



**HP 3000 Computer Systems  
COMMUNICATIONS  
HANDBOOK**

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# PRINTING HISTORY

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## **PREFACE**

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

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# 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.



## ASCII/EBCDIC/Hollerith

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		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.

## ASCII/EBCDIC/Hollerith

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	DO

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

ASCII/EBCDIC/Hollerith

CHAR CODE			ASCII			EE		
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	J	352	EA
205	315	CD		234	12-11-4-8		353	EB
206	316	CE		235	12-11-5-8	Y	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.

ASCII/EBCDIC/Hollerith

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			
CHAR	Left	Right	Dec.
A	040400	000101	65
B	041000	000102	66
C	041400	000103	67
D	042000	000104	68
E	042400	000105	69
F	043000	000106	70
G	043400	000107	71
H	044000	000110	72
I	044400	000111	73
J	045000	000112	74
K	045400	000113	75
L	046000	000114	76
M	046400	000115	77
N	047000	000116	78
O	047400	000117	79
P	050000	000120	80
Q	050400	000121	81
R	051000	000122	82
S	051400	000123	83
T	052000	000124	84
U	052400	000125	85
V	053000	000126	86
W	053400	000127	87
X	054000	000130	88
Y	054400	000131	89
Z	055000	000132	90
a	060400	000141	97
b	061000	000142	98
c	061400	000143	99
d	062000	000144	100
e	062400	000145	101
f	063000	000146	102
g	063400	000147	103
h	064000	000150	104
i	064400	000151	105
j	065000	000152	106
k	065400	000153	107
l	066000	000154	108
m	066400	000155	109
n	067000	000156	110
o	067400	000157	111
p	070000	000160	112
q	070400	000161	113
r	071000	000162	114
s	071400	000163	115
t	072000	000164	116
u	072400	000165	117
v	073000	000166	118
w	073400	000167	119
x	074000	000170	120
y	074400	000171	121
z	075000	000172	122
0	030000	000060	48
1	030400	000061	49
2	031000	000062	50
3	031400	000063	51
4	032000	000064	52
5	032400	000065	53
6	033000	000066	54
7	033400	000067	55
8	034000	000070	56
9	034400	000071	57

BYTE POSITION				
CHAR	Left	Right	Dec	Control Char
NUL	000000	000000	0	@
SOH	000400	000001	1	A
STX	001000	000002	2	B
ETX	001400	000003	3	C
EOT	002000	000004	4	D
ENO	002400	000005	5	E
ACK	003000	000006	6	F
BEL	003400	000007	7	G
BS	004000	000010	8	H
HT	004400	000011	9	I
LF	005000	000012	10	J
VT	005400	000013	11	K
FF	006000	000014	12	L
CR	006400	000015	13	M
SO	007000	000016	14	N
SI	007400	000017	15	O
DLE	010000	000020	16	P
DC1	010400	000021	17	Q (X ON)
DC2	011000	000022	18	R
DC3	011400	000023	19	S (X OFF)
DC4	012000	000024	20	T
NAK	012400	000025	21	U
SYN	013000	000026	22	V
ETB	013400	000027	23	W
CAN	014000	000030	24	X
EM	014400	000031	25	Y
SUB	015000	000032	26	Z
ESC	015400	000033	27	[
FS	016000	000034	28	\
GS	016400	000035	29	]
RS	017000	000036	30	^
US	017400	000037	31	_
SPACE	020000	000040	32	
!	020400	000041	33	
"	021000	000042	34	
#	021400	000043	35	
\$	022000	000044	36	
%	022400	000045	37	
&	023000	000046	38	
'	023400	000047	39	
(	024000	000050	40	
)	024400	000051	41	
*	025000	000052	42	
+	025400	000053	43	
,	026000	000054	44	
-	026400	000055	45	
.	027000	000056	46	
/	027400	000057	47	
:	035000	000072	58	
;	035400	000073	59	
<	036000	000074	60	
=	036400	000075	61	
>	037000	000076	62	
?	037400	000077	63	
@	040000	000100	64	
A	055400	000133	91	
B	056000	000134	92	
C	056400	000135	93	
D	057000	000136	94	
E	057400	000137	95	
F	060000	000140	96	
G	075400	000173	123	
H	076000	000174	124	
I	076400	000175	125	
J	077000	000176	126	
DEL	077400	000177	127	

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**



## Octal/Decimal Conversion

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

## Octal/Decimal Conversion

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

## Octal/Decimal Conversion

(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	

## Binary

$2^n$			$n$	$2^{-n}$									
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 to Octal to Hexadecimal

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 to Octal to Hexadecimal

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 Modem/Terminal Interface

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

PIN	NAME	DIRECTION		FUNCTION	CIRCUIT	
		↑ TO DTE	↓ TO DCE		(CCITT)	(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.

## EIA Modem Interface

### INTERFACE VOLTAGE

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

# EIA Modem Interface

## INTERCHANGE CIRCUITS BY CATEGORY

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

INTERCHANGE CIRCUITS BY CATEGORY

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

a = First segment, second segment  
b = Joint assignment





# COMMUNICATIONS CONTROLLERS AND MODEMS

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## ATC

### HP3000 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. IOTERMO interfaces the ATC hardware to the MPE operating system.

#### Features

- IOTERMO 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 interface consists of an ADCC main and extend PCA which multiplexes data transmission for 8 ports which may be hardwired or modem connected or any mix thereof. HIOTERMO interfaces the ADCC hardware to the MPE operating system.

### Functions

- HIOTERMO provides speeds of 110, 150, 300, 600, 1200, 2400, 4800, and 9600. HIOTERMO will speed sense up to 2400 baud.
- Will operate in full duplex or half duplex. Half duplex is supported 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 signals via channel programs.
- Detects parity errors, over-run errors, and break conditions.

## ATP

### 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.

## ASYNCRONOUS TERMINAL I/O CONFIGURATION

ASYNCRONOUS TERMINAL CONTROLLER  
HP 30032B DRIVER IOTERMO

ASYNCRONOUS DATA COMMUNICATIONS CONTROLLER  
HP 30018A DRIVER HIOTERMO

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

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:

$DRT\# = (IMBI\# \times 128) + (CHANNEL\# \times 8) + DEVICE\#$

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 sensing 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.

## ATC/ADCC/ATP

### 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, HIOASLPO

DEVICE CLASSES? (optional)

**ATC/ADCC/ATP**

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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



## TERMINAL TYPES

Term Type	Parity		CARRIAGE CONTROL			Comments
	Check (e)	Type (f)	Cursor Back- space	CTL-H Reply	Form Feed Reply (g)	
0	Yes	1,2	No	\(%134)	LF reply used.	
1	Yes	1,2	Yes	LF	Yes	Series 30/33 ADCC: Subtypes 0-5.
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.	
5	Yes	1,2	Yes	LF	Yes	At input ESC-A - ESC-E, ESC-H, ESC-J and ESC-K are stripped off on Series II/III
6	Yes	1,2	Yes	LF	Yes	
9	Yes	1,2	Yes	null	Yes	
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.

## TERMINAL TYPES

Term Type	Parity		CARRIAGE CONTROL			Comments (g)
			Cursor	CTL-H	Form	
	Check (3)	Type (f)	Back-space	Reply	Feed Reply	
15	No, 8 data bits	5	Yes	LF	Yes	Use ENQ/ACK handshake 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 handshake 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 commands, 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)

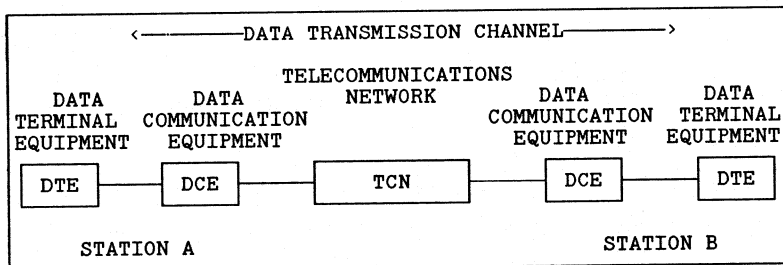
SERIES III TERMINAL GENERATES	HP 3000 OUTPUT GENERATES	HP 3000 INPUT
Odd parity or none (0)	Odd parity	No parity checking is accomplished unless explicitly enabled via FCONTROLS. The eighth bit is always set to zero.
Even parity or none (1)	Even parity	
SERIES 3X/4X/64 TERMINAL GENERATES	HP 3000 OUTPUT 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 =	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 parity	9 block checking
- (g) Form Feed Char=%14

## ATC/ADCC/ATP CABLING



COMMUNICATIONS NETWORK COMPONENTS

### RS232C MODEM/HARDWARE 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 (25 pin to 3 pin)	132n2X
n = 2 262X port 1	
3 264X	
4 262X port 2 and 2382	
Adapter Cable to convert 25 pin (connector to 3 pin)	30152A
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

## ATC/ADCC/ATP CABLING

### 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 @80°C (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

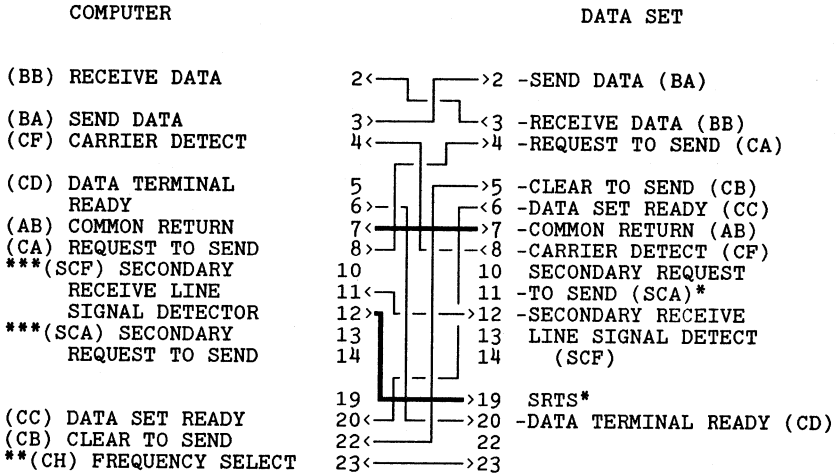
Shield (Outer): Braid from AWG 36 tinned copper for 85% minimum coverage.

Jacket: PVC, 35 mil minimum wall thickness.

Color: Pearl Gray cabinet per HP Visual Color Standard 6009-0108.

# ATC/ADCC/ATP CABLING

## ASYNCHRONOUS TERMINAL CONTROLLER MODEM CABLE PIN CONNECTIONS (30062B)



\* 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.



## ATC/ADCC/ATP CABLING

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

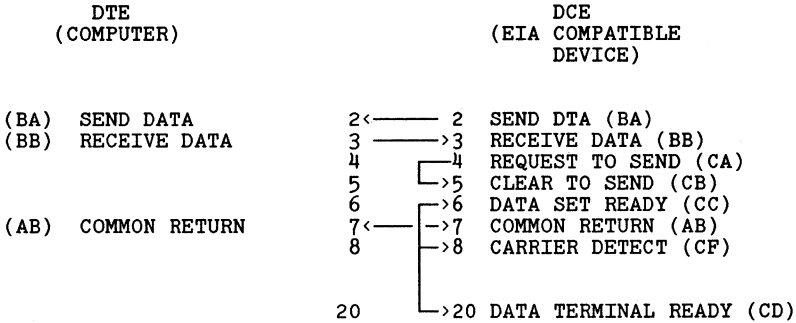
(DCE)  
COMPUTER OR MODEM

(DTE)  
TERMINAL

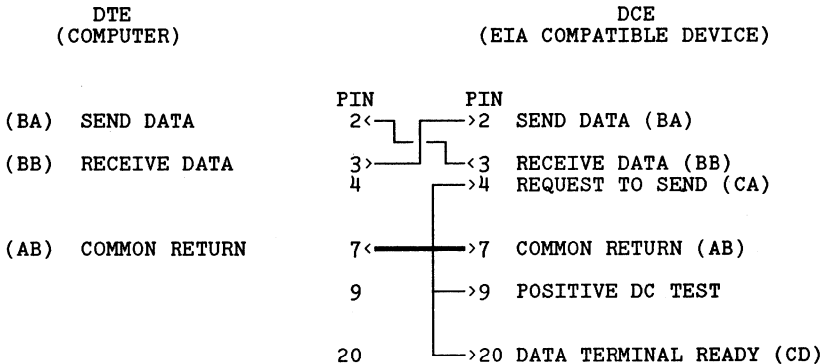
(BA) SEND DATA	-2	<-----	2		-SEND DATA (BA)
(BB) RECEIVE DATA	-3	----->	3		-RECEIVE DATA (BB)
(CA) REQUEST TO SEND	-4	<-----	4		-REQUEST TO SEND (CA)
(CB) CLEAR TO SEND	5	----->	5		CLEAR TO SEND (CB)
(CC) DATA SET READY	-6	----->	6		-DATA SET READY (CC)
(AB) COMMON RETURN	-7	<-----	7		-COMMON RETURN (AB)
(CF) CARRIER DETECT	-8	----->	8		-CARRIER DETECT (CF)
(SCF) SECONDARY CARRIER DETECT	-12	----->	12		SECONDARY CARRIER -DETECT (SCF)
(SDA) SECONDARY REQUEST TO SEND	-19	<-----	19		SECONDARY REQUEST -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:**



**TO CABLE TERMINALS ON AN ADCC 202T MODEM, CONFIGURE AS SUBTYPE 0 AND CONSTRUCT WITHOUT SUPPORT USING THE FOLLOWING SPECIAL CABLE:**



## ASYNCHRONOUS MODEMS

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.

## ASYNCHRONOUS MODEMS

### 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

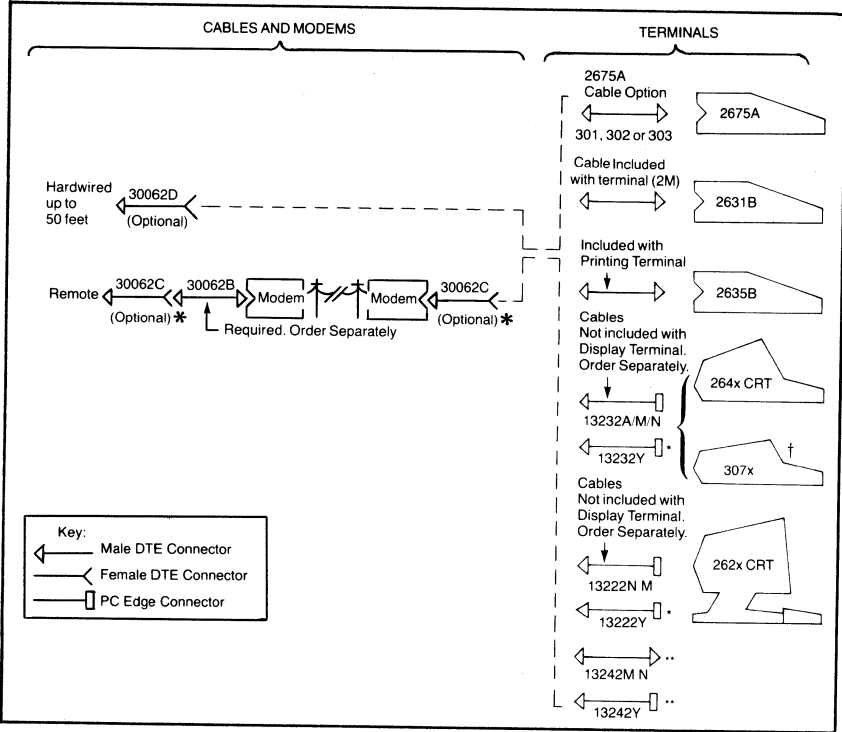
## ASYNCHRONOUS MODEMS

### 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



\* 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.

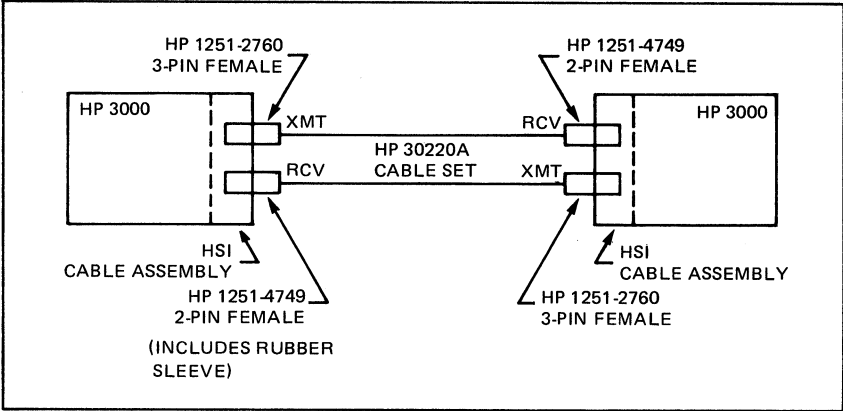
### Basic Configuration

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

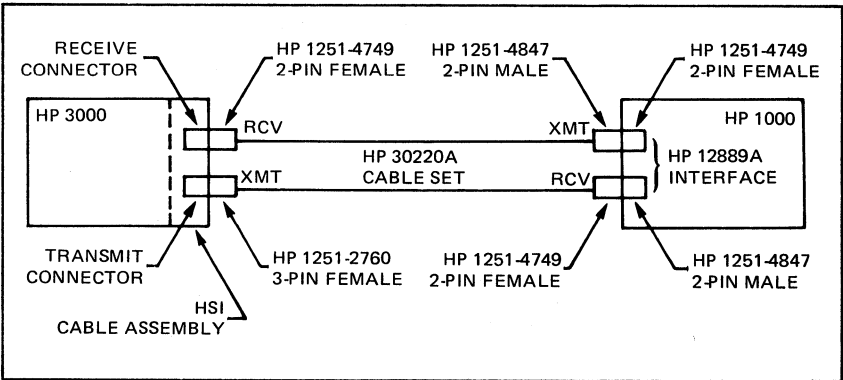
30220A	25 ft.
Opt. -001	100 ft.
Opt. -002	250 ft.
Opt. -003	500 ft.
Opt. -004	1000 ft.
Opt. -005	2000 ft.

# 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 optionally 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, additional LRC and CRC parity is provided.
- Maximum number of SSLC's per CPU is 7.

### Basic Configuration

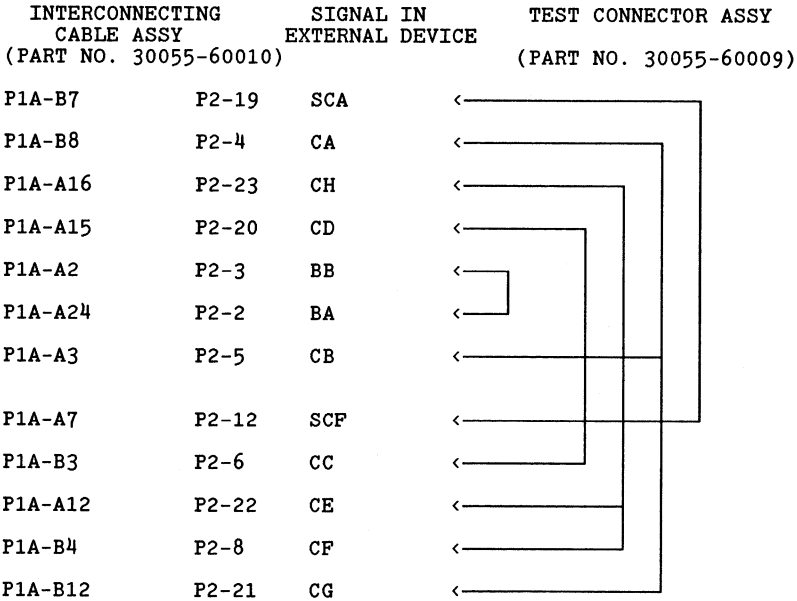
Synchronous Single Line Controller kit includes one PC board (30055-60001), cable assembly (30055-60008\*), and test connector (30055-60009). On previously installed systems, obsolete interface cable 30055-60003 and obsolete test connector 30055-60005 may be present. Within the United States this combination 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.

