CM monitor overlays and reverts to loading overlays from disk. If a dedicated load device is not present and the CM usage option is enabled, this command is rejected with message CANNOT CHANGE CM USAGE WITHOUT DEADSTART.

This command is for the I4C IOU only.

Command format:

*RV

PROGRAM CONTROL COMMANDS

Program control commands alter parameter bits contained in either of two parameter words. The address of the first parameter word is found in PPM address 0005. The address of the second parameter word is the first parameter word address plus 1. If bit 215 is set in the first parameter word, CMSE interprets the commands associated with the first parameter word and sets or clears the appropriate parameter bit. If bit 215 is not set, CMSE does not interpret the command, but leaves it in the keyboard buffer as a job command to be passed to any PP requesting keyboard/display data. If bit 215 is set in both the first and second parameter words, CMSE interprets the commands associated with the first and second parameter words and sets or clears the appropriate parameter bit.

These commands allow programs to use a common command set. Only the codes that have their corresponding bit set are displayed. They are displayed whenever the using program makes a 43 call to display information and bit 28 is set in word 5 of the call block. The codes are updated when a program control command is accepted or the B screen changes from a memory display to a job display. However, it is not mandatory that a program use any of this capability not applicable to the program. Refer to test descriptions for application. The commands, when entered, clear and set the bits regardless of their use by the program. Command formats, descriptions, and parameter bits associated with each command are shown in table 3-3. In the table, (5) is interpreted as the contents of PPM address 0005.

NOTE

When using the CSM/SSM commands in conjunction with the channel reservation flag, the user programs must always clear bit 2^{10} upon detection of the channel flag set condition or CMSE may not be able to regain communication with the PP.

Table 3-3. Program Control Commands and Descriptions (Sheet 1 of 3)

Command	Status of Bit†	Description	Parameter Word Address	Bit
SST	Set	Stop at end of test.	(5)	2^0
CST	Clear	Do not stop at end of test.		
SSS	Set	Stop at end of section.	(5)	2^1
CSS	Clear	Do not stop at end of section.		
SSB	Set	Stop at end of subsection.	(5)	2^2
CSB	Clear	Do not stop at end of subsection.		
SSC	Set	Stop at end of condition.	(5)	2^3
CSC	Clear	Do not stop at end of condition		
SSE	Set	Stop on error.	(5)	2^4
CSE	Clear	Do not stop on error.		
SLE	Set	Log errors.	(5)	2^5
CLE	Clear	Do not log erros.		
SRT	Set	Repeat test.	(5)	2^6
CRT	Clear	Do not repeat test.		
SRS	Set	Repeat section.	(5)	2^7
CRS	Clear	Do not repeat section.		
SRB	Set	Repeat subsection.	(5)	2^8
CRB	Clear	Do not repeat subsection.		
SRC	Set	Repeat condition.	(5)	2^9

†Refer to individual test descriptions for test settings.

Table 3-1. Program Control Commands and Descriptions (Sheet 2 of 3)

Command	Status of Bit†	Description	Parameter Word Address	Bit
CRC	Clear	Do not repeat condition.		
SSM	Set	Scope mode.	(5)	2^{10}
CSM	Clear	Disable scope mode.		
SQL	Set	Quick look.	(5)	2^{11}
CQL	Clear	No quick look done.		
SDR	Set	Bypass all messages. Override bit 2^{13}.	(5)	2^{12}
CDR	Clear	Do not bypass all running messages.		
SDE	Set	Display only error messages.	(5)	2^{13}
CDE	Clear	Display all messages.		
		Reserved.	(5)	2^{14}
		Must be set by using program to set or clear parameter bits associated with PP word (5) or (5) +1.	(5)	2^{15}
		Unused.	(5) + 1	$2^0 - 2^6$
SSR	Set	Set Scope mode Repeat assist enable	(5) + 1	2^7
CSR	Clear	Set Scope mode Repeat assist enable	(5) + 1	2^7
SCE	Set	Report condition errors.	(5) + 1	2^8
CCE	Clear	Do not report condition errors.		
		Unused.	(5) + 1	$2^9 - 2^{11}$
SSI	Set	Stop at end of iteration.	(5) + 1	2^{12}
CSI	Clear	Do not stop at end of iteration.		
SRI	Set	Repeat iteration.	(5) + 1	2^{13}
CRI	Clear	Do not repeat iteration.		
SAB	Set	Abort subsection on error.	(5) + 1	2^{14}

†Refer to individual test descriptions for test settings.

Table 3-3. Program Control Commands and Descriptions (Sheet 3 of 3)

Command	Status of Bit†	Description	Parameter Word Address	Bit
CAB	Clear	Do not abort subsection on error. Must be set by using program in addition to bit 2^{15} of PP word (5) to set or clear parameter bits associated with PP word (5) + 1.	(5) + 1	2^{15}
†Refer to individual test descriptions for test settings.				

CMSE STAND-ALONE TEST LOADER

Any 16-bit IOU diagnostics may be run in stand-alone mode by entering the diagnostic name via the keyboard at the initial CMSE display when MSL is on tape. If on disk, this type of load is not applicable. Refer to Tape Deadstart Display in section 2 for the CMSE initial display.

This section describes the procedures for constructing and manipulating command buffers and programs on the disk library. The procedures for creating a command buffer, modifying a command buffer, and adding programs to the disk library are described.

CREATING A COMMAND BUFFER

A command buffer is a series of keyboard commands residing on the disk library. The system monitor executes the command buffer as a group. Each command buffer has an assigned name to identify it in the library.

Command buffers can be added to the library by doing one of the following:

- Typing entries at the keyboard
- Using TDX

NOTE

If a disk installation is new and no command buffers exist, enter *DB * to clear the command buffer area.

CREATING A COMMAND BUFFER AT THE KEYBOARD

Command buffers can be created at the keyboard by performing the following steps.

1. Specify a name for the command buffer on the edit file by entering an AE,name or BE,name command.

2. Enter IN,0,command as the first buffer entry.

3. Press the forward key, enter the next command, and repeat this step until all buffer commands are entered.

4. Press the erase key after the last command is entered, or enter the last command using the (CR) key.

5. Enter a GO * command to verify a command buffer entered from the keyboard by executing it before it is placed on the library.

   If a command is incorrectly specified, use the DE command to delete or modify the command and repeat step 5.

6. Enter a *WB command to copy the completed command buffer from the edit display to the library.

Refer to Command Buffer Commands in section 3 for a complete listing and explanation of command buffer commands.

ADDING COMMENTS TO A COMMAND BUFFER

Comments may be made on the same line as a command buffer command. If comments are to be added, all parameters for the CMSE command must be accounted for either by a value or by successive commas. Also, the entire line must not exceed 60 characters including the CMSE command. For example:

```
*WP,,5,DMP,,,COMMENT-WRITE DMP TO DISK
```

COMMAND BUFFER EXAMPLE

The following example shows how a command buffer may be used to change default parameters and start execution of a test.

```
$$ FT8
DP5                     DEADSTART PP5.
KP5,,,                  CLEAR PP5 MEMORY.
CP5,FT8,,,,             LOAD FT8 INTO PP5.
EP5,1001,1000           SET REPEAT TEST BIT.
EP5,1002,0100           CHANNEL 1, EQUIPMENT 0.
PP5,,                   ASSIGN DISPLAY TO PP5.
RU5,101                 RUN FT8 AT ADDRESS 101.
TB                      TERMINATE BUFFER.
```

COMMAND BUFFER MODIFICATION

Commands may be added or deleted from a command buffer by performing the following steps.

1. Enter an AE or BE command and the name assigned to the command buffer to be modified.
2. Enter an IN command to insert a new command and/or enter a DE command to either delete or change a specific command from the command buffer.
3. Enter a *DB command and the name assigned to delete the previous command buffer.
4. Enter a *WB command to copy the modified command buffer from the edit file to the library.

ADDING PROGRAMS TO THE DISK LIBRARY

Programs can be added to the disk library by performing the following procedure or by using the TDX utility program described in section 6 of this manual.

Enter a *WP, *WC, or *WK command at the display station keyboard to copy existing programs from a peripheral processor (PP) memory, central memory (CM), or control store (CS), respectively.

ADDING PROGRAMS FROM A PP, CM, OR CS

To copy an existing program from PP memory to the monitor or program disk, enter the *WPn command at the keyboard.

To copy a program from CM to the disk, enter the *WC command.

To copy a program from CS to the disk, enter the *WK command.

LIST COMMAND BUFFERS PROVIDED ON MSL TAPE

The following procedure can be used to list the contents of all of the command buffers that exist on a released MSL tape. The procedure is written for use with an operating system.

NOTE

> The contents of the command buffers can also be found on microfiche.

1. Catalog the MSL tape using the following job deck.

```
Job control cards
Accounting information
REQUEST,MSL,NT,D=PE,F=SI,LB=KU,PO=R,VSN=MSL01 } for NOS or
REQUEST,MSL,NORING,VSN=MSL01                  } for NOS/BE
CATALOG,MSL.
7/8/9
```

2. Examine the resulting output and determine the record number of the first command buffer. The record numbers are printed on the left side of the output listing, and a command buffer can be recognized by a $$ (double dollar sign) as the first two characters of the name. Subtract one from the record number of the first command buffer and use the resulting number as the parameter on the SKIPR card of the next sequence.

3. Extract the command buffer listing using the following job deck.

```
Job control cards
Accounting information
REQUEST,MSL,NT,D=PE,F=SI,LB=KU,PO=R,VSN=MSL01 } for NOS or
REQUEST,MSL,NORING,VSN=MSL01                  } for NOS/BE
SKIPR,MSL,xxx                                   (xxx=record number
                                                parameter from step 2)
                                                Skips the number of records
                                                specified by xxx, which
                                                positions the MSL tape at
                                                the beginning of the first
                                                command buffer.
COPYSBF,MSL,OUTPUT                              Copies the command buffers
                                                from the tape to the output
                                                file and shifts the data
                                                one column to the right to
                                                avoid sending the first
                                                character of each line as a
                                                paper motion control
                                                character when the output
                                                file is printed.
7/8/9
```

4. The resulting printout will list all of the command buffers on the MSL tape.

LIST COMMAND BUFFERS PROVIDED ON MSL TAPE

The following procedure can be used to list the contents of all of the command buffers that exist on a released MSL tape. The procedure is written for use with an operating system.

1. Catalog the MSL tape using the following job deck.

```
Job control cards
Accounting information
REQUEST,MSL,NT,D=PE,F=SI,LB=KU,PO=R,VSN=MSL01 } for NOS or
REQUEST,MSL,NORING,VSN=MSL01                  } for NOS/BE
CATALOG,MSL.
7/8/9
```

2. Examine the resulting output and determine the record number of the first command buffer. The record numbers are printed on the left side of the output listing, and a command buffer can be recognized by a $$ (double dollar sign) as the first two characters of the name. Subtract one from the record number of the first command buffer and use the resulting number as the parameter on the SKIPR card of the next sequence.

3. Extract the command buffer listing using the following job deck.

```
Job control cards
Accounting information
REQUEST,MSL,NT,D=PE,F=SI,LB=KU,PO=R,VSN=MSL01 } for NOS or
REQUEST,MSL,NORING,VSN=MSL01                  } for NOS/BE
SKIPR,MSL,xxx                                   (xxx=record number
                                                parameter from step 2)
                                                Skips the number of
                                                records specified by
                                                xxx, which positions the
                                                MSL tape at the
                                                beginning of the first
                                                command buffer.
COPYSBF,MSL,OUTPUT                              Copies the command
                                                buffers from the tape to
                                                the output file and
                                                shifts the data one
                                                column to the right to
                                                avoid sending the first
                                                character of each line
                                                as a paper motion
                                                control character when
                                                the output file is
                                                printed.
7/8/9
```

4. The resulting printout will list all of the command buffers on the MSL tape.

There are three programs in MSL 15X that act as interfaces to other tests and utility programs within the MSL, but are not completely invisible to the user: the virtual level executive (VEXC), the PP-based CPU monitor program (EXC) and the DEMOT executive. A fourth program, the diagnostic executive (DEX), is common to most PP-based maintenance software. The use of DEX is completely invisible to you.

The cache initialization binary (OCCI) is used to initialize the model 990 cache tag memory prior to running diagnostics.

VIRTUAL LEVEL EXECUTIVE (VEXC)

VEXC is a CPU-based program enabling executive state CPU tests to execute in a virtual addressing mode. It is the primary communication link between the CPU tests and CMSE. In addition, VEXC processes traps and interrupts encountered during test execution.

PROGRAM DESCRIPTION

VEXC provides the virtual environment in which the tests execute. Following are the six elements that make up VEXC.

Page Table

The page table enables the conversion from process virtual addresses (PVAs) to real memory addresses (RMAs). The page table is loaded at real memory address 0.

Segment Table

A segment table exists for the monitor process state and the job process state. It is used in common by VEXC and the loaded CPU test. The segment table is used to reference the page table.

Monitor Process State Exchange Package (MPS)

The MPS establishes the environment for execution in monitor state. If testing is done in monitor state, it is necessary to execute an additional CMSE command to copy the JPS exchange package to the MPS exchange package area prior to test execution.

Job Process State Exchange Package (JPS)

The JPS establishes the environment for test execution. An exchange from monitor process state starts test execution.

Monitor Exchange Routine

When the CPU is initialized, the monitor exchange routine does an exchange to job process state to start test execution. On any subsequent return to monitor process state, this routine examines the monitor condition register (MCR) monitor mask (MM), user condition register (UCR), and user mask (UM) to determine the cause of the exchange and returns to job process state or outputs an error message.

Trap Interrupt Handler

If a job mode trap condition exists, control is passed to the trap handler. The trap handler examines the user condition register (UCR) and the user mask (UM) to determine the cause of the exchange. For an expected trap, control is returned to the executing test. For an unexpected trap, test execution stops and an error message is displayed in the B display (right screen).

LOADING PROCEDURE

VEXC is assembled with a test using the virtual machine assembler. The linked binary (the combination of VEXC and the CPU test) is loaded by CMSE beginning at real memory address zero. Any changes required to satisfy the initialization requirements of the individual tests are made at load time with the CMSE EC command (typically in a command buffer).

PARAMETERS

During initialization of VEXC the user is requested to set up the following monitor options.

Option	Description
Page faults	If enabled, VEXC will invalidate all the job pages before the initial exchange to job state.
Map purges	If selected and a page table search without find causes an exchange to monitor state, VEXC will execute a purge instruction purging map before returning control to job state.
Cache purges	If enabled and a page table search without find causes an exchange to monitor state, VEXC will execute a purge instruction purging cache before returning control to job state.
Limited working set size	If selected, repetitive page faulting occurs. The user is asked to enter the maximum number of pages to be valid at any given time. When VEXC recognizes the working set size has been met, all of job pages will be invalidated again.
32 entry page table search	If selected, VEXC sets up the page table so that there is one valid entry for every 32 entries with the continue bit set between entries. The small SIT option must be used with this option.

INFORMATIVE MESSAGES

The VEXC presents the following message if not monitor default and not monitor bypass are selected in the CPU test. Other informative messages are displayed if the operator answers the question in the last line of the message.

```
          V E X C  MONITOR PROCESSOR  X    VERSION X.X  MM/DD/YY

    VEXC AUTOMATICALLY KEEPS A HISTORY OF ALL EXCHANGE INTERRUPTS
    AND MONITOR AND JOB TRAP INTERRUPTS.  IT ALSO KEEPS A RECORD OF
    RESPONSE TIMES WHICH EXCEED 25 MICRO-SECONDS AND HANG CASES
    WHERE AN INSTRUCTION FAILS TO COMPLETE AS A RESULT OF A PIT/SIT

    TO DISPLAY HISTORY BUFFERS ENTER  -  AH,XXXX

    THE BUFFERS ARE NAMED AS FOLLOWS

      EXCH - EXCHANGE INTERRUPTS        RESPONSE - RESPONSE TIME
      MON TRAP - MONITOR TRAPS          P1  ERRS - DUE/SOFT ERRORS
      JOB TRAP - JOB TRAPS              SIT HAND - SIT HAND CONDS.
      UM  PTBL - USED/MODIFIED CHECK    PIT HAND - PIT HANG CONDS.

    DO YOU WANT TO SEE A DESCRIPTION OF THE BUFFERS (Y/N)
```

Monitor processor x	The CPU identification of the processor running at this time.
Version X.X	The version number of VEXC is also displayed in the test running message.
AH,XXXX	The word address where these buffers start.

ERROR MESSAGES

```
    PAGE FAULT  - PAGE TABLE FULL -
    HALT CONDITION
       MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                         P (PVA) = xxxxxxxxxxxxxxxx
                           (RMA) = xxxxxxxx
    SCOPE LOOP (Y/N) -
```

This message indicates that the page table is full. The CPU is halted in the monitor state. The user is asked if a scope loop should be initiated.

```
    PAGE FAULT  - PAGE ALREADY VALID
       MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                         P (PVA) = xxxxxxxxxxxxxxxx
                           (RMA) = xxxxxxxx
    SCOPE LOOP (Y/N) -
```

This message indicates that the CPU has taken a page fault on a valid page. The user is asked if a scope loop should be initiated.

```
    PAGE FAULT  - PAGE NON-EXISTENT
       MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                         P (PVA) = xxxxxxxxxxxxxxxx
                           (RMA) = xxxxxxxx
    SCOPE LOOP (Y/N) -
```

This message indicates that the CPU has taken a page fault on a page that does not exist. The user is asked if a scope loop should be initiated.

```
    UNEXPECTED EXCHANGE
       MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                         P (PVA) = xxxxxxxxxxxxxxxx
                           (RMA) = xxxxxxxx
    SCOPE LOOP (Y/N) -
```

This message indicates an unexpected exchange from job state to monitor state has occurred. The user is asked if a scope loop should be initiated.

```
UNEXPECTED TRAP IN MONITOR MODE
   MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                   P (PVA) = xxxxxxxxxxxxxxxx
                     (RMA) = xxxxxxxx
SCOPE LOOP (Y/N) -
```

This message indicates that an unexpected trap has occurred in monitor mode. If the user observes that the UTP on the display is not the same as the UTP in the processor, then the processor at the time of the trap was using the monitor segment table, segment 8, to access a page in the job's address space. The job PVA causing the trap is the UTP displayed on the screen. The user is asked if a scope loop should be initiated.

```
UNEXPECTED TRAP IN JOB MODE
   MCR/UCR = xxxxyyyy  UTP = xxxxxxxxxxxxxxxx
                   P (PVA) = xxxxxxxxxxxxxxxx
                     (RMA) = xxxxxxxx
SCOPE LOOP (Y/N) -
```

This message indicates that an unexpected trap has occurred in job mode. The user is asked if a scope loop should be initiated.

```
SIT POSITIVE,  VALUE = xxxxxxxx
```

This message warns the user that an exchange to monitor was caused by a SIT fire and the SIT was found to be positive and nonzero.

```
SOFT ERROR P = xxxxxxxxxxxxxxxx
  MCR = xxxx
 MCEL = xxxx
```

VEXC will log this message in the model 810/830 CMSE180 dayfile when an exchange to monitor state was caused by bit 48 or 62 being set in MCR.

```
SOFT ERROR P = xxxxxxxxxxxxxxxx
  MCR = xxxx
 CCEL = xxxxxxxx          MCEL = xxxxxxxxxxxxxxxx
```

VEXC will log this message in the model 835 CMSE180 dayfile when an exchange to monitor state was caused by bit 48 or 62 being set in MCR.

```
SOFT ERROR P = xxxxxxxxxxxxxxxx
  MCR = xxxx
 PFS0 = xxxxxxxxxxxxxxxx
 PFS1 = xxxx
 PFS2 = xxxxxxxxxxxxxxxx
 PFS3 = xxxx
 PFS4 = xxxxxxxxxxxxxxxx
 PFS5 = xxxx
 PFS6 = xxxxxxxxxxxxxxxx
 PFS7 = xxxx
 PFS8 = xxxxxxxxxxxxxxxx
 PFS9 = xxxx
```

VEXC will log this message in the model 840/860 CMSE180 dayfile when an exchange to monitor state was caused by bit 48 or 62 being set in MCR.

PP-BASED CPU MONITOR PROGRAM (EXC)

The CPU monitor (EXC) program loads and controls all C170 state CPU tests. EXC loads and controls from one to four CPU tests for each CPU from a PP.

HARDWARE REQUIREMENTS

EXC requires one CPU, central memory, and a monitor library load device.

SOFTWARE REQUIREMENTS

EXC loads and runs under control of the system monitor.

LOADING PROCEDURE USING A COMMAND BUFFER

The following command buffer loads EXC and then loads and runs any EXC controlled CPU test.

Command	Description
LT,EXC	Load EXC into first available PP.
SQ75,1,/	Wait until EXC initializes.
L,xxx,yyy,zzz,aaa	Load CPU test. One to four tests may be specified.
SQ75,1,/	Wait until tests are loaded.
SP	Start tests executing.

LOADING PROCEDURE CALLING EXC FROM THE LIBRARY

The following format is used when calling EXC from the library:

LT,EXC,p0,p1,p2,p3

p0=0	CPU 0.
p0=1	CPU 1.
p1=0	EXC loads tests in CM, starting at location 10000_8.
p1=1	Allows the two CPUs to share CM.
p2	RA/100_8.
p3	FL/100_8.

DISPLAY COMMANDS

Display commands for EXC are described as follows.

Help Display (H)

The H command describes the commands and parameters for EXC.

Normal Running Display (N)

The N command provides the running test status display:

The displayed information is as follows:

```
    MODE = RUN              AVAILABLE FL = xxxxxx
    BKP = xxxxxx            EXCHANGE RATE = xxxx

0   mne P=xxxxxx            EX = xxx
        RA=xxxxxx           FL = xxxxxx

    (message buffer)        Three lines, 46 octal characters per line

1   mne P=xxxxxx            EX = xxx
        RA=xxxxxx           FL = xxxxxx

    (message buffer)        Three lines, 46 octal characters per line

2   mne P=xxxxxx            EX = xxx
        RA=xxxxxx           FL = xxxxxx

    (message buffer)        Three lines, 46 octal characters per line

3   mne P=xxxxxx            EX = xxx
        RA=xxxxxx           FL = xxxxxx

    (message buffer)        Three lines, 46 octal characters per line

    (error message buffer)
```

Fast Running Display (T)

The T command allows the user to shorten the display time of the running test status. A second T command brings back the original display.

EXC KEYBOARD COMMANDS

The following are the keyboard commands for EXC.

Load CPU Tests (L)

The following is the load CPU tests command:

```
L,mne,mne,mne,mne
L,mne,mne,mne,mne,ra
L,mne
L
```

mne	Name of CPU test (three or four alphanumeric characters). If the mne parameters are absent, four CPU tests are loaded.
ra	The load address for the start of the test (one to six octal digits). The default address is 10000_8.

If from two to four tests are loaded, EXC operates in a in a multiprocess mode.

Set Field Length for EXC (AFL) or Test

The following command sets total available field length for EXC or test:

For EXC:

```
AFL,v
```

For test:

```
CFL,x,v
```

v	Field length (one to six octal digits).
x	Control point number of the test.

Tests are loaded beginning at the absolute CM location specified by v.

Set Exchange Rate (EXR)

The following command sets the exchange rate for EXC:

```
EXR,u
```

u	One to four octal digits. u is preset to 20_8 (an exchange every 40 microseconds).

Restart CPU Test (R)

The following command restarts the CPU test(s):

R,x

x Control point number of the test.

If no x parameter is entered, the current exchange package of each test is reset.

Start Selected Test (G)

The following command restarts the test previously stopped by an S,x command:

G,x

x Control point number of the test.

Start Central Processor (Space Bar)

Pressing the space bar causes EXC to exchange the central processor with one of the following:

- If run or test mode is selected, exchange is done with the input package.
- If step mode is selected, exchange is done with the last output package.

Stop Central Processor (S)

The S command causes EXC to exchange the central processor with an idle package and halt execution of the test(s) currently selected.

H DISPLAY TOGGLE COMMANDS

The following commands toggle on/off flags in the H display.

Set Auto Exchange Rate Flag (A)

The A command automatically sets the proper exchange rate if the flag is on.

Set DDP/ECM Flag (B)

The B command allows DDP to run simultaneously with ECM when the flag is turned on.

Set Error Stop (E)

The E command causes EXC to stop on a CPU error if turned on, and not to stop on a CPU error if turned off. The default setting is on.

CPU MANIPULATION COMMANDS

The following commands manipulate the CPU.

Set Exchange Address (EXK)

The following command sets the exchange address to the value v:

```
EXK,v
```

v Exchange address (one to six octal digits). Default is 400_8.

Set Breakpoint Address (BKP)

The following command sets the breakpoint address to the value v:

```
BKP,v
```

v Breakpoint address (one to six octal digits).

The instructions at address v are saved and replaced with a program stop instruction.

Set Run Mode (RUN)

The following command causes the CPU to run until the breakpoint is reached:

```
RUN
```

When the breakpoint is reached, the CPU is exchanged out and the breakpoint address is restored.

Set Test Mode (TEST)

The following command permits looping on an instruction or a series of instructions.

```
TEST
```

The P register is continually monitored for breakpoint address. When the breakpoint address is reached, the CPU is exchanged out. The same program is reexecuted by exchanging it with the original input exchange package.

Set Step Mode (STEP)

The following command permits an operator to monitor the execution of consecutive CPU instructions:

STEP

EXC sets up the step mode in which the P register is continually monitored for the breakpoint address. When the breakpoint address is reached, the CPU is exchanged out. When the CPU is restarted (space bar), the same program is reexecuted by exchanging it with the original output exchange package, and the breakpoint address is incremented by 1 each time the space bar is pressed.

Clear Breakpoint for CPMTR (CBP)

The following command clears the central processor monitor (CPMTR) capability to loop on error central exchange jump (CEJ) conditions:

CBP

Set Breakpoint for CPMTR (SBP)

The following command enables CPMTR to loop on an error CEJ condition:

SBP

A user program, with monitor flag clear, and exiting with any mode error, is restarted using its input exchange package.

CACHE INITIALIZATION BINARY (OCCI)

OCCI is loaded into the model 990 cache tag memory from the CIP command buffers prior to running diagnostics. It initializes the memory without having to deadstart the system.

LOADING PROCEDURE

OCCI is loaded with command WS, OCCI, OCC.

