HEWLETT PACKARD

HP 3000 Computer Systems

COMMUNICATIONS HANDBOOK

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the data of the current edition and of any pages changed in updates to that edition. Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. Changes are marked with a vertical bar in the margin. If an update is incorporated when an edition if reprinted, these bars are removed but the dates remain. No information is incorporated into a reprinting unless it appears as a prior update.

PRINTING HISTORY

New editions incorporate all update material since the previous edition. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual. The date on the title page changes only when a new edition is published. If minor corrections and updates are incorporated, the manual is reprinted but neither the date on the title page nor the edition changes.

First Edition. . . . . Dec 1977
Second Edition . . . . Oct 1978
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Fourth Edition. . . . . Jan 1983

This handbook is designed for quick reference by those who install, service, and use Hewlett-Packard data communications products. The information herein is appropriate for both Series II and Series III 30/33/44 Computer Systems and does not apply for Series I.

The sections in the handbook are independent of each other so that readers need refer only to the material that is relevant to their situation. To aid in locating material, the contents of each section are listed on the title page for that section.

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GENERAL
INFORMATION

CONTENT   **PAGE**

ASCII/EBCDIC/Hollerith

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)	to ASCII (Hex)
0	000	00	NUL	000	12-0-1-8-9	NUL	000	00
1	001	01	SOH	001	12-1-9	SOH	001	01
2	002	02	STX	002	12-2-9	STX	002	02
3	003	03	ETX	003	12-3-9	ETX	003	03
4	004	04	EOT	067	7-9	PF	234	9C
5	005	05	ENQ	055	0-5-8-9	HT	011	09
6	006	06	ACK	056	0-6-8-9	LC	206	86
7	007	07	BEL	057	0-7-8-9	DEL	177	7F
8	010	08	BS	026	11-6-9		227	97
9	011	09	HT	005	12-5-9		215	8D
10	012	0A	LF	045	0-5-9	SMM	216	8E
11	013	0B	VT	013	12-3-8-9	VT	013	0B
12	014	0C	FF	014	12-4-8-9	FF	014	0C
13	015	0D	CR	015	12-5-8-9	CR	015	0D
14	016	0E	SO	016	12-6-8-9	SO	016	0E
15	017	0F	SI	017	12-7-8-9	SI	017	0F
16	020	10	DLE	020	12-11-1-8-9	DLE	020	10
17	021	11	DC1	021	11-1-9	DC1	021	11
18	022	12	DC2	022	11-2-9	DC2	022	12
19	023	13	DC3	023	11-3-9	TM	023	13
20	024	14	DC4	074	4-8-9	RES	235	9D
21	025	15	NAK	075	5-8-9	NL	205	85
22	026	16	SYN	062	2-9	BS	010	08
23	027	17	ETB	046	0-6-9	IL	207	87
24	030	18	CAN	030	11-8-9	CAN	030	18
25	031	19	EM	031	11-1-8-9	EM	031	19
26	032	1A	SUB	077	7-8-9	CC	222	92
27	033	1B	ESC	047	0-7-9	CU1	217	8F
28	034	1C	FS	034	11-4-8-9	IFS	034	1C
29	035	1D	GS	035	11-5-8-9	IGS	035	1D
30	036	1E	RS	036	11-6-8-9	IRS	036	1E
31	037	1F	US	037	11-7-8-9	IUS	037	1F

NOTE: ASCII is a seven bit code, EBCDIC is an eight bit code.

CHAR CODE			ASCII			EBCDIC		
Dec	**Oct**	**Hex**	**Cntl/ Gph**	**to EBCDIC (Oct)**	**Hollerith**	**Cntl/ Gph**	**to ASCII (Oct)**	**to ASCII (Hex)**
32	040	20	SP	100	Blank	DS	200	80
33	041	21	!	117	12-7-8	SOS	201	81
34	042	22	"	177	7-8	FS	202	82
35	043	23	#	173	3-8		203	83
36	044	24	$	133	11-3-8	BYP	204	84
37	045	25	%	154	0-4-8	LF	012	0A
38	046	26	&	120	12	ETB	027	17
39	047	27	'	175	5-8	ESC	033	1B
40	050	28	(	115	12-5-8		210	88
41	051	29	)	135	11-5-8		211	89
42	052	2A	*	134	11-4-8	SM	212	8A
43	053	2B	+	116	12-6-8	CU2	213	8B
44	054	2C	,	153	0-3-8		214	8C
45	055	2D	—	140	11	ENQ	005	05
46	056	2E	.	113	12-3-8	ACK	006	06
47	057	2F	/	141	0-1	BEL	007	07
48	060	30	0	360	0		220	90
49	061	31	1	361	1		221	91
50	062	32	2	362	2	SYN	026	16
51	063	33	3	363	3		223	93
52	064	34	4	364	4	PN	224	94
53	065	35	5	365	5	RS	225	95
54	066	36	6	366	6	UC	226	96
55	067	37	7	367	7	EOT	004	04
56	070	38	8	370	8		230	98
57	071	39	9	371	9		231	99
58	072	3A	:	172	2-8		232	9A
59	073	3B	;	136	11-6-8	CU3	233	9B
60	074	3C	<	114	12-4-8	DC4	024	14
61	075	3D	=	176	6-8	NAK	025	15
62	076	3E	>	156	0-6-8		236	9E
63	077	3F	?	157	0-7-8	SUB	032	1A

ASCII/EBCDIC/Hollerith

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)	to ASCII (Hex)
64	100	40	@	174	4-8	SP	040	20
65	101	41	A	301	12-1		240	A0
66	102	42	B	302	12-2		241	A1
67	103	43	C	303	12-3		242	A2
68	104	44	D	304	12-4		243	A3
69	105	45	E	305	12-5		244	A4
70	106	46	F	306	12-6		245	A5
71	107	47	G	307	12-7		246	A6
72	110	48	H	310	12-8		247	A7
73	111	49	I	311	12-9		250	A8
74	112	4A	J	321	11-1	¢	133	5B
75	113	4B	K	322	11-2	.	056	2E
76	114	4C	L	323	11-3	<	074	3C
77	115	4D	M	324	11-4	(	050	28
78	116	4E	N	325	11-5	+	053	2B
79	117	4F	O	326	11-6	I	041	21
80	120	50	P	327	11-7	&	046	26
81	121	51	Q	330	11-8		251	A9
82	122	52	R	331	11-9		252	AA
83	123	53	S	342	0-2		253	AB
84	124	54	T	343	0-3		254	AC
85	125	55	U	344	0-4		255	AD
86	126	56	V	345	0-5		256	AE
87	127	57	W	346	0-6		257	AF
88	130	58	X	347	0-7		260	B0
89	131	59	Y	350	0-8		261	B1
90	132	5A	Z	351	0-9	!	135	5D
91	133	5B	[	112	12-2-8	$	044	24
92	134	5C	\	340	0-2-8	*	052	2A
93	135	5D	]	132	11-2-8	)	051	29
94	136	5E	∧	137	11-7-8	;	073	3B
95	137	5F	__	155	0-5-8	⌐	136	5E

NOTE: ASCII is a seven bit code, EBCDIC is an eight bit code.

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)	to ASCII (Hex)
96	140	60	`	171	1-8	–	055	2D
97	141	61	a	201	12-0-1	/	057	2F
98	142	62	b	202	12-0-2		262	B2
99	143	63	c	203	12-0-3		263	B3
100	144	64	d	204	12-0-4		264	B4
101	145	65	e	205	12-0-5		265	B5
102	146	66	f	206	12-0-6		266	B6
103	147	67	g	207	12-0-7		267	B7
104	150	68	h	210	12-0-8		270	B8
105	151	69	i	211	12-0-9		271	B9
106	152	6A	j	221	12-11-1	¦	174	7C
107	153	6B	k	222	12-11-2	,	054	2C
108	154	6C	l	223	12-11-3	%	045	25
109	155	6D	m	224	12-11-4	___	137	5F
110	156	6E	n	225	12-11-5	>	076	3E
111	157	6F	o	226	12-11-6	?	077	3F
112	160	70	p	227	12-11-7		272	BA
113	161	71	q	230	12-11-8		273	BB
114	162	72	r	231	12-11-9		274	BC
115	163	73	s	242	11-0-2		275	BD
116	164	74	t	243	11-0-3		276	BE
117	165	75	u	244	11-0-4		277	BF
118	166	76	v	245	11-0-5		300	C0
119	167	77	w	246	11-0-6		301	C1
120	170	78	x	247	11-0-7		302	C2
121	171	79	y	250	11-0-8	`	140	69
122	172	7A	z	251	11-0-9	:	072	3A
123	173	7B	{	300	12-0	#	043	23
124	174	7C	¦	152	12-11	@	100	40
125	175	7D	}	320	11-0	'	047	27
126	176	7E	~	241	11-0-1	=	075	3D
127	177	7F	DEL	007	12-7-9	"	042	22

ASCII/EBCDIC/Hollerith

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/Gph	to EBCDIC (Oct)	Hollerith	Cntl/Gph	to ASCII (Oct)	to ASCII (Hex)
128	200	80		040	11-0-1-8-9		303	C3
129	201	81		041	0-1-9	a	141	61
130	202	82		042	0-2-9	b	142	62
131	203	83		043	0-3-9	c	143	63
132	204	84		044	0-4-9	d	144	64
133	205	85		025	11-5-9	e	145	65
134	206	86		006	12-6-9	f	146	66
135	207	87		027	11-7-9	g	147	67
136	210	88		050	0-8-9	h	150	68
137	211	89		051	0-1-8-9	i	151	68
138	212	8A		052	0-2-8-9		304	C4
139	213	8B		053	0-3-8-9		305	C5
140	214	8C		054	0-4-8-9		306	C6
141	215	8D		011	12-1-8-9		307	C7
142	216	8E		012	12-2-8-9		310	C8
143	217	8F		033	11-3-8-9		311	C9
144	220	90		060	12-11-0-1-8-9		312	CA
145	221	91		061	1-9	j	152	6A
146	222	92		032	11-2-8-9	k	153	6B
147	223	93		063	3-9	l	154	6C
148	224	94		064	4-9	m	155	6D
149	225	95		065	5-9	n	156	6E
150	226	96		066	6-9	o	157	6F
151	227	97		010	12-8-9	p	160	70
152	230	98		070	8-9	q	161	71
153	231	99		071	1-8-9	r	162	72
154	232	9A		072	2-8-9		313	CB
155	233	9B		073	3-8-9		314	CC
156	234	9C		004	12-4-9		315	CD
157	235	9D		024	11-4-9		316	CE
158	236	9E		076	6-8-9		317	CF
159	237	9F		341	11-0-1-9		320	D0

NOTE: ASCII is a seven bit code, EBCDIC is an eight bit code.

CHAR CODE			ASCII			EB		
Dec	Oct	Hex	Cntl/Gph	to EBCDIC (Oct)	Hollerith	Cntl/Gph	to ASCII (Oct)	to ASCII (Hex)
160	240	A0		101	12-0-1-9		321	D1
161	241	A1		102	12-0-2-9	~	176	7E
162	242	A2		103	12-0-3-9	s	163	73
163	243	A3		104	12-0-4-9	t	164	74
164	244	A4		105	12-0-5-9	u	165	75
165	245	A5		106	12-0-6-9	v	166	76
166	246	A6		107	12-0-7-9	w	167	77
167	247	A7		110	12-0-8-9	x	170	78
168	250	A8		111	12-1-8	y	171	79
169	251	A9		121	12-11-1-9	z	172	7A
170	252	AA		122	12-11-2-9		322	D2
171	253	AB		123	12-11-3-9		323	D3
172	254	AC		124	12-11-4-9		324	D4
173	255	AD		125	12-11-5-9		325	D5
174	256	AE		126	12-11-6-9		326	D6
175	257	AF		127	12-11-7-9		327	D7
176	260	B0		130	12-11-8-9		330	D8
177	261	B1		131	11-1-8		331	D9
178	262	B2		142	11-0-2-9		332	DA
179	263	B3		143	11-0-3-9		333	DB
180	264	B4		144	11-0-4-9		334	DC
181	265	B5		145	11-0-5-9		335	DD
182	266	B6		146	11-0-6-9		336	DE
183	267	B7		147	11-0-7-9		337	DF
184	270	B8		150	11-0-8-9		340	E0
185	271	B9		151	0-1-8		341	E1
186	272	BA		160	12-11-0		342	E2
187	273	BB		161	12-11-0-1-9		343	E3
188	274	BC		162	12-11-0-2-9		344	E4
189	275	BD		163	12-11-0-3-9		345	E5
190	276	BE		164	12-11-0-4-9		346	E6
191	277	BF		165	12-11-0-5-9		347	E7

ASCII/EBCDIC/Hollerith

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)	to ASCII (Hex)
192	300	C0		166	12-11-0-6-9	{	173	7B
193	301	C1		167	12-11-0-7-9	A	101	41
194	302	C2		170	12-11-0-8-9	B	102	42
195	303	C3		200	12-0-1-8	C	103	43
196	304	C4		212	12-0-2-8	D	104	44
197	305	C5		213	12-0-3-8	E	105	45
198	306	C6		214	12-0-4-8	F	106	46
199	307	C7		215	12-0-5-8	G	107	47
200	310	C8		216	12-0-6-8	H	110	48
201	311	C9		217	12-0-7-8	I	111	49
202	312	CA		220	12-11-1-8		350	E8
203	313	CB		232	12-11-2-8		351	E9
204	314	CC		233	12-11-3-8	∫	352	EA
205	315	CD		234	12-11-4-8		353	EB
206	316	CE		235	12-11-5-8	⌐	354	EC
207	317	CF		236	12-11-6-8		355	ED
208	320	D0		237	12-11-7-8	}	175	7D
209	321	D1		240	11-0-1-8	J	112	4A
210	322	D2		252	11-0-2-8	K	113	4B
211	323	D3		253	11-0-3-8	L	114	4C
212	324	D4		254	11-0-4-8	M	115	4D
213	325	D5		255	11-0-5-8	N	116	4E
214	326	D6		256	11-0-6-8	O	117	4F
215	327	D7		257	11-0-7-8	P	120	50
216	330	D8		260	12-11-0-1-8	Q	121	51
217	331	D9		261	12-11-0-1	R	122	52
218	332	DA		262	12-11-0-2		356	EE
219	333	DB		263	12-11-0-3		357	EF
220	334	DC		264	12-11-0-4		360	F0
221	335	DD		265	12-11-0-5		361	F1
222	336	DE		266	12-11-0-6		362	F2
223	337	DF		267	12-11-0-7		363	F3

NOTE: ASCII is a seven bit code, EBCDIC is an eight bit code.

CHAR CODE			ASCII			EBCDIC		
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)	to ASCII (Hex)
224	340	E0		270	12-11-0-8	\	134	5C
225	341	E1		271	12-11-0-9		237	9F
226	342	E2		272	12-11-0-2-8	S	123	53
227	343	E3		273	12-11-0-3-8	T	124	54
228	344	E4		274	12-11-0-4-8	U	125	55
229	345	E5		275	12-11-0-5-8	V	126	56
230	346	E6		276	12-11-0-6-8	W	127	57
231	347	E7		277	12-11-0-7-8	X	130	58
232	350	E8		312	12-0-2-8-9	Y	131	59
233	351	E9		313	12-0-3-8-9	Z	132	5A
234	352	EA		314	12-0-4-8-9		364	F4
235	353	EB		315	12-0-5-8-9		365	F5
236	354	EC		316	12-0-6-8-9	H	366	F6
237	355	ED		317	12-0-7-8-9		367	F7
238	356	EE		332	12-11-2-8-9		370	F8
239	357	EF		333	12-11-3-8-9		371	F9
240	360	F0		334	12-11-4-8-9	0	060	30
241	361	F1		335	12-11-5-8-9	1	061	31
242	362	F2		336	12-11-6-8-9	2	062	32
243	363	F3		337	12-11-7-8-9	3	063	33
244	364	F4		352	11-0-2-8-9	4	064	34
245	365	F5		353	11-0-3-8-9	5	065	35
246	366	F6		354	11-0-4-8-9	6	066	36
247	367	F7		355	11-0-5-8-9	7	067	37
248	370	F8		356	11-0-6-8-9	8	070	38
249	371	F9		357	11-0-7-8-9	9	071	39
250	372	FA		372	12-11-0-2-8-9			372	FA
251	373	FB		373	12-11-0-3-8-9		373	FB
252	374	FC		374	12-11-0-4-8-9		374	FC
253	375	FD		375	12-11-0-5-8-9		375	FD
254	376	FE		376	12-11-0-6-8-9		376	FE
255	377	FF		377	12-11-0-7-8-9	EO	377	FF

ASCII/BYTES

	BYTE POSITION					BYTE POSITION			
CHAR	Left	Right	Dec.	CHAR	Left	Right	Dec.	Control Char	②
A	040400	000101	65	NUL	000000	000000	0	@	
B	041000	000102	66	SOH	000400	000001	1	A	
C	041400	000103	67	STX	001000	000002	2	B	
D	042000	000104	68	ETX	001400	000003	3	C	
E	042400	000105	69	EOT	002000	000004	4	D	
F	043000	000106	70	ENQ	002400	000005	5	E	
G	043400	000107	71	ACK	003000	000006	6	F	
H	044000	000110	72	BEL	003400	000007	7	G	
I	044400	000111	73	BS	004000	000010	8	H	
J	045000	000112	74	HT	004400	000011	9	I	
K	045400	000113	75	LF	005000	000012	10	J	
L	046000	000114	76	VT	005400	000013	11	K	
M	046400	000115	77	FF	006000	000014	12	L	
N	047000	000116	78	CR	006400	000015	13	M	
O	047400	000117	79	SO	007000	000016	14	N	
P	050000	000120	80	SI	007400	000017	15	O	
Q	050400	000121	81	DLE	010000	000020	16	P	
R	051000	000122	82	DC1	010400	000021	17	Q (X ON)	
S	051400	000123	83	DC2	011000	000022	18	R	
T	052000	000124	84	DC3	011400	000023	19	S (X OFF)	
U	052400	000125	85	DC4	012000	000024	20	T	
V	053000	000126	86	NAK	012400	000025	21	U	
W	053400	000127	87	SYN	013000	000026	22	V	
X	054000	000130	88	ETB	013400	000027	23	W	
Y	054400	000131	89	CAN	014000	000030	24	X	
Z	055000	000132	90	EM	014400	000031	25	Y	
				SUB	015000	000032	26	Z	
				ESC	015400	000033	27	[	
a	060400	000141	97	FS	016000	000034	28	\	
b	061000	000142	98	GS	016400	000035	29	]	
c	061400	000143	99	RS	017000	000036	30		
d	062000	000144	100	US	017400	000037	31	—	
e	062400	000145	101	SPACE	020000	000040	32		
f	063000	000146	102	!	020400	000041	33		
g	063400	000147	103	"	021000	000042	34		
h	064000	000150	104	#	021400	000043	35		
i	064400	000151	105	$	022000	000044	36		
j	065000	000152	106	%	022400	000045	37		
k	065400	000153	107	&	023000	000046	38		
l	066000	000154	108	'	023400	000047	39		
m	066400	000155	109	(	024000	000050	40		
n	067000	000156	110	)	024400	000051	41		
o	067400	000157	111	*	025000	000052	42		
p	070000	000160	112	+	025400	000053	43		
q	070400	000161	113	,	026000	000054	44		
r	071000	000162	114	—	026400	000055	45		
s	071400	000163	115	.	027000	000056	46		
t	072000	000164	116	/	027400	000057	47		
u	072400	000165	117	:	035000	000072	58		
v	073000	000166	118	;	035400	000073	59		
w	073400	000167	119	<	036000	000074	60		
x	074000	000170	120	=	036400	000075	61		
y	074400	000171	121	>	037000	000076	62		
z	075000	000172	122	?	037400	000077	63		
				@	040000	000100	64		
				[	055400	000133	91		
				\	056000	000134	92		
				]	056400	000135	93		
				^	057000	000136	94		
				—	057400	000137	95		
0	030000	000060	48	`	060000	000140	96		
1	030400	000061	49	{	075400	000173	123		
2	031000	000062	50	|	076000	000174	124		
3	031400	000063	51	:	076400	000175	125		
4	032000	000064	52	~	077000	000176	126		
5	032400	000065	53	DEL	077400	000177	127	②	
6	033000	000066	54						
7	033400	000067	55						
8	034000	000070	56						
9	034400	000071	57						

Bit: `0 1 2 3 4 5 6 7`

① An alphabetic character upshift turns bit two on.
② A control character turns bit one off; however, terminal software may prevent you from using a specific control character.

NOTE: ASCII is a seven bit code

A-10

2'S COMP		0	1	2	3	4	5	6	7
0	0	0	1	2	3	4	5	6	7
177770	10	8	9	10	11	12	13	14	15
177760	20	16	17	18	19	20	21	22	23
177750	30	24	25	26	27	28	29	30	31
177740	40	32	33	34	35	36	37	38	39
177730	50	40	41	42	43	44	45	46	47
177720	60	48	49	50	51	52	53	54	55
177710	70	56	57	58	59	60	61	62	63
177700	100	64	65	66	67	68	69	70	71
177670	110	72	73	74	75	76	77	78	79
177660	120	80	81	82	83	84	85	86	87
177650	130	88	89	90	91	92	93	94	95
177640	140	96	97	98	99	100	101	102	103
177630	150	104	105	106	107	108	109	110	111
177620	160	112	113	114	115	116	117	118	119
177610	170	120	121	122	123	124	125	126	127
177600	200	128	129	130	131	132	133	134	135
177570	210	136	137	138	139	140	141	142	143
177560	220	144	145	146	147	148	149	150	151
177550	230	152	153	154	155	156	157	158	159
177540	240	160	161	162	163	164	165	166	167
177530	250	168	169	170	171	172	173	174	175
177520	260	176	177	178	179	180	181	182	183
177510	270	184	185	186	187	188	189	190	191
177500	300	192	193	194	195	196	197	198	199
177470	310	200	201	202	203	204	205	206	207
177460	320	208	209	210	211	212	213	214	215
177450	330	216	217	218	219	220	221	222	223
177440	340	224	225	226	227	228	229	230	231
177430	350	232	233	234	235	236	237	238	239
177420	360	240	241	242	243	244	245	246	247
177410	370	248	249	250	251	252	253	254	255

Octal/Decimal Conversion

2'S COMP		0	1	2	3	4	5	6	7
177400	400	256	257	258	259	260	261	262	263
177370	410	264	265	266	267	268	269	270	271
177360	420	272	273	274	275	276	277	278	279
177350	430	280	281	282	283	284	285	286	287
177340	440	288	289	290	291	292	293	294	295
177330	450	296	297	298	299	300	301	302	303
177320	460	304	305	306	307	308	309	310	311
177310	470	312	313	314	315	316	317	318	319
177300	500	320	321	322	323	324	325	326	327
177270	510	328	329	330	331	332	333	334	335
177260	520	336	337	338	339	340	341	342	343
177250	530	344	345	346	347	348	349	350	351
177240	540	352	353	354	355	356	357	358	359
177230	550	360	361	362	363	364	365	366	367
177220	560	368	369	370	371	372	373	374	375
177210	570	376	377	378	379	380	381	382	383
177200	600	384	385	386	387	388	389	390	391
177170	610	392	393	394	395	396	397	398	399
177160	620	400	401	402	403	404	405	406	407
177150	630	408	409	410	411	412	413	414	415
177140	640	416	417	418	419	420	421	422	423
177130	650	424	425	426	427	428	429	430	431
177120	660	432	433	434	435	436	437	438	439
177110	670	440	441	442	443	444	445	446	447
177100	700	448	449	450	451	452	453	454	455
177070	710	456	457	458	459	460	461	462	463
177060	720	464	465	466	467	468	469	470	471
177050	730	472	473	474	475	476	477	478	479
177040	740	480	481	482	483	484	485	486	487
177030	750	488	489	490	491	492	493	494	495
177020	760	496	497	498	499	500	501	502	503
177010	770	504	505	506	507	508	509	510	511

2'S COMP		0	1	2	3	4	5	6	7
177000	1000	512	513	514	515	516	517	518	519
176770	1010	520	521	522	523	524	525	526	527
176760	1020	528	529	530	531	532	533	534	535
176750	1030	536	537	538	539	540	541	542	543
176740	1040	544	545	546	547	548	549	550	551
176730	1050	552	553	554	555	556	557	558	559
176720	1060	560	561	562	563	564	565	566	567
176710	1070	568	569	570	571	572	573	574	575
176700	1100	576	577	578	579	580	581	582	583
176670	1110	584	585	586	587	588	589	590	591
176660	1120	592	593	594	595	596	597	598	599
176650	1130	600	601	602	603	604	605	606	607
176640	1140	608	609	610	611	612	613	614	615
176630	1150	616	617	618	619	620	621	622	623
176620	1160	624	625	626	627	628	629	630	631
176610	1170	632	633	634	635	636	637	638	639
176600	1200	640	641	642	643	644	645	646	647
176570	1210	648	649	650	651	652	653	654	655
176560	1220	656	657	658	659	660	661	662	663
176550	1230	664	665	666	667	668	669	670	671
176540	1240	672	673	674	675	676	677	678	679
176530	1250	680	681	682	683	684	685	686	687
176520	1260	688	689	690	691	692	693	694	695
176510	1270	696	697	698	699	700	701	702	703
176500	1300	704	705	706	707	708	709	710	711
176470	1310	712	713	714	715	716	717	718	719
176460	1320	720	721	722	723	724	725	726	727
176450	1330	728	729	730	731	732	733	734	735
176440	1340	736	737	738	739	740	741	742	743
176430	1350	744	745	746	747	748	749	750	751
176420	1360	752	753	754	755	756	757	758	759
176410	1370	760	761	762	763	764	765	766	767

Octal/Decimal Conversion

2'S COMP		0	1	2	3	4	5	6	7
176400	1400	768	769	770	771	772	773	774	775
176370	1410	776	777	778	779	780	781	782	783
176360	1420	784	785	786	787	788	789	790	791
176350	1430	792	793	794	795	796	797	798	799
176340	1440	800	801	802	803	804	805	806	807
176330	1450	808	809	810	811	812	813	814	815
176320	1460	816	817	818	819	820	821	822	823
176310	1470	824	825	826	827	828	829	830	831
176300	1500	832	833	834	835	836	837	838	839
176270	1510	840	841	842	843	844	845	846	847
176260	1520	848	849	850	851	852	853	854	855
176250	1530	856	857	858	859	860	861	862	863
176240	1540	864	865	866	867	868	869	870	871
176230	1550	872	873	874	875	876	877	878	879
176220	1560	880	881	882	883	884	885	886	887
176210	1570	888	889	890	891	892	893	894	895
176200	1600	896	897	898	899	900	901	902	903
176170	1610	904	905	906	907	908	909	910	911
176160	1620	912	913	914	915	916	917	918	919
176150	1630	920	921	922	923	924	925	926	927
176140	1640	928	929	930	931	932	933	934	935
176130	1650	936	937	938	939	940	941	942	943
176120	1660	944	945	946	947	948	949	950	951
176110	1670	952	953	954	955	956	957	958	959
176100	1700	960	961	962	963	964	965	966	967
176070	1710	968	969	970	971	972	973	974	975
176060	1720	976	977	978	979	980	981	982	983
176050	1730	984	985	986	987	988	989	990	991
176040	1740	992	993	994	995	996	997	998	999
176030	1750	1000	1001	1002	1003	1004	1005	1006	1007
176020	1760	1008	1009	1010	1011	1012	1013	1014	1015
176010	1770	1016	1017	1018	1019	1020	1021	1022	1023

(ASSUME 16 BIT POSITIVE INTEGER)

OCTAL	DECIMAL	OCTAL	DECIMAL	OCTAL	DECIMAL
0	0	60000	24576	140000	49152
1000	512	61000	25088	141000	49664
2000	1024	62000	25600	142000	50176
3000	1536	63000	26112	143000	50688
4000	2048	64000	26624	144000	51200
5000	2560	65000	27136	145000	51712
6000	3072	66000	27648	146000	52224
7000	3584	67000	28160	147000	52736
10000	4096	70000	28672	150000	53248
11000	4608	71000	29184	151000	53760
12000	5120	72000	29696	152000	54272
13000	5632	73000	30208	153000	54784
14000	6144	74000	30720	154000	55296
15000	6656	75000	31232	155000	55808
16000	7168	76000	31744	156000	56320
17000	7680	77000	32256	157000	56832
20000	8192	100000	32768	160000	57344
21000	8704	101000	33280	161000	57856
22000	9216	102000	33792	162000	58368
23000	9728	103000	34304	163000	58880
24000	10240	104000	34816	164000	59392
25000	10752	105000	35328	165000	59904
26000	11264	106000	35840	166000	60416
27000	11776	107000	36352	167000	60928
30000	12288	110000	36864	170000	61440
31000	12800	111000	37376	171000	61952
32000	13312	112000	37888	172000	62464
33000	13824	113000	38400	173000	62976
34000	14336	114000	38912	174000	63488
35000	14848	115000	39424	175000	64000
36000	15360	116000	39936	176000	64512
37000	15872	117000	40448	177000	65024
40000	16384	120000	40960	177777	65535
41000	16896	121000	41472		
42000	17408	122000	41984		
43000	17920	123000	42496		
44000	18432	124000	43008		
45000	18944	125000	43520		
46000	19456	126000	44032		
47000	19968	127000	44544		
50000	20480	130000	45056		
51000	20992	131000	45568		
52000	21504	132000	46080		
53000	22016	133000	46592		
54000	22528	134000	47104		
55000	23040	135000	47616		
56000	23552	136000	48128		
57000	24064	137000	48640		

Binary

2^n		n	2^{-n}			
	1	0	1.0			
	2	1	0.5			
	4	2	0.25			
	8	3	0.125			
	16	4	0.0625			
	32	5	0.03125			
	64	6	0.01562	5		
	128	7	0.00781	25		
	256	8	0.00390	625		
	512	9	0.00195	3125		
1	024	10	0.00097	65625		
2	048	11	0.00048	82812	5	
4	096	12	0.00024	41406	25	
8	192	13	0.00012	20703	125	
16	384	14	0.00006	10351	5625	
32	768	15	0.00003	05175	78125	
65	536	16	0.00001	52587	89062	5
131	072	17	0.00000	76293	94531	25
262	144	18	0.00000	38146	97265	625
524	288	19	0.00000	19073	48632	8125
1 048	576	20	0.00000	09536	74316	40625

	2^n		n	2^{-n}					
	2	097 152	21	0.00000	04768	37158	20312	5	
	4	194 304	22	0.00000	02384	18579	10156	25	
	8	388 608	23	0.00000	01192	09289	55078	125	
	16	777 216	24	0.00000	00596	04644	77539	0625	
	33	554 432	25	0.00000	00298	02322	38769	53125	
	67	108 864	26	0.00000	00149	01161	19384	76562	5
	134	217 728	27	0.00000	00074	50580	59692	38281	25
	268	435 456	28	0.00000	00037	25290	29846	19140	625
	536	870 912	29	0.00000	00018	62645	14923	09570	3125
1	073	741 824	30	0.00000	00009	31322	57461	54785	15625
2	147	483 648	31	0.00000	00004	65661	28730	77392	57812 5
4	294	967 296	32	0.00000	00002	32830	64365	38696	28906 25
8	589	934 592	33	0.00000	00001	16415	32182	69348	14453 125
17	179	869 184	34	0.00000	00000	58207	66091	34674	07226 5625
34	359	738 368	35	0.00000	00000	29103	83045	67337	03613 28125
68	719	476 736	36	0.00000	00000	14551	91522	83668	51806 64062 5
137	438	953 472	37	0.00000	00000	07275	95761	41834	25903 32031 25
274	877	906 944	38	0.00000	00000	03637	97880	70917	12951 66015 625
549	755	813 888	39	0.00000	00000	01818	98940	35458	56475 83007 8125

Decimal to Octal to Hexadecimal

Decimal	Octal	Hex	Decimal	Octal	Hex
0	000000	0000	64	000100	0040
1	000001	0001	65	000101	0041
2	000002	0002	66	000102	0042
3	000003	0003	67	000103	0043
4	000004	0004	68	000104	0044
5	000005	0005	69	000105	0045
6	000006	0006	70	000106	0046
7	000007	0007	71	000107	0047
8	000010	0008	72	000110	0048
9	000011	0009	73	000111	0049
10	000012	000A	74	000112	004A
11	000013	000B	75	000113	004B
12	000014	000C	76	000114	004C
13	000015	000D	77	000115	004D
14	000016	000E	78	000116	004E
15	000017	000F	79	000117	004F
16	000020	0010	80	000120	0050
17	000021	0011	81	000121	0051
18	000022	0012	82	000122	0052
19	000023	0013	83	000123	0053
20	000024	0014	84	000124	0054
21	000025	0015	85	000125	0055
22	000026	0016	86	000126	0056
23	000027	0017	87	000127	0057
24	000030	0018	88	000130	0058
25	000031	0019	89	000131	0059
26	000032	001A	90	000132	005A
27	000033	001B	91	000133	005B
28	000034	001C	92	000134	005C
29	000035	001D	93	000135	005D
30	000036	001E	94	000136	005E
31	000037	001F	95	000137	005F
32	000040	0020	96	000140	0060
33	000041	0021	97	000141	0061
34	000042	0022	98	000142	0062
35	000043	0023	99	000143	0063
36	000044	0024	100	000144	0064
37	000045	0025	101	000145	0065
38	000046	0026	102	000146	0066
39	000047	0027	103	000147	0067
40	000050	0028	104	000150	0068
41	000051	0029	105	000151	0069
42	000052	002A	106	000152	006A
43	000053	002B	107	000153	006B
44	000054	002C	108	000154	006C
45	000055	002D	109	000155	006D
46	000056	002E	110	000156	006E
47	000057	002F	111	000157	006F
48	000060	0030	112	000160	0070
49	000061	0031	113	000161	0071
50	000062	0032	114	000162	0072
51	000063	0033	115	000163	0073
52	000064	0034	116	000164	0074
53	000065	0035	117	000165	0075
54	000066	0036	118	000166	0076
55	000067	0037	119	000167	0077
56	000070	0038	120	000170	0078
57	000071	0039	121	000171	0079
58	000072	003A	122	000172	007A
59	000073	003B	123	000173	007B
60	000074	003C	124	000174	007C
61	000075	003D	125	000175	007D
62	000076	003E	126	000176	007E
63	000077	003F	127	000177	007F

Decimal	Octal	Hex	Decimal	Octal	Hex
128	000200	0080	192	000300	00C0
129	000201	0081	193	000301	00C1
130	000202	0082	194	000302	00C2
131	000203	0083	195	000303	00C3
132	000204	0084	196	000304	00C4
133	000205	0085	197	000305	00C5
134	000206	0086	198	000306	00C6
135	000207	0087	199	000307	00C7
136	000210	0088	200	000310	00C8
137	000211	0089	201	000311	00C9
138	000212	008A	202	000312	00CA
139	000213	008B	203	000313	00CB
140	000214	008C	204	000314	00CC
141	000215	008D	205	000315	00CD
142	000216	008E	206	000316	00CE
143	000217	008F	207	000317	00CF
144	000220	0090	208	000320	00D0
145	000221	0091	209	000321	00D1
146	000222	0092	210	000322	00D2
147	000223	0093	211	000323	00D3
148	000224	0094	212	000324	00D4
149	000225	0095	213	000325	00D5
150	000226	0096	214	000326	00D6
151	000227	0097	215	000327	00D7
152	000230	0098	216	000330	00D8
153	000231	0099	217	000331	00D9
154	000232	009A	218	000332	00DA
155	000233	009B	219	000333	00DB
156	000234	009C	220	000334	00DC
157	000235	009D	221	000335	00DD
158	000236	009E	222	000336	00DE
159	000237	009F	223	000337	00DF
160	000240	00A0	224	000340	00E0
161	000241	00A1	225	000341	00E1
162	000242	00A2	226	000342	00E2
163	000243	00A3	227	000343	00E3
164	000244	00A4	228	000344	00E4
165	000245	00A5	229	000345	00E5
166	000246	00A6	230	000346	00E6
167	000247	00A7	231	000347	00E7
168	000250	00A8	232	000350	00E8
169	000251	00A9	233	000351	00E9
170	000252	00AA	234	000352	00EA
171	000253	00AB	235	000353	00EB
172	000254	00AC	236	000354	00EC
173	000255	00AD	237	000355	00ED
174	000256	00AE	238	000356	00EE
175	000257	00AF	239	000357	00EF
176	000260	00B0	240	000360	00F0
177	000261	00B1	241	000361	00F1
178	000262	00B2	242	000362	00F2
179	000263	00B3	243	000363	00F3
180	000264	00B4	244	000364	00F4
181	000265	00B5	245	000365	00F5
182	000266	00B6	246	000366	00F6
183	000267	00B7	247	000367	00F7
184	000270	00B8	248	000370	00F8
185	000271	00B9	249	000371	00F9
186	000272	00BA	250	000372	00FA
187	000273	00BB	251	000373	00FB
188	000274	00BC	252	000374	00FC
189	000275	00BD	253	000375	00FD
190	000276	00BE	254	000376	00FE
191	000277	00BF	255	000377	00FF

Decimal to Octal to Hexadecimal

Decimal	Octal	Hex	Decimal	Octal	Hex
0	000000	0000	16384	040000	4000
256	000400	0100	16640	040400	4100
512	001000	0200	16896	041000	4200
768	001400	0300	17152	041400	4300
1024	002000	0400	17408	042000	4400
1280	002400	0500	17664	042400	4500
1536	003000	0600	17920	043000	4600
1792	003400	0700	18176	043400	4700
2048	004000	0800	18432	044000	4800
2304	004400	0900	18688	044400	4900
2560	005000	0A00	18944	045000	4A00
2816	005400	0B00	19200	045400	4B00
3072	006000	0C00	19456	046000	4C00
3328	006400	0D00	19712	046400	4D00
3584	007000	0E00	19968	047000	4E00
3840	007400	0F00	20224	047400	4F00
4096	010000	1000	20480	050000	5000
4352	010400	1100	20736	050400	5100
4608	011000	1200	20992	051000	5200
4864	011400	1300	21248	051400	5300
5120	012000	1400	21504	052000	5400
5376	012400	1500	21760	052400	5500
5632	013000	1600	22016	053000	5600
5888	013400	1700	22272	053400	5700
6144	014000	1800	22528	054000	5800
6400	014400	1900	22784	054400	5900
6656	015000	1A00	23040	055000	5A00
6912	015400	1B00	23296	055400	5B00
7168	016000	1C00	23552	056000	5C00
7424	016400	1D00	23808	056400	5D00
7680	017000	1E00	24064	057000	5E00
7936	017400	1F00	24320	057400	5F00
8192	020000	2000	24576	060000	6000
8448	020400	2100	24832	060400	6100
8704	021000	2200	25088	061000	6200
8960	021400	2300	25344	061400	6300
9216	022000	2400	25600	062000	6400
9472	022400	2500	25856	062400	6500
9728	023000	2600	26112	063000	6600
9984	023400	2700	26368	063400	6700
10240	024000	2800	26624	064000	6800
10496	024400	2900	26880	064400	6900
10752	025000	2A00	27136	065000	6A00
11008	025400	2B00	27392	065400	6B00
11264	026000	2C00	27648	066000	6C00
11520	026400	2D00	27904	066400	6D00
11776	027000	2E00	28160	067000	6E00
12032	027400	2F00	28416	067400	6F00
12288	030000	3000	28672	070000	7000
12544	030400	3100	28928	070400	7100
12800	031000	3200	29184	071000	7200
13056	031400	3300	29440	071400	7300
13312	032000	3400	29696	072000	7400
13568	032400	3500	29952	072400	7500
13824	033000	3600	30208	073000	7600
14080	033400	3700	30464	073400	7700
14336	034000	3800	30720	074000	7800
14592	034400	3900	30976	074400	7900
14848	035000	3A00	31232	075000	7A00
15104	035400	3B00	31488	075400	7B00
15360	036000	3C00	31744	076000	7C00
15616	036400	3D00	32000	076400	7D00
15872	037000	3E00	32256	077000	7E00
16128	037400	3F00	32512	077400	7F00

Decimal	Octal	Hex	Decimal	Octal	Hex
32768	100000	8000	49152	140000	C000
33024	100400	8100	49408	140400	C100
33280	101000	8200	49664	141000	C200
33536	101400	8300	49920	141400	C300
33792	102000	8400	50176	142000	C400
34048	102400	8500	50432	142400	C500
34304	103000	8600	50688	143000	C600
34560	103400	8700	50944	143400	C700
34816	104000	8800	51200	144000	C800
35072	104400	8900	51456	144400	C900
35328	105000	8A00	51712	145000	CA00
35584	105400	8B00	51968	145400	CB00
35840	106000	8C00	52224	146000	CC00
36096	106400	8D00	52480	146400	CD00
36352	107000	8E00	52736	147000	CE00
36608	107400	8F00	52992	147400	CF00
36864	110000	9000	53248	150000	D000
37120	110400	9100	53504	150400	D100
37376	111000	9200	53760	151000	D200
37632	111400	9300	54016	151400	D300
37888	112000	9400	54272	152000	D400
38144	112400	9500	54528	152400	D500
38400	113000	9600	54784	153000	D600
38656	113400	9700	55040	153400	D700
38912	114000	9800	55296	154000	D800
39168	114400	9900	55552	154400	D900
39424	115000	9A00	55808	155000	DA00
39680	115400	9B00	56064	155400	DB00
39936	116000	9C00	56320	156000	DC00
40192	116400	9D00	56576	156400	DD00
40448	117000	9E00	56832	157000	DE00
40704	117400	9F00	57088	157400	DF00
40960	120000	A000	57344	160000	E000
41216	120400	A100	57600	160400	E100
41472	121000	A200	57856	161000	E200
41728	121400	A300	58112	161400	E300
41984	122000	A400	58368	162000	E400
42240	122400	A500	58624	162400	E500
42496	123000	A600	58880	163000	E600
42752	123400	A700	59136	163400	E700
43008	124000	A800	59392	164000	E800
43264	124400	A900	59648	164400	E900
43520	125000	AA00	59904	165000	EA00
43776	125400	AB00	60160	165400	EB00
44032	126000	AC00	60416	166000	EC00
44288	126400	AD00	60672	166400	ED00
44544	127000	AE00	60928	167000	EE00
44800	127400	AF00	61184	167400	EF00
45056	130000	B000	61440	170000	F000
45312	130400	B100	61696	170400	F100
45568	131000	B200	61952	171000	F200
45824	131400	B300	62208	171400	F300
46080	132000	B400	62464	172000	F400
46336	132400	B500	62720	172400	F500
46592	133000	B600	62976	173000	F600
46848	133400	B700	63232	173400	F700
47104	134000	B800	63488	174000	F800
47360	134400	B900	63744	174400	F900
47616	135000	BA00	64000	175000	FA00
47872	135400	BB00	64256	175400	FB00
48128	136000	BC00	64512	176000	FC00
48384	136400	BD00	64768	176400	FD00
48640	137000	BE00	65024	177000	FE00
48896	137400	BF00	65280	177400	FF00

EIA RS-232-C AND CCITT V24
PLUG/PIN DESIGNATIONS

PIN	NAME	← TO DTE	→ TO DCE	FUNCTION	CIRCUIT (CCITT)	CIRCUIT (EIA)
1	FG			FRAME GROUND	101	(AA)
2	TD		→	TRANSMITTED DATA . .	103	(BA)
3	RD	←		RECEIVED DATA	104	(BB)
4	RTS		→	REQUEST TO SEND	105	(CA)
5	CTS	←		CLEAR TO SEND	106	(CB)
6	DSR	←		DATA SET READY	107	(CC)
7	SG			SIGNAL GROUND	102	(AB)
8	DCD	←		DATA CARRIER DETECT	109	(CF)
9		←		POSITIVE DC TEST VOLTAGE		
10		←		NEGATIVE DC TEST VOLTAGE		
11				UNASSIGNED		
12	(S)DCD	←		SECONDARY DATA CARRIER DETECT	122	(SCF)
13	(S)CTS	←		SECONDARY CLEAR TO SEND	121	(SCB)
14	(S)TD		→	SECONDARY TRANSMITTED DATA	118	(SBA)
15	TC	←		TRANSMITTER CLOCK. .	114	(DB)
16	(S)RD	←		SECONDARY RECEIVED DATA	119	(SBB)
17	RC	←		RECEIVER CLOCK	115	(DD)
18			→	RECEIVER DIBIT CLOCK		
19	(S)RTS		→	SECONDARY REQUEST TO SEND	120	(SCA)
20	DTR		→	DATA TERMINAL READY	108.2	(CD)
21	SQ	←		SIGNAL QUALITY DETECT.	110	(CG)
22	RI	←		RING INDICATOR	125	(CE)
23			→	DATA RATE SELECT.	111/112	(CH/CI)
24	(TC)		→	EXTERNAL TRANSMITTER CLOCK	113	(DA)
25			→	BUSY		

NOTE: DCE – DATA COMMUNICATIONS EQUIPMENT

DTE – DATA TERMINAL EQUIPMENT

*SCA is on Pin 11 for 202C's.

INTERFACE VOLTAGE

NOTATION	NEGATIVE	POSITIVE
Binary State	1	0
Signal Condition	Marking	Spacing
Function	OFF	ON

INTERCHANGE CIRCUITS BY CATEGORY

CIRCUIT Type	Circuit	PIN	RS-232C	Circuit	RS-449
COMMON	AB	7	SIGNAL GROUND	SG	SIGNAL GROUND
				SC	SEND COMMON
				RC	RECEIVE COMMON
				IS	TERMINAL IN SERVICE
	CE	22	RING INDICATOR	IC	INCOMING CALL
	CD	20	DATA TERMINAL READY	TR	TERMINAL READY
	CC	6	DATA SET READY	DM	DATA MODE
CONTROL	BA	2	TRANSMITTED DATA	SD	SEND DATA
	BB	3	RECEIVED DATA	RD	RECEIVE DATA
DATA	DA	24	TRANSMITTER SIGNAL ELEMENT TIMING (DTE SOURCE)	TT	TERMINAL TIMING
	DB	15	TRANSMITTER SIGNAL ELEMENT TIMING (DCE SOURCE)	ST	SEND TIMING
	DD	17	RECEIVER SIGNAL ELEMENT TIMING	RT	RECEIVE TIMING
TIMING	CA	4	REQUEST TO SEND	RS	REQUEST TO SEND
	CB	5	CLEAR TO SEND	CS	CLEAR TO SEND
	CF	8	RECEIVED LINE SIGNAL DETECTOR	RR	RECEIVER READY
	CG	21	SIGNAL QUALITY DETECTOR	SQ	SIGNAL QUALITY
CONTROL				NS	NEW SIGNAL
				SF	SELECT FREQUENCEY
	CH	23	DATA SIGNAL RATE SELECTOR (DTE SOURCE)	SR	SIGNALING RATE SELECTOR
	CI	23	DATA SIGNAL RATE (DCE SOURCE)	SI	SIGNALING RATE INDICATOR
DATA	SBA	14	SECONDARY TRANSMITTED DATA	SSD	SECONDARY SEND DATA
	SBB	16	SECONDARY RECEIVED DATA	SRD	SECONDARY RECEIVE DATA
CONTROL	SCA	19	SECONDARY REQUEST TO SEND	SRS	SECONDARY REQUEST TO SEND
	SCB	13	SECONDARY CLEAR TO SEND	SCS	SECONDARY CLEAR TO SEND
	SCF	12	SECONDARY RECEIVED LINE SIGNAL DETECTOR	SRR	SECONDARY RECEIVER READY
				LL	LOCAL LOOPBACK
				RL	REMOTE LOOPBACK
				TM	TEST MODE
OTHER				SS	SELECT STANDBY
				SB	STANDBY INDICATOR
		1	PROTECTIVE GROUND		SHIELD
		9,10	RESERVED FOR DATA SET TESTING		SPARE
		11,18	UNASSIGNED		

INTERCHANGE CIRCUITS BY CATEGORY

CONTACT NUMBERS		Circuit	C.C.I.T.T. RECOMMENDATION V.24	CIRCUIT DIRECTION
37 PIN	9 PIN			
19	5	102	SIGNAL GROUND	
37	9	102a	DTE COMMON	
20	6	102b	DCE COMMON	
28				–
15		125	CALLING INDICATOR	TO DCE
12,30a		108/2	DATA TERMINAL READY	FROM DCE
11,29a		107	DATA SET READY	
				TO DCE
4,22a		103	TRANSMITTED DATA	FROM DCE
6,24a		104	RECEIVED DATA	TO DCE
				FROM DCE
17,35a		113	TRANSMITTER SIGNAL ELEMENT TIMING (DTE SOURCE)	TO DCE
5,23a		114	TRANSMITTER SIGNAL ELEMENT TIMING (DCE SOURCE)	FROM DCE
8,26		115	RECEIVER SIGNAL ELEMENT TIMING (DCE SOURCE)	TO DCE
				FROM DCE
				FROM DCE
7,25a		105	REQUEST TO SEND	TO DCE
9,27a		108	READY FOR SENDING	FROM DCE
13,31a		109	DATA CHANNEL RECEIVED LINE SIGNAL DETECTOR	FROM DCE
33		110	DATA SIGNAL QUALITY DETECTOR	FROM DCE
34				TO DCE
16b		126	SELECT TRANSMIT FREQUENCY	TO DCE
16b		111	DATA SIGNALING RATE SELECTOR (DTE SOURCE)	TO DCE
2		112	DATA SIGNALING RATE (DCE SOURCE)	FROM DCE
				TO DCE
				FROM DCE
	3	118	TRANSMITTED BACKWARD CHANNEL DATA	TO DCE
	4	119	RECEIVED BACKWARD CHANNEL DATA	FROM DCE
				FROM DCE
	7	120	TRANSMIT BACKWARD CHANNEL LINE SIGNAL	TO DCE
	8	121	BACKWARD CHANNEL READY	TO DCE
				FROM DCE
	2	122	BACKWARD CHANNEL RECEIVED LINE SIGNAL DETECTOR	TO DCE
				FROM DCE
	10	141	LOCAL LOOPBACK	
	14	140	REMOTE LOOPBACK	
	18	142	TEST INDICATOR	
32		116	SELECT STANDBY	
36		117	STANDBY INDICATOR	
1	1			
3,21a				

a = First segment, second segment
b = Joint assignment

COMMUNICATIONS
CONTROLLERS
AND MODEMS

HP3OOO COMMUNICATION CONTROLLERS

30032B ASYNCHRONOUS TERMINAL CONTROLLER

The HP 30032B Asynchronous Terminal Controller is an interface for low-speed bit-serial asynchronous devices (e.g., terminals, bit serial line printers, etc.). The controller can multiplex data transmission for up to 16 ports which may be hardwired or modem connected, or any mix thereof. IOTERM0 interfaces the ATC hardware to the MPE operating system.

Features

● IOTERM0 provides speeds of: 110, 150, 300, 600, 1200, 2400 baud. The ATC hardware speed senses all baud rates.

● Will operate in full duplex or half duplex.

● Character sizes can vary from 5 to 8 bits excluding start and stop bits; however, only seven or eight data bit characters are supported on an HP 3000.

● Supports Bell 103J, 113D, 202S, 202T, 212A modems, VA3451, and HP35016A modems. Additional modems have been used but have not been verified/certified by HP.

● Supports RS-232-C and CCITT V.24 interface specifications.

● Odd or even parity may be generated on transmitted data. Parity is generated but not verified on received data. Default parity on output is ODD.

● Operates in direct I/O mode, i.e., one CPU interrupt for each character sent/received.

ATC Hardware Components

HP 30032B   Provides support of data transfers for up to 16 hardwired ports.

HP 30032B-001   Adds support of full duplex modem control signals for these same 16 ports.

HP 30032B-002   Adds support of half duplex control signals for the same 16 ports.

                 With the HP30032B and options 001 and 002, any of these 16 ports can support either direct connected devices, full or half duplex modems in any combination.

30018A ASYNCHRONOUS DATA COMMUNICATIONS CONTROLLER

The HP 30018A Asynchronous Data Communications Controller (ADCC) is
an interface for low-speed bit-serial asynchronous devices. The in-
terface consists of an ADCC main and extend PCA which multiplexes
data transmission for 8 ports which may be hardwired or modem con-
nected or any mix thereof. HIOTERM0 interfaces the ADCC hardware to
the MPE operating system.

Functions

● HIOTERM0 provides speeds of 110, 150, 300, 600, 1200, 2400, 4800,
  and 9600. HIOTERM0 will speed sense up to 2400 baud.

● Will operate in full duplex or half duplex. Half duplex is sup-
  ported only on the Series 30 and 33.

● Character sizes vary from 10 to 11 bits including start and stop
  bits where data is either 7 or 8 bits in length.

● Provides modem control for Bell 103J, 113D, 202S, 202T, 212A
  modems, VA3451, and HP35016A modems. Note: 202S modems are half
  duplex and are supported only on the Series 30 and 33.

● Supports the RS-232-C and CCITT V.24 interface specifications.

● Odd or even parity may be generated on transmitted data; even
  parity is generated and checked on received data. Default parity
  for the series 3x/4x/64 is pass thru.

● Provides four control lines for modem control.

● Performs all the generation of service requests and interrupt sig-
  nals via channel programs.

● Detects parity errors, over-run errors, and break conditions.

30144A, 30145A, 30155A ADVANCED TERMINAL PROCESSOR

The Advanced Terminal Processor (ATP) is an interface for low and medium-speed bit-serial asynchronous devices. The interface consists of a System Interface Board (SIB) and up to 8 asynchronous interface boards (AIB). It can multiplex data for up to 96 ports which may be hardwired or on modems or a mix thereof. HIOTERM1 interfaces the ATP hardware to the MPE operating system.

Functions

● The HIOTERM1 provides speeds of 110, 300, 600, 1200, 2400,4800, and 9600. The ATP hardware will speed sense at all supported speeds.

● Operates in full duplex.

● Character size is 10 bits including one start and one stop bit. NOTE: At 110 Baud there is a delay after sending a character to simulate a second stop bit.

● Provides modem control for BELL 103J, 113D, 202T, 212A, VA3451, and HP35016A modems. NOTE: Half duplex is not supported.

● Supports the RS-232C, RS-422, and CCITT V.24 interface specifications.

● Odd, even, or pass thru parity may be generated on transmitted data. Default on output data is odd when FOPENed and even or pass thru when speed-sensed.

● Hardware is responsible for data transfers via direct memory access.

ASYNC TERMINAL I/O CONFIGURATION

ASYNCHRONOUS TERMINAL CONTROLLER
    HP 30032B DRIVER IOTERM0

ASYNCHRONOUS DATA COMMUNICATIONS CONTROLLER
    HP 30018A DRIVER HIOTERM0

ADVANCED TERMINAL PROCESSOR
    HP 30144A SIB
    HP 30145A DIRECT CONNECT AIB
    HP 30155A MODEM AIB
    DRIVERS HIOTERM1, HIOASLP0

LOGICAL DEVICE #? any appropriate number

DRT #? For ATC:

      DRT= 7 (for first system)
         10 (for second system)
         13 (for third system)
         16 (for fourth system)

      For ADCC and ATP:

    DRT# = (IMBI# x 128) + (CHANNEL# x 8) + DEVICE#

UNIT #? For ATC = 0-15 for each system

      For ADCC = 0 for all ports on each system

      For ATP = 0-95 for each subsystem

SOFTWARE CHANNEL #? 0

TYPE? 16 or 32

SUBTYPE?   Speed Sensing:

  Subtype 0 Directly connected terminals requiring speed sensing.

  Subtype 1 Asynchronous full duplex modems such as Bell 103's and
          CCITT V.21 modems requiring speed sensing.

  Subtype 2 Asynchronous half duplex modems with reverse channels
          (such as Bell 202S and CCITT V.23 modems). Speed sens-
          ing is performed and "Data Rate Select" (RS232C "CH"
          -CCITT 111) is set ON. Not available on HP 4X/64.

  Subtype 3 Identical to subtype 2 except that "Data Rate Select"
          is set OFF. Not available on HP 4X/64.

No Speed Sensing - Speed Specified:

Subtype 4 Identical to subtype 0 except that automatic speed sensing is disabled. This subtype is intended for operation with leased-line full duplex modems which can be configured to operate without control signals (i.e., 202T).

Subtype 5 Identical to subtype 1 except that automatic speed sensing is disabled.

Subtype 6 Identical to subtype 2 except that automatic speed sensing is disabled. Series II/II only.

Subtype 7 Identical to subtype 3 except that automatic speed sensing is disabled. Series II/III only.

Subtype 14 Directly connected 2631B.

Subtype 15 Remote 2631B over full duplex modems.

SPEED IN CPS? up to 9600 baud

TERM TYPE?

(See the table of terminal types on the following page.)

RECORD WIDTH?

40 (words). Default varies with terminal, 66 for printers.

OUTPUT DEVICE?

Class name or Ldev #

ACCEPT JOBS/SESSIONS?   YES

ACCEPT DATA?   YES

INTERACTIVE?   YES

DUPLICATIVE?   YES

INITIALLY SPOOLED?   NO

DRIVER NAME?   IOTERM0, HIOTERM0, HIOTERM1, HIOASLP0

DEVICE CLASSES? (optional)

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TERMINAL TYPES

Term Type (a)	Device Type = 16			subtype=		Typical Terminal	Term.Protocol(d)		
	ATC (b)	ADCC (b)	ATP (b)	SSLC (c)	INP (c)		ENQ/ACK	X ON/X OFF	Block Mode
0	0-7	--	--	--	--	ASR 33	No	Yes	No
1	0-7	--	--	--	--	ASR 37	No	Yes	No
2	0-7	--	--	--	--	ASR 35	No	Yes	No
3	0-7	--	--	--	--	Execuport	No	Yes	No
4	0-7	0-5	--	--	--	Datapoint	No	Yes	No
5	0-7	--	--	--	--	Memorex 1240	No	Yes	No
6	0-7	0-5	0-1	--	--	Terminet	No	Yes	No
9	0-7	0-5	0-1	--	--	Minibee	No	Yes	No
10	0-7	0-5	0-1	--	--	HP 2640B/ 44/45; HP 262X;	Yes	Yes	Yes
11	0-7	0-5	--	--	--	HP 2640A full enter capability	Yes	Yes	Yes
12	0-7	0-5	0-1	--	--	HP 2645K 8 bit word w/o parity	Yes	Yes	Yes
13	0-7	0-5	0-1	--	--	Telenet Pseudo-Terminal or 2601	No	Yes	No
14	--	--	--	0-3	0-3	Multipoint (HP 26xx, HP 307x)	No	No	Yes

Term Type	Parity Check (e)	Parity Type (f)	CARRIAGE CONTROL Cursor Back-space	CARRIAGE CONTROL CTL-H Reply	CARRIAGE CONTROL Form Feed Reply	Comments (g)
0	Yes	1,2	No	\(%134)	LF reply used.	
1	Yes	1,2	Yes	LF	Yes	
2	Yes	1,2	No	\(%134)	Yes	
3	Yes	1,2	Yes	LF	Yes	
4	Yes	1,2	Yes	Ctl-Y (EM) No display	LF reply used.	Series 30/33 ADCC: Subtypes 0-5.
5	Yes	1,2	Yes	LF	Yes	
6	Yes	1,2	Yes	LF	Yes	
9	Yes	1,2	Yes	null	Yes	At input ESC-A - ESC-E, ESC-H, ESC-J and ESC-K are stripped off on Series II/III
10	Yes	1,2	Yes	null	Yes	Uses ENQ/ACK hand-shake when write to terminal is greater than 80 characters.
11	Yes	1,2	Yes	null	Yes	Limited support for line block mode.
12	No, 8 data bits	5	Yes	null	Yes	Uses ENQ/ACK hand-shake when write to terminal is greater than 80 characters.
13	Yes	1,2	Yes	null	Yes	No echo.
14	Yes	6,9	n/a	n/a	n/a	Not used on ATC or ADCC. MTS/3000 required.

TERMINAL TYPES

Term Type (a)	Device type=16, subtype=					Typical Terminal	Term.Protocol(d)		
	ATC (b)	ADCC (b)	ATP (b)	SSLC (c)	INP (c)		ENQ/ ACK	X ON/ X OFF	Block Mode
15	0-7	0-5	0-1	--	--	HP 2635 8 bit word w/o parity	Yes	Yes	No
16	0-7	0-5	0-1	--	--	HP 2635 7 bit word	Yes	Yes	No
17	--	--	0-1	0-3	0-3	Reserved	No	No	Yes
18	0-7	0-5	0-1	--	--	General Non-HP Terminal	No	Yes	No
31	0-7	--	--	--	--	Default Series III only Terminal	No	Yes	No
Device Type = 32									
19	14-15	14-15	14-15	--	--	2631B Serial Printer	No	Yes	No
20	No	14	14	--	--	2631B	No	Yes	No
21	No	14-15	14-15	--	--	2631B	No	Yes	No
22	No	14	14	--	--	2631B	No	Yes	No

Footnotes are on page B-12.

Term Type	Parity Check (3)	Parity Type (f)	CARRIAGE CONTROL Cursor Back-space	CARRIAGE CONTROL CTL-H Reply	CARRIAGE CONTROL Form Feed Reply	Comments (g)
15	No, 8 data bits	5	Yes	LF	Yes	Use ENQ/ACK hand-shake when write to terminal is greater than 80 characters. Sends ENQ before writing. Does not time out.
16	Yes	1,2	Yes	LF	Yes	Uses ENQ/ACK hand-shake when write to terminal is greater than 80 characters. Sends ENQ before writing. Does not time out.
17	Yes	9	n/a	n/a	n/a	Not used on ATC or ADCC
18	Yes	1,2	Yes	null	Yes	No DC1 sent to start read. No ENQ/ACK handshake.
31	Yes	1,2	Yes	\(%134)	Yes	
19	Yes	1	n/a	n/a	Yes	Status checking done, extensive operator messages.
20	No	5	n/a	n/a	Yes	Same as 19 but no parity.
21	Yes	1	n/a	n/a	Yes	60 second time-out on status check.
22	No	5	n/a	n/a	Yes	Same as 21 but no parity.

Footnotes are on page B-12.

TERMINAL TYPES

(a) When successive HELLO commands are used without the use of
    the TERM parameter, and without any intervening BYE com-
    mands, the termtype value is carried forward.
(b) ATC, ADCC, & ATP subtypes are described on page B-4.
(c) SSLC & INP subtype =
    0 Group poll Hp 264x
    1 Individual poll Hp 264x
    2 Group poll HP 307x
    3 Individual poll HP 307x
(d) CTL-S & CTL-Q are allowed on all but logon types for multi-
    point, termtypes 14 and 17.
(e)

SERIES III TERMINAL GENERATES	HP 3000 OUTPUT GENERATES	HP 3000 INPUT
Odd parity or none (0)	Odd parity	No parity checking is accomplished unless explicitly enabled via FCONTROLS. The eighth bit is always set to zero.
Even parity or none (1)	Even parity	
SERIES 3X/4X/64 TERMINAL GENERATES	HP 3000 OUTPUT GENERATES	HP 3000 INPUT
Odd parity or none (0)	Eighth bit is passed	Eighth bit is passed through.
Even parity or none (1)	Even parity	Even parity is checked on input.

Parity verification may be allowed using the HP 3000 file
system to enable and disable parity checking, to enable
and disable binary transfers, and to set parity. All of
these are accomplished using the FCONTROL intrinsic, and
may be used on all but logon terminal types 12 and 15.
(f) Types =   Types =
    1 odd   6 8 data bits, odd parity for
    2 even   Bisync control characters.
    3 7 data, 8=0   7 reserved
    4 7 data, 8=1   8 reserved
    5 8 data bits, no   9 block checking
      parity
(g) Form Feed Char=%14

```
┌─────────────────────────────────────────────────────────┐
│       <─────────DATA TRANSMISSION CHANNEL─────────>       │
│                      TELECOMMUNICATIONS                   │
│    DATA         DATA        NETWORK      DATA       DATA   │
│  TERMINAL   COMMUNICATION            COMMUNICATION TERMINAL│
│  EQUIPMENT    EQUIPMENT                 EQUIPMENT  EQUIPMENT│
│   ┌─────┐    ┌─────┐     ┌─────────┐   ┌─────┐   ┌─────┐   │
│   │ DTE │────│ DCE │─────│   TCN   │───│ DCE │───│ DTE │   │
│   └─────┘    └─────┘     └─────────┘   └─────┘   └─────┘   │
│                                                           │
│      STATION A                        STATION B           │
└─────────────────────────────────────────────────────────┘
```
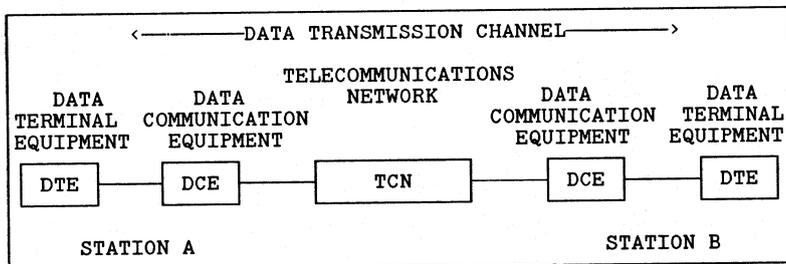
COMMUNICATIONS NETWORK COMPONENTS

RS232C MODEM/HARDWIRE EXTENSION CABLE MANUFACTURING SPECIFICATIONS (CABLE, UNSHIELDED)

The specification establishes requirements for a 3 or 25 conductor external low voltage computer cable with overall jacket: U.L. style 2560.

ELECTRICAL

Voltage Rating: 30V for Class 2 wiring systems only (220V rms test between conductors).

MECHANICAL

Singles: Three or twenty-five 26 (7 x 34) AWG tinned copper; tinned after stranding.

Insulation: PVC, seven-mil minimum wall thickness; rated at +60°C.

Cable Lay: Twist singles for flexibility.
              Fillers, cloth or nylon binding
              may be used for a smooth, round construction.

Jacket: PVC, 35-mil minimum wall thickness; rated at +60°C.

Color: Jade Gray per Visual Color Std., HP Part No.6009-0021.

ATC/ADCC/ATP CABLING

25 PIN RS232C INTERFACE CABLES FOR ATC, ADCC, ATP

```
Modem to connector panel, 25 ft.                        30062B
                         50 ft.                     30062B-001
Terminal to connector panel or US modem, 16 ft.        132n2N
Terminal to connector panel or European modem, 16 ft.  132n2M

    n = 2  262X  port 1
        3  264X
        4  262X  port 2 and 2382

Extension cable, 25 ft.                                 30062C
                50 ft.                             30062C-001
```

3 PIN RS232C INTERFACE CABLES FOR ATP

```
Terminal to connector panel                            132n2X
    (25 pin to 3 pin)

    n = 2  262X  port 1
        3  264X
        4  262X  port 2 and 2382

Adapter Cable to convert 25 pin                        30152A
    (connector to 3 pin)

Extension Cable, 50 ft.                                30153A
```

5 WIRE RS422 INTERFACE CABLES FOR ATP

```
Terminal to connector panel, 16 ft.
    262X                                               13222P
    264X                                               13232I
(Terminal must have opt 035)

Extension Cable, 90 ft.                                30154A
```

5 PIN RS422 HARDWIRE OR EXTENSION CABLE FOR ATP

The specification establishes requirement for a 5 conductor
shielded cable - UL styles 2464 and 1061.

ELECTRICAL

Voltage Rating: 300V rms @80oC (1000V rms between conductors
              and conductors to shield.
Conductor Resistance, dc: <30 ohms/1000 ft.
Mutual Pair Capacitance: <=22 pf between wires in pair.
Stray Capacitance: <=40 pf between one wire and all others
              (grounded)
Pair-to-Pair Balanced Crosstalk: >=40 dB of attenuation at
              150KHz between any two pairs.

MECHANICAL

Singles: Two twisted pairs plus one single AWG 24(7X32) tinned,
              stranded copper.
Insulation: PVC
Colors: One conductor of each twisted pair - white; the other
              conductors - blk, brn. Single conductor - red.
Cable Lay: Twist the twisted pairs around the single.
Shield (Inner): Metallized polyester; metalization facing outward
Shield (Outer): Braid from AWG 36 tinned copper for 85% minimum
              coverage.
Jacket: PVC, 35 mil minimum wall thickness.
Color: Pearl Gray cabinet per HP Visual Color Standard 6009-0108.

ASYNCHRONOUS TERMINAL CONTROLLER
MODEM CABLE PIN CONNECTIONS
(30062B)

COMPUTER   DATA SET

(BB) RECEIVE DATA   2<—   ┌—>2 -SEND DATA (BA)

(BA) SEND DATA   3>——┘ └<3 -RECEIVE DATA (BB)
(CF) CARRIER DETECT   4<—   ┌—>4 -REQUEST TO SEND (CA)

(CD) DATA TERMINAL   5   ——>5 -CLEAR TO SEND (CB)
     READY   6>—   —<6 -DATA SET READY (CC)
(AB) COMMON RETURN   7<—————>7 -COMMON RETURN (AB)
(CA) REQUEST TO SEND   8>—   —<8 -CARRIER DETECT (CF)
***(SCF) SECONDARY   10   10   SECONDARY REQUEST
     RECEIVE LINE   11<—   11 -TO SEND (SCA)*
     SIGNAL DETECTOR   12>—   —>12 -SECONDARY RECEIVE
***(SCA) SECONDARY   13   13   LINE SIGNAL DETECT
     REQUEST TO SEND   14   14   (SCF)

                                 19   —>19   SRTS*
(CC) DATA SET READY   20<—   —>20 -DATA TERMINAL READY (CD)
(CB) CLEAR TO SEND   22<—   22
**(CH) FREQUENCY SELECT   23<————>23

   * Required for 202S data sets only - physically strapped
     together in the modem. The DTE can control SCA from
     either pin 11 or pin 19.
  ** European modems only.
 *** For 202C modems; Pin 11 is Supervisory Transmitted Data
                 (SBA) at the DCE.
                 Pin 12 is Supervisory Receive Data (SBB)
                 at the DCE.
                 Cross connect pins 11-12 and 12-11 for
                 202C.

ASYNCHRONOUS TERMINAL CONTROLLER
HARDWIRED/MODEM CABLE PIN CONNECTIONS
(132X2N)

```
      (DCE)                                        (DTE)
COMPUTER OR MODEM                                TERMINAL


(BA)   SEND DATA          -2 <------- 2 -SEND DATA (BA)
(BB)   RECEIVE DATA       -3 -------> 3 -RECEIVE DATA (BB)
(CA)   REQUEST TO SEND    -4 <------- 4 -REQUEST TO SEND (CA)
(CB)   CLEAR TO SEND       5 -------> 5  CLEAR TO SEND (CB)
(CC)   DATA SET READY     -6 -------> 6 -DATA SET REACY (CC)
(AB)   COMMON RETURN      -7 <------> 7 -COMMON RETURN (AB)
(CF)   CARRIER DETECT     -8 -------> 8 -CARRIER DETECT (CF)

(SCF)  SECONDARY CARRIER                SECONDARY CARRIER
       DETECT           -12 -------> 12 -DETECT (SCF)


(SDA)  SECONDARY REQUEST                SECONDARY REQUEST
       TO SEND          -19 <------- 19 -TO SEND (SCA)
(CD)   DATA TERMINAL READY-20 <------- 20 -DATA TERMINAL READY (CD)

(CH)   FREQUENCY SELECT  -23 -------> 23 -FREQUENCY SELECT (CH)

                    MALE        FEMALE
```

ATC/ADCC/ATP CABLING

FOR UNSUPPORTED TERMINALS DIRECTLY CONNECTED ON AN ATC THAT NEED RS-232-C SIGNALS CONFIGURE AS SUBTYPE 4, AND CONSTRUCT CABLE AS FOLLOWS:

```
        DTE                            DCE
     (COMPUTER)                    (EIA COMPATIBLE
                                       DEVICE)


(BA)   SEND DATA        2<─────── 2   SEND DTA (BA)
(BB)   RECEIVE DATA     3 ──────>3   RECEIVE DATA (BB)
                        4    ┌─4   REQUEST TO SEND (CA)
                        5    └─>5   CLEAR TO SEND (CB)
                        6    ┌─>6   DATA SET READY (CC)
(AB)   COMMON RETURN    7<──┤─>7   COMMON RETURN (AB)
                        8    ├─>8   CARRIER DETECT (CF)

                        20   └─>20 DATA TERMINAL READY (CD)
```
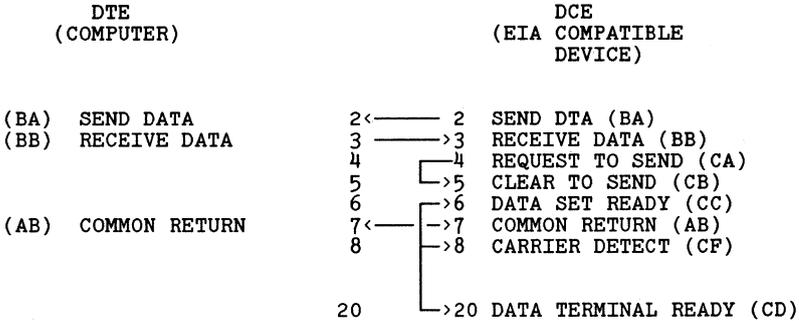
TO CABLE TERMINALS ON AN ADCC 202T MODEM, CONFIGURE AS SUBTYPE 0 AND CONSTRUCT WITHOUT SUPPORT USING THE FOLLOWING SPECIAL CABLE:

```
        DTE                            DCE
     (COMPUTER)                  (EIA COMPATIBLE DEVICE)


                        PIN    PIN
(BA)   SEND DATA        2<─┐  ┌─>2   SEND DATA (BA)

(BB)   RECEIVE DATA     3>──┘  └─<3   RECEIVE DATA (BB)
                        4      ┌─>4   REQUEST TO SEND (CA)

(AB)   COMMON RETURN    7<─────●─>7   COMMON RETURN (AB)

                        9      ├─>9   POSITIVE DC TEST

                        20     └─>20 DATA TERMINAL READY (CD)
```
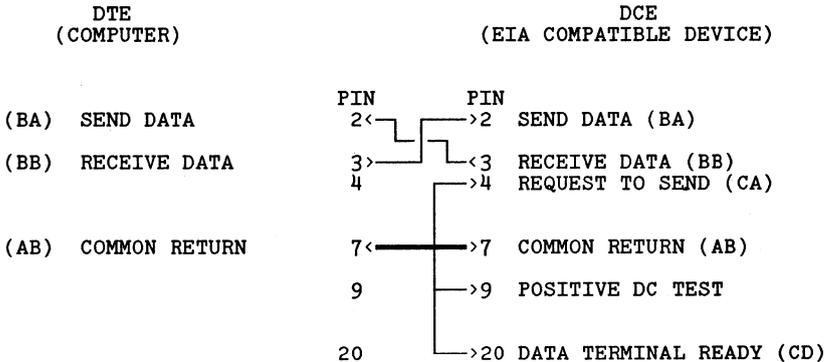
Following are the recommended asynchronous modems and options to be used in conjunction with the ATC, ADCC, and ATP. Note that these options are those required at the CPU end (local). To insure successful communication with the remote end, different options in the remote data set may be required.

For further definition of these options/modem capabilities refer to the relevant "Bell System Technical Reference" publication that is available from your local Bell System Representative.

BELL 103J AND 113D MODEMS

0-300 Bits/sec, Asynchronous
Full duplex on 2-wire operation
Works with another 103, 113, 212A, VA3451, or HP35016A Modem

OPTION	DESCRIPTION	RECOMMENDATIONS COMPUTER	TERMINAL
A1	Send Space Disconnect	X	X
B3	Receive Space Disconnect	X	X
C5	Loss of Carrier Disconnect	X	X
D7	Fail Safe State on CN Circuit OFF	X	X
E9	Auto Answer YES	X	

ASYNCHRONOUS MODEMS

BELL 202S MODEM

Asynchronous,half duplex, with Reverse Channel, in switched
network applications.
Speed 1200 bits per second.

NOTE: Not supported on an HP 3000/4X/64

OPTION	DESCRIPTION	RECOMMENDATIONS COMPUTER	TERMINAL
A1 A2	Local copy on primary No local copy on primary	X	X
B3 B4	Local copy on Reverse No local copy on Reverse	Note 1	
C5	Telephone company engineer timing options	X	X
D8	Data Set Ready Interface lead OFF in Analog loopback test mode	X	X
E9 E10	Automatic Answer IN (Note Automatic Answer OUT 2)	X	X
F11	Signal ground connected to Frame Ground	X	X

Notes: 1. If terminal has internal echo capability to provide
          local copy use B4, otherwise specify B3 for local
          copy.
       2. Auto answer depends on application. Generally, the
          terminal is dialed manually, and the computer auto
          answers.

BELL 202T-L1A MODEM

Asynchronous Modem, provides Self Test, Analog Loopback and Remote Test capabilities.

Generally, used with HP 3000 at 1200 bits per second; full duplex on normal 3002 channel 4-wire service (no reverse channel).

Subtype 4 is preferred for configuration without speed sense. (Subtype 0 may also be used, however, noisy line or power failure may cause potential trouble with speed sense.)

OPTION	DESCRIPTION	RECOMMENDATIONS COMPUTER	TERMINAL
A2	No local copy on primary channel	X	X
B4	No local copy on reverse channel	X	X
C5	Telephone company engineer timing options	X	X
D7	Telephone company engineer control options	X	X
E10	Reverse channel not installed	X	X
F11	Signal Ground connected to Frame Ground	X	X

ASYNCHRONOUS MODEMS

BELL 212A MODEM

0-300 bits per second asynchronous
1200 bits per second asynchronous

Compatible with 103/113 type modem at 300 bits per second, and
212 type modem at 1200 bits/second full duplex type operation.

Use subtype 1 or 5.

