



CONTROL DATA®
OMEGA/480 - MODEL 1
CENTRAL PROCESSING UNIT

AA125A, AA126A, AA127A,
AA128A, AA129A, AA130A

OPERATING PROCEDURES

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PREFACE

The manual contains information necessary to operate the OMEGA computer system. A visual index is provided, as an aid, for quickly locating the controls and indicators described. For a more detailed description of the OMEGA see:

- OMEGA/Theory of Operation (81-104-000)
- OMEGA/Maintenance Manual (81-104-003)

The reader of this manual is assumed to have basic computer knowledge and experience.

This manual is divided into sections as follows:

SYSTEM CONTROL PANEL INDICATORS, SWITCHES, AND KEYS - This section describes the purpose of the individual indicators, switches and keys. It does not describe the applications of these facilities beyond the normal operating procedures.

CONSOLE FILE - This section contains the procedures required to handle the insertion and removal of the flexible magnetic disks.

CONSOLE PRINTER KEYBOARD - This section contains the printer/key board manual operations initial setup, operator adjustment, operator maintenance procedures and descriptions of indicators and controls.

OPERATING PROCEDURES - This section contains the procedures for operation initialization and error recovery.

HANDLING ABNORMAL SITUATIONS - This section contains general and specific flowcharts and text for the reader's use in analyzing abnormal situations.

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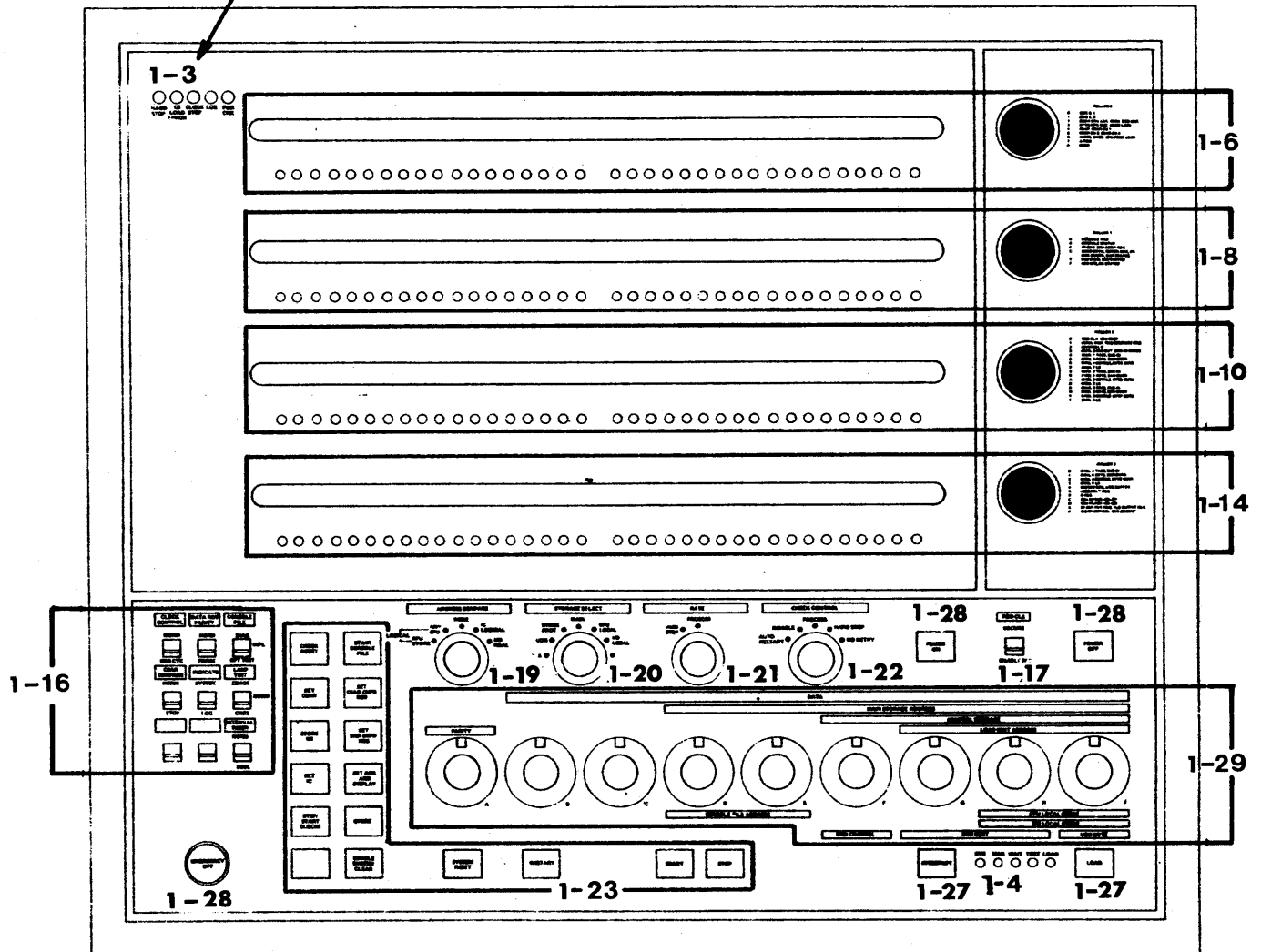
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ABBREVIATIONS

AVLBL	available	LSAR	local storage address register
ADR	address	MCH CHK	machine check
ALU	arithmetic logic unit	MPX	multiplexer
BFFR	buffer	MRK	mark
BLK	block	MS	main storage
BNDRY	boundary	MTR	meter
CDA	chain data	NEQ	not equal
CE	correctable error	NH	not high
CHAN	channel	OP	operate
CHK	check	PE	parity error
CLK	clock	PRKB	printer-keyboard
CMD	command	PSW	program status word
CMPT	complete	PTY	parity
CNT	control	RD	read
CNTL	control	RECON	reconfigure
CNTR	counter	REG	register
COMP	compare	RIP	retry in process
COND	condition	RST	reset
CONS	console	SAR	storage address register
CPU	central processor unit	SCU	storage control unit
CS	control storage	SEL	select
CSAR	control storage address register	SP	storage protect
CSIC	control storage instruction counter	SP/IVA	storage protect violation or invalid address violation
DAT	dynamic address translation	SP VIOL	storage protect violation
DBWD	doubleword	STATS	status register
DEGR	degrade	SUPR	suppress
DEL	delete	SYS	system
DTB	data transfer bus	TLB	translation lookaside buffer
ECC	error correction control	TMR	timer
ERR	error	TRANS	translation
EXCP	exception	UCW	unit control word
FWD	forward	UE	uncorrectable error
FNB	function branch	VLD	valid
FRWD	forward	WD	write data
HRT	high resolution timer	WR	write
IDAW	indirect address word	XER	transfer
INTF	interface	XF	transfer
ISO	inhibit select out	XFR BUS	transfer bus
IVA	invalid address		

VISUAL INDEX

THESE NUMBERS REFER TO THE PAGES OF THIS MANUAL WHERE THE APPLICABLE HARDWARE IS DISCUSSED.



OMEGA CONSOLE

INTRODUCTION

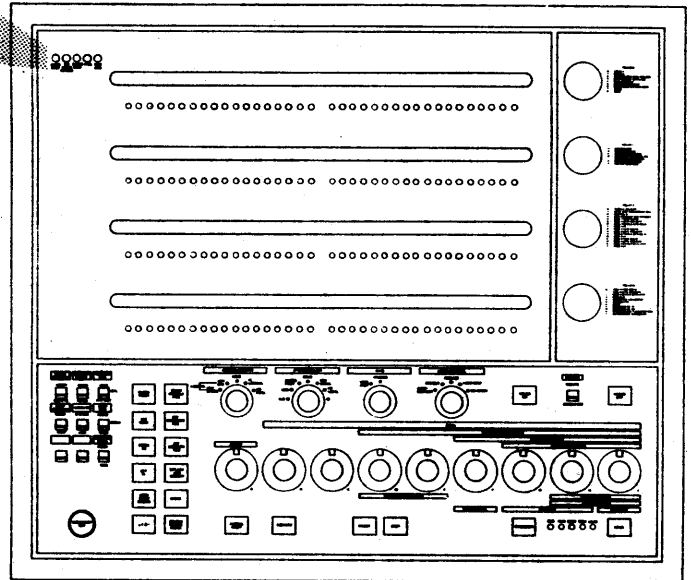
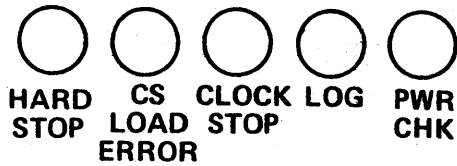
The OMEGA Computer Systems' Central Processing Unit (CPU) has indicators and manual controls that permit operation of the system and observation of the results of any operation. These indicators and controls are assembled on a panel that serves as both operator's system control and a maintenance control panel.

The Console file is the microprogram loading device for the OMEGA System. The Maintenance/File Card (MF) is the interface and control link between the CPU and the console file.

The console file, through the MF card loads control storage with either a microprogram, for user operations, or with a microdiagnostic program for checking out the CPU. An initial microprogram load (IMPL), or a diagnostic operation initiated from the CPU console, turns console-file power on.

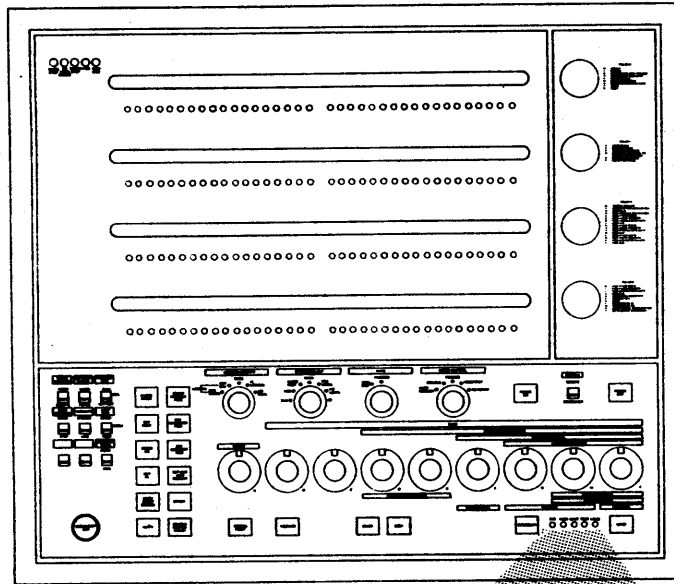
The console printer/keyboard is connected to the CPU through the multiplexer channel interface. The control unit is the OP card.

OPERATOR ACTION INDICATORS



INDICATOR	CONDITION INDICATED
HARD STOP	CPU is in a Hard-Stop condition. CPU clock not running.
CS LOAD ERROR	Floppy Disk did not load correctly to control storage.
CLOCK STOP	CPU clock is stopped. Microinstruction processing has ceased.
LOG	A log of the CPU status to the Console Buffer is in progress. This operation, initiated by a machine check, takes approximately 2 msecs. Should the light be on for more than an instant, the machine is constantly receiving machine checks.
PWR CHK	A power supply failure occurred during system operation, or a power supply is at margin.

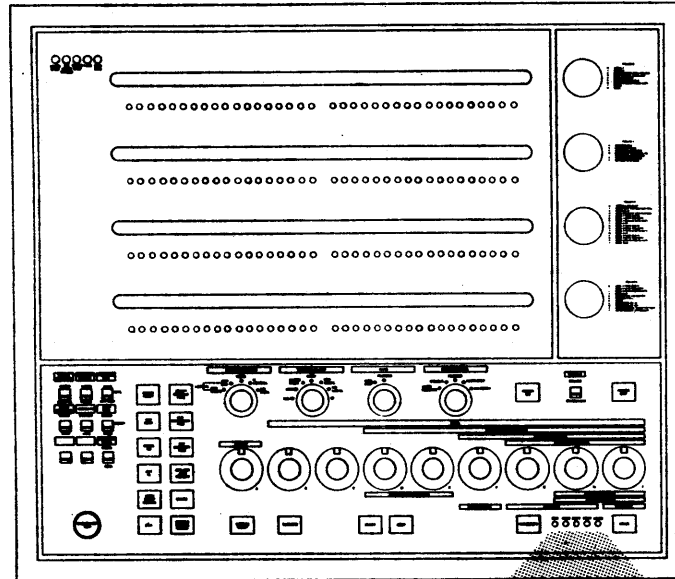
SYSTEM INDICATORS.



SYS MAN WAIT TEST LOAD
 ○ ○ ○ ○ ○

INDICATOR	CONDITION INDICATED
SYS	CPU operations are in progress.
MAN	Program processing is stopped and will not resume until operator intervention occurs. All pending interrupts are handled. Manual store/display operations are possible only when the MAN indicator is on.
WAIT	System is in a wait state (CPU running but no instruction processing taking place). If an interrupt occurs, the CPU is taken out of wait state and processing is started under control of the program being executed.

SYSTEM INDICATORS

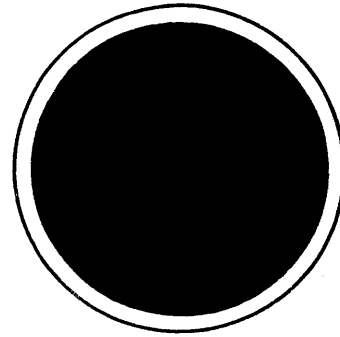


SYS MAN WAIT TEST LOAD

○ ○ ○ ○ ○

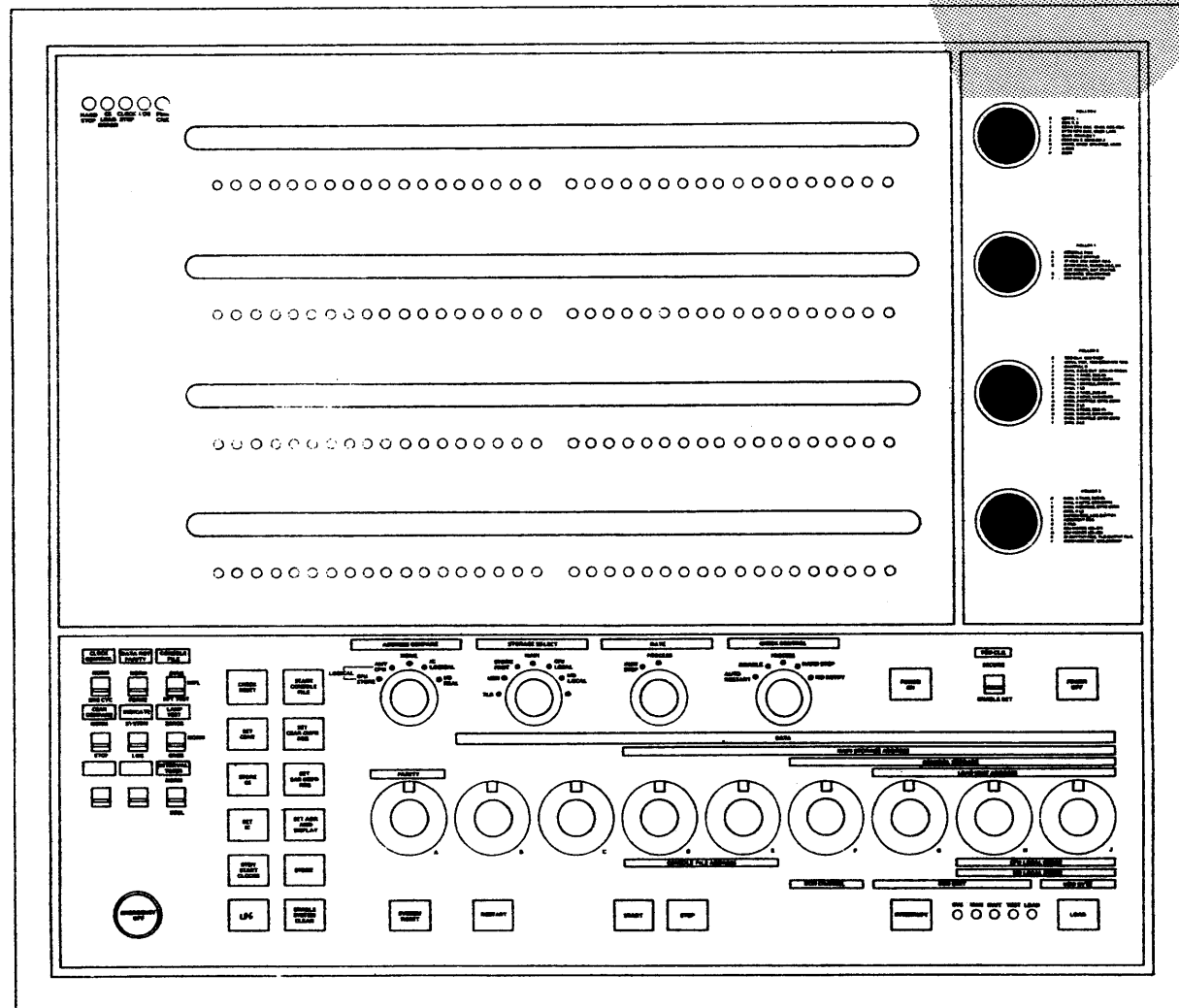
INDICATOR	CONDITION INDICATED
TEST	<p>Any of the following switches are not in the positions indicated:</p> <ol style="list-style-type: none"> 1. CHECK CONTROL -----PROCESS 2. RATE -----PROCESS 3. ADDRESS COMPARE -----NONE 4. CLOCK CONTROL -----NORM 5. DATA ROT PARITY -----NORM 6. CONSOLE FILE -----IMPL 7. INTERVAL TIMER -----NORM 8. CSAR COMPARE -----NORM
LOAD	<p>Initial Program Load (IPL) is in process. This indicator turns on when LOAD is pressed and turns off when the initial PSW is loaded successfully.</p>

ROLLER INDICATORS



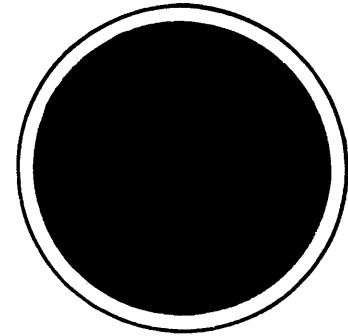
ROLLER 0

- 0 CSIC 0, 1
- 1 CSIC 2, 3
- 2 DATA SRV CSIC, CHNL END CSIC
- 3 BYTE MPX CSIC, CSDR LATE
- 4 CSAR, CSAR BU 1
- 5 CSAR BU 2, CSAR BU 3
- 6 STATS, EREG, CPU ERSS, LSAR
- 7 A REG
- 8 CSDR
- F DIAG

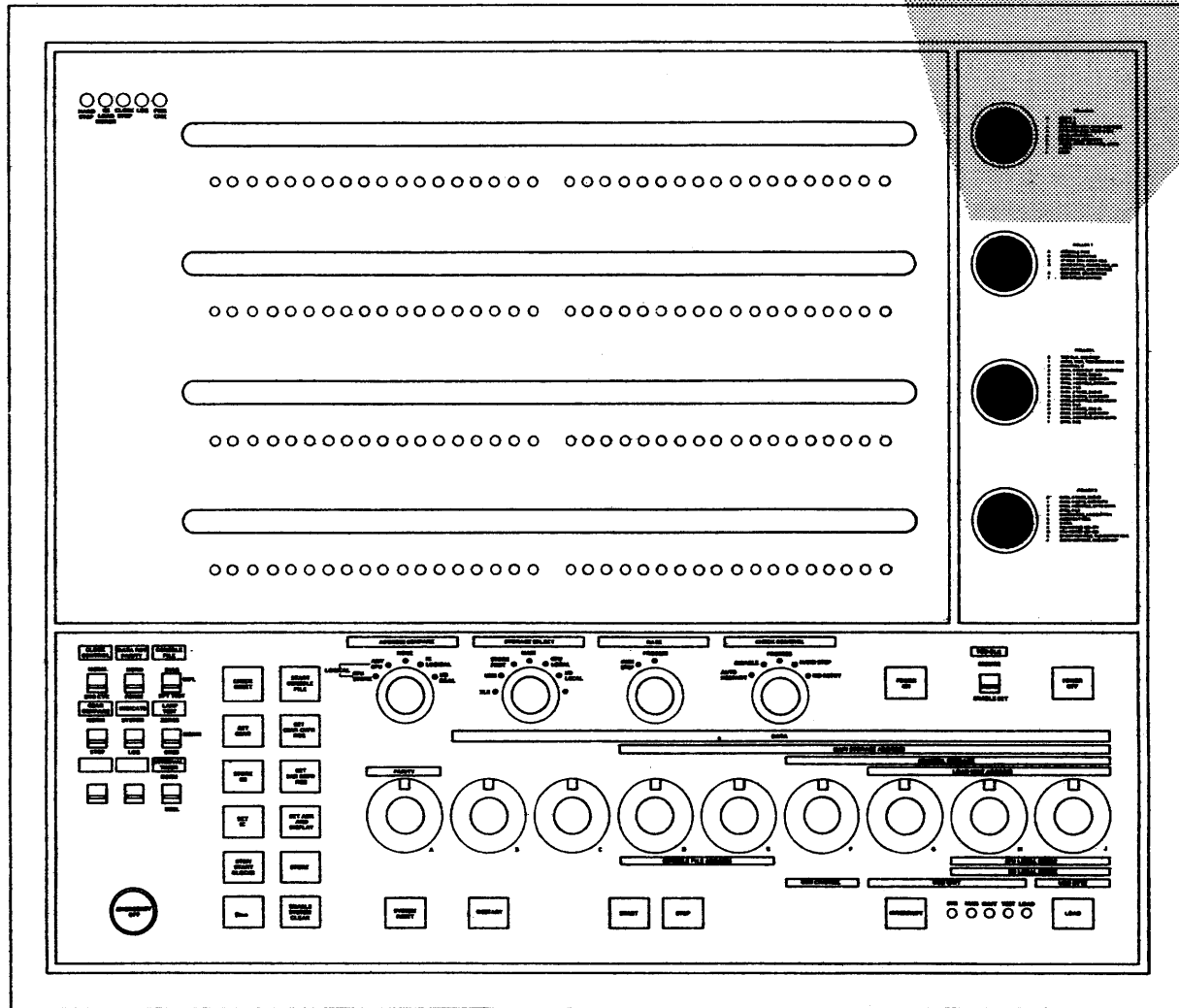


DISPLAY ROLLER 0, SWITCH			
SWITCH POSITION	BIT POSITION	INFORMATION DISPLAYED	LOGIC DRAWING
0	4-17	Control Storage Instruction Counter 0 (14 Bits)	CPU-CA-014
0	22-35	Control Storage Instruction Counter 1 (14 Bits)	CPU-CA-014
0	18	System Reset Trap Latch (1 bit)	CPU-CA-007
0	19	Machine Check Trap Latch (1 bit)	CPU-CA-007
0	20	Branch Latch (1 bit)	CPU-CA-007
0	21	Call Latch (1 bit)	CPU-CA-007
1	0	Store Protect/Invalid Address Trap Latch (1 bit)	SCU-SA-013
1	1	Dynamic Address Translation Trap Latch (1 bit)	SCU-SA-023
1	2	Function Branch 1 Latch (1 bit)	CPU-CA-007
1	3	Function Branch 2 Latch (1 bit)	CPU-CA-007
1	4-17	Control Storage Instruction Counter 2 (14 bits)	CPU-CA-015
1	18-20	Control Storage Instruction Counter Pointer C, B, & A (3 bits)	CPU-CA-008
1	21	Return Latch (1 bit)	CPU-CA-007
1	22-35	Control Storage Instruction Counter 3 (14 bits)	CPU-CA-015
2	5-17	Control Storage Instruction Counter Channel Data Service	CPU-CA-016
2	23-35	Channel End Control Storage Instruction Counter (13 bits)	CPU-CA-016
3	5-17	Byte Multiplexer Control Storage Instruction Counter	CPU-CA-017
3	25-35	Control Storage Data Register Late (11 bits)	CPU-CA-001
4	5-17	Control Storage Address Register (13 bits)	CPU-CA-010
4	23-35	Control Storage Address Register Backup 1 (13 bits)	CPU-CA-011
5	5-17	Control Storage Address Register Backup 2 (13 bits)	CPU-CA-011
5	23-35	Control Storage Address Register Backup 3 (13 bits)	CPU-CA-011
6	0-8	CPU Status (8 bits +P)	CPU-AU-017
6	9	Data Transfer Bus Parity Error (1 bit)	CPU-AU-025
6	10-17	Exception Register (8 bits)	CPU-AU-018
6	18	Carry 0 (1 bit)	CPU-AU-016
6	19	P Register Parity Error (1 bit)	CPU-AU-025
6	20	Q Register Parity Error (1 bit)	CPU-AU-025
6	21-24	Local Storage Address Register (4 bits)	CPU-AU-019
6	25	Spill Left (1 bit)	CPU-AU-013
6	26	Arithmetic Logic Unit Error (1 bit)	CPU-AU-009
7	0-35	"A" Register +4 Parity Bits (36 bits)	CPU-AU-009
8	0-35	Control Storage Data Register	CPU-AU-001
F	0-35	Diagnostics	

ROLLER INDICATORS

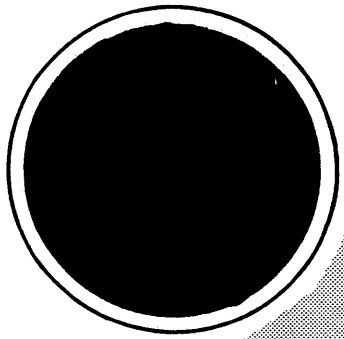


ROLLER 1
B CONSOLE FILE
A CONSOLE STATUS
C SP REG, SCU STATUS
D CARD SKEW, RECON REG, MS
E SIZE CONTR, DAT STATUS
F SCU ERRS, SCU STATUS
F SCU OPS, MS STATUS



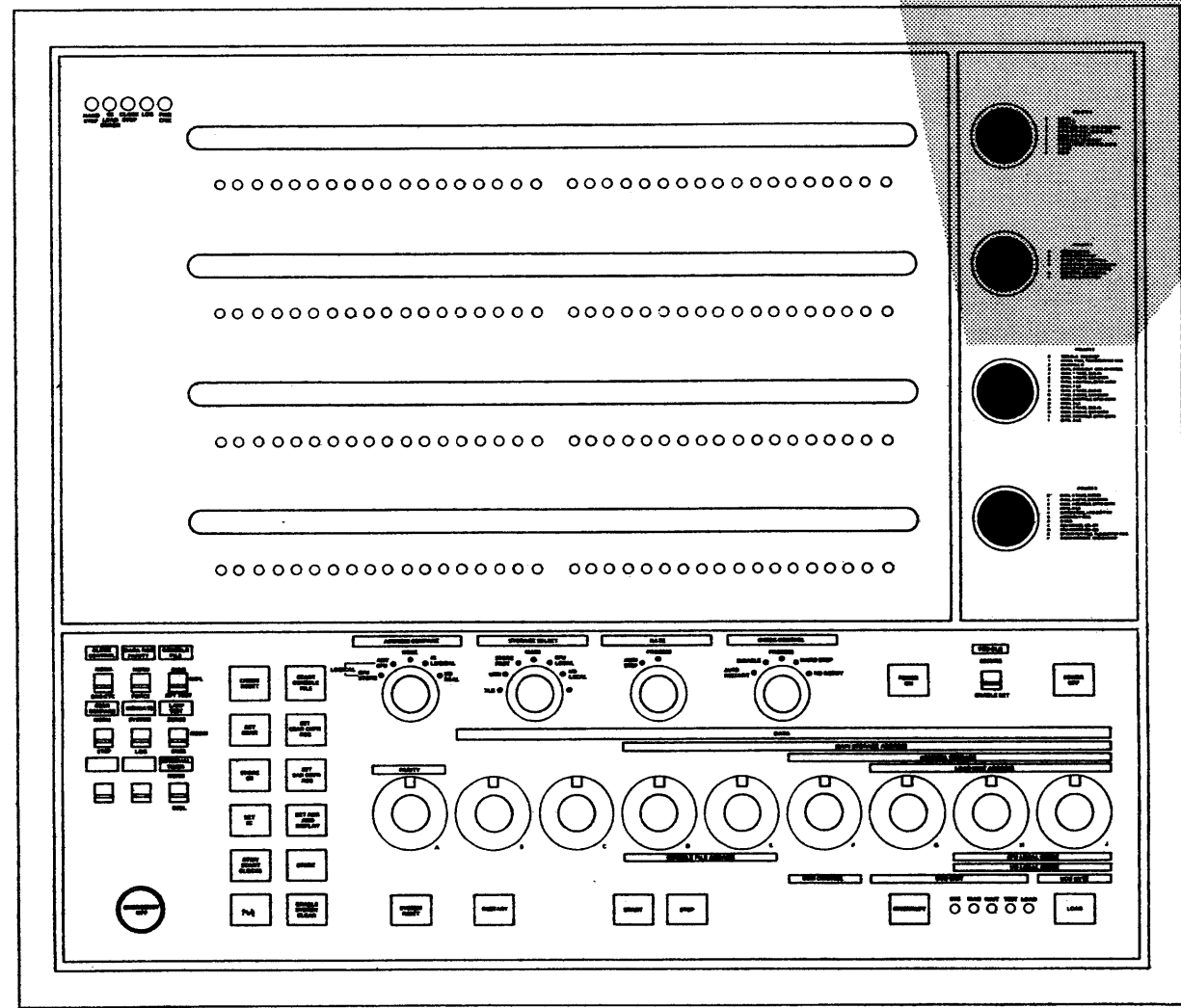
DISPLAY ROLLER 1, SWITCH			
SWITCH POSITION	BIT POSITION	INFORMATION DISPLAYED	LOGIC DRAWING
A	28-31	Data Transfer Bus in Microprogram (4 bits) 0 thru 3	CNSL-MF-002
A	32	Transfer Bus Compare Error (1 bit)	CNSL-MF-002
A	33	Hard Stop (1 bit)	CNSL-MF-017
A	34	Clock Stopped (1 bit)	CNSL-MF-017
A	35	Log (1 bit)	CNSL-MF-017
B	0-6	CONSOLE FILE ADDRESS (7 Bits)	CPU-CA-028
B	9-17	File Command Register (8 bits +P)	CNSL-MF-006
B	18-26	File Controls (9 bits)	CNSL-MF-013
B	18	Start bit (1 bit)	CNSL-MF-006
B	19	File wrd parity (1 bit)	CNSL-MF-006
B	20	Mode (. bit)	CNSL-MF-006
B	21	Run File (1 bit)	CNSL-MF-011
B	22	Ready : (1 bit)	CNSL-MF-011
B	23	Search (1 bit)	CNSL-MF-011
B	24	Read Latch (1 bit)	CNSL-MF-011
B	25	Error . (1 bit)	CNSL-MF-011
B	26	Error : (1 bit)	CNSL-MF-011
B	27	Send Meter Out (1 bit)	CNSL-IB-008
B	28	Data Transfer Bus Parity Error (1 bit)	CNSL-MF-002
B	29	Control Storage Address Register Compare Negative (1 bit)	CNSL-MF-022
B	30	Control Storage Data Register Parity Error (1 bit)	CPU-CA-002
B	31	Log Condition (1 bit)	CNSL-MF-008
B	32	Storage Control Unit Hard Stop (1 bit)	SCU-SC-015
B	33	Central Processor Unit Error (1 bit)	CPU-AU-025
B	34	Console Error (1 bit)	CNSL-MF-015
C	0-8	Storage Protect Register (9 bits) P+O thru 7	SCU-SA-001
C	9-35	Storage Control Unit Address Register (24+3P bits)	SCU-SA-002
D	0-8	Main Storage Card Skew Register (9 bits)	SCU-SA-029
D	0-2	Bytes : & 2 (3 bits)	SCU-SA-029
D	3-5	Bytes : & 4 (3 bits)	SCU-SA-029
D	6-8	Bytes : & 6 (3 bits)	SCU-SA-029
D	10-13	Reconfigure register (4 bits) 0 thru 3	SCU-SA-028
D	14-17	Main Storage Size Control (4 bits) 0 thru 3	SCU-SA-028
D	19	Data Mode (1 bit)	SCU-SC-022
D	20-25	Translation Lookaside Buffer (6 bits)	SCU-SA-024
D	20	Left Parity (1 bit)	SCU-SA-024
D	21	Left Use	SCU-SA-024
D	22	Left Delete (1 bit)	SCU-SA-024
D	23	Right Parity (1 bit)	SCU-SA-024
D	34	Right Use (1 bit)	SCU-SA-024
D	25	Right Delete (1 bit)	SCU-SA-024
D	26	Dynamic Address Translation Trap (1 bit)	SCU-SA-012
D	28	Data Transfer Bus Check (1 bit)	SCU-SA-012
D	29	Storage Protect Output Check (1 bit)	SCU-SA-005
E	3-35	Storage Control Unit Errors & Status	SCU-SC-005
E	3	Uncorrectable Error (1 bit)	SCU-SC-013
E	4	Storage Data Bus In Check (1 bit)	SCU-SC-013
E	6	Storage Protect Buffer Check (1 bit)	SCU-SC-013
E	7	Data Transfer Bus Control Check (1 bit)	SCU-SC-013
E	8	Data Transfer Bus Address Check (1 bit)	SCU-SC-013
E	12-14	SCU Cycle (3 bits) 1 thru 3	SCU-SC-008
E	15	Stop Main Storage Ring Counter (1 bit)	SCU-SC-007
E	16	Contro. Register System Reset Mode (1 bit)	SCU-SC-022
E	17	Contro. Register ECC Mode (1 bit)	SCU-SC-022
E	21	Main Storage Error - Busy (1 bit)	SCU-SC-018
E	22	Main Storage Error - Data Available (1 bit)	SCU-SC-018
E	23	Main Storage Error - Early (1 bit)	SCU-SC-015
E	24	Soft Machine Check Exception (1 bit)	SCU-SC-016
E	26	Storage Address Register Backup Valid (1 bit)	SCU-SC-031
E	30	Start SCU Ring Counter (1 bit)	SCU-SC-005
E	31	Start Main Storage Ring Counter (1 bit)	SCU-SC-005
E	32	Load SCU Register Operation (1 bit)	SCU-SC-021
E	33	Purge Translation Lookaside Buffer Command (1 bit)	SCU-SC-021
E	35	SCU Exception	SCU-SC-025
F	3-35	SCU OPERATIONS & MAIN STORAGE STATUS	
F	3	Channe. Main Storage Operation (1 bit)	SCU-SC-006
F	4	CPU Main Storage Operation (1 bit)	SCU-SC-006
F	5	Write (lock (1 bit)	SCU-SC-004
F	6	Read Cack (1 bit)	SCU-SC-004
F	7	Read Storage Protect (1 bit)	SCU-SA-011
F	8	Write Storage Protect (1 bit)	SCU-SA-011
F	12	Main Storage Double Word Operation (1 bit)	SCU-SC-006
F	14	Main Storage Data Transfer Bus Busy (1 bit)	SCU-SC-009
F	15	Main Storage SCU Busy (1 bit)	SCU-SC-009
F	16	Data Transfer Bus Busy (1 bit)	SCU-SC-009
F	17	SCU Busy (1 bit)	SCU-SC-009
F	21	Main Storage Store (1 bit)	SCU-SC-006
F	22	Part Store (1 bit)	SCU-SD-005
F	23	Write Translation Lookaside Buffer (1 bit)	SCU-SA-011
F	24	Read Translation Lookaside Buffer (1 bit)	SCU-SA-011
F	25	Read Error Correction Control (1 bit)	SCU-SC-004
F	26	Block traps	SCU-SC-012
F	30	*Main Storage Unit Busy (1 bit)	SCU-SC-017
F	31	Main Storage Busy (1 bit)	SCU-SC-009
F	32	SCU Main Storage Operation (1 bit)	SCU-SC-006
F	33	SCU Operation Block (1 bit)	SCU-SC-012
F	34	Main Storage Operation Block (1 bit)	SCU-SC-012
F	35	CPU Hold Off (1 bit)	SCU-SC-005