DEMOT EXECUTIVE (DEMOT)

DEMOT runs under user control with the common maintenance software executive (CMSE). The support function within the CMSE system includes a peripheral processor (PP) executive that provides a user interface. DEMOT provides a compiler that converts the source language diagnostics into executable PP code and PP driver/product overlays that execute the compiled code.

DEMOT is composed of the following seven elements:

- A PP executive that controls the compiler and the PP driver and provides a user interface.
- A compiler that compiles non-I/O language commands, low-level language commands, and high-level language commands to generate executable binary PP code. Non-I/O commands are used with both levels of language to control the program and manipulate data buffers and operating registers.
- A PP driver that executes non-I/O statements.
- Product overlays to the PP driver that execute the low-level and high-level language commands.
- Non-I/O language commands that control module program flow and data in the PP and which apply to both language levels. These commands are detailed in the MALET Reference Manual.
- Low-level language commands for channel interfaces and controllers that are not device oriented. These include commands such as CONNECT, STATUS, OUTPUT, and FUNCTION. This level of language is used to write diagnostics designed to detect and isolate errors and allows the repair of controller and channel interfaces. These commands are detailed in the MALET Reference Manual.
- High-level language commands for specific hardware families. These commands include non-I/O statements and such device-oriented I/O statements as REWIND, ENDFILE, and so forth for tapes; and PRINT, EJECT, and so forth for printers. This level of language is used to write diagnostics designed to detect and diagnose errors and allows the repair of peripheral units. These commands are detailed in the MALET Reference Manual.

EXECUTIVE

The executive is loaded to a PP in the CMSE system and is then the master of the other components. Input data to the executive is in the form of directives, which are executed by the executive, or source code, which is saved for the compiler.

The executive does the following:

- Acts upon executive directives.
- Saves source code lines in central memory (CM) for the compiler.
- Calls and controls the central processor unit (CPU) compiler.
- Drives the DEMOT displays.
- Calls and controls the driver and its product overlays.
- Honors PP requests for assistance during the execution of modules.

The DEMOT executive provides the following capabilities for input of directives and source code:

- Directives may be input from the keyboard, card reader, or a CMSE command buffer.
- Source code may be input from the keyboard, card reader, or, along with a precompiled module, loaded from the Maintenance Software Library (MSL).
- Precompiled modules can be loaded from the MSL program library and executed.
- A card deck may be read on the card reader to input executive directives and source code. DEMOT output is written to a disk library file named OUTPUT.

Data for the DEMOT display is organized in the form of pages that can be displayed upon user request. Page displays are 60 decimal characters per line wide and 40 decimal lines deep.

The PP messages display is a page derived from data generated by modules running in the PP. The display buffer may contain up to 40 decimal messages. Each line is directly addressed by the module.

In addition to the message capability, a graphics capability allows the programmer to generate a plot within the same display area, intermixed with messages. Using the PLOT command, an alpha character asterisk (*) is added to the existing display area on a specified line and character position.

The BLANK command allows the programmer to blank fill the PP display contents. The PICTURE command sends the current display contents to the output file.

Input data to the executive that are not recognized as directives are assumed to be source code and are saved for later compilation. Figure 5-1 shows data flow into the MSL library.

Typically, a number of modules are required to form a total diagnostic. The user has the option to run specific modules in a specific sequence, plus options to loop on a single module, or to run a series of modules.

Source code can be entered, compiled, and saved for execution.

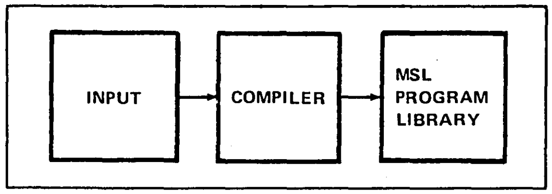

Figure 5-1. Data Flow Into the MSL Program Library

All modules executed by the PP driver are obtained from the MSL program library by the PP executive (figure 5-2).

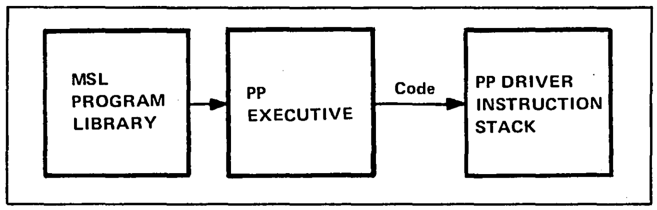

Figure 5-2. Data Flow Out of the MSL Program Library

The complete module is read and the source code, if present, may be displayed and/or modified and recompiled. If this module is run, the executable code is executed in the PP driver. If there is any compiled data, it is passed to the PP for access by the module.

A variety of capabilities exists for obtaining/generating data within a module to test I/O device data paths:

- Data defined in the DATA statement can be carried with the module binary.
- Executable statements (DUP, RANDOM, and the replacement statements) can be used to dynamically generate data.
- Data can be obtained from a user-supplied scratch file with the SYSRD command.

The output-of-results mechanism within DEMOT allows the module to accumulate messages in the PP display and control the time at which a picture of this display is sent to the output file.

COMPILER

The compiler compiles the source code and generates an executable binary file. It can also produce a listing of the source code and binary PP code which is sent to the output file. The compiler may be used to compile only if running CMSE disk based.

PP DRIVER

The maintenance language driver (MLD), also known as the PP driver, executes PP code in the form of modules that have been compiled by the DEMOT compiler. These modules are diagnostic subroutines used to verify the operation of a peripheral device or to detect and aid in error isolation and repair of the device.

The driver is called into execution with a CMSE RU command and remains in execution until a DROP command is processed by the executive. Module execution begins when a RUN command is processed by the executive and continues until one of the following conditions occurs:

- A STOP directive is processed by the executive and passed to the driver. The PP stops when a logical breakpoint is reached (that is, a RES or REL sequence is executed).
- An END statement is executed by the PP driver. This causes the PP and the executive to enter their respective idle routines.
- The PP driver detects that more than 2 seconds have elapsed since the last attempted release of the assigned I/O channel to the CMSE system.

PP PRODUCT OVERLAY

The PP product overlay is a specialized overlay to the basic PP driver. Its function is to drive specific I/O devices.

NON-I/O COMMANDS

The non-I/O DEMOT language commands apply to both language levels. The primary purpose of these commands is to provide means to control the flow of the program within a module and the control of data within the operating registers and buffers in the PP. The syntax details are in the MALET Reference Manual.

LOW-LEVEL I/O COMMANDS

Low-level I/O commands apply to all 3000 and 6000 channels, as well as to buffer controller devices on 6000/CYBER 70/CYBER 170 channels. This level of language is used primarily to test I/O channel interfaces and controllers and the details may be found in the MALET Reference Manual.

HIGH-LEVEL I/O COMMANDS

High-level I/O commands are designed for each specific hardware family. This level of language is used primarily to test peripheral units. High-level I/O commands are detailed in the MALET Reference Manual.

STRUCTURE AND ORGANIZATION

In addition to the elements of DEMOT, it is necessary to understand the structure and organization. The structure and organization consist of the module, registers and buffers, and data organization.

MODULE

The smallest block of code that can be executed in DEMOT is a module. A single module can be executed, or a series of modules can be linked and executed in a defined order.

A module is a maximum of 120 decimal lines of source code consisting of an identification division, a data division, an executable division, and a termination division. A slash (/) statement, documenting the purpose/use of the module, is allowed anywhere between the identification and the termination divisions. The four divisions are as follows:

- The identification division names the module and describes the device type it is written for and the specific device codes supported.
- The data division is optional and may contain any of the following:
  - DATA statements, defining data to be used within the module.
  - FORMAT statements, defining normal/error messages for use within the module. A maximum of eight microsubstitutions of values may be specified within each FORMAT statement, and a maximum of 24 FORMAT statements is allowed per module.
  - EQUATE statements, equating a user-specified name to an octal or decimal value. A maximum of 20 names is allowed. The equated value may be used within the module for any variable for which an octal or decimal value is legal.
  - BASE statements, identifying whether numbers defined within source code statements are octal or decimal.
- The executable code division contains the commands that create executable PP code for the PP driver. Language levels cannot be mixed within the same module.
- The termination division ends the module and specifies the entry point for the module.

Identification of source code lines is done by assigning a line number to each source line. These numbers are in the range of 0 through 167_8 and are assigned by DEMOT. User addressing within a module for JUMPS and FORMAT statements is accomplished through user-assigned statement numbers in the range of 0 through 77_8. A statement number may be defined only once within a module.

REGISTERS AND BUFFERS

Fixed names are assigned to registers and buffers used as variables within the DEMOT language. The following programmable registers exist in the PP driver:

Register	Function
B0-B15	Index registers for arithmetic and indexing.
WC	Word count register for I/O operations.
BA	Beginning address for buffer first word address (fwa) for I/O.

The following read-only registers exist as operands:

Register	Function
P0-P9	Parameter registers.
WT	Words transmitted on the last I/O operation.
LF	Last function code issued to I/O.
EC	Last error code posted.
EA	Error address; line where last error occurred.
EM	Error message index.
ES	Executive switches (stop on error, repeat module, and so on). These switches are used by DEMOT diagnostic modules which are executing in a PPU and are driving a device directly connected to the I/O channel.
DS	Diagnostic switches (repeat module, repeat condition and so on). These switches are used by DEMOT diagnostic modules which are executing remotely in a device such as the Loosely Coupled Network (LCN) or the Federal Standard Channel (FSC).
DC	Device code of the device being tested.
AL	Current access level to device assigned.
P	Program address register that identifies the current line number being executed within a module.
RT	Real-time PP clock. This value can be an operand only in a very few specific cases.

The following programmable buffers exist in the product overlays to the PP driver within the PP:

Buffer	Function
OB	Output buffer for writing data to devices.
IB	Input buffer for reading data from devices.
SB	Status buffer for input of device status.

Buffers entries can be referenced with ordinals, called subscripts of octal, decimal, or equated values; registers; or registers plus an octal or decimal value. Zero is the first word of any buffer.

Examples:

IB (20)	Octal ordinal (default).
OB (8)	Decimal ordinal.
SB (GENST1)	Equated ordinal.
OB (B1)	Register ordinal.
SB (B1 + 5)	Register plus value ordinal.

The occurrence of an 8 or 9 within any numeric field indicates that the field is a decimal-number field. If a postradix of D or B is used, the number is converted according to the radix.

Examples:

LINE = 78	The number 78 equals 116_8.
LINE = 72D	The line number equals 110_8.
ASSIGN, AL=8, CH=1	The AL field equals 10_8.

All references to a buffer imply all of the above ordinals. The compiler supports the following keywords as equated values to allow easy reference to specific bits of the ES or DS registers. These values may be used anywhere a constant or an equated value is legal.

ES Register Equates:

Keyword	Description	Keyword	Description
RM	Repeat module.	SE	Stop on error.
RC	Repeat condition.	SL	Scoping loop (RM or RC, not SE).
MS	RM or SE.	CM	Repeat condition or module.
CS	RC or SE.	TM	Terminal mode.
DL	Dayfile log on.	PL	Print log on.
PD	PL or DL.		

DS Register Equates:

Keyword	Description	Keyword	Description
RM	Repeat module.	SE	Stop on error.
RC	Repeat condition.	CM	Repeat condition or module.
MS	Repeat module or stop on error.	BC	Beginning of condition stop.
CS	Repeat condition or stop on error.	BT	Beginning of test stop.
BM	Beginning of module.	TE	Test end stop.
CE	Condition end.	ME	Module end stop.
S1	Programmable switch 1.	S2	Programmable switch 2.

DATA ORGANIZATION

Executive directives and source code lines may consist of a maximum of 60 decimal characters per line. Directives are decoded and acted upon immediately. Source code data is saved for later compilation in a fixed format of 60 decimal characters (six central memory words) per line, and a maximum of 120 decimal source lines may exist within a module.

Source code commands must be in a defined order to be interpreted by the compiler:

- Statement labeling within a module is by user-defined statement numbers of 0 through 77B or 0 through 63D that must appear in columns 1 and/or 2. Single-digit statement numbers may start in column 1 or 2, with a leading 0 optional. Statement numbers may be decimal numbers in the range of 0 through 63 if a BASE DECIMAL statement appears in the data division of the module.

- A source line is assumed to be 60 decimal characters long. Any information past column 60 is ignored by the compiler.

- Column 3 must be blank on noncomment statements, except for the DATA statement continuation cards in which a comma is used to indicate continuation. Comment statements are free field.

- Command keynames must start in column 4 or 5, and command parameters continue until two successive blanks are detected. Each command starts with a keyname followed by an expected sequence of parameters.

- Commas, periods, or single blanks are used to separate keynames and parameters. Two successive commas or periods cause an octal 0 to be stored as a parameter, and this is repeated for each subsequent comma or period following the first two.

Examples:

DATA (OB(10), CON) 1,2,,3	Data items = 1, 2, 0, 3.
IB (10) = B1 + 1234	Two blanks terminate string.

- The plus (+), minus (-), left parenthesis ((), right parenthesis ()), equal sign (=), dollar sign ($), asterisk (*), and slash (/) are separators, but are also considered to be parameters themselves. This means that if one of these separators is included in the syntax of a command, it is not optional; it must be specified.

- Once a command string has been properly terminated with two successive blanks, the remaining characters, if any, may be used as comments for documentation purposes.

OPERATIONAL PROCEDURE

The DEMOT executive and driver are called and placed into execution by a series of CMSE commands. These commands can be entered at the keyboard or through the card reader.

To execute the command buffer, the operator enters:

GO,name

name Name of the command buffer.

Refer to section 5 for typical command buffers to place the executive/driver and compiler into execution from cards.

All of the print log output is placed on an MSL file called OUTPUT. To dump this file, the MSL utility, DMP, must be used. The SETSW, PL directive must be given before running the diagnostic. The following CMSE commands dump this file:

```
CP,DMP
RU,/,100
PP,/
```

This brings up the parameter display for DMP. The F,OUTPUT command dumps the output file. If the message DUPLICATE FILE NAME-OUTPUT appears, an output file, OUTPUT, already exists and the new file is appended to the existing output.

EXECUTIVE DIRECTIVES

Table 5-1 provides a summary of DEMOT executive directives. These directives are read by the executive and acted upon immediately, if legal at the time of input. If illegal, an error message is written to the currently selected output files.

All executive directives may be preceded by a period, if desired, to distinguish them from CMSE commands.

Table 5-1. Executive Directives Summary

Directive	Description
ASSIGN or A	Assigns a device to DEMOT for testing.
CLRDS	Clears switch options within the DS register.
CLRSW	Clears switch options within DEMOT.
COMPILE or C	Calls the compiler to compile a module.
DEVICES	Displays list of device codes supported.
DEMOT	Displays DEMOT executive directives.
DEMOT C	Sets compiler to active or inactive.
DEMOT S = xxxxxx	Sets name of file to be used for SYS read.
DROP	Stops the module; idles EXEC/driver PPs.
GO or G	Resumes execution of a stopped module.
I or D	Increments or decrements to next display page.
LINE or L	Sets line number to receive next source.
LOAD	Loads module from library.
LOADCM	Loads specified modules into central memory.
LOADCM S=xxxxxx	Loads scratch file for SYS read into central memory.
MOVE or M	Opens up or eliminates source code lines.
PARAM or P	Inputs parameters to pass to PP registers.
PICTURE	Forms picture of DEMOT display on output.
PPU	Displays PP messages/plots.
RUN or R	Starts PP executing selected modules.
SCRATCH	Change record accessed by SYSRD/SYSREW/SYSRD.
SETDS	Sets switch options within the DS register.
SETSW	Sets switch options within DEMOT.
SOURCE	Displays source code of current module.
STOP or S	Stops execution of a module in the PP.

ASSIGN Directive

The ASSIGN directive assigns a device to DEMOT for testing. It uses one of the following formats:

```
ASSIGN CH=aa,EQ=bb,UN=cc,DC=dd,SN=eeeeee,AL=ff.
    or
A,CH=aa,EQ=bb,UN=cc,DC=dd,SN=eeeeee,AL=ff.
```

aa	Channel (default = 0).
bb	Equipment number (default = 0).
cc	Unit number (default = 0).
dd	Device code (default = 0).
eeeeeee	Media serial number (default = 0).
ff	Access level (default = 0).

NOTE

Be sure to provide an access level (AL) with every ASSIGN directive. If the access level is not provided, AL is set to zero.

For MSS, the following additional parameters are used:

```
ASSIGN...,MST=gg, MSA=hh, MSTPH=ii, CSU=jj
```

gg	MST address (default = 0).
hh	MSA address (default = 0).
ii	MST physical address (default = 0).
jj	CSU address (default = 0).

For the Loosely Coupled Network (LCN), the following additional parameters are used.

```
ASSIGN...,LTA=kkk,TCU=jj,AC=mmmm,BFZ=nn
```

kkk	Logical Trunk Control Unit (TCU) address, used if DC=301 (octal).
jj	Octal number of enabled TCU (1=TCU 3, 2=TCU 2, 4=TCU 1, 10=TCU 0). Used if DC=301 (octal).
mmmm	Access code of assigned NAD, used if DC=301 (octal).
nn	Octal value representing controlware buffer size (1=516 bytes, 2=2064 bytes, 4=4128 bytes). Used if DC=301 (octal).

The ASSIGN directive provides the required data to access a device for testing. There are several formats of the ASSIGN directive to provide the required data to gain this access. Access levels 0 through 4 indicate that a high-level language and product overlay is to be used. If the controller has controlware memory, its contents cannot be changed.

Access level 5 indicates that only the assigned device may have its controlware destroyed. Access level 5 is used for Loosely Coupled Network (LCN) Network Access Device (NAD) tests.

Access level 6 indicates that both the assigned and accessed devices may have their controlware destroyed. Access level 6 is for LCN NAD local and remote testing.

To gain access to the low-level I/O commands, access level 10, 20, or 21 must be specified.

Table 5-2 defines the access level codes and the level of testing that is allowed at each level.

Table 5-2. Access Level Codes

Level Octal	RMS	Non-RMS
0	Illegal (if specified on assign).	Dedicated unit, high-level I/O.
1	Read preallocated area only, high-level I/O.	Illegal.
2	Read any normal data area only, high-level I/O.	Illegal.
3	Read any normal data area, write preallocated area, high-level I/O.	Illegal.
4	Read/write any normal data area, high-level I/O dedicated unit.	Illegal.
5	Illegal.	LCN NAD dedicated. Code in NAD assigned may be rewritten.
6	Illegal.	LCN NAD local and remote dedicated. Code may be rewritten in both.
10	Dedicated controller and all units. High- and low-level I/O. May destroy controlware.	
20	Dedicated controller, all units and channel. All devices must be off and not in use on the channel since master clears may be performed. High- and low-level I/O. Controlware may be destroyed.	
21	Same as level 20 plus I/O channel is left in a hung state if a channel hang occurs.	

Prior to allowing any module to be executed, DEMOT verifies that the module requested was actually written for the device code that is currently assigned. A module may support as many as 10 unique device codes.

CLRDS Directive

CLRDS aa,bb,...,ff

The CLRDS directive sets switches logically off in the DS register. The parameters aa through ff may be any of the following:

Switch	Default	Bit	Description
SE	On	0	Stop on error.
RM	Off	1	Repeat module.
RC	Off	2	Repeat condition.
BC	Off	3	Beginning of condition stop.
BM	Off	4	Beginning of module stop.
BT	Off	5	Beginning of test stop.
TE	Off	6	End of test stop.
CE	Off	7	Condition end stop.
ME	Off	8	Module end stop.
S1	Off	9	Programmable switch 1.
RT	Off	10	Repeat test.
S2	Off	11	Programmable switch 2.

CLRSW Directive

The CLRSW directive clears switch options within DEMOT. It uses the following format:

CLRSW,aa,bb...,ff

aa through ff Switch options to clear as follows:

Switch	Default	Description
RC	Off	Repeat condition.
SE	On	Stop on error.
RM	Off	Repeat module.
PL	Off	Print log (off stops all new output).
DL	Off	Dayfile log (off stops all new dayfile messages).
RT	Off	Repeat test.
KL	Off	System display.

COMPILE Directive

The COMPILE directive calls the compiler to compile the source code buffer. It uses one of the following formats:

```
COMPILE a,b
    or
C a,b
```

a,b   Compiler options as follows:

Option	Description
LIST	Causes the source and binary of the module compiled to be written to the output file if the print log (PL) switch is on.
SOURCE	Causes the source code to be carried with the module binary when it is saved on the library after being compiled.

DEMOT Directive

The DEMOT directive displays the executive directives (figures 5-3 and 5-3.1). It uses the following format:

```
DEMOT
```

DEMOT C Directive

The DEMOT C directive sets the compiler to active or inactive status. It uses the following format:

```
DEMOT C= a
```

a   Status of compiler:

Code	Status
A	Active
I	Inactive

DIRECTIVE	COMMENTS
ASSIGN	ASSIGN DEVICE FOR DEMOT USE *ASSIGN=AA, EQ=BB, UN=CC, DC=DD, SN=EEEEEE, AL=FF*
CLRDS	CLEAR DS SWITCHES *CLRDS SE,RT,RM,RC*
CLRSW	CLEAR SWITCHES *CLRSW SE,RT,DL,RM,PL,KL,RC*
COMPILE	COMPILE SOURCE BUFFER *COMPILE,SOURCE,LIST*
DEVICES	DISPLAY DEVICE CODES *DEVICES*
DROP	DROP DEMOT PPUS *DROP*
GO	RESUMT EXECUTION OF MODULE THAT WAS STOPPED *G*
LINE	SET LINE FOR NEXT ENTRY *LINE*
LOAD	LOAD MODULE *LOAD MNENN*
LOADCM	LOAD MODULES TO CM *LOADCM MNE (00,01,02,03,03A)* OR *LOADCM S=SYSFIL*
DEMOT	DISPLAY DEMOT EXECUTIVE DIRECTIVES *DEMOT C=A/I* OR CHANGE SYS FILE NAME *DEMOT S=SYSFILE*
MOVE	*MOVE AAA UP BBB LINES*
MOVE	*MOVE AAA DOWN BBB LINES*

Figure 5-3. Sample Display for DEMOT Directive (First Page)

DIRECTIVE	COMMENTS
PARAM	CHANGES PARAMETERS *PARAM P0=1234,P1=1234,P9=1234, LL=1234 LL=LINE LIMIT
PICTURE	PRINT DISPLAY ON OUTPUT FILE *PICTURE=TYPE*
PPU	DISPLAY PPU MESSAGES/PLOTS *PPU*
RUN	RUN MODULE(S) *RUN MNE (10,02,03,04,10,07)*
SCRATCH	CHANGE SYSRD RECORD NAME *SCRATCH=LFN*
SETDS	SET DS SWITCHES *SETDS,RC,RM,SE,TE,DE,RT
SETSW	SET SWITCHES *SETSW,SE,RC,RM,DL,PL,KL,RT*
SOURCE	DISPLAY SOURCE FOR MODULE *SOURCE*
STOP	STOP PPU EXECUTION *STOP*
I	INCREMENT PAGE ON DISPLAY *I*
D	DECREMENT PAGE ON DISPLAY *D*
.X-X	ENTER SOURCE LINE FROM KEYBOARD *.SOURCE*

Figure 5-3.1. Sample Display for DEMOT Directive (Second Page)

DEMOT S Directive

The DEMOT S directives changes the name of the scratch file used with the SYS command. The default name is SCRATCH. This command must be entered before MLD is initiated. The DEMOT S directive uses the following format:

DEMOT S=xxxxxx

xxxxxx Name of the scratch file.

DEVICES Directive

The DEVICES directive displays device codes for use on the ASSIGN directive (figures 5-4, 5-4.1, and 5-4.2). It uses the following format:

    DEVICES

CODES FOR DEVICES

01=841	02=7054/844-2 DISK
03=7054/844-4 DISK	04=7154/844-2 DISK
05=7154/7155/844-4 DISK	06=819 DISK
07=FMD-885 DISK	10=FSC-100 MBYTE
11=FSC-200 MBYTE	12=FSC-317 MBYTE
13=RESERVED	14=7155/885-42 DISK (DEMA)
15=RESERVED	16=7155/885 DISK (LSFMD)
17=RESERVED	20=405 CARD READER
21=415 CARD READER	22=512 LINE PRINTER
23=580-12 LINE PRINTER	24=580-16 LINE PRINTER
25=580-20 LINE PRINTER	26=580-12 PFC LINE PRINTER
27=580-16 PFC LINE PRINTER	30=580-20 PFC LINE PRINTER

Figure 5-4. Sample Display for DEVICES Directive (First Page)

CODES FOR DEVICES

31=CCC/5870 PRINTER (NIP)	32=CCC/5970 PRINTER (NIP)
33-37=RESERVED	40=60X 7 TRK TAPE
41=65X 7 TRK TAPE	42=66X 7 TRK TAPE
43=RESERVED	44=67X 7 TRK TAPE
45=FSC 7 TRK TAPE	46=RESERVED
47=RESERVED	50=60X 9 TRK TAPE
51=65X 9 TRK TRAP	52=66X 9 TRK TAPE
53=RESERVED	54=67X 9 TRK TAPE
55=67X GCR 9 TRK TAPE	56=FSC 9 TRK TAPE
57=639 9 TRK TAPE	60=6671 MUX
61=6676 MUX	62=2550-100 EMULATING 6671
63=2550-100 EMULATING 6676	64=2550
65=7077-1 LCC	66=6673 DATA SET
67=6683 COUPLER	70=DDP
71=ECS COUPLER	72=RESERVED

Figure 5-4.1. Sample Display for DEVICES Directive (Second Page)

```
                         CODES FOR DEVICES

73-77=RESERVED                  100=MSS-MLST
101=MSS-CSU                     102-103=RESERVED
104=CCC/MASSTOR SUBSYSTEM       105-107=RESERVED
110=7255/834 DISK (FSD I)       111=7255/836 DISK (FSD II)
200=CYBERPLUS RING PORT         201-277=RESERVED
300=LCN LOCAL NAD               301=LCN NAD REMOTE
302-377=RESERVED                400=CIU OUTPUT CONTRL
401=CIU INPUT CONTRL            402-477=RESERVED
500=CYBER/UNIBUS INTERFACE      501-7677=RESERVED
7700-7777=QSE

LINE=0000    PP STATUS = STOPPED    MODULE = xxx00
```

Figure 5-4.2 Sample Display for DEVICES Directive (Third Page)

DROP Directive

The DROP directive stops the PP driver, if running, and drops DEMOT. It uses the following format:

DROP

GO Directive

The GO directive resumes execution of the PP driver that has stopped. It uses one of the following formats:

GO
or
G

I or D Directive

The I or D directive increments or decrements, respectively, to the next display page. It uses one of the following formats:

I = a
or
D = a

a Advances or moves back from the current page being displayed on the system, the number of pages specified by a.