OPTION	DESCRIPTION	RECOMMENDATIONS COMPUTER	TERMINAL
A2	Customer selected disconnect options a. Send space disconnect b. Receive space disconnect c. Loss of carrier disconnect	IN OUT IN	OUT IN don't care
B3	Automatic Answer	YES	
C6	Customer selected EIA interface a. Data set ready (CC) indication for analog loop b. Clear to send (CB) and carrier (CF) indications c. Signal ground to frame d. Answer mode indication (CE) e. Interface speed indication f. Speed control g. Interface controlled DL h. CN & TM assignments	OFF COMMON IN OFF OUT HS OUT CN-25	OFF COMMON IN OFF OUT HS OUT CN-25
D8	Customer selected modes a. 1200 bps operation b. Character length c. Transmitter timing d. Speed mode e. Receiver responds to DL	ASYNC 10 INT DUAL OUT	ASYNC 10 INT DUAL don't care
E10	Make Busy/Analog Loop (CN) circuit disabled	OUT	OUT
F11	TELCO Option Table tip-ring make busy	don't care	IN

HP35016A and VADIC 3451P/S

OPTION	DESCRIPTION	RECOMMENDATION
A1	Attended Disconnect	ON
A2	Respond to Remote Test Enable	ON
A3 & A5	Character Length - 10 bits	A3 ON, A5 OFF
A4	103 Operation Enabled	ON
A6	Standard Options Mode Disabled	ON
A7	Loss of Carrier Disconnect Disabled	OFF
B1	Remote DLB Select	ON
B2	Controlled by DTE	OFF
B3	Originate/Answer	OFF
B4	Maximum Data Rate 1205 BPS	OFF
B5	Auto Disconnect/Abort Timer Enabled	ON
B6	Data Timing Asynchronous	OFF
B7	Data Set Ready in Test DSR ON	OFF
W1-W5	Top Board Straps	OUT

ASYNCHRONOUS TERMINAL CABLING

POINT-TO-POINT CABLE CONFIGURATIONS

CABLES AND MODEMS | TERMINALS

2675A
Cable Option
◁————▷ 2675A
301, 302 or 303

Cable Included
with terminal (2M)
◁————▷ 2631B

Hardwired
up to   30062D
50 feet (Optional)

Remote ◁ 30062C   30062B [Modem] ✶//✶ [Modem] 30062C
(Optional) ✱   (Optional) ✱
         └── Required. Order Separately.

Included with
Printing Terminal
◁————▷ 2635B

Cables
Not included with
Display Terminal.
Order Separately.
◁————[] 264x CRT
13232A/M/N
◁————[] * 307x †
13232Y

Cables
Not included with
Display Terminal.
Order Separately.
◁————[] 262x CRT
13222N M
◁————[] *
13222Y

◁————▷ ..
13242M N
◁————[] ..
13242Y

Key:
◁—— Male DTE Connector
◁—— Female DTE Connector
——[] PC Edge Connector

* Only option 001 is supported for RS-232-C distance
specifications.

30360A HARDWIRED SERIAL INTERFACE

The HP 30360A is a controller interface which uses modified binary synchronous protocol for high speed asynchronous data communications between HP 3000 CPUs and/or the HP 1000 systems used with the DS/3000 subsystems. (RJE/3000 will also run using this controller between two HP 3000 Systems.) The connection between machines is via a pair of coaxial cables.

Features

- 2.5 Mega-bits per second transfer rate up to 1000 ft. cable lengths.

- 1.25 Mega-bits per second transfer rate up to 2000 ft. cable lengths.

- Transmission is half duplex in a full duplex environment in point-to-point mode.

- CRC parity checking on the controller.

- Speed is system configurable.

- Four separate transmit/receive channels, only one of which may be open at any one time.

- Maximum number of active HSIs per CPU is two.

Basic Configuration

Hardwired Serial Interface Kit includes one PC board (30360-60001), cable connector panel (30360-60003), and one coaxial cable as follows:

30220A	25 ft.
Opt. -001	100 ft.
Opt. -002	250 ft.
Opt. -003	500 ft.
Opt. -004	1000 ft.
Opt. -005	2000 ft.

HSI

HSI LINK -- 3000 TO 3000
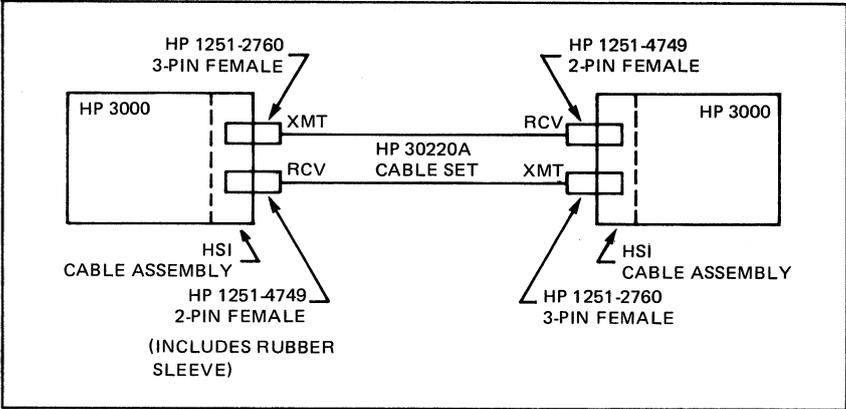
HSI LINK -- 3000 TO 1000
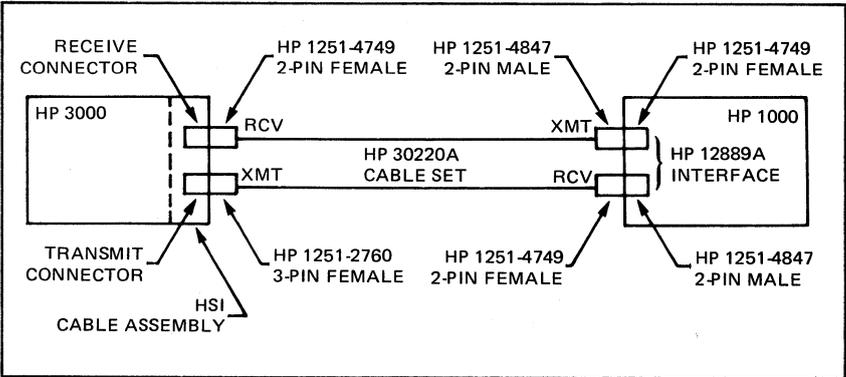
30055A SYNCHRONOUS SINGLE LINE CONTROLLER

The HP 30055A SSLC is a controller interface for high speed bit-serial synchronous devices. The controller can accommodate one modem device and is utilized with the RJE, DS, MRJE, and MTS subsystems. With MTS (Multipoint Terminal Software), the SSLC board may option-ally be used for asynchronous transmissions. An SSLC may NOT be used for IMF, Remote Data Link (MTS), HP 2608S printer, or HP 2333A Cluster Controller.

Features

● 75 to 19,200 bits/sec. 9600 bps max certified for use with modems to date.

● Operates on a 2-wire (half duplex) or 4-wire (full duplex) circuit and/or split-speed.

● Transmission is always half duplex, IBM binary synchronous protocol.

● May be utilized in a leased or dial up environment.

● Data communications may be point-to-point (RJE, DS, and MRJE) or multipoint (MTS).

● Character size may be six to eight bits in length, for synchronous, five to nine for asynchronous.

● Supports HP 37210T, HP 37220T, HP 37230A, Bell 201C, 208A, 208B, 209A modems, and DATAPHONE II (2024,2048,2096). Additional modems have been used but have not been verified/certified by HP.

● Supports the standard EIA RS232C and CCITT.V24 interface specifications.

● Odd or even parity may be specified. Under System Software, addi-tional LRC and CRC parity is provided.

● Maximum number of SSLC's per CPU is 7.

Basic Configuration

Synchronous Single Line Controller kit includes one PC board (30055-60001), cable assembly (30055-60008*), and test connector (30055-60009). On previously installed systems, obsolete interface cable 30055-60003 and obsolete test connector 30055-60005 may be present. Within the United States this combination will work for synchronous testing. Outside the USA, only the 30055-60008* cable and 30055-60009 test connector combination is recommended for synchronous mode. (Note that the test connectors are designed for use with a particular cable and thus are not interchangeable.)

SSLC CABLING – SYNCHRONOUS

For asynchronous communication under MTS, use cable assembly 30055-60010.

*30055-60011 replaces 30055-60008. Pin 23 (Modem speed) tied high on 60011 cable. (Always "ON")

HP 30055-60010 CABLE AND TEST CONNECTOR WIRING DIAGRAM

INTERCONNECTING CABLE ASSY (PART NO. 30055-60010)		SIGNAL IN EXTERNAL DEVICE	TEST CONNECTOR ASSY (PART NO. 30055-60009)
P1A-B7	P2-19	SCA	<
P1A-B8	P2-4	CA	<
P1A-A16	P2-23	CH	<
P1A-A15	P2-20	CD	<
P1A-A2	P2-3	BB	<
P1A-A24	P2-2	BA	<
P1A-A3	P2-5	CB	<
P1A-A7	P2-12	SCF	<
P1A-B3	P2-6	CC	<
P1A-A12	P2-22	CE	<
P1A-B4	P2-8	CF	<
P1A-B12	P2-21	CG	<

HP 30055-60011 CABLE AND TEST CONNECTOR
WIRING DIAGRAM

INTERCONNECTING CABLE (PART NO. 30055-60011)		SIGNAL IN EXTERNAL DEVICE	TEST CONNECTOR ASSY (PART NO. 30055-60009) 5061-2507
P1A-B7	P2-14	SBA	<
P1A-B8	P2-4	CA	<
P1A-A16	P2-23	CH	<
P1A-A15	P2-20	CD	<
P1A-A23	P2-24	DA	<
P1A-A2	P2-3	BB	<
P1A-A24	P2-2	BA	<
P1A-B24	P2-17	DD	<
P1A-A7	P2-16	SBB	<
P1A-B3	P2-6	CC	<
P1A-A12	P2-22	CE	<
P1A-B4	P2-8	CF	<
P1A-A3	P2-5	CB	<
P1A-B12	P2-15	DB	<
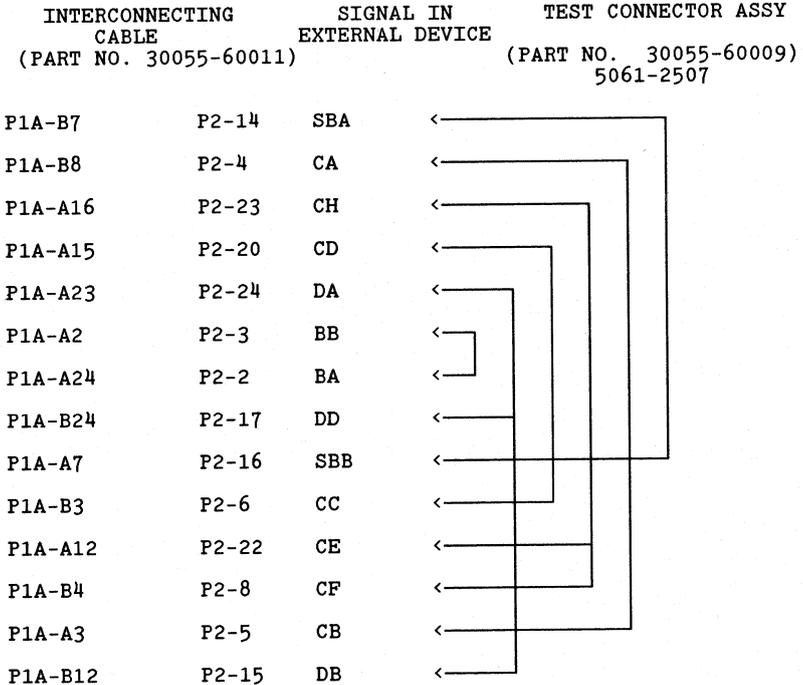
NOTE:
* Obsolete SSLC cable (Part No. 30055-60003) has DA signal presented on pin 13.
* Obsolete test connector (Part No 30055-60005) has pins 13, 15, and 17 tied together.
* Obsolete SSLC cable 30055-60008 replaced by 30055-60011. An upgrade is only necessary if a dual speed modem is to be installed.
* Note pin 25 is tied high on 60011 cable.
* Connector Part No. 30055-60009 is the same as 5061-2507. Pins 12, 19, 21 are not shown and not required.

INTELLIGENT NETWORK PROCESSOR (INP)

30010A, 30020A/B INTELLIGENT NETWORK PROCESSOR

The Intelligent Network Processor (INP) is a computer system which provides the HP 3000 with data communciations capabilities in a high speed as well as a low speed environment. The HP 30010A is used with a Series II/III. The HP 30020A/B is used with Series 3X/4X/64. An INP can accommodate one modem, or a test hood, or an INP to SSLC direct connect cable, or an INP to INP direct connect cable. An INP may be used with the RJE, DS, MRJE, MTS, and IMF subsystems. With MTS an INP may optionally be used for asynchronous transmission.

Features:

- Maximum data transfer rates: NOTE: Data transfer rates are influenced by the communications subsystem being used. Up to 19,200 bits per second in half duplex or full duplex mode using a modem. Up to 56,000 bits per second in CCITT V.35 (DDS) connections, or for INP to INP connections, hardwired.

- Operates on two wire (half duplex) or four wire (full duplex) circuits.

- Performs data communications protocol handling. Transmission is in half duplex, IBM binary synchronous protocol for an HP 3000. The INP is HDLC/SDLC protocol compatibile.

- May be utilized in a leased or dial up (switched) environment.

- Data communications may be point-to-point (RJE, DS, MRJE, IMF) or multipoint (MTS and IMF).

- Character size may be seven to eight bits in length.

- Modems Supported: HP 37210T, HP 37220T, HP 37230A, Bell 201C, Bell 208A, Bell 208B, Bell 209A, and Dataphone II, DDS. Also Bell 202T and 212 for Remote Data Link (MTS). The 30020B supports the Bell 801 Auto Call Unit and the Vadic 811 Autodialer. Additional modems have not been verified or certified by HP.

- Interfaces supported: EIA RS232C, CCITT V.24, V.28, V.34 (DDS).

- Odd, even, or no parity may be specified. Cyclic redundancy checking (CRC) is provided.

- Buffering is through 1024 word buffers.

- The INP uses an LSI DMA controller chip to provide three high speed channels between data buffers in RAM and the HP 3000 Interface, as well as between RAM and datacomm LSI devices.

- The maximum number of HP 30010A INP's per Series II/III is 7; of HP 30020A/B INP's per Series 30/40 is 3; of HP 30020A/B INP's per Series 33/44 is 7; of HP 30020B INP's per Series 64 is 16.

● Diagnostics and self-testing built in; diagnostics run under MPE (DSM).

Basic Configuration:

The standard HP 30010A INP consists of:

● One INP Micro-processor PCA board (30010-60001)

● One INP Data communications interface PCA board (30010-60002)

● One Flat Cable (ribbon cable for connecting the two INP PCA boards) (30000-93052)

● One Memory Power Jumper PCA board (30380-60033)

● One I/O Memory Power Cable (30380-60034)

● One I/O Memory Jumper Cable (30380-60035)

The standard HP 30020A/B INPs consist of:

● One INP Network processor PCA board (30020-60001)

● One HP-IB ribbon cable (30030-60008) standard length, or 8120-2848 (optional longer cable)

HP 3000 SERIES II/III CABLE ASSEMBLIES FOR 30010A

Product Number	Description	Part Number
30222A	RS232 Synchronous Modem Cable	30222-60001
30222B	Asynchronous Multipoint Cable	30222-60002
30222F	HP3000 to HP1000 direct connect	30222-60006
30222D	High-speed Synchronous Modem Cable	30222-60004
30224A	INP-to--INP Direct-Connect Cable	5061-2524
30224L	External Interconnect Cable (10-meter)	30224-60001
30225A	INP to SSLC Direct Connect Cable (Modem Eliminator Cable)	30225-60004

INTELLIGENT NETWORK PROCESSOR (INP)

HP 3000 SERIES II/III TEST EQUIPMENT COMPATIBILITY

Description	Part Number	Used With Cable Product Number
Board Test Hood	5061-2527	30222A 30225A
	5061-2529	30222D
	5061-2530	30224A
Cable Test Connector (See Note)	5061-2507 30055-60009	30222A
	5061-2512	30224A
	30225-60004	30225A

Note: Pins: 2-3, 4-5-21, 6-20, 8-22-23, 12-14-16-19, 15-17-24.

HP 3000 SERIES 3X/4X/64 EQUIPMENT COMPATIBILITY:

Description	Part Number	Used With Cable Product Number
Board Test Hood	5061-2519	30221A 30221B 30225B
	5061-2522	30224B
Cable Test Connector (See Note)	5061-2507 30055-60009	30221A 30221B
	5061-2512	30224B
	30225-60004	30225B

Note: Pins: 2-3, 4-5-21, 6-20, 8-22-23, 12-14-16-19, 15-17-24.

HP 3000 SERIES 3X/4X/64 CABLE ASSEMBLIES FOR 30020A/B

Product Number	Description	Part Number
30221A	RS232 Synchronous Internal Cable RS232 10-meter External Cable	30221-60001 5061-2514
30221B	RS232 Asynchronous Internal Cable RS232 10-meter External Cable	30221-60002 5061-2514
30221F	HP3000 to HP1000 Direct Connect Cable (HP1000 board is 12834A with 5061-3422 cable)	30221-60006
30221D	High Speed Synchronous Modem Cable (V.35)	30221-60010 5061-2517
30224B	INP-to-INP Direct Connect Cable (Internal) (1)	30224-60014

30224L	External Interconnect Cable
	Direct Connect 10 meter
	               25 meter
	               50 meter
	           100 meter
	           250 meter
	           500 meter
	       1000 meter
		30224-60001
		-60002
		-60003
		-60004
		-60005
		-60006
		-60007

30225B	INP-SSLC Direct Connect (Modem Eliminator Cable)	30225-60006
30221G	AUTO CALL Modem Cable (INP-B only)	30221-60007 8120-3576
30221H	X.21 Digital Network Direct Connect Cable	30221-60012 5061-2535

(1) INP-to-INP direct connection requires the use of a 30224L inter-
connect cable, part numbers 30224-60001 through 30224- 60007.
The cable lengths range from 10 through 1000 meters.

INTELLIGENT NETWORK PROCESSOR (INP)
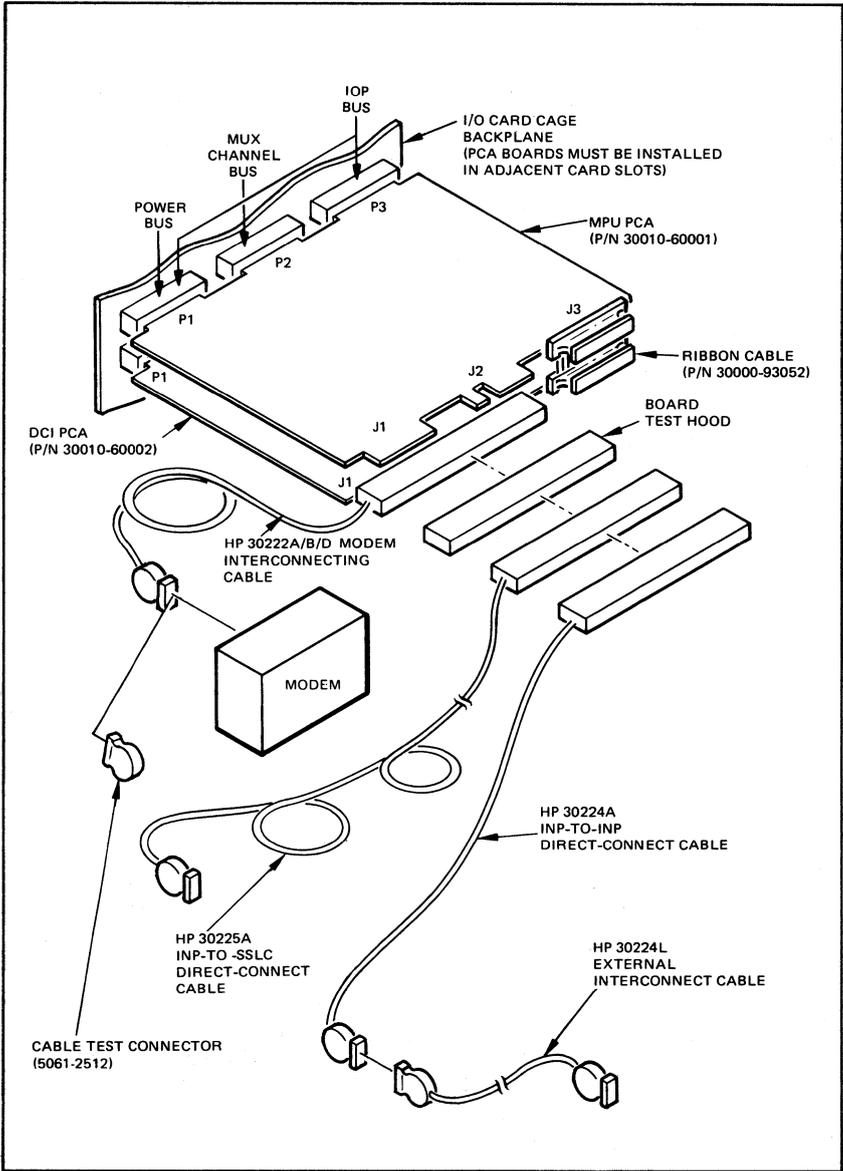
IOP
BUS

MUX
CHANNEL
BUS

POWER
BUS

I/O CARD CAGE
BACKPLANE
(PCA BOARDS MUST BE INSTALLED
IN ADJACENT CARD SLOTS)

P3

P2

P1

MPU PCA
(P/N 30010-60001)

J3

J2

RIBBON CABLE
(P/N 30000-93052)

BOARD
TEST HOOD

P1

DCI PCA
(P/N 30010-60002)

J1

J1

HP 30222A/B/D MODEM
INTERCONNECTING
CABLE

MODEM

HP 30224A
INP-TO-INP
DIRECT-CONNECT CABLE

HP 30225A
INP-TO-SSLC
DIRECT-CONNECT
CABLE

HP 30224L
EXTERNAL
INTERCONNECT CABLE

CABLE TEST CONNECTOR
(5061-2512)

**HP 30010A INTELLIGENT NETWORK PROCESSOR
AND RELATED CABLING FOR SERIES II/III**
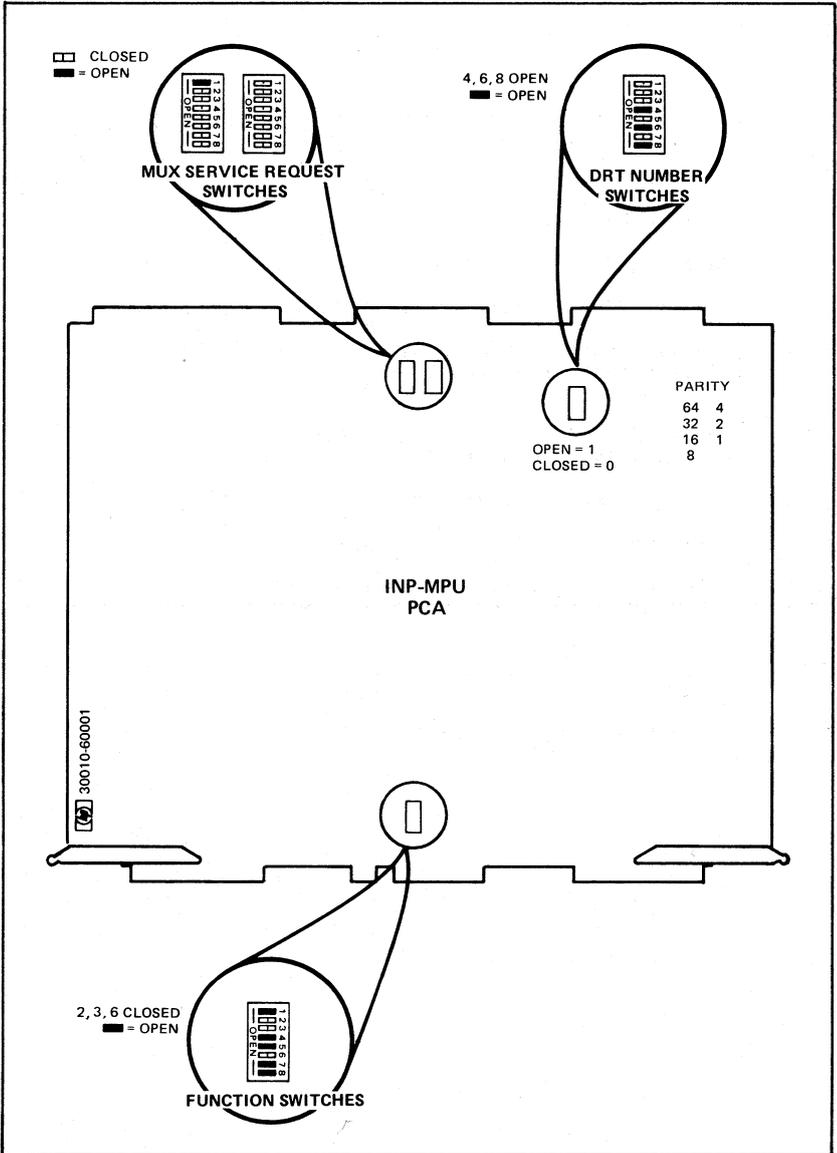
HP30010A LOCATION OF PCA SWITCHES

INTELLIGENT NETWORK PROCESSOR (INP)

FUNCTION SWITCH SETTING, HP30010A   SERIES II/III

Switch Number	Function	Enable Position	Position For System Use
1	Unassigned	Open	Open
2	Watchdog Timer	Closed	Closed
3	Access INP ROM (see note 1)	Closed	Closed
4	Execute from ET PROM instead of self test after reset of INP	Closed	Open
5	Access ET PROM exclusively (see note 1)	Closed	Open
6	System Interface Indicator	Closed	Closed
7	Unassigned	Open	Open
8	Loop Self Test (see note 2)	Closed	Open

Notes: 1. Simultaneous closure of switches 3 and 5 defaults to ET PROM access.

2. With HP-supplied SOS ROMs, the self-test program will loop when switch 8 is closed.

SERVICE REQUEST NUMBER	ROCKER SWITCH NUMBER TO BE CLOSED	SWITCH BLOCK LOCATION (LEFT OR RIGHT)
SR0	1	Right
SR1	2	Right
SR2	3	Right
SR3	4	Right
SR4	5	Right
SR5	6	Right
SR6	7	Right
SR7	8	Right
SR8	1	Left
SR9	2	Left
SR10	3	Left
SR11	4	Left
SR12	5	Left
SR13	6	Left
SR14	7	Left
SR15	8	Left

INTELLIGENT NETWORK PROCESSOR (INP)

INP PCA (P/N 30020-60001)

BOARD TEST HOOD (5061-2522)

BACKPLANE

TEST SIGNALS

POWER

NOT USED

POWER

MODEM INTERCONNECTING CABLE – INTERNAL

MODEM INTERCONNECTING CABLE – EXTERNAL

HP 30221A/B/D

P1

P2

P3

P4

J1

J2

J3

HP-IB RIBBON CABLE TO GIC

JUNCTION PANEL

HP 30224B or HP 30225B DIRECT-CONNECT CABLE – INTERNAL

HP 30224L or HP 30225B DIRECT-CONNECT CABLE – EXTERNAL

CABLE TEST CONNECTOR (5061-5212)

MODEM
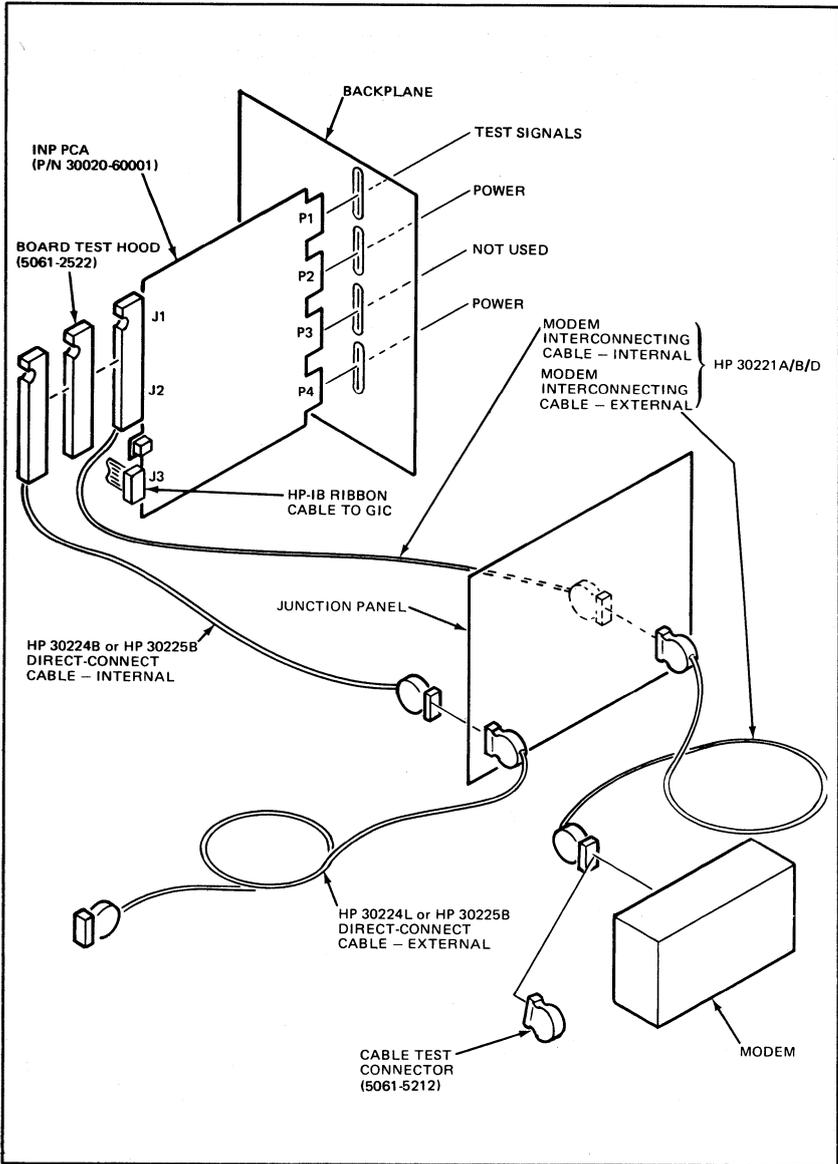
HP 30020A/B INTELLIGENT NETWORK PROCESSOR AND RELATED CABLING FOR SERIES 3X/4X/64
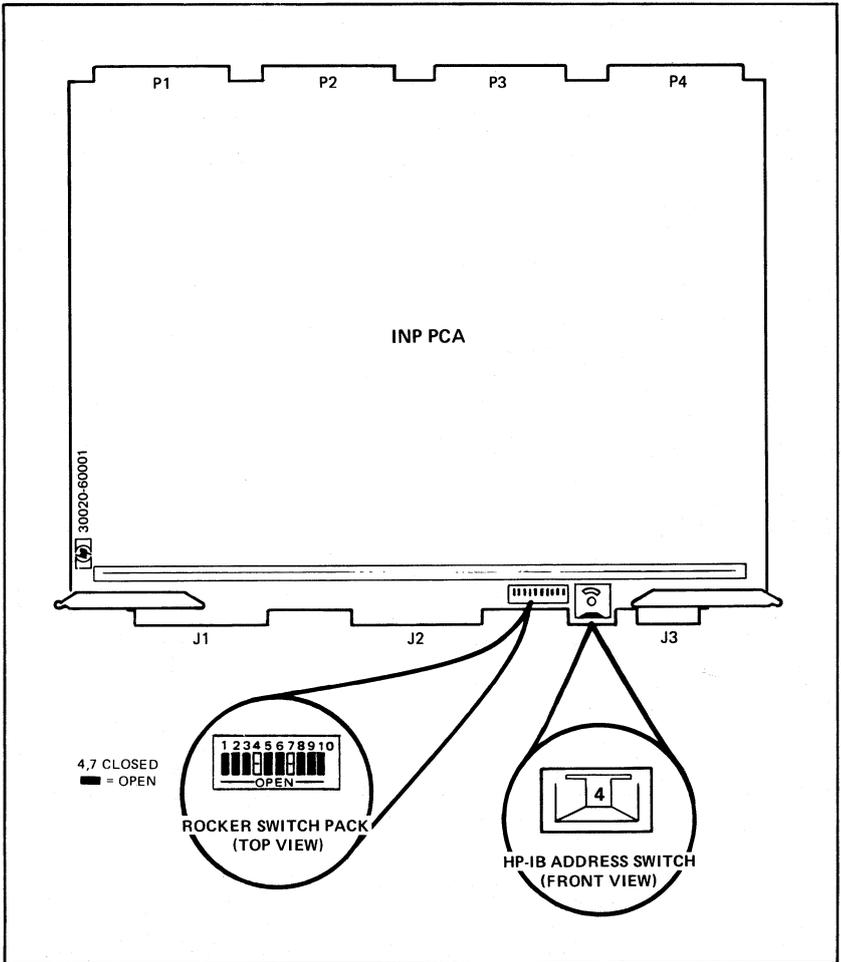
NOTE: HP30020B has no switches.

HP 30020A, LOCATION OF PCA SWITCHES

INTELLIGENT NETWORK PROCESSOR (INP)

ROCKER SWITCH POSITIONS 30020A   SERIES 3X,4X

Switch Number	Function	Enable Position	Required Position for System Use
1	Allow RAM refresh	Open	Open
2	Allow processor execution	Open	Open
3	Access ET PROM exclusively (see note 1)	Closed	Open
4	Access INP ROM (see note 1)	Closed	Closed
5	Allow remote restart capability	Open	Open
6	HP-IB shield (ground)	Closed	Open
7	HP-IB system controller	Open	Closed
8	Execute from ET PROM instead of self-test after reset of INP	Closed	Open
9	System interface indicator	Open	Open
10	Loop self-test (see note 2)	Closed	Open

Notes: 1. Simultaneous closure of switches 3 and 4 defaults
           to ET PROM access.

        2. With HP-supplied SOS ROMs, the self-test program
           will loop when switch 10 is closed.

COMMUNICATIONS CABLING DIAGRAMS

INP Modem Connection
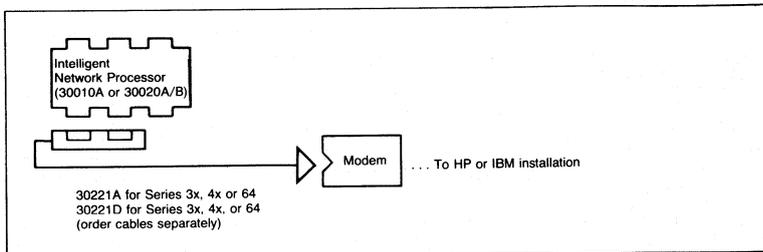
```
┌─────────────────────┐
│ Intelligent         │
│ Network Processor   │
│ (30010A or 30020A/B)│
└─────────────────────┘

      ┌──────┐
      └──────┘──────▷ ┌────────┐
                      │ Modem  │  . . . To HP or IBM installation
                      └────────┘

   30221A for Series 3x, 4x or 64
   30221D for Series 3x, 4x, or 64
   (order cables separately)
```

Note: May be used for DS/3000, RJE/3000, MRJE 3000, IML 3000, or MTS 3000 synchronous modem communication.

INP Modem – Auto Call Unit Connection
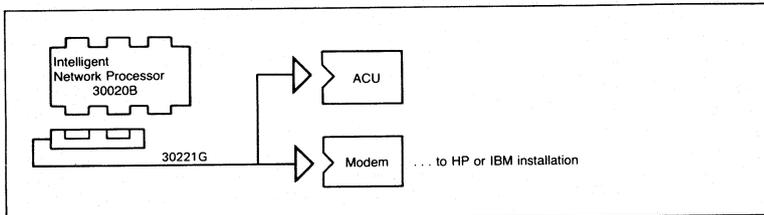
```
┌─────────────────────┐
│ Intelligent         │
│ Network Processor   │
│    30020B           │
└─────────────────────┘
                     ▷ ┌────────┐
   ┌──────┐            │  ACU   │
   └──────┘            └────────┘

         30221G       ▷ ┌────────┐
                        │ Modem  │  . . . to HP or IBM installation
                        └────────┘
```

Note: May be used for DS/3000, RJE/3000, MRJE 3000, IML 3000, or MTS 3000 synchronous modem communication.

DS/3000 INP-INP Direct Connection

```
┌─────────────────────┐              ┌─────────────────────┐
│ Intelligent Network │              │ Intelligent Network │
│ Processor           │              │ Processor           │
│ (30020A/B or 30010A)│              │ (30020A/B or 30010A)│
└─────────────────────┘              └─────────────────────┘

  ┌──────┐                                       ┌──────┐
  └──────┘──◁◁       ▷▷──────┘

30224B for Series 3x, 4x or 64   30224L          30224B for Series 3x, 4x or 64
                                 (order separately and
                                 select option for
                                 appropriate length)
```
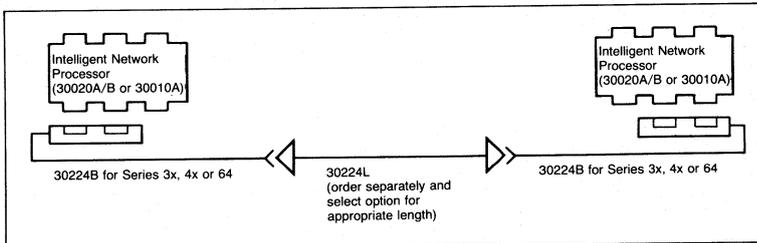
```
┌────────────────────┐
│     Symbol Key     │
│                    │
│ Male DTE    ───▷   │
│                    │
│ Female DTE  ───◁   │
│                    │
│ Male M·P    ───▷)  │
│                    │
│ Female M·P  ───(   │
│                    │
│ Male A·R           │
│ Connector   ──□    │
│                    │
│ Female A·R         │
│ Connector   ──□    │
└────────────────────┘
```

INP Communications Cabling Diagrams

COMMUNICATIONS CABLING DIAGRAMS

DS/3000 INP-SSLC Direct Connection

Intelligent Network Processor (30010A or 30020A)

Synchronous Single Line Controller (30055A)

30225B for Series 3x or 44
30225A for Series III
(order cables separately)

cable included

Note: Transmission mode 1 and subtype 1 on both sides is required.

DS/3000 HSI-HSI Hardwired Connection (Available only on Series III)

HSI
30360A

HSI
30360A

30220A Coaxial Cable (Order Separately)

Up to 4 links to other HSI cards are possible on a single HSI. However, DS/3000 can be active over only one link at a time.

DS/3000-DS/1000 Hardwired Connection

HP 3000

INP
30010A or 30020A/B

HP 1000

Extender Cable

30221F for Series 3x or 44
30222F for Series III

Note: Maximum distance of 50 feet supported.

DS/3000-DS/1000 Modem Connection

HP 3000

INP
30010A or 30020A/B

HP 1000

modem   • • • • • • • • • • • • • • • •   modem

30221A/D for Series 3x or 44
30222A/D for Series III

cable included

HP 30020
INTELLIGENT
NETWORK
PROCESSOR
(INP)
SERIES 30/33/44
40/64

J1

J2

INTERNAL
CABLE } ASYNCHRONOUS — 320221-60002

JUNCTION
PANEL

F   M

EXTERNAL CABLE
5061-2514

F
M

HP 3074A
RS-232-C/DATA LINK
ADAPTER

92905A DATA
LINK-TO-DEVICE CABLE

THE LAST CONNECITON
BOX ON A DATA
LINK REQUIRES A
100Ω TERMINATING
RESISTOR

HP92901A
CONNECTION
BOX

HP92902A
DSN/DATA LINK
CABLE

HP92905A
DATA LINK
TO DEVICE CABLE

HP 13264A
RS-232-C/DATA LINK
ADAPTER

HP 13264A
RS-232-C/DATA LINK
ADAPTER

HP 3075
FIRST
TERMINAL

HP92905A DATA LINK TO DEVICE CABLE

F

TERMINAL

2608S
PRINTER

HP2333A-021
CLUSTER
CONTROLLER

UP TO 16
POINT-TO-POINT DEVICES

HP30010
INTELLIGENT
NETWORK
PROCESSOR
SERIES II/III

J1   J2

30222-60001
SYNCHRONOUS CABLE

M F

MODEM

2608S
PRINTER

MODEM

13222 A/N
MODEM CABLE

F   M

MODEM

FIRST
TERMINAL

13232P MODEM-TO-
TERMINAL CABLE

TERMINAL

13268A-001
SYNCHRONOUS
MULTIPOINT MODULE

2608S
PRINTER

13268A-01
SYNCHRONOUS
MULTIPOINT MODULE

MODEM

HP233A-022
CLUSTER
CONTROLLER

02333-60008
MODEM-TO-TERMINAL
CABLE

MODEM

FIRST
TERMINAL

13232P MODEM-TO-
TERMINAL CABLE

TERMINAL

132320 STANDARD
MULTIPOINT CABLE
OR
13232T POWER-DOWN
PROTECT CABLE

MODEM

FIRST
TERMINAL

HP13267A-001
SYNCHRONOUS
MULTIPOINT
FIRST MODULE

TERMINAL

13268A-001
SYNCHRONOUS
MULTIPOINT MODULE

LOCAL 2608S ON SERIES II/III

HP 30010
INTELLIGENT
NETWORK
PROCESSOR
(INP)
SERIES II/ III

J1   J2

2608S
PRINTER

M

F

30225A
INP MODEM BYPASS CABLE

HP 30020
INTELLIGENT
NETWORK
PROCESSOR
(INP)
SERIES 30/33/44
40/64

J1

J2

INTERNAL
CABLE

ASYNCHRONOUS –
320221-60002

THE LAST CONNECITON
BOX ON A DATA
LINK REQUIRES A
100Ω TERMINATING
RESISTOR

HP92901A
CONNECTION
BOX

F

M

F

M

MODEM

JUNCTION
PANEL

EXTERNAL
5061-2514

HP 13264A
RS-232-C/DATA LINK
ADAPTER

TERMINAL

HP 13264A
RS-232-C/DATA LINK
ADAPTER

2608S
PRINTER

F

MODEM

M

92905A
DATA LINK-TO-
DEVICE CABLE

M

F

HP 3074A
RS-232-C/DATA LINK
ADAPTER

TERMINAL

F

MODEM

F

M

HP3074M
RS-232C/DATA LINK
ADAPTER

100Ω TERMINATING
RESISTOR

IBM 3270 CLUSTER HARDWIRED POINT-TO-POINT

REMOTE POINT-TO-POINT

SYNCHRONOUS MODEMS

The following Synchronous modem recommendations and options are for use with the 30055A Synchronous Single line Controller (SSLC) or 30010A/30020A/B Intelligent Network Processor. Further definition of these options and capabilities can be obtained from the relevant "Bell System Technical Reference" publication, which is available from your local Bell System Representative or CCITT reference.

MODEM CONFIGURATIONS

Modems can be connected in one of two basic configurations:

CONFIGURATION A
Point-to-Point Connection (RJE, MRJE, DS, IMF*, MTS)

```
Control              Tributary
                                       BELL SYSTEM
                              HP MODEMS MODEMS
          A
 MODEM ──────────── MODEM      37210T    201C
                               37220T    208A
                               37230A    208B
   PUBLIC (SWITCHED) OR                  209A
   PRIVATE (LEASED) LINE                 2024A
  *IMF must be leased.                   2048A
                                         2096A
                                         DDS
```

CONFIGURATION B
Multidrop Connection (MTS, IMF - as tributary)
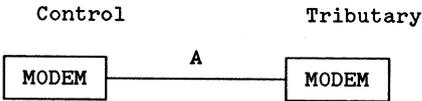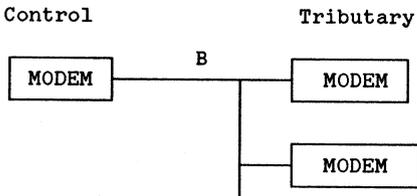
```
Control              Tributary

          B                    HP MODEMS BELL SYSTEM
 MODEM ─────────┬──── MODEM     37210T   MODEMS
                │               37230A   201C
                │                        208A
                └──── MODEM              2024A
                                         2048A,C
                                         DDS

   PRIVATE (LEASED)
   MULTIDROP LINE
```

CONTROL = The site responsible for running diagnostics.
TRIB = All other sites.

BELL 201C MODEM, PUBLIC SWITCHED LINE, HALF DUPLEX, POINT–TO–POINT

Type of Modem: Bell System Type 201C Data Set (Also called
                      DATAPHONE 2400)
Type of Line: Public Telephone Network (Switched Line)
Transmission Rate: 2400 bits-per-second
HP Products: RJE (2780/3780), MRJE, DS,
                      and MTS - Configuration A.

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	X
B3	Without 801 Automatic Calling Unit	Depends- (Note 1)
B4	With 801 Automatic Calling Unit	
C5	EIA interface	X
D8	With automatic answer	X
E9	Automatic answer permanently wired.	Either
E10	Automatic answer key-controlled.	

NOTE 1: Depends on whether auto-dialer on INP-B is used.

In half duplex operation, this modem provides a 150 msec Request-to-Send - Clear-to-Send delay.

Note 2: The Bell 201C is fully compatible with CCITT V.26bis modems (Modulation Alternative B).

SYNCHRONOUS MODEMS

BELL 201C MODEM, PRIVATE LEASED LINE, POINT-TO-POINT, FULL OR HALF DUPLEX

```
Type of Modem:        Bell System Type 201C Data Set (Also called
                      DATAPHONE 2400)
Type of Line:         Public Telephone Network
                      Private Leased Line
Transmission Rate:    2400 bits-per-second
HP Products:          RJE (2780/3780), IMF, MRJE,
                      DS, and MTS - Configuration A.
```

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	EIA interface	X
B3 B4	Alternate voice Without alternate voice	Customer defined
C6	New synch under customer control	X
D8	4-wire circuit	X

E9
 	
E10
	4-wire private line
	  continuous carrier
	  0-millisecond delay
	4-wire private line
	  transmitter internally
	  timed
		X
		
		X

BELL 201C–L1D MODEM, PRIVATE LEASED LINE, POINT–TO–POINT

Type of Modem:	Bell System Type 201C-L1D Data Set
Type of Line:	Public Telephone Network
	Private Leased Line
	Full Duplex Operation
Transmission Rate:	2400 bits-per-second
HP Products:	RJE (2780/3780), IMF, MRJE, DS,
	MTS - Configuration A.

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter timing internal	X
B3	Without new synch	X
C6	Continuous carrier operation 4-wire, 0 msec clear-to-send delay	X
D8	Continuous receiver Bit clock	
E10	EIA interface pin 18 provides receive symbol clock.	X
F12	Customer selected EIA interface and ground options.	
	A1 Status of data set ready during local analog loopback - ON.	X
	B1 Frame ground connected to signal ground.	X

SYNCHRONOUS MODEMS

BELL 201C–L1D MODEM, PRIVATE LEASED LINE, MULTIDROP

Type of Modem: Bell System Type 201C-L1D Data Set
Type of Line: Public Telephone Network
                       Private Leased Line
                       Full Duplex Operation
                       Multidrop Configuration
Transmission Rate: 2400 bits-per-second

HP products: MTS, IMF - Configuration B

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A1	Transmitter timing internal	X	X
B4	Without new synch		X
	With new synch (w/SSLC)	X	

C6	Switched carrier operation
	   4-wire, 7 msec clear-to-
	   send delay
			X

	Continuous carrier operation
	   4-wire, 0 msec clear-to-
	   send delay
		X	

D8	Continuous receiver Bit clock - OUT	X	X
E10	EIA interface pin 18 provides receive symbol clock	X	X

F12	Customer selected EIA interface
	and ground options
	A1 Status of data set ready
	   during local analog loop-
	   back - ON
		X	X

	B1 Frame ground connected to signal ground	X	X

BELL 208A, MODEM, PRIVATE LEASED LINE, POINT-TO-POINT, FULL DUPLEX

Type of Modem: Bell System Type 208A Data Set (Also called
                     DATAPHONE 4800)
Type of Line: Private Leased Line
Transmission Rate: 4800 bits-per-second
HP Products: RJE, MRJE, DS, IMF,
                     MTS - Configuration A

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter timing internal	X
B3	Continuous carrier	X
C6	Continuous REQUEST TO SEND	X
D7	One second holdover used	X
E10	Without new synch	X
F11	Continuous carrier ON when analog loop is present	X

SYNCHRONOUS MODEMS

BELL 208A MODEM, PRIVATE LEASED LINE – MULTIDROP

Type of Modem: Bell System Type 208A Data Set (Also called
                     DATAPHONE 4800)

Type of Line: Private Leased Line
Transmission Rate: 4800 bits-per-second
HP Products: IMF, MTS - Configuration B

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A1	Transmitter internally timed.	X	X
B3	Continuous carrier.	X	
B4	Switched carrier.		X
C5	Switched REQUEST TO SEND.		X
C6	Continuous REQUEST TO SEND.	X	
D7	One-second holdover used.		X
D8	One-second holdover not used.	X	
E9	With new sync. (w/SSLC)	X	
E10	Without new sync.		X
F11	Continuous Carrier when analog loop is present.	X	X

BELL 208B MODEM, HALF DUPLEX, SWITCHED LINE, POINT-TO-POINT

```
Type of Modem:      Bell System Type 208B Data Set (Also called
                    DATAPHONE 4800)
Type of Line:       Public Telephone Network (Switched)
Transmission Rate:  4800 bits-per-second
HP Products:        RJE (2780/3780), MRJE, DS,
                    IMF, MTS - Configuration A
```

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	X
B3	Without 801 Automatic calling Unit.	Depends
C6	Data Set Ready (CC) ON when analog loop is present.	X
D8	With automatic answer.	X
E9 E10	Desk mounting Rack or cabinet mounting.	Either

NOTE: Switch controlled 50 or 150 msec Request-to-Send
      Clear-to-Send delay.

801 AUTO CALL UNIT OPTIONS

DESCRIPTION	RECOMMENDATION
* Abandon Call Timer Control	Stop
* Abandon Call Timer Options	56 Seconds
* Call Termination Control	Via Data Set
* Signal Ground Option	Signal to Frame

SYNCHRONOUS MODEMS

BELL 209A MODEM, FULL DUPLEX, PRIVATE LEASED LINE, POINT-TO-POINT

Type of Modem: Bell System Type 209A Data Set (Also called
                     DATAPHONE 9600)
Type of Line: Private Leased Line (3002 Type 4-wire) with
                     D1 conditioning (no C conditioning)
Transmission Rate: 9600 bits-per-second.
HP Products: RJE (2780/3780), MRJE, DS,
                     IMF, MTS - Configuration A

Note that this modem will accept four simultaneous devices as
long as their aggregate speed does not exceed 9600 bits/sec.

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter timing supplied by data set	X
B3	Data Set Ready interface lead On for Analog Loopback mode	X
C6	Transmitter timing NOT slaved by receiver	X
D8	Elastic Store option disabled (OUT)	X
E9	Continuous carrier operation	X
F12	Continuous Request-to-Send operation.	X
	Grounding: Protective ground to signal ground	AA to AB
	With alternate voice Without alternate voice	Either*

*The data set normally is supplied without a hand set.

BELL DATAPHONE II 2024A MODEM, PRIVATE LEASED LINE, POINT-TO-POINT

```
Type of Modem:        Bell System Type DPII 2024A Data Set
Type of Line:         Private Leased Line
                      Public Telephone Network (Dial Back-Up)
Transmission Rate:    2400 bits-per-second
HP Products:          RJE, MRJE, DS, IMF,
                      MTS - Configuration A
```

```
NOTE:  For Dataphone II modems:
       * only one control on each line
       * C is usually the control computer site
       * T is usually the remote computer, host, or terminal site
       * C and T are for diagnostic purposes only.
```

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A1	Point-to-point control	X	
A2	Point-to-point tributary or extended point-to-point tributary		X
B1	Internal timing (default)	X	X
C5	Continuous Carrier, continuous RTS	X	X
E5	Maximum Address - 16	X	
SA	RS-232 Rise Time	X	X
*Local Address		101	011
Network Address		65	01

*If rack mount, level II, or level III, contact TELCO marketing for assistance.
*If rack mount, level II, or level III, contact TELCO marketing for addressing assistance.

SYNCHRONOUS MODEMS

BELL DATAPHONE II 2024A MODEM, PRIVATE LEASED LINE, MULTIDROP

Type of Modem: Bell System Type DPII 2024A Data Set
Type of Line: Private Leased Line
                    Public Telephone Network (Dial Back-Up)
Transmission Rate: 2400 bits-per-second
HP Products: MTS - Configuation B, IMF as
                    a tributary

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A3	Multipoint Control	X	
A4	Multipoint Tributary		X
B1	Internal Timing (Default)	X	X
C5	Continuous Carrier,	X	
C6	Switched Carrier		X
D6	Anti-Stream Timer - 27 seconds		X
D8	Disable Receive Signal Quality	**	
E5***	Maximum Address-16	X	
E6***	Maximum Address-32		
E7	Disable Diagnostic Channel	**	
E8	Disable Receive Signal Level	**	
SA	RS-232 Rise Time	X	X
*Local Address		101	001
Network Address		65	01,02...

*If rack mount, level II, or level III, contact TELCO marketing
 for addressing assistance.
**Use E7 if alarms are not desired during partially complete
 network conversion. Varying degrees of alarm suppression
 can be obtained by combinations of D8 and E8 instead of E7.
***Use E5 for 1-16 remote modems; use E6 for 17-32.

BELL DATAPHONE II 2048A MODEM, PRIVATE LEASED LINE, POINT-TO-POINT

Type of Modem: Bell System Type DPII 2048A Data Set
Type of Line: Private Leased Line
                       Public Telephone Network (Dial Back-Up)
Transmission Rate: 4800 bits-per-second
HP Products: RJE, MRJE, DS, IMF
                       MTS - Configuration A

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A1	Point-to-Point Control	X	
A2	Point-to-Point Tributary		X
B1	Internal Timing (Default)	X	X
C5	Continuous Carrier	X	X
E5	Maximum Address-16	X	
SA	RS-232 Rise Time	X	X
*Local Address		101	011
Network Address		65	01

*If rack mount, level II, or level III, contact TELCO marketing for addressing assistance.

SYNCHRONOUS MODEMS

BELL DATAPHONE II 2048A MODEM, PRIVATE LEASED LINE, MULTIDROP

Type of Modem: Bell System Type DPII 2048A Data Set
Type of Line: Private Leased Line
                      Public Telephone Network (Dial Back-Up)
Transmission Rate: 4800 bits-per-second
HP Products: MTS - Configuration B, IMF as
                      Tributary

NOTE: With more than 8 remote modems, use 2048C Quick Start at
       control, with option E1 at all modems.

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A3	Multipoint Control	X	
A4	Multipoint Tributary		X
B1	Internal Timing (Default)	X	X
C5	Continuous Carrier	X	
C6	Switched Carrier		X
D6	Anti-Stream Timer – 27 seconds	X	
D8	Disable Receive Signal Quality		
E5***	Maximum Address-16	X	
E6***	Maximum Address-32		
E7**	Disable Diagnostic Channel		
E8**	Disable Receive Signal level		
Sa	RS-232 Rise Time	X	X
*Local Address		101	001
Network Address		65	01,02...

*If rack mount, level II, or level III, contact TELCO marketing
 for addressing assistance.
**Use E7 if alarms are not desired during partially complete
  network conversion. Varying degrees of alarm suppression can
  be obtained by combinations of D8 and E8 instead of using E7.
***Use E5 for 1-16 remote modems; use E6 for 17-32.

BELL DATAPHONE II 2096A MODEM, PRIVATE LEASED LINE, POINT–TO–POINT

Type of Modem: Bell System Type DPII 2096A Data Set
Type of Line: Private Leased Line
                      Public Telephone Network (Dial Back-Up)
Transmission Rate: 9600 bits-per-second
HP Products: RJE,MRJE,IMF,DS
                      MTS - Configuration A

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER	TERMINAL
A1	Point-to-Point Control	X	
A2	Point-to-Point Tributary		X
B1	Internal Timing (Default)	X	X
C5	Continuous Carrier	X	X
E5	Maximum Address-16	X	
SA	RS-232 Rise Time	X	X
*Local Address		101	011
Network Address		65	01

*If rack mount, level II or level III, contact TELCO marketing for addressing assistance.

SYNCHRONOUS MODEMS

BELL DATAPHONE DIGITAL SERVICE (DDS), DATA SERVICE UNIT (DSU), BELL PRIVATE LEASED LINE, POINT-TO-POINT OR MULTIPOINT

Type of Modem: Bell System 500B Type Data Service Unit (DSU)
Type of Line: Bell DATAPHONE Digital Service (DDS) Channel
Transmission Rate: 500B L1/2 2400 bits-per-second
                     500B L1/3 4800 bits-per-second
                     500B L1/4 9600 bits-per-second
                     500B L1/5 56 kilobits-per-second

HP Products: RJE,MRJE,IMF,DS,
                     MTS - Configurations A and B

OPTION NUMBER	DESCRIPTION	RECOMMENDATION COMPUTER TERMINAL	
A1	Continuous Request-to-Send (Default Option)	X	
A2	Switched Request-to-send		X
B3	Signal Ground to Frame Ground (Default Option)	X	X
C5	Loop-Back Switch and Indicator Lamps on Front - (Default)	Customer	
C6	Loop-Back Switch and Indicator Lamps on Rear		Choice
D7	Circuit Assurance Installed	X	X

HEWLETT-PACKARD 37210T MODEM

Type of Modem: Synchronous
Type of Line: Private Line/Switched Telephone Network
Transmission Rate: 4800 bps, 2400 bps fallback

Options

 *Option 001 PTT Module (Private Line Isolation)
  Option 002 2-Wire Switched Line Isolation
  Option 003 Auto Answer USA
  Option 004 Secondary Channel
**Option 005 Remote Command

 *Not required in the USA
**4-Wire Leased Lines Only. Options 002 or 003 must be in-
  stalled in modem.

Modem configuration Recommendations

See Modem Strapping Configuration Log located inside modem top
cover.

More comprehensive strapping information is to be found in the
Operating and Service Manual, HP 37210-90000.

HEWLETT-PACKARD MODEMS

HEWLETT-PACKARD 37220T MODEM

Type of Modem: Synchronous
Type of Line: Private Line (D1 conditioning recommended)
Transmission Rate: 9600 bps, 4800 bps fallback

Options

*Option 001 PTT Module (Private Line Isolation).

*Not required in the USA.

Modem Configuration Recommendations

See Modem Strapping Configuration Log located inside modem top cover.

More comprehensive strapping information is to be found in the Operating and Service Manual.

HEWLETT-PACKARD 37230A MODEM

Type of Modem: Synchronous Modem.
Type of Line: 4 or 2-wire leased/private lines. Must be un-
                    loaded metalic circuit.
Transmission Rate: 19200/9600/4800/2400/bps

INTERNAL STRAPPING OPTIONS

Internal straps tailor modem operation to suit the particular in-stallation. Full details of all internal straps and their recom-mended setting are contained in the 37230A Operating and Installation Manual (37230-90000). The Modem Strapping Configuration Log, located on the underside of the modem top cover, also contains details of all internal strapping and should be filled in at time of installation to document actual modem strapping.

OPTIONS

001 DTE Control of loopback. Allows the local data terminal equip-ment to control the loopback features on the local modem.

SELF TESTS FOR
WESTERN ELECTRIC
SYNCHRONOUS MODEMS

GENERAL

The majority of the supported modems have built-in test capabilities which can be utilized by a customer to isolate transmission problems to the data set(s) transmission facility and in some cases the data terminal equipment. The test procedures should be used prior to calling the Telephone Company Repair Center or when assistance is required by the Rapair Center.

Note that on those modems that are on dial-up lines, the relevant "down line" tests will only indicate the given dialed connection is either good or bad and is no guarantee that all calls will be the same.

201C DATA SET TESTS

STATUS LAMPS

(ON)   (TR)(MR)(RS)   (CS)(CO)(MC)   (TM)   [RO] [AL|ST|RT] [DL]

POWER   REQUEST   TEST   DIGITAL
INDICATION   TO SEND   MODE   LOOPBACK

    DATA   DATA SET   MODEM   RECEIVE   REMOTE
TERMINAL   READY   CHECK   ONLY   TEST
READY   (Modem
             Ready)   RECEIVED   SELF
                           LINE SIGNAL   TEST
                           INDICATOR
                           (Carrier ON)   ANALOG
                                                 LOOP
                           CLEAR TO   BACK
                           SEND
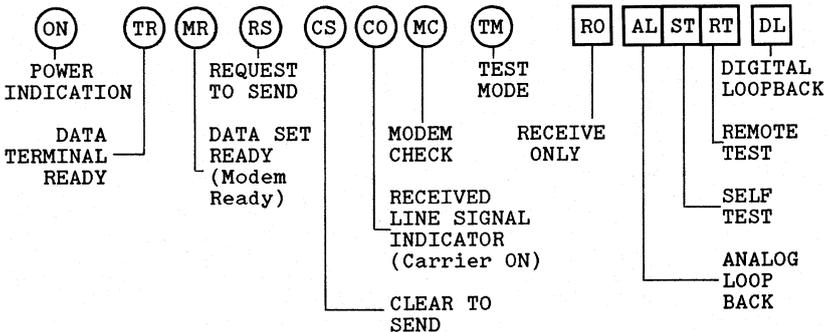
SYNCHRONOUS MODEM TESTS

TEST 1. Analog Loopback Self-Test (Used for either 2- or 4- wire data sets).

Step 1 - Press the AL button

Step 2 - Press the ST button

Step 3 - At this point the MC lamp should be off and all other lamps should be on.

Step 4 - If the MC lamp blinks on or remains on or if any of the other lamps are off, the data set is defective. The lamps should be observed for at least 30 seconds to be confident that the data set is working properly.

Step 5 - To check that the transmitter turns off, press the RO button. The RS and CS lamps should go off and the MC lamp should go on. The CO lamp should go off if the data set is optioned for switched carrier operation, or on if for continuous carrier operation.

Step 6 - To return the data set to normal operation, release the RO, ST, and AL buttons. Check that the TM lamp goes off.

TEST 2. End-To-End Self-Test

Step 1 - Press the ST button on each data set.

Step 2 - Establish a line connection between the data sets, i.e., go to DATA mode. After the line connection is made, the MC lamp should be off and all other lamps on each data set should be on.

Step 3 - The MC lamp on each data set will blink on if an error occurs in the received data signal from the other end. An average of two blinks per minute or less at each end indicates satisfactory operation. If more blinks than this are observed, or if the MC lamp is on con- tinuously, or if any other status lamps are off, the data set or telephone facilities are the source of trouble.

Step 4 - To return each data set to normal operation, the ST button should be released at both ends. This should turn the TM lamp off.

TEST 3.   2-Wire Data Set End-to-End Self-Test

Step 1 - Press the ST button on both data sets. Decide which data
         set is to receive data. Press the RO button on that data
         set.

Step 2 - Establish a line connection between the data sets. At the
         transmitting data set, the CO lamp should be off and all
         other lamps should be on. At the receiving data set, the
         RS, CS, and MC lamps should be off and the remaining lamps
         should be on.

Step 3 - At the receiving data set the MC lamp will blink on if an
         error occurs. Satisfactory operation is indicated by an
         average of two blinks per minute or less. If the number of
         blinks is excessive, or if the MC lamp is on continuously,
         or if the status of any of the lamps on either data set is
         not as specified in Step 2, then the data sets or telephone
         facilities are the source of trouble. For switched network
         service, due to the statistical nature of performance on
         dial connections, several connections must be tested before
         a valid in- dication of unsatisfactory operation can be
         deter- mined.

Step 4 - This same test should be repeated in the opposite di- rec-
         tion by releasing the RO button on one data set and press-
         ing the RO button on the other data set. Then repeat Steps
         2 and 3.

Step 5 - To return the data sets to normal operation, release the ST
         button on each data set and RO button at the receiving data
         set to release them from TEST mode. The TM lamp on each
         data set should go off.

Telephone Company Remote Test

Further testing should be done through the telephone company if no
errors have yet been detected and modem is still suspect.

SYNCHRONOUS MODEM TESTS

208A DATA SET TESTS

Status Lamps	Test Buttons	
POWER INDICATOR (ON)	LP	LAMP TEST
DATA SET READY (MR) (Modem Ready)	AL	ANALOG LOOP- BACK TEST MODE
CLEAR TO SEND (CS)	ST	SELF TEST MODE
RECEIVED LINE (CO) SIGNAL DETECTOR (Carrier On)	DL	DIGITAL LOOPBACK TEST MODE
EQUALIZER (ER) RETRAIN OR ERROR INDICATOR		

TEST 1.   Analog Loopback Self-Test

Step 1 - Press the AL button

Step 2 - Press the ST button to place the data set in self-test.
         Ignore flashes on ER while the ST button is being operated.

Step 3 - At this point the ON, RS, CS, and CO lamps should be on and
         the MR and ER lamps should be off.

Step 4 - If the ER lamp flashes one or more times or remains on or
         if any of the other lamps do not agree with the conditions
         in Step 3, the data set is defective. The lamps should be
         observed for at least 30 seconds to be confident that the
         data set is or is not working.

Step 5 - To return the data set to normal operation, release the ST
         and AL buttons.

TEST 2. End-to-End Self-Test

Step 1 - With an attendant at each station, manually establish a voice link between them by means of a separate voice channel. (If alternate voice service is pro- vided, the private line to be tested can serve as the initial voice link as long as no discussion is desired during the test interval.)

Step 2 - Have the attendants agree on when to start the test and when to end it, then transfer from the TALK to the DATA mode (if necessary).

Step 3 - Press the ST button on both data sets. Note that the data set whose ST button is depressed first may show error indications until the ST button on the other set is pressed.

Step 4 - After a few seconds have the attendant at each data set check that ON, RS, CS, and CO lamps are on and that the MR and ER lamps are off.

Step 5 - The ER lamp at each data set will flash if errors occur. Satisfactory operation is indicated by an average of three flashes per minute or less. At either end, if the number of flashes of ER exceeds an average of three per minute, or if the ER lamp is on continuously, or if the status of any of the lamps on either data set is not correct per Step 4, the receiver of that data set, the transmitter of the other data set, or the interconnecting facilities is not providing proper performance. Each data set may be tested using TEST 1 to isolate the trouble further.

Step 6 - To return the data sets to normal operation, release the ST button on each data set to release them from the TEST mode.

SYNCHRONOUS MODEM TESTS

208B DATA SET TESTS

Status Lamps

Test Buttons

(ON) POWER INDICATION

(TR) DATA TERMINAL READY
      (TERMINAL READY)

(MR) DATA SET READY
      (MODEM READY)

(RS) REQUEST TO SEND

(CS) CLEAR TO SEND

(CO) RECEIVED LINE
      SIGNAL DETECTOR
      (Carrier On)

(ER) EQUALIZER RETRAIN
      IN NORMAL MODE
      ERROR INDICATION
      TEST MODE

| LP | LAMP TEST |

| AL | ANALOG LOOPBACK |

| ST | SELF TEST |

| RO | RECEIVE ONLY |

| RT | REMOTE TEST |

| 50 | IN   50 MILLISECONDS
       RTS - CTS INTERVAL
       OUT   150 ms
       RTS - CTS INTERVAL |

SYNCHRONOUS MODEM TESTS

TEST 1.   Analog Loopback Self-Test

Step 1 - Press the AL button.

Step 2 - Press the ST button to place the data set in the self- test mode.

Step 3 - At this point the MR and ER lamps should be off and all other lamps except TR should be on. The TR lamp may be on or off depending on the state of the Data Terminal Ready circuit provided by the data terminal equipment.

Step 4 - If the ER lamp flashes one or more times or remains on or if any of the lamps do not agree with the condi- tions in Step 3, the data set is defective. The lamps should be ob- served for at least 30 seconds to be con- fident that the data set is or is not working.

Step 5 - To return the data set to normal operation, release the ST and AL buttons.

The data set's power supply is equipped with an over- volt- age protection circuit which limits the output voltage should it rise excessively. When this occurs, the data set fails the analog loopback self-test. To reset the power supply, the power cord must be un- plugged and replugged into the ac outlet.

TEST 2.   End-to-End Self-Test

Step 1 - With an attendant at each station, manually establish a call between the two data sets to be tested.

Step 2 - Have the attendants agree on when to start and end the test. Decide which data set will receive data first. The RO button on the receiving data set.

Step 3 - Depress the ST button on both data sets and the RO button on the receiving data set.

Step 4 - Transfer both data sets to the DATA mode in the normal way.

Step 5 - After a few seconds have the attendant at the transmitting data set check that the ON, RS, CS, and ER lamps are on and the MR and CO lamps are off. The attendant at the receiving data set should check that the ON and CO lamps are on and that the MR, RS, CS, and ER lamps are off. The TR lamp on either data set may be on or off depending on the state of the data terminal.

SYNCHRONOUS MODEM TESTS

Step 6 – At the receiving data set the ER lamp will flash if an er-
         ror occurs. Satisfactory operation is indicated by an
         average of three flashes per minute or less. If the number
         of flashes or ER exceeds an average of three per minute, or
         if the ER lamp is on continuously, or if the status of any
         of the lamps on either data set is not correct per Step 5,
         then the data sets or the particular telephone facilities
         involved in the call are not providing proper performance.

Step 7 – If no problems are indicated in Step 6, this same test
         should be repeated in the opposite direction of transmis-
         sion by releasing the RO button on one data set and press-
         ing the RO button on the other data set. The Steps 5 and 6
         should be repeated.

Step 8 – To return the data sets to normal operation, release the ST
         button on each data set and the RO button at the receiving
         data set to release them from the TEST mode.

         If the transmission test on at least two calls fails to
         meet the limit of three error indications per minute or the
         data set lamps are not providing the proper indication in
         Step 5, then the customer should notify the Telephone
         Company of the problem.

Telephone Company

Further testing should be done through the telephone company if no
errors have yet been detected and modem is still suspect.

209A DATA SET TESTS

Multiplex Status Lamps	General Status Lamps		Test Switches	
(96)	(ON)	POWER INDICATION	[LP]	LAMPTEST
(72)	(MR)	DATA SET READY (Modem Ready)	[AL]	ANALOG LOOPBACK
(48)	(RS)	REQUEST TO SEND	[ST]	SELF-TEST
(24)	(CS)	CLEAR TO SEND	[DL]	DIGITAL LOOPBACK
	(CO)	RECEIVED LINE INDICATOR (Carrier On)		
	(ER)	EQUALIZER RETRAIN IN DATA MODE OR ERROR (In Self-test Mode)		
	(TM)	TEST MODE		

TEST 1.   Analog Loopback Self-Test

Step 1 - Depress the AL switch. The TM lamp should light.

Step 2 - Depress the ST switch to place the data set in self- test mode.

Step 3 - At this point the MR and ER lamps should be off and all other lamps should be on.

Step 4 - If the ER lamp flashes one or more times or remains lit or if any of the other lamps do not agree with the conditions in Step 3, the data set is defective. The lamps should be observed for at least 30 seconds to be confident that the data set is or is not working.

Step 5 - To return the data set to normal operation, release the ST and AL switches.

SYNCHRONOUS MODEM TESTS

TEST 2. Digital Loopback Self-Test

Step 1 - After assuring that the AL and ST switches are released, depress the DL switch on the remote data set. The TM lamp should light on that data set.

Step 2 - Depress the St switch on the local data set to place it in the self-test mode. The TM lamp should light on the local data set. The test is controlled from this data set.

Step 3 - At this point the MR and ER lamps on the local data set should be out and the remaining lamps should be lit. On the remote data set, the lamps should be in the same states except it should be noted that the ER lamp indicates equalizer retain periods and not errors. Lamp indications other than these denote data set malfunction or transmission problems on the channel.

Step 4 - At the local data set the ER lamp will flash if errors occur. Five one minute observations should be made. If the number of flashes of ER over these 5 minutes exceeds 30, the error performance objective is not being met by the data sets and the channel.

Step 5 - To return to normal operation, release the ST switch on the local data set and the DL switch on the remote data set.

Telephone Company Remote Test

Further testing should be done through the telephone company if no errors have yet been detected and modem is still suspect.

DATAPHONE II DIAGNOSTICS

All Dataphone II tests are accessed thru switches on the front of
the data set. Persistent faults in the network will be detected by
the monitoring system and displayed as an acronym in the al-
phanumeric display. Transient impairments such as impulse noise and
hits may not cause a fault to display. In such a case, an extended
test between the modems is necessary. There are many tests within
the Dataphone II which have replaced some of the need for DSM tests
in Set 6 which are used for loop back tests.

When responding to a fault (MD, FA, SR, or NR), the recommendation
by Telco is to run the modem test (MT) first. It may also be neces-
sary to display options (DSOP) and addresses (DSNA, DSPL) before
going on to other tests such as end-to-end (EE), remote Digital
Loopback (DL), or a continuous modem test (C-MT). The steps to per-
form the extended tests are documented in the data set User's Manual
and on a plastic card inside the data set. The MT and EE are listed
below.

If the network is experiencing transient hits, it may be desirable
to test the network, cables and INP using DSM. For this purpose,
the local loop (LL) and remote digital loop (DL) are listed.

All of the diagnostics are accessed thru this panel.

Dataphone II Controls

o STATUS o	DM oooo RD oooo SD oooo	MD15	DIAG CHAN o o TEST COND	− BWD TEST	| | |	+ FWD CMD	EXEQ

| Display | Switches   Button |
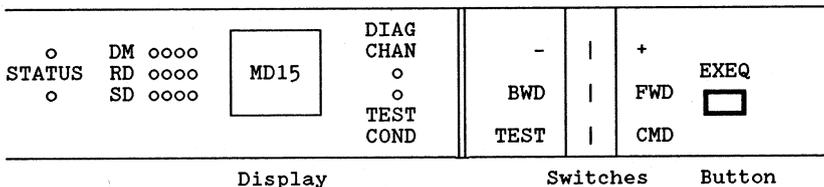
The switches (TEST/CMD, BWD/FWD, and -/+) allowing scroll thru a
three level menu of tests and commands which are listed in in menu
order in this section after the tests. The steps included here show
the action to take and the displayed result of each step. These
diagnostics included many flashing LEDs, flashing displays and
pauses between steps. Some tests take two minutes to run; always
wait for the display to stop as noted below.

DATAPHONE II MODEM TESTS

Modem Test (MT) at Control   Displayed

Place TEST/CMD switch to TEST position.   AUTO
Use BWD/FWD switch to scroll to MT.   MT
Press the EXEQ button.   MT** (** flashing)
Use +/- switch to scroll to MT--.   MT--
Press the EXEQ button.   PASS or FAIL
Return TEST/CMD switch to center when done.

Modem Test (MT) at Tributary

Place TEST/CMD switch to TEST position.   MT
Press the EXEQ button.   PASS or FAIL
Return TEST/CMD switch to center when done.

End-to-End Test (EE) at Control

Place TEST/CMD switch to TEST position.   AUTO
Use BWD/FWD switch to scroll to EE.   EE
Press the EXEQ button.   EE** (** flashing)
Use +/- switch to scroll to EE01.   EE01
Press the EXEQ button.   EE01,nnEO,nnEI
If nn is 00, there are no errors.
Return TEST/CMD switch to center when done.

Displaying Options and Addresses

Place TEST/CMD switch to CMD position.   MDCK or DSAB
Use BWD/FWD switch to scroll to DSOP.   DSOP
Press the EXEQ button.   OP** (** flashing)
Use +/- switch to scroll thru options.   Options with check
At the Control only,
   Use BWD/FWD switch to scroll to DSPL   DSPL
   Press the EXEQ button   PL** (** flashing)
   Use +/- switch to scroll thru poll list.   Addresses with check
Use BWD/FWD switch to scroll to DSNA.   DSNA
Press the EXEQ button for network address.   NA65 or NA01
Return TEST/CMD switch to center when done.

Maintenance Mode (MTCE) is required for the following tests:

To place the data set in maintenance mode:

```
Place TEST/CMD switch to CMD position.          MDCK or DSAB
Use BWD/FWD switch to scroll to MTCE.           MTCE
Press the EXEQ button.                          MC/O
Press the EXEQ button.                          MC/I  (in)

   Do EE, LL or DL tests, then

Place TEST/CMD switch to CMD position.          MDCK or DSAB
Use BWD/FWD switch to scroll to MTCE.           MTCE
Press the EXEQ button.                          MC/I
Press the EXEQ button.                          MC/O  (out)
Return TEST/CMD switch to center when done.
```

End-to-End Test (EE) at Tributary

```
In Maintenance Mode (MC/I),
Place TEST/CMD switch to TEST position.         MT
Use BWD/FWD switch to scroll to EE.             EE
Press the EXEQ button.                          EE01,nnEO,nnEI
If nn is 00, there are no errors.
```

Local Loop (LL) at Control or Tributary

```
In Maintenance Mode (MC/I),
Place TEST/CMD switch to TEST position.         AUTO or MT
Use BWD/FWD switch to scroll to LL.             LL
Press the EXEQ button.                          LL flashing
Wait for TEST COND lamp to light.
```

Remote Digital Loop (DL) at Control

```
In Maintenance Mode (MC/I),
Place TEST/CMD switch to TEST position.         AUTO
Use BWD/FWD switch to scroll to DL.             DL
Press the EXEQ button.                          DL** (** flashing)
Use +/- switch to scroll to DL01.               DL01
Press the EXEQ button.                          DL01 flashing
Wait for TEST COND lamp to light.
```

DATAPHONE II MODEM TESTS

DATAPHONE II DIAGNOSTIC MENUS

TESTS	ACRONYM	CNTL	TRIB	Maintenance Mode CNTL	TRIB
PORTx	PORT	*	*	*	*
AUTO NETWORK TEST	AUTO	*D	–	*D	–
MODEM TEST	MT	*D	*D	*D	*D
DIGITAL TESTxx	DT	*D	*D	*D	*D
END-TO-END	EE	*D	–	*D	*D
TRANSMIT LOSS	TRMT	–	–	*D	*D
RECEIVE LOSS	RCV	–	–	*D	*D
1004 Hz TEST TONE	1004	–	–	*DN	*DN
LOCAL LOOPBACK	LL	–	–	*DN	*DN
DIGITAL LOOPBACK	DL	–	–	*DN	*DN
CONT. MODEM TEST	C-MT	–	–	*DN	*DN
SELF-TESTxx	ST	–	–	*DN	*DN
RCV SIGNAL LOSS	RSL	*	*	*	*
RCV SIGNAL QUA1.	RSQ	*	*	*	*
LAMP TEST	LAMP	*	*	*	*
ABORT TEST	ABT	*	*	*	*

COMMANDS	ACRONYM	CNTL	TRIB	Maintenance Mode CNTL	TRIB
MODEM CHECK	MDCK	*	–	*	–
DISABLE/ENABLE	DSAB	*D	*D	*D	*D
MAINTENANCE MODE	MTCE	*	*	*	*
DISPLAY OPTIONS	DSOP	*	*	*	*
CLEAR OPTIONS	CLOP	–	–	*D	*D
CHANGE OPTIONS	CHOP	–	–	*D	*D
CHG MUX OPTIONSx	CHMX	–	–	*	*
ADD TO POLL LIST	ADPL	–	–	–	*
PORTx	PORT	–	–	–	1
DISPLAY POLL LIST	DSPL	*	–	*	1
ACQUIRE POLL LIST	AQPL	–	–	*	1
CHANGE POLL LIST	CHPL	–	–	*	1
DISPLAY SW VERS.	DSSV	–	–	*	*
DISP NETWORK ADDR	DSNA	*	*	*	*
CHG NETWORK ADDR	CHNA	–	–	*	*
DISP LOCAL ADDR	DSLA	*	*	*	*
PORT MONITORx	PMON	*	*	*	*

* Available   D Disrupts data transmission
- Not available   N Non-timed; user must terminate
x 2096A only   xx 2024A,2048A/C only
1 Only when G2 or G4 options are used

HP 37210T FRONT PANEL

RTS	CTS	TXD	LSD	RXD				
○	○	○	○	○				
120	121	118	122	119				

LP	EP	24	RQ	TP	IT	IL	DL	AL

TST	SQM	RXD	TXD	LSD	CTS	RTS	DSR	DTR
○	○	○	○	○	○	○	○	○
142	110	104	103	109	106	105	107	108

○
ON

SELF TESTS FOR 37210T MODEM

The following self tests can be used by the customer or CE to deter-
mine if a data transmission problem exists between two modems, and
to isolate the fault to either the modems or telephone lines.

