

MACH TYPE	SERIAL NUMBER	SYST TYPE	SYSTEM NUMBER	F/E B/O	W/T CTY	CUST NUMBER	MD CD	MICRO TPC-CD	SCHEDULE SHIP	SHIP DATE	PLT MFG	PLT CTL	MACHINE STATUS
5406	0032340	3006	0004602	0144		7735116				73-01-19	ROCH	ROCH	NORMAL

BASIC MACHINE EC LEVEL / ECA=071 EC=571602 FACTORY EC LEVEL=572160 SALES MODEL=B03 MFG MD=001

STANDARD FEATURE SECTION

ECA	FIELD	FACTORY	FEATURE	BM	DEVICE	FTR-ASN	FEATURE NAME	STATUS	MES-NO	STAT	DATE
000	572137		1111119	9902			208 60 HZ 1 PHASE	FACT INST			
000	571569		1119202	9202			5444 MOD 2	FACT INST			
034	571538	572152	5128833				SPIN 1 DISK STORAGE	FACT INST			
059	572130	572153	5128887				FINAL ASM MECH CPU	FACT INST			
059	572130	572153	5129071				FINAL ASM MECH I/O	FACT INST			
000	571500	572043	5129101				NO SPIN 2	FACT INST			
071	571602	571598	5129102				FINAL ASM ELECT CPU	FACT INST			
096	571659	571633	5129104				MAINT PACKAGE CPU	FACT INST			
054	571579	572139	5129106				12K STORAGE	FACT INST			
002	572037	570094	5129110	9043			BLUE COVERS	FACT INST			
093	571653	571665	5129123	3903			5213 MOD 3 ATT	TO BE INST	893825	WRIT	75-01-13
000	571500	572081	5129131				KEYBOARD ATTACH CPU	FACT INST			
064	571567	572025	5129139				5213 PRINTER MTG	FACT INST			
081	571622	571598	5129140				BASIC PRINTER	FACT INST			
000	571500	572122	5129146				NO ADDL COM KEYS I/O	FACT INST			
000	571500	572128	5129254				13IN PRNTR W/O DIS	FACT INST			
026	572021	572119	5129258	2927			ENGLISH I/O	FACT INST			
000	571500	572001	5129264				NO DATA RECDR I/O	FACT INST			
000	571504	570094	5129550				CHARCOAL COVER GRP	FACT INST			
000	572013	571598	5133588	2750			ENGLISH CPU	FACT INST			
000	571511	572128	5133615				TAPE CASS READ E	FACT INST			
000	571512	572014	5133638				NO BSCA	FACT INST			
095	571650	571629	5133766				VOLTAGE GRP-60HZ	FACT INST			
000	572055		5133767				VOLTAGE GRP-60HZ	FACT INST			
093	571653	571665	5133774	3902			5213 MOD 2 ATT	TO BE REM	893825	WRIT	75-01-13
093	571653	571665	5133774	3902			5213 MOD 2 ATT	FACT INST			
000	572060	571543	5133814				NO B GATE-60HZ	FACT INST			
000	571598	571617	5134090				CPU BD W/O KATAKANA	FACT INST			

CABLE AND SHIP GROUP SECTION

ECA	FIELD	FACTORY	B/M #	DC-RPQ	LENGTH	DESCRIPTION	STATUS	MES-NO	STAT	DATE
000	571500	572153	5129103			SHIPPING GROUP	FACT INST			
000	572055		5133769			8FT LINE CORD	FACT INST			

ECA HISTORY SECTION

N/A = ECA NOT ASSIGNED EC PROD PRAC LEVEL = 0037 (MRS)

ECA	EC NO	ECA STATUS	FLD	B/M	EIT	QTY	FCSI	DATE
000	816708	INSTALLED						
000	816723	INSTALLED						
002	572037	INSTALLED						
003	572034	NOT REQUIRED						
004	571513	INSTALLED						
005	572051	INSTALLED						
006	571521	INSTALLED						
007	571526	INSTALLED						
008	571530	INSTALLED						
009	572046	INSTALLED						
010	572052	INSTALLED						
011	571527	INSTALLED						
012	571524	INSTALLED						
013	572079	INSTALLED						
014	571529	INSTALLED						
014	816707	INSTALLED						
015	571533	NOT REQUIRED						
015	816716	NOT REQUIRED						
016	572053	NOT REQUIRED						
017	572078	NOT REQUIRED						
018	572057	INSTALLED						
019	571534	NOT REQUIRED						
020	571531	INSTALLED						
021	571535	INSTALLED						
022	571544	INSTALLED						
023	572062	INSTALLED						
024	571536	INSTALLED						
025	572056	INSTALLED						
026	572021	INSTALLED						
027	571539	INSTALLED						
027	759121	INSTALLED						
027	799576	INSTALLED						
028	571542	INSTALLED						
029	571547	INSTALLED						
030	572064	NOT REQUIRED						
031	571545	INSTALLED						
032	571546	INSTALLED						
033	572055	NOT REQUIRED						
034	571538	INSTALLED						
035	571555	INSTALLED						
036	571551	INSTALLED						
037	571537	INSTALLED						
038	571540	INSTALLED						
039	572063	INSTALLED						

MACH TYPE	SERIAL NUMBER	SYST TYPE	SYSTEM NUMBER	F/E B/O	W/T CTY	CUST NUMBER	MD CD	MICRO TPC-CD	SCHEDULE SHIP	SHIP DATE	PLT MFG	PLT CTL	MACHINE STATUS
5406	0032340	3006	0004602	0144		7735116				73-01-19	ROCH	ROCH	NORMAL

ECA HISTORY SECTION

N/A = ECA NOT ASSIGNED EC PROD PRAC LEVEL = 0037 (MRS)

ECA	EC NO	ECA STATUS	FLD B/M	EIT	QTY	FCSI	DATE
040	571557	INSTALLED					
041	571554	INSTALLED					
042	571553	INSTALLED					
043	571552	INSTALLED					
044	571556	INSTALLED					
045	572104	NOT REQUIRED					
045	714997	NOT REQUIRED					
046	571558	NOT REQUIRED					
046	816773	NOT REQUIRED					
047	571562	INSTALLED					
049	571572	INSTALLED					
050	571575	INSTALLED					
050	816756	INSTALLED					
051	571577	INSTALLED					
051	816761	INSTALLED					
051	818909	INSTALLED					
052	571580	INSTALLED					
053	572125	INSTALLED					
053	715841	INSTALLED					
054	571579	INSTALLED					
054	733609	INSTALLED					
054	818963	INSTALLED					
055	572127	NOT REQUIRED					
056	571559	INSTALLED					
057	308966	INSTALLED					
057	572069	INSTALLED					
058	571582	INSTALLED					
059	572130	INSTALLED					
062	571565	INSTALLED					
063	571585	INSTALLED					
064	571567	INSTALLED					
065	571581	INSTALLED					
066	572142	INSTALLED					
066	816788	INSTALLED					
067	571587	NOT REQUIRED					
068	571597	INSTALLED					
069	571595	INSTALLED					
069	818676	INSTALLED					
070	571599	INSTALLED					
071	571602	INSTALLED					
072	571583	INSTALLED					
073	571607	INSTALLED					
074	571612	TO BE ADDED					
075	571606	NOT REQUIRED					
076	571600	INSTALLED					
077	571619	INSTALLED					
079	571609	INSTALLED					
080	571621	INSTALLED					
081	571622	INSTALLED					
083	571627	INSTALLED					
084	571631	INSTALLED					
085	571632	INSTALLED					
086	571634	INSTALLED					
088	571637	INSTALLED					
089	572179	TO BE ADDED					
090	893713	TO BE ADDED					
091	571626	INSTALLED					
093	571653	INSTALLED					
094	572183	INSTALLED					
095	571650	INSTALLED					
096	571659	INSTALLED					
097	571664	OPTIONAL CHG NOT INST					
098	572194	OPTIONAL CHG NOT INST					
N/A	571618	INSTALLED					
N/A	571625	INSTALLED					
N/A	571638	NOT REQUIRED					
N/A	818817	INSTALLED					
N/A	818945	INSTALLED					
N/A	818948	INSTALLED					
N/A	893204	NOT REQUIRED					
N/A	893748	NOT REQUIRED					

MACH LIST FOR-5406 MOD-001 SER- 32340 PLT-10 REQSTR 04549 01 19 B<< 29DEC72

CTRY- CUST-7735116- SER BR-G02 SYS#- - -04602 TYP-3006

SHIPPED- SHP SEQ-A0007 FCT SEQ-B0009 W/D SUF- P3 MACH STA-FACTRY

SEQ#	EC#	STATUS	FLD B/M	FCSI #	TIME	ECA#	DATE
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A0007	572125	PRES LVL					
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B0009	FCT	572160					FACT LVL
Y0001	OPT	571571					INSTALLD
Y0002	OPT	816761					INSTALLD
Y0003	OPT	818909					INSTALLD
Y0004	OPT	571577					INSTALLD
Y0005	OPT	571559					INSTALLD
Y0006	OPT	571582					INSTALLD
Y0007	OPT	818676					INSTALLD
Y0008	OPT	571595					INSTALLD
Y0009	OPT	571602					INSTALLD
Y0010	OPT	571612					INQUIRY*
Y0011	OPT	571619					INSTALLD

FEAT	BM	QTY	FEATURE NAME	STATUS	DATE	ACC	SHP-LVL-FCT	
SEQ#		EC#	STATUS	FLD B/M	FCSI #	TIME	ECA#	DATE

1111119		001	208V 60 HZ					
D0001		572137	PRES LVL					
				INT		DEC72		D0001 E0000

1119202		001	5444 MOD 2 ATT SPIN 1					
D0001		571569	PRES LVL					
				INT		DEC72		D0001 E0000

5128833		001	SPIN 1 DISK STORAGE CPU					
D0004		571538	PRES LVL					
				INT		DEC72		D0004 E0005
E0005	FCT	571510						FACT LVL
E0007	FCT	571549						INSTALLD
E0008	FCT	571564						INSTALLD
E0009	FCT	572152						INSTALLD

5128887		001	FINAL ASM MECH CPU					
D0005		572130	PRES LVL					
				INT		DEC72		D0005 E0030

E0030	FCT	572153						FACT LVL
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5129071		001	FINAL ASM MECH I/O					
D0003		572130	PRES LVL					
				INT		DEC72		D0003 E0020

E0020	FCT	572153						FACT LVL
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5129101		001	NO SPIN 2					
D0001		571500	PRES LVL					
				INT		DEC72		D0001 E0004

E0004	FCT	572043						FACT LVL
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5129102		001	FINAL ASM ELEC CPU					
D0005		571529	PRES LVL					
				INT		DEC72		D0005 E0017

E0017	FCT	571598						FACT LVL
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5129103		001	SHIP GROUP CPU					
D0001		571500	PRES LVL					
				INT		DEC72		D0001 E0010

E0010	FCT	572153						FACT LVL
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5129104		001	MAINT PACKAGE CPU					
D0043		571625	PRES LVL					
				INT		DEC72		D0043 E0061

E0061	FCT	571634						FACT LVL
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FEAT .BM SEQ#	QTY EC#	FEATURE NAME STATUS	FLD B/M	STATUS FCSI #	DATE TIME	ACC ECA#	SHP-LVL-FCT DATE
5129106 D0007	001 571579	12K STORAGE CPU PRES LVL		INT	DEC72		D0007 E0014
E0014 FCT	572139	FACT LVL					
5129110 D0002	001 572037	BLUE COVERS CPU PRES LVL		INT	DEC72		D0002 E0001
E0001 FCT	570094	FACT LVL					
5129131 D0001	001 571500	KEYBOARD ATTACH CPU PRES LVL		INT	DEC72		D0001 E0004
E0004 FCT	572081	FACT LVL					
5129139 D0002	001 571567	5213 PRINTER MTG PRES LVL		INT	DEC72		D0002 E0005
E0005 FCT	572025	FACT LVL					
5129140 D0007	001 571622	BASIC PRINTER B/M PRES LVL		INT	DEC72		D0007 E0009
E0009 FCT	571598	FACT LVL					
5129146 D0001	001 571500	NO ADDL COM KEYS I/O PRES LVL		INT	DEC72		D0001 E0003
E0003 FCT	572122	FACT LVL					
5129254 D0001	001 571500	13 INCH PRNTR W/O DIS PRES LVL		INT	DEC72		D0001 E0006
E0006 FCT	572128	FACT LVL					
5129258 D0002	001 572021	ENGLISH I/O PRES LVL		INT	DEC72		D0002 E0008
E0008 FCT	572119	FACT LVL					
5129264 D0001	001 571500	NO DATA RECDR I/O PRES LVL		INT	DEC72		D0001 E0002
E0002 FCT	572001	FACT LVL					
5129550 D0001	001 571504	CHARCOAL COVER GROUP PRES LVL		INT	DEC72		D0001 E0001
E0001 FCT	570094	FACT LVL					
5133588 D0001	001 572013	AMERICAN ENGLISH PRES LVL		INT	DEC72		D0001 E0003
E0003 FCT	571598	FACT LVL					
5133615 D0001	001 571511	TAPE CASSETTE READ E PRES LVL		INT	DEC72		D0001 E0001
E0001 FCT	572128	FACT LVL					

FEAT SEQ#	BM	QTY EC#	FEATURE NAME STATUS	FLD B/M	STATUS FCSI #	DATE TIME	ACC ECA#	SHP-LVL-FCT DATE
5133638 D0001		001 571512	NO BSCA PRES LVL		INT	DEC72		D0001 E0001
E0001	FCT	572014	FACT LVL					
5133766 D0007		001 571632	VOLT GP 60 HZ PRES LVL		INT	DEC72		D0007 E0017
E0017	FCT	571620	FACT LVL					
E0019	FCT	717330	INSTALLD					
E0020	FCT	571629	INSTALLD					
5133767 D0001		001 572055	60 HZ VOLTAGE GRP PRES LVL		INT	DEC72		D0001 E0000
5133769 D0001		001 572055	8 FT LINE CORD PRES LVL		INT	DEC72		D0001 E0000
5133774 D0005		001 571637	5213 MOD 2 ATTACH PRES LVL		INT	DEC72		D0005 E0006
E0006	FCT	571630	FACT LVL					
5133814 D0001		001 572060	NO B GATE 60 HZ PRES LVL		INT	DEC72		D0001 E0003
E0003	FCT	571543	FACT LVL					
5134090 D0001		001 571598	CPU BD W/D KANA PRES LVL		INT	DEC72		D0001 E0001
E0001	FCT	571617	FACT LVL					

## BASIC CUSTOMER FEATURES INSTALLED OR ORDERED

SHP-LVL-FCT	FEAT	BM	QTY	FEATURE NAME	STATUS
D0001	E0000	1111119	001	208V 60 HZ	INSTALLED
D0001	E0000	1119202	001	5444 MOD 2 ATT SPIN 1	INSTALLED
D0004	E0005	5128833	001	SPIN 1 DISK STORAGE CPU	INSTALLED
D0005	E0030	5128887	001	FINAL ASM MECH CPU	INSTALLED
D0003	E0020	5129071	001	FINAL ASM MECH I/O	INSTALLED
D0001	E0004	5129101	001	NO SPIN 2	INSTALLED
D0005	E0017	5129102	001	FINAL ASM ELEC CPU	INSTALLED
D0001	E0010	5129103	001	SHIP GROUP CPU	INSTALLED
D0043	E0061	5129104	001	MAINT PACKAGE CPU	INSTALLED
D0007	E0014	5129106	001	12K STORAGE CPU	INSTALLED
D0002	E0001	5129110	001	BLUE COVERS CPU	INSTALLED
D0001	E0004	5129131	001	KEYBOARD ATTACH CPU	INSTALLED
D0002	E0005	5129139	001	5213 PRINTER MTG	INSTALLED
D0007	E0009	5129140	001	BASIC PRINTER B/M	INSTALLED
D0001	E0003	5129146	001	NO ADDL COM KEYS I/O	INSTALLED
D0001	E0006	5129254	001	13 INCH PRNTR W/O DIS	INSTALLED
D0002	E0008	5129258	001	ENGLISH I/O	INSTALLED
D0001	E0002	5129264	001	NO DATA RECDR I/O	INSTALLED
D0001	E0001	5129550	001	CHARCOAL COVER GROUP	INSTALLED
D0001	E0003	5133588	001	AMERICAN ENGLISH	INSTALLED
D0001	E0001	5133615	001	TAPE CASSETTE READ E	INSTALLED
D0001	E0001	5133638	001	NO BSCA	INSTALLED
D0007	E0017	5133766	001	VOLT GP 60 HZ	INSTALLED
D0001	E0000	5133767	001	60 HZ VOLTAGE GRP	INSTALLED
D0001	E0000	5133769	001	8 FT LINE CORD	INSTALLED
D0005	E0006	5133774	001	5213 MOD 2 ATTACH	INSTALLED
D0001	E0003	5133814	001	NO B GATE 60 HZ	INSTALLED
D0001	E0001	5134090	001	CPU BD W/O KANA	INSTALLED

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS SP

\*\* LOGIC TYPE MST/SLT BOARDS 6

01A-A1	CSTMZ BD SPIN 1	5129172	571564	.W.	5128833
01A-A2	CSTMZ BD PRINTER	5134000	571622	.W.	5133774
01A-B1	CSTMZ BD STANDARD	5128856	571527	.W.	5129102
01A-B2	CSTMZ BD FIN ASSEM CPU	2590324	818676	.W.	5129102
01A-B3	CSTMZ BD MEMORY A 12 K	2512420	759121	.W.	5129106

PAGE NO.	SH	TITLE	PART NO	EC NO.	FEATURE B/M OR B/MS
** LOGIC TYPE SHIPPING GROUP			3		
0038235		SCREW	QTY 02	0038235 572099	.W. 5129103
0110775		SCREW	QTY 08	0110775 572099	.W. 5129103
0257187		NUT	QTY 02	0257187 572099	.W. 5129103
0311977		CONN BULB REM	QTY 01	0311977 572025	.W. 5129103
0322061		SCREW IO TO CPU MTG	QTY 06	0322061 572025	.W. 5129103
0365716		SPACER	QTY 08	0365716 572099	.W. 5129103
0829117		JUMPER A 6 INCH	QTY 03	0829117 572025	.W. 5129104
0829118		JUMPER A 18 INCH	QTY 03	0829118 572025	.W. 5129104
2122160		LAMP CON PWR ON	QTY 01	2122160 572025	.W. 5129103
2162666		PAD-LEVELER	QTY 06	2162666 572025	.W. 5129103
2391121		LAMP CON INDCTR	QTY 03	2391121 572025	.W. 5129103
2536509		SHIP GRP 5444	QTY 01	2536509 572025	.W. 5129104
2566610		SCREW	QTY 02	2566610 572099	.W. 5129103
2574822		SCREW	QTY 02	2574822 572099	.W. 5129103
2575293		WSHR IO TO CPU MTG	QTY 03	2575293 572025	.W. 5129103
2575295		SCRW IO TO CPU MTG	QTY 03	2575295 572025	.W. 5129103
2588263		JUMPER A 12 INCH	QTY 02	2588263 572025	.W. 5129104
2590960		CLAMP ASM	QTY 02	2590960 572099	.W. 5129103
2594238		TERM A SINGLE PIN EXT	QTY 04	2594238 572025	.W. 5129104
2596291		CLIP (CABLE)	QTY 03	2596291 572099	.W. 5129103
5128992		CBL ASM REF DRAWING	QTY 01	5128992 572099	.W. 5129104
5129064		CONSOLE OVERLAY	QTY 03	5129064 572025	.W. 5129103
5129069		TOP CBM	QTY 01	5129069 572025	.W. 5129254
5129099		SPACE LEVELER	QTY 06	5129099 572025	.W. 5129103
5129220		HINGE LWR LO CV	QTY 04	5129220 572025	.W. 5129103
5129236		COVER	QTY 01	5129236 572025	.W. 5129103
5129237		COVER	QTY 01	5129237 572025	.W. 5129103
5129238		COVER	QTY 01	5129238 572025	.W. 5129103
5129308		CBL ASM REF DRAWING	QTY 01	5129308 572099	.W. 5129104
5129340		CBL ROUTING	QTY 01	5129340 572025	.W. 5129104
5129365		BRACKET CBL CLAMP	QTY 01	5129365 572099	.W. 5129103
5129397		BOLT LEVELER	QTY 06	5129397 572025	.W. 5129103
5129571		FINAL ASM CPU	QTY 01	5129571 572025	.W. 5129104
5133531		DISK ASM DIAG PROG	QTY 01	5133531 571627	.W. 5129104
5133549		COVER TO FRAME ASM	QTY 01	5133549 572025	.W. 5129104
5133646		CASSETTE CARTRIDGE TAPE #1	QTY 01	5133646 571520	.W. 5129104
229800500		SYS 3 ERROR LOG PAD	QTY 01	9800500 572030	.W. 5129104
5229800700		FUNC CODE GUIDE	QTY 01	9800700 572030	.W. 5129104



PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE REFERENCE DATA 5

A	INSTALLATION MANUAL	5133687	571627	.W.	5129104
A 2	VOL 001 CONTROL B/M	5133712	571627	.W.	5129104
BN000	INT MAINT PKG USERS GUIDE	5129672	571621	.W.	5129104
BN001	INT MAINT PKG GEN DESCRIPTION	5129400	571621	.W.	5129104
BN002	DIAGNOSTIC USERS GUIDE	5134157	571621	.W.	5129104
BN004	USERS GUIDE	2589743	577007	.W.	5129104
BN008	DIAG USERS GUIDE METER TEST	5129692	571621	.W.	5129104
BN009	USER GUIDE PROG SELECT LOGIC	5129676	571609	.W.	5129104
BN010	USERS GUIDE DIAG DISK CONFIG	5129476	571627	.W.	5129104
BN012	DIAG USERS GUIDE MAST TIME ANAL	5129674	571621	.W.	5129104
BN014	DIAG USERS GUIDE KYBOARY FUNC	5129473	571621	.W.	5129104
BN015	DIAG USERS GUIDE 5213 2222 FUNC	5129485	571621	.W.	5129104
BN020	DIAGNOSTIC USERS GUIDE 5444	5129660	571603	.W.	5129104
BN061	DIAG USERS GUIDE 2265 DISPLAY STA	5129479	571621	.W.	5129104
BN062	DIAG USERS GUIDE 5496 DATA RECRDR	5129482	571621	.W.	5129104
BN063	DIAG USERS GUIDE TAPE LOADER	5133880	571621	.W.	5129104
BN064	129 DATA RECORDER FUNCTION TEST	5134139	571610	.W.	5129104
SQ022	USERS GUIDE SYS TEST	5129663	571591	.W.	5129104
SQ140 1	5444 DIAGNOSTIC USER'S GUIDE	5129623	571609	.W.	5129104

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A	VOL 002 CONTROL B/M	5133713	571627	.W.	5129104
A0F	DIAGNOSTIC PROGRAM	5129650	571634	.W.	5129104
E8F	DIAGNOSTIC PROGRAM	5129666	571588	.W.	5129104
FEA	DIAGNOSTIC PROGRAM	5129693	571565	.W.	5129104
FED	DIAGNOSTIC PROGRAM	5129477	571627	.W.	5129104
FEE	DIAGNOSTIC PROGRAM	5129617	571565	.W.	5129104
FE1 1	PROGRAM LISTING	2589909	818948	.W.	5129104
FFA	DIAGNOSTIC LISTING	2588455	816730	.W.	5129104
FFB	DIAGNOSTIC LISTING	2588457	577050	.W.	5129104
FFD	DIAGNOSTIC LISTING	5134042	571565	.W.	5129104
FFF	PROGRAM LISTING	2589901	818390	.W.	5129104
FF1	PROGRAM LISTING	2589905	818948	.W.	5129104
FF2 1	PROGRAM LISTING	2589907	818693	.W.	5129104
FF4	DIAGNOSTIC LISTING	2589923	816760	.W.	5129104
F8F	DIAGNOSTIC PROGRAM	5129668	571565	.W.	5129104
F81	DIAGNOSTIC PROGRAM	5129483	571520	.W.	5129104
F9F	129 SYSTEM TEST MOD	5134137	571610	.W.	5129104
F91	129 DATA RECDR FUNCTION TEST NO 1	5134133	571610	.W.	5129104
F92	129 DATA RECDR FUNCTION TEST NO 2	5134135	571610	.W.	5129104
ODA	DIAGNOSTIC LISTING	5129419	571504	.W.	5129104
ODB	DIAGNOSTIC LISTING	5129421	571504	.W.	5129104
ODC	DIAGNOSTIC LISTING	5129423	571504	.W.	5129104
ODD	DIAGNOSTIC LISTING	5129425	571504	.W.	5129104
ODE	DIAGNOSTIC LISTING	5129427	571504	.W.	5129104
ODF	DIAGNOSTIC LISTING	5129429	571504	.W.	5129104
OD1	DIAGNOSTIC PROGRAM	5129401	571526	.W.	5129104
OD2	DIAGNOSTIC PROGRAM	5129403	571526	.W.	5129104
OD3	DIAGNOSTIC LISTING	5129405	571504	.W.	5129104
OD4	DIAGNOSTIC PROGRAM	5129407	571520	.W.	5129104
OD5	DIAGNOSTIC PROGRAM	5129409	571520	.W.	5129104
OD6	DIAGNOSTIC PROGRAM	5129411	571520	.W.	5129104
OD7	DIAGNOSTIC PROGRAM	5129413	571520	.W.	5129104
OD8	DIAGNOSTIC LISTING	5129415	571504	.W.	5129104
OD9	DIAGNOSTIC LISTING	5129417	571504	.W.	5129104
OE1	DIAGNOSTIC LISTING	5129431	571504	.W.	5129104
OE2	DIAGNOSTIC LISTING	5129433	571504	.W.	5129104
OE3	DIAGNOSTIC LISTING	5129435	571504	.W.	5129104
OE4	DIAGNOSTIC LISTING	5129437	571504	.W.	5129104
OE5	DIAGNOSTIC LISTING	5129439	571504	.W.	5129104
OE6	DIAGNOSTIC LISTING	5129441	571504	.W.	5129104
OE7	DIAGNOSTIC LISTING	5129443	571531	.W.	5129104
OE8	DIAGNOSTIC PROGRAM	5129445	571526	.W.	5129104
OE9	DIAGNOSTIC LISTING	5129447	571504	.W.	5129104
OFA	DIAGNOSTIC LISTING	5129469	571504	.W.	5129104
OF5	DIAGNOSTIC LISTING	5129459	571504	.W.	5129104
OF6	DIAGNOSTIC PROGRAM	5129461	571520	.W.	5129104
OF7	DIAGNOSTIC LISTING	5129463	571520	.W.	5129104
OF8	DIAGNOSTIC PROGRAM	5129465	571520	.W.	5129104
OF9	DIAGNOSTIC PROGRAM	5129467	571520	.W.	5129104
12F	DIAGNOSTIC PROGRAM	5129664	571520	.W.	5129104
121	DIAGNOSTIC PROGRAM	5129474	571633	.W.	5129104
381	DIAGNOSTIC PROGRAM	5129690	571607	.W.	5129104
90F	DIAGNOSTIC PROGRAM	5129670	571520	.W.	5129104
901	DIAGNOSTIC PROGRAM	5129480	571522	.W.	5129104

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE DIAGNOSTIC PROGRAMS 8

A	VOL 003 CONTROL B/M	5133714	571603	.W.	5129104
A0A	DIAGNOSTIC PROGRAM	5129638	571531	.W.	5129104
A0B	DIAGNOSTIC PROGRAM	5129640	571531	.W.	5129104
A0C	DIAGNOSTIC PROGRAM	5129642	571531	.W.	5129104
A0D	DIAGNOSTIC PROGRAM	5129644	571591	.W.	5129104
A0E	DIAGNOSTIC PROGRAM	5129626	571573	.W.	5129104
A01	DIAGNOSTIC PROGRAM	5129611	571573	.W.	5129104
A03	DIAGNOSTIC PROGRAM	5129624	571591	.W.	5129104
A05	DIAGNOSTIC PROGRAM	5129628	571591	.W.	5129104
A06	DIAGNOSTIC PROGRAM	5129630	571540	.W.	5129104
A07	DIAGNOSTIC PROGRAM	5129632	571531	.W.	5129104
A08	DIAGNOSTIC PROGRAM	5129634	571540	.W.	5129104
A09	DIAGNOSTIC PROGRAM	5129636	571591	.W.	5129104
B01	DIAGNOSTIC PROGRAM	5129613	571524	.W.	5129104
B03	DIAGNOSTIC PROGRAM	5129646	571601	.W.	5129104
B04	DIAGNOSTIC PROGRAM	5129648	571565	.W.	5129104
FF5	DIAGNOSTIC PROGRAM	5129658	571540	.W.	5129104
FF6	DIAGNOSTIC PROGRAM	5129661	571628	.W.	5129104
FF7	DIAGNOSTIC LISTING	2589745	577050	.W.	5129104

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**		LOGIC TYPE DIAGNOSTIC PROGRAMS		8	
A		VOL 004 CONTROL B/M	5133715	571624	.W. 5129104
EFF		DIAGNOSTIC PROGRAM	5129615	571624	.W. 5129104
E8A		DIAGNOSTIC PROGRAM	5129498	571535	.W. 5129104
E8B		DIAGNOSTIC PROGRAM	5129600	571624	.W. 5129104
E8C		DIAGNOSTIC PROGRAM	5129602	571624	.W. 5129104
E8D		DIAGNOSTIC PROGRAM	5129604	571535	.W. 5129104
E8E		DIAGNOSTIC PROGRAM	5129606	571535	.W. 5129104
E81		DIAGNOSTIC PROGRAM	5129486	571535	.W. 5129104
E82		DIAGNOSTIC PROGRAM	5129488	571630	.W. 5129104
E83		DIAGNOSTIC PROGRAM	5129621	571535	.W. 5129104
E84		DIAGNOSTIC PROGRAM	5129490	571624	.W. 5129104
E85		DIAGNOSTIC PROGRAM	5129608	571624	.W. 5129104
E86		DIAGNOSTIC PROGRAM	5129619	571624	.W. 5129104
E87		DIAGNOSTIC PROGRAM	5129492	571583	.W. 5129104
E88		DIAGNOSTIC PROGRAM	5129494	571588	.W. 5129104
E89		DIAGNOSTIC PROGRAM	5129496	571566	.W. 5129104

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## \*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A	VOL 005 CONTROL B/M		5133705	571600	.W.	5129104
SQ010	CPU MAP CH		5129759	571600	.W.	5133766
SQ020	CPU GENERAL COMMENTS	MAP CHART	5129726	571581	.W.	5129104
SQ030	CPU SYSTEM STATEGY	MAP CHART	5129727	571600	.W.	5129104
SQ040	CPU PROCESSOR CHK	MAP CHART	5129728	571581	.W.	5129104
SQ050	CPU LOCAL STORE	MAP CHART	5129729	571581	.W.	5129104
SQ060	CPU LOCAL STORE FEAT	MAP CHART	5129730	571556	.W.	5129104
SQ070	CPU SAR	MAP CHART	5129731	571581	.W.	5129104
SQ080	CPU DBI	MAP CHART	5129732	571581	.W.	5129104
SQ090	CPU A REGISTER	MAP CHART	5129733	571526	.W.	5129104
SQ100	CPU O/OP ALU B CARRY	MAP CHART	5129734	571581	.W.	5129104
SQ110	CPU DBO	MAP CHART	5129735	571600	.W.	5129104
SQ120	CPU CHANNEL DBO	MAP CHART	5129736	571581	.W.	5129104
SQ130	CPU I/O LSR SELECT	MAP CHART	5129737	571600	.W.	5129104
SQ140	CPU INVALID OPERAND	MAP CHART	5129738	571581	.W.	5129104
SQ150	CPU INVALID ADDRESS	MAP CHART	5129739	571581	.W.	5129104
SQ160	CPU INVALID Q	MAP CHART	5129740	571526	.W.	5129104
SQ170	CPU SYSTEM RESET	MAP CHART	5129741	571581	.W.	5129104
SQ180	CPU MANUAL ROUTINE	MAP CHART	5129742	571536	.W.	5129104
SQ190	CPU MANUAL ROUT 1-6	MAP CHART	5129743	571581	.W.	5129104
SQ200	CPU BRIDGE MEM	MAP CHART	5129744	571600	.W.	5129104
SQ210	CPU IPL	MAP CHART	5129745	571581	.W.	5129104
SQ220	INDEX TO CPU DIAG HALT	MAP CHART	5129746	571600	.W.	5129104
SQ230	CPU LIO/SNS	MAP CHART	5129747	571600	.W.	5129104
SQ240	CPU SAR BIT FAILURE	MAP CHART	5129748	571581	.W.	5129104
SQ250	CPU TIO	MAP CHART	5129749	571536	.W.	5129104
SQ260	CPU PROG DIAG HALT	MAP CHART	5129750	571600	.W.	5129104
SQ270	CPU LAMP	MAP CHART	5129751	571581	.W.	5129104
SQ280	CPU POWER SEQUENCE		5129758	571600	.W.	5133766
SQ290	CPU INTERMITTENT FAIL	MAP CHART	5129753	571600	.W.	5129104
SQ300	CPU ERROR GENERATOR	MAP CHART	5129754	571526	.W.	5129104
SQ310	INVAL LEV	MAP CHART	5129755	571530	.W.	5129104
SQ312	USAGE METER	MAP CHART	5129756	571553	.W.	5129104
SQ317	APLD	MAP CHART	5129757	571581	.W.	5129104
SQ320	KEYBOARD	MAP CHART	5129833	571581	.W.	5129104
SQ330	KEYBOARD ALTER	MAP CHART	5129835	571536	.W.	5129104

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## \*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A		VOL 006 CONTROL B/M		5133706	571616	.W. 5129104
SQ010		FCU INDEX	MAP CHART	5129775	571552	.W. 5129104
SQ020		FCU MAIN ENTRY	MAP CHART	5129776	571594	.W. 5129104
SQ030		CPU ERROR ASSOC FCU LIN	MAP CHART	5129777	571552	.W. 5129104
SQ040		FILE NOT READY	MAP CHART	5129778	571573	.W. 5129104
SQ050		HALT A088	MAP CHART	5129779	571552	.W. 5129104
SQ060		FCU PROCESS CHECK	MAP CHART	5129780	571552	.W. 5129104
SQ070		IPL FAILURE	MAP CHART	5129788	571552	.W. 5129104
SQ080		PRELIMINARY FILE CHECK	MAP CHART	5129789	571571	.W. 5129104
SQ090		ERROR HALT	MAP CHART	5129790	571594	.W. 5129104
SQ100		SEEK ERROR HALTS	MAP CHART	5129791	571594	.W. 5129104
SQ110		READ OR SELECT FAILURE	MAP CHART	5129792	571573	.W. 5129104
SQ120		INDEX FAILURE	MAP CHART	5129793	571552	.W. 5129104
SQ130		HALT A08A	MAP CHART	5129794	571552	.W. 5129104
SQ140		HALT A00C	MAP CHART	5129795	571552	.W. 5129104
SQ150		HANG UP	MAP CHART	5129796	571552	.W. 5129104
SQ160		FILE UNSAFE	MAP CHART	5129797	571571	.W. 5129104
SQ170		DATA SEPARATOR CARDS	MAP CHART	5129798	571552	.W. 5129104
SQ180		DRAWER RELEASE CHK	MAP CHART	5129799	571573	.W. 5129104
SQ190		STATUS FAILURE	MAP CHART	5129803	571552	.W. 5129104
SQ200		FILE WRITE SW FAIL	MAP CHART	5129804	571552	.W. 5129104
SQ210		ALTER LOAD DEVICE PROB	MAP CHART	5129823	571614	.W. 5129104
SQ220		BUSY UP	MAP CHART	5129800	571552	.W. 5129104
SQ230		BIT RING NOT ADVANCE	MAP CHART	5129801	571573	.W. 5129104
SQ240		INITIAL ERROR	MAP CHART	5129821	571552	.W. 5129104
SQ250		ERROR IN FUNC TEST A01	MAP CHART	5129782	571573	.W. 5129104
SQ260		FCU DEVICE STAT BYTES	MAP CHART	5129822	571552	.W. 5129104
SQ270		DIAG TEST A01 ERROR	MAP CHART	5129824	571594	.W. 5129104
SQ275		FCU UDT FEAT DISCREP	MAP CHART	5129805	571552	.W. 5129104
SQ280		5444 DISK DRIV 1 & 2	MAP CHART	5129802	571573	.W. 5129104
SQ290		DATA RECORDER ATTACH	MAP CHART	5129825	571616	.W. 5129104
SQ298		PROGRAM HALT CHART		5129826	571631	.W. 5129104
SQ300		TABLE CONT PRINTER ATT	MAP CHART	5129837	571600	.W. 5129104
SQ310		GEN INFO FOR PRINT TEST	MAP CHART	5129838	571546	.W. 5129104
SQ320		MAIN ENTRY	MAP CHART	5129839	571600	.W. 5129104
SQ330		CONTIN CHK LIST	MAP CHART	5129840	571567	.W. 5129104
SQ340		INTERFACE TO PRINTER	MAP CHART	5129841	571600	.W. 5129104
SQ350		MAP GP 1	MAP CHART	5129842	571616	.W. 5129104
SQ360		MAP GP 2	MAP CHART	5129843	571600	.W. 5129104
SQ370		MAP GP 3	MAP CHART	5129844	571616	.W. 5129104
SQ380		MAP GP 4	MAP CHART	5129845	571567	.W. 5129104
SQ390		MAP GP 5	MAP CHART	5129846	571600	.W. 5129104
SQ400		MAP GP 6	MAP CHART	5129847	571546	.W. 5129104
SQ410		MAP GP 7	MAP CHART	5129848	571616	.W. 5129104
SQ420		MAP GP 8	MAP CHART	5129849	571616	.W. 5129104
SQ430		MAP GP 9	MAP CHART	5129850	571600	.W. 5129104
SQ440		MAP GP 10	MAP CHART	5129851	571616	.W. 5129104
SQ450		MAP GP 11	MAP CHART	5129852	571616	.W. 5129104
SQ460		MAP GP 12	MAP CHART	5129853	571567	.W. 5129104
SQ470		MAP GP 13	MAP CHART	5129854	571567	.W. 5129104
SQ480		MAP GP 14	MAP CHART	5129855	571616	.W. 5129104
SQ490		PTR HALT	MAP CHART	5129856	571616	.W. 5129104
SQ790		CRT		5129829	571581	.W. 5129104

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\*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A	VOL 007 CONTROL B/M	5133707	571560	.W.	5129104
SY34-0021	5444 MDM VOL 7	QTY 01 2222222	571560	.W.	5129104

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\*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A	VOL 008 CONTROL B/M	5133708	571560	.W.	5129104
SY34-0022	5406 MDM VOL 8	QTY 01 2222222	571560	.W.	5129104



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** LOGIC TYPE SYSTEM DIAGRAMS			0		
A		VOL 009 CONTROL B/M	5133709	571602	.W. 5129104
AA000		TIEDOWN CHARTS AND ACC CODES	5133775	571599	.W. 5129104
AA100		SOCKETLISTING 01A-A1	5132281	571564	.W. 5129104
AA100	1	LOGIC SYMBOLOGY BASIC	7369305	816756	.W. 5129104
AA101		LOGIC SYMBOLOGY FUNCTIONAL	7369304	816756	.W. 5129104
AA102		LOGIC SYMBOLOGY ANALOG	7369306	816756	.W. 5129104
AA201		PLUG CHART	5134164	571637	.W. 5133774
AV102		ALU	2589060	818659	.W. 5129104
AV132		ALU	2589363	818659	.W. 5129104
AV162		ALU	7369439	818659	.W. 5129104
A1131		SOCKET LISTING	5129361	571602	.W. 5134090
A1152		50Z-W2 PLUG CHART	7369698	818676	.W. 5129104
CR101		USE METER	5132000	571557	.W. 5129104
CS101		METER CONTROL	2589223	818659	.W. 5129104
CT011		INTERFACE SIGNALS	5132001	571557	.W. 5129102
CT101		CRT TIMING	5132002	571557	.W. 5129104
CT111		CRT TIMING COUNTER	5132003	571557	.W. 5129104
CT121		CRT INTERFACE TIMING	5132004	571557	.W. 5129104
CT201		DBO INPUT RECEIVERS AND PAR CHECK	5132005	571557	.W. 5129104
CT301		CRT CHANNEL CONTROLS	5132006	571557	.W. 5129104
CT321		CRT CONTROLS	5132007	571557	.W. 5129104
GD020		SERVICE VOLTAGES	5132400	571564	.W. 5129104
GD101		CHAN DBI ASSEM AND FCU CLOCK	5132401	571564	.W. 5129104
GD103		CHAN DBI ASSEM AND FCU CLOCK	5132402	571564	.W. 5129104
GD111		BIT RING CYCLIC CHECK AND ADDRESS	5132404	571564	.W. 5129104
GD114		BIT RING CYCLIC CHECK AND ADDRESS	5132407	571564	.W. 5129104
GD121		CYCLE CONTROL RING AND CONTROL	5132411	571564	.W. 5129104
GD123		CYCLE CONTROL RING AND CONTROL	5132413	571564	.W. 5129104
GD201		INTIAL SELECTION	5132416	571564	.W. 5129104
GD203		INTIAL SELECTION	5132418	571564	.W. 5129104
GD211		OP REGISTER AND SER-DES CARD	5132420	571564	.W. 5129104
GD213		OP REGISTER AND SER-DES CARD	5132421	571564	.W. 5129104
GD301		COMMON SEEK CONTROLS	5132425	571564	.W. 5129104
GD311		SPIN 0 SEEK CONTR AND HEAD REG	5132429	571564	.W. 5129104
GD314		SPIN 0 SEEK CONTR AND HEAD REG	5132431	571625	.W. 5129104
GD321		SPIN 0 SEEK CONTR AND HEAD REG	5132433	571564	.W. 5129104
GD324		SPIN 0 SEEK CONTR AND HEAD REG	5132435	571625	.W. 5129104
GD501		3.177 MHZ OSCIL AND WRITE DATA	5132437	571564	.W. 5129104
GD601		LSR SELECTS-IPL	5132440	571564	.W. 5129104
GD603		LSR SELECTS-IPL	5132442	571564	.W. 5129104
GD611		DATA REQUEST SER-DES AND CPU CONT	5132444	571564	.W. 5129104
GD614		DATA REQUEST SER-DES AND CPU CONT	5132447	571564	.W. 5129104
GD621		READ WRITE ERASE CLOCK GATES	5132449	571564	.W. 5129104
GD624		READ WRITE ERASE CLOCK GATES	5132452	571564	.W. 5129104
GD701		COMPARE SCAN ORIENTATION & ERROR	5132454	571564	.W. 5129104
GD703		COMPARE SCAN ORIENTATION & ERROR	5132456	571564	.W. 5129104
GD711		RESETS-END OF CYL-NRF	5132460	571564	.W. 5129104
GD801		FILE METERING TAPS LINE RECEIV	5132463	571564	.W. 5129104
KA101		25 MHZ OSCILLATOR	5132008	571562	.W. 5129104
KA202		RUN CONTROLS	7369452	818659	.W. 5129104
KA232		RUN CONTROLS	7369453	818659	.W. 5129104
KB101		DISPLAY AND CHECK	2588926	818659	.W. 5129104
KB151		DISPLAY AND CHECK	2588927	818659	.W. 5129104
KC102		CLOCK CONTROLS	7369454	818659	.W. 5129104
KC132		CLOCK CONTROLS	7369455	818659	.W. 5129104
KD101		CYCLE CONTROLS	7369456	818659	.W. 5129104
KD131		CYCLE CONTROLS	7369457	818659	.W. 5129104

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** LOGIC TYPE		SYSTEM DIAGRAMS	0		
A		VOL 010 CONTROL B/M	5133710	571602	.W. 5129104
KE101		CHANNEL IN	5132009	571562	.W. 5129104
KE141		CHANNEL IN	5132010	571557	.W. 5129104
KE201		CHANNEL IN	5132011	571557	.W. 5129104
KE241		CHANNEL IN	5132012	571562	.W. 5129104
KE271		DISPLAY CHANNEL OUT	5132013	571557	.W. 5129104
KE293		BOARD 50HZ-W2 DISPLAY BITS P-7 HI	2588392	818659	.W. 5129104
KE295		BOARD 50HZ-W2 DISPLAY BITS P-7 LO	2588393	818659	.W. 5129104
KE301		LSR SEL BANK 2	5132014	571557	.W. 5129104
KE510		INTERFACE LINES LEAV W2 BD TO CH	2588394	816756	.W. 5129104
KE520		INTERFACE LINES ENTER CHAN BD	5132015	571574	.W. 5129104
KE530		INTERFACE LINES LEAV W2 BD TO CH	2588396	816756	.W. 5129104
KE540		INTERFACE LINES ENTER CHAN BD	5132016	571574	.W. 5133774
KE580		CHANNEL BANK 1 TERMINATORS	5132097	571562	.W. 5129104
KE610		INTERFACE LINES ENTER CHAN BD	5132017	571557	.W. 5129104
KE620		INTERFACE LINES LEAV W2 BD TO CH	2588399	818944	.W. 5129104
KE630		INTERFACE LINES ENTER CHAN BD	5132018	571557	.W. 5129104
KE640		INTERFACE LINES LEAV W2 BD TO CH	2588401	816756	.W. 5129104
KG101		REGISTER CONTROLS	2589082	818676	.W. 5129104
KG131		REGISTER CONTROLS	2589083	818659	.W. 5129104
KL101		BASE LSR CONTROLS	2589383	818659	.W. 5129104
KL121		BASE LSR CONTROLS	2589385	818659	.W. 5129104
KM101		INTERRUPT 1 TO 4	2589386	818659	.W. 5129104
KT101		DUAL PROGRAM FEATURE	7369460	818659	.W. 5129104
KT131		DUAL PROGRAM FEATURE	7369461	818659	.W. 5129104
KT201		BASE HALT ID	5132019	571557	.W. 5129104
KY101		ALU CONTROLS	7369462	818659	.W. 5129104
MA102		BASE LSR AND SAR LOW	7369463	818659	.W. 5129104
MA117		BASE LSR AND SAR HI	2589092	818659	.W. 5129104
MA142		BASE LSR AND SAR HI	7369464	818659	.W. 5129104
MA157		BASE LSR AND SAR HI	2589094	818659	.W. 5129104
MA202		FEAT 1 LSR REGISTER	2588979	818659	.W. 5129104
MA222		FEAT 1 LSR REGISTER	7369465	818659	.W. 5129104
MA242		FEAT 1 LSR REGISTER	2588985	818659	.W. 5129104
MA252		FEAT 1 LSR REGISTER	2589226	818659	.W. 5129104
MA302		FEAT 1 LSR REGISTER	2588988	818659	.W. 5129104
MA322		FEAT 2 LSR REGISTER	7369466	818659	.W. 5129104
MA342		FEAT 1 LSR REGISTER	2588991	818659	.W. 5129104
MA352		FEAT 2 LSR REGISTER	7369686	818659	.W. 5129104
MA372		FEAT 2 LSR REGISTER	7369685	818659	.W. 5129104
MC101		DATA BUS OUT-BANK 2	5132020	571557	.W. 5129104
MC201		CHANNEL BANK 2 TERMINATORS	5133733	571557	.W. 5129104
MD101		IN PHASE TERMINATED B 2	5132021	571557	.W. 5129104
PA101		CE MODE & TOGGLE SWITCH	2589105	818659	.W. 5129104
PA111		ROTARY BIT SWITCHES	5132022	571557	.W. 5129104
PB101		DRUM INDICATOR	5132023	571557	.W. 5129104
PB111		INDICATORS MACHINE CYCLE	2589108	818659	.W. 5129104
PB121		CLOCK INDICATORS	2589109	818659	.W. 5129104
PB131		INDICATOR HALT IDENTIFIER	5132024	571557	.W. 5129104
PB151		FIELD AND COMMAND INDICATORS	5132025	571557	.W. 5129104
PB161		FIELD COMMAND 9-16	5132026	571557	.W. 5129104
PC101		DISPLAY SELECTOR DRUM	5132027	571557	.W. 5129104
PC111		LSR SELECT AND OPERATOR	2589113	818659	.W. 5129104
PC121		DUAL PROGRAM CONTROLS	2589114	818659	.W. 5129104
PK001		KEYBOARD DBO ASSEMBLER	5132028	571557	.W. 5133588
PK004		COMMAND INDICATOR LATCHES	5132029	571557	.W. 5133588
PK007		KEYBOARD COMMANDS	5132030	571557	.W. 5133588
PK011		KEYBOARD DBI	5132031	571557	.W. 5133588
PK014		KEYBOARD CONTROLS	5132032	571557	.W. 5133588
PK015		FIELD INDICATORS	5132033	571557	.W. 5133588
PK021		KB RECEIVERS AND CONVERTERS	5132034	571602	.W. 5133588
PK024		KB SERVICE PAGE	5132035	571557	.W. 5133588
PK030		KEYBOARD ENCODE BOARD	5129562	572069	.W. 5129104
PK031		KEYBOARD WEIGHTED CODES	5129143	571557	.W. 5129104
PR001		SERVICE PAGE	5132036	571562	.W. 5133774
PR011		PRINTER CABLES	5132037	571618	.W. 5133774
PR024		DOT BLOCKS AND CABLES	5132038	571574	.W. 5133774
PR111		MP SINGLE	5132039	571574	.W. 5133774
PR131		SENSE AMPS AND ROS MODULE	5132040	571618	.W. 5133774
PR211		DBO-INITIAL SELECTION DIAG COMM	5132041	571574	.W. 5133774
PR214		LSR SELECTION	5132042	571574	.W. 5133774
PR221		PRINTER COMMANDS	5132043	571574	.W. 5133774
PR223		ERROR DETECTION	5132044	571557	.W. 5133774
PR231		CYCLE STEAL CONTROLS	5132045	571574	.W. 5133774
PR232		LSR CONTROLS	5132046	571574	.W. 5133774
PR233		CLOCK AND CONTROLS	5132047	571574	.W. 5133774
PR241		SERIAL PRINTER STEPPER MOTOR CONT	5132048	571557	.W. 5133774
PR242		SERIAL PRINTER STEPPER MOTOR CONT	5132049	571557	.W. 5133774
PR243		PULSE GENERATION	5132050	571557	.W. 5133774
PR244		HI-LO SPEED CONTROL	5132051	571562	.W. 5133774
PR251		DATA BUS IN ASSEM AND PRINT PRE	5132053	571574	.W. 5133774
PR261		ATTACH RESET-ATTACH BUSY VERT OP	5132054	571574	.W. 5133774

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE SYSTEM DIAGRAMS 0

PR271	ROS INPUT-OUTPUT CONTROLS	5132056	571562	.W.	5133774
PR281	SPEED SHIFT CONTROLS	5132057	571574	.W.	5133774
PR282	HORIZONTAL HIGH SPEED INLKS	5132058	571557	.W.	5133774
PR411	50 LPM FEAT	5132059	571562	.W.	5133774

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

## \*\* LOGIC TYPE SYSTEM DIAGRAMS 0

A	VOL 011 CONTROL B/M	5133711	571602	.W.	5129104
RA101	A AND B REGISTERS	2589115	818659	.W.	5129104
RA121	A AND B REGISTERS	2589229	818659	.W.	5129104
RA141	A AND B REGISTERS	2589242	818659	.W.	5129104
RN101	OP AND Q REG	2589116	818659	.W.	5129104
RN111	OP AND Q REG	7369467	818659	.W.	5129104
RN121	OP AND Q REG	7369468	818659	.W.	5129104
RP101	RECEIVERS	5132073	571557	.W.	5134090
RP201	DBO LATCHES	5132074	571557	.W.	5134090
RP211	I-Q CYCLE	5132075	571557	.W.	5134090
RP221	STATUS CONDITIONS	5132076	571557	.W.	5134090
RP231	DBO ASSEMBLER	5132077	571557	.W.	5134090
RP301	OP DECODE AND LSR SELECT	5132078	571557	.W.	5134090
RP311	DBO DRIVE LINES	5132079	571602	.W.	5134090
RP321	DBI CONTROLS	5132080	571602	.W.	5134090
RP331	DBI CONTROLS	5132081	571602	.W.	5134090
RP411	DBI ASSEMBLER	5132083	571602	.W.	5134090
RP901	CABLE CONNECTIONS FOR 5496	5132084	571602	.W.	5134090
RP911	SERVICE PAGE	5132085	571557	.W.	5134090
WA992	CABLES AND CROSSOVERS 50HZ & CHBD	5132086	571557	.W.	5129104
WB101	CHANNEL 1 IN ENTRY LINES	5132087	571557	.W.	5134090
WB103	CHANNEL 1 IN ENTRY LINES	5132088	571574	.W.	5134090
WB105	CHANNEL 1 IN ENTRY LINES	5132089	571574	.W.	5134090
WB107	CHANNEL 1 IN ENTRY LINES	5132090	571574	.W.	5134090
WB151	CHANNEL 1 OUT EXIT LINES	5132091	571557	.W.	5134090
WB153	CHANNEL 1 OUT EXIT LINES	5132094	571557	.W.	5134090
WB155	CHANNEL 1 OUT EXIT LINES	5132095	571557	.W.	5134090
WB157	CHANNEL 1 OUT EXIT LINES	5132096	571557	.W.	5134090
WB201	CHANNEL 2 IN ENTRY LINES	5133735	571557	.W.	5134090
WB251	CHANNEL 2 OUT EXIT LINES	5133736	571557	.W.	5134090
WB255	CHANNEL 2 OUT EXIT LINES	5133737	571557	.W.	5134090
WF010	CPU INTERFACE ENTER	5132465	571564	.W.	5129104
WF015	CPU INTERFACE EXIT	5132466	571625	.W.	5129104
WF020	NON CHANNEL CPU INTERFACE	5132467	571625	.W.	5129104
WG010	I/O CHANNEL OUTPUT LINES	5133738	571557	.W.	5129104
WG015	I/O CHANNEL INPUT LINES	5133739	571557	.W.	5129104
WK000	FILE INTERFACE SPINDLE 0	5132468	571625	.W.	5129104
WS001	16KX9 INTERFACE	7369589	818963	.W.	5129106
WS101	CPU TO STORAGE LINES	2589122	816788	.W.	5129104
WS102	STORAGE TO CPU LINES	2589123	816756	.W.	5129104
YB090	POWER UP SEQUENCE	5133755	572060	.W.	5133766
YB095	POWER DOWN SEQUENCE	5133756	572060	.W.	5133766
YB096	POWER SEQUENCE TIMING CHART	5133757	572060	.W.	5133766
YB100	POWER LOGIC 60HZ AC DISTRIB	5133748	571599	.W.	5133766
YB101	PWR LOGIC-60HZ & 50HZ LINE CONN	5133801	572142	.W.	5133766
YB102	MAP CHART	5133802	572055	.W.	5133766
YB109	PWR LOGIC 60/50HZ FERRO # 1	5133763	571599	.W.	5133766
YB110	POWER LOGIC VOLTAGE DISTRIB	5133749	571599	.W.	5133766
YB115	POWER LOGIC LAMP TEST & FERRO #2	5133751	571620	.W.	5133766
YB120	POWER LOGIC POWER SEQUENCE	5133750	571620	.W.	5133766
YB130	POWER LOGIC CPU I/O DC DISTRIB	5133752	571632	.W.	5133766
YB131	FILE #2 POWER 60HZ	5133560	571632	.W.	5133766
YB132	METER LOGICS 60HZ	5133561	571599	.W.	5133766
YB150	POWER LOGIC COMP VIEW DIAG	5133753	571620	.W.	5133766
YB151	SYSTEM CONSOLE-REAR VIEW	5133577	572052	.W.	5133766
YB152	SYSTEM FE-PANEL REAR VIEW	5133578	572054	.W.	5133766
YB160	POWER LOGIC COMPONENT LISTING	5133754	571599	.W.	5133766
YE101	BIAS VOLTAGES FOR A-B1 & A-B2 BD	5132092	571557	.W.	5129104
YE111	SERVICE AND BIAS VOLTAGES A-B3 BD	2589232	816756	.W.	5129104
YE121	SERVICE VOLTAGES FOR A-B1 BD	5132093	571557	.W.	5129104
YF531	MST 1 REG	5797451	715231	.W.	5133766
YF533	MST 1 REG	2557471	717330	.W.	5133766
YF534	MST 1 REG	5797481	716105	.W.	5133766
YF567	WIRING DIAGRAM 60HZ	5232851	714871	.W.	5133766
YF616	WIRING DIAGRAM	2562461	713362	.W.	5133766
YF651	WIRING DIAGRAM 60HZ	2572191	715842	.W.	5133766
ZA100	01A-A1 CONN CHART	5133563	571620	.W.	5133766
ZA110	01A-A2 CONN CHART	5133564	572058	.W.	5133766
ZA120	CONNECTOR CHART BOARD 01A-B1	5133580	572065	.W.	5133766
ZA130	01A-B2 CONN CHART	5133566	572052	.W.	5133766
ZB002	CE MODE + TOGGLE SWITCHES	5133568	572052	.W.	5133766
ZB004	DRUM INDICATORS	5133569	572052	.W.	5133766
ZB006	MACHINE CYC + OPER LIGHTS	5133570	572063	.W.	5133766
ZB008	CLOCK INDICATORS	5133571	572052	.W.	5133766
ZB010	DISPLAY SELECTOR DRUM	5133567	571599	.W.	5133766
ZB012	OPERATOR CONTROL AND LSR SELECT	5133579	571620	.W.	5133766
ZB014	ROTARY BIT SWITCH	5133573	572052	.W.	5133766
ZB016	MLD	5133574	572052	.W.	5133766
ZB018	CONSOLE LITES	5133581	571620	.W.	5133766
ZB020	CONSOLE LIGHTS	5133576	571599	.W.	5133766
ZB110	CABLE CARD REF	2589301	816463	.W.	5133766

PAGE NO.	SH	TITLE	PART NO	EC NO.	FEATURE B/M OR B/MS
** LOGIC TYPE		SYSTEM DIAGRAMS			0
01A-B1		CSTMZ BD PL & NL	5128856	571602	.W. 5134090
** LOGIC TYPE		COMPONENT CIRCUITS			2
A		VOL 012 CONTROL B/M	5133730	572128	.W. 5129104
01A-A1		CSTMZ BD PIN & NET LIST	5129172	571564	.W. 5128833
01A-A2		CSTMZ BD PIN-NET LIST PRINTER	5134000	571622	.W. 5133774
01A-B2		CSTZ BD PIN & NET LIST	2590324	818676	.W. 5129102

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE DIAGNOSTIC PROGRAMS 8

A0A	FILE SCAN EQUAL TEST	5129639	571531	.W.	5129104
A0B	FILE SCAN LO OR EQUAL	5129641	571531	.W.	5129104
A0C	FILE SCAN HI OR EQUAL	5129643	571531	.W.	5129104
A0D	FILE SPEED TEST	5129645	571591	.W.	5129104
A0E	FILE SEEK TEST	5129627	571573	.W.	5129104
A0F	FILE SYSTEM TEST MOD	5129651	571634	.W.	5129104
A01	FCU LOGIC DIAG	5129612	571573	.W.	5129104
A03	FILE SEEK TEST	5129625	571591	.W.	5129104
A05	FILE WRITE DATA TEST	5129629	571591	.W.	5129104
A06	FILE VERIFY DATA TEST	5129631	571540	.W.	5129104
A07	FILE READ DIA TEST	5129633	571531	.W.	5129104
A08	FILE READ DATA TEST	5129635	571540	.W.	5129104
A09	FILE WRITE ID & DISK SELECT	5129637	571591	.W.	5129104
BOA	DATA DECKS	5134154	571609	.W.	5129104
BOB	DATA DECKS	5134156	571609	.W.	5129104
B01	FCU LOGIC DIAGNOSTIC	5129614	571524	.W.	5129104
B03	FILE IPL FORMAT CHECK	5129647	571601	.W.	5129104
B04	FILE FRIEND TEST	5129649	571565	.W.	5129104
EFE	PROGRAM DECK	5133912	571559	.W.	5129104
EFF	PRINTER START I/O SUB ROUTINE	5129616	571624	.W.	5129104
E8B	PRINTER FORMS TEST	5129601	571624	.W.	5129104
E8F	SYSTEM TEST MOD	5129667	571588	.W.	5129104
E85	PRINTER DIA MODE T PRINT TEST	5129609	571624	.W.	5129104
E87	PRINTER MOTOR SPEED TEST	5129493	571583	.W.	5129104
E88	PRINTER TAB & MARGINE SET	5129495	571588	.W.	5129104
E89	PRINTER EMITTER TIMING TEST	5129497	571566	.W.	5129104
E9A	PROGRAM DECK	5133902	571587	.W.	5129104
E9B	PROGRAM DECK	5133904	571587	.W.	5129104
E9C	PROGRAM DECK	5133906	571559	.W.	5129104
E9E	PROGRAM DECK	5133908	571587	.W.	5129104
E9F	DIAGNOSTIC DECK	5133910	571587	.W.	5129104
E91	PROGRAM DECK	5133886	571559	.W.	5129104
E92	PROGRAM DECK	5133888	571559	.W.	5129104
E93	PROGRAM DECK	5133890	571559	.W.	5129104
E94	PROGRAM DECK	5133892	571559	.W.	5129104
E95	PROGRAM DECK	5133894	571559	.W.	5129104
E96	PROGRAM DECK	5133896	571559	.W.	5129104
E98	PROGRAM DECK	5133898	571587	.W.	5129104
E99	PROGRAM DECK	5133900	571559	.W.	5129104
FEA	METER TEST	5129694	571565	.W.	5129104
FED	CE DISK CONFIGURATOR	5129478	571627	.W.	5129104
FEE	APLD TAPE LOADER	5129618	571565	.W.	5129104
FE1	CPU SYSTEM TEST MOD	2589908	818948	.W.	5129104
FFA 1	DISK IPL LOADER	2588454	816730	.W.	5129104
FFB 1	DISK DCP SECTION LOADER	2588456	577050	.W.	5129104
FFD	DIAGNOSTIC DECK	5134043	571565	.W.	5129104
FFF 1	DIAG CONTROL PROG	2589900	818390	.W.	5129104
FF1	SYS TEST RELOCATING LOADER	2589904	818948	.W.	5129104
FF2 1	CPU PROGRAM DIAG DECKS	2589906	818948	.W.	5129104
FF4	DIAGNOSTIC DECK	2589722	816760	.W.	5129104
FF6	DIAGNOSTIC DECK	5129662	571628	.W.	5129104
FF7	DIAGNOSTIC DECK	2589744	577050	.W.	5129104
F8F	CPU PROGRAM DIAG DECKS	5129669	571565	.W.	5129104
F81	5496 DATA REC FUN TEST	5129484	571520	.W.	5129104
OBA	TAP CONTROL DECK 5444	5129687	571540	.W.	5129104
OBB	TAP CONTROL DECK 5444	5129688	571540	.W.	5129104
OBO	TAP CONTROL DECK 5444	5129677	571540	.W.	5129104
OB1	TAP CONTROL DECK 5444	5129678	571540	.W.	5129104
OB2	TAP CONTROL DECK 5444	5129679	571540	.W.	5129104
OB3	TAP CONTROL DECK 5444	5129680	571540	.W.	5129104
OB4	TAP CONTROL DECK 5444	5129681	571540	.W.	5129104
OB5	TAP CONTROL DECK 5444	5129682	571540	.W.	5129104
OB6	TAP CONTROL DECK 5444	5129683	571540	.W.	5129104
OB7	TAP CONTROL DECK 5444	5129684	571540	.W.	5129104
OB8	TAP CONTROL DECK 5444	5129685	571540	.W.	5129104
OB9	TAP CONTROL DECK 5444	5129686	571540	.W.	5129104
OCF	DIAGNOSTIC DECK	2589746	577050	.W.	5129104
ODA	CPU PRG F,10 SECT 9 HO	5129420	571504	.W.	5129104
ODB	CPU PRG 11,12,13,14 SECT A HO	5129422	571504	.W.	5129104
ODC	CPU PRG 15,16,17 SECT B HO	5129424	571504	.W.	5129104
ODD	CPU PRG 18,19 SECT C HO	5129426	571504	.W.	5129104
ODE	CPU PRG 1A,1C,1F SECT D HO	5129428	571504	.W.	5129104
ODF	CPU PRG 20,21,22 SECT E HO	5129430	571504	.W.	5129104
OD1	CPU PRG 1 SECT 0 HO	5129402	571526	.W.	5129104
OD2	CPU PRG 2 SECT 1 HO	5129404	571526	.W.	5129104
OD3	CPU PRG 3 SECT 2 HO	5129406	571504	.W.	5129104
OD4	CPU PRG 4 SECT 3 HO	5129408	571520	.W.	5129104
OD5	CPU PRG 5 SECT 4 HO	5129410	571520	.W.	5129104
OD6	CPU PRG 6 SECT 5 HO	5129412	571520	.W.	5129104
OD7	CPU PRG 7 SECT 6 HO	5129414	571520	.W.	5129104
OD8	CPU PRG 9 SECT 7 HO	5129416	571504	.W.	5129104
OD9	CPU PRG A,C,E SECT 8 HO	5129418	571504	.W.	5129104

PAGE NO. SH TITLE PART NO EC NO. FEATURE B/M OR B/MS

\*\* LOGIC TYPE DIAGNOSTIC PROGRAMS 8

0EA	CPU PRG 68,69,6A,6C,6D SECT 0 H1	5129450	571526	.W.	5129104
0EB	CPU PRG 6E,6F,7A,7C SECT 1 H1	5129452	571526	.W.	5129104
0EC	CPU PRG 70,71,72,73 SECT 2 H1	5129454	571504	.W.	5129104
0ED	CPU PRG 83,84,85,86 SECT 3 H1	5129456	571504	.W.	5129104
0EE	STOR SEP 8P, PRG 91 SECT 4 H1	5129458	571504	.W.	5129104
0E1	CPU PRG 24,25,26 SECT F H0	5129432	571504	.W.	5129104
0E2	CPU PRG 27,28,29 SECT 10 H0	5129434	571504	.W.	5129104
0E3	CPU PRG 2A,2C,2E SECT 11 H0	5129436	571504	.W.	5129104
0E4	CPU PRG 2F,30 SECT 12 H0	5129438	571504	.W.	5129104
0E5	CPU PRG 31,32,33 SECT 13 H0	5129440	571504	.W.	5129104
0E6	CPU PRG 34,35,36 SECT 14 H0	5129442	571504	.W.	5129104
0E8	CPU PRG 36,3E SECT 16 H0	5129446	571526	.W.	5129104
0E9	CPU PRG 3F,40,41,42 SECT 17 H0	5129448	571504	.W.	5129104
0FA	CPU SPEC PRG A0,A1 SECT A H1	5129470	571504	.W.	5129104
0F5	STOR SEP 8P, PRG 93 SECT 5 H1	5129460	571504	.W.	5129104
0F6	STOR SEP 8P, PRG 94 SECT 6 H1	5129462	571520	.W.	5129104
0F7	STOR SEP 8P, PRG 95 SECT 7 H1	5129464	571520	.W.	5129104
0F8	STOR SEP 8P, PRG 96 SECT 8 H1	5129466	571520	.W.	5129104
0F9	STOR SEP 8P, PRG 97 SECT 9 H1	5129468	571520	.W.	5129104
12F	KEYBOARD SYSTEM TEST MOD	5129665	571520	.W.	5129104
121	KEYBOARD FUNCTION TEST	5129475	571633	.W.	5129104
301	SIOC	2588794	816761	.W.	5129104
302	SIOC	2588795	816761	.W.	5129104
303	SIOC	2588796	816761	.W.	5129104
381	APLD DIA LOADER	5129691	571607	.W.	5129104
80A	BSCA RESPONDER	2589717	818394	.W.	5129104
80F	BSCA SYSTEM TEST MOD	2589996	818693	.W.	5129104
801	BSCA BASIC OPS TEST	2589701	818660	.W.	5129104
802	BSCA LOOP, XMT CYCLE COMP. AUTO C	2589703	816773	.W.	5129104
803	BSCA EBCDIC SECTION	2589705	816773	.W.	5129104
804	BSCA ASCII SECTION	2589707	816632	.W.	5129104
805	BSCA XMT,SYNC,IDLE BCC SYNC-SYN	2589709	816632	.W.	5129104
806	BSCA TIMEOUT ITB & CONT XMT	2589711	818945	.W.	5129104
809	BSCA ON LINE TEST	2589715	818395	.W.	5129104
90F	2265 CRT SYS TEST MOD	5129671	571520	.W.	5129104
901	2265 CRT FUNCTION TEST	5129481	571522	.W.	5129104
FF50	DISK INITIALIZER	5129659	571540	.W.	5129104
0E8A0	PRINTER PRINT TEST	5129499	571535	.W.	5129104
0E8C0	PRINTER COMB OPS TEST	5129603	571624	.W.	5129104
0E8D0	PRINTER TIMING GRAPH RIGHT	5129605	571535	.W.	5129104
0E8E0	PRINTER TIMING GRAPH LEFT	5129607	571535	.W.	5129104
0E810	PRINTER BASIC OPS TEST	5129487	571535	.W.	5129104
0E820	PRTR DIA MODE CARR INDEX	5129489	571630	.W.	5129104
0E830	PRTR DIA MODE TAB TEST	5129622	571535	.W.	5129104
0E840	PRTR DIA MODE TSKIP TEST	5129491	571624	.W.	5129104
0E860	PRTR DIA MODE TSIMPLE PRT EXCER	5129620	571624	.W.	5129104
00E70	CPU PRG 37,38,39,3A SECT 15 H0	5129444	571531	.W.	5129104

INSTALLATION MANUAL

IBM SYSTEM/3 MOD 6

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PREFACE

This manual is a guide for installing the IBM System/3 Mod 6. The manual contains mechanical installation procedures, cabling instructions, and system test procedures for making the system operational for a customer.

Installation instructions are given for the basic system, display station, data recorder, BSCA and SIOC. Unit installation manuals will be provided for other features. This system manual, together with the unit manuals, provides the Customer Engineer with a complete installation package for a particular configuration.

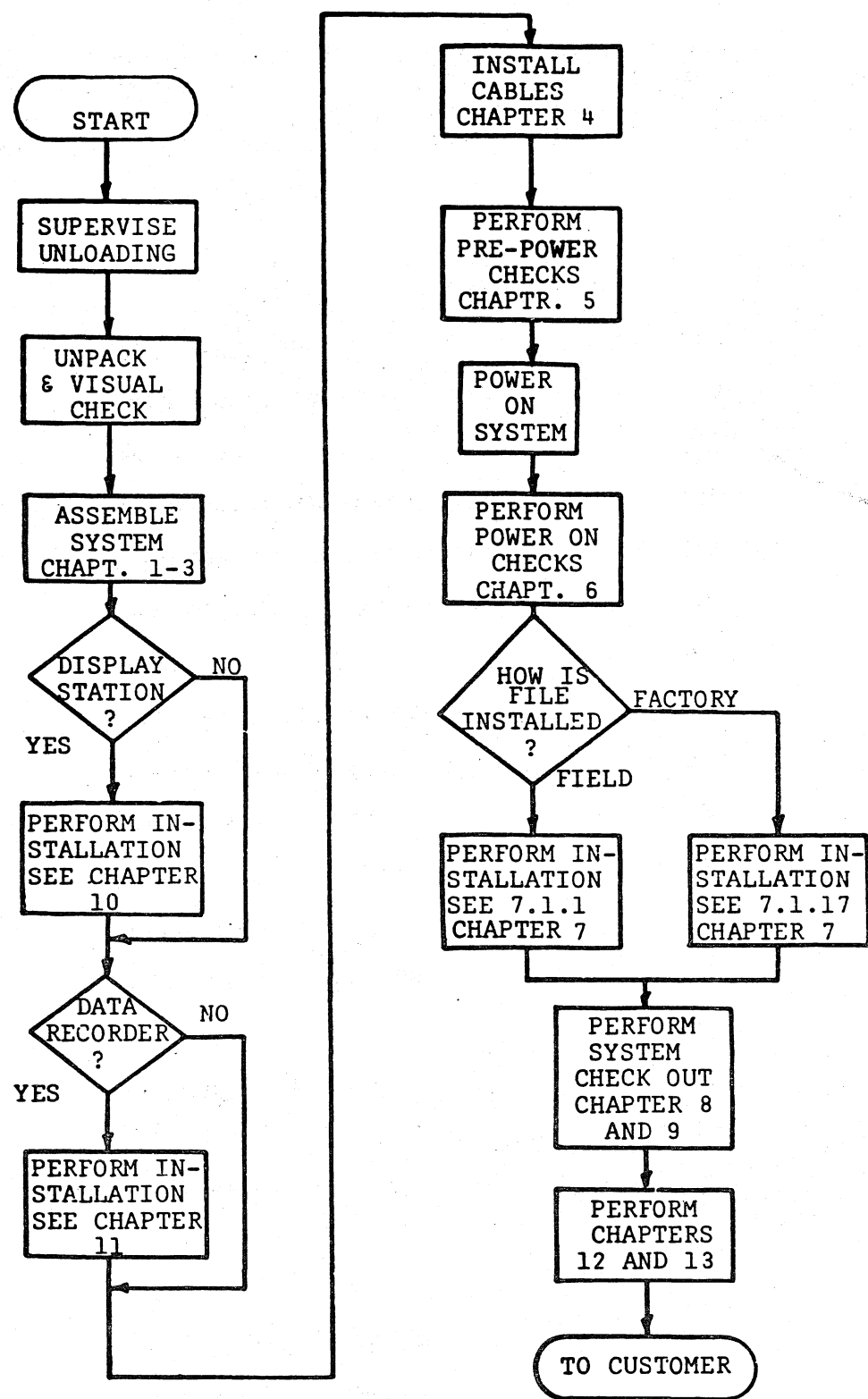
Keep the installation manuals with the system for possible use when re-installing the equipment. Installation manuals are updated frequently, and a new manual obtained at the time of re-installation may lack information pertinent to these units.

P/N 5133687

EC	572030	572045	572076	572090	572099	572130
Date	4/16/70	7/10/70	7/31/70	9/15/70	2/11/71	1JUN71
EC	572070	572150	572155	572160	571611	571627
Date	18JUN71	16AUG71	7OCT71	15NOV71	07APR72	02JUN72

P/N	5133687					
E/C	572030	572045	572076	572090	572099	572130
Date	4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	1JUN71
EC	572070	572150	572155	572160	571611	571627
Date	18JUN71	16AUG71	7OCT71	15NOV71	07APR72	02JUN72





CHAPTER I

SAFETY

- 1.1.1 Power down system when removing and installing cables, circuit cards, jumpers, etc.
- 1.1.2 Remove all AC and DC power and disconnect the main power cable when removing or assembling major components, working in immediate area of power supplies, performing mechanical inspection of power supplies, and installing changes in machine circuitry.
- 1.1.3 When it is absolutely necessary to work on equipment having exposed line electrical circuitry anywhere in the machine, the following precautions must be followed:  
  
Another person familiar with power off controls must be in the immediate vicinity.  
  
Rings, wrist watches, chains and bracelets shall not be worn.  
  
Only insulated pliers or screwdrivers shall be used.  
  
When using test instruments, be certain controls are set correctly and proper capacity and insulated probes are used.  
  
Avoid contacting ground potential (metal floor strips, machine frames, etc.).
- 1.1.4 Safety glasses must be worn when soldering, drilling, driving pins and all other conditions that may be hazardous to the eyes.
- 1.1.5 Do not use solvents, chemicals, greases or oils that have not been approved by IBM.
- 1.1.6 Avoid using tools or test equipment that have not been approved by IBM.
- 1.1.7 Replace worn or broken tools and test equipment.
- 1.1.8 Do not lift machines or devices weighing in excess of sixty (60) lbs. (27.2kg).
- 1.1.9 All safety devices such as guards, shields, signs, etc., shall be restored after maintenance.

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SAFETY

1.2.1 Each person is responsible to be certain that no action on his part renders equipment unsafe or exposes hazards to other personnel.

1.2.2 Maintain good housekeeping in area of machines.

KNOWING SAFETY RULES IS NOT ENOUGH

OBSERVE THEM - FOLLOW THEM

USE GOOD JUDGEMENT

THINK SAFELY

WORK SAFELY

CHAPTER II

GENERAL INFORMATION

2.1.1 The following special tools are needed to install an IBM System/3 Mod 6

Weston 901 DC Meter (P/N 460879)  
Tektronix 453 Oscilloscope.

2.1.2 Make a physical inspection of all units for damage resulting from shipment.

Report any serious damage observed immediately to your Branch Office.

2.1.3 Open all boxes and packages and inventory all parts. Place parts on or near their respective units. Refer to ITC, Vol. 1.

2.1.4 Refer to the Pack/Unpack Instructions taped to the outside of each unit.

2.1.5 Check for the presence of all air filters and install if necessary.

2.1.6 Place all units in the location specified in the system physical planning layout (established by the customer prior to the system arrival).

2.1.7 Any time you are installing cables or working in the area of a terminal block, tighten all screws on that terminal block.

2.1.8 As each step is performed, place a check to the left of the step number. This will help avoid missing steps that will require back-tracking later on.

2.1.9 Refer to system assembly procedure for further instructions.

NOTE: ALL REFERENCE MATERIAL REFERED TO IN THIS MANUAL IS IN 5129104 MAINTENANCE PACKAGE.

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CHAPTER III

SYSTEM ASSEMBLY PROCEDURES

- ( ) 3.1.1 Ensure that all external packing material and tape have been removed from the units. (Check for scratches or dents, etc. on exterior of machines.)
- ( ) 3.1.2 Open covers and inspect each unit carefully for any sign of physical damage.
- ( ) 3.1.3 Ensure that all internal packing and shipping braces are removed and stored properly.
- ( ) 3.1.3.1 Refer to each unit pack/unpack instructions for location of any shipping braces. Do only that section of I/O instructions and then return to this system manual.
- ( ) 3.1.4 Position the 5406 CPU.
- ( ) 3.1.5 Remove the rear modesty skirt from I/O frame.
- ( ) 3.1.6 Position the I/O frame next to the CPU. Separate the two frames enough to allow for cable routing.
  - 3.1.6.1 The AC & DC power cables are shipped in the I/O frame. Uncoil and route the DC cables P/N 5129247 and 5129248 to TB-3 of the CPU. Refer to Dwg. #5129340 sheet 3 for Stage I and sheet 4 for Stage II machines. Refer to Fig. 5, Page 15 for terminal connections.
  - 3.1.6.2 Route the AC power cable P/N 5128992 to the primary power box TB-1. Refer to Dwg. 5129340 for routing and TB location. Refer to cable Dwg. 5128992. For 50/60HZ and additional Dwg. 5129308 for 50HZ terminal connections. Note: Stage II machines can be identified by the presence of a printed circuit board sequence relay panel. NOTE: Remove center bolt from angle bracket before performing next step.
  - 3.1.6.3 Refer to assembly Dwg. 5133549, using (6) screws P/N 322061, (3) screws P/N 2575295, and (3) washers P/N 2575293, attach the I/O frame to the CPU frame.

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( ) 3.1.6 (continued)

- 3.1.6.4 Remove the angle bracket with casters attached. Store for possible future use.
- ( ) 3.1.7 Install (4) brackets P/N 5129220 using (8) screws P/N 110775, and (8) washers P/N 365716. Refer to Dwg. 5133549, Sheet 2.
- ( ) 3.1.8 If Display Station, perform items 10.1.1 through 10.1.15 of Chapter X. Return to this section.
- ( ) 3.1.9 If Data Recorder, perform items 11.1.1 through 11.1.5 of Chapter XI. Return to this section.

CHAPTER IV

CABLE INSTALLATION

- 4.1 General Information
  - ( ) 4.1.1 The number of signal cables that will be shipped is dependent upon the additional features beyond the basic system.
  - ( ) 4.1.2 There are three types of signal cables - 60 conductor SLT flat ribbon cables (WHITE), 20 conductor discrete ribbon cables (YELLOW), and a bulk cable terminated with a nylon connector.

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CABLE INSTALLATION

4.2 Cable Routing (Use reference drawing P/N 5129340)

4.2.1 The signal cables are shipped attached to the CPU frame, coiled and taped. Connect as indicated by the label on the end of the cable.

4.2.2 Route the cables in the following sequence:

- (1 P/N 5129370 to W1A1
- (2 P/N 5129371 to W1B1
- (3 P/N 5133602 to W1A2 (5802827)
- (4 P/N 5129285 to W1B2
- (5 P/N 5802894 to W4A1
- (6 P/N 5802894 to W4A2
- (7 P/N 5129716 to W2A1
- (8 P/N 5129716 to W2A2 (5802875)
- (9 P/N 5129514 to W2B1
- (10 P/N 5129369 to W2B2
- 11 Console power cable to plug (5129353)
- 12 P/N 5129164 or 5133782 to TB-4 term. 15 & 16
- 13 P/N 5129715 to nylon connector (sense lines.)
- 14 P/N 5129712 to printer power cable.
- 15 P/N 5129714 to LCD sense lines

See Fig. 4

4.2.3 If Disk Drive 2 installed connect the two signal cables to W4B1 and W4B2

NOTE: If cables to W4A1, A2, B1, B2 are not marked, identification can be made by continuity checks between:

- W4A1 to 01A-A1A2 Cable grp 5133544
- W4A2 to 01A-A1A3
- W4B1 to 01A-A1A4 Cable Grp 5133545
- W4B2 to 01A-A1A5

CHAPTER V

PRE-POWER CHECKS

- ( ) 5.1.1 Check that all cards and flat cables are plugged and seated properly.
- ( ) 5.1.2 Be sure that all I/O signal and power cables are connected correctly.
- ( ) 5.1.3 Assure that the customer's voltage matches the voltage specified on the machine voltage tag.
  - 5.1.3.1 This tag is located on the PRI Power Box. Refer to Dwg. P/N 5129571.
- ( ) 5.1.4 Inspect board wiring for bent pins and console for damaged and/or loose cables.
- ( ) 5.1.5 Check for loose or missing ground straps. Refer to DWG PN 5133549
- ( ) 5.1.6 Fill the printer reservoir using IBM #6 oil.
- ( ) 5.1.7 Install printer ribbon PN 1136906 and PTR forms Guide
- ( ) 5.1.8 Be sure that all safety shields are installed.

Note: If 2222 Printer, install the SMS card. Socket located in rear of printer. The card is shipped inside printer cover.

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CHAPTER VI

POWER-ON CHECKS

- ( ) 6.1.1 After ensuring that "Power Off" SW is off and main CB is off, connect the main power cable to the customer's outlet. Check for continuity between frame and power outlet box.
- ( ) 6.1.2 Turn the CPU main power cable circuit breaker on, and ensure that all secondary power circuit breakers are on and remain on.
- ( ) 6.1.3 Place the "Power On" switch to the "on" position. (Do not turn disk power on at this time.)
- ( ) 6.1.4 Verify that power comes up normally. (Power On light comes on)
- ( ) 6.1.5 Observe the entire system for signs of overheating or smoking.

POWER DOWN IMMEDIATELY IF ANY ABNORMAL CONDITIONS ARE NOTED.

- ( ) 6.1.6 Check the logic voltages at the upper laminar bus of the primary gate or at the supply as noted in the table below.
- ( ) 6.1.6.1 Use a Weston 901 DC meter P/N 460879 and adjust to nominal voltage if necessary.

<u>SUPPLY</u>	<u>NOMINAL VOLTAGE</u>	<u>TOLERANCE</u>	<u>LOCATION</u>
+6	+6.00	+5.8 to +6.2	+6 position 3 laminar bus. Gnd Position 2 Laminar Bus
-4	-4.05	-3.9 to -4.1	-4 position 6 laminar bus. Gnd position 7 laminar bus.
-30 (VXYZ)	-30.00	See Decal	-30 position
(NOTE: If -30V need adjustment, refer to 5406 FET-MM page 1-406 section 4.3.4)		on pin side of MST Board 01A-B3	8-lower laminar bus. Gnd position 9 laminar bus.

POWER-ON CHECKS

- ( ) 6.1.6.1 (continued)

<u>SUPPLY</u>	<u>NOMINAL VOLTAGE</u>	<u>TOLERANCE</u>	<u>LOCATION</u>
+3	+3.00	+2.97 to +3.03	+3 01A-B3C4D03 01A-B3C4B11
-14	-14.00	-14.05 to -13.95	-14 01A-B3C4J11 Gnd 01A-B3C4D08
The +3V and -14V are adjusted by the pot on regulator card at location 01A-B3C4.			
-4	-4	-3.9 to -4.1	-4 01B-A1T2B06 GND 01B-A1T2D08

- ( ) 6.2.1 Check operation of printer cover interlock switch. (Open cover and verify PTR Attn.)
- ( ) 6.2.2 Check carriage motor is running. (Carriage motor switch located under cover on rear of printer)

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P/N	5133687	572045	572076	572090	572099	572130
E/C	572030	572045	572076	572090	572099	572130
Date	4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	1JUN71
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CHAPTER VII

DISK DRIVE(S) INSTALLATION

Note: If files installed, skip to Section 7.1.17. Turn system power off.