LINE Directive

The LINE directive sets the data input pointer to a specific source line number. The next source code input then is sent to this line number. It uses one of the following formats:

LINE a
or
L a

a Line number of 0 to 167_8.

LOAD Directive

The LOAD directive loads a module from the CMSE file to the module buffer and displays the first page of the source, if available. It uses the following format:

```
LOAD aaannn
```

aaa	Module test series.
nnn	Module number.

LOADCM Directive

The LOADCM directive loads specified modules into central memory when running DEMOT from a tape system. Processing of this directive terminates with an error message if a specified module cannot be found on the library. The LOADCM directive uses the following format:

```
LOADCM aaa(bbb,cc,ddd)
```

aaa	Module test series.
bbb through ddd	Two- or three-character module or submodule numbers.

LOADCM S Directive

The LOADCM S directive loads specified scratch files into central memory, after the modules have been loaded. It uses the following format:

```
LOADCM S=xxxxxx
```

xxxxxx Name of the scratch file to be used by the SYS read.

MOVE Directive

The MOVE directive moves source lines up or down. It is used to make space for modifications to a module or to eliminate unwanted lines. A move up overwrites the data currently existing in the lines being moved to. It uses one of the following formats:

```
MOVE a UP b
    or
MOVE a DOWN b

M a UP b
    or
M a DOWN b

MOVE a + b
    or
MOVE a - b

M a + b
    or
M a - b
```

a	Line number to start the move.
b	Number of lines to move.

PARAM Directive

The PARAM directive passes program parameters to the PP driver when a module is started into execution. The display is changed to the PARAM display (figures 5-5 and 5-5.1). The PARAM directive uses one of the following formats:

```
PARAM aa=xxxx, aa=xxxx,...
    or
P aa=xxxx, aa=xxxx,...
```

aa   Indicates one of the following:

Code	Description
P0 to P9	PP driver register number.
LL	The number of lines allowed (line limit) before DEMOT turns print output off. (LL set to 0 = infinity.)

xxxx   Octal value to be placed into the specified PP driver register.

```
                     PARAMETERS IN OCTAL

P0=0000   P1=0000   P2=0000   P3=0000   P4=0000   P5=0000
P6=0000   P7=0000   P8=0000   P9=0000             LL=1750
---------------------------------------------------------------
                     ES SWITCH STATUS

ON  - (SE) STOP ON ERROR          OFF - (RM) REPEAT MODULE
OFF - (RT) REPEAT TEST
OFF - (PL) PRINT LOG              OFF - (DL) DAYFILE LOG
OFF - (KL) K/L DISPLAY            OFF - (RC) REPEAT CONDITION
---------------------------------------------------------------
                     ASSIGN VALUES

DC=0000   CH=0000   EQ=0000   UN=0000   AL=0000
SN=000000
---------------------------------------------------------------
                     SCRATCH = SCRATC
```

Figure 5-5. Sample Display for PARAM Directive with Default Values (First Page)

```
                     DS SWITCH STATUS

ON  - (SE) STOP ON ERROR          OFF - (BT) BEGINNING OF TEST
OFF - (RT) REPEAT TEST            OFF - (TE) TEST END
OFF - (RM) REPEAT MODULE          OFF - (CE) CONDITION END
OFF - (RC) REPEAT CONDITION       OFF - (ME) MODULE END
OFF - (BC) BEGINNING OF COND      OFF - (S1) PROG SWITCH 1
OFF - (BM) BEGINNING OF MODULE    OFF - (S2) PROG SWITCH 2

              ADDITIONAL VALUES FOR MSS ONLY

CSU=0000   MSA=0000   MST=0000   MSTPH=0000

           ADDITIONAL ASSIGN VALUES FOR LCN ONLY

LTA=0000   TCU=0000   AC=0000   BFZ=0000

LINE=000   PPU STATUS=STOPPED   MODULE=xxx00
```

Figure 5-5.1. Sample Display for PARAM Directive with Default Values (Second Page)

PICTURE Directive

The PICTURE directive is used to print a picture of a specified display. It uses the following format:

PICTURE type

type Specifies display to be printed:

Code	Prints
DEMOT	DEMOT directives display.
DEVICES	Devices display.
PARAM	Parameter display.
PPU	PP display.
SOURCE	List one page of source data. To obtain a complete source data listing, use the COMPILE directive with the LIST option (*COMPILE,LIST,SOURCE*)
Blank	Current display.

PPU Directive

The PPU directive displays module-generated information. It uses the following format:

PPU

RUN Directive

The RUN directive starts PP execution. It uses one of the following formats:

RUN sss (aa,bb,cc,dd,ee,ff,gg,...)

or

R sss (aa,bb,cc,dd,ee,ff,gg,...)

sss A three-alphanumeric-character test series name.

aa,bb, and so on Decimal module numbers within the specified series to be executed in the order defined. (If only the test series is specified, all modules in the series are executed in numerical order up to the first END command.)

Leading zeros are necessary when specifying module numbers. The RUN directive specifies the test series of modules that are to be executed, the specific modules in this series to execute, and the order in which to execute them. If more than 60 characters are needed to specify module numbers, do not include the right parenthesis character until the last line of the directive. As many as 100 modules may be specified on one RUN directive.

Examples:

1. Run specific modules regardless of END/EXIT statements:

    RUN TST (00,01,02,03,04,05,06,07....29,30,31,32,33,34)

        Runs modules 00 through 34 in order specified.

    RUN TST (00,01,00,01)

        Runs modules 00,01,00,01.

2. Run a test series:

RUN TST	Runs test series starting with 00.
RUN TST20	Runs test series starting with 20.
RUN TST30	Runs test series starting with 30.

NOTE

A false CMSE error message ERR-NOT ON LIBRARY, may be encountered if a break exists in the numerical series. Execution is not affected.

3. Run single module:

RUN TST (00)	Runs module 00.
RUN TST (01)	Runs module 01.
RUN	Runs currently loaded module.

SCRATCH Directive

SCRATCH=lfn

The SCRATCH directive changes the record name accessed by SYSRD/SYSREW/SYSWR to lfn, where lfn is from 1 to 6 characters.

SETDS Directive

SETDS aa,bb,...,ff

The SETDS directive sets switches logically on in the DS register. The parameters aa through ff may be any of the following:

Default	Switch	Bit	Description
On	SE	0	Stop on error.
Off	RM	1	Repeat module.
Off	RC	2	Repeat condition.
Off	BC	3	Beginning of condition stop.
Off	BM	4	Beginning of module stop.
Off	BT	5	Beginning of test stop.
Off	TE	6	End of test stop.
Off	CE	7	Condition end stop.
Off	ME	8	Module end stop.
Off	S1	9	Programmable switch 1.
Off	RT	10	Repeat test.
Off	S2	11	Programmable switch 2.

SETSW Directive

The SETSW directive turns on switch options and sends them to the PP driver. It uses the following format:

SETSW aa,bb,cc,...

aa,bb,cc, and so on — Switch options to be set as follows:

Switch	Default	Description
RC	Off	Repeat condition.
SE	On	Stop on error.
RM	Off	Repeat module.
PL	Off	Print log (on resumes new output).
DL	Off	Dayfile log (on resumes new dayfile messages).

Switch	Default	Description
RT	Off	Repeat test.
KL	Off	System display used for input.

NOTE

PL and DL must remain OFF when running DEMOT from tape.

SOURCE Directive

The SOURCE directive displays a page of the source code buffer (figure 5-6). The I directive can be used to advance the page. The LINE=0 directive can be used to reset the page to the beginning. It uses the following format:

```
SOURCE

          000=     MODULE TEST01, 3000 (20, 21,22)
          001=01   FORMAT SAMPLE MODULE TO DISPLAY MAGS ON LINE=*OCT
          002=02   B2=0
          003=03   B1=0
          004=4    MSG 1 (B1) TO LINE B1
          005=     GOTO 4 WHILE (B1+1.LT.50B)
          006=     GOTO 3 WHILE (B2+1.LT.100B)
          007=     END 2
          010=
          011=
          012=
          013=
          014=
          015=
          016=
          017=
          .
          .
          .
          021=

           LINE=010   PPU STATUS=   STOPPED   MODULE  = xxx00
```

Figure 5-6. Sample Display for SOURCE Directive

STOP Directive

The STOP directive flags the PP driver to stop the current module being executed at the next logical breakpoint. It uses one of the following formats:

```
STOP
   or
S
```

MESSAGES

In the DEMOT system, messages can originate from either the executive or the compiler.

EXECUTIVE MESSAGES

The following is a list of messages issued by the DEMOT executive.

Message	Definition
ACCESS LEVEL NOT HIGH ENOUGH.	Module is low level. Access level for low level must be greater than or equal to 10.
ACTIVE MODULE NOT STOPPED.	A GO was issued to a module that was not stopped.
CMSE REJ 21 CALL.	CMSE rejected the call by the executive to read a module.
COMPILER NOT ACTIVE.	The compiler is not active. Can be activated with DEMOT C=A directive.
COMPILER NOT RESPONDING.	The executive did not receive a response from the compiler on a compile call.
DAYFILE LIMIT REACHED.	Dayfile entry limit reached. Dayfile log is turned off.
DIRECTIVE PARAMETER ERROR.	Parameter was in error. Reenter with correct parameter.
DISK LOAD ERR.	Executive received a disk error while trying to load a module.
DRIVER DETECTED ERROR, SEE DAYFILE.	The driver detected an error on initialization and terminated.
END OF TEST.	Test series being run has encountered an END statement.
FORMAT WAS OUT OF RANGE.	Format statement could not be found. Check module source for error.
ILLEGAL WHEN MODULE RUNNING.	Directive is illegal when module is running.
ILLEGAL COMPILER CALL.	Call received from compiler is illegal.

Message	Definition
LANG CHANGE ON ACTIVE CALL.	A call was active and a module was requested that was not written in the same language of the module that performed the CALL or EXIT TO.
LINE LIMIT REACHED.	Print log line limit has been reached. Print log is turned off.
LINE VALUE OUT OF RANGE.	Value too large. Reenter with a value within range.
LOAD MODULES BEFORE SYSFILE.	Modules were not loaded to central memory prior to a request to load SYSFILE to central memory.
MODULE DOES NOT SUPPORT DEVICE CODE.	Device codes specified in the MODULE command do not include currently assigned device code.
MODULE LENGTH ERR.	Module read by the executive was too long.
MODULE NOT LOADED.	The module called has not been loaded into central memory or a module could not be found when processing a LOADCM directive.
MODULE NOT RUNNING.	Directive is illegal when module is not running. (Example: STOP when module not running.)
MODULE NOT WRITTEN - DUPLICATE NAME = name.	An attempt was made to recompile a module already on the MSL library.
MODULE WRITTEN = name.	Module was compiled correctly and binary placed on the library.
MULT CALLS.	A CALL command was executed while a previous call was still active.
NO DEVICE ASSIGNED.	Device is not assigned. Enter ASSIGN directive before trying to run module (with device code nonzero).
OVERLAY LOAD ERR.	The executive received an error indication while trying to read an overlay from CMSE.
RUN DIRECTIVE NEEDS).	RUN directive was entered and never terminated. Enter a right parenthesis to terminate run directive.

Message	Definition
SOURCE BUFFER FULL.	More than 120 source statements were entered. No more source entries are accepted until an executive directive is encountered.
SYNTAX ERROR. DIR = ...	Syntax error on input directive. Reenter corrected directive.
TOO MANY MODULES ON RUN DIRECTIVE.	RUN directive can contain only 100 module numbers.
UNKNOWN MODULE.	Module name not found on MSL file.
UNKNOWN MODULE SERIES.	The module series is not on the MSL library.
VERSION NUMBER ERR.	Current version of DEMOT does not match version number stored in module. If the user wants to run module, it must be recompiled.

COMPILER MESSAGES

The following is a list of messages posted by the DEMOT compiler.

Message	Definition
BUFFER SUBSCRIPT ILLEGAL.	Entry ordinal is illegal for IB, OB, or SB.
COMMENT CARD OUT OF MODULE/ END CARD RANGE.	A / comment card was detected prior to the first MODULE card or following an END card.
COMPILER ERRORS - MODULE = name.	Module had compiler errors.
DOUBLE-DEFINED STATEMENT NUMBER.	Two statements have the same value assigned to them.
EQUATE TABLE FULL - MAXIMUM OF 20 ALLOWED.	Maximum number of equates to use is only 20.
EQUATED NAME HAS AN ILLEGAL LENGTH.	Equated name too long.
FORMAT BLOCK FULL - MAXIMUM OF 24 ALLOWED.	Maximum number of formats is 24 octal. Reduce number of formats to assemble module.
ILLEGAL FORMAT STATEMENT NUMBER.	Format statement number is illegal.
MODULE CARD ERROR MODULE = name.	A legal module card was not found.

Message	Definition
MODULE OVERFLOW - REDUCE SIZE.	Binary of module will not fit within bounds of module buffer. Alter source to correct overflow.
NO END STATEMENT - MODULE = name.	END statement not encountered within module source.
OCTAL OR EQUATED VALUE IS OUT OF RANGE.	Octal or equated value too large or too small.
SOURCE OVERFLOW MODULE = name.	More than 167_8 source lines were found.
STATEMENT OVERFLOW REDUCE SIZE.	An IF statement generated too much code. Reduce complexity of the statement.
SUBSCRIPT IS NOT TERMINATED.	Subscript must be terminated with a right parenthesis).
SYNTAX ERROR - COLUMN 3 MUST BE A BLANK.	Column 3 must be blank except on continuation lines.
SYNTAX ERROR - STATEMENT NUMBER MUST BE 0-77B.	Value used on statement number is too large.
SYNTAX ERROR.	Syntax of statement is in error.
UNDEFINED STATEMENT NUMBER.	Statement number not found.
UNRECOGNIZED STATEMENT.	Statement is unrecognized by the compiler.

TYPICAL DEMOT JOBS

Running DEMOT may be divided into three types of operations: The first is getting the executive and the drivers up and running. This must precede any other DEMOT operations. The second, which is optional, is calling the compiler to compile source code into binary. The third is the running of binary modules of a diagnostic. This may be done on a binary module just compiled or on binary modules saved from a previous compilation. (An example of typical source code is also shown to illustrate its appearance.)

GETTING DEMOT UP AND RUNNING

Before anything else can occur, DEMOT must be up and running. Up and running means that the executive and the drivers are loaded and executing.

DEMOT always runs under CMSE. If CMSE is running on disk, use command buffer DEMOT to load and start executing the executive and drivers.

DEMOT is now ready to process executive directives to execute modules. Central memory is used for display buffers.

Two error messages may appear. The message ERR-NOT ON LIBRARY appears any time a broken series of modules is run. The message DUPLICATE FILE NAME-OUTPUT appears if the file OUTPUT has already been put in the library. Any further output is appended to the original file OUTPUT.

USING THE DEMOT COMPILER FROM DISK

The DEMOT compiler creates binary modules from source code. The compiler must be loaded and running in order for documentation on the source code to be examined.

Run command buffer DEMOTCx to activate the DEMOT compiler, where x is the last digit of the MSL library (for example, DEMOTC1 for MSL 151).

NOTE

Run command buffer DEMOT and load microcode before executing command buffer DEMOTCx.

Example 1:

Run DEMOT from the tape library (DEMOT overlays in central memory).

This sequence loads executive and driver overlays to central memory as a part of initialization. This sequence can also be used with disk-based libraries.

Command	Definition
*OV,0,2000	Put CMSE overlays into CM.
DP4	Deadstart PP 4.
DP5	Deadstart PP 5.
TL4,MCX,,5	Load and run MCX (executive) into PP 4; use channel 5 for communication.
TL5,MLD,,5	Load and run MLD (driver) into PP 5; use channel 5 for communication.
PP4	Select executive display.

DEMOT is now ready to process executive directives to execute modules. Central memory is used for overlay storage and display buffers.

NOTE

If a scratch file is required for testing, the LOADCM command should be used to load test modules and/or scratch file data to central memory.

Following is the recommended procedure for running DEMOT disk tests on a system with only one channel access to disk:

NOTE

Run DEMOT from the tape library.

1. Examine ordinals 6, 7, and 8 of the Initial CMSE Display to ensure that the channel to be tested is not assigned to CMSE.

2. Set ordinal 12 of the Initial CMSE Display to $44xx_8$ to use the central memory directory option.

3. Load CMSE and enter the command *OV,0,2000 to load the CMSE monitor overlays to central memory. The first parameter, 0, ensures that the central memory tape directory is not overwritten.

4. Run DEMOT from the tape library using the command sequence described above.

The tape loader, the CMSE monitor, and DEMOT all use central memory. The only reference to tape required from this point on is to read the diagnostic modules. Since these modules are in sequential order on the tape, you should use the RUN,xxx command without specifying module numbers to run the diagnostic.

Total diagnostic execution time should be approximately equal to disk mode.

USING THE DEMOT COMPILER FROM TAPE

The DEMOT compiler creates binary modules from source code. The compiler must be loaded and running in order for documentation on the source code to be examined.

Example 2:

Run DEMOT with compiler (using central memory).

Before this command sequence can be executed, the DEMOT executive and drivers must have been initialized as shown in example 1.

NOTE

Load microcode and put the CPU in C170 state before executing this command sequence.

Command	Definition
HC	Halt CPU.
CC,MLC	Load MLC (compiler).
DP,n	Deadstart PP n.
EPn,100,2001	
EPn,101,0000	
EPn,102,2600	Enter values into PP n memory.
EPn,103,0100	
EPn,104,7606	
RUn,100	Run driver at address 100.
CN,1016	Define CMSE/CPU interface block.
DEMOT C=A	Set compiler active.

DEMOT is now ready to process LOAD and COMPILE directives. The LOAD directive can be used to examine the source code carried with modules on the CMSE library (xxx99 modules contain user documentation as part of their source). The COMPILE directive can be used to modify or create modules if running from a disk library.

RUNNING DEMOT DIAGNOSTICS

These two remaining command sequence examples show how binary modules may be executed.

Example 3:

Run DEMOT diagnostic from disk library.

Before this command sequence can be executed, the DEMOT executive and drivers must have been initialized using command buffer DEMOT. Initialization of the compiler as shown in example 1 is optional.

Command	Definition
ASSIGN CH=10,EQ=2,UN=3,DC=40	Assign the required channel, equipment number, unit number, and device type.
PARAM P0=100,P1=1234	Preset the required parameter registers.
SETSW SE,PL	Set control switches.
RUN T7X(00,15,21)	Run selected test modules. In this example, modules 00, 15, and 21 of diagnostic T7X are to be run in that order.

To run all modules of T7X, the last command is changed to read:

Command	Definition
RUN T7X	Run entire default diagnostic.

Example 4:

Run DEMOT diagnostic from tape library.

Before this command sequence can be executed, the DEMOT executive and drivers must have been initialized using command buffer DEMOT. Initialization of the compiler as shown in example 1 is optional.

Command	Definition
ASSIGN CH=10,EQ=2,UN=3,DC=40	Assign the required channel, equipment number, unit number, and device type.
PARAM P0=100,P1=1234	Preset the required parameter registers.
LOADCM T7X(00,15,21)	Load selected modules to central memory.
LOADCM s=xxxxxx	Load scratch file xxxxxx to central memory. This command is necessary only if the diagnostic to be run accesses scratch file data.
RUN T7X(00,15,21)	Run selected test modules. In this example, modules 00, 15, and 21 of diagnostic T7X are to be run in that order.

Example 5:

The following is the source code for a typical module written to execute on a 67X tape subsystem. This source code could be compiled into executable PP code by the DEMOT compiler and executed by the PP driver and 66X product overlay.

```
     MODULE T7X,67X(54)
/
/    THIS IS AN END-OF-FILE TEST FOR A 67X ATS.
/    THE TAPE IS REWOUND, 200 OCTAL TAPE MARKS WRITTEN,
/    AND THE PROCESS REPEATED FOR 10 OCTAL TIMES.
/    EOF STATUS IS TESTED AFTER EACH ENDFILE.
/    TERMINATE TESTING AFTER 50 OCTAL ERRORS.
/
10   FORMAT NO EOF ON LOOP *OCT RECORD *OCT,STATUS= *OCT
     EQUATE EOF TO 20
1    B1 = 0
     B3 = 0
2    B2 = 0
     RES P1
     REWIND
3    RES P1
     ENDFILE
     IF( SB(1) AND EOF EQ EOF) GOTO 4                IF NO ERROR
     MSG 10(B1,B2,SB(1)) TO LINE B3
     GOTO 4 WHILE (B3 + 1 NE 50)                     IF BUFFER NOT FULL
     PICTURE
     EXIT                                            TERMINATE ON 40 ERRORS
4    GOTO 3 WHILE (B2 + 1 NE 200)
     GOTO 2 WHILE (B1 + 1 NE 10)
     EXIT
     END 1
```

UTILITY PROGRAMS 6

Utility programs provide capabilities not covered under standard CMSE commands or tests.

There are two types of utilities. First are those that are part of CMSE. These utilities are usually overlays executed by a CMSE command. The other type are the stand-alone utilities, which may require a supporting system to perform their function, but are maintained as a separate program. These programs usually have their own user interface commands. Both types of utilities are described in this section.

CTI/MSL DISK AREA UTILITY (CAU)

CAU is a common test initialization (CTI) utility, which is used to store data in a CTI/MSL disk storage area (CDA).

HARDWARE REQUIREMENTS

The following equipment is necessary for the proper execution of CAU:

- Two peripheral processors.
- Four I/O channels (one channel each for disk, system console, PP- to PP-communications, and tape).
- One tape controller and unit.
- One disk controller and unit.
- One system console and controller.

All of this hardware and any associated controlware must be operational during CAU execution. All tape data must be in either I or SI format. CAU supports all equipment configurations supported by the NOS and NOS/BE operating systems.

SOFTWARE REQUIREMENTS

CAU loads and runs under CTI. Controlware must be loaded and running in any subsystem requiring controlware for normal operation.

RESTRICTIONS

This utility supports only I and SI formatted tapes as input. No tape output is performed.

All programs read from tape must contain a prefix (77) table and a load table.

The size of the CTI/MSL disk area is restricted to 1.1 megabytes. The following table indicates the disk cylinder numbers used for CDA.

Disk Type	Cylinders
834	806-813
836	695-697
844-21	402-406
844-4X	814-818
3330-1	402-406
3330-11	806-810
3350	554-556
885	838-839
895	877-881

LOADING PROCEDURES

CAU is called into operation by choosing the D option on the Manual Operations display. The following is the initial display presented by CAU. Entering a carriage return (CR) causes CAU to accept the displayed default value and proceed to the next selection request.

ENTER DISK CHANNEL - 01

Enter the two-digit octal channel number of the desired disk, if different from the default value, and follow it with a (CR). The following line is added to the display:

ENTER DISK UNIT - 00

Enter the two-digit octal unit number of the desired disk, if different from the default value, and follow it with a (CR). For an 834 disk, enter two octal digits designating the control module and unit, and follow them with a (CR). CAU connects to the specified disk and reads the initial status. If status indicates that the disk unit is reserved to another channel, the following message appears on the display:

DISK RESERVED.

CAU waits for the reserved status to clear before proceeding. After the reserved status clears, CAU performs a check of the general and detail status to determine the type of disk being used. If the disk is a fixed module drive (FMD), CAU checks for an active READ ONLY switch. If the switch is active, the following message appears on the display:

READ ONLY SELECTED.

CAU waits for the READ ONLY switch to clear before proceeding.

After the switch is cleared, CAU searches the disk for the presence of a CDA. If the CDA is found, CAU proceeds to the options display. If CDA is not found, the following display is presented:

```
NO SPACE RESERVED FOR CTI/MSL
DISK AREA. MSL/HVS OR OS FILES
MAY BE LOST IF THE OPERATION
CONTINUES. ENTER -BKSP- TO
SELECT A DIFFERENT DISK,
OR -CR- TO USE THE CURRENT DISK
```

If a backspace is entered, CAU returns to the initial display and requests a new disk selection. If a (CR) is entered, CAU continues using the currently selected disk and proceeds to the initial options display.

INFORMATIVE MESSAGES

The following informative messages, which may require further operator intervention may appear.

Message	Description
PROGRAM NOT ON TAPE - xxxx (CR) TO CONTINUE	Indicates that the program xxxx was not found on tape. The xxxx in the message is the four-character mnemonic of the binary program being searched for.
DISK RESERVED	The disk drive is reserved by another controller. An automatic retry is attempted and CAU will continue as soon as the reserved status is cleared.
DIRECTORY FULL	Indicates that the CDA is full and that no further programs or data may be added. No attempt is made by CAU to retry the operation which caused the message to appear.

ERROR MESSAGES

Following are the error messages for CAU.

Message	Description
INVALID ENTRY	Indicates that a character that is not a member of an accepted character set has been entered. Enter a valid character to clear the error.
TAPE STATUS ERROR STATUS = xxxx	Indicates that CAU has detected a tape status error during a tape operation. The xxxx in the message is the tape status word. Enter a (CR) to attempt an error recovery operation.
DISK STATUS ERROR STATUS = xxxx	Indicates that CAU has detected a disk status error during a disk operaton. The xxxx in the message is the disk status word. Enter a (CR) to attempt an error recovery operation.
DISK FUNCTION REJECT FUNCTION = xx	Indicates that the disk unit has rejected a function issued by CAU. The xx in the message is the function code that has been rejected. Enter a (CR) to attempt an error recovery operation.

INITIAL OPTIONS DISPLAY

The CAU initial options display is as follows:

REPLACE CTI/MSL DISK AREA MODULE

A-DEFAULT PARAMETER DECK

B-MICRO-CODE

C-ENVIRONMENT INTERFACE

D-SYSTEM CONSOLE DRIVER

E-MONITOR DISPLAY DRIVER

F-FAULT TOLERANCE MODULE

Y-DISPLAY CTI/MSL AREA CONTENTS

Z-INITIALIZE COMMON DISK AREA

The selection of a legal option character results in CAU proceeding to the proper option. The selection of an illegal option character results in the following message being added to the options display:

INVALID OPTION - n

where n is the illegal character entered.