Tests 1 and 2 should be performed at all suspect modem sites.
Test 3 should be performed on 4-wire installations only.
Test 4 should be performed at all 2-wire installations.

NOTE: On modems fitted with option 005 the remote modem can be con-
      trolled from the local modem using the Remote Command
      Assembly.

TEST 1. Lamp Test

1. Depress the LP pushbutton.

2. If any of the front panel indicators fails to illuminate, the
   modem is faulty.

HEWLETT-PACKARD MODEM TESTS

TEST 2. Local Analog Loopback Test

1. Depress the AL and TP pushbuttons (DL should not be depressed).

2. The LSD indicator should be fully on.

3. If the SQM indicator flickers on or remains on, the modem is faulty. The indicators should be observed for at least 30s.

4. Return the modem to normal operation by releasing the TP and AL pushbuttons.

TEST 3. Remote Digital Loopback Test (4-wire installations only)

1. Depress the DL pushbutton at the remote modem.

2. Depress the TP pushbutton at the local modem.

3. The LSD indicators at both modems should turn on.

4. If the SQM indicator flickers on more often than 3 times per 30s period on average, the telephone lines are likely to be substandard.

5. Return both modems to normal operation by releasing the DL pushbutton at the remote modem and the TP pushbutton at the local modem.

TEST 4. 2-Wire Receive Only Test

1. Press the RO pushbutton on the local modem.

2. Depress the TP pushbutton at the remote modem.

3. The LSD and RXD indicators at the local modem should turn on.

4. If the SQM indicator at the local modem flickers on, it indicates a telephone line disturbance. Frequent flickering on of the SQM indicator (more often than 3 times/30s period on average) indicates a substandard telephone line.

5. Repeat the test reversing the direction of transmission.

REMOTE COMMAND OPERATION

In a point-to-point system remote commands can be sent from either modem to the other. In a multi-point system remote commands can only be sent from the master modem.

Procedure to send remote commands:

1. Set the ADDRESS thumbwheel to the address of the remote modem.

2. Set the Code thumbwheel to the appropriate code (see table).

3. Momentarily depress the TX pushbutton to transmit the remote command. The TX indicator will light to indicate transmission of the remote command.

4. A message confirming receipt of the remote command is transmitted back to the master modem. Receipt of this message is indicated by the TX indicator turning OFF and the ABORT indicator not lighting.

5. If the ABORT indicator lights, no confirmatory message has been received by the master modem.

6. To resend a command it will be necessary to depress the TX indicator twice, once to clear the ABORT indication and once to transmit the command.

REMOTE COMMAND CODES

Code No.	Function at Remote Modem
0	Depression of TP pushbutton
1	Selects 2400 bps data rate
2	No effect
3	Depression of AL pushbutton
4	Remote Command Module transmits 1020Hz tone. Remote Transmitter disabled
5	Disables transmitter
6	No effect
7	Depression of DL pushbutton
8 or 9	Resets/Clears remote commands in the remote modem.

HEWLETT-PACKARD MODEM TESTS

HP 37220T TRANSMITTER & RECEIVER FRONT
PANELS WITH FRONT COVER OPEN

```
┌──────────────────────────────────────────────────────────────────┐
│  RTS○CTS○TXD○  TVF[ ⊙  ⊙ ]   48◖96 SP◖MK DLB◖ALB   TRN●   │TX│
│  PWR○LSD○RXD○  RVF[ ⊙  ⊙ ]   GND⊙EYE⊙ ERR○  TST○    SQM○  │RX│
└──────────────────────────────────────────────────────────────────┘
```

SELF TESTS FOR 37220T MODEM

The following self tests can be used by the customer of CE to deter-
mine if a data transmission problem exists between two modems and to
isolate the fault to either the modem or telephone lines.

Test 1 should be performed at all suspect modem sites.

TEST 1. Local Analog Loopback Test

1. Set the ALB-NORM-DLB switch to ALB.

2. Set the MK-NORM-SP switch to MK.

3. If the ERR indicator flickers on or remains on, the modem is
   faulty. The ERR indicator should be observed for at least 30s.

4. Set the MK-NORM-SP switch to SP and repeat step 3.

5. Check that the TXD and RXD indicators both light when the MK-
   NORM-SP switch is set to SP, and both go out when MK is selected.

TEST 2. Remote Digital Loopback Test

1. Set the ALB-NORM-DLB switch on the remote modem to DLB.

2. Set the MK-NORM-SP switch on the local modem to SP.

3. Check that LSD turns on steady at the local modem within 9s. If
   LSD fails to turn on, the phone lines are faulty.

4. If the SQM indicator at the local modem flickers on more often
   than 3 times every 30s on average, the telephone lines are likely
   to be substandard.

5. Set the MK-NORM-SP switch to MK and repeat step 4.

REMOTE CONTROL OF LOOPBACK

The 37220T modem has a facility whereby a local modem can control loopback on the remote modem. The loopback returns signals received over the telephone lines either by looping the received phone line signal directly to the transmit phone lines (analog loopback) or by looping the output of the receiver back to the transmitter input (digital loopback).

Only one of these two remote loopback modes can be selected. See Operating and Service Manual for details.

Depression of the TRN pushbutton at the local modem for greater than 3s will cause the remote modem to enter the remote loopback mode. The TST indicators at both modems will also light.

To remove the remote modem from the remote loopback mode, press TRN at aproximately 1s intervals. The TST indicators at both modems should extinguish provided both test switches are in the NORM position.

HEWLETT-PACKARD MODEM TESTS

HP 37230A FRONT PANEL

```
ON    RTS  CTS  TXD  RXD  DCD  RDL  RDL              DLB  RDL
 O     O    O    O    O    O    O    O              ┌──┬──┬──┐
                                                   │  │  │  │
                                                   └──┴──┴──┘
                                                   TEST  AB
```
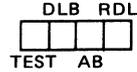
SELF TESTS FOR HP 37230A

ANALOG LOOPBACK TEST:

Should be performed at each modem to check local transmit/receive functions. Failure of this test indicates a faulty modem.

1. Depress the ALB and TEST pushbuttons on the modem front panel. Ensure all other pushbuttons are not depressed.

2. Check that the ERR lamp is off. If ERR is on or flashes on, the modem is faulty.

3. Return the modem to normal operation by releasing both pushbuttons.

DIGITAL LOOPBACK TEST: (Modems connected by 4-wire only)

Checks out the ability of two modems to transmit and receive data over the telephone network. In a multidrop network this test can be performed only between the master modem and a slave modem. It cannot be performed between two slave modems. Failure of this test and a pass for both modems in the Analog Loopback Test indicates a faulty phone line connection.

1. Depress the DLB pushbutton on the far end modem. Ensure all other pushbuttons are not depressed.

2. Depress the TEST pushbutton on the local modem. Ensure all other pushbuttons are not depressed

3. Each time an error is detected in the data received at the local modem, ERR will flash on. Occasional flashing on of ERR is acceptable. However, if ERR flashes on frequently or stays on for long periods, a faulty phone line connection is indicated.

4. Return both modems to normal mode by releasing both pushbuttons.

2-WIRE TEST: (Modems connected by 2-wire lines only)

This test checks out the phone line connection between two modems operating in a 2-wire network.

1. At the local modem remove the wire links between the rear panel TX and RX terminals. Ensure that the 2-wire telephone line is connected to the RX terminals on the modem.

2. Depress the TEST pushbuttons on both the local and far end modems. Ensure all other pushbuttons are not depressed.

3. Each time an error is detected in the data received at the local modem, ERR will flash on. Occasional flashing of ERR is acceptable. However, if ERR flashes on frequently or stays on for long periods, a faulty phone line connection is indicated.

4. Release both TEST pushbuttons and reconnect the wire links between the TX and RX terminals on the local modem.

REMOTE CONTROL OF DIGITAL LOOPBACK

This facility, available only when two modems are connected in a point-to-point arrangement via a 4-wire line, allows an operator at one of the modems to command the far end modem to enter the digital loopback mode.

1. Depress the RDL pushbutton on the local modem to command the far end modem to enter the digital loopback mode.

2. Check that the RDL indicator turns on at the local modem within 6s. If RDL fails to light and ERR turns on, digital loopback at the far end modem is not guaranteed.

3. Releasing the RDL pushbutton at the local modem removes the digital loopback from the far end modem.

SELECTED HP 1640A/B SETTINGS

FORMAT	ATC	ATP/ADCC	ASYNC MTS
DATA CODE	ASCII-7	ASCII-8 or ASCII-7	ASCII-7
MODE	ASYNC-1	ASYNC-1	ASYNC-1
CLK(3)			
BITS/SEC(1) SYNC CHAR(2)	line speed	line speed	line speed
RESYNC ON(2)			
PLUS-- IDLES(2)			
ERROR CHECK	ODD	NONE OR EVEN (4)	ODD
Mode: (defaults)	MONITOR	MONITOR	MONITOR
TRIG SOURCE	TX DATA	TX DATA	TX DATA
RUN MODE (exception)	CONT TIG or CONTINUOUS(3)	CONT TIG or CONTINUOUS	CONT TRIG or CONTINUOUS(3)
TRIGGER	any	any	any
SUPPRESS PLUS-- -- CHARACTERS	OFF n/a	OFF	OFF n/a
Patch Panel	2:TX 3:RX 7:GND	2:TX 3:RX 7:GND	2:TX 3:RX 7:GND

Notes:

1 = Asynchronous
2 = Synchronous
3 = Synchronous for HP 1640B
4 = None for ASCII 8. Even for ASCII-7
5 = Applies to 1640A; for 1640B - don't care

For asynchronous operation, CLEAR-TO-SEND must be "ON" for TRANSMI
DATA to be displayed. CARRIER DETECT must be "ON" for RECEIVED DAT
to be displayed. The 1640A/B will set these lines "ON" automatical
ly if pins are not used at positions 5 and 8 on the patch panel.

SSLC AND INP CONFIGURATION SUMMARY

DS and Synchronous MTS	DS X.25	IMF, MRJE, RJE (to host)
ASCII-7	HEX-8	OTHER-8 (EBCDIC)
SYNC	SYNC	SYNC
	EXT	EXT
16,16 (5)	32,32 (5)	32,32 (5)
FF (5)	FF (5)	FF (5)
0	0	0
ODD	SDLC	NONE
MONITOR	MONITOR	MONITOR
TX DATA	TIME INT	TX DATA
CONT TRIG or CONTINUOUS	CONT TRIG	CONT TRIG or CONTINUOUS
OFF n/a	SYNCS	OFF
2:TX 3:RX 4:RTS 5:CTS 6:DSR 7:GND 8:CAR 15:SCT 17:SCR 20:DTR	2:TX 3:RX 4:RTS 5:CTS 6:DSR 7:GND 8:CAR 15:SCT 17:SCR 20:DTR	2:TX 3:RX 4:RTS 5:CTS 6:DSR 7:GND 8:CAR 15:SCT 17:SCR 20:DTR

SSLC AND INP CONFIGURATION SUMMARY

If several subsystems will use the SSLC or INP, it must be con-
figured so as to be compatible for all. This table summarizes the
configuration choices available for each subsystem when it is the
SOLE user of the SSLC or INP. The user will need to select the
choices that will permit his or her particular set of subsystems to
use the SSLC or INP.

Step Number	MPE Prompt and the Recommended Response for Each Data Communications Subsystem
3.7	UNIT #?0
3.8	SOFTWARE CHANNEL #?0
3.9	TYPE? 17 (INP) 18 (SSLC)
3.10	SUBTYPE? 0 Synchronous, switched line with a modem 1 Synchronous, nonswitched line with a modem 3 Synchronous hardwired line 7 Asynchronous line 0 or 1 (DS, RJE, MRJE) 0,1,3,or7 (MTS) 1 (IML)
3.14	PROTOCOL? 1 (Bisync)

3.15	LOCAL MODE?
	
	1 Local is multipoint control station or primary
	  contention station.
	
	2 Local is secondary contention station.
	
	1 or 2 (DS, RJE)
	1 (MTS and IMF)
	          (MRJE overrides this option)

Step Number	MPE Prompt and the Recommended Response for Each Data Communications Subsystem

3.16	TRANSMISSION CODE?
	
	1 Automatic code sensing
	2 ASCII
	3 EBCDIC
	
	1,2,or 3 (DS,RJE)
	            (MRJE,MTS,and IMF
	            override the response)

3.17	RECEIVE TIMEOUT? (default=20) 0-32000 (DS, RJE, MTS, IMF) or return (MRJE overrides response)
3.18	LOCAL TIMEOUT? (default=20) 0-32000 (DS, RJE, MTS, IMF) or return (MRJE overrides response)

3.19	CONNECT TIMEOUT? (default=900)
	
	300 (Recommended for DS,RJE,
	          MTS)
	900+ (Recommended for IMF)
	         (MRJE overrides response)

3.20	DIAL FACILITY? YES, NO, LDEV # on INP-B, or return (DS,RJE, and MTS use response) (MRJE and IMF don't use response)
3.21	ANSWER FACILITY? YES, NO, or return (DS,RJE, and MTS use response) (MRJE and IMF don't use response)

3.23	DUAL SPEED?
	
	YES or NO (DS,RJE,MRJE-
	           YES for European modems only)
	NO (MTS)
	          (IMF doesn't use response)

3.24	HALF-SPEED? YES or NO (DS,RJE,MRJE use response) (MTS and IMF don't use response)

SSLC AND INP CONFIGURATION SUMMARY

Step Number	MPE Prompt and the Recommended Response for Each Data Communication Subsystem
3.25	SPEED CHANGEABLE? YES or NO (response overridden if modems that provide internal clocking are used)
3.26	TRANSMISSION SPEED? line transmission speed in characters per second: 250, 300, 600, 900, 1200, 2400, 7000 (IMF overrides response)
3.27	TRANSMISSION MODE? 0 Full duplex (Transmission facility, not protocol.) 1 Half duplex
3.28	PREFERRED BUFFER SIZE? 0-4095 1024 words maximum for INP, 4095 maximum for SSLC. 1024 (recommended for DS) 500 (recommended for MTS) (MRJE,RJE and IMF override response)
3.29	DRIVER CHANGEABLE? YES (MRJE with SSLC, MTS with SSLC) NO (All other subsystems and configurations)
3.30	DRIVER OPTIONS? 0
3.50	DRIVER NAME? CSSBSCO (SSLC) IOINP0 (INP)
3.52	PHONE LIST? YES or NO (DS,RJE,and MTS use response) (MRJE and IMF override response)

Step Number	MPE Prompt and the Recommended Response for Each Data Communications Subsystem
3.54	LOCAL ID SEQUENCE? ID or return (DS uses response) (MTS,RJE,MRJE, and IMF do not use response)
3.55	REMOTE ID SEQUENCE? ID or return (DS uses response) (MTS,RJE,MRJE, and IMF do not use response)
3.70	DEVICE CLASSES? classname or return (DS,MRJE,MTS,IMF) RJLINE (RJE. Additional names are optional; see RJE Reference manual, Section III for discussion of #RJLINE subsystem command.) Note: The same class name may not be used for both the INP and the SSLC.
3.94	ADDITIONAL DRIVER CHANGES? YES (MRJE (SSLC),MTS with SSLC) NO (All other subsystems and configurations.)
3.98	ADD DRIVERS? YES or NO
3.99	DRIVER NAME? CSSMRJE0 (MRJE WITH SSLC) CSSBSC1 (MTS WITH SSLC)

COMMUNICATIONS
PROTOCOL

Reference: "Binary Synchronous Communication Protocol"
IBM GA27-3004-02

CONTENT   **PAGE**

NOTE: The information in this handbook is not a set of product
specifications. Refer to the appropriate subsystem, system,
and component specifications, reference manuals, or
technical specifications.

COMMUNICATIONS PROTOCOL

Bisync Control Characters

Characters	NAME	ACII/octal /[hex]	EBCDIC/octal [hex]
ACK0	Even Acknowledgment	DLE 0 [10. 20.60 30]	DLE 20.160 [10.70]
ACK1	Odd Acknowledgment	DLE 1 [10. 20.61 30]	DLE/ 20.141 [10.61]
BEL	Bell	7	57 [2F]
DLE	Data Link Escape	20	20 [10]
ENQ	Enquiry	5	55 [2D]
EOT	End of Tranmission	4	67 [37]
ETB	End of Text Block	27 [17]	46 [26]
ETX	End of Text	3	3
NAK	Negative Acknowledgment	25 [15]	75 [3D]
PAD	Trailing Pad	377 [FF]	377 [FF]
RVI	Reverse Interrupt	DLE< [10. 20.74 3C]	DLE@ 20.174 [10.7C]
SOH	Start of Header	1	1
STX	Start of Text	2	2
SYN	Sync Character	26 [16]	62 [32]
TTD	Temp. Text Delay	STX.ENQ 2.5	STX.ENQ 2.55 [02.2D]
US/IUS	Information Unit Separator	37 [IF]	37 [IF]
WACK	Wait Before Transmit	DLE; 20.73 [10.3B]	DLE,20.153 [10.6B]

BISYNCH Control Character Definitions

ACK   (Affirmative Acknowledge) reply to station selection, receipt of message sent.

DLE   (Data link Escape) provdes supplementary line control expansions; control of DLE sequences. DLE-EOT is a forced disconnect.(1)

ENQ   (Enquiry) Interrogates terminal to status or I.D. (control). Message state; request retransmission of acknowledgement or preceding block to be ignored.(1)

EOT   (End of Transmission) ends a transmission, all stations go to control mode; negative response to a poll.

ETB   (End of Transmission Block) terminates a message block, indicating additional messsage blocks to be sent. Requires a reply.(1)

ETX   (End of Text) terminates last block of a message. Requires a reply.(1)

NAK   (Negative Acknowledge) indicates a message error by receiving terminal; reply to a selection sequence by a non-ready device; response to a TTD.

RVI   (Reverse Interrupt) sent by receiving station to terminate prematurely operation in progress.

SOH   (Start of Heading) precedes header records.

STX   (Start of Text) precedes text records.(1)

SYN   (Synchronous Idle) used as a "fill" to maintain sync.(1)

TTD   (Temporary Text Delay) sent by transmitting station to indicate a delay or initiate an abort in transmission.
(Unit Separator) (Information Separator)

US or IUS   Terminates an intermediate block of characters, BBC is sent, no line turnaround occurs. This character may also be called ITB (Intermediate Text Block Separator).(1)

WACK   (Wait Before Transmit Positive Acknowledge) sent by receiving station to indicate not ready to receive.

---

(1) Follows a DLE to indicate control characters while in TRANSPARENT TEXT mode.

COMMUNICATIONS PROTOCOL

BISYNCH End To End Control Characters

Characters	NAME	ASCII/octal/ [hex]	EBCDIC/octal [hex]
DCI, DC2 or ESC*	Component Select (Refer to 2780/ 3780 RJE)	21,22[11.12] 33*[1B*]	21,22 [11,12] 47.* [27.*]
ESC*	Carriage Control (Refer to 2780/37808 RJE)	33.* [1B*]	47.* [27.*]
GS/IGS	Group Separator	35 [1D]	35 [1D]
HT	Horizontal Tab	11 [9]	5
RS/IRS	Intermediate Record Separator	36 [1E]	36 [1E]
VT	Vertical Tab	13 [0B]	13 [0B]

*An appropriate character.

End To End Control Character Definitions

DC1,DC2 or ESC*	(Component Selection) The 3780 uses DC1 for selecting printer and DC2 or DC3 for selecting punch. The 2780 uses ESC 4 for selecting punch and any valid carriage control sequence ESC* for selecting printer. (Refer to 2780?3780 RJE)
ESC*	(Carriage Control) The 2780/3780 uses a two-character ESC sequence to provide carriage control. (Refer to 2780/3780 RJE).
GS/IGS	(Group Separator) used for space compression within a record to represent repetitive consecutive characters. (In 2780/3780 RJE).
HT	(Horizontal Tab) requires a tab format message which defines tab positions. Allows tabbing to next tab position.
RS/IRS	(Intermediate Record Separator) In 3780 RJE non-transparent mode, allows record separation and blank truncation.
VT	(Vertical Tab) terminates buffer loading, initiates print cycle, and skips to printer tape channel 2.

COMMUNICATIONS PROTOCOL

CRC CYCLIC REDUNDANCY CHECK

A 16-bit longitudinal check performed on all significant charac-
ters following SOH or STX, including the End-of-Block character.

Also referred to as BCC Block Check Character.

Used in EBDIC mode or ASCI Transparent.

E	B	B	p		E	B	B	p		I	B	B	p
T	C	C	a	or	T	C	C	a	or	T	C	C	a
B	C	C	d		X	C	C	d		B	C	C	d
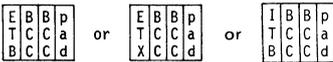
VRC VERTICAL REDUNDANCY CHECK

Provides odd parity for each character (including LRC character).

Used in ASCII mode.

LRC LONGITUDINAL REDUNDANCY CHECK

Computed on each block following SOH or STX but including a End-
of-Block character.

Used in ASCII mode.

E	L	p		E	L	p
T	R	a	or	T	R	a
B	C	d		X	C	d
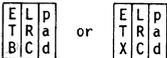
IUS INFORMATION UNIT SEPARATOR
IUS (EBCDII), US (ASCII), (2780 PROTOCOL)

Serves as an Intermediate Block Check. It is followed by the BCC
character.

text	I U S	B C C	B C C	text	**EBCDIC**

text	U S	L R C	text	**ASCII**
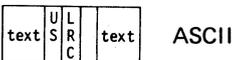
IRS INTER RECORD SEPARATOR
IRS (EBCDIC), RS (ASCII), (3780 Protocol)

In non-transparent mode each record normally terminates with
IRS/RS, each block with ETB. The last block in data set is ter-
minated with ETX. Allows trailing blank record truncation.

IRS also terminates line for print control.

Summary of Responses

EOT

Sent by receiver as an error response for printer error; parity
error;buffer overrun.

Sent by sender to indicate End-of-Data set, or abort.

NAK

Sent y receiver as an error response for incorrect CRC or VRC/
LRC check, or received ENQ in text.

```
┌─┬─┐        ┌─┬────┬─┐
│S│E│        │S│    │E│
│T│N│  or    │T│data│N│
│X│Q│        │X│    │Q│
└─┴─┘        └─┴────┴─┘
```
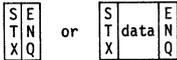
TTD

Sent in text by sender if buffer parity error occurs, or
transparency check is detected by communications adapter.

```
TTD ──────▶
◀──────NAK
TTD ──────▶
```
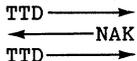
An abort sequence for card reader error or input parity error.

NOTE: The EOT is a blind transmission. It does not require a
        response. If the EOT is not received, it may produce
        anomalous results.

COMMUNICATIONS PROTOCOL

DS/3000 FORMAT USING BISYNCH PROTOCOL

S Y N	D L E	S T X	16 BYTES fixed format	variable byte appendage 0-50 bytes	user data	D L E	E T X	B C C	B C C	P A D

0	Length of Fixed & Appendage (words)	Message Class
1		

	Reply	Reject	Continue	Break	Compress	Stream Class
2						
	0	1	2	3	4	

3 4 5	I.C. - from Process #	to - I.C. Process #
6 7	Length (bytes) Appendage & Data	

GROUP POLL (GENERAL POLL)

Group A — Every Terminal

Note: No BCC

CPU
Control
Station

*	A	A	"	"	E N Q	P A D

*	B	B	"	"	E N Q	P A D

Tributaries
(Conponents)

S Y N	S Y N	S Y N	E O T

S Y N	S Y N	S Y N	E O T

· · ·   · · ·

None of Group A's Stations
wants to transmit data

None of Group B's Stations
wants to transmit data

Control
Station
(Continued)

*	C	C	"	"	E N Q	P A D

Tributaries
(continued)

S T X	C	A	TEXT BLOCK	E T B	B C C	B C C	P A D

· · ·

Station CA transmits
a text block

*NOTE: If terminal sends transparent text there would be a
DLE in front of the STX and ETB characters.*

GROUP POLL (GENERAL POLL, CONTINUED)

Control Station (continued)

A C K 1						A C K 0					

Tributaries (continued)

S T X	TEXT BLOCK	E T X	B C C	B C C	S T X	C	D	TEXT BLOCK	E T X	B C C	B C C	...

Station CA sends more data   Station CD sends data

Control Station (continued)

A C K 1				*	D	D	"	"	E N Q	P A D

Tributaries (continued)

S Y N	S Y N	S Y N	E O T

No other stations in Group C want to transmit data

* =

P A D	S Y N	S Y N	S Y N	E O T	P A D	S Y N	S Y N	S Y N

Specific Poll

Control Station

P A D	S Y N	S Y N	S Y N	E O T	P A D	S Y N	S Y N	S Y N	A	A	D	D	E N Q	P A D

Tributary (AD)

S Y N	S Y N	S Y N	E O T

Selection

Note: Lower case

NOTE: DLE precedes control characters of transparent.

Control Station

*	a	a	B	B	E N Q

S T X	TEXT	E T X or T	E T B	B C C	B C C

E O T

Tributaries

S Y N	S Y N	S Y N	A C K 0

S Y N	S Y N	S Y N	A C K 1

* =

P A D	S Y N	S Y N	S Y N	E O T	P A D	S Y N	S Y N	S Y N

Control State

COMMUNICATIONS PROTOCOL

Broadcast (Not Supported)

Control
Station

| * | a | a | ~ | ~ | E
N
Q |

| S
T
X | TEXT | B
C
C | B
C
C |
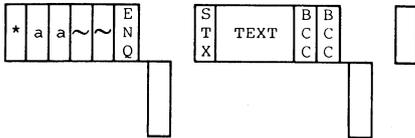
No response from
Tributaries

| * = | P
A
D | S
Y
N | S
Y
N | S
Y
N | E
O
T | P
A
D | S
Y
N | S
Y
N | S
Y
N |
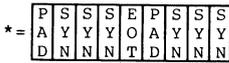
Control
State

Line Select (Not Supported)

Control

| * | ~ | ~ | ~ | S
T
X | TEXT | E
T
X | B
C
C | B
C
C |

| * = | P
A
D | S
Y
N | S
Y
N | S
Y
N | E
O
T | P
A
D | S
Y
N | S
Y
N | S
Y
N |

Control
State

BINARY SYNCHRONOUS
CONTROL CHARACTER SEQUENCES

Framing

Heading Block   Text Block

Combined Heading and Text Blocks

STX may or may not be sent   Response   Response
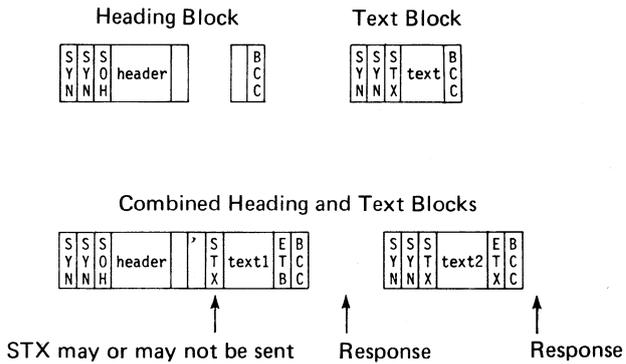
BCC Accumulation – Transparent Mode

Start Transparent Text

Deleted   BCC   Deleted   BCC

Deleted   BCC   BCC   BCC   BCC
          Deleted   Deleted   Deleted

COMMUNICATIONS PROTOCOL

Normal Message

```
CPU    ENQ   STX odd text ETB   STX even text ETB   STX odd text ETB   STX even text ETX              EOT
Sends

B Sends  ACK 0          ACK 1            ACK 0            ACK 1            ACK 0
```

ENQ-ENQ Convention

```
Primary    ENQ 2-sec time out ENQ   STX text ETX   EOT   ACK 0              ACK 1

Secondary  ENQ 3-sec time out ACK 0       ACK 1   ENQ   STX text ETX   EOT
```

Unanswered Line Bid

```
ENQ 2- or 3-sec response time out   ENQ time out   ENQ time out # of retries   EOT
```

BINARY SYNCHRONOUS CONTROL CHARACTER
SEQUENCES (Continued)

Retransmission

ENQ		STX odd text ETB		STX odd text ETB	
	ACK 0		NAK or ACK 0		ACK 1
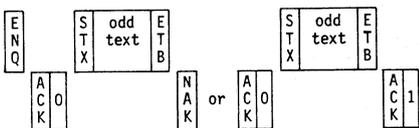
Receive – Initiated Transmission Delay (WACK)

ENQ	STX text ETB	STX text ETB	ENQ	ENQ	STX text ETB ...
ACK 0	ACK 1	2-sec delay WACK	2-sec delay WACK	ACK 0	ACK 1 ...
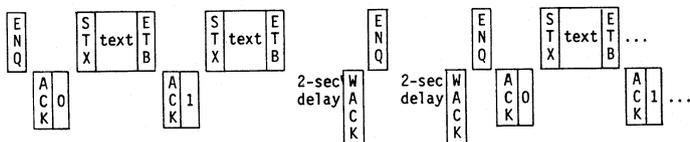
Transmitter – Initiated Transmission Delay (TTD)

ENQ	STX text ETB	STX text ETB	* TTD	* TTD	STX text ETB	EOT
ACK 0	ACK 1	ACK 0	NAK	NAK	ACK 1	
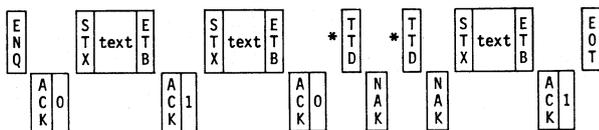
*Up to a 20-second delay

Improper Ack

ENQ	STX odd text ETB	STX even text ETB	STX odd text ETB	ENQ	ENQ *	... EOT
ACK 0	ACK 1	ACK 0	ACK 0	ACK 0	ACK 0	
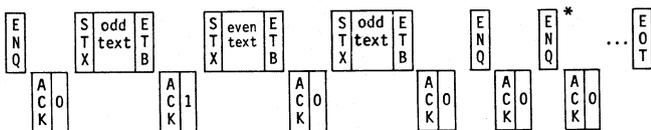
*The text block may be retransmitted.

COMMUNICATIONS PROTOCOL

BINARY SYNCHRONOUS CONTROL CHARACTER
SEQUENCES (Continued)

No-Response
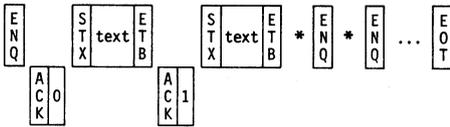
*3-second response time out

C-14

Bisynch Handshaking

ENQ | pad | SYN | SYN | ENQ | pad |

ACK
(ASCII) | pad | SYN | SYN | DLE | 0 | pad | or | pad | SYN | SYN | DLE | 1 | pad |

STX | pad | SYN | SYN | STX | text |

NAK | pad | SYN | SYN | NAK | pad |

TTD | pad | SYN | SYN | STX | ENQ | pad |

WACK | pad | SYN | SYN | DLE | , | pad | or | DLE | ; | pad |
EBCDIC .... ASCII

ETB | text | ETB | BCC | BCC | pad | or | text | ELRC | BCC | pad |

ETX | text | ETX | BCC | BCC | pad | or | text | ELRC | BCC | pad |

RVI | SYN | SYN | SYN | DLE | @ | pad | or | DLE | < | pad |
ASCII

EOT | SYN | SYN | SYN | EOT | pad |
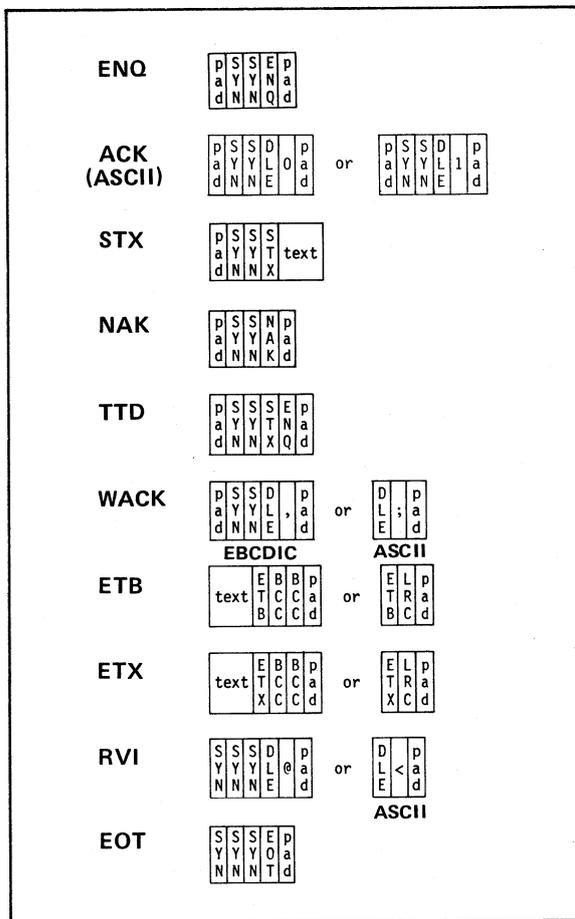
COMMUNICATIONS PROTOCOL

RJE Peculiarities

Buffer overruns may result in NAK, or in failure to alternate ACK.

Attempted sign-on to a remote already in use may result in line disconnect rather than NAK or error message.

Some installations send EOT every 10 or 15 seconds so wait=m,s fails to time out.

Comments on Block Format

2780 and 3780 RJE Emulators may use either non-transparent or transparent mode.

The MRJE subsystem uses transparent mode. The transmission block requires control parameters for data control, stream identification, repetitive character compression, etc. See Section E.

The DS/3000 subsystem uses transparent mode. The transmission block contains an 8-word header and an optional appendage for parameter values and DS control information, described above.

X.25 DATA LINK PROTOCOL: LAP-B
(Reference: CCITT X.1 - X.29 recommendations)

Framing Format

```
FLAG
    ADDRESS                                    Flag
         CONTROL
  ┌───┬───┬───┬──────────────────────┬───┬───┬───┐
  │ F │ A │ C │ Information (optional)│ F │ F │ F │
  │   │   │   │                      │ C │ C │   │
  │   │   │   │                      │ S │ S │   │
  └───┴───┴───┴──────────────────────┴───┴───┴───┘
                        (FRAME CHECK SEQUENCE)
```
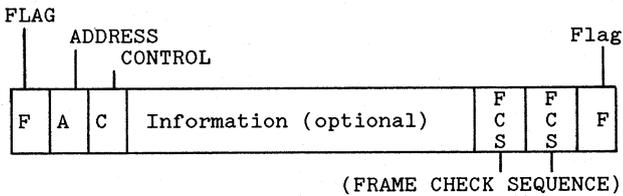
FLAG is 01111110 or 7E (Hex)

Address Convention for LAP-B

    A   00000011
    B   00000001

Frame Transmitter: Type of Frame	Network (DCE)	DTE
Command	A	B
Response	B	A

X.25

CONTROL FIELD

FORMAT	FUNCTION	ENCODING 8 7 6 5 4 3 2 1				TYPE
Information	I-Information	N(R)	P	N(S)	0	Command
Supervisory	RR- Receiver Ready	N(R)	P F	0 0 0 1		Either
	RNR-Receiver Not Ready	N(R)	P F	0 1 0 1		Either
	REJ-REJECT	N(R)	P F	1 0 0 1		Either
Unnumbered	SABM- Set Asynchronous Balanced Mode	0 0 1	P	1 1 1 1		Command
	DM- Disc Mode	0 0 0	F	1 1 1 1		Response
	DISC - Disconnect	0 1 0	P	0 0 1 1		Command
	UA- Unnumbered Ack	0 1 1	F	0 0 1 1		Response
	FRMR- Frame Reject	1 0 0	F	0 1 1 1		Response

LAP-B CONTROL FUNCTION DEFINITONS

I-Frame (Information)	Frame which transmits data in packets.

RR (Receiver Ready)	Indicates the DTE or DCE is ready to receive an I frame and acknowledge previously received I-frames numbered up to and including N(R)-1. May also be used to clear a busy condition.
RNR (Receiver Not Ready)	Indicates a busy condition at the remote DTE or or DCE and acknowledges frames numbered N(R)-1. The transmission of a UA, RR, REJ or SABM indicates the busy condition has cleared.
REJ (REJECT)	Used by DTE or DCE to request retransmission of I-frames starting with the frame numbered N(R). I-frames numbered N(R)-1 and below are acknowledged.
SABM (Set Async. Balanced Mode)	Set up a LAP-B link.
DM (Disconnect Mode)	Used to report that the DTE or DCE is logical-ly disconnected from the link and is in the disconnected phase.
DISC (Disconnect)	Used to terminate the link.
UA (Unnumbered Acknowledgment)	Used to acknowledge the receipt and acceptance of the Unnumbered format commands.
FRMR (Frame Reject)	Used to report an error condition not recover-able by retransmission of the identical frame.
P/F (Poll/Final Bit)	Used in timeout recovery situations. The P-bit is set in a command to elicit an immediate response from the remote secondary. The specific response to this command will have the F-bit set to acknowledge the poll bit.
N(R), N(S)	N(R) is the sequence number of the next receive frame expected. N(S) is the sequence number of the send frame assigned by the transmitter.

X.25

INFORMATION FIELD

The I-field appears in Information frames and contains the pac-
ket. This field is unrestricted with respect to code.

In the FRMR frame the following information appears in the
I-field:

Rejected Control Field	V(S)| C/R| V(R)| 0	0 0 0 0 Z Y X W
----8 bits----	-------8 bits-----	-----8 bits-----

V(S) --- the current send state variable of the rejecting
station.

C/R --- 1 = frame rejected was a response frame.
0 = frame rejected was a command frame.

V(R) --- the current receive state variable of the rejecting
station.

W --- the control field was invalid.

X --- the control field was invalid because the I-field was
not permitted with the command. Bit W must be set also.

Y --- the I-field exceeded maximum established capacity.

Z --- the control field contained an invalid N(R).

FCS (FRAME CHECKING SEQUENCE)

The FCS is a 16-bit sequence used to detect transmission errors.
The address, control, and information fields are checked.

Transparency Bit Stuffing

● When transmitting, DTE or DCE inserts 0-bit after all sequences
of 5 contiguous 1-bits within the frame content.

● When receiving, DTE or DCE discards 0-bit which follows 5 con-
tiguous 1-bits within the frame content.

Interframe time fill is accomplished by transmitting contiguous
flags between frames.

PACKET LEVEL PROTOCOL

Packet Formats

DATA

```
Q D 0 1 L C G N
    L C N
P(R)   M P(S) 0
   USER DATA
```

or

```
Q D 1 0 L C G N
    L C N
P(S)           0
P(R)           M
   USER DATA
```

RR (Receiver Ready)

```
0 0 0 1 L C G N
    L C N
P(R) 0 0 0 1
```

or

```
0 0 1 0 L C G N
    L C N
0 0 0 0 0 0 0 1
     P(R)      0
```

RNR (Receiver Not Ready)

```
0 0 0 1 L C G N
    L C N
P(R) 0 0 1 0 1
```

or

```
0 0 1 0 L C G N
    L C N
0 0 0 0 0 1 0 1
     P(R)      0
```

REJ (Reject)

```
0 0 0 1 L C G N
    L C N
P(R) 0 1 0 0 1
```

or

```
0 0 1 0 L C G N
    L C N
0 0 0 0 1 0 0 1
     P(R)      0
```

INT. (Interrupt)

```
0 0 S N L C G N
    L C N
0 0 1 0 0 0 1 1
   USER DATA
```

INT. CONF (Interrupt Confirmation)

```
0 0 S N L C G N
    L C N
0 0 1 0 0 1 1 1
```

CALL REQUEST

```
0 D S N L C G N
    L C N
0 0 0 0 1 0 1 1
Calling     Called   Address
                     Lengths
     Addresses
```

CALL CONFIRMATION

```
0 D S N L C G N
    L C N
0 0 0 0 1 1 1 1
Calling     Called   Address
                     Lengths
     Addresses
```

CLEAR REQUEST

```
0 0 S N L C G N
    L C N
0 0 0 1 0 0 1 1
   Clearing Cause
  Diagnostic Code
```

CLEAR CONFIRMATION

```
0 0 S N L C G N
    L C N
0 0 0 1 0 1 1 1
```

RESET REQUEST

```
0 0 S N L C G N
    L C N
0 0 0 1 1 0 1 1
  Resetting Cause
  Diagnositc Code
```

RESET CONFIRMATION

```
0 0 S N L C G N
    L C N
0 0 0 1 1 1 1 1
```

RESTART REQUEST

```
0 0 S N 0 0 0 0
0 0 0 0 0 0 0 0
1 1 1 1 1 0 1 1
  Restarting Cause
  Diagnostic Code
```

RESTART CONFIRMATION

```
0 0 S N 0 0 0 0
0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1
```

INCOMING CALL FROM PAD

```
0 D S N L C G N
    L C N
0 0 0 0 1 0 1 1
Calling     Called   Address
                     Lengths
     Addresses
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1
```

X.25

Q	D	SN
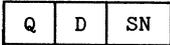
Q   --- The data qualifier bit used in X.29 (host <--> PAD) pac-
         kets only.

D   --- The delivery confirmation bit used to signal the use of
         the D-bit in call request packets. In data packets, it
         means that an end-to-end acknowledgment is desired.

SN --- Sequence Numbering
             01: sequencing is modulo 8
             10: sequencing is modulo 128

LCGN -   The logical channel group number and logical channel
LCN   number combine to identify the virtual circuit
         (values 0-4095).

P(R) -   The sequence number of the next receive packet expected.

P(S) -   The sequence number of the send packet.

M-bit - Indicates the data was longer than the packet length so
         there is more data in the next packet.

Interrupt User Data (DS/X.25 on HP3000)

        1 Break
        2 Control-y
        3 Resume
        4 Abort
        6 Abortjob

Clearing Cause Codes

Coding of Clearing Cause Field in Clear Indication Packet

Bits

```
                                            8 7 6 5 4 3 2 1
DTE originated ............................. 0 0 0 0 0 0 0 0

Number busy ................................ 0 0 0 0 0 0 0 1
Out of order ............................... 0 0 0 0 1 0 0 1
Remote procedure error ..................... 0 0 0 1 0 0 0 1
Reverse charging acceptance not subscribed*. 0 0 0 1 1 0 0 1
Incompatible destination ................... 0 0 1 0 0 0 0 1
Fast select acceptance not subscribed*...... 0 0 1 0 1 0 0 1

Invalid facility request ................... 0 0 0 0 0 0 1 1
Access barred .............................. 0 0 0 0 1 0 1 1
Local procedure error ...................... 0 0 0 1 0 0 1 1

Network congestion ......................... 0 0 0 0 0 1 0 1
Not obtainable ............................. 0 0 0 0 1 1 0 1
RPOA out of order*.......................... 0 0 0 1 0 1 0 1
```

*May be received only if the corresponding optional user
 facility is used.

Resetting Cause Codes

Coding of Resetting Cause Field in Reset Indication Packet

                                              Bits

                                        8 7 6 5 4 3 2 1
DTE originated* 0 0 0 0 0 0 0 0

Out of order** 0 0 0 0 0 0 0 1
Remote procedure error* 0 0 0 0 0 0 1 1
Local procedure error 0 0 0 0 0 1 0 1
Network congestion 0 0 0 0 0 1 1 1
Remote DTE operational** 0 0 0 0 1 0 0 1
Network operational*** 0 0 0 0 1 1 1 1
Incompatible destination* 0 0 0 1 0 0 0 1

   * Applicable to virtual calls and permanent virtual
        circuits only.
  ** Applicable to permanent virtual circuits only.
*** Applicable to permanent virtual circuits and datagram
        logical channels only.

Restarting Cause Codes

Coding of the Restarting Cause Field in Restart Indication
Packets

                                              Bits

                                        8 7 6 5 4 3 2 1
Local procedure error 0 0 0 0 0 0 0 1

Network congestion 0 0 0 0 0 0 1 1
Network operational 0 0 0 0 0 1 1 1

Diagnostic Codes

Coding of X.25 Network Generated Diagnostic Fields in Clear,
Reset, and Restart Indication and Diagnostic Packets

No additional information 0 0 0 0 0 0 0 0   0
Invalid P(S) 0 0 0 0 0 0 0 1   1
Invalid P(R) 0 0 0 0 0 0 1 0   2
                                      . . . .
                                      0 0 0 0 1 1 1 1   15

Packet type invalid 0 0 0 1 0 0 0 0   16
For state r1 .... 0 0 0 1 0 0 0 1   17
For state r2 .... 0 0 0 1 0 0 1 0   18
For state r3 .... 0 0 0 1 0 0 1 1   19
For state p1 .... 0 0 0 1 0 1 0 0   20
For state p2 .... 0 0 0 1 0 1 0 1   21
For state p3 .... 0 0 0 1 0 1 1 0   22
For state p4 .... 0 0 0 1 0 1 1 1   23
For state p5 .... 0 0 0 1 1 0 0 0   24
For state p6 .... 0 0 0 1 1 0 0 1   25
For state p7 .... 0 0 0 1 1 0 1 0   26
For state d1 .... 0 0 0 1 1 0 1 1   27
For state d2 .... 0 0 0 1 1 1 0 0   28
For state d3 .... 0 0 0 1 1 1 0 1   29
                                      . . . .
                                      0 0 0 1 1 1 1 1   31

Packet not allowed 0 0 1 0 0 0 0 0   32
Unidentifiable packet 0 0 1 0 0 0 0 1   33
Call on one way logical channel 0 0 1 0 0 0 1 0   34
Invalid packet type on a permanent
               virtual circuit............... 0 0 1 0 0 0 1 1   35
Packet on unassigned logical channel . 0 0 1 0 0 1 0 0   36
Reject not subscribed to 0 0 1 0 0 1 0 1   37
Packet too short 0 0 1 0 0 1 1 0   38
Packet too long 0 0 1 0 0 1 1 1   39
Invalid general format identifier 0 0 1 0 1 0 0 0   40
Restart with nonzero in bits 1-4,9-16. 0 0 1 0 1 0 0 1   41
Packet type not compatible with
               facility 0 0 1 0 1 0 1 0   42
Unauthorized interrupt confirmation .. 0 0 1 0 1 0 1 1   43
Unauthorized interrupt 0 0 1 0 1 1 0 0   44
                                      . . . .
                                      0 0 1 0 1 1 1 1   47

```
Timer expired ........................ 0 0 1 1 0 0 0 0   48
For incoming call .................... 0 0 1 1 0 0 0 1   49
For clear indication ................. 0 0 1 1 0 0 1 0   50
For reset indication ................. 0 0 1 1 0 0 1 1   51
For restart indication ............... 0 0 1 1 0 1 0 0   52
                                       . . . . . . . . . . . . . .
                                       0 0 1 1 1 1 1 1   63


Call set-up problem .................. 0 1 0 0 0 0 0 0   64
Facility code not allowed ............ 0 1 0 0 0 0 0 1   65
Facility parameter not allowed ....... 0 1 0 0 0 0 1 0   66
Invalid called address ............... 0 1 0 0 0 0 1 1   67
Invalid calling address .............. 0 1 0 0 0 1 0 0   68
                                       . . . . . . . . . . . . . .
                                       0 1 0 0 1 1 1 1   79


Not assigned ......................... 0 1 0 1 0 0 0 0   80
                                       . . . . . . . . . . . . . .
                                       0 1 0 1 1 1 1 1   95


Not assigned ......................... 0 1 1 0 0 0 0 0   96
                                       . . . . . . . . . . . . . .
                                       0 1 1 0 1 1 1 1  111


Not assigned ......................... 0 1 1 1 0 0 0 0  112
                                       . . . . . . . . . . . . . .
                                       0 1 1 1 1 1 1 1  127


Reserved for network ................. 1 0 0 0 0 0 0 0  128
specific diagnostic information
                                       . . . . . . . . . . . . . .
                                       1 1 1 1 1 1 1 1  255
```

* Not all diagnostic codes need apply to a specific network, but
  those used are as coded in the table.

* A given diagnostic need not apply to all packet types (i.e.,
  reset indication, clear indication, restart indication, diag-
  nostic packets).

* The first diagnostic in each grouping is a generic diagnostic
  and can be used in place of the more specific diagnostics
  within the grouping. The decimal 0 diagnostic code can be used
  in situations where no additional information is available.

DS/3000 FORMATING FOR DATA TRANSFER USING X.25 PROTOCOL

```
FLAG                                                              FLAG
   ADDRESS                              Frame Checking Sequence
      CONTROL
         GFI/LEN
            LCGN
               DATA PACKET TYPE

┌───┬───┬───┬───┬───┬───┬─────────────┬──────────────┬──────┬───┬───┬───┐
│   │   │   │   │   │   │ *  16 bytes │ variable byte│ user │ F │ F │   │
│ F │ A │ C │ G │ L │ D │ fixed format│ appendage    │ data │ C │ C │ F │
│   │   │   │   │   │   │             │ 0-50 bytes   │      │ S │ S │   │
└───┴───┴───┴───┴───┴───┴─────────────┴──────────────┴──────┴───┴───┴───┘
```
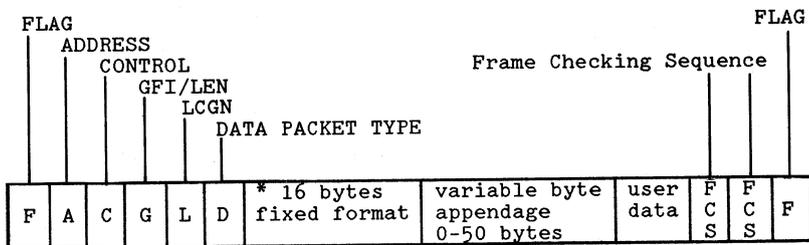
*Refer to page C-8 for fixed format.

SDLC: SYNCHRONOUS DATA LINK CONTROL

SDLC is the Data Link Control defined in Systems Network
Architecture (SNA). Two types of stations are used in SDLC com-
munications: primary stations and secondary stations.

> Primary stations - controls a data link and issues commands.
> Secondary stations - receive commands and returns responses.

There can be only one primary station on a data link at one time,
but there can be multiple secondary stations. All communications
on a data link are from the primary station to one or more secon-
dary stations, or from a secondary station to the primary
station.

All information is sent in frames. A provision is made for
transmitting numbered information frames and making sure they are
received in the proper order.

Framing Format

```
FLAG
  |     ADDRESS                              Flag
  |      |    CONTROL                          |
  |      |     |                               |
 _____
|    |    |    |                       | F | F |    |
| F  | A  | C  | Information (optional)| C | C | F  |
|    |    |    |                       | S | S |    |
 ---------------------------------------------------
                              (FRAME CHECK SEQUENCE)
```
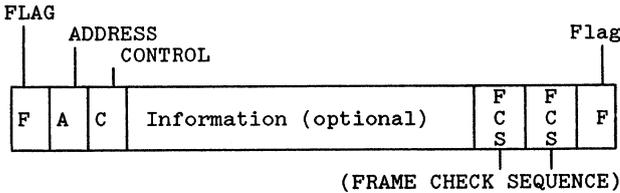
FLAG is 01111110 or 7E (Hex)

ADDRESS FIELD

The address field always contains the address of the secondary
station. There are 3 types of addresses:

- a station address - intended for individual secondary station;
- a group address - intended for a group of secondary stations;
- a broadcast address - intended for all secondary stations.

Hex 'FF' is reserved for a broadcast address.

CONTROL FIELD

FORMAT	FUNCTION	8 7 6	5	4 3 2 1	TYPE
Information	I-Information	Nr	P/F	Ns 0	Either
Supervisory	RR- Receiver Ready	Nr	P/F	0 0 0 1	Either
	RNR-Receiver Not Ready	Nr	P/F	0 1 0 1	Either
	REJ-REJECT	Nr	P/F	1 0 0 1	Either
Unnumbered	UI - Unnumbered Information	0 0 0	P/F	0 0 1 1	Either
	RIM - Request Initialization Mode	0 0 0	F	0 1 1 1	Response
	*SIM - Set Initialization Mode	0 0 0	P	0 1 1 1	Command
	*SNRM - Set Normal Response Mode	1 0 0	P	0 0 1 1	Command
	DM - Disconnected Mode	0 0 0	F	1 1 1 1	Response
	DISC - Disconnect	0 1 0	P	0 0 1 1	Command
	UA - Unnumbered Acknowledgment	0 1 1	F	0 0 1 1	Response
	FRMR - Frame Reject	1 0 0	F	0 1 1 1	Response
	BCN - Beacon	1 1 1	F	1 1 1 1	Response
	CFGR - Configure	1 1 0	P/F	0 1 1 1	Either
	RD - Request Disconnect	0 1 0	F	0 0 1 1	Response
	XID - Exchange Identification	1 0 1	P/F	1 1 1 1	Either
	UP - Unnumbered Poll	0 0 1	P	0 0 1 1	Command
	TEST	1 1 1	P/F	0 0 1 1	Either

*Resets Nr and Ns

SDLC

P/F Bit	All three C field formats contain a poll/final (P/F) bit. A P (poll) bit is sent to a secondary station to require that it initiate transmission; an F (final) bit is sent to a primary station by a secondary station in the last frame of a transmission. (Do not confuse the F (final) bit with the F (flag) frame delimiter pattern.) Only one P bit may be outstanding (unanswered by an F bit) at one time on any of the data links described thus far.
Ns	Modulo 8 sequence number assigned by the transmitter to the frame being sent.
Nr	Count of the next expected frame; should match the next incoming Ns count.

SDLC CONTROL FUNCTION DEFINITIONS

I-Frame (Information)	Frame which transmits data

RR (Receiver Ready)	Indicates the primary or secondary is ready to receive an I frame and acknowledge previously received I-frames numbered up to and including Nr-1. May also be used to clear a busy condition.
RNR (Receiver Not Ready)	Indicates a busy condition at the remote primary or secondary and acknowledges frames numbered Nr-1. The transmission of a UA, RR, REJ or SNRM indicates the busy condition has cleared.
REJ (REJECT)	Used by primary or secondary to request retransmission of I-frames starting with the frame numbered Nr. I-frames numbered Nr-1 and below are acknowledged.
SNRM (Set Normal Response Mode)	Set up a SDLC link.
DM (Disconnect Mode)	Used to report that the secondary is logically disconnected from the link and is in the disconnected mode.
DISC (Disconnect)	Used to terminate the link.
UA (Unnumbered Acknowledgment)	Used to acknowledge the receipt and acceptance of the Unnumbered format commands.
FRMR (Frame Reject)	Used to report an error condition not recoverable by retransmission of the identical frame.
UI (Unnumbered Information)	Unnumbered command or response that carries information.
RIM (Request Initialization Mode)	Response sent by secondary if SIM has not been issued.
SIM (Set Initiation Mode)	Command to set initiation mode.
RD (Request Disconnect)	Response requesting disconnection.
TEST	Test pattern being sent in information field.

SDLC

XID (Exchange Identification)	Identification is being sent in information field.

UP (Unnumbered Poll)	Response optional if poll set not on.
BCN (Beacon)	Loss of input detected.
CFGR (Configure)	Contains function descriptor in information field.

INFORMATION FIELD

The I-field appears in Information frames and contains the data.
This field is unrestricted with respect to code.

The information field in an SNA environment consists of a trans-
mission header (TH) and a request/response header and data. The
data may be user or application data or it may be SNA commands.

```
 ___ ___ ___ _____ ___ ___ ___
|   |   |   |             | F | F |   |
| F | A | C | Information | C | C | F |          FRAME
|   |   |   |             | S | S |   |
|___|___|___|_____|___|___|___|
              \                /
               \              /
                \            /
             _____
            | TH | RH |  DATA   |               I - FIELD
            |____|____|_____|
                         |
                         |
                    SNA command
                         or
                     user data
```
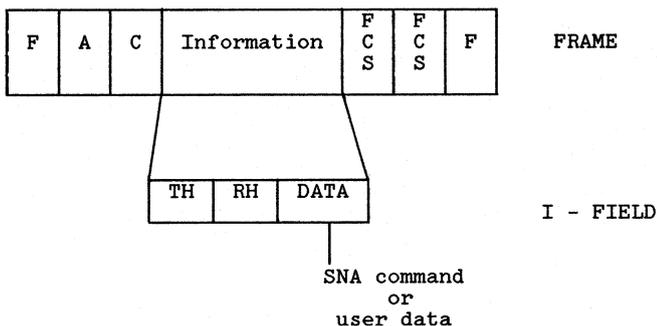
When operating a 3270 device the TH is 2 bytes in length and the
RH is 3 bytes. When reading an SDLC trace of a 3270 data stream,
this means that the eighth byte is the start of the 3270 data
stream. (The flag is stripped off by the TRACE facility.)

For environments other than 3270, consult the SNA handbook (GA
27-3136-4) for TH and RH header lengths.

DSN/RJE
REMOTE JOB ENTRY
2780/3780 EMULATOR

For official information about RJE refer to these IBM manuals:

- Component Information for the IBM 3780 Data Communications Terminal (GA 27-3063)
- Component Description IBM 2780 Transmission Terminal (GA 27-3005)

CONTENT   PAGE

DSN/RJE – HP 30130E

	Driver	Interface Board
SSLC	CSSBSC0	30055A
INP	IOINP0	30010A, Series II,III
		30020A/B, Series 30, 33, 40, 44, 64

Capability Requirements

Account	CS, OP for Programmatic Control
Group	
User	CS, OP for Programmatic Control

```
 :RJE
```

:RJE [command file][,[input file][,[list file][,punch file]]]

command file RJECOM Default: $STDINX
    File or device containing DSN/RJE commands
    FOPTIONS %2054 if unspecified.
    FOPTIONS %7 if user-specified.
    AOPTIONS %0

input file RJIN Default: $STDIN
    File or device containing input data to be transmitted to
    remote computer
    FOPTIONS %2054 if unspecified.
    FOPTIONS %7 if user-specified.
    AOPTIONS %0

list or out file RJLIST Default: $STDLIST
    File or device to which list output from remote computer is
    routed.
    FOPTIONS %2514 if unspecified.
    FOPTIONS %507 if user-specified file.
    FOPTIONS %504 if user-specified device.
    AOPTIONS %1

punch file RJPUNCH Default: $OLDPASS
    File or device to which punch output from the remote computer
    is routed.
    FOPTIONS %2132 if unspecified.
    FOPTIONS %3 if user-specified.
    AOPTIONS %102

    Use for routed output with #RJOUT with no file, device, or
    procedure specified.

If opened for #RJPUNCH command:
FOPTIONS %3 if a file is specified.
FOPTIONS %0 if a device is specified.
AOPTIONS %102
File code = 1060, which shows up as RJEPN when :LISTF ,1

source file
 Used when you want to look at the contents of source file
 and stay within RJE, using either #RJLIST or #RJPUNCH
 followed by the option ;SOURCE=source file.
 FOPTIONS %7
 AOPTIONS not passed.

message file
 In group and account MSG.RJE, typically,

 :BUILD message file name;REC=-36,,V,ASCII;DISC=100;MSG.

 Used in MSGFILE parameter of RJLINE, with OP capability.
 A user program to write to message file name opens with
 FOPTIONS %32105
 AOPTIONS %1203

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│   #RJLINE                                                             │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Defines communication link. This must be the first subsystem
command unless RJLIST or RJPUNCH is used with SOURCE.

#RJLINE {2780|3780}
[;LINECODE={ASCII|EBCDIC}]   The default is ASCII.
                              If the communications controller is
                              an INP and it is to be used in
                              EBCDIC the LINECODE must be passed
                              explicitly.
[;CONNECT={DIAL[,{telephone number}{selection signals}{DIRECT}]}
        {ANSWER}   ]
                              The default is DIAL.
[;MAXRPB=blocking factor]

                              Default   ┌─────────────────┐
                              Values: │   Transparent   │
                                           │ Yes │   No   │
                                           ├───────┼─────────┤
                                2780   │   4   │   7   │
                                3780   │   6   │   255   │
                                           └─────────────────┘

[;ID=local terminal identification]
[;RIN=rin number,rin password]
[;CHNL3=printer channel number]   The default is 8, the single
                                    space VFU position.
[;XEND]   Ignore DLE EOT sequence.
[;TRACE=ON,[ALL],[mask],[numentries],[WRAP],[trace file name]]

     Default values:
     Trace errors only, not ALL; mask = %37 (See Section I);
     numentries = 24; linear trace file use, not WRAP;
     trace file name = RJETRCEn|RJETRCnn|RJETRnnn in the
     log on group and account, where `n' is the logical device
     number of the communications line.

[{;DEV={logical device number}{class name} } Default is RJLINE.
 {;NODE={logical node name}   ]
[;LOCK={YES|NO}]   Locks stack, or allows its memory management.
[;PRI={HIGH|NORMAL}]   HIGH is 150, otherwise job or session
                         priority.
[;QUEUETIME=[m][,s]]

[;MSGFILE=message file name]   The file must reside in MSG.RJE.

Typically, :BUILD message file name;REC=-36,,V;ASCII;MSG;DISC=100

     OP capability is required to use MSGFILE.

```
┌─────────────────────────────────────────────────────────────────┐
│  #RJIN                                                            │
└─────────────────────────────────────────────────────────────────┘
```

Initiates transmission of input data set to the remote computer.

```
#RJIN [input file|@procedure name[(G|P|S)]]
[;REC=[starting record number][,ending record number]]
         This is for disc files only.  The first record is 0.
[;COMPRESS={YES|NO}]     Default for 2780 is NO, for 3780 is YES.
[;XPARENT={YES|NO}]      Default is NO.  Sends transparent text.
[;TRUNCATE={YES|NO}]     Default is YES, for trailing blanks.
[;INCODE={ASCII|EBCDIC|BINARY}]    Default is ASCII.
    When INCODE and LINECODE are a combination of ASCII and
    EBCDIC, the appropriate conversion of data is provided.
    When INCODE is BINARY data is left unconverted.
[;MAXSIZE=nnn]      Extends 80-byte input limit to -256<nnn<128
                    bytes or words.  For remote to remote use.
[;XEOF]  Ignore end of file errors.  Useful for magnetic tape
         input.
```

```
┌─────────────────────────────────────────────────────────────────┐
│  #RJOUT                                                           │
└─────────────────────────────────────────────────────────────────┘
```

Initiates receipt of routed output data sets from remote computer.

```
#RJOUT [output file|@procedure name[(G|P|{S})]][,data set count]
[;WAIT=[minutes][,seconds]]  Default value: 3 minutes.
                             Maximum value: 32767 seconds.
                             Zero value: Indefinite in session.
[;OUTCODE=ASCII|EBCDIC|BINARY}]
    When OUTCODE and LINECODE are a combination of ASCII and
    EBCDIC, the appropriate conversion of data is provided.

    When OUTCODE is BINARY data is left unconverted.
[;OUTSIZE=nnn]      Extends 80-byte output limit to -256<nnn<128
                    bytes or words.  For remote to remote use.
[;REPEAT={YES|NO}]
[;INTERRUPT={YES|NO}]
```

#<u>RJLIST</u>

Initiates receipt of unrouted output, and routed output to list
file from the remote computer, or initiates offline list from the
source file.

#RJLIST [list file|@procedure name[(G|P|{S})]][,data set count *]
[;WAIT=[minutes][,seconds]] * Default value: 3 minutes.
                                Maximum value: 32767 seconds.
                                Zero value: Indefinite in session.
[;SOURCE=source file]   When this option is used the
                                <u>source file</u> is copied to the <u>list</u>
                                <u>file</u>. The WAIT, OUTCODE, and
                                AUTOPAGE parameters are prohibited.
[;OUTCODE=<u>ASCII</u>|EBCDIC|BINARY)]   *
    When OUTCODE and LINECODE are a combination of ASCII and
    EBCDIC, the appropriate conversion of data is provided.
    When OUTCODE is BINARY data is left unconverted.
[;OUTSIZE=nnn] *   Extends 80-byte output limit to -256<nnn<128
                    bytes or words. For remote to remote use.
[;FORMSMSG=message.]   Prompts operator for a forms message when
                       printing an output spool file. The
                       <u>message</u> must end with a period.
[;AUTOPAGE={YES|<u>NO</u>}]   * Allows automatic page eject to coincide
                       with page separation perforation.

* This parameter has no meaning when the SOURCE parameter is
  used.

#RJPUNCH

Initiates receipt of unrouted output, and routed output to punch
file from the remote computer, or initiates offline punch from
the source file. #RJPUNCH does not insert control functions, and
is useful for transferring binary files.

```
#RJPUNCH [punch file|@procedure name[(G|P|{S})]][,count * ]
[;WAIT=[minutes][,seconds]]  *  Default value: 3 minutes.
                                Maximum value: 32767 seconds.
                                Zero value: Indefinite in session.
[;SOURCE=source file]           When this option is used the
                                source file is copied to the
                                punch file.  The WAIT, OUTCODE,
                                and AUTOPAGE parameters are
                                prohibited.
[;OUTCODE={ASCII|EBCDIC|BINARY}]  *
    When OUTCODE and LINECODE are a combination of ASCII and
    EBCDIC, the appropriate conversion of data is provided.
    When OUTCODE is BINARY data is left unconverted.
[;OUTSIZE=nnn]  *   Extends 80-byte output limit to -256<nnn<128
                    bytes or words.  For remote to remote use.
```

* This parameter has no meaning when the SOURCE parameter is
  used.

#RJEOD

Terminates the #RJIN buffer and sends EOT to remote computer.
#RJEOD provides End of File.

#RJEND

Generates a block of performance statistical information and then
terminates DSN/RJE Subsystem.

#RJIO <u>message</u> or #<u><special character>message</u>

Equivalent to #<u>RJIN</u> followed by #<u>RJOUT</u>. Useful for sending
job entry system commands or other job control language. Not
required in session mode where '<u>/*$DA</u>' type commands are
appropriate.

#<u>RJINFO</u>

Initiates communications line information display to $STDLIST.
See Section I of Handbook for the format of this display.

#<u>RJDEBUG</u>

Sets DSN/RJE into 'debug' mode to allow the user to access the
debugging facility.   Used to test user-written input and output
procedures.

#<u>RJCOMMENT</u>

Provides a way to explain a subsystem command stream in the same
file as the commands.

#RJCOMMENT [message string]

CONTROL-Y

Breaks a subsystem command in a session.

- RJOUT, RJLIST, RJPUNCH: Data sets in process will complete.
- RJIN: If no file specified, terminates input.
- RJCMDFILE: Interruptable commands will be interrupted, and control will return to the session console.
- Programmatic Control: RJOUT with repeat or interrupt set YES returns control to the session terminal. Commands from a command file referenced in a message file will conclude execution, after which control returns to the session terminal.
- Error situations: If a CONTROL-Y is entered before a data set is received or before all commands in a command file are executed, then control is returned to the session terminal.
- Other: During programmatic control mode without either error recovery or data received or user command files in execution, control is returned to the session terminal.

In order to return to programmatic control mode an RJOUT command with interrupt or repeat set YES must be entered.

The only response message issued by the subsystem is the prompt character, "#".

#RJCMDFILE

Causes DSN/RJE to stop processing subsystem commands from its current source, and to begin processing subsystem commands from a new source.

#RJCMDFILE command file reference

The command file reference in this subsystem command may be any of the following:

    logical device number
    "device class name"
    actual file designator
    *formal file designator

The default value is $STDINX.

#RJCONTINUE

Identifies user procedure to handle DSN/RJE detected errors.

                    #RJCONTINUE @procname[(G|P|S̲)]

The user-written procedure must adhere to this SPL specification:
PROCEDURE procname (filenum,errors,comimage,newfname,action);
    INTEGER filenum,action; INTEGER ARRAY errors;
    BYTE ARRAY comimage,newfname;

errors(0)	errors(1)	errors(2)
0 = File System	0 = List File 1 = Punch File 2 = Out File 3 = Command File 4 = In File 5 = Source File 6 = Message File 7 = Statistic File	MPE File System Error Number.
1 = CS	0 = COPEN Intrinsic 1 = CREAD Intrinsic 2 = CWRITE Intrinsic	CS Error Number. (0:8) = Recoverable (8:8) = Irrecoverable
2 = Line Error	0 = Not specified 1 = Unable to open any. 2 = NODE not in database. 3 = Database access error. 4 = Database intrinsic error. 5 = DEV or NODE mapping error.	-1, Not used.
3 = RIN Error	0 = Invalid RIN value	-1, Not used.
4 = Procedure Error	1 = Invalid Procedure Identification	-1, Not used.
5 = Command Error	0 = Invalid Command 1 = Invalid Command Length 2 = Invalid Number of Parameters	-1, Not used.
6 = Routing	0 = Routed list output data set received when not expected. 1 = Routed punch output data set received when not expected.	-1, Not used.
7 = Syntax Error	0 = Invalid key word 1 = Duplicate key word 2 = Invalid construct. 3 = Invalid parameter. 4 = Invalid numeric parmeter. 5 = Parameter required.	Byte position of the command string error.

#RJSTAT

Provides statistical information on frequency of subsystem command use, elapsed times, and tallies of data sets transmitted and received. This information is displayed on $STDLIST, or to a statistic file reference specified by the user.

#RJSTAT [statistic file reference]

statistic file reference is any of the following:

```
        logical device number
        "device class name"
        actual file designator        See DSN/RJE Reference Manual
        *formal file designator       for file characteristics.

        @procedurename[   (G)          See the following comments.
                          (P)
                          (S)   ]
```

When "G" is specified, the segmented library files, SL's, are searched in the following order: Group, Account Public, System. When "P" is specified, the segmented library files, SL's, are searched in the following order: Account Public, System. When "S" is specified or the parameter omitted, the system segmented library file, SL.PUB.SYS, is searched.

If the statistic file reference is present, all output received will be passed as list output to that file or device.

If a user-supplied procedure is specified, it must adhere to the following formal declaration:

```
                PROCEDURE procedurename(target,count)
                VALUE count;
                INTEGER count;
                ARRAY target;
```

DSN/RJE

Space Compression

Operational in 3780 with non-transparent mode.

Each group of two or more consecutive characters, up to 63, are replaced by an EBCDIC IGS or an ASCII GS character followed by the space count. This is %100 plus the number of space characters.

Transparency

Treats all data as binary, allowing all 256-bit combinations.

Requires DLE STX at the beginning of each transparent record. A DLE precedes any valid data-link control character. With no preceding DLE character, the binary representation is considered to be data. THe exception to this rule is DLE itself; a binary byte equivalent to DLE must be preceded by a DLE in order to be considered data.

In transparent mode, each record is normally terminated with an ETB instead of IRS.

Carriage Control 2780/3780

A two-character escape sequence, the first two characters of a record, are the carriage control for a line printer.

2780	3780	ASCII	EBCDIC	Carriage Operation
*	*	ESC Q	ESC /	Single Space
*	*	ESC R	ESC S	Double Space
*	*	ESC S	ESC T	Triple Space
*	*	ESC A	ESC A	Skip to Channel 1, Form Feed
*	*	ESC B	ESC B	Skip to Channel 2, Vertical Tab
*	*	ESC C	ESC C	Skip to Channel 3
*	*	ESC D	ESC D	Skip to Channel 4
*	*	ESC E	ESC E	Skip to Channel 5
*	*	ESC F	ESC F	Skip to Channel 6
*	*	ESC G	ESC G	Skip to Channel 7
*	*	ESC H	ESC H	Skip to Channel 8
	*	ESC I	ESC I	Skip to Channel 9
	*	ESC J	ESC J	Skip to Channel 10
	*	ESC K	ESC K	Skip to Channel 11
	*	ESC L	ESC L	Skip to Channel 12
	*	ESC M	ESC M	Suppress Space

Note: These channels must be configured on the line printer to be functional.

The carriage action required by the escape character sequence is only executed once a NL (new line) or IRS (inter-record separator) character has been received and has caused a print cycle.

Component Selection

Provides automatic routing between list and punch output files.

The component selection character must be the first text character of the first block of text following an ENQ and ACK0, or the first block of a conversational reply, or the first block following an ETX block.

3780 EMULATOR:

Character	File
DC1	List
DC2 or DC3	Punch

DSN/RJE

2780 EMULATOR:

ESC followed by any carriage control character specifies the printer.

ESC followed by a '4' specifies the punch.

Special Forms

The use of special forms is accomplished by the capabilities of the HASP, ASP, or JES system of the host computer, and by the spooler subsystem of the HP 3000.

The job on the host may include an output statement to a device, such as: WRITE (7,1020) X, Y, Z.

The JCL can define this device with a forms parameter. Actual JCL is installation-dependent.

```
//STP7.FT07001 DD SYSOUT=(C,,C325)
//                DCB=(RECFM=UA,BKSIZE=133,LRECL=133)
```

A HASP system indicates the special forms this way:

```
#/*$DF
$19.50.19 OUT 30 F=C325 C=6 T=**** CLS C=1
```

The output to the special form is selected by operator-controlled mode:

```
#/*$T RM30.PR1,F=C325,Q=C
$19.52.27 OK
```

The output file is then transmitted to the HP 3000 with a forms message such as:

```
#RJLIST *LP;FORMSMSG=C325.
```

Upon receipt of the data set, the spooler prompts the operator for mounting the form, and for forms alignment.

```
20:18/J189/14/FORMS: C325
?20:18/J189/14/SP #6 IS #101; LP ON LDEV #6 (Y/N)?
:REPLY 14,Y
?20:22/J189/14/LDEV #6 FORMS ALIGNED OK ? (Y/N)?
:REPLY 14,Y
```

2780/3780 Comparison

The following describes real 2780/3780 equipment:

- Half duplex protocol on point-to-point 2-wire or 4-wire leased or switched networks.

- Support of ASCII or EBCDIC codes:
  ASCII, odd VRC and 8-bit LRC; EBCDIC, 16-bit CRC.

- Horizontal or vertical tabulation.

Feature	2780	3780
Buffer Size	400 bytes	512 bytes
Short record truncation	Yes, but supply EM	Yes, automatic
Blank compression	No	Yes, automatic
Maximimum block factor	2, option 7	Non-transparent, 216
		Transparent 1, option 6
Generate WACK, TTD	No	Yes
Intermediate Block	US BCC ASCII	RS no BCC
Terminator, logical	IUS BCC EBCDIC	IRS no BCC
record separator		Will accept IUS BCC
Component Selection		
Printer	ESC x	DC1
	x = control	
Punch	ESC 4	DC2/DC3
SOH	Treated as STX	Not recognized

DSN/RJE

Timeouts

RECEIVE TIMEOUT: DEFAULT IS 20 SECONDS

This timeout is set when the ACK is sent to the remote. Additional communications are expected from the remote in the form of text, EOT, or TTD. In case of a timeout a batch job aborts.

```
  local  ◄────── text remote       Insure host sends TTD
          ──────► ACK               or change timeouts.

              │         Receive timeout >= 20 seconds.

          ◄────── text,TTD, or EOT
```
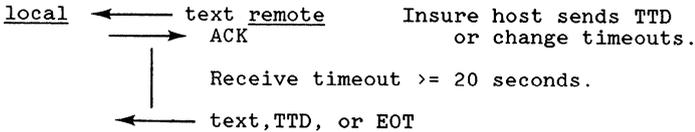
LOCAL TIMEOUT: DEFAULT IS 60 SECONDS

This timeout seves to make effective use of the line by timing between requests to the driver. In a job when this timeout expires the job will abort. This is the time from the completion of a CS Intrinsic until the receipt of the next CS Intrinsic call, such as CCONTROL, CREAD, or CWRITE.

CONNECT TIMEOUT:

The connect timeout is the interval until the Data Set Ready signal is provided indicating the communications link is established. In a session, if CONNECT=ANSWER this timeout is disabled.

REPONSE TIMEOUT:

This is used for line bids, response to control characters, and response to text.

The response timeout is chosen when configuring the local mode. A primary contention response is 2 seconds, a secondary is 3 seconds.

For example, if the response from the remote is not received within the allowable time period, the local station sends an ENQ and waits. This is repeated until a response is received, or the number or retries is exhausted. This timeout is used to resolve ENQ-ENQ contention conflicts.

WAIT TIMEOUT:

Used in #{RJEOUT}, #{RJLIST}, and #{RJPUNCH} subsystem commands.

The {WAIT=m,s} parameter can be specified. It applies to each data set specified in the {count} filed. This timeout establishes the maximum amount of time to wait for the remote computer to bid for the line. If the timeout is exceeded, the command completes, and the next command executes.

QUEUE TIMEOUT:

Queue timeout is the time DSN/RJE is to queue on an X.21 connection attempt.

DSN/RJE Error Message Structure

*** CS ERROR x,yyy,zz ***

    x=0 Line open
    x=1 Line read
    x=2 Line write
    yyy Irrecoverable CS error. See Section I of Handbook.
    zz   Recoverable CS error. See Section I of Handbook.

*** LINE ERROR x ***

    x=0 Line not yet established.
    x=1 Unable to open any of the DEV or NODE parameters specified.
    x=2 The DEV or NODE parameter specified was absent.
    x=3 The network configuration database could not be closed successfully after all access completed.
    x=4 A fatal network intrinsic error occurred while accessing the network configuration data base.
    x=5 Unable to map the DEV or NODE parameter specified to any configured communications device.

*** PROCEDURE ERROR xx ***

An error has occurred in the use of a user-written procedure in an RJOUT, RJLIST, RJPUNCH, or RJIN subsystem command. The error itself is a Loader Error, and is described in the MPE Intrinsics Reference Manual.