- ( ) 7.1.1 From the front of the I/O unit of 5406, open the upper file by inserting a tool through the hole in side cover of file enclosure. This will release the latching device.
- ( ) 7.1.2 Remove the upper file cover by loosening four shoulder screws (P/N 5129396) that secure the cover to the file pan.
- ( ) 7.1.3 Remove the bottom shoulder screw completely on each side of base pan after cover has been removed.
- ( ) 7.1.4 Remove the rear cover by turning coin latch and hinge cover down and set cover aside. Remove the rear "file fan" covers.
- ( ) 7.1.5 Pull the file pan to rear of file enclosure so that the catch on drawer slide locks in the open position.
- ( ) 7.1.6 Position the shipping container approximately six inches from file pan. Make sure that front of 5444 is facing host machine.
- ( ) 7.1.7 Refer to "5444 unpack" instructions and prepare file for installation into file enclosure.
- ( ) 7.1.8 Slide file forward onto pan, guiding it between two studs located on front of base pan.
- ( ) 7.1.9 Secure the file to base pan with (2) screws (P/N 2566610). Screw location, rear and underside of base pan. See Fig. 7.
- ( ) 7.1.10 Install bracket (P/N 5129365) to base of file with (2) screws (P/N 2574822). See Figure 7.
- ( ) 7.1.11 Install flexible cable retainer (P/N 2590967) to bracket (P/N 5129365) with screw (P/N 38235) and nut (P/N 257187). Make sure that clips of retainer face the underside of file pan. See Figure 7.
- ( ) 7.1.12 Install cable clamp (P/N 2590960) to file cables per (Fig. 8). Insure that markings are as indicated. Then secure cable clamp (P/N 2590960) to bracket (P/N 5129365) per Figure 7.

- ( ) 7.1.13 Route cables through retainer (P/N 2590967) with flat cables against back of retainer, then secure clips.
- ( ) 7.1.14 Release catch on drawer slide and move slide to front of unit. Care should be exercised that retainer goes between guides on bottom pan of frame.
- ( ) 7.1.15 Secure loose end of cable retainer (P/N 2590967) to guide (P/N 5129366) with screw (P/N 38235) and nut (P/N 257187). See Figure 7.
- ( ) 7.1.16 Install cable clamp asm (P/N 2590960) with cables of 5444 File installed to guide (P/N 5129366). See Fig. 7.
- ( ) 7.1.17 If File(s) are factory installed, DC and signal cables must be unplugged.  
  
Refer to 5444 Installation Instructions (P/N 2598211 Friction Drive, P/N 2598260 Stepper Drive) for file installation procedure. Note: If File(s) are factory installed, skip sections 7.1.18, 7.1.19, 7.1.20, 7.1.21.
- ( ) 7.1.18 Attach 5444 AC cable to AC cable (P/N 5133537) for upper file or (P/N 5133538) for lower file. Route 5444 cable via clamp (P/N 2596291) on base of frame pan to absorb slack in file AC cable. See Figure 7.
- ( ) 7.1.19 Attach 5444 DC cable to DC cable (P/N 5133538) for upper file or (P/N 5133540) for lower file.
- ( ) 7.1.20 Route flat cables of 5444 file through side wall to the W4 connector. Fold cables on single and double diagonal lines only, with fold lines on inside of the fold. Ignore all tripple diagonal fold lines. The first set of double diagonal fold lines away from the file are used when installing the lower disk. Ignore them when installing the upper disk. Arrange cables so that flat cables are against cable retainer. See Fig.8.
- ( ) 7.1.21 Route riat cables of 5444 file through (2) clamps (P/N 2596291) located on guide (P/N 5129366). These clamps are to be positioned to absorb slack in signal cables. See Figure 7.
- ( ) 7.1.22 To power up files without front covers, override the drawer interlock. Continue 5444 installation procedure.
- ( ) 7.1.23 Turn system power off.
- ( ) 7.1.24 Install file front cover(s).
- ( ) 7.1.25 Close file drawer(s). Check interlock. (Drawer should not open).
- ( ) 7.1.26 Turn system power on. (Drawer(s) should open).
- ( ) 7.1.27 Turn file power on. (Drawer(s) should not open).

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CHAPTER VIII

SYSTEM TEST PROCEDURE

( ) 8.1.1 Disk Test (Drive 1 - Removable)

- 8.1.1.1 Install the CE Diagnostic Disk Cartridge.
- 8.1.1.2 Turn Disk Drive 1 switch on.  
(NOTE: If two file system, both drives must be on)
- 8.1.1.3 Refer to IMP Users Guide,
- 8.1.1.4 Confirm that the configuration is representative of the system.
  - 8.1.1.4.1 To reconfigure, select the configuration program "FED". Follow print out.
- 8.1.1.5 Run File Diagnostic Programs A01, A03, A05, A06 & A09. Refer to Users Guide  
  
NOTE: File diagnostics to be run on Drive 1, removable disk only at this time. To accomplish this, turn on sense switches 16 and 1F after each section is loaded.

( ) 8.1.2 Disk Initialization

- 8.1.2.1 Program Selection  
  
NOTE: After all file programs have run successfully on Drive #1 removable; it will be necessary to initialize all other system disks. Refer to User's Guide.
- 8.1.2.2 Set "FE" Data Switches to "DFF5".
- 8.1.2.3 System Reset, start.
- 8.1.2.4 Verify Halt "FF5".

CAUTION DO NOT INITIALIZE CE DIAGNOSTIC PACK

- 8.1.2.5 Select first disk to be initialized.

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CHAPTER VIII

SYSTEM TEST PROCEDURE

Disk Initialization (continued)

- 8.1.2.6 Set "FE" data switch #1 to "0".
- 8.1.2.7 System Start. Begin initialization.  
  
NOTE: At the completion of the initializer program, enter the next disk selection. System reset, start to re-execute the program.

( ) 8.2.1

Disk Initialization

- 8.2.1.1 Program Termination.  
  
NOTE: To exit the initializer program, the operator must enter a program terminate command.
- 8.2.1.2 System Reset
- 8.2.1.3 Enter "EEOO" from FE Data Switches.
- 8.2.1.4 Set "FE" Data Switch #1 to 0, system start.
- 8.2.1.5 Verify halt "FE5", program terminated.

( ) 8.2.2

File, Drive #2

- 8.2.2.1 Turn on sense switch #7, load and go.
- 8.2.2.2 Enter "DAOO" in FE Data Switches; Depress Start.
- 8.2.2.3 Set FE Data switch #1 to "0".

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SYSTEM TEST PROCEDURE

File, Drive # 2 (continued).

8.2.2.4 System start. The Diagnostics will be run on both drives.

( ) 8.3.1 Run Printer Diagnostics.

8.3.1.1 Enter "DE80" in FE data switches. Depress Start.

8.3.1.2 Run LCD Diagnostics E9-.

( ) 8.3.2 Refer to Users Guide & run keyboard Diagnostics.

( ) 8.3.3 Refer to Users Guide and run meter Diagnostics.

( ) 8.3.4 If display station and data recorder installed, finish Chapters X & XI.

NOTE: If BSCA and/or SIOC, do those chapters then return to this section.

SYSTEM FUNCTIONAL TEST

( ) 8.3.5 Program Operation

8.3.5.1 All system test programs are available on the program disk pack.

8.3.5.2 Program selection is accomplished by the system test loader program (FF1).

8.3.5.3 The loader selects the programs to be run, from the table set up by the configurator program.

8.3.5.4 Storage capacity of 12K or 16K is sufficient to exercise all of the features system test.

8.3.5.5 Ensure that each test program is run for at least 15 minutes (12K or 16K).

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SYSTEM TEST PROCEDURE

Program Operation (Continued)

8.3.5.6 Ensure that the keyboard test is completed four times error free.

NOTE: Manual intervention (Inq. Reg.) is required to unlock the keyboard.

8.3.5.7 The Alternate Program Load Device must be run to insure proper operation. Refer to the IMP User's Guide, key in the "Boot Strap" Program and verify the tape cassette reads in. It is suggested that the optimum volume setting be recorded on the cassette label for future reference.

NOTE: Any halt while running system tests, refer to users guide. Any other error go to main entry of CPU map charts.

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CHAPTER IX

COMPLETING THE INSTALLATION

- 9.1.1 Assemble the leveling studs, P/N's 2162666, 5129397, 5129099 and install. Refer to Ref. Dwg. 5133549.
- 9.1.2 Assemble I/O frame leveling studs (2), P/N's 2162666, 5129397, 5129099, and install. See Ref. Dwg. 5133549.
- 9.1.3 Install Panels.
  - ( ) 9.1.3.1 Refer to Dwg. 5133549. Install Panel P/N 5129237.
  - ( ) 9.1.3.2 Refer to Dwg. 5133549. Install Panel P/N 5129236.
  - ( ) 9.1.3.3 Refer to Dwg. 5133549. Install Panel P/N 5129238.
  - ( ) 9.1.3.4 Re-install rear modesty skirt.
- 9.1.4 Set up records.
  - 9.1.4.1 Record all meter readings.
  - 9.1.4.2 Set up IR Log System.
  - 9.1.4.3 Install meter tamper proof plugs.
  - 9.1.4.4 Install file meter decal(s) P/N 740490. Identify file by serial number.

CHAPTER X

CRT DISPLAY STATION INSTALLATION

- 10.1.1 Unpack the CRT display station (2265-Mod II).
- 10.1.2 Set the display station on the I/O table top, approximately over the cable routing hole in the table top. Do not crush the display cables. If necessary temp. route the cables through any of the side opening of the display station pedestal.
- 10.1.3 Make certain the back panel of the I/O frame is removed.
- 10.1.4 Slide top File drawer out. (If files not installed, skip this step).
- 10.1.5 Tilt the display station forward slightly and route all display cables directly downward from the approximate bottom center of the display through the display pedestal and into the display cable access hole.
- 10.1.6 Route the three display cables and ground strap through the upper access hold of the I/O panel.
- 10.1.7 Adjust the display station on the table top so that the display pedestal mounting holes (2 corners) are aligned to the 2 table top mounting alignment holes.
- 10.1.8 Attach the display station to the table top using the 2 mounting bolts PN438589 inserted from beneath the table top through the mounting holes and into the display pedestal.
- 10.1.9 Dress the display cables to lay flat along the underside of the table top. Remove any cable twisting.
- 10.1.10 Attach the display ground strap to the underside of the I/O frame using screw P/N 58207.
- 10.1.11 Attach the display cable cover P/N 5129246 to the underside of the I/O table top using the 3 mounting screws P/N 2574822
- 10.1.12 Connect the display station AC and DC cable group to the proper terminal blocks behind the I/O frame. Route cables so there is no interference or chaffing problems, Ref. Dwg. 5129340, and Fig. 6. Connect the AC cable shield drain to I/O chassis frame at most convenient spot.
- 10.1.13 Route and connect display station flat signal cable along the upper portion of the I/O frame into quick disconnect connector, W2-B1, in back of the I/O frame, Ref. Dwg. 5129340.

P/N	5133687					
E/C	572030	572045	572076	572090	572130	
Date	4/16/70	7/8/70	7/31/70	9/15/70	1JUN71	
E/C	572070	572150	572155	572160	571611	571627
Date	18JUN71	16AUG71	7OCT71	15NOV71	7APR72	02JUN72

P/N	5133687					
E/C	572030	572045	572076	572090	572099	572130
Date	4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	1JUN71
E/C	572070	572150	572155	572160	571611	571627
Date	18JUN71	16AUG71	7OCT71	15NOV71	7APR72	02JUN72

CHAPTER XI

129 OR 5496 DATA RECORDER INSTALLATIONS

- 10.1.14 Route and connect display station attachment cable into opposite end of quick disconnect connector W2-B1.
- 10.1.15 Visually verify that all display station power and signal connections are correct.
- 10.1.16 Slide file drawer back in place, turn system power on and subsequently depress display power on switch. Display Power on switch should back light and stay on when released.
- 10.1.17 Replace back of I/O panel unless other attachment access is required. (See Chapter IX).
- 10.1.18 Select the configuration program "FED" and enter information for CRT display station.
- 10.1.19 Select and run CRT diagnostic (901) to check for correct operation of CRT display station.
- 10.1.20 Improper operation of the CRT display station and or attachment should be referred to the CRT attachment MAP charts P/N 5129829.
- 10.1.21 Display station adjustments (size, centering, etc.) should be referred directly to the 2265-Mod II display station documentation and fault flowcharts FE "off-line" adjustment card is located inside the CRT Unit.

- 11.1.1 Turn off all system power.
- 11.1.2 Unpack the Data Recorder.
- 11.1.3 Connect power cable of Data Recorder to customer's outlet.
- 11.1.4 Check unit off line operation before proceeding to ON LINE check-out. Refer to Data Recorder documentation and MAPS for added information.
- 11.1.5 Connect signal cable (P/N 2595830) to CPU connector P/N 5362304 (location W5) and unit connector, P/N 5362304 (location C-C1 for 5496; location W1 for 129). Connect ground straps at both ends of the attachment cable.
- 11.1.6 Switch settings for 5496 ON LINE operation.

MCDE

- A) Data Recorder on line switch -ON-
- B) Auto Rec Rel Switch -ON-
- C) Print Switch -OPTIONAL-
- D) All other DA-REC Switches -OFF-

- 11.1.7 Switch settings for 129 ON-LINE operation.

MODE

- A) Data Recorder ON-LINE Switch (5406) ON
- B) Verify/Punch Switch (129) PUNCH
- C) Record Advance Switch (129) ON
- D) Program Mode Dial (129) DATA READ
- E) PRINT SWITCH (129) OPTIONAL
- F) OTHER 129 switches NO MEANING

- 11.1.8 Select and run Data Recorder ON Line Diagnostics to check for correct operation of Data Recorder. Refer to Data Recorder Attachment documentation and MAPS for added information. (5496, F81; 129 F91 & F92)
- 11.1.9 If 5496 and 129 are both to be connected to the system (not simultaneously), then the UDT entries will include both F8 (for 5496) and F9 (for 129). When running system test, the module for the unit that is not connected must be aborted.

P/N 5133687						
E/C 572030	572045	572076	572090	572099	572130	
Date 4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	1JUN71	
E/C 572070	572150	572155	572160	571611	571627	
Date 18JUN71	16AUG71	7OCT71	15NOV71	7APR72	02JUN72	

P/N 5133687					
E/C 572030	572045	572076	572090	572099	572130
DATE 4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	6/1/71
E/C 572070	572150	572155	572160	571611	571627
DATE 18JUN71	16AUG71	7OCT71	15NOV71	7APR72	02JUN72

CHAPTER XII

BSCA INSTALLATION

- ( ) 12.1.2 Turn off all system power
- ( ) 12.1.2 Install external cables. Refer to Dwg. 5133727. (Depending on BSCA type (Med or Hi Speed), cable P/N will be 5133611, or 5133612. Auto-call feature requires additional cable P/N 5133613).
- ( ) 12.1.3 Ensure all "B" Gate cards and cables are seated firmly, including pin side voltage mini-busses.
- ( ) 12.1.4 Turn system power on.
- ( ) 12.1.5 Turn disk drive power on.
- ( ) 12.1.6 Confirm BSCA Feature configuration matches order card. If not, reconfigure.  
  
(NOTE: Any mistake in this area and diagnostics will not run).
- ( ) 12.1.7 Refer to Diagnostic Users Guide, run BSCA diagnostics. (NOTE: If internal clock feature is installed, modem need not be connected to run diagnostics).
- ( ) 12.1.8 Depress lamp test and verify that all BSCA indicators light.
- ( ) 12.1.9 Run on line test to customer communication point, or if possible to Raleigh FE Test Center.

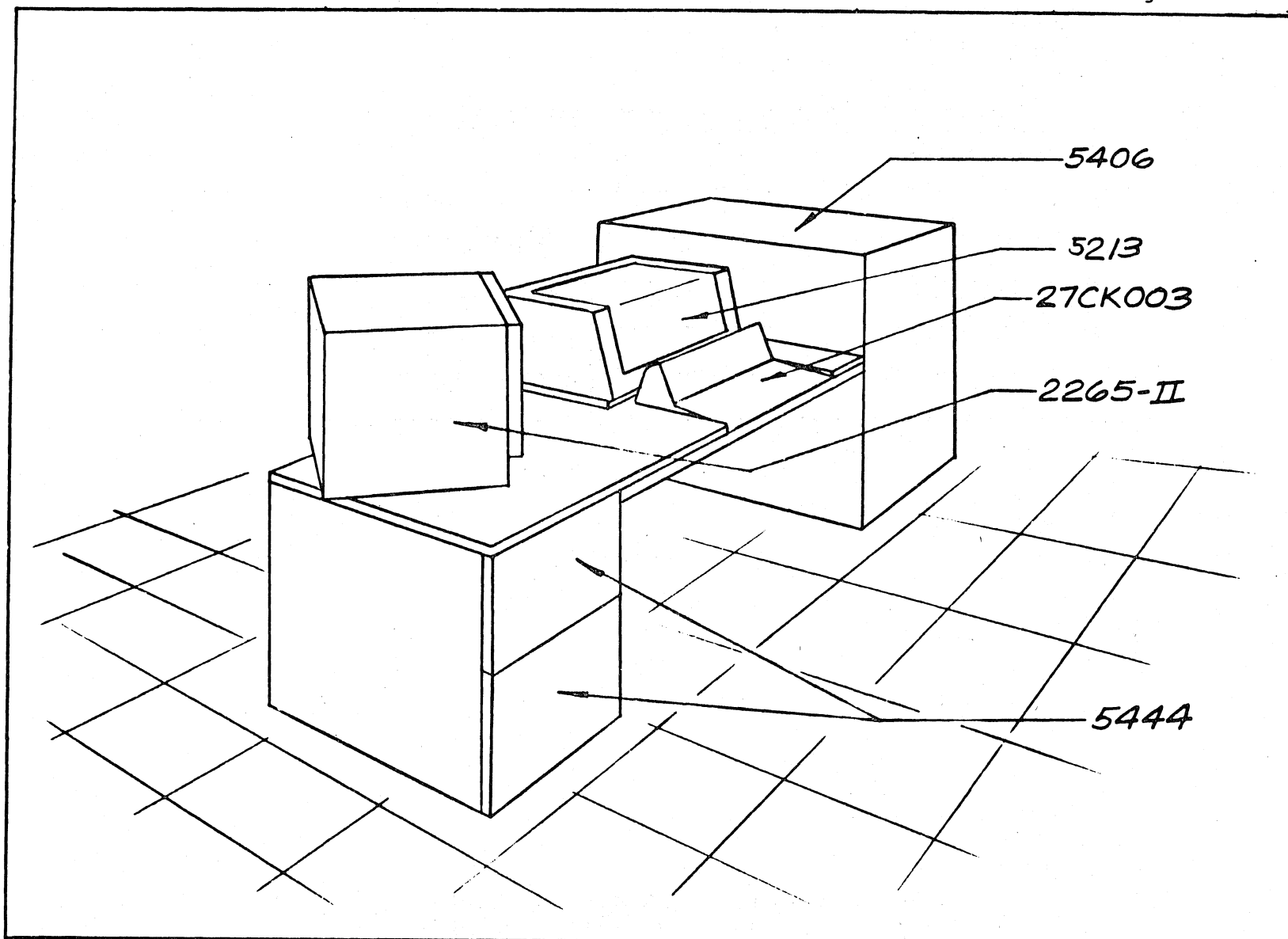
CHAPTER XIII

SIOC INSTALLATION

- ( ) 13.1.1 Turn off all system power.
- ( ) 13.1.2 Ensure all "B" Gate cards and cables are seated firmly, including pin side, voltage mini-bus.
- ( ) 13.1.3 Turn on system power.
- ( ) 13.1.4 Confirm SIOC feature configuration. If not reconfigure. Refer to Users Guide.
- ( ) 13.1.5 Run I/O Attachment Diagnostics (300 series). Follow print-out.
- ( ) 13.1.6 Refer to cable routing drawing P/N 5133727 for cable installation.
- ( ) 13.1.7 Refer to 1255 MICR Installation Manual to install and check out the 1255. This is located in volume 3 of the 1255 binder.
- ( ) 13.1.8 Refer to Users Guide and run 1255 on line function test 350.

571611	571627					
7APR72	02JUN72					
572090	572099	572130	572070	572150	572155	572160
9/15/70	2/11/71	1JUN71	18JUN71	16AUG71	7OCT71	15NOV71

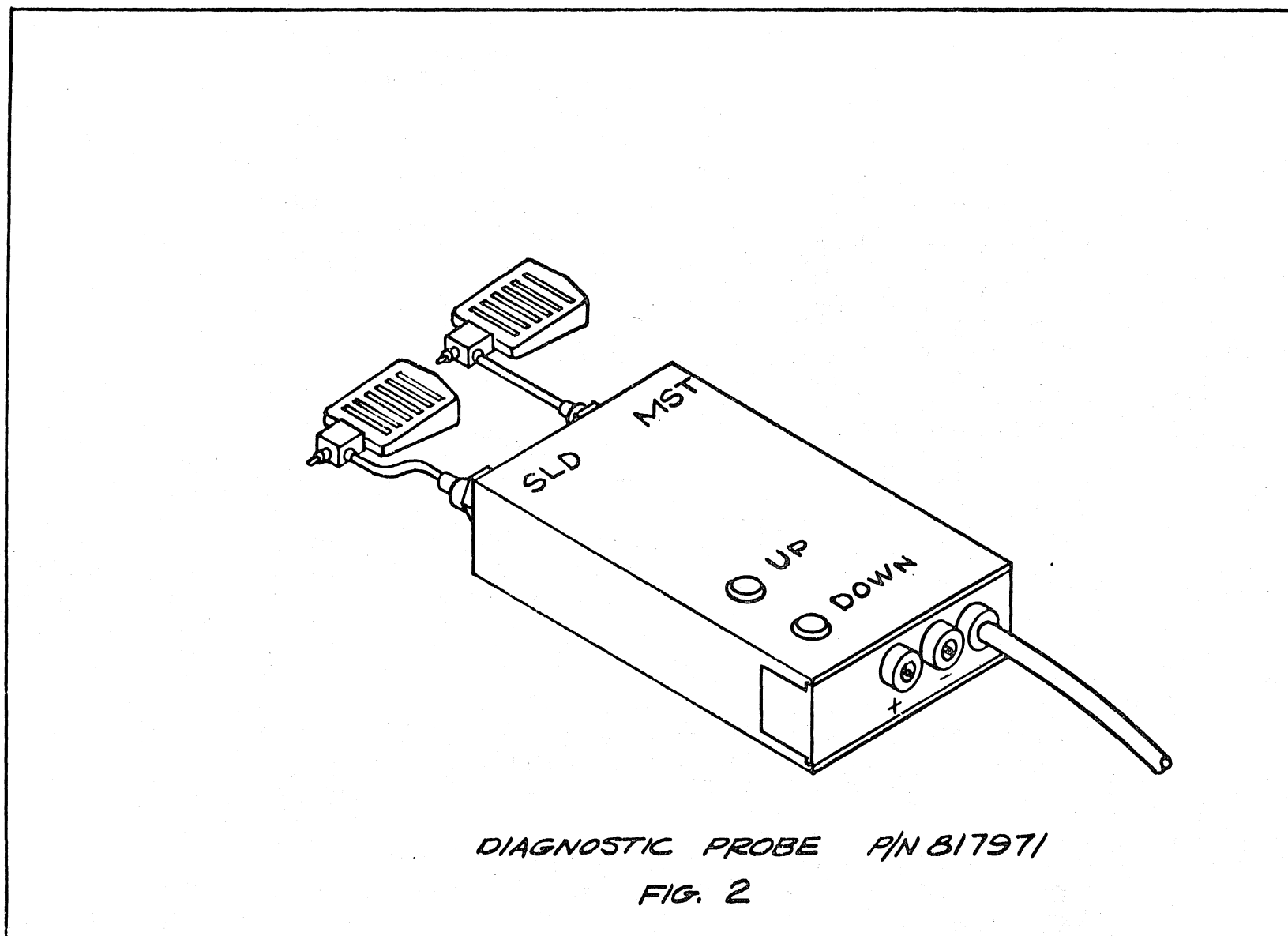
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9/15/70	2/11/71	1JUN71	18JUN71	16AUG71	7OCT71	15NOV71
571611	571627					
7APR72	02JUN72					



CHAPTER XIV

SYSTEM 3/MOD 6  
FIG. 1

P/N 5133687	572150	572155	572160	571611	571627
E/C 572030 !	17AUG71	7OCT71	15NOV71	7APR72	02JUN72
Date 4/16/70					



DIAGNOSTIC PROBE P/N 817971  
FIG. 2

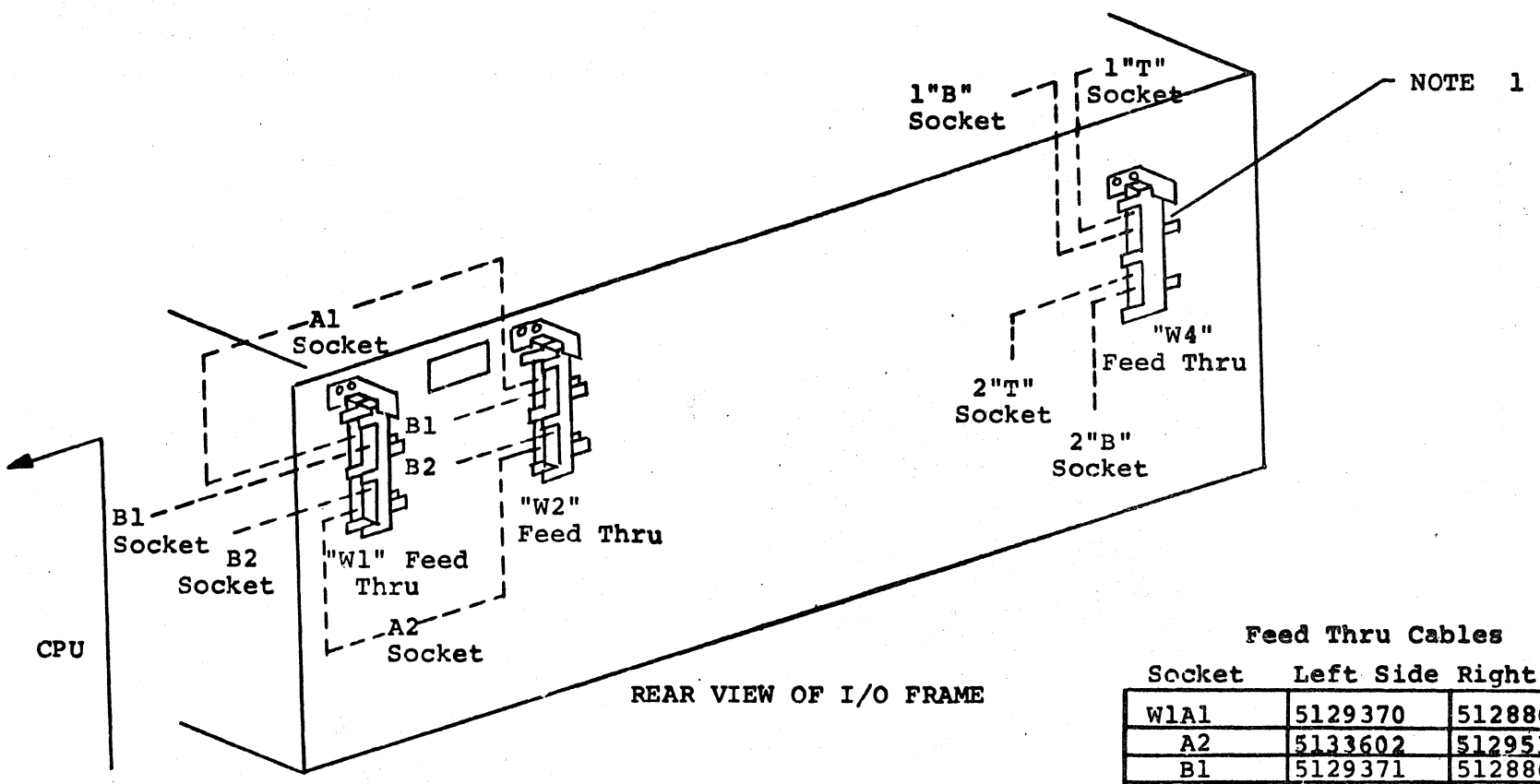
IBM	LOCATOR DECAL
Please Print Locations	SYSTEM TYPE
INSTALLATION MANUAL	IR/PAIR PACKETS
LOGICS	SYSTEM LOG
REFERENCE MANUAL	METER LOG
TEST CARDS/TAPE	PROGRAMMING SYSTEMS ACTIVITY LOG
PARTS AND SUPPLIES	E.C. RECORDS
SCOPE/SPECIAL TOOLS	

120-1803-0

Figure 3

P/N 5133687									
E/C 572030	572045	572076	572090	572099	572130	572150	572155	572160	
Date 4/16/70	7/8/70	7/31/70	9/15/70	2/11/71	1JUN71	17AUG71	7OCT71	15NOV71	
571611	571627								
7APR72	02JUN72								

SHEET NO. OF  
 JOB NO.  
 SUBJECT  
 DATE  
 CHKD. BY



NOTES:  
 1 FEED THRU CONNECTOR ADJACENT I/O FRAME IS USED FOR FILE NO. 1 SIGNAL CABLES. OUTSIDE CONNECTOR (NOT SHOWN) IS USED FOR FILE NO. 2.

Feed Thru Cables		
Socket	Left Side	Right Side
W1A1	5129370	5128865
A2	5133602	5129513
B1	5129371	5128866
B2	5129285	5128867
W2B1	5129514	2583428
B2	5129092	5129369
W4-1"T"		5802226
W4-1"B"	5802894	5802229
W4-2"T"		
W4-2"B"	5802894	5802229
W2A1	5129716	PTR
W2A2	5129716	PTR

571611	571627								
7APR72	02JUN72								
572045	572076	572090	572099	572130	572070	572150	572155	572160	
7/8/70	7/31/70	9/15/70	2/11/71	1JUN71	18JUN71	17AUG71	7OCT71	15NOV71	

Fig. 4

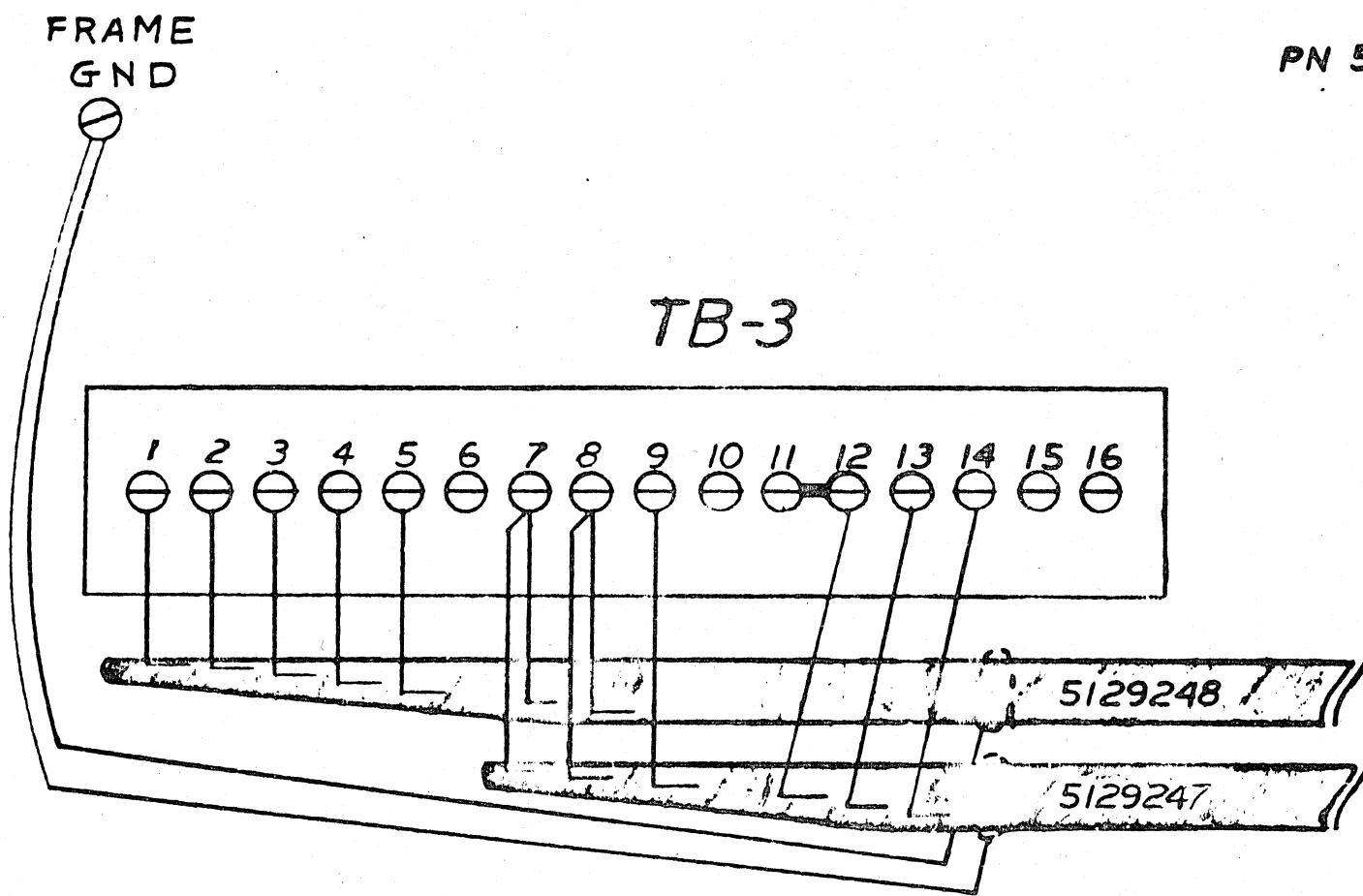


FIG 5

572099 ✓11/71	572130 1JUN71	572070 18JUN71	572150 17AUG71	572155 8 OCT 71	572160 15NOV71	571611 7APR72	571627 02JUN72
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PN 5133687  
PAGE 15A

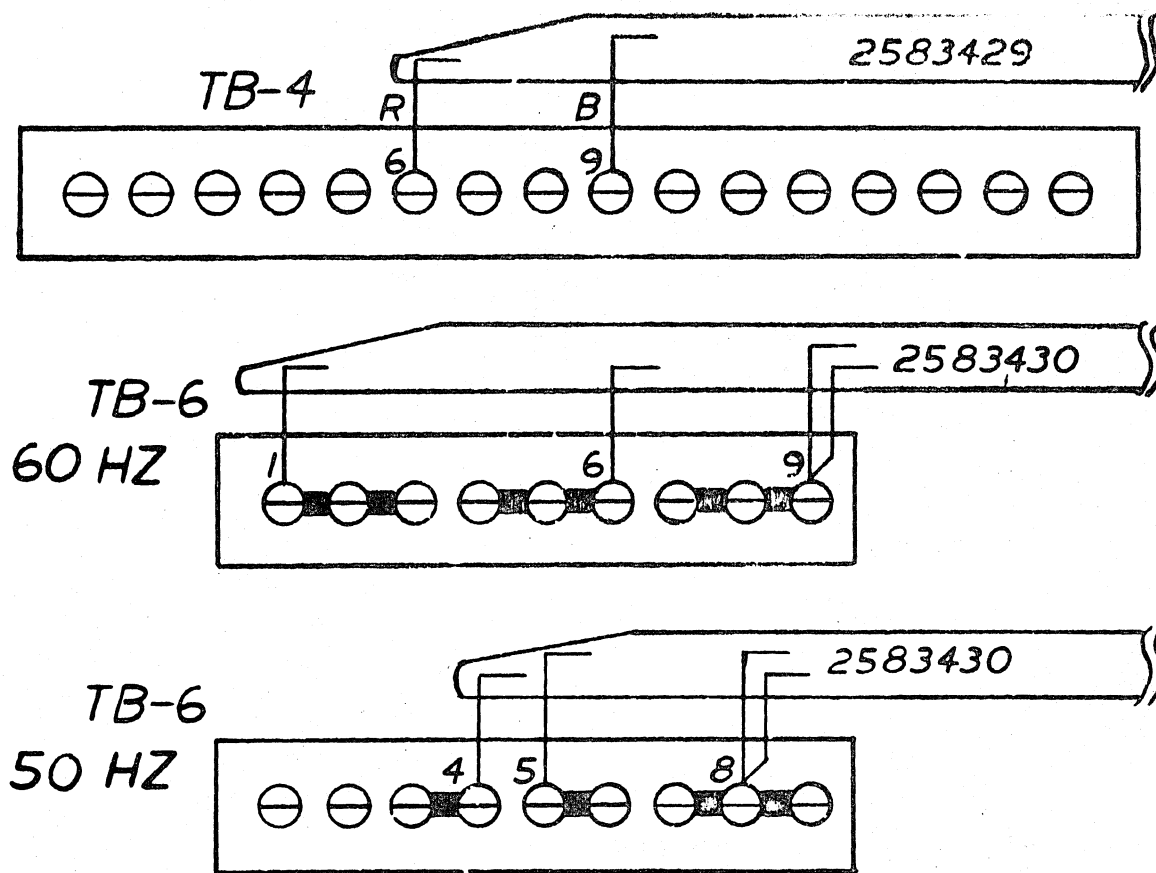
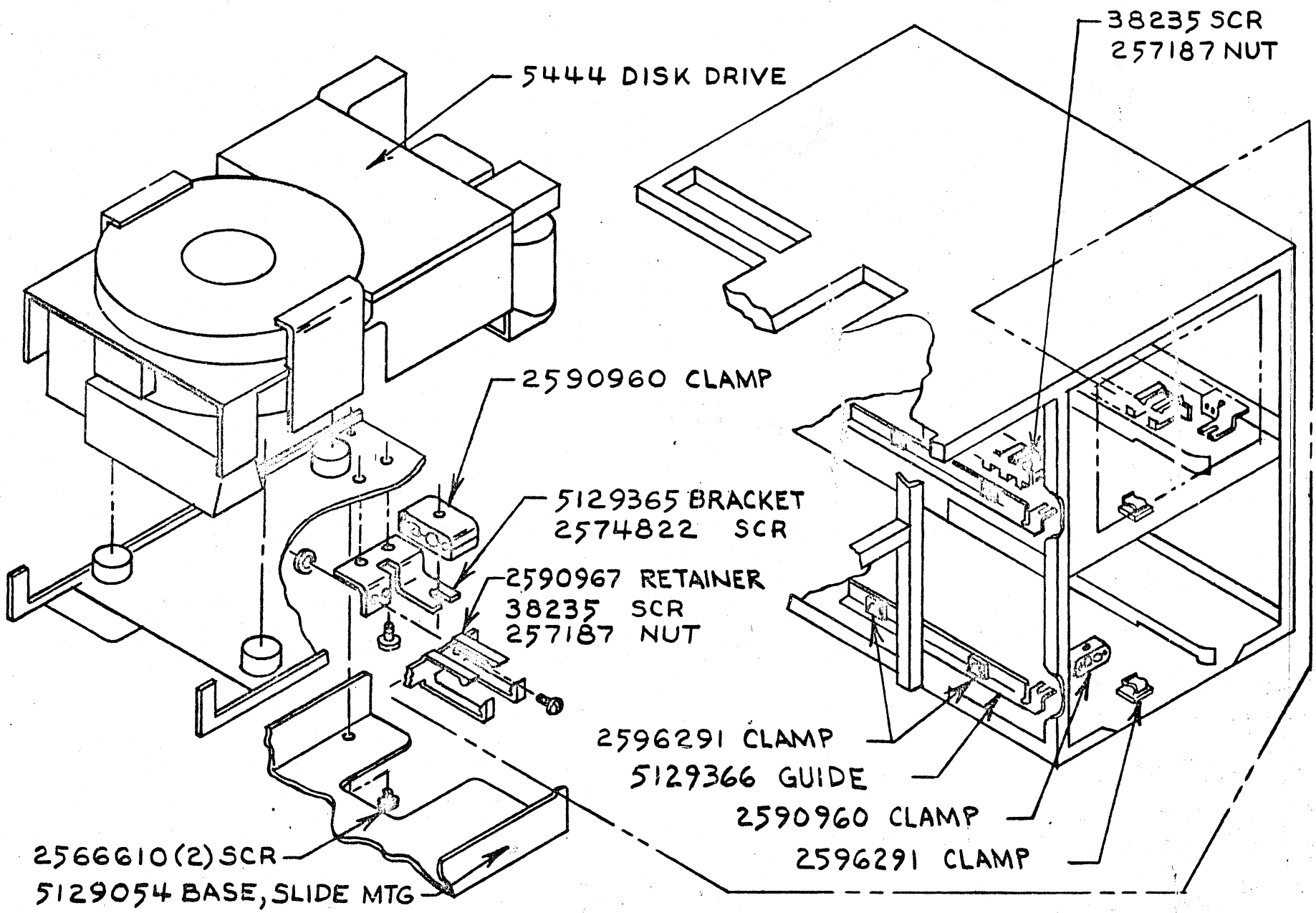
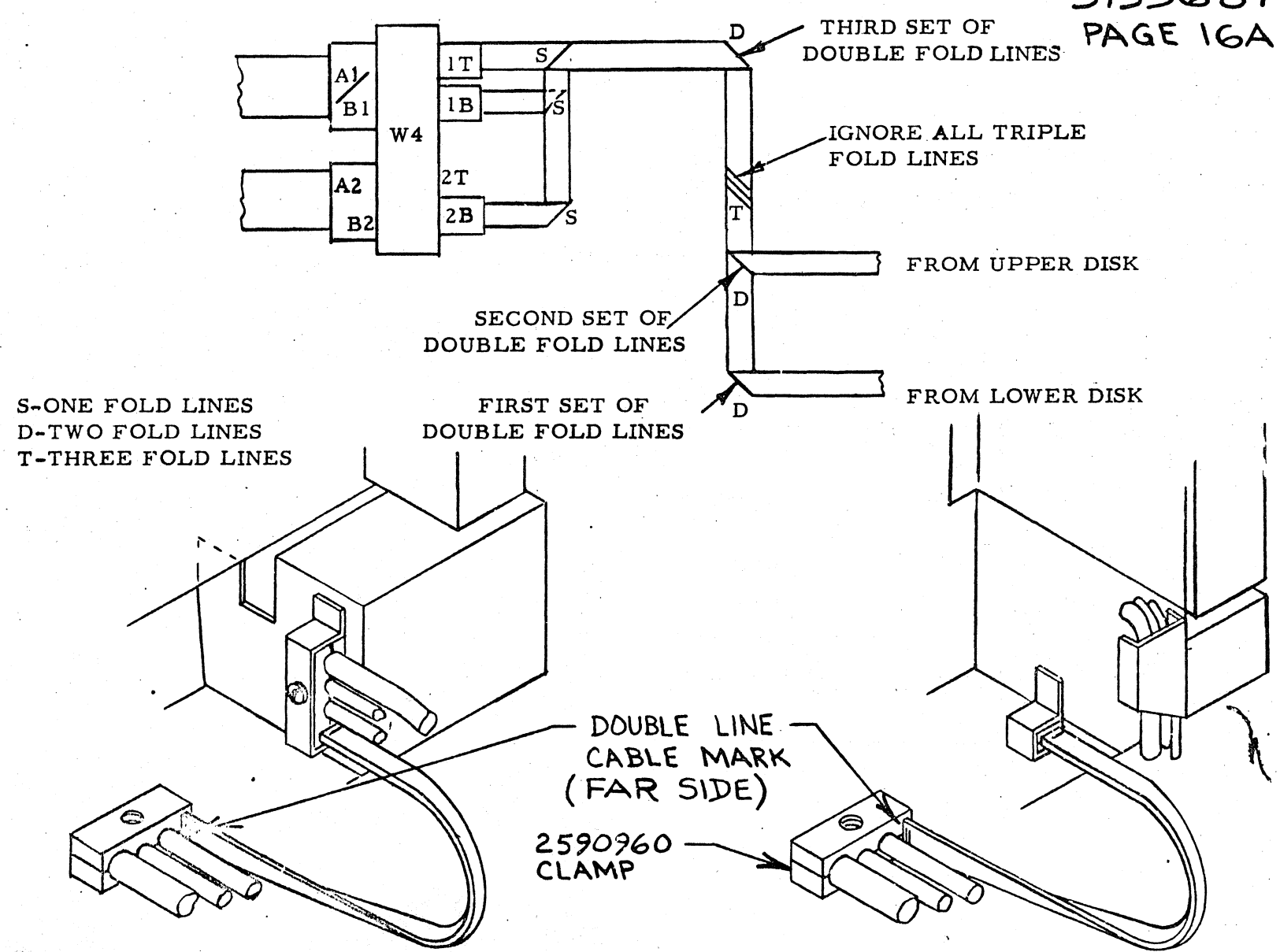


FIG 6

572150 8/17/71	572070 6/18/71	572130 6/1/71	572099 2/11/71	572090 9/15/70	572076 7/31/70	572045 8 JUL 70	572155 7OCT71	571611 7APR72	571627 02JUN72
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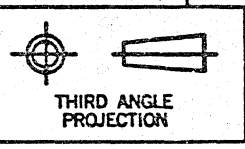
E.C. 572099    572130 1JUN71    572070 18JUN71    572150 17 AUG71    FIG 7    572155 7OCT71    572160 15NOV71    571611 7APR72    571627 02JUN72



FRICION DRIVE FILE                      STEPPER MOTOR DRIVE FILE  
(FIG. 8)

E.C. 572099    572130 1JUN71    572070 18JUN71    572150 17AUG71    572155 8OCT71    572160 15NOV71    571611 7APR72    571627 02JUN72

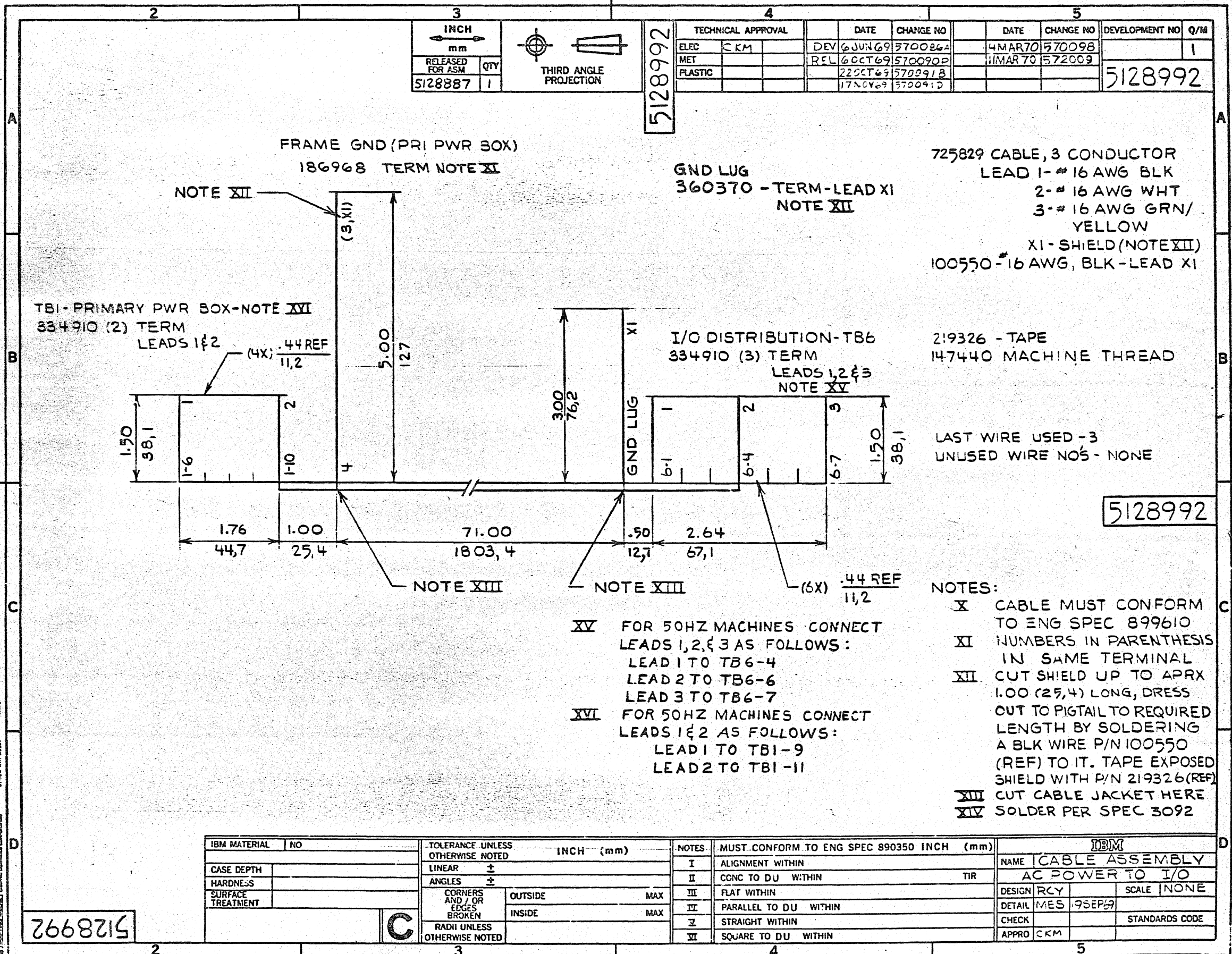
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RELEASED FOR ASM	QTY		
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5128992

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ELEC	CKM	DEV	6 JUN 69	570086	4 MAR 70	570098	1
MET		REL	6 OCT 69	570090	11 MAR 70	572009	
PLASTIC			22 OCT 69	570091 B			
			17 NOV 69	570091 D			

5128992



IBM MATERIAL	NO	TOLERANCE UNLESS OTHERWISE NOTED	INCH (mm)	NOTES	MUST CONFORM TO ENG SPEC 890350 INCH (mm)	IBM	
CASE DEPTH		LINEAR	±	I	ALIGNMENT WITHIN	NAME	CABLE ASSEMBLY
HARDNESS		ANGLES	±	II	CONC TO DU WITHIN	TIR	AC POWER TO I/O
SURFACE TREATMENT		CORNERS AND / OR EDGES BROKEN		III	FLAT WITHIN	DESIGN	RCY
		RADI UNLESS OTHERWISE NOTED		IV	PARALLEL TO DU WITHIN	DETAIL	MES 7SEP69
				V	STRAIGHT WITHIN	CHECK	
				VI	SQUARE TO DU WITHIN	APPRO	CKM
						SCALE	NONE
						CHECKED	
						STANDARDS CODE	

5128992

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5129308

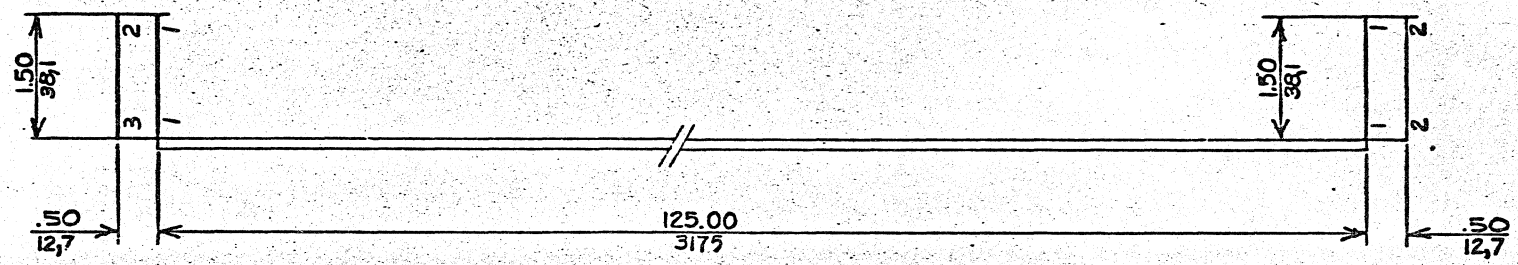
INCH m/m		THIRD ANGLE PROJECTION	TECHNICAL APPROVAL		8		9		
RELEASED FOR ASM	QTY		ELEC		DATE	CHANGE NO	DATE	CHANGE NO	DEVELOPMENT NO
5129145	1			7SEP65	570087A				
				18FEB70	570092E				
				7OCT70	572088				
				17FEB71	572110				
								5129308	

4110148-2 CONDUCTOR CABLE  
NOT SHIELDED  
LEAD 1 - #16 AWG, BLK  
2 - #16 AWG, WHT

#47440 - MACHINE THREAD  
  
LAST WIRE USED - 2  
UNUSED WIRE NOS - NONE

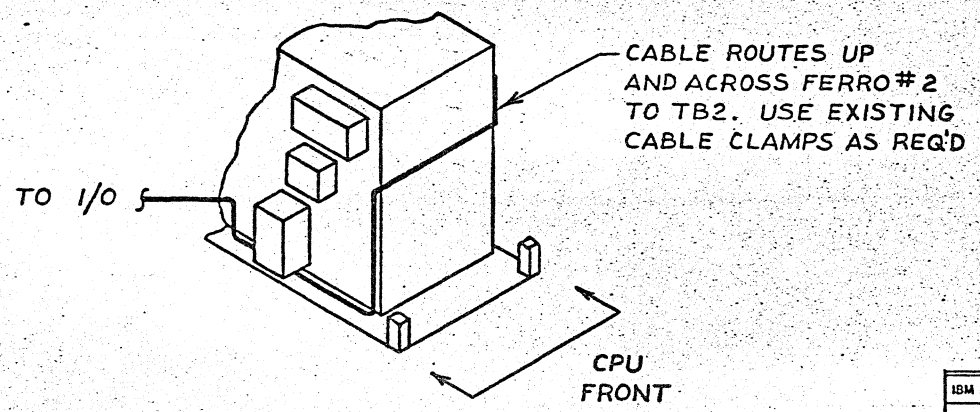
NOTE:  
XI MUST CONFORM TO ENG SPEC 899610

5129308



FERRO #2-TB2  
334910 (2) TERM-LEADS 1 & 2

I/O DISTRIB-TB6  
334910 (2) TERM-LEADS 1 & 2



DETAIL A  
CABLE ROUTING

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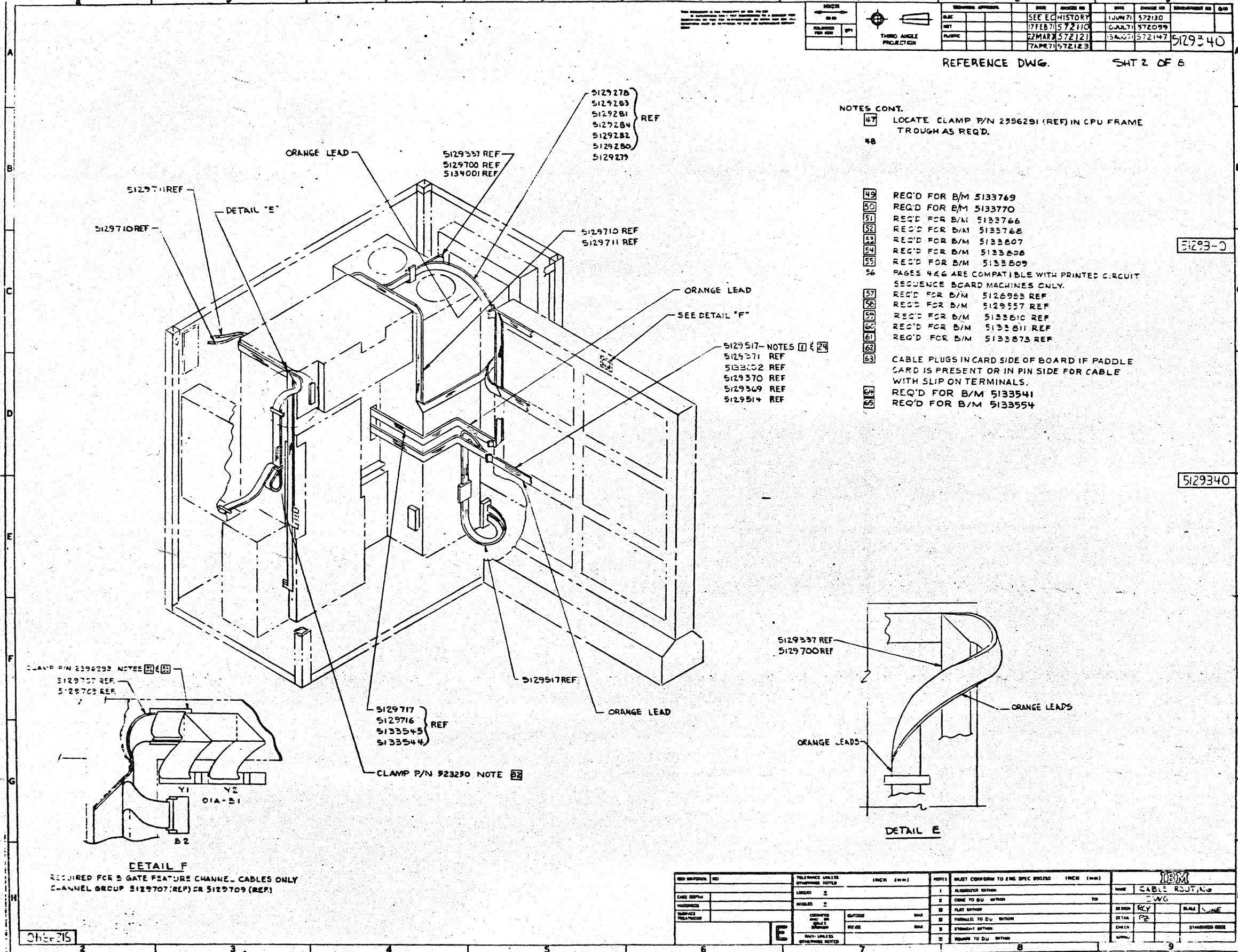
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CASE DEPTH	LINEAR	±	I	ALIGNMENT WITHIN		NAME	CABLE ASM-FERRO#2,TB-6.
HARDNESS	ANGLES	±	II	CONIC TO DU WITHIN	TIR	AC DIST. TO FILE FANS - 50HZ	
SURFACE TREATMENT	CORNERS AND/OR EDGES BROKEN	OUTSIDE	III	FLAT WITHIN		DESIGN	SCALE 1/1
		INSIDE	IV	PARALLEL TO DU WITHIN		DETAIL	MES
	RADI UNLESS OTHERWISE NOTED		V	STRAIGHT WITHIN		CHECK	STANDARDS CODE
			VI	SQUARE TO DU WITHIN		APPRO	

5129308



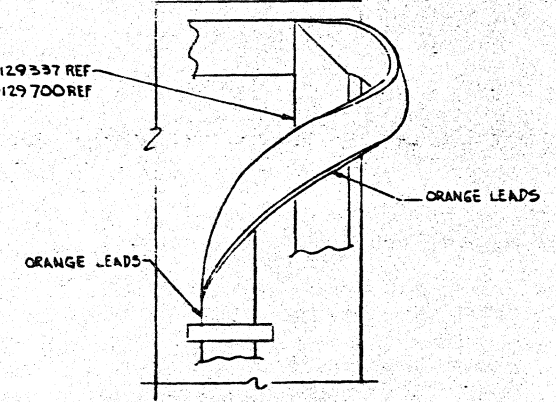
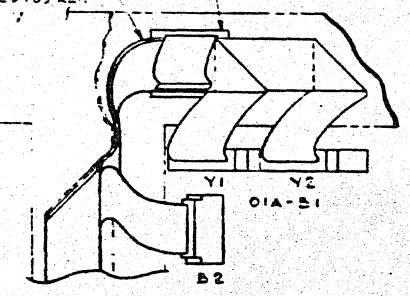
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SEE ECHISTORY	1 JUN 71	572130				
17 FEB 71	572110	572099				
22 MAR 71	572121	572147				
7 APR 71	572123					

REFERENCE DWG. SHT 2 OF 6



NOTES CONT.  
 47 LOCATE CLAMP P/N 2596291 (REF) IN CPU FRAME TROUGH AS REQ'D.  
 48

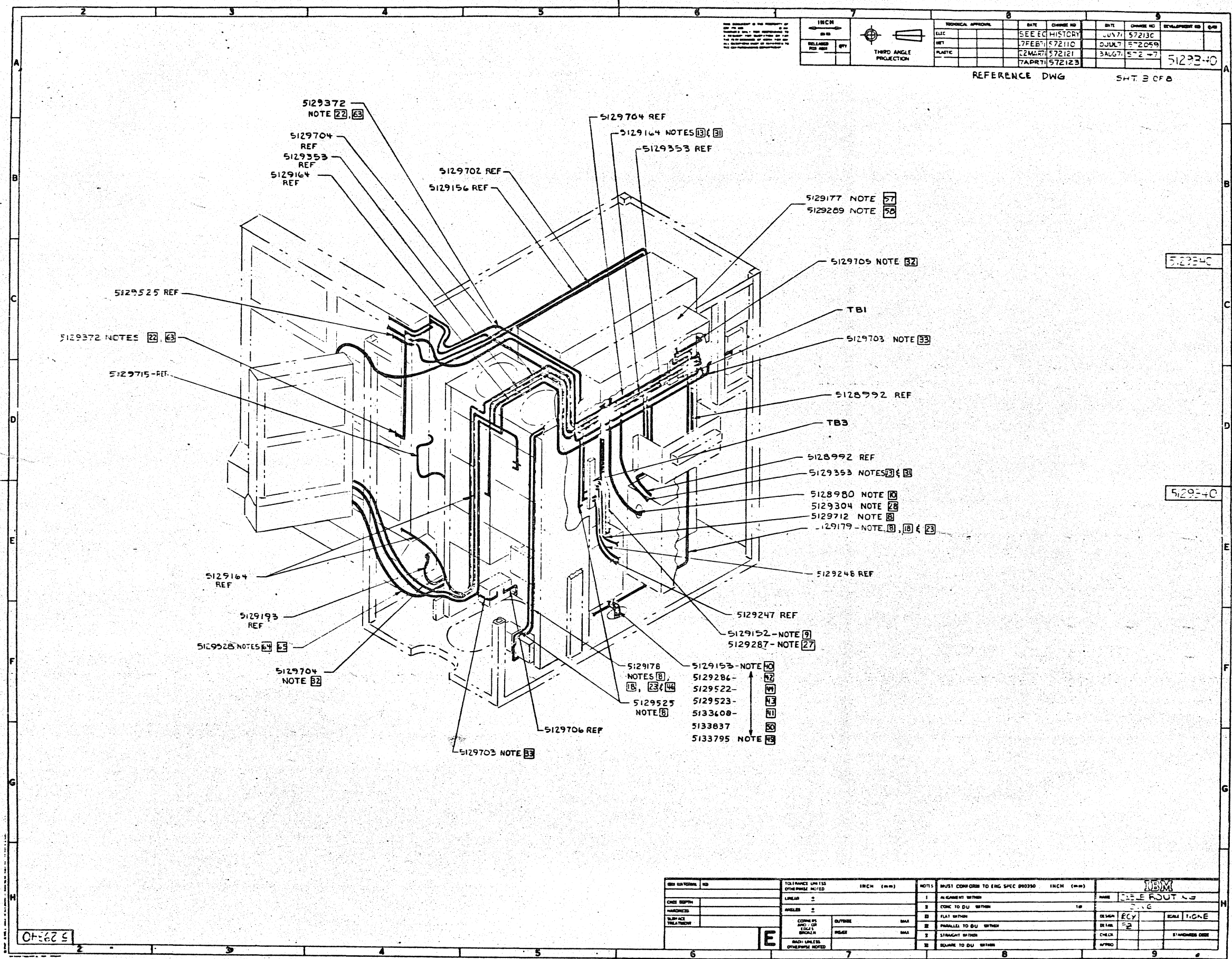
- 49 REQ'D FOR B/M 5133769
- 50 REQ'D FOR B/M 5133770
- 51 REQ'D FOR B/M 5133766
- 52 REQ'D FOR B/M 5133768
- 53 REQ'D FOR B/M 5133807
- 54 REQ'D FOR B/M 5133808
- 55 REQ'D FOR B/M 5133809
- 56 PAGES 446 ARE COMPATIBLE WITH PRINTED CIRCUIT SEQUENCE BOARD MACHINES ONLY.
- 57 REQ'D FOR B/M 5126953 REF
- 58 REQ'D FOR B/M 5129557 REF
- 59 REQ'D FOR B/M 5133810 REF
- 60 REQ'D FOR B/M 5133811 REF
- 61 REQ'D FOR B/M 5133873 REF
- 62
- 63 CABLE PLUGS IN CARD SIDE OF BOARD IF PADDLE CARD IS PRESENT OR IN PIN SIDE FOR CABLE WITH SLIP ON TERMINALS.
- 64 REQ'D FOR B/M 5133541
- 65 REQ'D FOR B/M 5133554



REVISED BY	DATE	REVISION	DATE	REVISION	DATE	REVISION
1						
2						
3						
4						
5						
6						
7						
8						
9						

51293-0  
 5129340

08-215



INCH	DATE	CHANGE NO.	DATE	CHANGE NO.	REVISION NO.	QTY
SEE EC HISTORY	JULY 71	57213C				
7 FEB 71	57211C		JULY 71	572059		
22 MAR 71	572121		AUG 71	57207		
7 APR 71	572123				5129340	

REFERENCE DWG SHT 3 OF 8

5129372 NOTE 22, 23

5129704 REF

5129353 REF

5129164 REF

5129702 REF

5129156 REF

5129704 REF

5129164 NOTES 13, 14

5129353 REF

5129177 NOTE 57

5129269 NOTE 58

5129525 REF

5129372 NOTES 22, 23

5129715-REF

5129705 NOTE 52

TB1

5129703 NOTE 33

5128992 REF

TB3

5128992 REF

5129353 NOTES 23, 24

5128980 NOTE 10

5129304 NOTE 28

5129712 NOTE 8

5129179-NOTE 18, 18 & 23

5129164 REF

5129193 REF

5129246 REF

5129287 REF

5129152-NOTE 9

5129287-NOTE 27

5129178 NOTES 18, 18, 23, 14

5129153-NOTE 10

5129284-NOTE 17

5129522-NOTE 14

5129523-NOTE 14

5133600-NOTE 14

5133837-NOTE 14

5133795-NOTE 14

5129164 REF

5129193 REF

5129287 NOTES 24, 25

5129704 NOTE 22

5129706 REF

5129703 NOTE 33

5129340

5129340

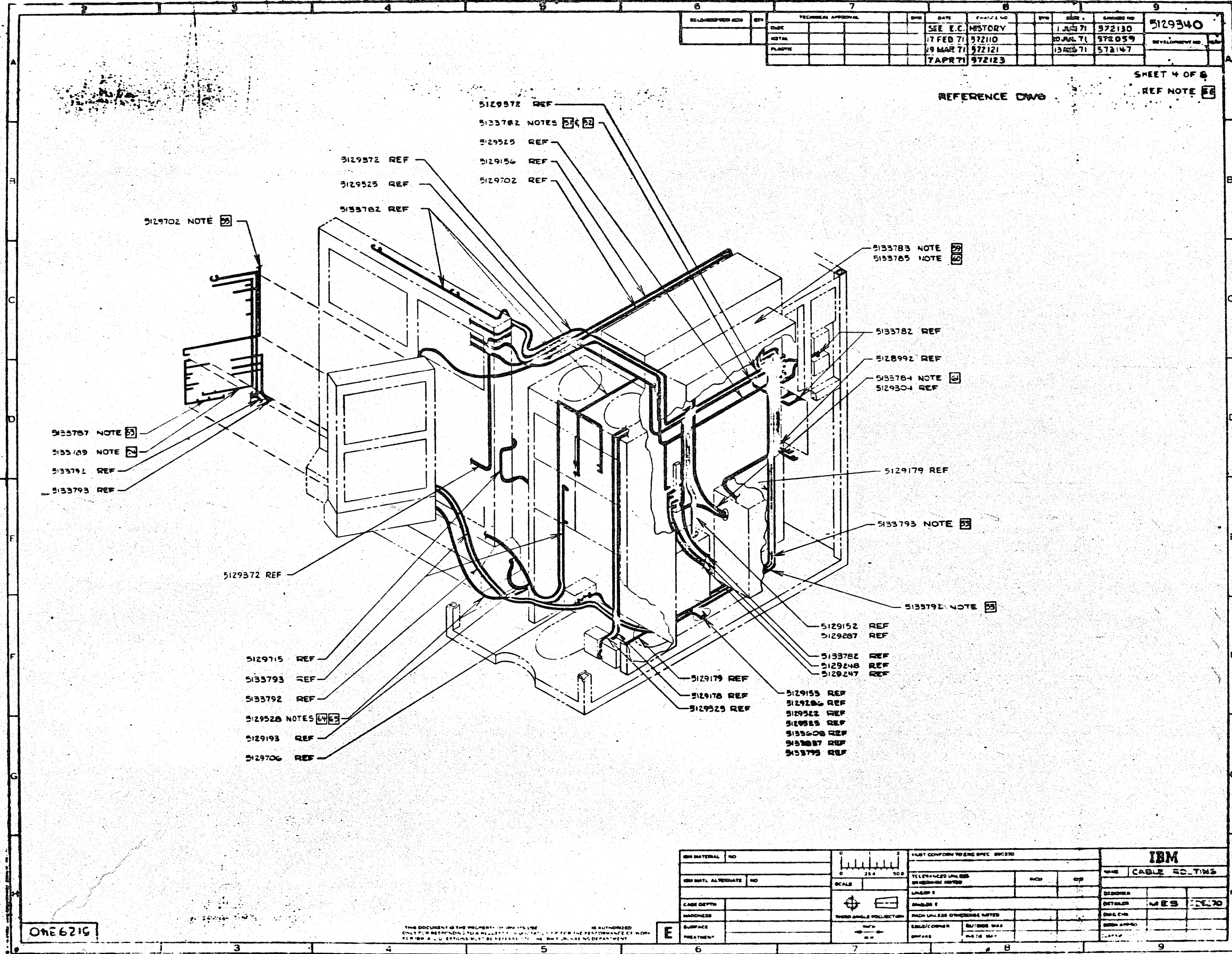
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APPROVED		ANGULAR		2	EDGE TO DU WITHIN	1/8"	SCALE
				3	FLAT WITHIN		DESIGN
				4	PARALLEL TO DU WITHIN		DRAW
				5	PERPENDICULAR TO DU WITHIN		CHECK
				6	SQUARE TO DU WITHIN		APPROV

07-625

6	7	8	9
RELEASED BY	TECHNICAL APPROVAL	DATE	CHANGE NO.
DATE	SEE E.C. HISTORY	1 JUL 71	972130
DATE	17 FEB 71	972110	972059
DATE	19 MAR 71	972121	572147
DATE	7 APR 71	972123	
			5129340

SHEET 4 OF 8

REFERENCE DWG REF NOTE 5



- 5129572 REF
- 5123782 NOTES 21, 22
- 5129525 REF
- 5129572 REF
- 5129156 REF
- 5129525 REF
- 5129702 REF
- 5129702 NOTE 25
- 5133782 REF
- 5133783 NOTE 53
- 5133785 NOTE 53
- 5133782 REF
- 5128992 REF
- 5133784 NOTE 24
- 5129304 REF
- 5129179 REF
- 5133793 NOTE 25
- 5133792 NOTE 25
- 5129152 REF
- 5129287 REF
- 5133782 REF
- 5129248 REF
- 5129247 REF
- 5129179 REF
- 5129178 REF
- 5129525 REF
- 5129155 REF
- 5129206 REF
- 5129522 REF
- 5129515 REF
- 5133608 REF
- 5133657 REF
- 5133793 REF
- 5129115 REF
- 5133793 REF
- 5133792 REF
- 5129528 NOTES 64, 65
- 5129193 REF
- 5129706 REF
- 5129372 REF
- 5133787 NOTE 25
- 5133789 NOTE 24
- 5133792 REF
- 5133793 REF

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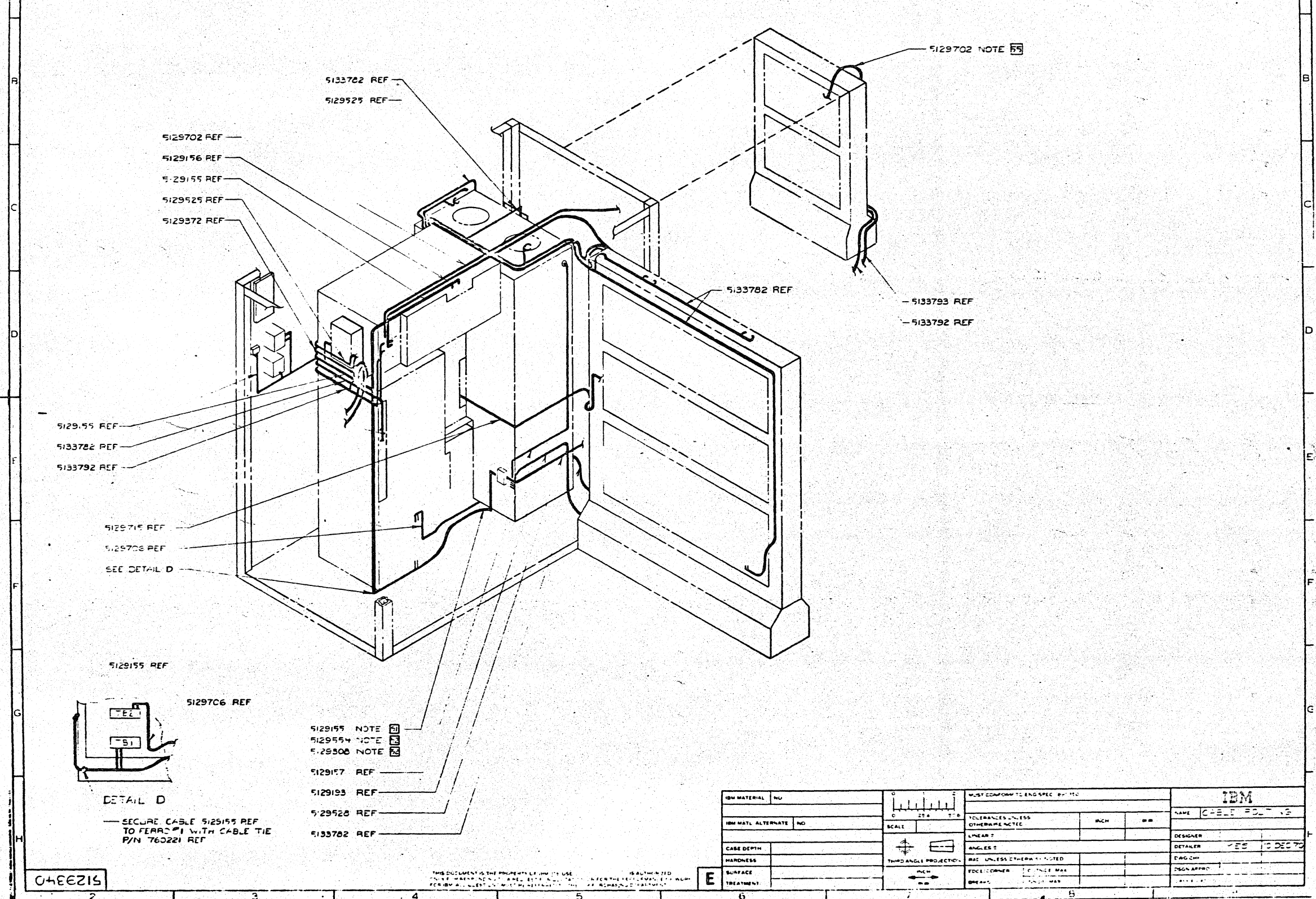
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CASE DEPTH	3:4	UNLESS OTHERWISE NOTED	DESIGNER
HARDNESS	THIRD ANGLE PROJECTION	UNLESS OTHERWISE NOTED	DETAILER
SURFACE TREATMENT	ISO/COMER	UNLESS OTHERWISE NOTED	DATE
	DATE	UNLESS OTHERWISE NOTED	DESIGNED BY
		UNLESS OTHERWISE NOTED	DATE



RELEASED FOR ASM		TECHNICAL APPROVAL		DATE		CHANGE NO		DATE		CHANGE NO	
ELEC				10 DEC 70	57207B			1 JUN 71	572130	5129340	
METAL				17 FEB 71	572110			12 JUL 71	572059	DEVELOPMENT NO. / QTY	
PLASTIC				22 MAR 71	572121			13 AUG 71	572147		
				7 APR 71	572123						

REFERENCE DRAWING

SHEET 6 OF 8.  
REF NOTE 58



04EEZ15

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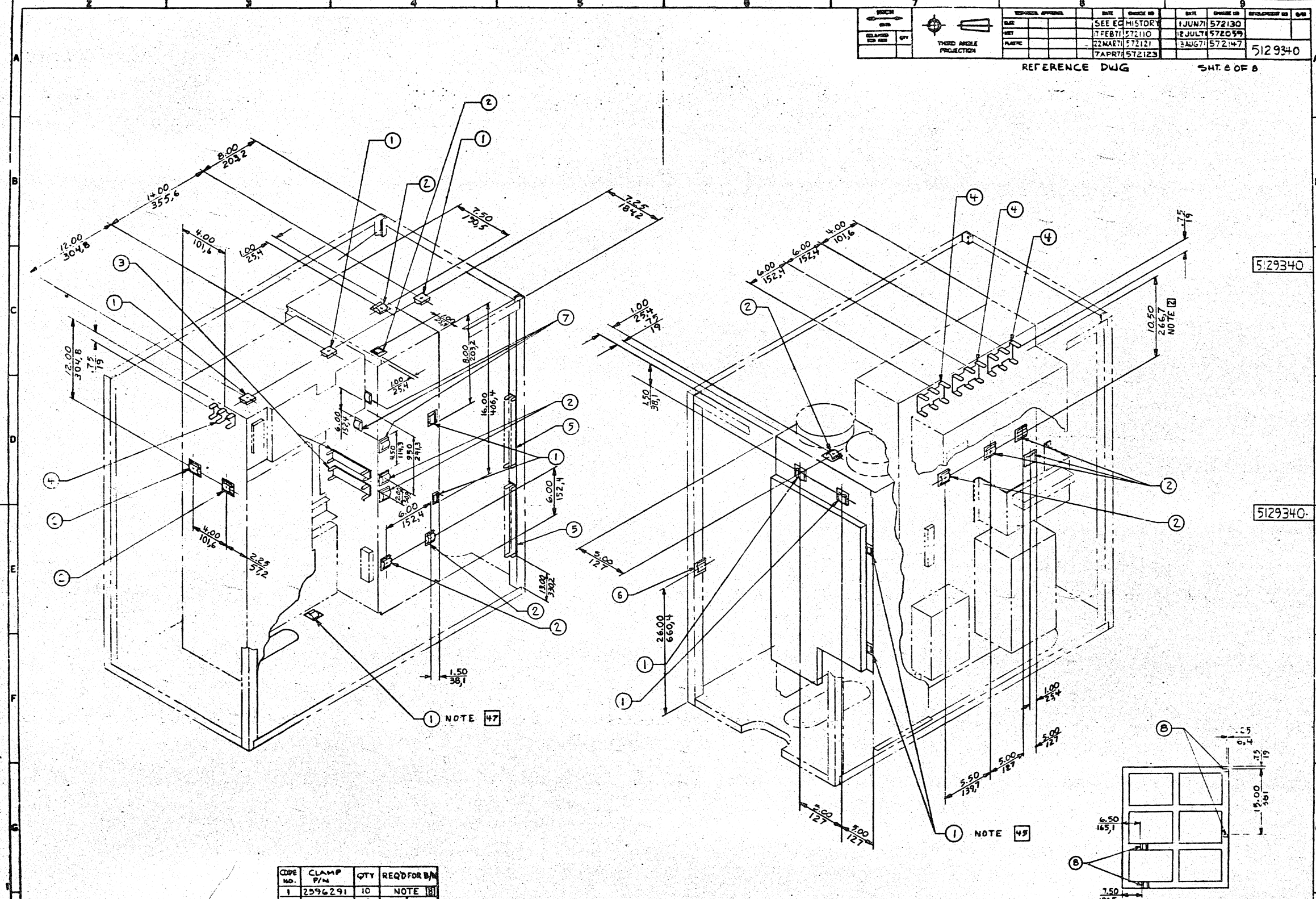
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CASE DEPTH				LINEAR ±	DESIGNER
HARDNESS				ANGLES ±	DETAILER YES 10 DEC 70
SURFACE				RAC UNLESS OTHERWISE NOTED	DWG CHG
TREATMENT				EDGE CORNER RADIUS MAX	DESIGN APPROV
				BREAKS	





REVISION	DATE	BY	CHKD BY	APP'D BY	QTY
1	1 JUN 71	572130			
2	7 FEB 71	572110			
3	22 MAR 71	572121			
4	7 APR 71	572123			

REFERENCE DWG 5129340 SHT. 2 OF 2

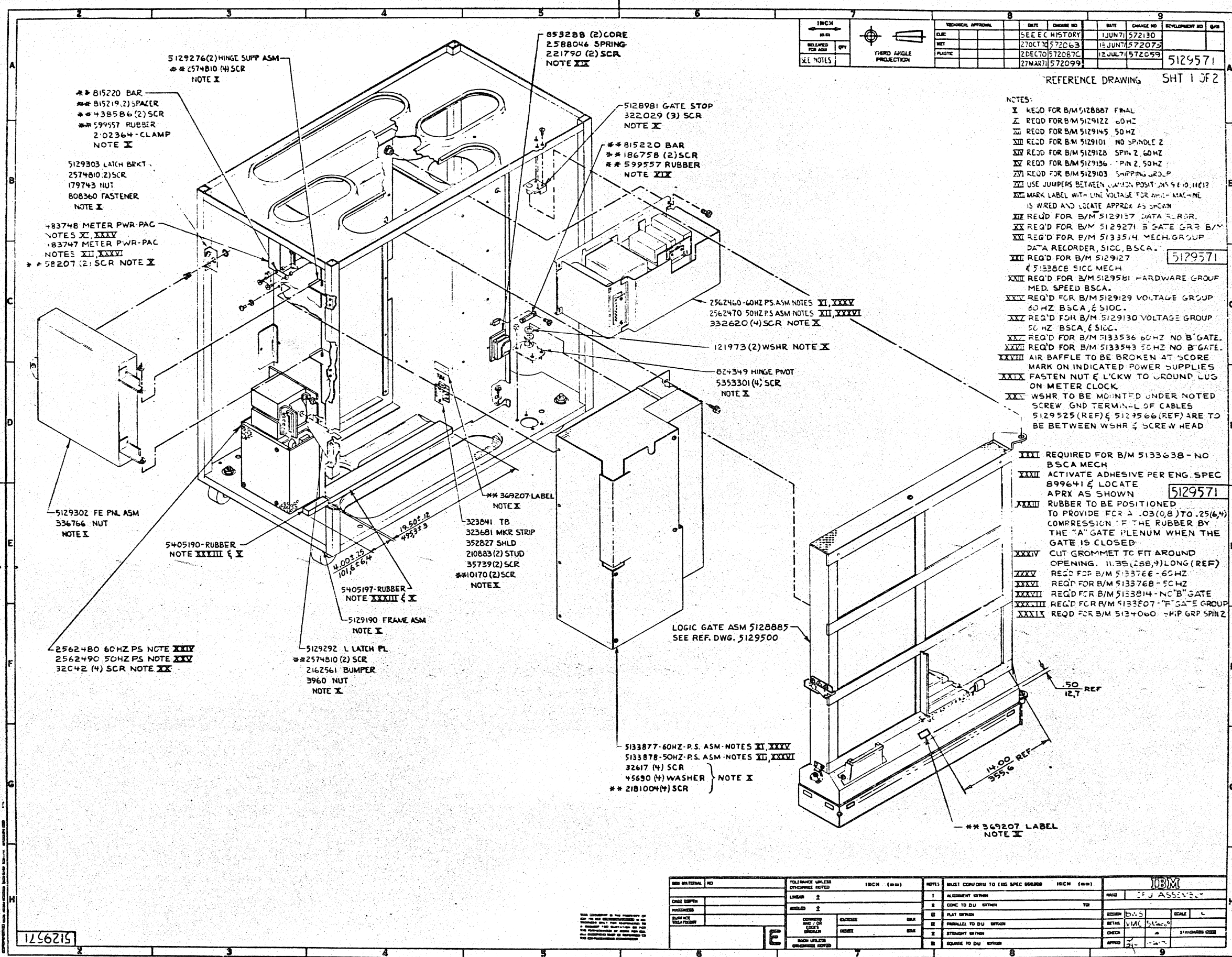


5129340  
5129340

CODE NO.	CLAMP P/N	QTY	REQ'D FOR B/M
1	2596291	10	NOTE 8
2	2596293	13	
3	2590010	2	
4	2242323	4	NOTE 8
5	2590011	2	NOTE 8
6	2596293	1	NOTE 32
7	2596293	3	NOTE 33
8	2596277	4	NOTE 10

ITEM	DESCRIPTION	UNIT	QTY	REMARKS
1	ALIGNMENT BUSH			
2	CORD TO BU WEDGE			
3	FLAT WEDGE			
4	PARALLEL TO BU WEDGE			
5	STRAIGHT WEDGE			
6	SQUARE TO BU WEDGE			

GHE6215



INCH		MILLIMETER		TECHNICAL APPROVAL		DATE		CHANGE NO.		DATE		CHANGE NO.		EMPLOYMENT NO.		GRN	
SEE NOTES						SEE ECH HISTORY	1 JUN 71	572130			15 JUN 71	572075					
						27 OCT 70	572063				2 DEC 70	572070					
						27 MAR 71	572099				12 JUL 71	572099					