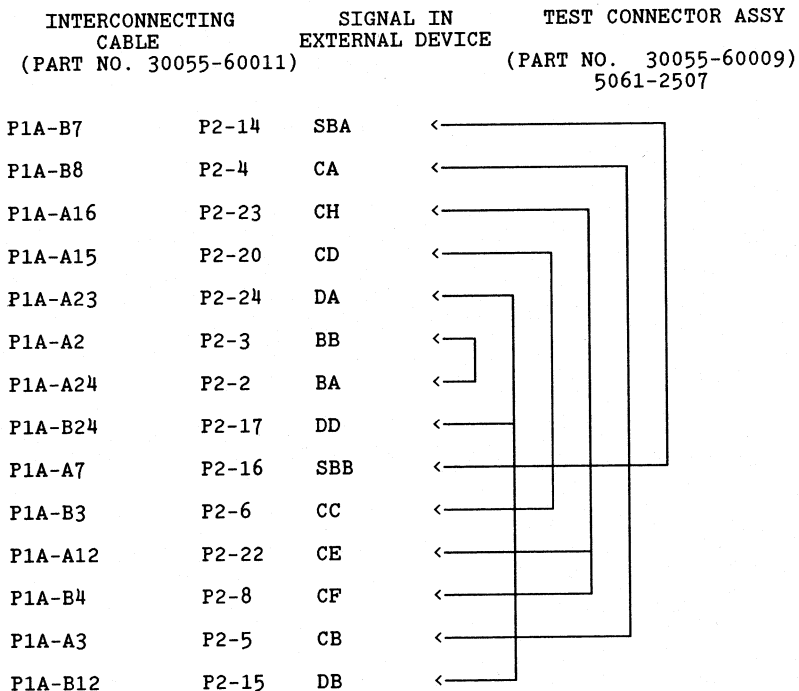
\*30055-60011 replaces 30055-60008. Pin 23 (Modem speed) tied high on 60011 cable. (Always "ON")

## HP 30055-60010 CABLE AND TEST CONNECTOR WIRING DIAGRAM



## SSLC CABLING - SYNCHRONOUS

### HP 30055-60011 CABLE AND TEST CONNECTOR WIRING DIAGRAM



**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 communications 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 compatible.
- 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 Vadec 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.

## INTELLIGENT NETWORK PROCESSOR (INP)

- 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.



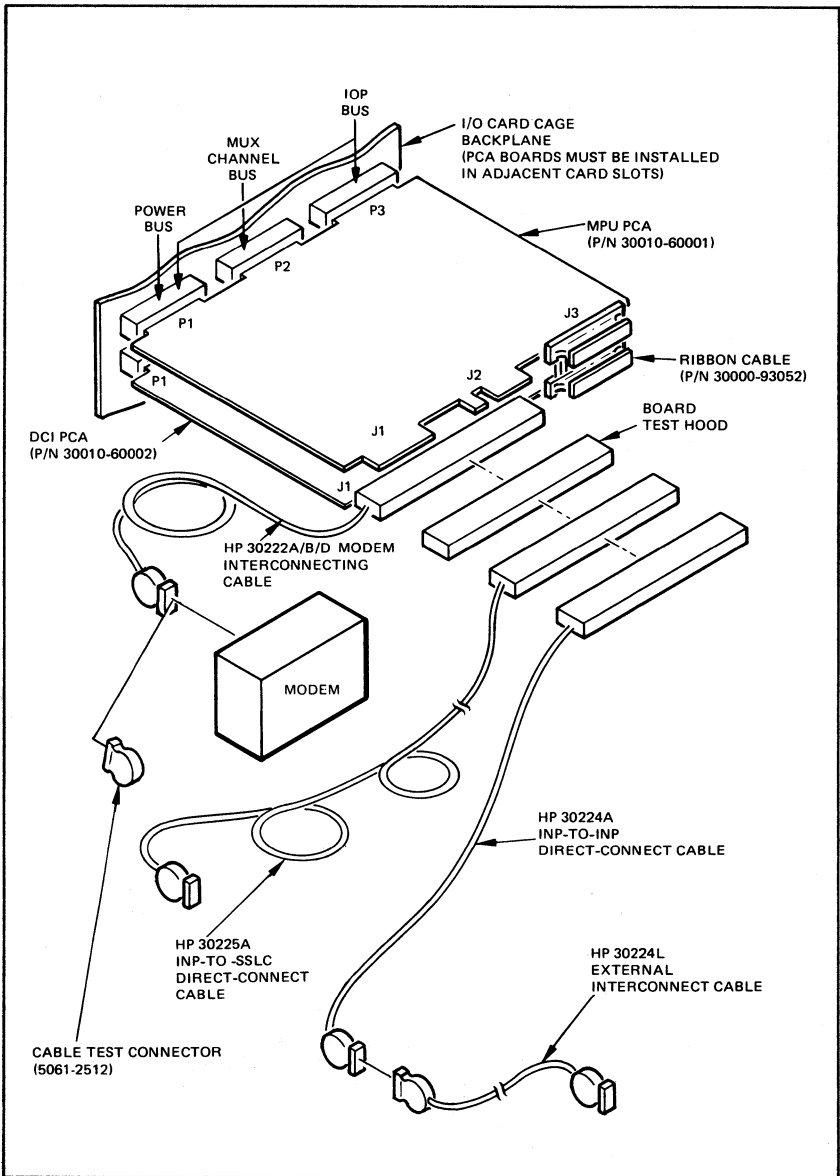
## INTELLIGENT NETWORK PROCESSOR (INP)

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

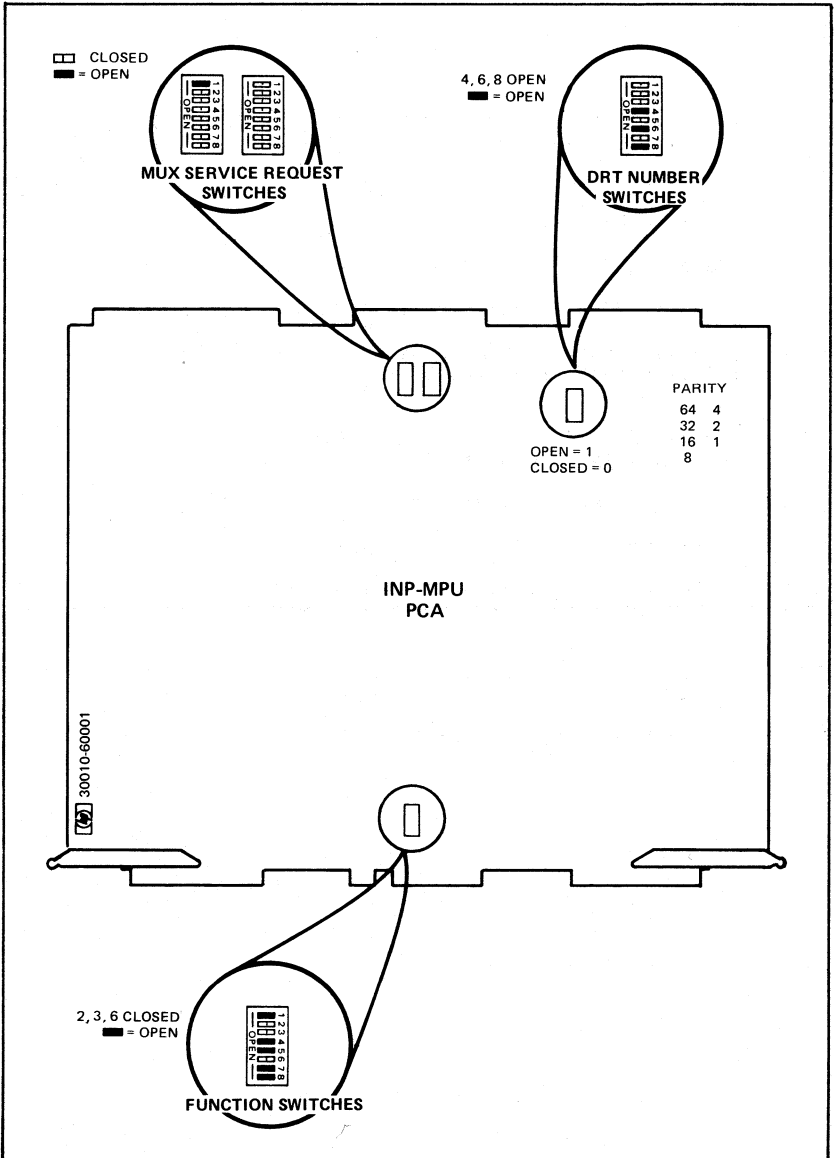
(1) INP-to-INP direct connection requires the use of a 30224L interconnect cable, part numbers 30224-60001 through 30224- 60007. The cable lengths range from 10 through 1000 meters.

# INTELLIGENT NETWORK PROCESSOR (INP)



HP 30010A INTELLIGENT NETWORK PROCESSOR  
AND RELATED CABLING FOR SERIES II/III

# INTELLIGENT NETWORK PROCESSOR (INP)



HP30010A LOCATION OF PCA SWITCHES

## INTELLIGENT NETWORK PROCESSOR (INP)

### FUNCTION SWITCH SETTING, HP30010A SERIES II/III

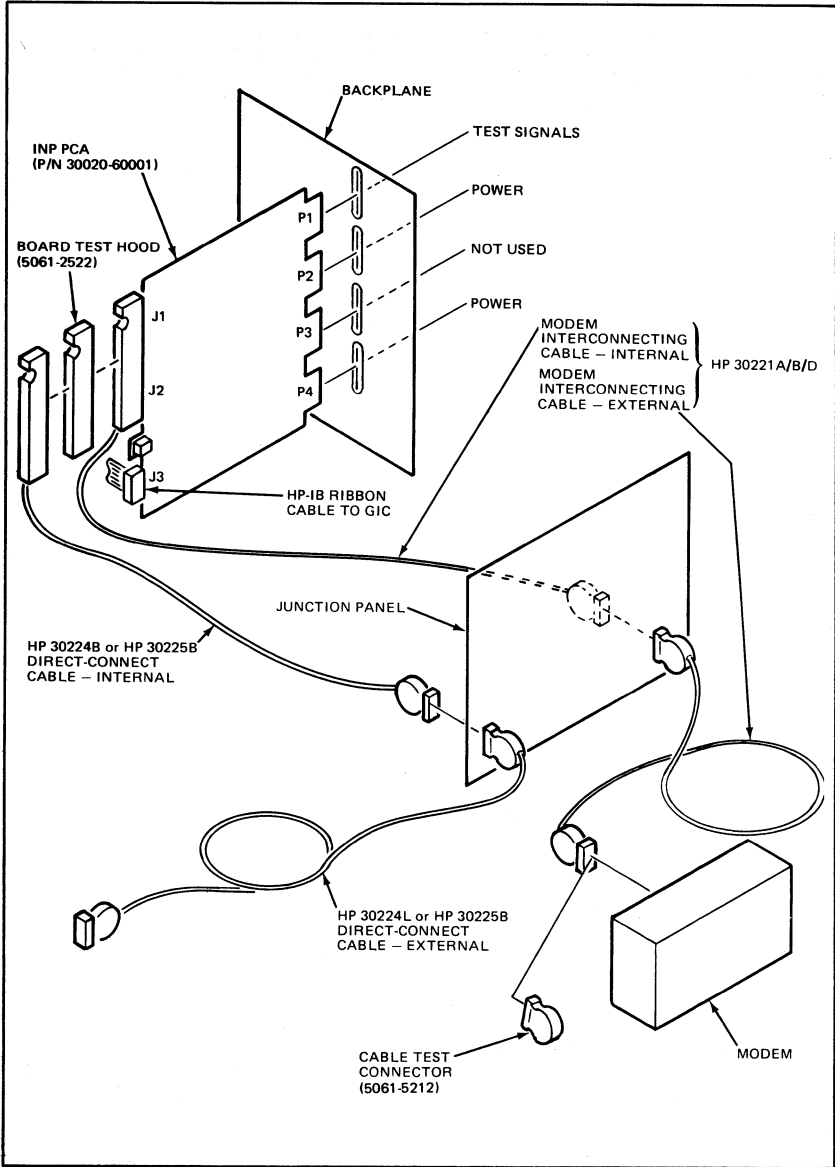
Switch Number	Function	Enable Position	Position For System Use
1	Unassigned	Open	Open
2	Watchdog Timer	Closed	Closed
3	Access INP ROM (see note 1)	Closed	Closed
4	Execute from ET PROM instead of self test after reset of INP	Closed	Open
5	Access ET PROM exclusively (see note 1)	Closed	Open
6	System Interface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

## INTELLIGENT NETWORK PROCESSOR (INP)

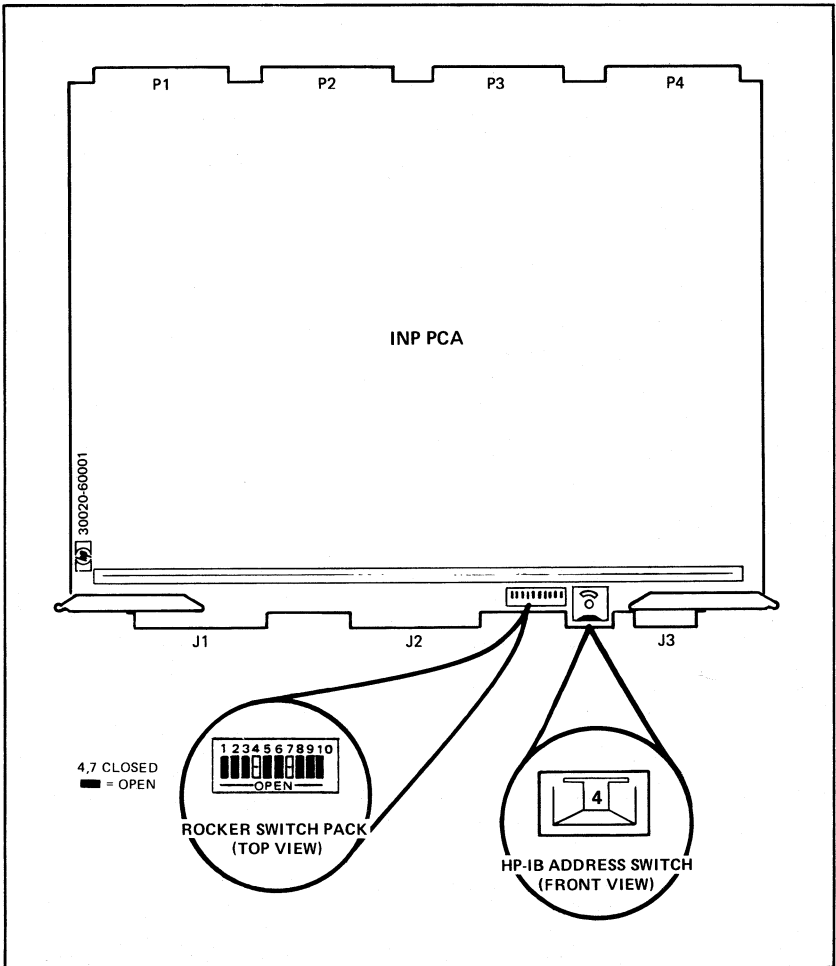
SERVICE REQUEST NUMBER	ROCKER SWITCH NUMBER TO BE CLOSED	SWITCH BLOCK LOCATION (LEFT OR RIGHT)
SR0	1	Right
SR1	2	Right
SR2	3	Right
SR3	4	Right
SR4	5	Right
SR5	6	Right
SR6	7	Right
SR7	8	Right
SR8	1	Left
SR9	2	Left
SR10	3	Left
SR11	4	Left
SR12	5	Left
SR13	6	Left
SR14	7	Left
SR15	8	Left

# INTELLIGENT NETWORK PROCESSOR (INP)



HP 30020A/B INTELLIGENT NETWORK PROCESSOR AND RELATED CABLING FOR SERIES 3X/4X/64

# INTELLIGENT NETWORK PROCESSOR (INP)



NOTE: HP30020B has no switches.

HP 30020A, LOCATION OF PCA SWITCHES

# INTELLIGENT NETWORK PROCESSOR (INP)

ROCKER SWITCH POSITIONS 30020A SERIES 3X,4X

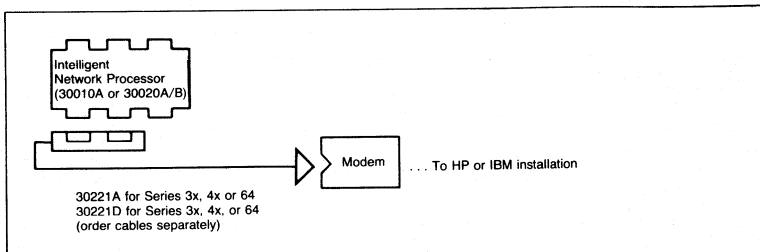
Switch Number	Function	Enable Position	Required Position for System Use
1	Allow RAM refresh	Open	Open
2	Allow processor execution	Open	Open
3	Access ET PROM exclusively (see note 1)	Closed	Open
4	Access INP ROM (see note 1)	Closed	Closed
5	Allow remote restart capability	Open	Open
6	HP-IB shield (ground)	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.



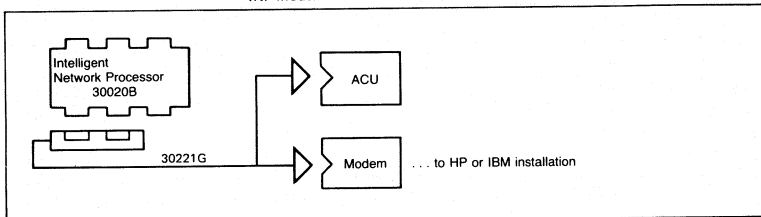
# COMMUNICATIONS CABLING DIAGRAMS

INP Modem Connection



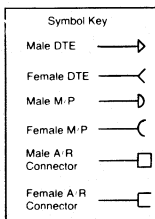
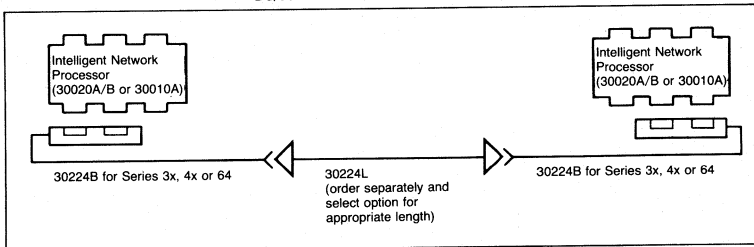
Note: May be used for DS/3000, RJE/3000, MRJE 3000, IML 3000, or MTS 3000 synchronous modem communication.

INP Modem - Auto Call Unit Connection



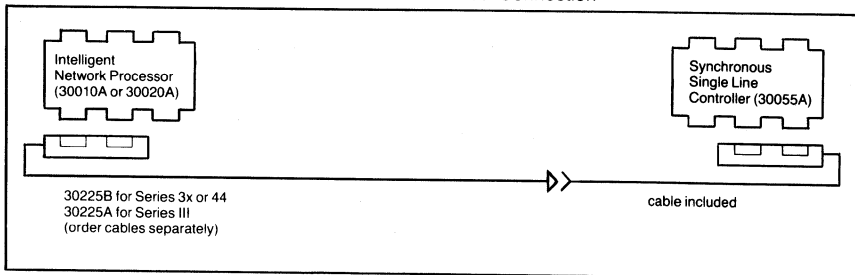
Note: May be used for DS/3000, RJE/3000, MRJE 3000, IML 3000, or MTS 3000 synchronous modem communication.