*** COMMAND FILE ERROR x,yy
*** INPUT FILE ERROR x,yy
*** LIST FILE ERROR x,yy
*** MESSAGE FILE ERROR x,yy
*** PUNCH FILE ERROR x,yy
*** OUT FILE ERROR x,yy
*** SOURCE FILE ERROR x,yy
*** STATISTIC FILE ERROR x,yy

    x=0 FOPEN error
    x=1 FCLOSE error
    x=2 FREAD or FWRITE error
    x=3 Insufficient file space
    yy   File system error number. See Section I of Handbook.

DSN/RJE Communication Line Specifications

See procedure RJECNFG

Parameter:	Setting:	Comment:
formaldesig	RJLINE	Formal line designator. For :CLINE.
device	RJLINE	device class name, or from input.
coptions	%040100	communications options, below & Section I
aoptions	%000417	access options, below & Section I
doptions	%010060	driver options, below & Section I
numbuffers	1	buffers assigned to the line
bufsize	261	words
idlist	specified	May be 0.
suplist	empty	DSN/MTS use.
pollist	empty	DSN/MTS use.
dwnldfile	empty	DSN/INP use.
yyy	empty	reserved for future use
phonelist	specified	May be 0.
inspeed	empty	
outspeed	empty	
miscarray	specified	8,1,900,2,4,180,5,15. See Section I
drivername	empty	line default used
ctraceinfo	0	coptions.(3:1) allows CLINE tracing

```
|0|1|2 3|4 5|6 7 8 9|0 1 2|3 4 5|        coptions = %040100
 0:1 0 0:0 0 0:0 0 1:0 0 0:0 0 0
   |   |   |   |    |transmission code, use default setting.
   |   |   |   |local is primary contention station
   |   |   |use configured default speed setting
   |   |allow CLINE command override
   |   |do not invoke CS trace facility at opening
   |allow ID sequences, both user supplied and configured
 allow timeouts
```

```
|0 1 2 3 4 5 6 7|8 9 0|1|2 3|4|5        aoptions = %000417
 0:0 0 0:0 0 0:1 0 0:0 0 1:1 1 1
             |     | |   |perform all I/O using CIO
             |     | |disallow CLINE buffer override
             |     |dial: answer on write & read connect
             |allow CS hardware error messages at
             |console
          reserved for future use
 use BSC protocol
```

```
:011121314 51617 8191011 21314 51        doptions = %010060
 0:0 0 1:0 0 0:0 0 0 1:1 0:0 0 0
           |   |   | | | |send four leading SYN characters
           |   |   | | | reserved for future use
           |   |   | | MFW placed into & expected in text
           |   |   | expect ITB sequence from remote station
           |   |   automatic generation of TTD
           |   BCC: VRC or LRC (non-transparent or transparent
           |   with header and CRC 16 (transparent without header)
           |  remote will not send leading graphics
        Ending sequence: BSC default.  EOT (non-switched) or
        DLE EOT (switched)
       control state listen mode between user request ignores
       remote control sequences
     poll termination: transmit RVI to return line to control
     mode
   delay sequence: wait on received WACK or TTD sequences
 reserved for future use
```

JES 2 Commands

Command	Parameters
$A Release	A Q[,classes] { Jn [-n] 'jobname' Sn [-n] Tn [-n] } [,Jn [-n] ,'jobname' ,Sn [-n] ,Tn [-n]] ...
$B Backspace	{ PRTn Rn.PRn } { n D } [,PRTn ,Rn.PRn } { ,n ,D }] ... { PUNn Rn.PUn } { n D } [,PUNn ,Rn.PUn } { ,n ,D }] ...
$C Cancel	A { RDRn Rn.RDn } [,RDRn ,Rn.RDn] ... { PUNn Rn.PUn } [,PUNn ,Rn.PUn] ... { PRTn Rn.PRn } [,PRTn ,Rn.PRn] ... (Jn [-n] 'jobname' Sn [-n] Tn [-n]) [,D ,P]

JES 2 Commands

Command	Parameters
$D Display	I [n [,-n]] Mn [-n] ,'message' O A [,XEQ / ,DEV / ,JOB / ,STC / ,TSU] [,XEQ / ,DEV / ,JOB / ,STC / ,TSU] . . . F [,n [-n]] [,Jn [-n] / ,Sn [-n] / ,Tn [-n]] [,H / ,A] { Jn [-n] / Sn [-n] / Tn [-n] } [,Jn [-n] / ,Sn [-n] / ,Tn [-n]] . . . 'jobname' { Q / N } [,n [-n]] , (XEQ, { class / STC / TSU } / OUT / HOLD) U (ALL / LNEn / LNES / PRTS / PUNS / RMTS / RMTn / RDRs / RDI / device [,device] . . .) [,L = { a / cc / cca }]
$E Restart	LNEn [,LNEn] . . . Jn [-n] [,Jn [-n]] . . . 'jobname' { PRTn / Rn.PRn } [,PRTn / ,Rn.PRn] . . . { PUNn / Rn.PUn } [,PUNn / ,Rn.PUn] . . .
$F Forward space	{ PRTn / Rn.PRn } { ,n / D } [,PRTn / ,Rn.PRn ,n / ,D] . . . { PUNn / Rn.PUn } { ,n / D } [,PUNn / ,Rn.PUn ,n / ,D] . . .

JES 2 Commands

Command	Parameters
$H Hold	A Q[,classes] { Jn [-n] } [,Jn [-n]] { Sn [-n] } [,Sn [-n]] ... { Tn [-n] } [,Tn [-n]] 'jobname'
$I Interrupt	{ PRTn } [,PRTn] ... { Rn.PRn } [,Rn.PRn] { PUNn } [,PUNn] ... { Rn.PUn } [,Rn.PUn]
$L List output	{ Jn [-n] } [,Jn [-n]] { Sn [-n] } [,Sn [-n]] ... [,L= { a / cc / cca }] { Tn [-n] } [,Tn [-n]] 'jobname'
$N Repeat	{ PRTn } [,PRTn] ... { Rn.PRn } [,Rn.PRn] { PUNn } [,PUNn] ... { Rn.PUn } [,Rn.PUn]
$O Output	Jn [-n] [,Q=classes] 'jobname' [,C] Sn [-n] [,Rn] ... Tn [-n] [,LOCAL]
$P Stop after current function	JES2 I [n [-n]] LNEn [,LNEn] ... { PRTn } [,PRTn] ... { Rn.PRn } [,Rn.PRn] { PUNn } [,PUNn] ... { Rn.PUn } [,Rn.PUn] { RDRn } [,RDRn] ... { Rn.RDn } [,Rn.RDn] { Jn [-n] } [,Jn [-n]] { Sn [-n] } [,Sn [-n]] ... { Tn [-n] } [,Tn [-n]] 'jobname'

JES 2 Commands

Command	Parameters
$R Route Output	$\left\{ \begin{array}{l} \text{ALL,for-id,to-id } \left[\text{,Q=classes} \right] \\ \left\{ \begin{array}{l} \text{PRT} \\ \text{PUN} \end{array} \right\} \text{,for-id,to-id} \end{array} \right\}$ where *for-id is:* *to-id is:* Jn LOCAL Sn Rn Tn devicename LOCAL RMTn devicename
$S Start	$\left[\begin{array}{l} \text{A} \\ \text{LNEn} \left[\text{,LNEn} \right] \ldots \\ \text{I} \left[\text{n [-n]} \right] \\ \left\{ \begin{array}{l} \text{PRTn} \\ \text{Rn.PRn} \end{array} \right\} \left[\begin{array}{l} \text{,PRTn} \\ \text{,Rn.PRn} \end{array} \right] \ldots \\ \left\{ \begin{array}{l} \text{RDRn} \\ \text{Rn.RDn} \end{array} \right\} \left[\begin{array}{l} \text{,RDRn} \\ \text{,Rn.RDn} \end{array} \right] \ldots \\ \left\{ \begin{array}{l} \text{PUNn} \\ \text{Rn.PUn} \end{array} \right\} \left[\begin{array}{l} \text{,PUNn} \\ \text{,Rn.PUn} \end{array} \right] \ldots \end{array} \right]$

JES 2 Commands

Command	Parameters
$T Set	$\left\{\begin{matrix}Jn\\Sn\\Tn\end{matrix}\right\}\left[\begin{matrix},P=\left\{\begin{matrix}n\\+n\\-n\end{matrix}\right\}\\,C=classes\end{matrix}\right]$ 'jobname' $\left\{\begin{matrix},P=\left\{\begin{matrix}n\\+n\\-n\end{matrix}\right\}\\,C=class\end{matrix}\right\}$ Acccc,CANCEL A$\left[cccc\right]\left[,\left\{\begin{matrix}I=ssss\\T=hh.mm\end{matrix}\right\},'\$\right\}$command$\left[;command\right]...\left\{'\right\}$ $\left[,L=\left\{\begin{matrix}a\\cc\\cca\end{matrix}\right\}\right]$ LNEn,P=$\left[password\right]\left[,E=\left\{\begin{matrix}Y\\N\end{matrix}\right\}\right]$ I$\left[n\ [-n]\right]$,classes C,msglevel,rtcode$\left[,rtcode\right]...$ $\left\{\begin{matrix}OSCn\\Rn.CON\end{matrix}\right\},D=\left\{\begin{matrix}T\\J\\M\end{matrix}\right\}$ M$\left[\begin{matrix}a\\cc\\cca\end{matrix}\right]\left[,\left[operand...\right]\right]\left[,L=\left\{\begin{matrix}a\\cc\\cca\end{matrix}\right\}\right]$ $\left\{\begin{matrix}PRTn\\Rn.PRn\end{matrix}\right\}\left[\begin{matrix}\left[,P=\left\{\begin{matrix}Y\\N\end{matrix}\right\}\right]\left[,K=\left(\begin{matrix}1\\2\\3\\R\end{matrix}\right)\right]\left[,S=\left\{\begin{matrix}Y\\N\end{matrix}\right\}\right]\\\left[,C=id\right]\left[,T=id\right]\left[,F=form\right]\left[,F=AUTOM\right]\\\text{'QUEUE=classes}\end{matrix}\right]$ $\left\{\begin{matrix}PUNn\\Rn.PUn\end{matrix}\right\}\left[\begin{matrix}\left[,P=\left\{\begin{matrix}Y\\N\end{matrix}\right\}\right]\left[,S=\left\{\begin{matrix}Y\\N\end{matrix}\right\}\right]\left[,F=form\right]\left[,F=AUTOM\right]\\,QUEUE=classes\end{matrix}\right]$ $\left\{\begin{matrix}RDRn\\Rn.RDn\\RDI\end{matrix}\right\}\left[\begin{matrix},A=n\\,H\\,R\\\left[,C=class\right]\left[,Q=class\right]\end{matrix}\right]$
$V	S,'command'$\left[,'command'\right]...$

JES 2 Commands

Command	Parameters
$Z Halt	A I[n [-n]] { PRTn / Rn.PRn } [,PRTn / ,Rn.PRn] ... { RDRn / Rn.RDn } [,RDRn / ,Rn.RDn] ... { PUNn / Rn.PUn } [,PUNn / ,Rn.PUn] ...

Selected JES 3 Commands

Command	Parameters
*I *INQUIRY	,S ,D=dspname ,H *I.Q ,C=cls 10 ,G=grp ,N= nnn ,J=jobno ALL device group ,T= termgrp ,blank
*F *MODIFY	,H ,R *F,j=jobno ,C ,CP ,P=prty
*V *VARY	(dev,. . .) (dev adr. . . .) dev adr—dev adr) ONLINE control—unit X ON *V main OFFLINE [,main] ALL OFF lanme CONSOLE SDGXX mssname

DSN/MRJE
MULTILEAVING REMOTE JOB ENTRY

CONTENT   **PAGE**

DSN/MRJE SUBSYSTEM COMMANDS

DSN/MRJE PRODUCT NUMBER HP 32192A

```
            Capability          DSN/MRJE
            Requirements   User       Manager

            Account        default    OP *
            Group          default    default
            User           default    OP *
```

* The user and account must be MANAGER.SYS to use both the NEW
and the PURGE ALL commands.

```
                              :MRJE
```

Initiates the subsystem.

For listing $STDLIST to an optional file, precede the command
with a file equation whose formal designator is LISTING:

```
            :FILE LISTING;DEV=LP
            :MRJE
```

With the use of the FILE statement above, all commands and most
output generated by them will be sent to $STDLIST and to device
class LP.

MRJE Commands

```
    #ALTER  {item number}
            {item list  }
```

You must be a DSN/MRJE Manager to use this command. It specifies
the items in the configuration file to be changed.

item number   The number assigned an entry in the configuration
              file. Range is 1 through 43.

item list   A comma-separated list of item numbers.

```
              ┌ job number ┐
#CANCEL [JOBS]│ job name   │
              └ job list   ┘
```

Cancels one or more jobs and notes the event in the joblog file.

The DSN/MRJE manager can cancel any job, regardless of who sub-
mits it. As a DSN/MRJE user you may cancel only those jobs you
have submitted.

Jobs   Optional parameter.

job number   The number DSN/MRJE assigns to a job when
                submitted.

job name   The name on a JOB card in an input file.

job list   A comma-separated list of job names and/or job
                numbers.

```
                    Host

                    Joblog    ┌ ,job number ┐
                              │ ,job name   │
                              └ ,job list   ┘

    #DISPLAY        Oldjobs

                    Status

                    Config    ┌ ,item number ┐
                              └ ,item list   ┘
```

Displays job and system information.

Host   Lists the current host system The host is referenced by
         SUBMIT, DISPLAY, ALTER, PURGE, and CANCEL commands until
         a HOST command selects another system.

Joblog   Displays information about jobs. If neither the job
         number, job name, nor a job list is specified, displays
         the entire job log file for the current host system.
         This is the default. A DSN/MRJE manager may display any
         job; users may display only those jobs they have
         submitted.

DSN/MRJE SUBSYSTEM COMMANDS

Oldjobs   Displays canceled or timed-out jobs.   A timed-out job
          has been in the job log file longer than the limit
          established by item 42 of the configuration file.

Config   Lists the contents of the configuration file.   If an
          item list is included, only those items are displayed.
          A DSN/MRJE manager may display the entire configuration
          file; users may display only selected items.

```
#EXIT
```

Terminates DSN/MRJE and returns control to MPE.

```
#NEW [host identification]
```

Creates or re-creates the configuration, job log, and directory
files for the host identification specified. You will be prompt-
ed to give information. You must log on as MANAGER.SYS to use
this command.

In a single-host environment, the host identification parameter
need not be specified.

Host ident-   Needed only for multi-host environments. The host
fication   identification   may   contain eight alphanumeric
              characters. In a multi-host environment, the first
              character must be unique.

After using this command you may ALTER items in the configuration
file.

```
┌──────────────────────────────────────────────────────────────┐
│                       ⎧Oldjobs⎫                                │
│     #PURGE            ⎨All    ⎬                                 │
│                       ⎩       ⎭                                │
└──────────────────────────────────────────────────────────────┘
```

All   Purges all entries from the job log file.

Oldjobs   Purges entries for cancelled and timed out jobs.   See
          item 42 of the configuration file. You must be a DSN/
          MRJE manager to use this command.

```
┌──────────────────────────────────────────────────────────────┐
│     #HOST       [host identification]                          │
└──────────────────────────────────────────────────────────────┘
```

Selects a particular host system to be the current host system.
The host identified by this command is referenced by all subse-
quent commands of the subsystem.

Host   The name of a host machine that was configured by the
ident-   DSN/MRJE manager. This may be abbreviated to its first
ifica-   character. Omit this parameter to select the default
tion   host system.

```
┌──────────────────────────────────────────────────────────────┐
│     #<host system console command>                             │
└──────────────────────────────────────────────────────────────┘
```

Whenever a communications line is active, host system console
commands may be issued interactively. They must begin with the
character specified in item 7 of the configuration   file.
DSN/MRJE managers may issue only those host system console com-
mands allowed to the remote station. DSN/MRJE users are addi-
tionally restricted to host system console commands beginning
with the string in item 6 of the configuration file. A host sys-
tem console command will be refused if any other DSN/MRJE user or
manager is already communicating interactively with the host sys-
tem; however, host console commands may be submitted as job
input.   A DSN/MRJE manager will retain interactive use of the
host system console until a CONTROL-Y is issued. A DSN/MRJE user
may enter only one host system console command at a time.   See
also the JES2 commands in Section D of the Data Communications
Handbook.

DSN/MRJE SUBSYSTEM COMMANDS

```
#SUBMIT Infile1[(N[,T])] [ ... , Infile5[(N[,T])] ]
       [;Reader=pseudo reader logical device number ]
       [;PRint = print file [ (N) ]                 ]
       [;PUnch = punch file [ (N) ]                 ]
       [;Forms = forms file [ (N) ]                 ]
```

N   The Notranslate parameter requests no translation for a file
     when its contents are transmitted or received. The default
     is to translate ASCII to EBCDIC for input files, and EBCDIC
     to ASCII for output files.

T   The Transparent transmission parameter requests that the
     first JOB card of an Infile be recognized, and that all
     subsequent JOB cards within that Infile be passed to the host
     system as data. DSN/MRJE Manager capability is required to
     use this option in the SUBMIT command.

Infile   Five   infiles   may   be   specified.   They   are
          transmitted in the sequence in which they appear in the
          SUBMIT command. An infile can be:

          • An optionally qualified actual file designator.
          • A formal file designator equated to an actual file
            designator, a logical device number, a device
            class name, or one of these system files: $STDIN,
            $STDINX, or $OLDPASS.
          • A device class name of a real MPE input device,
            enclosed in quotation marks, for example "TAPE".
          • One of these system files: $STDIN, $STDINX, or
            $OLDPASS.
          • A logical device number of a real MPE input
            device.

pseudo   Specifies a particular DSN/MRJE pseudo reader on which
reader   the jobs in the input file will be submitted. Pseudo
          reader can be:

          • The logical device number assigned to a DSN/MRJE
            pseudo reader.
          • A pseudo reader device class name enclosed in quo-
            tation marks.   The pseudo reader should have a
            unique device class name.

          If READER=parameter is omitted, then the default pseudo
          reader is identified in configuration file item 19.

E-6

print
file
punch
file

forms
file

These parameters specify where the results of processing
of a submitted job are to go. One of each can be speci-
fied by:

- The logical device number of an MPE output device.
- An MPE device class name enclosed in quotation marks.
- An unqualified actual file designator.
- An exclamation mark, followed by a seven character file name, to indicate predefined routing.
- A zero device, to indicate unsolicited output device routing.

The default output devices for print and punch files are
in configuration file items 20 and 28. The default form
file is the default print file.

HP 3000 Console Operator Command Summary

```
:MRJECONTROL START[,host id][;TRACE,ON,trace options]
```

NOTE: Before issuing this command, a stream file for each host
system must be built for host identification. It
must exist in the PUB group of the SYS account with the
name MRJESTRh, where 'h'
is the first letter of the host id. The stream file must
contain the command RUN MRJEMON;INFO='h'.

Used to open a communications line, initiate transmission over
the line, and turn on the CS TRACE facility. Contact Hewlett-
Packard to find out the most appropriate way to use the trace
options.

```
:MRJECONTROL SIGNOFF[,host id]
```

Used to close the communications line in an orderly fashion.

```
:MRJECONTROL KILL[,host id]
```

Used to close the communications line immediately and in an un-
orderly fashion.

LISTING TRACE FILE

```
:MRJECONTROL RETRIES,[host id],retry number
```

Used to set a limit on the number of times DSN/MRJE will request re-transmission of a block of data not received successfully from the host.

```
:MRJECONTROL {TRACE,[host id],ON[trace options]}
             {TRACE,[host id],OFF                }
```

Used to activate and de-activate the CS TRACE facility.   Contact Hewlett-Packard to find out the most appropriate way to use this command.

trace options   [,[ALL][,[mask][,[numentries][,[WRAP][,file]]]]]

file   The name of a file where trace records are to be stored. This file must be built prior to execution of the command.   If this parameter is omitted, then its name will be MRJETRCh.PUB.SYS, where h is the first character of the host id.

Listing Trace File Contents

The CS TRACE dump utility program CSDUMP.PUB.SYS can be used to format and print the contents of trace files generated by the trace facility. An example of the commands required to list the files to a line printer is:

```
:FILE CSTRACE=file name
:FILE LIST;DEV=LP        Device class "LP" must be configured.
:RUN CSDUMP.PUB.SYS[,OCTAL]
```

where "file name" is the name of the file specified in the command :MRJECONTROL TRACE (or, if no file name was specified, MRJETRCh). The secondary entry point "OCTAL" may be used to produce uninterpreted data in octal instead of hexadecimal based numbers.

Job Input

A job stream is composed of MPE job control cards; HASP, JES2, JES3 or ASP job control cards; executable programs; and data.

80-column card images are stored in one or more HP 3000 files. One card image constitutes one record in a file.

Files that are merged to form a job stream can contain any number of separate jobs.

Three levels of input files are permitted:

- Infiles   Named in a SUBMIT command
- Level-one FD files. Named on ##FD card images in infiles.
- Level-two FD files. Named on ##FD card images in level-one infiles.

No "looping" between any input files is permitted. Infiles and FD files must constitute a valid job stream according to the host system requirements.

FD files and infiles may contain they same kind of information and may be constructed in the same way.

Five infiles are permitted in a SUBMIT command. An infile name may be:

- actual file designator, qualified or unqualified
- formal file designator
- device class name
- logical device number
- system file names: $STDIN, $STDINX, or $OLDPASS

```
##FD file name [(N[,T]) [comment] ]
               [(T[,N])            ]
```

File definition cards may appear in infiles and in level-one FD files to reference additional files. The ##FD card images are not transmitted. The "##FD" must occur in the first four characters of the card image.

file name   The file designator can be:

- Actual file designator, qualified or unqualified.
- Formal file designator.
- Device class name.
- Logical device number.
- System file name: $STDIN, $STDINX, or $OLDPASS.

N   No translation requests that the FD file be submitted without translation. Refer to the SUBMIT command.

T   Transparent transmission requests that all JOB cards be passed to the host system as data. Refer to the submit command.

comment   Optional. If file name is either $STDIN or $STDINX the comment will be printed at your terminal before the DSN/MRJE message: ENTER INPUT ENDING WITH MRJEOD. It

may always be used to identify the type of input
expected.

```
MRJEOD
```

For infiles or FD files orginating from $STDIN or $STDINX, an
"MRJEOD" in characters 1 through 6 acts as an end sentinel for
data, and an end of file. This record is never transmitted.

Job Output

Output can be routed to a disc file or to an output device by
naming the output files in the SUBMIT command, or by specifying
them in user defined routing and referencing them in the SUBMIT
command. File record sizes are:

    Print file: 132 characters per record with CCTL
    Forms file: 132 characters per record with CCTL
    Punch file: 80 characters per record

If a SUBMIT command names a disc file, build the file with suffi-
cient extents allocated because DSN/MRJE will not allocate addi-
tional ones as the need arises. The subsystem does inform the
system operator when the file limits are exceeded.

In the SUBMIT command, specify output files using one of the
following:

    ● An unqualified actual file designator.
    ● The logical device number of an MPE output device.
    ● An MPE device class name.
    ● An exclamation mark, followed by an seven character file
      name, to indicate user predefined output routing.
    ● A zero character, to indicate unsolicited output

The file must be predefined by the MRJE manager before the work-
station is connected to the host. Contact your MRJE manager for
correct names.

Both print and special forms files must have 132 character re-
cords with carriage control character specified, CCTL;REC=-132
characteristics.

The MRJE manager may issue file equations within the monitor's
job or session which starts the MRJE workstation. Refer to the
manual for how to route job output to the devices specified by
those file equations.

Carriage Control

When output is written to a disc file, a carriage control charac-
ter prefixes line printer and special forms reords. DSN/MRJE
translates the characters as follows:

HOST SYSTEM CONTROL	HP3000 CONTROL CODE
Skip immediately n spaces, n<3.	%101 (if necessary) %2nn (nn<3)
Skip immediately to channel n, n<13.	%101 (if necessary) %3nn (2<nn<12) or %61, for channel 1.
Space n lines after print, n<3.	%100 (if necessary) %2nn (nn<3)
Skip to channel n after print, n<13.	%100 (if necessary) %3nn (2<nn<12) or %61, for channel 1.
Suppress space	%53
All other host system control codes.	Single space

Summary of Configuration File Entries

The following information is provided for each con-
figuration file entry:

- ENTRY NUMBER (alternatively referred to as "Item Number") AND
  DESCRIPTION. DSN/MRJE accesses entries in the file by
  number.

- ENTRY/TYPE--the literal entry or the character type allowed
  for each entry.

    Literal entries appear in UPPER CASE letters

    n   = numeric (acceptable range of values is shown in table)

    an = alphanumeric

    sp = special (non-alphanumeric)

    *   = numeric value of LDN (Logical Device Number); or

CONFIGURATION FILE FORMAT

      alphanumeric value, enclosed in quotes, of DC (Device Class); for example, "OUTFILE"; or

      alphanumeric characters and slashes or periods, indicating an AFD (Actual File Designator)

      an exclamation mark followed by an seven character alphanumeric formal file designator, indicating pre-defined routing.

- ASCII BYTES--the maximum number of characters that can be entered.

- DEFAULT VALUE provided by DSN/MRJE. When there is more than one value, the values are labeled as to Job Entry Subsystem.

- NOTES--

    1 The ALTER command will not alter this entry. To change it, you have to re-build the configuration file (use NEW command).

    2 This entry is not displayed to DSN/MRJE Users.

    3 The first character of the User host console command must be identical to entry number 7. DSN/MRJE automatically alters the character when entry number 7 is altered.

    4 This entry will be automatically changed whenever Item 5--Job Entry Subsystem--is changed. The new value will be the default value for the new Subsystem.

DSN/MRJE Configuration File Entries

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
1. Host machine ID	an	8	(none)	1
2. Pseudo console (logical device number)	n 0-999	3	(none)	
3. Pseudo line monitor (logical device number)	n 0-999	3	(none)	
4. Signon card image	an, sp	80	(none)	2
5. Job Entry Subsystem on host	HASP, JES2, JES3 or ASP	4	(none)	

DSN/MRJE Configuration File Entries (continued)

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
6. User host console command(s)	an	10	(none)	3
7. Host console command character	n or sp	1	$ (HASP) $ (JES2) * (JES3) * (ASP)	4
8. Number of lines to check for print banner	n 0-999	3	10 (HASP) 60 (JES2) 60 (JES3) 60 (ASP)	4
9. Number of cards to check for punch banner	n 0-999	3	1	4
10. For HASP and JES2--column where host-assigned job number begins in the print banner	n 6-129	3	33 (HASP) 19 (JES2)	4
For JES3 and ASP--width of a block letter in the print banner	n 6-129	3	13 (JES3) 13 (ASP)	4
11. Column where job name begins in print banner (Not used by JES3 or ASP)	n 0-124	3	79 (HASP) 25 (JES2)	4,5
12. Column where host-assigned job number begins in the punch banner	n 1-76	2	44 (HASP) 44 (JES2) 21 (JES3) 21 (ASP)	4
13. Column where job name begins in punch banner	n 0-72	2	0 (HASP) 0 (JES2) 35 (ASP)	4,6

CONFIGURATION FILE FORMAT

DSN/MRJE Configuration File Entries (continued)

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
14. For HASP and JES2--column where "SETUP" or "LOAD" begins in special forms console message	n 1-120	3	10 (HASP) 21 (JES2)	4
For JES3--column where "JOB NAME" begins in special forms console message	n 1-120	3	18 (JES3)	
For ASP--column where "JOB" begins in special forms console message	n 1-120	3	16 (ASP)	
15. Column where "JOB" begins in console "job received" message	n 1-99	2	11 (HASP) 10 (JES2) 18 (JES3) 16 (ASP)	4
16. Column where job name begins in console "job received" message	n 1-99	2	35 (HASP) 28 (JES2) 30 (JES3)	4
17. Column where "ON" begins in console "job received" message (not used by JES3 or ASP)	n 1-99	2	20 (HASP) 37 (JES2)	4
18. Maximum number of job log file entries	n 25-1000	4	100	1
19. Default device for input to DSN/MRJE (LDN or DC)	*	10	"MRDR1"	
20. Default device for printer output from DSN/MRJE (LDN, DC, or AFD)	*	10	"LP"	
21. Unsolicited print disposition, printer 1 (LDN, DC, or AFD)	*	26	"LP"	
22. Unsolicited print disposition, printer 2 (LDN, DC, or AFD)	*	26	"LP"	
23. Unsolicited print disposition, printer 3 (LDN, DC, or AFD)	*	26	"LP"	

DSN/MRJE Configuration File Entries (continued)

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
24. Unsolicited print dis-position, printer 4 (LDN, DC, or AFD)	*	26	"LP"	
25. Unsolicited print dis-position, printer 5 (LDN, DC, or AFD)	*	26	"LP"	
26. Unsolicited print dis-position, printer 6 (LDN, DC, or AFD)	*	26	"LP"	
27. Unsolicited print dis-position, printer 7 (LDN, DC, or AFD)	*	26	"LP"	
28. Default device for punch output from DSN/MRJE (LDN, DC, or AFD)	*	10	"LP"	
29. Unsolicited punch dis-position, punch 1 (LDN, DC, or AFD)	*	26	"LP"	
30. Unsolicited punch dis-position, punch 2 (LDN, DC, or AFD)	*	26	"LP"	
31. Unsolicited punch dis-position, punch 3 (LDN, DC, or AFD)	*	26	"LP"	
32. Unsolicited punch dis-position, punch 4 (LDN, DC, or AFD)	*	26	"LP"	
33. Unsolicited punch dis-position, punch 5 (LDN, DC, or AFD)	*	26	"LP"	
34. Unsolicited punch dis-position, punch 6 (LDN, DC, or AFD)	*	26	"LP"	
35. Unsolicited punch dis-position, punch 7 (LDN, DC, or AFD)	*	26	"LP"	

CONFIGURATION FILE FORMAT

DSN/MRJE Configuration File Entries (continued)

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
36. DSN/MRJE output process priority	BS, CS or DS	1	CS	
37. Number of characters to test in job name	n 0-8	1	8	
38. Translation type	EBCDIC or EBCDIK	1	EBCDIC or EBCDIK	
39. Host system phone number	n	16	(none)	
40. Time communications line opened (set by DSN/MRJE when MRJECONTROL START executes)	(no user input)	6	(none)	1
41. Time communications line closed (set by DSN/MRJE when :MRJECONTROL SIGNOFF or KILL executes)	(no user input)	7	(none)	1
42. Maximum time job remains active in job log after transmittal (days,hrs,min)	n	6	1/0/0	
43. Host buffer size (bytes)	n 100-2000	5	400	

CONFIGURING A HASP, JES2, JES3, OR ASP SYSTEM

Configuring a HASP System

For a HASP system, specify:

- Terminal type: System/360, model 25 or higher.

- Line printer width: 132 characters or less.

- Console support: YES

- Transparency: YES

- Communications line:
  a. Full or half duplex
  b. Speed: less than or equal to 9600 bits per second for
      communication through an SSLC. Less than or equal
      to 19200 bits per second for communication through
      an INP.
  c. EBCDIC and transparent.

- Multileaving buffer size: Not to exceed 2000 characters.

- A standard forms name of "STD." in the standard forms para-
  meter, or use "STD." as the name of standard forms for both
  printers and punches.

- All other generation parameters should be specified consistent
  with practices at the host site.

Make note of the value being configured for the number of print
lines per page. This value should be used as entry number 8 in
the MRJE/3000 configuration file for this host.

CONFIGURING A HASP, JES2, JES3, or ASP SYSTEM

Configuring a JES2 System

For a JES2 system, specify:

- Remote terminal type: S/360.

- The terminal should have:
  a.   A console.
  b.   A multileaving interface.
  c.   The text transparency feature.

- For each remote printer configured at a remote terminal:
  a.   Automatic forms mode.
  b.   Automatically started printer.
  c.   No FCB support.
  d.   Separator pages.
  e.   Printer width: 132 characters or less.

- For each remote card punch configured at a remote terminal:
  a.   Automatic forms mode.
  b.   Automatically started punch.
  c.   Separator cards.

- For each remote card reader configured at a remote terminal:
  a.   Automatically started (hot) card reader.

- A standard forms name of "STD." in the standard forms param-
  eter or use "STD." as the name of standard forms for both
  printers and punches.

- Communication line:
  a.   Full or half duplex
  b.   Speed: less than or equal to 9600 bits per second for
             communication through an SSLC. Less than or equal
             to 19200 bits per second for communicaton through
             an INP.
  c.   EBCDIC and transparent.

- Multileaving buffer size: Not to exceed 2000 characters.

- All other generation parameters should be specified consistent
  with practices at the host site.

Make note of the value being configured for the number of print
lines per page. This value should be used as entry number 8 in
the MRJE/3000 configuration file for this host.

CONFIGURING A HASP, JES 2, JES 3, OR ASP SYSTEM

Configuring a JES 3 or ASP System

For a JES3 or ASP system, specify the following:

● Remote terminal type: S/360

● The terminal should have:
a. A console.
b. A multileaving interface.
c. The text transparency feature.

● For each remote printer configured at a remote terminal:
a. Automatically started printer.
b. No FCB support.
c. Printer width of 132 characters or less.
d. Separator pages.

● For each remote card punch configured at a remote terminal:
a. Automatically started punch.
b. Separator cards.

● For each remote card reader configured at a remote terminal:
a. Automatically started (hot) card reader.

● A standard forms name of "STD." in the standard forms parame-
ter, or use "STD." as the name of standard forms for both
printers and punches.

● Communication line:
a. Full or half duplex

b. Speed: less than or equal to 9600 bits per second for
communication through an SSLC. Less than or equal
to 19200 bits per second for communication through
an INP.
c. EBCDIC and transparent.

● Multileaving buffer size not to exceed 2000 characters.

● All other generation parameters should be specified consistent
with practices at the host site.

Make note of the value being configured for the number of print
lines per page. This value should be used as entry number 8 in
the MRJE/3000 configuration file for this host.

DSN/MRJE MESSAGES

DSN/MRJE Messages

These messages are unique to DSN/MRJE activity:

- User messages -- These are printed on a user's output device. These are listed alphabetically, starting on G-21.

- MRJECONTROL distributed console messages -- These are sent to the terminal of the user who issued the MRJECONTROL command. These are listed by Command Interpreter Error (CIERR) number, starting on G-40.

- Console operator messages -- These are sent to the system console. These are listed alphabetically, starting on G-43.

In these messages, those that report an error or a failure also include the cause and instructions for corrective action. In cases where a message gives information only, and no error or failure occured, only the message and its meaning are given.

DSN/MRJE User Messages

NOTE

An asterisk (*) preceding a message indicates the error causes program termination if DSN/MRJE is being run non-interactively.

* "ALL" OR "OLDJOBS" ARE ONLY VALID PURGE PARAMETERS.
    A PURGE parameter other than ALL or OLDJOBS was entered. Re-enter PURGE command with no parameter (for OLDJOBS) or with "ALL" or "OLDJOBS".

* "BS" OR "CS" OR "DS" REQUIRED.
    BS, CS, or DS are the only valid values for output process priority in the configuration file.

{ jobname / job# } CANCELED.
    Specified job has been canceled as requested.

*{ jobname / job# } CAN'T BE CANCELED.
    Named job cannot be canceled because of an error in writing to or reading from a job log file. Retry the CANCEL.

⎰$CJ host#,host#⎱ CANCEL COMMAND WILL BE SENT TO HOST.
⎱$CJ host#,P⎰
When an interactive User/Manager cancels a job which has been transmitted to the host and the host is on-line, DSN/MRJE automatically sends the appropriate host cancel command and prints the host response.

* COMMA OR NUMBER REQUIRED.
Comma or number is required.

* COMMA OR SLASH REQUIRED TO SEPARATE PARAMETERS.
Comma or slash required to separate parameters in "joblist" or "itemlist".

* COMMA REQUIRED TO SEPARATE PARAMETERS.
Comma is required to separate positional parameters, DAYS, HOURS, MINUTES.

* ⎰DEFAULT HOST⎱ CONFIGURATION FILE SET CANNOT BE ACCESSED.
⎱HOST hostname⎰
Named host configuration file cannot be accessed because of an open or read error. Determine the reason for the I/O failure from the MPE file error number.

* CONTINUATION LINE EXPECTED.
When an ampersand (&) is entered at the end of a line in a SUBMIT command, DSN/MRJE expects the following line(s) to be a continuation of the command. Re-enter the entire SUBMIT command with continuation line(s) as required.

* CONTROL-Y IS THE ONLY VALID INPUT DURING HOST COMMAND PROCESSING.
A User may only enter Control-Y during host console command processing. (Control-Y halts output.) Any other input causes this error message and returns the # prompt. If all output has not been received, re-enter the host console command.

* filename RECORD m CTRANSLATE FAILED.
An error occurred while translating a SUBMIT input file from ASCII to EBCDIC (or EBCDIK, depending on the translation type). This is an internal software failure. Contact Hewlett-Packard.

DAYS, HOURS, MINS CAN'T BE ZERO.
The maximum time a job remains in the job log file after transmission cannot be zero.

DEFAULT HOST ASSUMED.
If no host name is given in a HOST or NEW command, DSN/MRJE assumes the default host is desired.

DSN/MRJE USER MESSAGES

* DIGIT OR SPECIAL CHARACTER REQUIRED.
        Host system character must be a digit or a special
        character. Re-enter command.

* n DIGITS ARE THE MAX ALLOWED FOR THIS NUMBER.
        A number with too many digits has been entered.
        Re-enter command with no more than n digits.

$DJ host# DISPLAY COMMAND WILL BE SENT TO HOST.
        When an interactive User/Manager displays a job that
        has been transmitted to the host and the host is
        online, DSN/MRJE automatically sends the appropriate
        host display command and prints the host response.

jobname: DUPLICATE JOBNAMES IN JOBLOG. CANCEL REFUSED. A
DISPLAY OF JOBS WITH THIS NAME WHICH YOU OWN (IF ANY)
FOLLOWS:
        A CANCEL by job name is refused if duplicate names
        exist in the job log file.   RE-enter the CANCEL
        command, specifying "job#" rather than "jobname".

* "EBCDIC" OR "EBCDIK" REQUIRED.
        EBCDIC and EBCDIK are the only valid translation
        types. Re-enter.

* EMBEDDED BLANKS NOT ALLOWED IN QUALIFIED NAME.
        A qualified actual file designator may not contain
        embedded blanks. Re-enter.

* END OF FILE ON $STDINX. FURTHER INPUT IMPOSSIBLE. FATAL
ERROR!
        End-of-file on standard input device (for example, a
        user enters ":EOD" while submitting from $STDINX)
        makes further input impossible. MRJE terminates. Run
        the job again and do not use ":EOD" or ":EOF" in
        SUBMIT. Use "MRJEOD".

ENTER INPUT ENDING WITH "MRJEOD".
        This message followed by a prompt (>) requests input
        from $STDIN/$STDINX during SUBMIT.   If $STDIN or
        $STDINX are FD files, any comment on the ##FD card
        will appear ahead of this message.   For example,
        assume infile DATA1 contains the record

        ##FD $STDIN   This input is for file DATA1.

        When this ##FD card is read by DSN/MRJE, the following
        appears on the terminal:

        This input is for file DATA1.
        ENTER INPUT ENDING WITH "MRJEOD"
        >

* EXTRANEOUS INFORMATION AFTER VALID ITEM.
    Some extra information has been included that
    DSN/MRJE does not recognize. Re-enter with only the
    required information.

* ##FD CARDS NOT PERMITTED IN LEVEL 2 FILE.
    File Definition cards may be contained only in an
    Infile (level 0) or a first-level FD file. Remove the
    ##FD card from the named level 2 file, reconstruct
    input files as required, and re-submit job(s).

  FILE ERROR #n, filename CAN'T BE CLOSED.
    Named SUBMIT file (input or output) cannot be closed.
    SUBMIT processing continues. Determine the reason for
    the failure from MPE file system error number (#n).

* FILE ERROR #n, filename CAN'T BE CLOSED. FATAL ERROR!
    Named file (configuration, directory, job log, or host
    console device) cannot be closed. DSN/MRJE termin-
    ated. Determine the reason for the failure from MPE
    file system error number (#n).

* FILE ERROR #n, filename CAN'T BE OPENED.
    Named file cannot be opened. Determine the reason for
    the failure from MPE file system error number (#n).

* FILE ERROR #n, filename CAN'T BE OPENED. FATAL ERROR!
    Named list file (if other than $STDLIST) cannot be
    opened. DSN/MRJE terminated. Determine the reason for
    the failure from MPE file system error number (#n).

* FILE ERROR #n, MRJEJOBh RECORD m CAN'T BE POSTED.
    Record m of job log MRJEJOBh cannot be physically
    transferred from the I/O buffer to the disc file.
    Determine the reason for the I/O failure from MPE file
    system error number (#n).

* FILE ERROR #n $\left\{ \begin{array}{l} \text{filename RECORD m} \\ \text{HOST CONSOLE OUTPUT} \\ \text{STANDARD INPUT FILE} \end{array} \right\}$ CAN'T BE READ.
    Named file (record m) cannot be read. Determine the
    reason for the I/O failure from the MPE file system
    error number (#n).

* FILE ERROR #n, filename RECORD m CAN'T BE WRITTEN.
    Record m of the named file cannot be written.
    Determine the reason for the I/O failure from the
    MPE file system error number (#n).

* FILE ERROR #n, filename RECORD m CAN'T BE WRITTEN. FATAL
  ERROR!
    An output record cannot be written to the named list
    file. DSN/MRJE terminated. Determine the reason for
    the I/O failure from the MPE file system error
    number (#n).

* FILE ERROR #n, xxxx CAN'T BE WRITTEN TO HOST READER.
        xxxx = "filename RECORD m" or "MONITOR CARD". Record
        "m" of the SUBMIT input file, or the monitor card can-
        not be written to the host reader. (The latter asso-
        ciates a host job with a pseudo reader.) Determine the
        reason for the I/O failure from the MPE file system
        error number (#n).

* FILE ERROR #n, CAN'T CLOSE $STDINX. HOST CONSOLE COMMANDS
  CAN'T BE SENT.
        $STDINX (standard input device) must be closed, then
        re-opened for NOWAIT I/O, in order to send host con-
        sole commands. Determine the reason for the the
        failure from the MPE file system error number (#n).

  FILE ERROR #n, HOST BUSY. CONSOLE COMMAND NOT SENT.
        Host pseudo console device has received more messages
        from the host than it can handle. Determine the reason
        for the failure from the MPE file sytem error (#n).

* FILE ERROR #n, HOST CONSOLE CAN'T BE OPENED.
        Host pseudo console device specified in the configu-
        ration file cannot be opened. Determine the reason
        for the failure from MPE file system error number
        (#n).

* FILE ERROR #n, HOST CONSOLE COMMAND CAN'T BE WRITTEN.
        Host console command cannot be written to the host
        pseudo console device specified in the configuration
        file. Determine the reason for the I/O failure from
        the MPE file system error number (#n).

* FILE NAME, DEVICE CLASS, OR LOGICAL DEVICE NUMBER REQUIRED.
        File name, device class, or logical device number is
        the only valid input. Re-enter.

  hostname FILES CREATED.
        The configuration file set for the named host has been
        created as requested in the NEW command.

  FOLLOWING MUST BE INITIALIZED IN CONFIGURATION FILE:
        When creating a new configuration file, certain items
        that do not have default values must be initialized.

* FORMS SPECIFIED TWICE.
        "FORMS" file specified twice in SUBMIT command. Re-
        enter SUBMIT command, specifying FORMS only once.

* GET PRIVILEGED MODE FAILURE. FATAL ERROR!
        An error occurred in the GETPRIVMODE intrinsic. This
        is an internal software failure. Contact Hewlett-
        Packard.

* GET USER MODE FAILURE. FATAL ERROR!
> An error occurred in the GETUSERMODE intrinsic. This
> is an internal software failure. Contact Hewlett-
> Packard.

* HOSTNAME MUST START WITH SAME CHAR AS HOSTID
> The first character of a host name must be the same as
> the first character of the host ID given in the NEW
> command. Re-enter.

* jobname IN DIRECTORY (ENTRY n) BUT NOT IN JOB LOG. FATAL
ERROR!
> Named job has been found in directory entry n, but
> cannot be found in the job log. DSN/MRJE terminated.
>
> This is an internal software failure. Do not permit
> further jobs to be submitted to this job log. When
> all jobs in it have completed, use FCOPY to list the
> directory and job log as follows:
>
> :FILE L;DEV=LP
> :RUN FCOPY
> >FROM=MRJEJOBh;TO=*L
> >FROM=MRJEDIRh;TO=*L
> >EXIT
>
> ("h" is the host ID.)
>
> Show the listing to Hewlett-Packard. Use the PURGE ALL
> command to re-initialize the directory and job log
> files.

* INPUT FILE NAME(S) REQUIRED.
> SUBMIT requires at least one input filename. Re-enter.

* INPUT MUST BE NUMERIC
> Numeric input required. Re-enter.

  INTERACTIVE TERMINAL REQUIRED FOR HOST CONSOLE COMMANDS.
> User/Manager must run DSN/MRJE interactively in order
> to send host console commands from a   terminal.
> (Console commands may also be sent as part of an IBM
> JCL deck, but they must be in batch format.)

* INVALID ACTUAL FILE DESIGNATOR.
> A fully qualified actual file designator has the form
>
> filename/lockword.groupname.accountname
>
> where names and lockword have a maximum of eight
> alphanumeric characters each, and the first character
> is alphabetic. No embedded blanks are permitted.
> Re-enter.

DSN/MRJE USER MESSAGES

* INVALID COMMAND.
        MRJE does not recognize the input as a command. Enter
        a valid MRJE or host Job Entry Subsystem command.

* INVALID DEVICE CLASS SPECIFICATION.
        Valid device class has the form

        "name"

        where name can have a maximum of eight alphanumeric
        characters, starting with an alphabetic. No embedded
        blanks are permitted and quotation marks are required.
        Re-enter.

* INVALID HOST SYSTEM.
        HASP, JES2, JES3, and ASP are the only valid host Job
        Entry Subsystems. Re-enter.

* INVALID HOSTID. MUST BE ALPHANUMERIC, <=8 CHARS.
        Valid host ID has a maximum of eight alphanumeric
        characters. Re-enter.

* INVALID JOBNAME--TOO LONG.
        Eight characters is the maximum length for host job
        name. Re-enter.

* INVALID KEYWORD.
        Valid keywords are READER, PRINT, PUNCH, FORMS. Re-
        enter SUBMIT command.

* INVALID OCTAL NUMBER.
        Octal number cannot contain blanks or the digits 8 and
        9. Re-enter.

* INVALID PARAMETER FOR DISPLAY COMMAND.
        Valid DISPLAY parameters are CONFIGURATION,
        DIRECTORY, HOST, JOBLOG, OLDJOBS, STATUS. Re-enter
        DISPLAY command with correct parameter.

* INVALID SPECIAL CHARACTER.
        Re-enter using one of the following special characters
        only: , $ # @ / = " ( ) > % ; : & ! < ^ + - '

* INVALID SUBMIT PARAMETER.
        Valid SUBMIT parameters are "infile" "(N)" and the
        keywords "READER", "PRINT", "PUNCH", and "FORMS". Re-
        enter SUBMIT command.

* device IS AN INVALID PSEUDO LINE MONITOR DEVICE. FATAL ERROR!

> DSN/MRJE, in determining whether the host is on-line or off-line, has found that the pseudo line monitor logical device number in the configuration file is invalid. Ensure that the logical device number in the configuration file correctly indicates the pseudo line monitor device configured on the 3000.

* jobname IS NOT YOUR JOB.

> Requested job will not be canceled or displayed because the user's logon ID does not match that in the job log file entry. Re-enter CANCEL or DISPLAY with correct job name or job number.

hostname IS OFF-LINE.

> Named host is off-line.

hostname IS OFF-LINE. HOST CONSOLE COMMAND CAN'T BE SENT.

> Host console command cannot be sent because named host is off-line. Re-enter command when host is on-line.

* hostname IS OFF-LINE. JOB CAN'T BE CANCELED AT HOST.

> Job to be canceled has been transmitted to host, but the host is now off-line, so a CANCEL command cannot be sent to host. However, the cancel flag in the job log entry is set so that any output from the job will be flushed.

hostname IS ON-LINE.

> Named host is on-line.

hostname IS THE CURRENT HOST MACHINE

> Named host is the host to which all succeeding commands will be directed.

* n IS THE MAX LEVEL OF NAMES IN THIS ACTUAL FILE DESIGNATOR.

> Lockword, groupname, and accountname are the only permissible file name qualifications.

* n IS THE MAXIMUM NUMBER OF CHARACTERS FOR THIS PARAMETER.

> Certain inputs, such as phone number in the configuration file, cannot exceed a specified length. Reenter.

* command IS THE ONLY VALID CONSOLE COMMAND.

> The User is permitted to use only the host console command(s) designated by the Manager in the configuration file in Item 6. Re-enter.

* m TO n IS THE VALID RANGE FOR THIS PARAMETER.

> The number specified is not within valid range. Re-enter.

DSN/MRJE USER MESSAGES

ITEM 4 ONLY DISPLAYED FOR MANAGER.
> Item 4 in the configuration file (host SIGNON image) is displayed only for the MRJE Manager.

ITEM NOT USED WITH THIS HOST SYSTEM.
> Items 11 and 17 in a configuration file are not used with a JES3 or ASP host.

* ITEM NUMBER REQUIRED.
> When altering a configuration file, item number is required. Re-enter with an item number.

JOB ALREADY CANCELED.
> A CANCEL request has been entered for a job which has already been canceled. The job log entry is displayed.

JOB #n CAN'T BE CANCELED DUE TO A PREVIOUS SYSTEM FAILURE.
> Message occurs if the system is restarted between the time a job is submitted and the time a CANCEL request is issued. System restart invalidates the spool file numbers that would normally be used in a cancelation procedure. Thus the CANCEL request fails. After receiving all output for all jobs, purge all old jobs.

* JOB CAN'T BE CANCELED AT HOST FOR NON-INTERACTIVE USER.
> Job to be canceled has been transmitted to the host, but since the User/Manager is not running DSN/MRJE interactively the CANCEL command cannot be sent to the host. However, the cancel flag in the job log entry is set so that any output from the job will be discarded.

JOB NOT CANCELED.
> When User/Manager requests that a job be canceled, the job log entry is displayed. In an interactive session DSN/MRJE then asks for verification of the CANCEL. If the response is anything other than "YES", the job is not canceled.

n JOBS ARE IN THE JOBLOG. VERIFY PURGE WITH "YES".
> When the Manager enters the PURGE ALL command DSN/MRJE checks to see whether there are any jobs in the job log. (These may or may not have completed.) If there are remaining jobs and if the Manager is running interactively he or she is asked to verify the PURGE request by typing YES.

JOB#n NO JOBLOG ENTRY.
> No job log entry exists for the job specified in a CANCEL or DISPLAY command. Display by job name to determine the correct job number.

* LOGICAL DEVICE NUMBER OR DEVICE CLASS REQUIRED.
         A logical device number or device class is the only
         valid   input.   Back-references   not   permitted.
         Re-enter.

  MANAGER CAPABILITY IN EFFECT.
         This user has "OP" capability.

* MANAGER CAPABILITY REQUIRED FOR THIS COMMAND
         This command is not available to a user without "OP"
         capability.

* MAXIMUM OF 5 INPUT FILES ALLOWED.
         SUBMIT will accept a maximum of five explicit input
         files. Re-enter the SUBMIT command.

* MISSING RIGHT PARENTHESIS.
         Closing right parenthesis has been omitted from the
         "(NOTRANSLATE)" parameter.   Re-enter the SUBMIT com-
         mand.

  MRJECONh FILE ALREADY EXISTS. REPLY "YES" TO RECREATE.
         The host named in NEW command already has a set of
         configuration files.   In an interactive session the
         Manager is asked to verify that the existing files are
         to be deleted and new ones created.   Reply YES to
         delete the existing set of configuration files. Any
         other response will retain the existing files.

  MRJECONh NOT ALTERED.
         No change has been made to the named configuration
         file because of an I/O error, invalid input, or no new
         value being entered when requested. If a change is
         required, re-enter the ALTER command.

  MRJECONh SUCCESSFULLY ALTERED.
         The named configuration file has been successfully
         altered as requested.

  MRJEJOBh COMPLETELY PURGED OF ALL JOB ENTRIES.
         Named job log has been completely purged as requested.

* MRJEJOBh DIRECTORY FULL. NO FURTHER JOBS CAN BE
  SUBMITTED.
         Directory of the named job log indicates that the job
         log is full. PURGE the named job log of old, inactive
         jobs.

* MRJEJOBh DIRECTORY/JOBLOG UPDATE CAN'T BE COMPLETED.
  FATAL ERROR!
         Some or all entries have been deleted from the job log
         during PURGE, but the job log or directory cannot be
         updated because of an I/O error. DSN/MRJE terminated.
         Rebuild the set of configuration files for this host
         using the NEW command.

MRJEJOBh END OF FILE.
>   End-of-file has been reached in search of named job
>   log.

MRJEJOBh n JOBLOG ENTRIES CLEARED. m FREE ENTRIES NOW
EXIST.
>   A PURGE command cleared n entries from the named job
>   log file by:
>   ● deleting canceled jobs
>   ● deleting timed-out jobs
>   ● clearing directory entries that were reserved for
>   jobs that failed during SUBMIT.

MRJEJOBh JOBLOG IS EMPTY.
>   Named job log is empty. This response may be given to
>   a DISPLAY DIRECTORY, DISPLAY JOBLOG, or PURGE command.

MRJEJOBh NOT PURGED.
>   The named job log has not been purged because the Man-
>   ager negated his or her request, or an I/O error
>   occurred.   If PURGE is required, determine the reason
>   for failure from the MPE file error number given in
>   the I/O error message and re-enter the PURGE command.

MRJEJOBh n OLD JOBS IN THIS FILE.
>   The named job log contains n "old jobs" -- jobs which
>   have timed-out or been canceled and are therefore sub-
>   ject to purging.

MRJEJOBh n OLD JOBS PURGED THUS FAR.
>   An error has occurred during PURGE processing which
>   makes directory/job log update impossible. However, n
>   old jobs have already been deleted from the job log.
>   Rebuild the configuration files for this host using
>   the NEW command.

* (current command char) MUST BE FIRST CHAR IN USER HOST CMD.
>   The specified command character must be the first
>   character entered in the user host command. For
>   example, if the host system command character is a
>   dollar sign ($), the User host command cannot be %DA.

* NO BLANKS ALLOWED IN FORMAL FILE DESIGNATOR
>   Embedded blanks are not permitted within a back ref-
>   erenced file designator. Re-enter.

* NO CLOSING QUOTE ON DEVICE CLASS NAME.
>   Valid device class must be enclosed in quotes.
>   Re-enter.

* NO FILE DESIGNATOR ON ##FD CARD.
>   A ##FD card with no file designator has been found
>   in a SUBMIT input file. Correct the ##FD card and
>   re-submit.

* NO JOB CARD FOUND.
    DSN/MRJE has read and spooled or transmitted all
    SUBMIT input (Infiles and FD files) without finding a
    host JOB card with the form:

    //jobname JOB optional information

    Add a valid host job card and re-SUBMIT.

* NO NEW FILES CREATED.
    If an error occurs or the DSN/MRJE Manager enters
    Control-Y during NEW command processing, no new set of
    configuration files is created. If new files are
    required, determine the reason for failure from the
    MPE file error number given in the I/O error message
    and re-enter the NEW command.

* NO PARAMETERS ALLOWED.
    No parameters are allowed in this command. Re-enter
    the command.

  NO SPOOL FILE FOUND.
    Message occurs when a job is canceled and no spool
    file exists that contains information to be trans-
    mitted for the canceled job.

  jobname NOT FOUND.
    The job named in a CANCEL or DISPLAY command is not
    in the job log. Ensure that job name is correct and
    re-enter the command. The Manager may DISPLAY the
    entire job log to check job names.

  $\begin{Bmatrix} JOB \\ jobname \end{Bmatrix}$ NOT SUBMITTED.

    The named job (or "JOB" if DSN/MRJE did not find a
    host card) was not submitted to the host. Make cer-
    tain the job has a recognizable job card.

* NOTRANSLATE CAN'T BE SPECIFIED FOR $STDIN/$STDINX.
    Input from the standard input file is always trans-
    lated from ASCII to EBCDIC or EBCDIK, depending on
    translation type. Re-enter SUBMIT command, deleting
    the "(NOTRANSLATE)" parameter from $STDIN/$STDINX.

* "NOTRANSLATE" REQUIRED.
    "(NOTRANSLATE)" is the only parenthesized parameter
    allowed in the SUBMIT command. Re-enter command.

* NUMERIC PARAMETER EXPECTED.
    Numeric input is expected after a comma. Re-enter.

DSN/MRJE USER MESSAGES

* ONLY 3 PARAMETERS ARE ALLOWED.
> Only three values (days, hours, minutes) can be given to specify maximum time a job remains in the job log after transmittal. Re-enter.

* outfile : OUTPUT FILE DOES NOT EXIST.
> The named output file (PRINT, PUNCH, or FORMS file) has been given in a SUBMIT command, but has not yet been created. Build the named output file and re-submit.

* PARAMETERS REQUIRED.
> The given command requires parameters. Re-enter the command.

* PRINT SPECIFIED TWICE.
> PRINT file specified twice in SUBMIT command. Re-enter command, specifying "PRINT" once only.

* PUNCH SPECIFIED TWICE
> PUNCH file specified twice in SUBMIT command. Re-enter command, specifying "PUNCH" once only.

* reader READER CANNOT BE CLOSED.
> The named host pseudo reader cannot be closed. Determine the reason for the failure from MPE file error number.

* READER SPECIFIED TWICE.
> READER file specified twice in SUBMIT command. Re-enter command.

SPOOL FILE DELETED.
> Message occurs when a job is canceled before it is transmitted to the host and the spool containing it is deleted.

SPOOL FILE NOT IN READY STATE. UNABLE TO DELETE.
> Message occurs when a job is canceled while it is being transmitted to the host. The spool file is busy and cannot be deleted.

* STANDARD INPUT FILE CAN'T BE OPENED. FATAL ERROR!
> $STDINX cannot be opened. DSN/MRJE terminates.

* STANDARD INPUT FILE CAN'T BE OPENED FOR NOWAIT I/O.
> $STDINX must be opened for NOWAIT I/O in order to send host console commands.

* $STDIN, $STDINX, $OLDPASS ARE ONLY SYSTEM INPUT FILES ALLOWED.
> Only those system files named in the message can be used for Input or FD files. Other system files are prohibited. Re-enter SUBMIT with valid input files.

* THIS ITEM NOT DYNAMICALLY CONFIGURABLE.
>   Items 1, 18, 40, and 41 in the configuration file cannot be altered after the file has been created. In order to change these items, use the NEW command to reconstruct the configuration file.

  USER CAPABILITY IN EFFECT.
>   This user does not have "OP" capability, and cannot carry out DSN/MRJE Manager functions.

* VALID RESPONSE MUST BE GIVEN.
>   When creating a new set of configuration files, items that do not have default values must be initialized. DSN/MRJE continues to ask for a valid response until one is given or until the Manager enters Control-Y, in which case no new files are created.

  VERIFY CANCEL WITH "YES".
>   When User/Manager requests that a job be canceled, the job log entry is displayed. In an interactive session DSN/MRJE then asks for verification of the CANCEL. Reply YES to verify cancellation.

  WARNING: HOST COMMAND CARD FOUND IN INPUT-NOT TRANSMITTED.
>   DSN/MRJE did not transmit the record to the host. SUBMIT processing continues.

  WARNING: MRJEOD CARD FOUND IN INPUT-NOT TRANSMITTED.
>   An MRJEOD card is only required when an input file (Infile or FD file) is $STDIN or $STDINX. If an MRJEOD card is found in any other input file it is not transmitted to the host. SUBMIT processing continues.

  WARNING: SIGNOFF CARD FOUND IN INPUT-NOT TRANSMITTED.
>   A signoff card has the form:

>   /*SIGNOFF

>   DSN/MRJE did not transmit this record to the host. SUBMIT processing continues.

* "YES" OR "NO" REQUIRED.
>   YES or NO is the only valid response. Re-enter.

* YOU MUST LOG ON MANAGER.SYS TO CREATE/PURGE CONFIG FILES.
>   The MRJE Manager must be logged on to MANAGER.SYS,PUB to create a set of configuration files (NEW command) or to purge all entries from the job log (PURGE ALL), since the files are in PUB.SYS.

MRJECONTROL CONSOLE MESSAGES

MRJECONTROL Console Messages

The messages in this table can be received by DSN/MRJE users while using :MRJECONTROL commands.

CIERR(OR) NUMBER	MESSAGE, MEANING AND RECOVERY
4200	EXPECTED ONE OR MORE OF THE CONTROL FUNCTIONS: START, TRACE, RETRIES, SIGNOFF OR KILL. Entering "MRJECONTROL" alone is not OK. Enter "MRJECONTROL" plus one of the control commands listed in the message.
4201	EXCEEDED MAXIMUM NUMBER OF PARAMETERS. Look up syntax of DSN/MRJE command and re-enter using no more than the maximum number of paramters allowed.
4202	START ALREADY REQUESTED. The :MRJECONTROL START command has already been issued, but the line is not fully open. Before the command can again be successfully issued, the :MRJECONTROL SIGNOFF or :MRJECONTROL KILL command must be executed.
4203	EXPECTED TWO PARAMETERS, HOSTID AND RETRYNUM. Re-enter command using both parameters.
4204	UNABLE TO OPEN CONFIGURATION FILE FOR THIS HOST. There are several possible reasons for this message: 1) The wrong host ID may have been used in command. 2) Someone may be altering or rebuilding the configuration file. 3) There may be no configuration file for this host.
4205	UNABLE TO ACCESS CONFIGURATION FILE FOR THIS HOST. An FWRITE to or FREAD from the file failed.
4206	INSUFFICIENT CAPABLITIES FOR MRJECONTROL COMMANDS. A user must be authorized to use MRJECONTROL commands through the MPE :ALLOW command.
4207	UNABLE TO CREATE MRJEMON. Do a LISTF on MRJEMON.PUB.SYS to see if file exists. If it doesn't, check MPE configuration.

4208	UNABLE TO ACTIVATE MRJEMON. Do a LISTF on MRJEMON.PUB.SYS to see if file exists. If it does, check MPE configuration.
4209	MRJE ALREADY ACTIVE. Line already open. Command is ignored.
4210	NUMBER OF RETRIES MUST BE IN RANGE 1 - 255. Re-enter command with "RETRIES" within range.
4211	SIGNOFF ALREADY REQUESTED. Command in process. If line won't close, it may be necessary to issue :MRJECONTROL KILL.
4212	KILL ALREADY REQUESTED. :MRJECONTROL KILL command already has been requested. If line won't close, it may be necessary to physically disconnect it.
4213	INVALID DEVICE FOR MRJE0. The logical device numbers entered for items two and three of configuration file are different from logical device numbers used in MPE I/O system configuration. Alter configuration file entries.
4214	EXPECTED AT LEAST ONE PARAMETER, "ON" OR "OFF". The TRACE command must be issued with either "ON" or "OFF" specified.
4215	MRJE NOT ACTIVE. Start DSN/MRJE (:MRJECONTROL START) and then re-issue command.
4216	NO SYSTEM BUFFER AVAILABLE. COMMAND FAILED. Re-issue command until it succeeds. If problem persists, contact Hewlett-Packard.
4217	"TRACE" ONLY VALID COMMAND HERE.
4218	MRJEMON ADOPT FAILURE. Contact Hewlett-Packard.
4219	HOST ID MUST BE ALPHANUMERIC. Host ID may not contain a special character.
4220	SIGNOFF INVALID UNTIL HOST CONNECTION COMPLETED. :MRJECONTROL SIGNOFF cannot be executed until the communications line is open.

SYSTEM CONSOLE MESSAGES

DSN/MRJE Messages Sent to System Console

NOTE

A number of DSN/MRJE messages are sent to the system console
only. The messages have the following format:

$$\text{time/pin/} \left\{ \begin{array}{l} \text{MRJE} \\ \text{MRJEh} \end{array} \right\} \left\{ \begin{array}{l} \text{message} \\ \text{WARNING: message} \\ \text{ERROR: message} \end{array} \right\}$$

Message items are:

time   The time of day the message was sent.

pin   The MPE process identification number.

MRJE   Indicates DSN/MRJE generated the message and that
            the message concerns the default host system.

MRJEh   Indicates DSN/MRJE generated the message and
            that the message concerns the host system whose
            ID begins with "h".

message   The message itself.

WARNING: This message reports a potential problem.

ERROR: This message reports a failure.

ACTIVATE FAILURE ON MRJEMON.
        Internal software error. Contact Hewlett-Packard.

CONFIGURED BUFFER SIZE INVALID.
        Buffer size in the MRJE configuration file (Item 43)
        is invalid. The MRJE Manager must alter the item in
        the configuration file to agree with the host system's
        buffer size.

CONSMRJE, OPEN FAILURE (nn) ON $NULL.
        File system error nn. Contact Hewlett-Packard.

CONSMRJE, OPEN FAILURE (nn) ON MRJECONh.
        The specified MRJE configuration file could not be
        opened; see if it exists. If it does, determine the
        cause of the failure from the file system error
        number (nn) and take corrective action.

CONSMRJE, READ FAILURE (nn) ON MRJECONh.
        File system error nn. If severe, contact Hewlett-
        Packard.

CONSMRJE, WRITE FAILURE (nn) ON MRJECONh.
>   File system error nn. If severe, contact Hewlett-Packard.

CREATE FAILURE ON MJOBLOGR.
>   A job-logging process could not be created. Ensure that MRJELOGR is present in PUB.SYS.

CREATE FAILURE ON MRJEMON.
>   An DSN/MRJE monitor process could not be created. Ensure that MRJEMON is present in PUB.SYS.

CREATE FAILURE ON MRJEOUT.
>   An DSN/MRJE output process could not be created. Ensure that MRJEOUT is present in PUB.SYS.

DATA RECEIVED FOR INVALID UNIT #nn.
>   The host system has sent data to an unconfigured pseudo device.
>   1. Backspace the host unit (nn).
>   2. Drain host unit (nn),
>   3. As soon as convenient, reconfigure the DSN/MRJE pseudo I/O devices so that the host and the HP 3000 system have the same configuration.
>
>   DSN/MRJE pseudo devices should be configured with the following unit numbers:
>
> | | |
> |------------|------------------------------|
> | 2 | pseudo console |
> | 3 thru 9 | pseudo line printers 1 thru 7 |
> | 10 thru 16 | pseudo punches 1 thru 7 |

DIAL REMOTE number.
>   The communications link has been initially established. Dial the number shown in the message and complete the connection. This message is printed only if the SSLC or INP is configured for a switched (not a leased) line.

HOST BLOCK SEQUENCE (n1,n2).
>   A block sequence error occurred on the CS device. Block n2 was received when block n1 was expected. Normally, MRJE will recover from this condition. If the problem recurs, contact Hewlett-Packard.

HOST BUFFER SIZE (nnnn) EXCEEDS MAXIMUM.
>   The value specified in the MRJE configuration file for the host buffer size exceeds 2048. The MRJE Manager should alter Item 43 in the configuration file.

HOST # NOT ENTERED FOR 3000 JOB #nnn.
>   All output received from job nnn was sent to one of the unsolicited output device specified in MRJE configuration file.

SYSTEM CONSOLE MESSAGES

INVALID BUFFER RECEIVED FROM HOST.
> The last buffer of data received from the host had contradictory or invalid control information. Contact Hewlett-Packard.

INVALID DEVICE FOR MRJE0.
> The logical device number configured in the MRJE configuration file for the pseudo line (Item 3) is not the same as the number configured into MPE for IOMRJE0. The MRJE Manager must alter the logical device number in the configuration file (#ALTER command).

KILL ALREADY REQUESTED.
> The :MRJECONTROL KILL message has already been issued, but unsuccessfully. Subsequent KILL commands for the same host cause this message. If MRJE does not disconnect the line, you may need to physically disconnect it. If MRJE repeatedly fails to close the line after a KILL is issued, contact Hewlett-Packard.

LOCKSEG FAILURE.
> LOCKSEG Intrinsic failure. Internal software problem. Contact Hewlett-Packard.

n1 BLOCK SEQUENCE RECOVERY. EXPECTED BLOCK n2.
RECEIVED BLOCK n3.
> While data was being transmitted to the host system, block n3 was received when block n2 was to have been sent. There were n1 blocks recovered. MRJE will normally recover from this condition. If the problem persists, contact Hewlett-Packard.

MRJELOGR, FINFO FAILURE (nn) ON MRJEDIRh.
> File system error nn. If severe, contact Hewlett-Packard.

MRJELOGR, JOB TRANSMITTED TO WRONG HOST.
> In HP 3000 systems configured with two or more MRJE subsystems, jobs can be transmitted to the wrong host if the same pseudo card reader is configured in more than one MRJE configuration file.

MRJELOGR, OPEN FAILURE (nn) ON $NULL.
> File system error nn. If severe, contact Hewlett-Packard.

MRJELOGR, OPEN FAILURE (nn) ON MRJECONh.
> File system error nn. If severe, contact HP.
DSN/MRJE System Console Messages (continued)

MRJELOGR, OPEN FAILURE (nn) ON MRJEDIRh.
> File system error nn. If severe, contact Hewlett-Packard.

MRJELOGR, OPEN FAILURE (nn) ON MRJEJOBh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJELOGR, READ FAILURE (nn) ON MRJECONh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJELOGR, READ FAILURE (nn) ON MRJEDIRh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJELOGR, READ FAILURE (nn) ON MRJEJOBh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJELOGR, WRITE FAILURE (nn) ON MRJEDIRh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJELOGR, WRITE FAILURE (nn) ON MRJEJOBh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJEMON, OPEN FAILURE (nn) ON CS DEVICE.
        The MRJE monitor could not open the line. The CS
        error number (nn) references the reason for the
        failure. CS error codes are listed in the Data
        Communications Handbook Section I.

MRJEMON, OPEN FAILURE (nn) ON $NULL.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJEMON, OPEN FAILURE (nn) ON MRJE0.
        The DSN/MRJE pseudo line monitor file could not be
        opened. (nn) specifies the MPE file system error
        number which identifies a reason for the failure. If
        the problem is severe, contact Hewlett-Packard.

MRJEMON, OPEN FAILURE (nn) ON MRJECONh.
        File system error nn. If severe, contact Hewlett-
        Packard.

MRJEMON, READ FAILURE (nn) ON CS DEVICE.
        The communication link to the host failed. The CS
        error number (nn) identifies the reason for the
        failure. CS errors are in Handbook Section I.
        If the problem is severe, contact Hewlett-Packard.

MRJEMON, READ FAILURE (nn) ON MRJE0.
        File system error nn. If severe, contact Hewlett-
        Packard.

SYSTEM CONSOLE MESSAGES

MRJEMON, READ FAILURE (nn) ON MRJECONh.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEMON, WRITE FAILURE (nn) ON CS DEVICE.
   If this message appears as a WARNING, a communica-
   tion problem developed and DSN/MRJE sent a SIGNOFF
   command prior to disconnecting the line. The host
   system probably has accepted the command and is
   closing the communications link.

   If this message appears as an ERROR, the communica-
   tions link failed unexpectedly. Irrecoverable com-
   munication error codes are in Handbook Section I. The
   CS error number references the reason for the failure.
   Contact Hewlett-Packard, if such errors persist.

MRJEMON, WRITE FAILURE (nn) ON MRJEO.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEMON, WRITE FAILURE (nn) ON MRJECONh.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, CLOSE FAILURE (nn) ON MRJECONh.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, FINFO FAILURE (nn) ON MRJE'PNLP.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, FINFO FAILURE (nn) ON MRJEOUT.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, OPEN FAILURE (nn) ON $NULL.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, OPEN FAILURE (nn) ON MRJE'PNLP.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, OPEN FAILURE (nn) ON MRJECONh.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, OPEN FAILURE (nn) ON MRJEDIRh.
   File system error nn. If severe, contact Hewlett-
   Packard.

MRJEOUT, OPEN FAILURE (nn) ON MRJEJOBh.
      File system error nn. If severe, contact Hewlett-
      Packard.

MRJEOUT, OPEN FAILURE (nn) ON MRJEOUT.
      DSN/MRJE couldn't open a User's output file.   Output
      destined for the file is irrecoverable.   Notify
      DSN/MRJE Users that output was lost. This is file
      system error nn. If severe, contact Hewlett-Packard.

MRJEOUT, READ FAILURE (nn) ON MRJE'PNLP.
      File system error nn. If severe, contact Hewlett-
      Packard.

MRJEOUT, READ FAILURE (nn) ON MRJECONh.
      File system error nn.   If severe, contact Hewlett-
      Packard.

MRJEOUT, READ FAILURE (nn) ON MRJEDIRh.
      File system error nn. Contact Hewlett-Packard.

MRJEOUT, READ FAILURE (nn) ON MRJEJOBh.
      When nn=0, it indicates that unsolicited output that
      doesn't belong to any entry in the job log file was
      received. When nn does not equal zero, an internal
      software error has occurred.   In the latter case,
      contact Hewlett-Packard.

MRJEOUT, WRITE FAILURE (nn) ON MRJE'PNLP.
      This message should be ignored.

MRJEOUT, WRITE FAILURE (nn) ON MRJEOUT.
      DSN/MRJE couldn't write to a user's file. Output des-
      tined for the file is irrecoverable. Notify DSN/MRJE
      users that output was lost. Contact Hewlett-Packard.

NO 3000# FOR HOST JOB# nnnn, jobname.
      Internal software problem. All output received for
      JOB# nnnn was sent to the unsolicited output devices
      specified in the DSN/MRJE configuration file. If the
      problem is severe, contact Hewlett-Packard.

NO SYSTEM BUFFER FOR SIGNOFF.
      An :MRJECONTROL SIGNOFF command failed because no HP
      3000 system buffers were available.   Wait and try
      again. If this problem occurs frequently, contact
      Hewlett-Packard.

SYSTEM CONSOLE MESSAGES

PHYSICAL BOUNDS OF OUTFILE EXCEEDED FOR IBM JOB nnnn PLEASE
RESPOND "RETRY" OR "FLUSH".
>The file specified to receive output for host job nnnn
appears to be full. Writing to the file is suspended
until the console operator responds to the message. A
FLUSH response causes the remaining job output to be
sent from the host, but the data is lost. Notify the
owner of job nnnn that output was lost. A RETRY re-
sponse causes the system to attempt to rewrite the
lost record. Use RETRY only after attempting to
identify and rectify the cause of the message. If the
rewrite fails, this message is repeated until a retry
is successful or until a FLUSH response is given.

PRINTER 0 TERMINATING.
>Internal software error. A printer or punch output
process terminated, but DSN/MRJE cannot determine
which one. Contact Hewlett-Packard.

PRINTER n TERMINATING.
>Internal software error. The DSN/MRJE output process
corresponding to printer n terminated.
>1. If no SIGNON COMPLETED message has been received,
enter the :MRJECONTROL KILL [,hostid] command.
>2. If a SIGNON COMPLETED message was received, back-
space host printer n to the start of the data set.
>3. Drain all host printers and punches.
>4. Enter the :MRJECONTROL SIGNOFF [,hostid] command.
>5. In either case, contact Hewlett-Packard.

PUNCH n TERMINATING.
>Internal software error. The DSN/MRJE output process
corresponding to punch n terminated.
>1. If no SIGNON COMPLETED message has been received,
enter the :MRJECONTROL KILL [,hostid] command.
>2. If a SIGNON COMPLETED message was received, back-
space host punch n to the start of the data set.
>3. Drain all host printers and punches.
>4. Enter the :MRJECONTROL SIGNOFF [,hostid] command.
>5. In either case, contact Hewlett-Packard.

SIGNOFF ALREADY REQUESTED.
>The :MRJECONTROL SIGNOFF command has already been
entered. (If the SIGNOFF command is issued while the
host is transmitting, transmission continues until the
current data set has been received; then the line is
disconnected.)

SIGNON COMPLETED.
>The :MRJECONTROL START command has successfully exe-
cuted and the communication link is now open. If jobs
have been submitted, DSN/MRJE will automatically begin
transmitting data and accepting output.

SYSTEM ALREADY ACTIVE.
>   The :MRJECONTROL START command was isued for a host
>   that is already connected.

SYSTEM NOT ACTIVE.
>   The :MRJECONTROL SIGNOFF (or KILL) command was issued
>   for a host that is not connected.

TERMINATING.
>   The DSN/MRJE monitor process terminated. When printed
>   alone (that is, without an accompanying ERROR or
>   WARNING message), the termination was normal.

UNABLE TO OPEN UNSOLICITED OUTPUT FILE FOR IBM JOB nnnn
PLEASE RESPOND "Retry" OR "FLUSH".
>   The device or file specified to receive unsolicited
>   output cannot be opened. The output procedure is sus-
>   pended until the Console Operator responds to the
>   message. A FLUSH response restarts output from the
>   host, but all data is lost. Notify the owner of job
>   nnnn that output was lost. A RETRY response causes
>   the system to try again to open the device or file.
>   Use RETRY only after attempting to identify and
>   rectify the cause of the message. If the specified
>   device file still cannot be opened, this message is
>   repeated until RETRY is successful or until a FLUSH .
>   response is given.

UNLOCKSEG FAILURE.
>   The UNLOCKSEG intrinsic failed. Internal software
>   error.
>   1. COOLSTART the system (to reclaim the line moni-
>   tor's stack).
>   2. Contact Hewlett-Packard.

ZSIZE ERROR.
>   The ZSIZE intrinsic failed. Internal software error.
>   Contact Hewlett-Packard.