REFERENCE DRAWING SHT 1 OF 2

- NOTES:
- I REQD FOR B/M 512887 FINAL
  - II REQD FOR B/M 512912Z 60HZ
  - III REQD FOR B/M 512945 50HZ
  - IV REQD FOR B/M 5129101 NO SPINDLE Z
  - V REQD FOR B/M 5129128 SPIN 2 60HZ
  - VI REQD FOR B/M 5129136 PIN 2 50HZ
  - VII REQD FOR B/M 5129103 SHIPPING GRP-P
  - VIII USE JUMPERS BETWEEN COMMON POSIT. AS 9 & 10, 11 & 12
  - IX MARK LABEL WITH LINE VOLTAGE FOR EACH MACHINE IS WIRED AND LOCATE APPROX AS SHOWN
  - X REQD FOR B/M 5129137 DATA REC'DR.
  - XI REQD FOR B/M 5129271 B GATE GRP B/M
  - XII REQD FOR B/M 5133514 MECH. GROUP DATA RECORDER, SICC, BSCA.
  - XIII REQD FOR B/M 5129127 5133606 SICC MECH
  - XIV REQD FOR B/M 5129581 HARDWARE GROUP MED. SPEED BSCA.
  - XV REQD FOR B/M 5129129 VOLTAGE GROUP 60HZ BSCA & SICC.
  - XVI REQD FOR B/M 5129130 VOLTAGE GROUP 50HZ BSCA & SICC.
  - XVII REQD FOR B/M 5133536 60HZ NO B' GATE.
  - XVIII REQD FOR B/M 5133543 50HZ NO B' GATE.
  - XIX AIR BAFFLE TO BE BROKEN AT SCORE MARK ON INDICATED POWER SUPPLIES
  - XX FASTEN NUT & LOCKW TO GROUND LUG ON METER CLOCK
  - XXI WSHR TO BE MOUNTED UNDER NOTED SCREW GND TERMINAL OF CABLES 5129525 (REF) & 5129566 (REF) ARE TO BE BETWEEN WSHR & SCREW HEAD
  - XXII REQUIRED FOR B/M 5133638 - NO BSCA MECH
  - XXIII ACTIVATE ADHESIVE PER ENG. SPEC 899641 & LOCATE APRX AS SHOWN
  - XXIV RUBBER TO BE POSITIONED TO PROVIDE FOR A .03(.08) TO .25(.64) COMPRESSION OF THE RUBBER BY THE "A" GATE PLENUM WHEN THE GATE IS CLOSED
  - XXV CUT GROMMET TO FIT AROUND OPENING. 11.35(288.9) LONG (REF) REQD FOR B/M 5133766 - 60HZ
  - XXVI REQD FOR B/M 5133768 - 50HZ
  - XXVII REQD FOR B/M 5133814 - NO "B" GATE
  - XXVIII REQD FOR B/M 5133807 - "F" GATE GROUP
  - XXIX REQD FOR B/M 513+060 - HP GRP SPIN 2

5129276(2) HINGE SUPP ASM  
\*\*2574810 (4) SCR  
NOTE X

\*\*815220 BAR  
\*\*815219(2) SPACER  
\*\*438586(2) SCR  
\*\*599557 RUBBER  
2:02364-CLAMP  
NOTE X

5129303 LATCH BRKT.  
2574810(2) SCR  
179743 NUT  
808360 FASTENER  
NOTE X

+83748 METER PWR-PAC  
NOTES XI, XXIV  
+83747 METER PWR-PAC  
NOTES XII, XXV  
\*\*58207 (2) SCR NOTE X

5129302 FE PNL ASM  
336766 NUT  
NOTE X

5405190-RUBBER  
NOTE XXXIII & X

5405197-RUBBER  
NOTE XXXIII & X

5129190 FRAME ASM  
NOTE X

2562480 60HZ PS NOTE XXIV  
2562490 50HZ PS NOTE XXV  
32042 (4) SCR NOTE XX

5129292 L LATCH PL.  
\*\*2574810 (2) SCR  
2162561 BUMPER  
3960 NUT  
NOTE X

653288 (2) CORE  
2588046 SPRING  
221790 (2) SCR  
NOTE XIX

5128981 GATE STOP  
322029 (3) SCR  
NOTE X

\*\*815220 BAR  
\*\*186758 (2) SCR  
\*\*599557 RUBBER  
NOTE XIX

2562460-60HZ PS ASM NOTES XI, XXIV  
2562470 50HZ PS ASM NOTES XII, XXV  
332620 (4) SCR NOTE X

121973 (2) WSHR NOTE X

824349 HINGE PIVOT  
5353301 (4) SCR  
NOTE X

LOGIC GATE ASM 512885  
SEE REF. DWG. 5129500

5133877-60HZ-P.S. ASM-NOTES XI, XXIV  
5133878-50HZ-P.S. ASM-NOTES XII, XXV  
32617 (4) SCR  
45690 (4) WASHER } NOTE X  
\*\*218100(4) SCR

\*\*369207 LABEL  
NOTE X

323041 TB  
323681 MKR STRIP  
352827 SHLD  
210883 (2) STUD  
35739 (2) SCR  
\*\*10170 (2) SCR  
NOTE X

19.50±.12  
493333

4.00±.25  
1015564

5405190-RUBBER  
NOTE XXXIII & X

5405197-RUBBER  
NOTE XXXIII & X

5129190 FRAME ASM  
NOTE X

5129292 L LATCH PL.  
\*\*2574810 (2) SCR  
2162561 BUMPER  
3960 NUT  
NOTE X

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NOTES XII, XXV  
\*\*58207 (2) SCR NOTE X

\*\*815220 BAR  
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\*\*438586(2) SCR  
\*\*599557 RUBBER  
2:02364-CLAMP  
NOTE X

5129276(2) HINGE SUPP ASM  
\*\*2574810 (4) SCR  
NOTE X

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2588046 SPRING  
221790 (2) SCR  
NOTE XIX

5128981 GATE STOP  
322029 (3) SCR  
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2562460-60HZ PS ASM NOTES XI, XXIV  
2562470 50HZ PS ASM NOTES XII, XXV  
332620 (4) SCR NOTE X

121973 (2) WSHR NOTE X

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NOTE X

LOGIC GATE ASM 512885  
SEE REF. DWG. 5129500

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NOTE XIX

5128981 GATE STOP  
322029 (3) SCR  
NOTE X

\*\*815220 BAR  
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NOTE XIX

2562460-60HZ PS ASM NOTES XI, XXIV  
2562470 50HZ PS ASM NOTES XII, XXV  
332620 (4) SCR NOTE X

121973 (2) WSHR NOTE X

824349 HINGE PIVOT  
5353301 (4) SCR  
NOTE X

LOGIC GATE ASM 512885  
SEE REF. DWG. 5129500

5133877-60HZ-P.S. ASM-NOTES XI, XXIV  
5133878-50HZ-P.S. ASM-NOTES XII, XXV  
32617 (4) SCR  
45690 (4) WASHER } NOTE X  
\*\*218100(4) SCR

\*\*369207 LABEL  
NOTE X

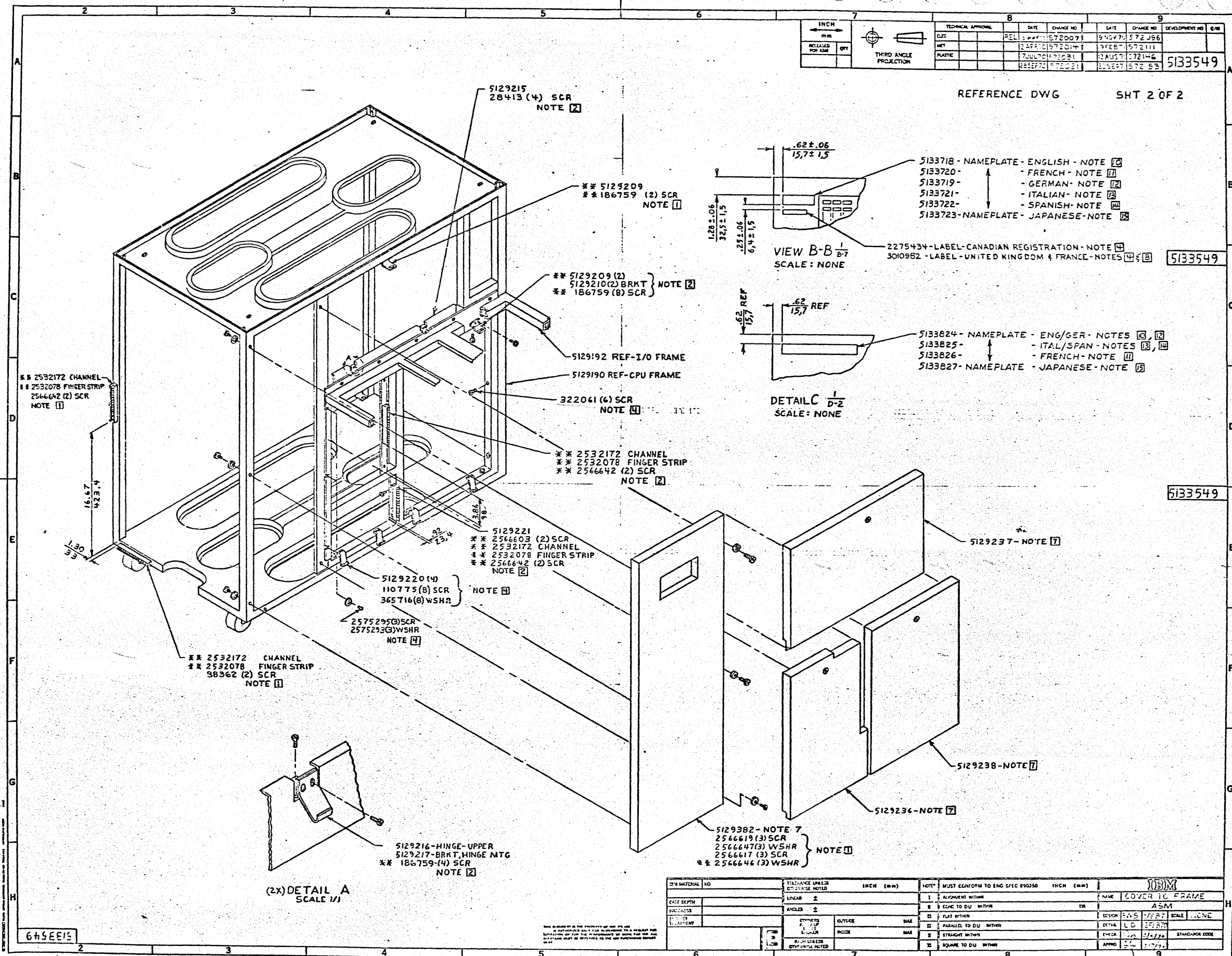
IBM MATERIAL NO	TOLERANCE UNLESS OTHERWISE NOTED	INCH (mm)	NOTES	MUST CONFORM TO ENG SPEC GROUP	INCH (mm)	IBM
DATE SPEC'D	LINEAR ±		I	ALIGNMENT WITHIN		REF
FINISHES	ANGLES ±		II	CONC TO DU WITHIN	TH	REF
SURFACE TREATMENT	CONTOUR ±		III	FLAT WITHIN		REF
	PERPENDICULAR ±		IV	PARALLEL TO DU WITHIN		REF
	STRAIGHT WITHIN		V	SQUARE TO DU WITHIN		REF

1156215

11







ITEM	MATERIAL NO.	QUANTITY	INCH (mm)	NOTE	MUST CONFORM TO ENG SPEC 890350	INCH (mm)	IBM
1	ALUMINUM WITHIN						COVER TO FRAME
2	STEEL TO DU WITHIN						ASM
3	FLAT WITHIN						SCALE NONE
4	PARALLEL TO DU WITHIN						SCALE NONE
5	STRAIGHT WITHIN						SCALE NONE
6	SQUARE TO DU WITHIN						SCALE NONE

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3. CPU AND STORAGE DIAGNOSTICS. . . . .	02	5134157
4. DISK ERROR RECORDING ANALYSIS PROGRAM (ERAP) . . . . .	04	2589743
5. METER TEST . . . . .	08	5129692
6. 5406 DIAGNOSTIC PACK LOADING PROCEDURE (5406 OR 5410). . . . .	09	5129676
7. DIAGNOSTIC CONTROL PROGRAM (DCP) AND 5406 CE PACK CONFIGURATOR PROGRAM . . . . .	10	5129476
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9. MASTER TIMING ANALYSIS PROGRAM (MTAP). . . . .	12	5129674
10. DISK FUNCTION TESTS. . . . .	13	5129623
11. KEYBOARD FUNCTION TEST . . . . .	14	5129473
12. 5213 AND 2222 PRINTER FUNCTION TESTS . . . . .	15	5129485
13. SERIAL INPUT/OUTPUT CHANNEL (SIOC) . . . . .	18	2588790
14. BINARY SYNCHRONOUS COMMUNICATIONS ADAPTER (BSCA) . . . . .	19	2589700
15. DISK UTILITIES . . . . .	20	5129660
16. LEDGER CARD DEVICE FUNCTION TEST (LCD) . . . . .	60	5133884
17. 2265 DISPLAY STATION FUNCTION TEST (CRT) . . . . .	61	5129479
18. 5496 DATA RECORDER . . . . .	62	5129482
19. TAPE LOADER DIAGNOSTIC PROGRAM . . . . .	63	5133880
20. 129 DATA RECORDER. . . . .	64	5134139
21. KATAKANA FUNCTION TEST . . . . .	65	5134099
22. 5213 OR 2222 PRINTER EXERCISER . . . . .	66	5134214

INTEGRATED MAINTENANCE PACKAGE

BLOCK 01 PAGE 001

GENERAL DESCRIPTION

07 PAGES 05/23/72

PREV EC 571565 PRES EC 571621 P/N 5129400

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INTEGRATED MAINTENANCE PACKAGE

1. PURPOSE: THE PURPOSE OF THIS SECTION IS TO GIVE YOU DETAILED INFORMATION CONCERNING THE SYSTEM/3 INTEGRATED MAINTENANCE PACKAGE (IMP).

2. INTRODUCTION: INTEGRATED MAINTENANCE PACKAGE

CONSISTS OF:

- A. FE EDUCATION COURSES
- B. MAINTENANCE ANALYSIS PROCEDURE (MAP) CHARTS
- C. CE AIDS DESIGNED SPECIALLY FOR THIS SYSTEM AND THE MST-1 TECHNOLOGY
- D. FE PUBLICATIONS
- E. DIAGNOSTIC PROGRAMS

THIS PACKAGE IS UNIQUE IN THE FACT THAT IT EFFECTIVELY TIES ALL MAINTENANCE EQUIPMENT AND INFORMATION TOGETHER. THIS PACKAGE, WHEN USED CORRECTLY, MAKES DIAGNOSING SYSTEM PROBLEMS SIMPLE, REQUIRES A MINIMUM OF RECALL ON PART OF THE CE AND GREATLY REDUCES DIAGNOSTIC TIME.

THE IMP IS PRIMARILY ORIENTED TOWARD FIRST LINE MAINTENANCE PERSONNEL. HOWEVER, SUPPORT PERSONNEL AT ALL ECHELONS WILL ALSO FIND THE IMP USEFUL IN SOLVING DIFFICULT SYSTEM PROBLEMS. THE SYSTEMATIC APPROACH OF THE MAP CHARTS TO PROBLEMS. THE DETAILED TESTING DONE BY DIAGNOSTIC PROGRAMS AND THE ADVANCED CE AIDS (E.G. DIAGNOSTIC PROBE, CARD EXTENDERS, CE SENSE BITS, ETC.) WILL GREATLY ASSIST THE SPECIALIST IN RECALLING SYSTEM OPERATION AND IN DIAGNOSING THE PROBLEM.

3. INTEGRATED MAINTENANCE PACKAGE:

3.1 FE EDUCATION - THE IMP HAS BEEN DESIGNED FOR SIMPLICITY OF USE. HOWEVER, SOME TRAINING IS REQUIRED TO USE IT EFFECTIVELY. THIS TRAINING PLUS THE TRAINING YOU REQUIRE TO UNDERSTAND SYSTEM OPERATION, AND THE OPERATION AND REPAIR OF VARIOUS I/O DEVICES, HAS BEEN COVERED IN YOUR FE TRAINING COURSE. THIS GUIDE PLUS THE INTRODUCTIONS AT THE BEGINNING OF EACH SET OF MAP CHARTS WILL ASSIST YOU IN RECALLING SOME OF THE DETAILS PERTINENT TO THE SYSTEM.

3.2 MAP CHARTS - THE MAP CHARTS HAVE BEEN DESIGNED TO ISOLATE THE FAILURES IN THE MINIMUM AMOUNT OF TIME AND WITHOUT ELABORATE TEST EQUIPMENT. THESE CHARTS SHOULD BE USED PRIOR TO TRYING FREE-LANCE METHODS ON A PROBLEM.

THE MAP CHARTS HAVE BEEN STANDARDIZED WHEREVER POSSIBLE. HOWEVER, CLARITY, SIMPLICITY AND EASE OF USE HAVE BEEN OVERRIDING FACTORS IN MAP CHART DESIGN. FOR THESE REASONS THERE WILL BE DIFFERENCES BETWEEN THE MAP CHARTS FOR VARIOUS SYSTEM DEVICES AND/OR ATTACHMENTS. AN EXPLANATION OF THESE VARIATIONS AND OTHER INFORMATION PERTINANT TO THE CHARTS FOR EACH SYSTEM AREA IS CONTAINED IN THE BRIEF INTRODUCTION AT THE BEGINNING OF EACH SET OF MAP CHARTS. THE INDIVIDUAL INTRODUCTIONS ALSO CONTAIN A SUMMARY OF DIAGNOSTIC PROGRAMS AVAILABLE FOR THE DEVICE AND OR ATTACHMENT AND A SUMMARY OF ALL DIAGNOSTIC HALT ID'S. THIS SUMMARIZED INFORMATION WILL BE BENEFICIAL TO YOU IN YOUR DIAGNOSTIC EFFORTS. MORE DETAILED DESCRIPTIONS OF ALL DIAGNOSTIC PROGRAMS CAN BE FOUND IN THIS GUIDE.

THE FOLLOWING ITEMS MUST BE OBSERVED WHEN USING THE MAP CHARTS.

1. CHECK THE PROBE FOR CORRECT OPERATION. REFER TO THE DECAL ON THE FRONT END OF GATE A FOR PROBE POINTS. A SLIGHT GLOW WILL BE PRESENT ON BOTH 'UP' AND 'DOWN' INDICATORS WITH POWER ONLY APPLIED TO THE DIAGNOSTIC PROBE. FOR MORE DETAILS, SEE YOUR CE HANDBOOK
2. ALWAYS GO THROUGH THE SYSTEM STRATEGY CHART (PAGE 005 OF 5406 CPU MAP CHARTS). THIS CHART WILL EVENTUALLY DIRECT YOU TO THE FAILING I/O ATTACHMENT OR DEVICE. ONCE YOU EXIT TO THE ATTACHMENT HOWEVER, IT IS ASSUMED THE CPU IS FUNCTIONING PROPERLY.
3. ALWAYS ENTER ATTACHMENT AND DEVICE MAPS AT THE ENTRY CHART.
4. WORK DILIGENTLY AND DOUBLE CHECK YOUR WORK AS YOU GO. IF YOU MAKE A MISTAKE GO BACK TO THE ENTRY CHART TO RESTART. REMEMBER, THE MAPS USE A VERY SYSTEMATIC APPROACH TO ALL PROBLEMS. IF YOU ALTER THIS APPROACH OR BACK UP IN THE MAPS THEIR ACCURACY CANNOT BE GUARANTEED. IT IS ALSO RECOMMENDED (WHERE POSSIBLE) THAT YOU NOTE THE FAILING PART ON THE FIRST PASS AND GO THRU THE CHARTS A SECOND TIME TO VERIFY THAT YOU HAVEN'T MADE A MISTAKE.
5. ALWAYS INVESTIGATE NOISES ABOVE REASONABLE AUDIBLE LEVELS AND CORRECT GROSS ERRORS BEFORE USING THE MAP CHARTS.
6. BEFORE REPLACING A CARD INDICATED BY THE MAPS:
  - A) CHECK THE VOLTAGE PLUG-ON CONNECTORS ON THE PIN SIDE OF THE GATE.
  - B) MAKE A VISUAL INSPECTION OF THE CARD/S CALLED OUT BY THE MAPS FOR BAD MECHANICAL CONNECTIONS.
  - C) RESEAT THE CARD/S INDICATED BY THE MAPS.
  - D) CHECK CABLES ENTERING AND LEAVING BOARD FOR PROPER SEATING.
7. DROP POWER BEFORE INSERTING OR REMOVING A CARD FROM THE CPU UNLESS OTHER INSTRUCTIONS ARE GIVEN.
8. WHEN THE MAPS INSTRUCT THE CE TO REMOVE A NUMBER OF CARDS TO ISOLATE AN I/O ATTACHMENT IN ERROR, PULL THE CARD/S ASSOCIATED WITH THE FILE CONTROL UNIT LAST.
9. WHEN THE CE IS INSTRUCTED TO >D.H. CPU START, THE START SWITCH SHOULD BE HELD OPERATED UNTIL THE NEXT ACTION OR RECTANGULAR BLOCK IS REACHED. (ANSWER ALL QUESTIONS BEFORE RELEASING THE SWITCH.)

10. WHEN REFERENCE IS MADE TO A MACHINE CYCLE AND A CLOCK, THE FOLLOWING IS USED: (IQ-4 = IQ MACHINE CYCLE AT CLOCK 4).

11. WHEN THE MAPS INSTRUCT THE CE TO CLOCK STEP TO SOME MACHINE CYCLE-CLOCK (FOR EXAMPLE EB-2) AND A PROCESSOR CHECK OCCURS BEFORE REACHING EB-2, IGNORE THE CHECK AND CONTINUE BY USING CHECK RESET.

12. IF THE CE IS INSTRUCTED TO ENTER A CPU CHART (FOR EXAMPLE, CPU SYSTEM RESET CHART), THE MAIN ENTRY SHOULD BE USED. IF THE MAIN ENTRY SHOULD NOT BE USED, THE MAPS WILL SPECIFY (CPU SYSTEM RESET CHART ENTRY 2).

13. PSEUDO LOCATIONS FOR MULTI-USE BOARDS HAVE BEEN ASSIGNED. THE MEMORY PSEUDO LOCATION IS 50Z-W1. FOR CPU IT IS 50Z-W2. FOR FILE CONTROL IT IS 50Z-W3. FOR SIOC IT IS 50Z-W4. FOR BSCA IT IS 50Z-W5. THE CPU MAPS DO NOT REFLECT THESE DESIGNATIONS. HOWEVER, IF THE CPU LOGIC IS REFERENCED TO FIND, FOR EXAMPLE, A-B2T2D02, THE POINT WILL BE FOUND AS Z-W2T2D02.

14. WHEN THE CE IS INSTRUCTED TO ALTER SAR TO AN ADDRESS, ADDRESS STOP AT A SECOND ADDRESS, AND THEN CLOCK STEP TO A PARTICULAR CLOCK, HE SHOULD DO THE FOLLOWING:
 

- A) SET THE CE MODE SELECTOR SWITCH TO ALTER SAR
- B) SET HEX DATA SWITCHES TO GIVEN SAR ADDRESS
- C) OPERATE CPU START
- D) SET HEX DATA SWITCHES TO GIVEN STOP ADDRESS
- E) SET ADDRESS COMPARE SWITCH TO STOP
- F) SET ROTARY DISPLAY SWITCH TO ROLLER 1 (SAR)
- G) SET CE MODE SELECTOR TO PROCESS
- H) OPERATE CPU START
- I) WAIT FOR ADDRESS COMPARE LIGHT TO COME ON
- J) SET ADDRESS COMPARE SWITCH TO RUN
- K) SET CE MODE SELECTOR SWITCH TO CLOCK
- L) OPERATE CPU START UNTIL DESIRED MACHINE CYCLE AND CLOCK ARE REACHED

15. BEFORE EXITING TO AN ATTACHMENT, REVIEW THE PATH FOLLOWED THROUGH THE CPU MAPS. THE ATTACHMENT MAPS MAY ASK QUESTIONS ABOUT THIS PATH.

16. WHEN THE CPU MAPS DIRECTS TO AN ATTACHMENT, 'BUT SUSPECTS CARD' THE SUSPECTED CARD SHOULD BE CHANGED ALONG WITH ANY CARD CALLED OUT BY THE ATTACHMENT.

17. IF THE FAILING OPERATION WAS IPL, THE CE MUST ALTER ALL OF STORAGE TO FE (REFER MR2) PRIOR TO RETRYING THE FAILING OPERATION. THIS INSURES MAP CHART EFFECTIVENESS.

18. IN PERFORMING ACTIONS AND PROBING POINTS IN THE MAPS, THE ORDER IN WHICH THE INSTRUCTIONS ARE GIVEN IS VERY IMPORTANT. ASSUME THE MAPS INSTRUCT THE FE TO PROBE A POINT, REPEAT FAILING OPERATION, AND THEN THE MAPS ASK EITHER 'LINE PULSING' OR ASK 'PULSE ON LINE'. IF THE LINE DID PULSE UNTIL A PROCESS CHECK OCCURRED, THE ANSWER TO EITHER QUESTION WOULD BE YES. (NO LINE EXCEPT THE OSCILLATOR WILL BE PULSING AFTER A PROCESS CHECK OCCURS.)

IF THE CE IS INSTRUCTED TO PERFORM AN ACTION AND THEN PROBE A POINT, ANY QUESTION REGARDING THE STATE OF THE PROBED POINT WOULD REFER TO THE STATE OF THE PROBED POINT AFTER THE ACTION HAD BEEN PERFORMED.

IF THE FE IS INSTRUCTED TO PROBE A POINT AND THEN PERFORM AN ACTION, ANY QUESTION REGARDING THE STATE OF THE PROBED POINT REFERS TO THE STATE OF THE PROBED POINT WHILE THE ACTION WAS BEING PERFORMED. (FROM THE TIME THE FE BEGINS TO PERFORM THE ACTION UNTIL THE ACTION IS COMPLETED).

19. IF YOU HAVEN'T ISOLATED THE PROBLEM WITHIN TWO HOURS, IT IS RECOMMENDED THAT YOU CALL FOR ASSISTANCE.

20. A GLOSSARY OF ABBREVIATIONS AND THEIR MEANING IS CONTAINED IN SECTION 5. OF THIS GUIDE. THESE ABBREVIATIONS ARE USED BECAUSE THE SYSTEM DECALS USE THEM, THEY ARE IBM STANDARDS OR BECAUSE THEY ARE SO FREQUENTLY USED THROUGHOUT OTHER SYSTEM DOCUMENTS.

21. IF THE MAP CHART EVER FAILS YOU, YOU MAY WISH TO CONSIDER THE FOLLOWING ITEMS DURING YOUR FREE-LANCE EFFORT.

- A. CHECK FOR SHORTED NETS ON THE BOARDS, PARTICULARLY CHECK FOR LOOSE OBJECTS (E.G. PAPER CLIPS, BITS OF WIRE, DROPS OF SOLDER ETC.) ON THE BOARD. CHECK FOR LOOSE CABLES IN THE BOARDS.
- B. CHECK FOR OPEN LAND PATTERNS ON THE BOARD.
- C. IF ERRORS ARE HIGHLY INTERMITTENT - CHECK THE POWER SUPPLY ADJUSTMENTS. THIS REQUIRES A METER EQUIVALENT TO THE WESTON 901 (1/4% ACCURACY). THESE ARE AVAILABLE AT THE BRANCH OFFICE.
- D. CHECK POWER CROSS-OVERS COMING FROM THE LAMINAR BUS TO THE ELECTRONICS BOARDS.
- E. CHECK FOR LOOSE AND SHORTED SIGNAL AND POWER CABLES.

22. ALL 'PROBE' INSTRUCTIONS ARE FOR MST PROBES UNLESS THE SLD PROBE IS SPECIFIED.

THESE ITEMS SHOULD BE REVIEWED PERIODICALLY SINCE THEY ARE IMPORTANT TO SUCCESSFUL COMPLETION OF A CALL USING MAP CHARTS.

3.3 CE AIDS: THE FOLLOWING CE AIDS HAVE BEEN DEVELOPED FOR THIS SYSTEM:

3.3.1 CE DIAGNOSTIC PROBE - THE CE DIAGNOSTIC PROBE IS DESIGNED AS A SUBSTITUTE FOR THE SCOPE IN NORMAL DIAGNOSTIC TECHNIQUES



THE DIAGNOSTIC PROBE HAS TWO PROBE TIPS. ONE IS FOR PROBING MST-1 SIGNALS AND THE OTHER FOR SLD (SLT) 100/700 SIGNALS. ONLY ONE TIP AT A TIME IS USED. THE TIP SLIPS OVER THE SIGNAL PIN OF INTEREST AND SUPPORTS THE PROBE.

TWO LAMPS ARE PROVIDED TO INDICATE THE STATUS OF THE LINE BEING PROBED. IF THE LINE HAS AN UP LEVEL WITHIN THE SPECIFICATION RANGE, THE 'UP' INDICATOR WILL BE ON. A DOWN LEVEL WITHIN THE SPECIFICATION RANGE WILL CAUSE THE 'DOWN' INDICATOR TO LIGHT. A PULSE WILL BE SHOWN AS A FLASH OF ONE OF THE LIGHTS (DEPENDENT ON THE POLARITY). A SERIES OF PULSES IS INDICATED BY BOTH LAMPS ON, OR ON ALTERNATELY, DEPENDING ON THE FREQUENCY OF THE PULSES. FLOATS OR GROUNDS CAUSING THE PROBED POINT TO BE BEYOND THE 'UP' OR 'DOWN' SPECIFICATION RANGE WILL NOT ALLOW EITHER LIGHT TO BE ON.

EACH INDICATOR LAMP HAS ITS OWN SAMPLING CIRCUITS AND OPERATES INDEPENDENTLY OF THE OTHER LAMP. THUS PULSES WILL BE DETECTED AND DISPLAYED BY THE PROBE. IF A LINE IS ACTIVE, WHEN PROBED, THE APPROPRIATE INDICATOR WILL BE TURNED ON FOR APPROXIMATELY 75 MS. AFTER THIS TIME THE INDICATOR WILL GO OFF AND THE LINE WILL IMMEDIATELY BE SAMPLED AGAIN. IF IT IS STILL ACTIVE THE LAMP WILL BE TURNED ON FOR ANOTHER 75 MS, OTHERWISE IT WILL STAY OFF UNTIL THE LINE AGAIN BECOMES ACTIVE.

THE PROBE IS POWERED BY - 4VDC AND GROUND, THROUGH A 42-INCH POWER CABLE. THE END OF THE CABLE HAS A 4-PIN SOCKET WHICH PLUGS ONTO THE POWER CROSS-OVER CONNECTORS ON THE MST BOARDS, OR AT OTHER SIMILAR LOCATIONS WHERE - 4V AND GROUND HAVE BEEN PROVIDED IN THE PROPER PIN CONFIGURATION. ALWAYS KEEP THE SIDE OF THE POWER PLUG LABELED "UP" IN THE UP DIRECTION.

ADDITIONALLY, THE PROBE HAS TWO MST GATES FOR "GATING" PURPOSES. WHEN A JUMPER WIRE IS CONNECTED FROM ONE OF THESE GATES TO AN MST SIGNAL PIN, OPERATION OF THE INDICATOR LAMPS IS INHIBITED (BOTH LIGHTS OFF) UNTIL THE CORRECT POLARITY SIGNAL IS RECEIVED BY THE GATE. THE "+" GATE REQUIRES AN UP MST LEVEL TO START SAMPLING AND THE "-" GATE IS CONTINGENT UPON AN MST DOWN LEVEL. THE GATES WORK FOR MST ONLY. HOWEVER, AN SLD SIGNAL AT THE SLD PROBE TIP MAY BE GATED WITH AN MST SIGNAL AT THE GATE.

THE FOLLOWING ARE SPECIFICATIONS PERTINENT TO THE PROBE. "IN BETWEEN LEVELS" ARE NOT DEFINED AND WILL VARY FROM PROBE TO PROBE.

- A. MST SPECIFICATIONS FOR MST PROBE TIP -
- UP LEVEL: -0.55V TO - 0.98V
  - DOWN LEVEL: -1.52V TO - 2.18V
  - PROTECTION: +24VDC TO - 30VDC
  - RESPONSE: 30 NANOSECOND PULSE WIDTH
  - INHIBIT RANGE -0.5VDC TO +24VDC, -3.98VDC TO -30VDC, AND ON OPEN PINS.
- B. SLD SPECIFICATIONS FOR SLD PROBE TIP -
- UP LEVEL: +2.7VDC TO +60VDC
  - DOWN LEVEL: -.01VDC TO +0.45VDC
  - PROTECTION: -12VDC TO +60VDC
  - RESPONSE: 200 NS (WORSE CASE) PULSE WIDTH
  - INHIBIT RANGE: -3.0V TO -12.0V AND ON OPEN PINS.
- C. SPECIFICATIONS FOR MST GATES -
- 1) "+" GATE:
    - ACTIVE RANGE: -1.01V TO -0.613V
    - INHIBIT RANGE: -1.55V TO -4.48V
  - 2) "-" GATE:
    - ACTIVE RANGE: -1.55V TO -4.48V
    - INHIBIT RANGE: -0.613V TO -1.01V
  - 3) PROTECTION: -4VDC TO +6VDC
  - 4) RESPONSE: SAME AS MST
- D. POWER REQUIREMENTS: -4VDC +OR- 12% AT 265 MA (MAX)
- E. POWER DISSIPATION: 1.95 WATTS (WORSE CASE)
- F. LAMPS: 2 EACH - PN 454612
- G. TIPS 2 EACH - PN 453163

3.3.2 CE SNS BITS - SPARE BITS IN SOME ATTACHMENTS HAVE BEEN PROVIDED FOR CE USE. THESE BITS ALLOW THE CE TO INPUT SIGNALS WHICH ARE NOT NORMALLY AVAILABLE FOR SENSING INTO THE CPU.

3.3.3 SINGLE PIN EXTENDERS - THE SINGLE PIN EXTENDERS SHIPPED WITH EACH SYSTEM ALLOW THE CE TO USE HIS CE METER ON BOARD PINS WITHOUT SHORTING TO ADJACENT PINS. THIS EXTENDER SLIPS OVER THE PIN AND ALLOWS THE CE TO PLACE THE ALLIGATOR CLIPS OF HIS METER ON THE STUB END. THIS EXTENDER CAN ALSO BE USED TO MEASURE THE POWER TEST JACKS BY PLACING THE ALLIGATOR CLIP ON THE SLIP OVER END AND USING THE STUB END AS A METER PROBE

3.3.4. MST CARD EXTENDERS - MST CARD EXTENDERS ARE AVAILABLE IN 2 WIDE SIZES. THESE AIDS ARE USED FOR SCOPING MODULE PINS ON THE CARD AND FOR OTHER GENERAL SERVICE NEEDS. THESE AIDS ARE AVAILABLE AS BRANCH OFFICE TOOLS.

4. FE PUBLICATIONS: THE FOLLOWING TYPES OF PUBLICATIONS WILL ALSO BE AVAILABLE FOR THE SYSTEM. EACH DEVICE HAS DETERMINED ITS OWN REQUIREMENTS FOR THE DOCUMENTS PROVIDED BY AN ASTERISK AND THESE MAY OR MAY NOT BE PROVIDED:

- A. FE THEORY OF OPERATION MANUAL (FETOM)
- \*B. FE MAINTENANCE MANUAL (FEMM)
- \*C. FE MAINTENANCE AND DIAGRAM MANUAL (FEMDM)
- D. FE AUTOMATED LOGIC DIAGRAMS (FEALD'S)
- \*E. INSTALLATION MANUAL
- F. ILLUSTRATED PARTS CATALOG (IPC)

IN ADDITION FE TECH OPS HAS DEVELOPED A CE HANDBOOK FOR THE SYSTEM.

## 5. STANDARD ABBREVIATIONS, SYMBOLS AND MEANINGS:

### 5.1 ABBREVIATIONS:

>	THEN PERFORM THE FOLLOWING
A	ADD TO REGISTER
ACC	ACCESS
ALT	ALTER
ALU	ARITHMETIC LOGIC UNIT
AMP	AMPLIFIER
APL	ADVANCE PROGRAM LEVEL
APLD	ALTERNATE PROGRAM LOAD DEVICE (CASSETTE TAPE PLAYER)
ARM	ARMATURE
ARR	ADDRESS RECALL REGISTER
ASNMT	ASSIGNMENT
ATCH	ATTACHMENT
ATTN	ATTENTION
BIN	BINARY
BSCA	BINARY SYNCHRONOUS COMMUNICATIONS ADAPTER
CAR	CARRY
CARR	CARRIAGE
CE	CUSTOMER ENGINEER
CE PACK	5440 DISK CARTRIDGE
CHAN	CHANNEL
CHK	CHECK
CLK	CLOCK
COND A	CONDITION A
COND B	CONDITION B
CPU	CENTRAL PROCESSING UNIT
CR	CONDITION REGISTER
CRT	CATHODE RAY TUBE (THE 2265 DISPLAY STATION IS OFTEN REFERRED TO AS 'CRT')
CS	CYCLE STEAL
CTRL	CONTROL
CYC	CYCLE
D.	DEPRESS AND RELEASE
DBI	DATA BUS IN
DBO	DATA BUS OUT
DEC	DECIMAL
DEV	DEVICE
DFC	DUAL FEED CARRIAGE
D.H.	DEPRESS AND HOLD UNTIL NEXT NON-DECISION BLOCK
DIAG	DIAGNOSTIC
DIG	DIGIT
DISK	5444 DISK STORAGE DRIVE
DISP	DISPLAY
EM	EMITTER
EOF	END OF FORMS
EQ	EQUAL
FCU	FILE CONTROL UNIT
FD	FEED
FEMM	FIELD ENGINEERING MAINTENANCE MANUAL
FT T	FAULT TEST
FN	FUNCTION
FWD	FORWARD
GATE (+OR-)	PLACE "+" OR "-" GATE TO THE POINT INDICATED
HOP	HOPPER
IAR	INSTRUCTION ADDRESS REGISTER
INDN	INDICATION
INJ	INJECT
INV	INVALID
INCR	INCREMENTER
INST	INSTRUCTIONS
INT	INTERRUPT
INTF	INTERFACE
I/O	INPUT-OUTPUT
IPL	INITIAL PROGRAM LOAD/ PROGRAM LOAD KEY
L	LEFT
LCD	LEDGER CARD DEVICE
LVL	LEVEL
LPM	LINES PER MINUTE
LIO	LOAD I/O REGISTER
LSR	LOCAL STORAGE REGISTER
M	METER
MAG	MAGNET
MACH	MACHINE
MR	MANUAL ROUTINE
MS	MAIN STORAGE
NOP	NO OPERATION
OP	OPERATION
OVFL	OVERFLOW REGISTER
P.	PROBE
PCH	PUNCH
PFB	PRINTER ELECTRONICS BOARD
PR	PRESSURE ROLL
PRG	PROGRAM
PROC	PROCESS
PS	POWER SUPPLY
PRT	PRINTER/PRINT
PTY	PARITY
PTX	PHOTO VARISTOR OR PHOTO TRANSISTOR
Q	Q CODE
R/RIGHT	RIGHT
RECOMP	RECOMPLEMENT
REG	REGISTER OR REGISTRATION
REM	REMOVE
REQ	REQUEST
REL	RELEASE
REV	REVERSE
RD	READ
RTN	ROUTINE
SAR	STORAGE ADDRESS REGISTER
SEL	SELECT
SDR	STORAGE DATA REGISTER
SIO	START I/O OPERATION
SIOC	SERIAL INPUT/OUTPUT CHANNEL
SNS	SENSE I/O REGISTER
SPN	SPINDLE/DISK DRIVE
SR	SYSTEM RESET
ST	STORE REGISTER
STOR	STORAGE
SW	SWITCH
SSW	SENSE SWITCH
CATED	CATED
TB	TERMINAL BLOCK
TEMP	TEMPORARY
TF	TEST FALSE
TIO	TEST I/O DEVICE
TRK	TRACK
TST	TEST
VFC	VERTICAL FORMS CONTROL
XR1	INDEX REGISTER 1.
XR2	INDEX REGISTER 2



6. DIAGNOSTIC PROGRAM LOADING AND EXECUTION

6.1 SET UP AND NORMAL RUN PROCEDURE - STORAGE SHOULD BE FILLED WITH 'FE'

- 6.1.1 INSTALL CE PACK ON DISK DRIVE 1 AND TURN ON DISK 1 POWER.
- 6.1.2 SET DISK SELECT SWITCH TO SELECT REMOVEABLE DISK.
- 6.1.3 SET CE SWITCHES TO 00FE (02FE TO BYPASS STORAGE PROGRAMS OR 03FE TO ALLOW SENSE SWITCH SETTING PRIOR TO ANY PRINTING OR TO BYPASS THAT PORTION OF I/O LSR TESTING THAT IS INCLUDED IN THE CPU TESTS).
- 6.1.4 OPERATE PROGRAM LOAD AND EXPECT HALT 'EE' (ABC 123) TO OCCUR. THE SAR INDICATION SHOULD BE (0003 COMPOSITE) OR 0000, 0001 OR 0002 IF THE STOP SWITCH WAS OPERATED.
- IF THE DISK LIGHT IS ON, WAIT FOR THE DISK TO BECOME READY. PROGRAM LOAD SHOULD BE AUTOMATIC. IF THE DISK LIGHT PERSISTS, REPEAT IPL AFTER DISK HAS BEEN POWERED DOWN AND BACK UP AGAIN.
- IF THE FAILURE PERSISTS, GO TO THE CPU MAP CHARTS FOR SYSTEM STRATEGY. (MAIN ENTRY)
- IF THE ABOVE HALT OR ANY OF THE FOLLOWING NORMAL HALTS DO NOT OCCUR OR IF OTHER HALTS OCCUR, THE MAPS AND/OR HALT CHARTS SHOULD BE CONSULTED TO DEFINE THE ERROR CONDITION.
- 6.1.5 OPERATE START AND EXPECT HALT 'FF5' (ABCD12345).
- 6.1.6 OPERATE START AND EXPECT HALT '805' (A 5) IF SETTING IN 6.1.3 WAS 00FE OR 03FE. IF THE SETTING IS 03FE AND IT IS NECESSARY TO BYPASS ALL PRINTING SEE NOTE 1 BELOW. IF SETTING WAS 02FE, EXPECT HALT 'FA5' (ABCD1 3 5) AFTER DCP HAS LOADED AND GO TO STEP 6.1.9
- NOTE 1: TO BYPASS ALL PRINTING, SET CE CONSOLE SWITCHES TO F103 AND PRESS START. A 'FF5' (ABCD12345) HALT WILL OCCUR DURING DCP LOADING. AT THIS POINT SET SENSE SWITCHES 03 AND 04 AND TO TO STEP 6.1.7.
- 6.1.7 OPERATE START AND EXPECT HALT '805' (A 5) IF SETTING WAS 00FE. IF SETTING WAS 03FE, EXPECT HALT 'FA5' (ABCD1 3 5) AFTER DCP HAS LOADED AND GO TO STEP 6.1.9.
- 6.1.8 OPERATE START AND EXPECT DCP TO LOAD, PRINT OUT THE SYSTEM CONFIGURATION TABLE AND HALT DISPLAYING 'FA5' (ABCD135).
- 6.1.9 SET CE SWITCH 1 (LEFT) TO 'D' AND OPERATE START. EXPECT HALT 'FF5' (ABCD12345).
- 6.1.10 DETERMINE DIAGNOSTIC PROGRAMS TO BE RUN. UP TO 4 SELECTIONS MAY BE MADE AT THIS TIME. (ONE SELECTION MAY BE ALL PROGRAMS FOR ONE DEVICE/ATTACHMENT ID.)
- 6.1.11 SET PROGRAM ID OF EACH DESIRED PROGRAM XXX OR GROUP OF PROGRAMS XX0 IN SWITCHES 2,3,4 AND FOR EACH SELECTION, OPERATE START ONE TIME. (CAUTION: EACH START OPERATION SETS A SELECT ENTRY IN THE LOADER TABLE. THE SELECTION WILL BE LOADED AND RUN ONE TIME FOR EACH ENTRY.) AFTER EACH ENTRY, THE DISPLAYED HALT SHOULD ALTERNATE BETWEEN 'FF5' AND 'F05' (ABCD 5).
- 6.1.12 SET CE SWITCH 1 TO 0 AND OPERATE START.
- 6.1.13 EXPECT HALT 'FA5' (ABCD135) TO INDICATE THAT THE FIRST SELECTED PROGRAM HAS LOADED AND IS READY TO BE EXECUTED.
- 6.1.14 OPERATE START TO EXECUTE THE PROGRAM.

6.2 ALTERNATE RUNNING PROCEDURES

- 6.2.1 CPU, STORAGE - REFER TO SECTION 7.
- 6.2.2 DCP CONTROLLED PROGRAMS - REFER TO SECTION 12.

6.3 PROGRAM LOADING FROM TAPE CASSETTE (NORMAL)

- 6.3.1 IF THE TAPE LOADER AND DCP HAVE BEEN LOADED FROM TAPE AND IS IN STORAGE SKIP TO 6.3.9.
- 6.3.2 LOAD THE FOLLOWING BOOTSTRAP PROGRAM INTO STORAGE STARTING AT ADDRESS 005D.
- | -ADDR- | -CODE-   |
|--------|----------|
| 005D   | C202005D |
| 0061   | AFD9FFFF |
| 0065   | E1E20E   |
| 0068   | E08708   |
| 006B   | ACFFFFFF |
| 006F   | AC62FFFF |
| 0073   | BA01FF   |
| 0076   | E1E21F   |
| 0079   | BB01FF   |
| 007C   | AED9FFFF |
| 0080   | E02008   |
- 6.3.3 INSERT THE CASSETTE CONTAINING THE LOADER AND DCP INTO THE RECORDER (DCP, LOADER LABEL UP).
- 6.3.4 REWIND THE TAPE AND PLUG THE TAPE OUTPUT CABLE INTO THE TAPE INPUT JACK ON THE CE PANEL. SET VOLUME CONTROL AT '6' (REAR DIAL-LOWER LEFTHAND SIDE)
- 6.3.5 SYSTEM RESET AND SET SAR TO 005D. (RETURN TO PROCESS MODE.)

6.3.6 START THE TAPE UNIT READING AND OBSERVE AT THE TAPE READ HEAD. WHEN THE END OF THE TAPE LEADER PASSES THE HEAD, ALLOW A FEW INCHES OF GOOD TAPE TO PASS THE HEAD AND THEN OPERATE SYSTEM START. (TAPE MUST ALWAYS BE IN MOTION BEFORE STARTING THE CPU.)

6.3.7 EXPECT ALL FIELD INDICATORS TO BE LIGHTED WHEN THE FIRST RECORD (TAPE LOADER IS SUCCESSFULLY READ). NEXT, ALL FIELD INDICATORS WILL GO OUT INDICATING THAT THE CHECK RECORD HAS BEEN READ. THEN EXPECT FIELD INDICATOR '8' TO COME ON ALONE TO INDICATE THAT RECORD ONE HAS LOADED. EACH SUCCEEDING RECORD SUCCESSFULLY LOADED WILL BE INDICATED BY DISPLAYING ITS BINARY RECORD NUMBER IN THE FIELD INDICATORS UNTIL DCP IS LOADED.

6.3.8 AS SOON AS DCP IS FULLY LOADED, AN ATTENTION NOTICE WILL BE PRINTED TO ALERT YOU THAT THE END RECORD IS ABOUT TO BE READ. AFTER THE END RECORD IS READ, COMMAND INDICATOR 01 WILL COME ON (TAPE STOP INDICATOR) AND THE TAPE UNIT SHOULD BE STOPPED. THE NORMAL DCP CONFIGURATION PRINT AND HALT 'FA5' WILL OCCUR. THE TAPE LOADER AND DCP IS NOW LOADED AND THE TAPE IS STOPPED IN A 30 SEC. GAP BETWEEN PROGRAMS.

6.3.9 AFTER THE TAPE LOADER AND DCP HAVE BEEN LOADED, LOAD THE CASSETTE CONTAINING THE DESIRED PROGRAM/S INTO THE TAPE UNIT. POSITION THE TAPE SO THAT THE 30 SECOND GAP PRECEDING THE DESIRED PROGRAM IS OVER THE READ HEAD (A FEW INCHES BEYOND THE LEADER IF FIRST PROGRAM ON TAPE). START THE TAPE UNIT READING AND THEN OPERATE CPU PROGRAM START. EXPECT A PROGRAM ID LOADING MESSAGE ON THE PRINTER FOLLOWED BY THE INDICATED BINARY RECORD COUNT IN FIELD INDICATORS, FOLLOWED BY THE ATTENTION MESSAGE WHICH IS FOLLOWED BY THE STOP INDICATOR (COMMAND INDICATOR 01) AND DCP HALT 'FA5' STOP THE TAPE. THE PROGRAM IS LOADED WITH TAPE STOPPED IN THE 30 SECOND GAP.

6.3.10 IF SECOND FILE IS PRESENT, IT MUST BE POWERED DOWN TO RUN THE FILE DIAGNOSTICS FROM TAPE.

6.3.11 ALL NORMAL DCP FUNCTIONS ARE NOW AVAILABLE JUST AS IF THE PROGRAM HAD BEEN LOADED FROM DISK. AFTER THE CURRENT PROGRAM HAS COMPLETED AND HALTED AT 'FE5' THE NEXT PROGRAM CAN BE LOADED BY THE SAME PROCEDURE JUST FOLLOWED.

6.4 TAPE ERROR HANDLING.

6.4.1 IF HALT 'F55' OCCURS, A TAPE READ ERROR JUST OCCURED. THE FIELD INDICATORS SHOW THE LAST SUCCESSFULLY READ RECORD NUMBER. STOP THE TAPE UNIT AND REWIND SLIGHTLY (REMEMBER THERE ARE ABOUT 7 INCHES OF TAPE PER RECORD). RESTART THE TAPE UNIT AND OPERATE CPU START. THE PANEL LIGHTS WILL BLINK AT ABOUT 4 SEC. INTERVALS AND IF THE BAD RECORD IS READ CORRECTLY THE FIELD INDICATORS WILL AGAIN START TO INCREMENT. CONTINUED 'F55' HALTS INDICATE A HARD ERROR ON THE TAPE, BUT SOME READJUSTMENT OF THE VOLUME CONTROL FROM ITS NOMINAL VALUE OF '6' MAY ALLOW A MARGINAL RECORD TO BE READ SUCCESSFULLY.

6.4.2 IF A HALT 'F85' OCCURS AFTER RETRYING A HALT 'F55', IT MEANS THAT THE TAPE WAS NOT REWOUND ENOUGH SO THAT THE BAD RECORD COULD BE RE-READ. REWIND THE TAPE FURTHER AND RESTART AS DESCRIBED IN 6.4.1. CAUTION: WHEN REWINDING NEAR THE START OF A PROGRAM, BE CAREFUL YOU DO NOT REWIND RIGHT THRU THE 30 SEC. GAP INTO THE PRECEDING SECTION PROGRAM. CONTINUED 'F85' HALTS WILL OCCUR IF YOU DO.

6.4.3 IF A HALT 'F85' OCCURS WHILE RUNNING (NOT RETRYING A 'F55' HALT) IT INDICATES THAT SOME UNUSUAL I/O CONDITION CAUSED ONE OR MORE RECORDS TO BE SKIPPED. STOP THE TAPE UNIT AND PROCEED AS DESCRIBED IN 6.4.1.

6.4.4 IF A HALT 'F75' OCCURS, IT INDICATES THAT THE FIRST TWO RECORDS WHILE LOADING THE LOADER AND DCP WERE NOT READ CORRECTLY. IN THIS CASE IT IS NECESSARY TO RESTART COMPLETELY. BE SURE THAT THE PROGRAM AT 005D-0082 IS LOADED PROPERLY. IF THE TAPE IS MARGINAL SOME READJUSTMENT OF THE VOLUME CONTROL MAY BE NECESSARY.

6.4.5 SHOULD IT BE NECESSARY TO RELOAD OR RESTART THE LOADER AND DCP THE FOLLOWING PROCEDURE IS USED:

IF RECORD 04 HAS NOT YET BEEN LOADED (FIELD INDICATORS = FF OR 03 OR LESS WHILE LOADING THE LOADER AND DCP), RETURN TO 6.3.4.

IF THE LOADER AND DCP WERE PREVIOUSLY FULLY LOADED OR NOW LOADED PAST RECORD 04, RETURN TO 6.3.4 BUT AT 6.3.5, SET SAR TO 0020 INSTEAD OF 005D.

NOTE THAT ONCE RECORD 05 IS LOADED, THE HAND ENTERED PROGRAM AT 005D IS DESTROYED, BUT RECORD 06 LEFT A COPY AT 0020.

6.4.6 IF UPDATING PROCEDURE FAILS, GO TO CPU APLD MAPS. DIAGNOSTIC TAPE CAN BE TRIED TO VERIFY SYSTEM OPERATION VIA APLD.

## 6.5 PROGRAM LOADING FROM CASSETTE (PRINT DISABLED)

SENSE SWITCHES 03 AND 04 WILL BE TURNED ON WHILE LOADING DCP.

6.5.1 USING PROCEDURE IN 6.3, SET CE SWITCHES TO F103 BEFORE THE TAPE IS STARTED. WATCH FOR HALT '775' (OCCURS AT THE TIME THE FIRST LINE OF ASTERISKS WOULD PRINT OUT FOR THE DCP SUMMARY) STOP THE TAPE UNIT.  
OPERATE START SWITCH - EXPECT HALT '775'  
OPERATE START SWITCH - EXPECT HALT '7D'  
SET F104 IN CE SWITCHES  
OPERATE START SWITCH - EXPECT HALT '775' (SETS SSW 03,04).

6.5.2 SET CE SWITCHES TO 0XXX, START TAPE UNIT AND OPERATE SYSTEM START. EXPECT A TAPE ERROR. STOP THE TAPE UNIT AND RESTART AS DESCRIBED IN 6.4.1.

6.5.3 EXPECT HALT 'FA5' AND TAPE STOP INDICATOR

6.5.4 TURN OFF TAPE UNIT. THE PRINTER IS NOW DISABLED AND FURTHER OPERATION MUST BE CONTROLLED BY HALT INDICATORS, FIELD INDICATORS AND THE TAPE STOP INDICATOR.

## 6.6 SKIPPING (FORWARD SPACE) TAPE

TAPE CAN BE SKIPPED TO LOCATE A DESIRED PROGRAM BY THE FOLLOWING PROCEDURE.

6.6.1 FORCE A TAPE READ ERROR - WHILE LOADING ANY SECTION, MOMENTARILY TURN THE TAPE UNIT OFF THEN BACK ON AGAIN. EXPECT HALT 'F55'. TURN OFF THE TAPE UNIT.

6.6.2 TURN ON SSW 10 (THIS IS POSSIBLE AT 'F55' HALT).

6.6.3 UNPLUG THE OUTPUT JACK FROM THE RECORDER TO ENABLE THE SPEAKER. TURN ON THE TAPE UNIT AND LISTEN FOR THE 30 SECOND GAPS SEPARATING PROGRAMS ON THE TAPE. POSITION THE TAPE SUCH THAT THE GAP PRECEDING THE DESIRED PROGRAM IS OVER HEAD.

6.6.4 PLUG THE TAPE JACK, START THE TAPE AND OPERATE SYSTEM START. (SSW 10 IS RESET AUTOMATICALLY AS SOON AS IT IS USED SO IT MUST BE SET ON EACH TIME THIS PROCEDURE IS USED.)

## 6.7 MANUAL TAPE DIAGNOSTIC PROGRAM

6.7.1 THIS DIAGNOSTIC PROGRAM SHOULD BE USED ONLY IF ALL OTHER MEANS HAVE FAILED. IT WILL DETERMINE SINGLE SHOT TIMING AND TAPE SPEED PROBLEMS.

6.7.2 ENTER AND VERIFY THE FOLLOWING PROGRAM

-ADDR-	-CODE-
0000	C2030000
0004	E1E20A
0007	E08704
000A	B6011A
000D	E1E20A
0010	B6011B
0013	E1E21C
0016	E08710
0019	000100
001C	F07878

6.7.3 PLACE A LOADER AND DCP TAPE INTO THE TAPE READER AND POSITION THE TAPE SO THAT BLANK TAPE JUST BEFORE THE FIRST RECORD IS IN FRONT OF THE READ HEAD.

6.7.4 START THE TAPE READER AND DEPRESS SYSTEM RESET AND START. WHEN THE FIRST RECORD IS READ A HALT 'FF' WILL OCCUR. WHEN THIS HAPPENS, DEPRESS SYSTEM STOP, STOP THE TAPE AND DISPLAY XR1. THE RIGHTMOST BYTE SHOULD BE A HEX 29 +-3. IF IT IS NOT PROCEED TO 6.7.7.

6.7.5 THE LEFTMOST BYTE OF XR1 SHOULD NOMINALLY BE HEX 5A. IF THE DEVIATION FROM THIS NUMBER IS SEVERE, IT MEANS THAT THE TAPE SPEED IS WRONG AND THAT THE TAPE READER SHOULD BE SERVICED. HOWEVER IT MAY STILL BE POSSIBLE TO GET THE FIRST RECORD INTO CORE IF A MODIFICATION IS MADE TO THE HAND LOADED BOOTSTRAP AT ADDR 005D (SEE 6.3.2). THE FOLLOWING TABLE TELLS WHICH BYTE TO CHANGE.

LEFTMOST BYTE OF XR1	MODIFICATION
53-61	NONE REQUIRED
62-66	CHANGE BYTE 0070 FROM 62 TO 8A
67-69	CHANGE BYTE 0070 FROM 62 TO 9E
6A-6C	CHANGE BYTE 0070 FROM 62 TO EC
4E-52	CHANGE BYTE 006C FROM FF TO D7
4B-4D	CHANGE BYTE 006C FROM FF TO C3
48-4A	CHANGE BYTE 006C FROM FF TO A5

AFTER THE ABOVE CHANGE (IF NECESSARY) AGAIN TRY TO LOAD THE LOADER AND DCP. IF THE NUMBER IN XR1 IS OUTSIDE OF THE ABOVE RANGE, EITHER THE SPEED IS TOO FAR OFF TO USE OR YOU DID NOT START AT THE VERY FIRST RECORD OF A LOADER AND DCP TAPE.

6.7.6 IF BOTH NUMBERS IN XR1 ARE AS SPECIFIED, THE READ CARD SINGLE SHOT TIMING AND THE TAPE SPEED ARE CORRECT.

6.7.7 TO ADJUST THE READ CARD SINGLE SHOT ADD AND VERIFY THE FOLLOWING PROGRAM AT ADDRESS 001C. NOTE THAT THIS ADDS TO THE PROGRAM LOADED AT 6.7.2 AND MODIFIES THE LAST INSTRUCTION.

-ADDR-	-CODE-
001C	B4012F
001F	B1122F
0022	B6011A
0025	E00122
0028	E1E228
002B	E08700

6.7.8 NOW START THE TAPE UNIT READING ANY TAPE AND DEPRESS SYSTEM RESET AND START.

6.7.9 THE FIELD INDICATORS WILL NOW DISPLAY THE BYTE OF XR1 WHICH GIVES THE SINGLE SHOT TIME. ADJUST THE SINGLE SHOT AT LOCATION A2B04 UNTIL THE FIELD INDICATORS READ HEX 29 +-1.  
CAUTION: KEEP XR1 DISPLAYED ON THE CE CONSOLE AND AS LONG AS THE LIGHTS BLINK THE PROGRAM IS OPERATING PROPERLY. IF THE LIGHTS DO NOT BLINK, THE PROGRAM IS NOT FUNCTIONING PROPERLY OR THE TAPE IS IN A GAP. DO NOT ADJUST THE SINGLE SHOT UNLESS THESE LIGHTS ARE BLINKING.

6.7.10 RELOAD F07878 IN ADDRESS 001C-001E AND RESTART AT 6.7.3.

6.8 PROGRAM HALTS

PROGRAM HALTS ARE GROUPED WITHIN EACH SYSTEM AREA, DEVICE OR ATTACHMENT. THEREFORE IT IS IMPORTANT TO RECOGNIZE WHEN AN ERROR HALT HAS OCCURRED.

6.8.1 ERROR HALTS OCCURRING DURING THE LOADING AND EXECUTION OF CPU AND STORAGE TESTS MAY BE OF ANY COMBINATION IN THE HALT INDICATORS. REFER TO THE CPU MAP CHARTS, INDEX TO DIAGNOSTIC HALTS, PAGE 150 FOR A COMPLETE LIST OF THESE CPU HALTS IF IT IS NOT INCLUDED IN THE CHART BELOW.

THE FOLLOWING HALTS ARE NORMAL OPERATOR INTERVENTION HALTS. ALL EXCEPT ID 3C SHOULD BE EXPECTED.

```

*****
* ID I INDICATION I MEANING AND ACTION *
* I I I I
*-----*
* EE I ABC 123 I NORMAL IPL HALT. IF SAR DISPLAYS *
* I I I I 0003 (COMPOSITE OF ADDRESSES 0000 *
* I I I I 0001 AND 0002) OPERATE START. *
* I I I I ANY OTHER SAR ADDRESS IS AN ERROR *
* I I I I CONDITION. *
*-----*
* FF5 I ABCD12345 I NORMAL HALT AFTER SECOND SECTOR *
* I I I I LOADED. IF SAR IS 0031, 32, 33- *
* I I I I SET CE SWITCHES TO COFE (01FE TO *
* I I I I LOOP CPU TESTS, 02FE OR 03FE FOR *
* I I I I BYPASS OPERATION) AND OPERATE *
* I I I I SYSTEM START. *
*-----*
* 3C I CD12 I SENSE SWITCH TEST FAILED OR CE *
* I I I I SWITCHES WERE NOT SET TO 00FE, *
* I I I I 01FE, 02FE OR 03FE AS EXPECTED *
* I I I I BY THE PROGRAM. SET SWITCHES AS *
* I I I I REQUIRED, SYSTEM RESET, OPERATE *
* I I I I START TWICE. IF PROGRAM DOES *
* I I I I NOT RUN, RE-START PROGRAM FROM *
* I I I I IPL. IF FAILURE PERSISTS-REFER *
* I I I I TO CPU MAPS. *
*-----*
* 8C5 I A 5 I THIS HALT OCCURS AT THE END OF *
* I I I I THE CPU TESTS WHEN 00FE OR 03FE *
* I I I I SETTING IS USED. SET CE SWITCHES *
* I I I I IF PROGRAM SELECTION IS DESIRED *
* I I I I AND/OR OPERATE START. THIS HALT *
* I I I I ALSO OCCURS AT THE END OF STORAGE *
* I I I I TESTS WHEN THE 00FE SETTING IS *
* I I I I USED. OPERATE START. *
*****
    
```

6.8.2 HALTS PROVIDED BY THE DCP FOR LOADING AND OPERATIONAL CHECKS WILL ALWAYS INCLUDE ABCD AND 5 INDICATORS. IN ADDITION, ANY COMBINATION OF THE 1234 INDICATORS MAY BE PROVIDED. THESE DCP HALTS ARE INCLUDED IN THE CHART BELOW.

```

*****
* HALT I CONDITION I ACTION *
* CODE I I REQUIRED *
*-----*
* F05 I INVALID RECORD FOUND I CORRECT INVALID *
* I I WHILE LOADING, UDT I RECORD AND RELOAD *
* I I TABLE IS TOO LARGE I *
* I I I I *
* I I CE SWITCH SETTING HAS I *
* I I BEEN RECOGNIZED AND I *
* I I ACTED UPON. I *
*-----*
* F15 I A DEVICE CALLED FOR BY I CHECK, CORRECT THE *
* I I THE TEST SECTION WAS I SYSTEM DEFINITION, *
* I I NOT DEFINED IN THE UDT I OR TO BYPASS THE *
* I I RECORDS. I ERROR, START. *
* I I I I (ERRORS COULD *
* I I I I RESULT) *
*-----*
* F25 I DATA SWITCH ENTRY I CORRECT DATA SWITCH *
* I I ERROR, OR MORE THAN I AND START. *
* I I 4 DISK SELECT ENTRIES I *
* I I ATTEMPTED. I *
* I I I I *
* I I INVALID ROUTINE SELECT I *
*-----*
* F35 I INVALID ROUTINE FOUND I ENTER ROUTINE *
* I I DURING CHAINING FROM I SELECT OPTION *
* I I ONE ROUTINE TO NEXT. I 'F2XX' IN DATA *
* I I I I SWITCHES AND START. *
* I I I I IF THIS DOES NOT *
* I I I I WORK, RELOAD *
* I I I I SECTION. *
*-----*
* F55 I 5496 NOT READY OR I MAKE 5496 READY. *
* I I ERROR. I *
* I I I I *
* I I TAPE READ ERROR I BACKSPACE TAPE AND *
* I I I I TRY AGAIN. *
*-----*
* F65 I 5213 OR 2222 PRINTER I CLEAR CONDITION AND *
* I I NOT READY OR ERROR. I START. IF FAILURE *
* I I (CHECK FORMS OR COVER I PERSISTS, RUN *
* I I INTERLOCK IF ATTENTION I PRINTER FUNCTION *
* I I IS ON) I TEST USING. *
* I I I I PROCEDURE IN PRINTER *
* I I I I FUNCTION TEST *
* I I I I DESCRIPTION. SET *
* I I I I SENSE SWITCH 05 TO *
* I I I I USE ALTERNATE *
* I I I I OUTPUT DEVICE. *
*-----*
* F75 I DISK ERROR. I START TO RETRY. *
* I I I I IF ERROR PERSISTS, *
* I I I I GO TO FCU MAP CHARTS *
* I I I I PAGE 002. *
* I I I I *
* I I TAPE ERROR WHILE I RESTART TAPE LOADING *
* I I READING TAPE LOADER. I PROCEDURE. *
* I I I I *
*-----*
* F85 I THE TAPE WAS NOT BACK- I BACKSPACE FURTHER *
* I I SPACED FAR ENOUGH I AND TRY READING THE *
* I I I I TAPE AGAIN. *
*-----*
* FA5 I CONTROL PROGRAM IS I START IF NO ENTRY *
* I I PREPARED TO RECEIVE I DESIRED. TO LOAD *
* I I DATA SWITCH ENTRY. I OPTIONS, SET UP *
* I I OCCURS AFTER DCP AND I DATA SWITCHES AND *
* I I SECTION LOADING. I START. SSW 07 MAY *
* I I I I BE USED TO BYPASS *
* I I I I THIS HALT. *
*-----*
* FC5 I DISK LOADER REQUIRES I IF NO ENTRY HAS *
* I I SPECIFICATION OF I BEEN MADE PREV- *
* I I SECTIONS TO BE LOADED I IUSLY, LOAD *
* I I FROM THE CE PACK OR I PROGRAM SELECTION *
* I I PROGRAM REQUESTED IS I AS INDICATED IN 14. *
* I I NOT ON THE CE PACK I UP TO FOUR ENTRIES *
* I I I I MAY BE MADE. IF *
* I I I I ENTRIES HAVE EVER *
* I I I I BEEN MADE, THE *
* I I I I PROGRAMS MAY BE *
* I I I I REPEATED BY *
* I I I I OPERATING START OR *
* I I I I DELETED BY REPEATING *
* I I I I SELECT PROCEDURE. *
* I I I I *
* I I I I NOTE: IF ANY PRE- *
* I I I I VIOUS SELECTION WAS *
* I I I I DXXO OPERATING START *
* I I I I WILL NOT LOOP AND *
* I I I I RUN THE ENTRY AGAIN. *
* I I I I RESELECT THE ENTRY. *
*-----*
* FE5 I CURRENT SECTION I START TO LOAD NEXT *
* I I TERMINATED I SECTION. SECTION *
* I I I I MAY BE RESTARTED BY *
* I I I I SYSTEM RESET/START. *
*-----*
* FF5 I DCP HALTS WITH 'FF5' I LOAD A VALID DATA *
* I I OR I DISPLAYED WHENEVER A I SWITCH ENTRY AND *
* I I F05 I VALID DATA SWITCH ENTRY I START. REPEAT FOR *
* I I I I IS RECOGNIZED. AS DCP I ALTERNATING HALTS *
* I I I I ACCEPTS ENTRIES, I 'FF5' AND 'F05'. TO *
* I I I I ALTERNATING HALTS 'F05' I TERMINATE ENTRY *
* I I I I AND 'FF5' OCCUR, I PROCEDURE, ROTATE *
* I I I I I LEFT-MOST SWITCH *
* I I I I TO ZERO AND START. *
* I I I I *
*****
    
```

6.8.3 HALTS PROVIDED BY THE DEVICE/ATTACHMENT TEST PROGRAMS (SECTION PROGRAMS CONTROLLED BY DCP) WILL NEVER USE THE 5 INDICATOR AND WILL BE OF A FORM SUCH THAT THE ABCD INDICATORS AND THE 1234 INDICATORS WILL EACH REPRESENT AN ENCODED HEXADECIMAL NUMBER, THE HALT ID.

EXAMPLE - AB 1 4 INDICATORS WOULD BE ON TO INDICATE HALT ID 'C9'.  
BCD 123 INDICATORS WOULD BE ON TO INDICATE HALT ID '7E'.

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1. GENERAL PROGRAM SUMMARY: SETTING UP THE CPU-STORAGE DIAGNOSTICS FOR THE EXISTING SYSTEM.

1.1 GENERAL DESCRIPTION

THE CPU AND STORAGE DIAGNOSTIC PROGRAMS ARE NUMBERED HEXIDECIMALLY FROM 01 TO AF. THE PROGRAMS ARE CLASSIFIED AS FOLLOWS:

01 THRU 42	BASIC CPU TESTS
44 THRU 67	NOT USED
68 THRU 7F	CPU I/O DEVICE TESTS
8P	CPU-STORAGE SEPARATOR
90 THRU 9F	STORAGE TESTS
AO THRU AF	SPECIAL TESTS

FOR A LIST OF THE INDIVIDUAL PROGRAM NUMBERS, SEE 2. ON THE FOLLOWING PAGES.

1.2 PROGRAM IDENTIFICATION

IN MOST CASES SEVERAL PROGRAMS ARE GROUPED WITHIN A BLOCK OF 256 BYTES OF STORAGE (1 DISK CARTRIDGE SECTOR) AND GIVEN A SEPARATE SECTION ID NUMBER.

THE CPU PROGRAMS ARE IDENTIFIED BY SECTION ID OD1 THRU ODF, OE1 THRU OEE.

THE STORAGE PROGRAMS ARE IDENTIFIED BY SECTION ID OF5 THRU OF9.

THE SPECIAL TESTS ARE CONTAINED IN SECTION ID OFA.

PROGRAM HALTS WILL IDENTIFY THE PARTICULAR PROGRAM NUMBER CURRENTLY BEING EXECUTED BY DISPLAYING THE PROGRAM NUMBER (NOT SECTION ID) AS THE HALT ID.

1.3 CPU PROGRAM CONTROLS.

ALL AVAILABLE CPU-STORAGE DIAGNOSTIC PROGRAMS ARE WRITTEN ON THE C.E. DIAGNOSTIC PROGRAM PACK. HOWEVER INITIAL CONFIGURATION CONTROLS ALLOW EXECUTION OF ONLY BASIC PROGRAMS THESE CONTROLS MUST BE ALTERED TO ALLOW EXECUTION OF SELECTED FEATURE PROGRAMS. THE NEW CONFIGURATION CAN BE RECORDED ON THE CE PACK FOR FUTURE AUTOMATIC CONTROL AND SHOULD NOT REQUIRE FURTHER CHANGE UNLESS A NEW FEATURE IS INSTALLED OR REMOVED.

THE CE PACK SHIPPED WITH THE SYSTEM IS CONFIGURED ONLY FOR A BASIC SYSTEM (FILE, PRINTER, AND 8K CORE.)

1.3.1 FROM SYSTEM RECORDS, DETERMINE THE FEATURES INCLUDED ON THE SYSTEM.

RUN CONFIGURATION PROGRAM - ID FED (REFER TO BLOCK 10)

SPECIAL RUN CONTROL 03FE MAY BE REQUIRED IF PROCESS CHECKS OCCUR WHILE EXECUTING CPU LSR TESTS. (REFER TO 1.4.3.5)

1.4 CPU PROGRAM OPERATION

1.4.1 SET UP

1. IF THE CE PACK IS ALREADY MOUNTED ON DISK 1, SKIP STEPS 2 AND 3.
2. TURN OFF DISK 1 POWER.
3. AFTER THE DISK STOPS INSTALL THE C.E. DIAGNOSTIC PACK.
4. TURN ON DISK 1 AND THE SYSTEM IF IT IS OFF.
5. FILL STORAGE WITH 'FE' FROM THE C.E. CONSOLE.
6. SET C.E. CONSOLE SWITCHES TO 00FE (02FE OR 03FE MAY BE USED FOR SPECIAL CONTROLS DESCRIBED IN 1.4.3.5).
7. SET ALL OTHER SWITCHES TO NORMAL.
8. SELECT THE REMOVEABLE DISK.

1.4.2 LOADING

OPERATE PROGRAM LOAD SWITCH - HALT ABC 123 (EE) SHOULD APPEAR. (SAR=0000,1,2 WHICH WILL DISPLAY AS A COMPOSITE CCC3).

IF THIS HALT DOES NOT APPEAR AND DISK 1 LIGHT IS NOT ON, REFER TO MAP CHARTS ( SYSTEM STRATEGY CHART).

IF THE DISK LIGHT IS ON, WAIT FOR THE DISK TO BECOME READY. PROGRAM LOAD SHOULD BE AUTOMATIC. IF THE DISK LIGHT PERSISTS-REPEAT IPL AFTER DISK HAS BEEN POWERED DOWN AND BACK UP AGAIN.

IF THE FAILURE PERSISTS, GO TO THE CPU MAP CHARTS FOR SYSTEM STRATEGY.

1.4.3 RUNNING

1.4.3.1 NORMAL OPERATOR INTERVENTION

EACH OF THE FOLLOWING HALTS SHOULD APPEAR IN SEQUENCE.

- 1) ABC 123 (EE) - WITH SAR ADDR 0000,1,2. ONLY NORMAL IPL HALT - OPERATE START.
- 2) ABCD 12345 (FF5) - NORMAL WAIT HALT - OPERATE START
- 3) A 5 (805)-CPU STORAGE SEPARATOR HALT - OPERATE START
- 4) A 5 (805)-STORAGE TEST COMPLETE, OPERATE START. DCP SHOULD LOAD AND PRINT OUT SYSTEM CONFIGURATION.

1.4.3.2 FAILURES

ADDITIONAL INTERVENTION, HALTS, CHECKS, OR LOOPS SHOULD BE INTERPRETED AS CPU OR I/O MALFUNCTIONS.

WHEN ERRORS OCCUR IN CPU PROGRAMS, THE PROGRAMS HALT WITH THE PROGRAM NUMBERS DISPLAYED IN THE HALT LIGHTS. HOWEVER THE LIGHTS REQUIRE 'HEX' INTERPRETATION TO ARRIVE AT THE NUMBER. LIGHTS ABCD REPRESENT FOUR BITS OF THE FIRST 'HEX' DIGIT AND 1234 REPRESENT FOUR BITS OF THE SECOND 'HEX' DIGIT. (EG HALT BC 1234 REPRESENTS PROGRAM NUMBER 6F)

IF A CHECK, LOOP, OR A HALT ID THAT IS MEANINGLESS OCCURS, OPERATE SYSTEM RESET AND START TO DISPLAY THE FIRST HALT OF THE SECTOR CURRENTLY LOADED IN CORE.

OPERATE START AGAIN TO EXECUTE THE FIRST PROGRAM. THE NEXT PROGRAM HALT ID WILL BE DISPLAYED IF THE FIRST PROGRAM IS NOT FAILING.

OPERATE START TO EXECUTE THE SECOND PROGRAM, ETC. THE LAST MEANINGFUL HALT WILL IDENTIFY THE FAILING PROGRAM.

1.4.3.3 SELECTING AN INDIVIDUAL CPU PROGRAM

A CPU PROGRAM MAY BE SELECTED ONLY BY RUNNING ALL CPU PROGRAMS PRECEDING THE DESIRED PROGRAM.

AT THE NORMAL WAIT HALT (ABCD12345), SYSTEM RESET AND MANUALLY ALTER STORAGE LOCATION 01A0 TO 00. MANUALLY SET SAR TO 0034 AND OPERATE START. HALT 34 LIGHTS (HEX 03) SHOULD COME ON TO INDICATE PROGRAM 03 IS LOADED. EACH OPERATION OF THE START KEY SHOULD ADVANCE SELECTION TO THE NEXT AVAILABLE PROGRAM AND HALT WITH THE PROGRAM ID INDICATED IN THE HALT LIGHTS. CONTINUE DEPRESSING START KEY UNTIL THE DESIRED PROGRAM IS LOADED.

1.4.3.4 LOOPING ON CPU PROGRAMS.

AUTOMATIC LOOPING OF ALL CPU PROGRAMS IS PROVIDED BY SETTING THE C.E. PANEL SWITCHES TO 01FE AT SET UP TIME.

AUTOMATIC LOOPING CONTROLS ARE NOT PROVIDED FOR INDIVIDUAL CPU PROGRAMS. HOWEVER ONCE A DESIRED PROGRAM IS LOADED, IF STORAGE LOCATION 018B (80) IS CHANGED TO 87, SYSTEM RESET AND START WILL PROVIDE A LOOP ON THE PROGRAMS CURRENTLY LOADED IN STORAGE. (USUALLY 2 OR 3 PROGRAMS).

1.4.3.5 SPECIAL RUNNING CONTROLS

- 1) SWITCH SETTING OF 01FE CAUSES CPU PROGRAMS TO LOOP.
- 2) SWITCH SETTING OF 02FE CAUSES CPU PROGRAMS TO RUN, BY PASSING THE STORAGE PROGRAMS.
- 3) SWITCH SETTING OF 03FE CAUSES CPU PROGRAMS TO RUN EXCEPT FOR LSR TESTS AND BY PASSES THE STORAGE PROGRAMS. THIS SETTING IS RECOMMENDED ONLY IF THE PROGRAM PACK IS NOT PROPERLY CONFIGURED FOR THE SYSTEM.

THIS SETTING ALSO PROVIDES AN '805' (A 5) HALT AT THE END OF CPU TESTS TO ALLOW THE CE SWITCHES TO BE SET FOR SPECIAL FUNCTIONS.

A CE SWITCH SETTING OF FXXX AT HALT 805 WILL PROVIDE A HALT 'FF5' PRIOR TO ANY PRINTING WHILE LOADING DCP. AT HALT 'FF5' SENSE SWITCHES 03, 04 MAY BE TURNED ON TO PREVENT ANY PRINTING. A REQUIREMENT FOR LOADING PRINTER DIAGNOSTICS.

SPECIAL SWITCH SETTINGS ARE AVAILABLE FOR LOADING PACKS NOT CONFIGURED FOR 5406 OR FOR LOADING A PACK THAT CONTAINS AN IMPROPER OR INVALID UDT ENTRY. SEE BLOCK 10 OR BLOCK 09

## 1.5 STORAGE DIAGNOSTICS

### 1.5.1 SET UP

THE OOFE SET UP USED FOR RUNNING THE CPU DIAGNOSTICS WILL CAUSE STORAGE PROGRAMS THRU 93 TO EACH RUN ONE TIME. OPERATING THE SYSTEM START KEY AT EACH A5 (805) HALT IS REQUIRED. (REFER TO 1.4.3.1)

ALTERNATE RUNNING PROCEDURES ARE AVAILABLE AS FOLLOWS.

#### 1.5.1.1 SELECTING ANY INDIVIDUAL STORAGE PROGRAM.

AT A5 HALT (CPU-STORAGE SEPARATOR) SET CE SWITCHES TO 00XX WHERE XX IS THE DESIRED PROGRAM NUMBER AND OPERATE START. THE DESIRED PROGRAM ID HALT WILL APPEAR WHEN THE PROGRAM IS LOADED.

#### 1.5.1.2 RUNNING PROCEDURES

THE RUN CONTROLS OF THE STORAGE PROGRAMS ARE AUTOMATIC UNLESS A PARTICULAR PROGRAM IS SELECTED AS (ABOVE) AND SYSTEM RESET IS OPERATED. AT THIS TIME RUN CONTROLS FOR PROGRAMS 94-97 ARE PROVIDED BY THE CE SWITCHES. CONTROL FOR LOOPING PROGRAMS 91, AND 93 IS NOT PROVIDED.

#### 1.5.1.3 SWITCH SETTINGS

SWITCH FUNCTIONS ARE DEFINED AT RIGHT.

IN PROGRAMS 91 THRU 96 ONLY THE AMOUNT OF CORE DEFINED IN THE CONFIGURATION TABLE WILL BE INITIALLY TESTED. CE SWITCH 1 MAY BE USED TO DEFINE AMOUNT OF STORAGE TESTED WHEN UNDER SWITCH CONTROL. TO GAIN CONTROL OF THE CONSOLE ADDRESS SWITCHES IN PROGRAMS 94 THRU 97, THE CE MUST SELECT THE DESIRED PROGRAM. ONCE THE HALT ID APPEARS, SYSTEM RESET, SET UP THE CONSOLE ADDRESS SWITCHES, AND START. (MORE THAN 1 START OPERATION MAY BE REQUIRED).

### 1.5.2 LOADING

REFER TO CPU LOADING PROCEDURES AND 1.5.1.1 ABOVE.

### 1.5.3 RUNNING

#### 1.5.3.1 OPERATOR INTERVENTION

REFER TO CPU PROCEDURES AND ALTERNATE RUNNING PROCEDURES IN 1.5.1 ABOVE.

#### 1.5.3.2 FAILURES

STORAGE PROGRAMS HALT WITH A PROCESSOR CHECK. TO DETERMINE WHICH PROGRAM FAILED. DO A SYSTEM RESET-START. THE PROGRAM ID WILL BE DISPLAYED IN THE HALT INDICATORS. ALSO REFER TO STORAGE MAP CHARTS. CONTENTS OF SAR, XR1, ETC. MAY BE OF IMPORTANCE.

### THE FUNCTIONS OF THE CONSOLE ADDRESS SWITCHES ARE:

SWITCH 1	SWITCH 2	SWITCH 3+4
0 TESTS CORE TO 4K	0 PROGRAM EXECUTED ONCE ONLY	00 NORMAL POSITION, WC PATTERN FILL
1 TESTS CORE TO 8K	1 BYPASS PROGRAM	XX ANY OTHER ENTRY SETS
2 TESTS CORE TO 12K	2 LOOP PROGRAM	-E4- HALT AND ALLOWS CE TO SELECT FILL PATTERN ON THESE TWO SWITCHES, A BYTE AT A TIME, FOR A TOTAL OF FOUR BYTES. 00 CAN BE USED AS A BYTE OF PATTERN AFTER -E4- HALT SET (SEE 2 NOTE)
3 TESTS CORE TO 16K (SEE NOTE 1)	4 COMPLEMENT FILL PATTERN USED	
	6 LOOP & COMPLEMENT FILL PATTERN USED	

1 NOTE: NOT USED ON PROGRAM 97

2 NOTE: NORMAL WC PATTERN FILL IS FFFF0000 TURNING ADDRESS SWITCHES 3+4 (RIGHTMOST) TO A SETTING OTHER THAN 00 WILL SET AN -E4- (ENTER PATTERN) HALT WHICH WILL ALLOW CE TO ENTER HIS OWN 'WORST CASE' PATTERN. THE FOUR BYTE PATTERN IS ENTERED A BYTE AT A TIME ON SWITCHES 3+4. AFTER THE INITIAL -E4- HALT, THE SWITCHES CAN BE SET TO ANY DESIRED COMBINATION, EVEN TO 00. THE FIRST START KEY OPERATION AFTER THE INITIAL -E4- HALT WILL SET THE CONTENTS OF SWITCHES 3+4 IN THE FIRST (LEFT MOST) BYTE OF THE PATTERN AND HALT -E4- WILL AGAIN BE DISPLAYED. AFTER THE FOURTH BYTE HAS BEEN ENTERED, THE PROGRAM WILL RUN. UNTIL IT IS CHANGED AGAIN EITHER BY THE CE THROUGH THE -E4-OPTION OR BY RESELECTING THE PROGRAM, THE CE ENTERED FILL PATTERN WILL BE USED AS THE FILL PATTERN. THE CHOSEN PATTERN WHETHER WC OR CE ENTERED WILL BE COMPLEMENTED ON 4K BOUNDARIES.