DS/3000 INP-INP Direct Connection



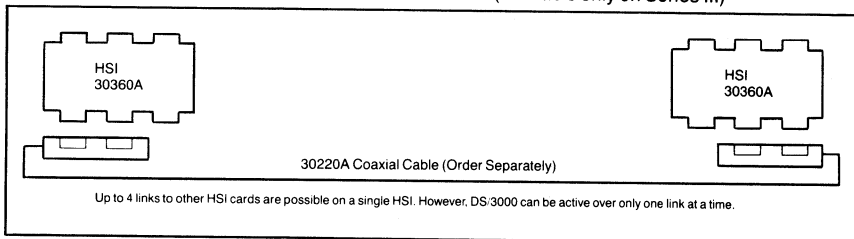
# COMMUNICATIONS CABLING DIAGRAMS

DS/3000 INP-SSLC Direct Connection

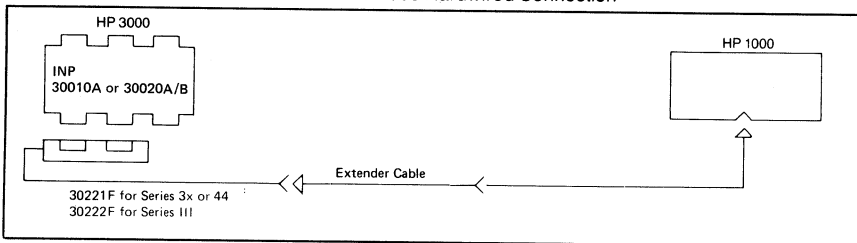


Note: Transmission mode 1 and subtype 1 on both sides is required.

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

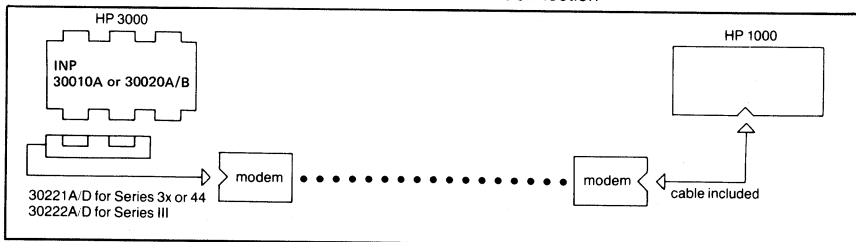


DS/3000-DS/1000 Hardwired Connection



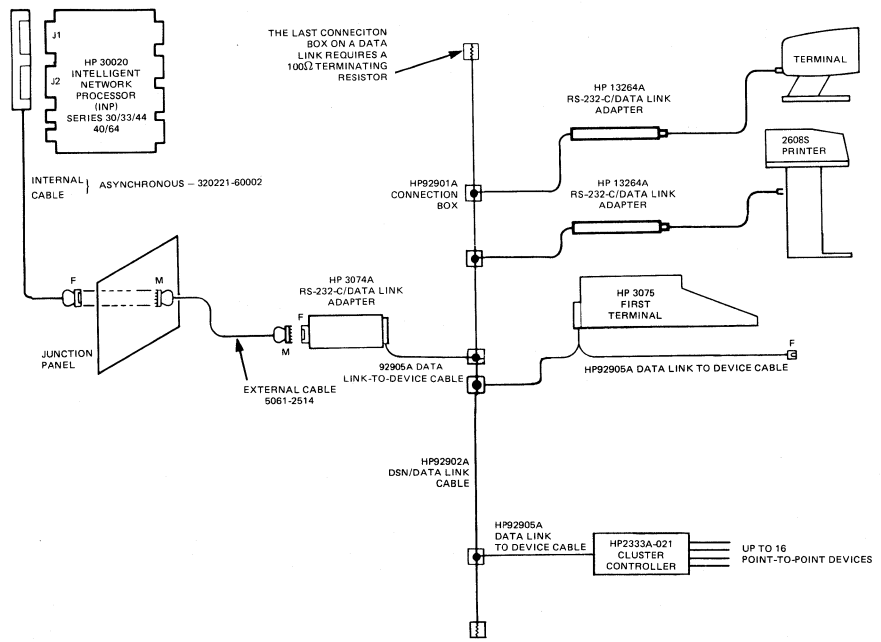
Note: Maximum distance of 50 feet supported.

DS/3000-DS/1000 Modem Connection



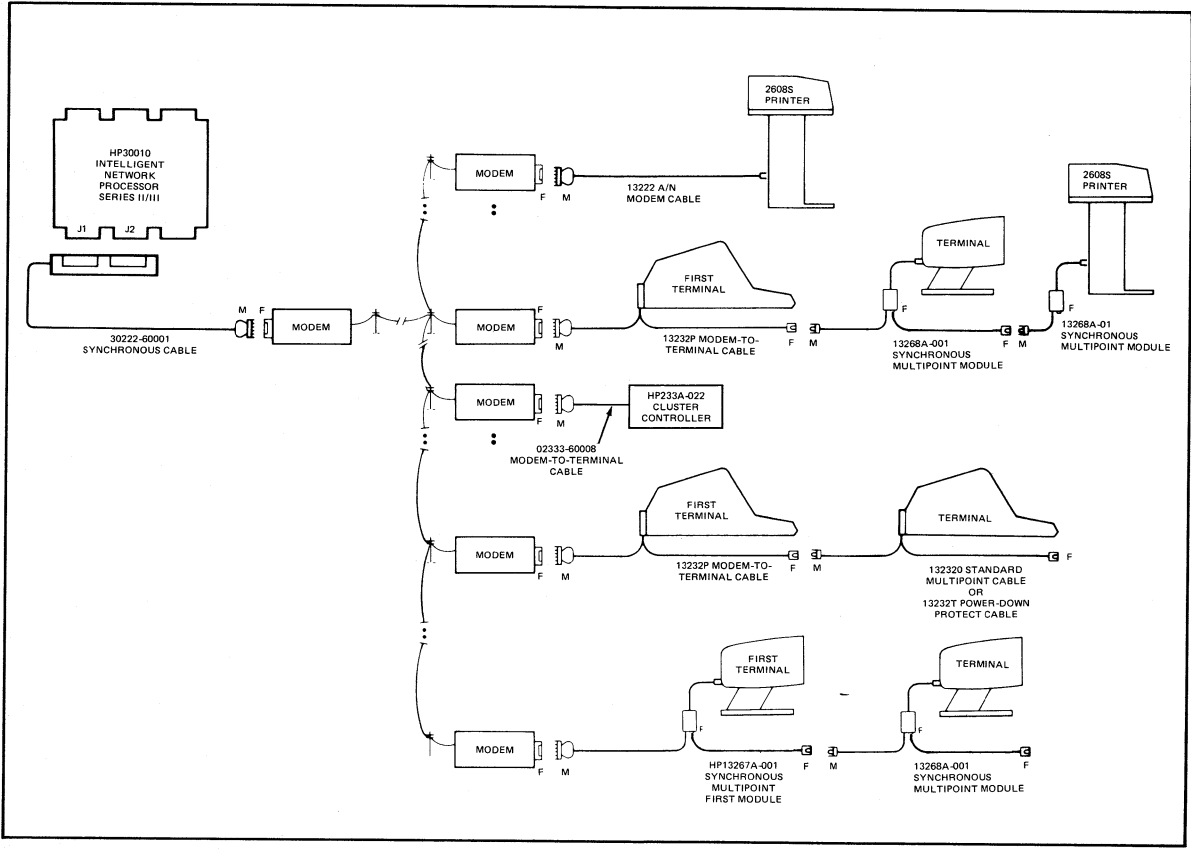
# MULTIPOINT CABLING DIAGRAMS

LOCAL DATA LINK



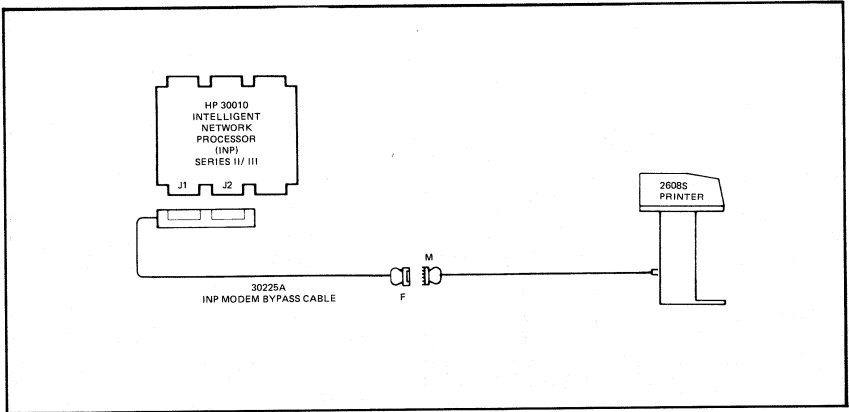
# MULTIPOINT CABLING DIAGRAMS

## REMOTE DAISY CHAIN



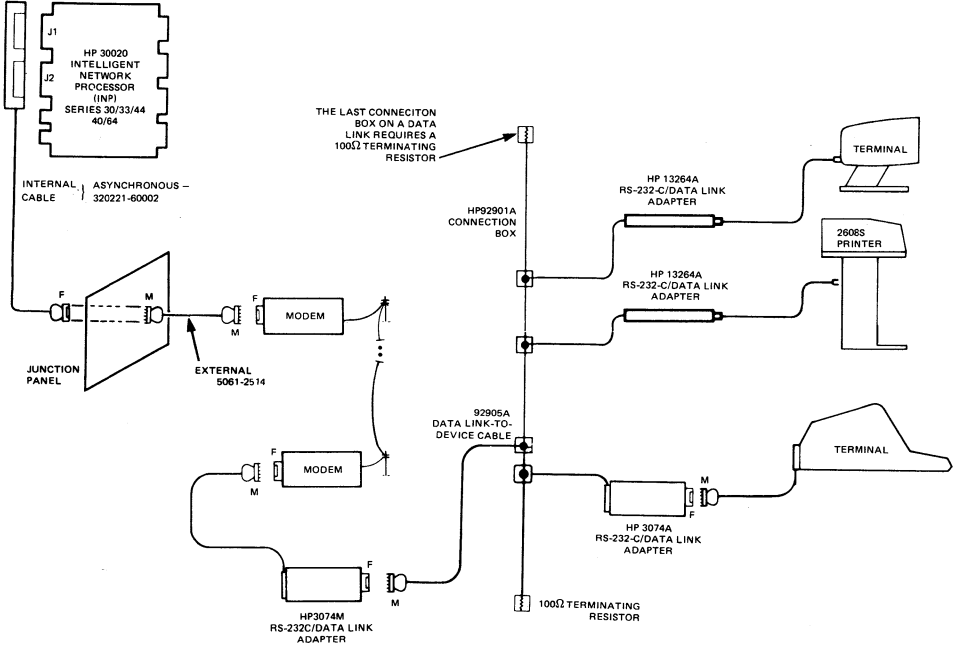
# MULTIPOINT CABLING DIAGRAMS

## LOCAL 2608S ON SERIES II/III



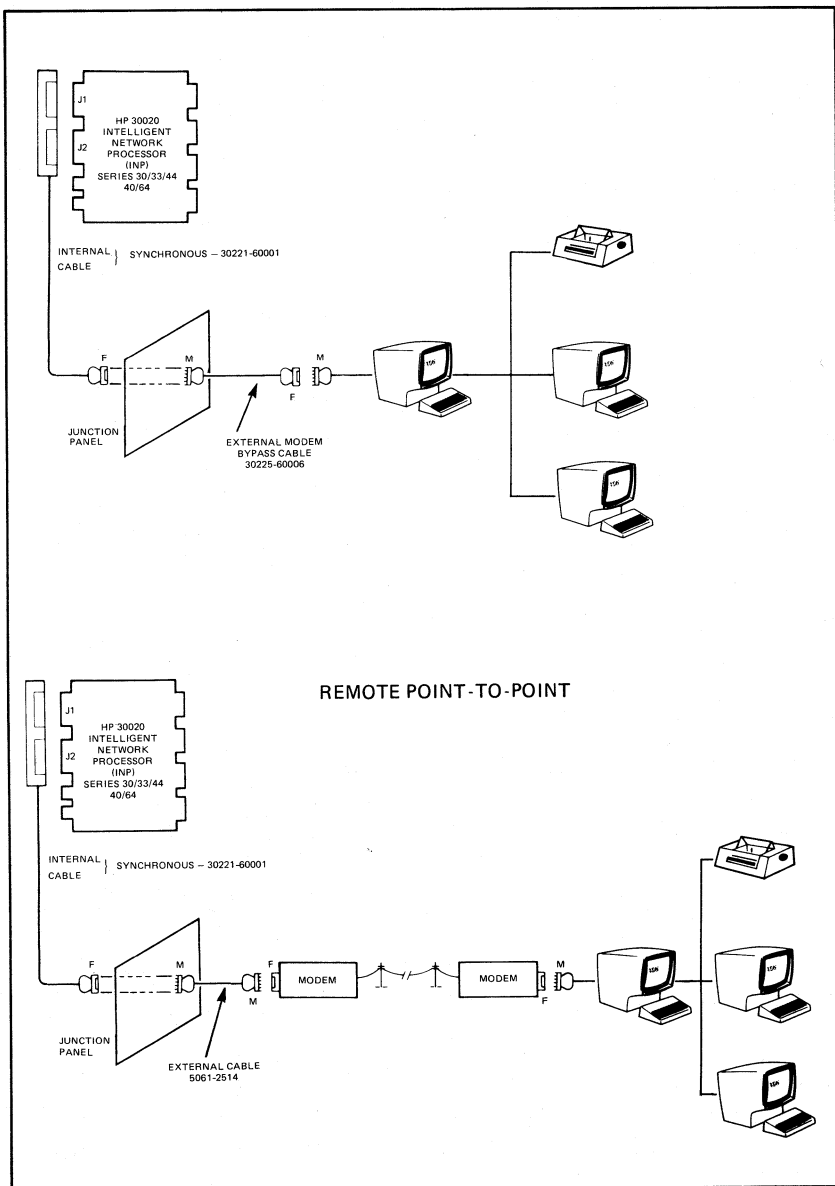
MULTIPOINT CABLING DIAGRAMS

REMOTE DATA LINK



# MULTIPOINT CABLING DIAGRAMS

## IBM 3270 CLUSTER HARDWIRED POINT-TO-POINT



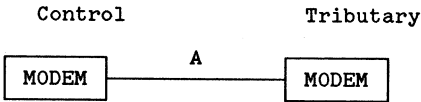
## SYNCHRONOUS MODEMS

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:

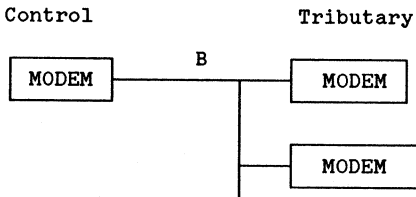
### CONFIGURATION A Point-to-Point Connection (RJE, MRJE, DS, IMF\*, MTS)



PUBLIC (SWITCHED) OR  
PRIVATE (LEASED) LINE  
\*IMF must be leased.

HP MODEMS	BELL SYSTEM MODEMS
37210T	201C
37220T	208A
37230A	208B
	209A
	2024A
	2048A
	2096A
	DDS

### CONFIGURATION B Multidrop Connection (MTS, IMF - as tributary)



PRIVATE (LEASED)  
MULTIDROP LINE

HP MODEMS	BELL SYSTEM MODEMS
37210T	201C
37230A	208A
	2024A
	2048A,C
	DDS

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



## SYNCHRONOUS MODEMS

### 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 B4	Without 801 Automatic Calling Unit With 801 Automatic Calling Unit	Depends- (Note 1)
C5	EIA interface	X
D8	With automatic answer	X
E9 E10	Automatic answer permanently wired. Automatic answer key-controlled.	Either

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

## SYNCHRONOUS MODEMS

### 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 inter- face and ground options. A1 Status of data set ready during local analog loop- back - ON. B1 Frame ground connected to signal ground.	X  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 With new synch (w/SSLC)	X	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

## SYNCHRONOUS MODEMS

### 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 B4	Continuous carrier. Switched carrier.	X	X
C5 C6	Switched REQUEST TO SEND. Continuous REQUEST TO SEND.	X	X
D7 D8	One-second holdover used. One-second holdover not used.	X	X
E9 E10	With new sync. (w/SSLC) Without new sync.	X	X
F11	Continuous Carrier when analog loop is present.	X	X

## SYNCHRONOUS MODEMS

### 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,  
 IMP, 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.



## SYNCHRONOUS MODEMS

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

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

## SYNCHRONOUS MODEMS

### 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 A4	Multipoint Control Multipoint Tributary	X	X
B1	Internal Timing (Default)	X	X
C5 C6	Continuous Carrier Switched Carrier	X	X
D6 D8	Anti-Stream Timer - 27 seconds Disable Receive Signal Quality	X	
E5*** E6*** E7*** E8**	Maximum Address-16 Maximum Address-32 Disable Diagnostic Channel Disable Receive Signal level	X	
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.

## SYNCHRONOUS MODEMS

### 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 Choice	
C6	Loop-Back Switch and Indicator Lamps on Rear		
D7	Circuit Assurance Installed	X	X

## HEWLETT-PACKARD MODEMS

### 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 installed 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 unloaded metallic circuit.  
Transmission Rate: 19200/9600/4800/2400/bps

#### INTERNAL STRAPPING OPTIONS

Internal straps tailor modem operation to suit the particular installation. Full details of all internal straps and their recommended 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 equipment to control the loopback features on the local modem.



## SYNCHRONOUS MODEM TESTS

### SELF TESTS FOR WESTERN ELECTRIC SYNCHRONOUS MODEMS

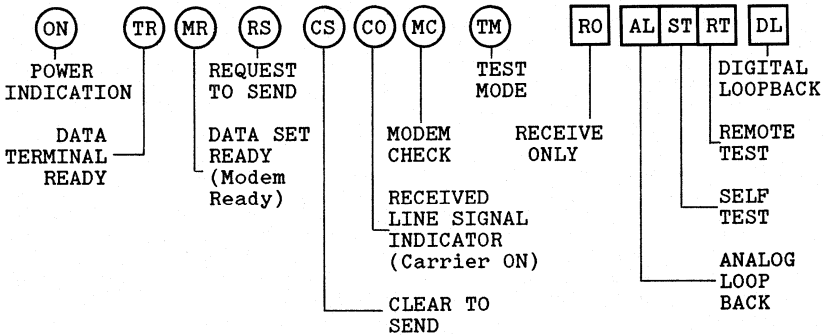
#### GENERAL

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 Repair 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



## 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 R0 button. The RS and CS lamps should go off and the MC lamp should go on. The C0 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 R0, 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 continuously, 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.

## SYNCHRONOUS MODEM TESTS

### 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 R0 button on that data set.
- Step 2 - Establish a line connection between the data sets. At the transmitting data set, the C0 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 indication of unsatisfactory operation can be determined.
- Step 4 - This same test should be repeated in the opposite direction by releasing the R0 button on one data set and pressing the R0 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 R0 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

POWER INDICATOR (ON)

DATA SET READY (Modem Ready) (MR)

CLEAR TO SEND (CS)

RECEIVED LINE SIGNAL DETECTOR (Carrier On) (CO)

EQUALIZER RETRAIN OR ERROR INDICATOR (ER)

#### Test Buttons

LP LAMP TEST

AL ANALOG LOOPBACK TEST MODE

ST SELF TEST MODE

DL DIGITAL LOOPBACK TEST MODE

#### 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.

## SYNCHRONOUS MODEM TESTS

### 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 provided, 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

- 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

### Test Buttons

- 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 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.