ROLLER INDICATORS



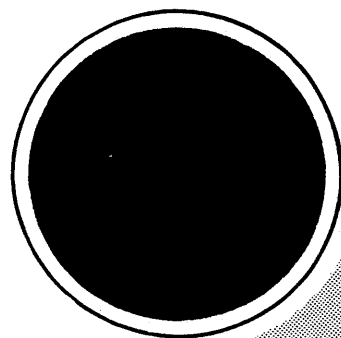
ROLLER 2

- # TOU CLK, SCU EXCP
- 1 INTVL TMR, TMR COMPARE REG
- 2 CHANNEL #
- 3 CHNL # BUS OUT, BRK-IN CODES
- 4 CHNL 1 TAGS, BUS IN
- 5 CHNL 1 KEYS, SAR CNTR
- 6 CHNL 1 CNTRLS, BYTE CNTR
- 7 CHNL 1 LS
- 8 CHNL 2 TAGS, BUS IN
- 9 CHNL 2 KEYS, SAR CNTR
- A CHNL 2 CNTRLS, BYTE CNTR
- B CHNL 2 LS
- C CHNL 3 TAGS, BUS IN
- D CHNL 3 KEYS, SAR CNTR
- E CHNL 3 CNTRLS, BYTE CNTR
- F CHNL 3 LS

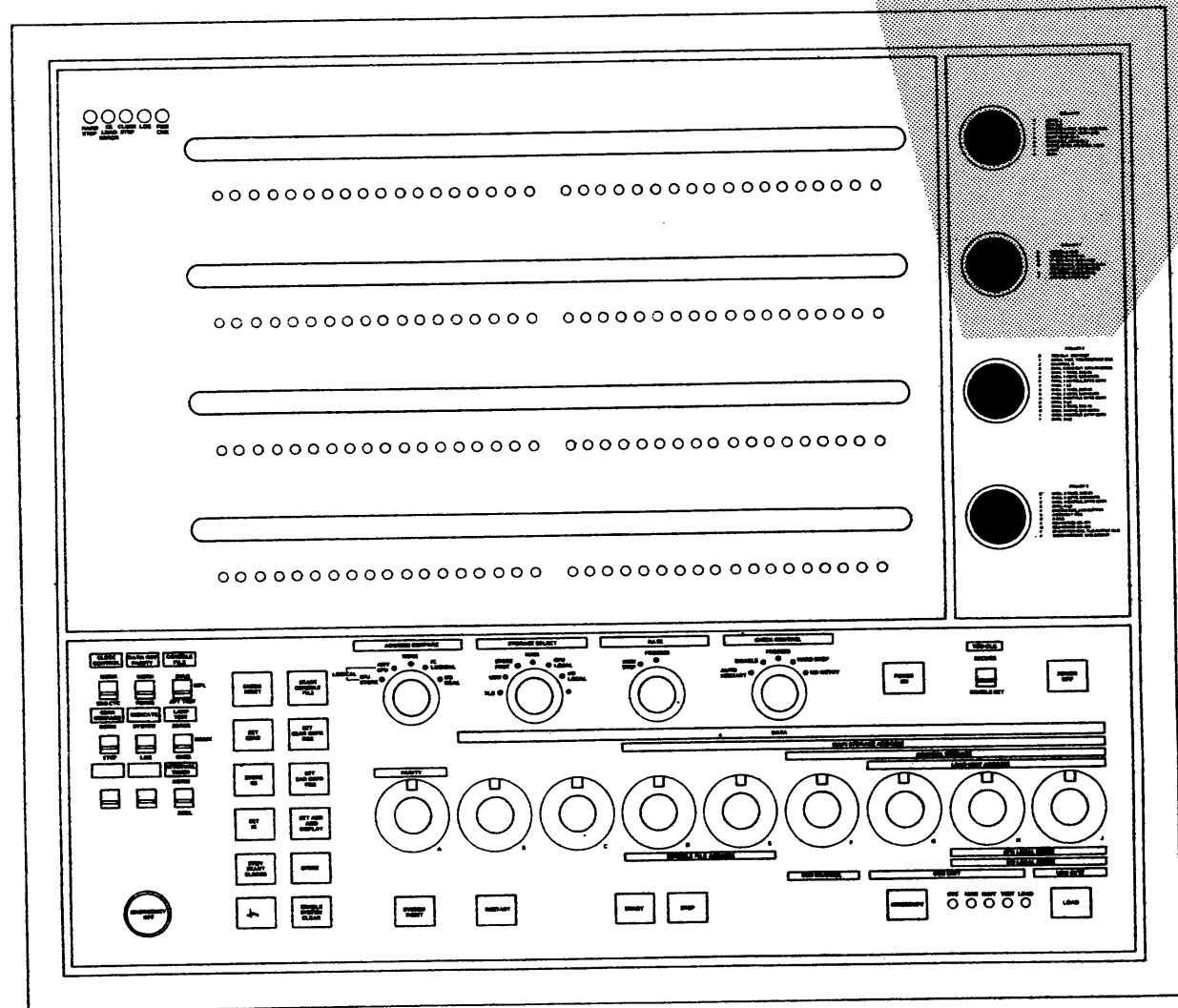


DISPLAY ROLLER 2, SWITCH			
SWITCH POSITION	BIT POSITION	INFORMATION DISPLAYED	LOGIC DRAWING
8	0-35	Channel 2 - Tags & Bus In	CH-IC-015
8	1	Not Inhibit Break In (1 Bit)	CH-IC-015
8	2	Operation Out (1 Bit)	CH-IC-015
8	3	Service Out (1 Bit)	CH-IC-015
8	4	Supervisor Out (1 Bit)	CH-IC-015
8	5	Data Out (1 Bit)	CH-IC-015
8	6	Hold Out (1 Bit)	CH-IC-015
8	7	Address Out (1 Bit)	CH-IC-015
8	8	Command Out (1 Bit)	CH-IC-015
8	10	Invalid Address (1 Bit)	CH-IC-032
8	11	Storage Protect Violation (1 Bit)	CH-IC-032
8	14	Storage Control Unit Data Error (1 Bit)	CH-IC-032
8	15	Disconnect In (1 Bit)	CH-IC-032
8	16	Count Not Equal to Zero (1 Bit)	CH-IC-019
8	17	Read (1 Bit)	CH-IC-033
8	19	Address In (1 Bit)	CH-IC-023
8	20	Data In (1 Bit)	CH-IC-023
8	21	Mark 0 In (1 Bit)	CH-IC-023
8	22	Operation In (1 Bit)	CH-IC-023
8	23	Select In (1 Bit)	CH-IC-023
8	24	Request In (1 Bit)	CH-IC-023
8	25	Status In (1 Bit)	CH-IC-023
8	26	Service In (1 Bit)	CH-IC-023
8	28-35	Bus In (8 Bits) 0 thru 7	CH-IC-024
9	0-35	Channel 2 - Keys & Storage Address Register Control	CH-IC
9	1-4	Storage Protect Key (4 Bits) 0 thru 3	CH-IC
9	10-32	Storage Address Register Counter (21 Bits) 8 thru 28	CH-IC-017
9	33	SCU Transfer Control 1 (1 Bit)	CH-IC-019
9	34	Compartment Full (1 Bit)	CH-IC-032
9	35	Compartment Empty (1 Bit)	CH-IC-032
A	0-35	Channel 2 - Controls & Byte Counter	CH-IC
A	1	Chain Data (1 Bit)	CH-IC-033
A	2	Write (1 Bit)	CH-IC-033
A	3	Not Skip (1 Bit)	CH-IC-033
A	4	Forward (1 Bit)	CH-IC-033
A	5	Not Indirect Address Word (1 Bit)	CH-IC-033
A	10	Not Page Boundary (1 Bit)	CH-IC-029
A	11	Last Store Done (1 Bit)	CH-IC-032
A	14	Invalid Address or Storage Protect Violation (1 Bit)	CH-IC-032
A	15-17	Interface Transfer Counter (3 Bits)	CH-IC-019
A	19-35	Byte Counter (16 Bits)	CH-IC-019
B	0-35	Channel 2 - Local Storage (32 Bits)	CH-IC-020
C	0-35	Channel 3 - Tags & Bus In	CH-IC
C	1	Not Inhibit Break In (1 Bit)	CH-IC-014A
C	2	Operation Out (1 Bit)	CH-IC-014A
C	3	Service Out (1 Bit)	CH-IC-014A
C	4	Supervisor Out (1 Bit)	CH-IC-014A
C	5	Data Out (1 Bit)	CH-IC-014A
C	6	Hold Out (1 Bit)	CH-IC-014A
C	7	Address Out (1 Bit)	CH-IC-014A
C	8	Command Out (1 Bit)	CH-IC-014A
C	10	Invalid Address (1 Bit)	CH-IC-031A
C	11	Storage Protect Violation (1 Bit)	CH-IC-031A
C	14	Storage Control Unit Data Error (1 Bit)	CH-IC-031A
C	15	Disconnect In (1 Bit)	CH-IC-023A
C	16	Count Not Equal to Zero (1 Bit)	CH-IC-018A
C	17	Read (1 Bit)	CH-IC-033A
C	19	Address In (1 Bit)	CH-IC-023A
C	20	Data In (1 Bit)	CH-IC-023A
C	21	Mark 0 In (1 Bit)	CH-IC-023A
C	22	Operation In (1 Bit)	CH-IC-023A
C	23	Select In (1 Bit)	CH-IC-023A
C	24	Request In (1 Bit)	CH-IC-023A
C	25	Status In (1 Bit)	CH-IC-023A
C	26	Service In (1 Bit)	CH-IC-023A
C	28-35	Bus In (8 Bits) 0 thru 7	CH-IC-034A
D	0-35	Channel 3 - Keys & Storage Address Register Control	CH-IC
D	1-4	Storage Protect Key (4 Bits) 0 thru 3	CH-IC
D	10-32	Storage Address Register Counter (21 Bits) 8 thru 28	CH-IC-016A
D	33	SCU Transfer Control 1 (1 Bit)	CH-IC-018A
D	34	Compartment Full (1 Bit)	CH-IC-031A
D	35	Compartment Empty (1 Bit)	CH-IC-031A
E	0-35	Channel 3 - Controls & Byte Counter	CH-IC
E	1	Chain Data (1 Bit)	CH-IC-033A
E	2	Write (1 Bit)	CH-IC-033A
E	3	Not Skip (1 Bit)	CH-IC-033A
E	4	Forward (1 Bit)	CH-IC-033A
E	5	Not Indirect Address Word (1 Bit)	CH-IC-033A
E	10	Not Page Boundary (1 Bit)	CH-IC-029A
E	11	Last Store Done (1 Bit)	CH-IC-031A
E	14	Invalid Address or Storage Protect Violation (1 Bit)	CH-IC-031A
E	15-17	Interface Transfer Counter (3 Bits)	CH-IC-018A
E	19-35	Byte Counter (16 Bits)	CH-IC-018A
F	0-35	Channel 3 - Local Storage (32 Bits)	CH-IC-020A

ROLLER INDICATORS

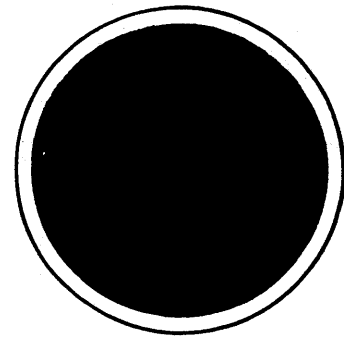


- ROLLER 2**
- 0 TOD CLK, SCU EXCP
 - 1 INTVL TMR, TMR COMPARE REG
 - 2 CHANNEL 0
 - 3 CHNL 0 BUS OUT, BRK-IN CODES
 - 4 CHNL 1 TAGS, BUS IN
 - 5 CHNL 1 KEYS, SAR CNTR
 - 6 CHNL 1 CNTRLS, BYTE CNTR
 - 7 CHNL 1 LS
 - 8 CHNL 2 TAGS, BUS IN
 - 9 CHNL 2 KEYS, SAR CNTR
 - A CHNL 2 CNTRLS, BYTE CNTR
 - B CHNL 2 LS
 - C CHNL 3 TAGS, BUS IN
 - D CHNL 3 KEYS, SAR CNTR
 - E CHNL 3 CNTRLS, BYTE CNTR
 - F CHNL 3 LS



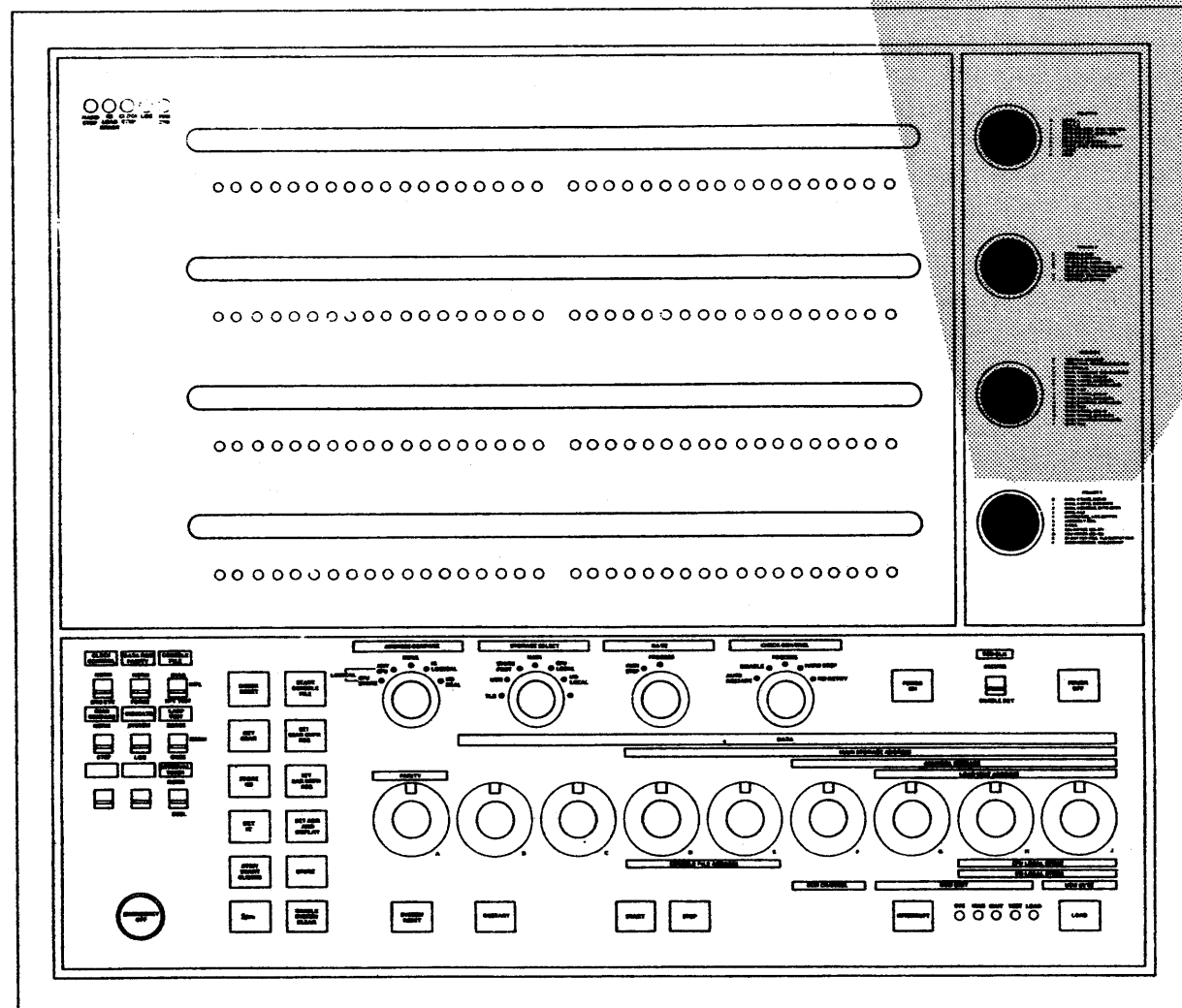
DISPLAY ROLLER 2, SWITCH			
In all switch positions parity bits are in bit positions 0,9,18,27, and represent the byte to the right of the parity indicator.			
SWITCH POSITION	BIT POSITION	INFORMATION DISPLAYED	LOGIC DRAWING
0	0-35	TIME OF DAY CLOCK & SCU EXCEPTIONS	
0	9-22	Time of Day Clock (13 Bits) Bits 40 thru 51	SCU-SC-023
0	23	Time of Day Set (1 Bit)	SCU-SC-022
0	24	Uncorrectable Error (1 Bit)	SCU-SD-022
0	25	Storage Protect Check (1 Bit)	SCU-SA-005
0	26	Cancel (1 Bit)	CNSL-OP-019
0	28	Correctable Error (1 Bit)	SCU-SD-022
0	29	Degrade (1 Bit)	SCU-SC-016
0	31-35	Timer Exception Register (5 Bits)	SCU-SC-025
0	31	High Resolution Timer (1 Bit)	SCU-SC-025
0	32	Address (1 Bit)	SCU-SC-025
0	33	Time of Day (1 Bit)	SCU-SC-025
0	34	Timer (1 Bit)	SCU-SC-025
0	35	Compare (1 Bit)	SCU-SC-025
1	9-22	Interval Timer (12 Bits) Bits 40 thru 51	SCU-SC-024
1	23-35	Timer Compare Register (12 Bits) 40 thru 51	SCU-SC-024
2	0-35	Channel 0,36 Bits	CH-IB
2	1	Inhibit Select Out (1 Bit)	CH-IB-005
2	2	Operation Out (1 Bit)	CH-IB-005
2	3	Service Out (1 Bit)	CH-IB-005
2	4	Supervisor Out (1 Bit)	CH-IB-005
2	5	Data Out (1 Bit)	CH-IB
2	6	Hold Out Log (1 Bit)	CH-IB-005
2	7	Address Out (1 Bit)	CH-IB-005
2	8	Command Out (1 Bit)	CH-IB-005
2	10	Hold Out Hardware (1 Bit)	CH-IB-007
2	11	Data Transfer Bus Out Error (1 Bit)	CH-IB-007
2	12	Data Transfer Bus In Error (1 Bit)	CH-IB-007
2	13	Data Transfer Bus 2 Error (1 Bit)	CH-IB-007
2	14	Data Transfer Bus 3 Error (1 Bit)	CH-IB-007
2	15	Discontinue In (1 Bit)	CH-IB-006
2	16	Interface Free (1 Bit)	CH-IB-007
2	17	Bus In Parity Error (1 Bit)	CH-IB-006
2	19	Address In (1 Bit)	CH-IB-006
2	22	Operation In (1 Bit)	CH-IB-006
2	23	Select In (1 Bit)	CH-IB-006
2	24	Request In (1 Bit)	CH-IB-006
2	25	Status In (1 Bit)	CH-IB-006
2	26	Service In (1 Bit)	CH-IB-006
2	28-35	Bus In (8 Bits) 0 thru 7	CH-IB-006
3	1-8	Low Priority Break In Code (8 Bits) 0 thru 7	CH-IB-009
3	10-17	High Priority Break In Code (8 Bits) 8 thru 15	CH-IB-009
3	28-35	Channel 0 Bus Out (8 Bits) 0 thru 7	CH-IB-005
4	0-35	Channel 1 - Tags and Bus In	CH-IC
4	1	Not Inhibit Break In (1 Bit)	CH-IC-014
4	2	Operation Out (1 Bit)	CH-IC-014
4	3	Service Out (1 Bit)	CH-IC-014
4	4	Supervisor Out (1 Bit)	CH-IC-014
4	5	Data Out (1 Bit)	CH-IC-014
4	6	Hold Out (1 Bit)	CH-IC-014
4	7	Address Out (1 Bit)	CH-IC-014
4	8	Command Out (1 Bit)	CH-IC-014
4	10	Invalid Address (1 Bit)	CH-IC-031
4	11	Storage Protect Violation (1 Bit)	CH-IC-031
4	14	Storage Control Unit Data Error (1 Bit)	CH-IC-031
4	15	Disconnect In (1 Bit)	CH-IC-023
4	16	Count Not Equal to Zero (1 Bit)	CH-IC-018
4	17	Read (1 Bit)	CH-IC-033
4	19	Address In (1 Bit)	CH-IC-023
4	20	Data In (1 Bit)	CH-IC-023
4	21	Mark 0 In (1 Bit)	CH-IC-023
4	22	Operation In (1 Bit)	CH-IC-023
4	23	Select In (1 Bit)	CH-IC-023
4	24	Request In (1 Bit)	CH-IC-023
4	25	Status In (1 Bit)	CH-IC-023
4	26	Service In (1 Bit)	CH-IC-023
4	28-35	Bus In (8 Bits) 0 thru 7	CH-IC-024
5	0-35	Channel 1 - Keys & Storage Address Register Counter	CH-IC
5	1-4	Storage Protect Key (4 Bits) 0 thru 3	CH-IC
5	10-32	Storage Address Register Counter (21 Bits) 8 thru 28	CH-IC-016
5	33	SCU Transfer Control 1 (1 Bit)	CH-IC-018
5	34	Compartment Full (1 Bit)	CH-IC-031
5	35	Compartment Empty (1 Bit)	CH-IC-031
6	0-35	Channel 1 Controls & Byte Counter	CH-IC
6	1	Chain Data (1 Bit)	CH-IC-033
6	2	Write (1 Bit)	CH-IC-033
6	3	Not Skip (1 Bit)	CH-IC-033
6	4	Forward (1 Bit)	CH-IC-033
6	5	Not Indirect Address Word (1 Bit)	CH-IC-029
6	10	Not Page Boundary (1 Bit)	CH-IC-031
6	11	Last Store Done (1 Bit)	CH-IC-031
6	14	Invalid Address or Storage Protect Violation (1 Bit)	CH-IC-018
6	15-17	Interface Transfer Counter (3 Bits)	CH-IC-018
6	19-35	Byte Counter (16 Bits)	CH-IC-018
7	0-35	Channel 1 Local Storage (32 Bits +4P)	CH-IC-020

ROLLER INDICATORS



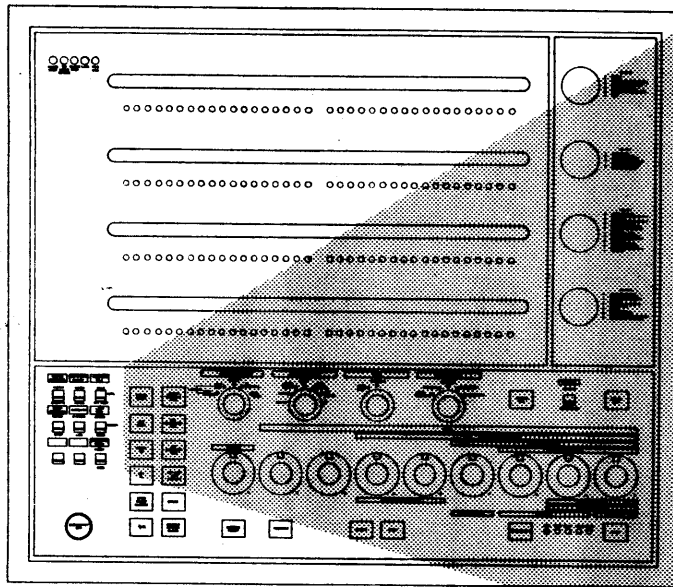
ROLLER 3

- 0 CHNL 4 TAGS, BUS IN
- 1 CHNL 4 KEYS, SAR CNTR
- 2 CHNL 4 CNTRLS, BYTE CNTR
- 3 CHNL 4 LS
- 4 SWITCH REG, LOG BUFFER
- 5 ASSEMBLY REG
- 8 B REG
- C SCU MERGE (00-31)
- D SCU MERGE (32-63)
- E SP OUT PUT REG, TLB OUTPUT REG
- F BIE/SYNDROME, SAR BACKUP



DISPLAY ROLLER 3, SWITCH			
SWITCH POSITION	BIT POSITION	INFORMATION DISPLAYED	LOGIC DRAWING
0	0-35	Channel 4 - Tags and Bus In	CH-IC
0	1	Not Inhibit Break In (1 Bit)	CH-IC-015A
0	2	Operation Out (1 Bit)	CH-IC-015A
0	3	Service Out (1 Bit)	CH-IC-015A
0	4	Supervisor Out (1 Bit)	CH-IC-015A
0	5	Data Out (1 Bit)	CH-IC-015A
0	6	Hold Out (1 Bit)	CH-IC-015A
0	7	Address Out (1 Bit)	CH-IC-015A
0	8	Command Out (1 Bit)	CH-IC-015A
0	10	Invalid Address (1 Bit)	CH-IC-032A
0	11	Storage Protect Violation (1 Bit)	CH-IC-032A
0	14	Storage Control Unit Data Error (1 Bit)	CH-IC-032A
0	15	Disconnect In (1 Bit)	CH-IC-023A
0	16	Count Not Equal to Zero (1 Bit)	CH-IC-019A
0	17	Read (1 Bit)	CH-IC-033A
0	19	Address In (1 Bit)	CH-IC-023A
0	20	Data In (1 Bit)	CH-IC-023A
0	21	Mark 0 In (1 Bit)	CH-IC-023A
0	22	Operation In (1 Bit)	CH-IC-023A
0	23	Select In (1 Bit)	CH-IC-023A
0	24	Request In (1 Bit)	CH-IC-023A
0	25	Status In (1 Bit)	CH-IC-023A
0	26	Service In (1 Bit)	CH-IC-023A
0	28-35	Bus In (8 Bits) 0 thru 7	CH-IC-024A
1	0-35	Channel 4 - Keys & Storage Address Register Counter	CH-IC
1	1-4	Storage Protect Key (4 Bits) 0 thru 3	CH-IC
1	10-32	Storage Address Register Counter (21 Bits) 8 thru 28	CH-IC-016A
1	33	SCU Transfer Control 1 (1 Bit)	CH-IC-019A
1	34	Compartment Full (1 Bit)	CH-IC-032A
1	35	Compartment Empty (1 Bit)	CH-IC-032A
2	0-35	Channel 4 - Controls & Byte Counter	CH-IC
2	1	Chain Data (1 Bit)	CH-IC-033A
2	2	Write (1 Bit)	CH-IC-033A
2	3	Not Skip (1 Bit)	CH-IC-033A
2	4	Forward (1 Bit)	CH-IC-033A
2	5	Not Indirect Address Word (1 Bit)	CH-IC-033A
2	10	Not Page Boundary (1 Bit)	CH-IC-029A
2	11	Last Store Done (1 Bit)	CH-IC-032A
2	14	Invalid Address or Storage Protect Violation (1 Bit)	CH-IC-032A
2	15-17	Interface Transfer Counter (3 Bits)	CH-IC-019A
2	19-35	Byte Counter (16 Bits)	CH-IC-019A
3	0-35	Channel 4 - Local Storage (32 Bits)	CH-IC-020A
4	0-17	Switch Register (16 Bits)	CNSL-MF-015
4	19	Retry In Process 1 (1 Bit)	CNSL-MF-017
4	20	Retry In Process 2 (1 Bit)	CNSL-MF-017
4	21	Byte Control (1 Bit)	CPU-CA-009
4	22	Block Control (1 Bit)	CPU-CA-009
4	26	Log Buffer Parity (1 Bit)	CNSL-MF-020
4	28-35	Log Buffer (8 Bits)	CNSL-MF-020
5	0-35	Assembly Register (36 Bits)	CNSL-MF-006
7	0-35	Diagnostics	
8	0-35	B Register (36 Bits)	CPU-AU-012
C	0-35	SCU Merge (36 Bits) Bits 00 to 31	SCU-SD-006
D	0-35	SCU Merge (36 Bits) Bits 32 to 63	SCU-SD-009
E	0-7	Storage Protect Output Register	SCU-SA-005
E	5	Fetch (1 Bit)	SCU-SA-005
E	6	Read (1 Bit)	SCU-SA-005
E	7	Changed (1 Bit)	SCU-SA-005
E	9-35	Translation Lockside Buffer Output Register	SCU-SA
E	9-15	Logical Address (8 Bits)	SCU-SA-025
E	19	Use (1 Bit)	SCU-SA-025
E	20	Valid (1 Bit)	SCU-SA-025
E	24	Delete (1 Bit)	SCU-SA-025
E	25-35	Real Address (10 Bits)	SCU-SA-026
F	0-8	Byte In Error Syndrome (8 Bits)	SCU-SD-022
F	13-35	SAR Backup	SCU-SA-030