PREV EC

PRES EC 571621

PN 5134157

2. LIST OF CPU AND STORAGE PROGRAMS.

PROGRAM NUMBER	HALT INDICATION	DESCRIPTION	PROGRAM NUMBER	HALT INDICATION	DESCRIPTION
01	ABC 123	HPL, LIO DISK, AND SIOC DISK, IPL, SAR DECODE BITS 15-7	32	CD 3	INDEXING
02	3	BOOTSTRAP	33	CD 34	INDEXING
03	34	FRANCH AND JUMP ON CONDITION	34	CD 2	INDEXING
04	2 4	LOAD REGISTER AND JUMP ON CONDITION	35	CD 2 4	INDEXING
05	2 4	LOAD REGISTER AND JUMP ON CONDITION	36	CD 23	INDEXING
06	23	COMPARE LOGICAL IMMEDIATE	37	CD 234	INDEXING
07	234	COMPARE LOGICAL IMMEDIATE	38	CD1 4	INDEXING
08	1	NOT USED	39	CD1 4	LOAD AND STORE REGISTER
09	1 4	MOVE LOGICAL IMMEDIATE	3A	CD1 3	CHECK IF 0 BIT STUCK DOWN
0A	1 3	SET BITS ON	3C	CD12	SENSE CONSOLE DATA SWITCHES
0C	12	TEST BITS ON	3E	CD123	FIRST AND/OR SECOND INDEXED OP
0E	123	TEST BITS ON	3F	CD1234	COMPARE LOGICAL IMMEDIATE
0F	1234	TEST BITS ON	40	B	COMPARE LOGICAL IMMEDIATE
10	D	SET AND TEST BITS OFF	41	B 4	ADD DECIMAL
11	D 4	LOAD AND STORE REGISTER	42	B 3	APL TEST
12	D 3	LOAD AND STORE	43-67		NOT USED
13	D 34	LOAD, STORE, AND ADD REGISTER	68	BC 1	LOAD AND SENSE I/O LSR'S, DISK
14	D 2	LOAD ADDRESS	69	BC 1 4	LOAD AND SENSE I/O LSR'S, DISK
15	D 2 4	MOVE NUMERIC TO NUMERIC	6A	BC 1 3	LOAD AND SENSE I/O LSR'S, CONSOLE
16	D 23	MOVE NUMERIC TO NUMERIC	6B		NOT USED
17	D 234	MOVE ZONE TO ZONE	6C	BC 12	LOAD AND SENSE I/O LSR'S, 5213
18	D1	MOVE ZONE TO NUMERIC	6D	BC 12 4	LOAD AND SENSE I/O LSR'S, LCD
19	D1 4	MOVE NUMERIC TO ZONE	6E	BC 123	LOAD AND SENSE I/O LSR'S, 5496
1A	D1 3	MOVE AND COMPARE LOGICAL	6F	BC 1234	LOAD AND SENSE I/O LSR'S, 2265
1C	D12	MOVE, ADD, SUBTRACT, AND COMPARE LOGICAL CHARACTERS	7A	BCD1 3	LOAD AND SENSE I/O LSR'S, BSCA
1E	D123	NOT USED	7C	BCD12	LOAD AND SENSE I/O LSR'S, SIOC
1F	D1234	ZERO AND ADD DECIMAL	70	BCD	LOAD AND SENSE I/O LSR'S, MFCU
20	C	ZERO AND ADD DECIMAL	71	BCD 4	LOAD AND SENSE I/O LSR'S, PRINTER
21	C 4	ZERO AND ADD DECIMAL	72	BCD 3	LOAD AND SENSE I/O LSR'S, MFCU
22	C 3	ZERO AND ADD DECIMAL	73	BCD 34	LOAD AND SENSE I/O LSR'S, PRINTER
23	C 34	NOT USED	74-79		NOT USED
24	C 2	ADD DECIMAL	7E-82		NOT USED
25	C 2 4	ADD DECIMAL AND ZERO AND ADD DECIMAL	83	A 34	DUAL PROGRAM FEATURE (5410 ONLY)
26	C 23	SUBTRACT DECIMAL	84	A 2 4	DUAL PROGRAM FEATURE (5410 ONLY)
27	C 234	EDIT	85	A 2 4	DUAL PROGRAM FEATURE (5410 ONLY)
28	C 1	EDIT	86	A 23	DUAL PROGRAM FEATURE (5410 ONLY)
29	C 1 4	EDIT	87-8F		NOT USED
2A	C 1 3	EDIT	8P	A 5	CPU MEMORY SEPARATOR
2C	C 12	INSERT AND TEST CHARACTERS	91	A D 4	SAR DECODE BITS 6, 5, 4, 3, 2
2E	C 123	INSERT AND TEST CHARACTERS	93	A D 34	SAR DECODE AND SAR BIT FAILURE TEST
2F	C 1234	INSERT AND TEST CHARACTERS	94	A D 2	HALF SELECT CORE TEST - LOWER CORE
30	CD	INSERT AND TEST CHARACTERS	95	A D 2 4	RIPPLE BITS ON AND OFF TEST - LOW CORE
31	CD 4	INDEXING	96	A D 23	WORST CASE CORE TEST - LOWER CORE
			97	A D 234	WORST CASE CORE TEST - UPPER CORE
			98-9F		NOT USED
			A0	A C	INVALID OP CODE
			A1	A C 4	PARITY CHECK CIRCUIT
			A2-AF		NOT USED

### 3. DETAILED DESCRIPTION OF TESTS

#### 3.1 FEATURE TESTS

- 68 LOAD AND SENSE I/O LSR'S, DISK  
THE DISK DATA ADDRESS AND CONTROL ADDRESS LSR'S ARE TESTED FOR CORRECT ADDRESS SELECTION, CORRECT LOADING, IMPROPER DATA SWITCH SELECTION, AND FOR BITS ALWAYS OFF.
- 69 LOAD AND SENSE I/O LSR'S, DISK  
THE DISK DATA ADDRESS AND CONTROL ADDRESS LSR'S ARE TESTED FOR BITS ALWAYS ON.
- 6A LOAD AND SENSE I/O LSR'S, CONSOLE  
THE CONSOLE INTERRUPT LEVEL 1 IAR IS TESTED FOR CORRECT ADDRESS SELECTION, CORRECT LOADING, BITS ALWAYS OFF AND BITS ALWAYS ON.
- 6C LOAD AND SENSE I/O LSR'S, 5213 OR 2222  
THE PRINT DATA, PRINT CONTROL ADDRESS LSR'S ARE TESTED FOR CORRECT ADDRESS SELECTION, LOADING AND BITS ALWAYS ON OR ALWAYS OFF.
- 6D LOAD AND SENSE I/O LSR'S, LCD .  
THE LINE LOCATE ADDRESS LSR IS TESTED FOR CORRECT ADDRESS SELECTION, LOADING AND BITS ALWAYS ON OR ALWAYS OFF.
- 6E LOAD AND SENSE I/O LSR'S, 5496.  
THE DATA ADDRESS LSR IS TESTED FOR CORRECT ADDRESS SELECTION, LOADING AND BITS ALWAYS ON OR ALWAYS OFF.
- 6F LOAD AND SENSE I/O LSR'S, 2265.  
THE DATA ADDRESS LSR IS TESTED FOR CORRECT ADDRESS SELECTION, LOADING AND BITS ALWAYS ON OR ALWAYS OFF.
- 70 LOAD AND SENSE I/O LSR'S, MFCU  
THE MFCU PRINT ADDRESS, READ ADDRESS, AND PUNCH ADDRESS LSR'S ARE TESTED FOR CORRECT ADDRESS SELECTION, CORRECT LOADING, AND FOR BITS ALWAYS OFF.
- 71 LOAD AND SENSE I/O LSR'S, 5213 OR 2222 PRINTER  
THE PRINTER IMAGE ADDRESS AND DATA ADDRESS LSR'S ARE TESTED FOR CORRECT ADDRESS SELECTION, CORRECT LOADING, AND FOR BITS ALWAYS OFF.
- 72 LOAD AND SENSE I/O LSR'S, MFCU  
THE MFCU PRINT ADDRESS, READ ADDRESS, AND PUNCH ADDRESS LSR'S ARE TESTED FOR BITS ALWAYS ON.
- 73 LOAD AND SENSE I/O LSR'S 5213 OR 2222 PRINTER  
THE PRINTER IMAGE ADDRESS AND DATA ADDRESS LSR'S ARE TESTED FOR BITS ALWAYS ON.
- 7C LOAD AND SENSE I/O LSR'S, SIOC  
THE SIOC LSR IS TESTED FOR CORRECT ADDRESS SELECTION, CORRECT LOADING, BITS ALWAYS OFF, AND BITS ALWAYS ON.
- 83 DUAL PROGRAM FEATURE  
THE ABILITY TO LOAD AND STORE PROGRAM LEVEL 2 IAR IS TESTED
- 84 DUAL PROGRAM FEATURE  
THE -APL- COMMAND IS TESTED IN BOTH PROGRAM LEVELS WITH DUAL PROGRAM MODE DISABLED AND THEN ENABLED USING -SIO- COMMAND FOR THE ENABLING AND DISABLING.
- 85 DUAL PROGRAM FEATURE  
THE DUAL PROGRAM CONTROL SWITCH IS TESTED
- 86 DUAL PROGRAM FEATURE  
THE PROGRAM LEVEL 2 INDEX REGISTER 1 OR 2 SELECTION IS TESTED FOR ALWAYS UP OR DOWN CONDITION.

#### 3.2 STORAGE TESTS

- 91 SAR DECODE BITS 6,5,4,3,2  
TESTS FOR PROPER DECODING OF SAR BITS 6 THRU 2 AND THE ABILITY TO ADDRESS CORE LOC 512 THRU 16,383.
- 93 SAR DECODE AND SAR BIT FAILURE TEST  
TESTS THE ABILITY TO ADDRESS EACH CORE LOCATION WITHIN A 16K BOM, AND CHECKS FOR ALTERATION IN CODE DUE TO SAR BIT FAILURE.
- 94 HALF SELECT CORE TEST - LOWER CORE  
THIS PROGRAM DETECTS THE DROPPING OR PICKING UP OF AN ODD NUMBER OF BITS WITHIN A BYTE CAUSED BY THAT BYTE BEING HALF-SELECTED 64 TIMES.
- 95 RIPPLE BITS ON AND OFF TEST-LOWER CORE  
THIS PROGRAM CHECKS THE ABILITY TO READ AND WRITE UNDER WORST CASE CONDITIONS.
- 96 WORST CASE CORE TEST - LOWER CORE  
THIS PROGRAM DETECTS THE ABILITY TO READ AND WRITE UNDER WORST CASE CONDITIONS.
- 97 WORST CASE CORE TEST - UPPER CORE  
THIS PROGRAM DETECTS THE ABILITY TO READ AND WRITE UNDER WORST CASE CONDITION. THIS PROGRAM RESIDES IN THE UPPER 512 BYTES OF THE SELECTED CORE SIZE.

#### 3.3 SPECIAL TEST

- A0 INVALID OP CODE TEST  
TEST INVALID OP CODE CIRCUITRY WITH INVALID COMMANDS, INVALID BRANCHES, INVALID 1 ADDRESS INSTRUCTIONS, AND INVALID 2 ADDRESS INSTRUCTIONS.
- A1 PARITY CHECK CIRCUIT TEST  
TEST PARITY CHECK CIRCUITRY BY FORCING DATA WITH BAD PARITY TO GO THROUGH THE NORMAL DATA FLOW.
- TO RUN SPECIAL TESTS, REFER TO CPU MAP SECTION FOR CPU ERROR GENERATOR (SEE CPU MAP INDEX FOR PAGE NUMBER).

4. CONTROL PROGRAM RECORD FORMATS

TEXT AND END RECORDS ARE STANDARD OBJECT RECORDS WHICH WILL NOT BE ALTERED OR PROVIDED BY THE CE. THERE ARE OTHER RECORDS AVAILABLE TO THE CE TO PROVIDE FLEXIBILITY OF OPERATION.

4.1 SENSE SWITCH RECORDS ( SSW XX,XX,....,XX )

SENSE SWITCH RECORDS PROVIDE A MEANS OF SETTING SENSE SWITCHES AT LOAD TIME. SENSE SWITCH RECORDS IN DCP SHOULD SET ONLY COMMON SENSE SWITCHES 00-0F, AND SSW RECORDS IN TEST SECTIONS SHOULD SET SECTION SENSE SWITCHES 10-2F ONLY. (DCP CLEARS ALL SECTION SENSE SWITCHES LOADING EACH SECTION). CAUTION MUST BE EXERCISED WHEN USING THESE RECORDS. SWITCH SETTINGS CAN BE REMOVED ONLY BY REPLACE RECORDS THAT ALTER THE SENSE SWITCH AREA OF STORAGE (0208-020D). REFER TO 5.4 FOR PROCEDURE

```
*****
* COLUMN I CONTENTS *
*****
* 1-3 I SSW *
*-----*
* 4 I BLANK *
*-----*
* 5- I XX,....,XX *
* I LIST OF SENSE SWITCHES TO *
* I BE TURNED ON FOLLOWED BY *
* I AT LEAST ONE BLANK. *
*****
```

4.2 REPLACE (PATCH) RECORDS ( R XX... )

THESE RECORDS ARE USED TO ALTER CORE STORAGE FOR THE PURPOSE OF MODIFYING PROGRAM FLOW. IT IS POSSIBLE TO ENTER AN ENTIRE PROGRAM USING THIS TYPE RECORD. THE PROGRAM MUST BE LOCATED AT ACO AND ABOVE. REFER TO 5.4 FOR PROCEDURE

```
*****
* COLUMN I CONTENTS *
*****
* 1 I 'R' *
*-----*
* 2 I BLANK - NORMAL PATCH. *
*-----*
* 3-6 I 4 HEX CHARACTERS SPECIFYING *
* I THE ADDRESS OF THE FIRST BYTE *
* I TO BE REPLACED OR EXECUTION *
* I ENTRY. *
*-----*
* 7 I BLANK *
*-----*
* 8- I XX,XXXX,XX,XXXXXX,....,XXXX *
* I *
* I FREE FORM HEX DATA, TWO *
* I CHARACTERS FOR EACH BYTE TO *
* I BE PATCHED. COMMAS MAY BE *
* I USED BETWEEN ANY PAIR OF HEX *
* I DATA. A BLANK MUST FOLLOW *
* I THE LAST PAIR OF HEX DIGITS. *
*****
```

4.3 COMMENT RECORDS ( \*... )

THESE RECORDS PROVIDE FOR THE ABILITY TO PRINT OUT ANY COMMENT PERTAINING TO THE TEST. THE CE MAY WISH TO ADD TO THE COMMENT RECORDS RELEASED. THESE RECORDS CANNOT BE DELETED, AND SHOULD BE USED SPARINGLY.

```
*****
* COLUMN I CONTENTS *
*****
* 1 I * *
*-----*
* 2- I COMMENT. THE CONTENTS OF THE *
* I RECORD IS PRINTED. *
*****
```

4.4 RECORD ENTRY PROCEDURE

1. LOAD PROGRAM ID FF6.
2. SET SENSE SWITCHES 10,12.
3. WHEN KEYBOARD BECOMES READY, KEY IN \$REPDDD. WHERE DDD IS THE PROGRAM ID TO BE CHANGED.
4. PRESS PROGRAM START ON THE KEYBOARD.
5. WHEN THE KEYBOARD BECOMES READY, KEY IN THE DESIRES RECORD IN THE FORMAT DESCRIBED IN 5.1, 5.2, OR 5.3.
6. AFTER EACH RECORD ENTRY PRESS KEYBOARD PROGRAM START.
7. AFTER LAST ENTRY HAS BEEN MADE, PRESS CHARACTER E (END) FOLLOWED BY KEYBOARD PROGRAM START.
8. THE KEYBOARD WILL BECOME READY AGAIN AFTER THE JOB IS COMPLETED. CE SWITCH FUNCTION 'EE' WILL ABORT THE PROGRAM.

5. SECTION PROGRAM LOADING AND EXECUTION.

- 5.1 INSTALL C.E. PACK ON DISK DRIVE 1.
- 5.2 SET DISK SWS TO SELECT REMOVABLE DISK.
- 5.3 SET CE SWITCHES TO 00FE (02FE TO BYPASS STORAGE PROGRAMS OF 03FE TO ALLOW SENSE SWITCH SETTING PRIOR TO PRINTING OR BYPASS THAT PORTION OF THE I/O LSRS INCLUDED IN THE CPU TESTS).
- 5.4 OPERATE PROGRAM LOAD
- 5.5 THE FOLLOWING HALTS WILL OCCUR. AFTER EACH, OPERATE THE START KEY.
  - 1) 'EE' (ABC 123)
  - 2) 'FF5' (ABCD 12345)
  - 3) '805' (A 5) - STORAGE SEPARATOR HALT
  - 4) '805' (A 5) - STORAGE SEPARATOR HALT
 THE STORAGE SEPARATOR HALTS OCCUR ONLY IF THE SWITCH SETTING IS 00FE OR 03FE. IMPROPER SAR ADDRESSES WITH THE ABOVE HALTS OR OTHER HALTS OCCURRING AT THIS TIME SHOULD BE INVESTIGATED.
- 5.6 DCP WILL LOAD AND PERFORM HALT 'FA5' (ABCD 135) OR 'FC5' (ABCD125) IF SENSE SWITCH 07 IS ON.
- 5.7 ENTER SWITCH OPTIONS AND/OR SELECT PROGRAM SECTIONS TO BE RUN USING PROCEDURE IN 14, AND PROGRAM LIST IN DEVICE DESCRIPTIONS. (LIMIT TO 4 DISK SELECTIONS)
- 5.8 THE FIRST SECTION SELECTED WILL BE LOADED. DCP WILL HALT, DISPLAYING 'FA5' (ABCD 135) IF SENSE SWITCH IS OFF. ENTER OPTIONS AND/OR OPERATE START.

WHEN A SECTION COMPLETES EXECUTION, DCP PRINTS A MESSAGE AND PERFORMS HALT 'FE5' (ABCD 1235). START IS OPERATED, DCP LOADS THE NEXT SECTION. A SECTION CAN BE TERMINATED PREMATURELY BY UTILIZING DATA SWITCH ENTRY 'EEX'. HOWEVER, SYSTEM RESET SHOULD PRECEED THIS ABNORMAL TERMINATION TO INSURE PROPER RESET OF THE DEVICE OR ATTACHMENT BEING TESTED.

6. PROGRAM RESTART

AFTER SUCCESSFUL LOADING OF EACH SECTION, DCP STORES A PROGRAM RESTART ROUTINE STARTING AT LOCATION 0000. THIS ROUTINE CHECKS THE DATA SWITCHES AND BRANCHES TO THE FIRST ROUTINE OF THE SECTION. PROGRAM RESTART IS ACCOMPLISHED BY PUSHING SYSTEM RESET FOLLOWED BY START.

7. DATA SWITCH ENTRY

THE ROTARY DATA SWITCHES ARE THE PRIMARY COMMUNICATIONS MEDIA BETWEEN THE DIAGNOSTICS AND THE CE.

METHOD OF ENTRY---

- 7.1 STOP CPU IF NOT AT AN INDICATED HALT.
- 7.2 SET UP ROTARY SWITCHES FOR ONE OF THE FOLLOWING OPTIONS.

	1	2	3	4	
***	***	***	***	***	
F	0	X	X	X	- TURN OFF SENSE SWITCH XX
F	1	X	X	X	- TURN ON SENSE SWITCH XX
F	2	X	X	X	- GO TO ROUTINE XX AFTER ENTRY PHASE COMPLETE.
**E	E	X	X		- TERMINATE CURRENT SECTION THIS SETTING SHOULD BE PRECEDED BY SYSTEM RESET.
*D	X	X	0		- DISK--EXECUTE SECTIONS FOR DEVICE WITH UNIT CODE XX
*D	X	X	X		- DISK--EXECUTE SECTION XXX

\*COMMON SENSE SWITCHES\*  
 00 - LOOP ON SECTION.  
 01 - LOOP ON ROUTINE.  
 02 - BYPASS MANUAL INTERVENTION ROUTINES  
 03 - BYPASS ERROR PRINTING.  
 04 - BYPASS NON-ERROR PRINTING.  
 05 - PRINT ON ALTERNATE PRINTER  
 06 - BYPASS ERROR HALT.  
 07 - LOAD AND GO.

\* UP TO FOUR DISK LOAD INSTRUCTION MAY BE ENTERED DURING ONE ENTRY PHASE.

\*\* NOTE: PRIOR TO EC 571565 TO ABORT A DXXO ENTRY EACH SELECTION MUST BE LOADED AND ABORTED SEPERATELY.

- 7.3 DEPRESS START. (OR SYSTEM RESET-START MAY BE USED TO DRAW IMMEDIATE ATTENTION TO THE SWITCHES.)
- 7.4 WHEN DCP RECEIVES CONTROL, IT HALTS WITH 'FF5' (ABCD 12345) DISPLAYED. OPERATE START ONCE TO ENTER THE FIRST OPTION.
- 7.5 DCP WILL PERFORM HALT 'F05' (ABCD5). LOAD THE NEXT OPTION AND OPERATE START ONCE.
- 7.6 REPEAT STEP 7.5 FOR AS MANY OPTIONS AS DESIRED. ALTERNATING CODES 'F05' AND 'FF5' WILL SIGNAL DCP ACCEPTANCE.
- 7.7 WHEN DONE, SET SWITCH 1 TO ZERO AND START.

8. SENSE SWITCHES

SENSE SWITCHES ARE EQUIVALENT TO 48 TOGGLE SWITCHES NUMBERED HEXADECIMALLY 00-2F. SENSE SWITCHES 00-0F ARE RESERVED FOR STANDARD OPTIONS PROVIDED BY DCP (LISTED BELOW). SENSE SWITCHES 10-2F ARE SIGNIFICANT TO THE PARTICULAR SECTION BEING RUN AND WILL BE RESET

* SSW	I	ON	I	OFF	*
* NUMBER	I		I	(NORMAL)	*
* 00	I	LOOP ON SECTION.	I	GO TO NEXT SECTION*	*
* 01	I	LOOP ON ROUTINE.	I	GO TO NEXT ROUTINE*	*
* 02	I	BYPASS MANUAL INTER- VATION ROUTINES.	I	EXECUTE ALL ROU- TINES. (EXCEPT SPECIAL ROUTINES CONTROLLED BY OTHER SWITCHES)	*
* 03	I	BYPASS ERROR PRINTING	I	PRINT ERROR MES- SAGES.	*
* 04	I	BYPASS NON-ERROR PRINTING.	I	PRINT NON-ERROR MESSAGES.	*
* 05	I	USE ALTERNATE PRINTER	I	NORMAL PRINTER.	*
* 06	I	BYPASS ERROR HALT.	I	HALT AFTER ERROR.	*
* 07	I	LOAD AND GO. BYPASS COMMENTS AND PROMPTING HALTS	I	PROMPTING MODE.	*
* 09	I	LEAVE SELT. SW. ON	I	NORMAL CLEARING	*

NOTE:  
 THE 5496 WILL BE USED.

9. PRINTOUT HEADINGS

\*ID UUXX. PROG PPRR-NN. SSWS YY,YY,....,YY'

THE ABOVE LINE IS PRINTED AS A HEADING FOR ALL MESSAGES. THE FIRST POSITION CONTAINS AN ASTERISK ONLY FOR ERROR MESSAGES. VARIABLE DATA PRINTED INCLUDES--

UUXX - DEVICE IDENTIFICATION (UU) AND INDEX NUMBER (XX). THE INDEX NUMBER POINTS TO THE CORRESPONDING DEVICE INDEX TABLE (SEE DEVICE MAP CHARTS) WHICH EXPLAINS THE CONDITION CAUSING THE PRINTOUT AND POSSIBLE SUBSEQUENT HALT. WITH THE FOLLOWING EXCEPTIONS, THE DEVICE CODE IS IDENTICAL TO THAT PUNCHED IN UDT RECORDS (SEE SECTION 10).

PF - SYSTEM TEST LOADER AND SUPERVISOR AND DCP.

NOTE - 'XX' CODE '00' IS USED FOR PRINTOUTS WHICH HAVE NO SUBSEQUENT HALT. THE PRINTOUT IS USUALLY SELF-EXPLANATORY.

PPRR - TEST SECTION IDENTIFICATION (PPP) PLUS THE REVISION LEVEL (R).

NN - ROUTINE CURRENTLY BEING EXECUTED.

YY,YY,....,YY - LISTING OF SENSE SWITCHES WHICH ARE CURRENTLY ON. IF NONE ARE ON, THIS AREA IS BLANK.

10. HALT CONVENTION

THE HALT SCHEME IS COMPATIBLE WITH PRINTOUTS AS INDICATED IN THE PREVIOUS SECTION. FOR ALL UNIT TESTS, HALTS WITH CODE 'XX' OCCUR TO INDICATE AN ERROR OR INTERVENTION REQUIRED CONDITION. THIS CODE REFERS TO THE SAME INDEX TABLE REFERENCED IN PRINTOUT HEADINGS. NOTE THAT SINCE ONLY ONE DEVICE IS BEING TESTED, THE UNIT CODE IS NOT PRESENTED. THE FOLLOWING CONVENTION IS USED IN ASSIGNING 'XX' CODES- 01-9F ERROR IDENTIFIERS.  
 A0-PF OPERATING INSTRUCTIONS.

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1. SUMMARY OF DISK ERAP

1.1 GENERAL DESCRIPTION

DISK ERAP (ERROR RECORDING ANALYSIS PROGRAM) RUNS UNDER DCP ON SYSTEM/3 .

DISK ERAP CONSISTS OF:

- A) SECTION PP7
- B) SECTION PP3 (ONLY WHEN 5445 IS PRESENT. THIS DECK IS ONLY DISTRIBUTED TO SYSTEM WITH 5445)
- C) DATA MODULE (PROG ID OCF)

X'AO' MUST BE DEFINED IN THE UDT FOR DISK ERAP TO RUN

1.2 ROUTINE DESCRIPTION

ROUTINE	DESCRIPTION	SENSE SWITCH
1	PRINTS AND CLEARS (UNDER SETTING OF SSW20) HISTORY TABLE AND THE MEANING OF THE ENTRIES IN THE HISTORY TABLE.	20
2	PRINTS AND CLEARS (UNDER SETTING OF SSW20) STATISTICAL DATA RECORDING (SDR) ENTRIES THAT ARE DEFINED IN THE UNIT DEFINITION TABLE (UDT).	20
3	PRINTS AND CLEARS (UNDER SETTING OF SSW20) A. MASTER SIO TABLE (5444) B. INDIVIDUAL VOLUME STATISTICS (UNDER SETTING OF SSW21-SSW24) FOR 5444.	20 20,21,22, 23,24
4	PRINTS AND CLEARS (UNDER SETTING OF SSW20) THE 5445 INDIVIDUAL VOLUME STATISTICS.	20 25,26

1.3 DECK ORGANIZATION

THE ORDER OF THE PROGRAM DECKS ARE AS FOLLOWS WHEN RUNNING FROM THE MPCU.

SYSTEM WITH NO 5445

- 1. PP7
- 2. OCF

SYSTEM WITH 5445

- 1. PP7
- 2. PP3
- 3. OCF

ERAP CAN BE RERUN WITHOUT RELOADING. IF RUNNING FROM CARDS A MESSAGE 'RELOAD DATA DECK' WILL OCCUR WITH AN -EA- HALT IF A ROUTINE IS LOOPED ON OR ERAP IS RERUN WITHOUT RELOADING. IF THIS OCCURS, MPRO THE MPCU, PLACE THE DATA DECK IN PRIMARY HOPPER, MAKE MPCU READY, AND RESET HALT.

IT IS ESSENTIAL THAT THE CARD NUMBERS OF THE DATA DECK BE IN NUMERICAL ORDER, IF NOT A MESSAGE 'DATA CARDS NOT IN ORDER' WITH AN -EC- HALT WILL OCCUR.

## 2. OPERATING PROCEDURES (DCP CONTROLLED SECTIONS)

THIS SECTION DESCRIBES THE USER INTERFACE FOR ALL PROGRAMS OPERATING UNDER THE DIAGNOSTIC CONTROL PROGRAM (DCP). MORE DETAIL IS PROVIDED IN THE DCP USERS GUIDE (BLOCK 10).

### 2.1 LOADING

THE CE MODE SELECTOR SWITCH MUST BE IN THE 'PROCESS' POSITION. ALL CE CONTROL PANEL TOGGLE SWITCHES SHOULD BE IN THE NORMAL (DCWN) POSITION.

#### 2.1.1 LOADING ON A MODEL 10 FROM A MPCU.

1. IF DCP IS LOADED, SKIP TO STEP 5.
2. IF A DISK SYSTEM, PLACE -PROGRAM LOAD SELECTOR- IN MPCU POSITION.
3. PLACE DCP FOLLOWED BY TEST SECTION/S INTO MPCU PRIMARY HOPPER. MAKE MPCU READY.
4. DEPRESS -PROGRAM LOAD- KEY. AFTER DCP IS LOADED, A -HA- HALT WILL OCCUR. COMMON SENSE SWITCHES MAY BE SET AT THIS TIME.
5. PLACE TEST SECTION/S INTO MPCU PRIMARY HOPPER AND MAKE MPCU READY (IF NOT ALREADY DONE).
6. IF A -HA- OR -HE- HALT OCCURS SKIP TO STEP 8.
7. DEPRESS -PROGRAM LOAD- KEY. DCP WILL PRINT SECTION TERMINATE MESSAGE AND HALT WITH A -HE-.
8. RESET THE HALT. DCP WILL LOAD THE SECTION AND DISPLAY A -AA- HALT.
9. MAKE DESIRED CONSOLE SWITCHES ENTRIES, IF ANY AND RESET THE HALT.

#### 2.1.2 LOADING ON A MODEL 10 FROM DISK WITH A 5424 (MPCU) ATTACHMENT.

1. SKIP TO STEP 5 IF DCP IS ALREADY LOADED.
2. PLACE THE CE PACK ON R1 AND MAKE DRIVE 1 READY.
3. PLACE THE -PROGRAM LOAD SELECTOR- IN REMOVABLE POSITION.
4. DEPRESS -PROGRAM LOAD- KEY. AFTER DCP IS LOADED, A -HA- HALT WILL OCCUR. COMMON SENSE SWITCHES MAY BE SET AT THIS TIME.
5. USE CONSOLE SWITCHES ENTRY -DXXI- (XXX - PROG ID) TO SPECIFY THE PROGRAMS TO BE LOADED. (SEE SECTION 2.4)
6. SET LEFTMOST SWITCH TO -0- AND RESET HALT. DCP WILL LOAD THE SECTION AND DISPLAY A -HA- HALT.
7. MAKE ANY CONSOLE SWITCH ENTRY DESIRED AND/OR RESET HALT.

#### 2.1.3 LOADING ON A MODEL 10 FROM DISK WITH A 5422 ATTACHMENT.

1. SKIP TO STEP 5 IF DCP IS ALREADY LOADED.
2. PLACE THE CE PACK ON R1 AND MAKE DRIVE 1 READY.
3. PLACE THE -PROGRAM LOAD SELECTOR- IN REMOVABLE POSITION.
4. PLACE -00FE- IN DATA SWITCHES AND DEPRESS -PROGRAM LOAD- KEY.

CPU AND MEMORY TEST ARE LOADED AND RUN BEFORE DCP IS LOADED. THE ORDER OF THE CPU AND MEMORY HALT ARE LISTED BELOW. RESET THE HALTS IF THEY OCCUR IN THE FOLLOWING ORDER. IF THE HALTS AREN'T IN THE PROPER ORDER REFER TO BLOCK 5. WHEN THE -HE- HALT OCCURS GO TO STEP 5.

HALTS  
A) -CC-  
B) -LL-  
C) -8P-  
D) -HE-

5. USE CONSOLE SWITCHES ENTRY -DXXI- (XXX - PROG ID) TO SPECIFY THE PROGRAM/S TO BE LOADED. (SEE SECTION 2.4)
6. SET LEFTMOST SWITCH TO -0- AND RESET HALT. DCP WILL LOAD THE SECTION AND DISPLAY A -HA- HALT.
7. MAKE ANY CONSOLE SWITCH ENTRY DESIRED AND/OR RESET HALT.

#### 2.1.4 LOADING ON A MODEL 6 FROM DISK.

1. SKIP TO STEP 8 IF DCP IS ALREADY LOADED.
2. LOAD THE CE PACK ON R1 AND MAKE DRIVE 1 READY.
3. PLACE THE -PROGRAM LOAD SELECTOR- IN REMOVABLE POSITION.
4. SET DATA SWITCHES TO -00FE- (-02FE- TO BYPASS STORAGE PROGRAMS OR -03FE- TO ALLOW SENSE SWITCH SETTING PRIOR TO PRINTING OR BYPASS THAT PORTION OF I/O LSRS INCLUDED IN THE CPU TESTS).
5. OPERATE PROGRAM LOAD.
6. THE FOLLOWING HALTS WILL OCCUR. AFTER EACH, OPERATE THE START KEY.

A) -EP-           {ABC 123}  
B) -FP5-        {ABCD 12345}  
C) -805-        {A        5}  
D) -805-        {A        5}    STORAGE SEPARATOR HALT.  
                                  STORAGE SEPARATOR HALT.

THE STORAGE SEPARATOR HALTS OCCUR ONLY IF THE DATA SWITCH ENTRIES ARE -00FE- OR -03FE-. OTHER HALTS OCCURRING AT THIS TIME SHOULD BE INVESTIGATED.

7. DCP WILL LOAD AND PERFORM A -FA5- (ABCD 1 3 5) HALT.
8. USE CONSOLE SWITCHES ENTRY -DXXI- (XXX -PROG ID) TO SPECIFY THE PROGRAM/S TO BE LOADED. (SEE SECTION 2.4)
9. SET LEFTMOST SWITCH TO -0- AND RESET HALT. DCP WILL LOAD THE SECTION AND DISPLAY A -FA5- (ABCD 1 3 5) HALT.
10. MAKE ANY CONSOLE DATA SWITCH ENTRY DESIRED AND/OR RESET HALT.

### 2.2 PROGRAM RESTART

DCP STORES INSTRUCTIONS STARTING AT LOCATION '0000' TO PROVIDE FOR A PROGRAM RESTART. THESE INSTRUCTIONS ALSO CHECK THE CONSOLE SWITCHES FOR A VALID ENTRY. TO PERFORM A PROGRAM RESTART, SIMPLY DEPRESS SYSTEM RESET FOLLOWED BY CPU START.

### 2.3 TERMINATION

NORMAL DCP-CONTROLLED CHAINING FROM ROUTINE TO ROUTINE PROVIDES AN AUTOMATIC TERMINATION OF A SECTION. IN ADDITION, THE CE MAY TERMINATE A SECTION AT ANY TIME BY (1) ENTERING 'EE00' IN THE CONSOLE SWITCHES, OR BY (2) LOADING THE NEXT SECTION. IN ALL CASES, DCP PRINTS A MESSAGE AND PERFORMS HALT 'HE'. THE SECTION CAN STILL BE RESTARTED AT THIS TIME BY USING THE PROGRAM RESTART PROCEDURE. IF NO RESTART IS DESIRED, RESET THE HALT TO LOAD THE NEXT SECTION.

2.4 CONSOLE ADDRESS/DATA SWITCH COMMUNICATIONS

THE ROTARY DATA SWITCHES ARE THE MEANS BY WHICH THE CE CAN COMMUNICATE WITH THE DIAGNOSTICS. ENTRIES ARE MADE AS FOLLOWS--

1. STOP CPU.
2. SET UP ROTARY SWITCHES FOR ONE OF THE FOLLOWING OPTIONS. X'S INDICATE POSITIONS WHICH VARY WITH THE NEED.

SWITCHES		1	2	3	4
P	0	X	X	X	
P	1		X	X	
P	2	X	X		
E	E 0	0			
D	X	X	0		
D	X	X	X		

- TURN OFF SENSE SWITCH 'XX'. (F008 WOULD TURN OFF SSW 08).  
 - TURN ON SENSE SWITCH 'XX'. (F108 WOULD TURN ON SSW 08).  
 - GO TO ROUTINE 'XX' AFTER CONSOLE ENTRY FINISHED. (F202 WOULD GO TO ROUTINE 2).  
 - TERMINATE THE CURRENT SECTION.  
 - DISK--EXECUTE SECTIONS FOR DEVICE WITH UNIT CODE 'XX'. (DE00 - EXECUTE ALL 5203 PRINTER PROGRAMS)  
 - DISK--EXECUTE SECTION 'XX'. (DE01 - SECTION E01). (DE01 - EXECUTE SECTION E01)

NOTE - UP TO FOUR DISK INSTRUCTIONS MAY BE ENTERED DURING ONE ENTRY PHASE.

3. DEPRESS CPU START. (SYSTEM RESET FOLLOWED BY START WILL CALL IMMEDIATE ATTENTION TO THE SWITCHES--SEE NOTE BELOW).
4. WHEN DCP RECEIVES CONTROL, IT HALTS WITH 'HP' DISPLAYED. RESET THE HALT TO ENTER THE FIRST OPTION.
5. DCP WILL PERFORM HALT 'HU' OR 'HP'. LOAD THE NEXT OPTION AND RESET THE HALT.
6. REPEAT STEP 5 FOR AS MANY OPTIONS AS DESIRED. ALTERNATING CODES 'HU' AND 'HP' WILL SIGNAL DCP ACCEPTANCE.
7. WHEN DONE, SET LEFTMOST SWITCH TO '0' AND RESET THE HALT.

NOTE - WHEN USING F2XX IN THE SWITCHES TO GO TO A ROUTINE AFTER A SECTION HAS BEGUN, SYSTEM RESET/START SHOULD BE PERFORMED BEFORE MAKING THE ENTRY. (THIS PREVENTS ERRORS FOUND IN ONE ROUTINE FROM BEING DETECTED IN SOME OTHER ROUTINE. IT SHOULD NOT BE PERFORMED IF OTHERWISE SPECIFIED IN THE MAPS.)

2.5 COMMON SENSE SWITCHES

SENSE SWITCHES ARE EQUIVALENT TO 48 TOGGLE SWITCHES NUMBERED HEXADECIMALLY 00-2F. SENSE SWITCHES 00-0F ARE RESERVED FOR STANDARD OPTIONS PROVIDED BY DCP (LISTED BELOW). SENSE SWITCHES 10-2F ARE SIGNIFICANT TO THE PARTICULAR SECTION BEING RUN. INSTRUCTIONS FOR SETTING SENSE SWITCHES ARE CONTAINED IN SECTION 2.4.

SSW	I	ON	I	OFF
NUMBER	I		I	(NORMAL)
00	I	LOOP ON SECTION.	I	GO TO NEXT SECTION.
01	I	LOOP ON ROUTINE.	I	GO TO NEXT ROUTINE.
02	I	BYPASS MANUAL INTERVENTION ROUTINES.	I	EXECUTE ALL ROUTINES.
03	I	BYPASS ERROR PRINTING.	I	PRINT ERROR MESSAGES.
04	I	BYPASS NON-ERROR PRINTING.	I	PRINT NON-ERROR MESSAGES.
05	I	USE ALTERNATE PRINTER. PRINTER KEYBOARD, IF ATTACHED. OTHERWISE, MFCU.	I	NORMAL PRINTER.
06	I	BYPASS ERROR HALTS.	I	HALT AFTER ERROR.
07	I	LOAD AND GO. BYPASS COMMENTS AND PROMPTING HALTS.	I	PROMPTING MODE.
08	I	USE 5203 RIGHT CARRIAGE.	I	USE LEFT CARRIAGE.
09	I	DON'T CLEAR SECTION SENSE SWITCHES AFTER LOADING	I	CLEAR SECTION SENSE SWITCHES AFTER LOADING
0A-0F	I	RESERVED		

2.6 CONTROL PROGRAM HALTS.

ALL CONTROL PROGRAM (DCP) HALTS USE THE CHARACTER 'H' AS THE FIRST DIGIT OF THE HALT CODE. THE SECOND DIGIT IDENTIFIES THE CONDITION ACCORDING TO THE FOLLOWING TABLE.

HALT CODES	I	CONDITION	I	ACTION
MODEL	I		I	REQUIRED
6	I	10	I	
F05	I	H0	I	INVALID RECORD FOUND WHILE LOADING. CORRECT INVALID RECORD AND RELOAD.
F15	I	H1	I	A DEVICE CALLED FOR BY THE TEST SECTION WAS NOT DEFINED IN THE UDT CARDS. CHECK UDT CARDS AND RELOAD OR RESET HALT TO BYPASS THE ERROR (ERRORS COULD RESULT).
F25	I	H2	I	DATA SWITCH ENTRY ERROR. CORRECT DATA SWITCHES AND RESET HALT.
F35	I	H3	I	INVALID ROUTINE PREFIX FOUND DURING CHAINING FROM ONE ROUTINE TO NEXT. ENTER ROUTINE SELECT OPTION 'F2XX' IN DATA SWITCHES AND RESET HALT. IF THIS DOES NOT WORK, RELOAD SECTION.
F55	I	H5	I	MFCU NOT READY OR ERROR. ERROR INDICATION SHOULD BE DISPLAYED IN THE MFCU LIGHTS. DO A NON-PROCESS RUN-OUT, RELOAD DECK STARTING WITH RUNOUT CARD/S AND RESET THE HALT.
F65	I	H6	I	PRINTER NOT READY OR ERROR. CLEAR CONDITION AND RESET THE HALT. IF FAILURE PERSISTS, RUN PRINTER FUNCTION TEST. SENSE SWITCHES 03 AND 04 MAY BE USED TO BYPASS PRINTING. SET SENSE SWITCH 05 TO USE ALTERNATE PRINTER.
F75	I	H7	I	DISK ERROR. RESET HALT TO RETRY. IF ERROR PERSISTS, RELOAD.
FA5	I	HA	I	CONTROL PROGRAM IS PREPARED TO RECEIVE DATA SWITCH ENTRY. OCCURS AFTER DCP AND SECTION LOADING. RESET THE HALT IF NO ENTRY DESIRED. TO LOAD OPTIONS, SET UP DATA SWITCHES AND RESET THE HALT. SSW 07 MAY BE USED TO BYPASS THIS HALT.
FC5	I	HC	I	DISK LOADER REQUIRES SPECIFICATION OF SECTIONS TO BE LOADED FROM DISK. IF NO ENTRY HAS BEEN MADE PREVIOUSLY, LOAD PROGRAM SELECTION ENTRY 'DXXX' AND RESET THE HALT. UP TO EIGHT ENTRIES MAY BE MADE. IF ENTRIES HAVE EVER BEEN MADE, THE PROGRAMS MAY BE REPEATED BY RESETTING THE HALT.
FD5	I	HD	I	SECTION RUNNING OR LOAD TABLE HAS SPECIFIED NEXT SECTION TO BE RUN. DISK SYSTEM - DXXX IS NOT ON DISK PACK, RESET THE HALT AND THE NEXT PROGRAM IN THE LOAD TABLE WILL BE LOADED. CARD SYSTEM - PLACE DECK KXX IN THE MFCU HOPPER AND RESET THE HALT.
FE5	I	HE	I	CURRENT SECTION TERMINATED. RESET HALT TO LOAD NEXT SECTION. SECTION MAY BE RESTARTED BY SYSTEM RESET/START.
FF5	I	HF	I	DCP HALTS WITH 'HP' DISPLAYED WHENEVER A VALID DATA SWITCH ENTRY IS RECOGNIZED. AS DCP ACCEPTS ENTRIES, ALTERNATING HALTS 'HU' AND 'HP' OCCUR. LOAD A VALID DATA SWITCH ENTRY AND RESET THE HALT. REPEAT FOR ALTERNATING HALTS 'HU' AND 'HP'. TO TERMINATE ENTRY PROCEDURE, ROTATE LEFT-MOST SWITCH TO ZERO AND RESET HALT.
D1	I	D1	I	IPL LOADER CAN'T LOAD DCP BECAUSE OF A DISK ERROR. RESET HALT TO RETRY. IF HALT PERSISTS, GET A NEW DISK PACK.



3. SENSE SWITCH DESCRIPTION

SENSE SWITCH	MEANING										
20	RE-INITIALIZE AREA IN ERROR RECORDING AREA ON DISK THAT IS BEING PRINTED OUT SSW20 = 0 CLEAR AREA SSW20 = 1 DONT CLEAR AREA										
2X X=1-4	PRINT AND CLEAR (UNDER SETTING OF SSW20) THE INDIVIDUAL VOLUME STATISTICS ON VOLUME X OF 5444. VOL 3 AND 4 WILL NOT BE PRINTED UNLESS X'80' IS DEFINED IN THE UDT.  SSW2X = 0 DONT PRINT VOLUME X ON 5444 SSW2X = 1 PRINT VOLUME X ON 5444.  <table border="1"> <thead> <tr> <th>VOLUME NUMBER</th> <th>DRIVE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1 FIXED</td> </tr> <tr> <td>2</td> <td>1 REMOV</td> </tr> <tr> <td>3</td> <td>2 FIXED</td> </tr> <tr> <td>4</td> <td>2 REMOV</td> </tr> </tbody> </table>	VOLUME NUMBER	DRIVE	1	1 FIXED	2	1 REMOV	3	2 FIXED	4	2 REMOV
VOLUME NUMBER	DRIVE										
1	1 FIXED										
2	1 REMOV										
3	2 FIXED										
4	2 REMOV										
25	PRINT AND CLEAR (UNDER SETTING OF SSW20) THE INDIVIDUAL VOLUME STATISTICS OF DRIVE 1 OF 5445.										
26	PRINT AND CLEAR (UNDER SETTING OF SSW20) THE INDIVIDUAL VOLUME STATISTICS OF DRIVE 2 OF 5445.										

4. HALT DESCRIPTION

HALT	MEANING	CE ACTION										
EA	RELOAD DATA CARDS. THIS HALT WILL ONLY OCCUR UNDER CARD DCP AND IF A ROUTINE IS RUN MORE THAN ONCE PER LOAD.	RELOAD DATA CARDS (PROGRAM ID = OCP) INTO PRIMARY HOPPER RESET HALT.										
EC	DATA CARDS ARE NOT IN ORDER.	CARD DCP. RESORT DATA CARDS (PROGRAM ID = OCP) RERUN DISK ERAP DISK DCP. RE-INITIALIZE DCP DISK PACK, MAKE SURE DATA CARDS ARE IN ORDER. RERUN DISK ERAP										
EE	DATA DECK (PROG ID = OCP) IS NOT THE RIGHT LEVEL.	DISK ERAP WILL NOT RUN UNLESS THE LEVEL NUMBER OF OCP IS THE NUMBER PRINTED ON THE PRINTER. FIND THAT LEVEL AND RESET THE HALT.										
FO	SELECT VOLUME(S) ON 5444 TO PRINT INDIVIDUAL VOLUME STATISTICS.	SET SSW2X (X=1-4) AS DESIRED. RESET HALT.										
FX X=1-4	VOLUME X IS NOT READY ON 5444 OR A NON-RECOVERABLE ERROR HAS OCCURRED ON VOLUME X  <table border="1"> <thead> <tr> <th>VOLUME NUMBER</th> <th>DRIVE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1 FIXED</td> </tr> <tr> <td>2</td> <td>1 REMOV</td> </tr> <tr> <td>3</td> <td>2 FIXED</td> </tr> <tr> <td>4</td> <td>2 REMOV</td> </tr> </tbody> </table>	VOLUME NUMBER	DRIVE	1	1 FIXED	2	1 REMOV	3	2 FIXED	4	2 REMOV	MAKE SURE VOLUME X IS READY AND EITHER 1. RESET HALT AND TRY AGAIN OR 2. RUN DISK FUNCTION TESTS
VOLUME NUMBER	DRIVE											
1	1 FIXED											
2	1 REMOV											
3	2 FIXED											
4	2 REMOV											
F5	5445 DISK ERROR. CHECK PRINTOUT ON PRINTER TO DETERMINE WHICH DRIVE.	MAKE SURE DRIVE IS READY. RESET THE HALT, IF HALT PERSIST RUN 5445 DIAGNOSTICS.										
FC	SELECT DRIVE(S) ON 5445 FOR INDIVIDUAL VOLUME STATISTICS.	SET SSW 25,26 AS DESIRED. RESET THE HALT										

5. DETAIL ROUTINE DESCRIPTION

5.1 ROUTINE 1

THIS ROUTINE PRINTS ALL RECORDED ENTRIES IN THE ERROR HISTORY TABLE IN CHRONOLOGICAL ORDER, OLDEST FIRST.  
 HERE IS A LIST OF DEVICES THAT CAN BE IN THE ERROR HISTORY TABLE.

1. 5444 -DISK
2. BSCA
3. 5471 -CONSOLE-PRINTER
4. 1442
5. 5424 -MFCU
6. 5203 -PRINTER
7. 2265
8. PRINTER MODEL 6 (5213 OR 2222)
9. LCD
10. CONSOLE MODEL 6
11. 5496 -DATA RECORDER
12. 1403 -PRINTER
13. 5445 -DISK

5.2 ROUTINE 2

THIS ROUTINE PRINTS ALL SDR (STATISTICAL DATA RECORDING) TABLES FOR DEVICES THAT ARE DEFINED IN THE UDT TABLE.  
 HERE IS A LIST OF DEVICES THAT HAVE A SDR TABLE WITH THEIR UDT CODE.

```

    DEVICE UDT CODE
    *****
    * 5444 * X'A0' *
    * 5471 * X'10' *
    * 1442 * X'50' *
    * 5203 * X'E0' *
    * 1403 * X'E0' *
    * 5424 * X'P0' *
    * 5445 * X'CO' *
    *****
    * 5213 - 2222 * X'80' *
    * LCD * X'E9' *
    * 5496 * X'P8' *
    * 2265 * X'90' *
    * CONSOLE MODEL 6 * X'12' *
    *****
    
```

ALL VALUES IN THE SDR TABLE ARE PRINTED IN DECIMAL.

5.3 ROUTINE 3

THIS ROUTINE PRINTS THE MASTER SIO TABLE AND THE INDIVIDUAL VOLUME STATISTICS (IVS) AFTER THE MASTER SIO TABLE IS PRINTED A -P0- HALT WILL OCCUR TO LET THE CE TO SET SSW21-24 FOR SELECTION OF VOLUMES. AFTER ALL SELECTED INDIVIDUAL VOLUME STATISTICS HAVE BEEN PRINTED THE -P0- HALT WILL OCCUR AGAIN. AT THIS TIME THE CE CAN

1. REMOUNT NEW VOLUMES AND RESET SSW21-24 TO OBTAIN MORE INDIVIDUAL VOLUME STATISTICS. THIS LOOP WILL OCCUR UNTIL THERE ARE NO PRINTOUTS.
- OR
2. CLEAR SSW21-24 AND RESET HALT. THIS WILL TERMINATE ROUTINE 3.

'B0' MUST BE DEFINED IN THE UDT TABLE TO OBTAIN INDIVIDUAL VOLUME STATISTICS FROM VOLUME 3 AND 4.

INDIVIDUAL VOLUME STATISTICS FOR VOLUMES WHICH HAVE A NON-STANDARD FORMAT FOR SYSTEM 3 DISK OPERATING SYSTEM WILL NOT BE PRINTED, A MESSAGE 'VOL X IS A NON-STANDARD PACK' WILL BE PRINTED, (X=1,4) IN THE IVS TABLE.

```

    VOL # DRIVE
    *****
    * 1 * 1 FIXED *
    * 2 * 1 REMOV *
    * 3 * 2 FIXED *
    * 4 * 2 REMOV *
    *****
    
```

ALL VALUES IN THE MASTER SIO TABLE AND INDIVIDUAL VOLUME STATISTICS ARE PRINTED IN DECIMAL.

IF RUNNING FROM DISK THE CE CAN REMOVE THE DCP DISK PACK -- ( ONLY AFTER THE -P0- HALT ) -- TO MOUNT OTHER VOLUMES ON THAT DRIVE TO OBTAIN MORE INDIVIDUAL VOLUME STATISTICS. THE DCP DISK PACK WILL NEED TO BE REMOUNTED AFTER TERMINATION OF ERAP OR RERUN OF ERAP.

5.4 ROUTINE 4

THIS ROUTINE PRINTS THE 5445 INDIVIDUAL VOLUME STATISTICS. WHEN THE -PC- HALT OCCURS YOU CAN:

1. REMOUNT NEW VOLUMES AND RESET SSW25-26 TO OBTAIN MORE INDIVIDUAL VOLUME STATISTICS. THIS LOOP WILL OCCUR UNTIL THERE ARE NO PRINTOUTS.
- OR
2. CLEAR SSW25-26 AND RESET HALT. THIS WILL TERMINATE ROUTINE 4.

SINCE ROUTINE 4 IS AN OVERLAY TO THE DISK ERAP YOU CAN'T GO TO ROUTINE 4 JUST AFTER ERAP HAS BEEN LOADED. RTN 4 CAN BE GONE TO THRU THE DATA SWITCHES (P 2 0 4) ONLY AFTER ANY ONE OF THE FIRST THREE ROUTINE HAVE STARTED TO BE EXECUTED. -C8- MUST BE DEFINED IN THE UDT TO OBTAIN PRINTOUT FROM DRIVE TWO.

## 6. TABLE DESCRIPTION

### 6.1 ERROR HISTORY TABLE

THE HISTORY TABLE PROVIDES FOR 63 ENTRIES AND IS RECURSIVE WITH NO OVERFLOW OR STOP LOGIC PROVIDED ON RECORDING. THE 64TH TIME AN ENTRY IS MADE IT WILL OVERLAY THE FIRST ENTRY, THE 65TH ENTRY WILL OVERLAY THE SECOND, ETC. THEREFORE THE HISTORY CAN OBTAIN AT MOST 63 ENTRIES. 5444 (DISK) ENTRIES ARE DOUBLE ENTRIES.

THE HISTORY TABLE WILL CONTAIN PERMANENT AND TEMPORARY ERRORS. TEMPORARY ERRORS ON DISK WILL CONTAIN A RETRY COUNT WHICH TELLS THE NUMBER OF RETRIES. THE RETRY COUNT WILL BE ZERO FOR PERMANENT ERRORS ON DISK. TEMPORARY ERRORS FOR BSCA WILL NOT BE RECORDED. A PERMANENT ERROR IS DEFINED AS ONE THAT PERSISTS THROUGHOUT THE NUMBER OF RETRIES OUTLINED IN THE ERROR RECOVERY PROCEDURES. A TEMPORARY ERROR IS DEFINED AS ONE WHERE RECOVERY OCCURS BEFORE THE MAXIMUM NUMBER OF RETRIES.

ERRORS ARE PRINTED IN CHRONOLOGICAL ORDER, OLDEST FIRST.

IN GENERAL, EACH ENTRIES IN THE ERROR HISTORY TABLE CONTAINS

1. Q AND R BYTES OF THE SIO INSTRUCTION (THE R BYTE IS NOT RECORDED FOR BSCA).
2. SENSE BYTE 0 AND 1 OF THE ERROR CONDITION.

FOR SOME DEVICES, MORE DATA IS RECORDED IN THE ERROR HISTORY TABLE THAN THE Q,R,SENSE BYTE 0-1. THIS ADDITIONAL DATA WILL BE PRINTED OUT AND EXPLAINED FOR EACH DEVICE.

### 6.2 MASTER DISK SIO TABLE FOR 5444.

THE MASTER SIO TABLE HAS COUNTERS FOR WRITES & VERIFIES AND READ & SCAN FOR EACH DRIVE.

ALL NUMBERS ARE PRINTED IN DECIMAL.

### 6.3 INDIVIDUAL VOLUME STATISTICS (IVS) DISK TABLE ON 5444.

THE IVS TABLE CONTAIN THE VOLUME ID, A COUNTER FOR TEMPORARY ERROR ON THE VOLUME, A COUNTER FOR THE NUMBER OF WRITES & VERIFIES ON THE VOLUME, A COUNTER FOR THE NUMBER OF READ & SCANS ON THE VOLUME, AND THE LOCATION OF UP TO THE LAST 12 PERMANENT DISK ERRORS.

THE TEMPORARY ERROR COUNTER CONTAINS THE COUNT OF MISSING ADDRESS MARKER, DATA CHECK ON READ, DATA CHECK ON WRITE, AND DATA CHECK IN IDENTIFIER.

A WRITE & VERIFY AND READ & SCAN WILL EACH BE RECORDED AS A SINGLE OPERATION.

THE NUMBER OF SEEK ARE NOT COUNTED.

ALL NUMBERS ARE PRINTED IN DECIMAL.

A MESSAGE 'VOL X IS A NON-STANDARD PACK' WILL BE PRINTED IN THE IVS TABLE IF THE PACK HAS A NON-STANDARD FORMAT FOR SYSTEM 3 DISK OPERATING SYSTEM.

```
VOL #   DRIVE
*****
*   1   * 1  FIXED *
*   2   * 1  REMOV *
*   3   * 2  FIXED *
*   4   * 2  REMOV *
*****
```

### 6.4 STATISTICAL DATA RECORDING (SDR) TABLES

EACH DEVICE SDR TABLE WILL CONSIST OF COUNTERS TO RECORD DISSTINGUISHABLE ERROR FOR THAT DEVICE. THE 5444 DEVICE HAS TEMPORARY AND PERMANENT COUNTERS. A PERMANENT ERROR IS DEFINED AS ONE PERSISTS THROUGHOUT THE NUMBER OF RETRIES OUTLINED IN THE ERROR RECOVERY PROCEDURES. A TEMPORARY ERROR IS DEFINED AS ONE WHERE RECOVERY OCCURS BEFORE THE MAXIMUM NUMBER OF RETRIES.

ALL NUMBERS ARE PRINTED IN DECIMAL.

### 6.5 INDIVIDUAL VOLUME STATISTICS (IVS) DISK TABLE ON 5445.

THE IVS TABLE CONTAIN THE VOLUME ID, A COUNTER FOR TEMPORARY ERROR ON THE VOLUME, A COUNTER FOR THE NUMBER OF WRITES & VERIFIES ON THE VOLUME, A COUNTER FOR THE NUMBER OF READ & SCANS ON THE VOLUME, AND THE LOCATION OF UP TO THE LAST 122 PERMANENT DISK ERRORS.

THE TEMPORARY ERROR COUNTER CONTAINS THE COUNT OF MISSING ADDRESS MARKER, DATA CHECK ON READ, DATA CHECK ON WRITE, AND DATA CHECK IN IDENTIFIER.

A WRITE & VERIFY AND READ & SCAN WILL EACH BE RECORDED AS A SINGLE OPERATION.

THE NUMBER OF SEEK ARE NOT COUNTED.

ALL NUMBERS ARE PRINTED IN DECIMAL, EXCEPT THE PERMANENT ERRORS ARE PRINTED IN HEX AS -CCHH- WHERE CC IS CYLINDER AND HH IS HEAD.

A MESSAGE 'VOL X IS A NON-STANDARD PACK' WILL BE PRINTED IN THE IVS TABLE IF THE PACK HAS A NON-STANDARD FORMAT FOR SYSTEM 3 DISK OPERATING SYSTEM.

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## 1. PROGRAM SUMMARY

1.1 PURPOSE - THE PURPOSE OF THIS PROGRAM IS TO CHECK ALL SYSTEM METERS FOR CORRECT OPERATION.

## 2. OPERATING PROCEDURES

## 2.1 PREPARATION

DCP MUST BE PROPERLY CONFIGURED BEFORE RUNNING THIS TEST. THE 'CPU' AND 'UDT' INFORMATION MUST ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION.

## 2.2 PROGRAM LOADING

THE PROGRAM IS LOADED FROM DISK USING THE STANDARD SELECT PROCEDURE (DPEA) DESCRIBED IN SECTION 06. OF THE BLOCK 01 OF THE USERS GUIDE.

## 2.3 PROGRAM OPERATION

TO ASSURE THOROUGH TESTING, THE TEST SHOULD BE RUN TWICE.

SPECIAL OPERATING PROCEDURES ARE REQUIRED IN ORDER TO OBTAIN OPTIMUM TEST RESULTS.

NOTE THE FOLLOWING POINTS:

- 1) NO OTHER PROGRAM SHOULD BE RUN CONCURRENTLY WITH THIS TEST.
- 2) A CE METER KEY IS REQUIRED TO OBTAIN COMPLETE TEST RESULTS.
- 3) THIS PROGRAM WILL CHECK THE AVAILABLE DISK FOR UNIT CHECK OR NOT READY. IF A UNIT CHECK OR NOT READY IS DETECTED, A HALT WILL OCCUR.

A HALT WITH AN ID OF ABCD135 WILL OCCUR AFTER CORRECT LOADING OF THE METER TEST. TO ADVANCE TO THE FIRST METER TEST, THE OPERATOR WILL PLACE THE START/STOP SWITCH IN THE START POSITION.

THIS MODULE IS DIVIDED INTO SIX SEPARATE METER CHECKS.

- 1) CHECKOUT OF ALL CUSTOMER METERS
- 2) CHECKOUT OF THE CE METER
- 3) CHECKOUT OF THE CUSTOMER I/O 2 METER
- 4) CHECKOUT OF THE CUSTOMER I/O 1 METER
- 5) CHECKOUT OF THE CUSTOMER CPU METER USING INTERRUPT REQUEST
- 6) CHECKOUT OF THE CUSTOMER CPU METER USING CYCLE STEAL

## 3. PROGRAM CONTENT AND OPERATION

## 3.1 CHECKOUT OF ALL CUSTOMER METERS

THE TEST BEGINS BY INTERROGATING THE DCP UDT SECTION FOR THE AVAILABILITY OF DISK DRIVE 1 AND DISK DRIVE 2. THE PROGRAM THEN PROCEEDS TO PRINT THE FOLLOWING MESSAGE FOLLOWED BY A HALT:

ROUTINE 1  
CHECKOUT OF ALL CUSTOMER METERS

REMOVE CE METER KEY

THE FOLLOWING UNITS ARE AVAILABLE AND WILL BE USED IN THE METER TEST

A0 - DISK DRIVE 1  
B0 - DISK DRIVE 2

CORRECT DCP UDT AND RESTART TEST IF ABOVE INFO. IS INCORRECT. IF CORRECT, ENABLE START SWITCH.

THE DEVICE AVAILABLE INFORMATION IS CHECKED FOR ACCURACY, IF INCORRECT, THE OPERATOR SHOULD CORRECT THE DCP UDT AND RESTART THE TEST. IF THE DEVICE AVAILABLE INFORMATION IS CORRECT, THE OPERATOR WILL PLACE THE START/STOP SWITCH IN THE START POSITION. THE PROGRAM WILL PROCEED TO CHECK THE DEVICES MENTIONED FOR UNIT CHECK. IF ONE OF THE DISK DRIVES IS FOUND TO HAVE A UNIT CHECK OR NOT READY, THE PROGRAM WILL COME TO A HALT. IF NO UNIT CHECK OR NOT READY CONDITION IS FOUND, A HALT WILL OCCUR AFTER PRINTING OF THIS MESSAGE.

--- RECORD ALL METER READINGS ---

TEST COMPLETION WILL BE INDICATED BY A HALT OF ABD4, AND WILL OCCUR 72 SEC. AFTER TEST START.

UPON COMPLETION, RECORD METER READINGS.

THE DIFFERENCE BETWEEN THE FIRST AND THE LAST METER READINGS SHOULD BE 0.02 HOURS.  
CE METER SHOULD NOT ADVANCE DURING THIS TIME.

AFTER COMPLETION OF METER TEST, ENABLE START SWITCH TO ADVANCE TO NEXT METER TEST.

TO BEGIN THE 72 SEC. METER TEST ENABLE THE START SWITCH.

THE OPERATOR WILL PROCEED TO TAKE READINGS OFF ALL CUSTOMER METERS. AFTER ASSURING THAT THE CE KEY HAS BEEN REMOVED, THE OPERATOR WILL PLACE THE CPU START/STOP SWITCH IN THE START POSITION. THE 72 SECOND METER TEST STARTS WITH THE AVAILABLE DISK/DISKS DOING A SREK SIO COMMAND.

THE PROGRAM WILL THEN GO INTO A LOOP AND REMAIN IN THAT LOOP UNTIL THE PERIOD OF 72 SECONDS EXPIRES. A HALT ABD4 WILL OCCUR. THE OPERATOR WILL TAKE METER READINGS. THE FOLLOWING CONDITIONS SHOULD HAVE TRANSPIRED:

- 1) CUSTOMER CPU AND I/O (IF AVAILABLE) METERS ADVANCED 0.02 HOURS.
- 2) CE METER SHOULD NOT HAVE ADVANCED DURING THIS 72 SECOND METER RUN.

## 3.2 CHECKOUT OF THE CE METER

TO BEGIN THE SECOND TEST THE OPERATOR WILL PLACE THE SYSTEM START/STOP SWITCH IN THE START POSITION, THE SECOND ROUTINE BEGINS BY INTERROGATING THE DCP UDT SECTION FOR THE AVAILABILITY OF DISK DRIVE 1 AND DISK DRIVE 2. THE PROGRAM THEN PROCEEDS TO PRINT THE FOLLOWING MESSAGE FOLLOWED BY A HALT:

ROUTINE 2  
CE METER TEST

THE FOLLOWING UNITS ARE AVAILABLE AND WILL BE CHECKED IN THE CE METER TEST.

A0 - DISK DRIVE 1  
B0 - DISK DRIVE 2

CORRECT DCP UDT AND RESTART TEST IF ABOVE INFO. IS INCORRECT. IF CORRECT, PLACE START/STOP SWITCH IN THE START POSITION.

THE DEVICE AVAILABLE INFORMATION IS CHECKED FOR ACCURACY, IF INCORRECT, THE OPERATOR SHOULD CORRECT THE DCP UDT AND RESTART THE TEST. IF THE DEVICE AVAILABLE INFORMATION IS CORRECT, THE OPERATOR WILL PLACE THE START/STOP SWITCH IN THE START POSITION. THE PROGRAM WILL PROCEED TO CHECK THE DEVICES MENTIONED FOR UNIT CHECK. IF ONE OF THE DISK DRIVES IS FOUND TO HAVE A UNIT CHECK OR NOT READY, THE PROGRAM WILL COME TO A HALT. IF NO UNIT CHECK OR NOT READY CONDITION IS FOUND, A HALT WILL OCCUR AFTER PRINTING OF THIS MESSAGE:

--- RECORD ALL METER READINGS ---  
TEST COMPLETION WILL BE INDICATED BY A HALT OF ABD4, AND WILL OCCUR 72 SECONDS AFTER TEST START.  
UPON COMPLETION, RECORD METER READINGS  
THE DIFFERENCE BETWEEN THE FIRST AND THE LAST METER READINGS SHOULD BE 0.02 HOURS.  
CUSTOMER I/O AND CPU METERS SHOULD NOT ADVANCE DURING THIS TIME.

AFTER COMPLETION OF THE METER TEST, ENABLE START SWITCH TO ADVANCE TO NEXT METER TEST

TURN CE KEY TO CE METER POSITION

TO BEGIN THE (7 SEC. METER TEST ENABLE THE START SWITCH.

THE OPERATOR WILL PROCEED TO TAKE CE METER READING. AFTER ASSURING THAT THE CE KEY IS IN THE CE METER POSITION, THE OPERATOR WILL PLACE THE CPU START/STOP SWITCH IN THE START POSITION. THE 72 SECOND METER TEST STARTS WITH THE AVAILABLE DISK/DISKS DOING A SEEK SIO COMMAND.

THE PROGRAM WILL THEN GO INTO A LOOP AND REMAIN IN THAT LOOP UNTIL THE PERIOD OF 72 SECONDS EXPIRES. A HALT ABD4 WILL OCCUR. THE OPERATOR WILL TAKE METER READINGS. THE FOLLOWING CONDITIONS SHOULD HAVE TRANSPIRED:

- 1) CE METER ADVANCED 0.02 HOURS.
- 2) CUSTOMER METERS SHOULD NOT HAVE ADVANCED DURING THIS 72 SECOND METER RUN.

## 3.3 CHECKOUT OF THE CUSTOMER I/O 2 METER

TO BEGIN THE THIRD ROUTINE THE OPERATOR WILL PLACE THE SYSTEM START/STOP SWITCH IN THE START POSITION. THE THIRD ROUTINE BEGINS BY INTERROGATING THE DCP UDT SECTION FOR THE AVAILABILITY OF DISK DRIVE 1 AND DISK DRIVE 2. THE PROGRAM THEN PROCEEDS TO PRINT THE FOLLOWING MESSAGE:

ROUTINE 3  
CHECKOUT OF CUSTOMER I/O 2 METER.

REMOVE CE METER KEY.

THE FOLLOWING UNITS ARE AVAILABLE AND WILL BE USED IN THE METER TEST.

A0 - DISK DRIVE 1  
B0 - DISK DRIVE 2

CORRECT DCP UDT AND RESTART IF ABOVE INFO. IS INCORRECT. IF CORRECT, ENABLE START SWITCH.

NOTE: IF YOU ARE CONFIGURED FOR A TWO DISK SYSTEM THIS ROUTINE CHECKS THE AVAILABILITY OF DISK DRIVE 2. IF YOU ARE CONFIGURED FOR A ONE DISK SYSTEM THIS ROUTINE WILL AUTOMATICALLY GO TO THE NEXT ROUTINE.

THE DEVICE AVAILABLE INFORMATION IS CHECKED FOR ACCURACY, IF INCORRECT, THE OPERATOR SHOULD CORRECT THE DCP UDT AND RESTART THE TEST. IF THE DEVICE AVAILABLE INFORMATION IS CORRECT, THE OPERATOR WILL PLACE THE START/STOP SWITCH IN THE START POSITION. THE PROGRAM WILL PROCEED TO CHECK THE DEVICES MENTIONED FOR UNIT CHECK. IF ONE OF THE DISK DRIVES IS FOUND TO HAVE A UNIT CHECK OR NOT READY. THE PROGRAM WILL COME TO A HALT. IF NO UNIT CHECK OR NOT READY CONDITION IS FOUND, A HALT WILL OCCUR AFTER PRINTING OF THIS MESSAGE:

--- RECORD ALL METER READINGS ---  
TEST COMPLETION WILL BE INDICATED BY A HALT OF ABD4, AND WILL OCCUR 72 SEC. AFTER TEST START.  
UPON COMPLETION, RECORD METER READINGS.  
THE DIFFERENCE BETWEEN THE FIRST AND THE LAST METER READINGS SHOULD BE 0.02 HOURS.

AFTER COMPLETION OF THE METER TEST, ENABLE START SWITCH TO ADVANCE TO NEXT METER TEST

CE AND CUSTOMER I/O METER 1 SHOULD NOT ADVANCE.

TO BEGIN THE 72 SECOND METER TEST, TURN DISK 1 POWER OFF AND THEN ON AND ENABLE START SWITCH.

THE OPERATOR WILL PROCEED TO TAKE METER READINGS. AFTER INSURING THAT THE CE KEY HAS BEEN REMOVED, THE OPERATOR WILL PLACE THE CPU START/STOP SWITCH IN THE START POSITION. THE 72 SEC. METER TEST STARTS WITH THE AVAILABLE DISK DOING A SEEK SIO COMMAND.

THE PROGRAM WILL GO INTO A LOOP AND REMAIN IN THAT LOOP UNTIL THE PERIOD OF 72 SECONDS EXPIRES. A HALT OF ABD4 WILL OCCUR. THE FOLLOWING CONDITIONS SHOULD HAVE TRANSPIRED.

- 1) CUSTOMER CPU AND I/O METER 2 WILL HAVE ADVANCED 0.02 HOURS.
- 2) CE AND CUSTOMER I/O METER 1 SHOULD NOT HAVE ADVANCED DURING THIS TIME.

## 3.4 CHECKOUT OF THE CUSTOMER I/O 1 METER

TO BEGIN THE THIRD ROUTINE THE OPERATOR WILL PLACE THE SYSTEM START/STOP SWITCH IN THE START POSITION. THE THIRD ROUTINE BEGINS BY INTERROGATING THE DCP UDT SECTION FOR THE AVAILABILITY OF DISK DRIVE 1 AND DISK DRIVE 2. THE PROGRAM THEN PROCEEDS TO PRINT THE FOLLOWING MESSAGE:

ROUTINE 4  
CHECKOUT OF CUSTOMER I/O 1 METER

REMOVE CE METER KEY.

THE FOLLOWING UNITS ARE AVAILABLE AND WILL BE USED IN THE METER TEST.

A0 - DISK DRIVE 1  
B0 - DISK DRIVE 2

CORRECT DCP UDT AND RESTART IF ABOVE INFO. IS INCORRECT. IF CORRECT, ENABLE START SWITCH.

## METER TEST

PREV EC 571537

PRES EC 571621

P/N 5129692

NOTE: IF YOU ARE CONFIGURED FOR A TWO DISK SYSTEM THIS ROUTINE CHECKS THE AVAILABILITY OF DISK DRIVE 2.  
IF YOU ARE CONFIGURED FOR A ONE DISK SYSTEM THIS ROUTINE WILL AUTOMATICALLY GO TO THE NEXT ROUTINE.

THE DEVICE AVAILABLE INFORMATION IS CHECKED FOR ACCURACY, IF INCORRECT, THE OPERATOR SHOULD CORRECT THE DCP UDT AND RESTART THE TEST. IF THE DEVICE AVAILABLE INFORMATION IS CORRECT, THE OPERATOR WILL PLACE THE START/STOP SWITCH IN THE START POSITION. THE PROGRAM WILL PROCEED TO CHECK THE DEVICES MENTIONED FOR UNIT CHECK. IF NO UNIT CHECK OR NOT READY CONDITION IS FOUND, A HALT WILL OCCUR AFTER PRINTING OF THIS MESSAGE:

--- RECORD ALL METER READINGS ---  
TEST COMPLETION WILL BE INDICATED BY A HALT OF ABD4, AND WILL OCCUR 72 SEC. AFTER TEST START.  
UPON COMPLETION, RECORD METER READINGS.  
THE DIFFERENCE BETWEEN THE FIRST AND THE LAST METER READINGS SHOULD BE 0.02 HOURS.  
AFTER COMPLETION OF METER TEST, ENABLE START SWITCH TO ADVANCE TO NEXT METER TEST.  
CE AND CUSTOMER I/O METER 2 SHOULD NOT ADVANCE.

TO BEGIN THE 72 SEC. METER TEST, TURN DISK 2 POWER OFF AND THEN ON AND ENABLE START SWITCH.

THE OPERATOR WILL PROCEED TO TAKE METER READINGS. AFTER INSURING THAT THE CE KEY HAS BEEN REMOVED, THE OPERATOR WILL PLACE THE CPU START/STOP SWITCH IN THE START POSITION. THE 72 SEC. METER TEST STARTS WITH THE AVAILABLE DISK DOING A SEEK SIO COMMAND.

THE PROGRAM WILL GO INTO A LOOP AND REMAIN IN THAT LOOP UNTIL THE PERIOD OF 72 SECONDS EXPIRES. A HALT OF ABD4 WILL OCCUR. THE FOLLOWING CONDITIONS SHOULD HAVE TRANSPIRED:

- 1) CUSTOMER CPU AND I/O METER 1 WILL HAVE ADVANCED 0.02 HOURS.
- 2) CE AND CUSTOMER I/O METER 2 SHOULD NOT HAVE ADVANCED DURING THIS TIME.

### 3.5 CHECKOUT OF THE CUSTOMER CPU METER USING INTERRUPT REQUEST.

BEFORE THE START OF THE FIFTH TEST, THE DISK DRIVES SHOULD BE TURNED OFF. THE OPERATOR WILL PROCEED TO PLACE THE SYSTEM START/STOP SWITCH IN THE START POSITION. SINCE THIS TEST WILL BE RUN WITHOUT THE DISK/DISKS, THE DCP UDT INTERROGATION IS DELETED DURING THIS PASS. THE FIFTH TEST BEGINS BY PRINTING THIS MESSAGE FOLLOWED BY A HALT:

ROUTINE 5  
CHECK CPU CUSTOMER METER ONLY

TURN DISK DRIVES OFF.

--- RECORD ALL METER READINGS ---  
THIS 72 SECOND METER RUN WILL BE STARTED BY USE OF THE INQUIRY REQUEST KEY.  
THE HALT WITH AN ID OF ABD4 WILL REMAIN ON AFTER INQUIRY REQUEST KEY IS ACTIVATED.  
UPON COMPLETION, RECORD METER READINGS.  
A HALT OF ABCD124 WILL INDICATE THE END OF THE ROUTINE.  
THE DIFFERENCE BETWEEN THE LAST AND FIRST CUSTOMER CPU METER READINGS SHOULD BE 0.02 HOURS.

THE CUSTOMER I/O AND CE METERS SHOULD NOT ADVANCE DURING THIS TIME.

AFTER COMPLETION OF METER TEST, ENABLE START SWITCH TO ADVANCE TO NEXT TEST.

TO BEGIN 72 SEC. METER TEST ENABLE INQUIRY REQUEST KEY.

NOTE: IF START ENABLED, WILL GIVE ERROR MESSAGE: RERECORD READINGS AND ENABLE INQUIRY REQUEST.

THE OPERATOR WILL PROCEED TO TAKE THE READING OFF THE CUSTOMER CPU METER. AFTER ASSURING THAT THE CE KEY IS REMOVED, THE OPERATOR WILL ACTIVATE THE INQUIRY REQUEST KEY.

THE PROGRAM WILL THEN GO INTO A LOOP AND REMAIN IN THAT LOOP UNTIL THE PERIOD OF 72 SECONDS EXPIRES. WHEN THE HALT INDICATORS CHANGE TO ABCD124, THE OPERATOR WILL TAKE METER READINGS. THE FOLLOWING CONDITIONS SHOULD HAVE TRANSPIRED:

- 1) CUSTOMER CPU METER SHOULD HAVE ADVANCED 0.02 HOURS.
- 2) CUSTOMER I/O METERS (IF AVAILABLE) AND CE METER SHOULD NOT HAVE ADVANCED DURING THIS 72 SECOND METER RUN.

### 3.6 CHECKOUT OF THE CUSTOMER CPU METER USING CYCLE STEAL.

BEFORE THE START OF THE SIXTH TEST THE DISK DRIVES SHOULD BE TURNED OFF. THE OPERATOR WILL PROCEED TO PLACE THE SYSTEM START/STOP SWITCH IN THE START POSITION. SINCE THIS TEST WILL BE RUN WITHOUT THE DISK/DISKS, THE DCP UDT INTERROGATION IS DELETED DURING THIS PASS. THE SIXTH TEST BEGINS BY PRINTING THIS MESSAGE FOLLOWED BY A HALT:

ROUTINE 6  
CHECK CPU CUSTOMER METER ONLY

REMOVE CE METER KEY

TURN DISK DRIVES OFF

--- RECORD ALL METER READINGS ---  
THE NEXT HALT WITH ID OF ABD4 WILL OCCUR PRIOR TO THE END OF THE 72 SECOND METER TEST.  
RECORD CUSTOMER CPU METER READINGS AFTER COMPLETION OF THE PRINTER EXERCISES.  
THE DIFFERENCE BETWEEN THE LAST AND FIRST CUSTOMER CPU METER READINGS SHOULD BE 0.02 HOURS.  
THE CUSTOMER I/O AND CE METERS SHOULD NOT ADVANCE DURING THIS TIME.

AFTER COMPLETION OF METER TEST TURN ON DISK/DISKS AND ENABLE START SWITCH TO TERMINATE.

THE OPERATOR WILL PROCEED TO TAKE THE READING OFF THE CUSTOMER CPU METER. AFTER INSURING THAT THE CE KEY HAS BEEN REMOVED, THE OPERATOR WILL PLACE THE CPU START/STOP SWITCH IN THE START POSITION. THE 72 SEC. METER TEST IS COMPOSED OF A SERIES OF TAB RIGHT 100 SPACES FOLLOWED BY AN ELEMENT RETURN. THIS COMBINATION OF COMBINATION OF COMMANDS WILL BE EXECUTED 30 TIMES BEFORE END OF THIS ROUTINE. THE OPERATOR WILL TAKE METER READINGS. THE FOLLOWING SHOULD HAVE TRANSPIRED:

- 1) CUSTOMER CPU METER SHOULD HAVE ADVANCED 0.02 HOURS.
- 2) CUSTOMER SPINDLE METERS (IF AVAILABLE) AND CE METER SHOULD NOT HAVE ADVANCED DURING THIS 72 SECOND METER RUN.

## 4. HALTS AND ERROR PRINTOUTS

A FOUR HEX DIGIT IDENTIFICATION CODE IS ASSOCIATED WITH EVERY ERROR PRINTOUT AND HALT. 'UXX'

UU - UNIT IDENTIFICATION CODE  
XX - INDEX NUMBER

AOFF - PRIMARY SPINDLE HALT IDENTIFIER

BOFF - SECONDARY SPINDLE HALT IDENTIFIER

IN A PRINTOUT, THE FOLLOWING INFORMATION APPEARS:

PRINTER UNIT CHECK OR END OF FORMS.  
SECONDARY SPINDLE NOT READY OR ERROR.  
PRIMARY SPINDLE NOT READY OR ERROR.

PREV EC 571565

PRES EC 571609

PN 5129676

CLEAR CORE TO 'PE' BEFORE STARTING

READ COMMENTS IN THIS COLUMN BEFORE STARTING

START FLOW CHART AT A2

FOR SEP HALT '805' (A 5) YOU MUST EXAMINE THE DECISION BLOCKS FOLLOWING HALT '805' TO DETERMINE THE NECESSARY ACTION BEFORE RESETTING THE '805' HALT.

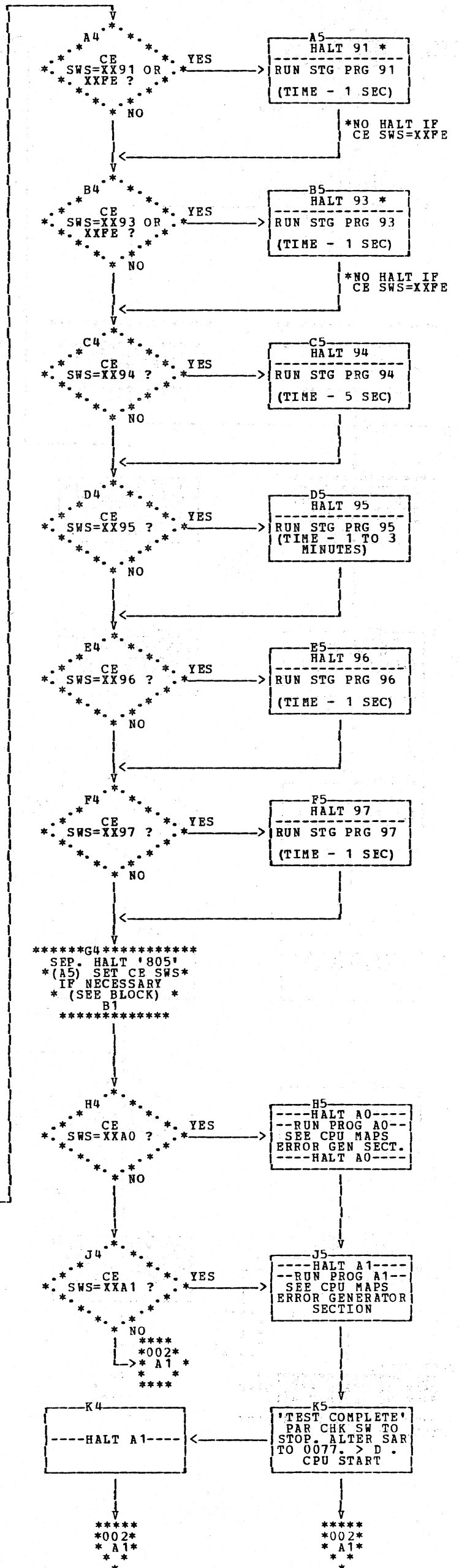
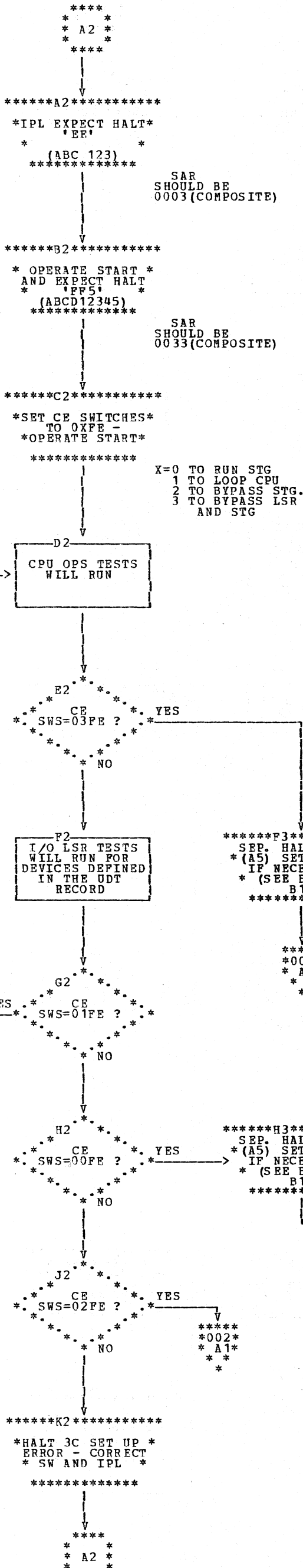
WHEN RUNNING MOD 6 DIAG PACK ON MOD 10, SOME HALTS ARE NOT CHANGED TO MOD 10 HALT IDENTIFIERS. USE THIS TABLE TO IDENTIFY THESE HALTS.