The data set's power supply is equipped with an over-voltage 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 unplugged 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 R0 button on the receiving data set.

Step 3 - Depress the ST button on both data sets and the R0 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 error 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 transmission by releasing the R0 button on one data set and pressing the R0 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 R0 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.



## SYNCHRONOUS MODEM TESTS

### 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 MODEM TESTS

### DATAPHONE II DIAGNOSTICS

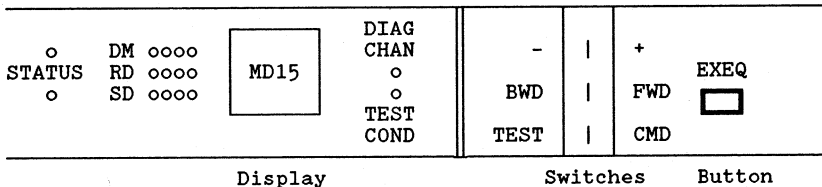
All Dataphone II tests are accessed thru switches on the front of the data set. Persistent faults in the network will be detected by the monitoring system and displayed as an acronym in the alphanumeric display. Transient impairments such as impulse noise and hits may not cause a fault to display. In 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 necessary 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 perform 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



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

Place TEST/CMD switch to TEST position.  
Use BWD/FWD switch to scroll to MT.  
Press the EXEQ button.  
Use +/- switch to scroll to MT--.  
Press the EXEQ button.  
Return TEST/CMD switch to center when done.

### Displayed

AUTO  
MT  
MT\*\* (\*\* flashing)  
MT--  
PASS or FAIL

### Modem Test (MT) at Tributary

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

MT  
PASS or FAIL

### End-to-End Test (EE) at Control

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

AUTO  
EE  
EE\*\* (\*\* flashing)  
EE01  
EE01,nnE0,nnEI

### Displaying Options and Addresses

Place TEST/CMD switch to CMD position.  
Use BWD/FWD switch to scroll to DSOP.  
Press the EXEQ button.  
Use +/- switch to scroll thru options.  
At the Control only,  
    Use BWD/FWD switch to scroll to DSPL  
    Press the EXEQ button  
    Use +/- switch to scroll thru poll list.  
Use BWD/FWD switch to scroll to DSNA.  
Press the EXEQ button for network address.  
Return TEST/CMD switch to center when done.

MDCK or DSAB  
DSOP  
OP\*\* (\*\* flashing)  
Options with check  
DSPL  
PL\*\* (\*\* flashing)  
Addresses with check  
DSNA  
NA65 or NA01

## DATAPHONE II MODEM TESTS

**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),	MT
Place TEST/CMD switch to TEST position.	EE
Use BWD/FWD switch to scroll to EE.	EE01, nnEO, nnEI
Press the EXEQ button.	
If nn is 00, there are no errors.	

### Local Loop (LL) at Control or Tributary

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

### Remote Digital Loop (DL) at Control

In Maintenance Mode (MC/I),	AUTO
Place TEST/CMD switch to TEST position.	DL
Use BWD/FWD switch to scroll to DL.	DL** (** flashing)
Press the EXEQ button.	DL01
Use +/- switch to scroll to DL01.	DL01 flashing
Press the EXEQ button.	
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 QUAL.	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	DSLAL	*	*	*	*
PORT MONITORx	PMON	*	*	*	*

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

## HEWLETT-PACKARD MODEM TESTS

### 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 determine 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 controlled 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.



## HEWLETT-PACKARD MODEM TESTS

### 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:

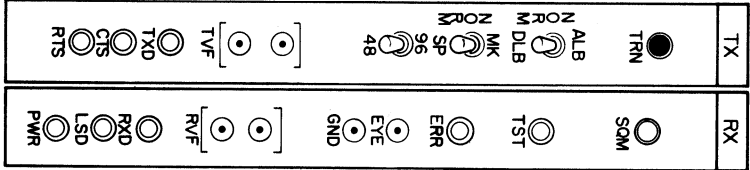
1. Set the ADDRESS thumbwheel to the address of the remote modem.
2. Set the Code thumbwheel to the appropriate code (see table).
3. Momentarily depress the TX pushbutton to transmit the remote command. The TX indicator will light to indicate transmission of the remote command.
4. A message confirming 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



### SELF TESTS FOR 37220T MODEM

The following self tests can be used by the customer of CE to determine 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.

## HEWLETT-PACKARD MODEM TESTS

### 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.

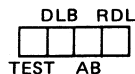
Depression of the TRN pushbutton at the local modem for greater than 3s will cause the remote modem to enter the remote loopback mode. The TST indicators at both modems will also light.

To remove the remote modem from the remote loopback mode, press TRN at approximately 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  
○    ○    ○    ○    ○    ○    ○    ○



### 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.

## HEWLETT-PACKARD MODEM TESTS

### 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 configured 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)



## SSLC AND INP CONFIGURATION SUMMARY

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

## SSLC AND INP CONFIGURATION SUMMARY

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?  CSSMRJEO (MRJE WITH SSLC) CSSBSC1 (MTS WITH SSLC)



# COMMUNICATIONS PROTOCOL

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

<b>CONTENT</b>	<b>PAGE</b>
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**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]

## COMMUNICATIONS PROTOCOL

### BISYNCH Control Character Definitions

ACK	(Affirmative Acknowledge) reply to station selection, receipt of message sent.
DLE	(Data link Escape) provides 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 message 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 Con- trol (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.



## COMMUNICATIONS PROTOCOL

### 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.

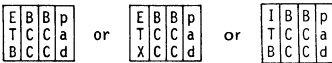
# COMMUNICATIONS PROTOCOL

## CRC CYCLIC REDUNDANCY CHECK

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

Also referred to as BCC Block Check Character.

Used in EBDIC mode or ASCII Transparent.



## VRC VERTICAL REDUNDANCY CHECK

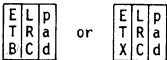
Provides odd parity for each character (including LRC character).

Used in ASCII mode.

## LRC LONGITUDINAL REDUNDANCY CHECK

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

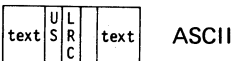
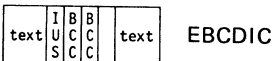
Used in ASCII mode.



## IUS INFORMATION UNIT SEPARATOR

IUS (EBCDIC), US (ASCII), (2780 PROTOCOL)

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



# COMMUNICATIONS PROTOCOL

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 terminated with ETX. Allows trailing blank record truncation.

IRS also terminates line for print control.

## Summary of Responses

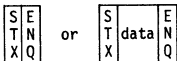
EOT

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.

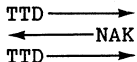
NAK

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



TTD

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

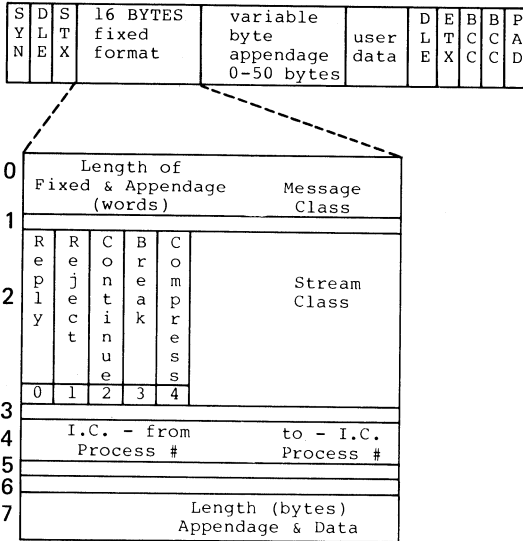


An abort sequence for card reader error or input parity error.

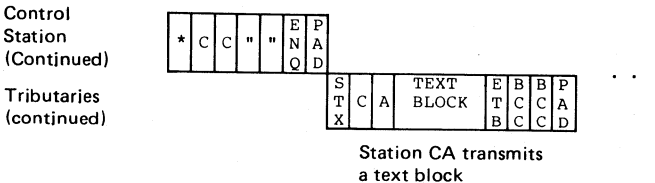
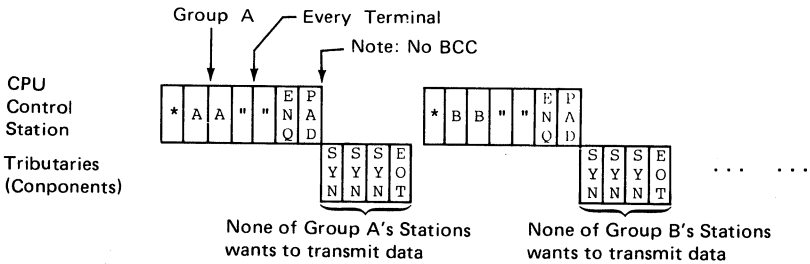
NOTE: The EOT is a blind transmission. It does not require a response. If the EOT is not received, it may produce anomalous results.

# COMMUNICATIONS PROTOCOL

## DS/3000 FORMAT USING BISYNCH PROTOCOL



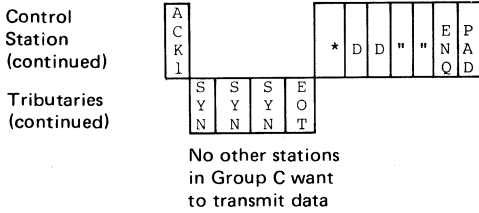
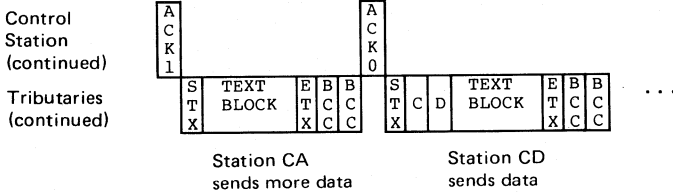
## GROUP POLL (GENERAL POLL)



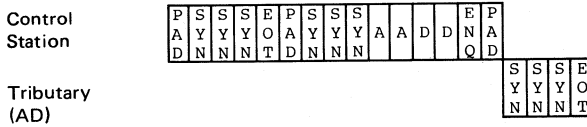
*NOTE: If terminal sends transparent text there would be a DLE in front of the STX and ETB characters.*

# COMMUNICATIONS PROTOCOL

## GROUP POLL (GENERAL POLL, CONTINUED)



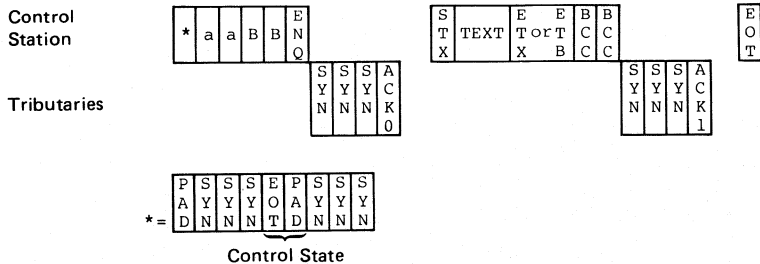
## Specific Poll



## Selection

Note: Lower case

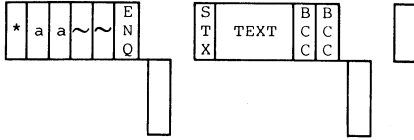
NOTE: DLE precedes control characters of transparent.



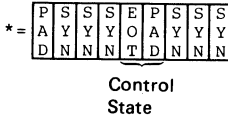
# COMMUNICATIONS PROTOCOL

## Broadcast (Not Supported)

Control Station

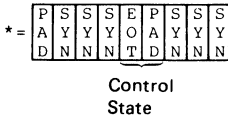
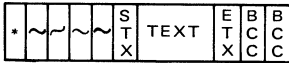


No response from Tributaries



## Line Select (Not Supported)

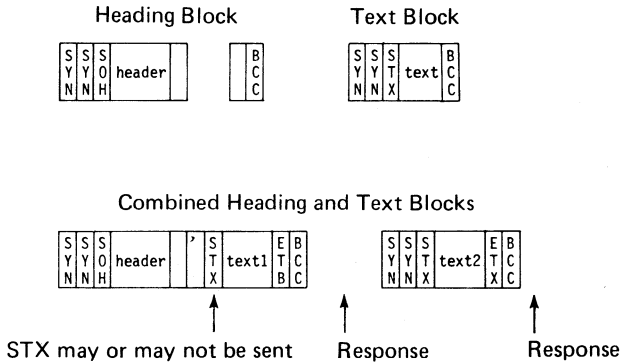
Control



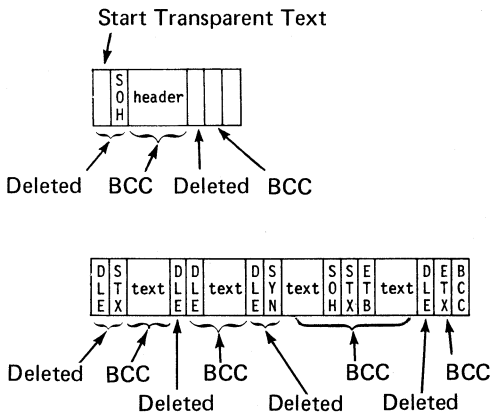
# COMMUNICATIONS PROTOCOL

## BINARY SYNCHRONOUS CONTROL CHARACTER SEQUENCES

### Framing



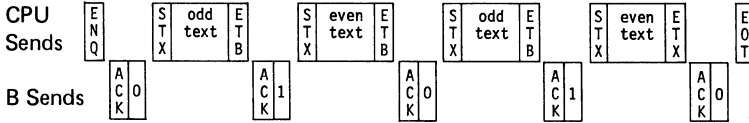
### BCC Accumulation - Transparent Mode



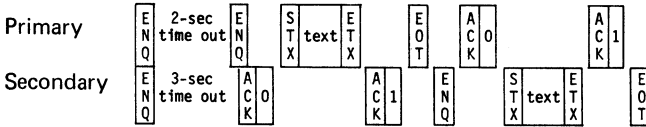
# COMMUNICATIONS PROTOCOL

## BINARY SYNCHRONOUS CONTROL CHARACTER SEQUENCES (Continued)

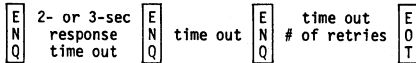
### Normal Message



### ENQ-ENQ Convention



### Unanswered Line Bid

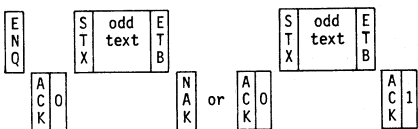




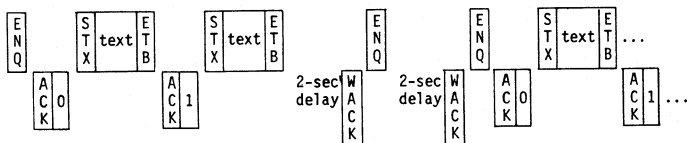
# COMMUNICATIONS PROTOCOL

## BINARY SYNCHRONOUS CONTROL CHARACTER SEQUENCES (Continued)

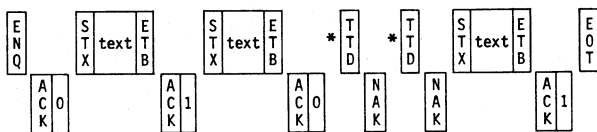
### Retransmission



### Receive - Initiated Transmission Delay (WACK)

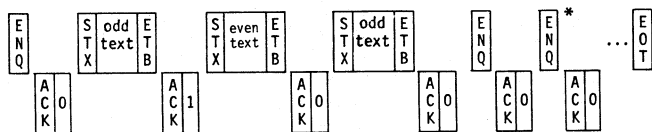


### Transmitter - Initiated Transmission Delay (TTD)



\* Up to a 20-second delay

### Improper Ack

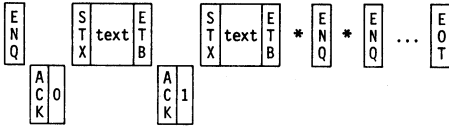


\*The text block may be retransmitted.

# COMMUNICATIONS PROTOCOL

## BINARY SYNCHRONOUS CONTROL CHARACTER SEQUENCES (Continued)

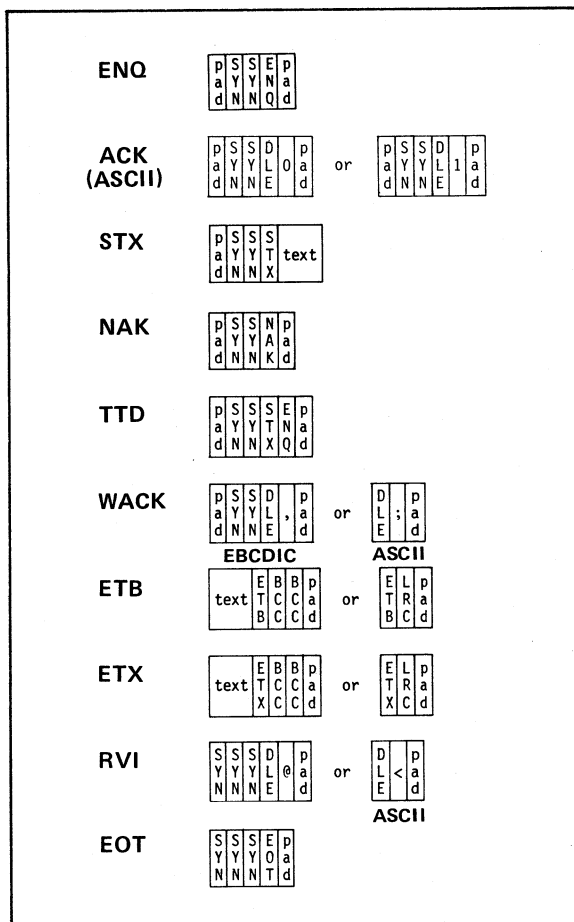
### No-Response



\*3-second response time out

# COMMUNICATIONS PROTOCOL

## Bisynch Handshaking



# 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

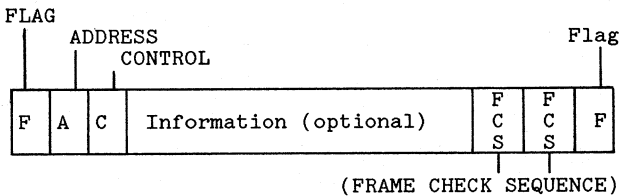
2780 and 3780 RJE Emulators may use either non-transparent or transparent mode.

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 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						TYPE		
		8	7	6	5	4	3		2	1
Information	I-Information	N(R)	P	N(S)	0			Command		
Supervisory	RR- Receiver Ready	N(R)	P	0	0	0	1	Either		
	RNR-Receiver Not Ready	N(R)	P	0	1	0	1	Either		
	REJ-REJECT	N(R)	P	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 DEFINITIONS

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 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 logically 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 recoverable 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 packet. 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 contiguous 1-bits within the frame content.