NOTE

Refer to the CIP User's Handbook listed in the preface for additional information on the CAU initial options.

PAGES 6-6 THROUGH 6-12 HAVE BEEN DELETED

REAL-TIME DISPLAY AND TIMING CLOCK PROGRAM (CLK)

The real-time display and timing clock program (CLK) provides a digital real-time display that computes run times of diagnostic software and related hardware operations.

CLK samples the real-time clock channel about once every 45 milliseconds. After 1000 milliseconds elapse, the second counter increments. This same procedure is used for minutes and hours. After 24 hours, the clock returns to zero.

The time kept by CLK is inaccurate when PP memory is displayed. To ensure the correct time is kept when using CLK, the PP memory should not be displayed.

HARDWARE REQUIREMENTS

CLK requires the following hardware.

- One peripheral processor (PP).
- One real-time clock with a 4.096-millisecond clock period.
- Equipment required to load any diagnostic.

SOFTWARE REQUIREMENTS

This program executes under the maintenance system.

LOADING PROCEDURE

This program is called into PP xx as CLK under the maintenance system with the command

    LTxx,CLK,,p.

If the load parameter, p, is nonzero, an RTC test is run during initialization. If the load parameter is zero, no RTC test is run.

PARAMETERS AND DISPLAYS

If Thhmmss.(CR) is typed under the PP display, the time display is changed to:

    TIME. hh.mm.ss.

hh	Hours
mm	Minutes
ss	Seconds

If R.(CR) is typed under the PP display, the time will be reset to zero.

ERROR MESSAGES

ERROR-RTC NEVER GOES TO ZERO

RTC was never found to be zero.

ERROR-RTC EXP=xxxx REC=yyyy

RTC was expected to be xxxx, but was found to be yyyy.

DAYFILE AND MEMORY DUMP UTILITY (DMP)

The DMP routine permits dumping of the PPs, CM, and EM to a line printer without the need to deadstart the HDP routine. The DMP routine also dumps the dayfile. DMP operates under CMSE.

HARDWARE REQUIREMENTS

DMP requires the following hardware.

- One PP
- One 512 or 580 Line Printer
- One library loading device

SOFTWARE REQUIREMENTS

DMP loads and runs under CMSE. The line printer train image memory and the format control memory (if applicable) must be loaded correctly prior to executing any dumps using DMP.

LOADING PROCEDURES

The DMP routine is called into a PP using the following CMSE command:

```
LT,DMP,,ccee
```

cc Line printer channel number.

ee Line printer equipment number.

An auto snap feature of DMP is initiated using the following CMSE command:

```
CP,DMP,,ccee,n
RU,/,100
```

cc Line printer channel number.

ee Line printer equipment number.

n Dump to display.

  1 = A display
  2 = B display

PARAMETERS

All parameter entries are displayed. The parameters may be changed at the end of any dump.

MESSAGES

If a hang condition occurs because of a paper-out or not-ready condition, press the space bar to continue (after condition is corrected).

The following message appears while dumping CM:

DUMPING CENTRAL MEMORY

The following message appears while dumping PPxx:

DUMPING PPxx

The following message appears while dumping EM:

DUMPING EXTENDED MEMORY

The following message appears when PPxx is not communicating with the monitor. DMP requires a restart.

PPxx CANNOT BE DUMPED

The following message appears when the line printer is not ready. Check for a paper-out condition. After making the line printer ready, press the space bar to continue.

LP NOT READY

The following message occurs during a PFC load when a 6/8 line coincidence cannot be achieved after five single spaces of the line printer.

UNABLE TO GET COINCIDENCE - TYPE R

The following message occurs at the conclusion of a successful PFC memory load. After ensuring that the paper is at the top of the form, a space bar clears the message.

PFC LOADED - SET PAPER TO TOP OF FORM

The following message occurs during an image memory load when an illegal printer type was previously selected. After changing address 1012, a space bar clears the message.

ILLEGAL PRINTER TYPE - RESET 1012

The following message occurs during an image memory load when an illegal image type was previously selected. After changing address 1013, a space bar clears the message.

ILLEGAL TRAIN TYPE - RESET 1013

The following message appears at the beginning of a dump. The user selects the type of dump desired from the option listed.

```
TYPE PXX, PNXX OR PCXX FOR PP DUMP
    PN(NIO) OR PC(CIO) FOR 8K
FOR 176-PPU(1-15), PP(21-31,40-51)
FOR 17X-PP(1-11,20-31)
DUMP PP MUST BE IDLED
NO SYSTEM PP MAY BE DUMPED
TYPE A - TO DUMP A DISPLAY
TYPE B - TO DUMP B DISPLAY
TYPE CX,Y. TO DUMP CM X TO Y
TYPE CX,Y,Z. TO DUMP CM X TO Y,RA=Z
TYPE I - TO LOAD IMAGE MEMORY
TYPE L - TO LOAD PFC MEMORY (580)
TYPE D - TO END DMP
TYPE EX,Y. TO DUMP EM X TO Y
TYPE EX,Y,Z. TO DUMP EM X TO Y,RA=Z
TYPE F - TO DUMP DAYFILE
TYPE F,NAME - TO DUMP FILE NAME
TYPE R - TO RESTART
1002 = LP(CCEE)
1007 = LINES/INCH (10=8LPI, 11=6LPI)
1012 = PRINTER (0=501, 1=512, 2=580)
1013 = TRAIN (1, 2, 3, 4, 5 OR 6)
```

The following message appears during a dump of the dayfile:

```
DUMPING DAYFILE
```

The following message appears while dumping the A or B display:

```
DUMPING DISPLAY
```

The following message appears during a dump to describe the dump from the address defined by F-F to the address defined by L-L, relative to the address defined by R-R:

```
TYPE CF-F, L-L, R-R. TO DUMP F TO L RELATIVE TO R
```

PAGES 6-21 THROUGH 6-32 HAVE BEEN DELETED

TAPE-TO-DISK UTILITY (TDX)

The tape-to-disk utility (TDX) is a PP routine that enables the operator to build an 834, 836, 844, 885, or 895 disk library. TDX consists of two records: TDX and TDO. TDX is a disk driver that loads into PP1, and TDO is a tape driver that loads into PPO. TDX operates in manual mode or in automatic mode.

TDX is capable of performing the following operations in manual mode.

- Building MSL on disk from tape.
- Building a command buffer library on disk from tape.
- Adding or replacing programs and command buffers to MSL on disk.
- Copying programs and command buffers to tape from MSL on disk.
- Displaying MSL tables.

TDX operates in automatic mode when it is used to install the MSL portion of the CYBER Initialization Package (CIP) tape. In automatic mode, no user input is required throughout the installation as TDX is loaded and is supplied with preset tape, disk, and build type parameters.

TDX is capable of performing the following operations in automatic mode.

- Initial CIP tape installation.
- Update CIP tape installation.

For additional information about CIP automatic installation see the CIP User's Handbook.

HARDWARE REQUIREMENTS

TDX requires the following hardware for proper execution:

- Three active PPs.
- Five I/O channels (one each for disk, tape, display and two for PP communication).
- One tape controller and unit.
- One disk controller and unit.
- One system console and controller.

All pertinent hardware must be operational for TDX to complete a requested task. Either the tape drive or the disk pack containing the library may be used as a deadstart device.

SOFTWARE REQUIREMENTS

Disk subsystem controlware must be loaded and executing. If MTS is being used, MTS controlware must be executing. The library device must contain the TDX utility, and a tape containing MSL is required to build the disk library.

TDX expects a deadstart program to be already installed on the deadstart sector of the disk before MSL is installed to the disk. TDX does not install a deadstart program to the deadstart sector, but does modify the sector pointers. Installation of CTI to the disk is one way to install a deadstart program to the deadstart sector.

RESTRICTIONS

All command buffers to be copied from tape must contain either a (blank) dollar sign ($) 5553_8 or a double dollar sign ($$) 5353_8 as the first 12 bits of the tape record.

Command buffers must be in display code (6 bit) when written on tape.

Command buffers must not contain a prefix or load table.

LOADING PROCEDURES

TDX can be loaded by CMSE after calling MSL from the initial CTI display. When the initial MSL display appears, type in:

TDX(CR), or type B, then M, and then T from the Manual Operations display.

This loads the disk driver (TDX) into PP1 and the tape driver (TDO) into PP0. The tape driver then loads a third PP with a message driver and most of the messages used by TDX and TDO.

PARAMETER ENTRIES

All parameter entries are terminated by a carriage return (CR). The backspace key (BKSP) allows changing the previous entry.

The following is the initial display presented by TDX.

```
                TDX
DISK AND TAPE TRANSFER UTILITY
        CR TO CONTINUE
```

Enter a (CR). The following lines are added to the display:

```
ENTER PARAMETERS

DISK CHANNEL 01
```

Enter the proper disk channel, if different from the default value, and follow it with a (CR). Disk channel may be in range of 0-13 or 20-33. The following line is added to the display:

```
DISK UNIT 00
```

Enter the proper disk unit number (0-77), if different from the default value, and follow it with a (CR). The display clears and the following lines appear:

```
TAPE TYPE 00
0=60X, 1=65X, 2=66X, 3=63X/67X/698
```

Message	Description
DISK CONTROLLER TRANSFER ERROR xxxxxxx	Indicates TDX was unable to output or input the expected number of words to or from the disk controller, but that the general status indicates no errors. The xxxxxxx is the name of the program or command buffer being copied. Pressing the space bar causes TDX to retry the transfer.
INTER-PP DATA TRANSFER ERROR	Indicates the tape or disk driver is unable to output or input the expected number of words to or from the other driver. The xxxxxxx is the name of the current program or command buffer. A deadstart is required.
FORMATTING ERROR	An error occurred while formatting the MSL area on an 895 disk. A deadstart is required.

Enter the proper tape type (0-3), if different from the default value, and follow it with a (CR). The following line is added to the display:

    TAPE CHANNEL 13

Enter the proper tape channel (0-13, 20-33), if different from the default value, and follow it with a (CR). The following line is added to the display:

    TAPE EQUIPMENT 00

Enter the proper tape equipment number, if different from the default value, and follow it with a (CR). Tape equipment number may be in the range of 0-7 for 63X, 66X, and 67X tape drives and 4-7 for 60X and 65X tape drives. The following line is added to the display:

    TAPE UNIT 00

Enter the proper tape unit number (0-17), if different from the default value, and follow it with a (CR). If the selection entered previously for TAPE TYPE was 1 (65X), the following line is added to the display (otherwise, parameter entry is complete and TDX proceeds to the options display):

CAUTION

> Selecting the same unit number as the deadstart device unit number through a dual access controller using a different channel number is an illegal operation. This will cause TDX to hang.

    TAPE MODE (0=7 TRK, 1=9 TRK) 00

Enter the proper tape mode (0 or 1), if different from the default value, and follow it with a (CR). TDX proceeds to the options display. If an illegal parameter is entered for disk channel, tape channel, tape equipment, or tape unit (parameter does not fall within the specified ranges), TDX displays the message:

    ILLEGAL ENTRY

Entering a space bar returns TDX to the parameter display and allows re-entry of the parameter.

If an illegal parameter is entered for tape type and tape mode (parameter is outside the range displayed on the screen), TDX halts and does not continue until a valid command and carriage return are entered. After disk and tape parameters are entered, TDX attempts to connect to the tape drive. If connection to the unit is unsuccessful, TDX displays:

    TAPE UNIT NOT CONNECTED

Entry of a space bar causes TDX to reattempt to connect to the tape drive.

TDX OPTIONS DISPLAY

Following is the options display presented by TDX.

    A - BUILD MSL ON DISK FROM TAPE
    B - BUILD COMMAND BUFFER LIBRARY ON DISK
    C - ADD PROGRAMS TO DISK
    D - ADD COMMAND BUFFERS TO DISK
    E - COPY PROGRAMS TO TAPE
    F - COPY COMMAND BUFFERS TO TAPE
    G - DISPLAY MSL SYSTEM TABLES

Select the desired option and enter the corresponding letter [no (CR) is necessary]. TDX begins execution of the selected option.

TDX OPTIONS

The following paragraphs describe the options available on the TDX options display.

A - Build MSL on Disk from Tape

This option allows TDX to create an MSL area on disk and to transfer programs from an MSL tape to disk. TDX must first determine the type of MSL build to be performed. Following is the initial display presented by option A:

```
MSL INSTALLATION OPTION

F - FULL MSL/SHARING WITH OS
S - SHORT MSL/SHARING WITH OS
        (810, 815, 825, 830 ONLY)
M - MSL MAINTENANCE ONLY-
        NO OS INFORMATION ON DISK
```

Selection of option F allows TDX to initialize 20 megabytes of the deadstart disk and install all of MSL.

Selection of option S, for models 810, 815, 825, and 830 only, allows TDX to initialize 12 megabytes of the deadstart disk and install a predefined set of the most frequently used diagnostics.

Selection of option M allows TDX to initialize for program installation to a disk reserved for maintenance programs. Programs are installed to an operator-defined area of the disk. The following line is displayed for option M:

```
STARTING CYLINDER NUMBER 0000
```

You may choose and enter the desired starting cylinder number for the installation (in octal). Enter the desired value, if different from the default value, and follow it with a (CR). If the selected cylinder is large enough to hold the MSL installation, the following message is displayed:

```
SAVE COMMAND BUFFER AREA
Y=YES  N=NO
```

A Y or N must be entered [no (CR) is necessary]. If the response is Y, TDX initializes the program name table (PNT) and the sector reservation table (SRT) without destroying any command buffer information. If the response is N, TDX initializes PNT and SRT, and any command buffers previously written on the selected cylinder are lost. This feature allows the operator to install a new MSL over an old MSL without the necessity of reinstalling the command buffers also.

If the selected cylinder is not large enough to hold the MSL installation, the following message is displayed:

```
NOT ENOUGH ROOM FOR MSL
INSTALLATION. DEADSTART AND
SELECT A NEW CYLINDER NUMBER
```

As indicated, a deadstart is required to escape from this display.

On 895 disk subsystems, the specified MSL area is formatted in small records (322 words). For each of the three options, TDX checks the tracks on which the two tables (PNT and SRT) are to reside and verifies their usability. TDX deletes from the SRT any flawed sectors that are logged in the disk utility map and that lie within the available MSL area.

NOTE

An SRT and PNT are not built for command buffers if option A is selected and if the operator has specified that command buffers should be saved.

TDX allows the operator to specify the first and last programs to be transferred from tape. After creation of the program PNT and SRT, TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

You may specify the first program to be copied to disk by entering the name of the program and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first program it encounters.

After a response has been entered for the CTI message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may enter a (CR), which instructs TDX to copy to the last program on the tape, or you may enter the name of the final program to be copied (seven characters or less) and follow it with a (CR).

TDX copies programs from the tape to the disk as directed by the user. The programs copied include CTI, if CTI is on the tape being used.

For tape to disk copies on 844 and 885 disks, TDX has the ability to verify data written to disk. TDX presents the following display:

```
DATA VERIFY (Y/N)
```

Enter a Y or N character [no (CR) is necessary]. If a Y is entered, TDX transfers each block of data from the tape to the disk controller twice. The first transfer is accompanied by a write function, and the data is written to the disk. The second transfer is accompanied by a write verify function, and the data is checked bit for bit with the data written on the disk.

Entry of a N results in data being transferred from tape to disk without any write verification.

NOTE

> Use of the write verification feature doubles the time required to perform an MSL program or command buffer library build.

Following the response to the DATA VERIFY display, TDX executes the operation. For each program transferred, the program name is entered into the PNT and the reserved sectors are entered into the SRT. TDX skips over any command buffers located on the tape.

The name of each program copied to disk is displayed while the copy is in progress. The names of programs not copied to disk are not displayed.

Upon completion of the copy operation, TDX displays the number of cylinders used for the build, and the number of cylinders still available. Entering a space bar clears the message and allows TDX to display a reduced set of copy options that may be performed without a deadstart.

B - Build Command Buffer Library on Disk

This option allows TDX to create a command buffer area on an MSL disk. Following the selection of this option, TDX reads the starting disk cylinder for MSL from the deadstart sector. TDX creates a command buffer SRT and deletes from it flawed sectors that are logged in the disk utility map and that are within range of the command buffer area. TDX also creates a command buffer PNT.

TDX allows the operator to specify the first and last command buffers to be transferred from tape. After creating the command buffer SRT and PNT, TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

You may specify the first command buffer to be copied to disk by entering the name of the command buffer and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first program it encounters.

After a response has been entered for the COPY FROM message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may either enter a (CR), which instructs TDX to copy to the last command buffer on the tape, or may enter the name of the final command buffer to be copied (seven characters or less) and follow it with a (CR).

For tape to disk copies on 844 and 885 disks, TDX has the ability to verify data written to disk. TDX presents the following display:

    DATA VERIFY (Y/N)

Enter a Y or N character [no (CR) is necessary]. If a Y is entered, TDX transfers each block of data from the tape to the disk controller twice. The first transfer is accompanied by a write function, and the data is written to the disk. The second transfer is accompanied by a write verify function, and the data is checked bit for bit with the data written on the disk.

Entry of a N results in data being transferred from tape to disk without any write verification.

NOTE

Use of the write verification feature doubles the time required to perform and MSL program or command buffer library build.

Following the response to the DATA VERIFY display, TDX executes the operation. For each command buffer transferred, the name is entered into the command buffer PNT and the reserved sectors are entered into the command buffer SRT. TDX skips over any programs located on the tape.

The name of each command buffer copied to disk is displayed while the copy is in progress. The names of command buffers not copied to disk are not displayed.

Upon completion of the build, TDX displays the number of sectors used for the build and the number of sectors still available. Entering a space bar clears the message and allows TDX to display a reduced set of copy options that may be performed without a deadstart.

C - Add Programs to Disk

This option allows TDX to add programs to an MSL area already existing on disk. Following the selection of this option, TDX reads the starting disk cylinder for MSL from the deadstart sector and prepares to receive parameters.

TDX has the ability to check the MSL disk for duplicate names. TDX presents the following display:

    DUPLICATE NAME CHECK (Y/N)

Enter a Y or N character [no (CR) is necessary]. If Y is entered, TDX presents the following display:

    REPLACE DUPLICATE NAMES (Y/N)

Enter a Y or N character [no (CR) is necessary]. If Y is entered, then for each program transferred from tape, TDX searches the disk for an existing program with the same name, deletes the disk program if it exists, and copies the new program to disk.

NOTE

> Programs deleted or replaced on disk create empty slots in the PNT. These slots are filled by TDX when TDX runs out of room for names at the end of the PNT. Program names added to empty slots appear in the PNT interspersed throughout the program name display.

If N is entered for REPLACE DUPLICATE NAMES, TDX adds to the disk only those programs that do not already exist there.

If N is entered for DUPLICATE NAME CHECK, TDX adds all the specified programs to disk regardless of whether or not they already exist there.

TDX allows the operator to specify the first and last programs to be transferred from tape. After selection of the desired duplicate name options, TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

You may specify the first program to be copied to disk by entering the name of the program and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first program it encounters.

After a response has been entered for the COPY FROM message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may either enter a carriage return, which instructs TDX to copy to the last program on the tape, or may enter the name of the final program to be copied (seven characters or less) and follow it with a (CR).

Following the response to the COPY THRU display, TDX executes the operation as specified by the duplicate name parameter selections. For each program transferred, the name of the program is added to the program PNT and the reserved sectors are entered into the program SRT. Names of replaced programs are deleted from the program PNT.

The name of each program added to disk is displayed while the copy is in progress. The names of duplicate programs that are skipped over are not displayed. Following the completion of the operation, TDX displays a reduced set of copy options that may be performed without a deadstart.

D - Add Command Buffers to Disk

This option allows the operator to add command buffers to an MSL area already existing on disk. Following the selection of this option, TDX reads the starting disk cylinder from the deadstart sector and prepares to receive parameters.

TDX has the ability to check the MSL disk for duplicate names. TDX presents the following display:

DUPLICATE NAME CHECK (Y/N)

Enter a Y or N character [no (CR) is necessary]. If Y is entered, TDX presents the following display:

REPLACE DUPLICATE NAMES (Y/N)

Enter a Y or N character [no (CR) is necessary]. If Y is entered, then for each command buffer transferred from tape, TDX searches the disk for an existing command buffer with the same name, deletes the disk command buffer if it exists, and copies the new command buffer to disk.

NOTE

Command buffers deleted or replaced on disk create empty slots in the command buffer PNT. These slots are filled by TDX when TDX runs out of room for names at the end of the command buffer PNT. Command buffer names added to empty slots show up on the command buffer PNT interspersed throughout the other command buffer names.

If N is entered for REPLACE DUPLICATE NAMES, TDX adds to the disk only command buffers that do not already exist there.

If N is entered for DUPLICATE NAME CHECK, TDX adds all specifed command buffers to the disk regardless of whether they already exist there.

TDX allows the operator to specify the first and last command buffers to be transferred from tape. After selection of the desired duplicate name options, TDX presents the following display:

COPY FROM
-CR- = 1ST NAME

You may specify the first command buffer to be copied to disk by entering the name of the command buffer and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first command buffer it encounters.

After a response has been entered for the COPY FROM message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may either enter a (CR), which instructs TDX to copy to the last command buffer on the tape, or may enter the name of the final command buffer to be copied (seven characters or less) and follow it with a (CR).

Following the response to the COPY THRU display, TDX executes the operation as specified by the duplicate name parameter selections. For each command buffer transferred, the name is added to the command buffer PNT and reserved sectors are entered into the command buffer SRT. Names of replaced command buffers are deleted from the command buffer PNT.

The name of each command buffer added to disk is displayed while the copy is in progress. The names of duplicate command buffers that are skipped over are not displayed. Following completion of the operation, TDX displays a reduced set of copy options that may be performed without a deadstart.

E - Copy Programs to Tape

This option allows TDX to copy programs from an MSL disk to tape. Following selection of this option, TDX reads the starting cylinder for MSL from the disk deadstart sector and prepares to receive parameters.

TDX allows the operator to specify the first and last programs to be transferred to tape. Following initialization of the option, TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

You may specify the first program to be copied to tape by entering the name of the program and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first program listed in the program PNT.

NOTE

For disk-to-tape operations, disk programs are read in the order in which they appear in the program PNT.

After a response is entered for the COPY FROM message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may either enter a (CR), which instructs TDX to copy to the last name in the PNT, or may enter the name of the final program to be copied (seven characters or less) and follow it with a (CR).

TDX allows you to select the desired density for the disk-to-tape copy on all 66X/67X tape drives. If, however, you are using a 679 tape drive, you must first select which type of 679 drive is being used for the copy. TDX presents the following display:

```
679 TAPE OPTIONS
0 = 679-2,3,4, and 63X
1 = 679-5,6,7, and 698
```

NOTE

The 679-5,6,7 tape drives have group coded recording (GCR) capabilities.

TDX then presents one of the following displays, depending upon which type of 66X or 67X tape drive is being used.

```
667  TAPE DENSITY OPTIONS
0 = 556 NRZI
1 = 800 NRZI

669  TAPE DENSITY OPTIONS
0 = 800 NRZI
1 = 1600 PE

677  TAPE DENSITY OPTIONS
0 = 556 NRZI
1 = 800 NRZI

679  TAPE DENSITY OPTIONS
0 = 800 NRZI
1 = 1600 PE

679  TAPE DENSITY OPTIONS
0 = 1600 PE
1 = 6250 GCR
```

NOTE

If a 679-5,6,7 tape drive is cabled to a 67X controller that doesn't have GCR capabilities and you selected 6250 GCR recording mode, the following error message appears:

```
NO GCR CAPABILITY
```

If this message appears, reselect 1600 PE density.

TDX allows the operator either to create a new tape of MSL programs or add programs to an existing tape. TDX presents the following display:

```
IS DATA ON THE TAPE VALID (Y/N)
```

Enter a Y or N character [no (CR) is necessary]. If Y is entered, TDX searches the tape for a tapemark or a filemark which signals the end of valid data on tape. TDX backspaces over the filemark and prepares to write the first block of new data.

If N is entered, TDX returns to the beginning of the tape and prepares to write the first block of new data there. Data previously written on the tape is destroyed.

Following a response to IS DATA ON THE TAPE VALID message, TDX executes the operation. The name of each program copied to tape is displayed while the copy is in progress. At the completion of the operation, TDX displays a reduced set of copy options that may be performed without a deadstart.

F - Copy Command Buffers to Tape

This option allows TDX to copy command buffers from an MSL disk to tape. Following the selection of this option, TDX reads the starting cylinder for MSL from the disk deadstart sector and prepares to receive parameters.

TDX allows the operator to specify the first and last command buffers to be transferred to tape. Following initialization of this option, TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

You may specify the first command buffer to be copied to tape by entering the name of the command buffer and following it with a (CR). As the characters are entered, they appear on the display to the right of COPY FROM. Names are limited to seven characters. Any attempt to enter more than seven characters results in the additional characters successively replacing the seventh character in the name. Entering only a (CR) causes TDX to begin copying with the first command buffer listed in the command buffer PNT.

NOTE

For disk-to-tape operations, disk command buffers are read in the order in which they appear in the disk command buffer PNT.

After a response has been entered for the COPY FROM message, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

You may either enter a (CR), which instructs TDX to copy to the last name in the PNT, or may enter the name of the final program to be copied (seven characters or less) and follow it with a (CR).

TDX allows you to select the desired density for the disk-to-tape copy on all 66X/67X tape drives. If, however, you are using a 679 tape drive, you must first select which type of 679 drive is being used for the copy. TDX presents the following display:

```
679 TAPE OPTIONS
0 = 679-2,3,4
1 = 679-5,6,7
```

NOTE

The 679-5,6,7 tape drives have group coded recording (GCR) capabilities.