MODEL 10 HALT ID	MODEL 6 HALT
FE	(ABC 123)
FP5	(ABCD12345)
805	(A 5)
3C	(CD12)
F15	(ABCD 45)
FA5	(ABCD1 3 5)

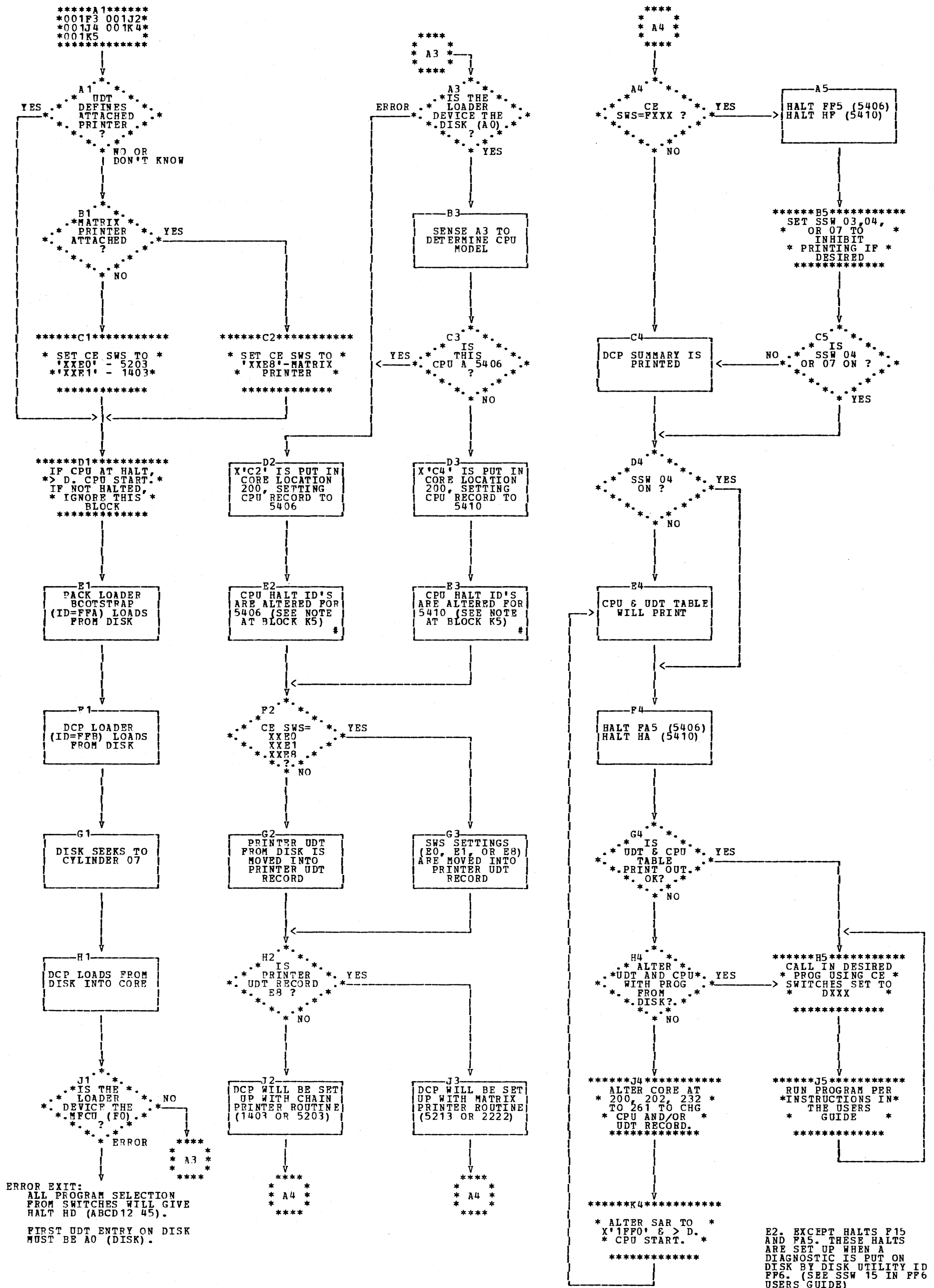
ADDITIONAL HALTS MAY ALSO OCCUR. USE THE CHART BELOW TO CONVERT THE MOD 10 STICK LIGHTS INTO MOD 6 HALT LIGHTS (ABCD12345)

XXXXX	55555
D X	4 X
D X	4 X
D X	4 X
CCCCC	33333
B X	2 X
B X	2 X
B X	2 X
AAAAA	11111

WHEN HALT IS DECODED LOCK IN THE CPU PROGRAM USERS GUIDE FOR HALT DEFINITION.







E2. EXCEPT HALTS F15 AND FA5, THESE HALTS ARE SET UP WHEN A DIAGNOSTIC IS PUT ON DISK BY DISK UTILITY ID FF6. (SEE SSW 15 IN FF6 USERS GUIDE)

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5. MANUAL CONFIGURATION (CONT.)

3. ALTER STORAGE TO MAKE CORRECTIONS AT THE ADDRESS SHOWN IN THE TABLE GENERATED IN STEP 2. (TO ALTER STORAGE TURN MODE SELECTOR TO 'PROCESS' AND OPERATE SYSTEM RESET, TURN MODE SELECTOR TO 'ALTER SAR', SET THE ADDRESS TO BE MODIFIED IN THE FOUR ROTARY ADDRESS SWITCHES AND OPERATE 'START'; TURN THE MODE SELECTOR TO 'ALTER STORAGE' AND TYPE IN AS MANY GROUPS OF TWO HEX-DECIMAL CHARACTERS AS IS NECESSARY TO COMPLETE THE CHANGE. RETURN THE MODE SELECTOR TO 'PROCESS'.
4. IF DCP WAS JUST LOADED (NO SECTION LOADED YET) THE UDT AND CPU ENTRIES MAY BE PRINTED OUT BY RESTARTING AT ADDRESS ODC6. TO START AT ADDRESS ODC6, TURN MODE SELECTOR TO 'PROCESS' AND OPERATE SYSTEM RESET, TURN MODE SELECTOR TO 'ALTER SAR', SET ODC6 IN THE FOUR ROTARY SWITCHES AND OPERATE 'START'. RETURN MODE SELECTOR TO 'PROCESS' AND OPERATE 'START'.
5. IF A SECTION HAS BEEN LOADED, START BY OPERATING SYSTEM RESET AND THEN OPERATE START.

6. UNIT DEFINITION RECORDS (UDT UU-XYZ,.....,UU-WXY)

UDT RECORD (SEE EXAMPLES IN SECTION 6.2)

THE UDT'S ARE LOCATED IN STORAGE STARTING AT LOCATION 0232. EACH DEVICE IS ASSIGNED 3 BYTES FOR THE DEFINITION. THE FIRST BYTE CONTAINS THE DEVICE ID, THE SECOND BYTE SHOULD BE 00 AND THE THIRD BYTE WILL CONTAIN THE OPTION BITS. (SEE CHART IN SECTION 5).

```

*****
* RECORD POSITION I CONTENTS I
* *****
* 1-3 I UDT I
* *****
* 4 I NON-BLANK - UDT IS NOT CLEAR- I
* I ED BEFORE PROCESSING THIS I
* I RECORD. THIS RECORD ACTS I
* I AS A CONTINUATION OF PRE- I
* I VIOUSLY LOADED UDT INFOR- I
* I MATION. I
* I BLANK - UDT TABLE IS CLEARED I
* I PRIOR TO PROCESSING THIS I
* I RECORD. ENTRIES FROM PRE- I
* I VIOUS UDT RECORD ARE WIPED I
* I OUT. I
* *****
* 5- I UU-XYZ, UU,....., UU-WXY I
* I NOTE - THE LAST ENTRY ON A I
* I UDT RECORD MUST I
* I ALWAYS BE FOLLOWED BY I
* I A BLANK. I
* I EACH UNIT IS SEPARATED BY I
* I COMMAS. THE DEVICE SHOULD I
* I BE SEPARATED FROM ITS OPTIONS I
* I BY A DASH. (SEE EXAMPLES) I
* I UU - DEVICE IDENTIFICATION I
* I CODE. I
* I XYZ - OPTIONAL FEATURES I
* I IDENTIFICATION NUMBERS I
* I IF THE DEVICE HAS NO I
* I FEATURES, ENTER ONLY I
* I THE DEVICE CODE. (SEE I
* I 6.2). I
* *****
    
```

6.1 DEVICE IDENTIFICATION CODE CHART

```

*****
* DEVICE I CODE I STANDARD I OPTIONAL FEATURES I
* * I -UU- I FEATURES I -WXYZ...- I
* *****
* KEYBOARD I 12 I FULL KBD I 0-COMMAND KEYS 9- I
* I I 18 CMD KEYS I 16. I
* I I 18 CMD IND- I 1-NOT USED I
* I I ICATORS I 2-2 ADDED WORLD I
* I I I TRADE KEYS I
* *****
* 5496 I F8 I I NONE I
* *DATA RECI I I I I
* *****
* 129 I F9 I I NONE I
* *DATA RECI I I I I
* *****
* 2265 I 90 I I I
* * CRT I I I I
* *****
* 5444 I A0 I I 1 - 100 CYL DISK I
* * DRIVE 1 I I I 2 - HIGH SPEED I
* I I I ACCESS (RPQ) I
* *****
* 5444 I B0 I I 0 - REMOVEABLE I
* * DRIVE 2 I I I DISK ONLY I
* I I I 2 - HIGH SPEED I
* I I I ACCESS (RPQ) I
* *****
* 5213 I E8 I I OPTIONS FOR 5213 I
* * OR I I I ARE SENSED FROM I
* * PRINTER I I I THE DEVICE. THUS I
* I I I NO OPTION BITS ARE I
* I I I NEEDED. I
* *****
* LEDGER I E9 I I FOR 2222 I
* * CARD I I I DUAL FEEDI I
* * DEVICE I I I CARRIAGE I
* I I I CARD I
* I I I DEVICE I
* *****
* BSCA I 80 I I 0 - MULTIPPOINT I
* * OR I I I 1 - INTERNAL CLOCK I
* * LCA I I I OR LCA I
* I I I 2 - HIGH SPEED I
* I I I 3 - AUTO CALL I
* I I I 4 - TRANSPARENCY I
* I I I 6 - USASCII I
* I I I 7 - SWITCHED NETWK I
* *****
* SIOC I 30 I I NONE I
* *****
* 1255 I 35 I I 0 - ACCOUNT NO. I
* * MAG. I I I CHECKING I
* * CHAR. I I I 1 - 51 COL. SORT I
* * RDR. I I I 2 - ALT. SORT I
* I I I STACKERS I
* I I I 0, 1, 2, 3, 4 I
* I I I 3 - DASH SYM TRANS I
* I I I 4 - MODEL 3, 12 I
* I I I STACKERS I
* *****
    
```

6.2 EXAMPLES OF UDT RECORD ENTRIES:

```

UDT A0,E8 (A BASIC UDT CONFIGURATION)
UDT A0-1,E8,12-0,80-023
THIS UDT RECORD DEFINES A SYSTEM WITH:
A 5444 DISK DRIVE 1 WITH THE 100
CYLINDER OPTION BIT
A 5213 PRINTER
A KEYBOARD WITH COMMAND KEYS 9 - 16
SPECIFIED.
A BSCA WITH MULTIPPOINT, HIGH SPEED,
AND AUTO CALL FEATURES SPECIFIED.
UDTX80-023
THIS UDT RECORD ADDS A BSCA TO THE CURRENT
UDT TABLE.
    
```

NOTE: X = ANY CHARACTER (SEE SECTION 6 CHART)

7. USING THE CE DIAGNOSTIC PACK.

7.1 PROGRAM LOADING - NORMAL

PROGRAM LOADING IS FLOWCHARTED IN THE USERS GUIDE UNDER PROGRAM SELECT LOGIC ON PAGE 19.

7.2 PROGRAM LOADING IF NORMAL PROCEDURES FAIL.

POSSIBLE CAUSES ARE:

1. PACK IS NOT CONFIGURED FOR 5406.
2. UDT OR CPU RECORD IS INVALID OR INCORRECT (CYL 7).
3. UDT OR CPU RECORD IS MISSING. (CYL 7).
4. IPL, BRING-UP TESTS, OR IPL LOADER HAVE BEEN WRITTEN OVER (CYL 0 - NO RECOVERY POSSIBLE).
5. PART OR ALL OF DCP HAS BEEN WRITTEN OVER (CYL 7 - NO RECOVERY POSSIBLE).
6. PROC CHECK CAUSED BY CPU PROBLEMS WHILE RUNNING CPU TESTS.

PREV EC 571654

PRES EC 571659

PN 5129476

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BLOCK 10

7.2 PROGRAM LOADING IF NORMAL PROCEDURES FAIL.

1. OPERATE IPL SWITCH - EXPECT HALT ABC 123  
PROC CHECK MEANS CYL 0, SECTOR 0 IS BAD OR DID NOT IPL PROPERLY. IF IT IS BAD, NO RECOVERY IS POSSIBLE.
2. OPERATE START SW - EXPECT HLT ABCD12345  
PROC CHECK MEANS CYL 0 IS BAD - NO RECOVERY POSSIBLE.
3. SET 03FE IN CE CONSOLE SWITCHES.
4. OPERATE START SW - EXPECT HALT A  
PROC CHECK MEANS CYL 0 IS BAD OR CPU TESTS FAILED. IF CYL 0 IS BAD, NO RECOVERY IS POSSIBLE.
5. SET F3E8 IN CE CONSOLE SWITCHES.
6. OPERATE START SW - EXPECT HALT ABCD12345  
PROPER HALT INDICATES DCP IS LOADED. PROC CHECK INDICATES CYL 0 OR 7 IS BAD. CAN POSSIBLY RECOVER BY USING SYS/3 MOD 10 (SEE STEP 11).
7. SET 03E8 IN CE CONSOLE SWITCHES.
8. OPERATE START SW - EXPECT DCP SUMMARY PRINT-OUT.
9. EXPECT HALT ABCD1 3 5.  
IF PROC CHECK OCCURS OR UDT AND CPU TABLE DO NOT SHOW VALID CPU MODEL, VALID CORE SIZE, AND VALID DEVICES, ALTER CORE AS FOLLOWS:

CORE LOCATION	NAME	ALTER TO
0200	MODEL	C2
0202	CORE SIZE	20
0232-0237	UDT ENTRIES	A00000E80000

10. RESTART PROGRAM AT CORE LOCATION 0DC6.
11. EXPECT CPU AND UDT TABLE PRINTOUT.  
EXPECT HALT ABCD1 3 5  
PROC CHECK MEANS THAT AT LEAST PART OF DCP IS FAULTY (CYL 7). IF A SYS/3 MOD 10 IS AVAILABLE, DCP (FF6) CAN BE RESTORED BY USING DISK UTILITY (FF6) TO PUT DCP BACK ON YOUR PACK. FOLLOW HAD 10 INSTRUCTIONS EXCEPT DO NOT REPEAT, DO NOT LOAD FFA. LOAD ONLY FF6 AND FFF.
12. LOAD PROG ID FED - IF HALT ABCD 45, OPERATE START UNTIL HALT ABCD1 3 5.
13. CONFIGURE YOUR CE PACK, FOLLOWING THE PRINTED INSTRUCTIONS PROVIDED BY ID FED.
14. WHEN ALL ENTRIES HAVE BEEN MADE, DEPRESS PROG START AS DIRECTED BY ID FED. THIS WILL WRITE YOUR CONFIGURATION RECORD ON DISK SO THAT NORMAL LOADING PROCEDURES MAY BE FOLLOWED IN THE FUTURE.
15. IF ID FED PRINTS EITHER "NO CPU RECORD ON DISK" OR "NO UDT RECORD ON DISK", IT INDICATES THAT YOUR PACK IS STILL NOT CONFIGURED, BECAUSE ID FED COULD NOT FIND A PLACE TO WRITE YOUR CONFIGURATION RECORD. HOWEVER, DCP IS PROPERLY CONFIGURED IN CORE AND YOU MAY PROCEED TO CALL IN DIAGNOSTICS. THE MISSING UDT OR CPU RECORD CAN BE RESTORED BY USING ID B04. (SEE NEXT STEP).
16. MISSING UDT AND CPU RECORDS ON DISK CAN BE CHECKED AND CORRECTED USING ID B04. LOAD ID B04 AND SET THE COMMAND TABLE WITH THE FOLLOWING COMMANDS:

1107	SEEK TO CYLINDER 7
2113	READ SECTOR 13
6113	WRITE SECTOR 13
2113	READ SECTOR 13 (TO CK WRITING)
2114	READ SECTOR 14
6114	WRITE SECTOR 14
2114	READ SECTOR 14 (TO CK WRITING)
0000	TABLE END

SET SSW 17, 19, 1A, AND 1C.  
 SET FOR ADDR STOP AT 10DB.  
 RESET ADDR STOPS UNTIL SECTOR 13 IS DUMPED.  
 SECTOR 13 SHOULD BE THE CPU RECORD AND SHOULD START WITH "C3D7E4".  
 IF IT DOES NOT, ALTER CORE AT 1DEB TO "C3D7E4" AND RESTART AT 10DB.  
 NEXT DATA PRINT SHOULD SHOW THE "C3D7E4" IN THE 1ST 3 BYTES.  
 RESET ADDR STOPS UNTIL SECTOR 14 IS DUMPED.  
 SECTOR 14 SHOULD BE THE UDT RECORD AND SHOULD START WITH "E4C4E3".  
 IF IT DOES NOT, ALTER CORE AT 10DB TO "E4C4E3" AND RESTART AT ADDRESS 10DB.  
 GO TO STEP 12.

7.3 PROGRAM RESTART

AFTER SUCCESSFUL LOADING OF EACH SECTION, DCP STORES A PROGRAM RESTART ROUTINE STARTING AT LOCATION X'0000'. THIS ROUTINE CHECKS THE DATA SWITCHES AND BRANCHES TO THE FIRST ROUTINE OF THE SECTION. PROGRAM RESTART IS ACCOMPLISHED BY PUSHING SYSTEM RESET FOLLOWED BY START.

7.4 DATA SWITCH ENTRY

THE ROTARY ADDRESS SWITCHES ARE THE PRIMARY COMMUNICATIONS MEDIA BETWEEN THE DIAGNOSTICS AND THE CE. METHOD OF ENTRY --

A. STOP CPU.

B. SET UP ROTARY SWITCHES FOR ONE OF THE FOLLOWING OPTIONS.

	SWITCHES				
	1	2	3	4	
***	***	***	***	***	
F	0	X	X	X	- TURN OFF SENSE SWITCH XX.
F	1	X	X	X	- TURN ON SENSE SWITCH XX.
F	2	X	X	X	- GO TO ROUTINE XX AFTER ENTRY PHASE COMPLETE.
E	E	X	X	X	- TERMINATE CURRENT SECTION
D	X	X	0		- DISK--EXECUTE SECTIONS FOR DEVICE WITH UNIT CODE XX.
D	X	X	X		- DISK--EXECUTE SECTION XXX.

C. DEPRESS CPU START. (SYSTEM RESET FOLLOWED BY START WILL CALL IMMEDIATE ATTENTION TO SWITCHES--SEE NOTE BELOW.)

D. WHEN DCP RECEIVES CONTROL, IT HALTS WITH 'FF5' DISPLAYED. RESET THE HALT TO ENTER THE FIRST OPTION.

E. DCP WILL PERFORM HALT 'F05' OR 'FF5'. LOAD THE NEXT OPTION AND RESET THE HALT.

F. REPEAT STEP E. FOR AS MANY OPTIONS AS DESIRED. ALTERNATING CODES 'F05' AND 'FF5' WILL SIGNAL DCP ACCEPTANCE.

G. WHEN DONE, SET THE LEFT HAND SWITCH TO ZERO AND RESET HALT.

NOTE - WHEN USING F2XX IN THE SWITCHES TO GO TO A ROUTINE AFTER A SECTION HAS BEGUN, SYSTEM RESET/START SHOULD BE PERFORMED BEFORE MAKING THE ENTRY. (THIS PREVENTS ERRORS FOUND IN ONE ROUTINE FROM BEING DETECTED IN SOME OTHER ROUTINE. IT SHOULD NOT BE PERFORMED IF OTHERWISE SPECIFIED IN THE MAPS.)

6.7 SENSE SWITCHES

SENSE SWITCHES ARE EQUIVALENT TO 48 TOGGLE SWITCHES NUMBERED HEXADECIMALLY 00-2F. SENSE SWITCHES 00-0F ARE RESERVED FOR STANDARD OPTIONS PROVIDED BY DCP (LISTED BELOW). SENSE SWITCHES 10-2F ARE SIGNIFICANT TO THE PARTICULAR SECTION BEING RUN.

COMMON SENSE SWITCHES			
SSW	I	ON	I OFF
NUMBER	I	I	(NORMAL)
00	I	LOOP ON SECTION.	I GO TO NEXT SECTION
01	I	LOOP ON ROUTINE.	I GO TO NEXT ROUTINE.
02	I	BY PASS MANUAL IN- I Tervention ROUT- I INES.	I EXECUTE ALL ROUTINES*
03	I	BYPASS ERROR I PRINTING.	I PRINT ERROR MESS- I AGES.
04	I	BYPASS NON-ERROR I PRINTING.	I PRINT NON-ERROR I MESSAGES.
05	I	USE ALTERNATE I PRINTER.	I NORMAL PRINTER.
06	I	BYPASS ERROR HALT I PRINTING.	I HALT AFTER ERROR.
07	I	LOAD AND GO. BY- I PASS COMMENTS AND I PROMPTING HALTS.	I PROMPTING MODE.
09	I	DON'T CLEAR SECTION I SENSE SWITCHES I AFTER LOADING.	I CLEAR SECTION SENSE I SWITCHES AFTER LOAD- I ING.
0A-0F	I	RESERVED	

7.6 CE PACK LAYOUT

CYLINDER	TRACK	SECTOR	FUNCTION
0	0	0-23	I IPL, BRING-UP TESTS, I IPL LOADER (FFA)
	1	0-16	I
	1	17-23	I DCP LOADER (FFB)
1-3	0-1	I ALL	I ALTERNATE TRACKS
4-6	0-1	I ALL	I ALIGNMENT TRACKS
7	0	I 0	I FIRST AVAILABLE SEC- I TOR POINTER
		I 1-23	I DIAGNOSTIC CONTROL I PROGRAM
	1	I 0-23	I DIAGNOSTIC CONTROL I PROGRAM
8-11	0-1	I ALL	I PROGRAM INDEX (VTOC)
12-13	0-1	I ALL	I RESERVED
14-70	0-1	I ALL	I PROGRAM SECTIONS & I DATA MODULES
71-75	0-1	I ALL	I ALIGNMENT TRACKS
76-LIMIT	0-1	I ALL	I PROGRAM SECTIONS & I DATA MODULES

PREV EC 571654

PRES EC 571659

PN 5129476

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8.0 HALT CODES

HALT CODES	MODEL	CONDITION	ACTION REQUIRED
* 5406	* 5410		
* F05	* H0	I INVALID RECORD FOUND WHILE LOADING.	* CORRECT INVALID RECORD AND RELOAD.
* F15	* H1	I A DEVICE CALLED FOR BY THE TEST SECTION WAS NOT DEFINED IN THE UDT RECORD	* CHECK UDT CARDS AND RELOAD OR RESET HALT TO BYPASS THE ERROR (ERRORS COULD RESULT).
* F25	* H2	I CE SWITCH ENTRY ERROR.	* CORRECT CE SWITCHES AND RESET HALT.
* F35	* H3	I INVALID ROUTINE PREFIX FOUND DURING CHANING FROM ONE ROUTINE TO NEXT.	* ENTER ROUTINE SELECT OPTION 'F2XX' IN CE SWITCHES AND RESET HALT. IF THIS DOES NOT WORK, RELOAD SECTION.
* F55	* H5	I MFCU NOT READY OR ERROR. ERROR INDICATION SHOULD BE DISPLAYED IN THE LIGHTS	* DO A NON-PROCESS RUN-OUT, RELOAD DECK STARTING WITH RUN-OUT CARD/S AND RESET THE HALT.
* F65	* H6	I PRINTER NOT READY OR ERROR.	* CLEAR CONDITION AND RESET THE HALT. IF FAILURE PERSISTS, RUN PRINTER FUNCTION TEST. SENSE SWITCHES 03 AND 04 MAY BE USED TO BYPASS PRINTING. SET SENSE SWITCH 05 TO USE ALTERNATE PRINTOUT DEVICE.
* F75	* H7	I DISK ERROR.	* RESET HALT TO RETRY. IF ERROR PERSISTS. RELOAD.
* FA5	* HA	I CONTROL PROGRAM IS PREPARED TO RECEIVE CE SWITCH ENTRY. OCCURS AFTER DCP AND SECTION LOADING.	* RESET THE HALT IF NO ENTRY DESIRED. TO LOAD OPTIONS SET UP CE SWITCHES AND RESET THE HALT. SSW 07 MAY BE REPEATED BY RESETTING THE HALT.
* FC5	* HC	I DISK LOADER REQUIRES SPECIFICATION OF SECTIONS TO BE LOADED FROM DISK, OR SELECTED SECTION NOT ON DISK.	* IF NO ENTRY HAS BEEN MADE PREVIOUSLY, LOAD PROGRAMS SELECTION ENRY 'DXXX' AND RESET THE HALT. UP TO FOUR ENTRIES MAY BE MADE. IF ENTRIES HAVE EVER BEEN MADE, THE PROGRAMS MAYBE REPEATED BY RESETTING THE HALT.
* FD5	* HD	I SECTION JUST TERMINATED HAS SPECIFIED THE NEXT SECTION TO BE RUN. THE ARR CONTAINS -DXXX- WHERE -XXX- IS THE PROGRAM IDENTIFICATION.	* LOAD SPECIFIED SECTION IN THE EXTERNAL OUTPUT DEVICE AND RESET THE HALT.
* FE5	* HE	I CURRENT SECTION TERMINATED.	* RESET HALT TO LOAD NEXT SECTION. SECTION MAY BE RESTARTED BY A SYSTEM RESET/START.
* FF5	* HF	I DCP HALTS WITH 'HF' DISPLAYED WHENEVER A VALID CE SWITCH ENTRY IS RECOGNIZED IN SSW 1 AS DCP ACCEPTS ENTRIES.	* LOAD A VALID CE SWITCH ENTRY AND RESET THE HALT. REPEAT FOR ALTERNATING HALTS 'HU' AND 'HP' ('FF5' AND 'F05' FOR MODEL 5406). TO TERMINATE ENTRY PROCEDURE, ROTATE LEFT-MOST SWITCH TO ZERO AND RESET HALT.
* F05	* HU-HP	I ALTERNATING HALTS 'HU' AND 'HP' OCCUR.	

NOTE: THE 'HD' HALT WILL BE DISPLAYED AS A CAPITAL 'H' AND A LOWER CASE 'D' 5410.

9. PRINTOUT HEADINGS

\*ID UUX. PROG PPPR-NN. SSWS YY,YY,....,YY'

THE ABOVE LINE IS PRINTED AS A HEADING FOR ALL MESSAGES. THE FIRST POSITION CONTAINS AN ASTERISK ONLY FOR ERROR MESSAGES. VARIABLE DATA PRINTED INCLUDES--

UUX - DEVICE IDENTIFICATION (UU) AND NUMBER (XX). THE NUMBER CORRESPONDS TO THE DEVICE DIAGNOSTIC HALT TABLE (SEE DEVICE MAP CHARTS) WHICH EXPLAINS THE CONDITION CAUSING THE PRINTOUT AND POSSIBLE SUBSEQUENT HALT. WITH THE FOLLOWING EXCEPTION, THE DEVICE CODE IS IDENTICAL TO THAT PRESENT IN THE UDT RECORD.

FF - SYSTEM TEST LOADER AND SUPERVISOR.  
 FE - CPU MODULE OF SYSTEM TEST.  
 FF - DCP.

NOTE - 'XX' CODE '00' IS USED FOR PRINTOUTS WHICH HAVE NO SUBSEQUENT HALT. THE PRINTOUT IS USUALLY SELF-EXPLAATORY.

PPPR - TEST SECTION IDENTIFICATION (PPP) PLUS THE REVISION LEVEL (R). THE CURRENT PPPR IS IN CORE LOCATION 0A00 - 0A01.

NN - ROUTINE CURRENTLY BEING EXECUTED, IS IN CORE LOCATION 0A03.

YY,YY,....,YY - LISTING OF SENSE SWITCHES WHICH ARE CURRENTLY ON. IF NONE ARE ON, THIS AREA IS BLANK.

HALT CONVENTION

10. THE HALT SCHEME IS COMPATIBLE WITH PRINTOUTS AS INDICATED IN THE PREVIOUS SECTION. FOR ALL UNIT TESTS, HALTS WITH CODE 'XX' OCCUR TO INDICATE AN ERROR OR INTERVENTION REQUIRED CONDITION. THIS CODE REFERS TO THE SAME HALT TABLE REFERENCED IN PRINTOUT HEADINGS. NOTE THAT SINCE ONLY ONE DEVICE IS BEING TESTED, THE UNIT CODE IS NOT PRESENTED. UNLIKE UNIT TESTS, THE SYSTEM TEST MUST PROVIDE THE UNIT CODE TO IDENTIFY THE FAILING DEVICE. THIS IS DCNE BY PROVIDING TWO HALTS FOR EVERY ERROR OR INTERVENTION REQUIRED CONDITION. HALT 'UU' DEFINES THE DEVICE AND IS FOLLOWED BY HALT 'XX'. THE FOLLOWING CONVENTION IS USED IN ASSIGNING 'XX' CODES - 01-9F ERROR IDENTIFIERS. A0-FF OPERATOR INSTRUCTIONS.

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### 1. PREPARATION

DCP MUST BE PROPERLY CONFIGURED BEFORE RUNNING THIS TEST. THE CPU AND UDT INFORMATION MUST ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION.

NOTE: THE 5496 DATA RECORDER SYSTEM TEST MODULE (F8F) AND THE 129 DATA RECORDER SYSTEM TEST MODULE (F9F) CAN NOT BE RUN TOGETHER.

### 2. PROGRAM LOADING

THE PROGRAM IS LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (DFF1) DESCRIBED IN SECTION 6.4 OF BLOCK 10.

PROGRAM FF1 IS THE SYSTEM TEST RELOCATING LOADER. IT WILL LOAD AND HALT WITH 'FA5' DISPLAYED. BY OPERATING START, THE RELOCATING LOADER WILL LOAD SYSTEM TEST MODULES FOR THE CPU AND ALL DEVICES THAT ARE DEFINED IN YOUR DCP-UDT, OR UNTIL THE LIMIT OF CORE STORAGE IS EXCEEDED.

NOTE: CPU, FILE, PRINTER, AND KEYBOARD MODULES WILL NOT ALL FIT SIMULTANEOUSLY IN A 8K SYSTEM. USE SSW 18 TO SELECT ANY THREE MODULES.

SENSE SWITCH 18 MAY BE USED TO SELECT ONLY THOSE MODULES DESIRED ON AN 8K, 12K, OR 16K SYSTEM.

THE SYSTEM TEST SUPERVISOR IS THEN LOADED BY THE LOADER, OVERLAYING THE LOADER. HALT 'FA5' WILL AGAIN OCCUR. START WILL INITIATE THE SUPERVISOR, WHICH IN TURN WILL INITIALIZE ALL MODULES AND START THE TEST. MANUAL INTERVENTION (INQ REQ) IS REQUIRED ON THE KEYBOARD TO UNLOCK THE KEYS.

SENSE SWITCH OPTION - RELOCATING LOADER FF1.

SSW 18 - PROVIDES A HALT BEFORE LOADING EACH MODULE. THE LAST LISTED MODULE MAY BE DELETED FROM CORE BY SETTING THE LEFT MOST CE CONSOLE SWITCH TO 'A' BEFORE STARTING AFTER THE HALT.

### 3. PROGRAM OPERATION

TO ASSURE THOROUGH TESTING, ALLOW THE TEST TO RUN AT LEAST TWO MINUTES.

REFER TO 6. TABLE OF MODULES FOR THE RUN PROCEDURE OF EACH MODULE.

#### NOTE FOLLOWING POINTS

- 1) A DEVICE MAY BE DISABLED AT ANY TIME BY MAKING IT NOT READY. THIS MAY RESULT IN ERROR HALTS AND CAUSE THE SYSTEM TEST TO HANG-UP. SYSTEM RESET START WILL CLEAR THE HANG-UP CONDITION.
- 2) A NOT READY DEVICE MAY BE BROUGHT BACK INTO THE TEST BY BECOMING READY. THIS MAY ALSO CAUSE HALTS TO OCCUR.
- 3) THE SYSTEM RESET/START - PROGRAM RESTART IS AVAILABLE. THIS WILL ENABLE ALL MODULES DISABLED IN SECTION 4.
- 4) THE SUPERVISOR CONSISTS OF TWO ROUTINES.  
ROUTINE 01 - IS THE SYSTEM TEST SUPERVISOR  
ROUTINE 02 - IS THE LOGOUT ROUTINE  
DATA SWITCH 'F202' MAY BE USED TO ENVOKE THE LOGGING OF THE ERROR RECORDING TABLES.
- 5) ANY MODULE CAN BE REMOVED AND RUN DIRECTLY UNDER THE CONTROL OF DCP.
- 6) A HALT WILL BE THE FIRST INDICATION OF AN ERROR
- 7) IF THE DATA RECORDER MODULE IS SELECTED THE AUTO REC. REL. SWITCH MUST BE IN THE UP POSITION
- 8) IF THE LCD MODULE IS SELECTED PROGRAM E9E MUST BE RUN PRIOR TO THE SYSTEM TEST TO CREATE THE THREE PROPER LCD SYSTEM TEST CARDS.

### 4. ENABLING AND DISABLING MODULES

MODULES CAN BE ACTIVATED OR DE-ACTIVATED DURING EXECUTION IN ONLY ONE WAY.

THE CRT WILL CONTINUE THE DISPLAY IN PROGRESS.

THE CRT MAY BE COMPLETELY DISABLED ONLY BY SYSTEM RESET, SET SWITCHES TO A90F, START. (PREVENTS INITIAL DISPLAY START).

#### 1. USE CE CONTROL ADDRESS/DATA SWITCHES.

- A) STOP CPU
- B) SET SWITCHES TO AXXX OR BXXX
- C) START CPU
- D) STOP CPU
- E) SET SWITCHES TO OXXX
- F) START CPU

SWITCH SETTINGS  
AXXX - DISABLE MODULE XXX  
BXXX - ENABLE MODULE XXX

XXX IS THE MODULE IDENTIFICATIONS WHICH ARE PRINTED BY THE RELOCATING LOADER AS THE MODULES ARE PLACED IN CORE STORAGE.

### 5. LOGOUT OF ERROR RECORDING TABLES.

EACH MODULE EXCEPT THE CPU MODULE (FE1) WILL HAVE A TABLE IN WHICH INFORMATION CONCERNING ERRORS AND CURRENT OPERATION IS STORED. THERE ARE TWO WAYS TO FORCE THE PRINT OUT OF THE TABLES.

- A) SET UP THE ADDRESS DATA SWITCHES TO CALL IN ROUTINE '02' THE LOGOUT ROUTINE IN THE SUPERVISOR. (SWITCH SETTING 'F202')
- B) STOP THE CPU AND SET THE LEFT TWO SWITCHES TO 'BB' THEN PRESS START ON CPU. AFTER LOGOUT OCCURS, CHANGE LEFT TWO SWITCHES AWAY FROM 'BB' BEFORE RESTARTING.



6. TABLE OF SYSTEM TEST MODULES

MODULE ID	UNIT TESTED	PREPARATION	TEST OPERATION
* 12P *	*KEYBOARD*	NONE	<p>THE FIELD INDICATORS ARE TURNED ON, KEYBOARD INTERRUPT IS ENABLED AND THE KEYBOARD LOCKED. THE OPERATOR NOW OPERATES THE INQUIRY REQUEST KEY WHICH RESULTS IN THE FOLLOWING MESSAGE BEING PRINTED ON THE PRINTER (INQ REQ KEY) THE FIELD INDICATORS ARE TURNED OFF, THE KEYBOARD IS UNLOCKED AND INTERRUPT ENABLED. THE OPERATOR MAY NOW DEPRESS ANY KEY.</p> <p>COMMAND KEYS-TURN ON/OFF CORRESPONDING INDICATOR LIGHTS</p> <p>FUNCTION KEYS-PRINT A KEY IDENTIFICATION MESSAGE</p> <p>DATA KEYS-STORES THE EQUIVALENT PRINTABLE CHARACTER IN A 30 POSITION FIELD WHICH IS PRINTED WHEN THE FIELD BECOMES FULL OR WHEN A FUNCTION KEY IS DEPRESSED WHICH EVER OCCURS FIRST.</p>
* 35P *	* 1255 *	<p>THE READER/SORTER MUST BE PLACED IN THE 'ON-LINE' MODE AND THE START KEY DEPRESSED IN PREPARATION OF DOCUMENT FEEDING. LOAD HOPPER WITH DOCUMENTS. ALL DATA FIELDS SHOULD BE ENABLED (SWITCHES DEPRESSED): AMOUNT, PROCESS CONTROL, ACCOUNT NUMBER, TRANSIT ROUTING, AND SERIAL NUMBER.</p>	<p>THE SIOC WILL BE CHECKED UPON INITIAL ENTRY INTO THIS MODULE. ONCE THE SIOC HARDWARE IS CHECKED, THE TRIM WILL BE EXERCISED. ONE DOCUMENT AT A TIME WILL BE READ FROM THE HOPPER AND STACKED. THE DOCUMENTS WILL BE RIPPLE STACKED STARTING WITH THE REJECT POCKET: R-0-2-4-6-8 OR R-0-1-2-3-4 DEPENDING UPON THE MACHINE CONFIGURATION.</p> <p>NOTE: IF THE CPU 'STOP' KEY IS DEPRESSED, THE 1255 MAY HALT WITH A 'STACKER COMMAND' CHECK. RESET THE STACKER COMMAND CHECK PRIOR TO DEPRESSING CPU 'START'.</p>
* AOP *	* 5444 * * DISK *	<p>DISK DRIVES MUST HAVE PACKS ON THEM AND ALL DRIVES POWERED UP TO BE TESTED.</p>	<p>A STORED TABLE OF DISK COMMANDS IS EXECUTED REPEATEDLY. THE PROGRAM ALTERS THESE COMMANDS TO EXERCISE BOTH FIXED AND REMOVEABLE DISKS. BOTH DRIVES ARE EXERCISED WHEN BOTH DRIVES ARE IN THE CONFIGURATION TABLE.</p>
* E8P *	* 5213 OR * * 2222 * * MATRIX * * PRINTER *	<p>MAKE SURE THAT THERE IS PAPER IN ALL PAPER FEEDS ON THE PRINTER</p>	<p>THE FOLLOWING PRINTER FUNCTIONS ARE EXECUTED, ELEMENT RETURN, TAB RIGHT FIFTY, TAB LEFT FORTY FIVE, PRIMARY INDEX AND (SECONDARY INDEX IF APPLICABLE), PRINT FULL LENGTH OF CARRIAGE FIVE RIPPLE PATTERN LINES (IN LINE PRINT MODE IF OPTION ON MACHINE), PRINT TWENTY TAB TWENTY UNTIL A COMPLETE LINE IS FORMED, REPEAT THIS LAST CHAIN OF COMMANDS FIVE TIMES, SKIP TWO LINES THEN SKIP FOUR LINES THEN EIGHT LINES. THE TEST NOW REPEATS ITSELF FROM THE START.</p> <p>NOTE: 1 THE TAB RIGHT FIFTY AND TAB LEFT FORTY FIVE MAY BE EXECUTED BEFORE THE ELEMENT RETURN IF THE ELEMENT IS AT THE LEFT MARGIN BEFORE THE BEGINING OF THE TEST.</p>
* E9P *	* 2222 * * LEDGER * * CARD * * DEVICE *	<p>RUN SECTION 'DE9E' TO CREATE THE THREE CARDS TO BE CHECKED DURING THIS TEST</p>	<p>CARD 1 - CHECKS THE LAST PRINTABLE LINE TO INSTRUCTION. USING A FEED, READ ID AND LOCATE, AND INDEX COMMANDS.</p> <p>CARD 2 - CHECKS A FEED READ ID AND LOCATE NEXT PRINTABLE LINE. THEN CHECKS THE EJECT COMMAND. WHEN ENTERED TWICE CHECKS LINE FINDER MARKS.</p> <p>CARD 3 - CHECKS A FEED READ ID AND LOCATE NEXT PRINT LINE. THEN CHECKS THE EJECT COMMAND. WHEN ENTERED TWICE CHECKS A FEED, READ ID, AND EJECT COMMAND.</p>
* FE1 *	* 5406 * * CPU *	NONE	<p>CPU INSTRUCTIONS ARE EXECUTED AND TESTED IN SEGMENTS. ALSO, ALL AVAILABLE CORE IS SCANNED.</p>
* 90P *	* 2265 * * CRT *	CRT POWER ON	<p>THE CRT CONTINUOUSLY DISPLAYS INFORMATION CONTAINED IN ADDRESSES 0801 TO 2801 IN SEGMENTS OF 960 BYTES.</p>
* F8P *	* 5496 * * DATA * * RECORDER *	<p>(1) DATA RECORDER ON LINE/OFF LINE TOGGLE SWITCH ON THE CPU MUST BE ON 'ON LINE'.</p> <p>(2) PROGRAM SWITCH MUST BE ON THE OFF POSITION</p> <p>(3) AUTO RECORD RELEASE SWITCH MUST BE ON 'AUTO'</p> <p>(4) PRINT SWITCH MUST BE 'ON'.</p> <p>(5) REMOVE ALL CARDS FROM THE STACKER</p> <p>(6) AT LEAST 30 BLANK CARDS IN THE HOPPER.</p>	<p>THE TEST WILL START BY PUNCHING AND PRINTING 2 COMMENT CARDS FOLLOWED BY 26 RIPPLE PATTERN CARDS. THE MESSAGE '5496 PUNCH CYCLE COMPLETE' WILL THEN FOLLOW ON THE PRINTER. THE PROGRAM WILL THEN WAIT FOR THE OPERATOR TO PERFORM THE INSTRUCTIONS WHICH WERE PRINTED IN THE FIRST TWO CARDS STACKED.</p> <p>FIRST CARD: SET 5496 SWITCH TO OFF LINE. TRANSFER ALL THE RIPPLE PUNCHED PATTERN CARDS WHICH ARE BEHIND THIS</p> <p>SECOND CARD: CARD FROM THE STACKER TO THE HOPPER. DO NOT INCLUDE THESE TWO CARDS. SET 5496 SWITCH TO ON LINE.</p> <p>THE PROGRAM WILL NOW PROCEED TO READ THE PATTERN CARDS AND COMPARE CHARACTER BY CHARACTER THE DATA PUNCHED VS THE DATA READ. A 'DATA RECORDER COMPARE ERROR' MESSAGE WILL BE PRINTED ON THE PRINTER FOR EVERY NON-COMPARE CHARACTER. AFTER READING 26 CARDS, THE PROGRAM WILL READ THE 27TH CARD AND CHECK THE FIRST CHARACTER FOR AN 'A'. IF THE FIRST CHARACTER IS AN 'A', THE PROGRAM WILL READ 26 MORE CARDS. IF THE FIRST CHARACTER IS NOT AN 'A', THE PROGRAM WILL AUTOMATICALLY START THE PUNCH CYCLE AGAIN. THIS PROCESS MAY BE REPEATED AS REQUIRED.</p> <p>NOTE 1: THE 'DATA RECORDER COMPARE ERROR AABCD' MESSAGE PROVIDES THE OPERATOR WITH THE FOLLOWING DATA:</p> <p>AA = SEQUENTIAL CARD 0 THRU 26 BB = SEQUENTIAL CHARACTER 0 THRU 96 C = PUNCH CHARACTER D = READ CHARACTER</p>

6. TABLE OF SYSTEM TEST MODULES (CCNT.)

MODULE ID	UNIT TESTED	PREPARATION	TEST OPERATION
F9F	129 DATA RECORDER	(1) DATA RECORDER ON LINE/OFF LINE TOGGLE SWITCH ON THE CPU MUST BE ON 'ON LINE'. (2) PUNCH/VERIFY MUST BE IN THE PUNCH OR UP POSITION. (3) AUTO SKIP/DUP (DON'T CARE). (4) REC ADV/CARD FEED MUST BE IN THE AUTO OR UP POSITION. (5) PROGRAM MODE MUST BE IN THE DATA READ POSITION. (6) PRINT IS OPTIONAL. (7) CHARACTER MODE (DON'T CARE). (8) LOAD BLANK CARDS IN THE HOPPER AND FEED TWO INTO THE TRANSPORT.	THE TEST WILL START BY PUNCHING AND PRINTING 3 COMMENT CARDS FOLLOWED BY 26 RIPPLE PATTERN CARDS. THE MESSAGE '129 PUNCH CYCLE COMPLETE' WILL THEN FOLLOW ON THE PRINTER. THE PROGRAM WILL THEN WAIT FOR THE OPERATOR TO PERFORM THE INSTRUCTIONS WHICH WERE PRINTED IN THE FIRST THREE CARDS STACKED. FIRST CARD: SET THE D.R. SWITCH TO OFF LINE. TRANSFER ALL THE RIPPLE PUNCHED PATTERN CARDS WHICH ARE BEHIND THIS CARD FROM THE STACKER TO THE 129 HOPPER. DON'T INCLUDE THESE 3 CARDS. SECOND CARD: SET D.R. SWITCH TO ON LINE. THE PROGRAM WILL NOW PROCEED TO READ THE PATTERN CARDS AND COMPARE CHARACTER BY CHARACTER THE DATA PUNCHED VS THE DATA READ. A 'DATA RECORDER COMPARE ERROR' MESSAGE WILL BE PRINTED ON THE PRINTER FOR EVERY NON-COMPARE CHARACTER. AFTER READING 26 CARDS, THE PROGRAM WILL READ THE 27TH CARD AND CHECK THE FIRST CHARACTER FOR AN 'A'. IF THE FIRST CHARACTER IS AN 'A' THE PROGRAM WILL READ 26 MORE CARDS. IF THE FIRST CHARACTER IS NOT AN 'A', THE PROGRAM WILL AUTOMATICALLY START THE PUNCH CYCLE AGAIN. THIS PROCESS MAY BE REPEATED AS REQUIRED. NOTE 1: THE 'DATA RECORDER COMPARE ERROR AABBCD' MESSAGE PROVIDES THE OPERATOR WITH THE FOLLOWING DATA: AA = SEQUENTIAL CARD 0 THRU 26 BB = SEQUENTIAL CHARACTER 0 THRU 80 C = PUNCH CHARACTER D = READ CHARACTER
80P	BSCA	THE EXTERNAL CABLE SWITCH MAY OPTIONALLY BE PUT ON (ONLY IF NOT HIGH SPEED FEATURE). IF THE SWITCH IS ON, THE DATA GOES OUT TO THE END OF THE DATA SET CABLE AND BACK INTO THE ADAPTER. A BSCA ERROR WILL OCCUR IF THIS SWITCH IS THROWN DURING BSCA OPERATION.	THE BSCA DIAGNOSTIC INSTRUCTION 'TEST LOOP' IS USED IN THIS ROUTINE. A BYTE OF DATA '7P' IS CYCLE STEALING OUT OF CORE INTO THE BSCA. (THE BSCA IS FIRST ENABLED). THE BYTE IS THEN SENT INTO THE SHIFT REGISTER, SHIFTED OUT TO THE TRANSMIT TRIGGER AND INTO THE RECEIVE TRIGGER WHERE IT GOES BACK TO THE SHIFT REGISTER. THIS BYTE (SHIFTED LEFT 7 BIT POSITIONS) IS THEN PUT BACK IN CORE AT N+1 ADDRESS WHERE N WAS STARTING ADDRESS. THIS BYTE IS CONTINUALLY SHIFTED AND STORED IN CORE AT THE INCREMENTED ADDRESS UNTIL FINALLY WHEN THE INCREMENTED ADDRESS EQUALS THE STOP LSR ADDRESS AN INTERRUPT OCCURS. IN THE INTERRUPT ROUTINE THE DATA IN CORE AND THE STATUS CONDITIONS ARE CHECKED FOR PROPER VALUES.

7. HALTS AND PRINTOUTS  
A FOUR DIGIT IDENTIFICATION CODE IS ASSOCIATED WITH ERROR PRINTOUTS AND HALTS. 'UUX' UU= UNIT IDENTIFICATION CODE  
XX= INDEX NUMBER.  
IN ERROR PRINTOUTS THIS INFORMATION IS IN THE HEADING LINE AS (ID UUX..). FOR HALTS THIS INFORMATION IS DISPLAYED BY TWO HALTS. HALT (UU) FOLLOWED BY HALT (XX).

'UU'	'XX'	HALT IDENTIFICATION	DOES	ERROR TABLE LOGOUT DISCRPTION
UNIT OR PROGRAM (HEX)	INDEX NUMBER (HEX)		ERROR LOG OUT	
'12'	'01'	KEYBOARD PARITY CHECK	YES	KEYBOARD CK AA= LAST SIO 0 BYTE Q RS2S1 BB= LAST SIO CONTROL BYTE AABBCCDD CC= SENSE BYTE 2 KEY DATA DD= SENSE BYTE 1 STATUS
'35'	01	SIOC IS BUSY.		
1255	02	NO SIOC DEVICE ATTACHED, CHECK CONNECTORS.		
	03	DATA TRANSFER REGISTER AND DIAG BYTE ERROR.		
	04	FUNCTION REGISTER BITS STUCK ON OR OFF		
	05	LENGTH COUNT REGISTER BITS STUCK ON OR OFF.		
	06	DATA ADDRESS REGISTER BITS STUCK ON OR OFF.		
	07	DATA TRANSFER REGISTER BITS STUCK ON OFF.		
	08	INTERRUPT TAKEN IN LEVEL 4 WITHOUT INTERRUPT REQUEST.		
	09	DIAGNOSTIC CONNECTOR ATTACHED TO SIOC, ATTACH DEVICE.		
	10	SIOC INTERRUPT ENABLE LATCH COULD NOT BE TURNED OFF.		
	11	INTERRUPT IN LEVEL 4 WAS NOT TAKEN.		
	12	INTERRUPT LEVEL 4 COULD NOT BE DISABLED.		
	13	INTERRUPT LEVEL 4 IAR BITS STUCK ON OR OFF.		
	21	TRIM DEVICE ID BITS NOT EQUAL TO, -0011-.		
	22	TRIM BUSY TOO LONG AFTER READ COMMAND ISSUED.		
	23	1255 NOT BUSY AFTER READ COMMAND ISSUED.		
	24	INTERRUPT NOT ISSUED AFTER READ COMPLETED.		
	25	INTERRUPT LEVEL 4 NOT RESET.		
	26	1255 STATUS BYTE ERROR-LCR OVERFLOW		
	27	READ DAR NOT DECREMENTED.		
	28	DATA NOT READ INTO CORE.		
	29	DATA TRANSFER REG PARITY CHECK OR NO-OP BIT ON.		
'90'	'01'	DATA REGISTER PARITY CHECK	YES	CRT CHECK AAAA=CONTENTS OF CRTAP (ADDRESS AAAAABCCDDEF BB=LAST SIO 0 BYTE
2265	'02'	CRT OFF OR NOT READY		CC=LAST SIO CONTROL CODE BYTE DD=SENSE BYTE 2 DATA REGISTEP EE=SENSE BYTE 1 CRT STATUS

7. HALT AND PRINTOUTS (CONT.)

UNIT OR PROGRAM (HEX)	INDEX NUMBER (HEX)	HALT IDENTIFICATION	DOES ERROR LOG OUT	ERROR TABLE LOGOUT DISCRIPTION
'A0'	'01'	SEEK BUSY BIT IS INITIALLY ACTIVE.	YES	5444 ERROR LOG
'B0'	'02'	DISK IS INITIALLY BUSY.		HALT STATUS BYTES SIO
5444	'03'	LOAD/SENSE OF THE DISK REGISTERS REVEALS A BAD REGISTER.		ID 0 1 2 3 Q R
DISK	'04'	SEEK TRAVEL CHECK. THE HEADS ARE NOT LOCATED AT THE EXPECTED TRACK.		AOXX .. .. .
	'05'	STATUS CHECK. STATUS (S) ARE IN ERROR AFTER THE LAST COMMAND.		BOXX .. .. .
	'06'	DISK IS NOT READY. NOTE THIS HALT WILL OCCUR ONLY ONCE.		.....
	'07'	SEEK BUSY DID NOT TIME OUT.		NOTE: FOR HALT CODES 01, 02, 03, AND 06 THE STATUS AND SIO BYTES WILL CONTAIN ONLY DOTS SINCE THEY DO NOT OCCUR ON SIO COMMANDS.
	'08'	DISK READ/WRITE BUSY DID NOT TIME OUT		COMMENTS AND EXPLANATION:
	'09'	DISK DATA ADDRESS REGISTER DID NOT INCREMENT PROPERLY.		DATA ARRANGED AS FOLLOWS:
	'0A'	DATA WAS NOT TRANSFERRED DURING A READ OPERATION.		XX - IS THE ERROR HALT THAT IS RECORDED.
	'0C'	DATA WAS NOT TRANSFERRED DURING A WRITE OPERATION.		A0 - IDENTIFIES ERROR TO DRIVE 1.
	'0E'	THE DISK DRIVE DROPPED READY AFTER ISSUING A SEEK COMMAND.		B0 - IDENTIFIES ERROR TO DRIVE 2.
				.... - NO ERROR LOGGED YET.
				ERRORS:
				TOP LINE - LEAST RECENT
				2ND LINE - PREVIOUS
				3RD LINE - MOST RECENT
'E9'	'01'	DRIVE CHECK		BYTE
LEDGER CARD DEVICE	'02'	SENSE CELL CHECK		1 - LCD 'STAGE' STATUS BYTE
	'03'	CARD SKEW CHECK		01 - OPEN
	'04'	READ BACK CHECK		02 - ONE OF THE FOLLOWING ERRORS HAS BEEN FOUND
	'05'	LINEFINDER MARK CHECK		1. A LCD CARD WAS EJECTED WITHOUT REASON.
	'06'	INVALID COMMAND CHECK		2. AN EJECT COMMAND OF SOME SORT WAS GIVEN AND THE CARD WAS NOT EJECTED.
	'07'	CARD WAS EJECTED WITHOUT REASON		3. THE LCD DID NOT EJECT A CARD AFTER FINDING THERE WERE NOT ANY MORE PRINTABLE LINES.
	'08'	CARD WAS NOT EJECTED AFTER GIVEN EJECT COMMAND.		03 - LAST PRINTABLE LINE CONDITION DETECTED.
	'09'	CARD WAS NOT EJECTED AFTER FINDING NO PRINT LINES.		04 - A LINEFINDER PRINT MARK ERROR REGISTERED
				10 - CARD WILL EJECT AT THE END OF COMMAND.
				20 - TEST CARD 2 IN PROCESS
				40 - TEST CARD 3 IN PROCESS
				80 - TEST CARD 1 OR UNKNOWN CARD IN PROCESS
				2 - SIO 0 BYTE
				3 - LCD SIO CONTROL CODE BYTE
				4 - LCD SENSE STATUS BYTE
				BIT 0 SENSE AMP CHECK
				1 CARD SKEW CHECK
				2 DRIVE CHECK
				3 READ MARK CHECK
				4 LINE FINDER MARK CHECK
				5 INVALID COMMAND CHECK
				6 CARD IN SWITCH
				7 CARD OUT SWITCH
				5 - TYPE OF COMMAND GIVEN
				01 EJECT
				02 INDEX
				03 READ BACK AND EJECT
				04 FEED, READ ID AND FIND NEXT PRINT LINE
				05 READ ALL LINE FINDER PRINT MARKS
				06 FEED, READ ID AND EJECT
				6 - COMMAND BYTE AT FAULT
				7 - COMMAND EXECUTION STATUS
				00 ERROR OCCURRED PRIOR TO START OF COMMAND.
				01 ERROR OCCURRED DURING EXECUTION OF COMMAND.
				02 ERROR OCCURRED AFTER COMPLETION OF COMMAND.
				8 - LOCATE LINE DATA AT TIME OF ERROR.
				9 - PRINT DATA ADDRESS REGISTER ADDRESS AT TIME OF ERROR
'E8'	'01'	DATA CHECK (PRINT CHARACTER PARITY CHECK)	YES	PRINTER CK
5213 OR 2222	'02'	ROS CHECK (ERROR WHILE PRINTING A CHARACTER)		AABBCCDDEEFGG
PRINTER	'03'	MARGIN CHECK (LEFT OR RIGHT MARGIN REACHED BEFORE COMPLETION OF PRINT OR TAB COMMAND)		AA= LAST SIO 0 BYTE
	'04'	SYNC CHECK		BB= LAST SIO CONTROL CODE BYTE
	'05'	HORIZONTAL CYCLE CHECK		CC= SENSE BYTE 2 PRINTER STATUS
	'06'	VERTICAL CYCLE CHECK		DD= SENSE BYTE 1 PRINTER STATUS
	'07'	PRIMARY END OF FORM CHECK. PLACE PAPER IN PRIMARY FEED BEFORE PRESSING SYSTEM START.		EE= COMMAND CODE BYTE
	'08'	SECONDARY END OF FORM CHECK. PLACE PAPER IN SECONDARY FEED BEFORE PRESSING SYSTEM START.		FF= COMMAND COUNT BYTE IF NEEDED
				GG= BAD CHARACTER ON ROS/DATA CK

UNIT OR PROGRAM (HEX)	INDEX NUMBER (HEX)	HALT IDENTIFICATION	DOES ERROR LOG OUT	ERROR TABLE LOGOUT DISCRPTION
'F8' 5496	'01'	DATA RECORDER IS OFF LINE	YES	DATA RECORDER CHECK
'F8' 5496	'02'	DATA RECORDER TRANSPORT JAM.		AABBCC AA = LAST SIO 0 BYTE
'F8' 5496	'03'	HOPPER EMPTY, HOPPER JAM, STACKER FULL		BB = LAST SIO CONTROL BYTE
'F8' 5496	'04'	INVALID CARD CODE		CC = SENSE BYTE 1 STATUS
'F8' 5496	'05'	COMPARE ERROR ON READ OR PUNCH I/O CYC		
'F9' 129	'01'	DATA RECORDER IS OFF LINE	YES	DATA RECORDER CHECK
'F9' 129	'02'	DATA RECORDER TRANSPORT JAM.		AABBCC AA = LAST SIO 0 BYTE
'F9' 129	'03'	HOPPER EMPTY, HOPPER JAM, STACKER FULL		BB = LAST SIO CONTROL BYTE
'F9' 129	'04'	INVALID CARD CODE		CC = SENSE BYTE 1 STATUS
'F9' 129	'05'	COMPARE ERROR ON READ OR PUNCH I/O CYC		
'80' BSCA	'01'	BSCA FAILURE. SEE DESCRIPTION OF BSCA LOGUOUT TO DETERMINE NATURE OF FAILURE. (LOGOUT WILL BE THE SAME AS ERROR PRINOUT IN FORMAT.)	YES	ERR- XX XX XX XX XX XX XX DIAGNOSTIC SENSE IS XXXX STATUS SENSE IS XXXX TEST NUMBER IS XXXX DATA EXP IS 7FPCF1C71F7FPCF1C71F7FPCF1C71F7F DATA ACT IS XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX NOTE: FOR ASCII ADAPTER REPLACE THE 2ND TO THE LAST LINE WITH: DATA EXP IS 7F7C7147147FPC71471F7FPC7147
				THE LINE WITH 'ERR' ON IT INDICATES AN ERROR OR COMBINATION OF ERRORS WHEN THERE ARE NUMBERS AFTER THE WORD. THE NUMBERS AND THEIR MEANING ARE: 1 UNIT CHECK NOT READY 2 'BUSY' ALWAYS ON 3 INTERRUPT REQUEST PENDING NOT ON 4 OP/END INTERRUPT NOT ON 5 ITB INTERRUPT ON 6 DATA IN CORE IS WRONG 7 NO INTERRUPT OCCURRED FOR THE DIAGNOSTIC AND STATUS SENSE SEE THE BSCA DESCRIPTION FOR BIT SIGNIFICANCE. THE TEST NUMBER IS A COUNTER OF THE NUMBER OF TIMES A LOOP TEST INSTRUCTION WAS PERFORMED. A SYSTEM RESET AND START OF THE SYSTEM TEST WILL REINITIALIZE THIS COUNTER. DATA ACT IS THE DATA THE BSCA SHIFTED AND PUT BACK IN CORE.
'FE' 5406 CPU	'01'	JUMP FALSE DID NOT JUMP ON A FALSE CONDITION.	NO	
'FE' 5406 CPU	'02'	JUMP TRUE DID NOT JUMP ON A TRUE CONDITION.		
'FE' 5406 CPU	'03'	BRANCH FALSE DID NOT BRANCH ON A FALSE CONDITION.		
'FE' 5406 CPU	'04'	JUMP TRUE DID NOT JUMP ON A TRUE CONDITION.		
'FE' 5406 CPU	'05'	BRANCH TRUE DID NOT BRANCH ON A TRUE CONDITION (TEST BITS ON)		
'FE' 5406 CPU	'06'	BRANCH TRUE DID NOT BRANCH ON A TRUE CONDITION (TEST BITS OFF)		
'FE' 5406 CPU	'07'	JUMP EQUAL DID NOT JUMP ON A EQUAL CONDITION. (COMPARE LOGICAL IMMEDIATE - ZEROS)		
'FE' 5406 CPU	'08'	JUMP EQUAL DID NOT JUMP ON A EQUAL CONDITION. (COMPARE LOGICAL IMMEDIATE - F'S)		
'FE' 5406 CPU	'09'	ZERO AND ADD ZONED DECIMAL FAILED.		
'FE' 5406 CPU	'0A'	ADD ZONED DECIMAL FAILED.		
'FE' 5406 CPU	'0B'	LOAD AND STORE XR1 FAILED.		
'FE' 5406 CPU	'0C'	LOAD AND STORE XR2 FAILED.		
'FE' 5406 CPU	'0D'	MOVE IMMEDIATE INDEXED BY XR1 FAILED		
'FE' 5406 CPU	'0E'	MOVE IMMEDIATE INDEXED BY XR2 FAILED.		
'FE' 5406 CPU	'0F'	LOAD ADDRESS USING XR1 FAILED.		

```

*****
* 'UU' * 'XY' *
* UNIT OR * INDEX *
* PROGRAM * NUMBER *
* (HEX) * (HEX) *
*****
* 'FE' * '10' * MOVE ZONE TO ZONE FAILED.
* 5406
* CPU * '11' * MOVE NUMERIC TO ZONE FAILED.
* (CONT.) * '12' * MOVE NUMERIC TO NUMERIC FAILED.
* * '13' * MOVE ZONE TO NUMERIC FAILED.
* * '14' * LOAD ADDRESS OF XR2 USING XR1 AS DISPLACEMENT
* * FAILED.
* * '15' * LOAD ADDRESS OF XR1 USING XR2 AS DISPLACEMENT
* * FAILED.
* * '16' * JUMP ON DECIMAL OVERFLOW FAILED.
* * '17' * BRANCH ON DECIMAL OVERFLOW FAILED.
* * '18' * BRANCH ON NO DECIMAL OVERFLOW FAILED.
* * '19' * JUMP ON NO DECIMAL OVERFLOW FAILED.
* * '1A' * EDIT INSTRUCTION FAILED.
* * '1C' * INSERT AND TEST CHARACTER FAILED TO SET FIELD
* * CORRECTLY.
* * '1E' * ARR NOT SET CORRECTLY AFTER INSERT AND TEST
* * CHARACTER INSTRUCTION.
* * '89' * INTERRUPT LEVEL 0 FAILED.
*****
* 'FP' * '01' * AVAILABLE CORE HAS BEEN USED. THE REMAINING * NO
* SYSTEM * * MODULES WILL BE BYPASSED (SEE ITEM 2).
* TEST
* LOADER * '02' * DEVICE CALLED FOR IN MODULE UDT NOT DEFINED.
* AND * * RESET HALT TO OVERLAY THIS MODULE.
* SUPER-
* VISOR * 'E0' * HALT BEFORE LOADING A MODULE TO ALLOW DELETION*
* * SET LEFT MOST SWITCH TO 'A' TO DELETE LAST
* * MODULE LISTED.
* * 'E1' * ROUTINE 2 LOGOUT COMPLETE. REMOVE CONSOLE
* * SWITCHES FROM 'BB' AND PRESS SYSTEM START
*****

```

## 1. PROGRAM SUMMARY

- 1.1 PURPOSE - THE PURPOSE OF THIS PROGRAM IS TO PROVIDE A GENERAL PURPOSE TIMING ANALYSIS PROGRAM THAT WILL UTILIZE INFORMATION FROM CONTROL INPUT RECORDS DEFINING SPECIFIC TIMING CONTROLS. STANDARDIZED TIMING OUTPUTS WILL BE PROVIDED.

NOTE: FOR FURTHER INFORMATION REFER TO 5444 MAPCHARTS, APPENDIX B.

## 2. OPERATING PROCEDURES

- 2.1 LOADING-THE PROGRAM IS LOADED FROM THE CE PACK IGNORE REFERENCES TO MFCU AND CARD LOADING PROCEDURES USED BY 5410. THE STANDARD PROGRAM SELECT PROCEDURE (DFF4) DESCRIBED IN SECTION 12. OF THE DIAGNOSTIC CONTROL PROGRAM USERS GUIDE. WHEN THE 'FF' HALT OCCURS, SET CE CONSOLE SWITCHES TO OPID WHERE PID = THE PROGRAM ID OF THE TAP PROGRAM YOU WANT TO RUN. THE FIRST CONTROL RECORD WILL BE LOADED AND EXECUTED AFTER START IS OPERATED AT 'FF' HALT.
- 2.2 RUNNING - AT THE 'PA5' HALT INDICATING THAT THE PROGRAM IS LOADED, OPERATE START. HALT 'FF' SHOULD OCCUR. SET CE SWITCHES AND OPERATE START TO ENTER THE FIRST SET OF CONTROL RECORDS. HALT 'FE' WILL OCCUR. AFTER PROPER JUMPERS HAVE BEEN INSTALLED, OPERATE START TO EXECUTE THE PROGRAM.
- 2.3 SENSE SWITCH OPTIONS
- 1) SENSE SWITCH 28 - ON - PROVIDES THE PRINTED OUTPUT FOR THE TIMING SEQUENCE DURING WHICH A STATUS ERROR OR NOT READY CONDITION IS RECOGNIZED.
  - 2) SENSE SWITCH 29 - ON - CAUSES THE TIMING DATA TO BE PRINTED IN TABULAR FORM INSTEAD OF THE 'SCOPE' GRAPHIC FORM.
  - 3) SENSE SWITCH 2B DOES NOT APPLY TO THE 5406.

## 3. PROGRAM HALTS

- 'FE' (ABCD123 ) - PROVIDES A HALT FOR MANUAL INTERVENTION. INSTALL JUMPERS.
- 'FF' (ABCD1234 ) - THE PROGRAM IS NOW READY TO LOAD A TAP CONTROL RECORD FROM THE CE SWITCHES

NOTE: PROGRAM ID LIST OF TAP PROGRAMS IS ON APPENDIX B TO 5444 MAPS PN 2598113.

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1. GENERAL PROGRAM SUMMARY

NOTE: DISK DRIVE 1 ALSO REFERS TO SPINDLE 0.

NOTE: DISK DRIVE 2 ALSO REFERS TO SPINDLE 1.

NOTE: IF LOADING FROM TAPE CASSETTE REFER TO BLOCK 20 (PROCEDURE FOR UPDATING A CE DIAGNOSTIC DISK PACK 5406).

1.1 DEVICE TESTS AND OPTIONS

1.1.1 DEVICE TESTS

SECTION	ROUTINE	INTENT	APPLICABLE SENSE SWITCHES
A01 - FCU LOGIC DIAGNOSE TEST	01	THIS ROUTINE USES A HARDWARE STEP FACILITY TO SET UP THE FCU LOGIC FOR ALL KNOWN CONDITIONS AND THEN TESTS THE OUTPUT FOR SPECIFIED RESULTS. ERROR MESSAGES WILL BE PROVIDED THAT WILL EITHER DIRECTLY OR INDIRECTLY INDICATE BY THE USE OF THE FAULT TABLE THE UNITS THAT SHOULD BE REPLACED.	
	02	THIS ROUTINE USES A HARDWARE STEP FACILITY TO TEST THE HIGH PERFORMANCE ACCESS FEATURE. IF THE FEATURE IS NOT DEFINED, THIS ROUTINE IS AUTOMATICALLY BYPASSED. (5410 ONLY)	
A03 - SEEK FUNCTION TEST	01	THE CYLINDER 0 SENSE BIT IS CHECKED FOR A '1' AFTER THE ACCESS MECHANISM IS POSITIONED AT CYLINDER 0 THE CYLINDER 0 SENSE BIT IS CHECKED FOR A '0' AFTER THE ACCESS MECHANISM IS POSITIONED AT CYLINDER 1	15 1E 1F
	02	AFTER THE ACCESS IS POSITIONED AT CYLINDER 0, A 'READ ID' COMMAND IS PERFORMED USING HEAD 0 HEAD 1, HEAD 2, HEAD 3	15-16 1E-1F
	03	THE SEEK CHECK AND THE NO-OP SENSE BITS ARE TESTED FOR A '1' AFTER GIVING TWO FORWARD SEEKS WHICH SHOULD POSITION THE ACCESS MECHANISM BEYOND THE INNER LIMIT SWITCH AND ONE READ ID COMMAND WHICH SHOULD BE ACCEPTED BUT NOT EXECUTED BY THE CONTROL UNIT. THESE BITS ARE ALSO TESTED FOR A '0' AFTER A RECALIBRATE AND SENSE HAVE BEEN ISSUED.	1E 1F
	04	A SERIES OF SEEKS FORWARD AND REVERSE, FOLLOWED BY A READ ID COMMAND ARE PERFORMED	
	05	THE HEAD SETTLING TIME IS MEASURED AFTER A ONE TRACK SEEK. THIS ROUTINE IS BYPASSED IF THE HIGH PERFORMANCE ACCESS FEATURE IS DEFINED. HEAD SETTLING IS MEASURED IN A01 ROUTINE 02 FOR HIGH PERFORMANCE. (5410 ONLY)	
	06	THE SEEK CHECK TIMEOUT COUNTER IS CHECKED	
	07	THIS IS A CONTROL ROUTINE THAT FACILITATES STEPPING TO DISK 2 IF THAT DISK IS PRESENT	
	08	THIS IS AN OPTIONAL ROUTINE WHICH WILL BE RUN ONLY IF SELECTED BY USE OF THE DATA SWITCHES. THE INPUTS FOR 3 SENSE LINES MUST BE PLUGGED PRIOR TO RUNNING. IT WILL ISSUE A SERIES OF 'SEEKS' (FORWARD AND REVERSE), FOLLOWING EACH ONE BY A 'READ ID'. THE 'GO' AND THE 'TRACK CROSSING' LINES WILL BE SENSED AND CHECKED FOR CORRECT OPERATION	
A05--WRITE DATA FUNCTION TEST	01	THE 'NO RECORD FOUND' SENSE BIT IS TESTED FOR A '1' AFTER A 'WRITE DATA' COMMAND IS PERFORMED USING A CONTROL FIELD WHERE THE CYLINDER ADDRESS IN CORE DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	15 16 1E 1F 27
	02	A SERIES OF 24 ONE SECTOR 'WRITE DATA' COMMANDS IS PERFORMED USING HEADS 0 AND 2.	15-16 1E-1F
	03	A SERIES OF 24 ONE SECTOR 'WRITE DATA' COMMANDS IS PERFORMED USING HEADS 1 AND 3.	15-16 1E-1F
	04	A 2 SECTOR 'WRITE DATA' COMMAND IS PERFORMED USING SECTORS 0 AND 1, HEADS 0 AND 2.	15-16 1E-1F
	05	HEAD SWITCHING IS CHECKED BY PERFORMING A 2 SECTOR 'WRITE DATA' COMMAND BEGINNING WITH HEAD 0 OR 2 SECTOR 23 AND ENDING WITH HEAD 1 OR 3 SECTOR 0	15-16 1E-1F
	06	THE 'END OF CYLINDER' SENSE BIT IS TESTED FOR A '1' AFTER A 2 SECTOR 'WRITE DATA' COMMAND IS PERFORMED WHICH BEGINS WITH HEAD 1 SECTOR 23 OR HEAD 3 SECTOR 23	15-16 1E-1F





SECTION	ROUTINE	INTENT	APPLICABLE SENSE SWITCHES
A09--WRITE ID AND SELECT DISK	01	THE 'WRITE ID FUNCTION IS TESTED USING HEAD 0. AFTER THE WRITE IS COMPLETED, 24 VERIFY DATA COMMANDS ARE ISSUED TO CHECK THE WRITES.	15 1E-1F
	02	THE 'WRITE ID FUNCTION IS TESTED USING HEAD 1. AFTER THE WRITE IS COMPLETED, 24 VERIFY DATA COMMANDS ARE ISSUED TO CHECK THE WRITES.	15 1E-1F
	03	THE 'WRITE ID FUNCTION IS TESTED USING HEAD 2. AFTER THE WRITE IS COMPLETED, 24 VERIFY DATA COMMANDS ARE ISSUED TO CHECK THE WRITES.	16 1E-1F
	04	THE 'WRITE ID FUNCTION IS TESTED USING HEAD 3. AFTER THE WRITE IS COMPLETED, 24 VERIFY DATA COMMANDS ARE ISSUED TO CHECK THE WRITES.	16 1E-1F
	05	THE ABILITY TO SELECT BOTH THE FIXED AND REMOVABLE DISK IS TESTED BY WRITING 2 DIFFERENT PATTERNS ON EACH OF THE 2 DISKS.	1E-1F
	06	THE LOGICAL END OF CYLINDER IS TESTED BY FIRST WRITING TRACK 1 ID'S ON TRACK 0 OF THE CE CYLINDER, AND THEN DOING A 24 SECTOR VERIFY DATA COMMAND ON TRACK 0 AND TESTING FOR END OF CYLINDER.	1E-1F
	07	THIS IS A CONTROL ROUTINE THAT FACILITATES STEPPING TO DISK 2 IF THAT DISK IS PRESENT	1E-1F
	08	THE ABILITY TO INHIBIT WRITING IS TESTED BY FIRST WRITING ONE SECTOR OF FF WITH THE FILE WRITE SWITCH ON AND THEN WRITING ONE SECTOR OF 00 WITH THE FILE WRITE SWITCH OFF.	1E-1F
A0A--SCAN EQUAL FUNCTION TEST	01	THE 'NO RECORD FOUND' SENSE BIT IS TESTED FOR A '1' AFTER A 'SCAN EQUAL' COMMAND IS PERFORMED USING A CONTROL FIELD WHERE THE CYLINDER ADDRESS IN CORE DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	15-16 1E-1F
	02	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	03	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '1' AFTER GENERATING A SCAN EQUAL CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	04	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '0' AFTER GENERATING A SCAN NOT EQUAL CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN EQUAL' COMMAND WHERE THE DATA ON THE DISK IS NOT EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	05	A SCAN FOUND CONDITION AND A '1' FOR THE SCAN EQUAL SENSE BIT ARE TESTED FOR AFTER EACH PASS THROUGH A SERIES OF 24 SECTOR 'SCAN EQUAL' COMMANDS WHERE ONE SECTOR ON THE DISK IS EQUAL TO THE DATA IN CORE AND 23 SECTORS ON THE DISK ARE NOT EQUAL TO THE DATA IN CORE. 24 PASSES ARE MADE AND THE EQUAL SECTOR IS MOVED DOWN THE TRACK ONE SECTOR FOR EACH OF THE 24 PASSES.	15-16 1E-1F
	06	THE 'END OF CYLINDER' SENSE BIT IS TESTED FOR A '1' AFTER A 2 SECTOR 'SCAN EQUAL' COMMAND IS PERFORMED BEGINNING AT SECTOR 23 OF HEAD 1 OR HEAD 3 WHERE THE DATA ON THE DISK IS NOT EQUAL TO THE DATA IN CORE.	15-16 1E-1F
	07	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN EQUAL' WHERE BOTH THE DATA ON THE DISK AND THE DATA IN CORE COMPRISES 256 BYTES OF '55'	15-16 1E-1F
	08	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN EQUAL' WHERE ONE BYTE OF DATA ON THE DISK IS EQUAL TO ONE BYTE OF DATA IN CORE AND THE COMPARE FUNCTION OF THE REMAINING 255 BYTES OF DATA IS MASKED OFF WITH 255 BYTES OF 'FF'	15-16 1E-1F

SECTION	ROUTINE		APPLICABLE SENSE SWITCHES
A0B--SCAN LOW OR EQUAL FUNCTION TEST	01	THE 'NO RECORD FOUND' SENSE BIT IS TESTED FOR A '1' AFTER A 'SCAN LOW OR EQUAL' COMMAND IS PERFORMED USING A CONTROL FIELD WHERE THE CYLINDER ADDRESS IN CORE DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	15-16 1E-1F
	02	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN LOW OR EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	03	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '1' AFTER GENERATING A SCAN EQUAL CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN LOW OR EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	04	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '0' AFTER GENERATING A SCAN NOT EQUAL BUT LOW CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN LOW OR EQUAL' COMMAND WHERE THE DATA ON THE DISK IS NOT EQUAL BUT IS LOWER THAN THE DATA FIELD IN CORE	15-16 1E-1F
	05	A SCAN FOUND CONDITION IS TESTED FOR AFTER EACH PASS THROUGH A SERIES OF 24 SECTOR 'SCAN LOW OR EQUAL' COMMANDS WHERE ONE SECTOR ON THE DISK IS WRITTEN WITH DATA THAT IS EQUAL TO THE DATA IN CORE, AND 23 SECTORS HAVE BEEN WRITTEN WITH DATA THAT IS HIGHER THAN THE DATA IN CORE. 24 PASSES ARE MADE AND THE EQUAL SECTOR IS MOVED DOWN THE TRACK ONE SECTOR FOR EACH OF THE 24 PASSES.	15-16 1E-1F
	06	THE 'END OF CYLINDER' SENSE BIT IS TESTED FOR A '1' AFTER A 2 SECTOR 'SCAN LOW OR EQUAL' COMMAND IS PERFORMED BEGINNING AT SECTOR 23 OF HEAD 1 OR HEAD 3 WHERE THE ON THE DISK IS NOT LOW OR EQUAL TO THE DATA IN CORE	15-16 1E-1F
	07	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN LOW OR EQUAL' WHERE BOTH THE DATA ON THE DISK AND THE DATA IN CORE COMPRISES 256 BYTES OF '55'	15-16 1E-1F
	08	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN LOW OR EQUAL' WHERE ONE BYTE OF DATA ON THE DISK IS EQUAL TO ONE BYTE OF DATA IN CORE AND THE COMPARE FUNCTION OF THE REMAINING 255 BYTES OF DATA IS MASKED OFF WITH 255 BYTES OF 'FF'	15-16 1E-1F
A0C--SCAN HIGH OR EQUAL FUNCTION TEST	01	THE 'NO RECORD FOUND' SENSE BIT IS TESTED FOR A '1' AFTER A 'SCAN HIGH OR EQUAL' COMMAND IS PERFORMED USING A CONTROL FIELD WHERE THE CYLINDER ADDRESS IN CORE DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TK.	15-16 1E-1F
	02	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN HIGH OR EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	03	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '1' AFTER GENERATING A SCAN EQUAL CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN HIGH OR EQUAL' COMMAND WHERE THE DATA ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	15-16 1E-1F
	04	THE SCAN EQUAL SENSE BIT IS TESTED FOR A '0' AFTER GENERATING A SCAN NOT EQUAL BUT HIGH CONDITION BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN HIGH OR EQUAL' COMMAND WHERE THE DATA FIELD IN CORE IS HIGH	15-16 1E-1F
	05	A SCAN FOUND CONDITION IS TESTED FOR AFTER EACH PASS THROUGH A SERIES OF 24 SECTOR 'SCAN HIGH OR EQUAL' COMMANDS WHERE ONE SECTOR ON THE DISK IS WRITTEN WITH DATA THAT IS EQUAL AND 23 SECTORS HAVE BEEN WRITTEN WITH DATA THAT IS LOWER THAN THE DATA THAT IS IN CORE. 24 PASSES ARE MADE, WITH THE EQUAL SECTOR BEING MOVED DOWN THE TRACK 1 SECTOR FOR EACH OF THE 24 PASSES	15-16 1E-1F
	06	THE 'END OF CYLINDER' SENSE BIT IS TESTED FOR A '1' AFTER A 2 SECTOR 'SCAN HIGH OR EQUAL' COMMAND IS PERFORMED BEGINNING AT SECTOR 23 OF HEAD 1 OR HEAD 3 WHERE THE DATA ON THE DISK IS NOT HIGH OR EQUAL TO THE DATA IN CORE	15-16 1E-1F
	07	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN HIGH OR EQUAL' WHERE BOTH THE DATA ON THE DISK AND THE DATA IN CORE COMPRISES 256 BYTES OF '55'	15-16 1E-1F
	08	A SCAN FOUND CONDITION IS GENERATED AND THEN TESTED FOR BY DOING A ONE SECTOR 'WRITE DATA' FOLLOWED BY A ONE SECTOR 'SCAN HIGH OR EQUAL' WHERE ONE BYTE OF DATA ON THE DISK IS EQUAL TO ONE BYTE OF DATA IN CORE AND THE COMPARE FUNCTION OF THE REMAINING 255 BYTES OF DATA IS MASKED OFF WITH 255 BYTES OF 'FF'	15-16 1E-1F

** A0D- DISK REVOLUTION TEST	01	PROGRAM TESTS THE ROTATIONAL SPEED OF DISK DRIVE 1 FOR THE NUMBER OF REVOLUTIONS SELECTED FROM 100 TO 1500 IN INCREMENTS OF 100.	1E-1F
**	02	PROGRAM TESTS THE ROTATIONAL SPEED OF DISK DRIVE 2 FOR THE NUMBER OF REVOLUTIONS SELECTED FROM 100 TO 1500 IN INCREMENTS OF 100.	1E-1F
** A0E - SEEK FUNCTION TEST	01	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EACH CYLINDER BEGINNING WITH ZERO AND STOPPING AT MAXIMUM	1E-1F
**	02	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EACH CYLINDER BEGINNING WITH MAXIMUM AND STOPPING AT ZERO	1E-1F
**	03	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EVERY 2ND CYLINDER BEGINNING WITH ZERO AND STOPPING AT MAXIMUM	1E-1F
**	04	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EVERY 2ND CYLINDER BEGINNING WITH MAXIMUM AND STOPPING AT ZERO	1E-1F
**	05	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EVERY 9TH CYLINDER BEGINNING WITH ZERO AND STOPPING AT MAXIMUM	1E-1F
**	06	A 'READ ID' IS PERFORMED AFTER A 'SEEK' TO EVERY 9TH CYLINDER BEGINNING WITH MAXIMUM AND STOPPING AT ZERO	1E-1F
**	07	A 'READ ID' IS PERFORMED AFTER EACH 'SEEK', WHERE THE SEEKS CONSIST OF A SERIES OF MIXED LONG AND SHORT MOVEMENT SEEKS.	
**	08	THIS ROUTINE WILL TIME A 100 TRACK SEEK IF THE HIGH PERFORMANCE ACCESS FEATURE IS DEFINED. (5410 ONLY)	1E-1F
**	09	THIS IS A 'DUMMY' ROUTINE THAT FACILITATES STEPPING TO DISK 2 IF THAT DISK IS PRESENT	1E-1F
** B01- FCU LOGIC DIAGNOSE	01	THIS ROUTINE CONTAINS ADDITIONAL TESTS OF THE TYPE CONTAINED IN SECTION A01. SENSE LINES MUST BE PLUGGED FOR THIS ROUTINE.	
**	02	THIS ROUTINE WILL BE USED TO DIAGNOSE UNSAFE CONDITIONS. SENSE LINES MUST BE PLUGGED FOR THIS ROUTINE. THE CE PROBE MUST BE USED.	
** B03- DISK IPL FORMAT CHECK	01	PROGRAM READS SECTOR 00 OF TRACK 000 (IPL DATA) OF BOTH THE FIXED AND REMOVABLE DISKS. THE PROGRAM THEN INSTRUCTS THE OPERATOR TO IPL THE DISKS. THE IPL DATA IS THEN COMPARED AGAINST THE READ DATA.	1B
** B04- DISK FRIEND TEST	01	PROGRAM BUILDS A COMMANDS TABLE BY READING VARIOUS CONSOLE SWITCH SETTINGS, AS SET BY THE OPERATOR.	
**	02	PROGRAM INTERPRETS AND ISSUES EACH SWITCH SETTING SEQUENTIALLY. NOTE - PROGRAM LOOPS ON THIS ROUTINE AND THE COMMANDS TABLE.	17, 18 19, 1A 1C,
**	03	PROGRAM PRINTS A LOG-OUT OF THE CURRENT COMMANDS TABLE. NOTE - THIS ROUTINE MUST BE DIALED IN VIA DCP'S SWS -F203-	





2. OPERATING PROCEDURES (DCP CONTROLLED SECTIONS)

THIS SECTION DESCRIBES THE USER INTERFACE FOR ALL PROGRAMS OPERATING UNDER THE DIAGNOSTIC CONTROL PROGRAM (DCP). MORE DETAIL IS PROVIDED IN THE DCP USERS GUIDE.

2.1 LOADING

THE CE MODE SELECTOR SWITCH MUST BE IN THE 'PROCESS' POSITION. ALL CE CONTROL PANEL TOGGLE SWITCHES SHOULD BE IN THE NORMAL (DOWN) POSITION.

LOADING FROM CARDS	LOADING FROM DISK
* 1. IF DCP LOADED, SKIP TO STEP 5. * 2. IF DISK SYSTEM, PLACE IPL SELECTOR IN 'MFCU' POSITION. * 3. PLACE DCP FOLLOWED BY TEST SECTION/S INTO MFCU PRIMARY HOPPER. MAKE MFCU READY. * 4. DEPRESS PROGRAM LOAD KEY. * AFTER DCP IS LOADED, HALT 'HA' WILL OCCUR. COMMON SENSE SWITCHES MAY BE SET AT THIS TIME. * 5. PLACE TEST SECTION/S INTO MFCU PRIMARY HOPPER AND MAKE MFCU READY (IF NOT ALREADY DONE). * 6. IF CPU IS HALTED WITH 'HA' OR 'HE' DISPLAYED, SKIP TO STEP 8. * 7. DEPRESS PROGRAM LOAD KEY. * DCP WILL PRINT SECTION TERMINATE MESSAGE AND HALT, DISPLAYING 'HE'. * 8. RESET THE HALT. * DCP WILL LOAD THE SECTION AND PERFORM HALT 'HA'. * 9. MAKE DESIRED CONSOLE SWITCH ENTRIES, IF ANY, AND RESET THE HALT.	* 1. SKIP TO STEP 5 IF DCP ALREADY LOADED. * 2. LOAD THE CE PACK AND MAKE FILE READY. * 3. PLACE THE IPL SELECTOR IN THE PROPER POSITION. (NORMALLY - REMOVABLE DISK). * 4. DEPRESS PROGRAM LOAD. (IF MODEL 5406 SEE 5406 IMP USERS GUIDE PN 5129400 FOR UNIQUE INSTRUCTIONS) AFTER DCP IS LOADED, HALT 'HA' ('FA5' ON MODEL 5406) OCCURS. COMMON SENSE SWITCHES MAY NOW BE SET. * 5. USE CONSOLE SWITCH ENTRY 'DXXX' TO SPECIFY THE PROGRAM/S TO BE LOADED. (SEE SECTION 2.4) * 6. SET LEFTMOST SWITCH TO '0' AND RESET THE HALT. * DCP WILL LOAD THE FIRST SECTION SPECIFIED AND PERFORM HALT 'HA' ('FA5' ON MODEL 5406). * 7. MAKE ANY CONSOLE SWITCH ENTRIES DESIRED AND/OR RESET THE HALT.