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



PACKET LEVEL PROTOCOL

Packet Formats

DATA

0	0	0	1	L	C	G	N
LCN							
P(R)				M		P(S)	
USER DATA							

or

0	0	1	0	L	C	G	N
LCN							
P(S)				0			
P(R)				M			
USER DATA							

CALL CONFIRMATION

0	0	S	N	L	C	G	N
LCN							
0 0 0 0 1 1 1 1				← Address Lengths			
Calling				Called			
Addresses							

RR (Receiver Ready)

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

or

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

CLEAR REQUEST

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

CLEAR CONFIRMATION

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 0 1 1 1							

RNR (Receiver Not Ready)

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

or

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

RESET REQUEST

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 1 0 1 1							
Resetting Cause							
Diagnostic Code							

RESET CONFIRMATION

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 1 1 1 1							

REJ (Reject)

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

or

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

RESTART REQUEST

0	0	S	N	0	0	0	0
LCN							
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
LCN							
0 0 0 0 0 0 0 0							
1 1 1 1 1 1 1 1							

INT. (Interrupt)

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

INT. CONF (Interrupt Confirmation)

0	0	S	N	L	C	G	N
LCN							
0 0 1 0 0 1 1 1							

CALL REQUEST

0	0	S	N	L	C	G	N
LCN							
0 0 0 0 1 0 1 1							
Calling				Called			
Addresses							

← Address Lengths

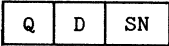
INCOMING CALL FROM PAD

0	0	S	N	L	C	G	N
LCN							
0 0 0 0 1 0 1 1							
Calling				Called			
Addresses							
0 0 0 0 0 0 0 0							
0 0 0 0 0 0 0 1							

← Address Lengths

## X.25

GFI (GENERAL FORMAT IDENTIFIER)



- Q --- The data qualifier bit used in X.29 (host <--> PAD) packets 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).
- F(R) - The sequence number of the next receive packet expected.
- F(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.

## X.25

### 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

<u>No additional information</u> .....	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
<u>Packet type invalid</u> .....	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
<u>Packet not allowed</u> .....	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
<u>Reject</u> 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

## X.25

<u>Timer expired</u> .....	0 0 1 1 0 0 0 0	48
<u>For incoming call</u> .....	0 0 1 1 0 0 0 1	49
<u>For clear indication</u> .....	0 0 1 1 0 0 1 0	50
<u>For reset indication</u> .....	0 0 1 1 0 0 1 1	51
<u>For restart indication</u> .....	0 0 1 1 0 1 0 0	52
.....		
	0 0 1 1 1 1 1 1	63
<u>Call set-up problem</u> .....	0 1 0 0 0 0 0 0	64
<u>Facility code not allowed</u> .....	0 1 0 0 0 0 0 1	65
<u>Facility parameter not allowed</u> .....	0 1 0 0 0 0 1 0	66
<u>Invalid called address</u> .....	0 1 0 0 0 0 1 1	67
<u>Invalid calling address</u> .....	0 1 0 0 0 1 0 0	68
.....		
	0 1 0 0 1 1 1 1	79
<u>Not assigned</u> .....	0 1 0 1 0 0 0 0	80
.....		
	0 1 0 1 1 1 1 1	95
<u>Not assigned</u> .....	0 1 1 0 0 0 0 0	96
.....		
	0 1 1 0 1 1 1 1	111
<u>Not assigned</u> .....	0 1 1 1 0 0 0 0	112
.....		
	0 1 1 1 1 1 1 1	127
<u>Reserved for network</u> .....	1 0 0 0 0 0 0 0	128
<u>specific diagnostic information</u>		
.....		
	1 1 1 1 1 1 1 1	255

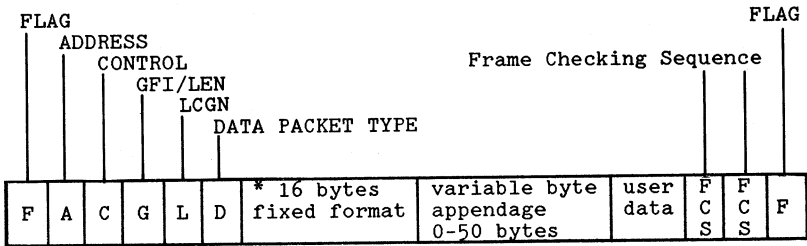
\* Not all diagnostic codes need apply to a specific network, but those used are as coded in the table.

\* A given diagnostic need not apply to all packet types (i.e., reset indication, clear indication, restart indication, diagnostic 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.

# X.25

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



\*Refer to page C-8 for fixed format.

# SDLC

## SDLC: SYNCHRONOUS DATA LINK CONTROL

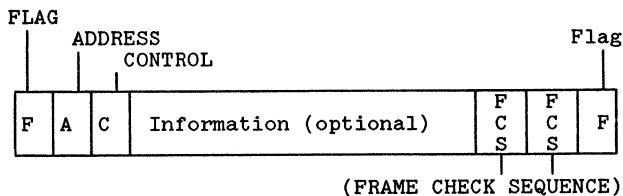
SDLC is the Data Link Control defined in Systems Network Architecture (SNA). Two types of stations are used in SDLC communications: primary stations and secondary stations.

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 secondary 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 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	ENCODING						TYPE				
		8	7	6	5	4	3		2	1		
Information	I-Information	Nr		P		Ns	0		Either			
Supervisory	RR- Receiver Ready	Nr		P		0	0	0	1	Either		
	RNR-Receiver Not Ready	Nr		P		0	1	0	1	Either		
	REJ-REJECT	Nr		P		1	0	0	1	Either		
Unnumbered	UI - Unnumbered Information	0	0	0		P		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		0	1	1	1	Either
	RD - Request Disconnect	0	1	0		F		0	0	1	1	Response
	XID - Exchange Identification	1	0	1		P		1	1	1	1	Either
	UP - Unnumbered Poll	0	0	1		P		0	0	1	1	Command
	TEST	1	1	1		P		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                      Frame which transmits data  
(Information)

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

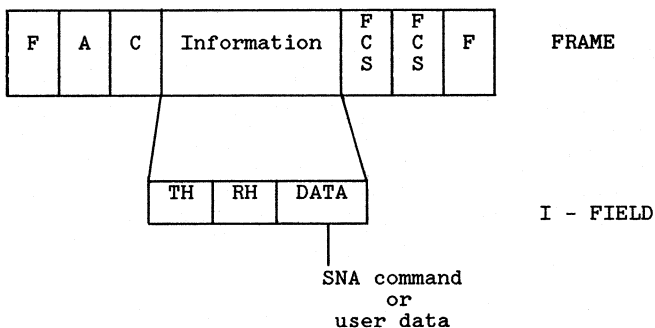
XID (Exchange Identification) Identification is being sent in information field.

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 transmission header (TH) and a request/response header and data. The data may be user or application data or it may be SNA commands.



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)

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## DSN/RJE

### DSN/RJE - HP 30130E

SSL	Driver	Interface Board
INP	CSSBSCO	30055A
	IOINPO	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

# DSN/RJE

## #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}]
```

## DSN/RJE

### #RJLIST

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  
                                source file is copied to the list  
                                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.  
[;FORMSMMSG=message.] Prompts operator for a forms message when  
                                printing an output spool file. The  
                                message must end with a period.  
[;AUTOPAGE={YES|NO}] * 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.

## DSN/RJE

#RJIO message or #<special character>message

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

#RJINFO

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

#RJDEBUG

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

#RJCOMMENT

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.

# DSN/RJE

```
#RJCONTINUE
```

Identifies user procedure to handle DSN/RJE detected errors.

```
#RJCONTINUE @procname[(G|P|S)]
```

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;
```

<u>errors(0)</u>	<u>errors(1)</u>	<u>errors(2)</u>
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 Length 1 = Invalid Command 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 parmter. 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  
 \*formal file designator

See DSN/RJE Reference Manual  
 for file characteristics.

@procedurename[  $\frac{(G)}{(P)}$   
 $\frac{(S)}{(S)}$  ] See the following comments.

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 ACKO, 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;FORMSMMSG=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.

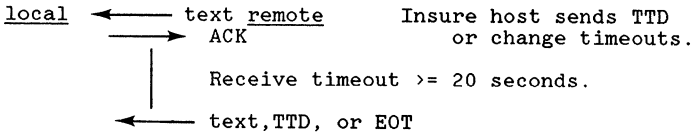
Feature	2780	3780
Buffer Size	400 bytes	512 bytes
Short record truncation	Yes, but supply EM	Yes, automatic
Blank compression	No	Yes, automatic
Maximum block factor	2, option 7	Non-transparent, 216 Transparent 1, option 6
Generate WACK, TTD	No	Yes
Intermediate Block Terminator, logical record separator	US BCC ASCII IUS BCC EBCDIC	RS no BCC IRS no BCC Will accept IUS BCC
Component Selection Printer	ESC x x = control	DC1
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 TIMEOUT: DEFAULT IS 60 SECONDS

This timeout serves 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 of 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

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	%00C417	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
phonest	specified	May be 0.
inspeed	empty	
outspeed	empty	
miscarray	specified	8,1,900,2,4,180,5,15. See Section I
drivename	empty	line default used
ctraceinfo	0	options.(3:1) allows CLINE tracing

10|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 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 0:0 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





# DSN/RJE

## JES2 Commands

Command	Parameters
<b>SA</b> <b>Release</b>	$\left( \begin{array}{l} A \\ Q[\text{,classes}] \\ \left\{ \begin{array}{l} Jn \text{ [-n]} \\ \text{'jobname'} \\ Sn \text{ [-n]} \\ Tn \text{ [-n]} \end{array} \right\} \left[ \begin{array}{l} \text{'Jn [-n]} \\ \text{'jobname'} \\ \text{'Sn [-n]} \\ \text{'Tn [-n]} \end{array} \right] \dots \end{array} \right)$
<b>SB</b> <b>Backspace</b>	$\left( \begin{array}{l} \left\{ \begin{array}{l} PRTn \\ Rn.PRTn \end{array} \right\} \left\{ \begin{array}{l} \text{'n'} \\ D \end{array} \right\} \left[ \begin{array}{l} PRTn \\ Rn.PRTn \end{array} \right] \left\{ \begin{array}{l} \text{'n'} \\ D \end{array} \right\} \dots \end{array} \right) \\ \\ \left\{ \begin{array}{l} PUNn \\ Rn.PUNn \end{array} \right\} \left\{ \begin{array}{l} \text{'n'} \\ D \end{array} \right\} \left[ \begin{array}{l} PUNn \\ Rn.PUNn \end{array} \right] \left\{ \begin{array}{l} \text{'n'} \\ D \end{array} \right\} \dots \end{array} \right)$
<b>SC</b> <b>Cancel</b>	$\left( \begin{array}{l} A \\ \left\{ \begin{array}{l} RDRn \\ Rn.RDn \end{array} \right\} \left[ \begin{array}{l} RDRn \\ Rn.RDn \end{array} \right] \dots \\ \\ \left\{ \begin{array}{l} PUNn \\ Rn.PUNn \end{array} \right\} \left[ \begin{array}{l} PUNn \\ Rn.PUNn \end{array} \right] \dots \\ \\ \left\{ \begin{array}{l} PRTn \\ Rn.PRTn \end{array} \right\} \left[ \begin{array}{l} PRTn \\ Rn.PRTn \end{array} \right] \dots \\ \\ \left\{ \begin{array}{l} Jn \text{ [-n]} \\ \text{'jobname'} \\ Sn \text{ [-n]} \\ Tn \text{ [-n]} \end{array} \right\} \left[ \begin{array}{l} \text{'D'} \\ \text{'P'} \end{array} \right] \end{array} \right)$

JES2 Commands

Command	Parameters
<p>\$D Display</p>	$  \left( \begin{array}{l}  I [n [-n]] \\  Mn [-n], 'message' \\  \\  O \\  \\  A \left[ \begin{array}{l} .XEQ \\ .DEV \\ .JOB \\ .STC \\ .TSU \end{array} \right] \left[ \begin{array}{l} .XEQ \\ .DEV \\ .JOB \\ .STC \\ .TSU \end{array} \right] \dots \\  \\  F [n [-n]] \left[ \begin{array}{l} .Jn [-n] \\ .Sn [-n] \\ .Tn [-n] \end{array} \right] \left[ \begin{array}{l} .H \\ .A \end{array} \right] \\  \\  \left\{ \begin{array}{l} Jn [-n] \\ Sn [-n] \\ Tn [-n] \end{array} \right\} \left\{ \begin{array}{l} .Jn [-n] \\ .Sn [-n] \\ .Tn [-n] \end{array} \right\} \dots \\  \\  'jobname' \\  \\  \left\{ \begin{array}{l} O \\ N \end{array} \right\} [n [-n]] \left\{ \begin{array}{l} .XEQ \\ .class \\ .STC \\ .TSU \end{array} \right\} \\  \\  \left. \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \right\} \left\{ \begin{array}{l} OUT \\ HOLD \end{array} \right\} \\  \\  U \left( \begin{array}{l} ALL \\ LNE n \\ LNES \\ PRTS \\ PUNS \\ RMTS \\ RMT n \\ RDRs \\ RDI \\ device [,device] \dots \end{array} \right) \\  \\  \left. \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \right\} [L = \left\{ \begin{array}{l} a \\ cc \\ cca \end{array} \right\}]  \end{array} \right)  $
<p>\$E Restart</p>	$  \left( \begin{array}{l}  LNE n [, LNE n] \dots \\  \\  Jn [-n] [, Jn [-n]] \dots \\  \\  'jobname' \\  \\  \left\{ \begin{array}{l} PRT n \\ Rn, PRn \end{array} \right\} \left\{ \begin{array}{l} .PRT n \\ .Rn, .PRn \end{array} \right\} \dots \\  \\  \left\{ \begin{array}{l} PUN n \\ Rn, PUn \end{array} \right\} \left\{ \begin{array}{l} .PUN n \\ .Rn, .PUn \end{array} \right\} \dots  \end{array} \right)  $
<p>\$F Forward space</p>	$  \left( \begin{array}{l}  \left\{ \begin{array}{l} PRT n \\ Rn, PRn \end{array} \right\} \left\{ \begin{array}{l} n \\ D \end{array} \right\} \left[ \begin{array}{l} .PRT n \\ .Rn, .PRn \end{array} \right] \left\{ \begin{array}{l} n \\ D \end{array} \right\} \dots \\  \\  \left\{ \begin{array}{l} PUN n \\ Rn, PUn \end{array} \right\} \left\{ \begin{array}{l} n \\ D \end{array} \right\} \left[ \begin{array}{l} .PUN n \\ .Rn, .PUn \end{array} \right] \left\{ \begin{array}{l} n \\ D \end{array} \right\} \dots  \end{array} \right)  $

# DSN/RJE

## JES2 Commands

Command	Parameters
SH Hold	$\left\{ \begin{array}{l} A \\ Q[.classes] \\ \left\{ \begin{array}{l} Jn [-n] \\ Sn [-n] \\ Tn [-n] \end{array} \right\} \left\{ \begin{array}{l} ,Jn [-n] \\ ,Sn [-n] \\ ,Tn [-n] \end{array} \right\} \dots \end{array} \right\}$ 'jobname'
SI Interrupt	$\left\{ \begin{array}{l} \left\{ \begin{array}{l} PRTn \\ Rn.PRn \end{array} \right\} \left\{ \begin{array}{l} ,PRTn \\ ,Rn.PRn \end{array} \right\} \dots \\ \left\{ \begin{array}{l} PUNn \\ Rn.PUn \end{array} \right\} \left\{ \begin{array}{l} ,PUNn \\ ,Rn.PUn \end{array} \right\} \dots \end{array} \right\}$
SL List output	$\left\{ \begin{array}{l} \left\{ \begin{array}{l} Jn [-n] \\ Sn [-n] \\ Tn [-n] \end{array} \right\} \left\{ \begin{array}{l} ,Jn [-n] \\ ,Sn [-n] \\ ,Tn [-n] \end{array} \right\} \dots \left[ ,L= \left\{ \begin{array}{l} a \\ cc \\ cca \end{array} \right\} \right] \end{array} \right\}$ 'jobname'
SN Repeat	$\left\{ \begin{array}{l} \left\{ \begin{array}{l} PRTn \\ Rn.PRn \end{array} \right\} \left\{ \begin{array}{l} ,PRTn \\ ,Rn.PRn \end{array} \right\} \dots \\ \left\{ \begin{array}{l} PUNn \\ Rn.PUn \end{array} \right\} \left\{ \begin{array}{l} ,PUNn \\ ,Rn.PUn \end{array} \right\} \dots \end{array} \right\}$
SO Output	$\left\{ \begin{array}{l} \left\{ \begin{array}{l} Jn [-n] \\ 'jobname' \\ Sn [-n] \\ Tn [-n] \end{array} \right\} \left\{ \begin{array}{l} ,Q=classes \\ C \\ ,Rn \\ ,LOCAL \end{array} \right\} \dots \end{array} \right\}$
SP Stop after current function	$\left[ \begin{array}{l} JES2 \\ I[[-n]] \\ LNE[.LNE] \dots \\ \left\{ \begin{array}{l} PRTn \\ Rn.PRn \end{array} \right\} \left\{ \begin{array}{l} ,PRTn \\ ,Rn.PRn \end{array} \right\} \dots \\ \left\{ \begin{array}{l} PUNn \\ Rn.PUn \end{array} \right\} \left\{ \begin{array}{l} ,PUNn \\ ,Rn.PUn \end{array} \right\} \dots \\ \left\{ \begin{array}{l} RDRn \\ Rn.RDn \end{array} \right\} \left\{ \begin{array}{l} ,RDRn \\ ,Rn.RDn \end{array} \right\} \dots \\ \left\{ \begin{array}{l} Jn [-n] \\ Sn [-n] \\ Tn [-n] \end{array} \right\} \left\{ \begin{array}{l} ,Jn [-n] \\ ,Sn [-n] \\ ,Tn [-n] \end{array} \right\} \dots \end{array} \right]$ 'jobname'

JES2 Commands

Command	Parameters												
<p>SR Route Output</p>	$\left\{ \begin{array}{l} \text{ALL,for-id,to-id [ ,Q=classes ]} \\ \text{PRT { .for-id,to-id}} \\ \text{PUN {}} \end{array} \right\}$ <p>where <i>for-id is:</i>                      <i>to-id is:</i></p> <table style="margin-left: 100px;"> <tr> <td>Jn</td> <td>LOCAL</td> </tr> <tr> <td>Sn</td> <td>Rn</td> </tr> <tr> <td>Tn</td> <td>devicename</td> </tr> <tr> <td>LOCAL</td> <td></td> </tr> <tr> <td>RMTn</td> <td></td> </tr> <tr> <td>devicename</td> <td></td> </tr> </table>	Jn	LOCAL	Sn	Rn	Tn	devicename	LOCAL		RMTn		devicename	
Jn	LOCAL												
Sn	Rn												
Tn	devicename												
LOCAL													
RMTn													
devicename													
<p>SS Start</p>	$\left[ \begin{array}{l} \text{A} \\ \text{LNEn [ ,LNEn ]} \dots \\ \text{I [ n [-n] ]} \\ \text{{ PRTn { } [ ,PRTn ]} \dots} \\ \text{{ Rn,PRn { } [ ,Rn,PRn ]} \dots} \\ \text{{ RDRn { } [ ,RDRn ]} \dots} \\ \text{{ Rn,RDn { } [ ,Rn,RDn ]} \dots} \\ \text{{ PUNn { } [ ,PUNn ]} \dots} \\ \text{{ Rn,PU n { } [ ,Rn,PU n ]} \dots} \end{array} \right]$												

JES2 Commands

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

**JES2 Commands**

Command	Parameters
<p>SZ Halt</p>	$\left( \begin{array}{l} A \\ i [ n \text{ } [-n] ] \\ \left. \begin{array}{l} \{ PRTn \} \\ \{ Rn,PRn \} \end{array} \right\} [ \left. \begin{array}{l} \{ PRTn \} \\ \{ Rn,PRn \} \end{array} \right] \dots \\ \left. \begin{array}{l} \{ RDRn \} \\ \{ Rn,RDn \} \end{array} \right\} [ \left. \begin{array}{l} \{ RDRn \} \\ \{ Rn,RDn \} \end{array} \right] \dots \\ \left. \begin{array}{l} \{ PUNn \} \\ \{ Rn,PUn \} \end{array} \right\} [ \left. \begin{array}{l} \{ PUNn \} \\ \{ Rn,PUn \} \end{array} \right] \dots \end{array} \right)$

# DSN/RJE

## Selected JES3 Commands

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



# DSN/MRJE MULTILEAVING REMOTE JOB ENTRY

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## DSN/MRJE SUBSYSTEM COMMANDS

### DSN/MRJE PRODUCT NUMBER HP 32192A

Capability Requirements	User	DSN/MRJE 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.