TDX then presents one of the following displays, depending upon which type of 66X or 67X tape drive is being used.

```
667  TAPE DENSITY OPTIONS
0 = 556 NRZI
1 = 800 NRZI

669  TAPE DENSITY OPTIONS
0 = 800 NRZI
1 = 1600 PE

677  TAPE DENSITY OPTIONS
0 = 556 NRZI
1 = 800 NRZI

679  TAPE DENSITY OPTIONS
0 = 800 NRZI
1 = 1600 PE

679  TAPE DENSITY OPTIONS
0 = 1600 PE
1 = 6250 GCR
```

NOTE

If a 679-5,6,7 tape drive is cabled to a 67X controller that doesn't have GCR capabilities and you selected 6250 GCR recording mode, the following error message appears:

```
NO GCR CAPABILITY
```

If this message appears, reselect 1600 PE density.

TDX allows the operator to either create a new tape of command buffers or add command buffers to an existing tape. TDX presents the following message:

IS DATA ON THE TAPE VALID (Y/N)

Enter a Y or N character [no (CR) is necessary]. If Y is entered, TDX searches the tape for a tapemark or filemark which signals the end of valid data on tape. TDX backspaces over the filemark and prepares to write the first block of new data.

If N is entered, TDX returns to the beginning of the tape and prepares to write the first block of new data there. Data previously written on the tape is destroyed.

Following a response to IS DATA ON THE TAPE VALID message, TDX executes the operation. The name of each command buffer copied to tape is displayed while the copy is in progress. At the completion of the operation, TDX displays a reduced set of copy options that may be performed without a deadstart.

G - Display MSL System Tables

This option causes TDX to display the program name tables (PNTs) and sector reservation tables (SRTs) for both programs and command buffers. Successive carriage returns are required to page through the SRT and PNT.

OPERATOR ENTRIES

During execution, TDX recognizes certain special keyboard entries and special restrictions for making those keyboard entries. The special restrictions are:

- If all possible responses to a TDX display are listed on that display (that is, Y/N), only those characters are acceptable. TDX ignores all other character entries.
- When TDX requests input of a numerical value, an octal value is expected and only octal digits are accepted.
- A (CR) is necessary to end the entry of all parameters that allow more than one character input. A (CR) must follow disk and tape parameter entries. Those displays that require only a single character entry execute immediately upon receiving a valid character.

Following are special characters recognized by TDX:

Character	Description
BACKSPACE	BACKSPACE moves the cursor one space to the left and may be used to re-enter a character for those entries that end with a carriage return. BACKSPACE is not recognized by entries requiring a single character.
SPACE BAR	SPACE BAR may be used to resume TDX execution following a halt for error display, information display, or user-requested halt.

Character	Description
S	The S key may be used to halt TDX during the transfer of programs or command buffers. TDX halts following the transfer of the current program. If TDX is resumed, it resumes at the point at which it was halted.
R	The R key may be used to restart TDX during the transfer of programs or command buffers. TDX finishes the current transfer, updates the PNT and SRT, and proceeds to the appropriate end-of-copy display.
G	The G key performs the G option (DISPLAY SYSTEM TABLES) presenting the PNT/SRT display. The G key is only valid during tape parameter entry or when it is listed as part of an options display. The G key allows the operator to debug disk problems before connecting to a valid tape drive.

INFORMATIVE MESSAGES

Following are messages presented by TDX during normal execution.

Message	Description
FORMATTING	This message applies to the 895 disk subsystem. It indicates that TDX is formatting the MSL area in small records (322 words per record).
INITIALIZING	Indicates that TDX is checking the starting cylinder for flaws, or is creating an SRT and PNT prior to installing programs or command buffers on the disk.
CYLINDERS USED THIS BUILD =	Indicates the octal value of the number of cylinders used to build the MSL program area.
CYLINDERS STILL AVAILABLE =	Indicates the octal value of the number of cylinders still available in the MSL program area.
SECTORS USED THIS BUILD =	Indicates the octal value of the number of sectors used to build the command buffer area.
SECTORS STILL AVAILABLE =	Indicates the octal value of the number of sectors still available in the command buffer area.
HALTED xxxxxxx	This message indicates that an S key has been entered which has halted execution of TDX. The xxxxxxx in this message is the name of the last program or command buffer copied by TDX. Entering a space bar clears this message and causes TDX to resume execution at the point where it was halted.
INSTALLATION COMPLETE DEADSTART IS REQUIRED	Indicates TDX has completed a disk build for automatic CIP tape installation. Deadstart to continue.

ERROR MESSAGES

Following are the error messages presented by TDX.

Message	Description
ILLEGAL BUILD SELECTION OS FILES COULD BE DESTROYED	Indicates the build option selected could cause operating system files to be destroyed because space previously allocated to the operating system is being used. Choose an installation mode that will not destroy operating system files or deadstart and release the disk space using CTI.
ILLEGAL ENTRY	The user entered an illegal parameter during parameter entry. Press the space bar to return to the parameter display and re-enter the parameter.
UNUSABLE DISK	Indicates that the default starting cylinder for a HIVS installation is faulty. The operator must deadstart and perform the installation to a different device.
MSL STARTING CYLINDER UNUSABLE	Indicates that the starting cylinder and the two succeeding cylinders are unsuitable for a maintenance-only installation. A deadstart is required to reattempt the installation at another cylinder.
MSL STARTING CYLINDER UNUSABLE ENTER -CR- TO USE ALTERNATE CYLINDER yyyy OR RELOAD TDX AND SELECT A NEW CYLINDER	Indicates that the starting cylinder is unusable, although one of the two succeeding cylinders is suitable for the operation. The yyyy is the cylinder which TDX has found to be suitable. Entering a (CR) allows TDX to prepare cylinder yyyy for the operation. Entering any other character allows TDX to request another starting cylinder.
IMPOSSIBLE TO INSTALL PROGRAMS AND SAVE COMMAND BUFFER AREA	The operator is saving a command buffer library at cylinder xxxxxxx. TDX does not examine the two succeeding cylinders to find a suitable starting cylinder. A deadstart is required.
xxxxxxx NOT FOUND	Indicates that TDX has not been able to locate a program or command buffer for which it has been searching. The xxxxxxx in this message is the name being searched for. In the case of a tape-to-disk copy, the TDX search is initiated by a COPY FROM request. In the case of a disk-to-tape copy, the TDX search may be initiated by either a COPY FROM or COPY THRU request. For a COPY THRU request, TDX begins the search with the program entered for the COPY FROM message. Entering a space bar returns TDX to the copy message that contains the unknown name.
xxxxxxx NO TAPE WRITE RING	Indicates that a disk-to-tape copy is being attempted and that no write ring is being detected on the tape. You may, upon seeing the NO TAPE WRITE RING message, unload and dismount the tape, insert a write ring into the tape hub, and mount and reload the tape. When you enter a space bar, the tape is positioned at the beginning of tape and the copy proceeds. The xxxxxxx is the name of the program or command buffer that TDX was working with.

Message	Description
xxxxxxx TAPE FUNC REJ yyyy	Indicates that a function sent to the tape drive or data channel converter (60X or 65X) has not been accepted. The xxxxxxx in this message is the name of the program or command buffer that TDX was working with when the error occurred, and the yyyy is the octal value of the function code that was rejected. TDX tries the operation three times (including timeouts) before displaying the message. A space bar allows TDX to retry the operation.
xxxxxxx DCC ERR STAT yyyy	Indicates that the status received from the data channel converter for a tape drive (60X or 65X) shows that an error condition exists. The xxxxxxx in this message is the name of the program or command buffer that TDX was working with when the error occurred, and yyyy is the octal status word. Entering a space bar allows TDX to request the current status word.
xxxxxxx TAPE ERR STAT yyyy	Indicates that the status received from the tape drive shows that an error condition exists. The xxxxxxx in this message is the name of the program or command buffer that TDX was working with when the error occurred, and yyyy is the octal status word. Entering a space bar allows TDX to attempt to continue the operation, though the result may not be reliable.
xxxxxxx TAPE UNIT NOT READY	Indicates that the status received from the tape drive shows that the unit is not ready. The xxxxxxx is the name of the program or command buffer that TDX was working with. Correct the not ready condition without moving the tape and press the space bar to continue.
xxxxxxx NAME TOO LONG	Indicates that TDX has detected a program or command buffer name on tape that contains more than seven characters. The xxxxxxx in the message is the first seven characters of the name that is too long. Entering a space bar will allow TDX to skip to the next program or command buffer and continue the operation.
xxxxxxx COMMAND TOO LONG	Indicates that during a tape-to-disk copy, TDX has encountered a command to be placed on disk that is greater than 60 (decimal) characters long. The xxxxxxx in the message is the name of the program or command buffer where the faulty command was found. Entering a space bar allows TDX to truncate the command to 60 (decimal) characters and continue the operation.
xxxxxxx NOT COPIED - END OF TAPE	Indicates TDX encountered the end of tape while writing program xxxxxxx in a disk to tape copy. TDX backspaced the tape and wrote end of information and file markes to the tape before displaying the message. A deadstart is required.
DISK BUSY	Indicates that the disk general status has responded busy to 10000 (octal) attempts by TDX to perform a seek to read or write. Entry of a space bar allows TDX to continue the read or write attempt.

Message	Description
DISK CONTROLLER RESERVED	Indicates that the disk controller general status shows the multiple access disk controller continues to be reserved to another PP channel following 20 (decimal) attempts to connect to the unit. TDX continues to display the message and attempt the connect until successful or until a deadstart is performed.
DISK UNIT RESERVED	Indicates that the disk general status shows that the disk remains reserved to another controller following 20 (decimal) attempts to connect to the disk. TDX continues to display the message and attempt the connect until successful or until a deadstart is performed.
DISK FUNC REJ yyyy xxxxxxx	Indicates that a function sent to the disk controller has been rejected. The xxxxxxx in this message is the name of the program or command buffer that TDX was working with when the error occurred, and the yyyy is the octal value of the function code that was rejected. Entering a space bar allows TDX to retry the operation.
DISK ERR STAT yyyy xxxxxxx	Indicates that the status received from the disk drive shows that an error condition exists. The xxxxxxx in the message is the name of the program or command buffer that TDX was working with when the error occurred, and yyyy is the octal status word. Entering a space bar allows TDX to continue the operation, though the result may not be reliable.
PNT FULL xxxxxxx	Indicates that the disk PNT is full. The xxxxxxx in the message is the name of the program or command buffer that filled the PNT. A deadstart is required to clear this message.
SRT FULL xxxxxxx	Indicates that the disk SRT has reserved the entire available area on the disk. The xxxxxxx in this message is the name of the program or command buffer that filled the disk. A deadstart is required to clear this message.
FLAW CYL xxxx TRK yyyy SEC zzzz	Indicates that TDX has failed in four consecutive attempts to write data to a disk sector. The values in the message are the cylinder (xxxx), track (yyyy), and the sector (zzzz), which may not be written in. Entering a space bar allows TDX to continue the copy with another sector. The bit of the flawed sector remains set in the SRT to ensure that TDX will not attempt to use the bad sector again.
COPY ERROR xxxxxxx	Indicates that during a copy operation, the program or command buffer xxxxxxx could not be copied successfully. Entry of a space bar allows TDX to skip to the next program or command buffer and resume copying.
DEADSTART SECTOR ERROR	Indicates TDX was unable to read or write the deadstart sector. A deadstart is required.

HARDWARE INITIALIZATION AND VERIFICATION SOFTWARE TAPE-TO-DISK UTILITY (HIVS TDX)

The hardware initialization and verification software (HIVS) version of TDX allows the operator to build a HIVS library on disk.

HARDWARE REQUIREMENTS

The HIVS version of TDX requires the following hardware for proper execution:

- Three peripheral processors.
- Five I/O channels (one each for disk, tape, and display, and two for PP communication).
- One tape controller and unit.
- One disk controller and unit.
- One system console and controller.

All pertinent hardware must be operational for the HIVS version of TDX to complete a requested task. Either the tape drive or the disk pack containing the library may be used as a deadstart device.

SOFTWARE REQUIREMENTS

Disk subsystem controlware must be loaded and executing. If MTS is being used, MTS controlware must be executing. The library device must contain the HIVS version of the TDX utility, and a tape containing HIVS is required to build the disk library.

TDX expects a deadstart program to be already installed on the deadstart sector of the disk before MSL is installed to the disk. TDX does not install a deadstart program to the deadstart sector, but does modify the sector pointers. Installation of CTI to the disk is one way to install a deadstart program to the deadstart sector.

LOADING PROCEDURES

HIVS TDX is called into operation by choosing the T option on the CTI Manual Operations display, or by selecting M and then TDX (CR).

PARAMETER ENTRIES

Following is the initial display presented by the HIVS version of TDX.

ENTER PARAMETERS

DISK CHANNEL 01

Enter the proper disk channel, if different from the default value, and follow it with a (CR). The following line is added to the display:

DISK UNIT 00

Enter the proper disk unit number, if different from the default value, and follow it with a (CR). The display clears and the following lines appear:

TAPE TYPE 00
0=60X, 1=65X, 2=66X, 3=63X/67X

Enter the proper tape type, if different from the default value, and follow it with a (CR). The following line is added to the display:

TAPE CHANNEL 13

Enter the proper tape channel, if different from the default value, and follow it with a (CR). The following line is added to the display:

TAPE EQUIPMENT 00

Enter the proper tape equipment number, if different from the default value, and follow it with a (CR). The following line is added to the display:

TAPE UNIT 00

Enter the proper tape unit number, if different from the default value, and follow it with a (CR). If the selection entered previously for TAPE TYPE was 1 (65X), the following line is added to the display (otherwise, parameter entry is complete and the HIVS version of TDX proceeds to the options display):

TAPE MODE (0=7 TRK, 1=9 TRK)

Enter the proper tape mode, if different from the default value, and follow it with a (CR). The HIVS version of TDX presents the following message as it prepares the disk for the HIVS transfer:

INITIALIZING

Immediately following completion of the initialization process, the HIVS version of TDX begins the transfer of HIVS programs from tape to disk. The following message is presented while the copy is in process:

LOADING

If CTI exists on the tape with the HIVS library, the HIVS version of TDX automatically skips over CTI and copies only the HIVS programs. When the copy is complete, the HIVS version of TDX displays the following message:

INSTALLATION COMPLETE
DEADSTART IS REQUIRED

SPECIAL KEYBOARD ENTRIES

During execution, the HIVS version of TDX recognizes certain special keyboard entries and special restrictions for making those entries. The special restrictions are:

- When the HIVS version of TDX requests input of a numerical value, an octal value is expected and only octal digits are accepted.
- A carriage return (CR) must follow disk and tape parameter entries.

Following are special characters recognized by the HIVS version of TDX:

Character	Description
Backspace	Backspace moves the cursor one space to the left and may be used to re-enter a character for those entries that end with a carriage return.
Space bar	Space bar may be used to resume the HIVS version of TDX execution following a halt for error display or user requested halt.
S	The S key may be used to halt the HIVS version of TDX during the transfer of HIVS programs. HIVS TDX halts following the transfer of the current program. If HIVS TDX is resumed, it resumes at the point at that it was halted.
R	The R key may be used to restart the HIVS version of TDX during the transfer of programs. HIVS TDX finishes the current transfer and proceeds to the END display.

ERROR MESSAGES

Following are the error messages presented by the HIVS version of TDX.

Message	Description
UNUSABLE DISK	Indicates that the default starting cylinder for a HIVS installation is faulty. You must deadstart and perform the installation to a different device.
TAPE FUNC REJ yyyy	Indicates that a function sent to the tape drive or data channel converter (60X or 65X) has not been accepted. The yyyy in the message is the octal value of the function code that was rejected. The HIVS version of TDX tries the operation three times (including timeouts) before displaying the message. A space bar allows HIVS TDX to retry the operation.
DCC ERR STAT yyyy	Indicates that the status received from the data channel converter for a tape drive (60X or 65X) shows that an error condition exists. The yyyy in the message is the octal status word. Entering a space bar allows the HIVS version of TDX to request the current status word.

Message	Description
TAPE ERR STAT yyyy	Indicates that the status received from the tape drive shows that an error condition exists. The yyyy in the message is the octal status word. Entering a space bar allows the HIVS version of TDX to attempt to continue the operation, though the result may not be reliable.
DISK BUSY	Indicates that the disk general status has responded busy to 10000 (octal) attempts by the HIVS version of TDX to perform a seek to read or write. Entry of a space bar allows HIVS TDX to continue the read or write attempt.
DISK CONTROLLER RESERVED	Indicates that the disk controller general status shows the multiple access disk controller is reserved to another PP channel following 20 (decimal) attempts to connect to the unit. The HIVS version of TDX continues to display the message and attempt the connect until successful or until a deadstart is performed.
DISK UNIT RESERVED	Indicates that the disk general status shows that the disk is reserved to another controller following 20 (decimal) attempts to connect to the disk. The HIVS version of TDX continues to display the message and attempt the connect until successful or until a deadstart is performed.
DISK FUNC REJ yyyy	Indicates that a function sent to the disk controller has been rejected. The yyyy in the message is the octal value of the function code that was rejected. Entering a space bar allows the HIVS version of TDX to retry the operation.
DISK ERR STAT yyyy	Indicates that the status received from the disk drive shows that an error condition exists. The yyyy in the message is the octal status word. Entering a space bar allows the HIVS version of TDX to continue the operation, though the result may not be reliable.
PNT FULL	Indicates that the disk PNT is full. A deadstart is required to clear this message.
SRT FULL	Indicates that the disk SRT has reserved the entire available area on the disk. A deadstart is required to clear this message.
FLAW CYL xxxx TRK yyyy SEC zzzz	Indicates that the HIVS version of TDX has failed in four consecutive attempts to write data to a disk sector. The values in the message are the cylinder (xxxx), track (yyyy), and the sector (zzzz), which may not be written in. Entering a space bar allows HIVS TDX to continue the copy with another sector. The bit of the flawed sector remains set in the SRT to ensure that HIVS TDX will not attempt to use the bad sector again.

HEXADECIMAL DUMP-TO-PRINTER UTILITY (HDP)

The hexadecimal dump-to-printer utility (HDP) is a stand-alone utility program that enables deadstart dumps of PP memories, CM, register files, IOU registers, CM registers, CP (central processor) registers, CST (control store) buffers, and PEM (physical environment monitor) registers. HDP also allows more than one dump per deadstart. Dump printouts are supported on either a 512 or a 580 line printer.

HARDWARE REQUIREMENTS

HDP runs on models 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, or 990 with a display console and controller. Printout capability is supported on a 512 line printer and the 580-12, 580-16, 580-20, 580-120, 580-160, or 580-200; and print array cartridges 596-1, 596-2, 596-3, 596-4, 596-5, and 596-6.

SOFTWARE REQUIREMENTS

HDP loads and runs under CTI. Controlware must be loaded and running in any subsystem requiring controlware for normal operation.

RESTRICTIONS

HDP is capable of off-line execution only and is not restricted to one line printer initialization per run.

LOADING PROCEDURE

HDP is called into operation by choosing the P option on the CTI utilities display.

HDP INITIAL OPTIONS DISPLAY

The initial options display is presented by HDP upon initial execution and again whenever a selected option completes execution.

```
  A - 512 PRINTER INITIALIZE
  B - 580 PRINTER INITIALIZE
  C - PP MEMORY DUMP
  D - CM DUMP
  E - PAGE MAP DUMP IN HEX
  F - SEGMENT MAP DUMP IN HEX
  G - CACHE DUMP IN HEX
  H - PP MEMORY DUMP IN HEX
  I - CENTRAL MEMORY DUMP IN HEX
  J - REGISTER FILE DUMP IN HEX
 +J - ERROR TAG MEMORY DUMP IN HEX
  K - IOU REGISTER DUMP IN HEX
  L - CM REGISTER DUMP IN HEX
  M - CPU REGISTER DUMP IN HEX
  N - CONTROL STORE DUMP IN HEX
 +N - REGISTER UNIT DUMP IN HEX
  O - PEM REGISTER DUMP IN HEX
 +P - IBS DUMP
 +Q - ACU DUMP IN HEX
 +R - BDP DUMP IN HEX
 +S - EPN DUMP IN HEX
 +T - CONTROL STORE DUMP IN HEX
 +U - CONTROL WORD DUMP IN HEX
 +V - MAPPING MEMORY DUMP IN HEX
 +W - LSU DUMP IN HEX
++Z - CHANNEL STATUS DUMP

  + Available for model 990 only.
 ++ Available for I4 IOU only.
```

HDP OPTIONS

The following paragraphs describe the options offered on the HDP initial options display.

A - 512 Printer Initialize

This option initializes the 512 printer image with the data necessary to print with a 512-1 print train. The first display presented following the selection of this option is:

```
PRINTER CH = 12
```

Enter the desired printer channel number, if different from the default value, and follow it with a carriage return (CR).

After the printer channel number is entered, the following line appears below the channel display:

```
PRINTER EQ = 5
```

Enter the correct equipment number for the line printer, if different from the default value, and follow it with a (CR). This step initializes the 512 printer buffer memory.

B - 580 Printer Initialize

This option initializes the 580 printer buffer image and format buffer image memories. The first display presented following the selection of this option is:

```
PRINTER CH = 12
```

Enter the desired printer channel number, if different from the default value, and follow it with a (CR). The following line appears below the channel display:

```
PRINTER EQ = 5
```

Enter the correct equipment number for the line printer, if different from the default value, and follow it with a (CR). The following message appears:

```
1 = 596-1
2 = 596-2
3 = 596-3
4 = 596-4
5 = 596-5
6 = 596-6
TRAIN SELECT = 5
```

Enter the correct printer train number, if different from the default value, and follow it with a (CR). The following message appears:

```
SET FORMAT BUFFER Y OR N
        Y = YES
        N = NO

     (DEFAULT = Y)
```

Enter the desired option, if different from the default value, and follow it with a (CR). If the Y option is selected, the 580 print buffer and format buffer memories are both initialized. If the N option is selected, only the print buffer memory is initialized.

C - PP Memory Dump

This option provides an octal dump to printer of 12-bit PP memories and 16-bit PP memories with their associated R registers. The first display following the selection of this option is:

PP NO =

Enter the desired PP number or the character A and follow it with a (CR). The A character will initiate the printer dump of all PPs except PP 0.

D - CM Dump

This option provides an octal dump to printer of a selected area of central memory. The first display presented following the selection of this option is:

START ADRS =

Enter the desired starting address for the printer dump and follow it with a (CR). The following message appears:

END ADRS =

Enter the desired concluding address for the printer dump and follow it with a (CR). This initiates the octal dump of central memory between the specified addresses.

E - Page Map Dump in Hex

This option provides a hexadecimal dump to the printer of the CPU page map contents. The following message appears.

CPU=

Enter the desired CPU number and follow it with a (CR).

F - Segment Map Dump in Hex

This option provides a hexadecimal dump to the printer of the CPU segment map contents. The following message appears.

CPU=

Enter the desired CPU number and follow it with a (CR).

G - Cache Dump in Hex

This option provides a hexidecimal dump to printer of the CPU cache contents. The following message appears.

CPU =

Enter the desired CPU number and follow it with a (CR).

H - PP Memory Dump in Hex

This option provides a hexadecimal dump to the printer of the PP memories. The actions required for option H are the same as for option C.

I - CM Dump in Hex

This option provides a hexadecimal dump to the printer of a selected area of central memory. The first display presented following the selection of this option is:

```
SELECT ADDRESS MODE
   H = HEX ADRS
   B = BYTE ADRS
```

Enter either H for hexadecimal address entry mode or B for byte address entry mode, followed by a carriage return. If you select byte address entry mode, the program converts the address to a hexadecimal word address and dumps memory in hexadecimal word mode. The following message appears:

```
START ADRS =
```

The actions required for subsequent messages are the same as for option D.

J - Register File Dump in Hex

This option provides a hexadecimal dump to the printer of the CPU register file contents. The following message appears.

```
CPU =
```

Enter the desired CPU number and follow it with a (CR).

J - Error Tag Memory Dump in Hex

This option provides a hexidecimal dump to the printer of the CPU error tag memory contents. The following message appears.

```
CPU=
```

Enter the desired CPU number and follow it with a (CR).

K - IOU Register Dump in Hex

This option provides a hexadecimal dump to the printer of the IOU maintenance register contents. No additional action is required.

L - CM Register Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the central memory maintenance registers. No additional action is required.

M - CPU Register Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU maintenance registers. The following message appears.

CPU =

Enter the desired CPU number and follow it with a (CR).

If microcode is not executing, the program dumps only the hardware maintenance registers, and in place of the software registers the following message appears on the printer dump.

MICROCODE HUNG

N - Control Store Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of control store. The following message appears.

CPU =

Enter the desired CPU number and follow it with a (CR).

N - Register Unit Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU register unit. The following message appears.

CPU=

Enter the desired CPU number and follow it with a (CR).

O - PEM Register Dump in Hex

This option provides a hexadecimal dump of the contents of the PEM registers. No additional action is required. If you select this option but PEM registers are not present on the system, the HDP options display returns to the screen.

P - IBS Dump

This option provides a hexadecimal dump to the printer of the contents of the CPU IBS.

Q - ACU Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU ACU control memory.

R - BDP Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU BDP control memory.

S - EPN Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU EPN control memory.

T - Control Store Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of control store followed by a dump of shadow memory, if available. Respond to the message CPU NO = by entering the number of the CPU for which control store is to be dumped.

U - Control Word Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU control word.

V - Mapping Memory Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU mapping memory control memory.

W - LSU Dump in Hex

This option provides a hexadecimal dump to the printer of the contents of the CPU LSU control memory.

Z - Channel Status Dump

This option dumps the status of Parity Error Disable, Active, Full, Channel Flag, and Channel Error for NIO subsystem channels 00 through 31B and CIO subsystem channels 00 through 11B. A 0 in the resulting output indicates the corresponding status flag is clear and a 1 indicates the status flag is set.

ERROR MESSAGES

The following error messages may be displayed during HDP execution:

Message	Description
PRINTER NOT READY	Indicates that the printer is not ready to accept HDP output. When the condition clears, the message is erased from the display and HDP execution continues automatically.
PRINTER BUSY	Indicates that the printer is busy. When the condition clears, the message is erased from the display and HDP execution continues automatically.
FUNCTION TIMEOUT, (CR) TO RETRY	Indicates that a function issued to the printer has not been accepted. Enter a (CR) to retransmit the function.
INVALID ENTRY	Indicates that a character that is not a member of an accepted character set has been entered. Enter a valid character to clear the error.
PP UNAVAILABLE, (CR) TO RE-ENTER	Indicates that the PP chosen for the PP memory dump option logically does not exist. Enter a (CR) and reenter the desired PP number.