TRANSPARENT TEXT BLOCK

Binary Synchronous Communication (BSC) Multileaving Block Structure in Bytes:

```
    Character:        Description:

    DLE               BSC leader (%020, !10)
    STX               BSC start of text (%002, !02)
    BCB      *        Block Control Byte
    FCS1     *        Function Control Sequence Byte 1 of 2
    FCS2     *        Function Control Sequence Byte 2 of 2
    RCB      *        Record Control Byte, first record
    SRCB     *        Sub-Record Control Byte, first record

    SCB      *        String Control Byte, first record
    text              character string, first record
    >>>               repeat SCB-text sequence until SCB=0

    >>>               repeat RCB-SRCB-SCB-text sequence as needed.

    RCB      *        Transmission block terminator is RCB=0

    DLE               BSC leader (%020, !10)
    ETB               BSC ending sequence (%046, !26)

    BCC1              Block Check Character 1 of 2
    BCC2              Block Check Character 2 of 2

        * = Description of this byte follows.
```

Reference: OS/VS2 JES2 Logic Reference Manual, Appendix B, (IBM SY28-0622)

BCB (Block Control Byte): Transmit block status and sequence count.

```
                    0 1 2 3 4 5 6 7
                    o x x x c c c c
```

```
o = 1      must always be on.
x = 000    normal block
    001    bypass sequence count validation
    010    reset expected block sequence to c value
    011    reserved, not supported
    100    reserved, not supported
    101    available for user modification, not supported
    110    available for user modification, not supported
    111    reserved for expansion, not supported
c = modulo 16 block sequence count
```

FCS (Function Control Sequence): Controls the flow of individual function streams.

```
                <----FCS 1----> <----FCS 2---->
                0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7
Device number,  o s r r a b c d o t r r w x y z
     RD or PR:          1 2 3 4         5 6 7
           PU:          7 6 5           4 3 2 1
```

o = 1	must always be on to be valid in both bytes	
r	reserved in both bytes	
s = 1	normal state	
0	wait a bit. Receiver is to suspend all transmission.	
t = 0	suspend remote console stream transmission.	
1	continue remote console stream transmission.	
a – d = 0	suspend device transmission.	
w – z	For example, a = 0 means suspend RD1 or PR1.	
a – d = 1	continue device transmission	
w – z	For example, b = 1 means continue RD2, PR2 or PU7.	

RCB (Record Control Byte): Identifies record type. Uniquely identifies data streams among identical record types.

```
                0 1 2 3 4 5 6 7
                o i i i t t t t
```

o = 0	end of transmission. RCB=0.	
1	normal state.	

t = 0000	control record. See the values of i, below.
0001	operator message display request, host to system
0010	operator command, system to host
0011	normal input record. See note 1, following.
0100	printer record. See note 1, following.
0101	punch record. See note 1, following.
0110	data set record. Unsupported.
0111	terminal message routing record. Unsupported.
1000-1100	reserved for expansion. Unsupported.
1101-1111	reserved for local modification. Unsupported.

TRANSPARENT TEXT BLOCK

Settings for control record, where t = 0000:

i = 000   reserved for future expansion
    001   request to initiate function transmission. See note 2, following.
    010   permission to initiate function transmission. See note 2, following.
    011   reserved. Unsupported.
    100   reserved. Unsupported.
    101   available for local modification. Unsupported.
    110   error in block check sequence. SRCB contains value.
    111   general control record. SRCB contains the type.

Note 1: In this instance the value of the i field identifies the stream number of the data for a reader, a printer, or a punch.

Note 2: In this instance the SRCB must contain the prototype RCB. This identifies the device which is the object of the request to intiate function transmission, and the permission to initiate function transmission.

SRCB (Sub-Record Control Byte): Provides supplementary information about a record.

```
                    0 1 2 3 4 5 6 7
                    o s s s s s s s
```

o = 1   must always be on
s   additional information according to the record type.

SRCB (Sub-Record Control Byte) for a general control record, where the i field of an RCB=7. Identifies type.

s = A   initial terminal signon
    B   final terminal signoff
    C   print initialization record. Not supported.
    D   punch intiialization record. Not supported.
    E   input initialization record. Not supported.
    F   data set transmission record. Not supported.
    G   system configuration status. Not supported.
    H   diagnostic control record. Not supported.
    I-R   reserved. Not supported.
    S-Z   available for local modification. Not supported.

SRCB (Sub-Record Control Byte) for print records.   Provides
carriage control information.

```
                    0 1 2 3 4 5 6 7
                    o m c c c c c c
```

```
o = 1          must always be on
m = 0          normal carriage control
    1          reserved for future user.  Unsupported.
```

```
c = 000000     suppress space
    0000xx     space xx lines after print
    01xxxx     skip to channel xxxx after print
    1000xx     space immediately xx lines
    11xxxx     skip immediately to channel xxxx
```

SRCB (Sub-Record Control Byte) for punch records.   Provides
additional information.

```
                    0 1 2 3 4 5 6 7
                    o m m b r r s s
```

```
o = 1          must always be on
m = 00         SCB character count unit = 1
    01         SCB character count unit = 2.  Unsupported.
    10         SCB character count unit = 4.  Unsupported.
    11         reserved.  Unsupported.
b = 0          normal EBCDIC card image
    1          column binary card image.  Unsupported.
r              reserved.  Unsupported.
s              punch stacker selection number.
```

SRCB (Sub-record Control Byte) for input records.   Provides
additional information.

```
                    0 1 2 3 4 5 6 7
                    o m m b r r r r
```

```
o = 1          must always be on
m = 00         SCB character count units = 1
    01         SCB character count units = 2.  Unsupported.
    10         SCB character count units = 4.  Unsupported.
    11         reserved.  Unsupported.
b = 0          normal EBCDIC card image.
    1          column binary card image.  Unsupported.
r              reserved.  Unsupported.
```

TRANSPARENT TEXT BLOCK

SRCB (Sub-Record Control Byte) for terminal message routing records. Indicates destination. Not supported at all.

```
0 1 2 3 4 5 6 7
o t t t t t t t
```

o = 1   must always be on
t = 0   broadcast to all systems. Unsupported.
   1-99   remote system number. Unsupported.
   100-127   remote system group. Unsupported.

SCB (String Control Byte) identifies type and length of a character string.

```
0 1 2 3 4 5 6 7
o k i j j j j j
```

o = 0   end of a record. SCB = 0
   1   all other SCB values.

k = 0   duplicate character string:
   i = 0   duplicate character is a blank. The next
            character is another SCB.
   i = 1   duplicate character is not a blank. The next
            character is duplicated.
   j   This is the duplication count. The maximum
            value is 31.

k = 1   non-duplicate character string. Text characters
         follow this SCB.
   ij   This is the text string length. The maximum
            value is 63.

DSN/MRJE COMMUNICATION LINE SPECIFICATION

DSN/MRJE Communication Line Specifications

Parameter	Setting	Comment
formaldesig	empty	prevents use of CLINE
device	SSLC	configured value
coptions	reference parameter	communications options. See coptions below, and Section I of the Data Communications Handbook.
aoptions	value parameter	access options. See aoptions, below, and Section I of the Data Communications Handbook.
doptions	value parameter	driver options. See doptions, below and Section I of the Data Communications Handbook.
numbuffers	0	no buffering to be done
buffsize	empty	not applicable. See numbuffers.
iolist	empty	received id sequences ignored
suplist	empty	multipoint use only
pollist	empty	multipoint use only
dwnldfile	empty	for INP
yyy	empty	reserved for future use
phonelist	empty	not used
inspeed	empty	not used
outspeed	empty	not used
miscarray	specified	8,0,20,1,60,2,0,5,255 See Section I of the Data Communications Handbook.
drivername	CSSMRJE0	string value set
ctraceinfo	empty	not used

```
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5        coptions = %050203
 0:1 0 1:0 0 0:0 1 0:0 0 0:0 1 1
 | | | |   | |     | transmission code is EBCDIC
 | | | |   | |     local is secondary contention station
 | | | |   | use configured default speed setting
 | | | | prohibit use of :CLINE command.
 | | | do not invoke CS trace facility
 | | inhibit use of ID sequences
 | allow timeouts
```

DSN/MRJE COMMUNICATION LINE SPECIFICATION

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5      aoptions
0:0 0 0:0 0 1:0 0 0:1 1 1:0 0 1      %001071 (with autodialing)
0:0 0 0:0 0 1:0 0 0:1 1 1:1 0 1      %001075 (without).
|                     | | |_perform all I/O using CIO
|                     | |_allow CLINE buffer override.
|                     10 = dial on write and read connect
|                     11 = answer on write connect; answer
|                     | on read connect.
|                     inhibit CS hardware error messages at
|                     | console
|           reserved: 1
| use conversation BSC protocol

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5      doptions = %000020
0:0 0 0:0 0 0:0 0 0:0 0 0:0 1 0
| | | | | |   | | | | |_send four leading SYN characters
| | | | | |   | | | |_reserved for future use
| | | | | |   | | |_MFW placed into and expected in text
| | | | | |   | |_no ITB expected from remote
| | | | | |   | |_automatic generation of TTD
| | | | | |   |_automatic generation of WACK
| | | | | |  BCC is VRC/LRC for non-transparent or transparent
| | | | | |  with heading and CRC16 for transparent without
| | | | | |  heading
| | | | |  ending sequence is BSC default: EOT for non-switched,
| | | | |  DLE EOT for switched lines
| | | |  control state listen mode between user requests ignores
| | | |  control sequences
| | |  poll termination: transmit RVI to return line to control
| | |  mode
| |  delay sequence: wait on received WACK/TTD sequences
|  reserved for future use
```

DSN/MRJE Psuedo Device Configuration

LDEV	DRT	UNIT	CH	TERM TYPE	S	T	REC WIDTH	DEV	M	DRIVER NAME	CLASS	Pseudo Device
___	#__	0	0	22	0		40	0		IOMRJE0		Monitor 1*
___	#__	1	0	22	0		40	0		IOMRJE1		Monitor 2*
___	#__	2	0	22	0		67	0		IOMCONS0		CON *
___	#__	3	0	22	0		67	0		IOMPNLP0		PR1 *
___	#__	4	0	22	0		67	0		IOMPNLP0		PR2
___	#__	5	0	22	0		67	0		IOMPNLP0		PR3
___	#__	6	0	22	0		67	0		IOMPNLP0		PR4
___	#__	7	0	22	0		67	0		IOMPNLP0		PR5
___	#__	8	0	22	0		67	0		IOMPNLP0		PR6
___	#__	9	0	22	0		67	0		IOMPNLP0		PR7
___	#__	10	0	22	0		40	0		IOMPNLP0		PU1
___	#__	11	0	22	0		40	0		IOMPNLP0		PU2
___	#__	12	0	22	0		40	0		IOMPNLP0		PU3
___	#__	13	0	22	0		40	0		IOMPNLP0		PU4
___	#__	14	0	22	0		40	0		IOMPNLP0		PU5
___	#__	15	0	22	0		40	0		IOMPNLP0		PU6
___	#__	16	0	22	0		40	0		IOMPNLP0		PU7
___	#__	17	0	22	0		40	0	S	IOMRDR0	MRDR1	RD1 *
___	#__	18	0	22	0		40	0		IOMRDR0		RD2
___	#__	19	0	22	0		40	0		IOMRDR0		RD3
___	#__	20	0	22	0		40	0		IOMRDR0		RD4
___	#__	21	0	22	0		40	0		IOMRDR0		RD5
___	#__	22	0	22	0		40	0		IOMRDR0		RD6
___	#__	23	0	22	0		40	0		IOMRDR0		RD7

S = spooled   Required = *

An SSLC, device type 18, must be configured with the driver, CSSMRJE0, as changeable. An INP, device type 17 is not to be configured with a changeable driver. The download files for an INP are:

    CSDMRJE0 for an HP 30010A;
    CSDMRJE1 for an HP 30020A;
    CSDMRJE2 for an HP 30020B.

DS/3000
DISTRIBUTED SYSTEMS

NOTE: The information in this handbook is not a set of product
        specificatons. Refer to the appropriate sub-system, system,
        and component specifications, reference manuals, or
        technical specifications.

DS/3000 COMMANDS

Controlling a Line From an Operator Console

The ASSOCIATE and ALLOW commands must be used to associate the user with a device and to permit specified users with CS capability to invoke this command.

```
                        ⌈ ⎧OPEN ⎫   ⌈ ⎧MASTER⎫             ⌉⌉
                        │ ⎨     ⎬   │,⎨SLAVE ⎬ [,SPEED=speed]││
                        │ ⎩SHUT ⎭   ⌊             ⌋         ⌋│

                                    ⎧ON [,[ALL] [,[mask] [,[numentries]⎫
:DSCONTROL dsdevice     ⌈          ⎨   [,[WRAP] [,filename]]]])         ⎬
                        │;TRACE,   ⎩OFF                                 ⌋

                        ⌈ ⎧COMP ⎫⌉⌈ ⎧MON  ⎡ ⎧CS⎫⎤⎫⌉⌈        ⎧DEFAULT⎫⌉
                        │;⎨     ⎬││;⎨    ⎢,⎨DS⎬⎥⎬││;RETRY= ⎨       ⎬│
                        ⌊ ⎩NOCOMP⎭⌋⌊ ⎩MOFF⌊ ⎩  ⎭⌋⎭⌋⌊        ⎩count  ⎭⌋
```

dsdevice   Logical device number or device classname. (Required parameter.)

OPEN   Establishes a communications link.

SHUT   Initiates an orderly shutdown. To terminate all activity now, do an :ABORTIO csdevice and then :DSCONTROL dsdevice;SHUT.

MASTER   Allows local HP 3000 to process only outgoing requests across the DS line.

SLAVE   Allows local HP 3000 to process only incoming requests across the DS line.

            If neither MASTER nor SLAVE are specified, the default is to allow both outgoing and incoming requests.

speed   Transmission speed (characters/second). Parameter is effective only if SPEED CHANGEABLE is selected when system is configured, and only if clocking is provided by a device other than the modem.

TRACE   Allows CSTRACE to be activated or deactivated. The default is TRACE,OFF.

ON   Allows TRACE to be activated. (Required parameter.)

OFF   Allows TRACE to be deactivated. (Required parameter.)

ALL   Generates trace records for line activity. If ALL is not
             specified, the trace record is written only when a
             transmission error occurs.

mask   Octal integer number preceded by percent sign (%nn).
             Default: %37

numentries   Decimal integer for maximum number of trace entries in a
             trace record (not greater than 248). Default:24 Maximum
             number of entries for an INP is 24.

WRAP   Causes trace entries that overflow the trace record
             (greater than numentries) to overlay the prior trace
             entries. Default: no wrap.

filename   Trace filename. The default file name is DSTRCxxx.
             PUB.SYS, where xxx is the dsdevice ldev.

COMP   Establishes data compression as default on the line.

NOCOMP   Establishes no data compression as default on line.

MON   Provides MMSTAT entries for CS and DS in cold dump.
             Default is both kinds.

MOFF   Deactivates MMSTAT monitoring.

count   Controls the number of line driver attempts to send or
             to receive data. The count must be a positive integer <=
             255. The default value is 15.

DEFAULT   The default value of RETRY counts is 15.

Once you have issued a DSCONTROL command, a SHOWDEV will display as
follows:

:SHOWDEV device	:DSCONTROL dsdevice	
	OPEN	SHUT
related communication controller	UNAVAIL	AVAIL
dsdevice	AVAIL	UNAVAIL

DS/3000 COMMANDS

Opening a Line From a User Terminal/Job

```
:DSLINE dsdevice
    [;LINEBUF=buffer size]
    [;LOCID=local-id-sequence]
    [;REMID=remote-id-sequence1 [,remote-id-sequence2]...]
    [;PHNUM=telephone-number]
    [;EXCLUSIVE]
    [ ;COMP   ]
    [ ;NOCOMP ]
    [;QUIET]
```

dsdevice   Device class name, logical device number, or a node
            name.

buffer-   Decimal integer (size in words) of the DS/3000 line
            buffer. Default is the CS buffer size specified during
            system configuration.

local-id-   ASCII character string within quotation marks or octal
sequence   numbers separated by commas and contained within
            parentheses.

remote-id- Same format as local-id-sequence.
sequence

telephone- Telephone number consisting of digits and dashes.
number   Maximum length permitted (including both digits and
            dashes) is 20 characters.

EXCLUSIVE   Requests non-shared line use.   Both CS and ND
            capabilities are required.

COMP   Overrides the current default and activates data com-
            pression. Sets mode of operation for subsequent DS/3000
            activity. (Optional parameter.) See also :DSCONTROL.

NOCOMP   Overrides current default and deactivates data compres-
            sion.(Optional parameter.) See also :DSCONTROL.

QUIET   This parameter causes the message that identifies the DS
            line number to be suppressed. Messages associated with
            subsequent REMOTE HELLO and REMOTE BYE commands will
            also be suppressed. (Optional parameter.)

LOCID, REMID, and PHNUM defaults are the values specified during HP
3000 I/O System configuration--if any values were specified.

Closing a Line From a User Terminal

```
                    ┌ dsdevice ┐
:DSLINE             │    @     │        ;CLOSE
                    └ ds-line-number ┘
```

dsdevice   Device class name, ldn, or node name specified in
            the DSLINE command that opened the particular line.

@   Specifies that all lines currently open should be
            closed.

ds line   The line number returned by a DSLINE...;OPEN.
number   Enter #Ln.

;CLOSE   Closes the specified line(s). (Required parameter.)

If no line identifier (dsdevice, @, or ds line number) is
specified, DS/3000 closes the line most recently opened.

File Commands for Remote Files
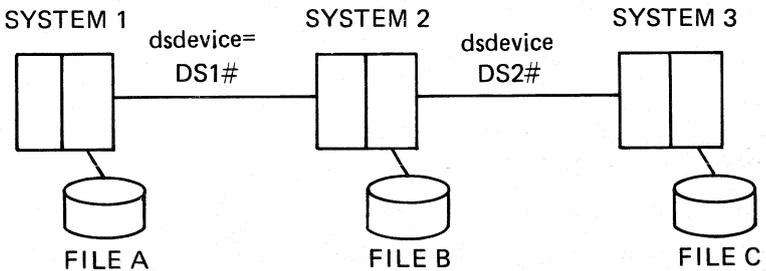
FILE COMMANDS

Issue a file command on the local system (in the illustration above, System 1) for a file resident on the first remote system (System 2).

    :FILE name;DEV=dsdevice#device

Example

    :FILE B;DEV=DS1#DISC

Issue a file command on the local system for a file resident on the second remote system (in the illustration, System 3).

    :FILE name;DEV=dsdevice#dsdevice#DISC

Example

    :FILE C;DEV=DS1#DS2# (Note that DISC is the default.)

With a remote session established, issue a file command on remote system (System 2) to indicate file is resident on the original system (System 1).

    :REMOTE FILE name;DEV=#

Example

    :REMOTE FILE A;DEV=#

Another way to specify a file on a second remote, system 3 is

    :FILE n_1;DEV=dsdevice#

    :REMOTE FILE n_2;DEV=dsdevice#

Example

    :FILE B;DEV=DS1#
    :REMOTE FILE B=C;DEV=DS2#

PROGRAM-TO-PROGRAM INTRINSIC LIMITATIONS:

- The user main session process identification number (UMAIN PIN) is used for identification, thus providing a limit of one slave from each family tree per each DS line.

- The slave program cannot be opened back across a dsline. It must be opened in the OUTGOING SENSE.

- While a slave is opened, simultaneous remote file access (RFA) cannot take place within the family structure.

Common Parameters

bufsize
integer by value (optional). Size in words of the communications buffer that is to be established. Parameter defines the maximum number of words of data that can be transmitted by a PWRITE or PREAD intrinsic call.

Default: Same size as the line buffer defined by the DSLINE command (LINEBUF=) for the first DSLINE issued to the dsdevice. Will never be smaller than 304 words.

If no LINEBUF= is specified then the default configuration length is used.

dsdevice
byte array (required). Contains an ASCII character string terminated by a space. String must be the device class name or ldn used in the DSLINE or REMOTE HELLO command that opened the communication line you will be using.

dsnum
integer by value (required). The link identifier returned by the particular POPEN intrinsic call which initiated communication with the remote slave program.

entry-
name
byte aray (optional). Contains an ASCII character string terminated by a space. String is the name of the entry point (label) at which execution of the remote slave program is to begin.

Default: Primary entry point.

flags
logical by value (optional). Default value is zero, all flags off.

NOTE: Bit 0 is the most significant bit; bit 15 is the least significant.

Bit(0:1) Not used.

Bit(1:1) Q-63 to S-bit. If on, the portion of the stack from Q-63 to S is dumped.

Bit(2:1) QI to S bit. If on, the portion of the stack from QI to S is dumped.

Bit(3:1) DL to QI bit. If on, the portion of the stack from DL to QI is dumped.

Bit(4:1) Should be set to zero.
Bit(5:2) STACKDUMP bits.
00 Enables only if enabled by father.
01 Enables unconditionally.

10   Same as 00.
11   Disables unconditionally for new
     process.

Bit(7:2)   Should be set to zero.

Bit(9:1)   NOCB bit.

Bit(10:2) LIBSEARCH bits.
           00--System Library
           01--Account Public, System Library

Bit(12:1) NOPRIV bit.

Bit(13:1) DEBUG bit, must be off (0).

Bit(14:1) LOADMAP bit.

Bit(15:1) (Always set on.)

icode
: integer (optional). PCHECK returned code that specifies the completion status of the most recently executed DS/3000 intrinsic.

il
: integer (optional). A word that has meaning only when a PREAD or PWRITE request is received from the remote master program.

For a PREAD request, il contains an integer specifying the number of words requested by the remote master program.

For a PWRITE request, il contains an integer specifying the number of words transmitted from the remote master program to the DS/3000 buffer.

ionumber
: integer (optional). A word that has meaning only when the condition code CCG and a ifun of 5 are returned. In that case, ionumber contains the MPE File System file number associated with the completed I/O without wait request.

itag   integer array (optional). A twenty-word array used for transmitting and receiving tag fields. Format of the tag field is defined as part of the user's application.

                  Default: A tag field of all zeros is sent; the returned tag field (if any) is not available to the master program.

param   integer by value (optional). A word used to transfer control information to the new process. Any instruction in the outer block of code in the new process can access this information in location Q-4. The default value is zero.

progname   byte array (required). Contains an ASCII character string terminated by a space. String is the name (with optional group and account names) of an MPE program file (residing on a disc connected to the remote HP 3000) containing the remote slave program.

stacksize   integer by value (optional). An integer (Z-Q) denoting the number of words assigned to the local stack area bounded by the initial Q and Z registers.

                  Default: Same as that specified in the program file.

dlsize   integer (DB-DL) denoting number of words in user-managed stack area bounded by DL and DB registers.

maxdata   integer by value (optional). The maximum size allowed for the process' stack (Z-DL) area in words. When specified, this value overrides the one established at program-preparation time.

                  Default: If not specified and not specified in program file either, MPE assumes the stack will remain the same size.

target   integer array (required for PREAD and PWRITE.) The array into which data received/transmitted to/from the remote slave program will deposited.

tcount   integer by value (required). The requested number of words (if positive) or bytes (if negative) of data.

Condition Codes

CCE   Request accepted (by slave program) or completed successfully.

CCG   Request rejected (POPEN, PREAD, PWRITE, or PCONTROL) by slave.

          Not returned (PCLOSE, ACCEPT, REJECT, PCHECK).

CCL   Request denied; an error occurred. Issue a PCHECK to determine error.

          PCHECK request denied because DSNUM was invalid.

POPEN

```
 I               BA      BA      IA      BA      IV

dsnum:=POPEN(dsdevice,progname,itag,entryname,param,

             L       IV      IV      IV      IV                OV

        flags,stacksize,dlsize,maxdata,bufsize);
```

PREAD

```
 I               IV      IA      IV      IA                    OV

lgth:=PREAD(dsnum,target,tcount,itag);
```

PWRITE

```
        IV      IA      IV      IA                            OV

PWRITE(dsnum,target,tcount,itag);
```

PCONTROL

```
        IV      IA                                            OV

PCONTROL(dsnum,itag);
```

PCLOSE

```
        IV

PCLOSE(dsnum);
```

GET

I	IA	I	I		OV
ifun:=GET(itag,il,ionumber);					

The GET intrinsic receives the next request from the remote master program and accepts an optional tag field (available in itag).

  CCE   Request received successfully.

  CCG   An IOWAIT (0) completed a file system I/O without wait, not DS I/O. The contents of ionumber identify the file.

  CCL   Error. Use PCHECK.

When the GET intrinsic executes, it returns to the slave program a number (ifun) specifying what type of request was received from the remote master program, as follows:

ifun:

  0   An error occurred. This value is returned only when the condition code CCL is also returned. Issue a PCHECK intrinsic call (with a dsnum parameter of zero) to determine what happened.

  1   POPEN request received.

  2   PREAD request received.

  3   PWRITE request received.

  4   PCONTROL request received.

  5   This value is returned only when the condition code CCG is also returned. It indicates that a pending MPE File System I/O without wait request was completed (instead of a DS/3000 remote I/O request). ionumber contains the file number associated with the completed I/O request.

DS/3000 SPL PTOP INTRINSICS

ACCEPT

```
        IA    IA    IV                                    OV

ACCEPT(itag,target,tcount);
```

        CCE   Response transmitted successfully
        CCG   Not returned
        CCL   Error. Use PCHECK

REJECT

```
        IA                                                OV

REJECT(itag);
```

        CCE   Request received successfully
        CCG   Not returned
        CCL   Error. Use PCHECK

PCHECK

```
  I             IV

icode:=PCHECK(dsnum);
```

Note that dsnum is 0 if issued from a slave program.

Refer to DS functional errors at the end of this section for the meaning of icode.

        CCE   Request was successful
        CCG   Not returned
        CCL   Request denied. dsnum is invalid.

Interface Conventions

Parameters in COBOL calling sequences can be:

Integer   Picture 9 through 9(4) or
                           Picture S9(3) computational

Character string   Picture X(n) or
                           Picture A(n)

In the following calls, the parameters not specifically defined
as character strings are assumed to be integers.

Common Parameters

Parameters whose use is the same for all procedures are:

CCODE   The condition code returned by the PTOP intrinsic:
             (see page F-9)
             -1   is the same as CCL in an SPL intrinsic.
              0   is the same as CCE in an SPL intrinsic.
              1   is the same as CCG in an SPL intrinsic.

DSNUM   The DS communication line number returned by CPOPEN.

ITAG   A 40-byte character field sent and received from the
             remote program.

TARGET   The character field used for reading or writing data.

TCOUNT   The number of words or bytes to be read or written:
             A positive integer for words.
             A negative integer for bytes.

CPOPEN

The COBOL callable interface to POPEN.

```
CALL "CPOPEN" USING CCODE,DSNUM,DSDEVICE,PROGNAME,ITAG,
                    ENTRYNAME,PARAM,FLAGS,STACKSIZE,DLSIZE,
                    MAXDATA,BUFFSIZE
```

DS/3000 COBOL PTOP CALLS

DSDEVICE   A character field containing the device class or
                    logical device number of the desired DS line.

PROGNAME   A character field containing the name (term- in-
                    ated by a space) of the remote slave program.

ENTRYNAME   The character field specifying the secondary
                    entry point (or spaces) where the remote program
                    will begin execution. ENTRYNAME is ignored if
                    the slave system is an RTE system.

PARAM   An integer value to be placed in Q-4 of the
                    slave program. It is ignored if the slave sys-
                    tem is an RTE system.

FLAGS   These are all MPE parameters used to specify
STACKSIZE   program loading. They are ignored if the
DLSIZE   slave system is an RTE system. See the POPEN
MAXDATA   specifications for parameters in this section.

BUFFSIZE   An integer specifying the maximum number of
                    words which will be transferred by the PTOP
                    intrinsic.

CPREAD

The COBOL callable interface to PREAD.

```
CALL "CPREAD" USING CCODE,DSNUM,LENGTH,TARGET,TCOUNT,ITAG
```

LENGTH   The actual number of words or bytes (depending on the
           value of TCOUNT) read into TARGET.

CPWRITE

The COBOL callable interface to PWRITE.

```
CALL "CPWRITE" USING CCODE,DSNUM,TARGET,TCOUNT,ITAG
```

CPCONTROL

The COBOL callable interface to PCONTROL

```
CALL "CPCONTROL" USING CCODE,DSNUM,ITAG
```

CPCLOSE

The COBOL callable interface to PCLOSE.

```
CALL "CPCLOSE" USING CCODE,DSNUM
```

CGET

The COBOL callable interface to GET.

```
CALL "CGET" USING CCODE,IFUN,ITAG,IL,IONUMBER
```

IFUN   The function number of the current pending PTOP
            operation. (See page F-11)

IL   The number of words sent by a PWRITE or the number of
            words requested by a PREAD.

IONUMBER   The file number of a non-DS file which completed an
            I/O without wait.

CACCEPT

The COBOL callable interface to ACCEPT.

```
CALL "CACCEPT" USING CCODE,ITAG,TARGET,TCOUNT
```

CREJECT

The COBOL callable interface to REJECT.

```
CALL "CREJECT" USING CCODE,ITAG
```

CPCHECK

The COBOL callable interface to PCHECK.

```
CALL "CPCHECK" USING CCODE,DSNUM,ICODE
```

ICODE   An integer identifying the last error encountered.

Refer to DS functional errors at the end of this section for
the meaning of ICODE.

DS/3000 COBOL PTOP CALLS

Interface Conventions

For each BASIC CALL statement, a parameter table constructed by BASIC contains the following:

1. The number of parameters.
2. A code word for each parameter, specifying data type and dimensioning.
3. A reference pointer to each parameter.

A BASIC/3000 slave program must be compiled and PREP'ed. A master program can be compiled or run on the HP 3000 Interpreter.

Common Parameters

Parameters whose use is the same for all procedures are:

CCODE   integer (required). The condition code returned by the PTOP intrinsic:

           -3   Not enough user stack for data transfer
           -2   Illegal calling parameter
           -1   CCL
           0   CCE   See page F-9
           1   CCG

DSNUM   integer (required). The DS/3000 communication line number. Analogous to the FOPEN file number.

ITAG   integer (optional). A 20-word array that is used to communicate tag fields. Its format is part of the user's application.

parm list   (optional). A parameter list can consist of one parameter or multiple parameters separated by commas. A parameter can be any BASIC-supported data type.

           NOTE: The same number of parameters must be specified on the master and slave and the data types must correspond.

           CAUTION: NO WARNING OF INCOMPATIBILITY IS ISSUED BY BASIC.

BPOPEN

The BASIC callable interface to POPEN.

```
CALL BPOPEN(CCODE,DSNUM,DSDEVICE,PROGNAME

[ {,ITAG}  [ {,ENTRYNAME}
[ {,0   }  [ {,0       }

[ {,PARAM}  [ {,FLAGS}  [ {,STACKSIZE}  [ {,DLSIZE}
[ {,0   }   [ {,0    }  [ {,-1       }  [ {,-1    }

[ {,MAXDATA}     [,BUFSIZE] ]]]]]]] )
[ {,-1    }
```

DSDEVICE   string (required). The DS line class name or logical
            device number. The string must be terminated with a
            blank.

PROGNAME   string (required). The name of a remote slave program,
            terminated with a blank.

ENTRY-   string (optional). A secondary entry point into the NAME
slave program, terminated with a blank.

PARAM   integer (optional). The value placed in Q-4 of the slave
            program stack.

FLAGS   These are all MPE parameters used to control program
STACKSIZE   loading. See the POPEN specifications for these
DLSIZE   parameters in this section.
MAXDATA

BUFSIZE   integer (optional). The maximum number of words per PTOP
            transfer.

BPREAD

The BASIC callable interface to PREAD.

```
    CALL BPREAD(CCODE,DSNUM,LGTH

   [ { ,ITAG }
   [ {      }  [,param list] ] )
   [ { ,0   }
```

LGTH   integer (required). The number of words received in the
        transfer.

DS/3000 COBOL PTOP CALLS

BPWRITE

The BASIC callable interface to BPWRITE.

```
CALL BPWRITE(CCODE,DSNUM,  [ { ,ITAG }    [,param list])
                            {           }
                            [ { ,0    }
```

BPCONTROL

The BASIC callable interface to PCONTROL.

```
CALL BPCONTROL(CCODE,DSNUM[,ITAG])
```

BPCLOSE

The BASIC callable interface to PCLOSE.

```
CALL BPCLOSE(CCODE,DSNUM)
```

BGET

The BASIC callable interface to GET.

```
CALL BGET(CCODE,IFUN  [ { ,ITAG }   [ { ,IL }  [,IONUMBER] ]])
                        {         }     {       }
                        [ { ,0   }      [ { ,0  }
```

IFUN   integer (required). The function code of the request issued by the remote master program.

IL   integer (required). The number of words sent by a BPWRITE or the number requested by a BPREAD.

IONUMBER   integer (required). Valid if both CCODE=1 and IFUN=5. The file number of an I/O completed without wait.

BACCEPT

The BASIC callable interface to ACCEPT.

```
                              ,ITAG
    CALL BACCEPT(CCODE,IFUN              [param list]
                              ,0
```

BREJECT

The BASIC callable interface to REJECT.

```
    CALL BREJECT(CCODE[,ITAG])
```

BPCHECK

The BASIC callable interface to PCHECK.

```
    CALL BPCHECK(CCODE,DSNUM,ICODE)
```

Refer to DS functional errors at the end of this section for the meaning of ICODE.

NETWORK FILE TRANSFER

- Copies <u>DISC</u> files within local system or across a DSLINE
  to an <u>ADJACENT</u> system.

- Uses intrinsics similar to PTOP intrinsics for transfers.

- Operates only in an <u>OUTGOING SENSE</u> depending on the node that
  originates DSCOPY: Given that
  A --> B --> C represents three systems with
  dslines opened in the direction shown...if the originating node
  is the one on the left, you can DSCOPY between A<-->B or
  B<-->C but not between B<-->A or C<-->B.

- Single command, DSCOPY.

- Two intrinsics, DSCOPY and DSCOPYMSG.

- A job or session that issues a copy request cannot already
  have an executing DSCOPY process.

- References SE note 3000/181 and DS/3000 Reference Manual.

$$:\text{DSCOPY}\left[\text{sfile}\left[,\left[\text{sdsdev}\right]\left[\begin{matrix},\\\#\end{matrix}\left[\text{sdev}\right]\right]\right]\left[\begin{matrix}\text{TO}\\;\end{matrix}\left[\text{tfile}\right]\left[\begin{matrix}\text{tdsdev}\\,\ast\end{matrix}\right]\left[\begin{matrix},\\\#\end{matrix}\left[\text{tdev}\right]\right]\right]\right]\right]$$

For interactive mode, omit all of the source and target parameters.
Network file transfer prompts for input and, after the tranfer com-
pletes, prompts again.

Terminate interactive mode by typing // or control-Y.

PARAMETER	MEANING
sfile	Required parameter. Identifies the file to be copied. The name can be in the following format: sfile[/lockword][.groupname][.accountname]
sdsdev	Optional parameter. The class name or logical device number that was used to open the line to the remote computer where sfile resides. The default is the lo-cal system, where the transfer request was submitted.
sdev	Optional parameter. The class name or logical device number of the disc where the sfile resides. Default is DISC.
tfile	Optional parameter. Specifies the file to receive the data. The format is the same as for sfile. The default is a new file of the same filename as sfile, with the log-on groupname and accountname. Security is set on for the tfile, even though the sfile may have been released.

tdsdev   Optional parameter.   The class name or logical
                device number that was used to open the line to the
                remote computer where the tfile will reside.   The
                default is that DSCOPY copies the sfile to the local
                computer and assigns the same filename as the sfile
                name. If the source computer is the local system,
                this will cause a file system error because the file
                already exists.

*   Means the target computer is also the source com-
                puter; i.e., the tdsdev is the same as the dsdevice.

tdev   Optional parameter. The device class name or logical
                device number of the disc where the tfile should
                reside.

● For remote file transfers a line must be open.

● Target filename cannot already exist on the target system.

● Never break and :ABORT a DSCOPY operation. Use a control-Y
  instead.

● Use an ampersand (&) as the last character in the DSCOPY
  command to continue the command to another line.

Examples:

    Local copy:

    :DSCOPY SFILE TO TFILE
    :DSCOPY SFILE;TFILE
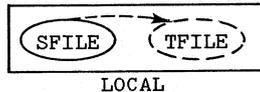
    Remote copy:

    :DSCOPY SFILE,54;TFILE,*
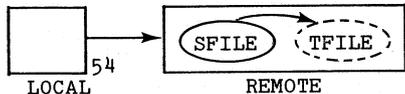
    Remote to local:

    A. :DSCOPY SFILE,54
    B. :DSCOPY SFILE,54 TO TFILE
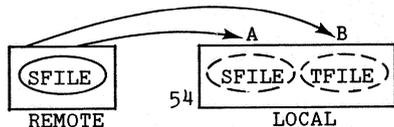
    Local to remote:

    A. :DSCOPY SFILE;,54
    B. :DSCOPY SFILE TO FILE,DS1
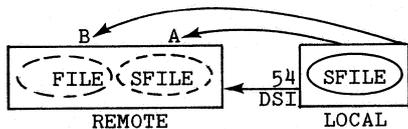
NETWORK FILE TRANSFER

Remote to remote:

A. :DSCOPY SFILE,54;,56
B. :DSCOPY SFILE,HSI;TFILE,56
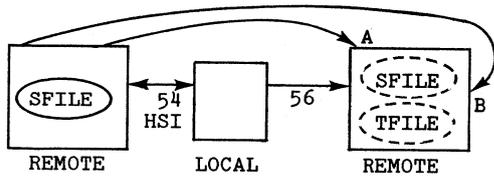
Network File Transfer Intrinsics:

- Callable from SPL, COBOL, FORTRAN and BASIC.

- All parameters are passed by reference.

- All parameters are required.

- All intrinsics are typeless procedure calls, and do not return a result as with a typed procedure.

- Condition codes are not affected.

- Split-stack calls are prohibited.

- COBOL data types are:

DATA TYPE	DATA DESCRIPTION
numeric	PICTURE S9(4) COMP
alphanumeric	PIC X(n) or PIC A(n)
numeric array	PIC S9(4) COMP SYNCHRONIZED OCCURS n TIMES

DSCOPY

```
PROCEDURE DSCOPY(OPT,SPEC,RESULT);
   LOGICAL OPT;
   LOGICAL ARRAY SPEC,RESULT;
```

OPT   Controls the primary output, such as to $STDLIST, and specifies the type of copy operation.

```
                                1 1 1 1 1 1
      0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
     ┌─────────────────────────────────┬─────────┐
     │ Reserved for future use. Must be 0. │    N    │
     └─────────────────────────────────┴─────────┘
```

N: Meaning:

0   Single transaction. Primary output disabled.

1   Multiple transactions. Return after first unsuccessful transaction. Primary output disabled.

2   Multiple transactions. Return after all transactions have been attempted, or after an internal error occurs. Primary output disabled.

3   Reserved

4   Single transaction. Primary output enabled.

5   Multiple transactions. Return after first unsuccessful transaction. Primary output enabled.

6   Multiple transactions. Return after all transactions have been attempted, or after an internal error occurs. Primary output enabled.

7   Reserved.

SPEC   The logical array should contain ASCII text terminated by an 8-bit binary zero.

In the single transaction case, the syntax required is the same as for the DSCOPY command parameters.

In the multiple transaction case, the array should contain only a zero. This will cause network file transfer to read the copy request from the DSCOPYI file, for which the default is $STDIN.

RESULT   A two-word array which contains the outcome of the intrinsic call.

       RESULT[0]   A zero value indicates the copy operation was successful. Any other value represents an error as defined in the DSCOPY error messages.

       RESULT[1]   The number of files that were successfully copied.

NETWORK FILE TRANSFER

COBOL Calling Sequence:

CALL "DSCOPY" USING OPT,SPEC,RESULT.

    OPT is a numeric data item.
    SPEC is an alphanumeric data item.
    RESULT is a numeric array of two or more data
      items.

FORTRAN Calling Sequence:

CALL DSCOPY (OPT,SPEC,RESULT)

    OPT is an INTEGER*2 variable.
    SPEC is a character array.
    RESULT is an array of two or more INTEGER*2
      variables.

BASIC Calling Sequence:

CALL BDSCOPY (O,S$,R)

    O is a numeric variable.
    S$ is a string variable.
    R is an array of two or more numeric variables.

DSCOPYMSG

```
PROCEDURE DSCOPYMSG(RESULT,FNUM,R);
      LOGICAL ARRAY RESULT;
      INTEGER FNUM,R;
```

RESULT   A two-word result returned by the DSCOPY intrinsic. This information is passed to this procedure.

              RESULT [0] equals 0 means that DSCOPY was successful.
              RESULT [0] not equal 0 means that an error occurred.
              Refer to DSCOPY error messages for the meaning.

FNUM   When this parameter is zero, the message associated with RESULT is printed on $STDLIST.

              When this parameter contains a file number returned by an FOPEN call, the message associated with RESULT is written to that file.

R   Result returned by this DSCOPYMSG call.

              R=0 successful R<>0 unsuccessful (See Error Messages)

              COBOL Calling Sequence:

              CALL "DSCOPYMSG" USING RESULT,FNUM,R.

       RESULT is an array of two or more data times.
       FNUM is a numeric data item.
       R is a numeric data item.

FORTRAN Calling Sequence:

CALL DSCOPYMSG(RESULT,FNUM,R)

       RESULT is an array of two or more INTEGER*2
       variables.
       FNUM is an INTEGER*2 variable.
       R is an INTEGER*2 variable.

BASIC Calling Sequence:

CALL BDSCOPYMSG(R,F,R0)

       R is an array of two or more numeric variables.
       F is an integer variable.
       R0 is an integer variable.

DSTEST and DSDUMP

DSDUMP

DS/3000 trace files can be analyzed interactively with DSDUMP.

:RUN DSDUMP.PUB.SYS

The user is prompted for the name of the CSTRACE file and
asked to select output destination (terminal or line printer).
The user may then enter any of the DSDUMP commands.
(Enter HELP for more Information on DSDUMP commands.)

DSTEST

DS/3000 software and the physical connection between computers can
be tested with DSTEST.

Software version verification:

>:RUN DSTEST....,VERS to obtain the version iden-
>tification of each DS/3000 module installed on the
>system. The user must have read access to the com-
>ponent modules of DS in PUB.SYS.

Configuration Verification:

>:RUN DSTEST...,CONFIG to display MPE I/O configura-
>tion and to verify that CS and DS devices are proper-
>ly configured.

Diagnostic Function:

>:RUN DSTEST...,DIAG to enter the diagnostic mode of
>operation. The user will be prompted to select RFA or
>PTOP, line information, and to specify data for the
>test.

>Normal mode:

>:RUN DSTEST...to enter a diagnostic mode, using PTOP
>for a line with 512 words blocks of all %177777.

COPEN and line specifications are provided for troubleshooting reference only.

See DSMON Code

```
Parameter:     Setting:      Comment:
formaldesig    empty         prevents use of CLINE
device         ALDEV         device number or class
coptions       reference     comm options, below, and section I.
aoptions       value parm    access options, below, and section I.
aoptins        value parm    driver options, below, and section I.
numbuffers     0             no buffering or queueing to be done.
buffsize       empty         not applicable. See numbuffers, above.
idlist         optional      may be specified.
suplist        empty         multipoint use only.
pollist        empty         multipoint use only.
dwnldfile      empty         for INP.
yyy            empty         reserved for future use.
phonelist      optional      may be specified.
inspeed        0
outspeed       0
miscarray      specified     10,1,0,2,0,4,29,5,15,9,0 ◄───Master
                             10,1,0,2,0,4,21,5,15,9,0 ◄───Slave
                                                     Disable MMSTAT
                                                     trace
                                         Drive retires =
                                         15,Master;15,
                                         slave.
                                    Line bid timeout = 29,
                                    Master;21,slave
                               Connect timeout disabled.
                             Local timeout disabled.
                           See section I.
drivername 0               Configured setting
ctraceinfo 0

0|1|2 3 4 5 6 7 8 9|0 1 2 3 4 5        ctraceinfo = 0
0:0,0 0:0 0 0:0 0 0:0 0 0:0 0 0
     |          |
     |          |          Number of trace entries is driver
     |          |          dependent.
     |          CS trace mask is driver dependent.
     |Trace entry fill type causes new entries to be discarded.
Trace on transmission errors only.
```

DS/3000 COPEN SPECIFICATION

```
|0|1|2|3|4 5|6 7 8 9|0 1 2 3 4 5      coptions = %000102    Master
 0:0 0 0:0 0 0:0 0 1:0 0 0:0 1 0
 |  | | | |       |   |transmission code is ASCII
 |  | | | |       |local is primary contention station
 |  | | | |use configured default speed setting
 |  | | |allow use of :CLINE command override. See note.
 |  | |do not invoke CS trace facility at COPEN time
 |  |allow use of ID sequences
 |allow timeouts


|0|1|2|3|4 5|6 7 8 9|0 1 2 3 4 5      coptions = %000201  Slave
 0:0 0 0:0 0 0:0 0 0:0 0 0:0 0 0
 |  | | | |       |   |transmission code is sensed by the driver
 |  | | | |       |local is secondary contention station
 |  | | | |use configured default speed setting
 |  | | |allow use of :CLINE command override. See note.
 |  | |do not invoke CS trace facility at COPEN time
 |  |allow use of ID sequences
 |alow timeouts


|0 1 2 3 4 5 6 7|8 9 0|1|2 3|4|5      aoptions = %000000    Master
 0:0 0 0:0 0 0:0 0 0:0 0 0:0 0 0
 |             |     | |   | |performs all I/O using NCIO
 |             |     | |   |allow :CLINE override for
 |             |     | |   NUMBUFFERS AND BUFFSIZE
 |             |     | |dial on write connect;      See note.
 |             |     | |answer on read connect.
 |             |     |allow CS hardware error messages to print
 |             |     |at console.
 |             |reserved
 |use configured default protocol


|0 1 2 3 4 5 6 7|8 9 0|1|2 3|4|5     aoptions - %000015    Slave
 0:0 0 0:0 0 0:0 0 0:0 0 0 1:1 1 1
 |             |     | |   | |perform all I/O using CIO
 |             |     | |   |disallow :CLINE override for
 |             |     | |   NUMBUFFERS AND BUFFSIZE  See note.
 |             |     | |answer on write connect;
 |             |     | |answer on read connect.
 |             |     |allow CS hardware error messages to print
 |             |     |at console
 |             |reserved
 |use configured default protocol
```

Note: System processes cannot be affected by :CLINE.

```
|0|1|2|3|4 5|6|7|8|9 0|1 2|3|4 5   doptions = %002000
 0:0 0 0:0 1 0:0 0 0:0 0 0:0 0   For SSLC and for BSC INP
                        | | | | |send four leading SYN characters
                        | | | |Multipoint use.
                        | | |MFW not placed into or expected in text
                        | |  no ITB not placed into or expected int ext
                        | |automatic generation of TTD
                        |automatic generation of WACK
                       |BCC=VRC:LRC (non xp or xp w/hd) & CRC16 (xp wo hd)
                      |remote will not send leading graphics
                   ending seq is to send DLE EOT
            While in control state and between user requests the driver
            will listen for any control sequences from the remote.
           |Receipt of a line bid puts line into text state.
          |Poll termination sequence: Before switching between stations
         |and RVI is transmitted to return the line to control mode.
       |delay sequence: wait on received WACK/TTD sequences
|reserved for future use


|0|1|2|3|4 5|6|7|8 9|0 1 2|3|4 5    doptions = %002000
 0:0 0 0:0 1 0:0 0 0:0 0 0:0|0 0   For HSI driver
                        | | | |Ignored.
                        | | |Reserved for future use.
                        | |Ignored.
                        |  automatic generation of TTD enabled.
                        |automatic generation of WACK enabled.
                      |Ignored.
                     |remote will not send leading graphics
                  ending seq is to send DLE EOT
            While in control state and between user requests the driver
            will listen for any control sequences from the remote.
           |Receipt of a line bid puts line into text state.
         |Ignored.
       |delay sequence: wait on received WACK/TTD sequences
|reserved for future use
```

See Section I

DS/3OOO SYSTEM FAILURES

SF Code	Module and Reason for DS system failure
911	DSSEG1.MANAGEWRITECONV An invalid message class or stream type was discovered.
912	DSSEG1.MANAGEWRITECONV DSSEG4.CSRFA(READRECORD) DSSEG4.CXRFA(WRITECONTUREC) An RFA buffer size was less than zero.
913	IODS0,DSW and DSWR counts disagree.
914	IODS0 IODSTRM0 The DS use count is negative.
915	DSMON,Bad data
916	DSMON,DEBUG on CS
917	DSSEG2.JOB'DSLCB,addressing error;unable to locate DSLCB.

Error   **DSCOPY Error Message**
Number

0	Succeeded.
1	Successfully initiated.
4	Unable to open tranaction file. (NFTERR 4)
5	Unable to open list fle (DSCOPY). (NFTERR 5)
6	IO error on transaction file.(NFTERR 6)
7	Transaction record>200 chars long. (NFTERR 7)
9	Temporary transaction file full. (NFTERR 9)
10	Parameters imply conflicting modes. (NFTERR 10)
11	Can't "RUN" copy process in this mode. (NFTERR 11)
13	Unrecognized parameter. (NFTERR 13)
14	Conflicting options have been specified. (NFTERR 14)
16	Unimplemented feature. (NFTERR 16)
17	Cannot contact remote node. (NFTERR 17)
18	File system error on source file. (NFTERR 18)
19	File system error on target file. (NFTERR 19)
21	Illegal dsline name. (NFTERR 21)
24	Unsupported standard device type. (NFTERR 24)
25	Cannot find or open the source file. (NFTERR 25)
26	Cannot create or open the target file. (NFTERR 26)
27	Cannot contact remote system. (NFTERR 27)
28	Source and target files cannot be accessed through remote file access. (NFTERR 28)
29	Communication IO error. (NFTERR 29)
30	Insufficient capabilities. (NFTERR 30)
33	No source file was specified. (NFTERR 33)
36	DS/3000 has not been installed on this system. (NFTERR 36)
37	Remote system unable to use transparent mode. (NFTERR 37)
38	Can't find the extra data segment, use the DSCOPY intrinsic to invoke NFT. (NFTERR 38)
39	Invalid extra data segment contents,use the DSCOPY intrinsic to invoke NFT. (NFTERR 39)
40	Negotiations failed, no copy can be performed. (NFTERR 40)
41	File transfer aborted. (NFTERR 41)
42	Copy cancelled by user. (NFTERR 42)

Intrinsic Error Returns

80	Bounds violation. (NFTERR 80)
81	Split-stack mode calls not allowed. (NFTERR 81)
82	First parameter value is out of range (-1:6). (NFTERR 82)
83	Second parameter too short to contain version string. (NFTERR 83)
84	NFT process is busy, can't sart new transaction. (NFTERR 84)
85	NFT process is not running. (NFTERR 85)
86	Illegal BASIC calling sequence. (NFTERR 86)

DSCOPY ERROR MESSAGES

DSCOPY Internal Errors

101 Internal error on remote system. (NFTERR 101)
102 Remote system NFT version is incompatible. (NFTERR 102)
103 Internal-string storage overflow. (NFTERR 103)
104 Unable to create temporary transaction file. (NFTERR 104)
105 An unexpected message was received. (NFTERR 105)
106 An illegal value was received in a message. (NFTERR 107)
107 A message received in invalid format. (NFTERR 107)
108 A required element was missing from a received message. (NFTERR 108)
109 NFT process create failed. (NFTERR 109)
110 Attempt to get extra data segment failed. (NFTERR 110)

DS/3000 FUNCTIONAL ERROR MESSAGES

Errror Number	Message
201	REMOTE DID NOT RESPOND WITH THE CORRECT REMOTE ID. (DSERR 201)
202	SPECIFIED PHONE NUMBER IS INVALID. (DSERR 202)
203	REMOTE ABORT/RESUME NOT VALID WHEN DOING PROGRAM TO-PROGRAM COMMUNICATION. USE LOCAL ABORT/RESUME (DSWARN 203)
204	UNABLE TO ALLOCATE AN EXTRA DATA SEGMENT FOR DS/3000. (DSERR 204)
205	UNABLE TO EXPAND THE DS/3000 EXTRA DATA SEGMENT. (DSERR 205)
206	SLAVE PTOP FUNCTION ISSUED FROM A MASTER PROGRAM. (DSERR 206)
207	SLAVE PTOP FUNCTION OUT OF SEQUENCE. (DSERR 207.)
208	MASTER PTOP FUNCTION ISSUED BY A SLAVE PROGRAM. (DSERR 208)
209	SLAVE PROGRAM DOES NOT EXIST OR IS NOT A PROGRAM FILE. (DSERR 209)
210	WARNING. INVALID MAXDATA OR DLSIZE FOR A SLAVE PROGRAM. SYSTEM DEFAULTS USED. (DSWARN 210)
211	SLAVE ISSUED A REJECT TO A MASTER PTOP OPERATION (DSWARN 211)
212	FILE NUMBER RETURNED FROM IOWAIT IS NOT A DS LINE NUMBER. (DSWARN 212)
213	EXCLUSIVE USE OF A DS LINE REQUIRES BOTH ND AND CS CAPABILITY. (DSERR 213)
214	THE REQUESTED DS LINE HAS NOT BEEN OPENED WITH A USER :DSLINE COMMAND OR A REQUIRED :REMOTE HELLO HAS NOT BEEN DONE. (DSERR 214)
215	THE DSLINE CANNOT BE ISSUED BACK TO THE MASTER COMPUTER. (DSERR 215)
216	MESSAGE REJECTED BY THE REMOTE COMPUTER. (DSERR 216)
217	INSUFFICIENT AMOUNT OF USER STACK AVAILABLE. (DSERR 217)
218	INVALID PTOP FUNCTION REQUESTED. (DSERR 218)
219	MULTIPLE POPEN. ONLY ONE MASTER PTOP OPERATION CAN BE ACTIVE ON A DS LINE. (DSERR 219)
220	PROGRAM EXECUTING GET WAS NOT CREATED BY POPEN. (DSERR 220)
221	INVALID DS MESSAGE FORMAT. (INTERNAL DS ERROR) (DSERR 221)

DS/3000 FUNCTIONAL ERROR MESSAGES

Error Number	Message
222	MASTER PTOP FUNCTION ISSUED PRIOR TO A POPEN. (DSERR 222)
223	REQUEST TO TRANSER MORE DATA THAN SPECIFIED IN THE POPEN. (DSERR 223)
224	FILE EQUATIONS FOR A REMOTE FILE CONSTITUTE A LOOP. (DSERR 224)
225	CANNOT ISSUE POPEN TO A SLAVE SESSION IN BREAK MODE. (DSERR 225)
226	SLAVE PROGRAM HAS TERMINATED BEFORE EXECUTING "GET". (DSERR 226)
227	REMOTE HELLO MUST BE DONE TO INITIATE REMOTE SESSION (DSERR 227)
231	INVALID FACILITY IN CONNECTION REQUEST. (DSERR 231)
232	THE REMOTE COMPUTER IS NOT OBTAINABLE. (DSERR 232)
233	VIRTUAL CIRCUIT IS NOT AVAILABLE. (DSERR 233)
236	COMMUNICATIONS HARDWARE HAS DETECTED AN ERROR. (DSERR 236)
237	CANNOT CURRENTLY GAIN ACCESS TO THE TRACE FILE. (DSERR 237)
238	COMMUNICATIONS INTERFACE ERROR. INTERNAL FAILURE. (DSERR 238)
239	COMMUNICATIONS INTERFACE ERROR. TRACE MALFUNC-TION. (DSERR 239)
240	THE LOCAL COMMUNICATIONS LINE HAS NOT BEEN OPENED BY THE OPERATOR. (DSERR 240)
241	THE DS LINE IS IN USE EXCLUSIVELY OR BY ANOTHER SUBSYSTEM. (DSERR 241)
242	INTERNAL DS SOFTWARE MALFUNCTION. (DSERR 242)
243	REMOTE OR PDN IS NOT RESPONDING. (DSERR 243)
244	COMMUNICATIONS INTERFACE ERROR. LINE RESET OCCURRED. (DSERR 244)
245	COMMUNICATIONS INTERFACE ERROR. RECEIVE TIMEOUT. (DSERR 245)
246	COMMUNICATIONS INTERFACE ERROR. REMOTE DISCONNECTED. (DSERR 246)
247	COMMUNICATIONS INTERFACE ERROR. LOCAL TIMEOUT (DSERR 247)
248	COMMUNICATIONS INTERFACE ERROR. CONNECT TIMEOUT (DSERR 248)
249	COMMUNICATIONS INTERFACE ERROR. REMOTE REJECTED CONNECTION. (DSERR 249)

Error Number	Message
250	COMMUNICATIONS INTERFACE ERROR. CARRIER LOST. (DSERR 250)
251	COMMUNICATIONS INTERFACE ERROR. THE LOCAL DATA SET FOR THE DS LINE WENT NOT READY. (DSERR 251)
252	COMMUNICATIONS INTERFACE ERROR. HARDWARE FAILURE (DSERR 252)
253	COMMUNICATIONS INTERFACE ERROR. NEGATIVE RESPONSE TO THE DIAL REQUEST BY THE OPERATOR. (DSERR 253)
254	COMMUNICATIONS INTERFACE ERROR. INVALID IO CONFIGURATION. (DSERR 254)
255	COMMUNICATIONS INTERFACE ERROR. UNANTICIPATED ERROR CONDITION. (DSERR 255)

DS/3000 TO DS/1000
DISTRIBUTED SYSTEMS

SOFTWARE SUPPORT

Reference Material

DS/3000 Reference Manual (32190-90001)
DS/3000 to DS/1000 Reference Manual for HP 3000 Users
  (32190-90005)
Software Pocket Guide (30000-90049)
MPE Intrinsics Reference Manual (30000-90010)
Getting Started With DS/1000-IV (91750-90004)
DS/1000-IV User's Manual (91750-90002)
DS/1000-IV Network Manager's Manual Vol I & II
  (91750-90010 & 91750-90011)
DS/1000-IV Quick Reference Guide (91750-90005)
DS/1000 Guide for New Users (91740-90015) .
DS/1000 Programmer`s Reference Manual (91740-90002)
DS/1000 Network Manager`s Manual (91740-90003)
RTE-6/VM Quick Reference Guide (92084-90003)
HP30010A Intelligent Network Processor (INP) Installation
    and Service Manual (30010-90001) (Series II/III)
HP30020A Intelligent Network Processor (INP) Installation
    and Service Manual (30020-90001 (Series 30,33,40,44)
HP30020B Intelligent Network Processor (INP) Installation
    and Service Manual (30020-90005) (Series 30,33,40,44,64)
HP30010A/HP30020A/B Intelligent Network Processor (INP)
    Diagnostic Procedures Manual (30010-90002)

SOFTWARE SUPPORT

DS/3000 HP32190A: Standard DS/3000 includes link to HP/1000.

DS/1000-IV HP91750A: Standard DS/1000-IV includes link to HP/3000
        Operating Systems: RTE-MIII,-IVB,-IVE,-6/VM,-XL,-A.1
        This is the current DS/1000 product which is described on
        the following pages.

DS/1000 HP91741 adds software to HP91740A for link to HP/3000.
        (See page G-7 for description of this product.)

Supported Capabilities:

        PTOP - Program-to-Program communication
        RFA - Remote File Access
        Remote Commands (3000 to 1000, RTE commands only)
        DEXEC (3000 to 1000)

Line Buffer Specifications

1000 SOFTWARE

The size of the HP 1000 line buffer depends on the library used
to generate the system.

nominal data*	maximum linebuf	maximum 1000 slave data
256 words	304 words	512 words
1024 words	1072 words	1024 words
4048 words	4096 words	4096 words

*The exact amount of data depends on the type of call. PTOP
header and appendage are larger than others.

1000 HARDWARE

M,E,F Series Interfaces:

HP 12834A: PSI - Direct Connect Interface, 1072 word maximum
(1024 data)
HP 12793B: PSI - Modem Interface, 1072 word maximum (1024 data)
HP 12889A: HSI, 4096 word maximum
HP 12250A: X.25

A,L Series Interfaces:

HP 12082A PSI - Direct Connect
HP 12073A PSI - Modem Interface
HP 12075A PSI - X.25 PSN Interface

3000 SOFTWARE

The software supports buffer sizes between 256 and 4095. The system
configuration establishes the line buffer size up to a 4095 word
maximum. The person opening the line may use the LINEBUF= parameter to
override the default configuration size.

SOFTWARE SUPPORT

3000 HARDWARE

```
SSLC            4095 word maximum
HSI             4095 word maximum
INP             1024 word maximum
```

The final effective line buffer size is the minimum of the four value
1000 hardware, 1000 software, 3000 hardware, and 3000 software.

Note: The end which establishes the link specifies the requested li
       buffer size. This may be less than, but not greater than t
       lesser of these four limits.

Maximum User Buffer Size (Intrinsic Calls)

```
PTOP       3000 Master/1000 Slave      4095 words*
PTOP       1000 Master/3000 Slave      4095 words
RFA/DEXEC  both ways                    512 words
```

*PTOP buffer may be 512, 1024, or 4096 depending on the library used
generate 1000 system.

DS/1000 Programs

(See DS/1000-IV Network Managers Manual and DS/1000-IV Users Manual f
more information.)

```
LOG3K,TRC3K   Logging and tracing capability
DSINF         DS parameter and timeout information
DSMOD         Modify DS link characteristics, re-enable line
DINIT         Initialize DS/1000
SLCIN         HSI Bisync Driver Trace information

DSLIN         Establishes a Bisync link to HP/3000 using HP/1000
                   PSI Modem or Direct Connect cards.
              Note: DSLIN is not necessary for X.25 connections.
RMOTE         Sends Remote Operator Commands to HP 3000:
                   provides virtual terminal capability
              (A version of RMOTE contains the MO command to
                   transfer files between 1000s and 3000s.)
DSTES         HP/1000 PTOP slave for HP/3000 DSTEST program
```

VIRTUAL SESSIONS

The number of virtual sessions (1000 to 3000) depends on the
number of virtual terminals configured on the 3000 and the
number of Transaction Control Blocks (TCB) on the 1000.

TCBs are used for:

a.   Remote session on 1000s and 3000s.
b.   Each outstanding master request and command.
c.   Each uncompleted slave request.

HARDWARE SUPPORT

Hardwired Direct Connect (RS-449 Link)

Series 30/33/40/44/64

    30020A/B INP to 12834A: PSI - Direct Connect Interface
                                  for M/E/F series
                  or 12082A: PSI - Direct Connect Interface
                                  for A/L series

    NOTE: 30020B must be used with Series 64.

    30221F Cable: Maximum length 1200m (3900 feet)
                  Cable 24 pin, contains 4 twisted wire pairs
                   (transmit data, receive data, transmit
                   clock, receive clock)
                  Data rate up to 7000 char/sec (56k bps)

    HP 1000 CONNECTION

                  Supported by 12834A (MEF) or 12082A (A/L) Direct
                  Connect Board. Includes Direct Connect Cable and
                  Diagnostic Hood.

                      Option 001 Firmware update

                      HP 91712A   75m cable (male-female) 24 pin
                                   connector.
                      HP 91713A   one pair cable connectors,
                                   Option 1 Edge connectors for card
                      HP 91714A   300m cable (no connectors)
                                   (Belden YR19169)

HARDWARE SUPPORT

Series II/III

```
30010A INP   to 12834A: PSI - Direct Connect Interface
                              for M/E/F series
             or 12082A: PSI - Direct Connect Interface
                              for A/L series
```

30222F Cable

HP 1000 Connection: (Same as above)

> NOTE: For an HP 1000 connection using the INP, the INP must be
> configured for full duplex transmission mode.

HSI HARDWIRED LINK

30360A HSI (for Series II/III) to 12889A HSI (for M/E/F Series)

```
HSI 12889-60001
Manual 12889-90001
Crystal (15 Mhz) 1813-0046
   250,000 char/sec up to 1000 feet
Crystal (7.5 Mhz) 1813-0052
   125,000 char/sec 1000 to 2000 feet
Cable 12889-60004
```

INTERFACING COAXIAL CABLES

```
30220A  Cable Kit       25 feet
        Option 001     100 feet
        Option 002     250 feet
        Option 003     500 feet
        Option 004    1000 feet
        Option 005    2000 feet
```

8120-2404 COAX (Beldon 9259) UL 1354
   75 ohm, 17.3pf/ft, 0.24 in. OD, stranded center,
   solid copper strands, 22 AWG (6x30) (1x29)

The cables are fabricated on site. Refer to the HP 30360A
Hardwired Serial Interface Installation and Service
Manual (30360-90001) for fabrication instructions.

HSI link up to 610m (2000 feet). Configured instantaneous
line speed: 125,000 char/sec (up to 610m), or 250,000
char/sec (to 305m).

MODEM SUPPORT

Series 30/33/40/44/64

```
30020A/B INP  to 12793B PSI for M/E/F series
              or 12073A PSI for A/L series
```

Series II/III

$$\left.\begin{array}{c} 30010A\ INP \\ or \\ 30055A\ SSLC \end{array}\right\} \quad to \quad \left\{\begin{array}{c} 12793B:\ PSI - Modem\ Interface \\ for\ M/E/F\ series \\ or \\ 12073A:\ PSI - Modem\ Interface \\ for\ A/L\ series \end{array}\right.$$

```
Maximum speed for  INP 19.2 kbps (RS-232)
                   for SSLC 9600 bps (RS-232 or CCITT V.24)

Synchronous modems, half or full duplex
                    dial or leased lines
```

Dialing

All 1000 Bisync lines (non-HSI) are placed in secondary (answer) mode when they are enabled by DINIT, the DS/1000-IV initialization program.

To place a 1000 Bisync line in primary (call) mode, run the program DSLIN. If no connection is made before the connect timer expires (about 4 minutes), the line is placed back in secondary mode. The line also goes to secondary mode if the RTE BR,DSLIN command is entered before the connection is made.

If a call is received during the four minute dial-out window, the 1000 will not answer.

DS/1000 91740A

DS/1000 91740A
(Runs only with an HSI)

Supported Capabilities

        PTOP
        RFA
        DEXEC (3000 to 1000)
        Remote Commands (3000 to 1000, RTE commands only)

    HSI-HSI Communications

    HP 1000 End of the Communications Link

        12889A HSI

        HSI 12889-60001
        Manual 12889-90001
        Crystal (15 Mhz) 1813-0046
            250,000 char/sec up to 1000 feet
        Crystal (7.5 Mhz) 1813-0052
            125,000 char/sec 1000 to 2000 feet
        Cable 12889-60004

    Number of Files (LSTEN Parameter)

    The number of open files (RFA 3000 to 1000) plus the number of 100(
    slave programs (depends on memory size and SAM).

    The number of TCB's is specified when running LSTEN.

    Virtual Sessions (See page G-5)

```
0          7 8         15
|   8 Bits  |   8 Bits  |      BYTE (8 Bits = 1 Byte)
```

```
0                      15
|        16 Bits        |      LOGICAL
```

```
0                      15
| S |    15 Bits        |      ARITHMETIC (INTEGERS)
```

$$-32768 \leqslant X \leqslant 32767$$

```
0    RB/RD      15    0    RA/RC      15      DOUBLE
| S |◄─ 31 Bits ──|    |───────────────►|     INTEGER
```

$$-2,147,483,648 \leqslant X \leqslant 2,147,483,647$$

```
0 1  RB/RD    9 10         15   0    RA/RC       15   REAL
| S | Exponent |◄─ 22 Bits ──|   |─ Fraction ────►|   (FLOATING
                        1.                             POINT)
```
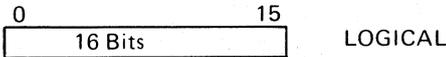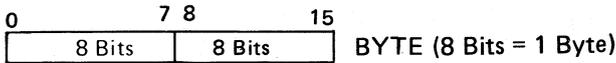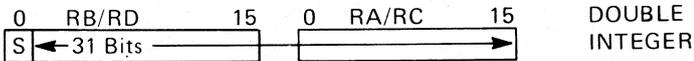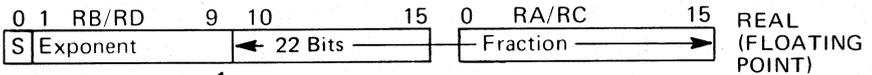
Exp. Excess 256   (Range 0 to 511)

Normalized Form: Implied 1 in Bit 9 preceding fraction, making 23 bits total.

Mantissa Range   1.000000 to 1.99999976

Range $\pm 8.63616 \times 10^{-78} \leqslant X \leqslant 1.1579208 \times 10^{77}$

Accuracy 6-7 Digits

HP 3000 DATA TYPES

FLOATING POINT EXAMPLES

Exp-256		exponent				=		
2^{-256}	S	0 0 0 0 0	0 0 0 0 0	=	Zero (by definition)	
2^{-256}	S	0 0 0 0 0	0 0 0 0 1	=	8.63616	*	10^{-78}
2^{-224}	S	0 4 0 0 0	0 0 0 0 0	=	3.70921	*	10^{-68}
2^{-192}	S	1 0 0 0 0	0 0 0 0 0 0	=	1.59312	*	10^{-58}
2^{-160}	S	1 4 0 0 0	0 0 0 0 0	=	6.84228	*	10^{-49}
2^{-128}	S	2 0 0 0 0	0 0 0 0 0	=	2.93823	*	10^{-39}
2^{-96}	S	2 4 0 0 0	0 0 0 0 0	=	1.26218	*	10^{-29}
2^{-64}	S	3 0 0 0 0	0 0 0 0 0	=	5.42101	*	10^{-20}
2^{-32}	S	3 4 0 0 0	0 0 0 0 0	=	2.32831	*	10^{-10}
2^{0}	S	4 0 0 0 0	0 0 0 0 0	=	1.00000		
2^{32}	S	4 4 0 0 0	0 0 0 0 0	=	4.29497	*	10^{9}
2^{64}	S	5 0 0 0 0	0 0 0 0 0	=	1.84467	*	10^{19}
2^{96}	S	5 4 0 0 0	0 0 0 0 0	=	7.92282	*	10^{28}
2^{128}	S	6 0 0 0 0	0 0 0 0 0	=	3.40282	*	10^{38}
2^{160}	S	6 4 0 0 0	0 0 0 0 0	=	1.46150	*	10^{48}
2^{192}	S	7 0 0 0 0	0 0 0 0 0	=	6.27710	*	10^{57}
2^{224}	S	7 4 0 0 0	0 0 0 0 0	=	2.69600	*	10^{67}
2^{256}	S	7 7 7 7 7	1 7 7 7 7 7	=	1.15792	*	10^{77}

Bit positions: 0, 1-3, 4-6, 7-4, 10-12, 13-15 (RB); 0, 1-3, 4-6, 7-9, 10-12, 13-15 (RA)

RB   RA

RD	RC	RB	RA	
S	Exp	◄— Fraction —	— 54 Bits —►	LONG
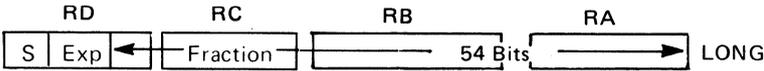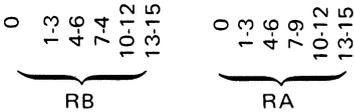
LONG FLOATING POINT

Range $8.63616\ 85551\ 14 * 10^{-78} \leqslant X \leqslant 1.15792\ 08923\ 72 * 10^{77}$

Accuracy 16-17 Digits

G-10

```
 5        8 7        0
┌──────────┬──────────┐
│  8 Bits  │  8 Bits  │        BYTE (8 Bits = 1 Byte)
└──────────┴──────────┘
```

```
15                    0
┌─────────────────────┐
│      16 Bits        │          LOGICAL
└─────────────────────┘
```
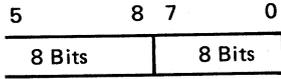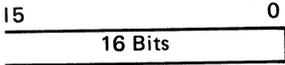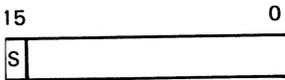
```
15                    0
┌─┬───────────────────┐
│S│                   │          INTEGER
└─┴───────────────────┘
```

$-32{,}768 \leqslant X \leqslant 32{,}767$
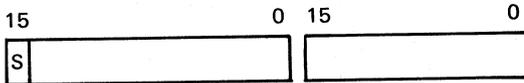
```
15               0  15               0
┌─┬───────────────┐ ┌───────────────┐
│S│               │ │               │     DOUBLE INTEGER
└─┴───────────────┘ └───────────────┘
```

$-2{,}147{,}483{,}648 \leqslant X \leqslant 2{,}147{,}483{,}647$
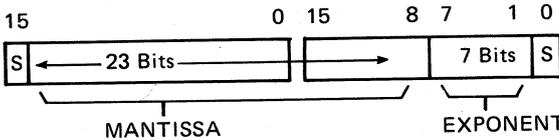
```
15               0  15       8 7    1 0
┌─┬───────────────┐ ┌────────┬─────┬─┐     REAL
│S│◄── 23 Bits ──►│ │       ►│7 Bits│S│    (FLOATING POINT)
└─┴───────────────┘ └────────┴─────┴─┘
      MANTISSA              EXPONENT
```

Mantissa	($\pm$23 bit fraction)
Exponent	($\pm$7 bit integer 2^x power)
Range	$1.469368 * 10^{-39}$
Accuracy	6 – 7 Digits

PTOP CALLS – 3000 MASTER

EXAMPLES

Mantissa	Exponent	Value (±)
.77777 776	0	.99999 988
.5	-32	$1.16415 *10^{-10}$
.5	-16	$7.62939 *10^{-6}$
.5	- 8	$1.95312 *10^{-3}$
.5	- 2	$1.25 *10^{-1}$
.5	0	.5
.5	2	2.0
.5	8	$1.28 *10^{2}$
.5	16	$3.2768 *10^{4}$
.5	32	$2.1475 *10^{9}$
+0	+0	ZERO

ROUND OFF ERROR

Number	Exponent	Maximum Error
8,388,607.0	23	1.0
1,048,474.87	20	.125
32,767.996	15	.0039
1,023.99988	10	.00012 2
31.99999 52	5	.00000 38
.99999 9881	0	.00000 012

PTOP COMMUNICATION

For DS/3000 to DS/1000 Program-to-Program communication:

● Programs residing on the 3000 must be written in SPL, FORTRAN, COBOL, or BASIC.

● Programs residing on the 1000 must be written in FORTRAN, PASCAL, or Assembly language.

Calls in this section are shown in FORTRAN.

Common Parameters – 3000 PTOP Calls

DSNUM   Master link identifier returned by POPEN. Required by all PTOF intrinsics.

ITAG   A 20-word tag array.

TARGET Integer array from which data is read, or into which data is returned.

PCHECK

Returns completion code of most recently completed DS/3000 intrinsic.

```
     I              IV
  ICODE = PCHECK (DSNUM)
```

ICODE   Applicable Completion Code Values:
        (Refer to function errors at end of section.)

Condition Codes: CCL Denied. Invalid DSNUM.
                    CCE Accepted by slave.
                    CCG Not returned.

PCLOSE

Forces immediate termination of the HP 1000 slave program.

```
              IV
  CALL PCLOSE (DSNUM)
```

Condition Codes: CCL Denied. Issue PCHECK for information.
                    CCE Accepted by slave.
                    CCG Not returned.

PTOP CALLS – 3000 MASTER

PCONTROL

Exchanges tag fields.

```
                    IV   IA          O-V
   CALL PCONTROL (DSNUM,ITAG)
```

Condition Codes: CCL Error. Issue PCHECK for information.
                  CCE Accepted by slave.
                  CCG Rejected by slave.

POPEN

Opens a slave program.

```
      I             BA        BA      IA          O-V
   DSNUM = POPEN (DSDEVICE, PROGNAME, ITAG)
```

DSDEVICE   ASCII string terminated by a space. Specifies DSLINE
            or logical device number, or device class name.

PROGNAME   ASCII slave name, up to 5 characters.

Condition Codes: CCL Error. Issue PCHECK for information.
                  CCE Accepted by slave.
                  CCG Rejected by slave.

PREAD

Reads a buffer from slave and exchanges tag field.

```
      I             IV      IA      IV      IA          O-V
   LGTH = PREAD (DSNUM, TARGET, TCOUNT, ITAG)
```

LGTH   Returns number of words transferred.

TCOUNT Positive (+) for words, negative (-) for bytes. The number of
        words transferred. Up to slave to indicate whether number is
        valid through tag field. (Cannot exceed 4096 words to the HP
        1000.)

Condition Codes: CCL   Error. Issue PCHECK for information.
                   CCE   Accepted by slave.
                   CCG   Rejected by slave.

PWRITE

Transmits a block of data and exchanges tag field.

```
                      V      IV     IV     IA        0-V
      CALL PWRITE (DSNUM, TARGET, TCOUNT, ITAG)
```

TCOUNT   Positive (+) for words, negative (-) for bytes. The number of
         words transferred, up to 4096 words to the HP1000.

Condition Codes: CCL   Error. Issue PCHECK for information.
                   CCE   Accepted by slave.
                   CCG   Rejected by slave.

GET

Receives the PTOP intrinsic from the master program.

```
      I       IA    I     I         0-V
   IFUN = GET (ITAG, IL, IONUMBER)
```

IFUN   Function from the master program:
             0   An error occurred (CCL)
             1   POPEN
             2   PREAD
             3   PWRITE
             4   PCONTROL
             5   CCG (I/O without wait)

IL   For PREAD, the number of words requested.
           For PWRITE, the number of words transmitted.

IONUMBER   Has meaning only for CCG (IFUN=5). The MPE file
           number for I/O without wait.

Condition Codes   CCL   Error. Issue PCHECK for information.
                  CCE   Request was successful.
                  CCG   Implicit I/O call completed pending MPE
                        I/O without wait instead of DS remote
                        I/O request.

PTOP CALLS – 3000 MASTER

ACCEPT

Completes the request of the most recent GET and transfers tag field.
For PREAD, transfers bufsize words from target/for PWRITE, moves buf-
size words from DS buffer to target.

```
                 IA      IA      IV           0-V
    CALL ACCEPT (ITAG, TARGET, LENGTH)
```

LENGTH   Number of words to be transferred. 4096 maximum.
      PREAD   Length of data buffer to be transmitted to remote
            master.
      PWRITE Number of words to be transferred from DS buffer
            to slave target.

Condition codes: CCL   Error. Issue PCHECK for information.
                  CCE   Request was successful.
                  CCG   Not Returned.

REJECT

Rejects most recent GET intrinsic from master program.

```
                 IA          0-V
    CALL REJECT (ITAG)
```

Condition Codes: CCL   Error. Issue PCHECK for information.
                  CCE   Request was successful.
                  CCG   Not returned.

PTOP Specifications

- One slave per dsline per user, father and son processes.

- POPEN valid toward remote (outgoing direction), not toward
  local (backward).

- Use of PTOP temporarily inhibits simultaneous RFA from the
  same user (father and son).

	PARAM	TAG	DATA	CCL	CCE	CCG
POPEN	DSNUM	Send / Receive	–	DSNUM Invalid	OK	Not Returned
PREAD	LGTH	Send / Receive	Receive	Error (PCHECK)	OK	Rejected by Slave
PWRITE	–	Send / Receive	Send	Error (PCHECK)	OK	Rejected by Slave
PCONTROL	–	Send / Receive	–	Error (PCHECK)	OK	Rejected by Slave
PCLOSE	–	–	–	Denied	OK	Not Returned
PCHECK	ICODE	–	–	Denied Bad DSNUM	OK	Not Returned
GET	IFUN	Receive	–	Error (PCHECK)	OK	Refer to Manual
ACCEPT	–	Send	Note 1	Error (PCHECK)	OK	Not Returned
REJECT	–	Send	–	Error (PCHECK)	OK	Not Returned

NOTE 1: Depends on the master intrinsic; required for a PREAD or PWRITE call.

PTOP CALLS - 1000 MASTER

Common Parameters - 1000 PTOP Calls

IPCB Control Block. A 4-word array filled by POPEN.
IERR Error code returned.
ITAG A 20-word tag array.

PCLOS

Terminates the slave program when the slave executes a GET, and terminates the logical communication link established by the POPEN.