## DSN/MRJE SUBSYSTEM COMMANDS

#CANCEL [JOBS] { job number 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 submits 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 prompted 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 identification** Needed only for multi-host environments. The host 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.

## DSN/MRJE SUBSYSTEM COMMANDS

#PURGE	{ Oldjobs 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 subsequent commands of the subsystem.

Host The name of a host machine that was configured by the identification- DSN/MRJE manager. This may be abbreviated to its first 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 commands allowed to the remote station. DSN/MRJE users are additionally restricted to host system console commands beginning with the string in item 6 of the configuration file. A host system console command will be refused if any other DSN/MRJE user or manager is already communicating interactively with the host system; 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 reader Specifies a particular DSN/MRJE pseudo reader on which 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 quotation 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.

## HP 3000 CONSOLE OPERATOR COMMANDS

- print file      These parameters specify where the results of processing of a submitted job are to go. One of each can be specified by:
- punch file      ● The logical device number of an MPE output device.  
                 ● An MPE device class name enclosed in quotation marks.
- forms file      ● 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 unorderly 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.



## JOB INPUT

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

## JOB OUTPUT

may always be used to identify the type of input expected.

MRJEOD
--------

For infiles or FD files originating 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 sufficient extents allocated because DSN/MRJE will not allocate additional 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 workstation is connected to the host. Contact your MRJE manager for correct names.

Both print and special forms files must have 132 character records 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

### Carriage Control

When output is written to a disc file, a carriage control character prefixes line printer and special forms records. 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 configuration file entry:

- ENTRY NUMBER (alternatively referred to as "Item Number") AND DESCRIPTION. DSN/MRJE accesses entries in the file by number.
- ENTRY/TYPER--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)	

## CONFIGURATION FILE FORMAT

### 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  For JES3--column where "JOB NAME" begins in special forms console message  For ASP--column where "JOB" begins in special forms console message	n 1-120  n 1-120  n 1-120	3  3  3 /	10 (HASP) 21 (JES2)  18 (JES3)  16 (ASP)	4
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"	

## CONFIGURATION FILE FORMAT

### DSN/MRJE Configuration File Entries (continued)

ENTRY NUMBER AND DESCRIPTION	ENTRY/ TYPE	ASCII BYTES	DEFAULT VALUE	NOTES
24. Unsolicited print disposition, printer 4 (LDN, DC, or AFD)	*	26	"LP"	
25. Unsolicited print disposition, printer 5 (LDN, DC, or AFD)	*	26	"LP"	
26. Unsolicited print disposition, printer 6 (LDN, DC, or AFD)	*	26	"LP"	
27. Unsolicited print disposition, 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 disposition, punch 1 (LDN, DC, or AFD)	*	26	"LP"	
30. Unsolicited punch disposition, punch 2 (LDN, DC, or AFD)	*	26	"LP"	
31. Unsolicited punch disposition, punch 3 (LDN, DC, or AFD)	*	26	"LP"	
32. Unsolicited punch disposition, punch 4 (LDN, DC, or AFD)	*	26	"LP"	
33. Unsolicited punch disposition, punch 5 (LDN, DC, or AFD)	*	26	"LP"	
34. Unsolicited punch disposition, punch 6 (LDN, DC, or AFD)	*	26	"LP"	
35. Unsolicited punch disposition, 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 parameter, 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 parameter 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.

## CONFIGURING A HASP, JES2, JES3, OR ASP SYSTEM

### Configuring a JES3 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 parameter, 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 occurred, 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 } CANCELED.  
  job#  
Specified job has been canceled as requested.
- \* { jobname } CAN'T BE CANCELED.  
  job#  
Named job cannot be canceled because of an error in writing to or reading from a job log file. Retry the CANCEL.

## DSN/MRJE USER MESSAGES

{ \$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"  
>

## DSN/MRJE USER MESSAGES

- \* EXTRANEIOUS 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 terminated. 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 { filename RECORD m } CAN'T BE READ.  
                  { HOST CONSOLE OUTPUT }  
                  { STANDARD INPUT FILE }  
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).

## DSN/MRJE USER MESSAGES

- \* 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 cannot be written to the host reader. (The latter associates 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 console commands. Determine the reason for 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 system error number (#n).
- \* FILE ERROR #n, HOST CONSOLE CAN'T BE OPENED.  
Host pseudo console device specified in the configuration 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.



## DSN/MRJE USER MESSAGES

- \* 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, JOBLLOG, 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.

## DSN/MRJE USER MESSAGES

- \* 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 cancellation 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.

## DSN/MRJE USER MESSAGES

- \* 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 "(NOTTRANSLATE)" parameter. Re-enter the SUBMIT command.
- 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.

## DSN/MRJE USER MESSAGES

MRJEJOBh END OF FILE.

End-of-file has been reached in search of named job log.

MRJEJOBh n JOBLLOG 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 JOBLLOG IS EMPTY.

Named job log is empty. This response may be given to a DISPLAY DIRECTORY, DISPLAY JOBLLOG, or PURGE command.

MRJEJOBh NOT PURGED.

The named job log has not been purged because the Manager 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 subject 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 referenced 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.

## DSN/MRJE USER MESSAGES

\* 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 transmitted 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.

{ JOB  
 jobname } NOT SUBMITTED.

The named job (or "JOB" if DSN/MRJE did not find a host card) was not submitted to the host. Make certain the job has a recognizable job card.

\* NOTTRANSLATE CAN'T BE SPECIFIED FOR \$STDIN/\$STDINX.

Input from the standard input file is always translated from ASCII to EBCDIC or EBCDIK, depending on translation type. Re-enter SUBMIT command, deleting the "(NOTTRANSLATE)" parameter from \$STDIN/\$STDINX.

\* "NOTTRANSLATE" REQUIRED.

"(NOTTRANSLATE)" 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.



## DSN/MRJE USER MESSAGES

\* 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 parameters 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: <ol style="list-style-type: none"><li>1) The wrong host ID may have been used in command.</li><li>2) Someone may be altering or rebuilding the configuration file.</li><li>3) There may be no configuration file for this host.</li></ol>
4205	UNABLE TO ACCESS CONFIGURATION FILE FOR THIS HOST. An FWRITE to or FREAD from the file failed.
4206	INSUFFICIENT CAPABILITIES 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.

## MRJECONTROL CONSOLE MESSAGES

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 MRJEO. 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:

time/pin/ { MRJE }            { message  
          { MRJEh }         { WARNING: message }  
                              { ERROR: message }

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.

## SYSTEM CONSOLE MESSAGES

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.

## SYSTEM CONSOLE MESSAGES

- 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 communication 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 communications link failed unexpectedly. Irrecoverable communication 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.



## SYSTEM CONSOLE MESSAGES

- 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 destined 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 response 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 executed and the communication link is now open. If jobs have been submitted, DSN/MRJE will automatically begin transmitting data and accepting output.

## SYSTEM CONSOLE MESSAGES

### SYSTEM ALREADY ACTIVE.

The :MRJECONTROL START command was issued 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 suspended 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 monitor'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

## TRANSPARENT TEXT BLOCK

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 initiate 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 initialization 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.

## TRANSPARENT TEXT BLOCK

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

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
																MFV 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 PSEUDO DEVICE CONFIGURATION

### 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		IOMCONSO		CON *
---	#	3	0	22	0		67	0		IOMPNLPO		PR1 *
---	#	4	0	22	0		67	0		IOMPNLPO		PR2
---	#	5	0	22	0		67	0		IOMPNLPO		PR3
---	#	6	0	22	0		67	0		IOMPNLPO		PR4
---	#	7	0	22	0		67	0		IOMPNLPO		PR5
---	#	8	0	22	0		67	0		IOMPNLPO		PR6
---	#	9	0	22	0		67	0		IOMPNLPO		PR7
---	#	10	0	22	0		40	0		IOMPNLPO		PU1
---	#	11	0	22	0		40	0		IOMPNLPO		PU2
---	#	12	0	22	0		40	0		IOMPNLPO		PU3
---	#	13	0	22	0		40	0		IOMPNLPO		PU4
---	#	14	0	22	0		40	0		IOMPNLPO		PU5
---	#	15	0	22	0		40	0		IOMPNLPO		PU6
---	#	16	0	22	0		40	0		IOMPNLPO		PU7
---	#	17	0	22	0		40	0	S	IOMRDRO	MRDR1	RD1 *
---	#	18	0	22	0		40	0		IOMRDRO		RD2
---	#	19	0	22	0		40	0		IOMRDRO		RD3
---	#	20	0	22	0		40	0		IOMRDRO		RD4
---	#	21	0	22	0		40	0		IOMRDRO		RD5
---	#	22	0	22	0		40	0		IOMRDRO		RD6
---	#	23	0	22	0		40	0		IOMRDRO		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.



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NOTE: The information in this handbook is not a set of product specifications. 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 } [ ; { SHUT } [ { SLAVE } [, SPEED=speed] ] ] ] ]
: DSCONTROL dsdevice [ ; TRACE, { ON [, [ALL] [, [mask] [, [numentries] [, [WRAP] [, filename]]]] ] } OFF ] [ ; { COMP } ] [ ; { MON } [ [, (CS) ] ] ] [ ; { NOCOMP } ] [ ; { MOFF } [ [, (DS) ] ] ] [ ; RETRY= { DEFAULT } 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.)

## DS/3000 COMMANDS

- 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

```
:DSLLINE dsdevice  
    [;LINEBUF=buffer size]  
    [;LOCID=local-id-sequence]  
    [;REMID=remote-id-sequencel [,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 compression. Sets mode of operation for subsequent DS/3000 activity. (Optional parameter.) See also :DSCONTROL.
- NOCOMP Overrides current default and deactivates data compression. (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.



## DS/3000 COMMANDS

### Closing a Line From a User Terminal

```
:DSLIME      [ dsdevice ]  
              @          ;CLOSE  
              ds-line-number
```

**dsdevice** Device class name, ldn, or node name specified in the DSLIME command that opened the particular line.

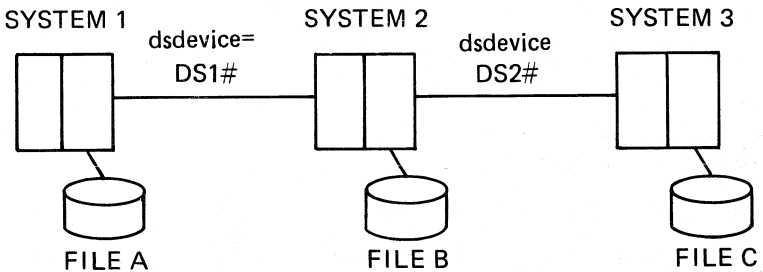
**@** Specifies that all lines currently open should be closed.

**ds line number** The line number returned by a DSLIME...;OPEN. 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 n1;DEV=dsdevice#
```

```
:REMOTE FILE n2;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.

## DS/3000 SPL PTOP INTRINSICS

### 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 array (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.

## DS/3000 SPL PTOP INTRINSICS

- 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.

## DS/3000 SPL PTOP INTRINSICS

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.
progrname	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 be 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.

## DS/3000 SPL PTOP INTRINSICS

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,progrname,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);

## DS/3000 SPL PTOP INTRINSICS

### 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.



## DS/3000 COBOL PTOP CALLS

### 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.
PROGRAMME	A character field containing the name (terminated 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 system is an RTE system.
FLAGS STACKSIZE DLSIZE MAXDATA	These are all MPE parameters used to specify program loading. They are ignored if the slave system is an RTE system. See the POPEN 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
```

### PCONTROL

The COBOL callable interface to PCONTROL

```
CALL "PCONTROL" USING CCODE,DSNUM,ITAG
```

## DS/3000 COBOL PTOP CALLS

### 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.

## DS/3000 BASIC PTOP CALLS

### BOPEN

The BASIC callable interface to POPEN.

```
CALL BOPEN(CCODE,DSNUM,DSDEVICE,PROGNAME
  [ { ,ITAG } [ { ,ENTRYNAME }
  [ { ,PARAM } [ { ,FLAGS } [ { ,STACKSIZE } [ { ,DLSIZE }
  [ { ,MAXDATA } [ ,BUFSIZE ] ] ] ] ] ] )
```

**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 loading. See the POPEN specifications for these parameters in this section.  
**STACKSIZE**  
**DLSIZE**  
**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 ] ] )
```

**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.

## DS/3000 BASIC PTOP CALLS

### BACCEPT

The BASIC callable interface to ACCEPT.

```
CALL BACCEPT(CCODE,IFUN      ,ITAG      [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 DISC files within local system or across a DSLINE to an ADJACENT system.
- Uses intrinsics similar to PTOP intrinsics for transfers.
- Operates only in an OUTGOING SENSE 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.

```
:DSCOPY [ sfile [, [ sdsdev ] [, [ sdev ] ] ] ] [ TO [ tfile [ , * [ tdsdev ] ] [, [ tdev ] ] ] ] ]
```

For interactive mode, omit all of the source and target parameters. Network file transfer prompts for input and, after the transfer completes, 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 local 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.



## NETWORK FILE TRANSFER

**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 computer; i.e., the tdsdev is the same as the dsdevice.

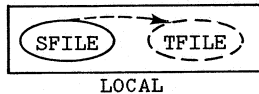
**tdev**          Optional parameter. The device class name or logical device number of the disc where the tfile should reside.

- 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:

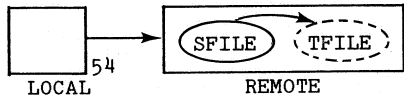
Local copy:

```
:DSCOPY SFILE TO TFILE
:DSCOPY SFILE;TFILE
```



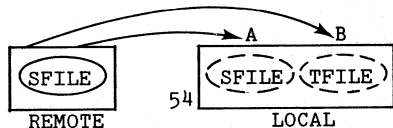
Remote copy:

```
:DSCOPY SFILE,54;TFILE,*
```



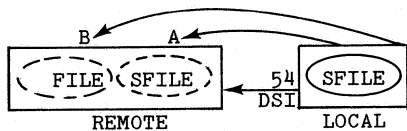
Remote to local:

```
A. :DSCOPY SFILE,54
B. :DSCOPY SFILE,54 TO TFILE
```



Local to remote:

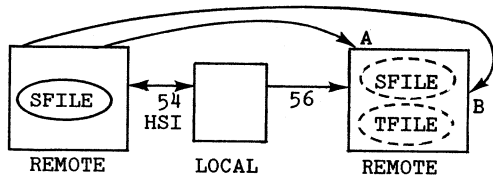
```
A. :DSCOPY SFILE;,54
B. :DSCOPY SFILE TO FILE,DS1
```



## NETWORK FILE TRANSFER

Remote to remote:

- A. :DSCOPY SFILE,54;,56
- B. :DSCOPY SFILE,HSI;TFILE,56



### Network File Transfer Intrinsic:

- 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;
```

## NETWORK FILE TRANSFER

OPT Controls the primary output, such as to \$STDLIST, and specifies the type of copy operation.

0	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1
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.

## NETWORK FILE TRANSFER

RESULT is an array of two or more data items.  
FNUM is a numeric data item.  
R is a numeric data item.

FORTTRAN 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 identification of each DS/3000 module installed on the system. The user must have read access to the component modules of DS in PUB.SYS.
```

Configuration Verification:

```
:RUN DSTEST...,CONFIG to display MPE I/O configuration and to verify that CS and DS devices are properly 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.
```

## DS/3000 COMMUNICATION LINE SPECIFICATIONS

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 queuing 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.

drivename 0 See section I.  
ctraceinfo 0 Configured setting

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 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 LINE OPEN SPECIFICATION

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	doptions = %002000	
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	:	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/3000 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 DSL CB.

## DSCOPY ERROR MESSAGES

### Error Number

### DSCOPY Error Message

0 Succeeded.  
1 Successfully initiated.  
4 Unable to open transaction file. (NFTErr 4)  
5 Unable to open list file (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 start 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

Error 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 :DSLIME COMMAND OR A REQUIRED :REMOTE HELLO HAS NOT BEEN DONE. (DSERR 214)
215	THE DSLIME 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 TRANSFER 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)

## DS/3000 FUNCTIONAL ERROR MESSAGES

<b>Error Number</b>	<b>Message</b>
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

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## 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 Intrinsic 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)

## SOFTWARE SUPPORT

### 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. PTOF 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 values: 1000 hardware, 1000 software, 3000 hardware, and 3000 software.

Note: The end which establishes the link specifies the requested line buffer size. This may be less than, but not greater than the 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 to generate 1000 system.

## DS/1000 Programs

(See DS/1000-IV Network Managers Manual and DS/1000-IV Users Manual for 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

## HARDWARE SUPPORT

### 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

### 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

$\left. \begin{array}{l} 30010A \text{ INP} \\ \text{or} \\ 30055A \text{ SSLC} \end{array} \right\}$  to  $\left\{ \begin{array}{l} 12793B: \text{ PSI - Modem Interface} \\ \text{for M/E/F series} \\ \text{or} \\ 12073A: \text{ PSI - Modem Interface} \\ \text{for A/L series} \end{array} \right\}$

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)

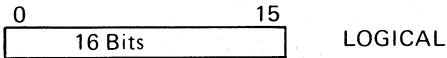
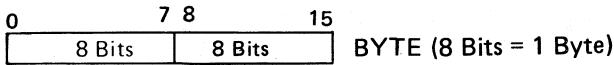
The number of open files (RFA 3000 to 1000) plus the number of 1000 slave programs (depends on memory size and SAM).

The number of TCB's is specified when running LSTEN.

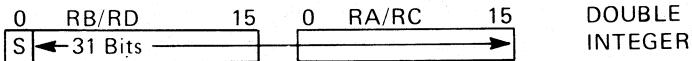
Virtual Sessions (See page G-5)



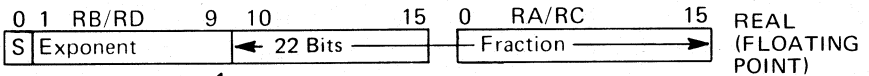
## HP 3000 DATA TYPES



$$-32768 \leq X \leq 32767$$



$$-2,147,483,648 \leq X \leq 2,147,483,647$$



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

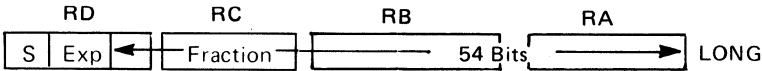
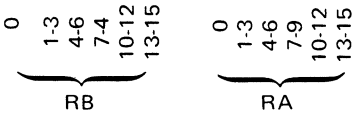
Range  $\pm 8.63616 \times 10^{-78} \leq X \leq 1.1579208 \times 10^{77}$

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 0	= Zero (by definition)
$2^{-256}$	S	0 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 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 0	= $6.84228 * 10^{-49}$
$2^{-128}$	S	2 0 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 0	= $1.26218 * 10^{-29}$
$2^{-64}$	S	3 0 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 0	= $2.32831 * 10^{-10}$
$2^0$	S	4 0 0 0 0	0 0 0 0 0 0	= 1.00000
$2^{32}$	S	4 4 0 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 0	= $1.84467 * 10^{19}$
$2^{96}$	S	5 4 0 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 0	= $3.40282 * 10^{38}$
$2^{160}$	S	6 4 0 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 0	= $6.27710 * 10^{57}$
$2^{224}$	S	7 4 0 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	= $1.15792 * 10^{77}$

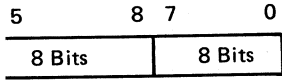


### LONG FLOATING POINT

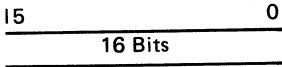
Range  $8.63616 85551 14 * 10^{-78} \leq X \leq 1.15792 08923 72 * 10^{77}$

Accuracy 16-17 Digits

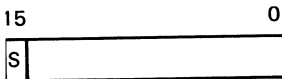
# HP 1000 DATA TYPES



BYTE (8 Bits = 1 Byte)

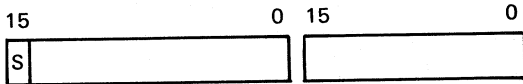


LOGICAL



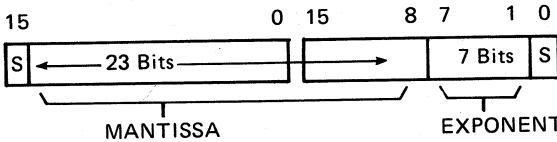
INTEGER

$$-32,768 \leq X \leq 32,767$$



DOUBLE INTEGER

$$-2,147,483,648 \leq X \leq 2,147,483,647$$



REAL  
(FLOATING POINT)

Mantissa	(±23 bit fraction)
Exponent	(±7 bit integer $2^x$ power)
Range	$1.469368 * 10^{-39}$
Accuracy	6 - 7 Digits

## PTOP CALLS - 3000 MASTER

### EXAMPLES

Mantissa	Exponent	Value ( $\pm$ )
.7777 776	0	.99999 988
.5	-32	1.16415 *10 <sup>-10</sup>
.5	-16	7.62939 *10 <sup>-6</sup>
.5	- 8	1.95312 *10 <sup>-3</sup>
.5	- 2	1.25 *10 <sup>-1</sup>
.5	0	.5
.5	2	2.0
.5	8	1.28 *10 <sup>2</sup>
.5	16	3.2768 *10 <sup>4</sup>
.5	32	2.1475 *10 <sup>9</sup>
+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 PTOF 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.