TOGGLE SWITCHES



**CONSOLE
FILE**

DIAG
IMPL
RPT TEST

**LAMP
TEST**
ZEROS

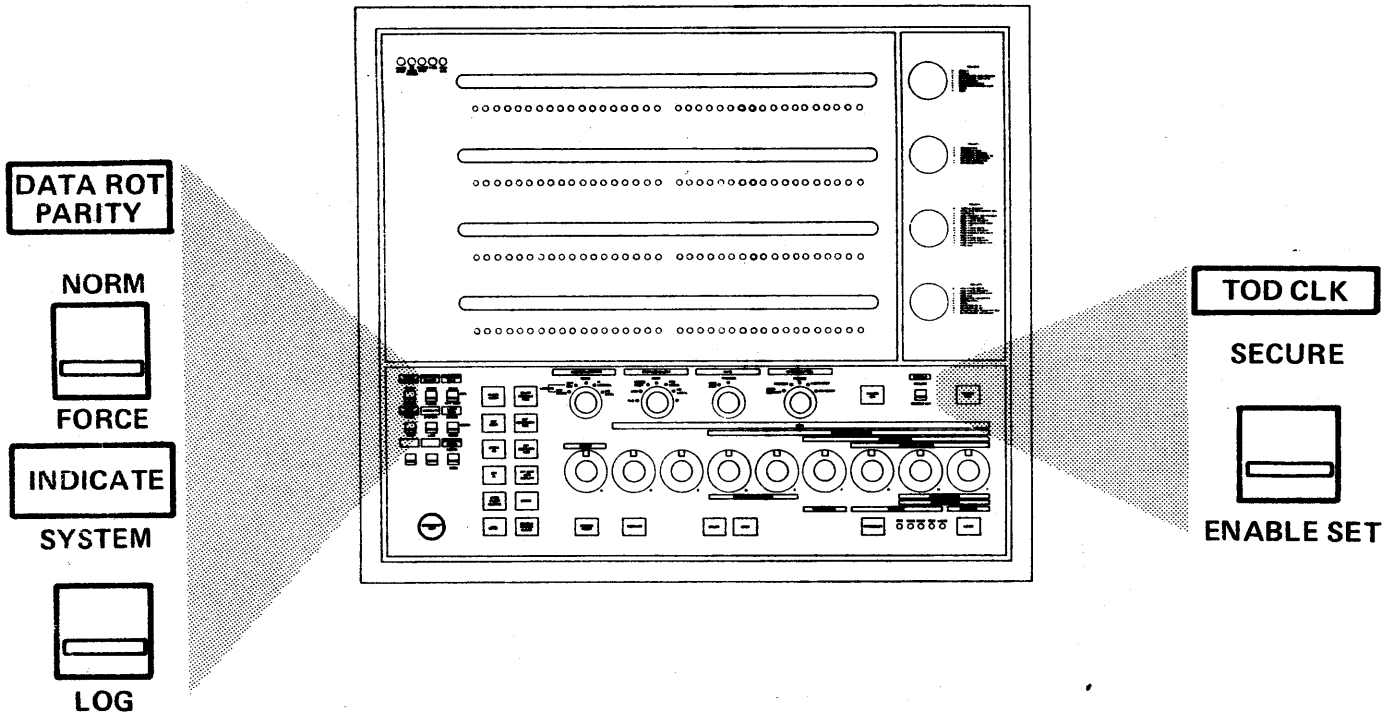
NORM
ONES

**INTERVAL
TIMER**
NORM

DSEL

SWITCH	POSITION	FUNCTION
CONSOLE FILE	DIAG	Allows a console file read starting at the CF track specified by rotaries D and E.
	IMPL	Allows a console file read starting at track zero.
	RPT TEST	Allows a continuous console file read of the track specified by rotaries D and E.
LAMP TEST	ZEROS	All system control panel and PTR/KBD indicator lights should extinguish in this position (Except PWR CHK and TEST).
	NORM	Normal Operation
	ONES	All system control panel and PTR/KBD indicator lights should illuminate in this position (Except PWR CHK and TEST).
INTERVAL TIMER	NORM	Allows incrementing of interval timer at location 80.
	DSBL	Disables the incrementing of the interval timer.

TOGGLE SWITCHES



SWITCH	POSITION	FUNCTION
TOD CLK		The Time of Day (TOD) clock switch guards against an unauthorized or inadvertent change of the time-of-day clock value.
	SECURE	This position prevents alteration of the time of-day clock value by the SET CLOCK Inst.
	ENABLE SET	This position allows the SET CLOCK instruction to change the value of the TOD clock.
DATA ROT PARITY	NORM	Normal Processing Mode.
	FORCE	Allows rotary switch A to control the parity for switches B thru J.
INDICATE	SYSTEM	Normal processing position.
	LOG	Indicates current contents of Log Buffer.

TOGGLE SWITCHES

CLOCK CONTROL

NORM



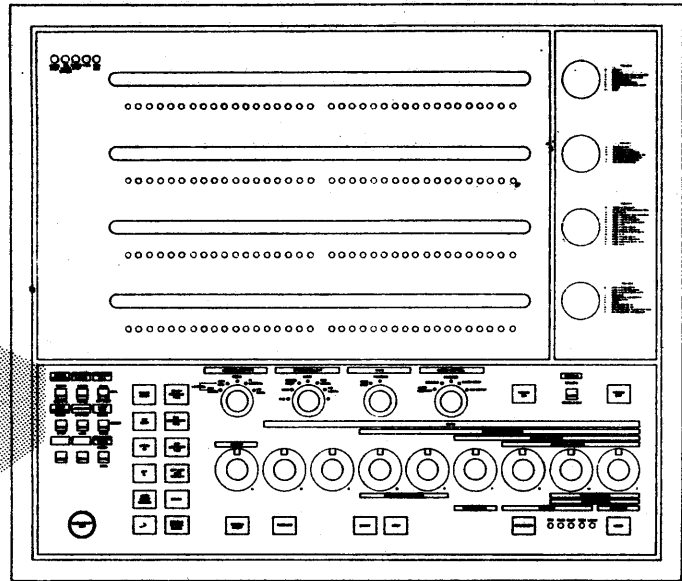
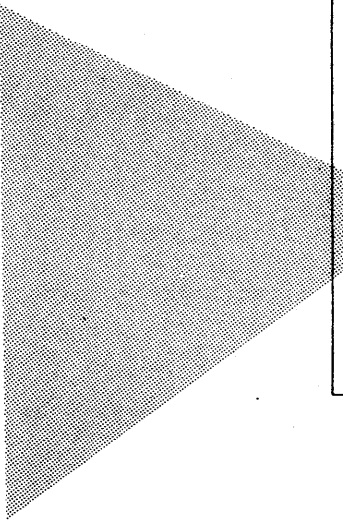
SNG CYC

CSAR COMPARE

NORM



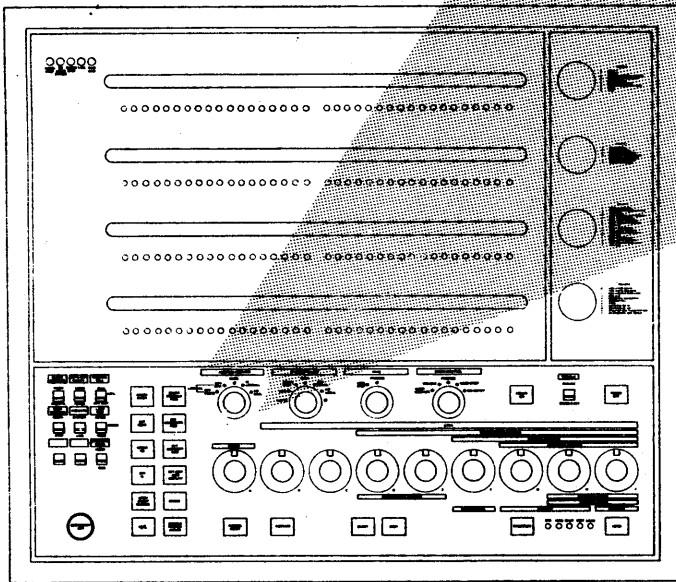
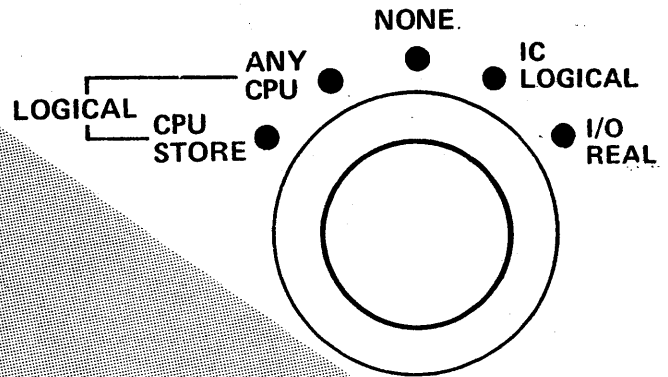
STOP



SWITCH	POSITION	FUNCTION
CLOCK CONTROL	NORM	Allows continuous processing of micro-instructions.
	SNG CYC	Allows processing of a single micro-instruction at a time.
CSAR COMPARE	NORM	Normal processing position.
	STOP	Allows a compare equal between CSAR and the CSAR CMPR REG to stop CPU clocks.

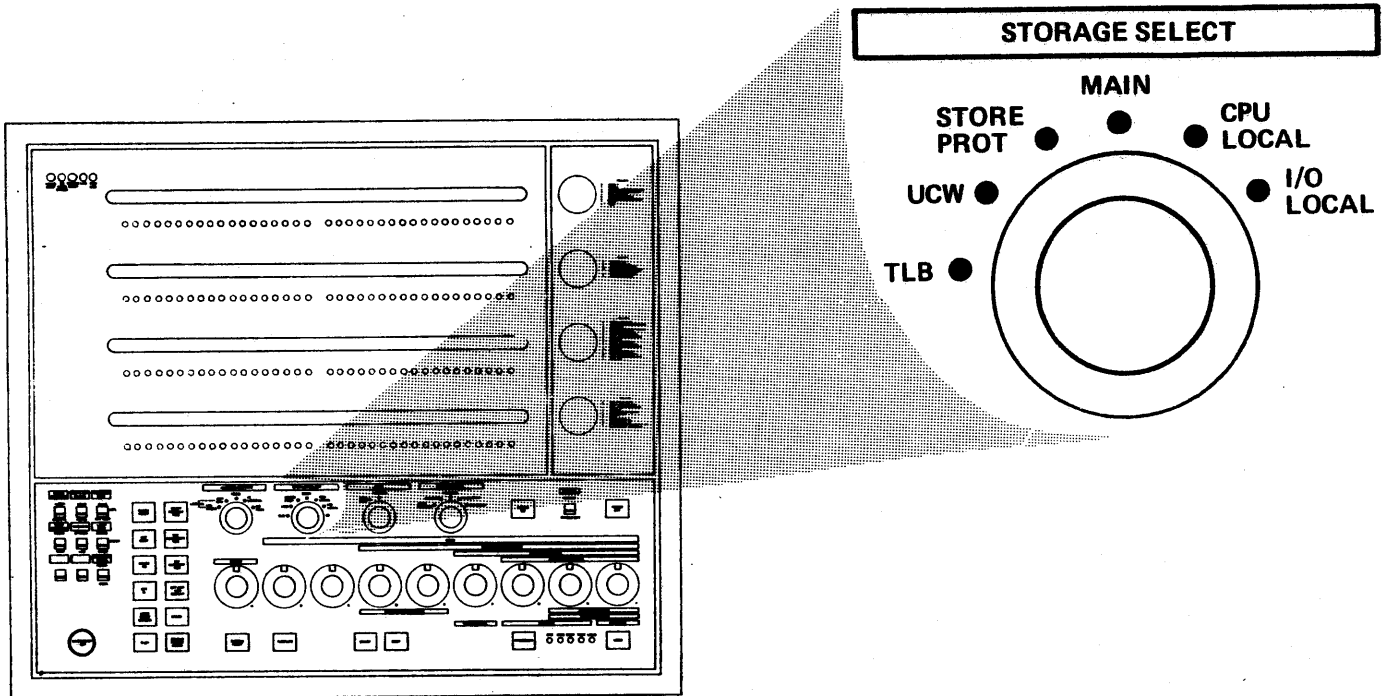
ADDRESS COMPARE SWITCH

ADDRESS COMPARE



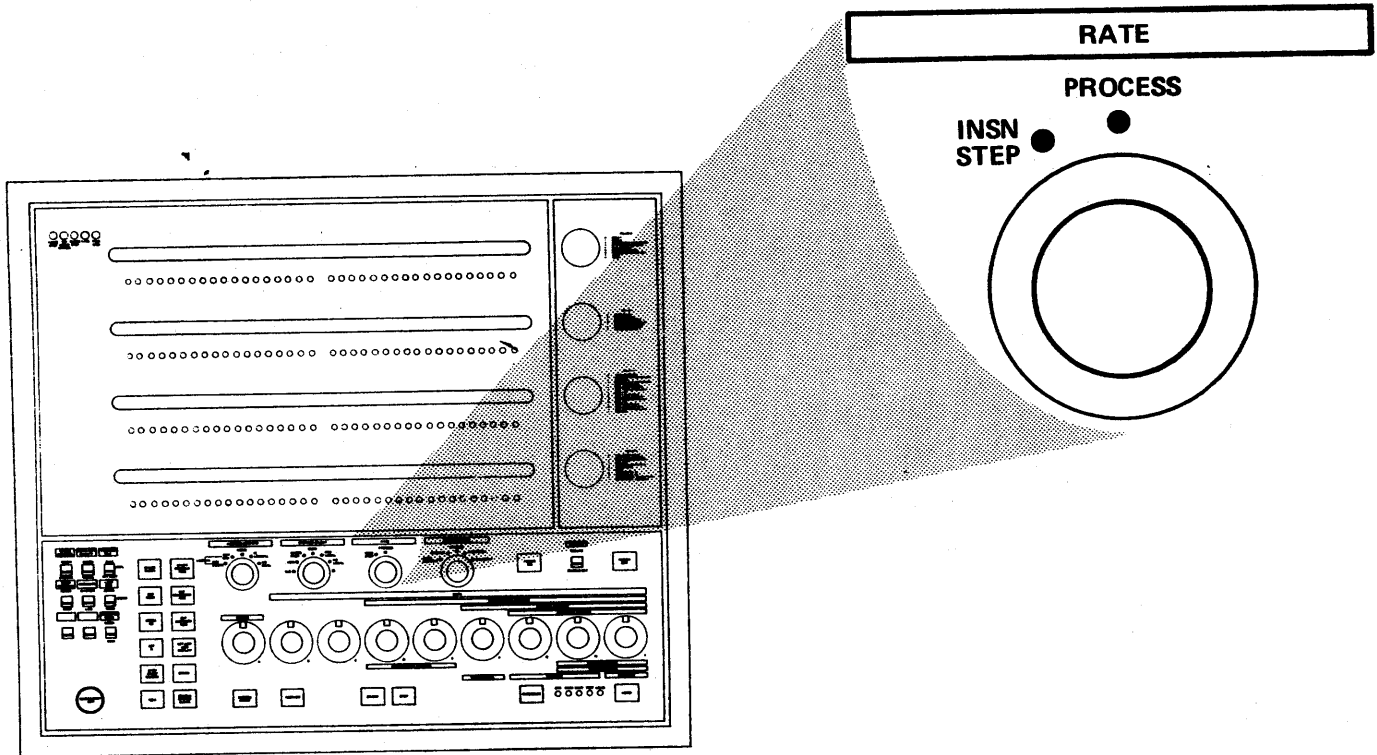
SWITCH	POSITION	FUNCTION
ADDRESS COMPARE		Specifies the type of main storage reference which is to be compared to the contents of the SAR Compare Register. The CPU will enter the stopped state when the compare is made.
	NONE	Disables the address compare operation.
	LOGICAL ANY CPU	Compares on any virtual address.
	LOGICAL CPU STORE	Compares on any virtual address used in a store operation.
	IC LOGICAL	Compares on any virtual address in an instruction fetch.
	I/O REAL	Compares on any real address used by a channel.

STORAGE SELECT SWITCH



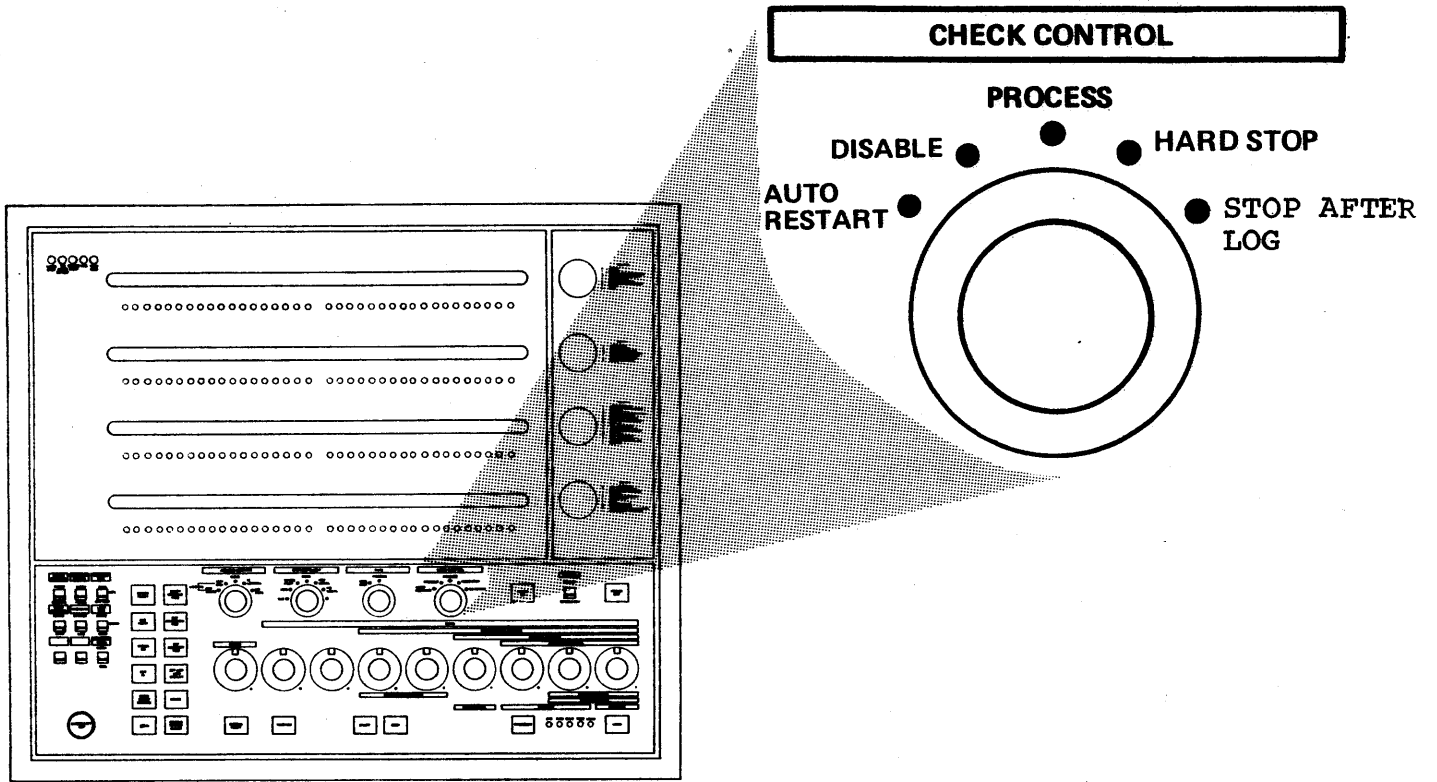
SWITCH	POSITION	FUNCTION
STORAGE SELECT		This switch selects the proper storage for manual store/display operations.
	MAIN	Normal program processing mode and manual store/display operations of main storage.
	CPU LOCAL	Selects manual store/display of general and floating point registers.
	I/O LOCAL	Selects manual store/display of channel LS.
	STORE PROT	Selects manual store/display of Key Storage.
	UCW	Selects manual store/display of unit Control Words.
	TLB	Selects manual store/display of TLB.

RATE SWITCH



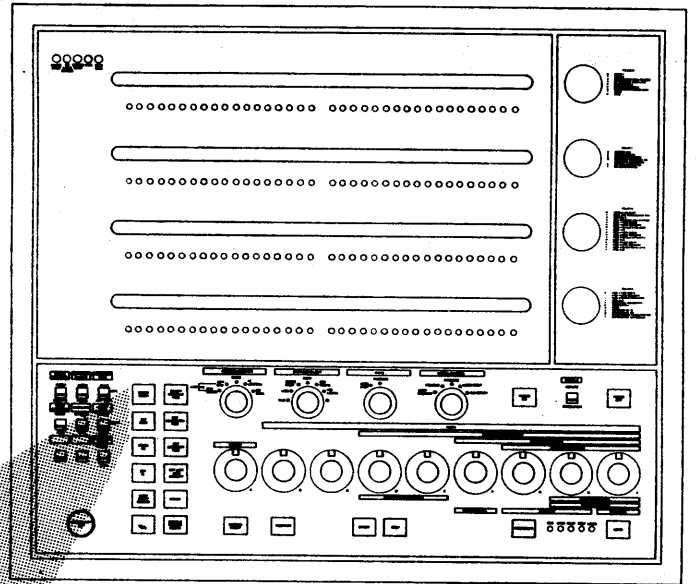
SWITCH	POSITION	FUNCTION
RATE		This switch controls the rate at which the CPU processes instructions.
	PROCESS	Normal Program Processing.
	INSN STEP	In this position one complete machine language instruction (including all pending interrupts allowed by the system mask) is executed for each operation of the start key. The machine enters the manual state and the indicator turns on. The address of the next instruction is displayed in rollers 2 and 3.

CHECK CONTROL SWITCH



SWITCH	POSITION	FUNCTION
CHECK CONTROL		This switch controls the action taken by the CPU when a machine check occurs.
	PROCESS	This position is for normal program processing when an operating system with automatic recording of logout data is used.
	HARD STOP	This position causes the machine to hard stop when an error is detected.
	STOP AFTER LOG	Retry is active on this position. An error causes a logout to Main Storage, the CPU then hard stops. This position is for normal program processing when an Operating System without automatic recording of logout data is used.
	DISABLE	This position causes all CPU errors to be ignored.
	AUTO RESTART	No retry is attempted, no logout is taken. Error causes PSW restart from ADDR \emptyset .

KEY SWITCHES



CHECK
RESET

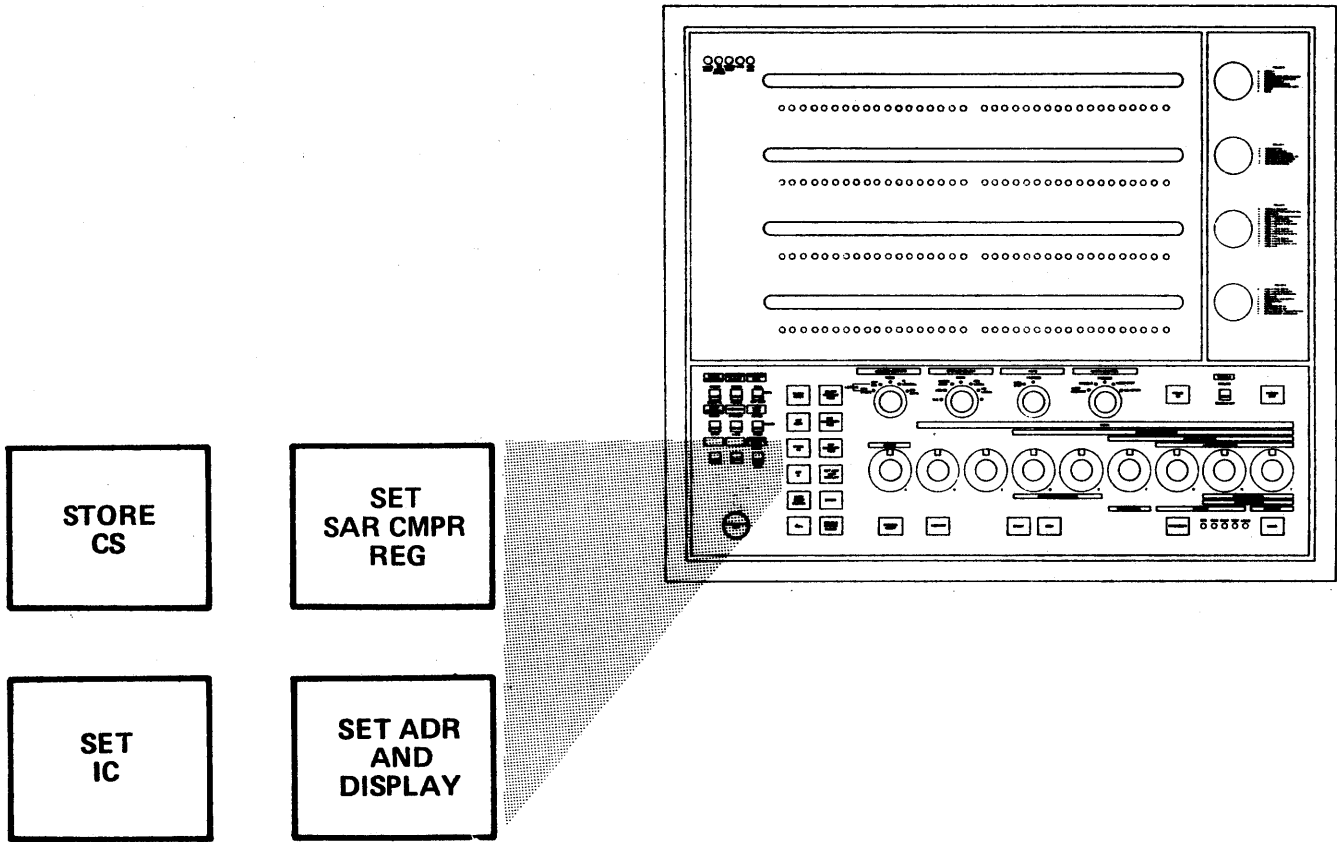
START
CONSOLE
FILE

SET
CSAR

SET
CSAR CMPR
REG

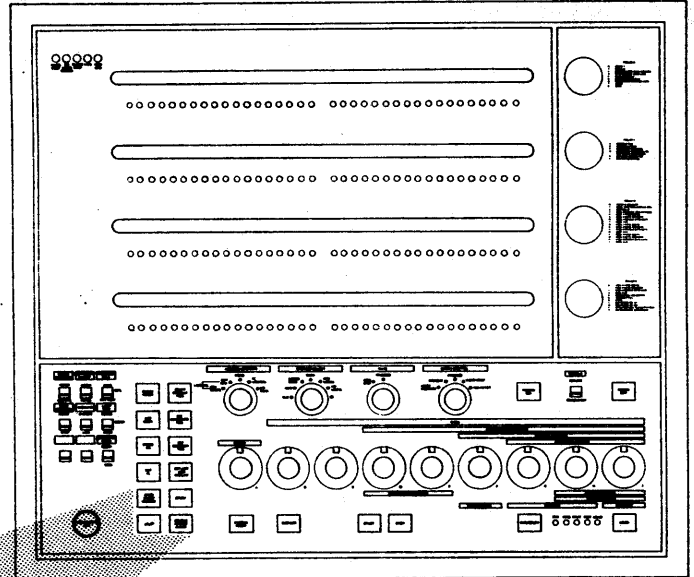
SWITCH	FUNCTION
CHECK RESET	Resets all machine error indicators.
START CONSOLE FILE	Applies power to the Console File and starts a console file read operation.
SET CSAR	Sets an address as specified by rotaries F thru J into control storage address register.
SET CSAR CMPR REG	Sets an address as specified by rotaries F thru J into CSAR compare register.

KEY SWITCHES



SWITCH	FUNCTION
STORE CS	Stores the contents of rotaries A thru J into the control storage word specified by CSAR. Use of this key updates CSAR by one.
SET SAR CMPR REG	Sets an address as specified by rotaries D thru J into SAR compare register.
SET IC	Loads the contents of rotary switches D thru J into the instruction address field of the current PSW.
SET ADR AND DISPLAY	Set into the bottom two rows of lights the data at the main storage locations indicated by rotaries D thru J.

KEY SWITCHES



**STEP/
START
CLOCKS**

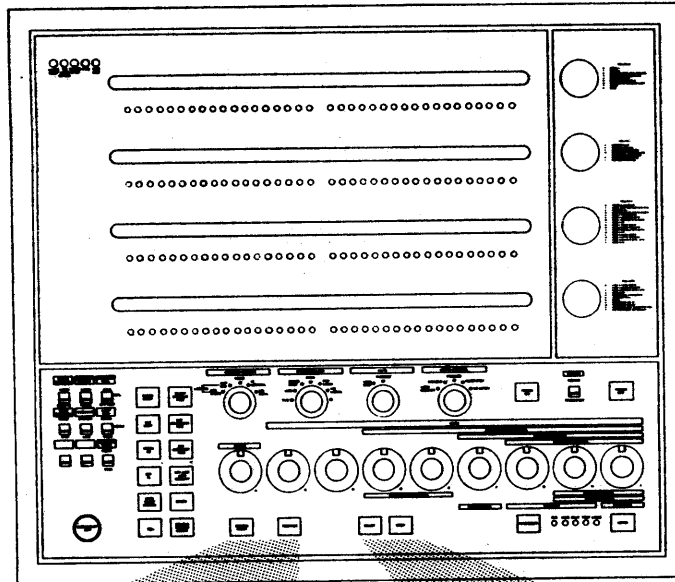
STORE

LOG

**ENABLE
SYSTEM
CLEAR**

SWITCH	FUNCTION
STEP/ START CLOCKS	Restarts CPU clock when the "clock stopped" mode is indicated. Single cycles the machine when CLOCK CONTROL switch is in the SNC CYC mode.
STORE	Stores rotaries A thru J into main storage at the location indicated by the preceding SET ADR AND DISPLAY.
ENABLE SYSTEM CLEAR	Main Storage is cleared if this key is depressed while the SYSTEM RESET or LOAD key is depressed.
LOG	Moves current contents of the lights to the logout buffer. No data is moved to main storage; no machine check interrupt occurs.