```
           IA      I
   CALL PCLOS (IPCB, IERR)
```

Slave programs are terminated immediately (does not wait for GET).

PCONT

Provides an exchange of tag fields between master and slave programs.

```
           IA      I     IA
   CALL PCONT (IPCB, IERR, ITAG)
```

POPEN

Opens a slave program on the 3000 system.

```
           IA      I     IA     I    IA      IA       I
   CALL POPEN (IPCB, IERR, NAME, NODE, ITAG [,IENAM [IPRAM
               I          I
               [,IFLAG [,IBFSZ]]]])
```

NAME   4-word array containing ASCII name of slave.
NODE   Node number where slave program resides (negative LU of HSI).
IENAM   DS/3000 program entry point.
IPRAM   DS/3000 program control.
IFLAG   DS/3000 loading options.
IBFSZ   DS/3000 communications buffer size.

ᴙEAD

ads a buffer from slave and transfers tag fields.

```
              IA    I    IA    I    IA
 CALL PREAD (IPCB, IERR, IBUF, IL, ITAG)
```

UF   Data buffer, equal to or less than IL.

        Data length in words (4096 maximum).

VRIT

ansmits a buffer to slave program and transfers tag fields.

```
              IA    I    IA    I    IA
 CALL PWRIT (IPCB, IERR,  IBUF, IL, ITAG)
```

UF   Data Buffer, equal to or greater than IL.
        Length in words (4096 maximum).

PTOP CALLS – 1000 SLAVE

GET

Determines the PTOP intrinsic requested by the master program.

```
             I     I      I     IA    I
    CALL GET (ICLAS, IERR, IFUNC, ITAG, IL)
```

ICLAS   Slave PTOP class. Value passed as parameter number
          1. Use RMPAR.
IFUNC   Function requested by the master program:
             1 POPEN
             2 PREAD
             3 PWRIT
             4 PCONT
IL   For IFUNC=2 PREAD, maximum size buffer expected.
          For IFUNC=3 PWRIT, the number of words transferred.

ACEPT

Accepts and completes the master request and sends tag field.

```
              IA     I      IA
    CALL ACEPT (ITAG, IERR [,IBUF])
```

IBUF   Optional data buffer for PREAD or PWRIT.

REJCT

Rejects the master request and sends tag field.

```
              IA     I
    CALL REJCT (ITAG, IERR)
```

COMMON PARAMETERS - DEXEC CALLS

Note: Check your specific RTE system for exact parameter formats
        and meanings.

LDEST   A 5-word logical array. Words 1 through 4 contain an
        ASCII LU name, word 5 contains DSLINE number.

PROG   A 5-character ASCII program name.

DEXEC 1 - READ, DEXEC 2 - WRITE

Reads or writes a record from or to a remote non-disc I/O device.

```
    DI              LA    IV    IV       BA       IV
  ABREG - DEXEC (LDEST, ICODE, CONTWD, BUFFER, BUFLEN,
                  IV    IV
                 OPT1, OPT2)
```

ABREG   Upon return, word 1 (displayed in A-register):
            8:8   Status information
            2:6   EQT type code
            0:2   Availability indicator;0=up, 1=down

            Upon return, word 2 (displayed in B-register):
            Positive number of words of minus number of characters
            read (depends on BUFLEN).

ICODE   1 Read, 2 Write

CONTWD   Control Word:
            11:1   Interactive write/read
            10:6   LU
             9:1   M bit   0=ASCII, 1=binary
             8:1   U bit ⎫
             7:1   K bit ⎪
             6:1   A bit ⎬ Refer to RTE manual for meaning
             5:1   X bit ⎭
             0:5   Must be 0

BUFFER   Byte array to contain the information read.
            Insure size is adequate.

BUFLEN   Positive (+) for words, negative (-) for bytes.
            Maximum size is 512 words.

DEXEC CALLS - 3000 TO 1000

OPT1,OPT2   Required for certain drivers.
                 See the appropriate manual.

Reads and writes that directly address a disc are not
supported.

DEXEC 3 - I/O Control

Performs an I/O control operation on a remote I/O device.

DI	LA	IV	IV	IV	O-V
ABREG=DEXEC	(LDEST,	ICODE,	CONTWD,	PARAM)	

ABREG   Upon return, word 1 (displayed in A-register) con-
                 tains status EQT word 5.

                 Word 2 (displayed in B-register) is meaningless.

ICODE   3 for I/O control.

CONTWD   Control word:
                 10:6 LU number
                  5:5 Function code:
                       00   Clear device
                       01   Write EOF   MT/CTU
                       02   Backspace 1 record   MT/CTU
                       03   Forwardspace 1 record   MT/CTU
                       04   Rewind   MT/CTU
                       05   Rewind/Standby   MT/CTU
                       06   Dynamic Status   MT
                       07   Set EOT, leader skipped   PT
                       10   Generate leader   PT
                             Write EOF   CTU
                       11   Skip line   LP
                       12   Write 3-inch gap   MT
                       13   Forward space file   MT/CTU
                       14   Backspace file   MT/CTU
                       15   Conditional form feed   LP
                       20   Enable terminal
                       21   Disable terminal
                       22   Set term time-out parameter
                       23   Ignore further term action
                       24   Restore term output processing
                       26   Write EOF   CTU
                       27   Locate file   CTU

```
PARM              Used with CONTWD 11, 22, and 27:
                  11   +n   Space n lines                    LP
                       -n   Top of form
                        0   No line feed
                  22   Time-out parameter value
                  27   File number (<256)                    CTU
```

DEXEC 10 - Program Schedule

Schedules dormant remote program for execution.

```
    DI          LA    IV    IA    IV    IV    IV
ABREG=DEXEC (LDEST, ICODE, PROG, OPT1, OPT2, OPT3,
            IV    IV    O-V
            OPT4, OPT5)
```

ABREG   Upon return, word 1 value (displayed in A-register)

                  0   Good return
                  1   Program was already scheduled
                  2   I/O suspend
                  3   Program in wait state
                  4   Unavailable memory suspend
                  5   Disc allocation suspend
                  6   Operator or program suspend

                  Word 2 (displayed in B-register) upon execution con-
                  tains address of 5-word parameter array.

ICODE   10 Program schedule.

OPT1 to   Optional parameters passed to program.

OPT5

DEXEC 11 - Time Request

Requests the RTE system clock values.

DEXEC CALLS - 3000 TO 1000

DI	LA	IV	LA
ABREG=DEXEC (LDEST,	ICODE,	TIME)	

ICODE   11   Time request.

TIME   5-word logical array:
                       1   Tens of milliseconds
                       2   Seconds
                       3   Minutes
                       4   Hours
                       5   Day of year (Julian)

DEXEC 12 - Program Execution (Offset)

Schedules a remote program for execution at specified time in- tervals, starting after an initial offset time. Program is placed in the time list.

DI	LA	IV	LA	IV	IV
ABREG=DEXEC (LDEST,	ICODE,	PROG,	RESOLUTION,	MULTIPLE,	
	IV				
	OFFSET)				

ICODE   12 Program execution time.

RESOLUTION   Time units:
                       1   Tens of milliseconds   (0-99)
                       2   Seconds   (0-59)
                       3   Minutes   (0-59)
                       4   Hours   (0-23)

MULTIPLE   Number of time units (1<n<4095)
                       Time interval=resolution * multiple
                       0= Run only once.

OFFSET   Indicates number of time units to wait before
                       initial program execution (must be negative value).

)EXEC 12 – Program Execution (Absolute)

!chedules a remote program for execution at specified intervals, start-
.ng initially at a specified time.

```
       DI          LA      IV   LA       IV         IV
   ABREG=DEXEC (LDEST,  ICODE, PROG, RESOLUTION, MULTIPLE,
               IV      IV        IV       IV      0-V
             HOURS,  MINUTES, SECONDS, MSECONDS)
```

:CODE	12 Program execution time.
!ESOLUTION	Time units: 1 Tens of miliseconds (0-99) 2 Seconds (0-59) 3 Minutes (0-59) 4 Hours (0-23)
!ULTIPLE	Number of time units (1‹n›4095) 0= Run only once
!OURS	0-23
!INUTES	0-59
5ECONDS	0-59
!SECONDS	0-99 (tens of milliseconds)

DEXEC 13 – I/O Status

Obtains status of remote I/O device.

```
       DI          LA      IV     IV      L          L     0-V
    ABREG=DEXEC (LDEST,  ICODE, CONTWD, STATUS1, STATUS2)
```

ICODE	13 I/O status.

DEXEC CALLS – 3000 TO 1000

CONTWD
   Control word:
   10:6 LU number
    5:5 0

STATUS1
   Logical
    0:2 0 Available
       1 Disabled (down)
       2 Busy
       3 Waiting for DMA
    2:6 Equipment type code
    8:8 Status (Physical or simulated status at end
       of each operation.)

STATUS2
   Logical EQT word 4
    0:1 D DMA
    1:1 B Autobuffering used
    2:1 P Driver process power fail
    3:1 S Driver process timeouts
    4:1 T Device timed out
    5:5 Unit number last subchannel addressed
   10:5 I/O select code

Errors

Errors in the DEXEC Intrinsics are tested by the use of the condition codes and the values are returned in the double variable.

CCE
   No error in intrinsic.

CCL
   Error at the HP 3000. ABREG contains binary
   information.

CCG
   Error on remote HP 1000 computer. ABREG contains a
   4-character ASCII code.

This section on Remote File Access intrinsics covers the 3000 to 1000 direction. For more information about 1000 FMP calls, refer to the Batch-Spool Monitor Reference Manual (92060-90013), Section III.

Error Conditions

Test condition code for satisfactory completion of an RFA intrinsic. In case of an error, refer to the value of IERR.

CCL   Failure at the HP 3000 end. Refer to "RFA Error Codes--
                   3000 to 1000" for error code meanings.

CCE   No DS error; but if IERR<0 then FMGR error.

CCG   Not used.

Common Parameters - 3000 to 1000 Intrinsics

DCB   4-word logical array. The array is filed at DOPEN or
                   DCRET time. The data is used by the system and should
                   not be changed by the user.

IERR   Normally returns 0 for valid completion.
                   Exceptions: DCRET and DOPEN.

DAPOS

Positions disc file to a record (reference DLOCF).

```
        LA   I     IV        IV         IV        O-V
  DAPOS (DCB, IERR, RECNM [,BLOCKNUM [,WORDNUM]])
```

RECNM   Sequential record number (reference DLOCF).

BLOCKNUM   Next sequential block number (block=128 words, 2 physi-
                   cal disc sectors).

WORDNUM   Word offset within block for beginning of a new record
                   Omitted for files with fixed length records. (0<n<127

DCLOS

Closes file and makes file available for other access. Optionally truncate.

```
        LA    I      IV         O-V
  DCLOS (DCB, IERR [,TRUNCATE])
```

TRUNCATE   Truncate parameter:
                  =0   File closed without truncation
                  <0   Truncate extents only
                  >0   Number of blocks to be deleted

DCONT

Provides I/O control to an I/O device (type 0 file).

```
        LA    I     IV       IV       O-V
  DCONT (DCB, IERR, CONTROL [,CONT2])
```

CONTROL   Function code (refer to DEXEC 13 for codes).

CONT2   Auxiliary con trol parameter for 11, 22, and 27.

DCRET

Creates a disc file, makes file directory entry, and allocates disc space.

```
              LA     I    LA    LA    IV         IV        IA    O-V
     DCRET (DCB, IERR, NAME, SIZE, TYPE [,[SECURITY][,CRTNM]])
```

IERR   >0 Number of sectors allocated
                <0 An error occurred

NAME   3-word ASCII name.

SIZE   2-word array. Word 1 contains size requested in blocks
                (<0 allocates rest of cartridge). Word 2, (for type\2
                files) contains record length.

TYPE   File type (1<type<32767). Types 1 through 7 are FMGR
                defined.

SECURITY   Security code (1<security<32767).
                =0 No security (default)
                >0 Write protect only
                <0 Read/write protect

CRTNM   Cartridge number. If 0, use any available cartridge;
                if>0, cartridge reference number; if<0, LU of
                cartridge.

                Words 2 through 5 ASCII DSLINE.

DLOCK

Retrieves status and pointer information on an open file.

```
              LA     I     I         I         I      I
     DLOCK (DCB, IERR, RECNM [,BLOCKNUM, WORDNUM, SECNM,
              I     I      I        O-V
         LU, TYPE, RECSIZE])
```

RECNM   Returns number of next sequential record.

BLOCKNUM   Returns number of current block (starts at 0. Type-0
                        file not returned; type-1 file=RECNM.

WORDNUM   Returns word offset within current block to beginning
                        of next record.

SECNM   Returns number of sectors in the main file.

LU   Returns the LU number of the file on disc (not type-0).

TYPE   Returns the file type,.

RECSIZE   Returns record size in words (for type-0: bit 15=1
                        read, bit 15=0 write).

DNAME

Renames an existing file, if security is non-zero, it must be
specified.   .


```
          LA   I    LA     LA      IV      LA       O-V
   DNAME (DCB, IERR, NAME, NEWNAME [,SECURITY, CRTNM])
```

NAME   3-word ASCII name.

NEWNAME   3-word ASCII name.

SECURITY   Security code (1<sec<32767). Omit or equal 0, if file
                        created without security code.

CRTNM   Cartridge reference (1<crtn<32767). If 0 or omitted,
                        first file with NAME is renamed.

)OPEN

pens the named file to the program.

	LA	I	LA	IV	IV	LA
DOPEN (DCB, IERR, NAME [,OPTN, SECURITY, CRTNM])

ERR
: >0 File type
: <0 An error occurred

AME
: 3-word ASCII name

PTN
: Open option: (default=0)
: 15:1 E 0 = exclusive, 1=shared
: 14:1 U 0 = standard, 1=update
: 13:1 T 0 = file type as created, 1=force type 1

: For remainder of bits, refer to FMGR manual.

ECURITY
: =0 No security (default)
: >0 Any may read, specify to write
: <0 Specify to read/write

RTNM
: 5-word logical array. Word 1, cartridge reference number. If omitted, opens first file found. Words 2 through 5, ASCII DSLINE number.

POSN

ositions file pointer forward or backward relative to current osition.

	LA	I	IV	IV
DPOSN (DCB, IERR, RECSKP [,FLAG])

ECSKP
: Number of records to be skipped:
: =0 No operation
: >0 Forward
: <0 Backward

LAG
: If non-zero, position to absolute number specified (no skip).

DPURG

Deletes the file and all extents.

```
           LA    I    LA       IV        LA
  DPURG (DCB,  IERR, NAME [,SECURITY, CRTNM])
```

NAME   3-word ASCII name.

SECURITY   Must be specified if created with security code.
                Otherwise, may omit. (default=0)

CRTNM   Cartridge reference number. If specified, searches
                only that cartridge. Otherwise, purges first file
                found with proper name.

DREAD

Reads a record from open file to user's buffer.

```
           LA    I    LA       IV        I        IV
  DREAD (DCB,  IERR, BUFFER, SIZE [,LENGTH, RECNM])
```

BUFFER   User buffer. Insure size is greater than or equal
                to length.

SIZE   Number of words maximum.

LENGTH   Reads full record or up to size words if size is less
                than record. If omitted, reads 1 record. If type-1
                file, length is read; if type-0 file, up to LENGTH
                words are read.

RECNM   Record number for random access type-1 and type-2
                files.

                =0 Transfer starts at current pointer position
                >0 Transfer starts at absolute record position
                <0 Transfer starts at current position

DSTAT

Returns status of all mounted cartridges.

```
          LA     I     LA
   DSTAT (STATUS, IERR, DSLINE)
```

STATUS   125-word buffer:
                1   LU number
                2   Last FMGR track
                3   Cartridge reference number
                4   0= non-locked ID segment address of locking program

                Four-word entry repeated for each cartridge, up to 31
                maximum.

DSLINE   4-word array. ASCII DSLINE name or LU.

DWIND

Places file pointer to first record in disc file. Rewinds type-0 files.

```
          LA     I
   DWIND (DCB, IERR)
```

DWRIT

Writes a record from a user's buffer to open file. For types 0 and ⋮
writes specified number of words (LENGTH).

```
          LA   I    LA      IV        IV
   DWRIT (DCB,IERR,BUFFER,LENGTH [,RECNM])
```

BUFFER   User buffer array containing a record.

LENGTH   Number of words to write. If omitted, zero length
                record is written. Type-1 and type-2 files, one
                record is written.

RECNM   Record number of type-1 and type-2 files:
                =0 Transfer starts at current pointer (default)
                >0 Transfer starts at absolute record position
                <0 Transfer starts at current pointer position

ıis section on Remote File Access intrinsics covers the 1000 to 3000
.rection.

‑ror Conditions

ı test condition code following a 1000 to 3000 RFA call:

    CALL intrinsic name
    IF (ICC(n)) *label* ‹ *,label=,label* ›

ıere *n* is a dummy parameter.

r CCL and CCG, use the FCHEK intrinsic to determine the error code.
fer to the MPE Intrinsics Reference manual for a list of error codes
sociated with the MPE FCHECK intrinsic.

ɔmmon Parameters – 1000 to 3000 RFA Intrinsics

LNM   File number returned by FOPEN. Required for all file
                intrinsics.

RGT   Array from which data is read, or into which data is
                returned.

CNM   Logical record number (starts at 0).

ɔHEK

ɔvides information about the RFA intrinsic that failed.   FILNM=0 for
POPEN error.

                    IV   I   I   D   I
    CALL FCHEK (FILNM, IERR, TLOG, BLKNM, NMREC)

ЯR   Returns the error code. Refer to MPE intrinsics.

TLOG   Transmission log. Specifies words left over (not
                read or written) as result of input or output error.

BLKNM   Relative block number.

NMREC   Number of logical records in the bad block.

Condition Codes: CCL Denied. Invalid FILNM, or bounds
                         violation.
                    CCE Request granted.
                    CCG Not returned.

FOPEN

Opens or creates a file and returns the file number required for al
other file intrinsics. Specify INTEGER FOPEN.

```
      I           A      LV     LV     IV    BA    BA
 FILNM=FOPEN (FNAME, FOPTS, AOPTS, RECSZ, DEV, FRMSG,
             IV     IB     IV     DV    IV      IV
             ULABL, BLKFR, NBUF, FILSZ, NMEXT, IALLC,
             IV      0-V
             FCODE)
```

FNAME   Fully qualified file name. Begins with alphabetic,
                contains alphanumeric, slash, and period.

FOPTS   F-options parameter.

AOPTS   A-options parameter.

Condition Codes: CCL Request rejected. Refer to FCHEK.
                    CCE File opened.
                    CCG Not returned.

FCLOS

Closes the file, releases MPE buffers, and may change the disposition.

```
                    IV     IV     IV
        CALL FCLOS (FILNM, DISP, SCODE)
```

DISP   Disposition: (default=0)
                13:3   0   No change
                        1   Permanent file
                        2   Temporary job file (rewound)
                        3   Temporary job file (not rewound)
                        4   Release (delete) file
                12:1   0   Retains all space
                        1   Returns space beyond EOF

SCODE   Security Code: (default=0)
                0   Unrestricted access
                1   Private file creator

Condition Codes: CCL File not closed.
                   CCE File closed successfully.
                   CCG Not returned.

FCNTL

Provides control operations of file or device.

```
                    IV     IV     L
        CALL FCNTL (FILNM, CCODE, PARAM)
```

CCODE   Control code.

PARAM   Used for CCODE 0 to 9.

Condition Codes: CCL Request denied.
                   CCE Request granted.
                   CCG Not returned.

FINFO

Returns file access and status information. Refer to MPE intrinsics for information on parameters.

```
              IV      BA      L      L      I      I
  CALL FINFO (FILNM, FNAME, FOPTS, AOPTS, RECSZ, DTYPE,
              L       L     I      D      D    D       D
            LDEVN, HWADR, FCODE, RECPT, EOF, FLIM, LCNT,
             D      I     L       I      I     BA
           PHCNT, BLKSZ, EXTSZ, NMEXT, ULABL, CRTID,
             D        O-V
           LADDR)
```

Condition Codes: CCL   Request denied due to error.
                    CCE   Request granted.
                    CCG   Not returned.

FLOCK

Dynamically locks a file.

```
              IV     LV
    CALL FLOCK (FILNM, LOCKC)
```

LOCKC   Lock condition:
                 15:1   1   TRUE   Unconditional lock. Suspends
                                    until file is locked.
                        0   FALSE   Locks if RIN is not currently
                                    locked. If RIN is used,
                                    returns CCG.

Condition   CCL Denied. File not opened with dynamic locking
Codes   or needs multiple RIN capability.
                 CCE   Request granted.
                 CCG   Denied. File was locked by another process.

FPOIN

Sets record pointer to a logical record (fixed-length only).

```
                    IV     DV
   CALL FPOIN    (FILNM, RECNM)
```

Condition Codes: CCL Request denied for various reasons.
                    CCE Request granted.
                    CCG Request denied. Beyond physical EOF.

FREAD

Reads a logical record from the current record pointer.
Specify INTEGER FREAD.

```
     I           IV      LA    IV
  LGTH=FREAD (FILNM, TARGT, TCNT)
```

LGTH   Returns length of data read (units are words/bytes
                  per TCNT).

TCNT   Maximum size of data transfer (>0 words, <0 bytes).

Condition Codes: CCL Data not read due to error.
                    CCE Data was read.
                    CCG Encountered End-of-Data.

FRDIR

Reads the specified logical record (fixed or undefined length).

RFA INTRINSICS - 1000 TO 3000

```
                 IV     LA    IV     DV
    CALL FRDIR (FILNM, TARGT, TCNT, RECNM)
```

TCNT   Maximum size for data (>0 words, <0 bytes).

Condition Codes: CCL   Not read due to error.
                    CCE   Data was read.
                    CCG   End End-of-Data.

FRDSK

Provides anticipatory read from disc file to buffer prior to FRDIR.
File must allow I/O buffering and have fixed or undefined length.

```
                 IV     DV
    CALL FRDSK (FILNM, RECNM)
```

Condition Codes: CCL   Read failed due to error.
                    CCE   Request granted.
                    CCG   Logical EOF encountered.

FRLAB

Reads a user-defined file label.

```
                 IV     LA    IV     IV
    CALL FRLAB (FILNM, TARGT, TCNT, LABID)
```

TCNT   Size in words (128 maximum).

LABID   Label ID number (default=0).

Condition Codes: CCL   Label not read due to error.
                    CCE   Label was read.
                    CCG   Referenced a label beyond the last
                           written label on the file.

FRNAM

Changes a file name.

```
              IV    BA
  CALL FRNAM (FILNM, NNAME)
```

NNAME   New file name, fully qualified.

Condition Codes: CCL   Request denied due to error.
                    CCE   Request granted.
                    CCG   Not returned.

FRLAT

Determines whether a file pair is interactive and/or duplicative.
Specify INTERGER INTDU.

```
    I          IV    IV
  INTDU=FRLAT (INFIL, LISTF)
```

INTDU   Returns information on the two files:
                15:1   1 = Form interactive pair
                 0:1   1 = Form duplicative pair

INFIL   File number of the input file.

Condition Codes: CCL   Denied due to error.
                          CCE   Request granted.
                          CCG   Denied. One of the files corresponds
                                    to $NULL.

FSPAC

Forward or backward spaces a disc file by changing logical recor
pointer. On magnetic tape, spaces physical records.

```
            IV    IV
  CALL FSPAC (FILNM, DISPL)
```

DISPL   Displacement from current record position
                         (>0 forward, <0 backward).

Condition Codes: CCL   Denied due to error, or file on
                                    Device that prohibits spacing.
                          CCE   Request granted.
                          CCG   Logical EOF encountered. For disc
                                    file, pointer unchanged. For mag-
                                    netic tape, positioned beyond file
                                    mark.

FSTMD

Activates or deactivates the access modes: automatic error recovery
critical output verification, and terminal control by the user.

```
            IV    IV
  CALL FSTMD (FILNM, MODEF)
```

MODEF   Mode flags:
                         14:1 Critical output verification

```
                  13:1 Terminal control by user
                  12:1 Tape error recovery
```

```
Condition Codes:     CCL    Request denied due to error.
                     CCE    Request granted.
                     CCG    Not returned.
```

FUNLK

Dynamically unlocks the file (RIN) that had been locked with FLOCK.

```
┌─────────────────────────────────────────────────────────────┐
│                  IV                                           │
│    CALL FUNLK (FILNM)                                         │
└─────────────────────────────────────────────────────────────┘
```

```
Condition Codes:     CCL    Denied. File was not opened with
                            dynamic locking AOPTIONS, or FILNM
                            invalid.
                     CCE    Request granted.
                     CCG    Denied. File had not been locked.
```

FUPDT

Updates the record in the disc file which was last referenced.

```
┌─────────────────────────────────────────────────────────────┐
│                  IV      LA    IV                             │
│    CALL FUPDT (FILNM, TARGT, TCNT)                            │
└─────────────────────────────────────────────────────────────┘
```

```
TCNT                 Number of words/bytes to be written (>0 words,
                     <0 bytes.
```

```
Condition Codes:     CCL    Request denied due to error.
                     CCE    Request granted.
                     CCG    EOF encountered.
```

FWRIT

Writes a logical record to a file, and updates the pointer.

```
                  IV    LA    IV     LV
     CALL FWRIT (FILNM, TARGT, TCNT, CONTL)
```

TCNT   Size of record (>0 words, <0 bytes)

CONTL   Carriage control code for appropriate file
                opened with CCTL.

Condition Codes: CCL   Denied due to error.
                    CCE   Request granted.
                    CCG   Denied. Physical limits exceeded.

FWDIR

Writes specified record to a disc file (fixed or undefined length)
Pads binary with zeros, ASCII with blanks.

```
                  IV    LA    IV     DV
     CALL FWDIR (FILNM, TARGT, TCNT, RECNM)
```

TCNT   Size of record (>0 words, <0 bytes).

Condition Codes: CCL   Request denied due to error.
                    CCE   Request granted.
                    CCG   Physical EOF encountered.

FWLAB

Writes a user-defined label onto a disc file.

```
              IV      LA    IV    IV      0-V
   CALL FWLAB (FILNUM, TARGT, TCNT, LABID)
```

TCNT   Size of label in words. (default=128)

LABID   Number of the label. First label=0.
                (default=0).

Condition Codes: CCL   Denied due to error.
                    CCE   Request granted.
                    CCG   Denied; would exceed limit established
                           in FOPEN.

HP 1000 FMGR ERROR CODES

FMGR Error Codes

```
FMGR-105  D.RTR directory track buffer too small
FMGR-102  Illegal D.RTR call sequence
FMGR-101  Illegal parameter in D.RTR call
FMGR-099  Directory manager EXEC request was aborted
FMGR-052  Spool shut down. Spool file setup failed
FMGR-048  Spool not initialized or SMP cannot be scheduled
FMGR-047  No session lu available for spool file
FMGR-046  Greater than 255
FMGR-041  No room in SST
FMGR-040  Lu not found in SST
FMGR-039  Spool lu not mapped to the spool driver
FMGR-038  Illegal scratch file number
FMGR-037  Attempt to purge an active type 6 file
FMGR-036  Lock error on device
FMGR-035  Already 63 discs mounted to system
FMGR-034  Disc already mounted
FMGR-033  Not enough room on cartridge
FMGR-032  Cartridge not found
FMGR-030  Value too large for parameter
FMGR-026  Queue full or max pending spools exceeded
FMGR-025  No SPLCON room
FMGR-024  No more batch switches
FMGR-023  No available spool files
FMGR-022  No available spool lu's
FMGR-021  Illegal destination lu
FMGR-020  Illegal access lu
FMGR-019  Illegal access on a system disc
FMGR-018  Illegal lu
FMGR-017  Illegal read/write on Type 0 file
FMGR-016  Illegal Type 0 or size=0
FMGR-015  Illegal file name
FMGR-014  Directory full
FMGR-013  Disc locked
FMGR-012  EOF or SOF error
FMGR-011  DCB not open
FMGR-010  Not enough parameters
FMGR-009  Attempt to use APOSN or force to 1 a Type 0 file
FMGR-008  File open or lock rejected
FMGR-007  Illegal security code or illegal write on lu2 or 3
FMGR-006  File not found
FMGR-005  Record length illegal
FMGR-004  Record size of Type 2 file is 0 or undefined
FMGR-003  Backspace illegal
FMGR-002  Duplicate file name
FMGR-001  Disc error, the disc is down
FMGR 000  Break, informative message only, no error has occurred
FMGR 001  Disc error - lu reported, disc associated with the lu
             is down
FMGR 002  Initialize lu 2!
FMGR 003  Initialize lu 3!
FMGR 004  Illegal response to FMGR 002 or FMGR 003
```

```
IGR 005   Required track not available - relative TAT position
            reported
IGR 006   FMGR suspended
IGR 007   Checksum error
IGR 008   D.RTR not loaded
IGR 009   ID segment not found
IGR 010   Input error
IGR 011   Do 'OF,XXXXX,8' on named programs
IGR 012   Duplicate disc label or lu
IGR 013   TR stack overflow
IGR 014   Required ID segment not found
IGR 015   LS track report
IGR 016   Insufficient system tracks for RP
IGR 017   ID segment not set up by RP
IGR 018   Program not dormant
IGR 019   File not set up by SP on current system
IGR 020   Illegal Type 0 file
IGR 021   Illegal disc specified
IGR 022   Copy terminated
IGR 023   Duplicate program name
IGR 038   Attempt to purge active file
IGR 041   Program cannot be a segment
IGR 042   Lu cannot be switched
IGR 043   Lu not found in SST
IGR 044   No messages waiting
IGR 045   Session command only
IGR 046   Insufficient capability
IGR 047   Spool set up failed
IGR 048   Global set out of range
IGR 049   Cannot run RP'ed program
IGR 050   Not enough parameters
IGR 051   Illegal master security code
IGR 052   Illegal lu
IGR 053   Illegal label or ilabel
IGR 054   Disc not mounted
IGR 055   Missing parameter
IGR 056   Bad parameter
IGR 057   Bad track not in file area
IGR 058   LG area empty
IGR 059   Reported track unavailable
IGR 060   Do you really want to purge this disc?
IGR 061   Do a "DC" and a "MC" on this CR
IGR 062   More than 63 discs
IGR 063   Exceeding session disc limit
IGR 064   No disc available from disc pool
IGR 065   Conflict in SST definition
IGR 066   No room in SST
IGR 067   Program not found
IGR 068   Lu not in variable part of SST
IGR 069   Job LOGON failed
IGR 070   Sectors/track value too large
IGR 071   Do "EX,SP" to save or "EX,RP" to release private
            cartridges
IGR 072   Lu not interactive
```

HP 1000 ERRORS

```
FMGR 073   Account not found
FMGR 074   JO command expected
FMGR 075   Cannot restore Type 6 PGM file (user protected)
FMGR 076   Cannot restore Type 6 PGM file (group protected)
FMGR 077   Cannot restore Type 6 PGM file (insufficient
               capability)
FMGR 078   Cannot restore Type 6 program file (internal error)
FMGR 079   Warning - records truncated to 128 words
```

HELLO/BYE ERROR CODES

```
0   No error
1   HELLO failure or line disconnected
4   Invalid LU
5   Timeout
6   Illegal (rejected) request
7   Transaction Table access error (not enough Transaction
        Control Blocks for HELLO)
8   Non-DS error (e.g., input-only device specified as list LU)
```

DS Alphanumeric Error Codes

(Refer to the DS/1000-IV Quick Reference Guide for a complete list.)

AUTO "BYE" FAILED (RMOTE) The "BYE" generated automatically when the I
    command is entered with a HELLO outstanding has failed.

BAD LU (RMOTE) A negative LU number was specified in a MO command.

DS/1000 ERROR nnn (RMOTE) The reported numeric DS/1000-IV error occui
    red during a file move.

>>DS/3000 COMMUNICATION LINK *DOWN* >> XXXXXXXXXXXXX @ YYYYYYYYYYYYY'
(QUEX) Displayed if initialization is not established or the link fai:
after initialization. QUEX tries to establish the link to the HP 30(
automatically. (See DS/1000-IV User's Manual for X and Y fie:
errors.)

>>DS/3000 COMMUNICATION LINK *UP* (QUEX) Displayed once initializati(
    of the DS/3000 Communication Link is established. (HSI only)

DS/3000 ERROR nnn (RMOTE) The reported numeric DS/3000 error occurr(
    during a file move operation.

HELLO FAILED OR LINE DOWN (RMOTE) HELLO command was not correct (
    could not be transmitted due to line error.

>>HP 3000: BAD BUFFER OUTGOING (QUEX) Transmission did not pa:
    verification test in QUEX.

HP 3000: BAD BUFFER RECEIVED (QUEX) A message was received which did not pass a verification test in QUEX.

LEGAL STATUS (RMOTE) RTE returned an SC03 scheduling eror for an RU, ON, or RW command.

VALID INPUT (RMOTE) Wrong or missing parameter or wrong prompt on transfer file input.

VALID REMOTE LU (RMOTE) From SW command: LU is not the one indicated when DINIT was executed. Simply re-enter SW.

nnn is not in the 3000 lu table. The lu was not specified as a 3000 link lu.

ne is up but the 3000 is not replying. The communications hardware has established a connection but messages are not being received. Be sure DS/3000 is initialized, and that 'QUEUE' is present in the 1000.

E FILE ERROR nnn (RMOTE) The reported FS/3000 error occurred during a file move operation.

ED "HELLO" (RMOTE) Attempt to send a command to the HP 3000 before issuing "HELLO".

ED TO RUN "DINIT" (RMOTE) Attempt to switch to remote node before the RTE node has been initialized for communications to the HP 3000.

BUFFER SPACE (RMOTE) Less than 256 words of memory are available for the PTOP file move buffer used with the "MO"ve command. Assign RMOTE more pages.

SLAVE AT 3000 (RMOTE) slave does not have copy of program COPY3K.PUB.SYS.

SUCH PROGRAM (RMOTE) RTE returned an SC05 scheduling error for an RU, ON, or RW command.

T ENOUGH SAM (RMOTE) RTE returned an SC10 scheduling error for an RU, ON, or RW command.

T LOCAL COMMAND (RMOTE) Entered a HELLO or BYE under the $ prompt from RMOTE.

ERWRITE? (RMOTE) Asked when the "to" file in a file move already exists.

OGRAM BUSY (RMOTE) An RU or ON command specified a non-dormant program.

UEX: INSUFFICIENT S.A.M. (QUEX) Could not deliver an incoming DS/3000 message because there was not enough System Available Memory

HP 1000 ERRORS

/QUEX: CLASS ERROR aaaa (QUEX) Got the indicated ASCII error message (aaaa) when a class I/O operation was performed.

/QUEX: TRACING ERROR aaaa (QUEX) Got the indicated ASCII error message (aaaa) when an attempt to write a trace record was made. The status of tracing is set to "down". (See LOG3K).

>>QUEX EXPECTS HSI LINK (QUEX) The wrong version of QUEX (PSI) is loaded.

>>QUEX EXPECTS PSI LINK (QUEX) The wrong version of QUEX (HSI) is loaded.

/QUEZ: INSUFFICIENT S.A.M (QUEZ) Could not deliver an incoming DS/3000 message because there was not enough System Available Memory.

/QUEZ: CLASS ERROR aaaa (QUEZ) Got the indicated ASCII error message (aaaa) when a class I/O operation was performed.

/QUEZ: TRACING ERROR aaaa (QUEZ) Got the indicated ASCII error message (aaaa) when an attempt to write a trace record was made. The status of tracing is set to "down". (See LOG3K)

>>QUEZ EXPECTS HSI LINK (QUEZ) The wrong version of QUEZ (PSI) is loaded.

>>QUEZ EXPECTS PSI LINK (QUEZ) The wrong version of QUEZ (HSI) is loaded.

REQUEST FAILED (RMOTE) The HP 3000 rejected the last request.

RMOTE IOxx (RMOTE) RTE-reported I/O errors.

RMOTE SCxx (RMOTE) indicates bad parameters.

TIMEOUT: NO REPLY FROM REMOTE (RMOTE) The HP 3000 did not respond to the last command.

TR STACK OVERFLOW (RMOTE) The transfer stack is more than seven levels deep.

UNINITIALIZED @ READ (RMOTE) Local and/or remote ID sequences do not match the HP 3000. Re-initialize or use DSMOD to change them.

WARNING - ILLEGAL OPTION (RMOTE) "SP" specified with input from RTE LU or an RTE file in non-spooled format.

Program-to-Program errors are returned by the PCHECK intrinsic.

CCE   No error.
CCL   Error condition. Refer to PCHECK
CCG   May not be returned, but generally indicates a reject by the slave program.

3   Not enough parameters.
5   Parameter address violation at the HP 3000.
72   Invalid DS line, or failure to do POPEN first.
205   No room at the 1000 to initiate communication.
206   Specified slave function from master program.
207   Slave function out of sequence (do GET first).
208   Specified master PTOP function on same line as slave functions.
209   Program does not exist on the 1000.
211   Slave progrram has issued reject (CCG).
213   Remote slave program not opened properly.
214   Missing :DSLINE command.
216   Remote computer has rejected request. May be due to time-out.
218   Invalid PTOP operation.
219   Too many POPENs issued. Only one master - to slave PTOP operation/DSLINE.
222   Master PTOP function issued prior to a POPEN. Do a POPEN first.

PTOP ERRORS - 1000

PTOP errors returned to the master or slave program. Note these
are negative numbers.

-40	Not enough parameters.	
-41	Remote program not defined (POPEN).	
-42	No room to initiate (POPEN), no class number available.	
-44	Remote program not opened.	
-45	PWRIT, PREAD, or PCONT issued to dormant slave program.	
-46	Sequence error.	
-47	Communication line error, NRV incorrect:	
	RTE: IOnn, RNnn, SCnn error.	
-48	Abortive communication error.	
-50	Local node not initialized.	(same as:)
-51	Communication line parity.	DS01
-52	Communication line time-out.	DS02
-53	Illegal record size.	DS03
-54	Illegal node address.	DS04
-55	Request time-out.	DS05
-56	Illegal request.	DS06
-57	System table error.	DS07
-58	Remote busy.	DS08
-59	Illegal or missing parameter.	DS09

DEXEC Errors

CCL - Errors at the HP 3000:

3	Not enough parameters.
5	Parameter address violation at the HP 3000.
72	Invalid DSLINE.

CCG - Errors at the remote HP 1000:

> Note: Check RTE system documentation
>   for complete list of error codes.

DS03	Illegal record size
DS06	Illegal request
DS07	System table error
DS09	Illegal or missing parameter
I001	Illegal or missing parameter
I002	Illegal logical unit
I003	Logical unit not assigned
I004	Illegal user buffer
I007	Call rejected by driver
SC01	Missing parameter
SC02	Illegal parameter
SC03	Program cannot be scheduled
SC05	Program cannot be defined
SC06	No resolution code in DEXEC call

Test condition code for satisfactory completion of RFA.

CCG   Not used

CCL   DS/3000 error:
    3 Not enough parameters
    5 Parameter address violation on the 3000
   72 Invalid DSLINE command

CCE   No error with DS at either end. Check IERR for
                 result on the 1000.

    00 · No error
  -01 Disc error (disc down)
  -02 Duplicate file name
  -03 Device cannot be backspaced
  -04 File too long, or record size error
  -05 Invalid record, or record too long
  -06 Cartridge Reference Number not found, or no room
  -07 Invalid security code

  -08 File open, lock rejected
  -09 Tries to open type-0 as type-1, or to position
      type-0
  -10 Missing or illegal parameter
  -11 DCB unopened
  -12 EOF or SOF
  -13 Cartridge is locked
  -14 Directory full
  -15 Illegal file name
  -16 Illegal type code, tried to purge type-0, zero
      length file
  -17 Illegal read/write position type-0 file
  -18 Destination node does not have FMP
  -25 Bad FCODE (internam RFAM error)
  -26 Bad entry number in RFAM (DCB destroyed)
  -28 No internal table space in RFAM
  -53 Illegal record size
  -56 Illegal request
  -57 System table error
  -59 Illegal or missing parameter

(Note: DCRET and DOPEN returns positive values.)

DSN/MTS MULTIPOINT TERMINAL SOFTWARE

CONTENT   **PAGE**

MTS HARDWARE SPECIFICATIONS

(Refer to Section B for Controller and Modem information.)

Limitations on Synchronous Communications

TERMINALS (number per line)	TRANSMISSION RATE (bits per second)		
	2400	4800	9600
2	2000	2000	2000
8	2000	2000	1200
16	2000	1200	480
32	1200	480	120

{ Maximum number of feet between terminals

Limitations on Asynchronous Communications

At 9600 bits per second, the maximum distance between any two
terminals is 2000 feet.

Devices With Multipoint Capabilities

Supported HP terminals: 2624B, 2626A, 2641A, 2642A,
                               2645A/N/S (3), 3075A (1),
                               3076A (1), 3077A (2)

                               (1) Serial 1929F and above
                               (2) Serial 1938 and above
                               (3) 8K memory minimum (13260D)
                                   One terminal with monitor mode
                                   13232P cable per modem
                                   13232T/Q cable for add on

Data rates: 9600 bits per second maximum

Other Supported Devices: 2608S printer
                               2333A cluster controller
                                   (19,200 bps max)

KEYBOARD INTERFACE PCA STRAPS FOR MULTIPOINT – HP264x

STRAP	SETTING FOR MTS
A,B,C	don't care
D	OPEN
E,F,G,H	don't care
J	OPEN
K,L,M,N,P,Q	don't care
R	OPEN – Terminal is first after an AR
	CLOSED – terminal is not first after an AR or synchronous terminal
S	CLOSED – means all consecutive spaces are transmitted
T	CLOSED
U	CLOSED
V	don't care
W,X,Y	don't care
Z	OPEN=transparent

HP264x MULTIPOINT TERMINAL STRAPPING OPTIONS

HP 13260C ASYNCHRONOUS MULTIPOINT COMMUNICATIONS PCA STRAPS 2640-60106

STRAP	SETTING FOR MTS
J17 - J16	Buffer size must be at least as large as SSLC preferred buffer size

	J17	J16	Buffer Size
	CLOSED	CLOSED	500 bytes
	CLOSED	OPEN	1000 bytes
	OPEN	CLOSED	2000 bytes
	OPEN	OPEN	4000 bytes

STRAP	SETTING FOR MTS
J15	OPEN - Cursor addressing disabled
J14 - J10	Device ID must be unique within a group (see J04-00). Example for Device ID 6: J14,J13 CLOSED J12,J11 OPEN = CC00C = 6 J10 CLOSED
J07	CLOSED
J06	OPEN
J05	CLOSED - Extended text mode disabled OPEN - Extended text mode enabled
J04 - J00	Group ID must be unique within an MTS network. Example for Group ID 7: J04, J03 CLOSED J02 - J00 OPEN = CC000 = 7
INT	OPEN
PL6 -PL0	All OPEN
A4	CLOSED
A11 - A9	All OPEN
- 12	OPEN Terminal is not connected by an HP 13232T Power-Down Protect cable. CLOSED Terminal is connected by an HP 13232T Power-Down Protect cable.
2SB	CLOSED

HP 13260D SYNCHRONOUS MULTIPOINT COMMUNICATIONS
PCA STRAPS 02640-60107

STRAP	SETTING FOR MTS
J17 - J16	Buffer size must be at least as large as SSLC preferred buffer size.
	J17 J16 Buffer Size
	CLOSED CLOSED 500 bytes
	CLOSED OPEN 1000 bytes
	OPEN CLOSED 2000 bytes
	OPEN OPEN 4000 bytes
J15	OPEN - Cursor addressing disabled
J14 - J10	Device ID must be unique within a group (see J04-J00). Example for Device ID 6:
	J14,J13 CLOSED ⎫
	J12,J11 OPEN ⎬ = CC00C = 6
	J10 CLOSED ⎭
J07	CLOSED
J06	OPEN
J05	CLOSED - Extended text mode disabled OPEN - Extended text mode enabled
J04 - J00	Group ID must be unique within an MTS /3000 network. Example for Group ID 7:
	J04,J03 CLOSED ⎫
	J02 - J00 OPEN ⎬ = CC000 =7
- 12	OPEN The terminal is not connected by an HP 13232T Power-Down Protect cable.
A4	CLOSED
A9 - A11	All OPEN
RCLK	OPEN All terminals except the first on a line; or the terminal is first on a line and clocking is provided by an external device.
	CLOSED The terminal is first on a line and clocking is not provided by an external device.

HP264x MULTIPOINT TERMINAL STRAPPING OPTIONS

HP 13260D SYNCHRONOUS MULTIPOINT COMMUNICATIONS PCA
STRAPS 02640-60107 (Continued)

STRAP	SETTING FOR MTS
2400 or 4800 or 9600	OPEN if RCLK is OPEN, set all three OPEN CLOSED if RCLK is CLOSED, set only one strap CLOSED to match the appropriate line speed.
19K	OPEN
1200	Label has no strap, ignore.

HP264x MULTIPOINT TERMINAL KEYBOARD SWITCHES

RANGE Switch	Synchronous Communications, switch has no effect. Asynchronous communications, HI selects speeds 1200 and above while LO selects speeds 600 and below on the BAUD RATE switch.
BAUD RATE Switch	Selects transmission rate. All terminals on the same line must be set to the same rate.
PARITY Switch	ODD
DISPLAY FUNCTIONS Key	Off; key should be in the up position.
BLOCK MODE Key	Either position - key has no effect.
REMOTE Key	On; key must be in the down position.
CAPS LOCK Key	Either position - no special consideration for MTS.
MEMORY LOCK Key	Either position - no special consideration for MTS.
AUTO LF Key	Either position - no special consideration for MTS.

HP 2626 MULTIPOINT TERMINAL STRAPPING

HP 2626 Keyboard:

In addition to alphanumerics, cursor control, and edit control keys, there are also function control keys.

When you press the ⌈MODES⌉ key the eight function keys become mode selection keys. In this capacity you may use them to enable and disable various terminal operating modes (such as remote mode and display functions mode). Each mode selection key alternately enables and disables a particular mode. When the mode is enabled, an asterisk appears in the associated key label on the screen. At power-on f1 through f8 are automatically initialized as mode selection keys.

When you press the ⌈AIDS⌉ key on an HP 2626 the eight function keys become general control keys that you use for configuring the terminal, setting and clearing margins and tab stops, enabling and disabling display enhancements, drawing forms, defining data entry fields, controlling the display windows, and so forth.

HP2626 Multipoint Terminal Strapping

```
┌────────────────────────────────────────────────────────────────────┐
│                    TERMINAL CONFIGURATION #1                         │
│                                                                      │
│          REMOTE  ON       BLOCK  OFF       MODIFY  OFF      AutoLF OFF│
│       LocalEcho OFF    Caps Lock OFF     Start Col   1  ASCII 8 Bits NO│
│     XmitFnctn(A)  NO       SPOW(B)  NO  InhEolWrp(C)  NO  Line/Page(D) PAGE│
│     InhHndShk(G) YES    Inh DC2(H)  NO  Auto Term(J) YES  ClearTerm(K)  NO│
│     InhSlfTst(L)  NO  InvertWrp(M)  NO   Esc Xfer(N)  NO   InhDcTst(W)  NO│
│     FldSeparator  ▉     Termnator  ▉                                  │
│     ESC )      A        B        C          Alternate Set            │
│             Math Set   LineDraw  LargeChr              B             │
│                                                                      │
│                                                                      │
│  ┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐┌──────┐  │
│  │ SAVE ││ NEXT ││PREVIOUS││DEFAULT││POWER ON││ACTIVE ││DISPLAY││CONFIG │  │
│  │CONFIG││CHOICE││CHOICE││VALUES││VALUES││VALUES││FUNCTNS││ KEYS │  │
│  └──────┘└──────┘└──────┘└──────┘└──────┘└──────┘└──────┘└──────┘  │
│ NOTE: Configuration choices that are shown with a black background affect│
│       DSN/MTS.  RS and GS are control-^ and control-] respectively.  │
└────────────────────────────────────────────────────────────────────┘
```

HP 2626 Terminal Configuration for MTS

```
                         MULTIPOINT ASYNC        #1

BaudRate  9600     Parity  ODD         Code  ASCII7   BufSize 1000  XmitClkSource  Int
Asterisk  LINE                     StopBits  1        NumBufs  2    RecvClkSource  Int
   TR(CD) HI         BCC  CRC        SR(CH)  LO                     XmitClkOut     x16
                                                                   ExtClkIn       x16

PGroupID  A       DeviceID  A
SGroupID  a                      FirstTerm  NO
XmitXpar  NO       ExtText  NO   DataSrAddr  NO         SpComp  NO           Ins SYN  NO




    SAVE      NEXT     PREVIOUS   DEFAULT    POWER ON    NEXT     DISPLAY    config
   CONFIG    CHOICE     CHOICE     VALUES     VALUES    CONFIG    FUNCTNS     keys

147015-23
```

HP 2626 Asynchronous Multipoint-Hardwired

DIFFERENCES BETWEEN HP 2626A and HP 2645

When configured for multipoint operator the HP 2626A differs from the HP 2645 in the following ways:

a.   The HP 2626A supports 8-bit ASCII whereas the HP 2645 does not.

b.   In transparent mode the HP 2626A sends its response to a Who Are You (WRU)) sequence in transparent mode whereas the HP2645 sends in a non-transparent mode.

c.   The HP 2626A permits you to specify as a configuration parameter the initial state of the Terminal Ready line where as the HP 2645 does not.

d.   When configured for asynchronous multipoint with the SYN insertion feature enabled the HP 2626A does NOT require SYN insertion by the host processor whereas the HP 2645 does.

HP 2626 MULTIPOINT TERMINAL STRAPPING

HP 2626 Synchronous Multipoint--Hardwired

HP 2626 Synchronous Multipoint--Modems

HP 2624B Terminal Configuration For MTS

HP 30037A ASYNCHRONOUS REPEATER

The HP 30037A Asynchronous Repeater is a stand-alone device which converts standard EIA RS232C communications signals to levels which are compatible with HP terminals that are operating in the asynchronous multipoint communications mode.

▶ With the AR, the first terminal can be located up to 609.6 meters (2000 feet) from the computer. This removes the 15.24 meter (50 foot) limitation imposed when an RS232C direct connect interface is used.

▶ The AR can be used in a daisy-chain connection of terminals to extend distance between terminals or to permit more flexible physical configurations. For this, the AR operates in terminal mode.

▶ Two ARs can be used, one at the computer and the other at a single asynchronous RS232C terminal, to extend the distance permitted between the computer and the terminal. For this, the AR nearest the CPU operates in CPU mode and the other operates in terminal mode.

The AR has two test modes:

1. Self test checks the internal operation of the AR.
2. Loop test is used with the data communications
   self test feature of the asynchronous multipoint
   terminals to verify a daisy-chain network.

AR CONNECTOR SIGNALS - TO TERMINALS

Pin No.	Mnemonic	Signal Name
1	BBO+	Received Data Out+
2	BBO-	Received Data Out-
3	BAI+	Transmitted Data In+
4	BAI-	Transmitted Data In-
5	CBO+	Clear to Send Out+
6	CBO-	Clear to Send Out-
7	CAI+	Request to Send In+
8	CAI-	Request to Send In-
9	-	Frame and Shield Ground
10	-	Not Used

HP 30037A ASYNCHRONOUS REPEATER

AR CONNECTOR SIGNALS — FROM TERMINALS

Pin No.	Mnemonic	Signal Name
1	BBI+	Received Data In+
2	BBI–	Received Data In–
3	BAO+	Transmitted Data Out+
4	BAO–	Transmitted Data Out–
5	CBI+	Clear to Send In+
6	CBI–	Clear to Send In–
7	CAO+	Request to Send Out+
8	CAO–	Request to Send Out–
9 thru 15	—	Not Used

AR CONNECTOR SIGNALS — DTE

Pin No.	Mnemonic	Signal Name
1	—	Not Used
2	BA	Transmitted Data
3	BB	Received Data
4	CA	Request to Send
5	CB	Clear to Send
6	CC	Data Set Ready
7	AB	Signal Ground
8	CF	Received Line Signal Detector
9, 10	—	Not Used
11, 19	SCA	Secondary Request to Send
12 thru 18	—	Not Used
20	CD	Data Terminal Ready
21 thru 25	—	Not Used

PRODUCT NUMBER	NAME	CONNECTORS (See NOTE below)			LENGTH
		A	B	C	
132x2A x=2=262X 3=264X	103/202 Asynchron- ous Modem Cable (HP 02640-60043)	RS-232-C	*	none	4.5 meters (15 ft)
132x2N x=2=262X 3=264X	U.S.A. Asynchron- ous Modem Cable (HP 02640-60131)	RS-232-C	*	none	4.5 meters (15 ft)
13232P	Modem-to-terminal Multipoint Cable (HP 02640-60132)	RS-232-C male	hood	daisy chain female	4.5 meters (15 ft) Each Leg
13232Q	Standard Multi- point Cable (HP 02640-60133)	daisy chain male	hood	daisy chain female	4.5 meters (15 ft) Each Leg
13232R	Extension Cable (HP 02640-60134)	daisy chain male	none	daisy chain female	30 meters (100 ft)
13232T	Power-Down Protect Cable (HP 02640-60151)	daisy chain male	hood	daisy chain female	4.5 meters (15 ft) Each Leg
13264A	Data Link Adapter	Data Link male	50 pin hood	none	3 meters
13267A	Asynchronous Multipoint First Module	RS-232-C male	50 pin hood	daisy chain female	10 meters
13267A option 001	Synchronous Multipoint First Module	RS-232-C male	50 pin hood	daisy chain female	10 meters

MTS CABLE ASSEMBLIES

PRODUCT NUMBER	NAME	CONNECTORS (See NOTE below)			LENGTH
		A	B	C	
13268A	Asynchronous Daisy Chain Module	daisy chain male	50 pin hood	daisy chain female	10 meters
13268A option 001	Synchronous Daisy Chain Module	daisy chain male	50 pin hood	daisy chain female	10 meters
30055A	SSLC Synchronous Assembly				
	SSLC Synchronous I/O Cable (HP 30055-60011)	I/O female	none	RS-232-C male	7.6 meters (25 ft)
30055A Option 001	SSLC Asynchronous Assembly				
	SSLC Asynchronous I/O Cable (HP 30055-60010)	I/O female	none	RS-232-C male	7.6 meters (25 ft)
30062C	Extension Cable (HP 30062-60006)	RS-232-C male	none	RS-232-C female	7.6 meters (25 ft)

PRODUCT NUMBER	NAME	CONNECTORS (See NOTE below)			LENGTH
		A	B	C	
30221A-- Series 30/33/40 /44/64	INP Synchronous Modem Cable				
	INP Synchronous Internal Cable (HP 30221-60001)	I/O female	none	RS-232-C female	----
	INP Synchronous External Cable (HP 5061-2514)	RS-232-C male	none	RS-232-C male	10 meters
30221B-- Series 30/33/40 /44/64	INP Asynchronous Cable				
	INP Asynchronous Internal Cable (HP 30221-60002)	I/O female	none	RS-232-C female	----
	INP Asynchronous External Cable (HP 5061-2514)	RS-232-C male	none	RS-232-C male	10 meters
30222A-- Series II/III	INP Synchronous Modem Cable (HP 30222-60001)	I/O female	none	RS-232-C male	10 meters
30222B-- Series II/III	INP Asynchronous Cable (HP 30222-60002)	I/O female	none	RS-232-C male	10 meters
30225A-- Series II/III	INP Synchronous/ Asynchronous Modem Bypass Cable (HP 30225-60005)	RS-232-C male	none	RS-232-C female	5 meters

MTS CABLE ASSEMBLIES

PRODUCT NUMBER	NAME	CONNECTORS (See NOTE below)			LENGTH
		A	B	C	
30225B-- Series 30/33/40 /44/64	INP Synchronous/ Asynchronous Modem Bypass Cable				
	INP Modem Bypass Cable (HP 30225-60006)	RS-232-C male	none	RS-232-C female	5 meters
	INP Internal Cable (HP 30221-60001)	I/O	none	RS-232-C	----
92902A-001	Data Link Cable	none	none	none	100 meters (328 ft)
92902A-002	Data Link Cable	none	none	none	300 meters (984 ft)
92905A	Data Link-to-Device Cable	Data Link male	hood	none	3 meters (9.6 ft)
92905P	Data Link-to-Device Cable with MP Extension	Data Link male	hood	multi-point female	3 meters (9.6 ft) Each Leg

NOTE: Install A connectors electrically toward the computer.
      Install B connectors onto the rear of a terminal.
      Install C connectors electrically away from the computer.
      INP and SSLC cables do not have their own product numbers.

* This connector is a 50-pin RS-232-C female for 262X and a
  card edge connector for 264X.

HP 13232P (2640-60132) MODEM/MULTIPOINT CABLE

Use: First terminal in a synchronous multipoint drop
Length: 4.5 meters (15 feet)
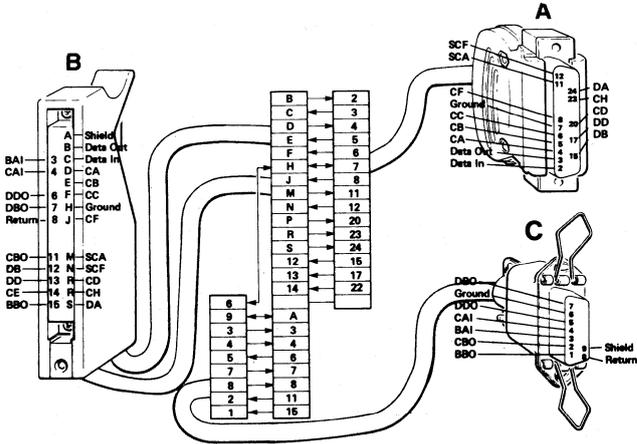
HP 13232Q (2640-60133) STANDARD MULTIPOINT CABLE

Use: Connects asynchronous or synchronous multipoint terminals
Length: 4.5 meters (15 feet)
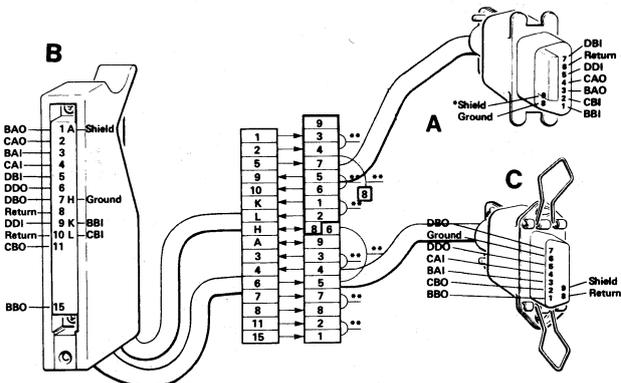
MTS CABLE ASSEMBLIES

HP 13232R (02640-60134) MULTIPOINT EXTENSION CABLE

Use: Extends distance between multipoint terminals. Connects
to 13232Q.

Length: 30 meters (100 feet)

Connector kit is HP part number 5061-2401
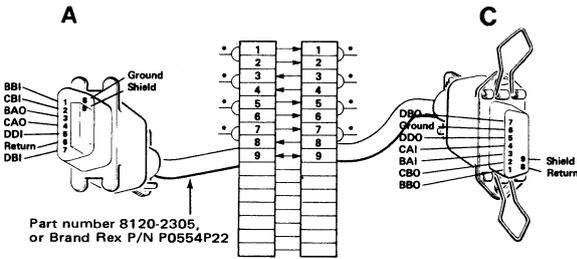
4 twisted pair, 22AWG, 75 ohm impedance, braided, shielded,
bracketed.

NOTE: Cable may be customer fabricated up to 2000 feet: See the
reference manual for your multipoint terminal.

HP 13232T (2640-60151) POWER-PROTECT MULTIPOINT CABLE

Use: Same as 13232Q except this cable has terminal power-down
rerouting relays. If a terminal using this loses power,
other terminals will not be affected.

Length: 9 meters (30 feet)

H-18
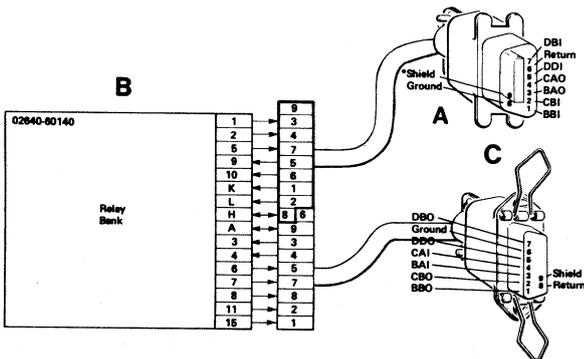
OPENING AND CLOSING AN MTS LINE

```
┌─────────────────────────────────────────────────────────────────┐
│              ⎧ OPEN [,FILENAME1]                              ⎫  │
│              │ UP, upentry                                    │  │
│   :MPLINE idn, DOWN, downentry                                │  │
│              │ SHUT [,NOW]                                    │  │
│              │ MESSAGES, {ON-OFF}                             │  │
│              │      ⎧ON [,[ALL] {,[mask[],[numentries]⎫     │  │
│              │ TRACE⎨            [,WRAP] [,filename2]]]]}    │  │
│              ⎩      ⎩OFF                                   ⎭  │
└─────────────────────────────────────────────────────────────────┘
```

OPEN   Opens the line and initiates MTS execution.

filename1   An MTS configuration file in PUB.SYS.
                The utility MPCONFIG is used to maintain a
                configuration file. If omitted, line is opened
                with the characteristics established by MPE
                configuration.

                (Refer to DSN/MTS Reference Manual for
                configuration file items.)

UP   Activate the terminal(s) specified in the up entry.

DOWN   Deactivates the terminal(s) specified in the down
                    entry parameter.

upentry   Up entries and down entries can be:
downentry   1. The logical device number of a multipoint
                    terminal as configured into MPE.
                2. A two letter terminal ID, specifying the
                    group and device ID of a particular
                    multipoint terminal.
                3. The word GROUP followed by a space and one
                    letter designating a particular group.

SHUT   Initiates an orderly MTS line closing procedure.
                If multipoint terminals are currently in use, the
                line will be closed when all users have finished.

MTS CONSOLE COMMAND

NOW   Immediately terminates MTS execution and closes the
             line without waiting for sessions to log off and for
             applications to close the terminals they are using.
             Caution: Data can be lost using this.

MESSAGES   Controls the printing of MTS messages on the system
             console.

             ON   causes   messages   that   result   from   MTS
                  communication activity to be displayed on the
                  system console. ON is the default.

             Off stops messages associated with MTS line
                  activity from being displayed.

TRACE   Specifies the CS trace facility is to be activated
             or deactivated.

ON   Activates CS trace. A line must be opened before
             you can trace that line.

ALL   Generates trace records for all line activity. If
             omitted, trace records are written only for
             transmission errors.

mask   An octal integer preceded by a perent sign (%nn).
             Specifies the type of trace entries. Use %77 for
             MPTEST on INP. Default is %37.

numentries   A decimal number. Maximum number of entries in a
             trace record, not greater than 248. 24 for INP.
             Default is 24.

WRAP   Causes trace entries that overflow the trace area
             (greater than numentries) to overlay the prior trace
             entries. If omitted, overflow entries are
             discarded.

filename2   Trace file name. If omitted, trace creates a file
             named CSTRACE in PUB.SYS.

OFF   Deactivates the CS trace facility.

MTS returns those FCONTROL requests not applicable to a multipoint environment as successfully completed, even though they did not execute. In addition, if a program requests an operation not supported by a terminal, the request is returned as invalid.

CONTROL OPERATION	CONTROLCODE	RESULT UNDER MTS
Set input speed and return Previous speed.	10	Speed not changed; current speed is returned.
Set output speed and return previous speed.	11	Speed not changed; current speed is returned.
Enable echo.	12	No operation.
Disable echo.	13	No operation.
Disable system break.	14	Standard operation.
Enable system break	15	Standard operation.
Disable subsystem break	16	Standard operation.
Enable subsystem break	17	Standard operation
Disable tape mode option	18	Invalid request.
Enable tape mode option.	19	Invalid request (1)
Disable terminal input timer.	20	Standard operation.
Enable terminal input timer.	21	Standard operation
Read terminal input timer.	22	Standard operation.
Disable parity checking.	23	No operation.
Enable parity checking.	24	No operation.
Define line-termination character for terminal input.	25	Use is limited as described in MTS manual.
Disable binary transfers.	26	Standard operation.
Enable binary transfers.	27	Standard operation.
Disable user block mode transfers.	28	No operation.
Enable user block mode transfers.	29	No operation.
Disable line deletion echo suppression.	34	No operation.
Enable line deletion echo suppression.	35	No operation.
Set parity.	36	No operation.

(1) The :PTAPE command will also fail because it issues this.

MTS EXECUTION CHARACTERISTICS

MTS CONTROL FUNCTIONS \ TERMINAL OPERATING MODES	ASCII TRANSFER DEFAULT Explicitly enabled through FCONTROL (control code 26) or FCONTROL (control-code 41, chars 0)	NORMAL TERMINAL CONTROL DISABLED through FSETMODE (modeflags bit 13=1)
MTS checks for an MPE defined end-of-file condition (for example, HELLO, :EOF:, etc.)	YES	YES
PAGE mode and AUTO TERM are selected before the first write when a session is logged on or the terminal is opened and allocated from a program.	YES	YES
MTS normally follows each write with ESC__.	YES	YES
GS as a last character is stripped from input data.	YES	YES
Normal terminal control is enabled. Each read is followed by sending CR LF ESC__ to the terminal.	YES	NO
CR and LF characters are stripped from input.	YES	YES
MTS checks output data for incorrect or improperly terminated escape sequences. If any are found, the write is not followed by ESC__.	YES	YES

Notes:

1. When user enters a System Break, MTS enables PAGE MODE and AUTO TERM at the terminal.

2. Normally an application program would enable only one of the above described modes at a time. If a program invokes more than one mode simultaneously, the mode listed in the column to the right of all other selected modes takes precedence.

LIMITED UNEDITED	UNEDITED	BINARY TRANSFER
with end–of–record character = %136 Enabled through FCONTROL, control-code 41.	with end–of–record character =%137. Enabled through FCON-TROL, controlcode 41.	Enabled through FCONTROL, control-code 27. Disabled through FCONTROL controlcode 26.
YES	YES	NO
PAGE mode and AUTO TERM settings are not altered by MTS when unedited mode is entered nor so long as the terminal stays in unedited mode.	PAGE mode and AUTO TERM settings are not altered by MTS when unedited mode is entered nor so long as the terminal stays in unedited mode.	NO
YES	NO	NO
YES	NO	NO
NO	NO	NO
YES	NO	NO
YES	NO	NO

3. There can be more than one file opened on a terminal at a given time (remember the ASCII file $STDLIST is always open when a session logs on). Since binary mode is effective only for a particular file opened on the terminal, the unedited mode (with end-of-record character =%137) should be used if MTS functions are to be disabled for both system and terminal user.

4. If end-of-record character is a value other than 0, %136, or %137, then MTS operation is undefined.

CONTROL CODES FOR FCONTROL

CONTROL OPERATION	CONTROLCODE	RESULT UNDER MTS
Allocate a terminal.	37	Valid request for terminal types 0 and 14, invalid for any other terminal type.
Set terminal type .	38	No operation for terminal types 0 and 14. Invalid for other terminal
Obtain terminal type information.	39	Standard operation.
Obtain terminal output speed.	40	Returns the speed as entered in the current configuration file or the MPE configured default speed.
Set unedited terminal mode.	41	Disables automatic MTS functions.

SELECTED CS ERROR CODES

(Refer to the CS SECTION of this book for a complete list of CS error codes.)

CODE	DESCRIPTION
7	Driver not found. Add the CSSBSC1 driver to the MPE configuration if using an SSLC.
8	Driver not compatible with the attributes of the communication line. Reconfigure the SSLC using the instructions given in Appendix D of MTS Reference Manual.
9	Driver not changeable. Reconfigure MPE and specify DRIVER CHANGEABLE? YES for the SSLC driver (if using SSLC).
10	Undefined device. Reconfigure MPE to include the INP or SSLC.
11	Device not available. The logical device for the INP or SSLC has been DOWNed. The console operator should UP the device. The device may also be in use by another subsystem (see 13).
12	Not a CS device. In the MPE configuration, the DRT numbers for the pseudo terminals and/or the Multipoint Supervisor do not back-reference the INP or SSLC. Reconfigure MPE being certain to enter the logical device number of the INP or SSLC as the DRT number for the MTS devices. Precede each DRT with a number sign (#).
13	Line in use by another subsystem. The console operator should terminate the other subsystem and reenter the MPLINE command.
19	The line as configured is not compatible with MTS. Reconfigure MPE using the instructions in Appendix C of the MTS Reference Manual.
77	Maximum number of I/O requests is already outstanding. Must first issue IOWAIT.
103	Data set not ready. Indicates remote terminals disconnected the line, or some sort of problem developed with the modem.
104	Carrier loss. The modem may have disconnected or the phone line has a problem.
151	Connect timeout. Line connection did not occur in the time allowed by the INP or SSLC configuration dialog.

CS ERROR CODES

156   An internal error was detected by the CS driver. This error code may also be the result of line and/or modem problems.

209   Receive timeout. An expected response from a terminal did not occur.

219   The entries in the pollist were polled the required number of times but no station responded.

222   Specified group or terminal did not respond or the entire line did not respond.

223   More than 2048 characters were transmitted by a terminal. Part of the data was lost. This problem may indicate a terminal is sending nonsense data, particularly if the message is printed frequently.

224   All devices on the line are logically down. Line is active for CPU to write to terminals, but no polling can be done.

The program MPTEST.PUB.SYS is used to verify the installation and configuration of a multipoint network, the terminal strappings, and communication link between multipoint terminals and the HP 3000.

The program prompts for information about the terminals to be tested, the configuration file name, whether the terminals' strap settings should be tested. Although CS capability is not needed to run MPTEST, you must have CS capability to read terminal strap settings.

If you want to perform the read, write, and verify tests MPTEST prompts the system operator to open the line. During the test, an observer can check HP 264x multipoint terminal screens to be certain the program is actually executing. Although HP 307x terminals are tested in the same way as HP 264x terminals, the data display normally remains constant.

If a problem develops, the subsystem prints an appropriate message on the terminal where MPTEST was run ($STDLIST). MPTEST sends timeout and data compare error messages to a file named MPLIST. It sends all other messages to a file named STDLIST. These files default to $STDLIST but can be redirected as shown:

```
:FILE MPLIST;DEV=LP
:FILE MPLIST;NOCCTL;REC=-80,16,F,ASCII;SAVE
:FILE STDLIST;DEV=LP
```

All messages associated with the MPTEST program are listed in this section.

MPE UNIT NUMBER TO GROUP/DEVICE ID CONVERSIONS

DEVICE ID		@	A	B	C	D	E	F	G	H	I
	NO.	0	1	2	3	4	5	6	7	8	9
GROUP ID	**NO.**										
@	0	000	001	002	003	004	005	006	007	008	009
A	1	010	011	012	013	014	015	016	017	018	019
B	2	020	021	022	023	024	025	026	027	028	029
C	3	030	031	032	033	034	035	036	037	038	039
D	4	040	041	042	043	044	045	046	047	048	049
E	5	050	051	052	053	054	055	056	057	058	059
F	6	060	061	062	063	064	065	066	067	068	069
G	7	070	071	072	073	074	075	076	077	078	079
H	8	080	081	082	083	084	085	086	087	088	089
I	9	090	091	092	093	094	095	096	097	098	099
J	10	100	101	102	103	104	105	106	107	108	109
K	11	110	111	112	113	114	115	116	117	118	119
L	12	120	121	122	123	124	125	126	127		

NOTES:

1) ID's shown are for polling.

2) Group and Device ID assignments can be overridden in MTS configuration file. See Section V.

3) MPE allows unit numbers to range from 0 to 127. If you wish to use other group or device ID's, they will have to be assigned in a configuration file.

OFFLINE CONFIGURATION OF HP 2333A

First attach an HP terminal to Port A1 with standard RS232C terminal cable. Set terminal to odd parity, full duplex, character mode.

1. Locate switches behind the front panel of the Hp 2333A controller. Close switches A through G by pressing the switches up, and open switch H by pressing switch down.

2. Power on the 2333A or press the reset switch.

3. Set terminal baud rate to 2400 baud.

4. Press RETURN key on the terminal you connected to Port A1.

At this point you are prompted with an asterisk "*" to enter one of the following commands:

HSA   configures high speed channel A.
HSB   configures high speed channel B.

(DC refers to Daisy Chain and DL refers to Data Link for the following dialog.)

● Trans. mod? SYNC or ASYNC

● Clck srce? INT none or EXT modem

● Bps rate? (DC) 4800/19200 or (DL) 1200/19200

● Trspy? CNTL

● Parity? ODD

● Tx Bufsiz? 512 (max)

● Rx Bufsiz? 512 (max)
●
● Group Id? @ or A-Z

● Welcome Message? Any message up to 24 characters.

You are prompted with another asterisk "*". Now you can enter "LIST" to display the HP 2333A's new configuration.

To disconnect your terminal from Port A1:

1. Close switch H on the 2333A controller - all switches down.

2. Press reset switch. The message you entered will be displayed.

3. Open communication line (MPLINE).

CONFIGURING MTS

2608S SWITCH SETTINGS

SWITCH 1

1 2 3 4 5 6 7 8
OPEN

BAUD RATE

TRANSMISSION MODE

CHECK CHARACTER ——

PARITY ———

SWITCH 2

1 2 3 4 5 6 7 8
OPEN

GROUP ID ADDRESS

—— MONITOR MODEM CONTROL LINES

—— MONITOR CC OR CF (OR) FIRST DEVICE

—— SYNCHRONOUS SIMULATION

SWITCH 3

1 2 3 4 5 6 7 8
OPEN

DEVICE ID ADDRESS

—— RESERVED

—— CONTINOUS CARRIER

RS-232-C (CH) SIGNAL

1 FACTORY SETTING
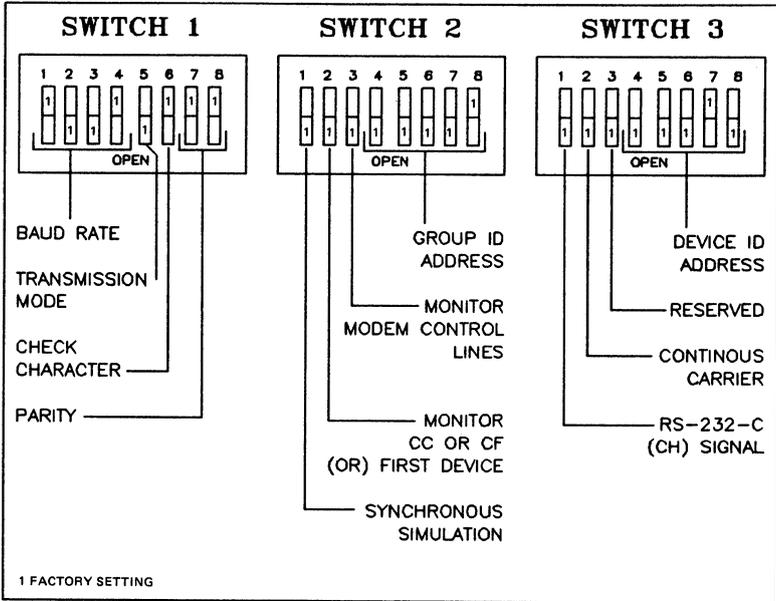
DATA LINK (LOCAL OR REMOTE, ASYNC)

S-1   BAUD   S-2   GI   S-3   DI

DAISY CHAIN   GI   1ST DEVICE   DI

DAISY CHAIN   GI   2ND DEVICE   DI

H-30
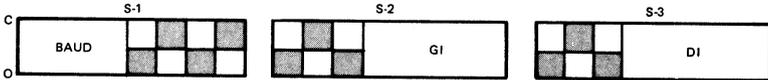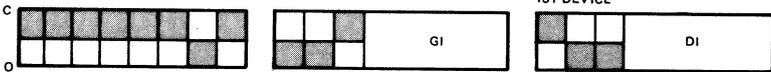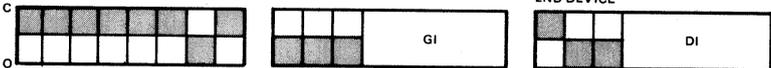
2608S ADDRESS SWITCH SETTINGS

SWITCH S—2	Group ID	
SWITCH S—3	Device ID	
O O O O O	●	40
O O O O C	A	41
O O O C O	B	42
O O O C C	C	43
O O C O O	D	44
O O C O C	E	45
O O C C O	F	46
O O C C C	G	47
O C O O O	H	48
O C O O C	I	49
O C O C O	J	4A
O C O C C	K	4B
O C C O O	L	4C
O C C O C	M	4D
O C C C O	N	4E
O C C C C	O	4F
C O O O O	P	50
C O O O C	Q	51
C O O C O	R	52
C O O C C	S	53
C O C O O	T	54
C O C O C	U	55
C O C C O	V	56
C O C C C	W	57
C C O O O	X	58
C C O O C	Y	59
C C O C O	Z	5A

2608S SELF TESTS

2608S Self Tests For I/O Board and Cables

I/O Board:

* Use 02608-60246 loopback hood on back of 2608S

* Run test 11

Cables and Pods:

* Use 02645-60004 loopback connector on RS232C end of cable that connects to modem or put modem in loopback

* Run test 13 for first pod

* Run test 14 for second pods

Data Link:

* Disconnect pod from data link box

* Run test 14

Determining Switch Settings With Self Test 11

1. Press SELF TEST twice quickly.

2. Press UP until "11" is displayed.

3. Press SELF TEST.

Switch setting will be printed on paper.

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

(Refer to the MTS Reference Manual for a complete list.)

7 END OF DATA ON $STDIN

   You typed a colon (:) in response to a test question.

8 INPUT STRING CONTAINS AN ILLEGAL DIGIT

   Respond with a positive non-zero integer.

11 READ TIMEOUT ERROR: LDEV # xxx; NUMBER nnn

   Terminal xxx did not respond within the time allowed by MPE
   configuration. MPTEST will attempt the procedure again.

12 WRITE TIMEOUT ERROR; LDEV #xxx; NUMBER nnn

   Terminal xxx did not respond within the time allowed by MPE
   configuration. MPTEST will attempt the prcedure again.

14 CREATE ERROR; PROGRAM OR ENTRY DOES NOT EXIST

   The multipoint program file must be named MPTEST.

26 DATA COMPARE ERROR: NUMBER nnn; LDEV #xxxnn

   The data read didn't match the data written.

27 ERROR IN FCHECK WHILE WRITING ERROR MESSAGES

   Further analysis is not possible. Re-run the test.

28 INVALID ENTRY - ENTER LOGICAL DEVICE NUMBERS OR "ALL"

   Logical device number should be separated by commas.

31 NON MULTIPOINT DEVICE ON LINE

   Nonmultipoint device configured on a multipoint line. Device
   must be configured as Device Type 16, Subtype 0, 1, 2, 3,
   Termtype 10, 14, or 17, or as Device Type 32, Subtype 9 or 13.

32 DEVICE IS NOT ON LINE

   Logical device number of device is not configured for the
   current line. Enter only devices configured for this line.

34 UNRECOGNIZABLE REPLY TO POLL SEQUENCE

   Check the straps on the multipoint devices. For example, the
   J07 strap on an HP 264x multipoint communications PCA may be
   set incorrectly.

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

35 AN UNCONFIGURED DEVICE RESPONDED TO POLL SEQUENCE

The device is perhaps configured into MPE incorrectly.

36 STRAP D (PAGE MODE) ON KEYBOARD INTERFACE PCA IS CLOSED.

Information only. The strap will be opened programmtically by
the MPMON process.

38 STRAP R (ASYNC REPEATERS) OPEN ON KEYBOARD INTERFACE PCA

HP 264X terminals not first on a line after an asynchronous
repeater should have strap R closed. The terminals listed
following this message should be installed immediately after an
asynchronous repeater.

39 NO TERMINALS HAVE STRAP R (ASYNCHRONOUS TEPEATERS) OPEN

No HP 264x terminals with strap R open are installed on the
line. This means there also should not be asynchronous
repeaters installed.

40 STRAP S ON KEYBOARD INTERFACE PCA IS OPEN

If the terminals listed following this message will ever run
under con- trol of an application program which makes use of
the HP 264x blank deletion feature, strap S must be open. If
each space typed on a terminal must be transmitted (as is the
case with EDIT/3000), strap S must be closed.

41 STRAP V (SYNC ADDED) CLOSED ON KEYBOARD INTERFACE PCA

For asynchronous communication, HP 264x terminals operate more
efficiently with strap V open.

42 STRAP Z (TRANSPARENT) CLOSED ON KEYBOARD INTERFACE PCA

Information only. If strap Z on the HP 264x Keyboard
Interface PCA is open, the terminal operates in transparent
mode, which may allow fewer protocol errors to occur.

43 STRAP J15 (CURSOR ADDRESSING) CLOSED ON MP COMMUNICATION PCA

Strap J15 on the HP 264x Multipoint Communications PCA must be
open.

44 DEVICE CONFIGURED AS HP 264x BUT RESPONDED OTHERWISE

Most likely due to an error in MPE I/O configuration or in
configuration file. Check Device Type Subtype in I/O
configuration.

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

45 STRAP J05 (EXTENDED TEXT) MODE IS OPEN

If the terminals listed following this message will ever be used for MPE sessions (that is, the terminals will serve as log-on devices), strap J05 on each HP 264x Multipoint Communications PCA must be closed.

51 NO MULTIPOINT DEVICES ON LINE

The MPE I/O configuration includes a properly configured line (INP or SSLC, and Multipoint Supervisor), but no multipoint devices. (See Message 31)

52 STRAP R (ASYNC REPEATER) OPEN BUT LINE IS SYNCHRONOUS

HP 264x terminals should have strap R on the Keyboard Interface PCA open ONLY if the terminal is first on a line after an asynchronous repeater (asynchronous communication). If the terminal is not first on the line after an asynchronous repeater or asynchronous communications will be used, strap R must be closed.

53 NO MULTIPOINT DEVICES CONFIGURED

A Multipoint Supervisor must be configured into the MPE I/O System as Termtype 14.

54 DEVICE CONFIGURED AS AN HP 307x BUT RESPONDED OTHERWISE

Check Device Subtype in I/O configuration.

56 STRAP J06 (BLOCK CHECK) CLOSED ON THE MP COMMUNICATIONS PCA

On an HP 264x terminal, strap J06 on the Multipoint Communications PCA must be open.

57 BAD RESPONSE TO STATUS REQUEST

Device sent an invalid response. Check that device is configured correctly in MPE I/O configuration or configuration file. Check subtype in MPE I/O configuration.

58 INVLAID OUTPUT DEVICE NUMBERS

A multipoint terminal's output device number should be the same as its input device number.

59 MULTIPLE MULTIPOINT SUPERVISORS

Only one Multipoint Supervisor should be configured for each SSLC or INP.

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

61 DEVICE(S) NOT SPECIFIED IN CONFIGURATION FILE POLL LIST

When an MTS configuration file is named, all terminals to be tested or their group mut be specified in the poll list, or no poll list must be specified.

65 UNCONFIGURED DEVICE(S) IN CONFIGURATION FILE

All devices specified in the MTS configuration file must be properly configured into the MPE I/O system.

66 UNCONFIGURED 'DOWN' DEVICE(S) IN CONFIGURATION FILE

All devices specifed in the MTS configuration file must be properly configured into the MPE I/O system, even those that are designated as being down.

74 LINE PARAMETERS IN CONFIGURATION FILE INVALID

Entries 1 through 7 in the configuration file are invalid. Use the MPCONFIG program to create and modify configuration files.

75 xxxERRORS IN CONVERTING LINE PARAMETERS TO BINARY

The configuration file probably contains invalid data. Use the MPCONFIG program to create and modify configuration files.

76 INCOMPATIBLE VERSIONS; CONF FILE VERSION x,MPTEST VER.y

Configuration file may have been damaged.

78 BAD NUMBER OF ENTRIES IN CONFIGURATION FILE

The configuration file probably contains invalid data. Use the MPCONFIG program to create and modify configuration files.

79 BAD NUMBER OF DOWN ENTRIES IN CONFIGURATION FILE

The configuration file probably contains invalid data. Use the MPCONFIG program to create and modify configuration files.

80 DEVICE DIDN'T ACKNOWLEDGE STATUS REQUEST

Device is off-line or malfunctioning.

81 OUTPUT BUFFER SIZE IS GREATER THAN HALF INPUT BUFFER SIZE

Information only. MTS is usually more efficient if the output buffer is one half the size of the input buffer. On 264x terminals change the output buffer size (straps T and U on the Keyboard Interface PCA) or the input buffer size (straps J17 and J16 on the multipoint communications PCA). If you change straps J17 and J1, make sure the line buffer is compatible with the new input buffer length.

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

82 TERMINAL'S BUFFER SIZE IS NOT TWICE THE LINE'S BUFFER SIZE

The line bufer size must be configured consistent with the strapped buffer size in each HP 264x terminal on the line. On 264x terminals change straps T and U on the Keyboard Interface PCA and straps J17 and J16 on the Multipoint Communications Interface PCA, or reconfigure the SSLC with the proper buffer size.

84 NO DEVICES ARE UP IN THE CONFIGURATION FILE

MPTEST can only test devices which are "up" in the configuration file.

86 MPTEST CANNOT TEST IBM STRAP SETTINGS; LINE# =

Testing of straps will still be done for any HP devices you specified.

87 DEVICE CONFIGURED AS 2608S BUT RESPONDED OTHERWISE

Most likely due to an error in the MPE I/O configuration or the configuration file. Check Device Subtype in the I/O configuraion.

88 IBM AND HP DEVICES ARE ON THE SAME LINE; LINE # =

You may not configure HP and IBM devices on the same line.

90 NON TERMTYPE 10 AND TERMTYPE 10 ARE IN THE SAME GROUP

Only Termtype 10 devices can be configured in an HP 2333A group.

95 ERROR IN SHUTTING LINE; LINE# =

MPTEST was unable to shut the lines being tested. This message is usually accompanied by a CI error. A request to shut the line(s) will be sent to the system console.

100 UNUSUAL CONDITION DETECTED ON 3270; LDEV# =

Check the indicated terminal; it may need to be reset.

102 STATUS AND SENSE RECEIVED FROM 3270; LDEV" =

The IBM device returned status and sense bytes. Check the device; it may be out of paper or have another problem.

104 DEVICE @ IS NOT IN GROUP WITH 2333A ATTACHED TERMINALS

The HP 2333A must be configured into the MPE I/O System. If you are using a configuration file, the HP 2333A must be configured into the same group as its attached devices, and it must be assigned the ID "@".

SELECTED MTS MPTEST DIAGNOSTIC MESSAGES

105 BAD VALUES IN CONFIGURATION FILE I/O CONFIGURATION

Run MPCONFIG.PUB.SYS and list file to verify it.

106 ONE OR MORE LINES ARE NOT OPEN AFTER WAITING nn SECS

MPTEST could not open all the lines. Check with the console
operator - a request to open the line(s) has been sent to the
system console.

108 HP 2333A DEVICES MUST BE GROUP POLLED.

Your configuration file may be bad.

109 MPTEST DOES NOT INDIVIDUALLY TEST TERMINALS ON 2333A

The link to the HP 2333A will be tested.

114 RECEIVED CONTROL INFORMATION FROM 2333A WHEN EXPECTING DATA

Device may have reset or may have lost power and regained it.
Rerun the test. If condition persists, contact HP.

115 RECEIVED DATA FROM 2333A WHEN EXPECTING CONTROL INFORMATION

Device may have reset or may have lost power and regained it.
Rerun the test. If condition persists, contact HP.

117 INCOMPATIBLE VERSIONS MPTEST VERSION nnn, MPTSTCAT VERSION nnn

The message catalog MPTSTCAT.PUB.SYS may have been damaged.

120 ERROR IN OBTAINING LINE SPEED FROM CSLDTX FOR LDEV# ldn

Check that any INPs or SSLCs which are used for multipoint
lines are configured correctly in the MPE I/O configuration.

124 ERROR OCCURRED IN READ FOLLOWING STATUS REQUEST

A device being tested replied incorrectly to a status request.
Rerun the test. If the problem occurs frequently, contact HP.

CS TRACE FACILITY
AND
ERROR MESSAGES

CONTENT   **PAGE**

TRACE

May be utilized by any subsystem that uses the CS drivers. Provides a recorded file of events that have occurred on the communications line.

CTRACE File

System Default File Name: CSTRACE

PARAMETER	VALUE
formal file designator	CSTRACE
FOPTIONS (14:2) (13:1) (10:3) (8:2) (7:1) (6:1) (5:1) (0:5)	00 (new file) 0 (binary file) 0 (use actual file designator) 0 (fixed length records) 0 (no carriage control) 0 1 (disallow file equation) 0
AOPTIONS (12:4) (11:1) (10:1) (8:2) (0:8)	4 (input/output access) 0 (no multi-record option) 0 (disallow dynamic locking/ unlocking) 0 (exclusive access) 0
blockfactor	1

User Defined File Name: FILE CSTRACE=oldfile name

The trace file is opened for variable length records because each line using it may have different record size requirements.

A new permanent file will be opened in the system domain each time TRACE is requested.

If an error occurs when trying to open the trace file, the particular COPEN or CCONTROL intrinsic call will fail.

If the trace file becomes full, the EOF marker will be moved to the top of the file, and all previous trace information is lost.

If the system fails while tracing is enabled, the trace file will be closed. Some of the last entries may be lost.

If a line being closed is the last one using the trace file, the CS/3000 trace facility issues an FCLOSE intrinsic call with the following parameters:

PARAMETER	VALUE
filenum	trace filenum
disposition	1 (save)
SECCODE	(0) unrestricted access

List File

The formal file designator for formatted trace dump output is LIST. The default output file is $STDLIST. To divert formatted output elsewhere, such as to device class LP, use the following file equation:

    :FILE LIST;DEV=LP

There may be a large volume of output generated by the CSDUMP program. You can control the list file output priority, keeping it below the outfence value, and examine selected portions of spooled output by using the supported MPE utility SPOOK.

CSDUMP Program

Formats and lists the CSTRACE file. It is invoked through:

    :RUN CSDUMP.PUB.SYS[,OCTAL][;PARM=0|1|2]

The secondary entry point OCTAL allows you to specify that all raw data will be output in octal, otherwise it will be output in hexadecimal. (The entry point HEX, allowing you to specify hexadecimal for the output, has been retained for backward compatibility to the time when the default was octal.) If you specify PARM=0 or 1 all entries will be output by time; however, if you specify PARM=2 only CS/3000 intrinsics will be output by time.

Various conditions can cause this program to abort. These are indicated in an information error message, and in parameter values of the QUIT intrinsic.

PARAMETER	MEANING
1	Illegal dump format request
2	Open failure on trace file
3	Open failure on list file
4	Trace file access error
5	Open failure on temporary file
6	Temporary file access error
7	List file access error

TRACE

Invoking and Revoking the Trace Facility

- RJE/3000
  ```
  :RJE
  #RJLINE{2780|3780};TRACE=ON,<trace options>
  ```

When you stop using RJE tracing will stop.

- MRJE/3000

  ```
       :MRJECONTROL START [,hostid];TRACE,ON[,<trace options>]
  or   :MRJECONTROL TRACE [,hostid],ON[,<trace options>]

       :MRJECONTROL TRACE[,hostid],OFF
  ```

- DS/3000

  ```
       :DSCONTROL dsdevice;OPEN;TRACE,ON[,<trace options>]
  or   :DSCONTROL dsdevice;TRACE,ON[,<trace options>]

       :DSCONTROL dsdevice;TRACE,OFF
  ```

- MTS/3000
  ```
  :MPLINE |dev,TRACE,ON[<trace options>]
  :MPLINE |dev,TRACE,OFF
  ```

- IMF/3000

  ```
       :IMFCONTROL START,configfile,TRACE,ON[,<trace options>]
  or   :IMFCONTROL TRACE,configfile,ON[,<trace options>]

       :IMFCONTROL TRACE,configfile,OFF

  or   :IMFMGR
       >CONFIGURATION FILE configfile
       >TRACE on{,<trace options>]
       >TRACE OFF
  ```

The <trace options> are:
    [ALL[,[mask] [,[entries][,[WRAP][,filename]]]]]
    - ALL means that all activity is to be traced. Its omission
    means that only I/O errors are to be traced.

    - mask indicates the type of activities to be traced,
    as follows:
        %000, or omitted, means use the driver default mask.
        *%001=generate PSTX entries
        *%002=generate PSCT, PPOL, PSEL entries
        *%004=generate PRTX entries
        *%010=generate PRCT entries
        *%020=generate POPR and PEDT entries
        %040=generate PSTN entries
        %100=generate INP interconnet entries
        %200=generate IMF control unit state transition entries.
            PCMP entries are generated automatically.
    * This is a default value for the BSC and MRJE protocol; also for
    HPDLC-I protocol except that POPR and PEDT entries are not ap-
    plicable and do not appear in the trace file.

    - The value of entries is used to derive the size of trace file
    record. Trace entries are deposited in a record in a circular
    manner. A driver dependent default of 24 will be used if the pa-
    rameter is omitted. The maximum value that may be specified is
    248. On an INP the maximum is 24. (If the numentries requested
    when tracing on an INP is greater then 24, a warning message will
    be printed and the maximum default of 24 will be used.)

    - WRAP specifies that if the trace record is full for a given CS
    intrinsic, previous entries are overlayed. Its absence indicates
    that succeeding entries will be flushed. This parameter does not
    affect the EOF marker of the file.

    - Trace output will be sent to a specified file name which has been
    previously built. If a file name is not specified, the default
    destination depends on the communications software product being
    used.

    - If a trace file exists it will be purged, and a new trace file
    will be created.

NOTE: When tracing IMF BSC use mask of %277. When tracing IMF SDLC
    use mask of %77.

TRACE

Protocol Driver Trace Entry Types

Mnemonic	Entry Type	Definition
POPR	Operation	This type of trace entry is generated each time the physical driver is called upon to perform an operation. The POPR trace entry tells what operation is to be performed. *
PSTN	State Transition Entry	This type of trace entry is generrated each time the driver transfers from one internal state to another. The PSTN trace entry tells what event just happened and what action is about to be performed.
PEDT	Editor Entry	This type of trace entry is generated each time a text message or control character sequence is received from the remote station. In the case of a text message, the PEDT trace entry shows the first 13 (for HSI) or 14 (for SSLC or INP) words of the user's buffer; control characters, pad characters and CRC parity sequences are omitted. In case of a control character sequence, the PEDT trace entry supplies a mnemonic phase telling what was received. *
PRCT	Receive Control Sequence Entry	This type of trace entry is generated each time a control character sequence is received from the remote station. The PRCT trace entry shows (in octal or hexadecimal) byte-for-byte exactly what was received. **
PSCT	Send Control Sequence Entry	This type of trace entry is generated each time the driver sends a control charactaer sequence to the remote station. The PSCT trace entry shows (in octal or hexadecimal) byte-for-byte exactly what was sent. **

Mnemonic	Entry Type	Definition
PRTX	Receive Text Entry	This type of trace entry is generated each time a text message is received from the remote station. The PRTX trace entry shows (in octal or hexadecimal) byte-for-byte exactly what was received. ***
PSTX	Send Text Entry	This type of trace entry is generated each time the driver sends a text message to the remote station. The PSTX entry shows (in octal or hexadecimal) byte-for-byte exactly what was sent. ***
PCMP	User Request Completed	This type of trace entry is generrated each time a user request (i.e., a CREAD,CWRITE, driver-performed CCONTROL, or CCLOSE intrinsic call) is completed. The PCMP trace entry summarizes the number of text messages sent and received and the number of errors that have occurred, etc.
PPOL	Send Polling Sequence Entry	This type of trace entry is generated each time the driver sends a polling sequence. The PPOL shows the sequence byte-for-byte.
PSEL	Send Selection Sequence Entry	This type of trace entry is generated each time the driver sends a selection sequence. The PSEL shows the sequence byte-for-byte.

* This entry will not be generated by the SDLC or HPDLC-I protocol.

** For SDLC and HPDLC-I, this entry type is generated each time a frame is received from the remote station (PRCT) or sent to the remote station (PSCT). The PRCT or PSCT trace entry omits the Flag characters and Frame checking sequence (FCS) and shows the first 27 bytes of the I field maximum. One byte of the FCS may appear if the frame doesn't end on a word boundary.

*** For SDLC and HPDLC-I, this entry type is generated only when the received frame (PRTX) or the sent frame (PSTX) is longer than 32 bytes. In this case PRTX or PSTX entries will be used to display the remainder of the I field that was not displayed in the entry. Trailing Flag and FCS bytes are omitted except when the frame does not end on a word boundary; then one byte of the FCS will appear.

TRACE

Interconnect Driver Trace Entry Types

Mnemonic	Entry Type	Definition
IDC	Driver Called	The entry is generated whenever the driver is called to perform an operation.
IDX	Driver Exited	This entry is generated whenever the driver completes an execution of the main control routines.
IADQ	Add to Queue	This entry is generated whenever the driver adds a request to one of its internal queues.
IRFQ	Remove From Queue	This entry is generated whenever the driver removes a request from one of its internal queues.
IDF	Data Frozen	This entry is generated whenever the driver requests a target data segment to be frozen in memory or to check if a previous request to freeze a data segment has been completed.
IUNF	Unfreeze Data	This entry is generated whenever driver wishes to unfreeze a previous frozen data segment or to insure that a data associated with a request is not frozen by the driver.
INR	New Request	This entry is generated each time the driver begins processing a new request.
IPR	Process Request	This entry is generated whenever the driver processes a request which may be completed immediately (i.e., requires no I/O to INP) or whenever a request requires some preprocessing before I/O is to be done.
IAR	Abort Request	This entry is generated whenever a request is to be hard aborted.
ISTO	Start Timeout	This entry is generated whenever the driver starts a software timeout on a request.

Interconnect Driver Trace Entry Types

Mnemonic	Entry Type	Definition
ISS	Set Status	This entry is generated whenever the request completion status is set.
ICR	Complete Request	This entry is generated whenever a request has been fully completed by the driver and is released to the request initiator.
ICC	Check Completion	This entry is generated whenever the driver calls the physical driver to check I/O completion status and to check for software timeout completions.
IPM	Process Message	This entry is generated each time the power fail recovery routine is called.
IPFR	Power Fail Recovery	This entry is generated each time the power fail recovery routine is called.
ICD	Call Driver	This entry is generated each time the physical driver is called to perform an operation.
IDIO	DO I/O	This entry is generated each time the driver wishes to do an operation which sends a message to INP or moves data between requests.
IRB	Illogical Condition	This entry is generated whenever the driver detects an illogical internal condition or receives an erroneous or illogical message from INP.

TRACE

Trace Dump Analysis

```
                              HEADER
*** CS TRACE DUMP FACILITY ***   TUE, JAN 6, 1977, 12:32 AM
TRACE FILE IS CSTRACE.CS30.DC
LAST OPENED ON TUE. JAN 6, 1977,  12:01 AM
SYSTEM ID=02.66
```

At the start of the trace listing is a header message telling the
date and time-of-day when the listing was printed and the fully-
qualified name of the trace file being used. The meanings of the
three remaining items in the header message are as follows:

LAST OPENED ON etc.   This tells you the data and time-of-day when
                           the trace was performed.

SYSTEM ID=xx.yy   This tells you the version number (xx) and
                           fix level (yy) of the MPE/3000 operating
                           system that was being used when the trace
                           was performed.

CS ID=xx.yy   This tells you the version number (xx) and
                           fix level (yy) of the CS/3000 subsystem that
                           was being used when the trace was performed.

```
********************************
* BEGIN TRACING FOR DEVICE 14 *
********************************

*************************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*************************************************************
*  LINE NUMBER: 3         LOGICAL DEV. NUMBER: 14      *
*  DEV. TYPE: 17          SURTYPE: 7     VER: A.04.02  *
*               012345678901234 5                      *
*  COPTIONS: 0001100011000010                          *
*  AOPTIONS: 0000000100001101                          *
*  DOPTIONS: C100010100010000                          *
*  NUMBUFFERS: 1              BUFFSIZE: 1024 (WORDS)   *
*  INSPEED: 1200              OUTSPEED: 1200           *
*  MISCARRAY:           RECEIVE TIMEOUT: 20    SECS.  *
*                         LOCAL TIMEOUT: 60    SECS.  *
*                       CONNECT TIMEOUT: 900   SECS.  *
*                      RESPONSE TIMEOUT: 300   MSECS. *
*                          LINE BID TIMEOUT: 60    SECS.  *
*                     NO. ERROR RETRIES: 7            *
*                  CLEAR-TO-SEND DELAY: 00.0  SECS.  *
*                  DATA-SET-READY DELAY: DISABLED.   *
*                      TRANSMISSION MODE: HALF DUPLEX.*
*                  MMSTAT TRACE FACILITY: ENABLED.   *
*                      POLL LOOP DELAY: 10     MSECS.*
*                          POLL REPEAT: 0            *
*                      POLL ENTRY DELAY: 10     MSECS.*
*  DRIVERNAME: IOINP0                                  *
*  DOWNLOAD FILE: CSDMTSO.PUB.SYS               (Binary value)
*  CTRACEINFO:   ENTRIES=24     MASK=011111000   *
*                TYPE OF TRACE = ALL, NOWRAP     *
*  POLLIST:      ENTRIES=3          INDEX=13     *
*      1 GRP = 1             2 GRP = 3           *
*      3 GRP = 4                                 *
*  PHONELIST:    ENTRIES=0          INDEX=0      *
*  ICLIST:       ENTRIES=0          INDEX=0      *
*  SUPLIST: GROUPS=6                DESC=00000000*
*  GRP   1   STATIONS= 1               DESC=00000001  Group Poll/Select
*         ⎧  POLL   ID = 4141  ASCII=AA  EBCDIC=   ⎫   IDs (General)
*         ⎨  SEL    ID = 6161  ASCII=aa  EBCDIC=//  ⎬  (Hexadecimal
*         ⎩GEN POLL ID = 2222  ASCII=**  EBCDIC=   ⎭   value)
*  STA 1    COMPONENTS= 1             TYPE=0
*    CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=
*           SEL    = 4141  ASCII=AA   EBCDIC=
*  GRP   2   STATIONS= 1               DESC=00000001  *
*            POLL   ID = 4242  ASCII=BB  EBCDIC=!!  *
*            SEL    ID = 6262  ASCII=bb  EBCDIC=22  *
*          GEN POLL ID = 2222  ASCII=**  EBCDIC=   *
*  ⎧STA 1   COMPONENTS= 1             TYPE=0        *
*  ⎨ CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=   ⎬   Station/Device ID
*  ⎩        SEL    = 4141  ASCII=AA   EBCDIC=   ⎭   (Hexadecimal
*  GRP   3   STATIONS= 1               DESC=00000001  value)
*            POLL   ID = 4343  ASCII=CC  EBCDIC=**  *
*            SEL    ID = 6363  ASCII=cc  EBCDIC=33  *
*          GEN POLL ID = 2222  ASCII=**  EBCDIC=   *
*  STA 1    COMPONENTS= 1             TYPE=0        *
*    CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=
*           SEL    = 4141  ASCII=AA   EBCDIC=
*  GRP   4   STATIONS= 1               DESC=00000001  *
*            POLL   ID = 4444  ASCII=DD  EBCDIC=##  *
*            SEL    ID = 6464  ASCII=dd  EBCDIC=44  *
*          GEN POLL ID = 2222  ASCII=**  EBCDIC=   *
*  STA 1    COMPONENTS= 1             TYPE=0        *
*    CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=
*           SEL    = 4141  ASCII=AA   EBCDIC=
*  GRP   5   STATIONS= 1               DESC=00000001  *
*            POLL   ID = 4545  ASCII=EE  EBCDIC=$$  *
*            SEL    ID = 6565  ASCII=ee  EBCDIC=55  *
*          GEN POLL ID = 2222  ASCII=**  EBCDIC=   *
*  STA 1    COMPONENTS= 1             TYPE=0        *
*    CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=
*           SEL    = 4141  ASCII=AA   EBCDIC=
*  GRP   6   STATIONS= 3               DESC=00000001  *
*            POLL   ID = 4646  ASCII=FF  EBCDIC=XX  *
*            SEL    ID = 6666  ASCII=ff  EBCDIC=66  *
*          GEN POLL ID = 2222  ASCII=**  EBCDIC=   *
*  ⎧STA 1   COMPONENTS= 1             TYPE=0        ⎫
*  ⎪ CMP 0  POLL   = 4141  ASCII=AA   EBCDIC=     ⎪
*  ⎪        SEL    = 4141  ASCII=AA   EBCDIC=     ⎪
*  ⎪STA 2   COMPONENTS= 1             TYPE=0        ⎬
*  ⎨ CMP 0  POLL   = 4242  ASCII=BB   EBCDIC=!!   ⎪ Stations in
*  ⎪        SEL    = 4242  ASCII=BB   EBCDIC=!!   ⎪ the Group
*  ⎪STA 3   COMPONENTS= 1             TYPE=0        ⎪
*  ⎩ CMP 0  POLL   = 4343  ASCII=CC   EBCDIC=**   ⎭
*           SEL    = 4343  ASCII=CC   EBCDIC=**/  *
*  ERRORCODE: RECOVERABLE=0   IRRECOVERABLE=201  *
*  MSGSENT: 1298           MSGRECV: 413          *
*  RECOVERRORS: 3         IRRECOVERRORS: 0       *
*************************************************************
```

TRACE

BEGIN TRACING MESSAGE -

LINE NUMBER -

AFT entry.

LOGICAL DEV. NUMBER -

Number as specified during system configuration.

DEV. TYPE -

As specified during system configuration.   INP=17, SSLC=18, HSI=19

SUBTYPE -

As specified during system configuration.

0 Point-to-point switch line (modem)
1 Point-to-point non-switched line (modem)
3 Point-to-point non-switched line (no modem)
7 Non-switched (hardwired) line with ASYNC mode.

VER -

CS driver version number.

:OPTIONS

A word describing the communications options associated with the line.

(0:1)   inhibit timeout

    = 0 allow timeout
    = 1 disable all timeouts

(1:1)   ID Sequence Verification

    = 0 allow the use of ID sequences (both user-supplied
        and configured defaults).
    = 1 inhibit the use of ID sequences. Any user-supplied
        or configured default ID sequences will be ignored
        (applies to both local and remote ID sequences).

(2:1)   CS trace

    = 0 do not invoke CS trace facility.
    = 1 invoke CS trace facility. See also CTRACEINFO.

(4:2)   Speed Select (European modems only)

    = 0 use configured default setting
    =
      1 set speed to low speed
    = 2 set speed to high speed
    = 3 reserved for future use. Specification of this value
        will cause a COPEN error.

(6:4)   Local Mode ("local" means the station at your end of the
        line)

    = 0 use configured default setting
    = 1 local is a primary contention station
    = 2 local is a secondary contention station
    = 3 local is a control station on a multipoint line
    = 4 local is a secondary station on a multipoint line
    = 5 local is an HPDLC.System acting as DTE.
    = 6 local is an HPDLC.System acting as DCE.
    = 7-15 reserved for HP use.

    A COPEN error will result if local mode is not compatible
    with either COPEN parameters or configured line values.

TRACE

(10:6) Transmission code

     = 0 use configured default setting
     = 1 use automatic code sensing feature of driver
     = 2 ASCII
     = 3 EBCDIC
     = 4-63 reserved for HP use

AOPTIONS

A word describing the access options associated with the line.

(0:8) Protocol

     = 0 use configured default protocol
     = 1 use BSC protocol
     = 2 use MRJE protocol (Conversational BSC)
     = 3 use HPDLC-I protocol
     = 4 255 reserved for HP use

A COPEN error will result if protocol is not compatible with
configured line specification or driver capabilities.

(8:1) Allows the user to choose Alpha and Graphic characters
       in the phone number specified.

     = 0 only numeric and "-" are allowed. (default)
     = 1 allows Alpha, Numeric, and Graphic characters.

(9:1) Designates whether or not to delay the INP powerfail
       recovery (necessary for a series 64).

     = 0 no delay (default)
     = 1 delay

       Note: No user control; set internally by CS.

(10:1) (reserved for future use.)

(11:1) Inhibit Console Error Message

     = 0 allow CS to print hardware error message of operator
         console.
     = 1 inhibit CS from printing hardware error message at
         operator console.

(12:2) Dial type

     = 0 dial on write connect; answer on read connect
     = 1 answer on write connect; dial on read connect
     = 2 dial on write connect; dial on read connect
     = 3 answer on write connect; answer on read connect

(15:1) Wait mode

> = 0 perform all I/O using NCIO
> = 1 perform all I/O using CIO

Note: Only users executing in privileged mode may open a line with CIO and no buffering.

DOPTIONS

A word describing driver-related options. For the SSLC Drivers and BSC INP Driver, the format of DOPTIONS is as follows:

(0:1) Reversed for future use.

(1:1) Delay sequence wait.

> = 0 wait on received WACK/TTD sequences.
> = 1 Do not wait on received WACK/TTD sequences.

(2:1) Poll termination sequence.

> = 0 Before switching between stations, an RVI is
>   transmitted to return the line to control mode.
> = 1 Before switching between stations, an EOT is
>   transmitted to return the line to control mode.

TRACE

(3:1)   Control state listen mode.

      = 0 While in control state and between user requests the
          driver will listen for any contorl sequences from the
          remote.
      = 1 While in control state and between user requests the
          driver will ignore any control sequences from the
          remote.

(4:2)   Ending sequence:

      = 0 Use BSC default (NSW=send EOT; SW=send DLE EOT)
      = 1 send DLE EOT
      = 2 send EOT

(6:1)   = 0 the remote will not send leading graphics
      = 1 expect leading graphics from the remote

(7:1)   Value of USASCII block check character (bcc).

      = 0 VRC/LRC (non-transparent mode or transparent with
             header)
         CRC-16 (transparent mode with no header)
      = 1 VRC/CRC-16 (non transparent mode)
         CRC-16 (transparent mode)

(8:1)   = 0 automatic generation of WACK
      = 1 no WACK will be sent

(9:1)   = 0 automatic generation of TTD
      = 1 no TTD will be sent

(10:1) = 0 do not expect to receive ITB sequences from the
          remote station

        Note: If an ITB sequence is received, the driver will
              require a retransmission to properly receive
              the message. The driver then sets this bit to a
              one.

      = 1 Expect ITB sequence form the remote station.

(11:2) Message Format Word (MFW)

      = 0 MFW will not be placed into received text nor expected
         in sent text. CS will use an implicit MFW of 000000
         for sent text.
      = 1 MFW will not be placed into received text nor expected
         in sent text. CS will use an implicit MFW of 100000
         for sent text.
      = 2 MFW will be placed into received text and expected in
         send text.
      = 3 reserved for future use.

(13:1) = 0 Multipoint primary station will reselect the device
          for every write request.
       = 1 Multipoint primary station will not reselect the
          device if a write request follows a read request.

(14:2) Number of leading SYNs
       = 0 send four leading SYNs
       = 1 send eight leading SYNs
       = 2 send twelve leading SYNs
       = 3 send sixteen leading SYNs

For the <u>HSI Driver</u>, the format of DOPTIONS is as follows:

(0:1) Reserved for future use.

(1:1) Delay sequence wait

(2:1) Ignored

(3:1) Control state listen mode
       = 0 while in control state and between user requests the
          driver will listen for any control sequences from the
          remote. Receipt of a line bid will cause the line
          to be placed into text state.
       = 1 while in control state and between user requests the
          driver will ignore any control sequences from the
          remote.

(4:2) Ending sequence:

       = 0 use BSC default (NSW=send EOT; SW=send DLE EOT)
       = 1 send DLE EOT
       = 2 send EOT

(7:1) Ignored

(8:1) = 0 automatic generation of WACK. Enable.
       = 1 no WACK will be sent. Disable.

(9:1) = 0 automatic generation of TTD. Enable.
       = 1 no TTD will be sent. Disable.

(10:3) Ignored

(13:1) Reserved for future use.

(14:2) Ignored

          Note: Most of the remaining LID entries are self-
                 explanatory.

TRACE

For the HPDLC-I INP driver the format of DOPTIONS is as follows:

(0:1)   Looped back mode:

      0 = normal.
      1 = looped back.

(1.1)   Satellite simulation mode:

      0 = normal.
      1 = simulate satellite delay.

(2:6)   Reserved.

(8:8)   Maximum number of outstanding frames. This is parameter K
        in the HPDLC-I protocol. Valid values are one through
        seven. The default value is seven.

NUMBUFFERS -

Total assigned to the line.

BUFFSIZE -

May differ from configured size due to subsystem requirements
(i.e., RJE 3780 = 512 words, etc.).

INSPEED/OUTSPEED -

Line input/output speed in characters per second.

MISCARRY -

The time out values may change during execution, and may not be
operational depending on subsystem and function.

MISCARRY format is:

Logical array

0 Number of words of parameter information following this word.
1 Parameter type.
2-n parameter value

Repeat the last two fields for each parameter type to be specified, as follows:
type, value

TYPE   MEANING OF VALUE

0   Receive Timeout (seconds) Default = 20*

1   Local Timeout (seconds) Default = 60*

2   Connect Timeout (seconds) Default = 900*

3   Response Timeout (seconds) Default = 3*

4   Line Bid Timeout (seconds) Default = 60*

5   Number of Error Recovery Retries Default = 6

6   = 0 Clear-To-Send. Delay determined by modems

       <> Clear-To-Send. Delay value in tenths of seconds.

       On an INP this parameter defines the amount of time the driver will await the expected clear to send change before deciding the modem is broken. The default value is 300 milliseconds.

7   = 0 Data Set Ready. No stabilization time.

       = 1 Data Set Ready. 100 Msec stabilization time after it goes true.

8   = 0 Transmission mode = full duplex.

       = 1 Transmission mode = half duplex.

9   = 0 Disable MMSTAT trace facility.

       <> 0 Enable MMSTAT trace facility (Memory Management).

       This is not implemented for an INP.

10   Poll Loop Delay. (.01 sec. each) Delay between iterations through Poll List (0=∞).

11   Poll Repeat. Number of iterations through Poll List (0=∞). Terminates when station responds or number of passes satisfied.

12   Poll Entry Delay. (.001 sec. each) Delay between polling entries in list. 0 disables timeout.

* A value of 0 will disable timeout.

TRACE

DRIVERNAME -

The name of the line driver being used.

CTRACE INFO

ENTRIES are the number of entries per record.

MASK is the binary specification of the events to be traced.

Type of trace indictes whether ALL or I/O errors are to be traced, and whether the Trace file is to be overlayed, WRAP.

POLLIST -

A set of multipoint station identifiers used for polling.

PHONELIST -

A set of telephone numbers to be used to prompt for dialing a switched line connection.

IDLIST -

A set of identification characters to be sent and to be received. RJE/3000 will send an ID sequence, but not receive them.

SUPLIST -

The maximum set of groups, stations, and components which will be recognized on a multipoint line.

ERRORCODE -

A specification of the type of error which occurred.

MSGSENT/MSGRECV -

Number of blocks correctly received or sent and acknowledged.

RECOVERRORS -

Number of errors during entire TRACE duration.

IRRECOVERRORS -

Note the subsystem may fail due to satisfactory BISYNC conditions which may abort the job, but still not be considered an irrecoverable error (i.e., receive a DLE EOT).

The CS error codes are returned in the ERRORCODE parameter in a procedure call to CCHECK. Irrecoverable errors are returned in ERRORCODE. (8:8), while recoverable errors are returned in ERRORCODE. (0:8).

Irrecoverable Errors.

RANGE	DESCRIPTION
0	Request completed successfully.
1-40	An error was found by the COPEN intrinsic.
41-50	The request was not initiated because of an error found by the CS intrinsics (including COPEN).
51-81	The request as not initiated because of an error found by the CS intrinsics (except COPEN).
84-109	A hardware error occurred or INP self test failed.
110-113	INP trace process detected error.
115-124	Main frame IC detected error.
151-200	An error or exceptional condition which resulted in the line being disconnected, which is driver dependent, occurred.
201-250	An error or exceptional condition occurred which did not result in the line being disconnected, which is driver dependent occurred.

Code Meaning of Irrecoverable Errors

CODE (DECIMAL)	MEANING
0	Request completed successfully.
1	None, or too many groups.
2	None, or too many stations.
3	None, or too many components.
4	Invalid poll or selection sequence length.
5	Not enough stack space for COPEN to process.

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
6	Invalid driver name.
7	Driver not found in system.
8	Driver not compatible with attributes of the line.
9	The line was not configured to allow for changeable drivers.
10	Undefined line device.
11	Line device not available.
12	Not a CS line device.
13	CS line device in use.
14	Invalid ID sequence length. It exceeds 16 characters.
15	Invalid buffer size. It exceeds configured device maximum.
17	Invalid telephone number length. It exceeds 20 characters.
18	Illegal character in telephone number. Only numerics or a hyphen character are allowed.
19	Local mode not compatible with line type.
20	Invalid information value in MISCARRAY.
21	Invalid information value in MISCARRAY.
23	Invalid entry in the poll list
24	Could not open trace file
25	Trace process unable to get, lock, or freeze extra data segment. [Trace file record size was too small] [Insufficient trace buffer space.]
26	Invalid user capability. User does not have CS capability.
27	Invalid line designator.
28	No line designator or device specified.

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
29	Too many files or lines. Insufficient PCBX space.
31	Insufficient main memory space.
32	Driver failed to open
33	Local mode was control station, but the SUPLIST parameter was not specified.
35	Down load file error.
38	Mainframe trace process not created or active.
39	Not enough INP buffer space.
40	Must have an INP with an autodialer.
41	Does not have autodial capability
47	Unable to lock code in memory.
48	No memory space available for tracing and/or buffering.
49	DB register not pointing at stack.
50	Process handling capability needed to trace.
51	Invalid line number. No such line.
52	Invalid parameter value.
53	Trace process detected a read error.
54	Autodialer detected errors.
55	No phone list exists.
56	Invalid buffer count parameter.
57	Console operator replied "NO" to a dial prompting message.
58	No telephone number list for dial attempt.
59	System problem with dial message

CS ERRORS

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
60	Invalid array length parameter.
61	CCONTROL code value invalid.
62	The device must be an INP.
63	No I/O in progress to abort.
64	Abort ignored because I/O already completed or aborted.
65	Logical group number value is invalid
66	Logical station number value is invalid
67	Logical component number
68	Non-existent phone index specified.
69	Phone number specified is not the same length as the current phone number.
70	Maximum allowed outstanding writes exceeded.
71	Maximum allowed outstanding reads exceeded.
72	Current phone index doesn't exist.
73	Parameter bounds violation
74	No CS buffers remaining.
76	Required buffer parameter absent.
77	Too many I/O requests. IOWAIT needed. Or, concurrent I/O in progress.
78	No I/O pending for any file or line.
79	No I/O pending for specified file or line.
80	Illegal operation of INP device.
81	File system error in INP dump.
82	Unexpected INP Shutdown
83	INP System failure
84	INP USYNRT failure with DMA.

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
85	INP parity error.
86	INP RAM software error
87	INP received invalid self-test control character.
88	INP DMA self-test error.
89	INP microprocessor (MC2) failure.
90	INP ROM failure.
91	INP RAM failure.
92	INP USART transmitter overrun.
93	INP USART parity error.
94	INP USART self-test receive error.
95	INP USYNRT self-test transmitter underrun.
96	INP USYNRT self-test receive error.
97	INP USYNRT self-test receive overrun.
98	INP USYNRT self-test receive aborted.
99	INP USART self-test received no data.
101	Non-responding device.
102	Data transfer error
103	Data set not ready.
104	Carrier lost.
105	Data overrun
106	INP USYNRT received no data.
107	INP USART failure with DMA
108	INP timer failure.
109	INP RAM parity error.

CS ERRORS

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
110	INP has no memory for trace buffers.
111	Illegal number of trace buffers requested for INP
112	Illegal start or stop requests for INP trace.
113	Illegal trace record size value specified for INP.
114	The device must be an INP
115	Power failure during down load.
116	Mainframe IC driver timed out.
117	Invalid interrupt.
118	Start or stop I/O program error.
119	Power failure recovery error.
120	Internal driver error.
121	ROM self test error
122	HP IB error.
123	GIC error
124	Reset while in RAM.
130	INP system failure. Highest value.
151	Connect timeout occurred.
152	Line bid not received.
153	Remote station rejected the connection.
154	Power failure occurred.
155	Local timeout occurred.
156	An internal error was detected by the driver.
157	Remote station protocol error occurred.
158	Remote station sent shutdown sequence and disconnected.

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
159	Remote station sent shutdown sequence and disconnected before the I/O request was issued.
160	An internal error was detected by the MPE.
161	Initialization timer expired.
201	Operation aborted.
202	Invalid request detected by the driver
203	Remote station is not ready to accept line bid. The remote station sent a NAK in sequence in response to the local line bid.
204	Remote station rejected the line bid.
205	Remote primary station bid for the line while.
206	Remote has requested to send. (An RVI sequence was received.)
207	Driver retry counter exhausted.
208	Unexpected text was received.
209	Receive timout expired while waiting for text from the remote station.
210	Remote station sent end-of-transmission
211	Remote station sent end-of-transmission sequence, and disconnected before the I/O request was issued.
212	During the execution of a CWRITE conversational with the output buffer to be the input buffer also, the remote requested a resend of the output buffer; but, its contents had been modified while receiving from the remote.
213	Remote station sent an ACK sequence in response to local CREAD acknowledgement.
214	Remote station sent an NAK sequence in response to a local CREAD acknowledgement.
215	Remote station sent an RVI sequence in response to a local CREAD acknowledgement.

CS ERRORS

Code Meaning of Irrecoverable Errors (continued)

CODE (DECIMAL)	MEANING
216	Remote station requested a download sequence be initiated.
217	No line bid was received from the remote station; local station timed out.
218	Remote sent a delay sequence instead of the expected text or response.
219	The entries in the pollist were polled the required number of times and no station responded.
220	An EOT was receoved from the remote station before the last block of multiblock transmission was sent.
221	After an RVI was sent to the remote station, it responced with text instead of the expected EOT.
222	All stations on a multipoint line are down.
223	Too much data was transmitted by the remote station. Part of the data was lost. Buffer overflow.
224	All stations on a multipoint line are logically down.
250	Unable to lock code in memory.

Recoverable Errors

CODE (DECIMAL)	MEANING
0	No recoverable error occurred.
1	Invalid ID sequence received
2	Received unintelligible sequence.
3	Block check character of field check sequence error.
4	Response timeout occurred.
5	Received incorrect acknowledgement.
6	Remote station attempted to bid for the line.
7	Remote station did not respond to the local line bid.
8	Received unintelligible sequence after sending text.
9	Received inquiry character after sending text.
10	Remote station requested a resend of the last local response.
11	Remote station requested a resend of the last text block.
12	Received end-of-transmission character while in control state.
13	Received text overflow.
14	Data overrun occured on SIO multiplexor.
15	Transfer error occurred on the SIO multiplexor.
17	Data underrun on INP interface board.
18	Host sent invalid data to 3270 station.
19	Requeue 3270 screen for transmit.

CS ERRORS

System Failure Codes in CS

900	I/O request no longer associated with process.
902	Unable to freeze of lock a code segment in main memory.
903	Unable to lock or unlock a segment in main memory.
904	Unable to increase a data segment size
905	Unable to decrease a data segment size.
906	Unable to unfreeze a code segment in main memory.
907	Unable to unlock a code segment in main memory.
909	Invalid pointer to poll list entry.
910	Invalid IO queue index value
911	IO queue value cleared after return from MMSTAT procedure

The recommended action for all of the above is to perform a cold dump, and to forward it to HP for analysis.

Data Comm File System Errors

201	Invalid ID sequence (FSERR 201)
202	Invalid telephone number (FSERR 202)
203	No telephone list specified (FSERR 203)

:SHOWCOM |dev[;ERROR][;RESET]

- ldev is the logical device number of a communications controller

- ERROR will produce a more detailed display of erors.

- RESET will clear totals.

Use of this command must be specifically ALLOWed.

INP DUMP FACILITY

INP dump analysis is done only by factory level support
personnel. The messagex at the sytem console announcing
board failure and dump are

    INP BOARD FAILURE - LDEV xx

where xx is a logical device number.

    INP RAM DUMPED IN INPLOGnn

    STORE AND PURGE ALL INPLOGnn FILES

where nn identifies a dump file created in the PUB group of
the SYS account.

Formatted output of an INP dump file, identified by the
console messages above, is done as follows:

Omit the following to default output to $STDLIST, or divert
output to device class LP.

    :FILE INPLIST;DEV=LP;CCTL

Identify the file to be formatted, such as the one indicated
in a console message.

    :FILE INPDUMP=INPLOGnn.PUB.SYS

Execute the dump file formatter.

    :RUN INPDPAN.PUB.SYS,FULLDUMP

You can store all INP dump files with the following commands:

    :FILE INPTAPE;DEV=TAPE
    :STORE INPLOG##.PUB.SYS;*INTAPE

Once you have finished using inplognn dump files, remember
to purge them, because their numbers are limited.

NOTE: The system can build up to 99 INP log files.

CSLIST

CSLIST allows the user to obtain a list of the version, update, and fix (VUF) of the installed CS modules. It also shows the VUF of the latest release of the CS modules to verify that the installed CS modules are current.

In addition, CSLIST allows the user to obtain information for the HP-Standard or user-designated INP download files. This information includes Download File Name, Protocol Type, Board Type, Compile Date, and four version numbers - IC, Protocol, Trace, and RamCP. The information for the HP-Standard download files is accessed through the normal processing of CSLIST. In order to input specific download files names, use the CSLIST entry point INP.

OPERATION:

Standard User Mode:

1. The program is executed by a :RUN CSLIST.PUB.SYS command.
   A header is printed out followed by a short explanation.

2. The question "DO YOU WANT A COMPLETE LISTING OF INSTALLED VUFS?" follows. Possible responses:
   YES (or Y) - A complete listing is produced.
   NO (or N) - VUFs of only non-current modules are listed.

3. "DO YOU WANT THE INP DOWNLOAD FILE INFORMATION?" is asked.
   Possible responses:
   YES (or Y) - A listing of the information for the HP-Standard
               download files is produced.
   NO (or N) - No listing is produced.

4. "SHOULD OUTPUT BE DIRECTED TO THE LP?" is asked.
   Possible responses:
   YES (or Y) - Output is directed to the LP. If no :FILE LP
               equation exists, the file LP defaults to device
               class LP - i.e., :FILE LP;DEV=LP is assumed.
   NO (or N) - Output is directed to $STDLIST.

5. The requested listings are now produced and sent to the correct output device. A total count of CS modules that do not have a current VUF is printed on $STDLIST. Any errors encountered while processing the download file information are printed to $STDLIST and to the LP, if output has been directed there (see next section on errors).

CSLIST

SPECIAL MODE (TO ACCESS INFORMATION ON SPECIFIC DOWNLOAD FILES):

1. The program is executed by a :RUN CSLIST.PUB.SYS,INP command.
    A short explanation is printed.

2. "SHOULD OUTPUT BE DIRECTED TO THE LP?" is asked.
    Possible responses:
    YES (or Y) - Output is directed to the file LP. If no
       :FILE LP equation exists, the file LP defaults to device
       class LP - i.e., :FILE LP;DEV=LP is assumed.
    NO (or N) - Output is directed to $STDLIST.

3. The prompt "DOWNLOAD FILE NAME= " is printed.
    Possible responses:
    EXIT (or E, e, exit, //, or carriage return) - Program
       terminates.
    file name - A listing of the information for this download
       file is produced on the requested device and the prompt
       is repeated.

ERROR MESSAGES PRODUCED DURING THE SEARCH FOR DOWNLOAD FILE
INFORMATION

Most of the recoverable and irrecoverable errors possible when run-
ning this program are self-explanatory. However, the user should
take note of the following mesages:

INVALID ADDRESS ON (file name) - An invalid address was encountered
   while following the pointers around the download file to access
   the miscellaneous information. Probably this download file is not
   in a format compatible with CSLIST. Make sure the download file
   is from CS release 5.04 or later. Although some information may
   be printed, it may be incorrect if the file is not in the correct
   format.

FOPEN ERROR ON (file name) - The program was not able to open the
   designated file - probably because the file does not exist.

FILE (file name) INVALID TYPE - The designated file does not pass
   the download file verification tests.

DSN/IMF
INTERACTIVE MAINFRAME FACILITY

For information about DSN/IMF for the HP 3000 refer to:

DSN/IMF Reference Manual (32229-90001),
IBM 3270 Information Display System Component Description
      (IBM Document GA27-2749)
IBM 3271, 3272, 3275 Control Unit Description and Programmer's
      Guide (IBM Document GA23-0060)
IBM 3274 Control Unit Description and Programmer's Guide
      (IBM Document GA23-0061)
IBM 3276 COntrol Unit Description and Programmer's Guide
      (IBM Document GA18-2081)

CONTENTS   PAGE

GENERAL INFORMATION

DSN/IMF for the HP 3000
3270 Emulator Software

HP 3000 Requirements

- DSN/INP Interface:
  HP 30010A for an HP 3000 Series II/III;
  HP 30020A for an HP 3000 Series 30/33/40/44;
  HP 30020B for an HP 3000 Series 30/33/40/44/64.

- Terminals supported by the Pass Thru Facility:

  ATC, ADCC, or ATP connection:
  HP 2622A HP 2624A HP 2626A HP 2640B HP 2640N HP 2640S
  HP 2382A HP 2622A HP 2624A HP 2624B HP 2626A HP 2626W
  HP 2640B HP 2640N HP 2640S HP 2642A HP 2645A HP 2645N
  HP 2645S HP 2647A HP 2648A

  DSN/MTS Terminals:
  HP 2624B HP 2626A HP 2645A HP 2647A HP 2648A

  HP 264x terminals using DSN/IMF require 8K memory and the
  display enhancements option. Multipoint terminals require an
  additional 4K of memory for multipoint operation.

  Printers   See IMF Reference Manual Page A-2

  HP 3000 Series II/III:

  HP 2608A HP 2613A HP 2617A HP 2619A HP 2631B

  HP 3000 Series 30/33/44:

  HP 2608A HP 2631B

HOST CAPABILITY

IBM 3270 screen sizes of either 480 or 1920 characters.

DSN/IMF INTRINSICS

General Information

● Parameter types are:
  BA Byte Array
  I   Integer
  IA Integer Array

● All parameters are passed by reference.
● All parameters are required.
● All intrinsics are untyped. None return a value.
● No intrinsics return a condition code.
● Those intrinsics that use row and column parameters assume values to begin with zero (0).
● No split stack intrinsic calls are allowed.

COBOL data descriptions

Use the following data item descriptions at levels 01 and 77 for COBOL.

DATA TYPE	SYNTAX
Numeric (1 word)	PICTURE S9(4) COMPUTATIONAL
Alphanumeric	PICTURE X(n) or PICTURE A(n)
Numeric String	05 identifier
	10 filler PIC S9(4) COMP SYNC [VALUE(......)]
	.
	.
	.
	10 filler PIC S9(4) COMP SYNC [VALUE(......)]

INTRINSICS

ABORT3270 – ABORTS OUTSTANDING NO-WAIT RECV3270 OR TRAN3270 REQUEST.

```
ABORT3270( terminalid, result)
              I          I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CABORT3270" USING TERMINALID RESULT.

Both parameters are numeric data items.

FORTRAN calling sequence:

CALL ABORT3270 (TERMINALID RESULT)

Both parameters are integer variables.

BASIC calling sequence:

CALL BABORT3270 (T,R)

Both parameters are integer variables.

ACQUIRE 3270 – PROVIDES PASS THRU CAPABILITY.

```
ACQUIRE3270 (confile, devicenum, ldev, enhance, priority,
             BA       I       I      I         I
        blanks, format, flags, result)
          I      I      I      I
```

confile (input)	Name of configuration file
devicenum (input)	Device number on control unit, (0<=n<=31).
ldev (input)	Logical device number of an HP 3000 terminal or printer to be used for Pass Thru
enhance (input)	Display enhancement options:

enhance:	3270 Normal Brightness converted to:	3270 High Intensity converted to:
0	264x Half Bright 262x Normal	262x/264x Normal
1	262x/264x Normal	262x/264x Underline
2	262x/264x Normal	262x/264x Inverse Video
3	262x/264x Inverse Video	262x/264x Normal

priority (input)	User-provided output priority for Pass Thru Capability.
blanks (input)	0 = convert leading blanks of an unprotected field into null characters. 1 = do not convert leading blanks.
format (input)	Informs Pass Thru which form of screen printing is to be used whenever the <u>f7 (PRINT)</u> key is used.

1 = Print the internal screen image with the location and characteristic of each attribute character.

2 = Print the internal screen image as it appears at the terminal.

3 = This is the same as <u>format = 1</u>; however, a copy of the screen is printed whenever RECV3270 or TRAN3270 is called.

	4 = This is the same as <u>format = 2</u>; however, a copy of the screen is printed whenever RECV3270 or TRAN3270 is called.
flags (input)	0 = Continue execution of user program after Pass Thru is activated as a son process. 1 = Reactivate the user program when Pass Thru terminates. 2 = Continue execution of user program after Pass Thru is activated as a son process.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CACQUIRE3270" USING CONFILE DEVICENUM LDEV ENHANCE PRIORITY
BLANKS FORMAT FLAGS RESULT.

All parameters are numeric data items, except CONFILE which is an alphanumeric data item.

FORTRAN calling sequence:

CALL ACQUIRE3270 (CONFILE, DEVICENUM, LDEV, ENHANCE, PRIORITY,
BLANKS, FORMAT, FLAGS, RESULT)

All parameters are **integer** data items, except CONFILE which is a character variable.

BASIC calling sequence:

CALL BACQUIRE3270 (C$, D1, L0, E1, P2, B1, F3, F, R)

All parameters are integer type, except C$ which is a string variable.

ATTRLIST – RETURN LOCATION OF ATTRIBUTE CHARACTERS IN A SCREEN.

```
ATTRLIST (terminalid, offset, subscreensize, maxlistlen,
            I         I          I            I
         fieldnum, offsetlist, actlistlen, result)
            I         I           I          I
```

---

terminalid (input)	A common parameter described below in "Common Parameters".
offset (input)	An offset in characters into the internal screen image, starting from zero. This describes where to start searching for attribute bytes.
subscreensize (input)	Size of the screen to be searched.
maxlistlen (input)	The number of elements in the array offsetlist.
fieldnum (input)	A common parameter described below in "Common Parameters".
offsetlist (output)	An array of the offset locations of the attribute characters within the screen area specified by offset and subscreensize.
actlistlen (output)	A count of the actual number of attributes in the screen subsection defined by offset and subscreensize.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CATTRLIST" UISNG TERMINALID OFFSET SUBSCREENSIZE MAXLISTLEN
FIELDNUM OFFSETLIST ACTLISTLEN RESULT.

All parameters are numeric data items.

FORTRAN calling sequence:

CALL ATTRLIST (TERMINALID, OFFSET, MAXLISTLEN, FIELDNUM,
OFFSETLIST, ACTLISTLEN, RESULT)

All parameters are integers, except for OFFSETLIST which is an
integer array.

INTRINSICS

BASIC calling sequence:

CALL BATTRLIST (T, 01, L1, L2, N, 02(*), L3, R)

All parameters are integer variables, except for 02 which is an integer array

CLOSE3270 – TURN OFF SPECIFIED DEVICE.

```
CLOSE3270 (terminalid, result )
              I          I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CCLOSE3270" USING TERMINALID RESULT.

Both parameters are numeric data items.

FORTRAN calling sequence:

CALL CLOSE3270 (TERMINALID, RESULT)

Both parameters are integer variables.

BASIC calling sequence:

CALL BCLOSE (T, R)

ERR3270 – RETURN ERROR MESSAGE.

```
ERR3270 (errorcode, msgbuf, msglength, result)
           I       BA        I         I
```

errorcode (input)	The contents of a <u>result</u> parameter from any other DSN/IMF intrinsic.
msgbuf (output)	A character string where a message associated <u>errorcode</u> will be returned. Plan for 144 characters.
msglength (output)	The number of characters returned in <u>msgbuf</u>.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CERR3270" USING ERRORCODE MSGBUF MSGLENGTH RESULT.

All parameters are numeric data items, except for MSGBUF, which is an alphanumeric data item.

FORTRAN calling sequence:

CALL ERR3270 (ERRORCODE, MSGBUF, MSGLENGTH, RESULT)

All parameters are integer variables, except for MSGBUF, which is a character array.

BASIC calling sequence:

CALL BERR3270 (E, M$, L, R)

All parameters are integers, except for M$, which is a string variable.

FIELDATTR – RETURN INFORMATION ABOUT THE ATTRIBUTES OF A SPECIFIED FIELD.

```
FIELDATTR (terminalid, fieldnum, fieldrow, fieldcolumn,
              I          I          I          I
           protectedattr, numericattr,  displayattr, mdt,
                I              I              I         I
           currentfieldlen, maxfieldlen, result)
                I                I           I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

fieldnum   A common parameter described below in "Common
(input)   Parameters".

fieldrow   A common parameter described below in "Common
(input)   Parameters".

fieldcolumn   A common parameter described below in "Common
(input)   Parameters".

protectedattr   0 = unprotected. 1 = protected.
(input)

numericattr   0 = alphanumeric. 1 = numeric.
(output)

displayattr   0 = normal display.   1 = normal display.
(output)   2 = intensified display. 3 = non-display,
                    non-print.

mdt   modified data tag
(output)   0 = modified data tag not set.
                    1 = modified data tag set.

currentfieldlen   The number of characters of the field in the
(output)   internal buffer, excluding training nulls.

maxfieldlen   The maximum number of characters the field
(output)   could contain.

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CFIELDATTR" UISNG TERMINALID FIELDNUM FIELDROW FIELDCOLUMN
PROTECTEDATTR NUMERICATTR DISPLAYATTR MDT LENGTH MAXLENGTH
RESULT.

All parameters are numeric data items.

FORTRAN calling sequence:

CALL FIELDATTR (TERMINALID, FIELDNUM, FIELDROWN, FIELDCOLUMN,
PROTECTEDATTR, NUMERICATTR, DISPLAYATTR, MDT, LENGTHJ, MAXLENGTH,
RESULT)

All parameters are integer variables.

BASIC calling sequence:

CALL BFIELDATTR (T, N, R0, C0, A1, A2, A3, A4, L5, L6, R)

All parameters are integer variables.

OPEN3270 – OPEN A 3270 EQUIVALENT TERMINAL AND ALLOCATE INTERNAL SCREEN BUFFER.

```
OPEN3270 ( deviceid, confile, flags, terminalid, devtype,
           I         BA       I      I           I
        ffindex, buffsize, timeout, result)
           I        I        IA       I
```

deviceid (input)	The identification number of an emulated 3270 device, as indicated in the configuration file.
confile (input)	Configuration file name, sufficiently qualified to obtain access and followed by a blank.
flags (input)	0 = wait I/O. 1 = no-wait I/O. 2 = wait I/O in data stream mode. 3 = no-wait I/O in data stream mode.
terminalid (output)	A unique identification number used by all other intrinsics to identify which OPEN3270 took place.
devtype (output)	A resultant device type. 0 = 3277 display and keyboard. 1 = 3277 display without keyboard. 2 = 3278 display and keyboard. 3 = 3278 display without keyboard. 4 = reserved. 5 = 3284 buffered printer.

```
 6 =  3286 printer.
 7 =  3287 printer with 3271 attachment.
 8 =  3287 printer with 3274 or 3276
       attachment.
 9 =  3288 printer.
10 =  3289 printer.
```

ffindex (output)	For printer a <u>devtype</u>, the number of lines per page, which is the number of lines between form feed index marks.
buffsize (output)	The maximum number of characters to be found in a buffer, either 480 or 1920.
timeout (input)	A two-word array, 0<=timeout<=28,800 seconds. A zero value disables the timer.
	First word: Keyboard enable timeout. Second word: Receive timeout.
result (intput)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "COPEN3270" USING DEVICEID CONFILE FLAGS TERMINALID DEVTYPE
FFINDEX BUFFSIZE TIMEOUT RESULT.

All parameters but CONFILE and TIMEOUT are numeric data items.
CONFILE is an alphanumeric data item. TIMEOUT is a two-element
numeric string.

FORTRAN calling sequence:

CALL OPEN3270 (DEVICEID, CONFILE, FLAGS, TERMINALID, DEVTYPE,
FFINDEX, BUFFSIZE, TIMEOUT, RESULT)

All parameters but CONFILE and TIMEOUT are type integer. CONFILE
is a character array. TIMEOUT is a two-word integer array.

BASIC calling sequence:

CALL BOPEN3270 (D, C$, F, T, D2, F1, B, T2(*), R)

All parameters but C$ and T2 are type integer. C$ is a string
variable. T2 is a two-element integer array.

PRINT3270 – PROVIDE A COPY OF THE INTERNAL SCREEN IMAGE TO FILE
LOGIMF.

```
PRINT3270 (terminalid, fileid, action, location, priority,
               I          I        I       BA         I
          results)
            I
```

terminalid (input)	A common parameter described below in "Common Parameters".
fileid (output then input)	An identification number initially returned by PRINT3270 to identify all subsequent use. The <u>fileid</u> identifies the spooler file.
action (input)	0 = Open output file. 1 = Print internal screen image as in <u>format = 1</u>. 2 = Print internal screen image as in <u>format = 2</u>. 3 = Print internal screen image as in <u>format = 3</u>. 4 = Print internal screen image as in <u>format = 4</u>.
location (input)	An identification string which is used to identify the origin of the PRINT3270 procedure call whenever <u>action = 1 or 2.</u> Fill or pad this array to total 40 characters.
priority (input)	The output priority for file LOGIMF.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CPRINT3270" USING TERMINALID FILEID ACTION LOCATION
PRIORITY RESULT.

All parameters are numeric data types except for LOCATION which
is an alphanumeric data item.

FORTRAN calling sequence:

CALL PRINT3270 (TERMINALID, FILEID, ACTION, LOCATION, PRIORITY,
RESULT)

INTRINSICS

All parameters are numeric data types except for LOCATION which is a character array.

BASIC calling sequence:

CALL BPRINT3270 (T, F2, O3, L$, P2, R)

All parameters are integer variables except for L$ which is a string variable.

READFIELD – READ A FIELD OF DATA FROM THE INTERNAL SCREEN BUFFER
INTO A USER DATA BUFFER.

```
READFIELD ( terminalid, fieldnum, offset, maxinbuflen, inbuf,
              I          I        I        I            BA
          actinbuflen, result)
              I          I
```

terminalid (input)	A common parameter described below in "Common Parameters".
fieldnum (input)	A common parameter described below in "Common Parameters".
offset (input)	A character displacement starting from zero within the field at which reading will begin.
maxinbuflen (input)	The maximum number of characters of the inbuf array parameter.
inbuf (output)	A character string containing the field contents.
actinbuflen (output)	The number of characters actually returned in the inbuf array parameter.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CREADFIELD" USING TERMINALID FIELDNUM OFFSET MAXINBUFLEN
INBUF ACTINBUFLEN RESULT.

All parameters are numeric data items, except for INBUF which is an alphanumeric data item.

FORTRAN calling sequence:

CALL CREADFIELD (TERMINALID, FIELDNUM, OFFSET, MAXINBUFLEN,
INBUF, ACTINBUFLEN, RESULT)

All parameters are integer, except for INBUF which is a character
array.

BASIC calling sequence:

CALL BREADFIELD (T, N, O, M, F$, A, R)

All parameters are integer variables, except for F$ which is a
string variable.

READSCREEN – READ FROM THE INTERNAL SCREEN BUFFER INTO A USER DATA BUFFER.

```
READSCREEN (terminalid, offset, maxinbuflen, inbuf, actinbuflen,
            I          I       I            BA      I
           result)
            I
```

terminalid (input)	A common parameter described below in "Common Parameters".
offset (input)	A character displacement starting from zero into the internal screen image at which reading will begin.
maxinbuflen (input)	The maximum number of characters of the <u>inbuf</u> parameter array.
inbuf (output)	A characterstring in which to return the data from the internal buffer. This must be large enough to accept <u>maxinbuflen</u> characters.
actinbuflen (output)	The actual length in characters of the data to the <u>inbuf</u> array.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CREADSCREEN" USING TERMINALID OFFSET MAXINBUFLEN INBUF
ACTINBUFLEN RESULT.

INTRINSICS

All parameters are numeric data items, except for INBUF which is an alphanumeric data item.

FORTRAN calling sequence:

CALL READSCREEN (TERMINALID, OFFSET, MAXINBUFLEN, INBUF, ACTINBUFLEN, RESULT)

All parameters are type integer, except for INBUF which is a character array.

BASIC calling sequence:

CALL BREADSCREEN (T, O, M1, I$, A, R)

All parameters are integer variables, except for I$ which is a string variable.

READSTREAM – RECEIVES DATA STREAM FROM THE SCREEN IMAGE INTO THE USER'S BUFFER, WITHOUT ANY TRANSLATION OF THE DATA BY IMF.

```
READSTREAM (terminalid, offset maxinbuflen,  inbuf, actinbuflen,
                I         I         I          BA         I
            result)
                I
```

NOTE

SDLC protocol and data stream MUST be specified in OPEN3270.

terminalid (input)	A common parameter described below in "Common Parameters".
offset (input)	The displacement in characters from the first character in the data stream, which = 0, at which data transfer will start.
maxinbuflen (input)	The maximum number of characters to transmit to inbuf.
inbuf (output)	The destination buffer containing the data stream.
actinbuflen (output)	The actual number of characters transmitted to inbuf.

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CREADSTREAM" USING TERMINALID OFFSET MAXINBUFLEN INBUF
ACTINBUFLEN RESULT.

All parameters are numeric data items except for INBUF, which is
an alphanumeric data item.

FORTRAN calling sequence:

CALL CREADSTREAM (TERMINALID, OFFSET, MAXINBUFLEN, INBUF,
ACTINBUFLEN, RESULT)

All parameters are numeric data items except for INBUF, which is
a a character array.

BASIC calling sequence:

CALL BREADSTREAM (T, O1, L7, I$, L8, R)

All parameters are integer variables, except for I$ which is a
string variable.

RECV3270 – ALLOW USER PROGRAM TO RECEIVE SCREEN AFTER MODIFICATION BY HOST.

```
RECV3270 (terminalid, result)
              I          I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CRECV3270" USING TERMINALID RESULT.

Both parameters are numeric data types.

INTRINSICS

FORTRAN calling sequence:

CALL RECV3270 (TERMINALID, RESULT)

Both parameters are integer variables.

BASIC calling sequence:

CALL BRECV3270 (T,R)

Both parameters are integer variables.

RESET3270 - EQUIVALENT OF THE RESET KEY.

```
RESET3270 (terminalid, result)
               I        I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CRESET3270" USING TERMINALID RESULT.

Both parameters are numeric data types.

FORTRAN calling sequence:

CALL RESET3270 (TERMINALID, RESULT)

Both parameters are integer variables.

BASIC calling sequence:

CALL BRESET3270 (T, R)

Both parameters are integer variables.

SCREENATTR – RETURN INFORMATION ABOUT THE ATTRIBUTES OF THE CURRENT SCREEN IMAGE.

```
SCREENATTR( terminalid, printformat, startprint, soundalarm,
            I           I           I           I
            keyboardlock, numfields, screenstatus, cursorrow,
            I             I          I             I
            cursorcolumn, result)
            I             I
```

terminalid (input)	A common parameter described below in "Common Parameters".
printformat (output)	printout format definition 0 = NL (new line), EM (end of message), and CR (carriage return) printer orders in the data of the fields determine the line length. The default is a 132-character line when these are absent. 1 = 40-character print line. 2 = 64-character print line. 3 = 80 character print line.
startprint (output)	1 = The host program has print output for this device.
soundalarm (output)	1 = The host program wants an audible alarm when the operation ends.
keyboardlock (output)	The current state of the keyboard. 1 = The keyboard is locked. Input is inhibited.
numfields (output)	The total number of fields in the internal buffer. 0 = The buffer is unformatted.
screenstatus (output)	0 = The host did not change either data or field attributes. 1 = Either data, or field, or both attributes may have changed.
cursorrow (output)	Current cursor row position.
cursorcolumn (output)	Current cursor column position.
result (output)	A common parameter described below in "Common Parameters".

INTRINSICS

COBOL calling sequence:

CALL "CSCREENATTR" USING TERMINALID PRINTFORMAT STARTPRINT
SOUNDALARM KEYBOARDLOCK NUMFIELDS SCREENSTATUS CURSORROW
CURSORCOLUMN RESULT

All parameters are numeric data items.

FORTRAN calling sequence:

CALL SCREENATTR (TERMINALID, PRINTFORMAT, STARTPRINT, SOUNDALARM,
KEYBOARDLOCK, NUMFIELDS, SCREENSTATUS, CURSORROW, CURSORCOLUMN,
RESULT)

All parameters are integer variables.

BASIC calling sequence:

CALL BSCREENATTR (T, P, A, K, N9, S9, R9, C9, R)

All parameters are integer variables.

STREAM3270 – EQUIVALENT TO TYPING A SERIES OF KEYSTROKES.

```
STREAM3270 (terminalid, cursorrow, cursorcolumn, outbuf,
                I          I           I          BA
            outbuflen, numprocessed, result)
                I           I           I
```

terminalid (input)	A common parameter described below in "Common Parameters".
cursorrow cursorcolumn (input and output)	Input: Where to start executing the keystrokes from the <u>outbuf</u>. parameter. Output: Where the cursor is located after 'typing' <u>numprocessed</u> keystrokes.
outbuf (output)	An input character string. The allowable characters range in value from %23-%176, !13-!7E. Out of range characters terminate the string.

Value			
Dec:	Oct:	Hex:	Equivalent 3270 Key:
19	23	13	None. End of stream.
20	24	14	Erase input.
21	25	15	Erase EOF.
22	26	16	->| Tab forward.>>>>ART WORK.
23	17	17	|<- Tab backward. "
24	30	18	<- Backspace. "
25	31	19	-> Cursor right. "
26	32	1A	Cursor up. "
27	33	1B	Cursor down. "
28	34	1C	DUP "
29	35	1D	Cursor home. "
30	36	1E	FM RESET. First character of outbuf only.
32-126	40-176	20-7E	ASCII graphic character set.

outbuflen
(input)

The length of the array <u>outbuf</u> in characters.

numprocessed
(output)

The number of successfully processed characters in the sream array, not including the end of stream character

result
(output)

A common parameter described below in "Common Parameters".

COBOL calling sequence:

CALL "CSTREAM3270" USING TERMINALID CURSORROW CURSORCOLUMN OUTBUF
OUTBUF OUTBUFLEN NUMPROCESSED RESULT.

All parameters are numeric, except for OUTBUF which is alphanumeric.

FORTRAN calling sequence:

CALL STREAM3270 (TERMINALID, CURSORROW, CURSORCOLUMN, OUTBUF,
OUTBUF, OUTBUFLEN, NUMPROCESSED, RESULT)

All parameters are numeric, except for OUTBUF which is alphanumeric.

BASIC calling sequence:

CALL BSTREAM3270 (T, RO, CO S$, L, L1, R)

All parameters are integer variables, except for S$ which is a string variable.

TRAN3270 – EQUIVALENT TO THESE KEYS: ENTER, PROGRAM FUNCTION
(FOR 3277 AND 3278), PROGRAM ATTENTION, CLEAR, AND
SYSTEM REQUEST (FOR SDLC ONLY).

```
TRAN3270 (terminalid, aid, cursorrow, cursorcolumn, result)
           I        I       I            I            I
```

terminalid   A common parameter described below in "Common
(input)   Parameters".

aid   Indicates the attention id to be transmitted
(output)   to the host.

value:	aid:	devices:
-1	Inhibit AID and cursor position transmission in data stream only.	
39	ENTER	All
49	PF1	3277, 3278
50	PF2	3277, 3278
51	PF3	3277, 3278
52	PF4	3277, 3278
53	PF5	3277, 3278
54	PF6	3277, 3278
55	PF7	3277, 3278
56	PF8	3277, 3278
57	PF9	3277, 3278
58	PF10	3277, 3278
35	PF11	3277, 3278
64	PF12	3277, 3278
65	PF13	3278
66	PF14	3278
67	PF15	3278
68	PF16	3278
69	PF17	3278
70	PF18	3278
71	PF19	3278
72	PF20	3278
73	PF21	3278
91	PF22	3278
46	PF23	3278
60	PF24	3278
37	PA1	All
62	PA2 (CANCEL)	All
44	PA3	All
95	CLEAR	All
48	SYSTEM REQUEST Key (SDLC only)	

cursorrow and   Cursor position. Use -1 in data stream mode
cursorcolumn   to inhibit their transmission.
(input)   )

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CTRAN3270" USING TERMINALID AID CURSORROW CURSORCOLUMN
RESULT.

All parameters are numeric.

FORTRAN calling sequence:

CALL TRAN3270 (TERMINALID, AID, CURSORROW, CURSORCOLUMN, RESULT)

All parameters are integer variables.

BASIC calling sequence:

CALL BTRAN3270 (T, A9, B9, R)

All parameters are integer variables.

VER3270 – OBTAIN DSN/IMF PRODUCT IDENTIFICATION VERSION.

```
VERS3270 (version)
           BA
```

version   A 14-character string indicating the DSN/IMF
(output)   version currently installed.

COBOL calling sequence:

CALL VERS3270 USING VERSION.

VERSION is an alphanumeric data item.

FORTRAN calling sequence:

CALL VERS3270 (VERSION)

VERSION is a character array.

BASIC calling sequence:

CALL BVERS3270 (V$)

V$ is a string variable.

WRITEFIELD – WRITE DATA FROM A USER BUFFER TO AN UNPROTECTED
FIELD IN THE INTERNAL SCREEN BUFFER.

```
WRITEFIELD (terminalid, fieldnum, offset, outbuf, outbuflen,
              I          I        I       BA       I
           result)
              I
```

terminalid (input)	A common parameter described below in "Common Parameters".
fieldnum (input)	Relative field number counting from the first attribute character in the internal buffer.
offset (input)	A character displacement, starting from <u>zero</u>, at which writing begins within the data field.
outbuf (input)	Data to replace the previous contents of the field. Valid input may be upper and lower case alphabetic characters, numeric characters, and the special characters and control codes following:

```
blank ! " # $ % & ' ( ) * + , - . / : ; < = >
? @ [ ] ^ _ { }

DUP (%34, !1C), FM (%36, !1E)
```

CAUTION:

The graphics are translated as follows.

ASCII:	EBCDIC:
[left bracket] right bracket ! exclamation ^ caret	¢ cent currency sign ! exclamation | vertical line ⌐ not symbol

outbuflen (input)	Length of output in characters. Must be less than or equal to <u>maxfieldlen</u>, from FIELDATTR intrinsic; otherwise <u>result</u> will be set to 13.

result   A common parameter described below in "Common
(output)   Parameters".

COBOL calling sequence:

CALL "CWRITEFIELD" USING TERMINALID FIELDNUM OFFSET OUTBUF
OUTBUFLEN RESULT.

All parameters are integer variables, except for OUTBUF which is
an alphanumeric.

FORTRAN calling sequence:

CALL WRITEFIELD (TERMINALID, FIELDNUM, OFFSET, OUTBUF, OUTBUFLEN,
RESULT)

All parameters are integer variables, except for OUTBUF which is
a character array.

BASIC calling sequence:

CALL BWRITEFIELD (T, N, O, F$, L, R)

All parameters are integer variables, except for F$ which is a
string variable.

WRITESTREAM – MOVES DATA STREAM FROM THE USER'S BUFFER INTO THE SCREEN BUFFER TO BE SENT TO THE HOST USING TRAN3270.

```
┌──────────────────────────────────────────────────────────┐
│ WRITESTREAM (terminalid, offset, outbuflen, outbuf, result) │
│                I        I        I         BA       I       │
└──────────────────────────────────────────────────────────┘
```

NOTE

SDLC protocol and data stream MUST be specified in OPEN3270.

terminalid   A common parameter described below in "Common
(input)   Parameters".

offset   The displacement in characters from the first
(input)   character in the data stream, which = 0, at
                         which data transfer will start.

outbuflenen   The number of characters in outbuf.

(input)

outbuf   The source buffer containing the data stream.
(input)

result   A common parameter described below in "Common"
(output)   Parameters".

COBOL calling sequence:

CALL "CWRITESTREAM" USING TERMINALID OFFSET OUTBUFLEN OUTBUF
RESULT.