Message	Description
PP HUNG, (CR) TO RETRY	Indicates that communication has been lost with the PP performing the memory dump to printer. Enter a (CR) to attempt to re-establish communication.
ELEMENT NOT ACCESSIBLE	Indicates that HDP is unable to access central memory, CPU, register files, or maintenance registers as required by the option.
CM UNAVAILABLE, (CR) TO RE-ENTER	Indicates that an address entered during a CM memory dump option is greater than the central memory size. Enter a (CR) and re-enter the address.
INVALID SELECTION, (CR) TO RETRY	Indicates that the start address is larger than the end address for a CM memory dump option. Enter a (CR) and reenter the two addresses.

DISK FORMAT UTILITY (DFU)

The Disk Format Utility is a generic utility for the intelligent peripheral family of disk products. Its primary purpose is to restore the disk to its original, factory, error-free conditions. DFU is not a media management program. It does not provide features for flawing data fields or updating flaw tables.

DFU is written in the MALET Low Level Language. Refer to the CML Reference Manual, listed in the preface, for a complete description of the compilation procedure.

The modules supporting the 7165/895 Disk Storage Subsystem provide the customer engineer with the capability to rewrite home addresses and to write the track descriptor record.

The 834/836 ISD section is a subsystem maintenance package designed to aid the user in formatting the intelligent small disk subsystem.

HARDWARE

DFU supports the following equipment:

- 7165/895 Disk Storage Subsystem
- 834/836 Intelligent Small Disk Subsystem (ISD)

RESTRICTIONS

DFU requires the following peripheral microcode to be loaded prior to execution:

Equipment	Microcode
895	MA464-D02
834/836	MA462-D02 (adapter)
	COS-6 (control module)

DFU is not intended for initial formatting of the disk.

DFU requires that the disk subsystem be fully operational.

METHOD

DFU performs its formatting operation by issuing functions to the subsystem peripheral microcode. These function codes reach the subsystem only after interfacing through DEMOT and CMSE respectively. The actual formatting is performed by the microcode within the subsystem. As a result, DFU is not capable of stopping the operation, once started.

RUNNING PROCEDURE

DFU follows the standard DEMOT test execution procedure of *RUN,DFUxx*, where xx = module number.

DFU is organized into modules. Each module performs a single task, and calls any submodules as they are required. Each module is a complete and separate function. Execution does not continue from one main module to the next, as not all the modules support the same equipment.

PARAMETERS

There are no parameters for the 895.

834/836 Parameters:

Parameter	Description
P7 $0CCC_8$	Cylinder number (octal) for the 834/836 reallocate sector module (DFU11) and reformat a single cylinder module (DFU17).
P8 $00TT_8$	Track number (octal) for the reallocate sector module (DFU11).
P9 $00SS_8$	Sector number (octal) for the reallocate sector module (DFU11).

CAPTURE BUFFER DUMP UTILITY (CBD)

CBD is a capture vehicle formatting program for model 990 only. The 512-word capture buffer is moved to central memory and then formatted and printed. CBD also provides a means of loading PFC memory and image memory.

HARDWARE REQUIREMENTS

CBD requires the following hardware:

- One PP.
- One 512 or 580 line printer.
- One library loading device.
- A 512-word block of central memory.
- One model 990 CPU.

SOFTWARE REQUIREMENTS

CBD loads and runs under CMSE. CBD uses the move capture buffer (MX) command.

LOADING PROCEDURE AND PARAMETERS

CBD is loaded into a PP using either the LT or CP command.

```
LT,CBD,,ccee,cmup,cmlo,auto,ident,sadr,eadr
```

ccee	Channel and equipment of the line printer.
cmup	Upper half of CM address to use.
cmlo	Lower half of CM address to use.
auto	Allows automatic selection of operation: 1 = Load PFC memory (580 only). 2 = Load image memory. 4 = Dump capture buffer. 10 = Omit page headings after first page. If 1, 2, or 4 is not present, a parameter stop occurs.
ident	A hexadecimal value that is printed as a dump identifier.
sadr	Starting capture buffer address to be printed.
eadr	Ending capture buffer +1 address to be printed (zero prints to entry 512).

eadr   Ending capture buffer +1 address to be printed (zero prints to entry 512).

CAUTION

If the ccee parameter is present, all remaining parameters must be supplied or they are taken as zero values.

The LT command cannot be used to change parameters MCP12 (printer type) or MCP13 (train type). The following load sequence can be used if these parameters require change.

Command	Parameter Default Values	
DPN		
CPn,CBD		
PPn		
EPn,1002,ccee	1205	
EPn,1003,cmup	737	Upper block of 16 MB but below
EPn,1004,cmlo	7000	CMSE communication area.
EPn,1005,auto	0000	Parameter stop occurs.
EPn,1006,ident	0000	
EPn,1007,sadr	0000	All 512 entries to be
EPn,1010,eadr	0000	printed.
EPn,1012,printer	2	580
EPn,1013,train	6	
RUn,100		

INITIAL DISPLAY

If no auto operation bits are set in MCP5, the following display appears.

```
CAPTURE BUFFER DUMP UTILITY
(NEEDS 512 WORD BLOCK OF CM)

TYPE C - TO DUMP CAPTURE BUFFER
TYPE I - TO LOAD IMAGE MEMORY
TYPE L - TO LOAD PFC MEMORY
TYPE D - TO END CBD
TYPE R - TO RESTART
1002 = LP(CCEE)
1003 = FWA OF 512 WORD CM (UPPER)
1004 = FWA OF 512 WORD CM (LOWER)
1005 = AUTO CONT. BITS (1=LOAD PFC,
       2=LOAD IMAGE, 4=DUMP CAP BUF,
       10=OMIT PAGE HEADING REPEAT)
1006 = CAPTURE BUFFER IDENT. (HEX)
1007 = CAPTURE BUF START ADRS. (HEX)
1010 = CAPTURE BUF END ADRS. (HEX)
1011 = LINES/INCH (10=8LPI, 11=6LPI)
1012 = PRINTER (1=512, 2=580)
1013 = TRAIN   (1, 2, 3, 4, 5, OR 6)
```

ERROR MESSAGES

The following message appears while dumping the capture buffer.

DUMPING CAPTURE BUFFER

The following message appears when the line printer is not ready. Check for a paper-out condition. After making the line printer ready, press the space bar to continue.

LP NOT READY

The following message appears during a PFC load when a 6/8 line coincidence cannot be achieved after five single spaces of the line printer.

UNABLE TO GET COINCIDENCE - TYPE R

The following message appears during an image memory load when an illegal printer type was previously selected. After changing address 1012, a space bar clears the message.

ILLEGAL PRINTER TYPE - RESET 1012

The following message occurs during an image memory load when an illegal image type was previously selected. After changing address 1013, a space bar clears the message.

ILLEGAL TRAIN TYPE - RESET 1013

CAPTURE BUFFER DUMP FORMAT

The following is a sample of the printed output.

```
CAPTURE VEHICLE FORMATTED DUMP - IDENTIFIER = 0000

                              ABRTOC          ALLCLR
                              VECVLD          LSUENA
       ISSUED                 VECACT          LSUENX
       CIRVLD         CREQUA  SEGTRD  RESPOA  RPLENA         LSULPT
       CWDVLD         CREQOB  PAGTRD  RESPOB  RPLENX  RPLVLD LSUVLD ACUVLD         ISSTRD
ADR    CWAVLD CSADDR  CREQOC  CACHIT  RESPOC  FCTNGO  RPLTAG LSUTAG ACUTAG ENTCTR EPSTRT PRTISS
-----------------------------------------------------------------------------------------------
000 T-  0000   000     000    000000   000    000000   0-0    00-0   0-0     0      00     00
--- -E  1111   ---     111    111111   111    111111   1--    11--   1--     -      11     --
511 ||         7FF                                       F       F      F     F             FF
    ||
    ||
    |'---(Enable Entry)
    '----(Start Capture)
```

The characters that may be used with CMSE are indicated in the following character set.

CDC GRAPHIC	ASCII GRAPHIC	DISPLAY CODE	026 PUNCH	ASCII CODE
A	A	01	12-1	41
B	B	02	12-2	42
C	C	03	12-3	43
D	D	04	12-4	44
E	E	05	12-5	45
F	F	06	12-6	46
G	G	07	12-7	47
H	H	10	12-8	48
I	I	11	12-9	49
J	J	12	11-1	4A
K	K	13	11-2	4B
L	L	14	11-3	4C
M	M	15	11-4	4D
N	N	16	11-5	4E
O	O	17	11-6	4F
P	P	20	11-7	50
Q	Q	21	11-8	51
R	R	22	11-9	52
S	S	23	0-2	53
T	T	24	0-3	54
U	U	25	0-4	55
V	V	26	0-5	56
W	W	27	0-6	57
X	X	30	0-7	58
Y	Y	31	0-8	59
Z	Z	32	0-9	5A
0	0	33	0	30
1	1	34	1	31
2	2	35	2	32
3	3	36	3	33
4	4	37	4	34
5	5	40	5	35
6	6	41	6	36
7	7	42	7	37
8	8	43	8	38
9	9	44	9	39
+	+	45	12	2B
-	-	46	11	2D
*	*	47	11-8-4	2A
/	/	50	0-1	2F
$	$	53	11-8-3	24
=	=	54	8-3	3D
blank	blank	55	no punch	20
,(comma)	,(comma)	56	0-8-3	2C
.(period)	.(period)	57	12-8-3	2E

CMSE ERROR MESSAGES

The following error messages appear during CMSE operation.

KEYBOARD ERROR LINE MESSAGES

Message	Description
ADDRESS PARAMETER ERROR	An address parameter references a nonexistent address or an address that should not be modified.
BP3 IS WRITE-ONLY, CANNOT BE DISPLAYED	CYBER 990 memory BP3 cannot be displayed because it cannot be read.
CANNOT ADD TO MSL LIBRARY ON TAPE	When running from tape-based MSL, writing of data to tape is not allowed.
CANNOT CHANGE CM USAGE WITHOUT DEADSTART	An *RV command was rejected. An attempt was made to load overlays to CM with the CM usage option selected and a dedicated load device not present (I4C IOU only).
CANNOT DELETE FROM MSL LIBRARY ON TAPE	When running from tape-based MSL, deleting programs from the tape is not allowed.
CANNOT LOAD CW AND DOWNLOAD CW ON SAME CHANNEL	It is impossible for CMSE to download controlware over the same channel being used to read the controlware to be downloaded.
CHANNEL NUMBER NOT VALID	The specified channel does not exist.
CHANNEL XX IS RESERVED	The requested channel is reserved to a PP or CMSE monitor usage.
CM ADDRESS NOT VALID- CM LOCKED	An attempt was made to modify a CM word which is part of the CMSE area of CM that is in use.
CM LOAD NOT VALID- CM LOCKED	An attempt was made to load a program into CM which would have wiped out data in the CMSE area of CM that is in use.
CM NOT IN USE	A command was entered which affects use of the CMSE area of CM, such as UL, but CMSE is not using CM.
CM OVERLAYS CORRUPTED, REVERTING TO DISK	CMSE could not locate an overlay in CM. Overlays will be obtained from disk until an *OV command is entered (I4C IOU only).
CMSE COMMUNICATIONS ERROR	The CMSE monitor unexpectedly lost communications with the I/O driver or the display driver PP.

Message	Description
COMMAND BUFFER COMMAND NOT FOUND	A command buffer editing or execution command was entered which referenced a command number which could not be found.
COMMAND BUFFER MUST HAVE A NAME	A DE command was entered to delete command number zero, the command buffer name, which is not allowable unless a replacement name is provided.
COMMAND BUFFER TOO BIG FOR EDITING	An AE command was entered to edit a command buffer, but the command buffer was too big to fit into CBU's editing buffer space.
COMMAND NUMBER NOT VALID	A command buffer edit or display command referenced a command number which did not exist.
CPU NUMBER ERROR	A CPU number parameter on a command referred to a CPU which does not exist.
DATA PARAMETER ERROR	The entry for a data parameter was not in hexidecimal or octal format.
DAYFILE UNAVAILABLE FROM TAPE	An attempt was made to add to the dayfile via a command or call but adding to the dayfile is not allowed when MSL is being run from tape.
DELETING MSB IS NOT ALLOWABLE	Deleting MSB from MSL is not allowed because MSB is essential for deadstarting MSL. There is no possible way of patching MSB under CMSE, so there is no reason to want to delete MSB. MSB can be replaced, however, via the replace duplicate name featuring using TDX.
DISPLAY TRUNCATED- UNDISPLAYABLE DATA	The display of a command buffer was truncated because the command buffer contained data which was not possible to display.
ENTERING REG. 21 WHEN CM IN USE NOT ALLOWABLE	An ER command to enter data into the bounds register is not allowed when CM is in use because CMSE could hang if certain values were entered.
ERROR- NO COMMAND BUFFER NAME GIVEN	A command was entered which requires a name parameter but no name was given.
ERROR- NO SHADOW MEMORY AVAILABLE	A command was entered with shadow memory parameters, but no shadow memory exists.
ERROR OCCURRED WHILE IDLING CBU PP	An error occurred on the KE command while the CBU PP was being idled. The CBU PP should be manually deadstarted.
ERROR- PP MEMORY TRANSFER NOT COMPLETED	An error occurred while transferring data from one PP to another (MP command).
ERROR- 42 CALL TO LOAD TO NONEXISTENT CPU	An error occurred when the CPU could not be located.
FORMAT ERROR	There was an error in the sequence or content of the parameters of a command.

Message	Description
LINE NUMBER TOO BIG- 13H IS MAXIMUM	An AM command specified a line number which is not allowable.
MAINT CHAN REJECT	CMSE attempted to issue a function across the maintenance channel which was rejected.
MAINT CHAN RSVD	CMSE could not complete a request to do something which requires use of the maintenance channel, because it was reserved by a pool PP.
MOVE INTO LOCKED AREA OF CM NOT ALLOWABLE	An MC command was entered which attempted to move data into the CMSE area of CM that is in use.
MxP OVERLAY NOT FOUND IN CM	The CMSE monitor was unable to find an overlay in CM (CM in use or *OV command has been executed). A deadstart is likely to be required.
NAME DISPLAY UNAVAILABLE FROM TAPE	An AF or AG command was entered from an MSL tape device, and those displays are unavailable from tape.
NAME LOADED IN PPxx	This is an informative message which is displayed when a program is loaded into a PP, giving the name of the program loaded and the PP number.
NEW COMMAND CAUSES COMMAND BUFFER TO BE TOO BIG	A command buffer edit command was entered which increased the size of the command buffer and caused the command buffer to be too big for the buffer in CBU. The new data is not entered into the command buffer.
NO ACTIVE COMMAND BUFFER	An attempt was made to execute a command buffer from the command buffer editing utility, but no command buffer was being edited (CBU was not loaded).
NO COMMAND BUFFER AVAILABLE FOR EDITING	A command buffer edit command was entered, but no command buffer was being edited at the time.
NO COMMAND BUFFER AVAILABLE TO WRITE TO DISK	A *WB command was entered, but no command buffer was being edited at the time.
NO PP AVAILABLE TO LOAD COMMAND BUFFER EDITING UTILITY INTO	An AE command was entered to begin editing a command buffer, but CBU was not loaded, and there was no PP available to load CBU into.
NO PP AVAIL IN CLUSTER FOR CW LOAD	A PP is not available for CMSE in the cluster that has access to the channel. The PPs should be deadstarted and idle (I4C IOU only).
NO PP AVAIL IN CLUSTER FOR CHANNEL COMMAND	A PP is not available for CMSE in the cluster that has access to the channel. The PPs should be deadstarted and idle (I4C IOU only).
NO PP HAS BEEN AUTO ASSIGNED	A command was entered with a slash (/) in place of the PP number to use automatic PP assignment, but no PP had been automatically assigned with a PP load command.
NO PROGRAM NAME GIVEN	A command was entered which requires a program name parameter, but none was given on the command.

Message	Description
NOT ACCESSIBLE FROM IOU1	A memory or processor maintenance channel command was entered when running CMSE from IOU1 on a dual-IOU mainframe.
OVERLAYS ALREADY IN CM	A *OV command was entered to load monitor overlays into CM, but monitor overlays were already in CM because CM was in use by CMSE and the command is aborted.
PP COMMUNICATIONS ERROR	An error occurred in communications between the CMSE monitor and a pool PP.
PP UNAVAILABLE	An attempt was made to use a PP that does not exist or which is unavailable, because it is being used by CMSE or has been downed by a DN command.
PP xx LOAD ERROR	An error occurred in loading a program into PP xx.
PP xx NOT IN CONTACT WITH CMSE FOR DISPLAY REFRESH	This message appears above a PP memory display when the CMSE monitor and PP cannot communicate to refresh the memory display.
SOFT CONTROL MEMORY NAME ERROR	The parameter given for a soft control memory name was in error (model 990 only).
SOFT CONTROL MEMORY NUMBER ERROR	The parameter given for a soft control memory number was in error (models 840, 845, 850, 855, and 860 only).
TEST COMMAND	A command was entered which CMSE does not recognize as a command to CMSE, and therefore assumes it is a command to a test or diagnostic. This message displays until a test or diagnostic accepts the command from CMSE.
UNABLE TO CONTACT COMMAND BUFFER EDITING PP	A command buffer edit command failed because the CMSE monitor lost communications with the CBU PP.
UNABLE TO CONTACT PP	CMSE was unable to accomplish a task because CMSE was unable to establish communications with a PP, and these communications are necessary to accomplish the task.
VERIFY ERROR	An error was discovered when the data loaded to control store or control word via a VK or VT command was checked against the data that originated on the MSL device.
WARNING- KE COMMAND TERMINATED COMMAND BUFFER	This is a warning message which means that a KE command was entered to drop CBU, while a command buffer in CBU was being executed. The command buffer execution is terminated.
2 CALL PP LOAD ERROR	An error occurred in loading a program into a PP as a result of a 2 call.
8K BIT MUST BE SET	An ER command was entered to modify the IOU DEC Register (30H) on an I4 IOU with a data parameter which would have cleared the 8K bit and set the IOU into 4K mode. This is not allowable, because CMSE must execute in 8K mode.

CMSE DISK DRIVER NORMAL RUNNING MESSAGES

Message	Description
CLEARING CM	Appears during execution of the KC command when size of CM to be cleared is larger than one megabyte (MB). It appears once for each MB of CM cleared.
LOADING CMSE	Appears when CMSE is being loaded. It appears once for the monitor load, once for the display driver load, and once for each monitor overlay loaded to CM when CM is being used by CMSE.

CMSE DISK DRIVER INITIAL DISPLAY AND STAND-ALONE ERROR MESSAGES

Message	Description
FORMAT ERROR	Appears when the syntax of an operator entry does not match the required format for the entry.
INVALID ENTRY	Appears when the value entered for a parameter or an option is not within the legal limits for the selection.
MR ERROR	Appears if an error condition is detected in the IOU status summary register. The message is cleared automatically when the error condition is cleared.
CM ERROR	Appears when the driver detects an error during execution of the KC command.
ERROR CLEARING PP XX	Appears when the driver detects an error during execution of the KP command. XX is the number of the PP being cleared when the error is detected.
MCH NOT RESPONDING	Appears if the driver is unable to input data from a maintenance register.
XXX NOT ON LIBRARY	Appears if a requested file name (XXX) was not found in the disk or dedicated load device. If the message comes from the library driver for a CMSE loader program, a deadstart is required to continue. If the message comes from the stand-alone loader, the message is presented in the keyboard entry line of the initial display, and the message can be cleared and normal input accomplished.
XXX NOT STAND-ALONE	Appears when a program binary that is requested to be loaded as a stand-alone program does not meet the stand-alone program criteria.
PP EXCEEDS CLUSTER LIMIT	One of the PPs selected when the Monitor/Display Driver PP Numbers Command was entered is not in cluster zero of the IOU. Only PPs in cluster zero may be selected.
GENERAL STATUS ERROR XXXX	Appears when a disk error is encountered while performing driver program loads or stand-alone program load operations. XXXX is the octal value of the general status word received. YYYY is the octal value of the contents of the detail status words received at the time of the error. Only a deadstart clears the message. The error message is displayed as follows:

Message	Description
	GENERAL STATUS ERROR XXXX WD DETAIL STATUS 1 YYYY YYYY YYYY YYYY 5 YYYY YYYY YYYY YYYY 9 YYYY YYYY YYYY YYYY 13 YYYY YYYY YYYY YYYY 17 YYYY YYYY YYYY YYYY
FUNCTION REJECT XXXX	Function code XXXX was issued to the MSL device and the correct response was not received.
MSL BOUNDS ERROR	An attempt was made to read or write to an area of the MSL device outside of the area reserved for the MSL. Re-enter the last command to retry the operation. Only a deadstart clears the message.
I/O WORD COUNT ERROR	The A register of the driver PP contained a nonzero value at the assumed completion of an I/O operation to the MSL device by the driver. Only a deadstart clears the message.

CMSE DISK DRIVER TO CMSE MONITOR ERROR MESSAGES

Message	Description
XXX NOT ON LIBRARY	The program or command buffer name XXX (one to seven alphanumeric characters) was not found on the MSL. Check the program or command buffer name and retry the command.
GENERAL STATUS ERROR XXXX (FSEC=YYYY/CSDEC=ZZ)	An error code XXXX was encountered by the driver during an MSL operation. The CC598A error code FSEC is indicated by YYYY and CSDEC error code by ZZ. These error codes are defined in the CYBER Systems Peripheral Diagnostic Reference Manual listed in the Preface. Retry by re-entering the command.
SRT FULL	A program or command buffer cannot be added to the MSL for lack of available storage space on the MSL disk. Examine the PNT for an unnecessary program or command buffer. If found, delete the unnecessary program or command buffer and retry the operation.
PNT FULL	A program or command buffer cannot be added to the MSL for lack of an open entry in the PNT. Examine the PNT for an unnecessary program or command buffer. If found, delete the unnecessary program or command buffer and retry the operation.
XXX DUPLICATE NAME	The program or command buffer name XXX currently exists in the MSL PNT. Examine the name and change it if necessary or delete the existing program or command buffer of the same name and retry the operation.
CONTROLWARE LOAD FAILURE	The attempt to load controlware on the channel specified in the command failed. Examine the command for the correct controlware name and I/O channel, make the necessary changes and retry the operation.

Message	Description
FUNCTION REJECT XXXX	The function code XXXX was issued to the MSL device and the correct response was not received. Re-enter the last command to retry the operation.
MSL BOUNDS ERROR	An attempt was made to read or write to an area of the MSL device outside of the area reserved for the MSL. Re-enter the last command to retry the operation.
I/O WORD COUNT ERROR	The A register of the driver PP contained a nonzero value at the assumed completion of an I/O operation to the MSL device by the driver.
LOAD ABORT - MEMORY BUFFER OVERFLOW	This message occurs if one of two conditions exist. The first condition is if an attempt is made to load a program into a PP that overwrites the monitor to a pool PP communication block in the upper memory of the PP. The second condition is if an attempt is made by the driver to write data to CM in the area reserved by CMSE when CM usage has been enabled. Retry for the first condition is to load the program to CM instead of a PP. Retry for the second condition is to do one of the following: • Deadstart, clear the CM usage parameter on the initial display, reload CMSE, and retry the operation. • Attempt to set the address parameter on the command to load at an address that does not cause overflow.
PRFX TABLE MISMATCH	This message occurs if the name in the PRFX table (77 table) that the I/O driver just read does not match the program name requested. If CM is being used by CMSE, this error causes the CM directory to be invalidated. NOTE Deleting any DEMOT created file without a 77 table; for example, Flaw map from FMU, results in the error message PRFX TABLE MISMATCH. Although the file was deleted, the disk space used by the file is not released by CMSE. If an SRT FULL situation is encountered, CIP requires reinstallation using the UPDATE installation option.
CB READ ERROR	Indicates that the command buffer command count in the first sector was incorrect. The first command of the command buffer is not command number one. The command buffer must be recreated before it can be executed.
FILE NOT AVAILABLE	Indicates an attempt was made to write data into a closed file. The file must be deleted from the library and recreated as an open file before data can be added to it.
XXX IS A HEX PROGRAM	An attempt was made to load a hexadecimal program as a stand-alone program on a model 865 or 875.

Message	Description
ERROR LOADING XXX	This message indicates that the program indicated by XXX could not be loaded due to a hardware failure or failure to initialize the hardware correctly.
COMMAND BUFFER TO LARGE FOR EDITING	This message indicates that the command buffer that was requested for editing is greater than 3100 octal PP words.
COMMAND LENGTH EQUALS ZERO	A request to write a command buffer command of zero words was requested by CBU. This is not a valid request.
COMMAND BUFFER EMPTY	The command buffer that was requested to be loaded did not contain any data. It was a zero length file.
TO MANY CHARACTERS IN THE COMMAND LINE	There were more than 64 decimal characters in a command buffer command line.

IOU ERROR MESSAGES

The following error messages may appear on the bottom line of the A display.

Message	Description
IOU ERO - CHxx	Parity error on channel xx.
IOU ERO - PPxx	Error in PP xx.
IOU ERO - CM IN BYxx	Parity error in CM data-in byte xx.
IOU ERO - PP IN	Parity error has been detected on the memory pack.
IOU ERO - PP AD	Address parity error has been detected on the memory pack.
IOU ERO - 7xxx	Error condition has been detected on a 7xxx pack. xxx is the pack type.
IOU ERO - PP OUT	Parity error has been detected on data read from PP memory.
IOU ERO - FMWR	Control firmware has detected a parity error.
IOU ERO - CM AD - O	Parity error was detected on the output of a CM address.
IOU ERO - CM DA - O	Parity error was detected on the output of CM data.
IOU ERO - CM RESP	CM response code error.
IOU ERO - TAG IN	Tag from CM has a parity error.
IOU ERO - REJ	CM reject error.
IOU ERO - WRT	Uncorrected CM write error.
IOU ERO - RD	Uncorrected CM read error.
IOU ERO - RD BF	Read data from CM has a parity error.
IOU ERO - CM OUT BYxx	Error in CM data-out byte xx.
IOU ERO - ADU - B	Parity error detected from barrel priority ROM.
IOU ERO - OSB A	Parity error detected on the OS boundary address.
IOU ERO - OSB V	PP has attempted to write or exchange at a CM address outside the region allowed by the OS bounds register.
IOU ERO - 12/16 CNV	Error detected on the 12/16 conversion pack.
IOU ERO - M ADV	Error detected on PPM data in the ADV pack.
IOU ERO - P/Q	Error condition detected on the P/Q register pack.
IOU ERO - A/R	Error detected on the A/R register pack.
IOU ERO - CM DA-IN	Parity error detected on the input of CM data.