KEY SWITCHES



**SYSTEM
RESET**

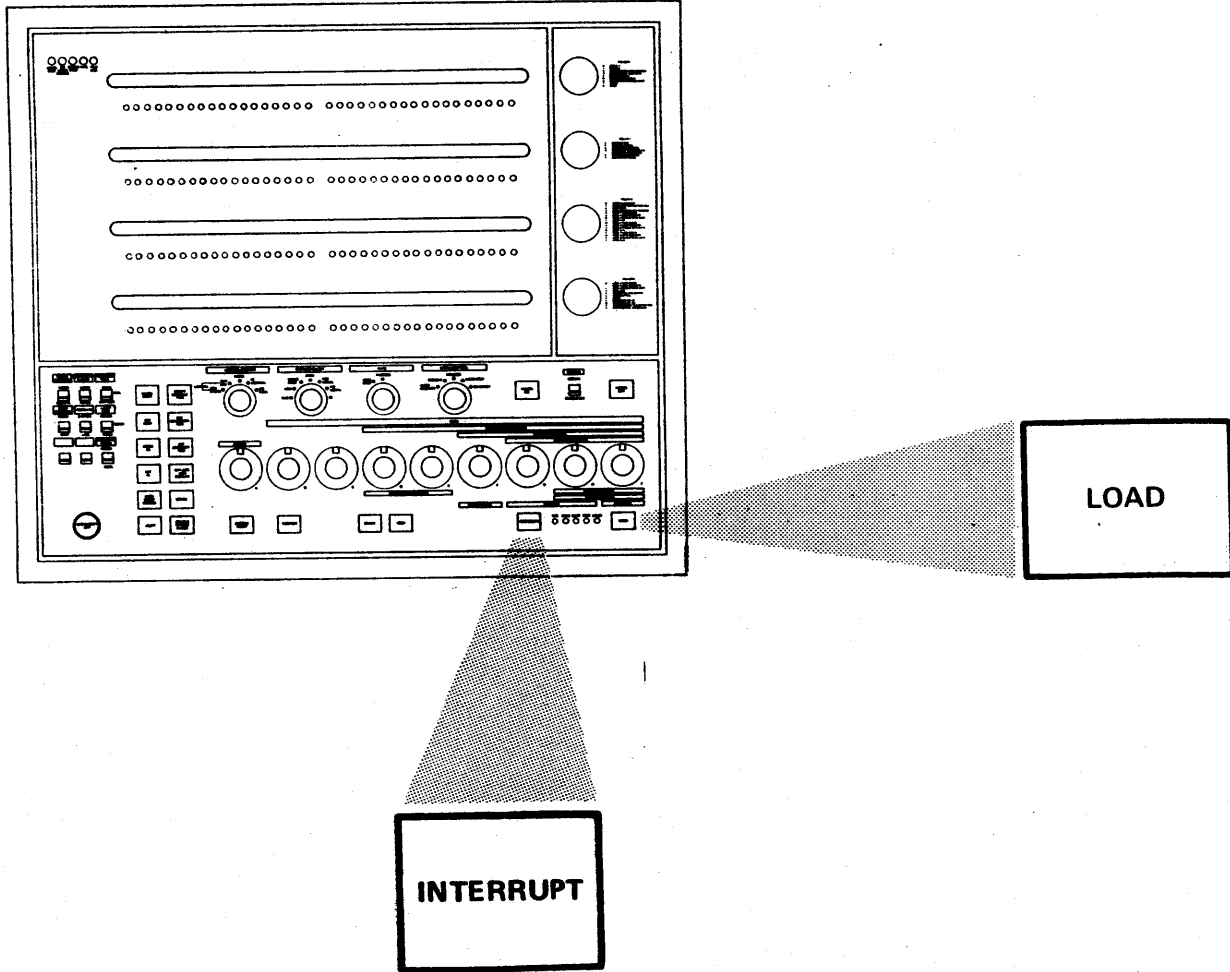
RESTART

START

STOP

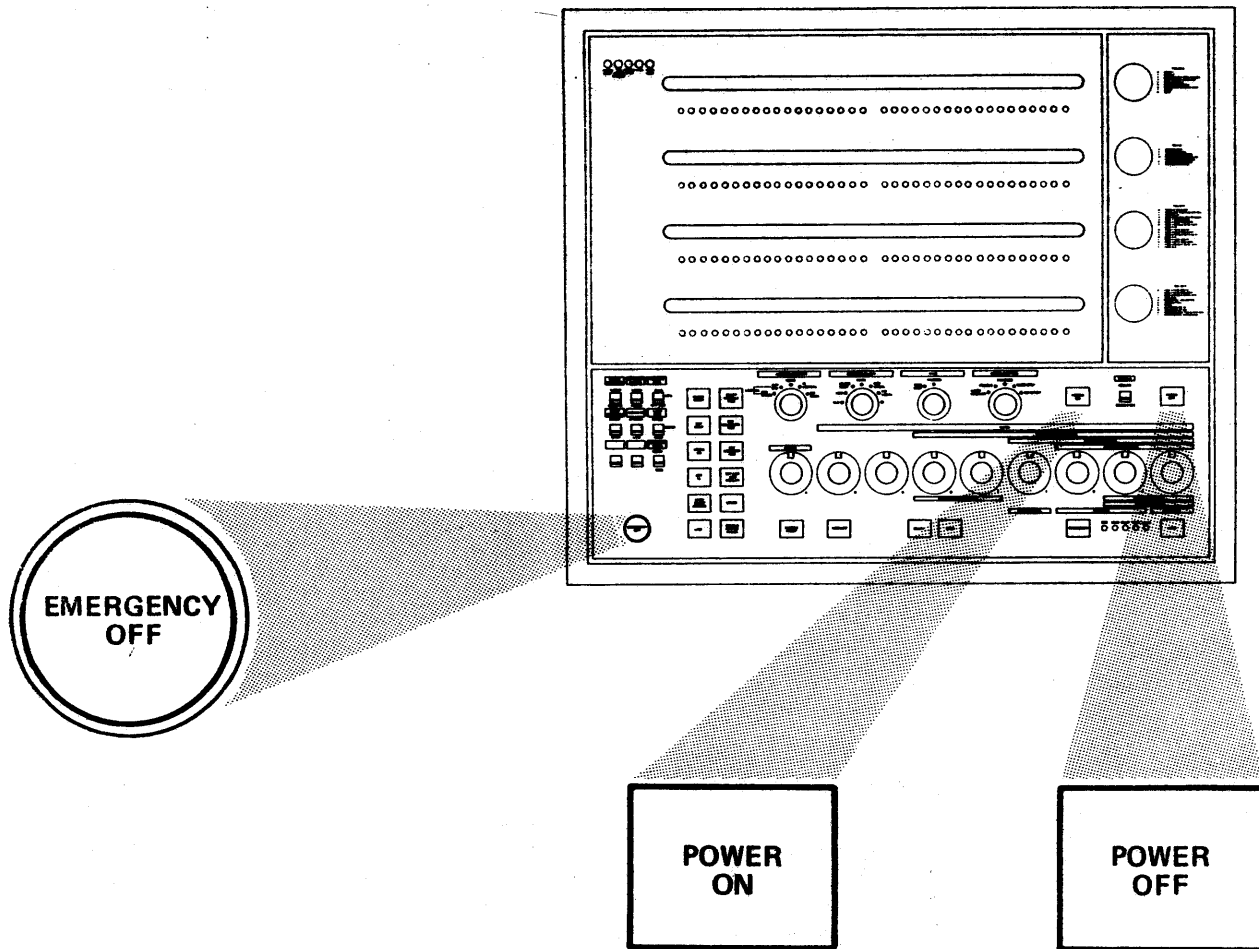
SWITCH	FUNCTION
START	Initiates instruction processing. Removes CPU from Manual State. If Rate Switch = Instruction Step, processing will stop again after one instruction.
STOP	Stops instruction processing when the current machine instruction and pending interrupts are completed. Places CPU in Manual state.
RESTART	Stores the content of the current PSW in address 8, and loads the doubleword starting at address 0 as the current PSW. The channels are not reset and processing starts under control of the PSW.
SYSTEM RESET	Performs a system reset function.

KEY SWITCHES



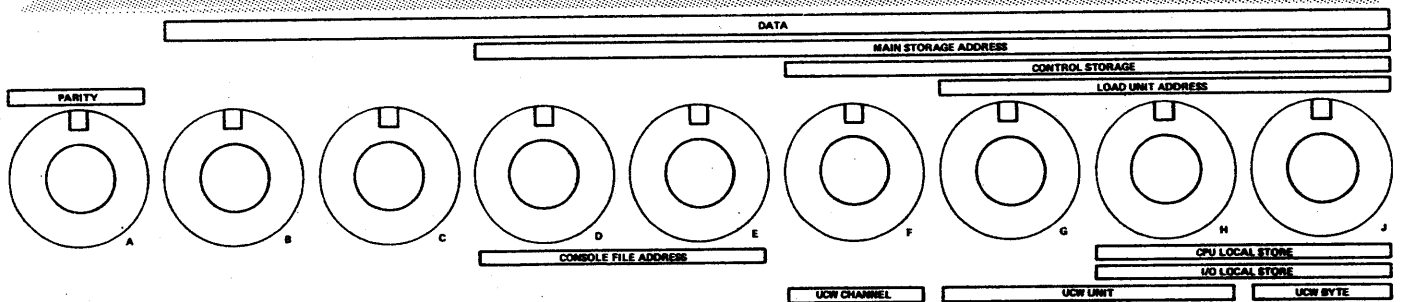
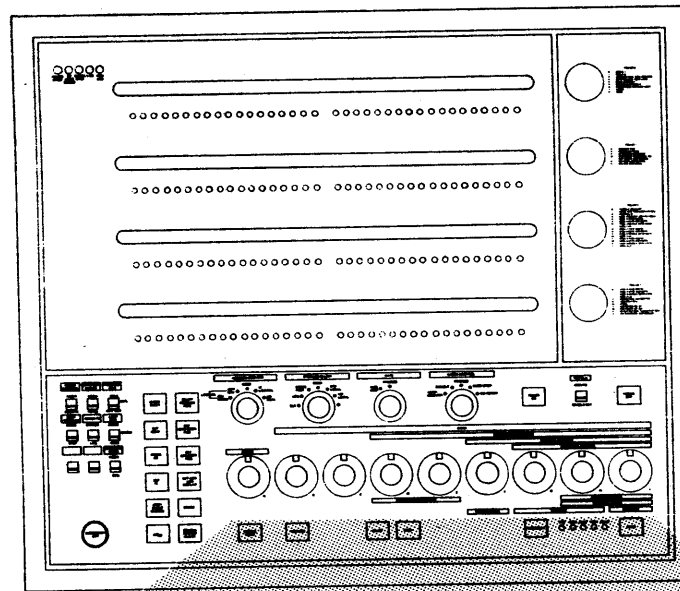
SWITCH	FUNCTION
INTERRUPT	Requests an external interrupt. The interrupt is taken when allowed by the system mask.
LOAD	Starts an IPL operation.

POWER SWITCHES



SWITCH	FUNCTION
POWER ON	Initiates a power up sequence.
POWER OFF	Initiates a power down sequence.
EMERGENCY OFF	Initiates an unconditional power off of CPU and all attached peripherals and should ONLY be used to prevent personal injury.

ROTARY SWITCHES A THRU J

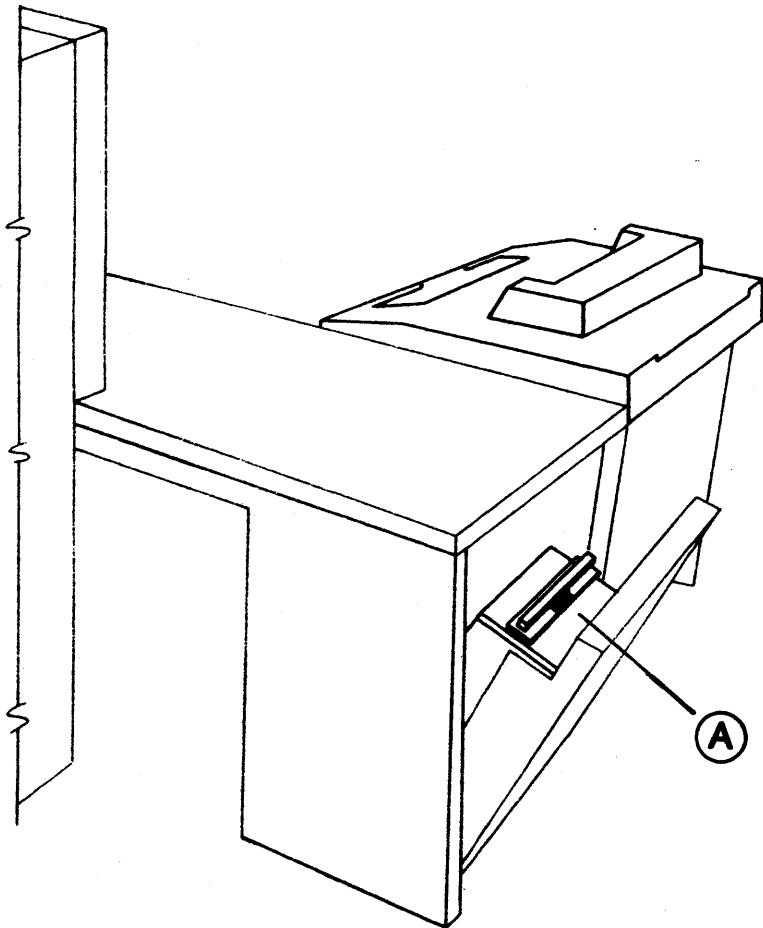


ROTARY SWITCHES A THRU J

SWITCH	LABEL	FUNCTION
BCDEFGHJ	DATA	Specifies the value of data to be entered on manual store operations.
DEFGHJ	MAIN STORAGE ADDRESS	Specifies the main storage address for manual store/display operations.
FGHJ	CONTROL STORAGE ADDRESS	Specifies a control storage address for manual store/display operations.
GHJ	LOAD UNIT ADDRESS	Specifies the load-unit address for IPL operations.
A	PARITY	Specifies parity bits for each switch byte when the DATA ROT PARITY Switch is in "FORCE" mode.
HJ	CPU LOCAL STORE	Specifies the local storage address for manual store/display operation in conjunction with STORAGE SELECT switch CPU LOCAL position. Right-Justified
HJ	I/O LOCAL STORE	Specifies the I/O local storage address for manual store/display operations in conjunction with STORAGE SELECT switch I/O LOCAL position. Right-Justified
DEF	CONSOLE FILE ADDRESS	Specifies the track address of the console file during microprogram load operations. Right-Justified
J	UCW BYTE	Specifies the physical byte address when the "STORAGE SELECT" switch is in the UCW position.
GH	UCW UNIT	Specifies the physical unit address when the "STORAGE SELECT" switch is in the UCW position.
F	UCW CHANNEL	Specifies the physical channel address when the STORAGE SELECT switch is in the UCW position.

SECTION 2

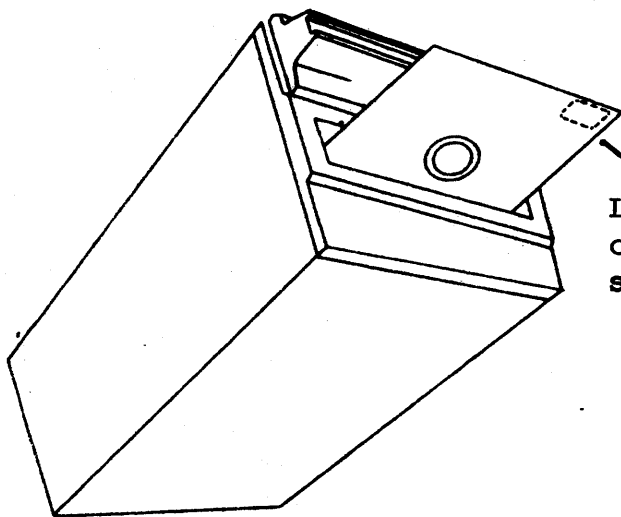
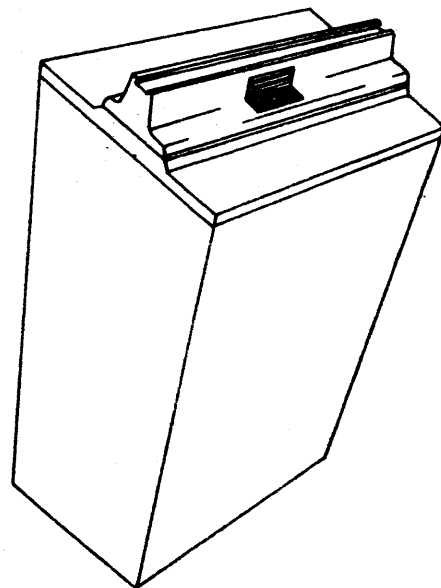
CONSOLE FILE FLEXIBLE DISK, INSERTION AND REMOVAL



TO INSERT A FLEXIBLE DISK INTO THE CONSOLE FILE:

1. Depress pushbutton A to open console file.
2. Insert flexible disk into the load aperture with the label facing away from operator.

3. Ensure that the disk is positioned fully within the drive housing.

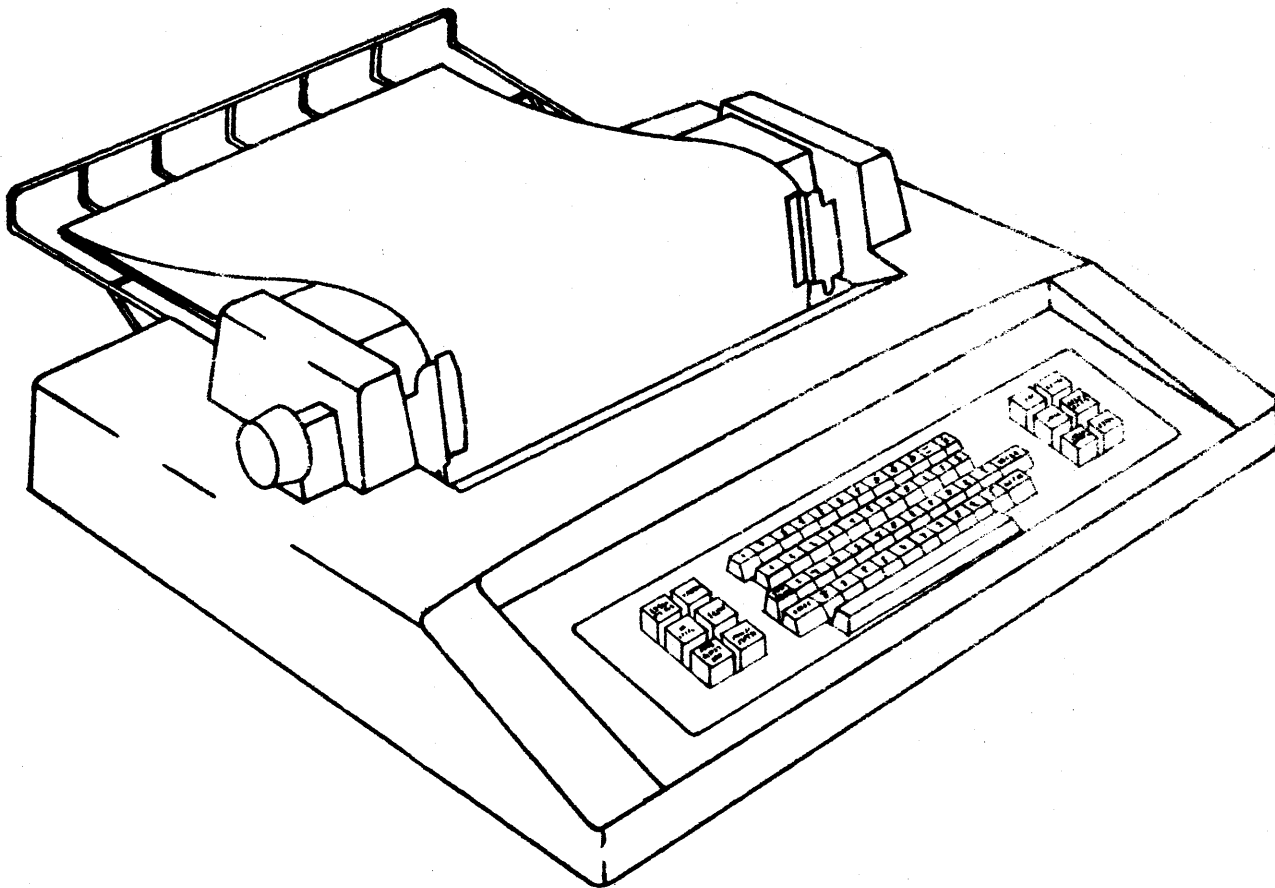


Label appears on reverse side down.

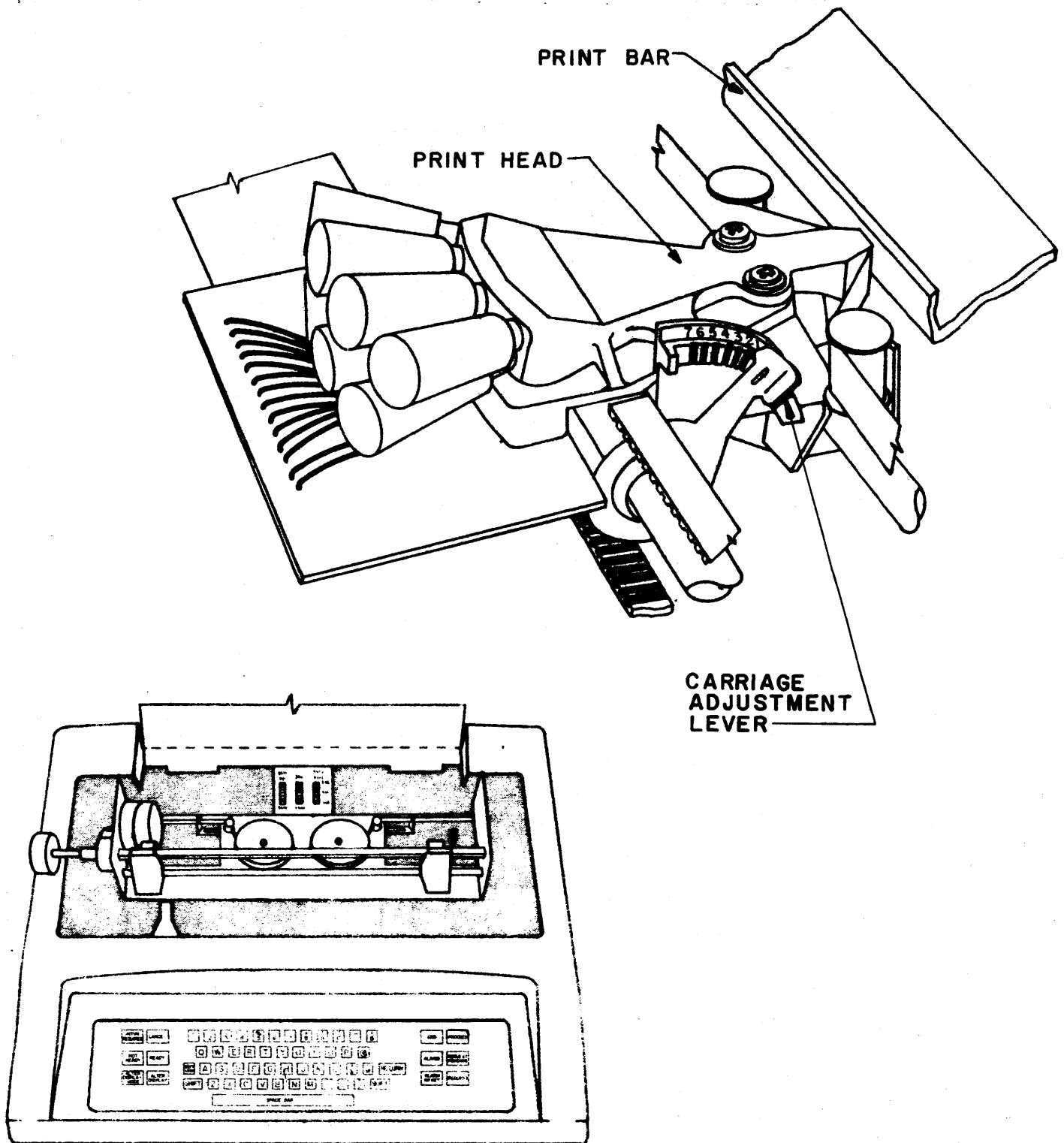
4. Close the console file by grasping the bar on the front plate and sliding it closed. The front plate will lock shut.

CONSOLE PRINTER KEYBOARD (PR-KB)

- The console printer keyboard is an input/output device which provides alter/display and control functions.

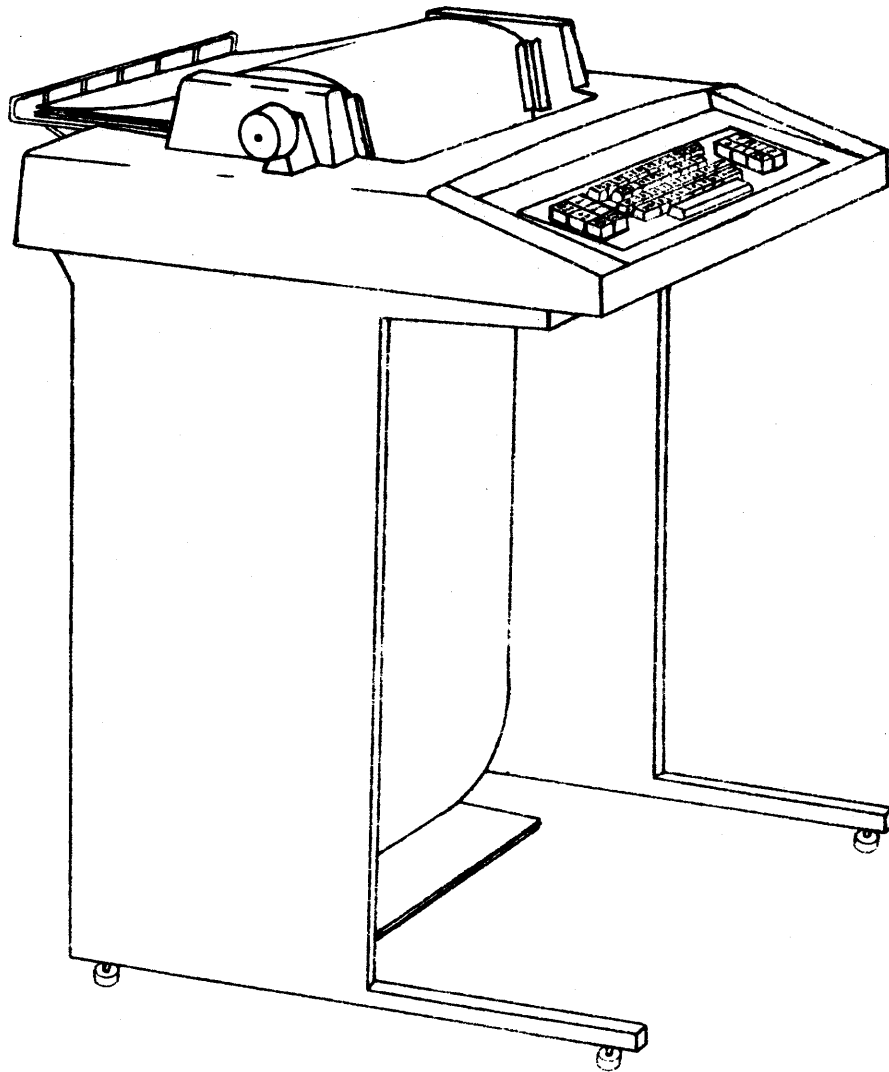


PRINTER KEYBOARD FORMS INSERTION PROCEDURE



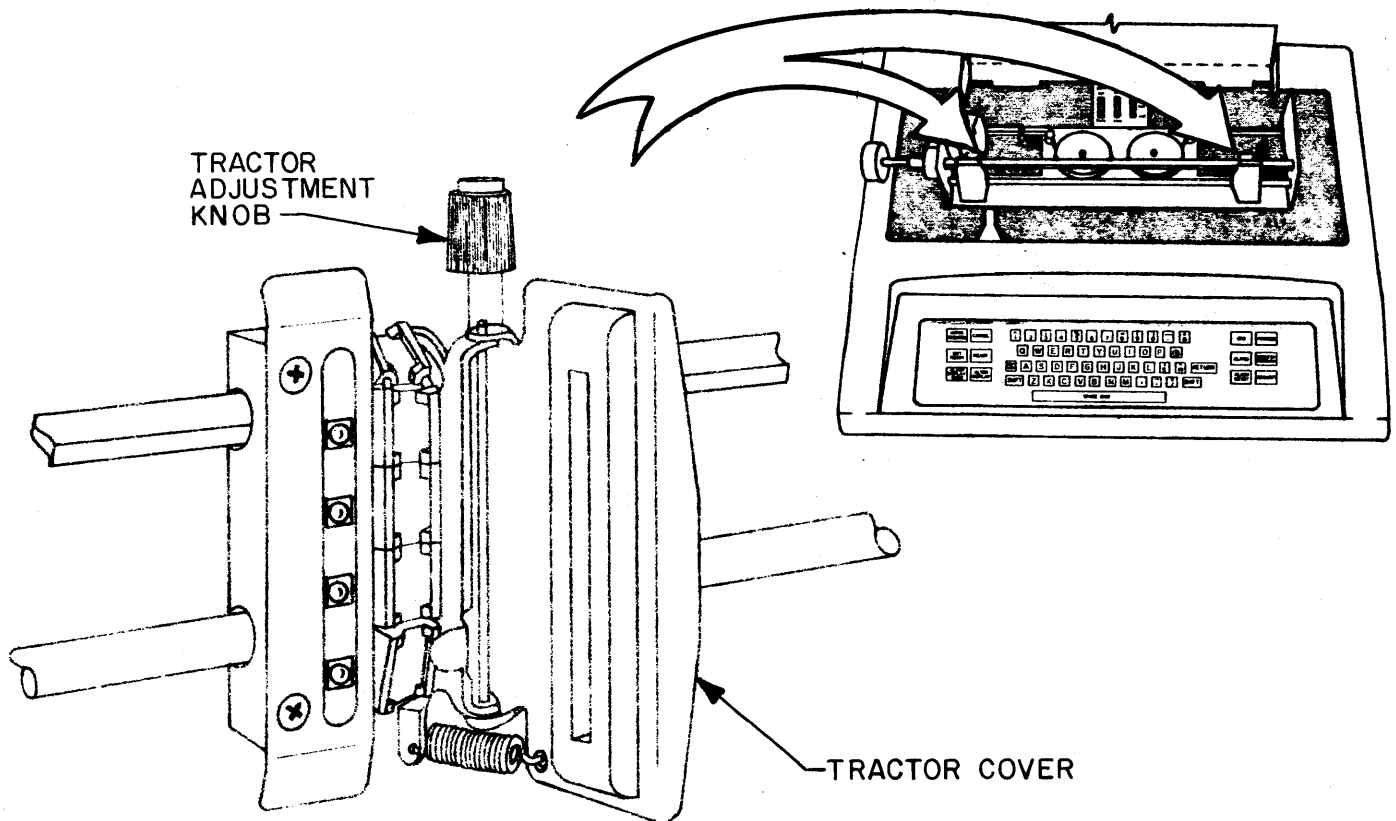
1. Set the POWER switch to OFF.
2. Move the carriage adjustment lever toward the keyboard as far as possible; this creates space for inserting the paper.