2.2 PROGRAM RESTART

DCP STORES INSTRUCTIONS STARTING AT LOCATION '0000' TO PROVIDE FOR A PROGRAM RESTART. THESE INSTRUCTIONS ALSO CHECK THE CONSOLE SWITCHES FOR A VALID ENTRY. TO PERFORM A PROGRAM RESTART, SIMPLY DEPRESS SYSTEM RESET FOLLOWED BY CPU START.

2.3 TERMINATION

NORMAL DCP-CONTROLLED CHAINING FROM ROUTINE TO ROUTINE PROVIDES AN AUTOMATIC TERMINATION OF A SECTION. IN ADDITION, THE CE MAY TERMINATE A SECTION AT ANY TIME BY (1) SYSTEM RESET AND ENTERING 'E00' IN THE CONSOLE SWITCHES, OR BY (2) LOADING THE NEXT SECTION. IN ALL CASES, DCP PRINTS A MESSAGE AND PERFORMS HALT 'HE' ('FE5' ON MODEL 5406). THE SECTION CAN STILL BE RESTARTED AT THIS TIME. IF NO RESTART IS DESIRED, RESET THE HALT TO LOAD THE NEXT SECTION.

2.4 CONSOLE ADDRESS/DATA SWITCH COMMUNICATIONS

THE ROTARY DATA SWITCHES ARE THE MEANS BY WHICH THE CE CAN COMMUNICATE WITH THE DIAGNOSTICS. ENTRIES ARE MADE AS FOLLOWS--

1. STOP CPU.
2. SET UP ROTARY SWITCHES FOR ONE OF THE FOLLOWING OPTIONS. X'S INDICATE POSITIONS WHICH VARY WITH THE NEED.

SWITCHES	1	2	3	4	
F 0	X	X	X	X	- TURN OFF SENSE SWITCH 'XX'. (F008 WOULD TURN OFF SSW 08).
F 1	X	X	X	X	- TURN ON SENSE SWITCH 'XX'. (F108 WOULD TURN ON SSW 08).
F 2	X	X	X	X	- GO TO ROUTINE 'XX' AFTER CONSOLE ENTRY FINISHED. (F202 WOULD GO TO ROUTINE 2).
E E	0	0	0	0	- TERMINATE THE CURRENT SECTION.
D X	X	X	X	X	- DISK--EXECUTE SECTIONS FOR DEVICE WITH UNIT CODE 'XX'. (DA00 - EXECUTE ALL DISK PROGRAMS)
D X	X	X	X	X	- DISK--EXECUTE SECTION XXX. (DA01 - SECTION A01). (DA01 - EXECUTE SECTION A01)

NOTE - UP TO FOUR DISK INSTRUCTIONS MAY BE ENTERED DURING ONE ENTRY PHASE.

3. DEPRESS CPU START. (SYSTEM RESET FOLLOWED BY START WILL CALL IMMEDIATE ATTENTION TO THE SWITCHES. SEE NOTE BELOW).
  4. WHEN DCP RECEIVES CONTROL, IT HALTS WITH 'HP' ('FF5' ON MODEL 5406) DISPLAYED. RESET THE HALT TO ENTER THE FIRST OPTION.
  5. DCP WILL PERFORM HALT 'HU' OR 'HP' ('F05' OR 'FF5' ON MODEL 5406). LOAD THE NEXT OPTION AND RESET THE HALT.
  6. REPEAT STEP 5 FOR AS MANY OPTIONS AS DESIRED. ALTERNATING CODES 'HU' AND 'HP' ('F05' OR 'FF5' ON MODEL 5406) WILL SIGNAL DCP ACCEPTANCE.
  7. WHEN DONE, SET LEFTMOST SWITCH TO '0' AND RESET THE HALT.
- NOTE: - WHEN USING F2XX IN THE SWITCHES TO GO TO A ROUTINE AFTER A SECTION HAS BEGUN, SYSTEM RESET/START SHOULD BE PERFORMED BEFORE MAKING THE ENTRY. (THIS PREVENTS ERRORS FOUND IN ONE ROUTINE FROM BEING DETECTED IN SOME OTHER ROUTINE. IT SHOULD NOT BE PERFORMED IF OTHERWISE SPECIFIED IN THE MAPS.)

2.5 COMMON SENSE SWITCHES

SENSE SWITCHES ARE EQUIVALENT TO 48 TOGGLE SWITCHES NUMBERED HEXADECIMALLY 00-2F. SENSE SWITCHES 00-0F ARE RESERVED FOR STANDARD OPTIONS PROVIDED BY DCP (LISTED BELOW). SENSE SWITCHES 10-2F ARE SIGNIFICANT TO THE PARTICULAR SECTION BEING RUN. INSTRUCTIONS FOR SETTING SENSE SWITCHES ARE CONTAINED IN SECTION 2.4.

COMMON SENSE SWITCHES			
SSW	I	ON	OFF
NUMBER	I	I	(NORMAL)
* 00	I	LOOP ON SECTION.	GO TO NEXT SECTION.
* 01	I	LOOP ON ROUTINE.	GO TO NEXT ROUTINE.
* 02	I	BYPASS MANUAL INTERVENTION ROUTINES.	EXECUTE ALL ROUTINES.
* 03	I	BYPASS ERROR PRINTING.	PRINT ERROR MESSAGES.
* 04	I	BYPASS NON-ERROR PRINTING.	PRINT NON-ERROR MESSAGES.
* 05	I	USE ALTERNATE PRINTER. PRINTER KEYBOARD, IF ATTACHED. OTHERWISE, MFCU.	NORMAL PRINTER.
* 06	I	BYPASS ERROR HALTS.	HALT AFTER ERROR.
* 07	I	LOAD AND GO. BYPASS COMMENTS AND PROMPTING HALTS.	PROMPTING MODE.
* 08	I	USE 5203 RIGHT CARRIAGE.	USE LEFT CARRIAGE.
* 09	I	DON'T CLEAR SECTION SENSE SWITCHES AFTER LOADING	CLEAR SECTION SENSE SWITCHES AFTER LOADING
* 0A-0F	I	RESERVED	

2.6 CONTROL PROGRAM HALTS.

ALL CONTROL PROGRAM (DCP) HALTS USE THE CHARACTER 'H' AS THE FIRST DIGIT OF THE HALT CODE. THE SECOND DIGIT IDENTIFIES THE CONDITION ACCORDING TO THE FOLLOWING TABLE.

HALT CODES	MODEL	CONDITION	ACTION REQUIRED
* 5406 * 5410	I	I	I
* F05	* H0	I INVALID RECORD FOUND WHILE LOADING.	I CORRECT INVALID RECORD AND RELOAD.
* F15	* H1	I A DEVICE CALLED FOR BY THE TEST SECTION WAS NOT DEFINED IN THE UDT CARDS.	I CHECK UDT CARDS AND RELOAD OR RESET HALT TO BYPASS THE ERROR (ERRORS COULD RESULT).
* F25	* H2	I DATA SWITCH ENTRY ERROR.	I CORRECT DATA SWITCHES AND RESET HALT.
* F35	* H3	I INVALID ROUTINE PREFIX POUND DURING CHAINING FROM ONE ROUTINE TO NEXT.	I ENTER ROUTINE SELECT OPTION 'P2IX' IN DATA SWITCHES AND RESET HALT. IF THIS DOES NOT WORK, RELOAD SECTION.
* F55	* H5	I MFCU NOT READY OR ERROR. ERROR INDICATION SHOULD BE DISPLAYED IN THE MFCU LIGHTS.	I DO A NON-PROCESS RUN-OUT, RELOAD DECK STARTING WITH RUNOUT CARD/S AND RESET THE HALT.
* F65	* H6	I PRINTER NOT READY OR ERROR.	I CLEAR CONDITION AND RESET THE HALT. IF FAILURE PERSISTS, RUN PRINTER FUNCTION TEST. SENSE SWITCHES 03 AND 04 MAY BE USED TO BYPASS PRINTING. SET SENSE SWITCH 05 TO USE MFCU AS PRINTER.
* F75	* H7	I DISK ERROR.	I RESET HALT TO RETRY. IF ERROR PERSISTS, RELOAD.
* FA5	* HA	I CONTROL PROGRAM IS PREPARED TO RECEIVE DATA SWITCH ENTRY. OCCURS AFTER DCP AND SECTION LOADING.	I RESET THE HALT IF NO ENTRY DESIRED. TO LOAD OPTIONS, SET UP DATA SWITCHES AND RESET THE HALT. SSW 07 MAY BE USED TO BYPASS THIS HALT.
* FC5	* HC	I DISK LOADER REQUIRES SPECIFICATION OF SECTIONS TO BE LOADED FROM DISK, OR SELECTED SECTION NOT ON DISK.	I IF NO ENTRY HAS BEEN MADE PREVIOUSLY, LOAD PROGRAM SELECTION ENTRY 'DXXI' AND RESET THE HALT. UP TO EIGHT ENTRIES MAY BE MADE. IF ENTRIES HAVE EVER BEEN MADE, THE PROGRAMS MAY BE REPEATED BY RESETTING THE HALT.
* FD5	* HD	I SECTION JUST TERMINATED HAS SPECIFIED THE NEXT SECTION TO BE RUN. THE ARR CONTAINS -DXXI- WHERE -XXX- IS THE PROGRAM IDENTIFICATION.	I LOAD SPECIFIED SECTION IN MFCU PRIMARY HOPPER AND RESET THE HALT.
* FE5	* HE	I CURRENT SECTION TERMINATED.	I RESET HALT TO LOAD NEXT SECTION. SECTION MAY BE RESTARTED BY SYSTEM RESET/START.
* FF5	* HF	I DCP HALTS WITH 'HP' DISPLAYED WHENEVER A VALID DATA SWITCH ENTRY IS	I LOAD A VALID DATA SWITCH ENTRY AND RESET THE HALT. REPEAT FOR ALTERNATING HALTS 'HU' AND 'HP'. TO TERMINATE ENTRY PROCEDURE, ROTATE LEFT-MOST SWITCH TO ZERO AND RESET HALT.
* F05	* HU-HP	I RECOGNIZED. AS DCP ACCEPTS ENTRIES, ALTERNATING HALTS 'HU' AND 'HP' OCCUR.	I

NOTE: THE 'HD' HALT WILL BE DISPLAYED AS A CAPITAL 'H' AND A LOWER CASE 'D'.



3 INDEX TABLE FOR HALTS AND PRINTOUTS

3.1 ERROR HALTS

* INDEX * NUMBER * 'XX'	MEANING OF HALT	* MAP * CHART * REFERENCE*
* 01 * SECTION * A01	I AN ERROR WAS RECOGNIZED BY SECTION A01. SEE THE DETAILED ROUTINE I DESCRIPTION OF A01 OR THE FCU MAPS FOR ADDITIONAL INFORMATION REGARDING I THE PRINTOUT.	I I I
* 01 * SECTION * A03	I AT LEAST ONE ERROR OCCURRED WHILE SELECTING AND DOING A READ ID I USING EACH HEAD	I I I
* 02	I AT LEAST ONE ERROR OCCURRED WHILE DOING A SERIES OF FORWARD AND REVERSE I SEEKS	I I I
* 03	I THE NO-OP SENSE BIT WAS NOT SET AFTER GIVING A SEEK BEYOND TRACK CAPACITY I FOLLOWED BY A READ ID	I I I
* 04	I THE HEAD SETTLING TIME IS INCORRECT	I I I
* 05	I AFTER A RECALIBRATE, THE CYLINDER 0 SENSE BIT, (BYTE 1 BIT 1) I WAS NOT ON.	I I I
* 06	I AFTER A SEEK TO CYLINDER 1, THE CYLINDER 0 SENSE BIT, (BYTE 1 BIT 1), I WAS NOT OFF.	I I I
* 07	I AFTER A SEEK TO 47 CYLINDERS BEYOND TRACK CAPACITY, THE SEEK CHECK I SENSE BIT, (BYTE 0 BIT 7), WAS NOT ON.	I I I
* 08	I THE NO-OP & SEEK CHECK SENSE BITS WERE NOT RESET AFTER A SENSE AND A SIO	I I I
* 09	I AN ERROR OCCURRED WHILE SEEKING	I I I
* 0A	I AFTER A SEEK AND READ ID, THE CYLINDER NUMBER READ DOES NOT EQUAL I THE ONE EXPECTED.	I I I
* 0B	I ACCESS OVER RUN SWITCH SWITCHED TOO SOON.	I I I
* 0C	I AFTER ISSUING A SEEK FORWARD COMMAND OF 1 TRACK, THE SEEK BUSY I SENSE BIT NEVER CAME ON.	I I I
* 0E	I AN ERROR OCCURRED WHILE DOING A RECALIBRATE (SEE SECTION BOB, RTN 08 & 09)	I I I
* 0F	I ERROR OCCURRED WHILE DOING A READ ID.	I I I
* 10	I WRITE DATA COMMAND DID NOT GIVE ANY ERROR WHEN ISSUED WHERE THE CONTROL I FIELD CYLINDER NUMBER DOES NOT MATCH THE CYLINDER NUMBER OF THE CE TRACK	I I I
* 11	I THE NO RECORD FOUND SENSE BIT NOT SET AFTER ISSUING A WRITE DATA COMMAND I WHERE THE CONTROL FIELD ID DOES NOT MATCH THE CYLINDER ID OF THE CE TRACK	I I I
* 12	I AN ERROR OR ERRORS OCCURRED WHILE DOING A WRITE DATA COMMAND USING I HEADS 0 OR 2.	I I I
* 13	I THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER THE I COMPLETION OF A ONE SECTOR WRITE DATA COMMAND	I I I
* 14	I THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER I A ONE SECTOR WRITE DATA COMMAND	I I I
* 15	I THE WRITE DATA FIELD IN CORE WAS CHANGED AFTER COMPLETION OF A WRITE I DATA COMMAND	I I I
* 16	I THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED TO FF AFTER I COMPLETION OF A WRITE ID COMMAND.	I I I
* 17	I AN ERROR OR ERRORS OCCURRED WHILE DOING A WRITE DATA COMMAND USING I HEADS 1 OR 3	I I I
* 18	I THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED I CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR WRITE DATA COMMAND	I I I
* 19	I THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED I CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR WRITE DATA COMMAND WHERE I THERE WAS HEAD SWITCHING	I I I
* 1A	I AN ERROR OR ERRORS OCCURRED WHILE DOING A 2 SECTOR WRITE DATA COMMAND I WITH HEAD SWITCHING	I I I

INDEX NUMBER 'XX'	MEANING OF HALT	MAP CHART REFERENCE
1C	A TIO ON AN ERROR DID NOT BRANCH AFTER ATTEMPTING TO WRITE PAST THE END OF CYLINDER USING A 2 SECTOR WRITE DATA COMMAND	
1E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING A 2 SECTOR WRITE DATA COMMAND WHICH BEGINS AT SECTOR 23 OF HEAD 1 OR HEAD 3	
1F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER ATTEMPTING A 2 SECTOR WRITE DATA COMMAND WHICH BEGINS AT SECTOR 23 OF HEAD 1 OR HEAD 3	
20	THE VERIFY DATA COMMAND DID NOT GIVE ANY ERROR WHEN THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TK.	
21	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A VERIFY DATA COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
22	AN ERROR OR ERRORS OCCURRED WHILE DOING A VERIFY DATA COMMAND USING HEADS 0 OR 2	
23	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER DOING A ONE SECTOR VERIFY DATA COMMAND	
24	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER DOING A ONE SECTOR VERIFY DATA COMMAND	
25	THE DATA FIELD IN CORE WAS CHANGED AFTER GIVING A ONE SECTOR VERIFY DATA COMMAND	
26	THE SECTOR NUMBER IN THE DISK CONTROL FIELD WAS NOT STEPPED TO 5C AT THE COMPLETION OF A WRITE ID COMMAND.	
27	AN ERROR OR ERRORS OCCURRED WHILE DOING A VERIFY DATA COMMAND USING HEADS 1 OR 3	
28	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR VERIFY DATA COMMAND	
29	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR VERIFY DATA COMMAND WHERE THERE WAS HEAD SWITCHING FROM 0 TO 1 OR 2 TO 3	
2A	A TIO ON AN ERROR DID NOT BRANCH AFTER ATTEMPTING TO VERIFY DATA PAST THE END OF CYLINDER. IF SECTION A09, THIS IS LOGICAL END OF CYLINDER.	
2C	AN ERROR OR ERRORS OCCURRED WHILE DOING A 2 SECTOR VERIFY DATA COMMAND WITH HEAD SWITCHING FROM 0 TO 1 OR 2 TO 3	
2E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING A TO VERIFY DATA TO THE END OF CYLINDER. NOTE: IF SECTION A09, THIS IS LOGICAL E.O.C.	
2F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER ATTEMPTING A 2 SECTOR VERIFY DATA COMMAND WHICH BEGINS AT SECTOR 23 OF HEAD 1 OR HEAD 3.	
30	THE READ DATA DIAGNOSTIC COMMAND DID NOT GIVE ANY ERROR WHEN THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK.	
31	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A READ DATA DIAGNOSTIC COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
32	AN ERROR OR ERRORS OCCURRED WHILE DOING A ONE SECTOR READ DATA DIAGNOSTIC COMMAND USING HEADS 0 OR 2.	
33	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER DOING A ONE SECTOR READ DATA DIAGNOSTIC COMMAND	
34	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER DOING A ONE SECTOR READ DATA DIAGNOSTIC COMMAND	
35	THE WRITE DATA FIELD IN CORE WAS CHANGED AFTER GIVING A ONE SECTOR READ DATA DIAGNOSTIC COMMAND	
36	THE READ FIELD DOES NOT CONTAIN THE EXPECTED DATA AFTER A ONE SECTOR WRITE DATA AND READ DATA DIAGNOSTIC	
37	AN ERROR OR ERRORS OCCURRED WHILE DOING A ONE SECTOR READ DATA DIAGNOSTIC COMMAND USING HEADS 1 OR 3.	

* INDEX * NUMBER * 'XX'	MEANING OF HALT	* MAP * CHART * REFERENCE
38	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR READ DATA DIAGNOSTIC COMND.	
39	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER A READ DATA DIAGNOSTIC COMMAND OF 24 SECTORS	
3A	AN ERROR OR ERRORS OCCURRED WHILE DOING A READ DATA DIAGNOSTIC COMMAND OF 24 SECTORS	
3C	A SEEK CHECK OCCURRED WHILE SEEKING THE CE CYLINDER	
3E	THE DISK DATA ADDRESS IS NOT AT THE CORRECT ADDRESS AT THE COMPLETION OF A WRITE OR READ OPERATION	
3F	THE DISK DATA ADDRESS WAS NOT STEPPED AFTER A WRITE COMMAND	
40	THE READ DATA COMMAND DID NOT GIVE ANY ERROR WHEN ISSUED WHERE THE DISK CONTROL FIELD CYLINDER NUMBER DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
41	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A READ DATA COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
42	AN ERROR OR ERRORS OCCURRED WHILE DOING A READ DATA COMMAND USING HEADS 0 OR 2	
43	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER THE COMPLETION OF A READ DATA COMMAND	
44	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER COMPLETION OF A ONE SECTOR READ DATA COMMAND	
45	THE WRITE DATA FIELD IN CORE WAS ALTERED AFTER COMPLETION OF A READ DATA COMMAND	
45	FILE SEEKED TO THE WRONG CYLINDER (AOE ONLY).	
46	THE READ FIELD DOES NOT CONTAIN THE EXPECTED DATA AFTER THE COMPLETION OF A WRITE DATA AND READ DATA COMMAND	
47	AN ERROR OR ERRORS OCCURRED WHILE DOING A READ DATA COMMAND USING HEADS 1 OR 3	
48	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER THE COMPLETION OF A 2 SECTOR READ DATA COMMAND	
49	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS NOT STEPPED CORRECTLY AFTER COMPLETING A 2 SECTOR READ DATA COMMAND USING HEAD SWITCHING FROM HEAD 0 OR 2 SECTOR 23 TO HEAD 1 OR 3 SECTOR 0	
4A	AN ERROR OR ERRORS OCCURRED WHILE DOING A READ DATA COMMAND USING HEAD SWITCHING FROM HEAD 0 OR 2 TO HEAD 1 OR 3.	
4C	A TIC FOR ERROR DID NOT BRANCH AFTER ATTEMPTING TO READ DATA PAST THE END OF CYLINDER USING A 2 SECTOR READ DATA COMMAND	
4E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING A 2 SECTOR READ DATA COMMAND WHICH BEGINS AT SECTOR 23 OF HEAD 1 OR HEAD 3	
4F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER ATTEMPTING A 2 SECTOR READ DATA COMMAND WHICH BEGINS AT SECTOR 23 OF HEAD 1 OR HEAD 3	
50	THE SCAN EQUAL COMMAND DID NOT GIVE ANY ERROR WHEN ISSUED WHERE THE DISK CONTROL FIELD CYLINDER NUMBER DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
51	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A SCAN EQUAL COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DID NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
52	AN ERROR OR ERRORS OCCURRED WHILE DOING A SCAN EQUAL COMMAND WHERE THE DATA FIELD IN CORE IS EQUAL TO THE DATA FIELD ON THE DISK	
53	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER COMPLETION OF A ONE SECTOR SCAN EQUAL COMMAND	
54	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER COMPLETION OF A ONE SECTOR SCAN EQUAL COMMAND	

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INDEX NUMBER 'XX'	MEANING OF HALT	MAP CHART REFERENCE
55	THE DATA FIELD IN MEMORY WAS ALTERED AFTER COMPLETION OF A ONE SECTOR SCAN EQUAL COMMAND	
55	FILE IS ACCESSING TOO SLOWLY (AOE ONLY).	
56	A SCAN FOUND CONDITION WAS NOT PRESENT OR DETECTED BY A TIO AFTER A SCAN FOUND CONDITION WAS GENERATED WITH A ONE SECTOR SCAN EQUAL COMMAND	
57	THE SCAN EQUAL SENSE BIT WAS NOT ON AFTER DOING A ONE SECTOR SCAN EQUAL COMMAND USING EQUAL DATA FIELDS	
58	AN ERROR OR ERRORS OCCURRED WHEN DOING A ONE SECTOR SCAN EQUAL COMMAND USING DATA FIELDS THAT ARE NOT EQUAL	
59	A SCAN FOUND CONDITION WAS DETECTED BY A TIO AFTER DOING A ONE SECTOR SCAN EQUAL COMMAND USING DATA FIELDS THAT ARE NOT EQUAL	
5A	THE SCAN EQUAL SENSE BIT WAS ON AFTER DOING A SCAN EQUAL COMMAND WHERE THE DATA FIELD IN CORE WAS NOT EQUAL TO THE DATA FIELD ON THE DISK	
5C	A SCAN EQUAL OCCURRED AT THE WRONG SECTOR WHEN DOING A 24 SECTOR SCAN EQ.	
5D	A TIO FOR ERROR DID NOT BRANCH AFTER ATTEMPTING TO SCAN EQUAL PAST THE END OF CYLINDER	
5E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING TO SCAN EQUAL PAST THE END OF CYLINDER USING A 2 SECTOR SCAN	
5F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD HAS CHANGED AFTER COMPLETION OF A 2 SECTOR SCAN EQUAL WHICH BEGAN AT SECTOR 23 HEAD 1 OR SECTOR 23 HEAD 3	
60	THE SCAN LOW OR EQUAL COMMAND DID NOT GIVE ANY ERROR WHEN ISSUED WHERE THE DISK CONTROL FIELD CYLINDER NUMBER DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
61	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A SCAN LOW OR EQUAL COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
62	AN ERROR OR ERRORS OCCURRED WHILE DOING A SCAN LOW OR EQUAL COMMAND WHERE THE DATA FIELD ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	
63	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER COMPLETION OF A ONE SECTOR SCAN LOW OR EQUAL COMMAND	
64	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER THE COMPLETION OF A ONE SECTOR SCAN LOW OR EQUAL COMMAND	
65	THE DATA FIELD IN MEMORY WAS ALTERED AFTER COMPLETION OF A ONE SECTOR SCAN LOW OR EQUAL COMMAND	
66	A SCAN FOUND CONDITION WAS NOT PRESENT OR DETECTED BY A TIO AFTER A SCAN FOUND CONDITION WAS GENERATED WITH A ONE SECTOR SCAN LOW OR EQUAL	
66	AN ERROR WAS DETECTED IN THE HIGH PERFORMANCE ACCESS FEATURE CIRCUITRY. (5410 ONLY)	
67	THE SCAN EQUAL SENSE BIT WAS NOT ON AFTER DOING A ONE SECTOR SCAN LOW OR EQUAL COMMAND USING EQUAL DATA FIELDS	
68	AN ERROR OR ERRORS OCCURRED WHEN DOING A ONE SECTOR SCAN LOW OR EQUAL COMMAND WHERE THE DATA ON THE DISK IS LOWER THAN THE DATA FIELD IN CORE	
69	A SCAN FOUND CONDITION WAS DETECTED BY A TIO AFTER DOING A ONE SECTOR SCAN LOW OR EQUAL COMMAND USING DATA ON THE DISK THAT IS NOT LOW OR EQUAL TO THE DATA IN CORE	
6A	THE SCAN EQUAL SENSE BIT WAS ON AFTER DOING A SCAN LOW OR EQUAL COMMAND WHERE THE DATA FIELD IN CORE WAS NOT EQUAL TO THE DATA FIELD ON THE DISK	
6C	A SCAN FOUND OCCURRED AT THE WRONG SECTOR WHILE DOING A 24 SECTOR SCAN LOW OR EQUAL	
6D	A TIO FOR ERROR DID NOT BRANCH AFTER ATTEMPTING TO SCAN LOW OR EQUAL PAST END OF CYLINDER	
6E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING TO SCAN LOW OR EQUAL PAST THE END OF CYLINDER USING A 2 SECTOR SCAN	

INDEX NUMBER 'XX'	MEANING OF HALT	MAP CHART REFERENCE
6F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER COMPLETION OF A 2 SECTOR SCAN LOW OR EQUAL COMMAND WHICH BEGINS AT SECTOR 23 HEAD 1 OR SECTOR 23 HEAD 3	
70	THE SCAN HIGH OR EQUAL COMMAND DID NOT GIVE ANY ERROR WHEN ISSUED WHERE THE DISK CONTROL FIELD CYLINDER NUMBER DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
71	THE NO RECORD FOUND SENSE BIT WAS NOT SET AFTER ISSUING A SCAN HIGH OR EQUAL COMMAND WHERE THE CYLINDER NUMBER IN THE DISK CONTROL FIELD DOES NOT EQUAL THE CYLINDER NUMBER OF THE CE TRACK	
72	AN ERROR OR ERRORS OCCURRED WHILE DOING A SCAN HIGH OR EQUAL COMMAND WHERE THE DATA FIELD ON THE DISK IS EQUAL TO THE DATA FIELD IN CORE	
73	THE SECTOR COUNTER IN THE DISK CONTROL FIELD WAS NOT STEPPED AFTER COMPLETION OF A ONE SECTOR SCAN HIGH OR EQUAL COMMAND	
74	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER THE COMPLETION OF A ONE SECTOR SCAN HIGH OR EQUAL COMMAND	
75	THE DATA FIELD IN MEMORY WAS ALTERED AFTER COMPLETION OF A ONE SECTOR SCAN HIGH OR EQUAL COMMAND	
76	A SCAN FOUND CONDITION WAS NOT PRESENT OR DETECTED BY A TIO AFTER A SCAN FOUND CONDITION WAS GENERATED WITH A ONE SECTOR SCAN HIGH OR EQUAL	
77	THE SCAN EQUAL SENSE BIT WAS NOT ON AFTER DOING A ONE SECTOR SCAN HIGH OR EQUAL COMMAND USING EQUAL DATA FIELDS	
78	AN ERROR OR ERRORS OCCURRED WHEN DOING A ONE SECTOR SCAN HIGH OR EQUAL COMMAND WHERE THE DATA ON THE DISK IS HIGHER THAN THE DATA FIELD IN CORE	
79	A SCAN FOUND CONDITION WAS DETECTED BY A TIO AFTER DOING A ONE SECTOR SCAN HIGH OR EQUAL COMMAND USING DATA ON THE DISK THAT IS NOT HIGHER OR EQUAL TO THE DATA IN CORE	
7A	THE SCAN EQUAL SENSE BIT WAS ON AFTER DOING A SCAN HIGH OR EQUAL COMMAND WHERE THE DATA FIELD IN CORE WAS NOT EQUAL TO THE DATA FIELD ON THE DISK	
7C	A SCAN FOUND OCCURRED AT THE WRONG SECTOR WHILE DOING A 24 SECTOR SCAN HIGH OR EQUAL	
7D	A TIO FOR ERROR DID NOT BRANCH AFTER ATTEMPTING TO SCAN HIGH OR EQUAL PAST END OF CYLINDER	
7E	THE END OF CYLINDER SENSE BIT IS NOT ON AFTER ATTEMPTING TO SCAN HIGH OR EQUAL PAST THE END OF CYLINDER USING A 2 SECTOR SCAN	
7F	THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD WAS CHANGED AFTER COMPLETION OF A 2 SECTOR SCAN HIGH OR EQUAL COMMAND WHICH BEGINS AT SECTOR 23 HEAD 1 OR SECTOR 23 HEAD 3	
80	THE GO LINE DOES NOT COME UP FOR A SEEK WITH MOVEMENT	
81	THE GO LINE IS UP FOR A NO MOTION SEEK	
82	THE GO LINE HAS DROPPED BEFORE RECEIVING THE CORRECT NUMBER OF TRACK CROSSING PULSES	
83	THE GO LINE DID NOT DROP AFTER RECEIVING THE CORRECT NUMBER OF TRACK CROSSING PULSES	
84	THE GO LINE HAS DROPPED BEFORE RECEIVING ANY TRACK CROSSING PULSES	
85	THE GO LINE IS UP AND NO TRACK CROSSING PULSES WERE RECEIVED	
86	THERE IS A SOLID ERROR WITH ONE HEAD	
87	THERE IS A SOLID ERROR WITH ALL FOUR HEADS	
88	THE DISK IS NOT READY OR THERE IS A SOLID ERROR ON BEFORE STARTING THE TEST	

INDEX NUMBER 'XY'	MEANING OF HALT	MAP CHART REFERENCE
89	THE INDEX SENSE BIT NEVER COMES ON	
8A	THE SEEK BUSY SENSE BIT IS HUNG UP	
8C	THE ACCESS MECHANISM IS POSITIONED BETWEEN TRACKS	
8E	AN UNEXPECTED TIMEOUT OCCURRED WHILE THE CURRENT ROUTINE WAS RUNNING	
8E	DRIVE X BUSY TOO LONG (B04 ONLY).	
8F	THE TRACK CROSSING SENSE BIT IS ON ALL THE TIME	
90	THE HEAD SETTLING SENSE BIT IS ON ALL THE TIME	
91	THE HEAD SETTLING SENSE BIT NEVER COMES ON	
92	SEEK CHECK TIMEOUT COUNTER FAILURE OR DISK DRIVE 2 IS NOT SPECIFIED IN DCP'S UDT CARD WHEN IT IS PRESENT ON THE SYSTEM.	
93	THE CONTROL UNIT IS STILL IN CE MODE WHEN IT SHOULD NOT BE.	
94	WHEN TESTING THE ABILITY TO SELECT EITHER DISK, THE SAME DISK IS ALWAYS SELECTED.	
95	MINIMUM DISK SPEED LESS THAN ALLOWABLE SPECIFICATION	
96	MAXIMUM DISK SPEED GREATER THAN ALLOWABLE SPECIFICATION	
97	SPINDLE STATUS CHECK - SEE PRINTOUT FOR BITS IN ERROR	
98	SPINDLE IS INITIALLY BUSY.	
99	SPINDLE DID NOT GO BUSY.	
9A	WHEN THE FILE WRITE SWITCH WAS TURNED OFF, WRITING WAS STILL ALLOWED.	
9C	AN ERROR OCCURRED WHILE DOING A WRITE ID COMMAND.	
9E	THE IPL'ED DATA DOES NOT CORRESPOND TO THE DATA READ FROM THE IPL SECTOR. SEE THE PRINTOUT FOR WHICH DISK IS IN ERROR.	
9F	NO DATA WAS LOADED FROM THE DISK DURING THE IPL OPERATION. SEE PRINTOUT FOR THE DISK IN ERROR.	
FE	INTERVENTION REQUIRED	

3.2 NON-ERROR HALTS AND PRINTOUTS

3.2.1 SECTIONS A01 - A0E  
 B03 - B04

* INDEX * NUMBER * 'XX'	MEANING OF HALT	* MAP * CHART * REFERENCE*
11-2E	SEE DETAILED DESCRIPTION OF B0B. 10'S POSITION = DRIVE, 01'S POSITION = ROUTINE.	
E0	THIS HALT INSTRUCTS THE OPERATOR TO SET THE CONSOLE SWITCHES FOR AN OPTION TO BE STORED IN THE COMMANDS TABLE FOR SECTION -B04-.	
E1 E2	THESE HALTS ALTERNATE AS EACH CONSOLE SWITCH OPTION IS ACCEPTED AND STORED IN THE COMMANDS TABLE OF SECTION -B04-.	
E3	CONSOLE SWITCH OPTION -0000- (END OF TABLE) WAS ACCEPTED AND PROGRAM IS READY TO START EXECUTING THE STORED COMMANDS TABLE IN SECTION -B04-.	
E4	PROGRAM -B04- HAS JUST COMPLETED EXECUTING THE STORED COMMANDS TABLE. RESET OF THIS HALT WILL CAUSE THE PROGRAM TO START ANOTHER TABLE PASS.	
E5	LOG-OUT OF CURRENT EXECUTION OF CCMANDS TABLE IN SECTION -B04- IS COMPLETED.	
E6	CAN NOT ISSUE A COMMAND TO DISK DRIVE 2 BECAUSE THIS DISK DRIVE IS NOT DEFINED IN DCP'S -UDT- TABLE	
E7	CAN NOT SELECT TRACKS 4,5,6,71,72,73,74,75 OF A REMOVABLE DISK. THIS IS A SAFEGUARD TO PROTECT DIAGNOSTIC PATTERNS STORED ON A CE REMOVABLE DISK.	
E8	CONSOLE SWITCH 1 OR 2 SETTING IS IN ERROR. CORRECT THE SETTING AND RESET THIS HALT.	
E9	CONSOLE SWITCHES 3 AND 4 SPECIFY TOO LARGE A VALUE FOR A SECTOR OR A TRACK. CORRECT THE SETTING AND RESET THIS HALT.	
EA	DISK SYSTEM CONFIGURATION IS NOT DEFINED TO DCP. CORRECT DCP'S UDT TABLE TO CORRESPOND TO THE SYSTEM CONFIGURATION AND RELOAD THE PROGRAM.	
EC	THIS HALT INSTRUCTS THE OPERATOR TO IPL THE SPECIFIED DISK (SEE PRINTOUT) WITH ADDRESS STOP SET FOR 0000 ADDRESS. AFTER DOING THIS THE OPERATOR MUST ALTER SAR TO -0C00- TO START THE PROGRAM RUNNING AGAIN.	
EE	DUMP OF THE IPL AND READ DATA IN SECTION -B03- IS COMPLETE. NOTE - THE DATA IS NOT IN ERROR.	
EF	OPERATOR MUST SPECIFY THE NUMBER OF SECTORS TO READ OR WRITE FOR PROGRAM B04.	
F1	THE DISK SYSTEM IS DEFINED AS A MODEL 3, VIA THE UDT CARD. THEREFORE YOU CAN NOT SELECT THE FIXED DISK ON DRIVE 2.	
F0	RESET THE HALT AND COUNT THE PULSES ON THE CE PROBE.	
F8	OPERATOR MUST OPERATE THE DISK WRITE INHIBIT SWITCH PER PRINTED INSTR- UCTIONS AND RESET THE HALT. SECTION A09, ROUTINE 08.	
F9	SET DATA SWITCHES TO DEFINE THE NUMBER OF REVOLUTIONS TO TIME NOTE: IF SSW 7 IS ON, THE DEFAULT CONDITION IS 100 REVOLUTIONS.	
FA	SENSE SWITCHES 15 AND 16 ARE BOTH ON. THIS IS AN INVALID COMBINATION OF SWITCH SETTINGS. TURN ONE OR BOTH OF THEM OFF TO CONTINUE.	
FC	HALT TO CONNECT JUMPERS FOR ROUTINE 08 IN SECTION A03. WHEN ALL CONNECTIONS HAVE BEEN MADE, RESET THE HALT NOTE: BE SURE TO POSITION THE ACCESS MECHANISM AT CYLINDER 0 BEFORE RESETTING THE HALT.	
FE	INTERVENTION REQUIRED	

#### 4. DETAILED DESCRIPTION OF TESTS

##### 4.1 SECTION A01 - B01

BOTH OF THESE SECTIONS REQUIRE THAT DISK DRIVE 1 IS READY. DRIVE 2 (IF PRESENT AND HIGH PERFORMANCE, MUST BE READY) OTHERWISE NOT USED.

THESE TESTS USE THE CPU TO SIMULATE SIGNALS FROM THE DISK FILE. COMMANDS ARE ISSUED TO THE CONTROL UNIT BY THESE PROGRAMS AND THE RESULTS MONITORED BY THE USE OF INDICATORS AVAILABLE TO THE PROGRAM. IF THE INDICATORS ARE NOT AS EXPECTED, AN ERROR PRINTOUT WILL OCCUR. THIS PRINTOUT WILL CONSIST OF THE FOLLOWING:

1. A MESSAGE NUMBER WHICH INDICATES HOW FAR THE TEST HAS ADVANCED.
  2. THE CONDITION OF THE BUSY AND ERROR INDICATORS,
  3. THE STATUS IN HEX,
  4. THE CONTROL FIELD,
  5. THE LSR CONTENTS,
  6. AND THE FIRST BYTE OF DATA TRANSFERRED.
- SEE THE FCU MAPS FOR AN EXPLANATION OF THE MESSAGE NUMBERS AND THE ASSOCIATED CARDS THAT THEY CALL OUT.

THE FOLLOWING IS AN EXPLANATION OF THE OTHER DATA PUT OUT:

1. -B- THIS REPRESENTS THE STATE OF BUSY. A 'Y' MEANS YES IT IS BUSY AND A 'N' MEANS NO IT IS NOT BUSY.
2. -E- THIS REPRESENTS THE STATE OF THE NOT READY/ERROR CONDITION. A 'Y' INDICATES THAT THE TIO ON NOT READY/ERROR DID BRANCH AND A 'N' INDICATES THAT IT DID NOT.
3. -STATUS- THIS INFORMATION IS THE 4 BYTES OF SENSE DATA RECEIVED FROM THE FCU AT THE TIME OF THE ERROR.
4. -CTRL FLD- THIS INFORMATION IS THE CONTENTS OF THE DISK CONTROL FIELD AT THE TIME OF THE FAILURE.
5. -DFCR- THIS INFORMATION IS THE CONTENTS OF THE DISK CONTROL REGISTER ADDRESS AT THE TIME OF THE FAILURE.
6. -DFDR- THIS INFORMATION IS THE CONTENTS OF THE DISK DATA ADDRESS REGISTER AT THE TIME OF THE FAILURE.
7. -DATA- THIS INFORMATION IS THE CONTENTS OF THE DISK DATA FIELD AT THE TIME OF THE FAILURE.

##### SECTION A01

PROGRAM A01 CHECKS SEVERAL DISK OPERATIONS WITH THE ATTACHMENT CIRCUITRY OPERATING IN 'CE' MODE. CE MODE IS TURNED ON BY A 'LIO' INSTRUCTION WHICH ELECTRONICALLY DISCONNECTS THE FILE FROM THE CONTROL UNIT. WHILE IN CE MODE, THE CPU PROVIDES THOSE SIGNALS THAT NORMALLY COME FROM THE FILE. THESE INCLUDE INDEX, SEPERATED CLOCK AND SEPERATED DATA. ALSO CONTROLLED BY THE CE MODE OF OPERATION ARE THE WRITE OSCILLATOR AND THE INHIBIT DATA CYCLE REQUEST.

THE FOLLOWING IS A DESCRIPTION OF THE TESTS CONTAINED WITHIN A01.

1. READ ID (10XXXX MSG #'S)  
THIS TEST TESTS THAT THE OP IS ACCEPTED, THAT A DATA CHECK PREVENTS END OP, THAT A-M RESTART IS ACTIVATED IF ALL CONDITIONS OF THE ADDRESS MARK ARE NOT MET, THAT PRE-ID RESETS ERROR CONDITIONS AND THAT THE OPERATION ENDS AT POST ID COUNTER SET IF DATA CHECK IS OFF.
2. READ DATA (11XXXX MSG #'S)  
THIS TEST TESTS THAT THE OP IS ACCEPTED, THAT TRACK CONDITION CHECK CAN BE SENSED, THAT PRE-ID DOES NOT RESET ERRORS, THAT MISSING ADDRESS MARK CHECK CIRCUITS ARE INHIBITED BY DATA CHECK, THAT OVERRUN AND PARALLEL PARITY CHECK CAN BE SENSED, THAT PARALLEL PARITY CHECK FORCES EQUIPMENT CHECK AND THAT EQUIPMENT CHECK ENDS THE OPERATION.
3. READ DATA (12XXXX MSG #'S)  
THIS TEST TESTS LR STATUS RESET, START ORIENTATION RESET, START ORIENTATION, CCR ADVANCE GATE, BCA COUNTER, BLOCK SDR TO B REG, PROPER ADVANCE OF DFDR, THAT A SYNC CHARACTER IS NOT RECOGNIZED IN THE DATA FIELD, THAT ONLY OE IS RECOGNIZED AS A SYNC CHARACTER, THAT AM CHARACTER IS NOT RECOGNIZED EXCEPT AT AM TIME, AND THAT A COUNTER SET OF 16 OCCURS FOR INDEX TIME.
4. WRITE DATA (13XXXX MSG #'S)  
THIS TEST TESTS THAT THE OP IS ACCEPTED BY THE CONTROL UNIT, THAT TWO CONSECUTIVE ODD ID'S WILL FORCE MISSING ADDRESS MARK, THAT MISSING ADDRESS MARK CAN BE SENSED, AND THAT THE F. C. U. ERROR ENDS THE OPERATION AT POST ID.
5. READ DATA DIAGNOSTIC (14XXXX MSG #'S)  
THIS TEST TESTS THAT SET TO 8 IS NOT ACTIVATED, THAT AM CHARACTERS WHICH HAVE EXTRA AM BITS AND EXTRA OR MISSING DATA BITS ARE ACCEPTED, THAT STATUS RESETS AT PRE-ID, THAT NO RECORD FOUND CAN BE FORCED BY UNEQUAL COMPARE AFTER ID ORIENTATION, THAT NO RECORD FOUND CAN BE SENSED, THAT ERRORS DO NOT END THE OPERATION, THAT END OF CYLINDER CAN BE SENSED AND THAT END OF CYLINDER ENDS THE OPERATION
6. WRITE ID (15XXXX MSG #'S)  
THIS TEST TESTS THE WRITE ID OP FOR PROPER OPERATION AND THAT N CARRY PREVENTS ADVANCE FROM POST DATA TO AM TIME. IF AN ERROR HAS BEEN RECOGNIZED BY THIS TIME, A HALT OCCURS AND THE REMAINDER OF THE TESTS ARE NOT RUN. IF NO ERROR IS DETECTED THE PROGRAM WILL CONTINUE WITH THE REMAINDER OF THE TESTS.
7. READ DATA DIAGNOSTIC (20XXXX MSG #'S)  
THIS READ DATA DIAGNOSTIC TESTS THAT IF A SIO IS ISSUED DURING INDEX TIME THE OPERATION DOES NOT START UNTIL INDEX HAS GONE OFF AND COME BACK ON AND THAT AN ODD ADDRESS AFTER INDEX FORCES A MISSING ADDRESS MARK
8. WRITE DATA (22XXXX MSG #'S)  
THIS WRITE DATA COMMAND TESTS THAT EVEN ADDRESS BEFORE INDEX FORCES MISSING ADDRESS MARK.
9. SCAN OPERATIONS (23XXX & 24XXX & 25000 THRU 253801 MSG #'S)  
SCAN OPS ARE CHECKED FOR SCAN FOUND, THAT SCAN FOUND END OP, THAT SCAN MASK CHARACTER WORKS AND THAT EQUAL HIT WORKS.
10. READ VERIFY (253900 THRU 256600 MSG #'S)  
THIS TEST TESTS THAT NO DATA CYCLE REQUESTS OCCUR DURING DATA TIME AND THAT EXECUTE IS NOT ON AFTER BUSY DROPS.
11. SEEK  
THIS TESTS THE FCU FOR PROPER OPERATION OF THE HIGH PERFORMANCE ACCESS FEATURE, IF DEFINED BY OPTION BIT 2 IN THE UDT TABLE.

##### SECTION B01

PROGRAM B01 USES CE MODE AND CE SENSE BYTE THROUGH EXTERNAL WIRING TO PINPOINT PROBLEMS WHICH NEED MORE THOROUGH ANALYSIS THAN IS POSSIBLE WITH A01. PROPER OPERATION, WITH FREQUENT SAMPLING OF CE SENSE LINES, OF READ ID, READ DATA, WRITE ID AND WRITE DATA IS TESTED IN THIS PROGRAM. ROUTINE 01 IS USED TO FURTHER ANALYZE PROBLEMS DETECTED IN A01. ROUTINE 02 IS USED, WHEN CALLED FOR IN THE MAP CHARTS, TO ANALYZE PROBLEMS IN THE UNSAFE AREA OR IN THE INCORRECT WRITING AREA. B01 WILL NEVER HAVE MORE THAN ONE ERROR MESSAGE NUMBER.

HALTS UNIQUE TO A01 AND B01

01- OCCURS AFTER AN ERROR PRINTOUT	-- REFER TO FCU MAP CHARTS PAGE 509.
02- OCCURS AFTER REF 10 PRINTOUT	-- REFER TO FCU MAP CHARTS PAGE 509.
03- OCCURS AFTER AN ERROR PRINTOUT	-- REFER TO FCU MAP CHARTS PAGE 509.
E0 STOP FOR INTERVENTION IN UNSAFE ROUTINE	-- FOLLOW PRINTED INSTRUCTIONS
E1 STOP FOR INTERVENTION IN UNSAFE ROUTINE	-- FOLLOW PRINTED INSTRUCTIONS
E4 STOP FOR JUMPER PLACEMENT	-- FOLLOW PRINTED INSTRUCTIONS
E5 STOP FOR JUMPER PLACEMENT	-- FOLLOW PRINTED INSTRUCTIONS



## 4.2 SECTION A03, SEEK AND READ ID TESTS.

- ROUTINE 01, CYLINDER ZERO AND SEEK BUSY SENSE BIT TEST  
BEFORE ANY ACCESS MOVEMENT IS ATTEMPTED, THE SEEK BUSY SENSE BIT IS TESTED TO DETERMINE IF IT IS ON. IF IT IS NOT THEN A RECALIBRATE FOLLOWED BY A SEEK TO CYLINDER 1 IS ISSUED. THE SEEK BUSY LINE IS AGAIN TESTED TO DETERMINE IF IT COMES UP FOR A SEEK. IF IT DOES THEN A SECOND LOOP IS ENTERED WHILE THE SEEK BUSY LINE REMAINS UP. WHEN IT DROPS, THE CYLINDER 0 BIT IS TESTED FOR OFF. NEXT A RECALIBRATE IS ISSUED AND AFTER THE SEEK BUSY LINE DROPS, THE CYLINDER 0 SENSE BIT IS TESTED FOR ON.
- ROUTINE 02, TEST OF READ FROM ALL HEADS  
AFTER A RECALIBRATE AND A SEEK TO CYLINDER 0, A SERIES OF 4 READ ID COMMANDS ARE ISSUED USING EACH OF THE 4 HEADS. THE RESULTS OF EACH READ ARE SAVED AND ANALYZED AFTER ALL READS ARE COMPLETED. IF ANY ERRORS ARE NOTED, THEN THE RESULTS, (GOOD OR IN ERROR), ARE PRINTED OUT:  
ITEMS CHECKED ARE:  
1. THE READ ID FUNCTION,  
2. THE TRANSFER OF A CYLINDER ADDRESS OF 0,  
3. THE SELECTION OF THE CORRECT HEAD.
- ROUTINE 03, TEST OF THE SEEK CHECK AND NOOP SENSE BITS.  
THE SEEK CHECK AND NOOP SENSE BITS ARE CHECKED BY FIRST SEEKING TO THE CE TRACK AND THEN ISSUING A SEEK TO 47 CYLINDERS BEYOND THE CE TRACK FOLLOWED BY A READ ID COMMAND WHICH SHOULD BE PROVISIONALLY ACCEPTED. THE SECOND SEEK SHOULD SET THE SEEK CHECK SENSE BIT, AND IF THAT BIT IS ON, THEN THE READ ID COMMAND SHOULD HAVE SET THE NOOP SENSE BIT. AFTER THESE TWO SENSE BITS HAVE BEEN TESTED FOR ON, ANOTHER SENSE IS ISSUED TO TEST THE NOOP SENSE BIT FOR OFF. A RECALIBRATE COMMAND IS GIVEN TO RESET THE SEEK CHECK SENSE BIT, AND A SENSE COMMAND IS GIVEN TO TEST THE SEEK CHECK BIT FOR OFF.
- ROUTINE 04, BASIC SEEK FORWARD AND REVERSE TEST.  
AFTER A RECALIBRATE, A SERIES OF EIGHT SEEKS, (FOUR FORWARD AND FOUR REVERSE), ARE ISSUED TO TEST THE ABILITY OF THE FILE TO MOVE IN BOTH THE FORWARD AND REVERSE DIRECTION. THE RESULTS OF EACH SEEK ARE SAVED, AND AFTER ALL SEEKS HAVE BEEN ISSUED, THE RESULTS ARE ANALYZED. IF ANY ERRORS ARE FOUND, THEN THE RESULTS OF ALL SEEKS, (GOOD OR IN ERROR), ARE PRINTED OUT.  
ITEMS CHECKED ARE:  
1. THE DIRECTION AND THE NUMBER OF TRACKS OF MOVEMENT THAT RESULTED FROM EACH SEEK COMMAND.  
2. THE DEVICE STATUS FOR EACH SEEK COMMAND.
- ROUTINE 05, MEASURE OF HEAD SETTLING TIME  
BEFORE ANY MOTION IS INITIATED, THE HEAD SETTLING SENSE BIT IS TESTED FOR OFF. IF IT IS, THEN A SEEK TO CYLINDER 0 FOLLOWED BY A SEEK TO CYLINDER 1 IS ISSUED. IF THERE ARE NO SEEK ERRORS, A SENSE LOOP IS ENTERED TO WAIT FOR THE HEAD SETTLING SENSE BIT TO COME ON. IF THIS BIT NEVER COMES ON, AN ERROR MESSAGE IS PRINTED OUT. IF THIS BIT DOES COME ON, THEN A SECOND SENSE LOOP IS ENTERED TO TIME THE DURATION OF THE HEAD SETTLING LINE. THE COMPUTED TIME IS COMPARED WITH THE ALLOWABLE MINIMUM AND MAXIMUM VALUES, AND IF THIS TIME IS OUT OF TOLLERENCE THE ACTUAL HEAD SETTLING TIME IS PRINTED OUT. (IF 5410 BYPASSED FOR HI-PERFORMANCE)
- ROUTINE 06, TEST OF THE SEEK CHECK TIMEOUT COUNTER.  
THIS ROUTINE WILL BE RUN ONLY WHILE TESTING DISK DRIVE 1 AND WILL BE BYPASSED IF DISK DRIVE 2 IS TURNED ON. AFTER A SEEK FORWARD COMMAND IS ISSUED, INDEX PULSES ARE GENERATED IN CE MODE TO CAUSE THE SEEK CHECK TIMEOUT COUNTER TO TIME OUT AND A SEEK CHECK TO BE GENERATED. ONCE THIS IS DONE, A READ ID COMMAND IS USED TO TAKE THE CONTROL UNIT OUT OF CE MODE.
- ROUTINE 07, UTILITY ROUTINE  
THIS ROUTINE PERFORMS NO TESTS, BUT DOES INITIALIZE CERTAIN PROGRAM CONTROLS SO THAT THIS SECTION MAY BE RERUN ON ANOTHER DISK DRIVE WITHOUT RELOADING THE PROGRAM.
- ROUTINE 08, A SEEK TEST WHICH CHECKS THE TRACK CROSSING AND GO FORWARD-GO REVERSE LINES  
THIS IS A MANUAL ROUTINE WHICH MUST BE SELECTED BY THE USE OF THE CONSOLE SWITCHES. IT REQUIRES THE PLACEMENT OF THREE JUMPERS PRIOR TO BEGINNING OPERATION. A SERIES OF FORWARD AND REVERSE SEEKS ARE ISSUED WITH THE GO FORWARD, GO REVERSE AND TRACK CROSSING LINES MONITORED FOR CORRECT OPERATION. THIS ROUTINE WILL LOOP TILL AN ERROR OCCURS OR TILL THE OPERATOR STOPS THE PROGRAM.

4.3 SECTION A05, WRITE DATA TEST.

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE, HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE WRITE DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR WRITE COMMAND IS INITIATED WHERE THE CYLINDER BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.

ROUTINE 02, A CHECK OF THE WRITE FUNCTION USING HEADS 0 AND 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITES ARE ISSUED BEGINNING WITH SECTOR 0 AND ENDING WITH SECTOR 23. THE DATA PATTERN USED FOR THIS WRITE IS 256 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER EACH WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 256 BYTES.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED FROM 00 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR NO CHANGE.  
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 03, CHECK OF THE WRITE FUNCTION USING HEADS 1 AND 3. THIS ROUTINE FUNCTIONS EXACTLY LIKE ROUTINE 02 WITH THE EXCEPTION THAT IT USES HEADS 1 AND 3 INSTEAD OF HEADS 0 AND 2. SEE THE DESCRIPTION OF ROUTINE 2 FOR DETAILS.

ROUTINE 04, A CHECK OF THE WRITE DATA FUNCTION WITH A 2 SECTOR WRITE USING HEADS 0 OR 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELECTS HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND IS ISSUED WHICH BEGINS WITH SECTOR 0. THE DATA PATTERN USED FOR THIS WRITE IS 512 BYTES OF 10. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 00 TO 04.  
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 05, A CHECK OF THE WRITE DATA FUNCTION USING HEAD SWITCHING. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND IS ISSUED WHICH BEGINS WITH SECTOR 23 OF HEAD 0 OR 2 AND ENDS WITH SECTOR 0 OF HEAD 1 OR 3. THE DATA PATTERN USED FOR THIS WRITE IS 512 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 5C TO 80.  
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE WRITE DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELECTS HEAD 1 OR HEAD 3, A 2 SECTOR WRITE DATA COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER WRITING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:  
1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 256.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.

## 4.4 SECTION A06, VERIFY DATA TEST.

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE VERIFY DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR VERIFY DATA COMMAND IS INITIATED WHERE THE CYLINDER BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.

ROUTINE 02, A CHECK OF THE VERIFY FUNCTION USING HEADS 0 AND 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITE DATA AND VERIFY DATA COMMANDS ARE ISSUED BEGINNING WITH SECTOR 0 AND ENDING WITH SECTOR 23. THE DATA PATTERN USED FOR THE WRITE IS 256 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER EACH VERIFY HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 256 BYTES.
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3) IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR NO CHANGE.
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 03, CHECK OF THE VERIFY DATA FUNCTION USING HEADS 1 AND 3. THIS ROUTINE FUNCTIONS EXACTLY LIKE ROUTINE 02 WITH THE EXCEPTION THAT IT USES HEADS 1 AND 3 INSTEAD OF HEADS 0 AND 2. SEE THE DESCRIPTION OF ROUTINE 2 FOR DETAILS.

ROUTINE 04, A CHECK OF THE VERIFY DATA FUNCTION WITH A 2 SECTOR VERIFY DATA COMMAND USING HEADS 0 OR 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELECTS HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND FOLLOWED BY A 2 SECTOR VERIFY DATA COMMAND WHICH BEGINS WITH SECTOR 0 IS ISSUED. THE DATA PATTERN USED FOR THE WRITE IS 512 BYTES OF 10. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT, AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR VERIFY HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3) IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 00 TO 04.
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 05, A CHECK OF THE VERIFY DATA FUNCTION USING HEAD SWITCHING. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND AND A 2 SECTOR VERIFY DATA COMMAND IS ISSUED WHICH BEGINS WITH SECTOR 23 OF HEAD 0 OR 2 AND ENDS WITH SECTOR 0 OF HEAD 1 OR 3. THE DATA PATTERN USED FOR THE WRITE IS 512 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR VERIFY HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE WRITE DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 5C TO 80.
4. THE DATA WRITE FIELD IS TESTED FOR NO CHANGE.

ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE VERIFY DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELCTS HEAD 1 OR HEAD 3, A 2 SECTOR VERIFY DATA COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER VERIFYING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:

1. THE VERIFY DATA ADDRESS IS TESTED FOR AN INCREASE OF 256.
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.

4.5 SECTION A07, READ DATA DIAGNOSTIC TEST.

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE READ DATA DIAGNOSTIC COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR READ DATA DIAGNOSTIC COMMAND IS INITIATED WHERE THE CYLINDER BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.

ROUTINE 02, A CHECK OF THE READ DATA DIAGNOSTIC COMMAND USING HEADS 0 OR 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA FOLLOWED BY A ONE SECTOR READ DATA DIAGNOSTIC COMMAND IS ISSUED. THE DATA PATTERN USED FOR THE WRITE IS 256 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ DATA DIAGNOSTIC COMMAND, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE READ DATA DIAGNOSTIC COMMAND HAS FINISHED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE READ DATA ADDRESS IS TESTED FOR NO CHANGE.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR NO CHANGE.

ROUTINE 03, CHECK OF THE READ DATA DIAGNOSTIC COMMAND USING HEADS 1 AND 3. THIS ROUTINE FUNCTIONS EXACTLY LIKE ROUTINE 02 WITH THE EXCEPTION THAT IT USES HEADS 1 AND 3 INSTEAD OF HEADS 0 AND 2. SEE THE DESCRIPTION OF ROUTINE 2 FOR DETAILS.

ROUTINE 04, A CHECK OF THE READ DATA DIAGNOSTIC COMMAND USING A 2 SECTOR READ DATA DIAGNOSTIC COMMAND USING HEADS 0 OR 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELECTS HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND FOLLOWED BY A 2 SECTOR READ DATA DIAGNOSTIC COMMAND WHICH BEGINS WITH SECTOR 0 IS ISSUED. THE DATA PATTERN USED FOR THE WRITE IS 512 BYTES OF 10. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ DATA DIAGNOSTIC COMMAND, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR READ DATA DIAGNOSTIC COMMAND HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE READ DATA ADDRESS IS TESTED FOR NO CHANGE.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 00 TO 04.  
4. THE HEAD FIELD IS TESTED FOR THE CORRECT DATA.

ROUTINE 05, A CHECK OF THE READ DATA DIAGNOSTIC COMMAND WHEN READING TO THE END OF CYLINDER. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEADS 1 OR 3, A SERIES OF 24 ONE SECTOR WRITE DATA COMMANDS IS INITIATED WHERE 23 SECTORS ARE WRITTEN WITH ZEROS AND THE 24TH IS WRITTEN WITH FF. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED A 24 SECTOR READ DATA DIAGNOSTIC COMMAND IS INITIATED. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ DATA DIAGNOSTIC OPERATION, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE READ DATA DIAGNOSTIC COMMAND HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:  
1. THE READ DATA ADDRESS IS TESTED FOR NO CHANGE.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 17 TO FF.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR HAVING STEPPED UP FROM 80 TO DC.  
4. THE READ FIELD IS TESTED FOR CONTAINING 256 BYTES OF FF.

## 4.6 SECTION A08, READ DATA TEST.

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

- ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE READ DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR READ DATA COMMAND IS INITIATED WHERE THE CYLINDER BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.
- ROUTINE 02, A CHECK OF THE READ DATA FUNCTION USING HEADS 0 AND 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITE DATA AND READ DATA COMMANDS ARE ISSUED BEGINNING WITH SECTOR 0 AND ENDING WITH SECTOR 23. THE DATA PATTERN USED FOR THE WRITE IS 256 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER EACH READ HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:
1. THE READ DATA ADDRESS IS TESTED FOR AN INCREASE OF 256 BYTES.
  2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.
  3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR NO CHANGE.
  4. THE DATA READ FIELD IS TESTED FOR THE CORRECT DATA.
- ROUTINE 03, CHECK OF THE READ DATA FUNCTION USING HEADS 1 AND 3. THIS ROUTINE FUNCTIONS EXACTLY LIKE ROUTINE 02 WITH THE EXCEPTION THAT IT USES HEADS 1 AND 3 INSTEAD OF HEADS 0 AND 2. SEE THE DESCRIPTION OF ROUTINE 2 FOR DETAILS.
- ROUTINE 04, A CHECK OF THE READ DATA FUNCTION WITH A 2 SECTOR READ DATA COMMAND USING HEADS 0 OR 2. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELECTS HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND FOLLOWED BY A 2 SECTOR READ DATA COMMAND WHICH BEGINS WITH SECTOR 0 IS ISSUED. THE DATA PATTERN USED FOR THE WRITE IS 512 BYTES OF 10. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT, AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ OPERATION, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR READ HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:
1. THE READ DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.
  2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.
  3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 00 TO 04.
  4. THE DATA READ FIELD IS TESTED FOR THE CORRECT DATA.
- ROUTINE 05, A CHECK OF THE READ DATA FUNCTION USING HEAD SWITCHING. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEADS 0 OR 2, A 2 SECTOR WRITE DATA COMMAND AND A 2 SECTOR READ DATA COMMAND IS ISSUED WHICH BEGINS WITH SECTOR 23 OF HEAD 0 OR 2 AND ENDS WITH SECTOR 0 OF HEAD 1 OR 3. THE DATA PATTERN USED FOR THE WRITE IS 512 BYTES OF E7. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE READ OPERATION, THE STATUS BITS ASSOCIATED WITH THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE 2 SECTOR READ HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:
1. THE READ DATA ADDRESS IS TESTED FOR AN INCREASE OF 512.
  2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO FF.
  3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD (BYTE 2), IS TESTED FOR HAVING STEPPED UP FROM 5C TO 80.
  4. THE DATA READ FIELD IS TESTED FOR THE CORRECT DATA.
- ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE READ DATA COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH SELCTS HEAD 1 OR HEAD 3, A 2 SECTOR READ DATA COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER READING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:
1. THE READ DATA ADDRESS IS TESTED FOR AN INCREASE OF 256.
  2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.
  3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.

## 4.7 SECTION A09, WRITE ID - DISK SELECT - AND DISK WRITE SWITCH

ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF WRITE ID USING HEAD 0  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0, A 24 SECTOR WRITE ID IS INITIATED. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE WRITE ID, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE SECTOR COUNTER (BYTE 3), IS TESTED FOR STEPPING DOWN FROM 17 TO FF.
2. THE SECTOR ADDRESS (BYTE 2), IS TESTED FOR STEPPING UP FROM 00 TO 5C.
3. THE DATA ADDRESS IS TESTED FOR NO CHANGE.

THE SECOND PORTION OF THIS ROUTINE CONSISTS OF A SERIES OF 24 ONE SECTOR VERIFY COMMANDS WHICH WILL CHECK THE VALIDITY OF EACH OF THE IDS JUST WRITTEN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. ALSO PRINTED OUT WILL BE THE SECTOR NUMBER IN ERROR.

ROUTINE 02, CHECK OF WRITE ID USING HEAD 1  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 1, A 24 SECTOR WRITE ID IS INITIATED. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE WRITE ID, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE SECTOR COUNTER (BYTE 3), IS TESTED FOR STEPPING DOWN FROM 17 TO FF.
2. THE SECTOR ADDRESS (BYTE 2), IS TESTED FOR STEPPING UP FROM 80 TO DC.
3. THE DATA ADDRESS IS TESTED FOR NO CHANGE.

THE SECOND PORTION OF THIS ROUTINE CONSISTS OF A SERIES OF 24 ONE SECTOR VERIFY COMMANDS WHICH WILL CHECK THE VALIDITY OF EACH OF THE IDS JUST WRITTEN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. ALSO PRINTED OUT WILL BE THE SECTOR NUMBER IN ERROR.

ROUTINE 03, CHECK OF WRITE ID USING HEAD 2  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 2, A 24 SECTOR WRITE ID IS INITIATED. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE WRITE ID, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE SECTOR COUNTER (BYTE 3), IS TESTED FOR STEPPING DOWN FROM 17 TO FF.
2. THE SECTOR ADDRESS (BYTE 2), IS TESTED FOR STEPPING UP FROM 00 TO 5C.
3. THE DATA ADDRESS IS TESTED FOR NO CHANGE.

THE SECOND PORTION OF THIS ROUTINE CONSISTS OF A SERIES OF 24 ONE SECTOR VERIFY COMMANDS WHICH WILL CHECK THE VALIDITY OF EACH OF THE IDS JUST WRITTEN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. ALSO PRINTED OUT WILL BE THE SECTOR NUMBER IN ERROR.

ROUTINE 04, CHECK OF WRITE ID USING HEAD 3  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 3, A 24 SECTOR WRITE ID IS INITIATED. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE WRITE ID, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS A HEX REPRESENTATION. AFTER THE WRITE HAS BEEN COMPLETED, THE FOLLOWING FUNCTIONS ARE TESTED:

1. THE SECTOR COUNTER (BYTE 3), IS TESTED FOR STEPPING DOWN FROM 17 TO FF.
2. THE SECTOR ADDRESS (BYTE 2), IS TESTED FOR STEPPING UP FROM 80 TO DC.
3. THE DATA ADDRESS IS TESTED FOR NO CHANGE.

THE SECOND PORTION OF THIS ROUTINE CONSISTS OF A SERIES OF 24 ONE SECTOR VERIFY COMMANDS WHICH WILL CHECK THE VALIDITY OF EACH OF THE IDS JUST WRITTEN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE VERIFY OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. ALSO PRINTED OUT WILL BE THE SECTOR NUMBER IN ERROR.

ROUTINE 05, CHECK THE ABILITY TO SELECT BOTH THE UPPER AND LOWER DISK  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0, OF THE REMOVABLE DISK, A ONE SECTOR WRITE DATA COMMAND IS INITIATED. THE DATA PATTERN USED FOR THE WRITE IS 256 BYTES OF THE CHARACTER R. IF ANY ERRORS OCCUR WHILE WRITING, ERROR MESSAGES WILL RESULT. THE SECOND PORTION OF THE TEST CONSISTS OF SELECTING THE FIXED DISK AND WRITING ONE SECTOR OF DATA THAT IS 256 BYTES OF THE CHARACTER F. THE THIRD PORTION OF THE TEST CONSISTS OF SELECTING THE REMOVABLE DISK AND READING ONE SECTOR OF DATA. IF THE READ DATA COMMAND PRODUCES A READ ERROR FIELD OF THE CHARACTER R, THEN WE KNOW THAT WE CAN SELECT BOTH DISKS. IF IT DOES NOT, THEN THERE IS AN ERROR SINCE EACH SELECT ALWAYS SELECTED THE SAME DISK.

ROUTINE 06, A TEST OF THE LOGICAL END OF CYLINDER.  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0, OF THE REMOVABLE DISK, A 24 SECTOR WRITE ID COMMAND IS INITIATED WHERE THE ID'S THAT ARE WRITTEN ARE FOR TRACK 1. IF ANY ERRORS OCCUR WHILE WRITING, ERROR MESSAGES WILL RESULT. THE SECOND PORTION OF THE TEST CONSISTS OF ISSUING A 24 SECTOR VERIFY DATA COMMAND WHICH SHOULD SET THE END OF CYLINDER CONDITION. A SENSE COMMAND IS ISSUED AND THIS BIT IS TESTED FOR ON. IF IT IS, THE ROUTINE PROCEEDS TO PART 3, OTHERWISE AN ERROR MESSAGE WILL RESULT. PART 3 CONSISTS OF RESTORING THE ID'S FOR TRACK 0 TO THEIR CORRECT FORMAT WITH ANOTHER 24 SECTOR WRITE ID COMMAND.

ROUTINE 07, UTILITY ROUTINE  
THIS ROUTINE PERFORMS NO TESTS, BUT DOES INITIALIZE CERTAIN PROGRAM CONTROLS SO THAT THIS SECTION MAY BE RERUN ON ANOTHER DISK DRIVE WITHOUT RELOADING THE PROGRAM.

ROUTINE 08, CHECK THE FUNCTION OF THE FILE WRITE SWITCH  
AFTER A SUCCESSFUL SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OF THE REMOVABLE DISK, A ONE SECTOR WRITE DATA COMMAND IS INITIATED. THE DATA PATTERN USED FOR THE WRITE IS 256 BYTES OF FF. IF ANY ERRORS OCCUR WHILE WRITING, ERROR MESSAGES WILL RESULT. AT THIS POINT A PRINTOUT AND HALT F8 OCCURS TO TELL THE OPERATOR TO TURN OFF THE FILE WRITE SWITCH AND RESET THE HALT. NOW THE PROGRAM DOES A ONE SECTOR WRITE DATA COMMAND USING A DATA FIELD OF 00. NEXT A ONE SECTOR READ DATA COMMAND IS INITIATED AND THE READ FIELD IS TESTED FOR FF. IF IT IS THEN THE FILE WRITE SWITCH FUNCTIONED CORRECTLY. IF IT IS NOT, THEN AN ERROR MESSAGE WILL RESULT SAYING THAT WHEN THE FILE WRITE SWITCH WAS TURNED OFF, WRITING WAS NOT INHIBITED. ANOTHER F8 HALT WILL OCCUR TO TELL THE OPERATOR TO TURN ON THE FILE WRITE SWITCH AGAIN.

#### 4.8 SECTION A0A, SCAN EQUAL

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

- ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE SCAN EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE CYLINDER BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.
- ROUTINE 02, A TEST OF SCAN FOUND USING A SCAN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN EQUAL COMMAND HAS BEEN COMPLETED AND IF A SCAN FOUND CONDITION IS GENERATED, THE FOLLOWING FUNCTIONS ARE TESTED FOR:  
1. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.  
2. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD, (BYTE 2), IS TESTED FOR NO CHANGE.  
3. THE SCAN DATA FIELD IS TESTED FOR NO CHANGE.
- ROUTINE 03, A TEST OF THE SCAN EQUAL SENSE BIT USING A SCAN EQUAL COMMAND AND AN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR ON. IF IT IS NOT AN ERROR MESSAGE WILL RESULT.
- ROUTINE 04, A TEST OF RESETTING OF THE SCAN EQUAL SENSE BIT USING THE SCAN EQUAL COMMAND AND AN UNEQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS 255 BYTES OF 00 AND ONE BYTE WHICH IS X'FE'. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION, THE STATUS BIT FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR OFF. IF IT IS NOT, AN ERROR MESSAGE WILL RESULT.
- ROUTINE 05, A TEST OF A 24 SECTOR SCAN EQUAL OPERATION WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 00 AND THE 24'TH IS WRITTEN WITH 255 BYTES OF 00 AND ONE BYTE OF X'AA'. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITE DATA COMMANDS ARE ISSUED WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 00, AND 1 SECTOR IS WRITTEN WITH 255 BYTES OF 00 AND ONE BYTE OF X'AA'. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER EACH SCAN HAS BEEN COMPLETED A CHECK IS MADE TO INSURE THAT THE SCAN FOUND CONDITION OCCURRED ON THE CORRECT SECTOR. THIS SEQUENCE OF WRITE AND SCAN OPERATIONS IS REPEATED 24 TIMES WITH THE EQUAL SECTOR BEING WRITTEN AT EACH OF THE 24 POSSIBLE POSITIONS.
- ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE SCAN EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 1 OR 3, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 23 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A 2 SECTOR SCAN EQUAL COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THE SCAN FIELD IN MEMORY IS 255 BYTES OF 00 AND ONE BYTE OF X'AA'. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER SCANNING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:  
1. THE SCAN DATA ADDRESS IS TESTED FOR NO CHANGE.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.
- ROUTINE 07, A TEST OF A SCAN EQUAL OPERATION USING A DATA FIELD OF 256 BYTES OF 55. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 55. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 55. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.
- ROUTINE 08, A TEST OF A SCAN EQUAL OPERATION USING A DATA FIELD OF 255 BYTES OF FF AND ONE BYTE OF 00. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS 255 BYTES OF FF AND 1 BYTE OF 0. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.

4.9 SECTION A0B, SCAN LOW OR EQUAL

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSW'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE SCAN LOW OR EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE CYL. BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.

ROUTINE 02, A TEST OF SCAN FOUND USING A SCAN LOW OR EQUAL COMMAND AND AN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN LOW OR EQUAL COMMAND HAS BEEN COMPLETED AND IF A SCAN FOUND CONDITION IS GENERATED, THE FOLLOWING FUNCTIONS ARE TESTED FOR:  
1. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.  
2. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD, (BYTE 2), IS TESTED FOR NO CHANGE.  
3. THE SCAN DATA FIELD IS TESTED FOR NO CHANGE.

ROUTINE 03, A TEST OF THE SCAN EQUAL SENSE BIT USING A SCAN LOW OR EQUAL COMMAND AND AN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN LOW OR EQUAL OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN LOW OR EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR ON. IF IT IS NOT, AN ERROR MESSAGE WILL RESULT.

ROUTINE 04, A TEST OF RESETTING OF THE SCAN EQUAL SENSE BIT USING THE SCAN LOW OR EQUAL COMMAND A LOW CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS 255 BYTES OF 00 AND ONE BYTE WHICH IS X'FF'. IF ANY ERRORS OCCUR WHILE DOING THE SCAN LOW OR EQUAL COMMAND, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN LOW OR EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR OFF. IF IT IS NOT, AN ERROR MESSAGE WILL RESULT.

ROUTINE 05, A TEST OF A 24 SECTOR SCAN LOW OR EQUAL OPERATION WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 01 AND THE 24TH IS WRITTEN WITH 256 BYTES OF 00. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITE DATA COMMANDS ARE ISSUED WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 01, AND 1 SECTOR IS WRITTEN WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE SCAN LOW OR EQUAL OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER EACH SCAN LOW OR EQUAL HAS BEEN COMPLETED, A CHECK IS MADE TO INSURE THAT THE SCAN FOUND CONDITION OCCURRED ON THE CORRECT SECTOR. THIS SEQUENCE OF WRITE AND SCAN OPERATIONS IS REPEATED 24 TIMES WITH THE EQUAL SECTOR BEING WRITTEN AT EACH OF THE 24 POSSIBLE POSITIONS.

ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE SCAN LOW OR EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 1 OR 3, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 23 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A 2 SECTOR SCAN LOW OR EQUAL COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THE SCAN FIELD IN MEMORY IS 255 BYTES OF 00 AND ONE BYTE OF X'AA'. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER SCANNING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:  
1. THE SCAN DATA ADDRESS IS TESTED FOR NO CHANGE.  
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.  
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.

ROUTINE 07, A TEST OF A SCAN LOW OR EQUAL OPERATION USING A DATA FIELD OF 256 BYTES OF 55. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 55. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 55. IF ANY ERRORS OCCUR WHILE DOING THE SCAN LOW OR EQUAL OPERATION THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.

ROUTINE 08, A TEST OF A SCAN LOW OR EQUAL OPERATION USING A DATA FIELD OF 255 BYTES OF FF AND ONE BYTE OF 00. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN LOW OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS 255 BYTES OF FF AND 1 BYTE OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN LOW OR EQUAL OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.



## 4.10 SECTION A0C, SCAN HIGH OR EQUAL

IF THIS PROGRAM IS RUNNING ON BOTH THE FIXED AND THE REMOVABLE DISK, (SSH'S 15 AND 16 BOTH OFF), EACH ROUTINE WILL BE RUN TWICE IN SUCCESSION, FIRST ON THE REMOVABLE DISK AND THEN ON THE FIXED DISK. ALL ROUTINES IN THIS SECTION DO A SEEK TO THE CE TRACK AS THE FIRST OPERATION OF EACH ROUTINE. HERE THE CYLINDER ID IS READ AND COMPARED WITH THE KNOWN ID OF THE CE TRACK. IN THE EVENT THAT THIS SEEK FAILS TO POSITION THE ACCESS MECHANISM AT THE CE TRACK OR GIVES ANY ERRORS WHILE DOING SO, THE PRINTOUT THAT FOLLOWS WILL GIVE THE STATUS ERRORS THAT OCCURRED WHILE THE SEEK WAS BEING PERFORMED AND MAY TELL THE CE TO RUN ONE OF THE SEEK FUNCTION TESTS BEFORE CONTINUING WITH THIS TEST. WITH THE EXCEPTION OF SEEK ERRORS, THE FUNCTIONS OF THIS SECTION ARE NOT DEPENDENT ON THE FUNCTIONS PERFORMED IN ANY OTHER SECTIONS. THE TESTS ARE HOWEVER, ORDERED IN A BUILDING BLOCK APPROACH AND ANY DEVIATION FROM THE NATURAL ORDER OF RUNNING MAY PRODUCE MISLEADING RESULTS.

ROUTINE 01, CHECK OF THE NO RECORD FOUND SENSE BIT USING THE SCAN HIGH OR EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE CYL. BYTE OF THE DISK CONTROL FIELD IS SET TO FF. THIS SHOULD CAUSE AN ERROR CONDITION TO BE GENERATED AFTER 2 REVOLUTIONS OF THE DISK. WHEN THIS IS DETECTED BY A TEST I/O COMMAND, A SENSE IS ISSUED. DEVICE STATUS BYTE 0 BIT 5 IS TESTED FOR ON. THIS IS THE NO RECORD FOUND SENSE BIT. IF EITHER THE TEST I/O COMMAND FAILS TO DETECT AN ERROR OR THE NO RECORD FOUND SENSE BIT IS NOT ON, ERROR MESSAGES WILL RESULT.

ROUTINE 02, A TEST OF SCAN FOUND USING A SCAN HIGH OR EQUAL COMMAND AND AN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN HIGH OR EQUAL COMMAND HAS BEEN COMPLETED AND IF A SCAN FOUND CONDITION IS GENERATED, THE FOLLOWING FUNCTIONS ARE TESTED FOR.

1. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 00 TO FF.
2. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD, (BYTE 2), IS TESTED FOR NO CHANGE.
3. THE SCAN DATA FIELD IS TESTED FOR NO CHANGE.

ROUTINE 03, A TEST OF THE SCAN EQUAL SENSE BIT USING A SCAN HIGH OR EQUAL COMMAND AND AN EQUAL CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN HIGH OR EQUAL OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN HIGH OR EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR ON. IF IT IS NOT, AN ERROR MESSAGE WILL RESULT.

ROUTINE 04, A TEST OF RESETTING OF THE SCAN EQUAL SENSE BIT USING THE SCAN HIGH OR EQUAL COMMAND AND A HIGH CONDITION. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 255 BYTES OF 00 AND ONE BYTE OF X'FE'. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IS 256 BYTES OF 00. IF ANY ERRORS OCCUR WHILE DOING THE SCAN HIGH OR EQUAL COMMAND, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER THE SCAN HIGH OR EQUAL COMMAND HAS BEEN COMPLETED, THE SCAN EQUAL SENSE BIT, (BYTE 1 BIT 0), IS TESTED FOR OFF. IF IT IS NOT, AN ERROR MESSAGE WILL RESULT.

ROUTINE 05, A TEST OF A 24 SECTOR SCAN HIGH OR EQUAL OPERATION WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 00 AND THE 24<sup>TH</sup> IS WRITTEN WITH 256 BYTES OF 01. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A SERIES OF 24 ONE SECTOR WRITE DATA COMMANDS ARE ISSUED WHERE 23 SECTORS ARE WRITTEN WITH 256 BYTES OF 00, AND 1 SECTOR IS WRITTEN WITH 256 BYTES OF 01. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. IN THE EVENT THAT ANY ERRORS OCCUR WHILE DOING THE SCAN HIGH OR EQUAL OPERATION, THE STATUS BITS FROM THAT ERROR WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. AFTER EACH SCAN HIGH OR EQ. HAS BEEN COMPLETED, A CHECK IS MADE TO INSURE THAT THE SCAN FOUND CONDITION OCCURRED ON THE CORRECT SECTOR. THIS SEQUENCE OF WRITE AND SCAN OPERATIONS IS REPEATED 24 TIMES WITH THE EQUAL SECTOR BEING WRITTEN AT EACH OF THE 24 POSSIBLE POSITIONS.

ROUTINE 06, A CHECK OF THE END OF CYLINDER SENSE BIT USING THE SCAN HIGH OR EQUAL COMMAND. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 1 OR 3, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 23 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A 2 SECTOR SCAN HIGH OR EQUAL COMMAND IS ATTEMPTED WHICH BEGINS WITH SECTOR 23 OF HEAD 1 OR SECTOR 23 OF HEAD 3. THE SCAN FIELD IN MEMORY IS 255 BYTES OF 00 AND ONE BYTE OF 00. THIS OPERATION SHOULD PRODUCE AN ERROR SINCE THE END OF CYLINDER WILL HAVE BEEN REACHED AFTER SCANNING JUST ONE OF THE 2 SECTORS SPECIFIED. IF NO ERROR IS DETECTED BY A TEST I/O FOR ERROR, IT WILL BE SO NOTED. A SENSE IS ISSUED AND STATUS BYTE 1 BIT 2 IS TESTED FOR ON, (END OF CYLINDER). IF THIS BIT IS NOT ON, IT WILL BE SO NOTED. ALSO TESTED ARE THE FOLLOWING:

1. THE SCAN DATA ADDRESS IS TESTED FOR NO CHANGE.
2. THE SECTOR COUNTER IN THE DISK CONTROL FIELD (BYTE 3), IS TESTED FOR HAVING STEPPED DOWN FROM 01 TO 00.
3. THE HEAD AND SECTOR BYTE OF THE DISK CONTROL FIELD IS TESTED FOR ITS ORIGINAL VALUE OF DC.

ROUTINE 07, A TEST OF A SCAN HIGH OR EQUAL COMMAND USING A DATA FIELD OF 256 BYTES OF 55. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 55. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS ALSO 256 BYTES OF 55. IF ANY ERRORS OCCUR WHILE DOING THE SCAN HIGH OR EQUAL OPERATION THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.

ROUTINE 08, A TEST OF A SCAN HIGH OR EQUAL COMMAND USING A DATA FIELD OF 255 BYTES OF FF AND ONE BYTE OF 00. AFTER AN ERROR FREE SEEK TO THE CE TRACK WHICH WILL SELECT HEAD 0 OR 2, A ONE SECTOR WRITE DATA COMMAND IS INITIATED WHICH WILL WRITE SECTOR 0 WITH 256 BYTES OF 00. IN THE EVENT THAT ANY ERRORS OCCUR WHILE WRITING, AN ERROR MESSAGE WILL RESULT AND IT IS RECOMMENDED THAT SECTION A05 BE RUN. AFTER THE WRITE IS COMPLETED, A ONE SECTOR SCAN HIGH OR EQUAL COMMAND IS INITIATED WHERE THE SCAN FIELD IN MEMORY IS 255 BYTES OF FF AND 1 BYTE OF 00. IF ANY ERROR OCCUR WHILE DOING THE SCAN HIGH OR EQUAL OPERATION, THE STATUS BITS FROM THAT OPERATION WILL BE DECODED AND PUT OUT VIA ENGLISH MESSAGES AS WELL AS HEX REPRESENTATION. IF A SCAN FOUND CONDITION IS GENERATED, THE ROUTINE WILL TERMINATE, OTHERWISE AN ERROR MESSAGE WILL RESULT.

## 4.11 SECTION A0D, SPEED TEST

## 4.11.1 ROUTINE 01 -DISK DRIVE 1

THE PURPOSE OF THIS SECTION IS TO TIME THE ROTATIONAL SPEED OF THE DISK FOR A SPECIFIED NUMBER OF REVOLUTIONS AND TO PRINT OUT THE MINIMUM, AVERAGE, AND MAXIMUM SPEED (TIME PER REVOLUTION) OF THE DISK. THE NUMBER OF REVOLUTIONS TO BE TIMED CAN BE CHOSEN BY THE CE BY SETTING THE DATA SWITCHES. THE NUMBER OF REVOLUTIONS TO BE TIMED WILL BE CHOSEN IN INCREMENTS OF A 100 FROM 100 TO 1500.