## PTOP CALLS - 3000 MASTER

### 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, PROGRAM, ITAG)				

DSDEVICE ASCII string terminated by a space. Specifies DSLINE or logical device number, or device class name.

PROGRAM 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.)

## PTOP CALLS - 3000 MASTER

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 bufsize words from DS buffer to target.

CALL ACCEPT	IA	IA	IV	0-V
	(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.

CALL REJECT	IA	0-V
	(ITAG)	

Condition Codes: CCL Error. Issue PCHECK for information.  
CCE Request was successful.  
CCG Not returned.

### PTOP Specifications

- One slave per dslne 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).



**PTOP SUMMARY - 3000**

	<b>PARAM</b>	<b>TAG</b>	<b>DATA</b>	<b>CCL</b>	<b>CCE</b>	<b>CCG</b>
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
<b>NOTE 1:</b> 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.

```
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.

```
CALL PCONT (IPCB, IERR, ITAG)
```

### POPEN

Opens a slave program on the 3000 system.

```
CALL POPEN (IPCB, IERR, NAME, NODE, ITAG [, IENAM [IPRAM  
[, 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.

## PTOP CALLS - 1000 MASTER

### READ

reads a buffer from slave and transfers tag fields.

CALL PREAD (IPCB, IERR, IBUF, IL, ITAG)
---

UF      Data buffer, equal to or less than IL.  
         Data length in words (4096 maximum).

### WRIT

transmits a buffer to slave program and transfers tag fields.

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.

```
CALL GET ( I      I      I      IA  I
           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.

### ACCEPT

Accepts and completes the master request and sends tag field.

```
CALL ACCEPT ( IA  I      IA
              ITAG, IERR [,IBUF])
```

IBUF Optional data buffer for PREAD or PWRIT.

### REJCT

Rejects the master request and sends tag field.

```
CALL REJCT ( IA  I
             ITAG, IERR)
```

## DEXEC CALLS - 3000 TO 1000

### 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 BUFLLEN).

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 } Refer to RTE manual for meaning  
6:1 A bit  
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) contains 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

## DEXEC CALLS - 3000 TO 1000

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	0-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 contains 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 intervals, 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).



## DEXEC CALLS - 3000 TO 1000

### DEXEC 12 - Program Execution (Absolute)

Schedules a remote program for execution at specified intervals, starting 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)				

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)  
0= Run only once

HOURS            0-23

MINUTES         0-59

SECONDS         0-59

MSECONDS        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.

## RFA INTRINSICS - 3000 TO 1000

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	0-V
DAPOS (DCB, IERR, RECNM [,BLOCKNUM [,WORDNUM]])					

RECNM Sequential record number (reference DLOCF).

BLOCKNUM Next sequential block number (block=128 words, 2 physical disc sectors).

WORDNUM Word offset within block for beginning of a new record Omitted for files with fixed length records. (0<n<127)

## IFA INTRINSICS - 3000 TO 1000

### DCLOS

Closes file and makes file available for other access. Optionally truncate.

LA	I	IV	0-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	0-V
DCONT (DCB, IERR, CONTROL [,CONT2])				

CONTROL Function code (refer to DEXEC 13 for codes).

CONT2 Auxiliary control parameter for 11, 22, and 27.

## RFA INTRINSICS - 3000 TO 1000

### DCRET

Creates a disc file, makes file directory entry, and allocates disc space.

LA	I	LA	LA	IV	IV	IA	0-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	0-V		
LU, TYPE, RECSIZE])					

## RFA INTRINSICS - 3000 TO 1000

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	0-V
DNAME (DCB, IERR, NAME, NEWNAME [,SECURITY, CRTNM])						

IAME 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.

## RFA INTRINSICS - 3000 TO 1000

### OPEN

opens 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.			
SECURITY		=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

positions file pointer forward or backward relative to current position.

	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).	

## RFA INTRINSICS - 3000 TO 1000

### 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,	DSLINA)

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.

DSLINA            4-word array. ASCII DSLINA name or LU.

**DWIND**

Places file pointer to first record in disc file. Rewinds type-0 files.

	LA	I
DWIND	(DCB,	IERR)

## RFA INTRINSICS - 3000 TO 1000

### DWRIT

Writes a record from a user's buffer to open file. For types 0 and 1 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				

## RFA INTRINSICS - 1000 TO 3000

This section on Remote File Access intrinsics covers the 1000 to 3000 section.

### Error Conditions

Test condition code following a 1000 to 3000 RFA call:

```
CALL intrinsic name  
IF (ICC(n)) label <,label=,label>
```

where *n* is a dummy parameter.

For CCL and CCG, use the FCHEK intrinsic to determine the error code. Refer to the MPE Intrinsic Reference manual for a list of error codes associated with the MPE FCHECK intrinsic.

### Common 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).

### FCHEK

Provides information about the RFA intrinsic that failed. FILNM=0 for FOPEN error.

CALL FCHEK (FILNM, IERR, TLOG, BLKNM, NMREC)
--

RR Returns the error code. Refer to MPE intrinsics.

## RFA INTRINSICS - 1000 TO 3000

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 all 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
	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.

## RFA INTRINSICS - 1000 TO 3000

### FINFO

Returns file access and status information. Refer to MPE intrinsics for information on parameters.

```
CALL FINFO (IV      BA      L      L      I      I
             (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
             LADDR)
             O-V)
```

Condition Codes: CCL Request denied due to error.  
CCE Request granted.  
CCG Not returned.

### FLOCK

Dynamically locks a file.

```
CALL FLOCK (IV      LV
            (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 Codes    CCL Denied. File not opened with dynamic locking  
                                 or needs multiple RIN capability.  
                         CCE Request granted.  
                         CCG Denied. File was locked by another process.

## RFA INTRINSICS - 1000 TO 3000

### FPOIN

Sets record pointer to a logical record (fixed-length only).

CALL FPOIN	IV	DV
	(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, TARGET, 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, TARGET, TCNT, LABID)
```

TCNT                    Size in words (128 maximum).

LABID                  Label ID number (default=0).



## RFA INTRINSICS - 1000 TO 3000

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.

## RFA INTRINSICS - 1000 TO 3000

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 record 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

## RFA INTRINSICS - 1000 TO 3000

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, TARGET, 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.

## RFA INTRINSICS - 1000 TO 3000

### FWRIT

Writes a logical record to a file, and updates the pointer.

```
CALL FWRIT (FILNM, IV, LA, IV, LV, TARGET, 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.

```
CALL FWDIR (FILNM, IV, LA, IV, DV, TARGET, 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.

## RFA INTRINSICS - 1000 TO 3000

### FWLAB

Writes a user-defined label onto a disc file.

CALL FWLAB (FILNUM, TARGT, TCNT, LABID)	IV	LA	IV	IV	0-V
---	----	----	----	----	-----

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

## HP 1000 FMGR ERROR CODES

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 occurred during a file move.

>>DS/3000 COMMUNICATION LINK \*DOWN\* >> XXXXXXXXXXXXXXX @ YYYYYYYYYYYYYY (QUEX) Displayed if initialization is not established or the link fails after initialization. QUEX tries to establish the link to the HP 3000 automatically. (See DS/1000-IV User's Manual for X and Y field errors.)

>>DS/3000 COMMUNICATION LINK \*UP\* (QUEX) Displayed once initialization of the DS/3000 Communication Link is established. (HSI only)

DS/3000 ERROR nnn (RMOTE) The reported numeric DS/3000 error occurred during a file move operation.

HELLO FAILED OR LINE DOWN (RMOTE) HELLO command was not correct and could not be transmitted due to line error.

>>HP 3000: BAD BUFFER OUTGOING (QUEX) Transmission did not pass verification test in QUEX.



## HP 1000 ERRORS

- 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 error 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.
- I ENOUGH SAM (RMOTE) RTE returned an SC10 scheduling error for an RU, ON, or RW command.
- I 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.
- JEX: 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 LI or an RTE file in non-spooled format.

## PTOP ERRORS - 3000

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 program has issued reject (CCG).  
213 Remote slave program not opened properly.  
214 Missing :DSLIN 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/DLSE.  
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: IO <sub>nn</sub> , RN <sub>nn</sub> , SC <sub>nn</sub> 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

## RFA ERRORS - 3000 TO 1000

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

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## 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)



## HP264x MULTIPOINT TERMINAL STRAPPING OPTIONS

### 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															
	<table border="0"> <thead> <tr> <th>J17</th> <th>J16</th> <th>Buffer Size</th> </tr> </thead> <tbody> <tr> <td>CLOSED</td> <td>CLOSED</td> <td>500 bytes</td> </tr> <tr> <td>CLOSED</td> <td>OPEN</td> <td>1000 bytes</td> </tr> <tr> <td>OPEN</td> <td>CLOSED</td> <td>2000 bytes</td> </tr> <tr> <td>OPEN</td> <td>OPEN</td> <td>4000 bytes</td> </tr> </tbody> </table>	J17	J16	Buffer Size	CLOSED	CLOSED	500 bytes	CLOSED	OPEN	1000 bytes	OPEN	CLOSED	2000 bytes	OPEN	OPEN	4000 bytes
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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 J04-00). Example for Device ID 6:															
	<table border="0"> <tbody> <tr> <td>J14, J13</td> <td>CLOSED</td> <td rowspan="3">} = CC00C = 6</td> </tr> <tr> <td>J12, J11</td> <td>OPEN</td> </tr> <tr> <td>J10</td> <td>CLOSED</td> </tr> </tbody> </table>	J14, J13	CLOSED	} = CC00C = 6	J12, J11	OPEN	J10	CLOSED								
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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:															
	<table border="0"> <tbody> <tr> <td>J04, J03</td> <td>CLOSED</td> <td rowspan="2">} = CC000 = 7</td> </tr> <tr> <td>J02 - J00</td> <td>OPEN</td> </tr> </tbody> </table>	J04, J03	CLOSED	} = CC000 = 7	J02 - J00	OPEN										
J04, J03	CLOSED	} = CC000 = 7														
J02 - J00	OPEN															
INT	OPEN															
PL6 -PLO	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															

## HP264x MULTIPOINT TERMINAL STRAPPING OPTIONS

### 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.  <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">J17</th> <th style="width: 30%;">J16</th> <th style="width: 40%;">Buffer Size</th> </tr> </thead> <tbody> <tr> <td>CLOSED</td> <td>CLOSED</td> <td>500 bytes</td> </tr> <tr> <td>CLOSED</td> <td>OPEN</td> <td>1000 bytes</td> </tr> <tr> <td>OPEN</td> <td>CLOSED</td> <td>2000 bytes</td> </tr> <tr> <td>OPEN</td> <td>OPEN</td> <td>4000 bytes</td> </tr> </tbody> </table>	J17	J16	Buffer Size	CLOSED	CLOSED	500 bytes	CLOSED	OPEN	1000 bytes	OPEN	CLOSED	2000 bytes	OPEN	OPEN	4000 bytes
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J06	OPEN															
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J04 - J00	Group ID must be unique within an MTS /3000 network. Example for Group ID 7:  <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 30%;">J04, J03</td> <td style="width: 30%;">CLOSED</td> <td rowspan="2" style="width: 40%; vertical-align: middle;">} = CC000 = 7</td> </tr> <tr> <td>J02 - J00</td> <td>OPEN</td> </tr> </tbody> </table>	J04, J03	CLOSED	} = CC000 = 7	J02 - J00	OPEN										
J04, J03	CLOSED	} = CC000 = 7														
J02 - J00	OPEN															
- 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 alphanumeric, 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
XmitFunct(A) NO    SPDW(B) NO    InhEolWrp(C) NO Line/Page(D) Page
InhHndShk(G) YES  Inh DC2(H) NO  Auto Term(J) YES ClearTerm(K) NO
InhSlftTst(L) NO  InvertWrp(M) NO Esc Xfer(N) NO InhDcTst(W) NO
FldSeparator A   Terminator A
ESC )   A       B       C       Alternate Set
        Math Set LineDraw LargeChr      B

SAVE   NEXT   PREVIOUS DEFAULT POWER ON APPLY DISPLAY RESET
VALUES VALUES VALUES VALUES VALUES VALUES VALUES VALUES
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

## HP 2626 MULTIPOINT TERMINAL STRAPPING

MULTIPOINT ASYNC				#1					
BaudRate	9600	Parity	ODD	Code	ASCII7	BufSize	1000	XmitClkSource	In1
Asterisk	LINE	StopBits	1	NumBufs	8	RecvClkSource	In1	XmitClkOut	X16
TR(CD)	H1	BCC	ORC	SR(CH)	L0	ExtClkIn	X16		
PGroupID	A	DeviceID	A	FirstTerm	NO	SpComp	NO	Ins SYN	NO
SGroupID	a	ExtText	NO	DataSrAddr	NO				
XmitXpar	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:

- The HP 2626A supports 8-bit ASCII whereas the HP 2645 does not.
- 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.
- 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.
- 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

```

MULTIPOINT SYNC #1
BaudRate 2500 Parity 000 Code 250000 BufSize 0000 XmitClkSource 000
Asterisk OFF TR(CD) 01 BCC 020 SR(CH) 00 NumBufs 02
PGroupID A DeviceID A FirstTerm 00
SGroupID a ExtText 00 DataSrAddr 00 SpComp 00
XmitXpar 00

SAVE NEXT PREVIOUS DEFAULT POWER ON NEXT DISPLAY
(CONFIG) (CHOICE) (CHOICE) (VALUES) (VALUES) (CONFIG) (FUNCTIONS) (Levs)
147015-24
    
```

## HP 2626 Synchronous Multipoint--Hardwired

```

MULTIPOINT SYNC #1
BaudRate 2500 Parity 000 Code ASCII12 BufSize 0000 XmitClkSource 000
Asterisk OFF TR(CD) 01 BCC 000 SR(CH) 00 NumBufs 02
PGroupID A DeviceID A FirstTerm 00
SGroupID a ExtText 00 DataSrAddr 00 SpComp 00
XmitXpar 00

SAVE NEXT PREVIOUS DEFAULT POWER ON NEXT DISPLAY
(CONFIG) (CHOICE) (CHOICE) (VALUES) (VALUES) (CONFIG) (FUNCTIONS) (Levs)
147015-25
    
```

## HP 2626 Synchronous Multipoint--Modems

```

TERMINAL CONFIGURATION
Bell ON Click ON FrameRate 00 TabSpaces 00
Language USASCII Datacomm/Printer Port1/2/3/4
RETURN Def RETURN=ENTER 00 PrinterCode4 EX1 PrinterNulls 0
LocalEcho OFF CapsLock OFF Start Col 1 ASCII 8 Bits 00
XmitFunctn(A) 00 SPDR(B) 00 InhColWrp(C) 00 Line/Page(L) 00
InhIndSnk(G) 00 InhDC2(H) 00 Auto Term(I) YES ClearTerm(K) 00
InhSI+Tst(L) 00 Esc Xfer(N) 00 InhDcTst(W) 00
FldSeparator 0 Bk1Terminator A B FormsBufSize(256x) 0
ESC ) 0 A B C Alternate Set
USASCII LINE DRAWING

FORMAT MODE
Decimal Type US Implied Dec Digits 0 Transmit All Fields
NOTE: Configuration choices that are shown with a black background affect
DSN/MTS. RS and GS are control-^ and control-] respectively.
    