PRINTER KEYBOARD FORMS INSERTION PROCEDURE Cont.



3. Place the tractor-feed paper on the floor between the legs of the printer stand. (The term tractor-feed refers to the holes on either side of the paper.)
4. Feed the paper through the load channel under the terminal. Draw the paper up as it passes between the print head and the print bar.

PRINTER KEYBOARD FORMS INSERTION PROCEDURE Cont.



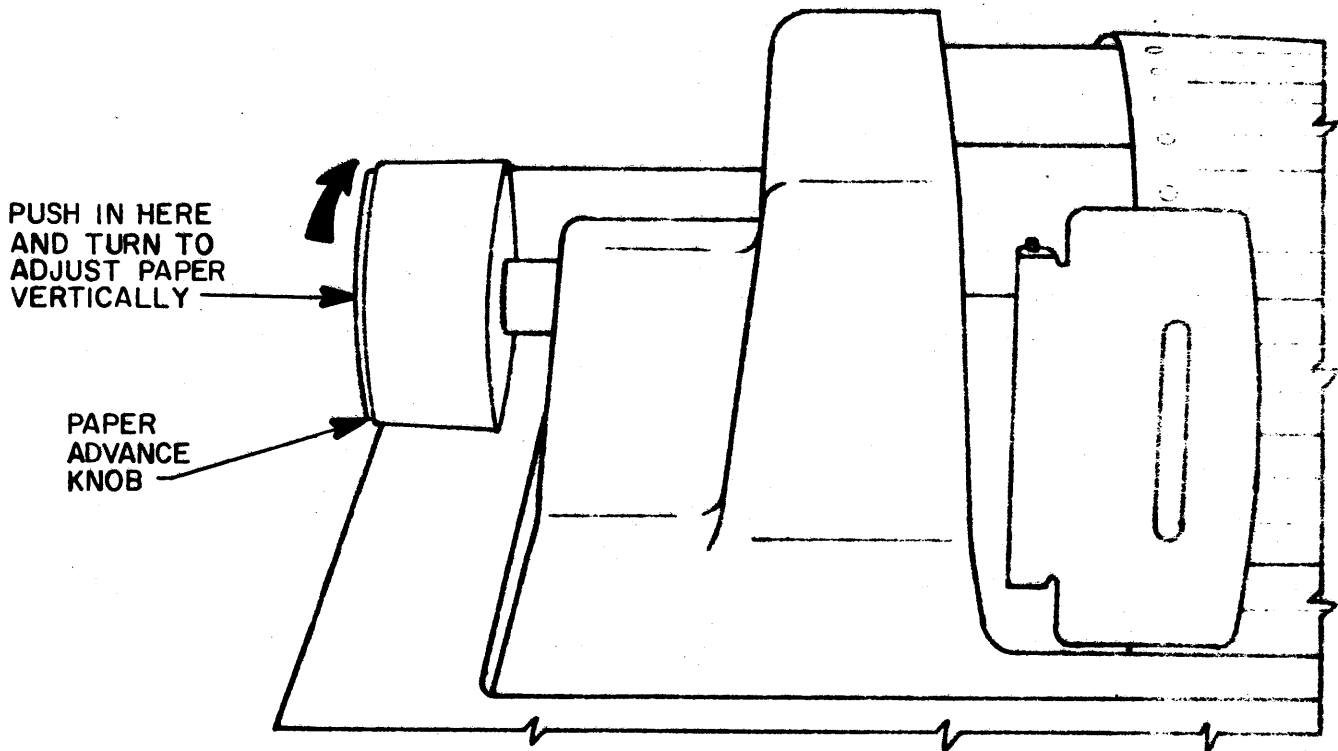
5. Open both tractor covers so that the tractor pins are exposed. Insert the left side of the paper with the holes aligned directly over the tractor pins. Close the left side tractor cover.
6. Loosen the tractor adjustment knob on the right tractor (about 1/4 turn). The tractor will now slide freely to the left or right. Slide the tractor to a position where the holes on the right margin align directly over the tractor pins. Tighten the tractor adjustment knob and close the cover.

Note:

In order to ensure proper paper feeding, do not tension paper too tightly. If the tension is excessive the following problems may occur:

- (1) Paper holes will be distorted.
- (2) Paper may become dislodged from tractor.
- (3) Spacing between lines may become uneven.

PRINTER KEYBOARD FORMS INSERTION PROCEDURE Cont.



7. Adjust the carriage adjustment lever so that the print head is near, but not exerting pressure on the paper. There should be no friction between the paper and the print head as either moves.

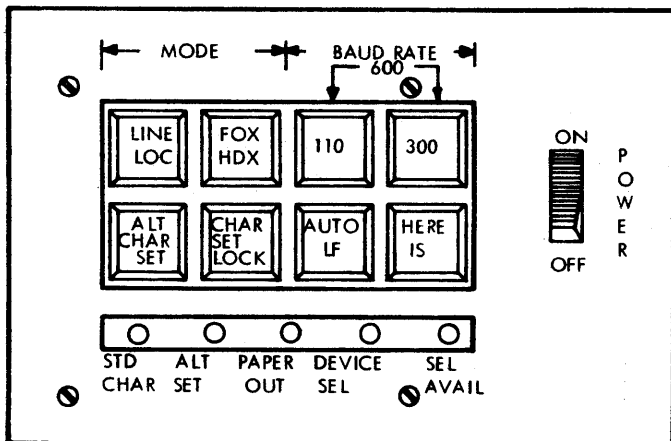
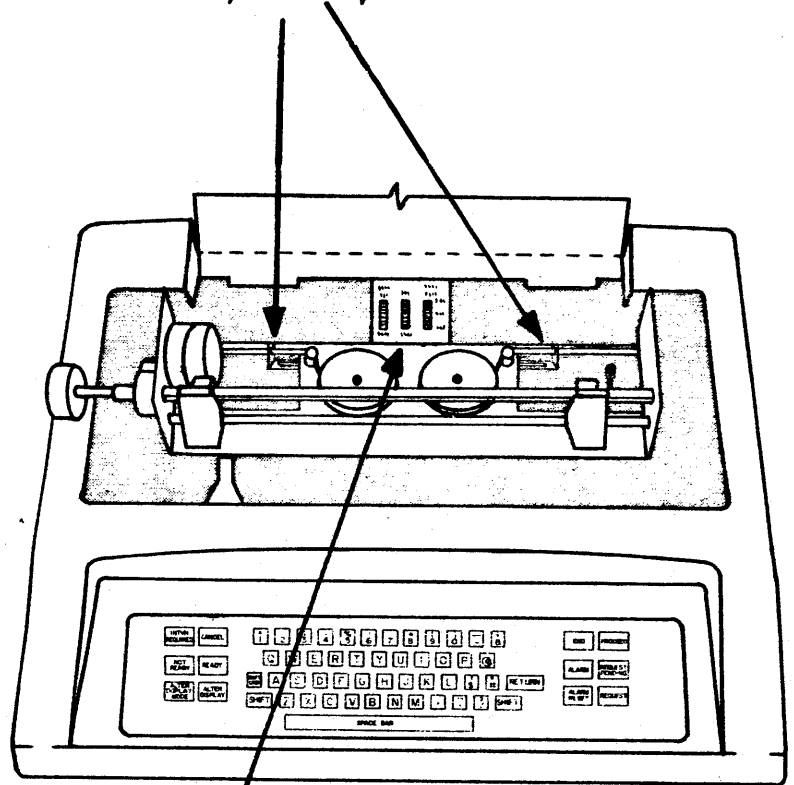
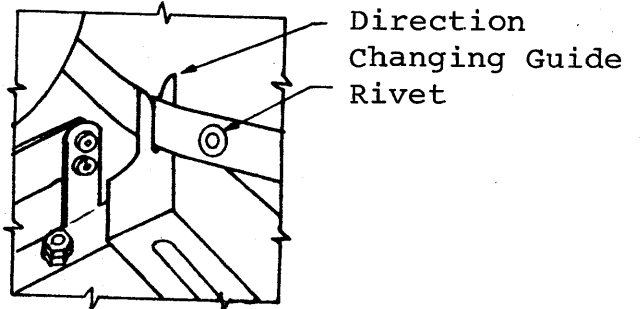
The right side of the carriage is numbered 1-7 approximately corresponding to 1-6 part forms. Check for proper print head alignment as follows:

- Manually turn the paper advance control counter-clockwise. If the print head is set too close, the paper will be smudged as it moves up past the print head.
- Set the POWER switch to ON; Set the LINE/LOCAL switch to LOCAL. Type a short line of text. If the print head is too far from the paper, characters will not print or they will have non-uniform dot density.

The paper advance control can be pushed in to position the paper such that the text is printed directly above the horizontal lines.

PRINTER KEYBOARD RIBBON REPLACEMENT PROCEDURE

- 1. Raise the cover.
- 2. Set the Power switch to OFF.
- 3. Move the carriage adjustment lever toward the keyboard. This moves the print head away from the paper to create enough space to remove the ribbon.
- 4. Lift the ribbon off the print head and unwind it from the idler spools.



PRINTER KEYBOARD RIBBON REPLACEMENT PROCEDURE Cont.

5. Lift the two ribbon reels from their hubs.
6. Place the full reel of new ribbon on the left hub and play out enough ribbon to feed around the idler spools.

Note:

Use only DEC recommended ribbon.
(Part No. 36-10558); use of other than this recommended ribbon can cause damage and void machine warranty.

Wind the ribbon around the outside of the idler spools and through the slot in the direction changing guide. Make sure that the rivet is on the ribbon spool side of the direction changing guide. The direction of ribbon movement is controlled by the ribbon direction guides.

When the ribbon is nearly played out, the rivet is drawn into contact with the direction changing guide. Since the rivet cannot pass through the guide, it moves the guide away from the reel, automatically changing the direction of the ribbon flow. If the rivet is on the print head side of the guide it will:

- Not act to change the ribbon direction.
 - Move around the idlers, stall the machine and blow the fuse.
7. Take up any slack in the ribbon by turning the takeup reel clockwise.
 8. Return the carriage adjustment lever to its original position.
 9. Close the cover.

PRINTER KEYBOARD OPERATOR MAINTENANCE

Do not oil the printer keyboard; moving parts are prelubricated and sealed.

Keep the cover closed at all times except when changing the ribbon.

Use only a lint free cloth when cleaning the cover and the keyboard. Do not use solvents or harsh cleaning agents. If excessively dirty a mild detergent or desk top cleaner may be used sparingly.

Do not use any surface of the printer keyboard to hold pencils, paper clips, staples, etc. If an object accidentally falls into the machine, turn the POWER switch to OFF, unplug the power cord from the wall outlet, and carefully remove the object.

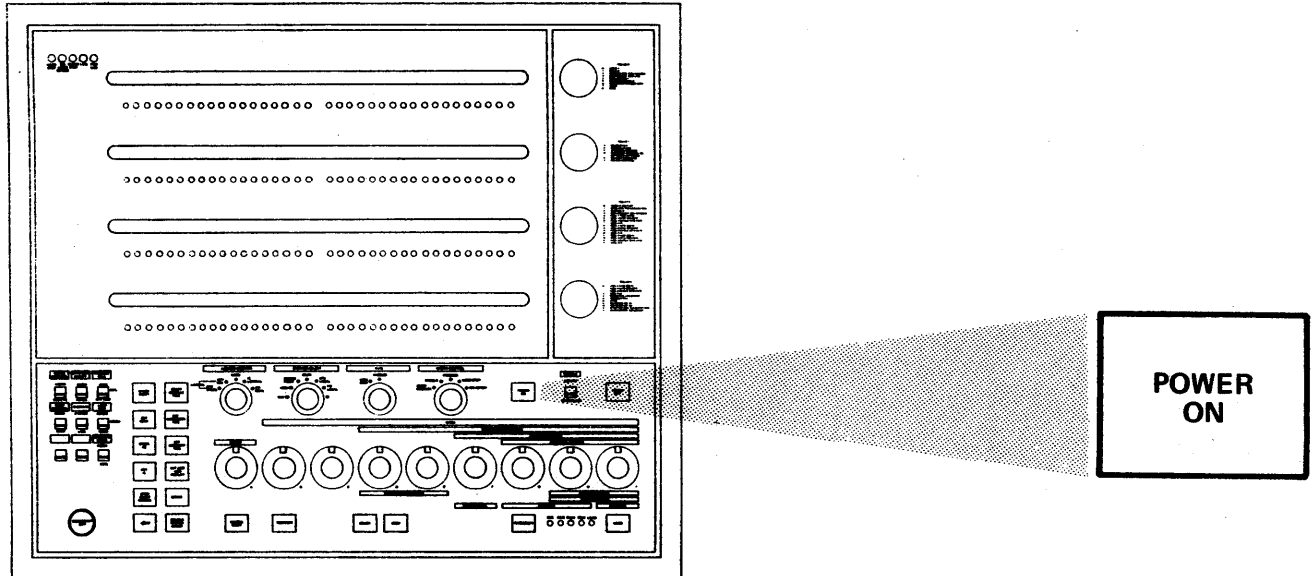
Tear the paper only along the perforations. Support paper on the cover when tearing to avoid distorting the tractor feed holes in the paper still in the machine.

Rapid off-line paper advance may be accomplished by placing the machine in LOCAL and depressing the LF and REPEAT keys simultaneously.

SECTION 3

OPERATING PROCEDURES

Power On



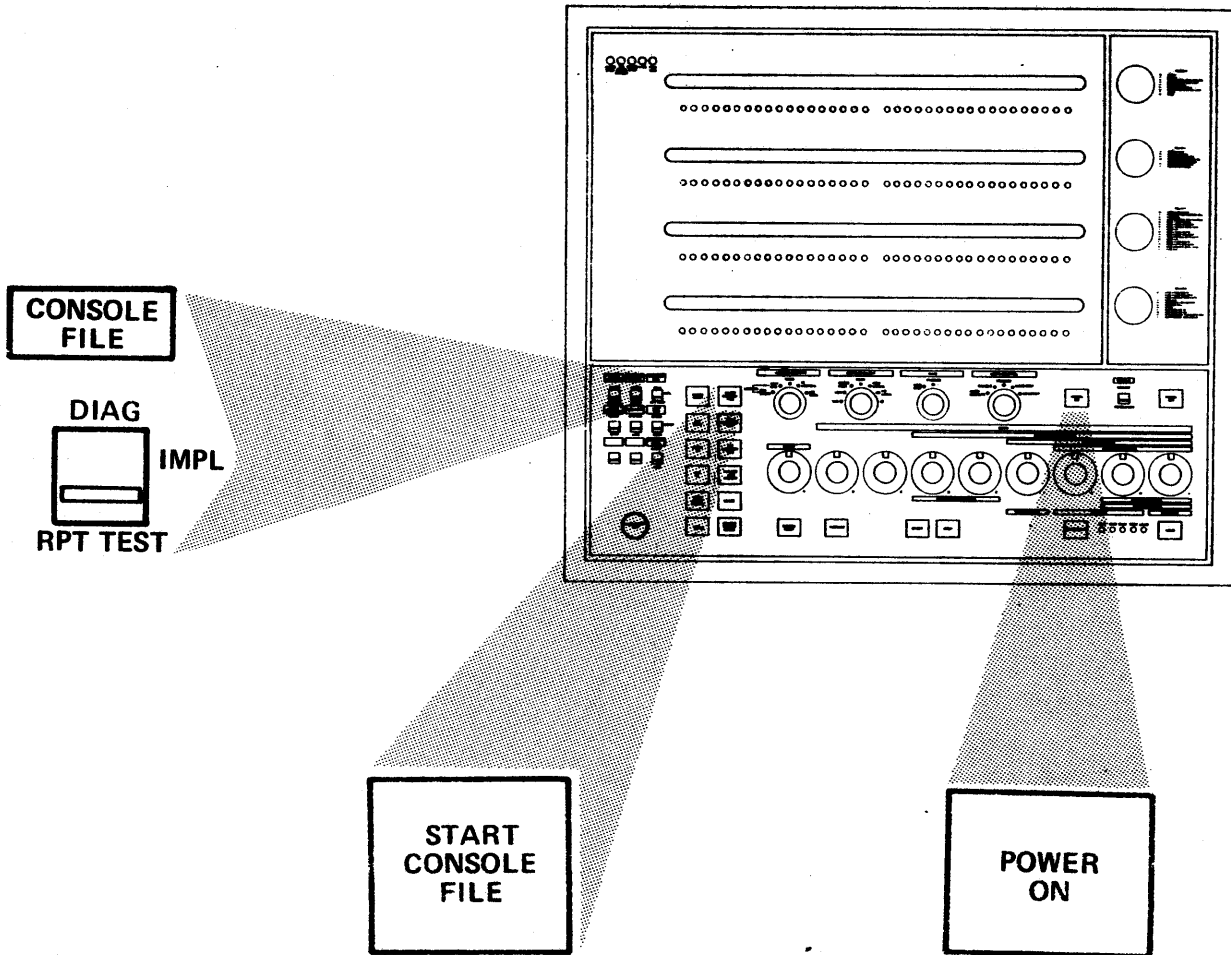
- Press the POWER-ON key

Pressing the POWER-ON key initiates a power-on sequence for the CPU and on-line I/O units. The key turns red when pressed and turns white when the power-on sequence is complete.

The time required for a power-on sequence is determined by the number and type of I/O units on-line. The contents of storage is not valid after a power-on sequence. Also, an IMPL operation is required. Note that the IMPL is automatic if the Console File switch is set to IMPL, the Clock Control toggle is set to NORMAL, the CSAR COMPARE toggle switch is set to NORM, and the microprogram disc is mounted on the console file.

OPERATING PROCEDURES

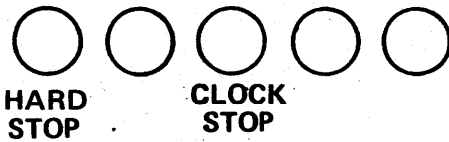
Initial Microprogram Load (IMPL)



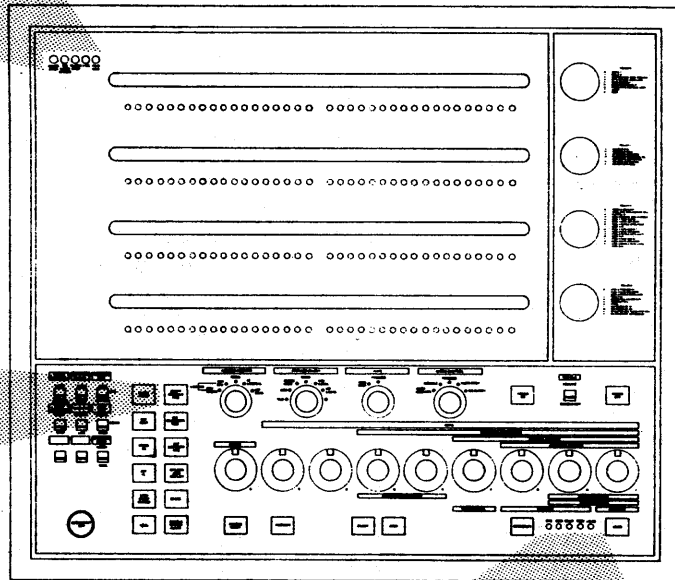
- Ensure that forms are inserted in the console PR-KB and the microprogram disc is mounted in the console file.
 1. If power is not on, press the POWER-ON key. An automatic IMPL occurs. (If power is on, press START CONSOLE FILE key to initiate the IMPL.)

OPERATING PROCEDURES

Initial Microprogram Load (IMPL) Cont.



START
CONSOLE
FILE



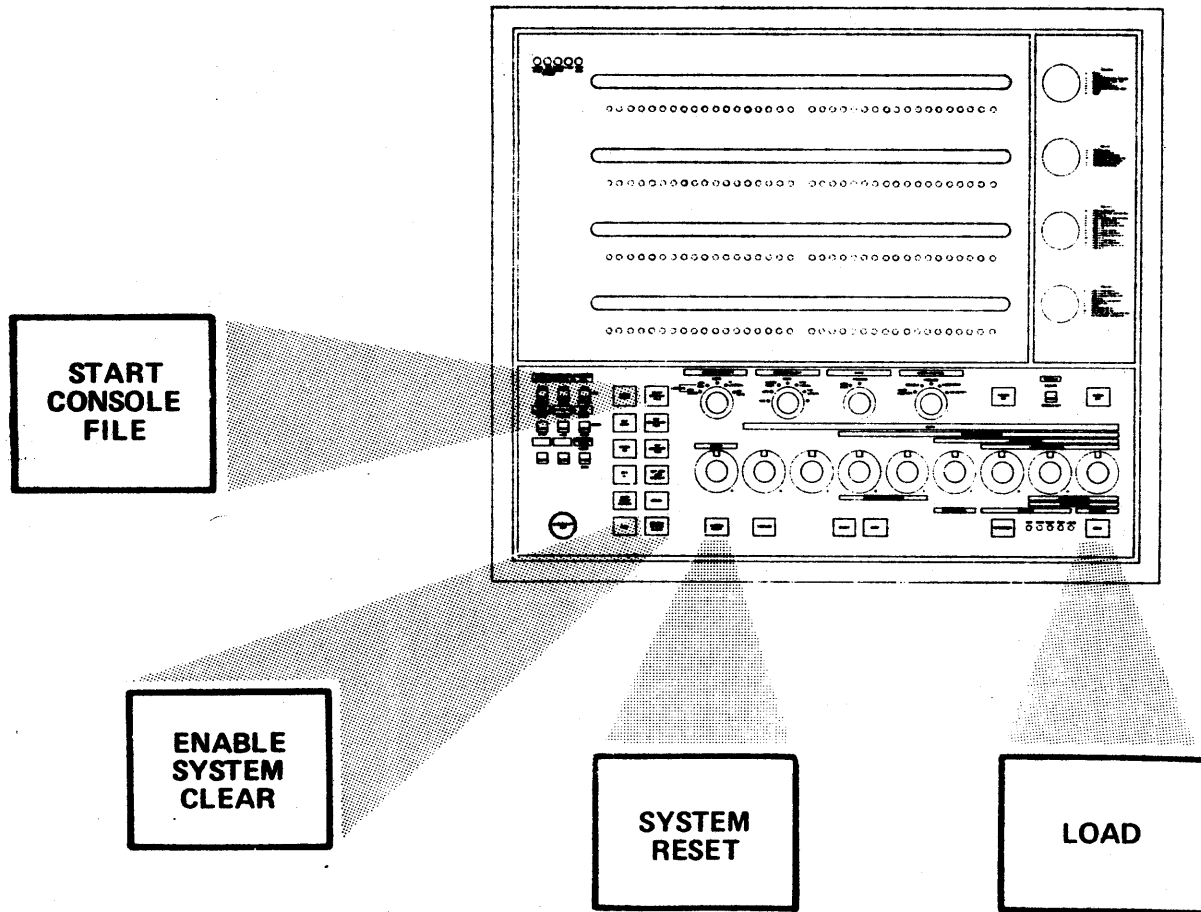
2. The START CONSOLE FILE key turns red.
When the console file starts reading, the START CONSOLE FILE key turns white.
3. When control storage is loaded, the console file powers off automatically and the START CONSOLE FILE key turns off.

The system reset routine executes and the CPU enters the manual state with the MAN indicator on.

The IMPL operation takes approximately 15 seconds.

OPERATING PROCEDURES

Initial Microprogram Load (IMPL) Cont.



4. EXCEPTIONS

If the system has been powered on without the microprogram disc inserted in the console file, the following procedure must be performed before using the system.

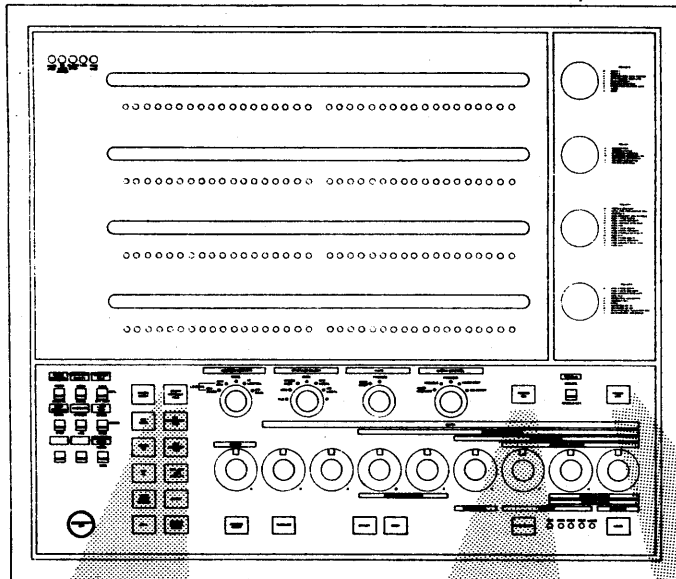
- a. Insert the microprogram disc in the console file.
- b. Close cover.
- c. After IMPL is complete, perform a clear storage operation as follows:
 - (1) Press and hold ENABLE SYSTEM CLEAR key.
 - (2) Press the SYSTEM RESET or the LOAD key.
All of main storage is cleared to zeros;
control storage is not affected.
 - (3) Release the ENABLE SYSTEM CLEAR key.

OPERATING PROCEDURES

IMPL Error Recovery

Ensure that all switches are set properly.
 Ensure that the flexible disc is inserted properly with the label facing the handle of the console file.

Attempt to re-IMPL using the START CONSOLE FILE key. If unsuccessful, press the CHECK RESET key and the POWER OFF key. Wait at least ten seconds, then re-IMPL by pressing the POWER ON key. If the problem continues, see (section 4 this manual) "HANDLING ABNORMAL SITUATIONS, GENERAL FLOW CHART."



START
CONSOLE
FILE

POWER
ON

POWER
OFF

IMPL ERROR INDICATOR CHART

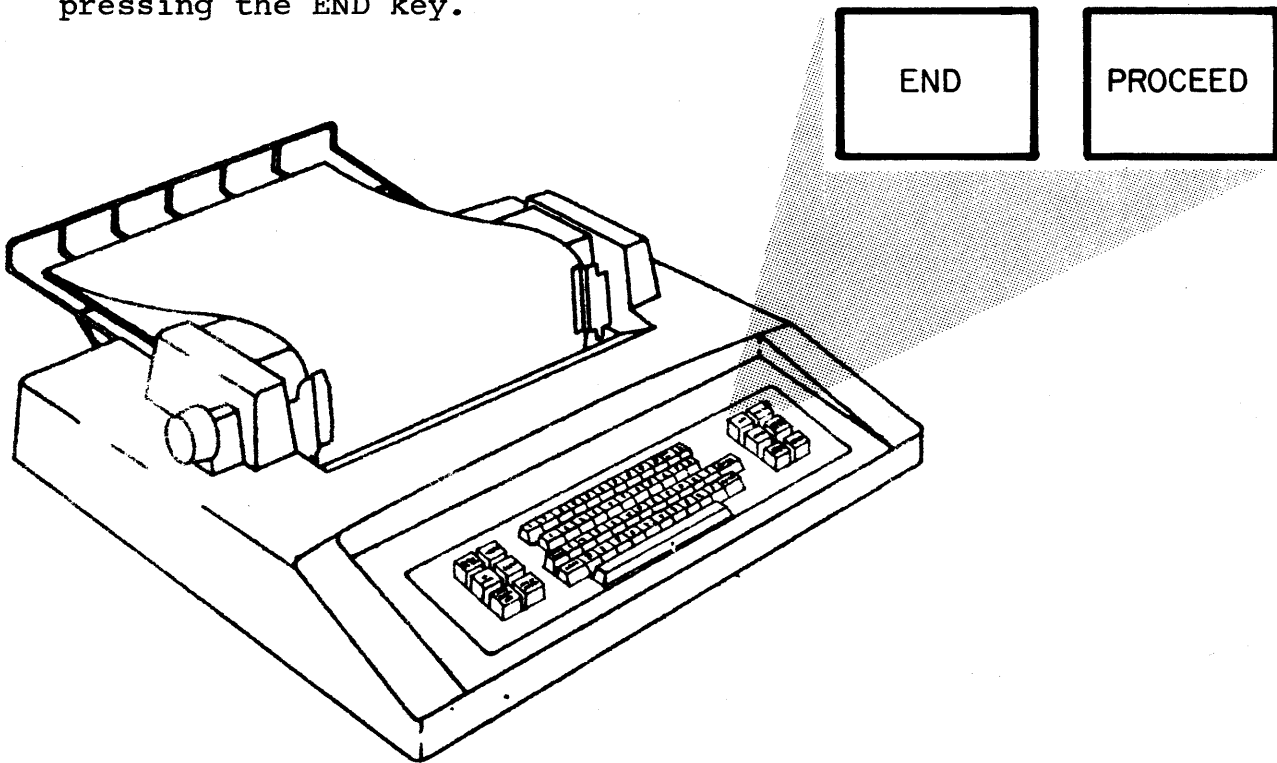
INDICATOR			ERROR CONDITION
START CONSOLE FILE KEY	HARD STOP	CS LOAD ERR	
RED	OFF or ON	OFF	DISC INSERTED UPSIDEDOWN OR BACKWARD. DISC NOT TURNING.
OFF	ON	ON	ERROR DURING LOADING OF CONTROL STORAGE
OFF	ON	OFF	CONTROL STORAGE LOADED ERROR IN EXECUTION OF SYSTEM RESET

OPERATING PROCEDURES

Console Printer-Keyboard Manual Operations

Data Entry

During a program-controlled read operation, PROCEED is turned on when the system requires data entry by the operator from the keyboard. The operation is ended by pressing the END key.



Alter/Display Operations

Alter/display operations are performed from the PR-KB. The PR-KB provides a record of the operation, the location(s) accessed, and the data involved.

Display operations print data from storage for operator inspection. The data is not changed. Alter operations change the data in storage.