MEMORY ERROR MESSAGES

Message	Description
Mx ERO-PORTp CAaa RArr BNKb PARt SYNDss	Corrected Mx error: x System number 1, 2, or 3 (models 845 and 855 only). p Memory port number (0 through 7). aa Chip column address (0 through 7F). rr Chip row address (0 through 1F). b Memory bank number (0 through 7). t Parity bit number (0 through 7). ss Syndrome bits (0 through FF).
M3 ERO-PORTp ADaaaaaaa PRTYt SYNDss (models 850, 860, and 960 only)	Corrected M3 error: P Memory port number (0 through 7). a Address (0 through 3FFFFFF for models 850 and 860 and 0 through FFFFFFF for model 960). t Address parity (0 through F). s Syndrome bits (0 through FF).
M5 ERO-Ax PTp COLc RSr CAaaaa BNKb DISTd PARt SYNDss (model 990 only)	Corrected M5 error: x Register number (0, 1, 2, or 3). p Memory port number (0 through 7). c CSU column number (0 through 1). r Chip row select (0 through 3). aaaa Chip address (0 through FFFF). b Memory bank number (0 through 7). d Cage (distributor) select (0 through 3). t Address parity (0 through F). ss Syndrome bits (0 through FF).
Mx ERO-INVALID FNC	Invalid function has been decoded. x System number (1, 2, 3, or 5).
Mx ERO-BOUNDS FAULT	Write operation has exceeded the address bounds as specified by the bounds register. x System number (1, 2, 3, or 5).

Message	Description

Mx ERO-Mm Lv PTp CAaa RArr BKb PRt BYy DIii MPxx FPff	Uncorrected Mx error 1:
	x System number 1, 2, or 3 (models 845 and 855 only).
	m 0 No multibit error.
	  1 Multibit error.
	v 1 Error at the memory port.
	  2 Parity error at the distributor or array pack.
	p Memory port number (0 through 3).
	aa Chip column address (0 through 7F).
	rr Chip row address (0 through 1F).
	b Memory bank number (0 through F).
	t Parity bit number (0 through 7).
	y Parity error byte position code (0 through F).
	ii Data in parity bits (0 through FF).
	xx Mark and parity bits (0 through FF).
	ff Function and parity code (0 through FF).

M3 ERO-Mm Lv PTp ADaaaaaaa PRTYt BYy DIii MPxxx FPff (models 850 and 860 only)	Uncorrected M3 error 1:
	m 0 No multibit error.
	  1 Multibit error.
	v 1 Error at the memory port.
	  2 Parity error at the distributor or array pack.
	p Memory port number (0 through 7).
	a Address (0 through 3FFFFFF).
	t Parity bit number (0 through F).
	y Parity error byte position code (0 through F).
	ii Data in parity bits (0 through FF).
	xxx Mark bits and parity (0 through 1FF).
	ff Function bits and parity (0 through 1F).

M3 ERO-Mm PTp ADaaaaaaa PRTYt BYy DIii MPxxx FPff (model 960 only)	Uncorrected M3 error 1: m 0 No multibit error. 1 Multibit error. p Memory port number (0 through 7). a Address (0 through FFFFFFF). t Parity bit number (0 through F). y Parity error byte position code (0 through F). ii Data in parity bits (0 through FF). xxx Mark bits and parity (0 through 1FF). ff Function bits and parity (0 through 1F).

Message	Description
Mx ERO-TAGg PRTp CAaa RArr BNKb PARt DPdd	Uncorrected Mx error 2: x System number (1, 2, or 3). g 1 Parity error in the 8-bit tag returned to the processor. p Memory port number (0 through 7). aa Chip column address (0 through 7F). rr Chip row address (0 through 1F). b Memory bank number (0 through 7). t Parity bit number (0 through 7). dd Data out path parity error when DP is displayed, or partial write parity byte (0 through 7) if PW is displayed.
M3 ERO-PORTp ADaaaaaaa PRTYt RDPrr PWDPww (models 850 and 860 only)	Uncorrected M3 error 2: p Memory port number (0 through 7). a Address (0 through 3FFFFFF). t Parity bit number (0 through F). rr Read data parity (0 through FF). ww Partial write data parity (0 through FF).
M3 ERO-DPE7b PORTp ADaaaaaaa PRTYt RDPrr PWDPww (model 960 only)	Uncorrected M3 error 2: b Data parity error byte 7 (0 and 1). p Memory port number (0 through 7). a Address (0 through FFFFFFF). t Parity bit number (0 through F). rr Read data parity (0 through FF). ww Partial write data parity (0 through FF).

NOTE

The following entire message is too long to display during log errors operation. Only the first portion through DISTd is displayed, but the entire message is logged.

Message		Description
M5 ERO-Ax IFi BFf Mm PAe CSu PTp COLc RSr CAaaaa BNKb DISTd PARt WDww PRWyy APEz MTFPv (model 990 only)		Uncorrected M5 error:
	x	Register number (4, 5, 6 or 7).
	i	Illegal function (0 or 1).
	f	Bounds fault (0 or 1).
	m	Multi bit error (0 or 1).
	e	Port address PE (0 or 1).
	u	CSU PE (0 or 1).
	p	Memory port number (0 through 7).
	c	CSU column number (0 or 1).
	r	Chip row select (0 through 3).
	aaaa	Chip address (0 through FFFF).
	b	Memory bank number (0 through 7).
	d	Cage (distributer) select (0 through 3).
	t	Address parity (0 through F).
	ww	Write data PE (0 through FF).
	yy	Read or partial write PE (0 through FF).
	z	Address PE (0 through F).
	v	Mark PE, tag PE, function PE, or partial write PE (0 through F).

Px ERROR MESSAGES

Message		Description
Px CPy ER-xxx PFS-ssssssssssssssss CEL-cccccccccccccccc	x	System number (1 or 2).
	y	Number of CPU in which error occurred.
	xxx	UCE Uncorrected error.
		CRE Corrected error.
		PEW Physical environment warning.
	s	Processor fault status.
	c	CACHE corrected error log.
Px CPy ER-UCE 8n-ssssssssssssssss 8n-ssssssssssssssss (models 840, 845, 850, 855, 860, and 990 only)	x	System number (3 or 5).
	y	Number of CPU in which error occurred.
	n	Processor fault status register number.
	s	Processor fault status.

A register

Address register.

Abs

Absolute.

AC

Address control.

Adrs

Address.

ALN

Arithmetic and logical network.

ALU

Arithmetic and logical unit.

AOR

Address out of range.

Arith

Arithmetic.

ASCII

American Standard Code for Information Interchange.

ASE

Address specification error.

ASID

Active segment identifier.

Assy

Assembly.

ATS

Advanced tape subsystem.

Aux

Auxiliary.

BCD

Binary coded decimal.

BD

Branch delta.

BDP

Business data processor.

Bfr

Buffer.

Bin

Binary.

Bkpt

Breakpoint.

BN

Byte number.

Bound

Boundary.

Br

Branch.

CA

Condition action.

CBD

Capture buffer dump utility.

CBU

Command buffer editing utility.

CABR

Cache address buffer register.

CAE

Condition action extension.

CAR

Cache address register.

CAU

Refer to Common Disk Area Utility.

CBP

Code base pointer.

CCR

Clock condition register.

CDA

Refer to Common Disk Area.

CEL

Critical error log.

Chan

Channel.

CIP

CYBER Initialization Package.

Clk

Clock.

Clr

Clear.

CM

Central memory.

CMC

Central memory control.

CMR

Central memory resident.

CMSE

Common maintenance software executive.

Cnt

Count.

Cntr

Counter.

Coef

Coefficient.

Com

Common.

Common Disk Area (CDA)

The disk storage area that contains a default parameter block, EI, microcode, and CEL.

Common Disk Area Utility (CAU)

A utility program that is used to initialize the common disk area and to store CIP components in it.

Comp

Complement.

Cond

Refer to Condition.

Condition (Cond)

A test within a subsection that uses a particular set of operands to test the common hardware element.

Confl

Conflict.

Cont

Control.

Conv

Convert, Converter.

Cor

Corrected.

CPU

Central processing unit.

CS

Condition sensing.

CST

Control store.

CTI

Common test and initialization.

CW1

Control word 1.

CW2

Control word 2.

DAI

Data interchange.

DCDR

Decoder.

DCI

Data control information. Two bytes of information that give the maintenance register address.

DEC

Dependent environment control, decimal.

Decr

Decrement.

Descr

Descriptor.

Destn

Destination.

DDP

Distributive data path.

DEX

Diagnostic executive (interface).

DFU

Disk Format Utility

Disassy

Disassembly.

Div

Divide.

Dlyd

Delayed.

Dsbl

Disable.

DSC

Display controller.

DSRB

Diagnostic software release bulletin.

EBCDIC

Extended binary coded decimal interchange code.

ECC

Error correction code.

EC1

Error code 1.

EC2

Error code 2.

ECL

Emitter-coupled logic.

ECM

Extended central memory.

ECR

Environment control register.

EDD

Express deadstart dump.

EDS

Extended deadstart.

EI

Environment interface.

EM

Exit mode.

EMMR

Exit mode mask register.

Enbl

Enable.

Encdr

Encoder.

ESE

Environment specification error.

EXC

CPU monitor program.

EXCH

Exchange.

Exp

Exponent.

Ext

External.

FCA

Field change announcement.

Fctn

Function.

FF

Flip flop.

FIFO

First-in, first-out.

FL

Field length.

FLC

C170 mode central memory field length.

FMD

Fixed module drive.

FNO

Fanout.

FP

Floating point.

FRC

Free running counter.

FU

Functional unit.

FWA

First word address.

GE

Greater than or equal.

Gen

Generator.

Genl

General.

GT

Greater than.

Hldg

Holding.

HDP

Hexadecimal dump-to-printer utility.

HDT

Hardware descriptor table.

HIVS

Hardware initialization and verification software.

HVS

Hardware verification sequencer.

IC

Integrated circuit.

ICC

Instruction completion control.

ICP

Instruction control pipeline.

IDX

Indexed.

IF

Instruction fetch.

II

Instruction issue.

Immed

Immediate.

Incr

Increment.

Indef

Indefinite.

Inf

Infinite.

Inh

Inhibit.

Inp

Input.

Instr

Instruction.

Int

Internal.

Intrpt

Interrupt.

I/O

Input/output.

IOU

Input/output unit.

ISE

Instruction specification error.

IU

Instruction unit.

JPS

Job process state pointer.

K/L

Key/lock.

Kypt

Keypoint.

Ld

Load.

LM

Local memory.

LOS

Loss of significance.

LRU

Least recently used.

LSD

Least significant digit.

LSI

Large scale integration.

LSM

Last symbol mask.

LT

Less than.

Lwr

Lower.

MAC

Maintenance access control.

Maint

Maintenance.

MAR

Micrand address register.

MBE

Multiple bit error.

MC

Master clear.

MCH

Maintenance channel.

MCR

Monitor condition register.

MCU

Maintenance control unit.

Mem

Memory.

Micr

Micrand.

Misc

Miscellaneous.

MMR

Monitor mask register.

MOP

Micro-operation.

MPS

Monitor process state.

MR

Maintenance register.

MSB

Most significant bit.

MSC

Micrand sequence control.

MSD

Most significant digit.

MSL

Maintenance software library.

MSNZB

Most significant nonzero byte.

MSS

Mass storage system.

MTS

Magnetic tape subsystem.

Mult

Multiply.

Mux

Multiplexer.

NE

Not equal.

Neg

Negative.

Network

A hardware element wholly contained on a pack and sharing no common circuits with any other network.

Norm

Normalize.

NOS

Network operating system.

ns

Nanosecond.

OCR

Optical card reader.

OP

Operand.

Opcode

Operation code.

OPI

Operand issue.

Opn

Operation.

OS

Operating system.

OSB

Operating system bounds register.

Out

Output.

Ovfl

Overflow.

P

Program address.

Pack

A replaceable hardware module.

Par

Parity.

PDM

Processor detected malfunction.

PE

Parity error.

PFA

Page frame address.

PFS

Processor fault status.

Ph

Phase.

PIT

Process interval timer.

PMF

Performance monitoring facility.

PN

Page number.

PNT

Program name table.

PO

Page offset.

PONR

Point of no return.

Pos

Positive.

PP

Peripheral processor.

PPM

Peripheral processor memory.

PPU

Peripheral processor unit.

P register

Program address register.

Prev

Previous.

Pri

Priority.

Prod

Product.

PSM

Page size mask.

PSWF

Page table search without find.

PTA

Page table address.

PTE

Page table entry.

PTL

Page table length.

PTM

Processor test mode.

PVA

Process virtual address.

PW

Partial write.

Quad

Quadrant.

RA

Reference address.

RA/FL

Reference address/field length.

RAC

C170 mode central memory reference address.

RAM

Random access memory.

RCL

Read and clear lock.

Rcvr

Receiver.

RDS

Register/data select.

Ref

Reference.

Regen

Regenerator.

Rel

Relative.

Rem

Remainder.

Req

Request.

Resync

Resynchronize, resynchronizer, resynchronization.

RF

Register file.

Rgtr

Register.

RSL

Read and set lock.

R/W

Read/write.

RMA

Real memory address.

RMS

Rotating mass storage.

ROM

Read only memory.

SBE

Single bit error.

SC

Soft control.

SCM

Soft control memory.

SCT

Special character table.

SECDED

Single error correction/double error detection.

Seg

Segment.

Sel

Select.

Sep

Separate.

Seq

Sequence.

Sig

Significant.

SIT

System interval timer.

SM

Segment map.

Spec

Specification.

SPID

Segment/page identifier.

SRT

Sector reservation table.

SS

Status summary.

STA

Segment table address.

STL

Segment table length.

Str

Stream.

Subsection

A series of tests that check out a specified hardware element.

Subtr

Subtract.

Suppr

Suppression.

SV

Specification value.

SVA

System virtual address.

Sw

Switch.

Syn

Syndrome.

Sync

Synchronize.

TDX

Tape-to-disk utility.

Termn

Terminate.

Test

A general term that can refer to conditions, subsections, sections, or units.

TFA

Tag file address.

UCEL1

Uncorrected error log 1.

UCEL2

Uncorrected error log 2.

UCR

User condition register.

UEM

Unified extended memory.

UMR

User mask register.

Unbr

Unbranch.

Uncond

Unconditional.

Uncor

Uncorrectable.

Undfl

Underflow.

Unit

An arbitrary functional area within the processor.

Unlog

Unlogged.

Upr

Upper.

UTP

Untranslatable pointer.

VLEX

Virtual level executive interface.

VMID

Virtual machine identifier.

WDS

Write data select.

WOI

Word of interest.

Xfer

Transfer.

Xltr

Translator.

Xmtr

Transmitter.

ZIF

Zero insertion force.

ZF

Zero flag.

ubit

Micrand bit.

usec

Microsecond.

This appendix has been deleted.

The following test, diagnostic, and support programs constitute the MSL library. The right-hand columns define subsets of the library to support maintenance of models 810, 815, 825, and 830 (MSL 151), model 835 (MSL 152), and models 840, 845, 850, 855, and 860 (MSL 153), and model 990 (MSL 155). Refer to the appropriate reference manual or microfiche listings of individual tests for a more detailed description.

CTI

		MSL 151	MSL 152	MSL 153	MSL 155
CTI	Common test and initialization (includes HDP, EDS1, EDS2)	X	X	X	X

CMSE

		MSL 151	MSL 152	MSL 153	MSL 155
MSB	CTI linker	X	X	X	X
DSB	CTI linker	X	X	X	X
CEZ	CTI/CMSE boundary indicator record	X	X	X	X
DSP	CC545 display driver	X	X	X	X
DSQ	721 and 752 display driver	X	X	X	-
MEP	CMSE monitor/executive	-	X	-	-
MDP	CMSE monitor/executive	X	-	-	-
MFP	CMSE monitor/executive	-	-	X	-
MHP	CMSE monitor/executive	-	-	-	X
MDL1	844 disk driver	X	X	X	X
MDL2	885 disk driver	X	X	X	X
MDL3	834 disk driver	X	X	X	X
MDL4	836 disk driver	X	X	X	X
MDL5	895 disk driver	X	X	X	X

CMSE

		MSL 151	MSL 152	MSL 153	MSL 155
KDP8XX	Keyboard/display processor	X	X	X	X
MDL	Disk CMSE loader	X	X	X	X
TLO	CMSE tape driver	X	X	X	X
TDL	Tape CMSE loader	X	X	X	X
TDLCRES	Tape loader channel resident	X	X	X	X
TDLMRES	Tape loader central memory resident	X	X	X	X
TDL8XX	Tape stand-alone program loader	X	X	X	X
DSL8XX	Disk stand-alone program loader	X	X	X	X
KDP8XX	Initial display processor	X	X	X	X

UTILITIES

		MSL 151	MSL 152	MSL 153	MSL 155
TDX†	MSL tape-to-disk loader	X	X	X	X
DMP	12/60 bit memory-to-printer dump	X	X	X	X
LDC	Peripheral controlware load program	X	X	X	X
FMU	FMD format utility	X	X	X	X
ABU	Assembly buffer utility	X	X	X	X
EDIT	EDIT source program	X	X	X	X
CLK	Real-time display and timing clock program	X	X	X	X
DFU	Disk format utility	X	X	X	X

EXECUTIVE INTERFACE PROGRAMS

		MSL 151	MSL 152	MSL 153	MSL 155
DDS	Deadstart diagnostic sequencer	X	X	X	X
EXC	CYBER 170 state virtual executive	X	X	X	X

RANDOM COMMAND TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
RCT1	Hexadecimal instruction random command test	X	X	X	X
RCT2	Hexadecimal BDP instruction random command test	X	X	X	X
EXCH	Exchange test	X	X	X	X
TRAP	Trap interrupt test	X	X	X	X

FIXED COMMAND TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
FCT1	Fixed operand command test	X	X	X	X
FCT2	Fixed operand command test	X	X	X	X
FCT3	Fixed operand command test	X	X	X	X

† Available with hardware initialization and verification (HIVS).

		MSL 151	MSL 152	MSL 153	MSL 155
FCT5	Fixed operand command test	X	X	X	X
FCT9	Fixed operand command test	X	X	X	X

CENTRAL MEMORY TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
CMEM	CPU-based CM test	X	X	X	X
CMT1	IOU-based CM test	X	-	-	-
CMI1	IOU-based CM isolation analyzer	X	-	-	-
CMT2	IOU-based CM test/diagnostic	-	X	-	-
CMT3	IOU-based CM test	-	-	X	-
CMI3	IOU-based CM isolation analyzer (models 845 and 855 with BS137A memory)	-	-	X	-
CMJ3	IOU-based CM isolation analyzer (models 840, 845, 850, 855, and 860 with BS213A memory)	-	-	X	-
CMT5	IOU-based central memory control (CMC) test	-	-	-	X

PROCESSOR DETECTION AND ISOLATION TESTS

NOTE

Beginning with the release of MSL 151 L137, FIS1 will be distributed separately on tapes provided in manufacturing and FCO kits. FIS1 can be installed from these tapes to the MSL device using TDX.

		MSL 151	MSL 152	MSL 153	MSL 155
FIS1	Microcode test with fault isolation capability	X	-	-	-
FIS2	Microcode test with fault isolation capability	-	X	-	-
MAT3	Microcode memory array test	-	-	X	-
MCT3	Maintenance access control (MAC) test	-	-	X	-

		MSL 151	MSL 152	MSL 153	MSL 155
MDT3	ALN multiply/divide test	-	-	X	-
BPT3	Business data processor test	-	-	X	-
OIT3	Operand issue test	-	-	X	-
IFT3	Instruction fetch test	-	-	X	-
ACT3	Address control test	-	-	X	-
LMT3	Local memory test	-	-	X	-
ANT3	Arithmetic and logic unit test	-	-	X	-
CST3	Control store (CS) basic paths test	-	-	X	-
CTT3	Common CS/MAC logic test	-	-	X	-
ICT3	Instruction complete control/ instruction control pipeline test	-	-	X	-
PDT3	ICC/ICP processor detected malfunctions and associated logic test	-	-	X	-
ACT5	Address control unit (ACU) test	-	-	-	X
BPT5	Business data processing unit (BDP/BP3) test	-	-	-	X
EPT5	Error processing network (EPN) test	-	-	-	X
FPT5	Floating point unit (FPU) test	-	-	-	X
IDT5	Instruction decode unit (IDU) test	-	-	-	X
IFT5	Instruction unit (INU) test	-	-	-	X
IGT5	Integer unit (IGU) test	-	-	-	X
LST5	Load/store unit (LSU) test	-	-	-	X
MAT5	Maintenance access control (MAC) test	-	-	-	X
MIT5	Microcode based memory and miscellaneous test	-	-	-	X
OCT5	Operand cache (OCA) test	-	-	-	X
PAT5	Basic paths test	-	-	-	X
SCT5	Scalar unit (SCU) test	-	-	-	X
VAT5	Virtual addressing test	-	-	-	X

IOU TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
SMT3	Segment map test	-	-	X	-
QLT1	Quicklook test	X	-	-	-
QLT2	Quicklook test	-	X	X	-
QLT4	Quicklook test	-	-	-	X
PMT1	PP memory test	X	-	-	-
PMT2	PP memory test	-	X	X	-
PMT4	PP memory test	-	-	-	X
EXT1	Execution unit test	X	-	-	-
EXT2	Execution unit test	-	X	X	-
EXT4	Execution unit test	-	-	-	X
PMU1	PP memory test	X	-	-	-
PMU2	PP memory test	-	X	X	-
PMU4	PP memory test	-	-	-	X
CHD1	Channel test	X	-	-	-
CHD2	Channel test	-	X	X	-
CHD4	Channel test	-	-	-	X
CMA1	CM access test	X	-	-	-
CMA2	CM access test	-	X	X	-
CMA4	CM access test	-	-	-	X
MRT1	Maintenance register test	X	-	-	-
MRT2	Maintenance register test	-	X	X	-
MRT4	Maintenance register test	-	-	-	X
MRA1	Maintenance register test	X	-	-	-
MRA2	Maintenance register test	-	X	X	-
MRA4	Maintenance register test	-	-	-	X
DST1	Display test	X	-	-	-
DST2	Display test	-	X	X	-

		MSL 151	MSL 152	MSL 153	MSL 155
DST4	Display test	-	-	-	X
TPM1	Two-port multiplexer test	X	-	-	-
TPM2	Two-port multiplexer test	-	X	X	-
TPM4	Two-port multiplexer test	-	-	-	X
FII1	IOU fault analyzer	X	-	-	-
FII2	IOU fault analyzer	-	X	X	-
FII4	IOU fault analyzer	-	-	-	X
EDS2	Extended deadstart test	-	-	X	-
EDS4	Extended deadstart test	-	-	-	X

CYBER 170 TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
CU8†	CPU command test (same as CU1 in MSL 100)	X	X	X	X
CT8	Product set microcode validation program (same as CT3 in MSL 100)	X	X	X	X
FM2	Floating multiply test	X	X	X	X
FS8	Product set microcode validation program (same as FST on MSL 100)	X	X	X	X
IMC	Integer multiply test	X	X	X	X
BGK	30-bit instruction test	X	X	X	X
FDT	Floating divide test	X	X	X	X
LAT	Long add unit test	X	X	X	X
POP	Population counter test	X	X	X	X
RTJ	Return jump test	X	X	X	X
MY1	65 K and 131 K CM test	X	X	X	X
CMC	CM conflict program	X	X	X	X
CM6	CM test	X	X	X	X
EJP	GO/NO GO exchange jump test	X	X	X	X

† Available with hardware initialization and verification (HIVS).

PERIPHERAL TESTS

		MSL 151	MSL 152	MSL 153	MSL 155
ATC	7021-3X controller diagnostic	X	X	X	X
CPE	415 Card Punch Exerciser	X	X	X	X
CP8	415 test	X	X	X	X
CRE	405 Card Reader Exerciser	X	X	X	X
CRP	CYBERPLUS	X	X	X	X
CR8	405 test (same as CR1 in MSL 100)	X	X	X	X
DTC	7155-X/844 test	X	X	X	X
D44	7054-X/844 test	X	X	X	X
D88	7155-X/885 test	X	X	X	X
FFU	FSC Disk Flaw Maintenance Utility	X	X	X	X
FMC	7255-X controller diagnostic	X	X	X	X
FLM	FSC test loader/monitor	X	X	X	X
FMD	885 serial drive diagnostic	X	X	X	X
FSD	834 disk subsystem (ISD) diagnostic	X	-	-	-
FSM	FSC memory test	X	X	X	X
FTP	580 test	X	X	X	X
FT8	FA205 coupler test	X	X	X	X
F44	FSC Disk Subsystem Test (100 and 200 Mbyte)	X	X	X	X
F7X	FSC Tape Subsystem Test	X	X	X	X
F88	FSC Disk Subsystem Test (317 Mbyte)	X	X	X	X
ITU	639 Intelligent Tape Utility	X	-	-	-
LCM	LCN Memory Test	X	X	X	X
LCN	LCN Confidence Test	X	X	X	X
LPE	512 Line Printer Exerciser	X	X	X	X
LP1	512 Line Printer Test	X	X	X	X
NDM	LCN NAD Memory Test	X	X	X	X
NDP	LCN NAD instruction test	X	X	X	X

		MSL 151	MSL 152	MSL 153	MSL 155
NDT	LCN NAD trunk test	X	X	X	X
NLM	LCN NAD test loader/monitor	X	X	X	X
RT5	6671 Communications Controller Test	X	X	X	X
SCX	6683/couple test	X	-	X	X
S2C	Satellite coupler test	X	X	X	X
TFE	2550 Emulator Communications Controller Test	X	X	X	X
TFF	2550 Coupler Diagnostic	X	X	X	X
TFL	2550 Off-Line Diagnostic Loader	X	X	X	X
TT3	6675 Communications Controller Test	X	X	X	X
T6X	7021-2X/66X test	X	X	X	X
T7X	7021-3X/67X test	X	X	X	X
ULD	2550 emulator upline dump	X	X	X	X

BUFFER CONTROLLER (BC) BASED PERIPHERAL TESTS AND UTILITIES

		MSL 151	MSL 152	MSL 153	MSL 155
BCX	BC command test	X	X	X	X
CD8	66X/844 coupler diagnostic (same as CDM in MSL 100)	X	X	X	X
CID	BC coupler isolation diagnostic	X	X	X	X
DTA	844 diagnostic	X	X	X	X
DTB	7X54 diagnostic	X	X	X	X
FM8	844/7X5X pack formatting utility	X	X	X	X
FT8	7054 full-track coupler test (same as FTD in MSL 100)	-	X	-	-
MTC	7X2X diagnostic	X	X	X	X
MYP	7152 PROM memory test	X	X	X	X
MY8	BC memory test	X	X	X	X
MY9	BC memory test	X	X	-	-

DEMOT

		MSL 151	MSL 152	MSL 153	MSL 155
MCX	DEMOT executive	X	X	X	X
MPX	DEMOT executive	X	X	X	X
MLC	DEMOT compiler	X	X	X	X
MLD	DEMOT language driver	X	X	X	X

CYBER 170 ENVIRONMENTAL INTERFACE

		MSL 151	MSL 152	MSL 153	MSL 155
EI†	Environment interface program	X	X	X	X

† Available with hardware initialization and verification (HIVS).