THE FOLLOWING TABLE WILL BE PRINTED TO LET THE CE KNOW THE RUNNING TIMES FOR THE NUMBER OF REVOLUTIONS TO BE TESTED (HIS SELECTION WILL BE PRINTED BELOW):

## DISK DRIVE 1

```
ID A0F9. PROG A0D0-01. SSWS
*****
*DATA *NUMBER*APPROX TIME*DATA *NUMBER*APPROX TIME*
*SWITCH*OF REV*TO COMPLETE*SWITCH*OF REV*TO COMPLETE*
*ENTRY *TESTED*CALCULATION*ENTRY *TESTED*CALCULATION*
*****I*****I*****I*****I*****I*****I*****
*00-01 I 100 I 12 SEC* 09 I 900 I 1 M 43 SEC*
* 02 I 200 I 25 SEC* 0A I 1000 I 1 M 55 SEC*
* 03 I 300 I 36 SEC* 0B I 1100 I 2 M 06 SEC*
* 04 I 400 I 48 SEC* 0C I 1200 I 2 M 17 SEC*
* 05 I 500 I 59 SEC* 0D I 1300 I 2 M 28 SEC*
* 06 I 600 I 1 M 10 SEC* 0E I 1400 I 2 M 39 SEC*
* 07 I 700 I 1 M 21 SEC* 0F I 1500 I 2 M 50 SEC*
* 08 I 800 I 1 M 32 SEC*10-PF I ONLY TEST 100 REV*
*****
```

NUMBER OF REVOLUTIONS TIMED= 0100

METHOD OF TESTING: THE PRESENCE OF THE INDEX SENSE BIT WILL BE CHECKED. IF THE INDEX BIT IS NOT SENSED WITHIN FOUR SECONDS (100 REVOLUTIONS) AN ERROR MESSAGE WILL BE PRINTED:

## DISK DRIVE 1

```
*ID A094. PROG A0D0-01. SSWS
INDEX BIT HAS NOT APPEARED IN LAST 4 SECONDS
```

THE PROGRAM WILL GO TO A 'HALT'. UPON RESETTING THE HALT, THE PROGRAM AGAIN WILL CHECK FOR THE PRESENCE OF THE INDEX SENSE BIT. IF THE INDEX BIT IS SENSED A 30.40 MICROSECOND TIMING LOOP IS ENTERED AND THE AMOUNT OF ELAPSED TIME BETWEEN INDEX PULSES IS RECORDED IN A TABLE. WHEN THE SPECIFIED NUMBER OF REVOLUTIONS ARE TIMED, THE MINIMUM, AVERAGE, AND MAXIMUM TIME/REVOLUTION IS CALCULATED AND PRINTED OUT.

```
MIN REV TIME= 040.249 MILLISEC (MIN TOLERANCE= 039.040 MILLISEC)
AVE REV TIME= 040.261 MILLISEC (NORMAL SPEED = 040.000 MILLISEC)
MAX REV TIME= 040.280 MILLISEC (MAX TOLERANCE= 040.960 MILLISEC)
```

SPECIFICATIONS: SPEED OF DISK 1500 +- 30 RPM. LENGTH OF INDEXING PULSE 42.0 +- 10.5 MICROSECONDS.

ACCURACY: THE PROGRAM MEASURES THE TIME BETWEEN INDEXING PULSES WITHIN 30.40 MICROSECONDS (WITHIN 0.1%).

## 4.11.2 ROUTINE 02 -DISK DRIVE 2

SEE DESCRIPTION FOR DISK DRIVE 1

## 4.12 SECTION A0E, SEEK TEST

- ROUTINE 01, SEEK FORWARD ONE CYLINDER AT A TIME FROM 0 TO THE CE CYLINDER. A SERIES OF ONE TRACK SEEKS BEGINNING WITH CYLINDER 0 AND ENDING WITH THE CE CYLINDER ARE ISSUED. AFTER EACH SEEK ANY STATUS ERRORS ARE NOTED. A READ ID COMMAND IS GIVEN SO THAT THE ID READ CAN BE COMPARED AGAINST THE ID EXPECTED. IF THESE ID FIELDS DO NOT COMPARE, THE FOLLOWING INFORMATION ABOUT THE SEEK IS PRINTED OUT:
1. THE CYLINDER NUMBER PRIOR TO BEGINNING THE SEEK,
  2. THE DESIRED CYLINDER NUMBER,
  3. THE ACTUAL CYLINDER NUMBER ARRIVED AT,
  4. THE DIRECTION OF THE SEEK AT THE TIME OF THE FAILURE.
- ROUTINE 02, SEEK IN REVERSE ONE CYLINDER AT A TIME FROM THE CE CYLINDER TO CYLINDER 0. A SERIES OF ONE TRACK SEEKS BEGINNING WITH THE CE CYLINDER AND ENDING WITH CYLINDER 0 ARE ISSUED. SEE THE DESCRIPTION OF ROUTINE 01 FOR ADDITIONAL DETAILS
- ROUTINE 03, SEEK FORWARD TWO CYLINDERS AT A TIME FROM 0 TO THE CE CYLINDER. A SERIES OF TWO TRACK SEEKS BEGINNING WITH CYLINDER 0 AND ENDING WITH THE CE CYLINDER ARE ISSUED. SEE THE DESCRIPTION OF ROUTINE 01 FOR ADDITIONAL DETAILS.
- ROUTINE 04, SEEK IN REVERSE TWO CYLINDERS AT TIME FROM THE CE CYLINDER TO CYLINDER 0. A SERIES OF TWO TRACK SEEKS BEGINNING WITH THE CE CYLINDER AND ENDING WITH CYLINDER 0 ARE ISSUED. SEE THE DESCRIPTION OF ROUTINE 01 FOR ADDITIONAL DETAILS.
- ROUTINE 05, SEEK FORWARD NINE CYLINDERS AT A TIME FROM 0 TO THE CE CYLINDER. A SERIES OF NINE TRACK SEEKS BEGINNING WITH CYLINDER 0 AND ENDING WITH THE CE CYLINDER ARE ISSUED. SEE THE DESCRIPTION OF ROUTINE 01 FOR ADDITIONAL DETAILS.
- ROUTINE 06, SEEK IN REVERSE NINE CYLINDERS AT A TIME FROM THE CE CYLINDER TO CYLINDER 0. A SERIES OF NINE TRACK SEEKS BEGINNING WITH THE CE CYLINDER AND ENDING WITH CYLINDER 0 ARE ISSUED. SEE THE DESCRIPTION OF ROUTINE 01 FOR ADDITIONAL DETAILS.
- ROUTINE 07, A SERIES OF SEEKS BOTH LONG AND SHORT, FORWARD AND REVERSE. A TABLE OF FIXED SEEK ADDRESSES IS USED TO DETERMINE WHICH CYLINDERS ARE TO BE SEEKED TO. IN MOST CASES THE SEEKS WILL ALTERNATE BETWEEN A FORWARD DIRECTION AND A REVERSE DIRECTION. THE FIRST SEEKS WILL BE QUITE LONG AND THE LAST ONES WILL BE QUITE SHORT. SEE ROUTINE 01 FOR ADDITIONAL DETAILS.
- ROUTINE 08, A 100 TRACK SEEK IS PERFORMED IF THE HIGH ACCESS FEATURE IS PRESENT. A TIME OUT CHECKS FOR PROPER HIGH SPEED OPERATION.
- ROUTINE 09, UTILITY ROUTINE. THIS ROUTINE PERFORMS NO TESTS, BUT DOES INITIALIZE CERTAIN PROGRAM CONTROLS SO THAT THIS SECTION MAY BE RERUN ON ANOTHER DISK DRIVE WITHOUT RELOADING THE PROGRAM.

## 4.13 SECTION B03

ROUTINE 01, DISK IPL FUNCTION TEST.  
 THE PROGRAM FIRST ISSUES A RECALIBRATE SIO TO PLACE THE DISK HEADS OVER TRACK 0. STATUS BIT 3 (CYLINDER 0) IS TESTED TO INSURE CORRECT RECALIBRATION. A READ DATA SIO IS ISSUED TO READ SECTOR 00 (IPL SECTOR) AND THE PROGRAM STORES THE CONTENTS OF THIS SECTOR. NEXT THE OPERATOR IS INSTRUCTED ON HOW TO IPL THE DISK. WARNING - THESE INSTRUCTIONS ON HOW TO MAKE THE PROGRAM OPERATE MUST BE FOLLOWED CAREFULLY. THE PROGRAM THEN ISSUES A SEEK SIO TO PLACE THE HEADS OVER TRACK 50. THIS WILL AID THE CE IN TESTING THE MECHANICAL MOTION OF THE HEADS BACK TO TRACK 0 DURING AN IPL OPERATION. BEFORE THE PROGRAM HALTS, THE BOTTOM 256 BYTES OF CORE ARE STORED SO THAT THIS DATA IS NOT LOST AFTER AN IPL OPERATION. THE PROGRAM THEN FILLS BOTTOM CORE WITH A TEST PATTERN. NOTE - A BRANCH INSTRUCTION IS STORED AT LOCATION -0000- TO PREVENT BOMBING OUT THE PROGRAM IF THE CE DOES SYSTEM RESET, START. AFTER THE PROGRAM HALTS, THE CE WILL IPL THE DISK. NEXT, THE CE WILL ALTER SAR TO LOCATION -0C00-. AT THIS LOCATION, THE PROGRAM 'PATCHES' ITSELF UP SO THAT IT CAN RUN AGAIN. THE PROGRAM THEN STORES THE BOTTOM 256 BYTES (NOW THE IPL DATA FROM SECTOR 00) AND REPLACES BOTTOM CORE WITH THE ORIGINAL CODE. THE IPL DATA IS FIRST CHECKED TO SEE IF IT IS THE SAME AS THE TEST PATTERN LOADED INTO BOTTOM CORE. IF IT IS, THE PROGRAM PRINTS A 'NO DATA TRANSFERRED' ERROR MESSAGE AND HALTS. OTHERWISE THE IPL DATA IS COMPARED AGAINST THE DATA THAT WAS PROGRAMMED READ FROM SECTOR 00. IF THE DATA IS AS EXPECTED, THE PROGRAM PRINTS OUT 'DATA OK'. OTHERWISE AN 'IPL DATA CHECK' ERROR MESSAGE IS PRINTED WITH THE EXPECTED AND ACTUAL DATA DUMPED IN HEX FORMAT. THIS ROUTINE IS EXECUTED TWICE. THE FIRST TIME THE PROGRAM TESTS THE REMOVABLE DISK AND THE SECOND TIME THE FIXED DISK IS TESTED.

## 4.14 SECTION B04

ROUTINE 01, BUILDING AN OPTION TABLE.  
 WHEN FIRST LOADED, THE PROGRAM CHECKS DCP'S UDT TABLE FOR THE CORE SIZE AND FOR THE DISK CONFIGURATION OF THE SYSTEM. THEN OPERATOR INSTRUCTIONS ARE PRINTED TO TELL THE OPERATOR TO SET THE CONSOLE SWITCHES TO THE VARIOUS OPTIONS (SEE BELOW) AND TO RESET THE HALT. THE PROGRAM ALSO INFORMS THE OPERATOR ON THE MAXIMUM NUMBER OF SECTORS THAT CAN BE READ OR WRITTEN, ACCORDING TO THE CORE SIZE AVAILABLE. WHEN THE SWITCHES ARE SET AND THE HALT RESET, THE PROGRAM FIRST CHECKS FOR -0000- THAT DESIGNATES THE LAST OPTION. IF THE SWITCHES ARE NOT -0000-, CONSOLE SWITCH 1 (LEFTMOST) IS CHECKED FOR A VALUE OF 1 TO 9 & SWITCH 2 IS CHECKED FOR A VALUE OF 1 TO 8. IF THESE SWITCHES ARE NOT SET OK, AN ERROR MESSAGE IS PRINTED. IF BOTH SWITCHES 1 AND 2 ARE OK, SWITCH 2 IS CHECKED TO SEE IF DRIVE 2 IS SPECIFIED. IF SO, THE PROGRAM CHECKS THE UDT TABLE TO SEE IF DRIVE 2 IS DEFINED TO THE SYSTEM. IF NOT, A CORRESPONDING ERROR MESSAGE IS PRINTED. NEXT SWITCH 2 IS TESTED TO SEE IF THE CORRECT DISK HEAD IS SELECTED. THE PROGRAM LOOKS AT THESE SITUATIONS - THE PREVIOUS HEAD SELECTION IN THE SEEK MUST CORRESPOND TO THE CURRENT HEAD SELECTION IF THIS OPTION IS A READ/WRITE OR IF LAST OPTION WAS A READ/WRITE, CHECK FOR SAME HEAD SELECTIONS OR FOR HEAD SWITCHING DURING THE LAST READ/WRITE OPTION. AN ERROR MESSAGE IS PRINTED IF ANY OF THESE CONDITIONS IS IN ERROR. IF BOTH SWITCHES 1 AND 2 ARE OK THE PROGRAM ANALYZES SWITCHES 3 AND 4. IF SWITCH 1 IS A SEEK OPTION, SWITCHES 3 AND 4 ARE CHECKED FOR A CORRECT TRACK ID VALUE (TRACK ID IS SPECIFIED IN HEX). LIKEWISE IF SWITCH 1 SPECIFIES A READ/WRITE COMMAND SWITCHES 3 AND 4 ARE CHECKED FOR A CORRECT SECTOR ID. NOTE - IF SWITCH 1 SPECIFIES A MULTIPLE READ/WRITE OPERATION, SWITCHES 3 AND 4 ARE TAKEN AS THE STARTING SECTOR ID (ALSO SPECIFIED IN HEX). IN THIS CASE THE PROGRAM ASKS THE OPERATOR TO DESIGNATE THE NUMBER OF SECTORS TO BE READ OR WRITTEN. WHEN THE OPERATOR ENTERS THIS VALUE IN SWITCHES 3 AND 4 AND RESETS THE HALT, THE PROGRAM CHECKS THIS VALUE TO MAKE SURE THAT IT DOES NOT EXCEED THE REMAINING SECTORS ON THE TRACK. ALSO THIS SECTOR NUMBER VALUE IS CHECKED AGAINST THE AVAILABLE CORE SIZE OF THE MACHINE. AN ERROR MESSAGE IS PRINTED IF THE NUMBER OF SECTORS EXCEEDS EITHER THE CORE SIZE OR OVERFLOWS THE SECTOR COUNT. ONE LAST CHECK IS MADE ON SWITCHES 3 AND 4 IF SWITCH 2 SPECIFIES A REMOVABLE DISK. THIS CHECK MAKES SURE THAT THE OPERATOR DOES NOT USE TRACKS 4 - 6 NOR TRACKS 71 - 75, SINCE THESE ARE THE TRACKS WHERE DISK DIAGNOSTIC PATTERNS ARE STORED. AFTER ALL OPTIONS ARE ENTERED, THE CURRENT OPTION 'TABLE' IS PRINTED ALONG WITH THE ENGLISH INTERPRETATION OF EACH OPTION. THE PROGRAM THEN HALTS TO ALLOW THE OPERATOR TO 'VERIFY' HIS TABLE OF OPTIONS. WHEN THIS HALT IS RESET THE PROGRAM GOES TO ROUTINE 02.

SWITCH 1	CONSOLE SWITCH OPTIONS SWITCH 2	SWITCHES 3 + 4
1 - ISSUE A SEEK	1 - DRIVE 1 - RMVBL - HD 0	XX - SPECIFY, IN HEX, TRACK OR SECTOR ID.
2 - READ DATA FROM SECTOR	2 - DRIVE 1 - RMVBL - HD 1	
3 - READ TRACK ID	3 - DRIVE 1 - FIXED - HD 2	
4 - READ DIAGNOSTIC	4 - DRIVE 1 - FIXED - HD 3	
5 - READ VERIFY	5 - DRIVE 2 - RMVBL - HD 0	
6 - WRITE DATA ON SECTOR	6 - DRIVE 2 - RMVBL - HD 1	
7 - WRITE ID ON TRACK	7 - DRIVE 2 - FIXED - HD 2	
8 - DO MULTI-SECTOR READ	8 - DRIVE 2 - FIXED - HD 3	
9 - DO MULTI-SECTOR WRITE		
A - ONE-TIME SEEK		

NOTE - THE PROGRAM ALLOWS 38 BYTES OF STORAGE FOR THE CONSOLE SWITCH OPTIONS. THEREFORE THE PROGRAM WILL ALLOW 19 OPTION ENTRIES (OR LESS). THE EXACT NUMBER DEPENDS ON THE USE OF THE MULTI-SECTOR READS OR WRITES (EACH MULTI-SECTOR REQUIRES 4 STORAGE BYTES). THE PROGRAM KEEPS TRACK OF THE STORAGE LIMITS AND WILL SELF-TERMINATE WHEN FILLED.

- OPTION A (SWITCH 1), THE ONE-TIME SEEK, SHOULD BE USED FOR SELECTING AND POSITIONING A DISK HEAD. THE REMAINING OPTIONS SHOULD DEAL ONLY WITH DATA TRANSFER. THIS SEEK WILL ONLY BE ISSUED ONCE AND THE PROGRAM WILL LOOP ON THE REMAINING DATA TRANSFERRING OPTIONS.
- THE PROGRAM DOES NOT AUTOMATICALLY DO A READ ID AFTER A SEEK COMMAND. THEREFORE TO VERIFY A SEEK, A READ ID MUST BE ENTERED AS AN OPTION. IF THE TRACK IS AN ALTERNATE OR DEFECTIVE TRACK THE PROGRAM ASSUMES THAT THE HEADS ARE AT THE CORRECT TRACK POSITION. TO FIND OUT IF IT IS AN ALTERNATE OR DEFECTIVE TRACK, SET SSW 19 ON AND EXAMINE THE CONTROL FIELD PRINTOUT FOR THE READ ID COMMAND.
- IF A WRITE ID OPTION IS SELECTED, THE PROGRAM AUTOMATICALLY SELECTS SECTOR 00 TO PREVENT 'MESSING UP' THE TRACK ID'S.
- THE DIAGNOSTIC READ OPTION STARTS AT SECTOR 00 AND WILL READ ALL SECTORS UP TO AND INCLUDING THE SECTOR SELECTED IN SWITCHES 3,4. IF SSW 19 IS ON, THE SECTOR THAT IS DUMPED IS THE LAST SECTOR READ (THE ONE SELECTED IN SWITCHES 3,4).

ROUTINE 02, EXECUTE OPTION TABLE.  
 THIS ROUTINE CONTINUALLY LOOPS ON THE ENTERED OPTION TABLE. BEFORE THE TABLE IS EXECUTED, THE DISKS ARE RECALIBRATED TO 'INITIALIZE' THE DISK HEAD'S LOCATION. EACH OPTION IS THEN EXECUTED SEQUENTIALLY. NOTE - IF SSW 17 IS ON THE PROGRAM DUMPS THE CURRENT MAKE UP OF EACH OPTION (THE START I/O AND ITS CONTROL FIELD) BEFORE THE COMMAND IS ACTUALLY EXECUTED. EACH OPTION IS ANALYZED INDIVIDUALLY AND THE ACTUAL SIO COMMAND AND CORRESPONDING CONTROL FIELD ARE 'CUSTOM MADE' FOR EACH OPTION AS THE PROGRAM RUNS. BEFORE EACH COMMAND IS ISSUED, THE READ/WRITE DATA FIELD IS FILLED WITH FF'S TO AID IN DETERMINING VALID DATA TRANSFERRING. NOTE - IF SSW 19 IS ON, THE DATA READ IN AFTER A READ SIO IS PRINTED OUT IN HEX FORMAT ALONG WITH THE SECTOR ID FROM WHICH IT WAS READ. EACH COMMAND ISSUED TO THE DISK IS CHECKED FOR TIMING OUT, THAT IS TO SEE IF THE BUSY CONDITION DROPS WITHIN LIMITS. IF SSW 1A IS ON THE PROGRAM WILL HALT -E4- AFTER ISSUING THE LAST OPTION STORED IN THE TABLE. WHEN THIS HALT IS RESET, THE PROGRAM STARTS OVER WITH THE FIRST OPTION AGAIN.  
 NOTE - IF SSW 18 IS ON, THE PROGRAM WILL READ THE CONSOLE SWITCHES AND USE THEM AS A DELAY BETWEEN SIO'S.

ROUTINE 03, SUMMARY DUMP OF OPTION TABLE.  
 THIS ROUTINE MUST BE DIALED IN VIA DCP'S SWITCHES -F203-. THIS ROUTINE IS THE SUMMARY DUMP OF THE OPTION TABLE. THIS ROUTINE LISTS, IN TABLE FORM, EACH OPTION AND THE NUMBER OF TIMES THE OPTION WAS EXECUTED AS WELL AS THE NUMBER OF TIMES THE OPTION CAUSED AN ERROR.

THE FIRST LINE OF THE TABLE IS CALLED 'STATUS CHECKS, INITIAL.' THE ERRORS SHOWN HERE WERE ENCOUNTERED WHILE ATTEMPTING, OR AFTER DOING A RECALIBRATE TO INITIALIZE THE DISK HEAD POSITION PRIOR TO EXECUTING THE OPTIONS IN THE TABLE.

4.15 SECTION BOA, CYLINDER 0 RESTORE PROGRAM

4.15.1 GENERAL PROGRAM DESCRIPTION.

- 4.15.1.1 'SAVE' CYLINDER 0 BY WRITING IT ON CYLINDER 3.
- 4.15.1.2 WRITE A ONE SECTOR RESTORE PROGRAM ON CYLINDER 3, SECTOR DC.
- 4.15.1.3 PRINTOUT THE FOLLOWING 22 BYTE MANUAL ROUTINE:

```
0000 31 A6 0007
0004 31 A4 0012
0008 F3 A0 00
000B 3C DC 0014
000F F3 A1 00
0012 00 03 8103
```

THE PROGRAM SHOULD BE RUN WHEN THE SYSTEM IS FUNCTIONING PROPERLY AND THE DISK PACK IS IN WORKING ORDER. IF CYLINDER 00 IS ALTERED OR DESTROYED, AFTER BOA HAS BEEN RUN, THE FOLLOWING 3 STEPS WILL RESTORE CYLINDER 00.

1. WITH FAULTY CE PACK ON R1, IPL FROM R1. THIS WILL POSITION CARRIAGE TO CYLINDER 00. IGNORE PROCESS CHECK, IF ANY.
2. TURN OFF I/O OVERLAP SWITCH.
3. ENTER AND EXECUTE THE 22 BYTE ROUTINE SHOWN IN STEP 3 ABOVE.

4.15.2 PROGRAM HALTS

```
*****
* MOD 10 HALT * MOD 6 HALT * DESCRIPTION
*-----*-----*-----*
* *** ** * AA * BOOTSTRAP SECTOR HAS LOADED CORRECTLY FROM CYL/SEC 03DC.
* *** ** * (A C 1 3) * HALT RESET. EXPECT HALT 44 (B2 ON 5406).
*-----*-----*-----*
* * * * 44 * CYLINDER 0 HAS BEEN RESTORED, SEE IF YOU CAN IPL FROM R1 NOW.
* * * * (B 2) *
*-----*-----*-----*
* *** ** * 88 * MANUAL ROUTINE HAS BEEN RESTORED TO 0000.
* *** ** * (A 1 ) * TO RESTART HIT SYSTEM RESET AND START.
*-----*-----*-----*
* * * * DD * DISK ERROR - CHECK ARR IN TABLE BELOW TO FIND WHAT OPERATION
* * * * (AB D12 4) * FAILED. ALSO CHECK TABLE FOR OTHER INFORMATION THAT IS
* * * * * * AVAILABLE IN CORE LOCATIONS 0003 TO 000E.
*-----*-----*-----*
* ERROR ROUTINE - STORES ERROR INFORMATION STARTING AT X'0003'
* 0000 - 0002 RESTART BRANCH
* 0003 - 0004 DISK SENSE BYTES 0 AND 1
* 0005 - 0006 DISK SENSE BYTES 2 AND 3
* 0007 - 0008 ARR - VALUE INDICATES WHICH ROUTINE FAILED
* 0013 - PROCESS CHECK - TURN ON I/O OVERLAP SW AND MAKE SURE THE CARRIAGE IS AT CYL 0
* WHEN YOU START.
* 0030 - NO MOTION SEEK, OR READ CYLINDER 3, HEAD 1
* 0040 - NOT AT CYLINDER 0 AFTER SEEK TO CYL 0, HEAD 1
* 004A - WRITE ID ON CYLINDER 0, HEAD 1
* 0057 - WRITE DATA ON CYLINDER 0, HEAD 1
* 006B - SEEK TO OR READ CYLINDER 0, HEAD 0
* 007B - NOT AT CYLINDER 0 AFTER SEEK TO CYL 0, HEAD 0
* 0085 - WRITE ID ON CYLINDER 0, HEAD 0
* 0092 - WRITE DATA ON CYLINDER 0, HEAD 0
* 009C - READ VERIFY ON CYLINDER 0, HEAD 0 AND HEAD 1
* 0009 - 000C LAST USED DISK CONTROL FIELD
* 000C - 000E DATA REGISTER CONTENTS AT TIME OF ERROR
*-----*-----*-----*
* *** ** * F0 * DISK ERROR WHEN TRANSFERRING CYL 0 TO CYL 3. RUN YOUR DISK
* *** ** * (ABCD ) * DIAGNOSTICS TO LOCATE TROUBLE.
* * * * *
*-----*-----*-----*
*****
```

4.16 SECTION BOB, 5444 ADJUSTMENT ROUTINES

4.16.1 GENERAL PROGRAM DESCRIPTION FOR ROUTINES 01 THRU 06 (5444 FRICTION CLUTCH DRIVE).

THESE ROUTINES ARE USED WITH THE 5444 MAP CHARTS, PAGE 514 TO ADJUST THE FWD AND REV CLUTCHES FOR OPTIMUM OPERATION. AS A PREVENTIVE MAINTENANCE TOOL, THE PROGRAM IS USED TO CHECK FOR DETERIORATION OF CLUTCH OPERATION, SO THAT ADJUSTMENTS CAN BE MADE BEFORE THE CUSTOMER HAS ANY SEEK PROBLEMS. SINCE THIS IS AN ADJUSTMENT PROGRAM, THE NORMAL MODE OF OPERATION IS TO LOOP IN THE SELECTED ROUTINE, ON THE SELECTED DRIVE. DRIVE AND DISK ARE SELECTED WITH SENSE SWITCHES 10, 11, 12, AND 13. SEE 4.16.3 SENSE SWITCH OPTIONS.

FORWARD AND REVERSE CLUTCH ADJUSTMENT OBJECTIVES

THE FORWARD AND REVERSE CLUTCHES SHOULD OPERATE RELIABLY OVER THE WIDEST POSSIBLE RANGE OF DRIVE GAPS, FOR ALL LENGTHS OF SEEKS. ONE TRACK SEEKS ARE THE MOST CRITICAL AND ARE USED BY THE PROGRAM FOR THE BASIC MEASUREMENTS. THE DRIVE GAP WILL INCREASE WITH WEAR, SO IT SHOULD BE ADJUSTED FOR THE SMALLEST GAP THAT WILL GIVE RELIABLE OPERATION.

WHAT IS RELIABLE OPERATION?

IF THE PROGRAM PRINTOUT IS WITHIN SPECIFICATIONS, AND THE ADJUSTMENTS ARE AS SPECIFIED IN THE FETOMM, THE CLUTCH OPERATION SHOULD BE CONSIDERED RELIABLE. WITH THESE CONDITIONS MET, CUSTOMER PROBLEMS ARE NOT LIKELY TO BE CAUSED BY THE CLUTCHES.

ROUTINE 01 ONE PASS OF THE ROUTINE WILL:

1. RECALIBRATE.
2. DO 1 TRACK, FORWARD SEEKS UNTIL RD ID INDICATES ARRIVAL AT THE HIGHEST POSSIBLE CYLINDER ADDRESS.
3. PRINT RESULTS OF THE FORWARD SEEKS.
4. DO 1 TRACK, REVERSE SEEKS UNTIL RD ID INDICATES ARRIVAL AT CYLINDER 00.
5. PRINT RESULTS OF THE REVERSE SEEKS.
6. HALT 11 OR 21.

FOR EACH SEEK, THE PROGRAM MEASURES HOW LONG IT TAKES FOR THE FLEXIBLE DISK TO COVER THE TRACK CROSSING CELL AFTER THE SIO INSTRUCTION WAS STARTED. IF THE CLUTCHES ARE ADJUSTED PROPERLY, THIS TIME WILL VARY LESS THAN 1 MS FOR ALL OF THE SEEKS. HOWEVER, IF THE CLUTCHES NEED ATTENTION, SLIPPAGE MAY OCCUR, CAUSING THE TIME TO VARY MORE THAN 3 MS.

THE PRINTOUT IS IN THE FORM OF A BAR GRAPH DISTRIBUTION CURVE. THE GRAPH SHOWS TIMINGS MEASURED IN ONE DIRECTION (FWD OR REV). SEE EXAMPLE OF AN ACCEPTABLE PRINTOUT AT THE END OF THE PROGRAM DESCRIPTION. EACH PRINTOUT IS CHECKED AGAINST LIMITS. IF THE LIMITS ARE EXCEEDED, APPROPRIATE MESSAGES WILL PRINT AFTER THE GRAPH.

ROUTINE 02 - 06

GOES THRU THE SAME 6 STEPS AS IN ROUTINE 01, EXCEPT THAT THE ROUTINE NUMBER BECOMES THE NUMBER OF TRACKS PER SEEK. THE TIME MEASURED IS FROM THE START OF THE SIO OPERATION TO THE TRACK CROSSING PULSE JUST BEFORE THE ACCESS IS SUPPOSED TO STOP. EACH ROUTINE BRINGS IN ITS OWN LIMITS, SO THAT THE PRINTOUT CAN BE CHECKED AGAINST THE PROPER LIMITS.

ROUTINE 07 THIS ROUTINE WILL ISSUE A SENSE AND A READ ID COMMAND, AND WILL PRINTOUT THE INITIAL STATUS AND THE ID FIELD FOR THE CURRENT POSITION OF THE CARRIAGE SEE 4.16.3 SENSE SWITCH OPTIONS.

ROUTINE 08 QUICK SEEK CHECK ROUTINE.

THIS ROUTINE RECALIBRATES AND SEEKS TO CYLINDER 101. IT THEN SEEKS ALTERNATELY BETWEEN 100 AND 101. A PRINTOUT WILL OCCUR IF ANY READ ID INDICATES THE CARRIAGE DID NOT ARRIVE AT THE EXPECTED CYLINDER. AFTER THE INITIAL HALT 18 OR 28, THERE CAN BE ONLY ONE OTHER HALT. THIS IS THE ERROR HALT E. PRINTOUT WILL GIVE STATUS, EXPECTED CYLINDER ADDRESS, AND ACTUAL CYLINDER ADDRESS AT THE TIME OF THE ERROR.

ROUTINE 09 MINI - FRIEND

THIS ROUTINE CAN BE USED TO CAUSE THE CARRIAGE TO MOVE BACK AND FORTH BETWEEN ANY TWO CYLINDERS. THE CONSOLE SWITCHES ARE SET TO A VALID S & N BYTE FOR A SEEK DISK CONTROL FIELD, THUS SELECTING THE HEAD DIRECTION, AND NUMBER OF TRACKS TO SEEK. SEE SECTION 5.1.5, BYTES 2 & 3 FOR EXPLANATION OF CONTROL FIELD S & N BYTES.

AT ANY HALT IN THIS ROUTINE, XR2 WILL CONTAIN THE CYL/SEC FROM THE LAST READ ID OPERATION.

WITH THE PRINTER NOT READY, ONE SEEK WILL BE PERFORMED, USING THE S & N BYTE FROM THE CONSOLE SWITCHES. XR2 CAN THEN BE CHECKED TO FIND THE POSITION OF THE CARRIAGE.

IF THE PRINTER IS READY, THE SEEK WILL BE PERFORMED, FOLLOWED BY ANOTHER SEEK IN THE OPPOSITE DIRECTION, FOR THE SAME NUMBER OF TRACKS. THIS WILL CONTINUE UNTIL THE PRINTER IS MADE NOT READY OR UNTIL THERE IS A DISK ERROR. HALT E WILL INDICATE DISK ERROR. SEC PRINTOUT FOR STATUS ETC.

ROUTINE 0A SCAN DISK FOR ERRORS & FLAGGED TRACKS.

VERIFY 48 SECTORS ON EACH TRACK. AFTER THE HEADING FOR EACH DETECTED ERROR THERE IS A PRINTOUT AS FOLLOWS:

```
*ID A000. PROG B0B3-A. SWS 07,10
EXP ACT
CYL--CYL--CTRL FLD--RD ID FLD--STATUS BYTES--FIRST 12 BYTES FROM BAD SECTOR
004 003 0004002F 0103FF 24 00 00 51 00CDCE800CF4633C0C000601 * 4 *
072 003 0047002F 0103FF 24 00 00 51 8C341828466B465DE06B3013 *NO DATA READ *
```

ACTUAL CYLINDER IS THE DECIMAL EQUIVALENT OF THE CYLINDER ADDRESS TAKEN FROM THE READ ID FIELD. IF THE THIRD BYTE OF THE ID FIELD IS FF, IT MEANS THAT THE READ ID DID NOT WORK PROPERLY, THEREFORE, THE ACTUAL CYLINDER SHOULD BE DISREGARDED.

ROUTINE 0B ADJUST DATA SEPARATOR. (EQUIVALENT TO 5444 FETOMM SCOPE PROCEDURE FOR DATA SEPARATOR).

ROUTINE DOES A CONTINUOUS VERIFY OPERATION ON THE CE TRACK. IF THERE IS ANY KIND OF DISK ERROR THE PRINTER WILL PRINT A LINE. IF THE PRINTER WILL NOT STOP PRINTING IN STEP 3, CALL IN ROUTINE 07 AND CHECK THE STATUS TO FIND OUT WHAT KIND OF ERROR IS PRESENT. WITH ROUTINE 0B RUNNING, ADJUST THE DATA SEPARATOR AS FOLLOWS:

1. LOCATE POT ON E4 CARD ON THE DISK ATTACHMENT BOARD.
2. TURN POT CCW UNTIL PRINTER PRINTS CONTINUOUSLY.
3. TURN POT CW UNTIL PRINTER STOPS PRINTING.
4. COUNT THE NUMBER OF CW TURNS NECESSARY TO CAUSE THE PRINTER TO START PRINTING.
5. TURN AT LEAST 1 MORE TURN CW (PRINTER WILL CONTINUE TO PRINT).
6. TURN POT CCW UNTIL PRINTER STOPS PRINTING.
7. TURN POT CCW 1/2 THE NUMBER OF TURNS RECORDED IN STEP 4. DATA SEPARATOR IS NOW ADJUSTED.

ROUTINE 0C ENCODE PLATE ADJUSTMENT. (EQUIVALENT TO 5444 FETOMM SCOPE PROCEDURE FOR SYMMETRY).

THIS ROUTINE REQUIRES 1 JUMPER ON THE DISK ATTACHMENT BOARD. THERE ARE TWO JUMPER LOCATIONS, DEPENDING ON WHICH DISK DRIVE IS SELECTED (SSW 12 OR 13). IF THE JUMPER IS NOT ON, OR FALLS OFF DURING THE MEASUREMENT, A MESSAGE WILL PRINT GIVING THE CORRECT LOCATION FOR THE SELECTED DISK DRIVE.

JUMPER IS FROM: W3G2G04 TO W3R2P10 FOR DRIVE 1.  
W3F2G04 TO W3R2P10 FOR DRIVE 2.

IF HIGH SPEED DRIVE REMOVE Y GATE CARD E6 BEFORE RUNNING THIS ROUTINE.

STARTING AT CYL 0, THE CARRIAGE DOES ALTERNATE FWD AND REV 100 TRACK SEEKS. IF THE PRINTER PRINTS LINES OF \*S FOLLOWED BY FOUR DIGITS THE ENCODE PLATE IS TOO FAR TO THE RIGHT. IF THE PRINTER PRINTS 4 DIGITS THE ENCODE PLATE IS TOO FAR TO THE LEFT. IF THE ENCODE PLATE IS ADJUSTED CORRECTLY AND THE HOLDING SCREWS ARE TIGHT, MODERATE PRESSURE TO THE RIGHT OR LEFT WILL CAUSE CONTINUOUS PRINTOUTS, CORRESPONDING TO THE DIRECTION OF PRESSURE.

THE FOUR DIGIT INDICATES THE DIFFERENCE BETWEEN THE FWD AND REV SPEED, NO PRINTING INDICATES EQUAL FWD AND REV SPEED.

ROUTINE 0D SPEED ADJUSTMENT (EQUIVALENT TO 5444 FETOMM SCOPE PROCEDURE FOR SPEED ADJUSTMENT).

SAME JUMPER AND MESSAGES AS RTN 0C. THIS ROUTINE SETS THE POT ON THE B6 CARD IN THE Y GATE IN THE DISK DRIVE.

WITH THE ROUTINE RUNNING:

1. TURN POT CCW UNTIL PRINTER PRINTS CONTINUOUS FOUR DIGIT LINES.
2. SLOWLY TURN THE POT CW UNTIL YOU HEAR A LONG PRINT LINE. THE POT IS NOW ADJUSTED.

THE TRACK TO TRACK SPEED FROM 2 TO 3 AND 52 TO 53 IS COMPARED AND THE DIFFERENCE INDICATED BY THE FOUR DIGIT PRINTOUT.

ROUTINE 0E SCOPING LOOP TO READ ANYTHING ON THE DISK.

THIS ROUTINE PROVIDES A TIGHT SCOPE LOOP FOR ANY KIND OF READ OPERATION. DRIVE SELECTION IS CONTROLLED BY SSW 13. SSW 13 ON FOR DRIVE 2, AND OFF FOR DRIVE 1. DISK SELECTION IS CONTROLLED BY SSW 10. SSW 10 ON FOR REMOVABLE, AND OFF FOR FIXED. HEAD SELECTION IS DETERMINED BY BIT 0 IN THE SECTOR ADDRESS (SEE TABLE BELOW). USE THE TABLE BELOW TO SELECT THE DESIRED OPTION. YOU WILL NOTE, THE SWITCH SETTINGS DO NOT SELECT THE TRACK ADDRESS. THEREFORE, IF YOU WANT TO READ A PARTICULAR CYLINDER, YOU MUST POSITION THE CARRIAGE TO THAT CYLINDER USING ROUTINE 09 OR THE OFF LINE CE SWITCHES ON THE DISK DRIVE. THE PROGRAM DOES A READ ID TO DETERMINE CARRIAGE LOCATION. THE FLAG AND CYLINDER BYTE FROM THE READ ID ARE PLUGGED INTO THE DISK CONTROL FIELD USED BY THE LOOP. TO CHANGE SW SET UP, SET SW 1 TO F WHILE LOOPING. THIS WILL GIVE HALT HF (PF5 ON 5406). SET SW 1 TO 0 AND RESET HALT TO GO TO HALT 1E OR 2E. OPTIONS ARE SET ONLY WHEN HALT 1E OR 2E IS RESET. IF YOU MUST LOOP ON A WRITE OP, CHANGE THE Q CODE OF THE SIO INSTRUCTION AT 'SIO18' TO 'A0'. USE SCAN EQU SETTING FOR WRITE DATA. USE SCAN LOW/EQU FOR WRITE ID.

\*\*\*\*\* CAUTION \*\*\*\*\*

IN THIS MODE YOU CAN WIPE OUT CUSTOMER DATA OR ALIGNMENT TRACKS - BE CAREFUL

THE CARRIAGE MUST BE ACCESSED TO THE THE DESIRED TRACK MANUALLY.  
 AT THE 1E OR 2E HALT SET THE SWITCHES AS FOLLOWS:

SWITCH 1 & 2					SWITCH 3 & 4										
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
SECTOR ADDRESS					OPERATION					SECTOR COUNT MAY BE 00 THRU 2F					
UPPER HEAD	DATA	0	0	0	READ	0	0	0	0	READ	SYS SIZE	MAX SECTOR CNT			
00 THRU 5C	ID	0	1	0	READ	1	0	0	0	READ	8K	00			
	DIAG	1	0	0	READ	1	1	0	0	READ	12K	10			
LOWER HEAD	VERIFY	0	0	1	SCAN	0	0	1	1	SCAN	16K	20			
80 THRU DC	EQU	0	0	1	SCAN	0	1	1	1	SCAN					
	LOW/EQU	1	0	1	SCAN	1	1	1	1	SCAN					
	HIGH/EQU	1	0	1	SCAN	1	1	1	1	SCAN					
	NOT USED	1	1	1	SCAN	1	1	1	1	SCAN					

NOTE: AT ANY TIME, WHILE RUNNING ANY ROUTINE YOU MAY TURN SW 1 TO F. YOU WILL EITHER GET THE DCP HALT HF (ABCD12345) OR THE CURRENT ROUTINE HALT. IN EITHER CASE F2XX WILL CALL IN ANY OTHER DESIRED ROUTINE OR ANY APPLICABLE SSW SETTING MAY BE MADE.

NOTE: WHEN RUNNING ROUTINES 1 THRU 6,0C AND 0D THE I/O OVERLAP SWITCH MUST BE ON.

4.16.2 HALT TABLE

HALT ID	TENS	UNITS	HALT MEANING
11 OR 21	DRIVE	RTN 01	HALT ID FOR FRICTION CLUTCH ADJUSTMENT ROUTINES.
12 OR 22	DRIVE	RTN 02	
13 OR 23	DRIVE	RTN 03	
14 OR 24	DRIVE	RTN 04	
15 OR 25	DRIVE	RTN 05	
16 OR 26	DRIVE	RTN 06	SEE SSW 2E & 2F FOR LINKING RTNS 01 THRU 06 TOGETHER.
17 OR 27	DRIVE	RTN 07	PRINT STATUS, READ ID AND PRINT IT.
18 OR 28	DRIVE	RTN 08	INITIAL HALT FOR QUICK CHECK ROUTINE.
19 OR 29	DRIVE	RTN 09	INITIAL AND NORMAL HALT WHEN NOT LOOPING IN MINI - FRIEND.
1A OR 2A	DRIVE	RTN 0A	INITIAL HALT. RTN A RESET TO RUN.
1B OR 2B	DRIVE	RTN 0B	INITIAL HALT. RTN B RESET TO RUN.
1C OR 2C	DRIVE	RTN 0C	INITIAL HALT. RTN C RESET TO RUN.
1D OR 2D	DRIVE	RTN 0D	INITIAL HALT. RTN D RESET TO RUN.
1E OR 2E	DRIVE	RTN 0E	INITIAL HALT. RTN E RESET TO RUN. SWITCHES ARE SET AT THIS HALT.
0E			ERROR HALT FOR ROUTINE 08 & 09, CHECK PRINTOUT - RESET TO RETURN.
FE			INTERVENTION REQUIRED - SEE PRINTOUT. (RESET TO TRY AGAIN)

4.16.3 SENSE SWITCH OPTIONS

SENSE SWITCH	COMMENTS	ROUTINE
10	PROGRAM WILL USE REMOVABLE DISK WHEN RUNNING.	ALL
11	PROGRAM WILL USE FIXED DISK WHEN RUNNING.	ALL
12	PROGRAM WILL USE DRIVE 1 WHEN RUNNING.	ALL
13	PROGRAM WILL USE DRIVE 2 WHEN RUNNING.	ALL
20	CAUSES "PER CYCLE" OPTION TO PRINT. WITH 1 TRACK SEEKS, THIS OPTION WILL PRINT OVER 400 LINES. THIS OPTION SHOULD BE USED ONLY WHEN THE DATA IS NEEDED FOR ANALYSIS. THIS OPTION CAN BE RESET BY - STOP - SYSTEM RESET - TURN OFF SSW 20 - RESTART DESIRED ROUTINE (SSW 28 OVERRIDES THIS OPTION).	1 - 6
23	CHECK FORWARD CLUTCH ONLY - ELIMINATES REVERSE MEASUREMENTS AND PRINTOUT.	1 - 6
24	CHECK REVERSE CLUTCH ONLY - ELIMINATES FORWARD MEASUREMENTS AND PRINTOUT.	1 - 6
27	USE LOWER HEAD WHEN RUNNING PROGRAM. (RTN 1 THRU 7 ONLY).	1 - 7
28	SNAPSHOT MODE - RUN 3 MEASUREMENTS AND RETURNS TO START HALT (OVERRIDES SSW 20).	1 - 6
2D	REPEAT LAST PRINTOUT (PWD - REV)	1 - 6
2E	RUN ROUTINE 01 THRU 06 IF SSW 2F IS ON.	1 - 6
2F	RUN MULT. ROUTINES - ROUTINE 01 THRU 03 IF SSW 2E IS OFF. ROUTINE 01 THRU 06 IF SSW 2E ON.	1 - 6

4.16.4 EXAMPLE OF AN ACCEPTABLE PRINTOUT

```
ID A011. PROG B0B3-01. SSWs
DIRECTION SIO CYCLES, SEEK LENGTH, DISK ... LIMITS - LOW VAR HIGH ... STATUS BYTES
FORWARD      203      1 TRACK  F1 ... IN MS  4.3 .9  8.7 ... 00 00 03 51

5.7
5.8 1 *
5.9 9 *****
6.0 69 *****
6.1 68 *****
6.2 41 *****
6.3 12 *****
6.4 3 ***
6.5
```

FOR MORE INFORMATION ABOUT INTERPRETING THE PRINTOUT, SEE THE 5444 SEEK FAILURE MAPS.







DIAGNOSTIC USER'S GUIDE  
KEYBOARD FUNCTION TEST

BLOCK 14 PAGE 001  
04 PAGES 12/19/73

PREV EC 571621 PRES EC 571659 P/N 5129473

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## 1. SUMMARY

## 1.1 PURPOSE

THE PURPOSE OF THE KEYBOARD FUNCTION TEST IS TO PROVIDE A COMPLETE EXERCISER FOR THE KEYBOARD AND ATTACHMENT HARDWARE AND TO RECOGNIZE FAILURES IN THIS HARDWARE. WHEN FAILURES ARE RECOGNIZED, THE KEYBOARD MAPCHARTS SHOULD BE USED TO FURTHER LOCATE THE FAILURE.

## 2. OPERATING PROCEDURES

## 2. 1. LOADING

THE PROGRAM IS LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (D121) SEE BLOCK 01.

## 2. 2. RUNNING (NORMAL)

OPERATE SYSTEM START TO BEGIN EXECUTION OF THE PROGRAM AFTER THE DCP FA5 (ABCD135) HALT. THE PRINTED OPERATOR MESSAGES WILL PROVIDE INSTRUCTIONS FOR OPERATION.

CAUTION: SINCE THIS IS A DIAGNOSTIC AND BOUNCE OR MULTIPLE INTERRUPTS ARE MONITORED AND RECOGNIZED AS ERRORS. THEY CAN BE FORCED BY ROLLING KEYS (KEYING TOO FAST). ALSO AN ERROR WILL BE INDICATED DURING TYPOMATIC TEST (ROUTINE 13) IF THE TYPOMATIC KEY IS NOT FULLY DEPRESSED IMMEDIATELY.

CAREFULLY NOTE ANY DISCREPENCIES ON THOSE ROUTINES REQUIRING ONLY VISUAL COMPARISONS (COMMAND INDICATORS, FIELD INDICATORS, KEYBOARD READY). IF ANY DISCREPENCIES EXIST OR IF ERROR HALTS OCCUR, REFER TO THE KEYBOARD MAP CHARTS.

## 2. 3. SENSE SWITCH OPTIONS

1. NORMAL DCP SWITCH CONTROL IS AVAILABLE.
2. SENSE SWITCH 10 WILL ALLOW LOOP ON CHARACTER OPTION.
3. SENSE SWITCH 11 WILL PROVIDE CORRECT RESULT PRINTOUT.

## 3. GENERAL PROGRAM INFORMATION

3. 1. KEYBOARD DATA AND STATUS IS ALWAYS SENSED TO LOCATIONS 0A20 RESPECTIVELY FOR THE FIRST SENSE IN THE INTERRUPT AND IN 0A22 FOR THE SECOND SENSE IF A SECOND IS EXECUTED. THE EXPECTED SENSE DATA AND STATUS WILL BE FOUND IN LOCATIONS 0A14, 0A15 FOR FIRST SENSE, 0A17, 0A18 FOR SECOND SENSE.

3. 2. IF THE PROGRAM HANGS UP WHILE ATTEMPTING AN I/O OPERATION, LOCATION 0A1C WILL CONTAIN INFORMATION THAT INDICATES THE TYPE OF OPERATION.
  1. BIT 0 ON-SENSE I/O
  2. BIT 1 ON-START I/O
  2. BIT 2 ON-LOAD I/O

3. 3. THE PROGRESS OF THE PROGRAM IS RECORDED IN LOCATIONS 0A1D, 0A1E. BITS HAVE THE FOLLOWING MEANING.

1. BYTE 0A1D
  - 0 BIT-START I/O 1 ISSUED
  - 1 BIT ON-EXPECTED INT FOR SIO1 OCCURRED.
  - 2 BIT ON-SENSE I/O 1 COMPLETE
  - 3 BIT ON-SENSE I/O 1 SHOULD OCCUR
  - 4 BIT ON-LOAD I/O EXECUTED
  - 5 BIT ON-EXPECTED INT FOR SIO1 FAILED TO OCCUR.
  - 6 BIT ON-AN UNEXPECTED INT FOR SIO1 OCCURRED.
  - 7 BIT ON-ERROR OCCURRED.
2. BYTE 0A1E
  - 0 BIT ON-START I/O 2 ISSUED
  - 1 BIT ON-EXPECTED INT FOR SIO1 OCCURRED.
  - 2 BIT ON-SENSE I/O 2 COMPLETE
  - 3 BIT ON-SENSE I/O 2 SHOULD OCCUR
  - 4 BIT ON-LOAD I/O 2 EXECUTED.
  - 5 BIT ON-EXPECTED INT FOR SIO2 FAILED TO OCCUR.
  - 6 BIT ON-AN UNEXPECTED INT FOR SIO2 OCCURRED.
  - 7 BIT ON-ERROR OCCURRED

3. 4. ROUTINE 14 IS AN OPTIONAL KEYBOARD UTILITY WITH PRINTER OR DISPLAY MODES. DISPLAY DATA IS PRESENTED IN THE HALT INDICATORS, AND STATUS IN THE FIELD INDICATORS DCP SENSE SWITCH 02 MUST BE OFF TO SELECT THIS ROUTINE.

THE FOLLOWING PROGRAM SENSE SWITCHES ARE USED:

SSW 11 = PRINTS ONE KEY STATUS THEN TERMINATES.  
SSW 10&11 = PRINTS AND DISPLAYS MULTIPLE KEYS.

## 4. WORLD TRADE INFORMATION

4. 1. NOTE THAT REFERENCES TO FUNCTION KEYS WITHIN THE PROGRAM USE AMERICAN NOMENCLATURE.
4. 2. IN ORDER TO HAVE THE KEYBOARD PRINT CHARACTERS CORRESPONDING TO THE KEYPADS, IT WILL BE NECESSARY TO ENTER REPLACE RECORDS THRU THE KEYBOARD (SEE BLOCK 20 PN 5129660). THE CONTENTS OF THESE REPLACE RECORDS IS GIVEN AT THE END OF THE LISTING FOR SECTION PROGRAM 121 (PN 5129474).
4. 3. CAUTION - - - WHEN ENTERING HEX INFORMATION THRU THE KEYBOARD SOME TRANSLATIONS MAY HAVE TO BE MADE DEPENDING UPON YOUR KEYPADS. SEE 5444 DISK STORAGE DRIVE UTILITIES PROGRAM DESCRIPTION (PN 5129657) FOR A LIST OF THESE TRANSLATIONS.

4. INDEX OF PROGRAM HALTS ALSO REFER TO KEYBOARD MAPS ON  
ERROR HALTS.

```
*****
                          HALT ID DEFINITIONS
*****
INDEX  I  HALT  I  MEANING AND ACTION REQUIRED
*****
11     I  D    4  I  DATA LOADED TO AND STORED FROM
      I      I  I  THE KEYBOARD IAR DID NOT COMPARE
      I      I  I  WITH EXPECTED RESULTS. SEE NOTES
      I      I  I  1, 3.
*****
12     I  D    3  I  PARITY BIT WAS NOT GENERATED OR
      I      I  I  INSERTED IN THE STATUS BYTE, OR
      I      I  I  EXTRA BITS WERE INSERTED. SEE
      I      I  I  NOTES 1, 3.
*****
13     I  D   34  I  STATUS BYTE WAS NOT AS EXPECTED
      I      I  I  AFTER KBD ENABLE AND UNLOCK(PICK)
      I      I  I  BAIL. SEE NOTES 1, 3.
*****
14     I  D    2  I  AN UNEXPECTED INTERRUPT OCCURED
      I      I  I  AFTER KBD ENABLE AND UNLOCK(PICK)
      I      I  I  BAIL. SEE NOTES 1, 3.
*****
15     I  D   2 4  I  STATUS WAS NOT AS EXPECTED AFTER
      I      I  I  LOCK (DROP) BAIL COMMAND TO A
      I      I  I  READY AND ENABLED KBD. SEE NOTES
      I      I  I  1, 3.
*****
16     I  D   23  I  AN UNEXPECTED INTERRUPT OCCURED
      I      I  I  AFTER KBD WAS LOCKED. KBD IS
      I      I  I  ENABLED. SEE NOTES 1, 3.
*****
17     I  D  234  I  STATUS BYTE WAS NOT AS EXPECTED
      I      I  I  AFTER KBD ENABLE AND RESTORE.
      I      I  I  SHOULD BE 84 SEE NOTES 1, 3.
*****
18     I  D    1  I  AN UNEXPECTED INTERRUPT OCCURED
      I      I  I  AFTER KBD ENABLE AND RESTORE.
      I      I  I  SEE NOTES 1, 3.
*****
19     I  D    1 4  I  STATUS BYTE WAS NOT AS EXPECTED
      I      I  I  AFTER DISABLE INTERRUPT TO A
      I      I  I  READY KBD. SHOULD BE 80. SEE
      I      I  I  NOTES 1, 3.
*****
1B     I  D    1 34 I  EXPECTED INTERRUPT DID NOT OCCUR.
      I      I  I  SEE NOTES 1, 3.
*****
1C     I  D   12  I  STATUS BYTE WAS NOT AS EXPECTED.
      I      I  I  AFTER FORCED INTERRUPT. SHOULD
      I      I  I  BE 80. SEE NOTES 1, 3.
*****
1D     I  D   12 4  I  AN UNEXPECTED INTERRUPT OCCURED
      I      I  I  AFTER A FORCED INTERRUPT REQUEST
      I      I  I  TO A DISABLED KBD. SEE NOTES 1,
      I      I  I  3.
*****
1E     I  D  123  I  RESET INTERRUPT FAILED. NEXT
      I      I  I  INSTRUCTION USED. SEE NOTES 1, 3.
*****
1F     I  D  1234 I  A PROGRAM HANG UP WAS ENCOUNTERED
      I      I  I  ON AN I/O INSTRUCTION, OR THE
      I      I  I  PROGRAM WAS STOPPED PRIOR TO
      I      I  I  EXECUTING AN I/O INSTRUCTION AND
      I      I  I  RESTARTED BY SYSTEM RESET-START.
      I      I  I  AOF CONTAINS THE I/O INSTRUCTION
      I      I  I  INVOLVED.
*****
21     I  C    4  I  A COMMAND KEY DID NOT GENERATE
      I      I  I  OR TRANSMIT THE PROPER CHARACTER.
      I      I  I  INSPECT 0A11-2 FOR THE ACTUAL
      I      I  I  CHARACTER TRANSMITTED AND 0A14-5
      I      I  I  FOR THE CHARACTER EXPECTED. SEE
      I      I  I  NOTES 1, 2, 3.
*****
22     I  C    3  I  A FUNCTION KEY DID NOT GENERATE
      I      I  I  OR TRANSMIT THE PROPER CHARACTER.
      I      I  I  INSPECT 0A11-2 FOR THE ACTUAL
      I      I  I  CHARACTER TRANSMITTED, AND 0A14-5
      I      I  I  FOR THE CHARACTER EXPECTED. SEE
      I      I  I  NOTES 1, 2, 3.
*****
```

```
*****
23     I  C   34  I  A TYPEWRITER KEY DID NOT GENERATE
      I      I  I  OR TRANSMIT THE PROPER CHARACTER.
      I      I  I  INSPECT 0A11-2 FOR THE ACTUAL
      I      I  I  CHARACTER TRANSMITTED, AND 0A14-5
      I      I  I  FOR THE CHARACTER EXPECTED. SEE
      I      I  I  NOTES 1, 2, 3.
*****
24     I  C    2  I  A NUMERIC KEY DID NOT GENERATE OR
      I      I  I  TRANSMIT THE PROPER CHARACTER.
      I      I  I  INSPECT 0A11-2 FOR THE ACTUAL
      I      I  I  CHARACTER TRANSMITTED, AND 0A14-5
      I      I  I  FOR THE CHARACTER EXPECTED. SEE
      I      I  I  NOTES 1, 2, 3.
*****
25     I  C   2 4  I  A WORLD TRADE KEY DID GENERATE OR
      I      I  I  TRANSMIT THE PROPER CHARACTER.
      I      I  I  INSPECT 0A11-2 FOR THE ACTUAL
      I      I  I  CHARACTER TRANSMITTED, AND 0A14-5
      I      I  I  FOR THE CHARACTER EXPECTED. SEE
      I      I  I  NOTES 1, 2, 3.
*****
26     I  C   23  I  TYPOMATIC KEY ERROR. SENSE BYTES
      I      I  I  WERE NOT AS EXPECTED.
*****
EE     I  ABC 123 I  DEPRESS ANY DESIRED CONSOLE KEY.
      I      I  I  (KEYBOARD UTILITY ROUTINE)
*****
F5     I  ABCD 2 4 I  DEPRESS AND HOLD RIGHT SHIFT KEY
      I      I  I  AND DEPRESS L-R, TOP TO BOTTOM
      I      I  I  LAST TWO ROWS OF TYPEWRITER
      I      I  I  CHARACTER KEYS EXCEPT FUNCTION
      I      I  I  KEYS SEE NOTES 1, 2, 3.
*****
F6     I  ABCD 23 I  IN NON SHIFT MODE DEPRESS ONE AT
      I      I  I  A TIME IN SEQUENCE ALL AVAILABLE
      I      I  I  COMMAND KEYS. SEE NOTES 1, 2, 3.
*****
F7     I  ABCD 234 I  DEPRESS AND HOLD TAB KEY FOR
      I      I  I  TYPOMATIC TEST SEE NOTES 1, 2.
*****
F8     I  ABCD 1  I  DEPRESS AND HOLD BACKSPACE KEY
      I      I  I  SEE NOTES 1, 2.
*****
F9     I  ABCD 1 4 I  IN NON SHIFT MODE DEPRESS IN
      I      I  I  SEQUENCE, THE FOLLOWING FUNCTION
      I      I  I  KEYS. TAB, PROG STT, SPACE, RET,
      I      I  I  BKSP, ERASE, MINUS, PLUS,
      I      I  I  INQUIRY REQUEST. SEE NOTES 1, 2,
      I      I  I  3.
*****
FA     I  ABCD 1 3 I  IN NON SHIFT MODE DEPRESS L-R,
      I      I  I  TOP TO BOTTOM ALL TYPEWRITER
      I      I  I  CHARACTER KEYS EXCEPT FUNCTION
      I      I  I  KEYS. SEE NOTES 1 AND 2.
*****
FB     I  ABCD 1 34 I  DEPRESS AND HOLD LEFT SHIFT KEY
      I      I  I  AND DEPRESS L-R, TOP TO BOTTOM
      I      I  I  TOP TWO ROWS OF TYPEWRITER
      I      I  I  CHARACTER KEYS EXCEPT FUNCTION
      I      I  I  KEYS SEE NOTES 1, 2, 3.
*****
FC     I  ABCD 12 I  IN NON SHIFT MODE, DEPRESS L-R,
      I      I  I  TOP TO BOTTOM ALL NUMERIC
      I      I  I  AND DECIMAL KEYS EXCEPT FUNCTION
      I      I  I  KEYS. SEE NOTES 1 AND 2.
*****
FD     I  ABCD 12 4 I  RELEASE THE TYPOMATIC KEY
*****
FE     I  ABCD 123 I  IN NON SHIFT MODE DEPRESS WORLD
      I      I  I  TRADE KEYS 1 AND 2 SEE NOTES 1,
      I      I  I  2.
*****
NOTE 1 I  I  TO LOOP ON ROUTINE, USE DCP
      I      I  I  SENSE SWITCH 01.
*****
NOTE 2 I  I  TO LOOP ON A CHARACTER, EXECUTE
      I      I  I  THE ROUTINE UP TO (NOT INCLUDING)
      I      I  I  THE CHARACTER DESIRED, SET CE
      I      I  I  SWITCHES TO F110 (SET SW 10)
      I      I  I  DEPRESS CHARACTER, DEPRESS START
      I      I  I  TO SET SWITCH, SET CE SWITCHES
      I      I  I  TO OXXX, DEPRESS START. THE LOOP
      I      I  I  IS ACTIVE-DEPRESS THE KEY TO BE
      I      I  I  TESTED.
*****
NOTE 3 I  I  SENSE SWITCH 11 ON WILL PROVIDE
      I      I  I  DETAILED RESULTS OF THE PROGRAM
      I      I  I  AS IT IS BEING EXECUTED WHETHER
      I      I  I  CORRECT OR INCORRECT.
*****
```

5. PROGRAM CONTENT - PROGRAM ID 121

```
*****
* ROUTINE I
* NUMBER I INTENT
* *****
* ROUTINE 1 I TESTS THE KEYBOARD IAR. LOAD WITH KNOWN*
* I PATTERN, THEN STORE. THE PATTERNS USED *
* I ARE 0001, 01FF, FFAA, AA55.
* *****
* ROUTINE 2 I TESTS SENSE I/O COMMAND: CHECKS THAT *
* I PARITY BIT (BIT 0) IS PRESENT IN THE *
* I STATUS BYTE AND DATA BYTE IS HEX 00.
* *****
* ROUTINE 3 I TESTS THAT START I/O ENABLE AND UNLOCK *
* I (PICK) BAIL (CONTROL CODE BITS 5 AND 6) *
* I TURNS ON KEYBOARD READY.
* *****
* ROUTINE 4 I TESTS THAT START I/O DROP BAIL *
* I (CONTROL CODE BIT 4) TO A READY KEY- *
* I BOARD TURNS OFF KEYBOARD READY.
* *****
* ROUTINE 5 I TESTS THAT START I/O ENABLE INTERRUPT *
* I REQUEST AND RESTORE TURNS ON KEYBOARD *
* I READY. A SENSE I/O IS ISSUED TO CHECK *
* I FOR KEYBOARD READY. NO INTERRUPT SHOULD *
* I OCCUR.
* *****
* ROUTINE 6 I TEST THAT START I/O DISABLE INTERRUPT *
* I REQUEST (CONTROL CODE BIT 5 OFF) TO A *
* I READY DEVICE TURNS OFF KEYBOARD READY.
* *****
* ROUTINE 7 I TEST THAT START I/O SET INTERRUPT *
* I REQUEST (CONTROL CODE BIT 2) TO A *
* I READY KEYBOARD CAUSES AN INTERRUPT TO *
* I OCCUR. CHECK THAT INTERRUPT REQUEST *
* I RESETS KEYBOARD READY. CHECK THAT START *
* I I/O RESET INTERRUPT REQUEST RESETS *
* I INTERRUPT REQUEST.
* *****
* ROUTINE 8 I TEST THAT START I/O SET INTERRUPT *
* I REQUEST (CONTROL CODE BIT 2) TO A *
* I DISABLED KEYBOARD DOES NOT CAUSE AN *
* I INTERRUPT TO OCCUR.
* *****
* ROUTINE 9 I TEST OF FUNCTION KEYS
* *****
* ROUTINE A I TEST LOAD I/O-TURN ON ALL COMMAND *
* I INDICATORS ONE AT A TIME.
* *****
* ROUTINE B I TEST LOAD I/O-TURN OFF ALL COMMAND *
* I INDICATORS ONE AT A TIME
* *****
* ROUTINE C I TEST LIO TURN ON ALL FIELD INDICATORS *
* I TEST LIO TURN OFF FIELD INDICATORS
* *****
* ROUTINE D I TEST EACH COMMAND KEY FOR CORRECT *
* I SENSE AND STATUS CHARACTER
* *****
* ROUTINE E I TEST OF TYPEWRITER KEYBOARD - NON SHIFT *
* I MODE.
* *****
* ROUTINE F I TEST OF TYPEWRITER KEYBOARD-SHIFT MODE, *
* I LEFT KEY.
* *****
* ROUTINE 10 I TEST OF TYPEWRITER KEYBOARD - SHIFT *
* I MODE - RIGHT KEY.
* *****
* ROUTINE 11 I TEST OF NUMERIC KEYBOARD NON SHIFT MODE*
* *****
* ROUTINE 12 I TEST OF WORLD TRADE OPTIONAL KEYS 1, 2 *
* I -NON SHIFT MODE
* *****
* ROUTINE 13 I TEST OF TYPOMATIC KEYS
* *****
* ROUTINE 14 I KEYBOARD UTILITY - PRINTER OR *
* I DISPLAY MODES ARE PROVIDED-DISPLAY DATA *
* I IN HALT INDICATORS STATUS IN FIELD *
* I INDICATORS. DCP SENSE SW 02 MUST BE OFF *
* I TO SELECT THIS ROUTINE, SECTION SENSE *
* I SWITCH 11 ON PROVIDES PRINTOUT FOR DATA *
* I AND STATUS.
* *****
```

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## 1. PROGRAM SUMMARY

- 1.1 PURPOSE - THE PURPOSE OF THIS PROGRAM IS TO PROVIDE A COMPLETE EXERCISE FOR THE 5213 OR 2222 PRINTER, AND TO DETECT ERRORS IF THEY SHOULD OCCUR. DIAGNOSTIC INFORMATION WILL BE PROVIDED WHEN THE CAPABILITY EXISTS. INTERFACE WITH THE PRINTER MAPS IS PROVIDED BY THE CODED PROGRAM HALTS. TIMING INFORMATION IS PROVIDED WHEN NECESSARY. ADJUSTMENT AIDING ROUTINES ARE AVAILABLE TO ALLOW FOR EASY ADJUSTMENTS.

## 2. OPERATING PROCEDURES

### 2.1 LOADING - NORMAL

THE PROGRAM IS LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (DE8X) SEE BLOCK 01.

### 2.2 LOADING - WITH PRINTER ERRORS

IF SOLID PRINTER CHECKS ARE OCCURRING, DCP CANNOT BE LOADED UNLESS PRINTING IS BYPASSED. THIS CAN BE ACCOMPLISHED BY TURNING ON SENSE SWITCHES 03 AND 04.

THE FOLLOWING IPL PROCEDURE SHOULD BE USED.

- 1) AT FF5 (ABCD12345) HALT AFTER IPL, SET CE CONSOLE SWITCHES TO 03FE AND START. HALT 805 (A 5) WILL OCCUR. AT THIS HALT SET CE CONSOLE SWITCHES TO F103 AND START. THE NEXT HALT WILL BE DURING DCP LOADING. SET SENSE SWITCHES 03, 04 AND START. SEE BLOCK 01 SECTION 6.

### 2.3 RUNNING

OPERATE START. AFTER TERMINATE HALT 'FE5', MAKE FURTHER PROGRAM SELECTIONS OR OPERATE START IF OTHER SELECTIONS HAVE BEEN MADE. ALL SECTION PROGRAM HALTS SHOULD BE INVESTIGATED. IF SENSE SWITCH 07 IS ON PROGRAM CHAINING IS AUTOMATIC FOR ALL PROGRAMS SELECTED.

THE MANUAL INTERVENTION 'PROCESS CHECK' IN E86 MAY BE BYPASSED BY TURNING ON SENSE SWITCH 02, WHICH BYPASSES THE MANUAL INTERVENTION ROUTINES.

### 2.4 SENSE SWITCH OPTIONS

- 1) NORMAL DCP SENSE SWITCH CONTROL IS AVAILABLE.
- 2) SENSE SWITCH 13 - RUN SSA ADJUSTMENT -E85 ROUTINE 1
- 3) SENSE SWITCH 14 - RUN SS1 ADJUSTMENT -E85 ROUTINE 1
- 4) SENSE SWITCH 16 SELECTS ADJUSTMENT ROUTINE FOR SINGLE SHOTS 1 OVERLAPPED (13 INCH PIN FEED MACHINE ONLY) AND SINGLE SHOT 2
- 5) SENSE SWITCH 17 TERMINATES ALL TIMING ADJUSTMENT ROUTINES. (MOMENTARY ON - SELF RST.)
- 6) SENSE SWITCH 18 LOOPS TEST WITHOUT ERROR HALTS. PROGRAMS E83, E85 ROUTINE 2
- 7) SENSE SWITCH 1A RUN ADJUSTMENT RTN FOR SS W-E83
- 8) SENSE SWITCH 1B RUN ADJUSTMENT RTN FOR SS X-E83
- 9) SENSE SWITCH 1C RUN ADJUSTMENT RTN FOR SS Y-E83
- 10) SENSE SWITCH 1D RUN ADJUSTMENT RTN FOR SS Z-E83
- 11) SENSE SWITCH 1F RUN SS3 ADJUSTMENT - E85 ROUTINE 2
- 12) SENSE SWITCH 20 - DOMESTIC MATRIX -E85 ROUTINE 2
- 13) SENSE SWITCH 21 - GERMAN, AUST. MATRIX-E85 ROUTINE 2
- 14) SENSE SWITCH 22 - FRANCE, BELG. MATRIX -E85 ROUTINE 2
- 15) SENSE SWITCH 23 - ENGLISH(UK), ITALY MATRIX-E85 RTN 2
- 16) SENSE SWITCH 24 - SPAIN MATRIX - E85, ROUTINE 2
- 17) SENSE SWITCH 25 - DENMARK, NORWAY MATRIX E85 RTN 2
- 18) SENSE SWITCH 26 - FINLAND, SWEDEN MATRIX-E85 RTN2
- 19) SENSE SWITCH 27 - SPANISH SPEAKING MATRIX-E85 RTN2
- 20) SENSE SWITCH 28 - BRAZIL, PORTUGAL MATRIX-E85 RTN2
- 21) SENSE SWITCH 2A - JAPAN MATRIX E85 - RTN 2

## 3. INDEX OF PROGRAM HALTS

REFER TO PRINTER ATCH MAPS FOR COMPLETE HALT LISTING.

4. PROGRAM CONTENT

```
*****
* PROGRAM * ROUTINE AND INTENT *
*
* E81 * RTN01 - TEST I/O BUSY - THIS ROUTINE *
* BASIC * ISSUES THE FIRST COMMAND TO THE *
* OPS TEST * PRINTER ATTACHMENT. IT SERVES *
* * TWO PURPOSES, 1) TO SEE IF THE *
* * PRINTER ATTACHMENT CAN RESPOND *
* * TO A COMMAND USING THIS DEVICE *
* * ADDRESS AND M CODE 2) TO MAKE *
* * SURE THE ATTACHMENT IS NOT *
* * INITIALLY BUSY. *
*
* * RTN02 - TEST I/O UNIT CHECK - THIS *
* * ROUTINE ISSUES A TEST I/O ON *
* * UNIT CHECK TO MAKE SURE THAT THE *
* * OPERATION CAN BE ISSUED AND THAT *
* * THE ATTACHMENT HAS NO UNIT CHECK *
* * CONDITIONS PENDING WHICH COULD *
* * GIVE MISLEADING INDICATIONS IN *
* * THE FOLLOWING ROUTINES. A SENSE *
* * STATUS IS ISSUED IN THE EVENT OF *
* * A UNIT CHECK. *
*
* * RTN03 - SENSE STATUS 1 AND 2 - THIS *
* * ROUTINE TESTS THE ABILITY TO *
* * ISSUE AND REACT TO A SENSE *
* * STATUS 1 AND 2 INSTRUCTION. THE *
* * STATUS READ IS NOT CHECKED SINCE *
* * NO KNOWN CONDITIONS EXIST AT *
* * THIS TIME. *
*
* * RTN04 - SENSE STATUS 3 AND 4 - THIS *
* * ROUTINE TESTS THE ABILITY TO *
* * ISSUE AND REACT TO A SENSE *
* * STATUS 3 AND 4 INSTRUCTION. THE *
* * STATUS READ IS NOT CHECKED SINCE *
* * NO KNOWN CONDITIONS EXIST AT *
* * THIS TIME. *
*
* * RTN05 - SENSE STATUS 5 - THIS ROUTINE *
* * TESTS THE ABILITY TO ISSUE AND *
* * REACT TO A SENSE STATUS 5 *
* * INSTRUCTION. SINCE THIS SENSE IS *
* * ALSO USED BY THE LEDGER CARD *
* * DEVICE, THE M CODE IS 1 AND THIS *
* * MAKES THIS INSTRUCTION DIFFERENT *
* * FROM ALL OTHER PRINTER COMMANDS. *
* * THE STATUS READ IS NOT CHECKED *
* * SINCE NO KNOWN CONDITIONS EXIST. *
*
* * RTN06 - TEST LOAD AND SENSE OF PCAR - *
* * THIS ROUTINE WILL LOAD AND SENSE *
* * THE PCAR AND COMPARE THE RESULT *
* * FOR CORRECT OPERATION. FIVE DATA *
* * PATTERNS ARE USED TO MAKE SURE *
* * ALL LSR BITS MAY BE TURNED ON *
* * AND OFF. *
*
* * RTN07 - TEST LOAD AND SENSE OF PDAR - *
* * SAME AS TEST OF PCAR (RTN06) *
*
* * RTN08 - SIO NO-OP - THIS ROUTINE ISSUES *
* * THE FIRST START I/O INSTRUCTION *
* * TO THE PRINTER. THE COMMAND *
* * FIELD IS 00 CAUSING THE ATTACH- *
* * MENT TO SET THE NO-OP LATCH. *
* * SOME OF THE ITEMS CHECKED ARE - *
* * BUSY NOT ON AFTER SIO NO-OP, *
* * PCAR UPDATED BY ONE, PDAR NOT *
* * CHANGED, NO SINGLE SHOTS FIRED *
* * AND NO UNIT CHECK. *
*
* * RTN09 - SIO NO-OPS CHAINED - THIS *
* * ROUTINE IS THE FIRST TO TEST *
* * COMMAND CHAINING. IT ISSUES 24 *
* * NO-OP COMMANDS WITH THE CHAIN *
* * BIT ON IN THE FIRST 23. THE *
* * CORRECT UPDATE OF PCAR IS *
* * CHECKED TO ASSURE THAT THE FULL *
* * CHAIN WAS EXECUTED. *
*
* * RTN0A - INVALID OPS TEST - THIS ROUTINE *
* * ISSUES INVALID COMMANDS TO THE *
* * PRINTER TO CHECK THE ABILITY OF *
* * THE ATTACHMENT TO DETECT AND *
* * REJECT INVALID COMMANDS. *
*
* * RTN0B - INVALID OPS IN CHAIN COMMAND - *
* * THIS ROUTINE ISSUES A CHAIN OF *
* * NO-OP COMMANDS WHICH ARE *
* * FOLLOWED BY AN INVALID COMMAND *
* * WITH THE CHAIN BIT ON AND MORE *
* * CHAINED NO-OPS. THE INVALID *
* * COMMAND SHOULD BREAK THE CHAIN *
* * WITH A UNIT CHECK AND INVALID *
* * COMMAND BIT IN THE SENSE FIELD. *
* * THE UPDATED PCAR IS ALSO CHECKED *
* * TO MAKE SURE THE CHAIN WAS *
* * TERMINATED AT THE PROPER POINT. *
*
*****
```

```
*****
* PROGRAM * ROUTINE AND INTENT *
*
* E82 * RTN01 - PRIM. VERT. INDEX IN DIAGNOSTIC *
* * MODE - THIS ROUTINE IS DESIGNED *
* * TO CHECK OUT VITAL CONTROLS IN *
* * THE ATTACHMENT. NO MECHANICAL *
* * MOTION TAKES PLACE AND THE *
* * PRINTER HARDWARE IS NOT CHECKED. *
* * AMONG THE THINGS CHECKED ARE *
* * 1) BUSY COMES ON AFTER THE SIO. *
* * 2) ON PIN FEED MACHINES, SS1 *
* * OVERLAPPED IS MEASURED AND *
* * ADJUSTED IF NECESSARY. NOTE 1 *
* * 3) VERTICAL CYCLE CHECK COMES ON *
* * BECAUSE OF NO MOTION INDICA- *
* * TION FROM THE VERTICAL *
* * EMITTER. *
* * 4) VERTICAL CYCLE CHECK AND THE *
* * DROP OF SINGLE SHOT 1 OR *
* * SINGLE SHOT 1 OVERLAPPED *
* * CAUSE SINGLE SHOT 2 TO BE *
* * TRIGGERRED. *
* * 5) SINGLE SHOT 2 IS MEASURED AND *
* * ADJUSTED IF NECESSARY. NOTE 1 *
* * 6) CHECK THAT BUSY DROPS AFTER *
* * SS2 TIMES OUT. *
* * 7) CHECK THAT PCAR WAS UPDATED *
* * BY 1. *
* * 8) CHECK THAT THE COMMAND BYTE *
* * PLUS 1 IS NOT ALTERED BY *
* * CYCLE STEALING. *
*
*****
* E83 * RTN01 - TAB RIGHT 11 SPACES IN DIAG MODE *
* * THIS ROUTINE IS DESIGNED TO *
* * CHECK THE FOLLOWING. *
* * 1) CHECK THAT SS A KEEPS THE *
* * STEPPER EMITTER PULSE 1 FROM *
* * CHANGING THE STATE OF TR A&B. *
* * 2) CHECK THE CORRECT ADVANCE OF *
* * TR A&B. *
* * 3) CHECK THAT HIGH SPEED COMES *
* * ON BEFORE STEPPER EMITTER 9 *
* * OF THE FIRST PRINT POSITION. *
* * ALSO CHECK THAT HIGH SPEED *
* * GOES DOWN AFTER THE SECOND *
* * CHARACTER. *
* * 4) CHECK THAT COUNT END COMES ON *
* * AT THE DROP OF INTEGRATED *
* * EMITTER AFTER THE TENTH PRINT *
* * POSITION. *
* * 5) CHECK THAT COUNT BYTE *
* * DECREASEMENTS TO FF AT THE TIME *
* * COUNT END COMES ON. *
* * 6) CHECK THE MATRIX COUNTER *
* * OUTPUTS FOR PROPER ADVANCE *
* * WITH RESPECT TO THE PRINT *
* * EMITTER. *
* * 7) CHECK THE NORMAL DECREMENT OF *
* * THE COUNT BYTE. *
* * 8) FORCE A SYNC CHECK BY GIVING *
* * AN EXTRA PRINT EMITTER PULSE *
* * BEFORE DROPPING INTEGRATED *
* * EMITTER. CHECK FOR UNIT CHECK *
* * AND SYNC CHECK IN THE SENSE *
* * STATUS. *
* * 9) CHECK SS W AND ADJUST IF *
* * NECESSARY. NOTE 1 *
* * 10) CHECK SS X AND ADJUST IF *
* * NECESSARY. NOTE 1 *
* * 11) CHECK SS Y AND ADJUST IF *
* * NECESSARY. NOTE 1 *
* * 12) CHECK SS Z AND ADJUST IF *
* * NECESSARY. NOTE 1 *
* * 13) MAKE SURE TRIGGERS A&B ARE *
* * BOTH OFF WHEN SS W COMES ON. *
* * 14) MAKE SURE BUSY DROPS WITH *
* * SS 2. *
*
* * NOTE 1 - TURN ON SENSE SW 17 *
* * TO EXIT ADJUSTMENT *
* * LOOPS. *
*****
* E84 * RTN01 - SKIP IN DIAGNOSTIC MODE WITH A *
* * COUNT OF 3 FOR VPC PRINTERS: IT *
* * CHECKS - *
* * 1) THAT BUSY CAME ON *
* * 2) THE COUNT IS DECREMENTED BY *
* * CYCLE STEALS *
* * 3) FOR UNIT CHECKS *
* * 4) THAT SS 2 AND BUSY DROP AT *
* * THE SAME TIME. *
*****
```

```
*****
* PROGRAM * ROUTINE AND INTENT *
*****
* E85 * RTN01 - TEST AND ADJUST SINGLE SHOT A *
* AND SINGLE SHOT 1. THIS ROUTINE *
* WILL ISSUE A PRINT 1 IN *
* DIAGNOSE * DIAGNOSTIC MODE TO TEST FOR *
* MODE * PROPER TIMING OF SINGLE SHOT A *
* PRINT * AND SINGLE SHOT 1. IT ALSO *
* TEST * PROVIDES A MEANS OF ADJUSTING *
* THESE SINGLE SHOTS WHEN THEY ARE *
* FOUND TO BE OUT OF SPEC. ALSO *
* HORIZONTAL CYCLE CHECK IS FORCED *
* AND CHECKED. NOTE 1 *
*
* RTN02 - PRINT ALL CHARACTERS IN *
* DIAGNOSTIC MODE. *
* THIS ROUTINE IS DESIGNED TO *
* CHECK THE FOLLOWING. *
* 1. MATRIX OUTPUTS FOR EACH *
* CHARACTER OF THE PRINTER. *
* 2. CHECK FOR SINGLE SHOT 3 AND *
* ADJUST IF NECESSARY. (NOTE 1) *
* 3. CHECK FOR ROS CHECKS AND *
* DATA CHECKS. *
* 4. CHECK PDAR UPDATE. *
* 5. CHECK PCAR UPDATE. *
* 6. CHECK THAT COUNT FIELD IS *
* DECREMENTED FROM 00 TO FF. *
* 7. PERIODICALLY CHECK MATRIX *
* COUNTER OUTPUTS. *
* 8. CHECK THAT SINGLE SHOT 2 *
* FIRES TO TURN OFF BUSY. *
*
* RTN03 - FORCE AND CHECK ROS AND DATA *
* CHECKS. THE ROUTINE PRINTS *
* ONE CHARACTER IN DIAGNOSTIC *
* MODE WITHOUT A ONE BIT. THE *
* ONE BIT IS FORCED SO THAT THE *
* RESULT IS AN EVEN PARITY DATA *
* CHARACTER. *
*
* NOTE 1 - TURN ON SENSE SW 17 *
* TO EXIT ADJUSTMENT LOOPS. *
*****
* E86 * RTN01 - TESTS MARGIN CHECK - THIS *
* ROUTINE ISSUES A TAB LEFT 2 *
* IN DIAGNOSTIC MODE. THREE *
* PRINT EMITTERS WILL BE ISSUED *
* TO FORCE MARGIN CHECK. *
* THIS INSURES THAT THE CHECK IS *
* FORCED BY THE THIRD EMITTER. *
*
* RTN02 - PRINT SHORT LINES AND TEST TIO *
* ON LEFT MARGIN. *
* THIS IS THE FIRST PRINTING RTN, *
* 16 LINES OF 20 CHARACTERS ARE *
* PRINTED. ELEMENT RETURN IN *
* COMBINATION WITH PRIMARY INDEX *
* IS USED. TIO CHECKS LEFT MARGIN *
* AND THE TIO COMMAND. *
*
* RTN03 - THIS ROUTINE DOES A SENSE 5 TO *
* TEST THE 13 INCH PRINTER BIT, *
* THE 'NOT VFC' BIT AND THE 'NOT *
* BI-DIRECTIONAL PRINT' BIT. *
* THE RESULTS OF THESE TESTS WILL *
* BE PRINTED BY THE PRINTER SIO *
* ROUTINE. DCP SENSE SWITCHES 3 *
* AND 4 WHICH MAY HAVE BEEN USED *
* TO INHIBIT PRINTING WILL BE *
* TESTED AND IF EITHER OR BOTH ARE *
* ON, ANOTHER PRINTOUT WILL BE *
* PRINTED BY THE SIO SUBROUTINE *
* ADVISING THAT THEY MAY BE TURNED *
* OFF. *
* THE ACTUAL FEATURE SPEED THE *
* PRINTER IS OPERATING AT, IS *
* PRINTED UNDER "PLEASE VERIFY" *
* COMMENTS, AS "CPS PRT. SPEED". *
* IF HI-SPEED IS NOT PRINTED, THEN *
* THE PRINTER SHOULD PRINT "85 CPS *
* PRT. SPEED". *
* IF HI-SPEED IS PRINTED THEN THE *
* PRINTER SHOULD PRINT "115 CPS *
* PRT. SPEED". *
* A CHECK FOR ACTUAL PRINT SPEED *
* CAN BE MADE BY LOOPING RTN 2 OF *
* 'E88' AND RUNNING FOR 1 MINUTE. *
* MOD-2 *
* THE NUMBER OF LINES PRINTED *
* WILL BE APPROXIMATELY '26'. *
* MOD-3 *
* THE NUMBER OF LINES PRINTED *
* WILL BE APPROXIMATELY '36' FOR *
* NOT HI-SPEED, AND APPROXIMATELY *
* '47' FOR HI-SPEED FEATURE. *
*
* RTN04 - FORCE DBO CHECK (PROC CHECK) *
* DBO CHECK IS FORCED BY A *
* CONTROL LIO WITH THE ONE BIT ON. *
* SYSTEM RESET START AFTER THE *
* PROC CHECK WILL ALLOW COMPLETION *
* OF THE ROUTINE. *
*****
* E87 * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT *
* RETURN FOR INITIALIZING. *
*
* STEPPER * RTN02 - THIS ROUTINE PERFORMS A TAB TO *
* MOTOR * POSITION 128 AND MEASURES *
* SPEED * TIME BETWEEN MATRIX 4 PULSES *
* TEST * PULSES FROM POSITION 15 TO *
* POSITION 125. *
*
* RTN03 - THIS ROUTINE PERFORMS A TAB LEFT *
* TO THE FIRST PRINT POSITION AND *
* MEASURES TIME BETWEEN MATRIX 4 *
* PULSES FROM POSITION 114 TO *
* POSITION 4. *
*
* RTN04 - THIS ROUTINE TESTS THE RESULTS *
* OF ROUTINES 2 AND 3. RESULTS ARE *
* THEN PRINTED OR DISPLAYED VIA *
* THE FIELD INDICATOR LIGHTS. *
*****
```

```
*****
* PROGRAM * ROUTINE AND INTENT *
*****
* E88 * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT *
* RETURN FOR INITIALIZING. *
*
* TAB * RTN02 - TAB RIGHT COMMANDS CHAINED. *
* AND * THIS ROUTINE TABS RIGHT 21, 1, 2, 3 *
* MARGIN * 4, 5, 6, 7, 8, 9, 10 AND 54 OR 142 *
* TEST * SPACES. *
*
* RTN05 - THIS ROUTINE TABS RIGHT *
* TO LAST PRINT POSITION AND *
* CHECKS RIGHT MARGIN SWITCH FOR *
* MAKE AFTER MATRIX COUNT 6, *
* POSITION 131/219 AND BEFORE *
* * MATRIX COUNT 2, POSITION 123/220 *
*
* RTN04 - THIS ROUTINE TABS LEFT AND TABS *
* RIGHT ONE POSITION PAST THE LAST *
* PRINT POSITION TO TEST THE RIGHT *
* MARGIN CHECK CIRCUIT. *
*
* RTN05 - TAB LEFT COMMANDS CHAINED. *
* THIS ROUTINE TABS LEFT 17, 1, 2, 3, *
* 4, 5, 6, 7, 8, 9, 10 AND 54 OR 142 *
* SPACES. *
*
* RTN06 - THIS ROUTINE TABS LEFT TO *
* POSITION 3 AND TESTS LEFT *
* MARGIN SWITCH 1 SLOW. *
*
* RTN07 - THIS ROUTINE TABS LEFT *
* TO POSITION 1 AND *
* TESTS LEFT MARGIN SWITCH FOR *
* MAKE AFTER MATRIX COUNT 6 *
* * COUNT 2, POSITION 1. *
*
* RTN08 - THIS ROUTINE TABS RIGHT THEN *
* LEFT ONE POSITION PAST THE FIRST *
* PRINT POSITION TO TEST THE LEFT *
* MARGIN CHECK CIRCUIT. *
*
* RTN09 - THIS ROUTINE PERFORMS A TAB *
* RIGHT 15 AND ELEMENT RETURN FOR *
* INITIALIZING. *
*****
* E89 * RTN01 - THIS ROUTINE PERFORMS THE *
* EMITTER * INITIALIZING ELEMENT RETURN. *
* TIMING * RTN02 - THIS ROUTINE TABS RIGHT 10 *
* POSITIONS AND CHECKS THE MAKE *
* TIME OF THE THIRD EMITTER PULSE *
* IN RELATION TO STEPPER MOTOR *
* ADVANCE PULSES. *
*
* RTN03 - THIS ROUTINE PERFORMS A TAB *
* RIGHT FOR INITIALIZING. *
*
* RTN04 - THIS ROUTINE TABS LEFT FROM *
* POSITION 11 TO 1 AND CHECKS THE *
* MAKE TIME OF THE THIRD EMITTER *
* PULSE IN RELATION TO STEPPER *
* MOTOR ADVANCE PULSES. *
*****
* E8A * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT *
* PRINT * RETURN TO INITIALIZE THE PRINT *
* TEST * ELEMENT. *
*
* RTN02 - THIS ROUTINE PERFORMS AN *
* ELEMENT RETURN, CARRIAGE INDEX *
* AND PRINTS A RIPLE PATTERN IN *
* ALL PRINT POSITIONS. *
*
* RTN03 - THIS ROUTINE PRINTS AN H IN ALL *
* PRINT POSITIONS. *
*
* RTN04 - THIS ROUTINE PRINTS AN E IN ALL *
* PRINT POSITIONS. *
*
* RTN05 - THIS ROUTINE PERFORMS AN ELEMENT *
* RETURN FOR INITIALIZING. *
*
* RTN06 - THIS ROUTINE PRINTS ONE *
* CHARACTER, TABS LEFT AND *
* OVERPRINTS THE CHARACTER. *
*
* RTN07 - THIS ROUTINE PERFORMS CARRIAGE *
* INDEX. *
*
* RTN08 - THIS ROUTINE TABS LEFT *
* ONE POSITION, PRINTS ONE *
* POSITION, TABS LEFT ONE POSITION *
* OVERPRINTS AND TABS LEFT TWO *
* POSITIONS. *
*****
* E8B * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT *
* FORMS * RETURN FOR INITIALIZING. *
* TEST *
*
* RTN02 - THIS ROUTINE PRINTS ALL POSITION *
* WHEN SECONDARY CARRIAGE IS USED, *
* PAPER IN CARRIAGES SHOULD *
* OVERLAP AND THE PRINTED DASH *
* CHARACTERS MUST BE ALIGNED. *
*
* RTN03 - THIS ROUTINE PERFORMS A VARIABLE *
* NUMBER OF INDEXES, PRINTS AND *
* DOES AN ELEMENT RETURN. *
*
* RTN04 - THIS ROUTINE PERFORMS AN ELEMENT *
* RETURN AND INDEX. *
*
* RTN05 - THIS ROUTINE PRINTS 132 POSITION *
* AND PERFORMS AN ELEMENT RETURN. *
*
* RTN06 - THIS ROUTINE PERFORMS VARIABLE *
* LENGTH SKIPS AND CHECKS THAT THE *
* CARRIAGE EMITTER MAKES BETWEEN *
* 20 AND 33 MS AFTER CARRIAGE SKIP *
* COMMAND. *
*****
```



```
*****
* PROGRAM * ROUTINE AND INTENT *
* *****
* EBC * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT*
* * RETURN FOR INITIALIZING. *
* COBINED*
* OPERATION* RTN02 - TAB RIGHT AND PRIMARY FORMS *
* TEST * INDEX. *
* *
* * RTN03 - TAB LEFT AND PRIMARY FORMS INDEX*
* *
* * RTN04 - TAB RIGHT AND SECONDARY FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN05 - TAB LEFT AND SECONDARY FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN06 - TAB RIGHT AND PRI AND SEC FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN07 - TAB LEFT AND PRI AND SEC FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN08 - TAB RIGHT AND PRI FORMS INDEX. *
* *
* * RTN09 - ELEMENT RETURN AND PRIMARY FORMS*
* * INDEX. *
* * RTN10 - TAB RIGHT AND PRIMARY FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN11 - ELEMENT RETURN AND SEC FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN12 - TAB RIGHT AND PRI FORMS INDEX. *
* * (NON-PIN FEED PRINTERS ONLY) *
* *
* * RTN13 - ELEMENT RETURN AND FORMS SKIP. *
* * (NON-PIN FEED PRINTERS ONLY) *
* *
* * RTN14 - TAB RIGHT AND PRIMARY FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *
* * RTN15 - ELEMENT RETURN, FORMS SKIP AND *
* * SECONDARY FORMS INDEX. (MODEL *
* * 2222 PRINTERS ONLY) *
* *
* * RTN16 - FORMS SKIP AND SECONDARY FORMS *
* * INDEX. (MODEL 2222 PRINTERS ONLY) *
* *****
* E8D * RTN01 - THIS ROUTINE PERFORMS AN ELEMENT*
* * RETURN FOR INITIALIZING. *
* PRINT *
* TIMING * RTN02 - THIS ROUTINE PERFORMS A TAB TO *
* GRAPH * THE LAST PRINT POSITION AND *
* RIGHT * MEASURES THE TIME BETWEEN MATRIX*
* * 4 PULSES. FIRST POSITION IS *
* * MEASURED FROM START OF SIO *
* * INSTR. UNTIL MATRIX 4 PULSE. *
* *
* * RTN03 - THIS ROUTINE PRINTS THE RESULTS *
* * IN GRAPH FORM. *
* *****
* E8E * RTN01 - ELEMENT RETURN AND *
* * TAB RIGHT 132 OR 220 POSITIONS *
* * FOR INITIALIZING. *
* PRINT *
* TIMING * RTN02 - THIS ROUTINE PERFORMS A TAB LEFT*
* GRAPH * TO THE FIRST PRINT POSITION AND *
* LEFT * MEASURES TIME BETWEEN MATRIX 4 *
* * PULSES. FIRST POSITION IS *
* * MEASURED FROM START OF SIO *
* * INSTR. UNTIL MATRIX 4 PULSE. *
* *
* * RTN03 - THIS ROUTINE PRINTS THE RESULTS *
* * IN GRAPH FORM. *
* *****
```

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1.1.3 EDITOR INPUT DEVICES.