OPERATING PROCEDURES

Console Printer-Keyboard Manual Operations

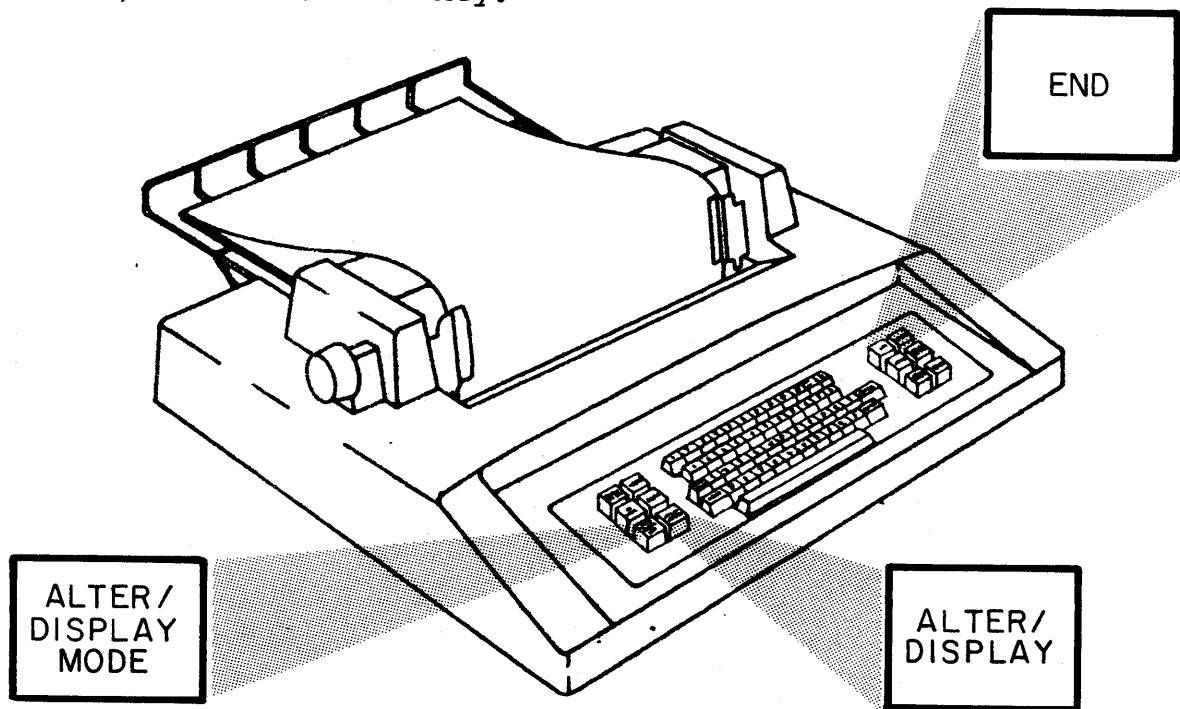
ALTER

Data is entered one hex digit at a time by using the space bar to skip over positions not being altered. The data in the skipped over positions remains unchanged and prints out each time the space-bar is operated.

To end the alter operation, press the ALTER/DISPLAY or END key.

DISPLAY

Data is printed starting at the address specified and continues until the ALTER/DISPLAY or END key is pressed, or until all data in the specific area chosen has been displayed.



NOTE:

When the operation is ended by the ALTER/DISPLAY key, the PR-KB remains in alter/display mode (ALTER/DISPLAY MODE indicator on).

When the operation is ended by the END key, alter/display mode is terminated, the machine now re-enters Manual State. When addressing main storage, word alignment is not necessary. If the starting address is not on a word boundary, the PR-KB spaces and aligns at the byte addressed.

OPERATING PROCEDURES

Console Printer-Keyboard Manual Operations

ALTER/DISPLAY PROCEDURES

NOTE:

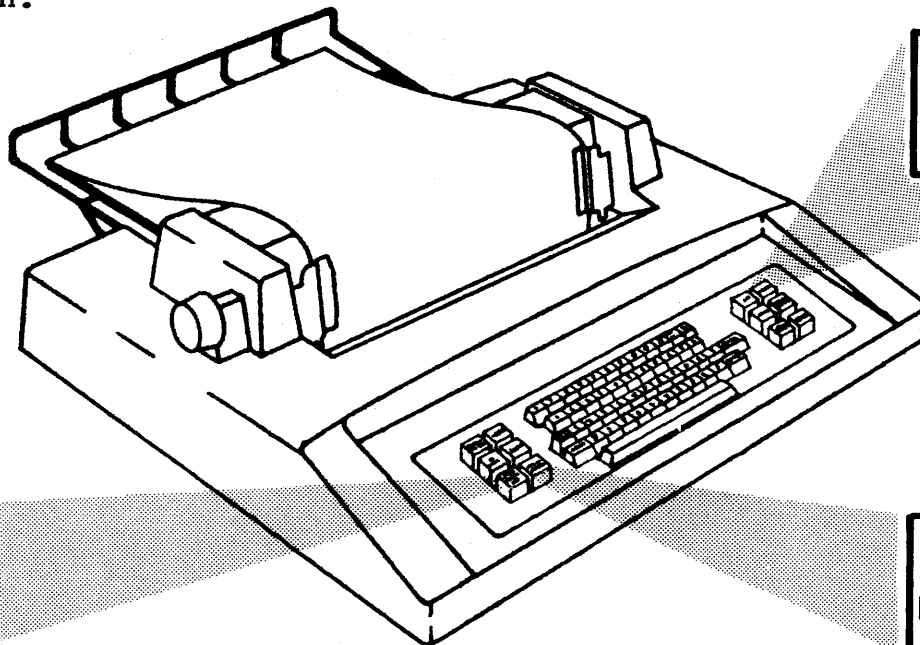
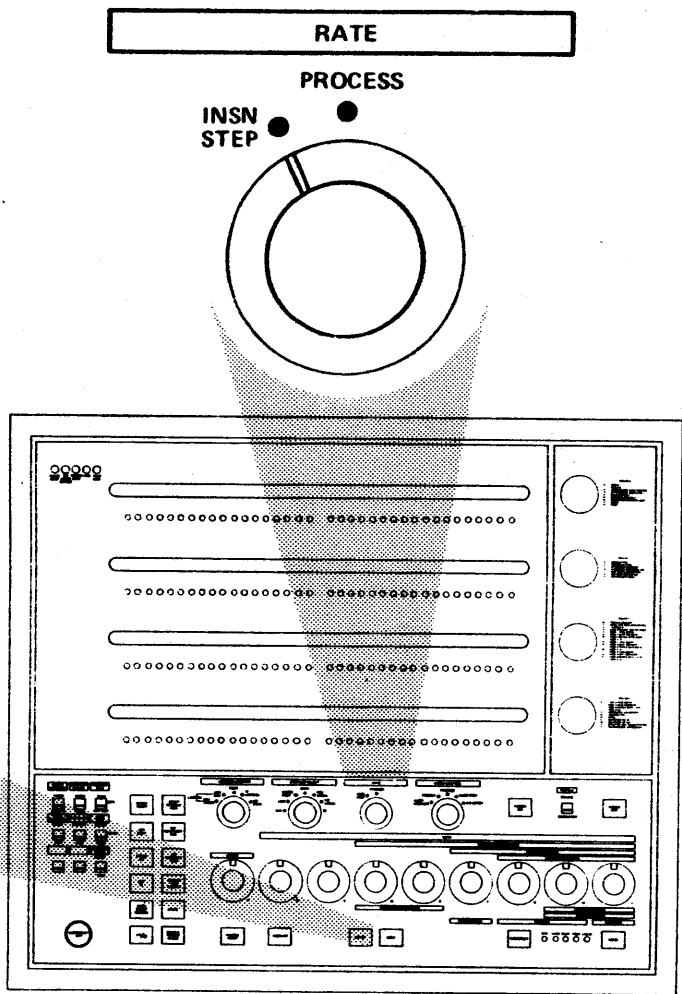
Steps 1 through 3 are common to both ALTER and DISPLAY OPERATIONS.

1. Place the machine in Manual state by pressing the STOP key or by setting the RATE switch to INSN STEP.



2. Press the ALTER/DISPLAY key.

3. Wait for both ALTER/DISPLAY MODE and PROCEED indicators to turn on.



OPERATING PROCEDURES

Console Printer-Keyboards Manual Operations

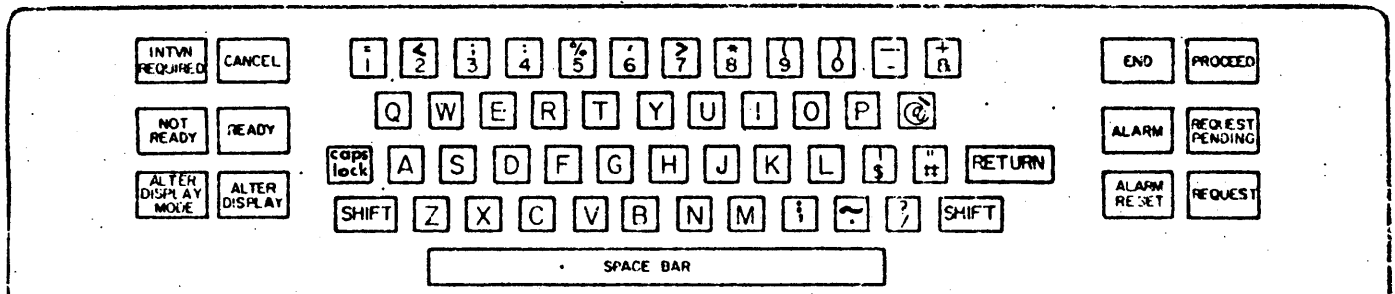
ALTER/DISPLAY PROCEDURES Cont.

4. From the following chart type the appropriate two-character mnemonic and address of the storage area or register to be altered or displayed

STORAGE AREA	ALTER MNEMONIC	DISPLAY MNEMONIC	ADDRESS RANGE
MAIN STORAGE	AM	DM	000000-1FFFFFF *
STORAGE KEY	AK	DK	000000-1FFFFFF *
CONTROL REGISTER	AC	DC	0-F
GENERAL REGISTER	AG	DG	0-F
FLOATING-POINT REGISTER	AF	DF	0,2,4,6
CURRENT PSW	AP	DP	None required
STORE STATUS	NONE	ST	None required
VIRTUAL STORAGE	AV	DV	000000-FFFFFF

* The upper boundary is movable and depends upon the capacity of main storage.

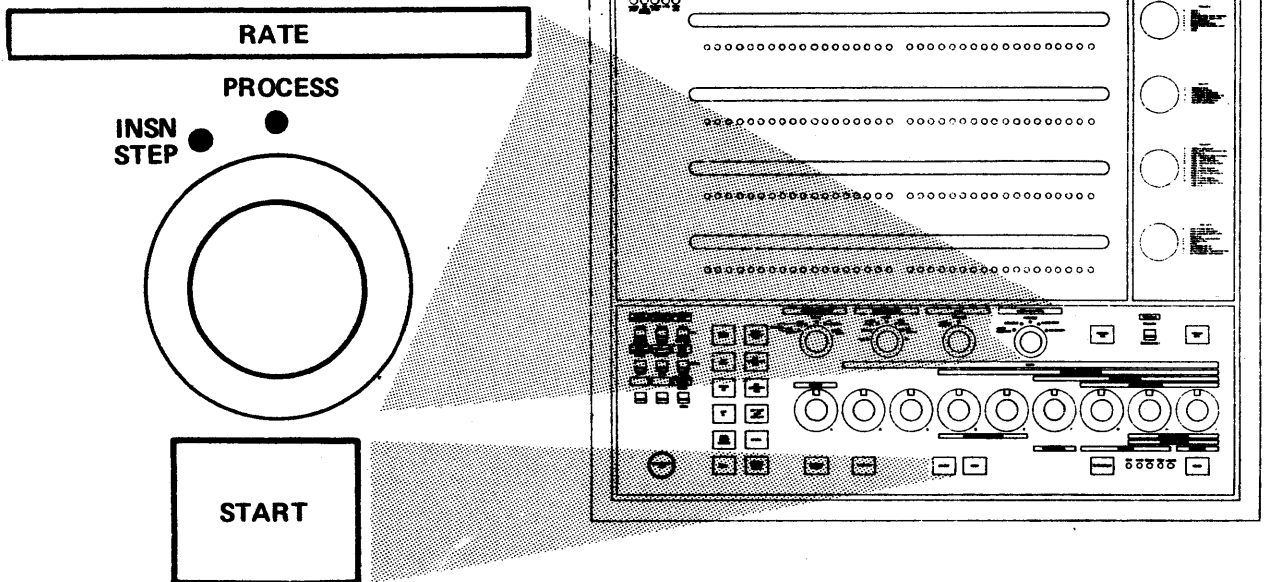
5. The display will begin immediately after the sixth digit of the address is typed. The RETURN key must be pressed after entering an address with less than six digits.



OPERATING PROCEDURES

Console Printer-Keyboard Manual Operations ALTER/DISPLAY PROCEDURES Cont.

6. To continue program processing when the alter or display operation is completed return the machine to manual state and press the START key.



ALTER/DISPLAY EXAMPLES

In the following examples, the Xs represent characters displayed or entered and printed by the PR-KB.

- MAIN STORAGE

```
DM 00008D
XXXXXXXXXXXXXXXXXXXX --- XX
XXXXXXXXXXXXXXXXXXXX (Press the ALTER/
DISPLAY or END key.)
XXXXXX XXXXXXXXXXXXXXXXXXXX ---- XX
XXXXXXXXXXXXXXXXXXXX (Press the ALTER/
DISPLAY or END key.)
AM 480 (Press the RETURN key.)
XXXXXXXXXX XXXX (Press the ALTER/DIS-
PLAY or END key.)
```

- FLOATING-POINT REGISTER

```
DF 2
XXXXXXXXXXXXXXXXXXXX ---- XX
```

- STORAGE KEY

```
DK 009000
XXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX (Press
the ALTER/DISPLAY or END key.)
Each word contains four storage
keys.
```

- CURRENT PSW

```
AP
XXXXXXXXXX XXXXXXXXXXX
```

- VIRTUAL STORAGE

```
Type in logical address: LLLLL;
system types out = RRRRRR (real
address)
DV LLLLLL=RRRRRR
XXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX
XXXXXXXXXX XXXXXXXXXXX (Press ALTER/
DISPLAY key.)
AV LLLLLL=RRRRRR
XXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX
XXXXXXXXXX XXXXXXXXXXX (Press ALTER/
DISPLAY key.)
```

OPERATING PROCEDURES

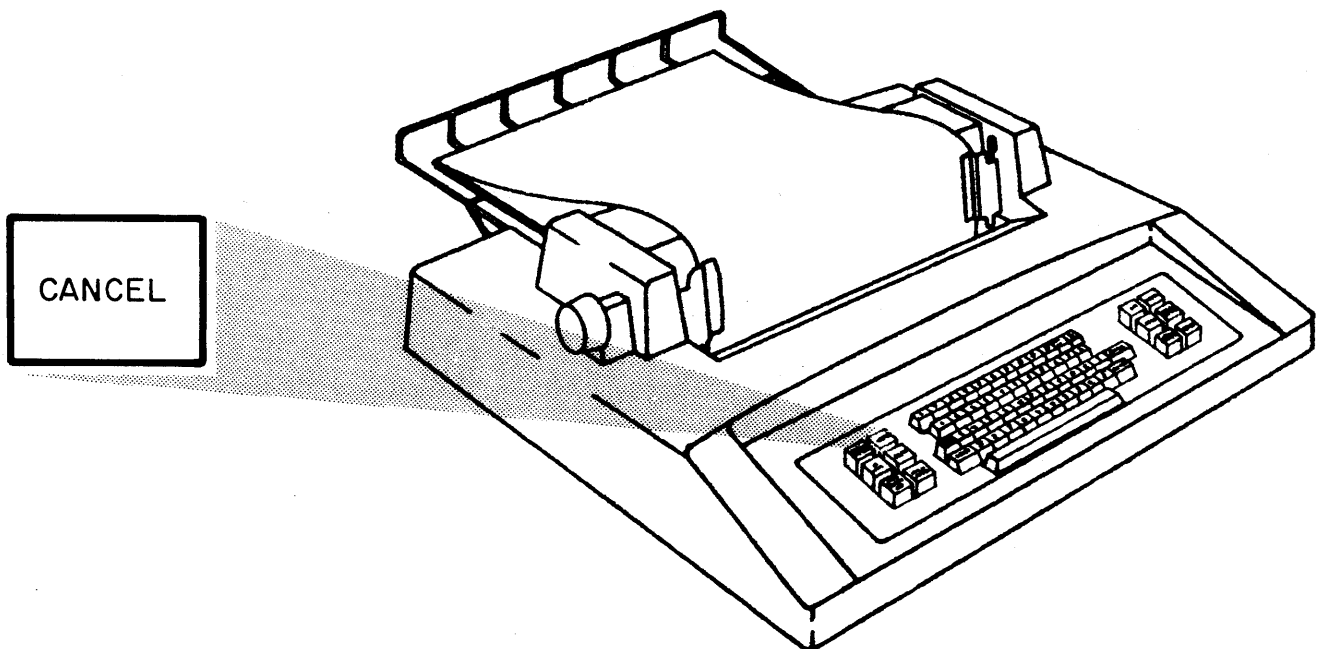
Console Printer-Keyboard Manual Operations

ALTER/DISPLAY ERROR ACTION

NO ACTION

The Console printer ignores the entered character when the following occurs:

1. The first character of a mnemonic is not A,D,S or T.
2. The second character is not M,K,C,G,F,P,T,V, or W.
3. An invalid hexadecimal digit is typed when addressing or altering data.
4. The CANCEL key is pressed.



When one of the following errors occur a "?" is printed.

1. Invalid starting address.
2. Updated address exceeds the capacity of specified storage.
3. Non-translated logical address (DV LLLLLL : "?")
4. The translated real address exceeds the capacity of main storage. (DV LLLLLL=RRRRRR "?").

OPERATING PROCEDURES

Console Printer-Keyboard Manual Operations

STORE STATUS

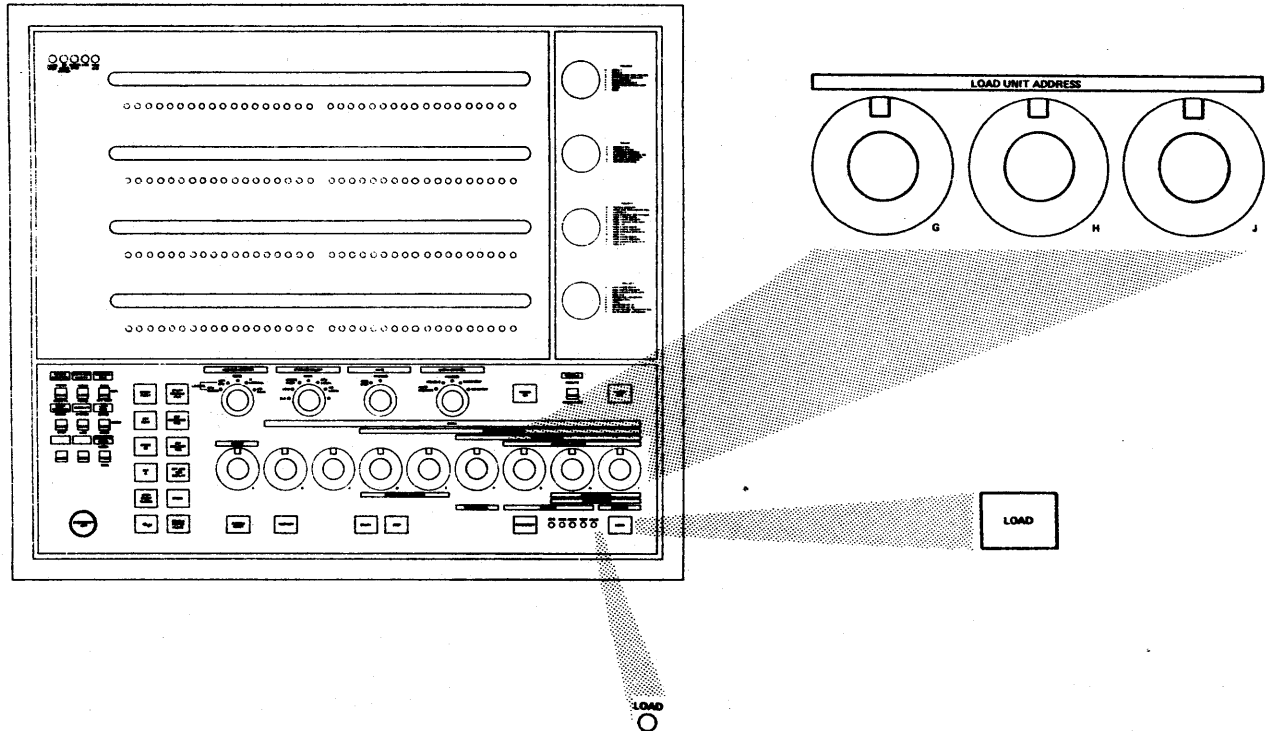
- A manually initiated function that places the programmable registers in fixed locations in processor storage.
- The function is initiated by placing the PR-KB in alter/display mode and typing in ST.

STORE STATUS PROCEDURE

1. Press the STOP key, or place the RATE switch in INSTRUCTION STEP position. This places the CPU in a stopped state.
2. Press the ALTER/DISPLAY key on the PR-KB. The PROCEED light turns on.
3. Type in the mnemonic ST. The function is executed, the carriage on the PR-KB returns, and the CPU exits from the ALTER/DISPLAY mode and returns to a stopped state. (No print-out is given.)

OPERATING PROCEDURES

Initial Program Load (IPL)



1. Load and ready the System Resident (SYS RES) device.
2. Dial the address of the IPL device into LOAD UNIT ADDRESS switches G, H, and J.
3. Press the LOAD key.
 - After an automatic system reset, the IPL operation starts.
 - The LOAD indicator turns on.
 - When IPL is complete, the LOAD indicator turns off and the system executes the program.

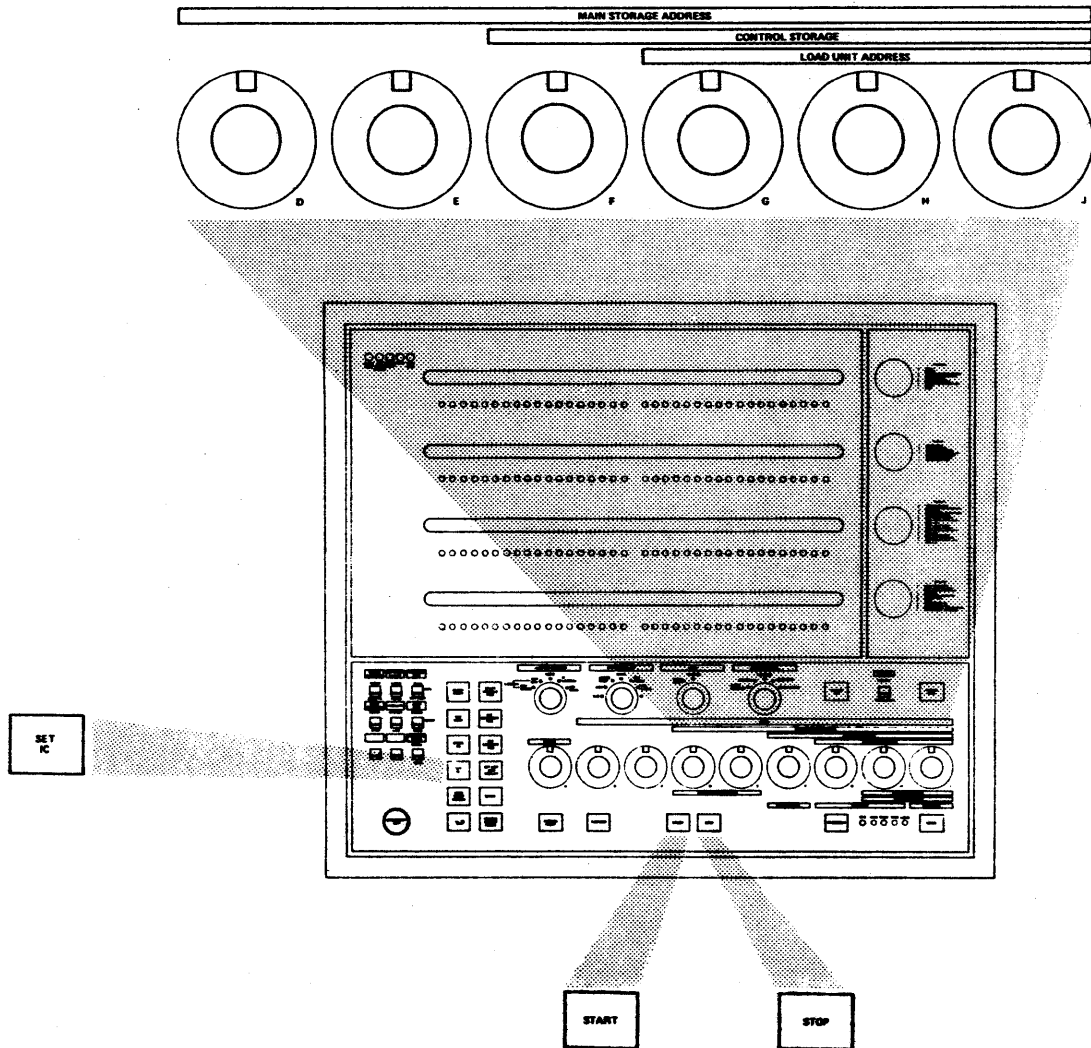
IPL ERROR RECOVERY

- Are the LOAD UNIT ADDRESS switches G, H, and J correct?
- Is SYS RES device ready?

If the setup is correct and IPL errors still occur, see (section 4 of this manual) "Handling Abnormal Situations, General Flowchart."

OPERATING PROCEDURES

SET IC (Instruction Counter)



1. Press the STOP key.
2. Dial the desired address into MAIN STORAGE ADDRESS switches D, E, F, G, H, J.
3. Press the SET IC key.

The set instruction counter operation loads the address from switches D, E, F, G, H, J into the instruction counter. Instruction processing starts from this address when the START key is pressed.

OPERATING PROCEDURES

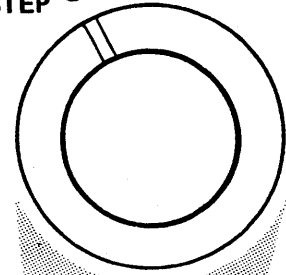
Instruction Step

1. Press the STOP key.
2. Set the RATE switch to INSTRUCTION STEP.



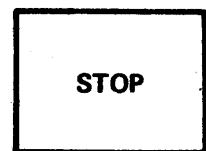
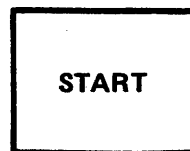
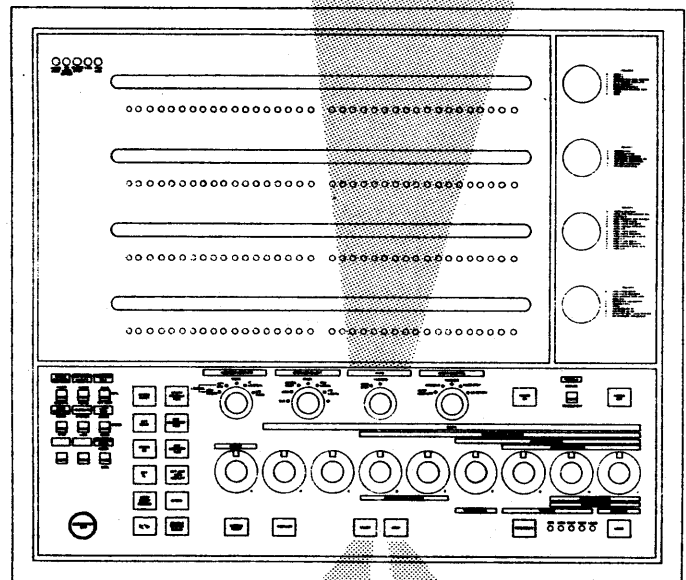
PROCESS

INSN
STEP



3. Press the START key.

One machine language instruction is executed for each operation of the START key. The instruction counter (displayed on roller 2 and 3 indicators) contains the address of the next instruction to be executed.

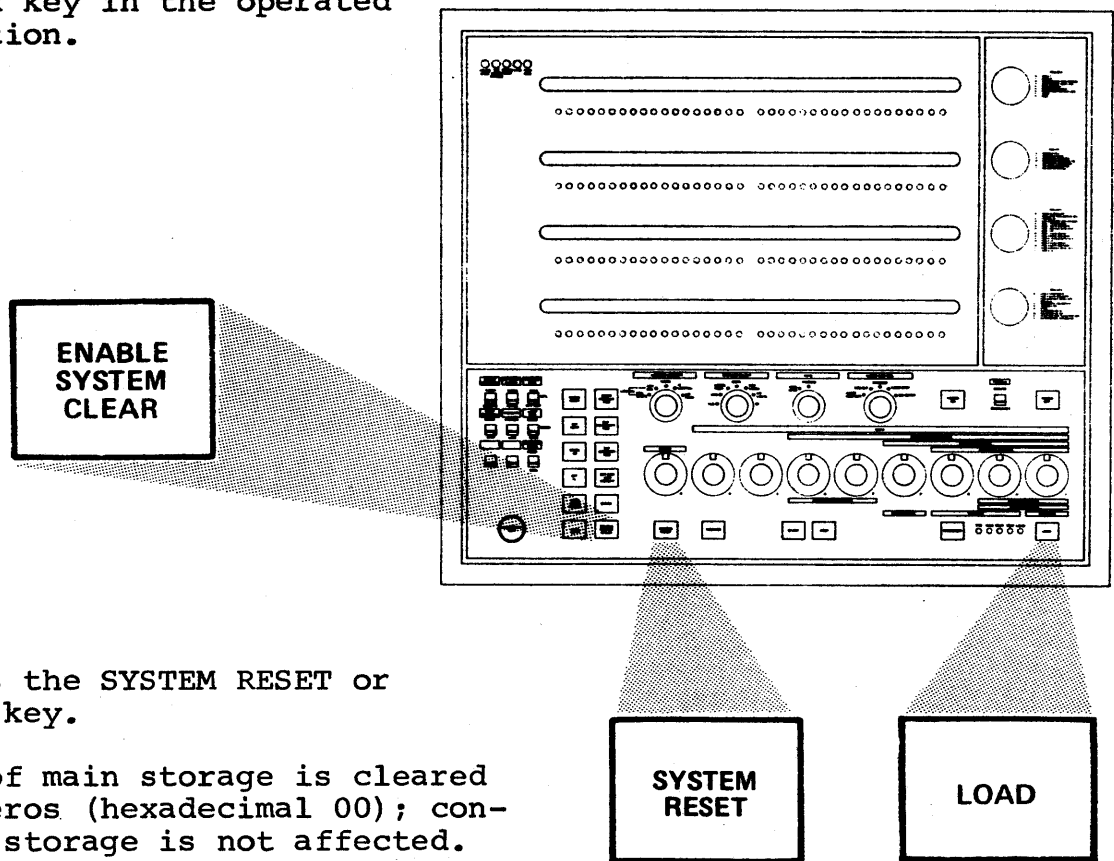


OPERATING PROCEDURES

Clear Storage

- Main storage can be cleared to zeros using the following procedure.

1. Hold the ENABLE SYSTEM CLEAR key in the operated position.



2. Press the SYSTEM RESET or LOAD key.

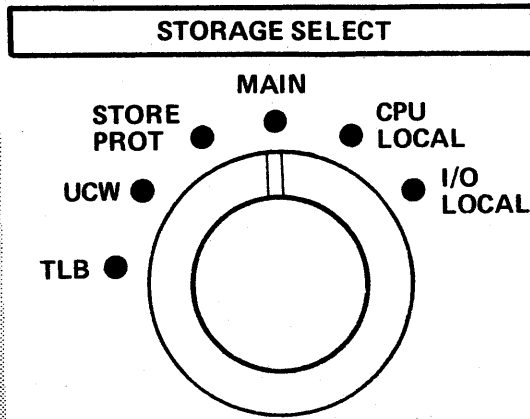
All of main storage is cleared to zeros (hexadecimal 00); control storage is not affected.