This appendix outlines the sequences of steps for installing CIP components, including MSL 15X, in shared-disk and maintenance only modes. The procedures guide you step-by-step through the general installation process, but refer you to other sections of this manual for detailed instructions about the utilities used. You are assumed to be familiar with components used as they are also described in other sections of this manual.

MSL 15X INSTALLATION PROCEDURE (SHARED-DISK)

Use one of the following procedures to install CIP tape components on a Model 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, or 990 Computer System prior to installing the operating system in a shared-disk environment.

PREPARATORY PROCEDURES

- Gather installation materials.
- Read documentation.
- Contact site analyst to coordinate MSL and operating system installation activities and prepare an installation plan.

Gather Installation Materials

___ 1. CYBER Initialization Package (CIP).

Locate the CYBER Initialization Package for your computer system. This kit contains a software release bulletin (SRB), a CIP binary tape, and documentation for your system. Be sure you have the correct kit as defined by the FCA for your system.

The tape provided in a CIP field release kit includes CTI, MSL, EI, microcode, command buffers, and most model-dependent tests.

___ 2. Disk on which to install CIP components and the operating system.

When performing an initial install, ensure that this disk does not contain any permanent files that must be preserved.

Read Documentation

___ 1. Read the SRB furnished with CIP.

___ 2. Review the Field Change Announcement (FCA). Check compatibility of the computer system with microcode, MSL, and operating system tapes provided.

___ 3. Review the following sections of the MSL 15X Reference Manual:

- Coldstart and warmstart procedures in section 2.
- CTI/MSL Disk Area Utility (CAU) in section 6. Review options A, B, C, and D.
- Tape-to-Disk Utility (TDX) in section 6. Review options A, B, C, D, and F.
- Command buffer maintenance in section 4.

___ 4. Review the displays and options described in the CIP User's Handbook.

Contact Site System Analyst

When installing or updating CIP and the operating system on a shared-disk, it is imperative that you and the site system analyst schedule computer time and perform the installation as a team to ensure that no system degradation occurs.

In shared-disk mode, a maximum of 20 megabytes of disk storage are allocated for MSL. If you want to enlarge the MSL area, you must first obtain customer permission to do so and then install in maintenance only mode.

INITIAL AUTO-INSTALL PROCEDURE (SHARED-DISK, MODELS 810, 815, 825, AND 830)

Use the following procedure to initially install components of an unmodified CIP tape to the disk in a shared-disk environment for models 810, 815, 825, or 830. This procedure installs either a predefined subset of MSL tests or all of MSL onto the disk, depending upon whether a Short or Full Install option is selected. The Short option should normally be selected. If additional tests are required, CMSE can be used to load individual tests.

The initial auto-install procedure assumes that this is the initial installation of CIP. The procedure reserves 12 megabytes of disk storage when the Short Install option is selected and 20 megabytes of disk storage when the Full Install is selected. CIP installation requires dedicated machine time, and at least one tape drive and one disk unit.

The procedure assumes that controlware has been loaded into the peripheral controllers. If the controlware isn't loaded, refer to coldstart procedures in section 2 of this manual.

___ 1. Ensure that the tape (639 or 66X) and disk (834, 836, 844, 885, or 895) controlware are present and functioning properly and perform a system warmstart.

   a. Mount the CIP tape without the write-enable ring and ready the unit.

   b. Enter the values for a warmstart from tape through the Maintenance Options display. Refer to Warmstart Procedures in section 2 of this manual. After a successful warmstart, the Initial Options display should appear.

___ 2. Press the carriage return key to select the default option, Build Deadstart Disk.

CAUTION

The next step destroys all information currently on the deadstart disk prior to installing the CIP. Before proceeding, be sure you have a back-up copy of any information on the deadstart disk that you want to preserve.

___ 3. Enter one of the following characters:

S To initialize the deadstart disk and install most of the CIP, including a predefined set of the most frequently used diagnostics.

F To initialize the deadstart disk and install all of the CIP.

___ 4. Enter the channel, equipment, and unit numbers of the deadstart disk as prompted.

___ 5. The message INSTALLATION COMPLETE appears upon completion of CIP installation. The system is now ready to call CMSE, install the operating system, or execute CTI utilities.

INITIAL AUTO-INSTALL PROCEDURE (SHARED-DISK, MODELS 835, 840, 845, 850, 855, 860 AND 990)

Use the following procedure to initially install components of an unmodified CIP tape to the disk in a shared-disk environment for models 835, 840, 845, 850, 855, 860, and 990. This procedure installs all of MSL onto the disk.

The initial auto-install procedure assumes that this is the initial installation of CIP. The procedure reserves 20 megabytes of disk storage for the CIP and requires dedicated machine time. At least one tape drive and one disk unit must be available.

The procedure assumes that controlware has been loaded into the peripheral controllers. If the controlware isn´t loaded, refer to coldstart procedures in section 2 of this manual.

___ 1. Ensure that the tape (66X) and disk (844, 885, or 895) controlware are present and functioning properly, and perform a system warmstart.

a. Mount the CIP tape without the write-enable ring and ready the unit.

b. Set the deadstart panel of a model 835, 840, 845, 850, 855, 860, or 990 for a warmstart from tape. Refer to Warmstart Procedures in section 2 of this manual. After a successful warmstart, the Initial Options display should appear.

___ 2. Press the carriage return key to select the default option, Build Deadstart Disk.

CAUTION

The next step destroys all information currently on the deadstart disk prior to installing the CIP. Before proceeding, be sure you have a back-up copy of any information on the deadstart disk that you want to preserve.

___ 3. Enter an I to select the Initial Install option. This option initializes the deadstart disk and installs the CIP.

___ 4. Enter the channel, equipment, and unit numbers of the deadstart disk as prompted.

___ 5. The message INSTALLATION COMPLETE appears upon completion of CIP installation. The system is now ready to call CMSE, install the operating system, or execute CTI utilities.

UPDATE AUTO-INSTALL PROCEDURE (SHARED-DISK)

Use the following procedure to update CIP components on the deadstart disk, which have been installed previously using the Initial Installation Procedure.

The update auto-install procedure installs the CIP tape components to the deadstart disk and preserves operating system information on the deadstart disk, including any permanent files. The update installation procedure requires dedicated machine time. At least one tape drive and one disk unit must be available.

The procedures assume that controlware has been loaded into the peripheral controllers. If the controlware isn´t loaded, refer to coldstart procedures in section 2 of this manual.

___ 1. Ensure that the tape (639 or 66X) and disk (834, 836, 844, 885, or 895) controlware are present and functioning properly and perform a system warmstart.

a. Mount the CIP tape without the write-enable ring and ready the unit.

b. Set the deadstart panel of a model 835, 840, 845, 850, 855, 860, or 990 for a warmstart from tape; for a model 810, 815, 825, or 830, enter the values for a warmstart from tape through the Maintenance Options display. Refer to Warmstart Procedures in section 2 of this manual. After a successful warmstart, the Initial Options display should appear.

___ 2. Press the carriage return key to select the default option, Build Deadstart Disk.

___ 3. Enter a U to select the Update option. This option installs the CIP and preserves other information previously stored on the disk.

___ 4. Enter the channel, equipment, and unit numbers of the deadstart disk as prompted.

___ 5. The message INSTALLATION COMPLETE appears upon completion of CIP installation. The system is now ready to call CMSE, install the operating system, or execute CTI utilities.

MANUAL INSTALLATION PROCEDURE (SHARED-DISK)

Use the manual installation procedure when you have modified the components of the CIP tape or when you need tests other than the predefined subset of tests.

Install CIP Components

Perform the following sequence to install CIP components in a shared-disk mode.

___ 1. Ensure that the tape (639 or 66X) and disk (834, 836, 844, 885, or 895) controlware are present and functioning properly, and perform a system warmstart.

a. Mount CIP tape without the write-enable ring and ready the unit.

b. Set the deadstart panel of a model 835, 840, 845, 850, 855, 860, or 990 for a warmstart from tape; for a model 810, 815, 825, or 830, enter the values for a warmstart from tape through the Maintenance Options display. Refer to Warmstart Procedures in section 2 of this manual. After a successful warmstart, the Initial Options display should appear.

___ 2. Install CTI module on deadstart disk.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Enter a C to install CTI. The C option display appears.

d. Press CR. The system now requests channel, equipment, and unit numbers for the disk device. This serves to properly prepare a disk which has not previously had CTI, MSL, or HIVS installed on it. Enter channel, equipment and unit number for device.

e. Press CR. The following message appears:

```
ENTRY OF (CR) WILL CAUSE
RELEASE OF CTI-MSL/HIVS RESERVED
DISK SPACE
```

f. Press CR. The following message appears if the operation is successful:

```
RELEASE COMPLETE
(CR) TO PROCESS DIFFERENT DEVICE
```

g. Press CR. The C option display reappears.

h. Press CR. The following warning message appears.

```
                    *WARNING*

PERMANENT FILES MAY BE LOST IF CTI IS NOT
ALREADY INSTALLED ON THIS DEVICE

(CR) TO CONTINUE
```

i. Press CR. The system now requests channel, equipment, and unit numbers of disk device. Enter channel, equipment, and unit number for device.

The following message appears when CTI is loaded successfully:

```
INSTALL COMPLETE
(CR) TO PROCESS DIFFERENT DEVICE
```

j. If your site has more than one system disk, press CR and repeat steps 2d through 2i for each disk.

k. Press DEADSTART switch to return to the Initial Options display. The version of CIP is indicated at the bottom of the display.

NOTES

1. If a CC634B display terminal is being used as the primary console, perform the following steps to deadstart:

    a. Hold down the CTRL key while pressing the G key.

    b. Hold down the CTRL key while pressing the R key.

2. For models 810, 815, 825, and 830, after deadstarting, enter an S (followed by a CR for models 815 and 825) to execute the selected deadstart program and return to the Initial Options display.

3. These notes apply to all further instructions in these procedures to press the DEADSTART switch and return to the Initial Options display.

___ 3. Install CTI/MSL Disk Area (CDA) Utility.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Select the D option. Then enter the disk and tape channel and unit number as prompted by the display. See CAU utility in section 6 of this manual for details.

If the disk unit selected for the CDA utility is reserved by another controller, the following message appears:

```
DISK UNIT RESERVED
```

Clear the reserved status of the disk unit to initiate automatic retry.

If the disk selected for the CDA utility is a fixed module drive whose READ ONLY switch is set, the following message appears:

```
READ ONLY SELECTED.
```

Turn off the READ ONLY switch and press CR to initiate automatic retry.

After the switch is cleared, the following message appears:

```
NO SPACE RESERVED FOR CTI/MSL
DISK AREA.  MSL/HVS OR OS FILES
MAY BE LOST IF THE OPERATION
CONTINUES.  ENTER (CR)
TO CONTINUE OR DEADSTART.
```

d. Enter a CR to use the currently selected disk. When the CDA is successfully installed, the CAU initial options display appears.

e. If your site has more than one system disk, press the backspace key and repeat steps 3d and 3e for each disk.

___ 4. Install microcode to deadstart disk.

a. Enter a C while displaying the CAU initial options display.

b. When installation is complete, the CAU initial options display appears.

___ 5. Install default parameter deck to deadstart disk from UDS tape.

a. Enter a B while displaying the CAU initial options display.

b. When installation is complete, the CAU initial options display appears.

___ 6. Modify default parameter deck.

a. Enter an A while displaying the CAU initial options display. The initial display for the A options appears.

b. Enter a + character and follow it with a CR.

c. Enter default values as prompted by the display. Follow each entry with a CR. Enter a + to advance to the next default display. Refer to the CAU utility in Section 6 of this manual for detailed instructions.

d. Upon completion of default parameter entry, the following message is displayed:

```
PARAMETER PROCESSING COMPLETE
ENTER (-), OR DEADSTART
```

e. Enter a - character followed by a CR to return to parameter entry, or press the DEADSTART switch, to return to the Initial Options display.

___ 7. Install environment interface (EI) to CTI/MSL disk area.

a. Enter a D while displaying the CAU initial options display.

b. When installation is complete, the CAU intitial options display appears.

___ 8. Install CC634B system console driver (SCD) to the disk.

a. Enter a G while displaying the CAU initial options display.

b. The CAU initial options display appears when installation is complete.

___ 9. Install monitor display driver (MDD) to the disk.

a. Enter an H while displaying the CAU initial options display.

b. The CAU initial options display appears when installation is complete.

c. Press the DEADSTART switch to return to the Initial Options display.

___10. Install MSL module to disk.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Enter a T. The console displays:

```
              TDX
DISK AND TAPE TRANSFER UTILITY
      CR TO CONTINUE
```

d. Enter a CR. Then enter TDX parameters as described in Section 6 of this manual. The TDX option display appears upon completion of these entries.

e. Enter an A to build MSL from tape.

f. Enter an F to select MSL/OS Shared Disk mode. Programs are installed at a predefined area of the disk.

The following message is displayed:

```
SAVE COMMAND BUFFER AREA
Y = YES  N = NO
```

g. Enter an N in response to the above message (No CR is required). TDX initializes the PNT and SRT and presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

h. Enter a CR to cause TDX to begin copying with the first program it encounters. When the COPY FROM selection is complete, TDX presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

i. Enter a CR to instruct TDX to copy to the last program on the tape. For tape-to-disk copies, TDX has the ability to verify data written to disk. TDX presents the following display:

```
DATA VERIFY (Y/N)
```

j. Enter a Y. TDX transfers each program to the disk, displaying the name of each program as it is copied to the disk. TDX skips over any command buffers located on the tape. Upon completion of the copy operation, TDX displays the last cylinder, track and sector used for the copy. Press the space bar to display the last available cylinder for the complete MSL build.

NOTE

> If the SRT FULL message appears instead, the edited MSL is too large for the predefined disk area. You must either obtain permission to use more of the disk and install in maintenance only mode, or use an alternate tape editing method and install a partial MSL. In either case, you cannot continue from this point without deadstarting.

k. Press the space bar to clear the display and display a reduced set of TDX options.

___11. Install command buffers to disk.

a. Enter a B when the TDX options display is present. TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

b. Enter a CR to cause TDX to begin copying with the first command buffer it encounters. TDX then presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

c. Enter a CR to instruct TDX to copy to the last command buffer on the tape. For tape-to-disk copies, TDX has the ability to verify data written to disk. TDX presents the following display:

```
DATA VERIFY (Y/N)
```

d. Enter a Y. TDX transfers each command buffer to the disk, displaying the name of each command buffer as it is copied to the disk. Upon completion of the copy operation, TDX displays the last cylinder, track, and sector used for the copy.

e. Press the space bar to clear the message and display a reduced set of TDX options.

___12. The system is now ready to install the operating system. The site analyst should install the operating system according to the installation plan agreed upon previously.

MSL 15X INSTALLATION PROCEDURE (MAINTENANCE ONLY)

Use this procedure to install an unedited CIP binary tape and microcode during installation and checkout of a Model 810, 815, 825, 830, 835, 840, 845, 850, 855, 860, or 990 Computer System. You should also use this procedure if you have customer permission to install an edited MSL tape that exceeds the disk limitations for shared-disk mode.

PREPARATORY PROCEDURES

- Gather installation materials.
- Read documentation.

Gather Installation Materials

___ 1. CYBER Initialization Package (CIP)

Locate the CYBER Initialization Package (CIP) provided by manufacturing for your computer system. This kit contains a software release bulletin (SRB), a CIP binary tape, and documentation for your system. Be sure you have the correct kit as defined by the FCA for your system.

The tape provided with the system hardware includes CTI, MSL, EI, microcode, command buffers, and model-dependent tests.

___ 2. Controlware Decks.

Locate the controlware decks for the 66X Magnetic Tape System (MTS) and/or 885 or 844-7X54 Disk System as required by your installation.

___ 3. Scratch disk on which to install MSL.

___ 4. Scratch tape on which to save modified command buffers.

Read Documentation

___ 1. Read the SRB furnished in the CIP.

___ 2. Review the Field Change Announcement (FCA). Check compatibility of the computer system with CIP and operating system tapes provided.

___ 3. Review the following sections of the MSL 15X Reference Manual:

- Coldstart, warmstart, and power-on initialization procedures in section 2.
- CTI/MSL Disk Area Utility (CAU) in section 6. Review options C and D.
- Tape-to-Disk Utility (TDX) in section 6. Review options A, B, C, D, and F.
- Command Buffer Modification in section 4.

___ 4. Review the displays and options described in the CIP User's Handbook.

INSTALLATION PROCEDURE (MAINTENANCE ONLY)

This procedure assumes that this is the initial installation of CIP components and that a disk unit is dedicated for maintenance (maintenance only mode). For MSL 15X shared-disk situations, use the MSL 15X Shared-Disk Installation Procedures provided earlier in this appendix.

___ 1. Ensure that the tape (639 or 66X) and disk (834, 836, 844, 885, or 895) controlware are present and functioning properly.

a. Mount CIP tape without the write enable ring and ready the unit.

b. Refer to Coldstart Procedures in section 2 of this manual and perform the appropriate coldstart. Coldstart loads the tape and/or disk controlware to their respective controllers.

c. Set the deadstart panel of a model 835, 840, 845, 850, 855, 860, or 990 for a warmstart from tape; for a model 810, 815, 825, or 830 enter the values for a warmstart from tape through the Maintenance Options display. Refer to Warmstart Procedures in section 2 of this manual.

___ 2. Install CTI module on a disk.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Enter a C to install CTI. The C option display appears.

d. Press R. The system now requests channel, equipment, and unit numbers for the disk device. This serves to properly prepare a disk which has not previously had CTI, MSL, or HIVS installed on it. Enter channel, equipment and unit number for device.

e. Press CR. The following message appears:

```
ENTRY OF (CR) WILL CAUSE
RELEASE OF CTI-MSL/HIVS RESERVED
DISK SPACE
```

f. Press CR. The following message appears if the operation is successful:

```
RELEASE COMPLETE
(CR) TO PROCESS DIFFERENT DEVICE
```

g. Press CR. The C option display reappears.

h. Press CR. The following warning message appears.

```
          *WARNING*
PERMANENT FILES MAY BE LOST
IF CTI IS NOT ALREADY
INSTALLED ON THIS DEVICE

(CR) TO CONTINUE
```

i. Press CR. The system now requests channel, equipment, and unit numbers of disk device. Enter channel, equipment, and unit number for device.

The following message appears if CTI is loaded successfully:

```
INSTALL COMPLETE
(CR) TO PROCESS DIFFERENT DEVICE
```

j. Press DEADSTART switch to return to the Initial Options display.

NOTES

1. If a CC634B display terminal is being used as the primary console, perform the following steps to deadstart:

   a. Hold down the CTRL key while pressing the G key.

   b. Hold down the CTRL key while pressing the R key.

2. For models 810, 815, 825, and 830, after deadstarting, enter an S (followed by a CR for models 815 and 825) to execute the selected deadstart program and return to the Initial Options display.

3. These notes apply to all further instructions in these procedures to press the DEADSTART switch and return to the Initial Options display.

___3. Install microcode to CTI/MSL disk area.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Select the D option. Then enter the disk channel and unit number as prompted by the display. See CAU utility in section 6 of this manual for details.

If the disk unit selected is reserved by another controller, the following message appears:

    DISK UNIT RESERVED

Clear the reserved status of the disk unit to initiate automatic retry.

If the disk selected is a fixed module drive whose READ ONLY switch is set, the following message appears:

    READ ONLY SELECTED.

Turn off the READ ONLY switch and press CR to initiate automatic retry.

After the switch is cleared, the following message appears:

```
NO SPACE RESERVED FOR CTI/MSL
DISK AREA.  MSL/HVS OR OS FILES
MAY BE LOST IF THE OPERATION
CONTINUES.  ENTER (CR)
TO CONTINUE OR DEADSTART
```

d. Enter a CR to use the currently selected disk. When the CDA is successfully installed, the CAU initial options display appears.

e. Enter a C. Then enter the tape type, channel, equipment, and unit as prompted by the displays, or enter a CR at each prompt to accept the default value. Enter the microcode type for the model of computer system. Refer to the CAU utility in section 6 of this manual for detailed instructions.

f. When installation is complete, the CAU initial options display appears.

___ 4. Install environment interface (EI) to CTI/MSL disk area.

a. Enter a D while displaying the CAU initial options display.

b. When installation is complete, the CAU intitial options display appears.

c. Press the DEADSTART switch to return to the Initial Options display.

___ 5. Install MSL module to disk.

a. Enter a B while displaying the Initial Options display. The Build Deadstart Disk display appears.

b. Enter an M. The Manual Operations display appears.

c. Enter a T. The console displays:

```
              TDX
DISK AND TAPE TRANSFER UTILITY
         CR TO CONTINUE
```

d. Enter a CR. Then enter TDX parameters as described in section 6 of this manual. The TDX option display appears upon completion of these entries.

e. Enter an A to build MSL from tape.

f. Enter an M to select the Maintenance Only option when the initial display presented by option A appears.

g. Enter the starting cylinder, followed by a CR. Refer to the table provided in the DSRB for starting cylinder and disk type. If the disk is a scratch disk, you can use cylinder number 0. However, if the disk is to be used to hold the operating system after system checkout, use the values in the DSRB.

   The following message is displayed:

   SAVE COMMAND BUFFER AREA
   Y = YES   N = NO

h. Enter an N in response to the above message (No CR is required). TDX initializes the PNT and SRT and presents the following display:

   COPY FROM
   -CR- = 1ST NAME

i. Enter a CR to cause TDX to begin copying with the first program it encounters. When the COPY FROM selection is complete, TDX presents the following display:

   COPY THRU
   -CR- = LAST NAME

j. Enter a CR to instruct TDX to copy to the last program on the tape. For tape-to-disk copies, TDX has the ability to verify data written to disk. TDX presents the following display:

   DATA VERIFY (Y/N)

k. Enter a Y. TDX transfers each program to the disk, displaying the name of each program as it is copied to the disk. TDX skips over any command buffers located on the tape. Upon completion of the copy operation, TDX displays the last cylinder, track and sector used for the copy. Press the space bar to display the last available cylinder for the complete MSL build.

l. Press the space bar to clear the message and display a reduced set of TDX options.

___ 6. Install command buffers to disk.

a. Enter a B while the TDX options display is presented. TDX presents the following display:

   COPY FROM
   -CR- = 1ST NAME

b. Enter a CR to cause TDX to begin copying with the first command buffer it encounters. TDX then presents the following display:

   COPY THRU
   -CR- = LAST NAME

c. Enter a CR to instruct TDX to copy to the last command buffer on the tape. For tape-to-disk copies, TDX has the ability to verify data written to disk. TDX presents the following display:

```
DATA VERIFY (Y/N)
```

d. Enter a Y. TDX transfers each command buffer to the disk, displaying the name of each command buffer as it is copied to the disk. Upon completion of the copy operation, TDX displays the last cylinder, track and sector used for the copy.

e. Press the DEADSTART switch to return to the Initial Options display.

___ 7. Perform power-on initialization.

a. Refer to the power-on initialization procedures in section 2 of this manual and perform steps 1 through 5 of the procedure for the model of computer being used. After performing step 5, the Initial CMSE display appears.

___ 8. Modify command buffers.

a. While displaying the Initial CMSE display, enter parameters to define the system configuration. Follow each entry with a CR.

b. Enter a CR after all system configuration changes have been made. The CMSE A and B display headers appear. Refer to Displays in section 3 of this manual.

c. Display and modify the command buffers as directed by comments embedded in each command buffer. Refer to Command Buffer Modification in section 4 of this manual for detailed instructions.

d. Press the DEADSTART switch to return to the Initial Options display.

___ 9. Copy command buffers to tape.

a. Mount a scratch tape with a write ring and ready the tape unit.

b. Enter a B character while displaying the Initial Options display. The Build Deadstart Disk display appears.

c. Enter an M. The Manual Operations display appears.

d. Enter a T while displaying the Manual Operations display.

e. Enter an F when the TDX options display is presented. TDX presents the following display:

```
COPY FROM
-CR- = 1ST NAME
```

f. Enter the name of the first command buffer to be copied to tape and follow it with a CR, or enter only a CR to cause TDX to begin copying with the first command buffer listed in the command buffer PNT. TDX then presents the following display:

```
COPY THRU
-CR- = LAST NAME
```

g. Enter the name of the last command buffer to be copied and follow it with a CR, or enter only a CR to cause TDX to copy to the last name in the PNT. TDX presents the following message:

IS DATA ON THE TAPE VALID (Y/N)

h. Enter a Y to add command buffers to an existing tape, or an N to create a new tape of command buffers. Following either response, TDX executes the operation and displays a reduced set of copy options.

i. Press the DEADSTART switch to return to the Initial Options display.

____10. The system is now ready to perform hardware checkout. When hardware checkout is complete, contact the site analyst and jointly prepare a plan to install the operating system.

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