All parameters are numeric data items except for OUTBUF, which is
an alphanumeric data item.

FORTRAN calling sequence:

CALL CWRITESTREAM (TERMINALID, OFFSET, OUTBUFLEN, OUTBUF, RESULT)

All parameters are numeric data items except for OUTBUF, which is
a a character array.

BASIC calling sequence:

CALL BWRITESTREAM (T, O1, L9, O$, R)

All parameters are integer variables, except for O$ which is a
string variable.

COMMON PARAMETERS

terminalid   contains the same terminal identifier as was returned from OPEN3270. All other intrinsics use this parameter as input.

result   indicates whether the intrinsic executed successfully. A non-zero result means that a condition described below took place. The values of result are described in a table which follows.

... row   the location of the first data character of the field.

$0 <= $ ... row $<= 11$ 480-character buffer
$0 <= $ ... row $<= 23$ 1920-character buffer

... column   the location of the first data character of the field.

$0 <= $ ... column $<= 39$ 480-character buffer

$0 <= $ ... column $<= 79$ 1920 character buffer

DSN/IMF INTRINSICS

NO-WAIT I/O INTRINSICS

The intrinsics following are actually part of the file system. They are described here as a convenience. These intrinsics are usable as shown by a FORTRAN routine. No COBOL or BASIC interfaces are provided.

Allows processing to continue while I/O is pending:

```
INTEGER PROCEDURE IODONTWAIT (FILENUM, TARGET, TCOUNT,
   CSTATION);
   INTEGER FILENUM, TCOUNT;
   LOGICAL CSTATION;
   LOGICAL ARRAY TARGET;
   OPTION VARIABLE;
```

The result returned is an integer representing the terminalid for which completion of I/O occurred, or a zero. The term terminalid is described above in "Common Parameters".

filenum (input)	terminalid; or, zero to check for any I/O completion. The term terminalid is described above in "Common Paramters".
target	This is meaningless for DSN/IMF.
tcount	This is meaningless for DSN/IMF.
cstation (output)	This parameter is the same as result, which is described in "Common Parameters", above.

Condition codes returned:

CCE	Request granted. If the result returned is a non-zero value, then I/O completion has taken place without error. If the value is zero, then no I/O has taken place.
CCG	An end-of-file condition was encountered.
CCL	Request denied. Normal completion did not occur because there were no requests pending, or a parameter error occurred, or an abnormal I/O completion occurred.

Delays processing until pending I/O is complete:

```
INTEGER PROCEDURE IOWAIT (FILENUM, TARGET, TCOUNT, CSTATION);
    INTEGER FILENUM, TCOUNT;
    LOGICAL CSTATION;
    LOGICAL ARRAY TARGET;
    OPTION VARIABLE;
```

The result returned is an integer representing the terminalid n for which completion of I/O occurred, or a zero.

filenum   terminalid; or, zero to check for any I/O
(input)   completion.

target   This is meaningless for DSN/IMF.

tcount   This is meaningless for DSN/IMF.

cstation   This parameter is the same as result, which is
(output)   described in "Common Parameters", above.

Condition codes returned:

CCE   Request granted. I/O completion without
                   error.

CCG   An end-of-file condition was encountered.

CCL   Request denied. Normal completion did not
                   occur because there were no requests pending,
                   or a parameter error occurred, or an abnormal
                   I/O completion occurred.

USING THE PASS THRU FACILITY

Pass Thru may be initiated in one of four ways:

• automatically, if AUTO ACQUIRE is specified in a configuration file
• from a DSN/IMF manager command by means of an ACQUIRE subsystem command
• programmatically issuing AQUIRE 3270 intrinsicthe
• by using the IMF command from a session, as shown below:

```
:IMF      [E[NHANCE] = 0 | 1 | 2 | 3 ]
     [;]  [B[LANKS]]
     [;]  [F[ORMAT]] = 0 | 1 | 2 | 3 | 4 ]
     [;]  [P[RIORITY] = 0 | 1 | 2 | 3 | .... | 11 | 12 | 13 ]
```

IMF ENHANCE Parameter Values	3270 Normal Brightness Converted to	3270 High Intensity Converted to
0	264x Half Bright, or 2626A Normal	264x/262x Normal
1	264x/262x Normal	264x/262x Underline
2	264x/262x Normal	264x/262x Inverse Video
3	264x/262x Inverse Video	264x/262x Normal

BLANKS absent	Convert leading blanks in unprotected fields into null characters.
BLANKS	Leading blanks will be transmitted undisturbed.
FORMAT	Used with f7 (PRINT) key to copy the internal screen image to spool file LOGIMF.
FORMAT = 1	Each PRINT will cause the internal screen image and the location and characteristic of each attribute byte will be output.
FORMAT = 2	Each PRINT will cause the internal screen image exactly as it appears on the terminal. Null and blank characters will appear as blanks.
FORMAT = 3 or 4	These are the same form as FORMAT = 1 or 2, respectively. Copies of the screen are created whenever the intrinsics TRAN3270 or RECV3270 are called.
PRIORITY	Identifies the output spool priority for LOGIMF, unless a FILE command has been issued. The default value is PRIORITY = 8.

Special Function Key Definiton (Default)
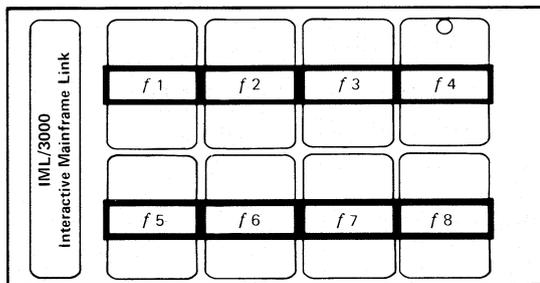
DSN/IMF Template

*PF 1-12 for 3277 emulation. PF 1-24 for 3278 emulation.

PASS THRU II

If you are running PASS THRU II, you may define up to seven soft
keys (F1 is reserved) in a file called PTCONFIG. Issuing the
:IMF command will automatically invoke the soft key definitions
specified in the PTCONFIG file. If no such file is found, the
soft key definitions default to those illustrated above. If the
AUTO AQUIRE command is issued from the IMFMGR subsystem, the
PTCONFIG file must reside in PUB.SYS or the default soft key
definitions will prevail.

Sample PTCONFIG File

```
 1   * This is an example configuration file for TSO/SPF
 2   * users.  It labels all seven function keys and sets
 3   * a keyboard enable timer.
 4   * This file was created using editor and was kept
 5   * unnumbered in a file called "PTCONFIG".
 6   *
 7   f2:pf1      * Help program function
 8   f3:pf3      * end program function
 9   f4:pf4      * the return program function
10   f5:pf12     * the cursor program function
11   f6:pf9      * the swap program function
12   f7:pf7      * UP program function
13   f8:pf8      * DOWN program function
14
15   *
16   * set keyboard enable timer to 1.5 minutes
17   *
18   ket : 90
19
20   *
21   * end of PASS THRU configuration file example for
22   * TSO/SPF users.
23   *
```

Keys not to be used with Pass Thru

HP264x	RESET TERMINAL (hard reset), ESC, MEMORY LOCK, DISPLAY FUNCTIONS, ROLL UP, ROLL DOWN, NEXT PAGE, PREVIOUS PAGE
HP2640B/N/S	RESET
HP264BA	Any graphics keys.

IBM to HP Character Display Differences:

IBM 3277/3278 Character	< EBCDIC> Oct: Hex:		HP Terminal Character	< ASCII > Oct: Hex:	
¢ cent sign	112	4A	[	133	5B
! exclamation	132	5A	]	135	5D
	vertical	117	4F	!	041	21
¬ not symbol	137	5F	^	136	5E

Null and Blank characters in Pass Thru Facility

TO THE PASS THRU FACILITY TERMINAL:

All null characters are converted to blank characters.

FROM THE PASS THRU FACILITY TERMINAL:

- Trailing blanks within a filed are assumed to be null characters, and are suppressed.
- Embedded blank characters are not suppressed. They are assumed to be blank characters.
- Leading blank characters are assumed to be null characters, and they are suppressed; however, if BLANKS is specified as a parameter, they are assumed to be blank characters, and are not suppressed.

Modified Fields

The Pass Thru Facility considers an unprotected field modified only if the contents of the field read from the Pass Thru Facility terminal vary from the contents of the field when it was written to the Pass Thru Facility terminal.

Pass Thru Facility Printing Terminals

CAPABILITIES:

- Most MPE-supported printers can emulate a 328x printer through the Pass Thru Facility.
- The printing capabiliy is started with the configuration file AUTO ACQUIRE, or with the IMFMGR subsystem command ACQUIRE.

LIMITATIONS:

- The printer may <u>not</u> be connected through an HP 264x terminal for the Pass Thru Facility.
- When a spooled line printer is used, output is retained until the line to the host is shut down, or until the IMFMGR uses the RELEASE subsystem command.

Configuration File Statements:

● At the beginning of the file:

L[DEV =] logical device number of
   pseudo device [*comment]
                             This statement is required.

CON[TROL UNIT=] control unit number, [BSC/SDLC]
   [*comment] BSC is the default.
                             This statement is required.

COD[E=] AS[CII] | EB[CDIC] [*comment]
   EBCDIC is the default.

M[ESSAGE =] message [*comment]

● For each device:

D[EVICE =] device number list; [*comment]
                             This statement is required.

```
T[YPE =]   {3277                        }
           {3278                        }
           {3284 | 3287 | 3288 | 3289 }
           {3287 | 3271 | 3274 | 3276 }  [*comment]
```

B[UFFER SIZE =] 490 | 1920 [*comment]

PA[GE LENGTH =] form feed index number [*comment]

AU[TO ACQUIRE =] MPE logical device number [*comment]

● At ending of file:

O[N] on list | # AL[LOW] allow list; [*comment]

Configuring DSN/IMF into MPE I/O system

An INP must be configured.

Configure one pseudo device for each INP, as follows:

```
  3.5  LOGICAL DEVICE #? nnn                    The pseudo device.

  3.6  DRT #? #xx          A number sign (#) followed by the DRT
                                            number of the INP

  3.7  UNIT #? 0

  3.8  SOFTWARE CHANNEL #? 0

  3.9  TYPE? 22                          A pseudo-device type.

  3.10 SUBTYPE?  1                               For DSN/IMF
          .
          .
          .
  3.50 DRIVER NAME? IOM3270                      For DSN/IMF
```

:IMFMGR COMMANDS

```
    A[CQUIRE] LDEV U[SING] DEVICE NUMBER
        [;E[NHANCE] = 0 | 1 | 2 | 3 ]
        [;B[LANKS]]
        [;F[ORMAT] = 1 | 2 | 3 | 4 ]
        [;P[RIORITY] = 0 | 1 | 2 | 3 | ... | 10 | 11 | 12 | 13 ]

        ldev            An MPE logical device number of a
                        terminal or printer.

        device number   The number of an emulated device.

    C[ONFIGURATION FILE = ] FILENAME [*COMMENT]

        filename        The name of an IMF configuration file.

    D[ISPLAY = ] LDEV | A[LL] | C[ONFIGURATION FILES] [*COMMENT]

        ldev            The currently active pseudo-devices.
        ALL             All pseudo devices.
        C ...           The configuration file names for all
                        currently configured DSN/IMF pseudo
                        devices.

    E[XIT] [*COMMENT]

    H[ELP] [COMMAND NAME]
```

K[ILL] [*COMMENT]

CAUTION

The line is closed immediately.

R[ELEASE] DEVICE NUMBER [*COMMENT]

    device number The number of an emulated IBM device.

STA[RT] [*COMMENT]

STO[P] [*COMMENT]
    This command initates an orderly line closing.

TRACE ON [PARMLIST] | OFF [*COMMENT]

  parmlist   [,[ALL][,mask][,[numentries][,[WRAP][,file]]]]]

    ALL   All activity is traced. If absent only trace errors.

    mask   A number to indicate the activities to be traced.

Bit	0	1	2	3	4	5	6	7
	IMF	INP	IMF	POPR	PRCT	PRTX	PSCT PPOL	PSTX
	PSTN	IC	PSTN				PSEL	

             <Most significant.   Least significant.>

    numentries   The number of entries in a trace file record. This is not used by DSN/IMF.

    WRAP   Use the trace file circularly.

    file   The name of the trace file. The default is CSTRACE.PUB.SYS

To produce a listing of the trace file for analysis:

```
:FILE CSTRACE=file
:FILE LIST;DEV=LP
:RUN CSDUMP.PUB.SYS[,HEX]
```

V[ERIFY =] CONFIGFILE [*COMMENT]

System Console Commands

```
:IMFCONTROL START configfile [;TRACE ON [parmlist]
:IMFCONTROL STOP configfile
:IMFCONTROL KILL configfile
:IMFCONTROL TRACE configfile ON [parmlist]
:IMFCONTROL TRACE configfile OFF
```

INP RAM dump

When an INP RAM dump has occured, this message appears at the
system console:

```
                    INP RAM DUMP IN INPLOGnn
```

This is a sample job stream to print the dump file:

```
:JOB INPDUMP,MANAGER.SYS
:FILE INPDUMP=INPLOGnn.PUB.SYS
:RUN INPDPAN.PUB.SYS
:EOJ
```

IMF Monitor Internal Dump

An IMF monitor internal dump will have taken place if one of the
following files appears in the PUB.SYS group:

```
            MONDUMPn or MONDUMnn or MONDUnnn
```

where n is the logical device number of the IMF pseudo device.
Any files which already existed are reused.

The IMF monitor internal dump should be submitted on magnetic
tape to your Hewlett-Packard representative.

TABLES

Bit Assignments in the 3270 Field Attribute Character

Bit(s)		Field Description
0-1		Value determined by the contents of bits 2-7.
2	U/P	0 = Unprotected 1 = Protected
3	A/N	0 = Alphanumeric (alphameric) 1 = Numeric Note: If bits 2 and 3 are both on, an automatic skip will result.
4-5	D	Display indicator 00 = Normal display. 01 = Normal display and selector pen detectable. 10 = Intensified display and selector pen detectable. 11 = Nondisplay and nonprint
6	RESERVED	Set to 0 by host.
7	MDT	Modified Data Tag (MDT). This bit indicates whether the field associated with this attribute character has been modified. 0 = Field has not been modified. 1 = Field has been modified. Either the terminal operator modified the field, or the host program set the Modified Data Tag when it sent this attribute character to the terminal.

Attention ID Codes Generated by IMF

AID	Decimal Code	ASCII Code (octal)	EBCDIC Code (hex)	Graphic Character
ENTER	39	047	7D	' (apos-trophe)
PF 1	49	061	F1	1
PF 2	50	062	F2	2
PF 3	51	063	F3	3
PF 4	52	064	F4	4
PF 5	53	065	F5	5
PF 6	54	066	F6	6
PF 7	55	067	F7	7
PF 8	56	070	F8	8
PF 9	57	071	F9	9
PF 10	58	072	7A	:
PF 11	35	043	7B	#
PF 12	64	100	7C	@
PF 13	65	101	C1	A
PF 14	66	102	C2	B
PF 15	67	103	C3	C
PF 16	68	104	C4	D
PF 17	69	105	C5	E
PF 18	70	106	C6	F
PF 19	71	107	C7	G
PF 20	72	110	C8	H
PF 21	73	111	C9	I
PF 22	91	133	4A	[(ASCII) (EBCDIC)
PF 23	46	056	4B	. (period)
PF 24	60	074	4C	<
PA 1	37	045	6C	%
PA 2	62	076	6E	>
PA 3	44	054	6B	, (comma)
CLEAR	95	137	6D	_ (under-line)
System Request	48	060	F0	0

Note: Attention ID codes for Card Reader and Selector Pen, are not used by DSN/IMF.

TABLES

Command Codes for 3271, 3274, 3276 Control Units

Command	ASCII Code (octal)	EBCDIC Code (hex)	Graphic Character
Copy	067	F7	7
Erase All Unprotected	077	6F	?
Erase/Write	065	F5	5
Read Buffer	062	F2	2
Read Modified	066	F6	6
Write	061	F1	1

The Read Modified All and Erase/Write Alternate commands are not supported on DSN/IMF.

Write Control Character (WCC)

Bit(s)	Meaning
0-1 (RESERVED)	
2-3 LINE LENGTH	Define line length in printout as follows: 00 = The NL, EM, and CR orders in the data stream determine print line length. Provides a 132-character line when orders are not present 01 = Print line is 40 characters long 10 = Print line is 64 characters long 11 = Print line is 80 characters long
4 START PRINTER	When set to 1, this bit starts print operation upon completion of the write operation
5 ALARM	When set to 1, this bit sounds an alarm at a selected output device as soon as an operation finishes (if the selected device has an alarm)
6 KEYBOARD ENABLE	When set to 1, this bit re-enables the keyboard of a selected device. (Device will now accept input)
7 MDT RESET	When on, this bit resets all MDT bits in the data in the existing buffer of a selected device before any data is written or any orders are executed

TABLES

Copy Control Character

Bit(s)	Meaning
0-1 (RESERVED)	
2-3 LINE	Define length of line in printout as follows: 00 = The NL, EM, and CR orders in the data stream determine print line length. Provides a 132-character line when orders are not present 01 = Print line is 40 characters long 10 = Print line is 64 characters long 11 = Print line is 80 characters long
4 START PRINTER	When this bit is on, it starts a printout operation at the "to" device after buffer transfers have been completed
5 ALARM	When on, this bit sounds the alarm at the "to" device after buffer transfers have been completed (if "to" device has an alarm)
6-7 DATA COPY	Define the type of data to be copied as follows: 00 = Attribute characters only 01 = Attribute characters and unprotected alphanumeric fields (including nulls). Nulls are transferred for alphanumeric characters not copied 10 = All attribute characters and protected alphanumeric fields (including nulls). Nulls are transferred for alphanumeric characters not copied 11 = The entire contents of the storage buffer (including nulls)

BSC Device Addresses Used for Transmission, and SDLC Control Unit Addresses

In BSC these codes are use for:
- Polling of specific devices
- General polling
- Selection of specific devices
- Return Addresses

In SDLC these codes are used for:
- Control Unit address byte.

Control Unit# or Device ID	ASCII Code (octal)	EBCDIC Code (hex)	Graphic Character
0	40	40	SP
1	101	C1	A
2	102	C2	B
3	103	C3	C
4	104	C4	D
5	105	C5	E
6	106	C6	F
7	107	C7	G
8	110	C8	H
9	111	C9	I
10	133	4A	[(ASCII) ¢ (EBCDIC)
11	056	4B	(period)
12	074	4C	<
13	050	4D	(
14	053	4E	+
15	041	4F	! (ASCII) | (EBCDIC)
16	046	50	
17	112	D1	J
18	113	D2	K
19	114	D3	L
20	115	D4	M
21	116	D5	N
22	117	D6	O
23	120	D7	P
24	121	D8	Q
25	122	D9	R
26	135	5A	] (ASCII) ! (EBCDIC)
27	044	5B	$
28	052	5C	*
29	051	5D	)
30	073	5E	;
31	136	5F	^ (ASCII) ¬ (EBCDIC)

TABLES

BSC Control Unit Addressing Used by the Host

Control Unit/ Device Number	ASCII Code (octal)	EBCDIC Code (hex)	Graphic Character
0	055	60	— (hyphen)
1	057	61	/
2	123	E2	S
3	124	E3	T
4	125	E4	U
5	126	E5	V
6	127	E6	W
7	130	E7	X
8	131	E8	Y
9	132	E9	Z
10	174	6A	
11	054	6B	, (comma)
12	045	6C	%
13	137	6D	_ (under- line)
14	076	6E	>
15	077	6F	?
16	060	F0	0
17	061	F1	1
18	062	F2	2
19	063	F3	3
20	064	F4	4
21	065	F5	5
22	066	F6	6
23	067	F7	7
24	070	F8	8
25	071	F9	9
26	072	7A	:
27	043	7B	#
28	100	7C	@
29	047	7D	' (apos- trophe)
30	075	7E	=
31	042	7F	"

SDLC Device Addresses From the Transmission Header

Device Number	Transmission Header Field Address Bits:								
	1	2	3	4	5	6	7	Octal	Hex
0	1	0	0	0	0	0	0	100	40
1	1	0	0	0	0	0	1	101	41
2	1	0	0	0	0	1	0	102	42
3	1	0	0	0	0	1	1	103	43
4	1	0	0	0	1	0	0	104	44
5	1	0	0	0	1	0	1	105	45
6	1	0	0	0	1	1	0	106	46
7	1	0	0	0	1	1	1	107	47
8	1	0	0	1	0	0	0	110	48
9	1	0	0	1	0	0	1	111	49
10	1	0	0	1	0	1	0	112	4A
11	1	0	0	1	0	1	1	113	4B
12	1	0	0	1	1	0	0	114	4C
13	1	0	0	1	1	0	1	115	4D
14	1	0	0	1	1	1	0	116	4E
15	1	0	0	1	1	1	1	117	4F
16	1	0	1	0	0	0	0	120	50
17	1	0	1	0	0	0	1	121	51
18	1	0	1	0	0	1	0	122	52
19	1	0	1	0	0	1	1	123	53
20	1	0	1	0	1	0	0	124	54
21	1	0	1	0	1	0	1	125	55
22	1	0	1	0	1	1	0	126	56
23	1	0	1	0	1	1	1	127	57
24	1	0	1	1	0	0	0	130	58
25	1	0	1	1	0	0	1	131	59
26	1	0	1	1	0	1	0	132	5A
27	1	0	1	1	0	1	1	133	5B
28	1	0	1	1	1	0	0	134	5C
29	1	0	1	1	1	0	1	135	5D
30	1	0	1	1	1	1	0	136	5E
31	1	0	1	1	1	1	1	137	5F

TABLES

3270 Buffer Control Orders

Byte 1		Byte 2	Byte 3	Byte 4
Order	Order code (EBCDIC hex/ ASCII octal)			
Start Field (SF)	1D/035	field attribute character		
Set Buffer Address (SBA)	11/021	address (1st byte)	address (2nd byte)	
Insert Cursor (IC)	13/023			
Program Tab (PT)	05/011			
Repeat to Address (RA)	3C/024	address (1st byte)	address (2nd byte)	character to be repeated
Erase Unprotected to Address (EUA)	12/022	address (1st byte)	address (2nd byte)	

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
<0	This code indicates that the error is not a normal IMF message. To find the code's meaning, look up its absolute value under GENMESSAGE in the MPE Intrinsics Reference Manual.
0	OK Intrinsic worked properly.
1	Device not open. An Intrinsic other than OPEN3270 was called without first having opened the device.
2	Could not access configuration file. The OPEN3270 Intrinsic could not FOPEN the IMF configuration file specified. Check the syntax of the configuration file name and make sure that the configuration file exists as an old, permanent file.
3	Invalid configuration file. The IMF configuration file specified has not been validly constructed. Use the IMF Manager's VERIFY command to check the validity of the configuration file.
4	IMF subsystem started but host is not communicating. OPEN3270 returns this error when the IMF START command has been issued but no host communications have been detected on the telephone line.
5	Device requested not in configuration file. The device number passed to the OPEN3270 Intrinsic does not exist in the configuration file. Either configure the device or use one that has been configured.
6	Not authorized to use this IMF device. Neither the program or user attempting to open the device, nor the device itself is on the ALLOW list in the configuration file. Check the ALLOW list to make sure that access has been provided for properly.
8	Device requested is already in use. The device requested has already been opened by another program.

TABLES

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
9	Host modified screen since last receive request. The host system has modified the contents of the current screen since the last time a call to RECV3270 was made; any attempt to change or transmit the screen at this point would be based on old information. Issue a call to RECV3270 to clear this condition. Subsequent calls to READFIELD will provide you with the new contents of the screen.
10	Attempt made to update protected field. You are not allowed to change the contents of a protected field.
11	Non-existent field number specified. The field number specified in a call to FIELDATTR, READFIELD, or WRITEFIELD does not exist in the screen.
12	Invalid character in field or stream. Unprotected fields may contain characters between octal 40 and octal 176, inclusive, and the characters octal 34 and 36. Control characters to STREAM3270 may only be between octal 23 and octal 37. See the descriptions of OUTBUF in the WRITEFIELD and STREAM3270 Intrinsics.
13	Attempt to write too long of a field. The field length specified in the call to WRITEFIELD is longer than the field length in the screen.
14	Attempt made to update or transmit from a printer. The device opened was a printer; you are not allowed to change the contents of any field on a printer, or to attempt to transmit from such a device.
15	Invalid AID code. The AID parameter of the TRAN3270 Intrinsic is invalid. Check the list of valid AID codes in the description of the TRAN3270 Intrinsic.

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
16	Invalid cursor address.
	The cursor address parameter of the TRAN3270 or STREAM3270 Intrinsic is invalid. The row address must be less than the number of rows on the screen and the column address must be less than the number of columns on the screen (IMF starts counting rows and columns at "0".) Do not attempt to use a "-1" value unless you are in data stream mode. Check the description of cursor address under the TRAN3270 or STREAM3270 Intrinsic.
17	Attempt made to write field with input inhibited.
	You called WRITEFIELD, STREAM3270, or TRAN3270 with input inhibited by the host. Either wait for the host system to re-enable input by issuing another call to RECV3270 or call the RESET3270 or STREAM3270 Intrinsic to simulate pressing of the RESET key.
18	Communications with the host system have been lost.
	For some reason, the host system stopped communicating. IMF will wait for the host to resume communications. Your program may either terminate or wait for the host to resume communications.
19	System Operator/Manager has requested disconnect.
	Either the System Console Operator or the IMF Manager has requested a disconnect. · You may continue to communicate, but this code will be returned by the TRAN3270 Intrinsic to indicate successful completion and that a disconnect has been requested. Issue a call to CLOSE3270 as soon as it is convenient.
20	System Operator/Manager killed the Subsystem.
	The System Operator or the IMF Manager has issued the KILL command. No further communications are possible.
21	Field offset out of range.
	The offset specified is not within the field length.
22	BASIC calling sequence error.
	A bad call was made to an IMF BASIC Intrinsic. The parameters may be in the incorrect order.

TABLES

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
23	Keyboard enable timeout occurred. The host computer failed to send a keyboard-enable within the time limit specified in the TIMEOUT parameter of OPEN3270.
24	Receive timeout occurred. The host computer failed to send data to this device within the Transmit/Receive time limit set in the TIMEOUT parameter of OPEN3270.
25	Intrinsic call made in split stack mode. You may only call the Intrinsics with DB pointing to your own stack.
26	Intrinsic call made with parameter out of bounds. The address of a parameter was either less than DL or greater than S when this Intrinsic was called. This error may also mean that the parameter you passed is out of range.
27	Could not open device, insufficient virtual memory. There was insufficient virtual memory to allocate the extra data segment to contain the screen.
28	Could not open device, insufficient real memory. There was not enough room in the PCBX of your process to allocate a file control entry for the device.
29	Called an intrinsic with a request already outstanding. In no-wait I/O only, you made a call to RECV3270 or TRAN3270 with a previous request to one of these Intrinsics still outstanding. Issue a call to IOWAIT or IODONTWAIT to complete the request before issuing any new Intrinsic calls.
30	Internal error in IMF intrinsic. Internal software error. Note circumstances and report them to your Hewlett-Packard representative.

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
31	IMF subsystem started with different configuration file. IMF is not running with the configuration file you specified. Check with your IMF Manager.
34	Request has been aborted. This message could occur if the IMF KILL command was issued during your Intrinsic call or if IMF terminated abnormally. Check with your IMF Manager.
38	Cannot start OUTBUF on an attribute byte. The stream data you supplied positioned the cursor on top of an attribute byte. You may not write over an attribute character.
42	Specified MAXINBUFLEN too large. You specified a MAXINBUFLEN that extends beyond the end of the screen. This parameter will not cause a wrap to the beginning of the screen.
45	SDLC reset from the host system. Your host session was terminated. This error is used only in SDLC protocol and will be returned with a TRAN3270 or RECV3270 Intrinsic. It means that the host has sent an SDLC protocol reset and has aborted your session on the host. The IMF line is still up and you do not have to do anything special for IMF but you should re-establish your session with the host and then verify that no transactions were lost.
46	Transmit timeout occured. The host computer has not indicated that it will accept data from this device within the Transmit/Receive time limit set in the TIMEOUT parameter of OPEN3270
47	IMF START command has not been issued. The IMF Manager or the system operator must issue an IMF START command. You may not access IMF until this command successfully starts communications with the host.

TABLES

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
49	INBUF is too small to hold the entire data stream. This error message only applies to the READSTREAM intrinsic, and it is returned when the size of the data stream received from the host is larger than the size of INBUF. IMF will return the first part of the data stream in INBUF.
50	Called READSTREAM without calling RECV3270 first. This error is only returned when the user is in data stream mode. You must issue a RECV3270 to accept data from the host and then call READSTREAM to obtain the data from the extra data segment.
51	Called TRAN3270 without calling WRITESTREAM first. This error is only returned when the user is in data stream mode. You must put the data to send to the host in the extra data segment by calling WRITESTREAM before you issue the TRAN3270 call.
52	Data stream is too long. This error message only applies to data stream mode, and it means that the size of the data stream is larger than the maximum allowable size; for 480 character screens, the maximum size is 540 bytes; for 1920 character screens, the maximum size is 2160 bytes. If this error occurs when RECV3270 is called, only the first 2160 (or 540) bytes of the data stream will be buffered in the XDS.
53	Invalid intrinsic called for data stream mode device. You may not use Intrinsics such as READFIELD and STREAM3270 in data stream mode. There is no internal screen image in data stream mode; therefore, you may not use any intrinsic that reads or writes to an internal screen image.
54	Device not opened in data stream mode. You did not specify data stream mode in the FLAGS parameter of your call to the OPEN3270 Intrinsic; therefore, you may not use the data stream Intrinsics READSTREAM and WRITESTREAM.

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
55	Data Stream mode not allowed with BSC line. BSC protocol was specified in your configuration file. Data Stream is supported only with SDLC.
56	The System Request function is not allowed with BSC protocol. BSC protocol was specified in your configuration file. This feature is allowed with SDLC protocol.
60	Invalid spool file priority; must be between 1 and 13 inclusive. This error message is returned to PRINT3270 when the user has provided a priority for the spool file which is invalid. The number must be between 1 and 13, inclusive. For more information on the meaning of the priority parameter see the FOPEN intrinsic in the MPE Intrinsic Reference Manual as the number that the user provides is passed to this intrinsic.
61	Failed to open PRINT3270 spool file. The attempt to open the spool file for PRINT3270 failed when the FOPEN intrinsic was called. The PRINT3270 Intrinsic will leave the FILEID parameter set to zero so that you may call the file system Intrinsic FCHECK to determine the specific reason why FOPEN failed.
62	Failed to write to a PRINT3270 spool file. PRINT3270 attempted to call the file system Intrinsic FWRITE to the spool file identified in FILEID; however, the call to FWRITE failed. Check that the value of FILEID is correct. One possible reson for this error is that there is no more disc space.
63	Illegal ACTION number. The value of the parameter ACTION in the PRINT3270 Intrinsic must be between 0 and 4, inclusively.
64	Wrong file type for PRINT3270 output file. You used a FILE command to override the formal designator LOGIMF, which is used by the PRINT3270 Intrinsic. This was incompatible with the requirements of the PRINT3270 Intrinsic for a spooled output file.

TABLES

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
65	Failed to close PRINT3270 spooled output file. The PRINT3270 Intrinsic attempted to call the file system Intrinsic FCLOSE to close the file specified in FILEID; however, this failed. Check that you supplied the proper value for FILEID in your call to the PRINT3270 Intrinsic. If you used a file equation for file LOGIMF be sure that you did not equate it to an existing file.
66	Failed to open CATIMF.PUB.SYS The file CATIMF.PUB.SYS, which is the message catalog for DSN/IMF, could not be opened. Check to see that this file is present.
67	GENMESSAGE failed to extract message. The MPE Intrinsic GENMESSAGE did not execute properly. Check to see that CATIMF.PUB.SYS and the GENMESSAGE Intrinsic are correctly installed.properly.
70	Invalid LDEV specified or LDEV is already in use. Verify that the value you used for LDEV is correct. Also, determine what other processes are using the LDEV you have identified.
71	The ENHANCE parameter must be an integer between 0 and 3. Verify that the value you used for the ENHANCE parameter is within the range of 0 through 3.
72	The PRIORITY parameter must be an integer between 1 and 13. Verify that the value you used for the PRIORITY parameter is within the range of 1 through 13.
73	The BLANKS parameter must be either 0 or 1. Verify that the value you used for the BLANKS parameter is a 0 or 1.
74	The FORMAT parameter must be an integer between 1 and 4. Verify that the value you used for the FORMAT parameter is within the range of 1 through 4.

Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
75	Invalid FLAGS parameter. You used an invalid value for the FLAGS parameter. Check the documentation for the parameter of the Intrinsic you used to determine the correct value to use.
76	TTSSON.PUB.SYS is missing. The file TTSSON.PUB.SYS has not been installed. It may be that the file was loaded into an incorrect group and account.

Data Communications Troubleshooting Guide

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Troubleshooting short- and long-haul analog lines, David Levin,
  Netcomm, Inc., Data Communications, November 1981
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  2780/3780 Emulator Reference Manual
  DSN/MTS Reference Manual
  DSN/DS Reference Manual
  DSN/IMF Reference Manual
  DSN/MRJE Reference Manual
  System Error Messages and Recovery Manual
  COMMUNICATIONS HANDBOOK
  Diagnostic Manual Set
Various AT&T and Bell Technical References

CONTENT   PAGE

THE BASICS

WHAT IS NEEDED IN GENERAL:

- the version of MPE that is on the system,
- the MPE I/O configuration,
- what hardware is being used,
- that the problem is not already listed in the Software Status Bulletin (SSB),
- that the product is right for the application,
- the SYMPTOMS of any operations that have been done, and
- the results of any testing that has already been done.

WHAT IS NEEDED FOR THE SPECIFIC DATA COMMUNICATIONS PRODUCTS:

DSN/DS (Distributed System)

- Versions and fix levels of DS and CS of both sides from CSLIST and DSTEST,VERS
- Accurate description of data comm network on both sides including controller switch settings and cable numbers
- Pertinent console messages from both sides
- Error messages reported to the user
- TRACE with ALL parameter

DSN/IMF (Interactive Mainframe Facility)

- Version numbers of modules from CSLIST
- IMF configuration file
- Description of screen or print file on real device
- Host type
- TRACE with mask of %277 for BISYNC with HEX entry in CSDUMP
- TRACE with mask of %77 for SDLC with HEX entry in CSDUMP

DSN/MRJE (Multileaving Remote Job Entry)

- Version numbers of modules from CSLIST
- MRJE versions numbers from MRJECONTROL CHECK
- MRJE configuration file
- Copy of print banner (if applicable)
- Copy of MRJE message file
- Copy of console messages
- Host type
- TRACE with ALL parameter

DSN/MTS (Multipoint Terminal Software)

- Version number of MTS
- Models of terminals and modems involved
- Complete description of network hardware

DSN/RJE (Remote Job Entry)

- Version number of CS from CSLIST or RJINFO
- Version number of RJE
- Listing of command file and/or console session
- RJINFO list
- Remote or host type
- TRACE with ALL parameter

TERMIO (Terminal I/O)

- MPE version
- TERMIO patches level applied
- ATC, ADCC or ATP
- 3-wire (RS-232-C), 5-wire (RS-449), or modem
- Terminal models

Modems

- Manufacturer
- Model
- Speed
- Synchronous or asynchronous
- Type of phone line or wire
- Communications software

THE METHOD

Symptomatic Troubleshooting Flowchart

```
┌─────────────┐          1. Answer the questions
│   Choose    │             that follow about what
│  Symptom    │             has changed.
│   Table     │
└─────────────┘
       │
       │                  2. Look thru the symptom
┌─────────────┐              tables for those which
│   Find      │◄──────┐     apply.
│  Symptom    │       │
└─────────────┘       │
       │   ┌Tools     │
┌─────────────┐       │  3. Do the test for the
│    Do       │       │     most likely cause as
│   Test      │       │     listed in the Cause
└─────────────┘       │     Table.
       │              │
       │      Yes     │  4. If the test is passed,
┌─────────┐───────────┘     go back and check
│  Pass   │                 another symptom.
│    ?    │
└─────────┘
    │
   No                  5. If the test fails,
┌─────────────┐           fix the problem.
│    Fix      │
│  Problem    │
└─────────────┘
```
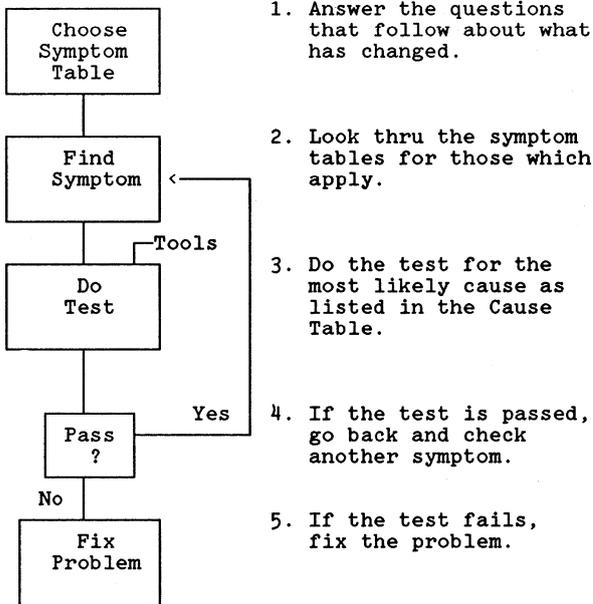
Questions to Help Choose a Symptom Table

```
┌──────────────────┐
│ Is this a new    │
│ installation of  │        Yes
│ software and     │
│ hardware?        │
└──────────────────┘            ┌──────────────────────┐
         No                     │ Use "Newly Installed",│
                                │ then other tables.    │
                                └──────────────────────┘
┌──────────────────┐
│ Has the software or│
│ MPE configuration│        Yes
│ changed but not  │
│ hardware?        │
└──────────────────┘            ┌──────────────────────┐
         No                     │ Use "Changed Software"│
                                │ symptom table.        │
                                └──────────────────────┘
┌──────────────────┐   Yes
│ Has the hardware │
│ changed but not the│
│ software?        │
└──────────────────┘            ┌──────────────────────┐
         No                     │ Use "Changed Hardware"│
                                │ symptom table.        │
                                └──────────────────────┘
┌──────────────────┐
│ Use 'No Changes' │
│ symptom table.   │
└──────────────────┘
```
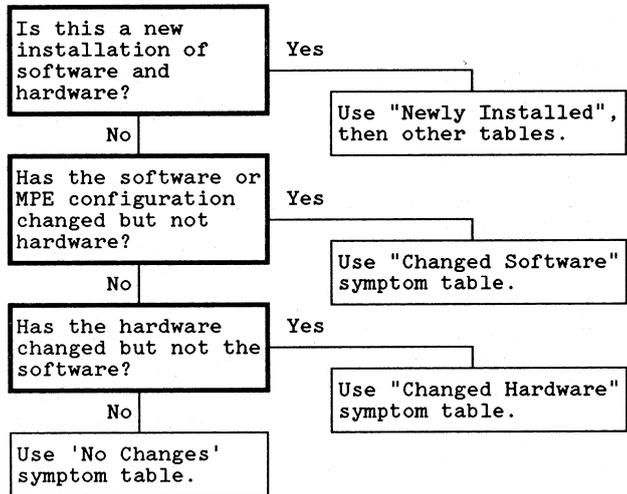
The symptom tables begin on the next page and are listed in the following order:

        Newly Installed
        Changed Software
        Changed Hardware
        No Changes

Page numbers for the symptom tables are listed in the Table of Contents.

Newly Installed
Symptom Table

(limited to symptoms encountered prior
to getting the line open)

```
MRJE DSN/MRJE
CS   All subsystems      MTS     DSN/MTS
DS   DSN/DS              RJE     DSN/RJE
IMF  DSN/IMF             TERMIO  Terminal I/O
```

SYMPTOM	POSSIBLE CAUSES
DS console locked	software installation bad
hung console	software installation bad
system failures	software installation bad
IMF can't connect	configuration files
can't sign on	configuration files
printer problems	host compatibility
screens don't work	screen design error
various problems	configuration files
	request aborted by host
	application wrong, IMF is not a
	3270 host configuration
MRJE	
aborts	MPE resource problem
	user written procedure
host shuts line	line problem
	modem problems
	sign on procedure error
	host configuration
line closes	line problems
	modem problems
MTS can't open line	software bad
	controller problem
	modem problem
can't open MPMON	MPE resource problem
CS117	INP switches wrong
	cable bad
	MPE configuration

RJE aborts	MPE resource problem
	user written procedure
host shuts line	line problem
	modem problems
	sign on procedure error
	host configuration
host won't take input	line problems
	modem problems
	sign on procedure
line closes	line problems
	modem problems
no output	host not sending data
	sign on procedure
poor response	host busy
	HP3000 busy
	line problems
TERMIO	
can only logon at one speed	MPE configuration
	terminal switches/configuration
can't logon	MPE configuration
	terminal switches/configuration
	cable problem
	controller problem
remote spooled printer problem	MPE configuration
	printer switches
	modem problems
	cable problems
system failures	software installation bad
SF 700,701,704-6,709	software installation bad
SF 703,708,710	configuration bad

Changed Software
Symptom Table

(same old hardware)

```
MRJE  DSN/MRJE
CS    All subsystems      MTS     DSN/MTS
DS    DSN/DS              RJE     DSN/RJE
IMF   DSN/IMF             TERMIO  Terminal I/O
```

SYMPTOM	POSSIBLE CAUSES
CS CSERR 6-7	software
	configuration
CSERR 8-10	configuration
CSERR 11-13	operator procedure
CSERR 14-19	configuration
CSERR 57-58	operator procedure
CSERR 153	operator procedure
	remote device
CSERR 154	hardware
CSERR 156	software
CSERR 157-159	remote device
CSERR 158	remote device
	operator procedure
CSERR 201	operator procedure
CSERR 203-204	remote device
CSERR 205-207	operator procedure
CSERR 207-209	hardware
	line problems
	modem problems
CSERR 207-217	remote device
CSERR 212-214	hardware
CSERR 217	hardware
DS DSCONTROL fails	software installation bad
DSCOPY aborts	software bad
	improper installation
line closes	configuration
poor response	configuration
sessions hang	DSMON bad
	programs not compatible with new
	MPE version
system failures	software installation bad

IMF can't connect	configuration files
can't sign on	configuration files
printer problems	host compatibility
screens don't work	screen design error
various problems	configuration files
	request aborted by host
	application wrong, IMF is not a
	3270 host configuration
MRJE	
can't open line	software installation bad
can't sign on	configuration file
didn't get host number back	message modified, can't read
job management doesn't work	job log corrupted
	didn't get host number back
	banner messed up
	configuration file corrupted
	RMT# changed or wrong
MRJE user errors	new user commands
no input taken by host	user sign on procedure
no output	user sign on procedure
only one input or output set	host configuration changed
printer problems	out of disc space
	spooler space problem
MTS can't open line	software installation bad
	download file bad
poor response	configuration file error
	software error
	MPE buffer size
RJE aborts	MPE resource problem
	user written procedure
can't sign on	sign on procedure
TERMIO	
can only logon at one speed	MPE configuration
can't change speed	MPE configuration
hang while running program	program busy
	program changed terminal config.
	MPE configuration
remote spooled printer problems	MPE configuration
SF 700,701,705,706	software installation bad
SF 708	configuration bad

Changed Hardware
Symptom Table

(same software and configuration)

```
MRJE DSN/MRJE
CS   All subsystems     MTS     DSN/MTS
DS   DSN/DS             RJE     DSN/RJE
IMF  DSN/IMF            TERMIO  Terminal I/O
```

SYMPTOM	POSSIBLE CAUSES
CS CSERR 84 through 109	hardware
CSERR 101-105	hardware
CSERR 117	hardware
CSERR 154	hardware
CSERR 207-209	hardware
CSERR 212-214	hardware
CSERR 217	hardware
DS line closes	modem problems
	line problems
poor response	didn't change configuration
REMOTE HELLO fails	line problems
remote system shuts line	line problems
system failures	configuration
IMF CSERR 117	hardware problem
host shuts line	hardware problem
poor response	MPE configuration error
MRJE	
can't open line	hardware problem
can't sign on	host configuration changed
didn't get host number back	hardware problem
host shuts line	line problems
line closes	line problems
poor response	line problems
MTS all but one remote	
drop is dead	line problem
	terminal problem
	modem problem
	terminal switches/configuration
can't logon	terminal switches/configuration
can't open line	conroller problem
	modem problem
commands don't work	terminal switches/configuration
poor response	hardware problem
	line overloaded

RJE can't open line	controller problems
	modem problems
can't sign on	host configuration
	modem problems
host shuts line	modem problems
	line problems
	host configuration
line closes	line problems
	modem problems
no output	line problems
poor response	line problems
TERMIO	
can only logon at one speed	terminal switches/configuration
	MPE configuration
can't change speed	MPE configuration
can't logon	port hung
	port DOWNed, REFUSEd
	terminal switches/configuration
hardwired worked, but	
modem won't work the same	port configured wrong
	modem problems
	line problems
	cable bad
remote spooled printer	
problems	modem problems
	line problems
	MPE configuration
	printer switches
SF 208 (HP-IB only)	noisy modems or lines
	using last port on main with
	modems
SF 209	noisy modems or lines
SF 211	ADCC hardware problem
SF 709,715	software bad
SF 708,710	configuration bad
SF 714-716	hardware problem

No Changes
Symptom Table

```
MRJE DSN/MRJE
CS   All subsystems        MTS     DSN/MTS
DS   DSN/DS                RJE     DSN/RJE
IMF  DSN/IMF               TERMIO  Terminal I/O
```

SYMPTOM	POSSIBLE CAUSES
CS CSERR 11-13	user
CSERR 57-58	user
CSERR 84 through 109	hardware
CSERR 101-105	hardware
CSERR 103	user
CSERR 153	user
CSERR 153	remote device
CSERR 154	hardware
CSERR 157-159	remote device
CSERR 158	user
CSERR 201	user
CSERR 203-204	remote device
CSERR 205-207	user
CSERR 207-209	hardware
CSERR 207-217	remote device
CSERR 212-214	hardware
CSERR 217	hardware

DS	console locked	terminal problem
		MPE problem, not DS
	DSLINE fails	line not open
		line open one way
	DSCOPY aborts	line errors
	DSCOPY fails	user error
		wrong file type
		copy in wrong direction
	hung session, can't abort	user errors
		PTOP program logic
		subsytem problem
		application program problem
	line closes	line errors
	NFT errors 101-110	resource errors
		internal software errors
	poor response	line errors
	REMOTE command fails	user errors
		MPE problems
		lack of psuedo-devices
	remote system shuts line	line problems
		hardware failure
	system failures	software problems
		missing patches or fixes
	transfer only one way	remote configuration problem
IMF	can't connect	line problems
	can't sign on	configuration file
	CS errors	other problems
	CSERR 117	
	host shuts line	
	IMF errors	
	line closes	
	poor response	
	printer problems	
	system failures	

MRJE	
can't get into console mode	someone else has console
can't sign on	host configuration changed
	user signon procedure
	configuration file
didn't get host number back	message modified, can't read
	hardware problem
host shuts line	line problems
job management doesn't work	job log corrupted
	didn't get host number back
	banner messed up
	configuration file corrupted
	RMT# changed or wrong
line closes	line problems
	host operator shut line
MRJE console operator errors	file system problems
MRJE user errors	user error
no input taken by host	user sign on procedure
no output	user sign on procedure
	host went down
	devices not open
	user command error
only one input or output set	host configuration changed
poor response	line problems
	systems busy
printer problems	out of disc space
	file equation error
	out of file space
	spooler space problem
	operator inhibitted printouts
	printer not ready

ITS all but one remote dead is dead	line problem group DOWNed terminal problem modem problem terminal switches/configuration
can't logon	terminal switches/configuration user error MPE resource problem
can't open line	software installation bad download file bad modem problem controller problem
commands don't work	terminal switches/configuration user error
dead terminals, no response	line not open line problem modem problem
hung terminals	terminal switches/configuration program problem
line shuts	line problems modem problems
no polling on any terminals no polling on some terminals	line not OPENned terminals DOWNed line problems modem problems
polling, no prompts	terminal switches/configuration MPE resource problem system busy
polling, some prompts poor response	some terminals DOWNed configuration file error line overloaded software error terminal switches/configuration modem problems MPE buffer size
read errors write errors	line problem line problem

THE SYMPTOMS

RJE aborts	MPE resource problem user written procedure
can't sign on	sign on procedure host configuration line problems
host shuts line	line problems modem problems sign on procedure error host configuration
line closes	line problems modem problems
no output	host not sending data line problems
poor response	host busy HP3000 busy line problems
TERMIO	
can only logon at one speed	terminal switches/configuration
can't get back into block mode	user hit break key
can't logon	port hung port DOWNed, REFUSEd terminal switches/configuration MPE resource problem user procedure wrong
session logged off	operator aborted session BYE in UDC
hang while running program	program busy program changed terminal configuration user changed term switches terminal switches/configuration
hardwired worked; modem won't worked	modem problems line problems cable bad
remote spooled printer problems	modem problems line problems printer switches program problem printer status not checked MPE resource problem (TBUFS)
SF 208 (HP-IB only)	noisy modems or lines using last port on main with modems
SF 209	noisy modems or lines
SF 211	ADCC hardware problem
SF 714,716	hardware problem
SF 715	console hardware problem

Once the symptoms are found and the possible causes are determined, the next step is to check to see which one is really the problem. The problems can generally be put into four groups.

Usage problems are those arising from improper use of an otherwise working data communications network. For example:

> Using wrong parameters
> Giving wrong reply to dial message
> Using wrong controller

Protocol problems involve the software that handles the link such as the CS subsystem, CSSBSC0, or the INP. These usually indicate a software or hardware error in the DTE. They may be caused by the user.

Digital problems are in the interface between the DTE and the DCE such as cables, connectors, RS-232-C pin usage, or modem options.

Analog problems are usually called impairments and dwell within the transmission facility. Transmission line impairments come in two types, fortuitous and systematic. The former is relatively similar to an 'acute illness;' it comes up suddenly, goes away quickly, and may come back when ever it pleases. Not much can be done about them except to redial the connection and let someone else have the problem. Some categories of fortuitous impairments are:

> Noise   - electrical disturbances
> Crosstalk   - interference from another channel
> Echo   - reflected signals
> Loss   - drop in signal power
> Jitter   - instability in frequency shifts

The other type of transmission line problems is systematic. These impairments, called distortion, can be corrected by conditioning the line. The are:

> Delay   - frequencies arrive at different times
> Attenuation - loss of some frequencies

There are several important steps to checking these causes:

● Verify the results - what really happened?

● Verify the software and I/O configuration - coldloads and res- tores can cause accidental destruction of the I/O configuration or system software.

● Actual protocol errors, where there is a bug, may require more extensive testing. If your software is up to date, CSDUMP may show the problem.

● Test the data communications network, modems, and DTE.

THE CAUSES

The following 'Cause Table' lists the possible causes of problems along with the type of cause and the tests used to check them out. Remember, some tests may be as simple as asking someone what they did or checking version numbers.

Cause Table

CAUSE	TEST or ACTION
ADCC hardware problem	try another port
	run ADCC diagnostic
application program problem	check program
application wrong	IMF is not exactly a 3270
ATP problems	run ATPDSM
banner messed up	check banner & configuration file
BYE in UDC	examine UDC files
cable bad	check cable part number
	check cable continuity
configuration	check configuration
configuration file	check configuration file
configuration file corrupted	check configuration file
	restore configuration file
configuration file error	check configuration file
controller problem	run DSM
copy in wrong direction	check user procedures for
	attempts to copy wrong way
devices not open	check remote operator procedure
didn't change configuration	check configuration to be sure
	all changes were made
didn't get host number back	check host configuration
download file bad	restore from tape
DSMON bad	check version
file equation error	check user procedures
file system problems	check file error code
group DOWNed	check console log
hardware	run DSM
	run modem selftest
	run terminal selftest
hardware failure	run hardware diagnostics
hardware problem	run hardware diagnostics
host busy	retry later
host compatibility	check host specifications
host configuration	check configuration
host configuration changed	check changes in configuration
host not sending data	check host configuration for
	when host sends or terminates
host operator shut line	check remote operator procedure
host went down	call host operator
HP3000 busy	try again later
improper installation	check versions numbers
	reinstall software

INP switches	check switches for correct setting
internal software errors	check SSB
	reinstall or coldload software
job log corrupted	check job log
	clean out job log
lack of psuedo-devices	check configuration
	add more devices
line not OPENned	check operator procedure
line not open	check operator procedure
line open one way	check remote operator procedure
line overloaded	check line traffic to speed ration
line problem	run modem diagnostics
	run terminal data comm tests
	run DSM loopbacks
	run MPTEST over lines
message modified, can't read	check host specifications
missing patches or fixes	check patch list in SYS
modem problem	run modem diagnostic
	run terminal data comm test
	run DSM loopbacks
	run MPTEST over lines
MPE buffer size	check configuration
MPE configuration	check configuration
MPE configuration error	check configuration
MPE problem, not DS	check SSB
MPE problem	check SSB
MPE resource problem	check configuration
MPE resource problem (TBUFS)	check configuration
new user commands	check user procedure
noisy lines	run modem selftests
	run modem remote tests
noisy modems	run modem selftests
	run modem remote tests
operator aborted session	check operator console log
operator inhibited printouts	do :SHOWOUT SP at console
operator procedure	check operator procedure
out of disc space	run FREE2
out of file space	do :LISTF,2 and run LISTEQ2
port DOWNed, REFUSEd	do SHOWDEV
port configured wrong	check configuration
port hung	run TABLE
printer not ready	check printer
printer status not checked	check program
printer switches	check printer switches
program busy	wait program to complete I/O, then
	check for hung terminal causes
program changed terminal	
configuration	check terminal switches/config.
program problem	check program
program not compatible	
with new MPE	check SRB for changes to MPE

THE CAUSES

PTOP program logic	check program
remote configuration problem	check remote configuration
remote device	check remote device hardware
request aborted by host	check remote operations
	rcheck user sign on procedure
	check line
resource errors	check system resources
RMT# changed or wrong	check job card
	check host configuration
screen design error	check screen design with original
sign on procedure	check user sign on procedure
software bad	coldload from known good tape
software error	check SSB, call PICS
software installation bad	check versions
	reinstall software
	check modems
	check line
software problems	check SSB, call PICS
some terminals DOWNed	check configuration file
	UP terminals
someone else has console	check user procedure
spooler space problem	do :SHOWOUT SP at console
	check configuration
subsytem problem	try on hardwired terminal
	check SSB
system busy	retry later
	check system usage
terminal problem	run terminal selftest
	run MPTEST
terminal switches/configuration	check terminal switches/config.
terminals DOWNed	check configuration file
	UP terminals
user changed term switches	check terminal switches/config.
	check user procedure
user command error	check user procedure
user error	check user procedure
user hit break key	check user procedure
user procedure wrong	check user procedure
user sign on procedure	check user procedure
	check job files
user written procedure	check changes to MPE procedures
using last port on main	check terminal connections to
	last port on each main
wrong file type	check user procedures for
	attempts to copy data bases

Data Communications Tests

```
┌──────────┐      ┌─────┐                    ┌─────┐      ┌──────────┐
│          │      │     │                    │     │      │          │
│   DTE    ├──────┤ DCE ├────── TelCo ───────┤ DCE ├──────┤   DTE    │
│          │      │     │                    │     │      │          │
└──────────┘      └─────┘                    └─────┘      └──────────┘
‹-Usage-›                                              ‹-Usage-›
   ‹-Protocol-›                                    ‹-Protocol-›
       ‹-- Digital -->‹-----Analog----->‹-- Digital -->
```
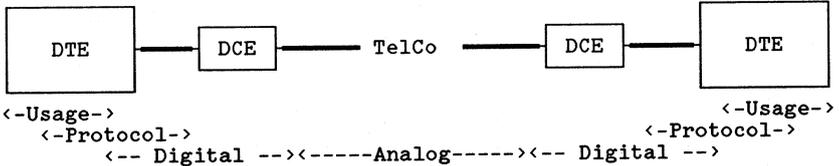
Usage Tests

Verify user procedures
Examine software tables
versions
configuration
configuration files
job card, files, logs
SSB

  Protocol Tests

  Check software versions
  Analyze data stream
  Verify RS-232-C signals

    Digital Tests

    Controller software tests
    Cable tests
    Modem tests
    Terminal tests
    Hardware diagnostics

      Analog Tests

      Phase jitter
      Single frequency interference
      Frequency shift
      Return loss
      Envelope delay distortion
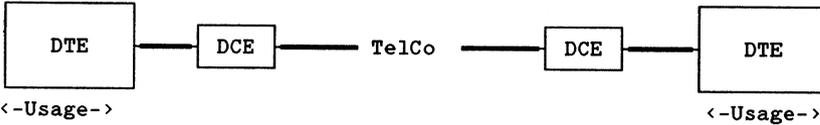   Frequency response
      Noise
      Loss

Each of these test can be used to check out possible causes. Most
of them can be done with software diagnostics available on the
HP3000. Some require very specialized equipment that is generally
used by TelCo personnel. Different tests are performed by a dif-
ferent set of tools.

Usage Tools

Usage test tools are usually commands or programs on the HP3000.
The major use of these tools is to verify that the system management
and users are using the system properly.

```
+---------+      +-------+                   +-------+      +---------+
|         |      |       |                   |       |      |         |
|   DTE   |======|  DCE  |====== TelCo ======|  DCE  |======|   DTE   |
|         |      |       |                   |       |      |         |
+---------+      +-------+                   +-------+      +---------+
<-Usage->                                                  <-Usage->
```

Verify user procedures
        CSDUMP   Prints data collected by TRACE facility
        TRACE   Records exactly what data went across line
        DSDUMP   Side by side trace of DS conversation
        MPCONFIG   Will show the .poll and downs lists
        SHOWME   Shows version number of current MPE
        EDITOR   Will list various job stream and UDC files
        IMFMGR   Will list parameters for host access
        LISTEQ2   Show file equations in effect

Examine software tables
        FREE2   Shows free disc space
        SHOWCOM   Shows current errors, retries, status
                                of a line
        TABLE   Will display terminal DIT and other table
                                entries
        CSDUMP   Will show how the line was openned
        DPAN4   Shows all tables at time of memory dump

    versions
        CSLIST   Displays version numbers of CS modules
        DSTEST,VERS   Displays version numbers of DS modules
        MRJECONTROL,CHECK   Displays version numbers of MRJE modules
        MPMON   Displays version number of MTS

    configuration
        SYSDUMP   Will show I/O configuration, table sizes
        SYSINFO   Will show I/O configuration, table sizes
        DSTEST,VERS   Shows DS MPE configuration

    configuration files
        IMFMGR   Will display and verify configuration files
        MPCONFIG   Will display configuration file

    job card, files, logs, other
        EDITOR   Will display job files and logs
        SSB   Contains known problem information

Protocol Tools

Protocol test tools provide a means for finding the source of
problems in the software that handles the link. They may simply
check that the right software is on the system or collect the data
for the factory to resolve the problem.

```
┌─────────┐        ┌───────┐                      ┌───────┐        ┌─────────┐
│   DTE   │────────│  DCE  │───── TelCo ──────────│  DCE  │────────│   DTE   │
└─────────┘        └───────┘                      └───────┘        └─────────┘
    <-Protocol->                                             <-Protocol->
```
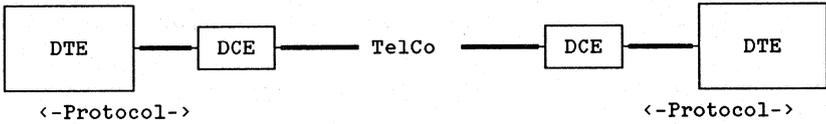
```
Check software versions    Verifies what protocol is being used
HP1640 Data Analyzer       Displays protocol sequences
CSDUMP                     Traces what protocol is being used
DSTEST,DIAG                Tests the DS protocol
```

Digital Tools

Digital test tools are for testing the interface between the DTE and the DCE. They are usually devices or programs that test the hardware.

```
 ┌─────────┐   ┌─────┐          ┌─────┐   ┌─────────┐
 │   DTE   ├───┤ DCE ├── TelCo ──┤ DCE ├───┤   DTE   │
 └─────────┘   └─────┘          └─────┘   └─────────┘
       <-- Digital -->                <-- Digital -->
```

Controller software tests

    DSM
       Interconnect   Groups 1 & 5 test INP processor and memory
       Onboard   Groups 2, 3, 4 and 5 test the USART chips
       Offboard   Groups 6 & 7 test the USART with cables
                            or modems
       INPDPAN   Processes the INP RAM dump showing protocol
                            and errors
       ATPDSM   Tests the ATP hardware and software

Cable tests

    DSM loopback   Groups 6 and 7 test the INP with cables and
                            modems
    MPTEST   Will test the complete cabling network for
                            MTS terminals
    Breakout Box   Indicates which signals are passing through
                            the cables
    Multimeter   Used for continuity tests
    Terminal data comm
       loopback   Test the cables attached to the terminals

Modem tests

    Selftest   Hardware within the modem
    Digital loopback   Digital interface connections
    Analog loopback   Analog (TelCo) interface connections
    Remote test   Modems as a set and the TelCo lines

Terminal tests

    Selftest   Terminal hardware
    Data comm board   Multipoint hardware within the terminal
    Data comm loopback Multipoint cable connections
    MPTEST   Shows the strap setting and tests terminal
                      I/O
    Display functions   Shows what terminal is receiving
    Monitor mode   Shows what is passing through the
                      communications interface
    Driver mode   Polls other terminals without computer

Hardware diagnostics

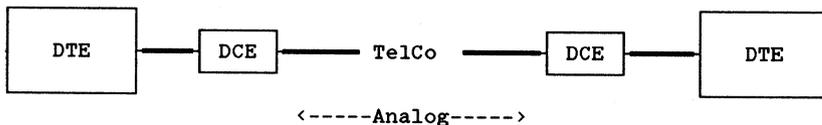   ADCC diagnostic   ADCC hardware
    ATC diagnostic   ATC hardware
    ATPDSM   ATP hardware
    DSM   INP hardware
    IOMAP   HP3000 HP-IB system hardware
    SLEUTH   HP3000 Series II/III hardware
    SSLC diagnostic   SSLC hardware
    Data Link Tester   Shows the status of signals on the DATA LINK

Analog Tools

Analog test tools provide the capability to examine the quality of the TelCo line or any privately owned transmission facility. They do this by sending data across the line which is read by another device on the other end or looped back to the originator.

```
 _____          _____                         _____          _____
|           |        |         |                       |         |        |           |
|    DTE    |--------|   DCE   |<------ TelCo ------>|   DCE   |--------|    DTE    |
|_____|        |_____|                       |_____|        |_____|

                           <-----Analog----->
```

Analog TelCo line tests

Noise and Loss
  BERT (HP1645)   Test of TelCo line and modems
  MPTEST   Extended test of TelCo line
  DSM Offboard   Extended test of TelCo line
  Modem remote test   Pass/fail test of TelCo line
  Terminal driver mode   Extended test of TelCo line
  TIMS (HP4943,4935)   Many extended tests of TelCo
                                     line quality

  Terminal data comm
    loopback   Pass/fail test of TelCo line

TOOL DESCRIPTIONS

This section includes an alphabetic list of tools. It tells what they do, when to use them, where to find them, and where they are documented.

ADCC diagnostic

It is   a set of diagnostics for the ADCC including tests for the IMB handshake logic thru the RS-232-C cable. After loading from the tape, specific tests can be selected. It requires a loopback hood and at least one good ADCC is needed for the console.

Use it when a port is suspected and nothing else has helped

Find it   on the DUS tape

Documented   in the DIAGNOSTIC MANUAL SET, Vol. 2

ATC diagnostic

It is   a set of offline diagnostics to verify the operation of the ATC ports. This simple test requires only the male-to-male cable that comes with your system.

Use it when a port is suspected and nothing else has helped

Find it   on the Non-CPU Diagnostic tape

Documented   in the ATC DIAGNOSTIC MANUAL

ATPDSM

It is   a diagnostic program that provides corrective capabilities for the ATP through easy commands

Use it when a port appears to be stuck or the LEDs remain ON after the AIB self test

Find it   in PUB.SYS

Documented   in the ATP DIAGNOSTIC MANUAL

TOOL DESCRIPTIONS

BERT (HP1645)

It is   a box for testing the quality of a phone line or modems
by sending and receiving test data. One is placed on
each end of the line or just one end with the other
end in loopback

Use it when a line or modem problem is suspected or it is necessary
to prove that one exists

Find it   HP and other supplier catalogs as HP1645A, Red Box,
BERTs

Documented in manuals supplied with device

Breakout Box

It is   a small box which fits in between two RS-232-C cables
that allows monitoring and patching of signals

Use it when there is doubt that a signal is getting through or a
test is to be made prior to modifying a cable

Find it   on the HP parts list or in the International
Data Sciences catalog or other catalogs as
breakout box, traffic light, etc.

Documented by instructions that come with it

CSDUMP

It is   a program that analyzes the data collected by a
TRACE process on one of the data communication
lines. It expects to find the file CSTRACE.

Use it when there is any question as to what is going over the line
or you want to determine what a user is sending. It is
usually required for factory involvement.

Find it   in PUB.SYS

Documented in RJE MANUAL and in Section I of the COMMUNICATIONS
HANDBOOK

CSLIST

It is   an unsupported program to list the version, update and
             fix levels of the CS modules on the system

Use it when wrong software modules are suspected or you want to
             know what versions are on your system

Find it   in PUB.SYS

Documented   nowhere, just run it and answer yes

CSTRACE

It is   the data file created by the TRACE process for an open
             line which contains a recent history of the data
             transmissions that have gone over the line

Use it when the subsystem in question is MTS, RJE or IMF; DS uses
             a file called DSTRCnnn and MRJE uses MRJETRCh

Find it   in PUB.SYS

Documented   in the RJE and DS manuals and in Section I of
             the COMMUNICATIONS HANDBOOK

Data Analyzer (HP1640)

It is   a protocol analyzer device placed into the RS-232-C
             line to display the conversation between two devices
             or to simulate one of them. It also has the ability
             to trap timing conditions and sequences.

Use it when the TRACE process does not show the needed information
             in content or time frame, or the problem is on an
             asynchronous terminal connection

Find it   in the HP catalog or at a local HP sales office

Documented   in Section B of the COMMUNICATIONS HANKBOOK, the DATA
             CAPTURE MANUAL, the Operation Manual that comes
             with the device, and Application Notes 275

TOOL DESCRIPTIONS

DPAN4

It is   a facility to analyze a memory dump tape. There is a
             job stream called DUMPJOB4 which collects additional
             data from the system such as the loadmap and I/O
             configuration.

Use it when any communications subsystem aborts or the system fails

Find it   in PUB.SYS.

Documented   in the SYSTEM UTILITIES MANUAL, SOFTWARE POCKET GUIDE

DSDUMP

It is   a CSTRACE analyzer program specifically for DS traces.
             It prints the DS conversation on alternate sides of the
             page at the high level of DS protocol.

Use it when you are troubleshooting a DS problem and want
             to eliminate the bisync protocol of CS.

Find it   in PUB.SYS

Documented   in newer DS manuals and in data communications
             training materials for SEs

DSM Interconnect

It is   the INP diagnostic and test tool Groups 1 thru 5 which
             do extensive tests of the INP processor and memory

Use it when the INP fails

Find it   in PUB.SYS

Documented   in the INP DIAGNOSTIC MANUAL supplied with the INP
             and in the help feature within the program

DSM Offboard

It is   the INP diagnostic and test tool Groups 6 and 7 which provide the capability to test the network external to the INP. It uses loopback connectors and modem loopbacks.

Use it when   you want to test cables, modems, or a complete INP to I connection

Find it   in PUB.SYS

Documented   in the INP DIAGNOSTIC MANUAL supplied with the INP and in the help feature within the program

DSM Onboard

It is   the INP diagnostic and test tool Groups 2 thru 5 which test the boards USART and other data comm chips. It requires card edge loopback hoods.

Use it when   the INP is suspect and the Interconnect tests have passed

Find it   in PUB.SYS

Documented   in the INP DIAGNOSTIC MANUAL supplied with the INP and in the help feature within the program

DSTEST

It is   a program to list versions of DS modules, list the I/O configuration pertaining to DS, and provide online diagnostics over the DS line

Use it when   DS software versions are suspected, you are in doubt about the configuration, or you want to test the line and software

Find it   in PUB.SYS

Documented   in the DS MANUAL

TOOL DESCRIPTIONS

Data Link Tester

It is   a small device used to test the Data Link cable at a
                connector box for continuity and proper wiring

Use it when   you are installing a Data Link to test your connections
                and when the data link cable is suspected

Find it   in the Data Link Installation Kit and HP parts list

Documented   in the DATA CAPTURE MANUAL

EDITOR

It is   the text editing facility of MPE

Use it when   you need to look at an ASCII file such as UDCs or job
                job streams

Find it   in PUB.SYS

Documented   in the EDIT/3000 MANUAL

FREE2

It is   a system utility to report on the current status of
                free disc space on the system

Use it when   you are unsure of whether there is sufficient free disc
                space available to do your job

Find it   in PUB.SYS

Documented   in the SYSTEM UTILITIES MANUAL

IMFMGR

It is   a command for the Interactive Mainframe Facility sub-
                system which provides the manager of the facility with
                control over its use and the capability to verify
                configuration files.

Use it when   it is necessary to confirm the contents of a config-
                uration file

Find it   as :IMFMGR

Documented   in the IMF MANUAL

INPDPAN

It is   an analyzer for the INP RAM dump.   Except for 'status at time of failure,' reading these dumps is usually done by the factory.

Use it when   the CS subsystem has created a RAM dump file for the INP and has notified the operator of its creation

Find it   in PUB.SYS

Documented   in Section I of the COMMUNICATIONS HANDBOOK and SE data communications training materials

IOMAP

It is   a diagnostic to identify and checkout the basic I/O system hardware.   This command driven program lists the hardware, channels and devices.

Use it when   the exact I/O configuration is not known.

Find it   on the DUS tape

Documented   in the DIAGNOSTIC MANUAL SET

LISTEQ2

It is   a program to list file equations and temporary files.

Use it when   files don't seem to be going to the right place or in the right fashion.

Find it   in PUB.SYS

Documented   in the SYSTEM UTILITIES MANUAL

MPCONFIG

It is   a program to list, change and create MTS configuration files.

Use it when   you want to view the contents of a configuration file

Find it   in PUB.SYS

Documented   in the MTS MANUAL

TOOL DESCRIPTIONS

MPMON

It is   the MTS line supervisor. Running it will display the
                version number.

Use it when   the version of MTS is unknown

Find it   in PUB.SYS

Documented   in the MTS MANUAL

MPTEST

It is   a testing facility for MTS lines and terminals. It
                will check terminal strap settings and perform
                read/write tests of the line, modems and terminals.

Use it when   a new MTS line is installed to check the terminal
                straps or a line is not functioning properly.

Find it   in PUB.SYS

Documented   in the MTS MANUAL

MRJECONTROL

It is   a console operator command used to control the MRJE
                line. The CHECK parameter will cause a list of version
                numbers to be listed.

Use it when   the version numbers are unknown or are suspected of
                being wrong.

Find it   as :MRJECONTROL

Documented   in the MRJE MANUAL

Modem analog loopback

It is   a modem capability to connect the analog output and
                input parts of the modem together to read whatever
                is written. This tests about 80% of the modem.

Use it when   testing data terminal equipment without going over the
                TelCo line (local test) or the local modem.

Find it   as a button or switch somewhere on the modem

Documented   in the modem manual, Bell and HP modem tests are in
                Section B of the COMMUNICATIONS HANDBOOK

Modem digital loopback

It is   a modem capability to connect the digital output and input parts of the modem together to return whatever was received. This loopback is necessary to test a TelCo line and is set on the far end modem from either the computer or terminal.

Use it when   when testing data communications equipment by going over the TelCo line (remote test).

Find it   as a button or switch somewhere on the modem

Documented   in the modem manual, Bell and HP modem tests are in Section B of the COMMUNICATIONS HANDBOOK

Modem remote test

It is   a modem capability to send data to and receive it back from a remote modem. Some modems have the capability to tell the remote modem to go into loopback. It provides a pass/fail test of the hardware.

Use it when   the TelCo line and modems are being tested independently of the data terminal equipment.

Find it   as a switch or button on the modems

Documented   in the modem manual, Bell and HP modem tests are in Section B of the COMMUNICATIONS HANDBOOK

Modem selftest

It is   a modem pass/fail test. It will determine if the modem is functioning within specifications.

Use it when   any time there is any doubt. Just push the button; it does the rest.

Find it   as a switch or button on the modem

Documented   in the modem manual, Bell and HP modem tests are in Section B of the COMMUNICATIONS HANDBOOK

TOOL DESCRIPTIONS

Multimeter

It is   an electronic tool for testing volts and ohms. It can
             be used to test the continuity of a cable or connector
             when set to ohms.

Use it when cables or connections are suspected of being faulty

Find it   in nearly any electronics store such as Radio Shack

Documented   in the manual that comes with it. Some cables are
             documented in the DTD CABLING MANUAL and the
             COMMUNICATIONS HANDBOOK.

SHOWCOM

It is   a console operator command to display the statistics
             generated for a data comm line such as CS errors,
             timeouts and retries.

Use it when the line appears hung, an exceptional number of errors
             are being encountered, or the last CS error message
             for the line was lost.

Find it   as :SHOWCOM XX;ERRORS

Documented   in the CONSOLE OPERATOR'S GUIDE and the COMMUNICATIONS
             HANDBOOK

SHOWME

It is   an MPE command to identify the session

Use it when the current version of MPE is needed

Find it   as :SHOWME

Documented   in the MPE COMMAND MANUAL

SLEUTH

It is   a diagnostic programming language useful in determining
             the exact I/O configuration on Series II/III computers.

Use it when the exact I/O configuration is not known

Find it   on the Non-CPU Diagnostic tape

Documented   in the diagnostic manuals that come with the system

SSB

It is   the SOFTWARE STATUS BULLETIN, a publication containing
                   a list of all known problems and enhancement requests.
                   It may have the problem you are troubleshooting already
                   listed with a fix or work around.

Use it when   you first encounter the problem to see if it is already
                   known.

Find it   in the mail from your CSS or SSS contract

Documented   in the GUIDE TO A SUCCESSFUL INSTALLATION

SSLC diagnostic

It is   a diagnostic useful in testing the SSLC, cables and
                   modems in the same manner as DSM for the INP. It
                   requires loopback hoods and cable connectors or modem
                   loopbacks.

Use it when   the modems, TelCo lines, or SSLC are not functioning
                   properly

Find it   on the Non-CPU Diagnostic tape

Documented   in the diagnostic manuals that come with the system

SYSDUMP

It is   the MPE configurator. When used with $NULL as the tape
                   file designator, it provides a quick method of finding
                   the exact configuration as MPE sees it.

Use it when   the exact configuration is not known

Find it   as :SYSDUMP

Documented   in the CONSOLE OPERATOR'S GUIDE and SYSTEM MANAGER
                   MANUAL.

TOOL DESCRIPTIONS

SYSINFO

It is   a contributed program that analyzes the MPE I/O
                configuration and lists it in parts or whole. It gives
                a nice analysis of how each controller and supervisor
                is used.

Use it when   the configuration is not known

Find it   usually in PUB.SYS

Documented   with an internal help facility

TABLE

It is   an unsupported program that lists terminal DITs and
                other tables used by MPE. It is command driven and
                is useful for examining DITs at a time when a
                terminal appears hung.

Use it when   a terminal appears hung

Find it   usually in PUB.SYS

Documented   in TABLEDOC on some systems or ask PICS for it

Terminal data comm tests

It is   a terminal resident test of the data comm board,
                cables, cable connections, modems and TelCo lines.
                The loopback hood and connectors come with the
                terminal. Modem loopbacks are also used.

Use it when   any component of the MTS network is not functioning
                other than the computer.

Find it   as sequences on the terminal keyboard

Documented   in the terminal and MTS REFERENCE MANUALS

Terminal display functions

It is   a terminal capability to display all terminal escape sequences and functions rather than perform them. It is very useful in finding improper data being sent to terminals.

Use it when   a terminal is hanging while receiving data

Find it   as a key on the terminal keyboard

Documented   in the terminal reference manual

Terminal driver mode

It is   a capability of 2645 and 2626 terminals to poll other multipoint terminals over a line. It can be used to eliminate the computer from the list of possible problems.

Use it when   you are trying to determine whether the problem lies in the computer or not, or you want to test the TelCo line

Find it   as sequences on the terminal keyboard

Documented   in the terminal reference manuals

Terminal monitor mode

It is   a method of using the terminal to display the traffic on the MTS line.

Use it when   information is needed about what polling is being done.

Find it   as a key on the terminal keyboard

Documented   in the terminal and MTS REFERENCE MANUAL

Terminal selftest

It is   a pass/fail test of the terminal hardware.

Use it when   a terminal is not functioning properly or other tests are to be done using a terminal

Find it   as a key on the terminal keyboard

Documented   in the terminal reference manuals

TOOL DESCRIPTIONS

TIMS (HP4943,4935)

It is	a Transmission Impairment Test Set or similar device for analyzing the quality of a line or set of modems. It is a standard piece of TelCo equipment and is used by many companies with large data communications installations.
Use it when	line quality is suspected as the cause of problems
Find it	on the HP price list and in various catalogs
Documented	in Telco manuals and accompanying literature

TRACE

It is	a process created when the TRACE parameter is used with a communications subsystem
Use it when	line activity is to be recorded to diagnose problems
Find it	the Operator commands for DS, IMF, MRJE and MTS, or the RJLINE command of RJE
Documented	in Section I of the Communications Handbook and in each subsystem reference manual

READER COMMENT SHEET

HP 3000 Computer Systems
Communications Handbook

30000-90105   **January 1983**

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(If no, explain under Comments, below.)

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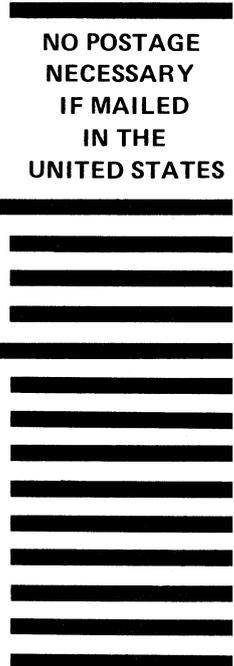IF MAILED
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