3. Release the ENABLE SYSTEM CLEAR key.

OPERATING PROCEDURES

Manual Store/Display Operations

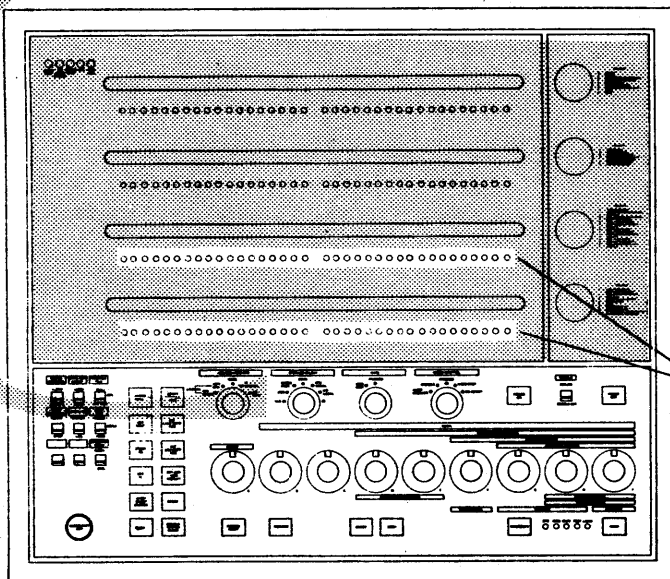
The MAN indicator must be on for the STORE and DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



Main Storage

With the system in manual mode (MAN indicator on), store/display of main storage is performed as follows:

1. Set the STORAGE SELECT switch to MAIN.

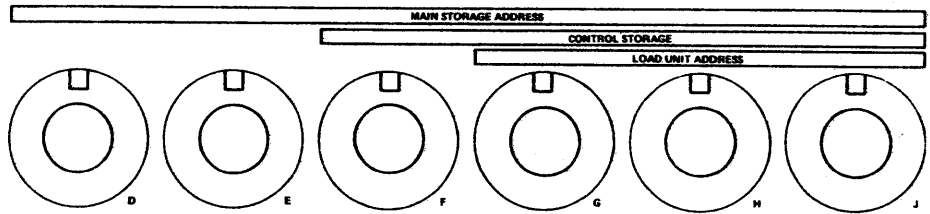


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators.

OPERATING PROCEDURES

Manual Store/Display Operations Cont.



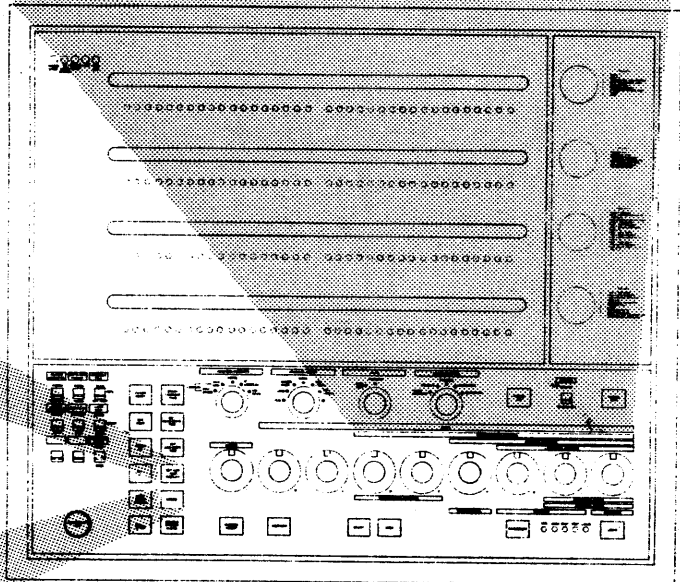
Main Storage Cont.

2. Dial the desired word address into rotary switches, D,E,F, G,H,J. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators.

SET ADR AND DISPLAY

3. For a store operation, set rotary switches B thru J to the Hexadecimal word value to be stored and press STORE key.

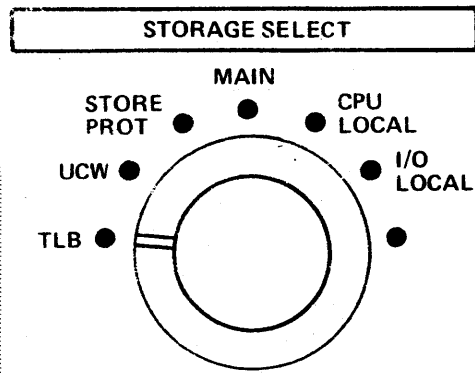
STORE



OPERATING PROCEDURES

Manual Store/Display Operations, Cont.

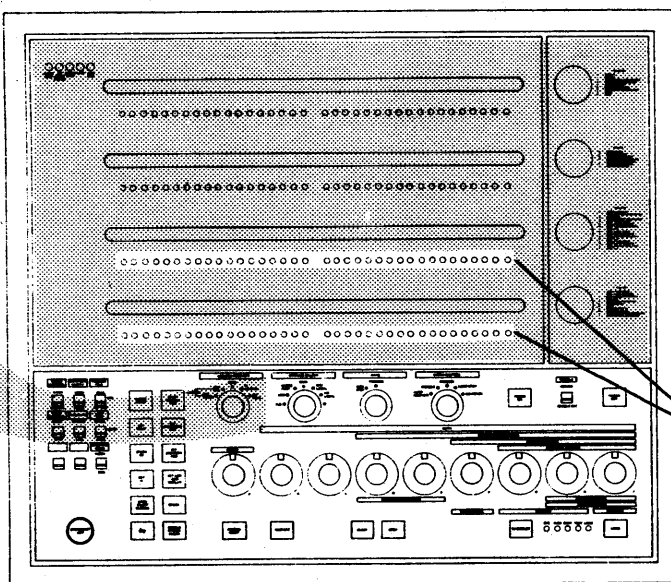
The MAN indicator must be on for the STORE and SET ADR AND DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



TLB Storage

With the system in manual mode (MAN indicator on), store/display of TLB storage is performed as follows:

1. Set the STORAGE SELECT switch to TLB.

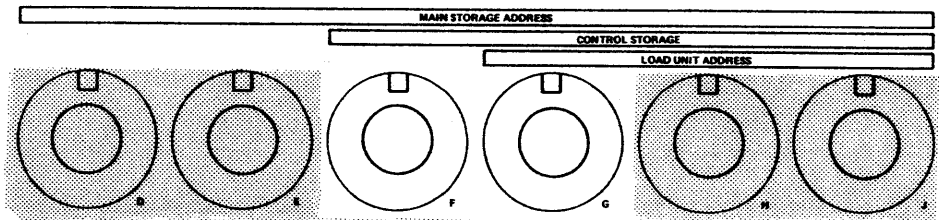


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators. The correct field labeling for this data can be found on roller 3 position E.

OPERATING PROCEDURES

Manual Store/Display Operations Cont.



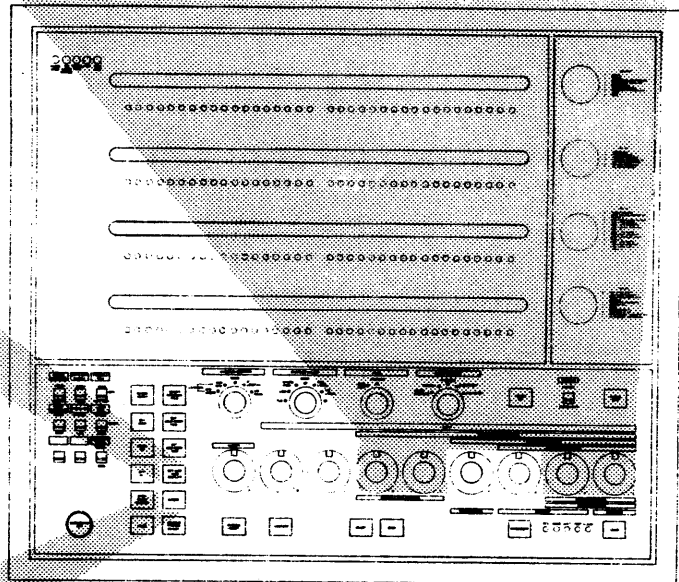
TLB Storage, cont.

2. Dial the desired address into rotary switches F and G. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators. The correct field labeling for this data can be found on roller 3 position E.

SET ADR AND DISPLAY

3. For a store operation, set rotary switches D thru J to the Hexadecimal value to be stored and press STORE key.

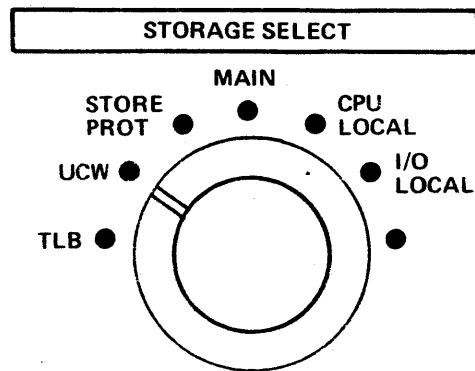
STORE



OPERATING PROCEDURES

Manual Store/Display Operations Cont.

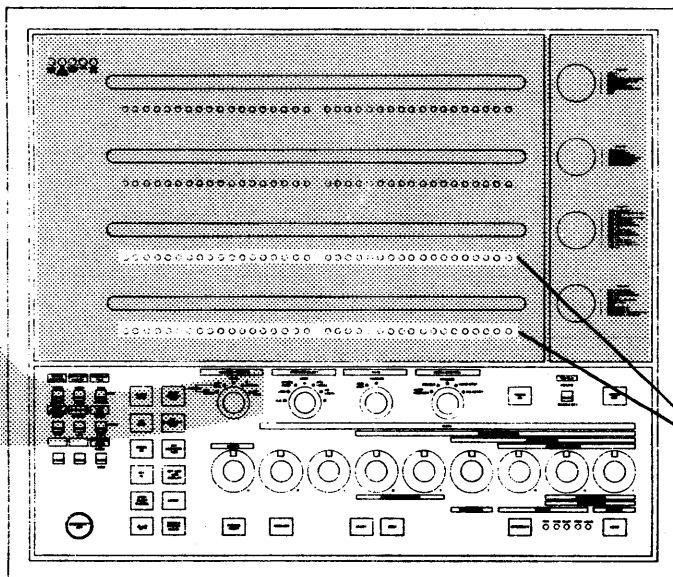
The MAN indicator must be on for the STORE AND SET ADR AND DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



UCW Storage

With the system in manual mode (MAN indicator on), store/display of UCW storage is performed as follows:

1. Set the STORAGE SELECT switch to UCW.

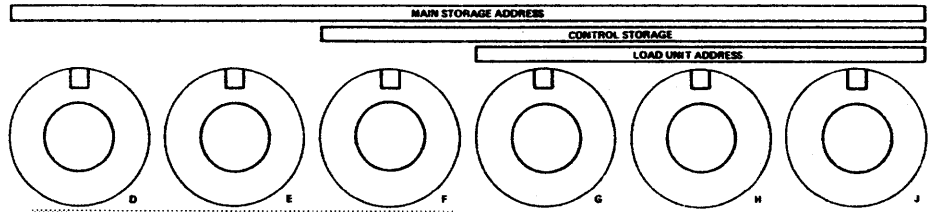


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators.

OPERATING PROCEDURES

Manual Store/ Display Operations Cont.



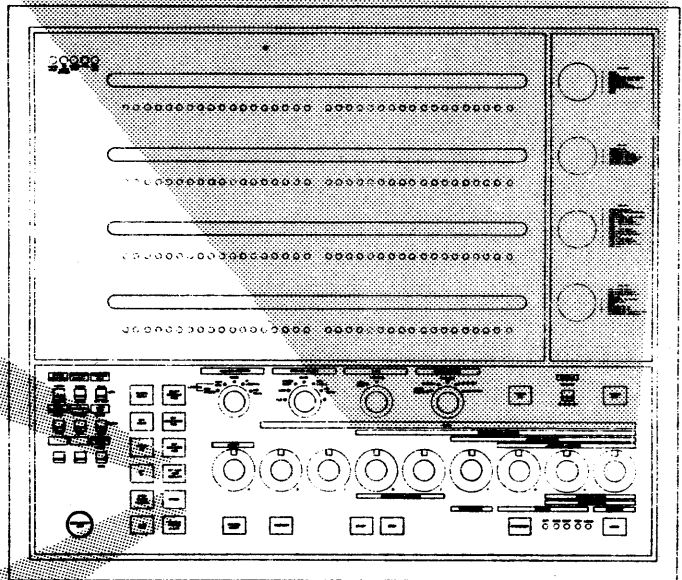
UCW Storage Cont.

2. Dial the desired word address into rotary switches, F, G, H, J. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators.

SET ADR AND DISPLAY

3. For a store operation, set rotary switches B thru J to the Hexadecimal word value to be stored and press STORE key.

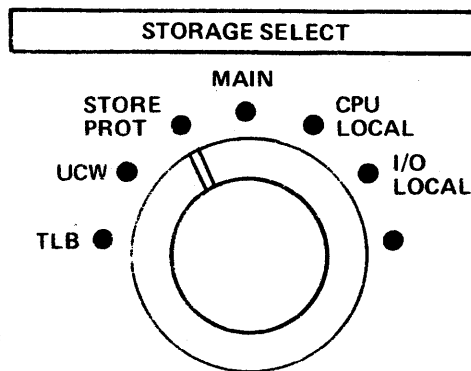
STORE



OPERATING PROCEDURES

Manual Store/Display Operations Cont.

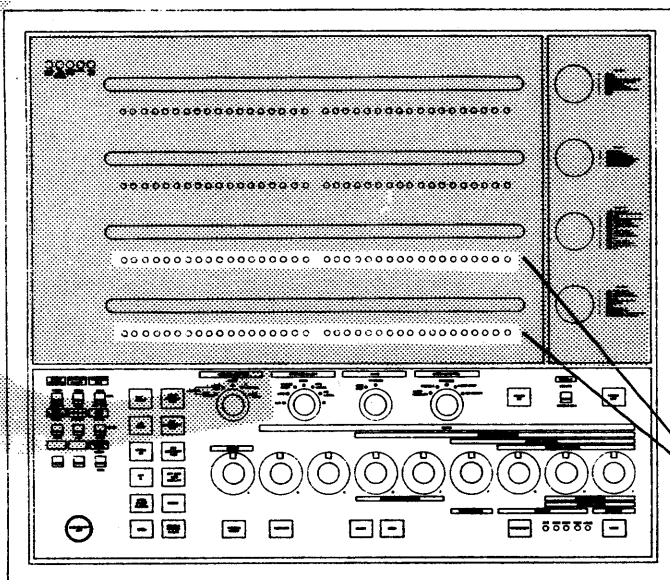
The MAN indicator must be on for the STORE and SET ADR AND DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



Store Prot Storage

With the system in manual mode (MAN indicator on), store/display of STORE PROT STORAGE is performed as follows:

1. Set the STORAGE SELECT switch to STORE PROT.

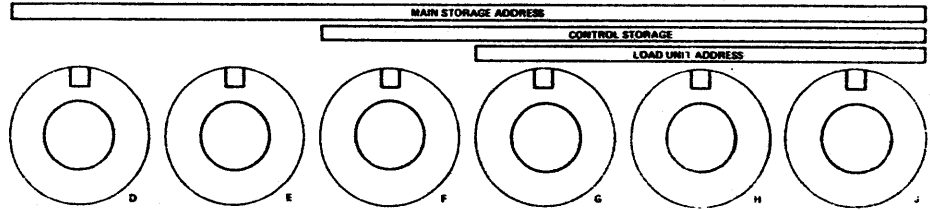


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators.

OPERATING PROCEDURES

Manual Store/Display Operations Cont.



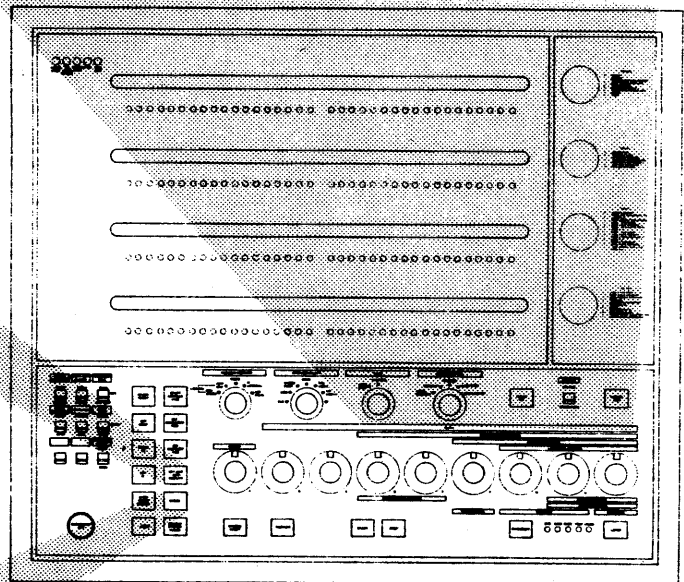
Store Prot Storage, cont.

2. Dial the desired address into rotary switches, D, E, F, G. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators, leftmost byte. The correct field labeling for the data can be found on roller 3 position E.

SET ADR AND DISPLAY

3. For a store operation, set rotary switches B and C to the Hexadecimal value to be stored and press STORE key.

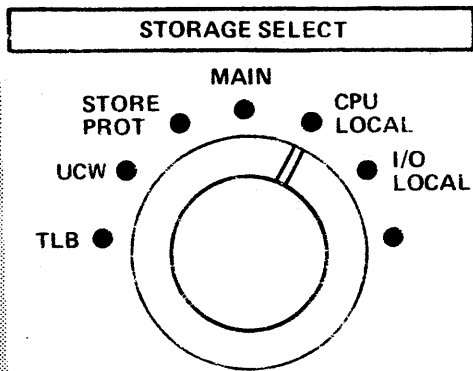
STORE



OPERATING PROCEDURES

Manual Storage/Display Operations Cont.

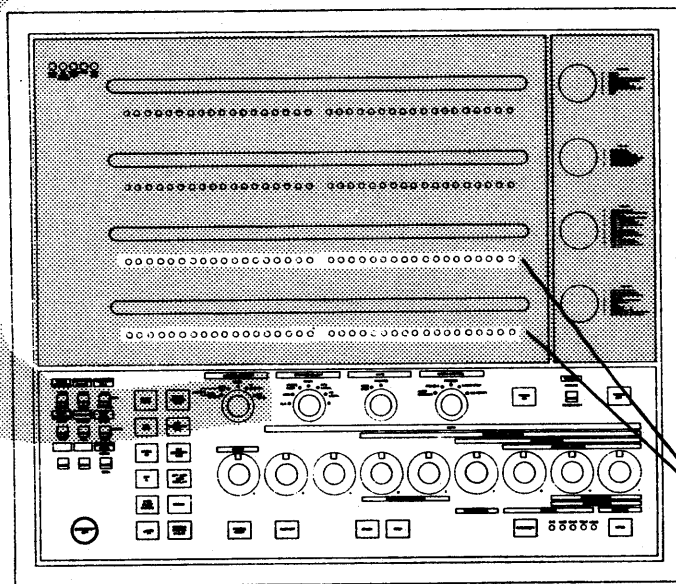
The MAN indicator must be on for the STORE and SET ADR AND DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



CPU Local Storage

With the system in manual mode (MAN indicator on), store/display of CPU LOCAL STORAGE is performed as follows:

1. Set the STORAGE SELECT switch to CPU LOCAL.

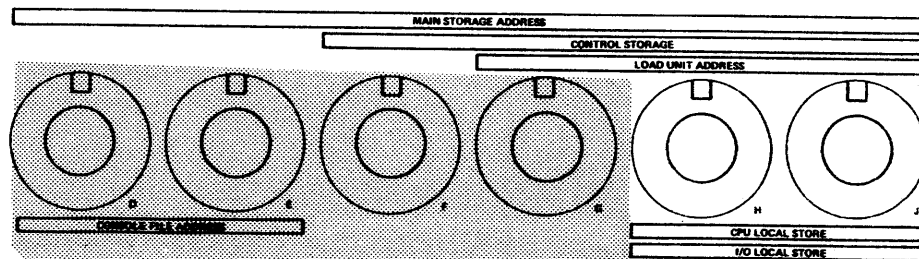


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators.

OPERATING PROCEDURES

Manual Storage/ Display Operations Cont.

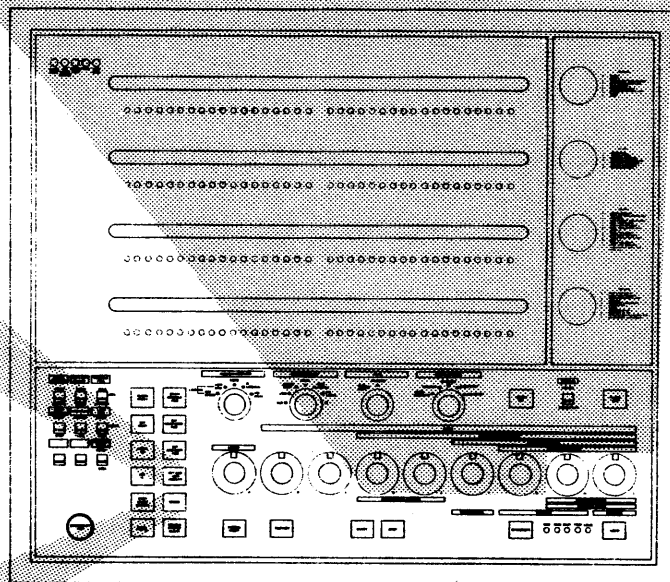


CPU Local Storage Cont.

2. Dial the desired word address, right justified, into rotary switches, H, J. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators.



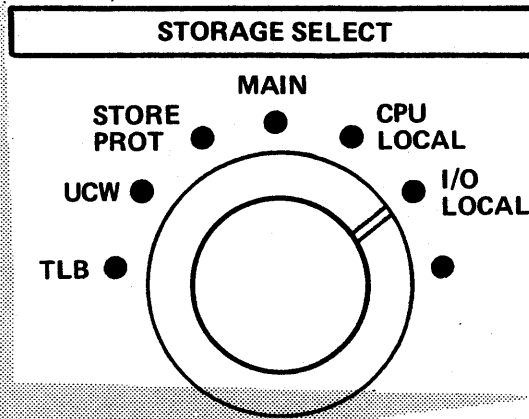
3. For a store operation, set rotary switches B thru J to the Hexadecimal word value to be stored and press STORE key.



OPERATING PROCEDURES

Manual Storage/ Display Operations Cont.

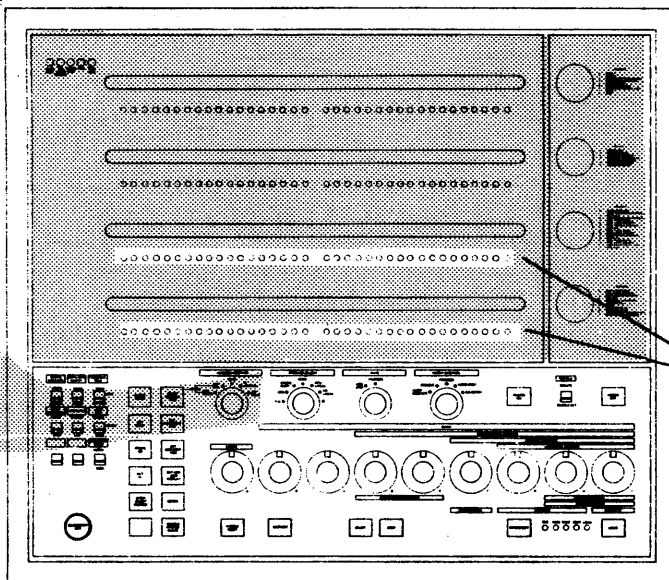
- The MAN indicator must be on for the STORE and SET ADR AND DISPLAY keys to be operative. If the CPU is running, press the STOP key to turn on the MAN indicator.



I/O Local Storage

With the system in manual mode (MAN indicator on), store/display of I/O LOCAL STORAGE is performed as follows:

1. Set the STORAGE SELECT switch to I/O LOCAL.

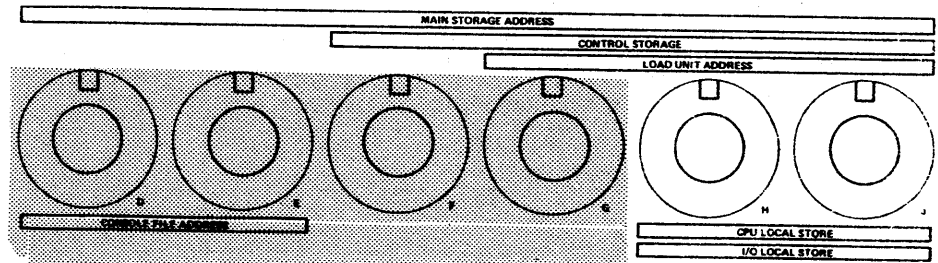


NOTE:

After step 2, data will be displayed on roller 2 & 3 indicators.

OPERATING PROCEDURES

Manual Storage/Display Operations Cont.



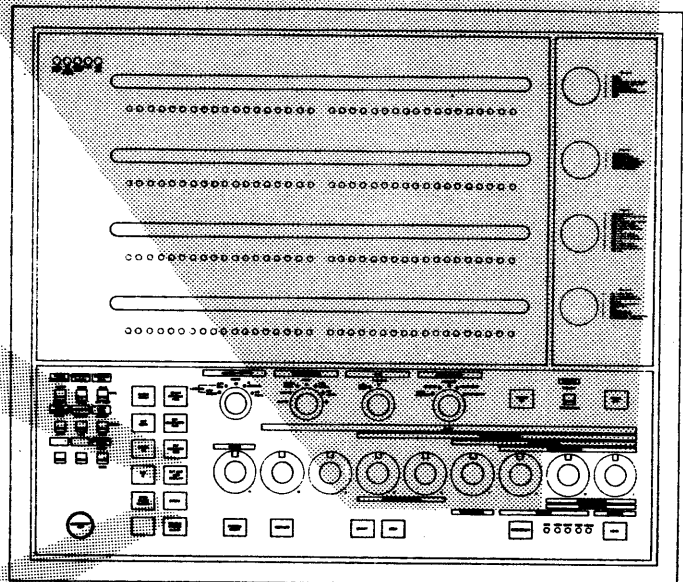
I/O Local Storage Cont.

2. Dial the desired word address into rotary switches, H. J. Press SET ADR AND DISPLAY key. Data is displayed on roller 2 and 3 indicators.

SET ADR AND DISPLAY

3. For a store operation, set rotary switches B thru J to the Hexadecimal word value to be stored and press STORE key.

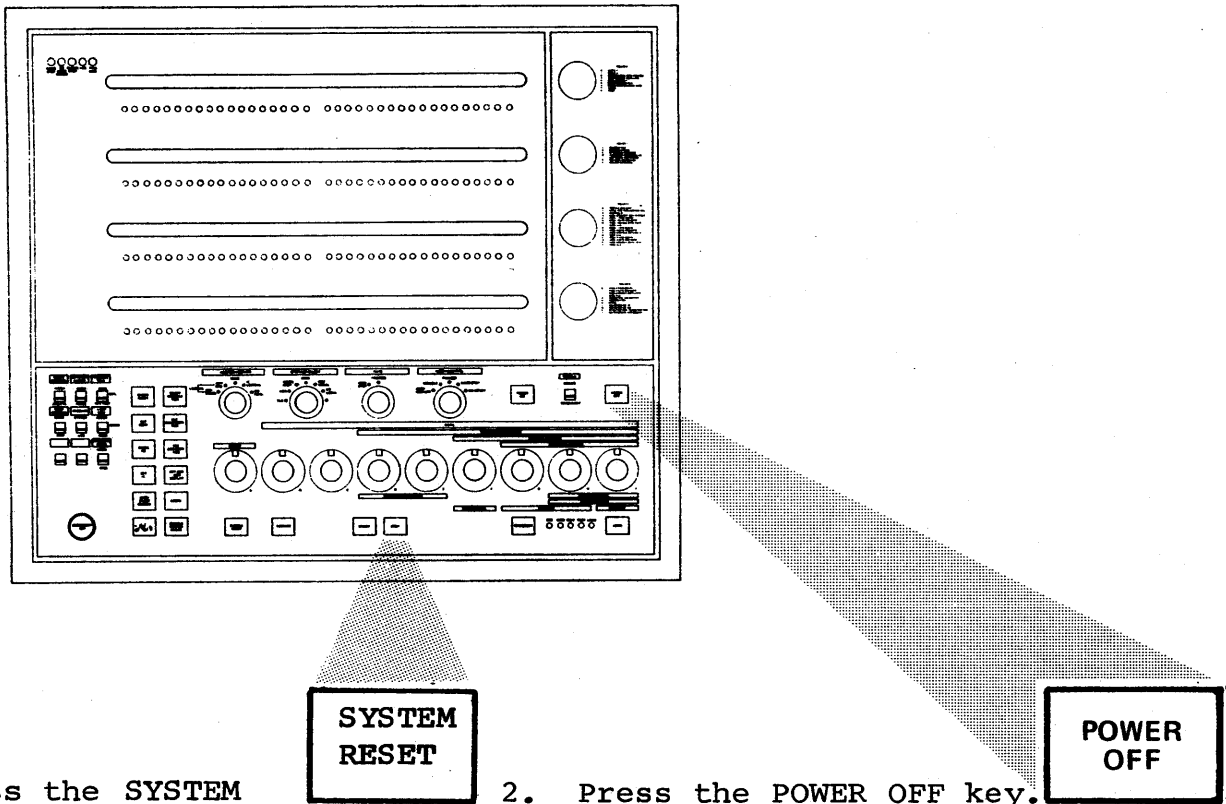
STORE



OPERATING PROCEDURES

Power Off Procedure

- Pressing the POWER-OFF key removes power to the CPU and on-line I/O units. Main and control storage information is lost.