THE EDITOR (FF6) IS PROGRAMED TO ACCEPT INPUT RECORDS FROM MANY INPUT DEVICES. EACH INPUT RECORD IS BASED ON 96 BYTES. FOR THE FORMAT AND DESCRIPTION OF THE INPUT RECORDS SEE PARAGRAPH 1.1.4 THRU 1.1.9 .

INPUT DEVICE	MODEL USED ON	HOW TO USE
* 5424 (MFCU) *	* 5410 *	* 1. THE MFCU IS THE DEFAULT INPUT DEVICE FOR THE EDITOR, IF THE MFCU IS DEFINED IN THE UDT. *
		* 2. PLACE ALL INPUT RECORDS IN THE PRIMARY HOPPER AND MAKE READY. *
* 5471 *	* 5410 *	* 1. IF THE 5471 IS NOT DEFINED IN THE UDT, THEN TURN ON SENSE SWITCH 17. *
		* 2. IF THE MFCU IS DEFINED IN THE UDT, THEN SET SSW 17 ON. YOU CAN SWITCH BACK TO THE MFCU BY TURNING SSW 17 OFF AT A -E1- HALT. *
		* 3. WHEN THE -PROCEED LIGHT- LIGHTS UP ON THE 5471 THEN TYPE IN A RECORD. WHEN FINISHED WITH THE INPUT RECORD PUSH -ENTER- ON THE 5471. *
		* 4. IF AN TYPING ERROR OCCURS WHILE INPUTTING A RECORD THEN PUSH -CANCEL- OR -RETURN- ON THE 5471 AND RE-TYPE IN THE INPUT RECORD. *
* MODEL 6 CONSOLE *	* 5406 *	* THE CONSOLE IS THE DEFAULT INPUT DEVICE FOR MODEL 6. *
		* 1. WHEN THE -KEYBOARD READY LIGHT- LIGHTS UP ON THE KEYBOARD TYPE IN THE INPUT RECORD. *
		* 2. IF A TYPING ERROR OCCURS WHILE INPUTTING AN INPUT RECORD, THEN PRESS THE -BACKSPACE- KEY AND THEN ENTER THE CORRECT CHARACTER AND CONTINUE. *
		* 3 WHEN FINISHED WITH AN INPUT RECORD PRESS -PROGRAM START-. *
* TAPE CASSETTE *	* 5410 AND 5406 *	* SET SSW 14 ON AND REFER TO PARAGRAPH 1.1.10 FOR MODEL 10, AND PARAGRAPH 1.1.11 FOR MODEL 6 . *
* 1442 80 COLUMN CARD RDR *	* 5410 *	* 1. THE 1442 IS THE DEFAULT INPUT DEVICE, IF THERE IS NO MFCU OR 5471 DEFINED IN THE UDT. SSW 18 CAN BE SET ON IF THE 1442 IS WANTED TO BE USED AS THE INPUT DEVICE WHEN THE MFCU OR 5471 IS DEFINED IN THE UDT. *
		* 2. INPUT RECORDS CAN BE 76 OR 96 BYTES IN LENGTH. IF THE INPUT RECORD IS LESS THAN 77 BYTES THEN USE ONE 80-COLUMN CARD PER RECORD, IF GREATER THAN 76 THEN YOU MUST USE 2 80-COLUMN CARDS PER RECORD. THE FORMAT FOR EACH RECORD IS GIVEN BELOW. *
		* 76-BYTE RECORD: IN COLUMN 1 THRU 76 PLACE THE INPUT DATA AND LEAVE COLUMN 77 BLANK. *
		* 96-BYTE RECORD: IN COLUMN 1 THRU 76 OF CARD 1 PLACE THE FIRST 76 BYTES OF DATA AND IN COLUMN 77 PLACE A 'C'. IN COLUMN 1 THRU 20 OF CARD 2 PLACE THE LAST 20 BYTES (BYTES 77 THRU 96) OF DATA. *
		* 3. PLACE ALL INPUT RECORDS IN THE 1442 FOLLOWED BY TWO BLANK CARDS AND MAKE READY. *

1.1.4 CONTROL CARD RECORDS

\* SINCE PROGRAM FF6 HAS THE CAPABILITY TO PERFORM SEVERAL DIFFERENT FUNCTIONS, THESE FUNCTIONS MUST BE SELECTED BY THE FE AS THEY ARE NEEDED BY THE USE OF CONTROL CARD INPUT RECORDS. THESE RECORDS BECOME PART OF THE INPUT STREAM TO PROGRAM FF6.

1.1.4.1 ADD CONTROL RECORD  
 COLUMN 1 2 3 4 5 THRU END OF RECORD  
 \$ A D D (BLANK)  
 ALL PROGRAM DECKS AND TAP DECKS WILL BE PLACED ON THE CE DISK AFTER THE LAST EXISTING PROGRAM

1.1.4.2 CMP CONTROL RECORD  
 COLUMN 1 2 3 4 5 THRU END OF RECORD  
 \$ C M P (BLANK)  
 THE \$CMP FUNCTION WILL REMOVE ALL DEAD SPACE ON THE DISK PACK. THE \$CMP FUNCTION SHOULD BE RUN WHEN EITHER THE NUMBER OF PROGRAM ENTRIES OR THE SPACE AVAILABLE FOR PROGRAMS APPROACHES ZERO. THE \$LST FUNCTION WILL GIVE YOU THE ABOVE VALUES. AT MOST THERE IS 192 PROGRAM ENTRIES, AND EACH PROGRAM ADDED WILL USE UP ONE OF THESE ENTRIES. EACH PROGRAM ADDED WILL ALSO USE UP APPROXIMATE (THE NUMBER OF BYTES IN THE PROGRAM DIVIDED BY 200) SECTOR(S).

1.1.4.3 DEL CONTROL RECORD  
 COLUMN 1 2 3 4 5 6 7 8 9 10 11 12 THRU END OF RECORD  
 \$ D E L X X X X X X AS MANY GROUPS OF XXX AS NEEDED  
 EACH PROGRAM THAT IS DEFINED BY AN ID XXX WILL BE DELETED FROM THE CE DISK.

1.1.4.4 LST CONTROL RECORD  
 COLUMN 1 2 3 4 5 THRU END OF RECORD  
 \$ L S T (BLANK)  
 THE ID OF EACH DIAGNOSTIC OR UTILITY PROGRAM RESIDING ON THE CE DISK WILL BE PRINTED ON THE SELECTED OUTPUT DEVICE, ALONG WITH ITS PART NUMBER AND EC. THE LAST STATEMENT PRINTED WILL TELL YOU HOW MANY MORE PROGRAM ENTRIES AND PROGRAM SPACE ARE AVAILABLE.  
 NOTE: PROGRAM ID'S CPU TST, FFA, PFB, AND PFF WILL NEVER BE LISTED EVEN THOUGH THEY MAY RESIDE ON THE DISK.

1.1.4.5 DUP CONTROL RECORD  
 COLUMN 1 2 3 4 5 6 7 8 9 10 THRU END OF RECORD  
 \$ D U P S S D D (BLANK)  
 THIS OPTION WILL ALLOW DUPLICATION OF THE CE PACK.  
 SS - SOURCE PACK  
 DD - DESTINATION PACK

```

DRIVE      VALUE FOR SS OR DD
*****
* R1      * X'A8'      *
* P1      * X'A9'      *
* R2      * X'B8'      *
* P2      * X'B9'      *
*****
    
```

1.1.4.6 REP CONTROL RECORD  
 COLUMN 1 2 3 4 5 6 7 8 9 THRU END OF RECORD  
 \$ R E P X X X S (BLANK)      XXX-PROGRAM ID      S-SUFFIX LEVEL OF EC  
 THIS CONTROL RECORD IS THE FIRST ONE OF A SERIES THAT WILL ALLOW ENTRY OF 'REP' RECORDS FOLLOWING IT. COLUMNS 5 6 AND 7 MUST CONTAIN THE PROGRAM ID OF THE PROGRAM TO WHICH THE 'REP' RECORDS WILL BE ADDED. THE TYPE OF RECORDS THAT CAN BE INPUTED ARE:  
 1. R (REPLACE RECORD)  
 2. T (TEXT RECORD)  
 3. SSW (SSW RECORD)  
 4. \* (COMMENT RECORD)  
 5. E (END RECORD)  
 FOR THE FORMAT OF THE ABOVE RECORD SEE BLOCK 10 OF THE USER GUIDE.  
 THE FINAL RECORD MUST CONSIST OF AN 'E' IN COLUMN 1, WHICH TERMINATE THIS FUNCTION.

1.1.4.7 CONFIG CONTROL RECORD  
 COLUMN 1 2 3 4 5 6 7 8 THRU END OF RECORD  
 \$ C O N F I G (BLANK)  
 THIS CONTROL RECORD IS THE FIRST ONE OF A SERIES THAT WILL ALLOW ENTRY OF 'CPU', 'UDT' OR '// CHAIN' RECORDS FOLLOWING IT. AS MANY 'CPU', 'UDT', OR '// CHAIN' RECORDS MAY BE ENTERED. WHEN ALL ENTRIES HAVE BEEN MADE, A FINAL RECORD CONSISTING OF AN 'E' IN COLUMN 1 WILL TERMINATE THIS OPTION

1.1.4.8 /\* CONTROL RECORD  
 COLUMN 1 2 3 4 THRU END OF RECORD  
 /\* (BLANK)  
 THIS CONTROL RECORD WILL CAUSE THIS PROGRAM TO COME TO AN 'E1' HALT. WHEN THIS HALT IS RESET, THE NEXT RECORD WILL BE READ FROM THE INPUT DEVICE.

1.1.4.9 /E CONTROL RECORD  
 COLUMN 1 2 3 4 THRU END OF RECORD  
 /E (BLANK)  
 THIS CONTROL RECORD WILL CAUSE THIS PROGRAM TO TERMINATE OPERATION.

1.1.5 A PROCEDURE FOR GENERATING A CE DIAGNOSTIC DISK CARTRIDGE BY CARDS.

NOTE: THE TERM 'CARDS' AS USED HERE IMPLIES USING THE MFCU AND 96 COLUMN CARDS OR THE 1442 AND 80 COLUMN CARDS, WHICHEVER IS ATTACHED TO THE SYSTEM YOU ARE USING.

1. PLACE CE DISK PACK ON DISK DRIVE 1 AND MAKE THE DRIVE READY. (DISK MUST BE INITIALIZED, IF NOT RUN PROG. FF5)
2. LOAD DCP (PROGRAM FFF) AND DISK EDITOR (PROGRAM FF6) FROM THE CARD INPUT DEVICE.

NOTE: IF LOADING DCP VIA 80 COLUMN CARDS FROM THE 1442, REFERENCE BLOCK 7 FOR ADDITIONAL INSTRUCTIONS REGARDING THE LOADING OF DCP AND PROGRAM FF6. WHEN PROGRAM FF6 IS LOADED AND READY TO USE, TURN ON SENSE SWITCH 18 AND RETURN TO STEP 3 OF PARAGRAPH 1.1.5 OF THIS BLOCK TO CONTINUE ON.

3. SET SENSE SWITCHES 10 AND 12 ON.
4. PLACE THE FOLLOWING CARDS IN THE MFCU PRIMARY HOPPER OR THE 1442 HOPPER AND MAKE IT READY.

```

$ADD            CONTROL CARD
  FFA DECK      IPL LOADER
  FFB DECK      DCP LOADER
  FFF DECK      DCP
  FF6 DECK      EDITOR
  OTHER
  :
  :
  DECKS
$LIST           CONTROL CARD TO LIST PROGRAMS ON DISK
/*              CONTROL CARD ( E1 HALT)
  
```

5. RESET HA AND FO HALTS
6. CARDS WILL BE READ FROM THE CARD INPUT DEVICE AND PLACED ON THE DISK, FOLLOWED BY A LISTING OF THE PROGRAMS ON THE DISK. PROGRAMS FFA, FFB, AND FFF WILL NOT BE LISTED. AN -E1- HALT WILL OCCUR AFTER THE -/\*- CONTROL CARD HAS BEEN READ. NOW YOUR CE PACK IS READY TO BE IPL'ED FROM.

1.1.6 A PROCEDURE FOR ADDING OR RE-ADDING PROGRAMS TO THE CE DISK PACK BY CARDS.

1. PLACE CE DISK PACK ON DISK DRIVE 1 AND MAKE DRIVE READY.
2. LOAD DCP (FFF) AND DISK EDITOR (FF6) FROM DISK.
3. SET SENSE SWITCHES 10 AND 12. ( SELECT R1), --ALSO 18 IF INPUT IS FROM THE 1442.
4. PLACE THE FOLLOWING CONTROL CARD AND YOUR PROGRAM DECKS IN THE CARD HOPPER AND MAKE IT READY.

```

$ADD            CONTROL CARD, MUST BE FIRST
  PROG 1 DECK
  PROG 2 DECK
  :
  :
  PROG N DECK
$CHP            (OPTIONAL) COMPRESS DISK SPACE
$LIST           (OPTIONAL) LIST PROGRAMS ON DISK
/*
  
```

5. RESET HALTS -HA- AND -FO-. CARDS WILL BE READ AND AND PROGRAMS WILL BE PLACED ON DISK, FOLLOWED BY A LISTING OF PROGRAM ON DISK AND A -E1- HALT.

1.1.7 PROCEDURE FOR DELETING PROGRAMS FROM THE CE DISK

BY USE OF THE \$DEL CONTROL CARD, UNWANTED PROGRAMS MAY BE DELETED FROM THE DISK. SEE PARAGRAPH 1.1.4.3 FOR THE FORMAT OF THE \$DEL CONTROL CARD. AS MANY PROGRAM ID'S AS DESIRED, (UP TO THE LIMIT OF THE CAPACITY OF THE CARD), MAY BE ENTERED ON ONE CARD PROVIDED THAT EACH ENTRY IS SEPARATED BY A COMMA (,). ANOTHER METHOD OF MAKING MULTIPLE DELETIONS IS TO USE MULTIPLE \$DEL CONTROL CARDS WITH A NEW CARD USED FOR EACH PROGRAM TO BE DELETED. IF A NEW PROGRAM ID LIST IS DESIRED AFTER ANY OF THE DELETIONS HAVE BEEN MADE, IT MAY BE OBTAINED BY USE OF THE \$LST CONTROL CARD. USE A /\* CONTROL CARD AFTER ALL OTHER \$DEL AND \$LST CONTROL CARDS HAVE BEEN ENTERED. THIS WILL CAUSE PROGRAM FF6 TO COME TO THE 'E1' HALT SO THAT YOU CAN PREPARE FOR THE NEXT FUNCTION YOU WISH TO PERFORM.

1.1.8 PROCEDURE TO ADD REPLACE CARDS TO A PROGRAM RESIDING ON THE CE DISK

ANY PROGRAM RESIDING ON THE CE DISK MAY HAVE REPLACE CARDS ADDED TO IT BY USING THE REQUIRED CONTROL CARDS IN ADDITION TO AS MANY STANDARD REPLACE CARDS AS ARE DESIRED. THE FIRST CONTROL CARD REQUIRED IS A \$REPXXX CARD, WHERE XXX IS THE ID OF THE PROGRAM ON THE DISK THAT YOU WISH TO ADD THE REPLACE CARDS TO. THE SECOND CARD ENTERED IS A REPLACE CARD OF THE STANDARD FORMAT. (SEE THE DCP USER'S GUIDE BLOCK 10 ENTITLED REPLACE CARDS FOR THE FORMAT OF THESE CARDS.) FOLLOW CARD 2 WITH AS MANY REPLACE CARDS AS ARE REQUIRED. AFTER THE LAST REPLACE CARD, ENTER A CARD WITH A 'E' IN COLUMN 1. FOLLOW THIS CARD WITH A /\* CONTROL CARD.

TO REP DCP, USE AN ID OF FFF.

SAMPLE INPUT FOR REP-ING DCP

```

$REPFFF
R ADDR XXXX...
SSW XX,XX,...
* COMMENTS IF WANTED
E
/*
  
```

SAMPLE INPUT FOR REP-ING OTHER PROGRAMS

```

$REPYYY            YYY - PROG ID
R ADDR XXXXX...
* COMMENT IF WANTED
SSW XX,XX,...
E
/*
  
```

1.1.9 PROCEDURE TO CONFIGURE THE DCP RESIDING ON THE DISK

THE SYSTEM CONFIGURATION AS DEFINED IN YOUR DCP BY THE CPU, UDT AND //CHAIN CARDS MAY BE CHANGED BY \$CONFIG CONTROL CARD. FOLLOWING THIS FIRST CONTROL CARD, ENTER AS MANY CARDS AS ARE REQUIRED TO PROPERLY CONFIGURE YOUR DCP. THESE CARDS MAY BE 'CPU', 'UDT' OR '//CHAIN' RECORDS (SEE DCP USER'S GUIDE, BLOCK 10, FOR THE FORMAT). AFTER THE LAST CONFIGURATION CARD, ENTER A CARD WITH AN -E- IN COLUMN 1, AND FOLLOW THIS WITH A /\* CARD.

SAMPLE INPUT TO CONFIGURE DCP

```

$CONFIG
UDT A0,E0,10,...
CPU D,4000
// CHAIN XXXXX...
E
/*
  
```

1.1.10 5410 TAPE CASSETTE INPUT.

BEFORE ATTEMPTING A PACK UPDATE, BE SURE THAT THE SYSTEM IS IN GOOD RUNNING CONDITION. PERFORMING AN UPDATE WITH A MALFUNCTIONING SYSTEM COULD CONCEIVABLY DESTROY YOUR CE PACK.

THE FOLLOWING STEPS DESCRIBE HOW TO UPDATE A CE PACK FROM TAPE CASSETTE.

1. CONNECT THE TAPE READER TO THE TAPE JACK ON BOARD A-A3, TURN THE IDLE CONTROL OVERRIDE ON (5203 ONLY), AND CONNECT THE CE JUMPER TO THE FOLLOWING PINS:  
 SYSTEM WITH A 5203: A-B1M2G10 TO A-A3U4D13  
 SYSTEM WITH A 1403: A-B1P2S07 TO A-A3U4D13
2. INSERT THE CASSETTE 1 SIDE A UP AND REWIND THE TAPE.
3. SET VOLUME CONTROL AT 6 AND MAKE PRINTER READY.
4. INSTALL THE CE PACK TO BE UPDATED ON R1 AND LOAD FP6 (EDITOR). SET SSW 10,12, AND 14 AT THE -FO- HALT.  
 \*\*\* -TAPE UNIT MUST ALWAYS BE IN MOTION MORE THAN 1 SECOND BEFORE STARTING THE CPU- \*\*\*  
 \*\*\* -ALWAYS HAVE THE PRINTER IN START MODE AND NEVER PUSH STOP ON THE PRINTER WHILE LOADING- \*\*\*  
 \*\*\* -THE PRINTER CHAIN SHOULD BE RUNNING CONTINUOUSLY. (ON THE 5203 PRINTER THIS IS DUE TO THE )- \*\*\*  
 \*\*\* (CE IDLE CONTROL OVERRIDE SWITCH BEING ON)- \*\*\*
5. AT THE -13- HALT, START THE TAPE DRIVE, WAIT 2 FULL SECONDS, THEN RESET THE -13- HALT.
6. FROM THIS POINT THE EDITOR WILL LEAD YOU THRU THE UPDATE BY A SERIES OF DIFFERENT HALTS. THE HALTS AND THEIR MEANINGS ARE LISTED BELOW.

IF THE PRINTER OR DISK DRIVE IS EVER WORKING CONTINUOUSLY FOR OVER 15 SEC. TURN THE TAPE UNIT OFF. WHEN THE PRINTER OR DISK DRIVE HAS CLEARLY CEASED OPERATION, PRESS CPU STOP. THEN RESTART THE TAPE READER AND PRESS CPU START.

NCT FOLLOWING THIS PROCEDURE CORRECTLY CAN LEAD TO -10- OR -11- HALTS. SEE THE BELOW PARAGRAPHS FOR PROPER RECOVERY PROCEDURE.

HALTS	MEANING	CE ACTION
* 10 *	* TAPE READ ERROR *	* 1. STOP TAPE DRIVE *
* * *	* CAUSE: BAD RECORD * *	* 2. REWIND TAPE ABOUT 3 TO 4 INCHES SO THAT THE RECORD CAN BE RE-READ. *
* * *	* OR VOLUME TOO HIGH, * *	* REWINDING NOT ENOUGH WILL CAUSE A -11- HALT. *
* * *	* OR VOLUME TOO LOW, * *	* * *
* * *	* OR NOISE IN TAPE GAP, * *	* 3. START THE TAPE DRIVE, WAIT 2 FULL SECONDS, THEN RESET THE -10- OR -11- HALT. *
* * *	* OR NOT WAITING 2 SEC. * *	* * *
* * *	* * * * *	* 4. IF THE ERROR PERSISTS, RE-ADJUST THE VOLUME CONTROL BY INCREMENTS OF 1. IF *
* * *	* * * * *	* THIS DOES NOT CORRECT THE PROBLEM GO TO BLOCK 7 (TAPE DIAGNOSTIC) * *
* * *	* * * * *	* * * * *
* 11 *	* TAPE RECORD SKIP *	* 1. STOP TAPE DRIVE *
* * *	* CAUSE: A TAPE RECORD * *	* 2. GO TO STEP 2 OF THE -10- HALT. *
* * *	* HAS BEEN SKIPPED * *	* * * * *
* * *	* * * * *	* * * * *
* 12 *	* STOP TAPE *	* 1. STOP THE TAPE DRIVE *
* * *	* * * * *	* 2. RESET THE HALT *
* * *	* * * * *	* * * * *
* 13 *	* START TAPE *	* 1. MAKE PRINTER READY- CE IDLE CONTROL OVERRIDE SWITCH ON *
* * *	* * * * *	* 2. START THE TAPE DRIVE- WAIT 2 SECONDS. *
* * *	* * * * *	* 3. RESET THE HALT *
* * *	* * * * *	* * * * *
* E1 *	* END TAPE CASSETTE *	* 1. REMOVE OLD TAPE CASSETTE FROM TAPE DRIVE. *
* * *	* * * * *	* 2. PLACE NEXT TAPE CASSETTE SIDE INTO TAPE DRIVE. *
* * *	* * * * *	* 3. REWIND TAPE CASSETTE. *
* * *	* * * * *	* 5. RESET HALT. *
* * *	* * * * *	* * * * *
* OTHER *	* SEE PARAGRAPH 3 *	* SEE PARAGRAPH 3 *
* HALTS *	* * * * *	* * * * *

6. THE TAPE CASSETTE UPDATE IS COMPLETED WHEN FP6 IS TERMINATED. THIS IS INDICATED BY A -HE- HALT. AT THIS TIME YOU MAY USE THE OTHER INPUT DEVICE AS INPUT TO THE EDITOR BY:
  - A) SYSTEM RESET
  - B) TURN OFF SSW 14
  - C) RESET THE HALT

## 1.1.11 UPDATING A 5406 CE PACK FROM THE TAPE CASSETTE.

BEFORE ATTEMPTING A PACK UPDATE BE SURE THAT THE SYSTEM (ESPECIALLY THE CPU, DISK AND THE PRINTER) ARE IN GOOD RUNNING CONDITION. PERFORMING AN UPDATE WITH A MALFUNCTIONING SYSTEM COULD CONCEIVABLY DESTROY GOOD INFORMATION AND MAKE IT NECESSARY TO RE-WRITE THE CE PACK COMPLETELY.

THE FOLLOWING DESCRIBES HOW TO UPDATE A CE PACK USING A PRERECORDED TAPE CASSETTE.

1. CONNECT THE TAPE READER TO THE CE CONSOLE TAPE JACK, INSERT THE TAPE CASSETTE AND VERIFY THAT IT IS COMPLETELY REWCUND. SET THE READER VOLUME CONTROL AT '6'.
2. INSTALL THE CE PACK TO BE UPDATED ON DISK DRIVE 1 AND LOAD PROGRAM ID PF6.
3. PRESS CPU START AND WHEN THE PRINTER MESSAGE TELLS YOU TO SELECT DISK AND SPINDLE, SET SENSE SWITCHES 10, 12, AND 14 ON.
4. START THE TAPE READER AND OBSERVE WHERE THE TAPE GOES BY THE READ HEAD. AS SOON AS THE LEADER IS PAST THE HEAD AND A FEW INCHES OF TAPE GO BY, PRESS CPU START.
5. AS SOON AS THE FIRST RECORD IS READ, THE FIELD INDICATORS WILL INDICATE HEX 01, AND THEN START INCREMENTING BY ONE AS EACH RECORD IS READ.
6. IF THE UPDATE CONSISTS OF MORE THAN ONE TAPE SIDE, EACH SIDE UNTIL THE LAST WILL STOP WITH A HALT 'E1' AND COMMAND LIGHT 01 WILL COME ON. WHEN THIS HAPPENS, TURN OFF THE TAPE UNIT. IF JUST READING SIDE A, TURN THE CASSETTE OVER TO READ SIDE B. IF JUST READING SIDE B, PROCEED TO SIDE A OF THE NEXT TAPE. RESTART BY POSITIONING THE LEADER PAST THE HEAD, START THE TAPE READER AND PRESS CPU START. THE UPDATE WILL NOW CONTINUE.
7. THE END OF UPDATE IS SIGNALLED BY THE NORMAL DCP SECTION TERMINATE MESSAGE. COMMAND LIGHT 01 WILL ALSO COME ON INDICATING THAT THE TAPE READER SHOULD BE STOPPED.
8. A HALT 'FF' INDICATES A DISK ERROR PERSISTED THROUGH OUT THE ERROR RECOVERY ROUTINE. IF THIS HAPPENS, DEPRESS CPU START AND THE OPERATION WILL BE TRIED AGAIN. CONTINUED 'FF' HALTS INDICATE A SERIOUS DISK PROBLEM. YOUR PACK MUST BE REWRITTEN AND THE TROUBLE CORRECTED.

IF A TAPE READ ERROR OCCURS, A HALT WILL OCCUR AND THE PRINTER WILL PRINT 'TAPE RECORD CHECK'. IF THIS HAPPENS STOP THE TAPE READER AND LOOK AT THE HALT INDICATORS.

A HALT OF 'F55' INDICATES A TAPE READ ERROR. IN THIS CASE, REWIND THE TAPE SLIGHTLY SO THAT THE ERROR RECORD CAN BE RE-READ. GENERALLY, ONLY A SLIGHT PUSH ON THE RE-WIND KEY IS NECESSARY TO DO THIS. START THE TAPE READER AGAIN AND PRESS CPU START. THE FIELD INDICATORS INDICATE THE RECORD NUMBER OF THE LAST TAPE RECORD SUCCESSFULLY READED IF THE RECORD IS READ SUCCESSFULLY, THE FIELD INDICATORS WILL AGAIN START TO INCREMENT. REPEATED 'F55' HALTS INDICATE A MARGINAL TAPE OR READER. READJUST THE VOLUME CONTROL IN INCREMENTS OF 1 ON THE DIAL (TRY GOING HIGHER FIRST) AND REPEAT THIS PROCEDURE. IF THIS DOES NOT WORK, A NEW TAPE MUST BE TRIED.

IF UPON ATTEMPTING TO RECOVER FROM A 'F55' HALT, A 'F85' HALT OCCURS, IT MEANS THAT YOU DID NOT BACKSPACE FAR ENOUGH TO READ THE ERROR RECORD. SIMPLY REWIND A LITTLE FURTHER AND TRY AGAIN.

IF A 'F85' HALT OCCURS WHILE NOT TRYING TO RECOVER FROM FROM AN 'F55' HALT, IT MEANS THAT SOME UNUSUAL I/O CONDITION DELAYED THE PROGRAM SUCH THAT A TAPE RECORD WAS SKIPPED. THE TAPE UNIT IS BY ITS NATURE A REAL TIME DEVICE AND THE GAPS BETWEEN RECORDS ARE SUFFICIENT FOR MOST I/O OPERATIONS TO FINISH. HOWEVER UNUSUAL CONDITIONS MAKE I/C TIME UNPREDICTABLE AND IF IT EXCEEDS THE GAP TIME AN 'F85' HALT WILL OCCUR. IN THIS CASE, SIMPLY STOP THE TAPE UNIT, RE-WIND SLIGHTLY AND TRY AGAIN AS DESCRIBED IN THE ABOVE PARAGRAPHS. A FOLLOWING 'F85' HALT MEANS YOU HAVE NOT BACKSPACED FAR ENOUGH YET.

A 'F85' HALT WILL ALSO OCCUR IF DURING AN UPDATE USING MULTIPLE TAPE SIDES, YOU LOAD TAPE SIDES IN THE WRONG ORDER EACH TIME THE 5213 OR 2222 PRINTER STARTS A LISTING OPERATION OR THE DISK STARTS MOVING PROGRAMS, THERE WILL BE AN INDETERMINATE DELAY UNTIL THE PROGRAM IS READY TO START ACCEPTING DATA AGAIN. A 20 SEC. GAP IS LEFT IN THESE CASES. HOWEVER, THIS WILL SOMETIMES NOT BE LONG ENOUGH SO THE FOLLOWING PROCEDURE MUST BE USED.

IF THE PRINTER OR DISK DRIVE IS EVER WORKING CONTINUOUSLY FOR OVER 15 SEC. TURN THE TAPE UNIT OFF. WHEN THE PRINTER OR DISK DRIVE HAS CLEARLY CEASED OPERATION, PRESS CPU STOP. THEN RESTART THE TAPE READER AND PRESS CPU START.

NOT FOLLOWING THIS PROCEDURE CORRECTLY CAN LEAD TO 'F55' OR 'F85' HALTS. SEE THE ABOVE PARAGRAPHS FOR PROPER RECOVERY PROCEDURE. ONCE AN UPDATE FROM A TAPE CASSETTE HAS BEEN MADE, YOU MUST AGAIN IPL BEFORE ATTEMPTING TO LOAD ANY OTHER PROGRAMS. THIS IS BECAUSE THE TAPE READ ROUTINE HAS OVERLAYED THE DISK LOADER ROUTINE IN STORAGE.





2.4 CONSOLE ADDRESS/DATA SWITCH COMMUNICATIONS

THE ROTARY DATA SWITCHES ARE THE MEANS BY WHICH THE CE CAN COMMUNICATE WITH THE DIAGNOSTICS. ENTRIES ARE MADE AS FOLLOWS--

1. STOP CPU.
2. SET UP ROTARY SWITCHES FOR ONE OF THE FOLLOWING OPTIONS. X'S INDICATE POSITIONS WHICH VARY WITH THE NEED.

	1	2	3	4	
F	0	X	X		- TURN OFF SENSE SWITCH 'XX'. (F008 WOULD TURN OFF SSW 08).
F	1	X	X		- TURN ON SENSE SWITCH 'XX'. (F108 WOULD TURN ON SSW 08).
F	2	X	X		- GO TO ROUTINE 'XX' AFTER CONSOLE ENTRY FINISHED. (F202 WOULD GO TO ROUTINE 2).
E	E	0	0		- TERMINATE THE CURRENT SECTION.
D	X	X	0		- DISK--EXECUTE SECTIONS FOR DEVICE WITH UNIT CODE 'XX'. (DE00 - EXECUTE ALL 5203 PRINTER PROGRAMS)
D	X	X	X		- DISK--EXECUTE SECTION XXX. (DE01 - SECTION E01). (DE01 - EXECUTE SECTION E01)

NOTE - UP TO FOUR DISK INSTRUCTIONS MAY BE ENTERED DURING ONE ENTRY PHASE.

3. DEPRESS CPU START. (SYSTEM RESET FOLLOWED BY START WILL CALL IMMEDIATE ATTENTION TO THE SWITCHES--SEE NOTE BELOW).
4. WHEN DCP RECEIVES CONTROL, IT HALTS WITH 'HF' DISPLAYED. RESET THE HALT TO ENTER THE FIRST OPTION.
5. DCP WILL PERFORM HALT 'HU' OR 'HP'. LOAD THE NEXT OPTION AND RESET THE HALT.
6. REPEAT STEP 5 FOR AS MANY OPTIONS AS DESIRED. ALTERNATING CODES 'HU' AND 'HP' WILL SIGNAL DCP ACCEPTANCE.
7. WHEN DONE, SET LEFTMOST SWITCH TO '0' AND RESET THE HALT.

NOTE - WHEN USING F2XX IN THE SWITCHES TO GO TO A ROUTINE AFTER A SECTION HAS BEGUN, SYSTEM RESET/START SHOULD BE PERFORMED BEFORE MAKING THE ENTRY. (THIS PREVENTS ERRORS FOUND IN ONE ROUTINE FROM BEING DETECTED IN SOME OTHER ROUTINE. IT SHOULD NOT BE PERFORMED IF OTHERWISE SPECIFIED IN THE MAPS.)

2.5 COMMON SENSE SWITCHES

SENSE SWITCHES ARE EQUIVALENT TO 48 TOGGLE SWITCHES NUMBERED HEXADECIMALLY 00-2F. SENSE SWITCHES 00-0F ARE RESERVED FOR STANDARD OPTIONS PROVIDED BY DCP (LISTED BELOW). SENSE SWITCHES 10-2F ARE SIGNIFICANT TO THE PARTICULAR SECTION BEING RUN. INSTRUCTIONS FOR SETTING SENSE SWITCHES ARE CONTAINED IN SECTION 2.4.

SSW NUMBER	ON	OFF (NORMAL)
00	LCOF ON SECTION.	GO TO NEXT SECTION.
01	LCCF ON ROUTINE.	GO TO NEXT ROUTINE.
02	BYPASS MANUAL INTERVENTION ROUTINES.	EXECUTE ALL ROUTINES.
03	BYPASS ERROR PRINTING.	PRINT ERROR MESSAGES.
04	BYPASS NON-ERROR PRINTING.	PRINT NON-ERROR MESSAGES.
05	USE ALTERNATE PRINTER. PRINTER KEYBOARD, IF ATTACHED. OTHERWISE, MFCU.	NORMAL PRINTER.
06	BYPASS ERROR HALTS.	HALT AFTER ERROR.
07	LOAD AND GO. BYPASS COMMENTS AND PROMPTING HALTS.	PROMPTING MODE.
08	USE 5203 RIGHT CARRIAGE.	USE LEFT CARRIAGE.
09	DON'T CLEAR SECTION SENSE SWITCHES AFTER LOADING	CLEAR SECTION SENSE SWITCHES AFTER LOADING
0A-0F	RESERVED	

2.6 CONTROL PROGRAM HALTS.

ALL CONTROL PROGRAM (DCP) HALTS USE THE CHARACTER 'H' AS THE FIRST DIGIT OF THE HALT CODE. THE SECOND DIGIT IDENTIFIES THE CONDITION ACCORDING TO THE FOLLOWING TABLE.

HALT CODES MODEL	CONDITION	ACTION REQUIRED
F05 * H0	INVALID RECORD FOUND WHILE LOADING.	CORRECT INVALID RECORD AND RELOAD.
F15 * H1	A DEVICE CALLED FOR BY THE TEST SECTION WAS NOT DEFINED IN THE UDT CARDS.	CHECK UDT CARDS AND RELOAD OR RESET HALT TO BYPASS THE ERROR (ERRORS COULD RESULT).
F25 * H2	DATA SWITCH ENTRY ERROR.	CORRECT DATA SWITCHES AND RESET HALT.
F35 * H3	INVALID ROUTINE PREFIX FOUND DURING CHAINING FROM ONE ROUTINE TO NEXT.	ENTER ROUTINE SELECT OPTION 'F2XX' IN DATA SWITCHES AND RESET HALT. IF THIS DOES NOT WORK, RELOAD SECTION.
F55 * H5	MFCU NOT READY OR ERROR. ERROR INDICATION SHOULD BE DISPLAYED IN THE MFCU LIGHTS.	DO A NON-PROCESS RUN-OUT, RELOAD DECK STARTING WITH RUNOUT CARD/S AND RESET THE HALT.
F65 * H6	PRINTER NOT READY OR ERROR.	CLEAR CONDITION AND RESET THE HALT. IF FAILURE PERSISTS, RUN PRINTER FUNCTION TEST. SENSE SWITCHES 03 AND 04 MAY BE USED TO BYPASS PRINTING. SET SENSE SWITCH 05 TO USE ALTERNATE PRINTER.
F75 * H7	DISK ERROR.	RESET HALT TO RETRY. IF ERROR PERSISTS, RELOAD.
FA5 * HA	CONTROL PROGRAM IS PREPARED TO RECEIVE DATA SWITCH ENTRY. OCCURS AFTER DCP AND SECTION LOADING.	RESET THE HALT IF NO ENTRY DESIRED. TO LOAD OPTIONS, SET UP DATA SWITCHES AND RESET THE HALT. SSW 07 MAY BE USED TO BYPASS THIS HALT.
FC5 * HC	DISK LOADER REQUIRES SPECIFICATION OF SECTIONS TO BE LOADED FROM DISK.	IF NO ENTRY HAS BEEN MADE PREVIOUSLY, LOAD PROGRAM SELECTION ENTRY 'DXXX' AND RESET THE HALT. UP TO EIGHT ENTRIES MAY BE MADE. IF ENTRIES HAVE EVER BEEN MADE, THE PROGRAMS MAY BE REPEATED BY RESETTING THE HALT.
FD5 * HD	SECTION RUNNING OR LOAD TABLE HAS SPECIFIED NEXT SECTION TO BE RUN. ARR CONTAINS -DXXX- WHERE XXX IS THE PROGRAM ID TO BE RUN.	DISK SYSTEM - DXXX IS NOT ON DISK PACK, RESET THE HALT AND THE NEXT PROGRAM IN THE LOAD TABLE WILL BE LOADED. CARD SYSTEM - PLACE DECK XXX IN THE MFCU HOPPER AND RESET THE HALT.
FE5 * HE	CURRENT SECTION TERMINATED.	RESET HALT TO LOAD NEXT SECTION. SECTION MAY BE RESTARTED BY SYSTEM RESET/START.
FF5 * HF	DCP HALTS WITH 'HF' DISPLAYED WHENEVER A VALID DATA SWITCH ENTRY IS RECOGNIZED. AS DCP ACCEPTS ENTRIES, ALTERNATING HALTS 'HU' AND 'HP' OCCUR.	LOAD A VALID DATA SWITCH ENTRY AND RESET THE HALT. REPEAT FOR ALTERNATING HALTS 'HU' AND 'HP'. TO TERMINATE ENTRY PROCEDURE, ROTATE LEFT-MOST SWITCH TO ZERO AND RESET HALT.
D1 * D1	IPL LOADER CAN'T LOAD DCP BECAUSE OF A DISK ERROR.	RESET HALT TO RETRY. IF HALT PERSISTS, GET A NEW DISK PACK.

3. INDEX TABLE FOR HALTS AND PRINTOUTS

3.1 ERROR HALTS

* INDEX * * NUMBER * * 'XX' *	MEANING OF HALT	* SECTION * * WHERE * * USED *
9C	ERROR OCCURRED WHILE DOING A WRITE ID COMMAND.	FF5
E0	A CONTROL CARD RECORD IS MISSING. (SEE PARAGRAPH 1.1.4.) CORRECT ERROR AND RESET HALT.	FF6
E1	THE EDITOR HAS REACHED AN /* RECORD. RESET THE HALT AND THE EDITOR WILL CONTINUE OPERATING.	FF6
E2	THE PREVIOUS CONTROL CARD RECORD ENTERED IS INVALID. ENTER ANY OF THE CONTROL CARDS DESCRIBED IN SECTION 1.1.4 AND RESET HALT	FF6
E3	THE INPUT DECK IS OUT OF SEQUENCE. CLEAR CARD INPUT DEVICE AND BEGIN WITH THE CARD NUMBER SPECIFIED IN THE PRINTOUT AND RESET HALT.	FF6
E4	THE PROGRAM ID IN COLUMNS 89-92 OF THE INPUT DECK DOES NOT AGREE WITH THE ID FOUND IN PREVIOUS CARDS OF THIS INPUT DECK. CORRECT AND BEGIN WITH THE CARD NUMBER THAT WAS PREVIOUSLY IN ERROR AND RESET HALT.	FF6
E5	AN ERROR OCCURRED WHILE THE EDITOR WAS DETERMINING THE PROGRAM TYPE JUST READ IN. START OVER FROM LAST HEADER CARD AND RESET HALT.	FF6
E6	THERE IS NOT ENOUGH SPACE LEFT ON THE CE CARTRIDGE TO ADD THE PROGRAM JUST READ IN. RUN THE \$CMP FUNCTION AND THEN \$ADD THE LAST PROGRAM.	FF6
E7	IN THE DUPLICATE DISK ROUTINE, THE ENTRY TO DEFINE THE READ SPINDLE IS INVALID. CORRECT THE \$DUP RECORD AND RESET HALT.	FF6
E8	IN THE DUPLICATE DISK ROUTINE, THE ENTRY TO DEFINE THE READ DISK IS INVALID. CORRECT THE \$DUP RECORD AND RESET HALT.	FF6
E9	IN THE DUPLICATE DISK ROUTINE, THE ENTRY TO DEFINE THE WRITE SPINDLE IS INVALID. CORRECT THE \$DUP RECORD AND RESET HALT	FF6
EA	IN THE DUPLICATE DISK ROUTINE, THE ENTRY TO DEFINE THE WRITE DISK IS INVALID. CORRECT THE \$DUP RECORD AND RESET HALT.	FF6
EC	THE CARD INPUT DEVICE IS EMPTY OR HAD AN ERROR. CORRECT ERROR AND RESET HALT.	FF6
EE	THERE WAS A SCAN ERROR IN THE REP CARD ROUTINE. START OVER FROM THE \$REP RECORD.	FF6
EF	A RECALIBRATE AND SEEK FAILED EACH TIME IT WAS ATTEMPTED RESET HALT TO RETRY. IF ERROR PERSIST RUN DISK DIAGNOSTICS.	FF5
F1	NO SENSE SWITCH HAS BEEN SET TO SPECIFY THE DISK (FIXED OR REMOVABLE), TO BE USED WHILE RUNNING. SET 10 TO SPECIFY REMOVABLE, 11 TO SPECIFY FIXED.	FF5 FF6
F2	NO SENSE SWITCH HAS BEEN SET TO SPECIFY THE DISK NUMBER OR SPINDLE TO BE USED WHILE RUNNING. SET 12 TO SPECIFY DISK 1, (SPINDLE A), OR 13 TO SPECIFY DISK 2, (SPINDLE B).	FF5 FF6
F4	AN ERROR HAS BEEN DETECTED IN THE ALTERNATE TRACK ASSIGNMENT. THIS DISK MUST BE INITIALIZED AGAIN.	FF5
F5	THERE ARE NO ALTERNATE TRACKS LEFT TO USE IN PLACE OF DEFECTIVE ONES.	FF5
F6	AN ERROR HAS OCCURRED WHILE DOING A 'READ ID' ON A DEFECTIVE TRACK	FF5
F7	AN EQUIPMENT CHECK OCCURRED WHILE SEEKING	FF5
F9	THE ACCESS MECHANISM DID NOT SEEK TO THE CORRECT CYLINDER PRIOR TO WRITING THE CYLINDER ID ON THE REMOVABLE DISK	FF5
FA	ERROR OCCURRED WHILE DOING A VERIFY DATA COMMAND ON THE CE TRACK.	FF5
FC	AN ERROR OCCURRED WHILE PROCESSING A 'REP' ENTRY. COLUMNS 2 AND 7 MUST BE BLANK. CORRECT THE ENTRY AND RESET THE HALT TO CONTINUE.	FF6
FE	INTERVENTION REQUIRED, MAKE DISK READY AND RESET HALT.	FF6
FF	UNRECOVERABLE DISK ERROR, RESET HALT TO TRY AGAIN. IF ERROR PERSISTS RUN DISK DIAGNOSTICS.	FF6



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1. PROGRAM SUMMARY

1.1 PURPOSE - THE PURPOSE OF THIS PROGRAM IS TO PROVIDE A COMPLETE EXERCISER FOR THE 2265 CRT AND ATTACHMENT, AND TO DETECT ERRORS IF THEY SHOULD OCCUR.  
DIAGNOSTIC INFORMATION WILL BE PROVIDED WHEN THE CAPABILITY EXISTS. INTERFACE WITH THE 2265 CRT MAPS IS PROVIDED BY THE CODED PROGRAM HALTS AND ERROR PRINTOUT.

2. OPERATING PROCEDURES

2.1 LOADING - NORMAL

THE PROGRAM IS LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (D901) SEE BLOCK 01.

2.2 RUNNING

OPERATE START. AFTER TERMINATE MESSAGE IS PRINTED MAKE FURTHER PROGRAM SELECTIONS OR OPERATE START IF OTHER SELECTIONS HAVE BEEN MADE.

THIS DIAGNOSTIC DISPLAYS AND PRINTS THE SYSTEM/3 64-CHARACTER SET SO THAT THE CRT OUTPUT MAY BE COMPARED TO THE PRINTER OUTPUT. WORLD TRADE NOTE: THE FOLLOW FOUR BIT CODES- 001010, 011011, 111011, AND 111100, MAY CREATE DISCREPANCIES BY BEING DISPLAYED ON THE CRT AS %, \$, \*, AND @ RESPECTIVELY AND TRANSLATED BY THE PRINTER TO VARIOUS OTHER WORLD TRADE SYMBOLS).

2.3 SENSE SWITCH OPTIONS

1) NORMAL DCP SENSW SWITCH CONTROL IS AVAILABLE.

3. INDEX OF PROGRAM HALTS

REFER TO 2265 CRT ATTACHMENT MAPS FOR A COMPLETE HALT LISTING.

4. PROGRAM CONTENT

PROGRAM	ROUTINE AND INTENT
901	RTN01 - READY TEST THIS ROUTINE DOES A TIO TO INSURE THAT THE 2265 IS READY
	RTN02 - SET/RESET OF CRT LSR THIS ROUTINE DOES A LOAD TO THE CRT LSR WITH NO BITS AND THEN SENSES THE LSR AND CHECKS. THIS IS THEN REPEATED WITH ALL BITS ON.
	RTN03 - SENSE TO INSURE 2265
	RTN04 - VERIFICATION OF DATA PATH. THIS ROUTINE ISSUES 256 HALT COMMANDS WITH THE IR BYTE CHANGING FROM 00 TO FF. THE DATA IS SET IN THE D-REG. A SUBSEQUENT SENSE OF THE ATTACHMENT WILL READ THE BYTE AND COMPARE IT WITH THE IR BYTE OF THE HALT COMMAND. THE 2ND BYTE OF SENSE SHOULD BE 00.
	RTN05 - SET/RESET OF WRITE LATCH THIS ROUTINE HAS THE FOLLOWING SEQUENCE HALT - SHOULD INSURE WRITE LATCH OFF AND THEREFORE NOT BUSY. SNS -- INSURE WRITE LATCH OFF TIO -- INSURE NOT BUSY WRITE- SHOULD SET WRITE LATCH AND THEREFORE TEST NOT BUSY. SNS -- INSURE WRITE LATCH ON TIO -- INSURE BUSY HALT - SHOULD RESET WRITE LATCH AND THEREFORE TEST NOT BUSY. SNS -- INSURE WRITE LATCH OFF TIO -- INSURE NOT BUSY
	RTN06 - A LIO SHOULD ISSUR 'RESET DISPLAY' TO THE 2265 FOR 192 MACHINE CYCLES
	RTN07 - RISE AND FALL OF CYCLE STEAL REQUEST (STATUS BIT 3) AND CYCLE STEAL ACKNOWLEDGED. (STATUS BIT 7). GIVEN EB-1 OF AN ATTACHMENT SENSE COMMAND FALLS IMMEDIATELY BEFORE AN I/D CYCLE. CYCLE STEAL REQUEST SHOULD BE ON. IF THE EB-1 CYCLE FALLS IMMEDIATELY AFTER AN I/D CYCLE CYCLE STEAL ACKNOWLEDGED SHOULD BE ON.
	RTN08 - +1 MODIFICATION WITH NO CURSOR. 1) SIO - HALT 2) PREPARE OUTPUT W/O CURSOR 3) LIO - 0C01 4) PAUSE 5) SIO - WRITE 6) 4 SENSE CMDS 7) SIO - HALT 8) CHECK RESULTS OF 4 SENSES. SHOULD BE 0C02 0C03 0C04 0C04.
	RTN09 - +1 MODIFICATION WITH CURSORS. 1) SIO - HALT 2) PREPARE OUTPUT WITH CURSORS. 3) LIO - 0C01 4) PAUSE 5) SIO - WRITE 6) 5 SENSE CMDS 7) SIO - HALT 8) CK RESULTS OF SENSES. SHOULD BE )C)@ )C) # )C) # )C) \$ )C) \$.
	RTNOA - UNIT CHECK TEST 256 DIFFERENT BYTES (00 TO FF) ARE WRITTEN AS DATA TO INSURE THAT NONE RESULT IN UNIT CHECK AND THAT THE SAME BYTE RETURNS VIA DBI IN LEFT BYTE OF SENSE. 1) SET DATA BYTE TO ZERO 2) SIO - HALT 3) MOVE DATA BYTE TO 0C01 - OUT 4) LIO - 0C01 5) PAUSE 6) SIO - WRITE 7) SNS ATTACHMENT 8) SIO - HALT 9) INSURE UNIT CHECK OFF 10) INSURE LEFT BYTE OF SNS DATA 11) INCREMENT DATA BYTE 12) BR TO STEP 3 UNTIL DATA BYTE EQUAL 00.
	RTNOB - LIO RESET DELAY 1) SIO - HALT 2) LIO - 0C01 3) SIO - WRITE 4) SNS LSR.. SHOULD'N'T CHANGE FOR 192 MACHINE CYCLES 5) SNS LSR.. SHOULD BE UPDATED TO 0C02 6) SIO - HALT
	RTNOC - CHECKING OF STEP DISPLAY AND START CHAR. GEN. 1) SIO - HALT 2) PREPARE OUTPUT STEP DISP STR CHAR GEN DATA W/O CURSORS. (BIT-2) (BIT-1) (OF STATUS) (OF STATUS) 3) LIO - 0C01 4) PAUSE 5) SNS -1 AND CHECK. OFF OFF 6) SIO - WRITE 7) SNS -2 OFF ON 8) SNS -3 ON OFF 9) SNS -4 ON OFF 10) SNS -5 OFF OFF 11) SNS -6 OFF ON 12) SIO - HALT 13) CK SNS 2 THRU 6
	RTNOD - 65 STEP 1) PREPARE DATA BYTES WITH NO CURSORS 2) SIO - HALT 3) LIO - 0C7F 4) SNS 1 AND CK. STEP DISP SHOULD BE DOWN 5) SIO - WRITE 6) SNS 2 STEP DISP SHOULD BE DOWN 7) SNS 3 STEP DISP SHOULD BE UP 8) SNS 4 STEP DISP SHOULD BE UP FOR 65 STEP. 9) SNS 5 STEP DISP SHOULD HAVE BEEN RESET 10) SIO - HALT 11) CHECK SNS 2, 3, 4, 5.
	RTNOE - END OF LINE RETRACE DELAY AT END OF A LINE, (ADDR=XXXX XXXX XX00 0001) RETRACE LATCH SHOULD COME ON AND THERE SHOULD BE NO I/O CYCLES FOR 192 MACHINE CYCLES. 1) SIO - HALT 2) LIO - 0C40 3) PAUSE 4) WRITE 5) SNS LSR SHOULD BE 0CB1 FOR 192 MACHINE CYCLES 6) REPEAT STEP 5 FOR 192 MACHINE CYCLES 7) SNS LSR SHOULD NOW BE 0CB2

```
*****  
* PROGRAM ROUTINE AND INTENT *  
*****  
* 901 RTNOF - RESTORE TEST *  
* *  
* START ADDRESS OF OUTPUT FIELD *  
* IS RESTRICTED TO XXXX XXXX 0000 *  
* 0001. WHEN THIS ADDR HAS BEEN *  
* INCREMENTED BY 960 (03C0 HEX) *  
* THE ATTACHMENT SHOULD RESTORE *  
* THE LSR TO IT'S ORIGINAL VALUE. *  
* (SUBTRACTING 960) *  
* *  
* A) SET - UP *  
* 1) BUILD OUTPUT DATA WITH NO *  
* CURSORS. *  
* 2) XR1=ADDRESS OF LABEL PLUS *  
* 1 FOR INDEXING. *  
* B) RESTORE WITH LIO=0C01. *  
* (SHOULD RESTORE TO 0C01 WHEN *  
* ADDR=0FC1) *  
* 1) SIO - HALT *  
* 2) LIO - 0C01 *  
* 3) PAUSE *  
* 4) SIO - WRITE *  
* 5) LOOP UNTIL LSR = 0FBF *  
* 6) BR (NO-OP) *  
* 7) SNS LSR *  
* 8) SIO - HALT *  
* 9) CHECK SNS *  
* C) RESTORE WITH LIO = 0B01 *  
* (SHOULD RESTORE TO 0B01 WHEN *  
* ADDR = 0FC1). *  
* SAME AS B, EXCEPT LIO = 0B01 *  
* AND LOOP LOOKS FOR 0EBF OR *  
* HIGHER. *  
* D) RESTORE WITH LIO = 0A01. *  
* (SHOULD RESTORE TO 0A01 WHEN *  
* ADDR = 0DC1). *  
* SAME AS B, EXCEPT LIO = 0A01 *  
* AND LOOP LOOKS FOR 0DBF OR *  
* HIGHER. *  
* E) RESTORE WITH LIO = 0901. *  
* (SHOULD RESTORE TO 0901 WHEN *  
* ADDR - 0CC1). *  
* SAME AS B, EXCEPT LIO = 0901 *  
* AND LOOP LOOKS FOR 0CBF OR *  
* HIGHER. *  
* *  
* RTN10 - RESTORE: DELAY AND RESET *  
* *  
* 1) BUILD OUTPUT DATA WITH *  
* CURSORS *  
* 2) XR1=ADDRESS OF LABEL 'PLUS 1' *  
* FOR INDEXING *  
* 3) SIO - HALT *  
* 4) LIO - 0C01 *  
* 5) PAUSE *  
* 6) SIO - WRITE *  
* 7) LOOP UNTIL LSR = 0FBF OR *  
* HIGHER *  
* 8) BR (NO-OP) *  
* 9) SNS LSR ... SHOULD BE RE- *  
* STORED TO 0C01 *  
* 10) SNS ATT ... DISPLAY RESET *  
* SHOULD BE UP. *  
* 11) REPEAT STEPS 9 AND 10 FOR *  
* APPROX 190 MACH CYCLES *  
* 12) SNS ATT ... DISPLAY RESET *  
* SHOULD BE DOWN. *  
* 13) SNS LSR ... SHOULD BE 0C02 *  
* NOW. *  
* 14) SIO - HALT *  
* *  
* RTN11 - DISPLAY ALL CHARACTERS WITH *  
* CURSORS. *  
* *  
* NOT RUN IF SSW 0 IS ON. *  
* *  
* 1) PREPARE 15 IDENTICAL LINES *  
* OF OUTPUT EACH LINE CONTAIN- *  
* ING THE 64 DIFFERENT CHAR- *  
* ACTERS OF THE SET. ALL WITH *  
* CURSORS. *  
* 2) LIO - 0C01 *  
* 3) PAUSE *  
* 4) SIO - WRITE *  
* 5) ENABLE KBD INTERRUPTS. *  
* 6) PRINT MESSAGES *  
* A) 'DISPLAY SHOULD BE 15 *  
* IDENTICAL LINES WITH *  
* CURSORS' *  
* B) 'ABCDEFG...ETC' *  
* C) 'KBD INQUIRY REQUEST WILL *  
* HOLD PATTERN AND PERMIT *  
* MODIFICATION' *  
* D) 'COMMAND KEY 1 ADDS *  
* CURSORS' *  
* E) 'COMMAND KEY 2 DELETES *  
* CURSORS' *  
* F) 'ALPHANUMERICS WILL CHANGE *  
* PATTERN' *  
* G) 'DEPRESS TAB FOR EXIT' *  
* 7) TIME-OUT, UNLESS INQUIRY *  
* REQUEST OCCURS. *  
* 8) DISABLE KBD INTERRUPTS *  
* 9) SIO - HALT *  
*****
```



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## 1. PROGRAM SUMMARY

1.1 PURPOSE - THE PURPOSE OF THIS PROGRAM IS TO PROVIDE A COMPLETE EXERCISER FOR THE DATA RECORDER ATTACHMENT AND THE ON-LINE PORTION OF THE 5496, AND TO DETECT ERRORS IF THEY OCCUR.

NORMALLY ERROR INDICATIONS WILL BE ERROR HALT PRINTOUTS, PROCESS CHECKS OR PHYSICAL ERRORS AS DESCRIBED IN THE DATA RECORDER ATTACHMENT MAP GROUND RULES. DIAGNOSTIC INFORMATION WILL BE PROVIDED WHEN THE CAPABILITY EXISTS. INTERFACE WITH THE DATA RECORDER ATTACHMENT MAPS IS PROVIDED BY THE ABOVE INDICATIONS.

## 2. OPERATING PROCEDURES

2.1 LOADING - THE PROGRAM IS LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (DF81) DESCRIBED IN BLOCK 01.

2.2 RUNNING - ENTER MAPS AT MAIN ENTRY. READ MAP GROUND RULES. ALWAYS PERFORM AN IPL AND FOLLOW MAP FLOW IN CONJUNCTION WITH THE PRONTOUT MESSAGES AS THEY OCCUR. IF ERROR MESSAGES OR HALTS EXIST, REFER TO THE DATA RECORDER MAP CHARTS. AFTER TERMINATE MESSAGE IS PRINTED, MAKE FURTHER PROGRAM SELECTIONS OR OPERATE START IF OTHER SELECTIONS HAVE BEEN MADE.

IF SENSE SWITCH 07 IS ON PROGRAM CHAINING IS AUTOMATIC FOR ALL PROGRAMS SELECTED.

NOTE: WHEN RUNNING THIS TEST THE AUTO REC REL. SWITCH, (LOCATED ON DATA RECORDER), MUST BE IN THE UP POSITION.

## 2.3 SENSE SWITCH OPTIONS

- 1) NORMAL DCP SENSE SWITCH CONTROL IS AVAILABLE.
- 2) SENSE SWITCH 10 WILL SHORT LOOP SIO ROUTINE.
- 3) SENSE SWITCH 11 WILL LOOP ENTIRE SIO ROUTINE.

## 3. INDEX OF PROGRAM HALTS

REFER TO DATA RECORDER ATTACHMENT MAPS FOR A COMPLETE HALT LISTING.

## 4. PROGRAM CONTENT

```

*****
* PROGRAM I ROUTINE AND INTENT
* I
*****
* F81 I RTN01 - TEST I/O AND BRANCH NOT READY (TO READY DEVICE) BRANCH CONDITION IS AN ERROR.
* I
* I RTN02 - TEST I/O AND BRANCH BUSY (TO NOT BUSY DEVICE) BRANCH CONDITION IS AN ERROR.
* I
* I RTN03 - SENSE I/O (STATUS).
* I
* I RTN04 - TEST I/O AND BRANCH NOT READY (TO NOT READY DEVICE) BRANCH IS CORRECT OPERATION.
* I
* I RTN05 - LOAD I/O AND SNS I/O LSR CHECKS THE ABILITY TO LOAD AND SENSE VARIOUS BIT PATTERNS
* I TO THE PPAR.
* I
* I RTN06 - DIAGNOSTIC SIO AND SENSE STATUS CHECKS THE ABILITY OF THE 5496 ATTACHMENT TO
* I RECOGNIZE A CARD CD, D, C. ALSO CHECKS THE DATA PATH BETWEEN THE ATTACHMENT AND THE
* I 5496. PICKED OR DROPPED BITS WILL CAUSE A COMPARE ERROR.
* I
* I RTN07 - DUMMY ROUTINE - THIS ROUTINE WILL TRANSMIT TO THE 5496 ATTACHMENT ALL 64 POSSIBLE
* I BYTES USABLE BY THE 5496. EACH BYTE WILL BE SENT TO AND THROUGH THE 5496 ATTACHMENT
* I USING THE DIAGNOSTIC SIO AND SENSE STATUS COMMANDS. THE DATA WRITTEN AND THE DATA
* I READ BACK WILL BE COMPARED TO INSURE THAT THE DATA PATH AND TRANSLATOR HANDLED IT
* I CORRECTLY.
* I
* I RTN08 - DIAGNOSTIC CYCLE STEAL.
* I 1) CHECK THE ABILITY OF THE 5496 ATTACHMENT TO PROPERLY UPDATE THE PPAR DURING A
* I CYCLE STEAL.
* I 2) CHECK FOR PROPER DATA TRANSFER.
* I
* I RTN09 - THIS ROUTINE CHECKS THE ABILITY OF THE 5496 ATTACHMENT TO PROPERLY RAISE BUSY FOR
* I BOTH READ AND PUNCH OPS.
* I
* I RTNOA - RIPPLE PUNCH TEST - THIS ROUTINE WILL GENERATE A RIPPLE DECK OF 4 CARDS THAT WILL BE
* I READ BY THE RIPPLE REA TEST, ALL ERROR CONDITIONS WILL BE TESTED DURING THIS ROUTINE.
* I
* I RTNOB - RIPPLE READ - THIS ROUTINE WILL READ AND COMPARE THE CARDS PUNCHED BY ROUTINE OA.
* I
* I RTNOC - TEST I/O AND BRANCH UNIT CHECK - CHECK THE ABILITY OF THE ATTACHMENT TO DETECT A UNIT
* I CHECK FOR THE FOLLOWING CONDITIONS:
* I 1) HOPPER JAM OR HOPPER EMPTY.
* I 2) STACKER JAM.
* I 3) TRANSPORT JAM.
* I THIS ROUTINE REQUIRES MANUAL INTERVENTION.
* I
*****

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DIAGNOSTIC USER'S GUIDE  
TAPE LOADER DIAGNOSTIC PROGRAM

BLOCK 63 PAGE 002  
02 PAGES 05/23/72

PREV EC 571540 PRES EC 571621 P/N 5133880

1. PURPOSE

- 1.1 THE PURPOSE OF THIS PROGRAM (ID 381) IS TO VERIFY THAT THE TAPE READ CIRCUITRY IS FUNCTIONING PROPERLY, TO CHECK THAT THE SINGLE SHOT IS ADJUSTED PROPERLY AND TO PROVIDE AN ADJUSTMENT PROCEDURE IF IT IS NOT.

2. PROCEDURE

- 2.1 TO USE THIS PROGRAM, IT MUST FIRST BE LOADED INTO STORAGE FROM THE FILE. THEN, PRESS CPU START AND FOLLOW THE INSTRUCTIONS WHICH WILL BE PRINTED OUT ON THE PRINTER.
- 2.2 TO RUN THIS PROGRAM A GOOD TAPE (PN 5133646 SIDE A) MUST BE LOADED INTO THE APLD. THE APLD MUST BE CONNECTED TO THE CPU AS IF A DIAGNOSTIC PROGRAM WERE TO BE READ IN.
- 2.3 THE ONLY HALT WHICH OCCURS IN THIS PROGRAM IS A HEX D0 HALT (AB D ). THIS HALT OCCURS ONLY AT THE END OF PRINTED INSTRUCTIONS. THE INSTRUCTIONS WILL TELL HOW THE HALT SHOULD BE RESET.

3. DESCRIPTION

- 3.1 THE FIRST PART OF THIS PROGRAM MEASURES THE SINGLE SHOT OUTPUT. IF IT IS NOT WITHIN APPROXIMATELY 10 MICRO-SECONDS OF THE NOMINAL VALUE (500 MICRO-SECONDS) A MESSAGE IS PRINTED OUT WHICH DIRECTS YOU HOW TO ADJUST THE SINGLE SHOT USING THE FIELD INDICATORS AS AN INDICATING DEVICE.
- 3.2 WHEN THE SINGLE SHOT ADJUSTMENT IS OKAY, A MESSAGE WILL DIRECT YOU TO REWIND THE TAPE AND START READING IT AGAIN. CORRECT OPERATION IS INDICATED BY THE FIELD INDICATORS GOING THROUGH A SEQUENCE OF CHANGES AS DIRECTED BY THE PRINTER MESSAGE.
- 3.3 NOTE THAT THIS PROGRAM IS TERMINATED BY PRESSING PROGRAM LOAD. THIS IS NECESSARY SINCE THE PROGRAM WILL DESTROY THE NORMAL DISK LOADER WHICH RESIDES IN LOW CORE. PROGRAM LOAD WILL RE-INITIATE THE DISK LOADER SO THAT MORE PROGRAMS CAN BE LOADED.

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1. PROGRAM SUMMARY

1.1 PURPOSE - THE PURPOSE OF THESE PROGRAMS IS TO PROVIDE AN EXERCISER FOR THE 129 DATA RECORDER AND ON-LINE ATTACHMENT, AND TO DETECT ERRORS IF THEY OCCUR.

NORMALLY ERROR INDICATIONS WILL BE ERROR HALT PRINTOUTS, PROCESS CHECKS, OR PHYSICAL ERRORS AS DESCRIBED IN THE 129 DATA RECORDER ATTACHMENT MAP GROUND RULES.

DIAGNOSTIC INFORMATION WILL BE PROVIDED WHEN THE CAPABILITY EXISTS. INTERFACE WITH THE 129 DATA RECORDER ATTACHMENT MAP IS PROVIDED BY THE ABOVE INDICATIONS.

1.2 DEVICE TESTS AND OPTIONS

1.2.1 DEVICE TESTS

```

*****
* SECTION * ROUTINE * INTENT *
*****
* F91 * 01 * TEST I/O AND BRANCH ON UNIT CHECK OR NOT READY TO A READY DEVICE. *
* FUNCTION * * BRANCH IS AN ERROR. *
* * * *
* TEST * 02 * TEST I/O AND BRANCH BUSY TO A NOT BUSY DEVICE. BRANCH IS AN ERROR. *
* * * *
* * 03 * SENSE I/O STATUS. *
* * * *
* * 04 * LOAD I/O AND SENSE I/O LSR TO CHECK THE ABILITY TO LOAD AND SENSE *
* * * *
* * * *
* * 05 * DIAGNOSTIC CYCLE STEAL TO CHECK THE ABILITY OF THE 129 ATTACHMENT TO *
* * * *
* * * *
* * 06 * DIAGNOSTIC SIO WITH INVALID DATA USING BYTE WRAP. *
* * * *
* * 07 * DIAGNOSTIC SIO WITHOUT THE TIMEOUT DELAY TO CHECK THE 129'S ABILITY TO *
* * * *
* * * *
* * 08 * DIAGNOSTIC SIO TO BYTE WRAP HEX 40 (CARD CODE = 'NO-BITS' ON CABLE *
* * * *
* * * *
* * 09 * DIAGNOSTIC SIO TO WRAP AND RIPPLE FOUR DATA RECORDS. *
*****
* F92 * 0A * TEST I/O AND BRANCH NOT READY TO A NOT READY DEVICE. BRANCH IS CORRECT *
* FUNCTION * * (MANUAL INTERVENTION). *
* * * *
* TEST * 0B * RIPPLE PUNCH TEST WILL GENERATE A FOUR CARD RIPPLE DECK TO BE READ BACK *
* * * *
* * * *
* * 0C * RIPPLE READ TEST WILL READ THE FOUR CARD RIPPLE DECK GENERATED BY *
* * * *
* * * *
* * 0D * TEST I/O AND BRANCH ON UNIT CHECK CHECKS THE ABILITY OF THE DEVICE TO *
* * * *
* * * *
*****
    
```

2. OPERATING PROCEDURES

2.1 LOADING

THE PROGRAMS ARE LOADED FROM THE CE PACK USING THE STANDARD PROGRAM SELECT PROCEDURE (DF91 & DF92). PRIOR TO RUNNING DF91 FEED TWO BLANK CARDS INTO THE TRANSPORT.

NOTE: THE CONFIGURATOR PROGRAM (FED) DOES NOT HANDLE THE 129 DATA RECORDER SYMBOLIC UNIT ADDRESS, THEREFORE, IT IS NECESSARY TO WRITE THE UDT CONFIGURATION MANUALLY USING THE DISK EDITOR PROGRAM (PF6). THE 129 DATA RECORDER'S SYMBOLIC UNIT ADDRESS IS 'P9', THERE ARE NO OPTION BITS AT THIS TIME. REFER TO VOL. 1, BLOCK 20, PN 5129660 OF THE USER'S GUIDE FOR FORMATS AND PROCEDURES.

2.2 RUNNING

ENTER MAPS AT THE CPU MAIN ENTRY. READ MAP GROUND RULES. ALWAYS FOLLOW MAP FLOW IN CONJUNCTION WITH THE PRINTOUT MESSAGES AS THEY OCCUR. IF ERROR MESSAGES OR HALTS EXIST IN EITHER P91 OR P92, REFER TO THE 129 DATA RECORDER MAP CHARTS. AFTER THE TERMINATE MESSAGE IS PRINTED, MAKE FURTHER PROGRAM SELECTIONS OR OPERATE START IF OTHER SELECTIONS HAVE BEEN MADE.

IF SENSE SWITCH 07 IS ON PROGRAM CHAINING IS AUTOMATIC FOR ALL PROGRAMS SELECTED.

ALL BUSY HANG-UP CONDITIONS WILL ATTEMPT RESET WHEN START IS DEPRESSED.

NOTE: WHEN RUNNING THIS TEST THE 129 SWITCHES MUST BE IN THE FOLLOWING POSITIONS (FROM LEFT TO RIGHT).

PUNCH/VERIFY IN THE PUNCH OR UP POSITION  
 AUTO SKIP/DUP (DON'T CARE)  
 REC ADV/CARD FEED IN THE AUTO OR UP POSITION  
 PROGRAM MODE IN THE DATA READ POSITION  
 PRINT (OPTIONAL)  
 CHARACTER MODE (DON'T CARE)

3. INDEX OF PROGRAM HALTS

HALT	MEANING	ROUTINE
* 01	I AN ERROR OCCURRED WHILE DOING A TIO TO A READY DRIVE INDICATING THE DEVICE IS NOT READY OR UNIT CHECK.	I 01
* 02	I AN ERROR OCCURRED WHILE DOING A TIO ON NOT BUSY INCICATING THAT THE DEVICE IS BUSY.	I 02
* 03	I AN ERROR OCCURRED WHILE TRYING TO SENSE STATUS.	I 03
* 04	I A STATUS ERROR WAS SENSED. STATUS BIT 7 IS OFF AND IT SHOULD BE ON.	I 03
* 05	I A STATUS ERROR WAS SENSED. STATUS BIT 6 IS ON AND IT SHOULD BE OFF.	I 03
* 06	I AN ERROR OCCURRED WHILE DOING A DIAGNOSTIC SIO AND SENSE STATUS (BIT 0, 1, 7 SHOULD BE ON. ONE OR MORR WERE OFF).	I 07
* 07	I SCME STATUS ERROR WAS SENSED.	I 03
* 09	I AN ERROR OCCURRED WHILE DOING A DIAGNOSTIC SIO AND SENSE STATUS.	I 07
* 10	I AN ERROR OCCURRED WHILE TRYING TO LOAD THE DBO (CARD CODE ERROR DETECTED).	I 06,08
* 11	I AN ERROR OCCURRED WHILE TRYING TO DO A BYTE WRAP USING 64 BYTES OF VALID DATA. SOME BYTE FAILED TO COMPARE WITH THE EXPECTED.	I 08
* 17	I AN ERROR OCCURRED WHILE TRYING TO DO A DIAGNOSTIC CYCLE STEAL.	I 05
* 18	I AN ERROR OCCURRED WHILE TRYING TO DO A DIAGNOSTIC CYCLE STEAL BECAUSE OF A DATA COMPARE ERROR AND A PPAR COMPARE ERROR.	I 05
* 19	I AN ERORR OCCURRED WHILE DOING A DIAGNOSTIC CYCLE STEAL BECAUSE OF A PPAR COMPARE ERROR.	I 05
* 25	I AN ERROR OCCURRED WHILE TRYING TO DO A SIO PUNCH COMMAND.	I 0B
* 26	I A STATUS COMPARE ERROR OCCURRED WHILE WRAPPING A DATA RECORD.	I 09
* 26	I AN ERROR OCCURRED WHILE PUNCHING.	I 0B
* 27	I A TRANSPORT JAM OCCURRED WHEN DOING A SIO TO PUNCH.	I 0B
* 28	I AN ERROR OCCURRED WHILE TRYING TO LOAD THE PPAR DURING A SIO PUNCH OPERATION.	I 0B
* 32	I AN ERROR OCCURRED WHILE DOING A SIO TO PUNCH THE WRAP DATA.	I 09
* 32	I AN ERROR OCCURRED WHILE TRYING TO DO A SIO READ CMMDAND TO READ BACK DATA JUST PUNCHED.	I 0B,0C
* 34	I A PPAR COMPARE ERROR.	I 09,0C
* 35	I A DATA COMPARE ERROR.	I 09,0C
* 36	I MORE THAN ONE COMPARE ERROR OCCURRED.	I 09,0C
* 40	I A SIO READ COMMAND WAS ISSUED TO AN EMPTY HOPPER BUT STATUS BIT 2 WAS NOT RECEIVED.	I 0D
* 43	I A UNIT CHECK HAS BEEN DETECTED.	I 0D
* 44	I TEN CARDS PASSED THROUGH THE TRANSPORT AND NO STACKER FULL INDICATION OR STATUS ERROR WERE FOUND.	I 0D
* 45	I TEN CARDS PASSED THROUGH THE TRANSPORT AND NO TRANSPORT JAM WAS FOUND, THE STATUS DID NOT COMPARE EQUAL.	I 0D
* 46	I TEN CARDS PASSED THROUGH THE TRANSPORT AND NO TRANSPORT JAM WAS FOUND, THE STATUS DID COMPARE EQUAL.	I 0D
* 47	I TEN CARDS PASSED THROUGH THE TRANSPORT AND NO UNIT CHECK OCCURRED.	I 0D
* 50	I AN ERROR OCCURRED AFTER A HUNG BUSY ERROR PRINTOUT AND HALT. THE PROGRAM TRIED UNSUCCESSFULLY TO RESET THE BUSY CONDITION. THIS SHOULD PRINT THE COMMENT 'CAN'T RESET BUSY HANG UP'.	I ALL
* 85	I AN ERRCCR OCCURRED WHILE DOING A SIO WITH VALID DATA TO SET THE DIAGNOSTIC WRAP LATCH.	I 09
* 86	I AN ERROR OCCURRED WHILE DOING A SIO TO READ THE WRAP DATA.	I 09
* 89	I AN ERROR OCCURRED WHILE COMPARING STATUS. SOME BIT 0, 1, 7 WAS OFF AND SHOULD BE ON.	I 09
* 91	I AN ERROR OCCURRED WHEN DOING A BYTE WRAP USING A 'NO-BIT' PATTERN (SAME AS EXPLANATION FOR ERROR 11 EXCEPT DATA IS 'NO-BIT').	I 08
* 92	I AN ERROR OCCURRED WHEN DOING A BYTE WRAP USING AN 'ALL-BIT' PATTERN (SAME AS EXPLANATION FOR ERROR 11 EXCEPT DATA IS 'ALL-BIT').	I 08
* 93	I AN ERROR OCCURRED AFTER READING, THE DIA. MODE LATCH FAILED TO TURN OFF.	I 0B
* 0A	I AN ERROR OCCURRED WHILE TRYING TO DO A TIO AND BRANCH NOT READY TO A READY DEVICE.	I 0A
* 0B	I AN ERROR OCCURRED WHILE TRYING TO DO A LIO TO CHECK THE ABILITY OF THE DEVICE TO LOAD THE PPAR.	I 04
* 0C	I AN ERROR OCCURRED WHILE TRYING TO DO A DIAGNOSTIC SIO AND SENSE STATUS.	I 07,09,0B
* 0D	I AN ERROR OCCURRED WHILE TRYING TO LOAD THE DBO.	I 06,08
* 0E	I AN ERROR OCCURRED WHILE TRYING TO LOAD THE DBO. (PICKED UP OR DROPPED A BIT).	I 06,08
* 0F	I AN ERROR OCCURRED WHILE TRYING TO LOAD THE DBO. (STATUS BIT 5 IS ON).	I 06,08
* 1A	I AN ERROR OCCURRED WHILE DOING A DIAGNOSTIC CYCLE STEAL BECAUSE OF A DATA COMPARE ERROR.	I 05
* 6C	I AN ERROR OCCURRED WHILE TRYING TO DO A DIAGNOSTIC SIO AND SENSE STATUS WHILE WRAPPING 64 VALID BYTES OF DATA.	I 08
* 9C	I AN ERORR OCCURRED WHILE TRYING TO DO A DIAGNOSTIC SIO WITH INVALID DATA.	I 06