1. Press the SYSTEM RESET key.

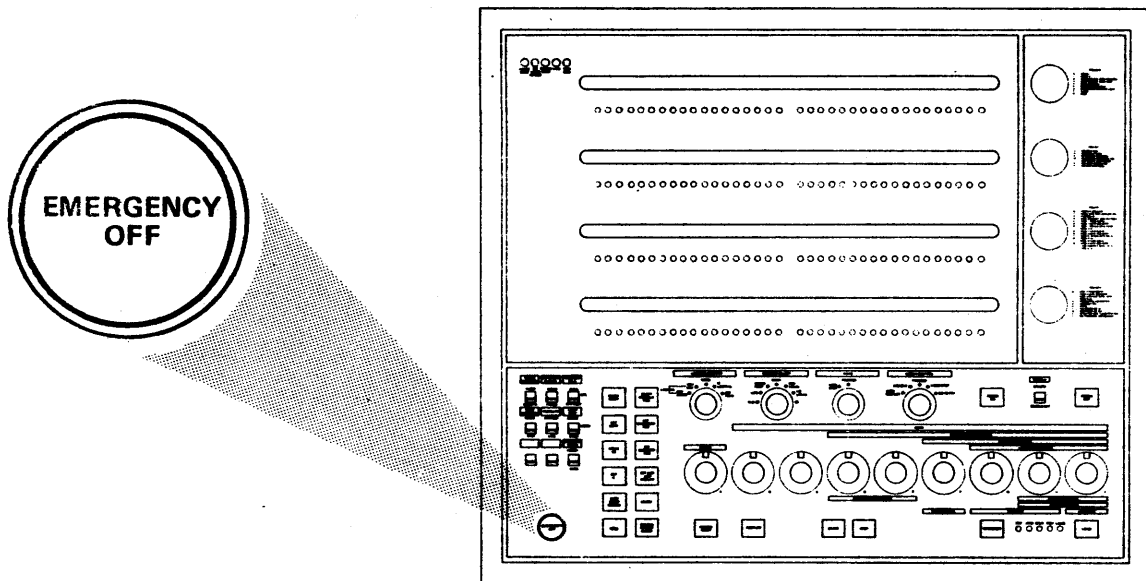
2. Press the POWER OFF key.

NOTE:

If the system is powered-off do not turn power back on for at least ten seconds. If the POWER-ON key is pressed before ten seconds have elapsed, a power check may occur.

OPERATING PROCEDURES

Emergency Off Switch



Pushing the EMERGENCY OFF switch turns off electrical power to the CPU and online I/O units, and makes the POWER ON key ineffective until the EMERGENCY OFF switch is reset by a service representative.

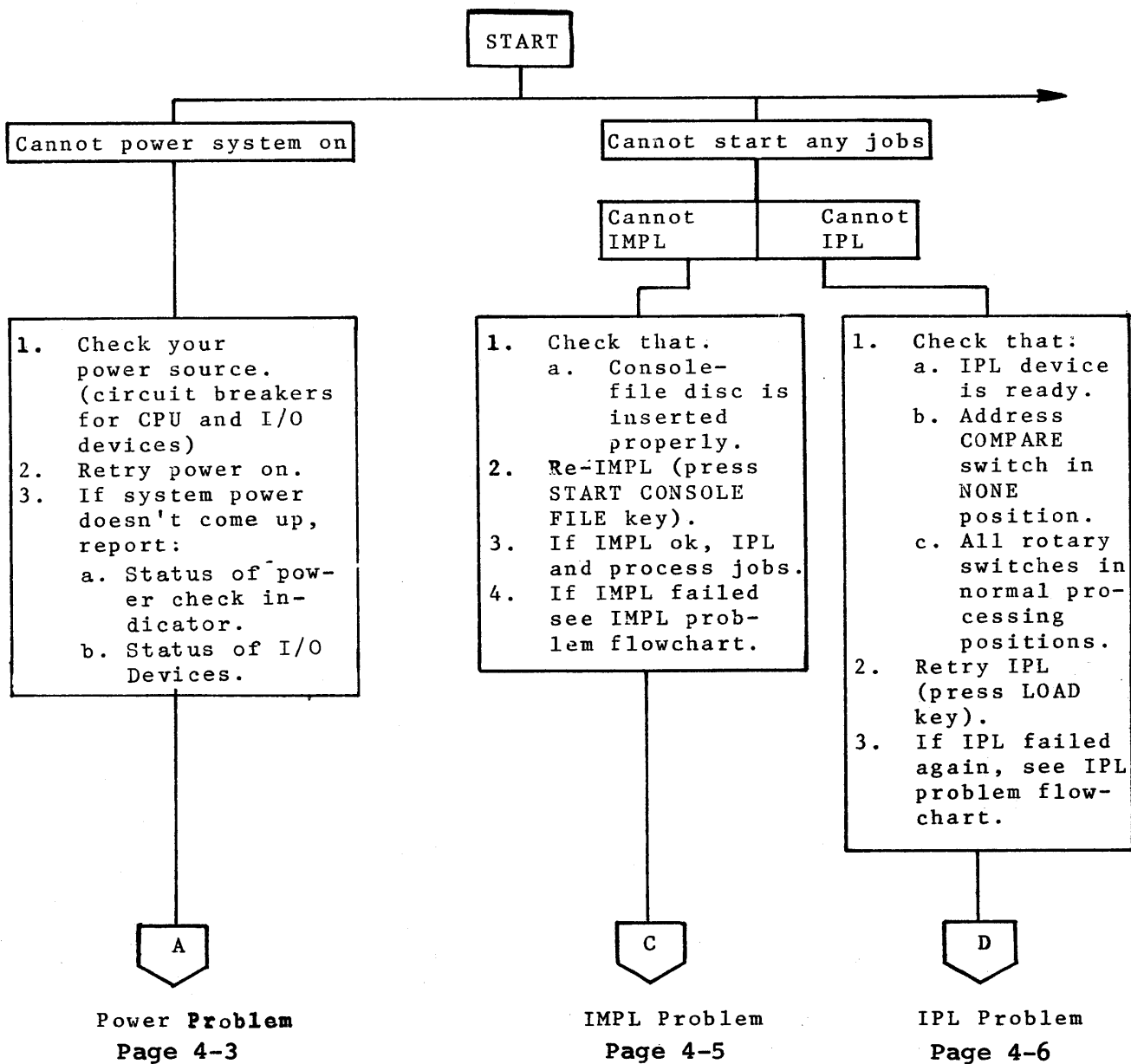
CAUTION

Push the EMERGENCY OFF switch in a true emergency only (a system fire or in case of danger to personnel).

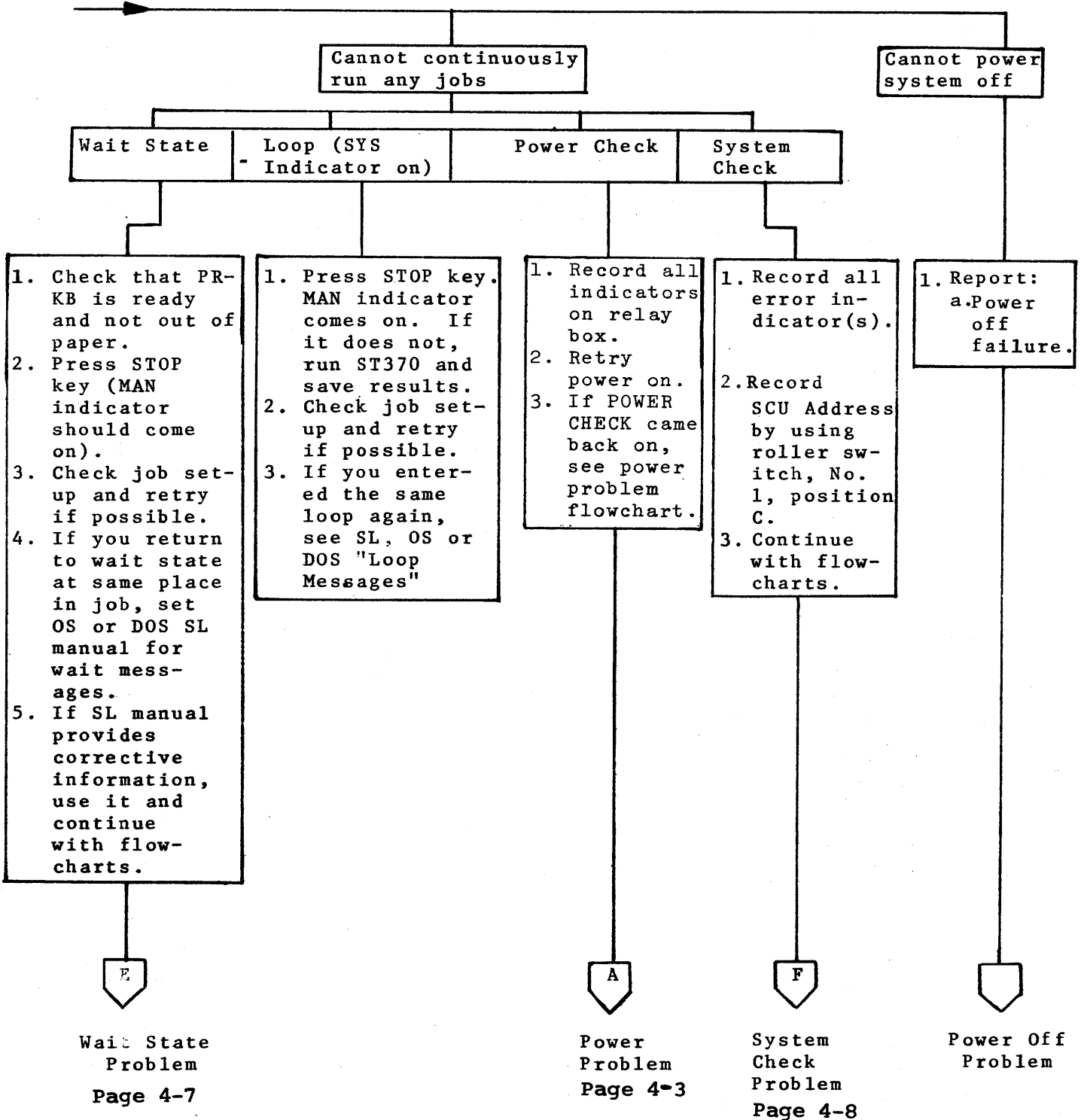
SECTION 4

HANDLING ABNORMAL SITUATIONS

1. Comply with all OS, DOS, or OS/VS messages before proceeding into flow. (Refer to appropriate Systems Library Manual: DOS, GC24-5074; OS, GC28-6631; OS/VC GC38-1001.)

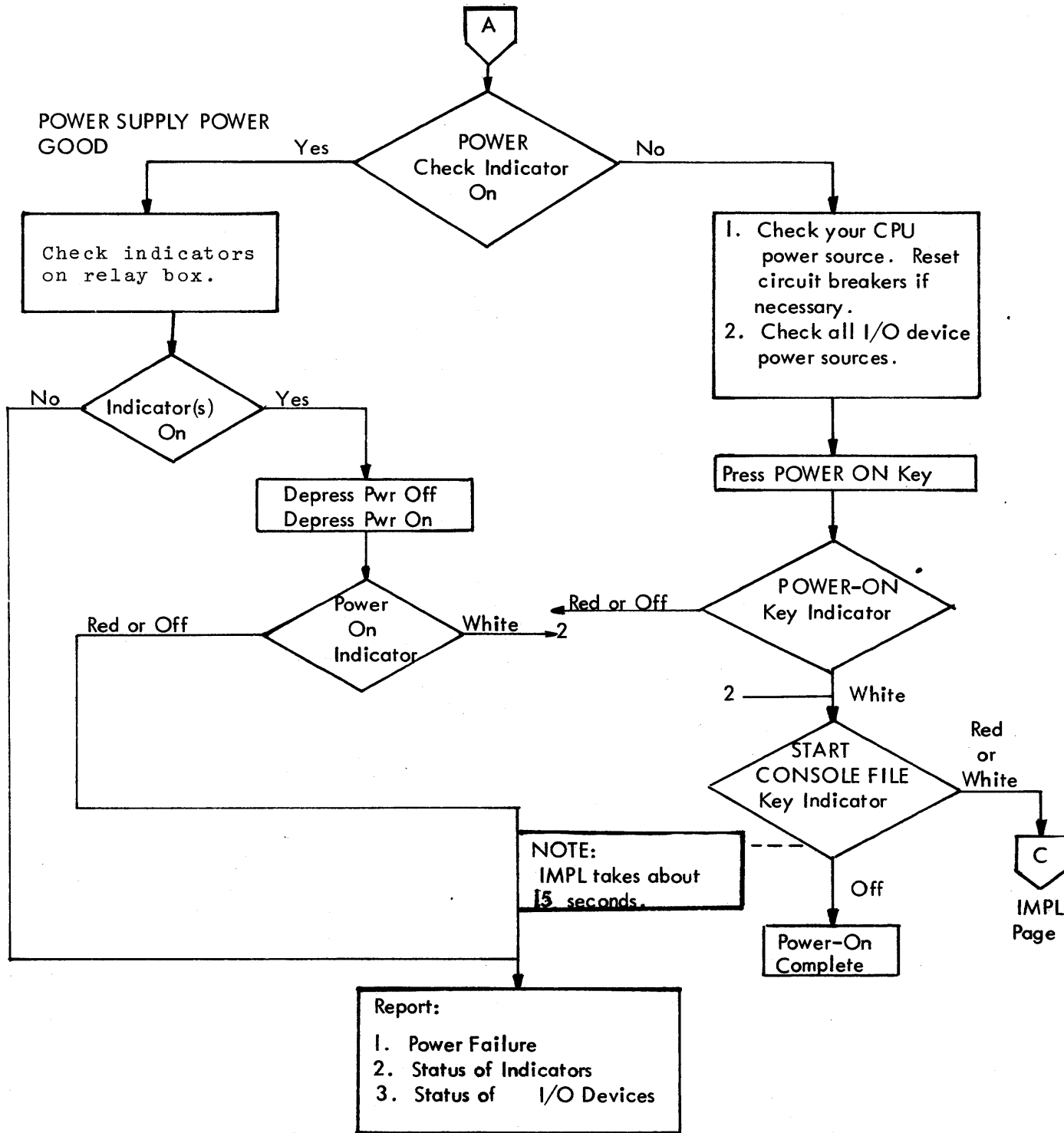


HANDLING ABNORMAL SITUATIONS Cont.



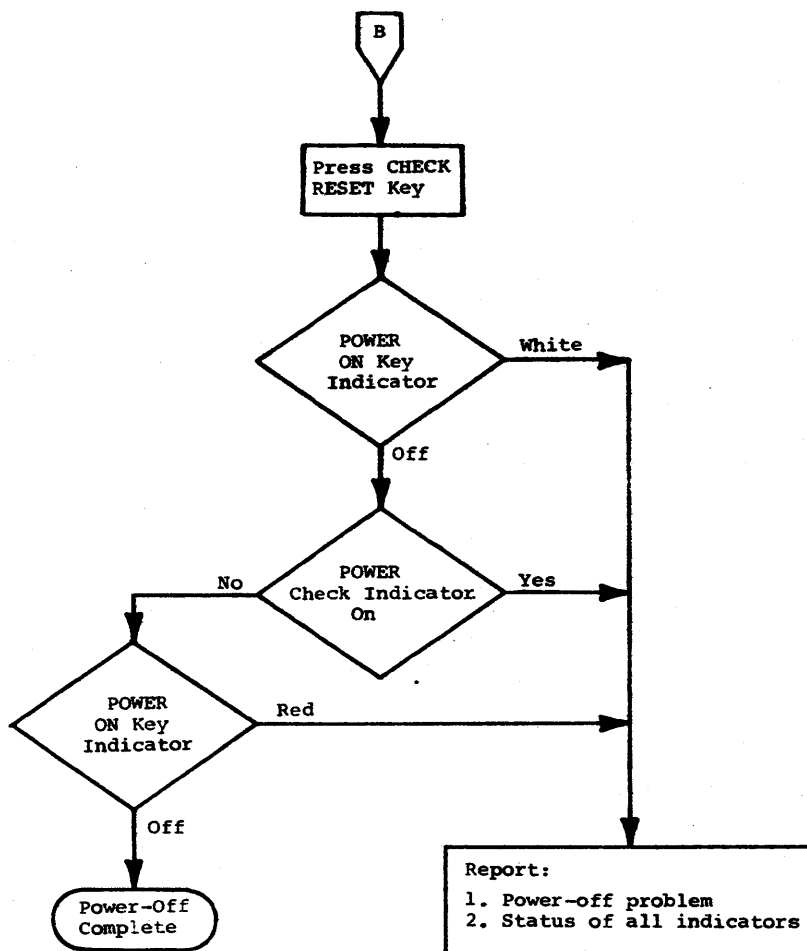
HANDLING ABNORMAL SITUATIONS Cont.

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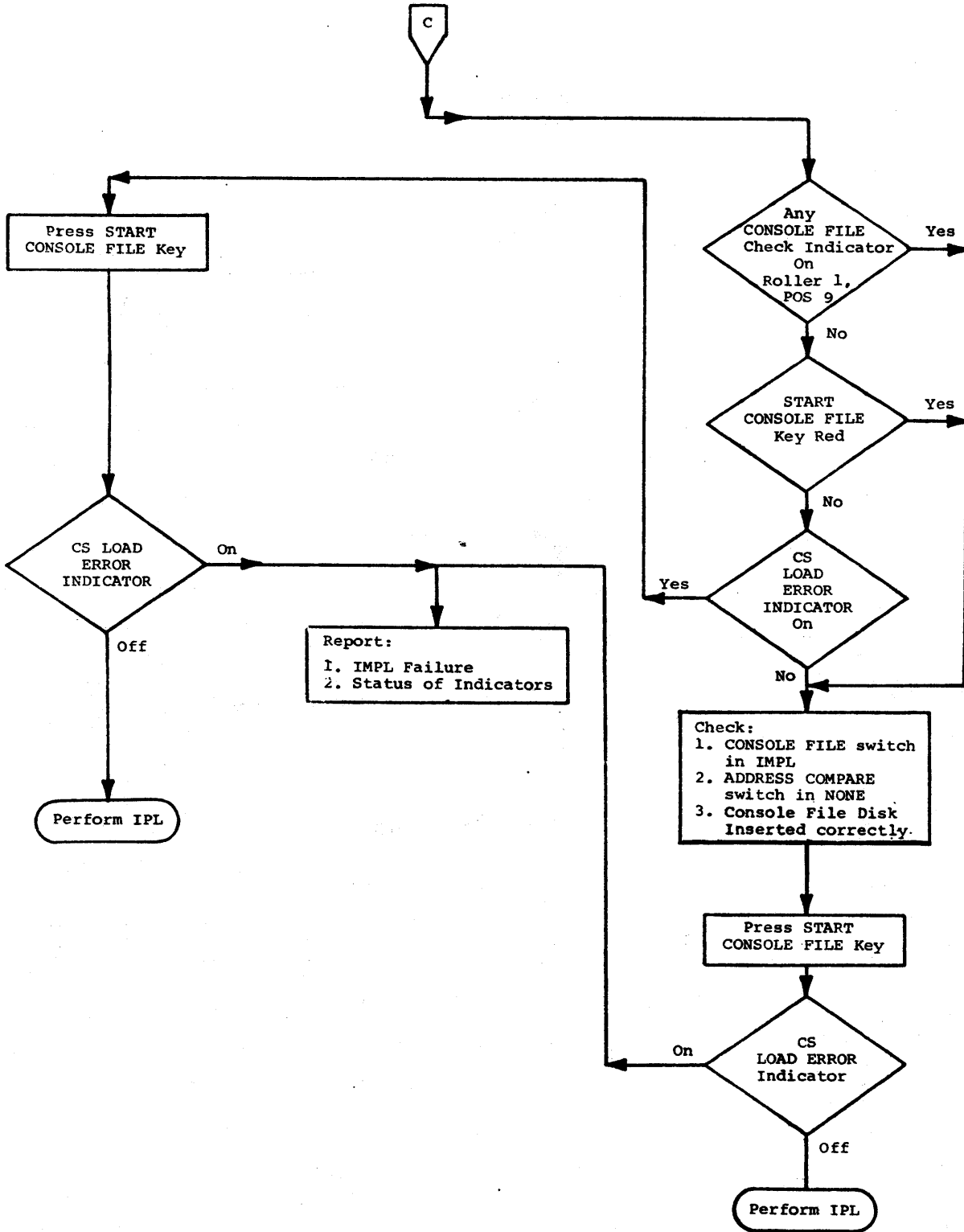
HANDLING ABNORMAL SITUATIONS Cont.

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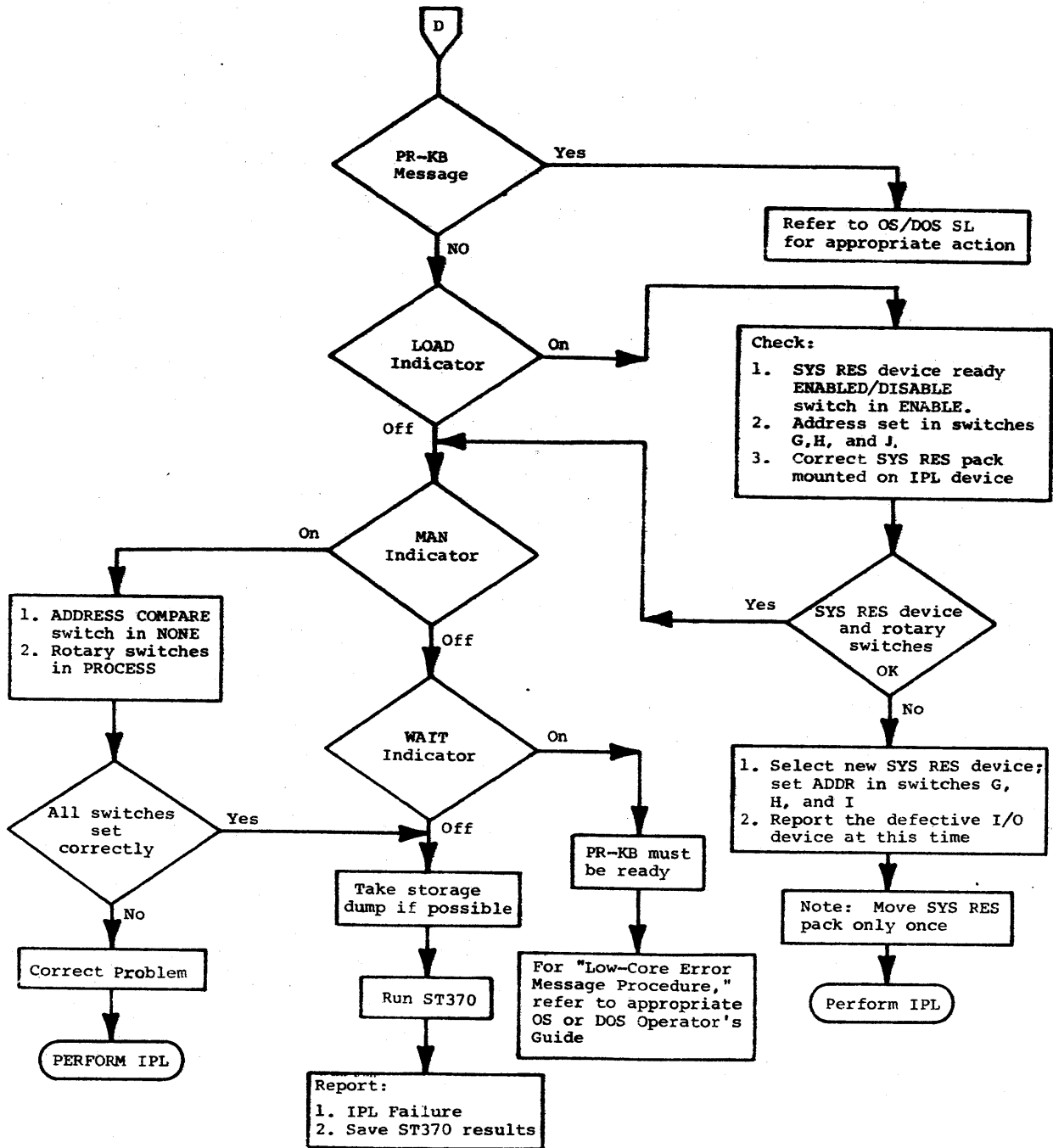
HANDLING ABNORMAL SITUATIONS Cont.

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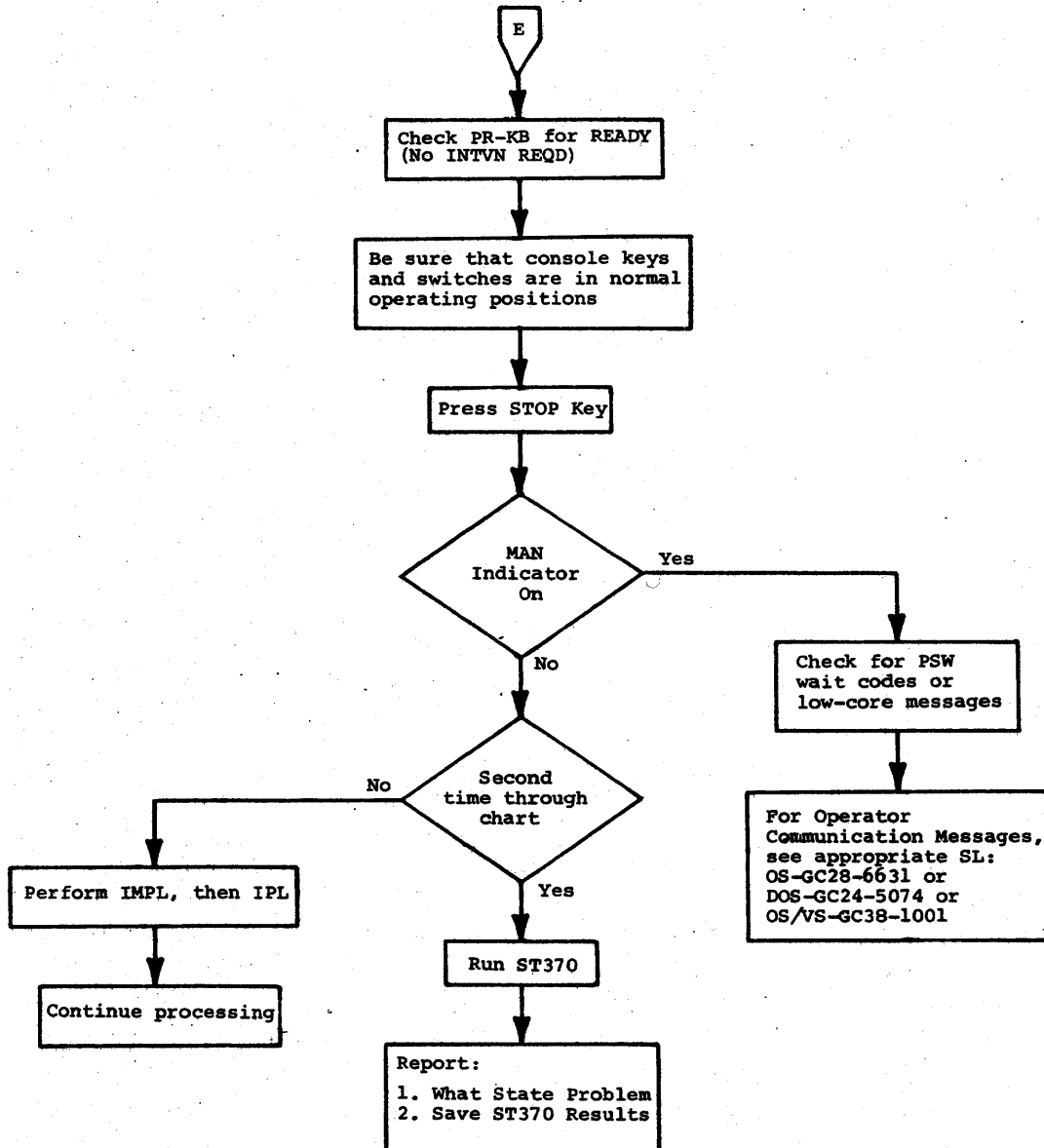
HANDLING ABNORMAL SITUATIONS Cont.

Page 4-1



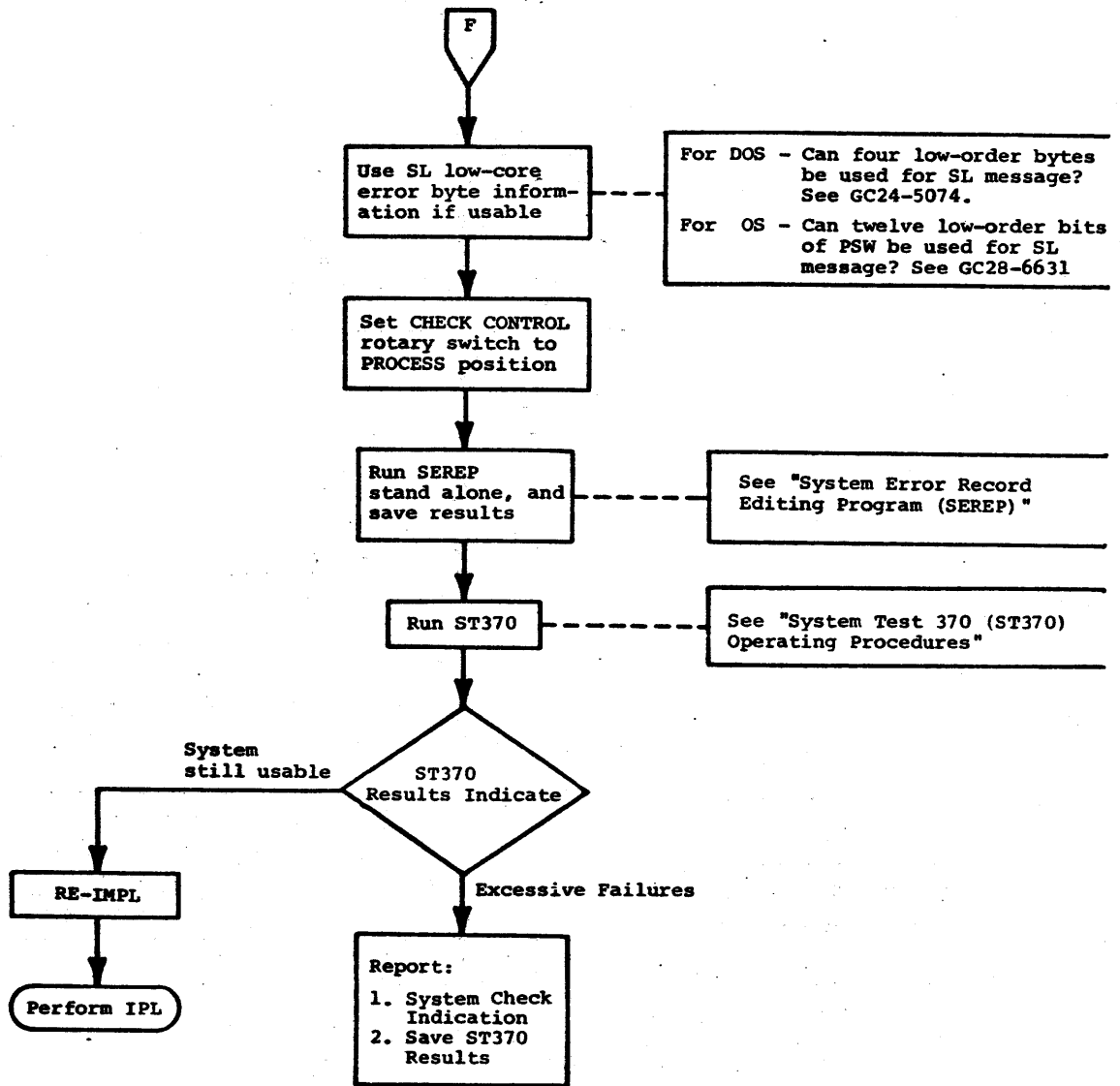
HANDLING ABNORMAL SITUATIONS Cont.

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HANDLING ABNORMAL SITUATIONS Cont.

Page 4-2



COMMENT SHEET

MANUAL TITLE Control Data OMEGA/480-Model I Operating Procedures

PUBLICATION NO. 22291360 REVISION A

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