```

## 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

## MTS CABLE ASSEMBLIES

PRODUCT NUMBER	NAME	CONNECTORS (See NOTE below)			LENGTH
		A	B	C	
132x2A x=2=262X 3=264X	103/202 Asynchronous Modem Cable (HP 02640-60043)	RS-232-C	*	none	4.5 meters (15 ft)
132x2N x=2=262X 3=264X	U.S.A. Asynchronous 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 Multipoint 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)

## MTS CABLE ASSEMBLIES

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

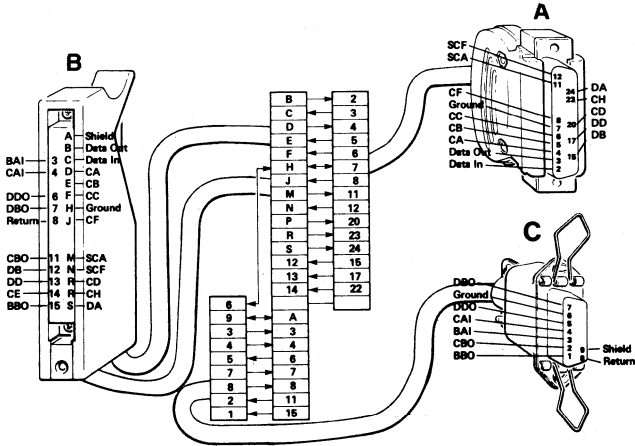
NOTE: Install A connectors electrically toward the computer.  
 Install B connectors onto the rear of a terminal.  
 Install C connectors electrically away from the computer.  
 INP and SSLC cables do not have their own product numbers.

\* This connector is a 50-pin RS-232-C female for 262X and a  
 card edge connector for 264X.

## MTS CABLE ASSEMBLIES

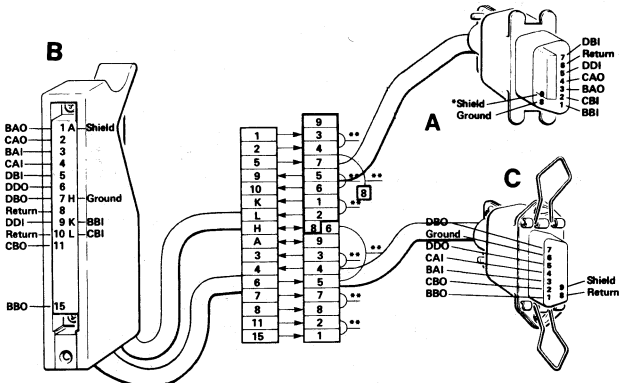
### HP 13232P (2640-60132) MODEM/MULTIPOINT CABLE

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)



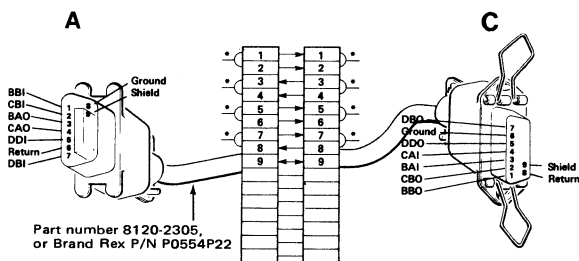
## MTS CABLE ASSEMBLIES

### 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



\*Same twisted pair.

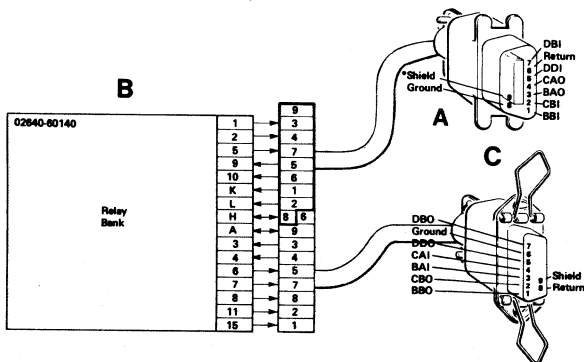
4 twisted pair, 22AWG, 75 ohm impedance, braided, shielded, bracketed.

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)





## MTS CONSOLE COMMAND

### OPENING AND CLOSING AN MTS LINE

:MPLINE idn,	}	OPEN [,FILENAME1] UP, upentry DOWN, downentry SHUT [,NOW] MESSAGES, {ON-OFF} TRACE {ON [, [ALL] { [, [mask[]], [numentries] [, 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 percent 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.

## CONTROL CODES FOR FCONTROL

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	CONTROL CODE	RESULT UNDER MTS
Set input speed and return Previous speed.	10	Speed not changed; current speed is returned.
Set output speed and re- turn 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.

(Continued on page 24)

## MTS EXECUTION CHARACTERISTICS

<b>MTS CONTROL FUNCTIONS</b> / <b>TERMINAL OPERATING MODES</b>	<b>ASCII TRANSFER DEFAULT</b> Explicitly enabled through FCONTROL (control code 26) or FCONTROL (control-code 41, chars 0)	<b>NORMAL TERMINAL CONTROL DISABLED</b> 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.

## MTS EXECUTION CHARACTERISTICS

LIMITED UNEDITED with end-of-record character = %136 Enabled through FCONTROL, control- code 41.	UNEDITED with end-of-record character =%137. En- abled through FCON- TROL, controlcode 41.	BINARY TRANSFER 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.

## CS ERROR CODES

### 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.



## MTS MULTIPOINT VERIFICATION

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.

# CONFIGURING MTS

## MPE UNIT NUMBER TO GROUP/DEVICE ID CONVERSIONS

GROUP ID	NO.	DEVICE ID	@	A	B	C	D	E	F	G	H	I
		NO.	0	1	2	3	4	5	6	7	8	9
@	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.

## CONFIGURING MTS

### 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.

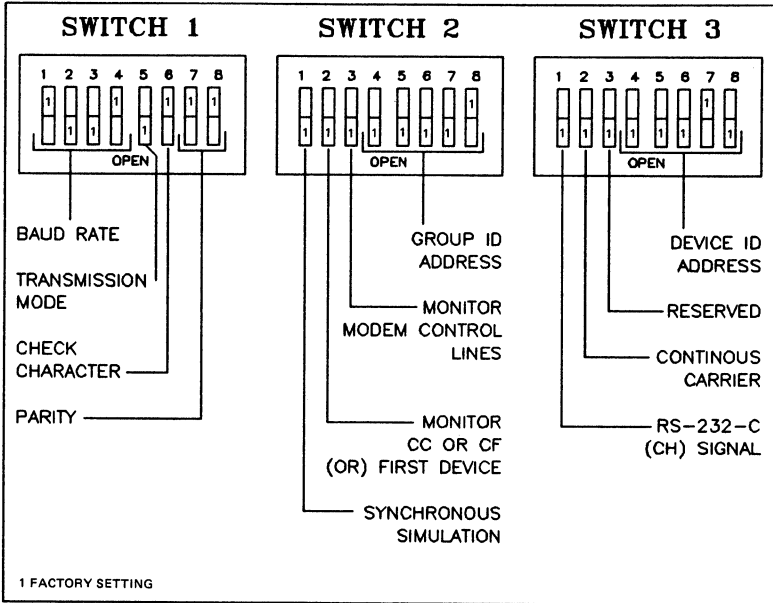
You are prompted with another asterisk "\*". Now you can enter "LIST" to display the HP 2333A's new configuration.

To disconnect your terminal from Port A1:

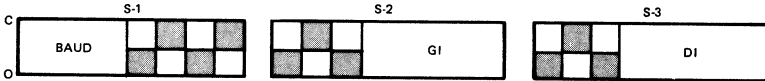
1. Close switch H on the 2333A controller - all switches down.
2. Press reset switch. The message you entered will be displayed.
3. Open communication line (MPLINE).

# CONFIGURING MTS

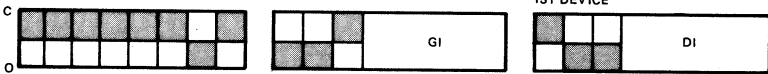
## 2608S SWITCH SETTINGS



DATA LINK (LOCAL OR REMOTE, ASYNC)



DAISY CHAIN



DAISY CHAIN



2608S ADDRESS SWITCH SETTINGS

SWITCH S-2	Group ID	
SWITCH S-3	Device ID	
0 0 0 0 0	●	40
0 0 0 0 C	A	41
0 0 0 C 0	B	42
0 0 0 C C	C	43
0 0 C 0 0	D	44
0 0 C 0 C	E	45
0 0 C C 0	F	46
0 0 C C C	G	47
0 C 0 0 0	H	48
0 C 0 0 C	I	49
0 C 0 C 0	J	4A
0 C 0 C C	K	4B
0 C C 0 0	L	4C
0 C C 0 C	M	4D
0 C C C 0	N	4E
0 C C C C	O	4F
C 0 0 0 0	P	50
C 0 0 0 C	Q	51
C 0 0 C 0	R	52
C 0 0 C C	S	53
C 0 C 0 0	T	54
C 0 C 0 C	U	55
C 0 C C 0	V	56
C 0 C C C	W	57
C C 0 0 0	X	58
C C 0 0 C	Y	59
C C 0 C 0	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 procedure 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 #xxxxnn

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, Termtyp 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 programmatically 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 control 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 Termtyp 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 must 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 specified 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 buffer 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 configuration.

### 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 Termttype 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
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## 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)	00 (new file)
(13:1)	0 (binary file)
(10:3)	0 (use actual file designator)
(8:2)	0 (fixed length records)
(7:1)	0 (no carriage control)
(6:1)	0
(5:1)	1 (disallow file equation)
(0:5)	0
AOPTIONS (12:4)	4 (input/output access)
(11:1)	0 (no multi-record option)
(10:1)	0 (disallow dynamic locking/ unlocking)
(8:2)	0 (exclusive access)
(0:8)	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.

## TRACE

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 outence 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 applicable 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 parameter 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 overlaid. 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 SDLCL 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 generated 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 character sequence to the remote station. The PSCT trace entry shows (in octal or hexadecimal) byte-for-byte exactly what was sent. **

## TRACE

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 generated 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.

TRACE

\*\*\*\*\*
\* BEGIN TRACING FOR DEVICE 14 \*
\*\*\*\*\*

\*\*\*\*\*
\* LINE NUMBER: 3 LOGICAL DEV. NUMBER: 14 \*
\* DEV. TYPE: 17 SURTYPE: 7 VER: A.34.02 \*
\* C0PTIONS: 000100011000010 \*
\* A0PTIONS: 000000100001131 \*
\* D0PTIONS: C100G100010000 \*
\* NUMBUFFERS: 1 BUFFSIZE: 1024 (WORDS) \*
\* INSPD: 1200 OUTSPD: 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: 00.3 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: IOINPO \*
\* DOWNLOAD FILE: CSDMTO.PUB.SYS \*
\* CTRACEINFO: ENTRIES=24 MASK=011111000 \*
\* TYPE OF TRACE = ALL; NOWRAP \*
\* POLLIST: ENTRIES=3 INDEX=15 \*
\* 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 \*
\* { POLL ID = 4141 ASCII=AA EBCDIC=# \*
\* SEL ID = 6161 ASCII=aa EBCDIC=# \*
\* 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 2 STATIONS= 1 DESC=00000001 \*
\* { POLL ID = 4242 ASCII=BB EBCDIC=# \*
\* SEL ID = 6262 ASCII=bb EBCDIC=# \*
\* 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 3 STATIONS= 1 DESC=00000001 \*
\* { POLL ID = 4343 ASCII=CC EBCDIC=# \*
\* SEL ID = 6363 ASCII=cc EBCDIC=# \*
\* 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=# \*
\* 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=# \*
\* 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=# \*
\* SEL ID = 6646 ASCII=ff EBCDIC=# \*
\* 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=# \*
\* SEL = 4242 ASCII=BB EBCDIC=# \*
\* 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 MSGRCV: 413 \*
\* RECOVERERRS: 3 IRRECOVERERRS: 0 \*
\*\*\*\*\*

(Binary value)

Group Poll/Select
IDs (General)
(Hexadecimal
value)

Station/Device ID
(Hexadecimal
value)

Stations in
the Group

## 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 control 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 00000 for sent text.
  - = 1 MFW will not be placed into received text nor expected in sent text. CS will use an implicit MFW of 10000 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 HSI Driver, 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.

BUFSIZE -

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

## TRACE

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= $\infty$ ).
11	Poll Repeat. Number of iterations through Poll List (0= $\infty$ ). 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 indicates whether ALL or I/O errors are to be traced, and whether the Trace file is to be overlaid, 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.

### RECOVERERRORS -

Number of errors during entire TRACE duration.

### IRRECOVERERRORS -

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).



## CS ERRORS

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.

## CS ERRORS

### 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.

## CS ERRORS

### 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.

## CS ERRORS

### 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.

## CS ERRORS

### 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 timeout 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 received from the remote station before the last block of multiblock transmission was sent.
221	After an RVI was sent to the remote station, it responded 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.



## CS ERRORS

### 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 occurred 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 or 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**

**:SHOWCOM [dev[;ERROR][;RESET]**

- ldev is the logical device number of a communications controller
- ERROR will produce a more detailed display of errors.
- 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 messages at the system 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;CTL
```

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 INPDUMP.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 file 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 running this program are self-explanatory. However, the user should take note of the following messages:

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)

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# DSN/IMF

## 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

### 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.

# INTRINSICS

## ACQUIRE3270 - PROVIDES PASS THRU CAPABILITY.

ACQUIRE3270 (confile, devicenum, ldev, enhance, priority,  
                   BA          I          I          I          I  
                   blanks, format, flags, result)  
                   I          I          I          I

confile                  Name of configuration file  
 (input)

devicenum               Device number on control unit, (0<=n<=31).  
 (input)

ldev                    Logical device number of an HP 3000 terminal  
 (input)                  or printer to be used for Pass Thru

enhance                 Display enhancement options:  
 (input)

	3270 Normal Brightness	3270 High Intensity
enhance: converted to:	converted to:	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               User-provided output priority for Pass Thru  
 (input)                  Capability.

blanks                  0 = convert leading blanks of an unprotected  
 (input)                  field into null characters.  
                           1 = do not convert leading blanks.

format                  Informs Pass Thru which form of screen  
 (input)                  printing is to be used whenever the f7 (PRINT)  
                           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 format = 1; however,  
       a copy of the screen is printed whenever  
       RECV3270 or TRAN3270 is called.

## INTRINSICS

	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.

## INTRINSICS

### 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 BATRLIST (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 Parameters".  
(input)

result                       A common parameter described below in "Common Parameters".  
(output)

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)

## INTRINSICS

### 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.

## INTRINSICS

**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 (input)	A common parameter described below in "Common Parameters".
fieldnum (input)	A common parameter described below in "Common Parameters".
fieldrow (input)	A common parameter described below in "Common Parameters".
fieldcolumn (input)	A common parameter described below in "Common Parameters".
protectedattr (input)	0 = unprotected. 1 = protected.
numericattr (output)	0 = alphanumeric. 1 = numeric.
displayattr (output)	0 = normal display. 1 = normal display. 2 = intensified display. 3 = non-display, non-print.
mdt (output)	modified data tag 0 = modified data tag not set. 1 = modified data tag set.
currentfieldlen (output)	The number of characters of the field in the internal buffer, excluding training nulls.
maxfieldlen (output)	The maximum number of characters the field could contain.
result (output)	A common parameter described below in "Common Parameters".

COBOL calling sequence:

```
CALL "CFIELDATTR" USING TERMINALID FIELDNUM FIELDROW FIELDCOLUMN  
PROTECTEDATTR NUMERICATTR DISPLAYATTR MDT LENGTH MAXLENGTH  
RESULT.
```



## INTRINSICS

All parameters are numeric data items.

FORTTRAN 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  
           findex, 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.

## INTRINSICS

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 devtype, 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,  $0 \leq \text{timeout} \leq 28,800$  seconds. A zero value disables the timer.  
First word: Keyboard enable timeout.  
Second word: Receive timeout.

**result**  
(input) 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.

## INTRINSICS

**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 PRIN3270 (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.

## INTRINSICS

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.

FORTTRAN 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, <u>which = 0</u> , at which data transfer will start.
maxinbuflen (input)	The maximum number of characters to transmit to <u>inbuf</u> .
inbuf (output)	The destination buffer containing the data stream.
actinbuflen (output)	The actual number of characters transmitted to <u>inbuf</u> .

## INTRINSICS

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 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.



## INTRINSICS

### 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)	<u>Input</u> : Where to start executing the keystrokes from the <u>outbuf</u> . parameter. <u>Output</u> : 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.

## INTRINSICS

Value			Equivalent 3270 Key:
Dec:	Oct:	Hex:	
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 outbuf in characters.

**numprocessed** (output)            The number of successfully processed characters in the stream 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, R0, CO S$, L, L1, R)
```

All parameters are integer variables, except for S\$ which is a string variable.

# INTRINSICS

**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 (input)                   A common parameter described below in "Common Parameters".

aid (output)                    Indicates the attention id to be transmitted 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	All
	(CANCEL)	
44	PA3	All
95	CLEAR	All
48	SYSTEM REQUEST Key (SDLC only)	

cursorrow and cursorcolumn (input)                    Cursor position. Use -1 in data stream mode to inhibit their transmission.

## INTRINSICS

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.

# INTRINSICS

BASIC calling sequence:

CALL EVERS3270 (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 zero, 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	¢ cent currency sign
] right bracket	! exclamation
! exclamation	vertical line
^ caret	⌂ not symbol

outbuflen (input)      Length of output in characters. Must be less than or equal to maxfieldlen, from FIELDATTR intrinsic; otherwise result will be set to 13.

## INTRINSICS

**result**  
(output)                    A common parameter described below in "Common Parameters".

COBOL calling sequence:

```
CALL "WRITEFIELD" 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**  
(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.

**outbuflen**                    The number of characters in outbuf.

## DSN/IMF INTRINSICS

(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 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.



## DSN/IMF INTRINSICS

### COMMON PARAMETERS

<code>terminalid</code>	contains the same terminal identifier as was returned from OPEN3270. All other intrinsics use this parameter as input.
<code>result</code>	indicates whether the intrinsic executed successfully. A non-zero <u>result</u> means that a condition described below took place. The values of <u>result</u> are described in a table which follows.
<code>... row</code>	the location of the first data character of the field.  0 <= ... row <= 11    480-character buffer 0 <= ... row <= 23    1920-character buffer
<code>... column</code>	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)	<u>terminalid</u> ; or, zero to check for any I/O completion. The term <u>terminalid</u> 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 <u>result</u> , 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.

## DSN/IMF INTRINSICS

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 (input)	<u>terminalid</u> ; or, zero to check for any I/O completion.
target	This is meaningless for DSN/IMF.
tcount	This is meaningless for DSN/IMF.
cstation (output)	This parameter is the same as <u>result</u> , which is 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 DSN/IMF

### USING THE PASS THRU FACILITY

Pass Thru may be initiated in one of four ways:

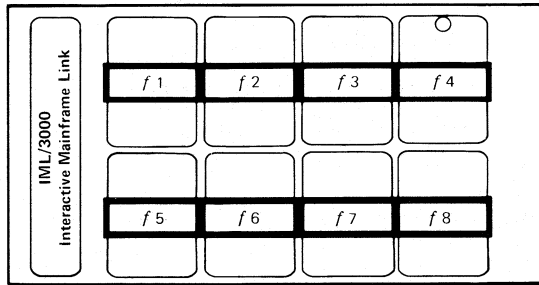
- automatically, if AUTO ACQUIRE is specified in a configuration file
- from a DSN/IMF manager command by means of an ACQUIRE subsystem command
- programmatically issuing ACQUIRE 3270 intrinsic
- by using the IMF command from a session, as shown below:

```
:IMF      [E[NHANCE] = 0 | 1 | 2 | 3 ]
          [;] [B[LANKS]]
          [;] [F[ORMAT]] = 0 | 1 | 2 | 3 | 4 ]
          [;] [P[RRIORITY]] = 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.

## USING DSN/IMF

### 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 field 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 capability is started with the configuration file AUTO ACQUIRE, or with the IMFMGR subsystem command ACQUIRE.

### LIMITATIONS:

- The printer may not 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.

## USING DSN/IMF

### 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]



## USING DSN/IMF

### Configuring DSN/IMF into MPE I/O system

An INP must be configured.

Configure one pseudo device for each INP, as follows:

3.5	<u>LOGICAL DEVICE #?</u> nnn	The pseudo device.
3.6	<u>DRT #?</u> #xx	A number sign (#) followed by the DRT number of the INP
3.7	<u>UNIT #?</u> 0	
3.8	<u>SOFTWARE CHANNEL #?</u> 0	
3.9	<u>TYPE?</u> 22	A pseudo-device type.
3.10	<u>SUBTYPE?</u> 1	For DSN/IMF
	.	
	.	
3.50	<u>DRIVER NAME?</u> 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[RRIORITY] = 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]
```

## USING DSN/IMF

K[ILL] [\*COMMENT]

### CAUTION

The line is closed immediately.

R[LEASE] DEVICE NUMBER [\*COMMENT]

device number The number of an emulated IBM device.

STA[RT] [\*COMMENT]

STO[P] [\*COMMENT]

This command initiates 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	PSTX
	PSTN	IC	PSTN				PPOL	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 occurred, 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 INPDFAN.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.

TABLES

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.			

## TABLES

### 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)



## TABLES

### 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	"

## TABLES

### SDLC Device Addresses From the Transmission Header

Device Number	Transmission Header Field Address Bits:							Octal	Hex
	1	2	3	4	5	6	7		
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)	

## TABLES

### 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 Intrinsic 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	<p>Host modified screen since last receive request.</p> <p>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.</p>
10	<p>Attempt made to update protected field.</p> <p>You are not allowed to change the contents of a protected field.</p>
11	<p>Non-existent field number specified.</p> <p>The field number specified in a call to FIELDATTR, READFIELD, or WRITEFIELD does not exist in the screen.</p>
12	<p>Invalid character in field or stream.</p> <p>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 Intrinsic.</p>
13	<p>Attempt to write too long of a field.</p> <p>The field length specified in the call to WRITEFIELD is longer than the field length in the screen.</p>
14	<p>Attempt made to update or transmit from a printer.</p> <p>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.</p>
15	<p>Invalid AID code.</p> <p>The AID parameter of the TRAN3270 Intrinsic is invalid. Check the list of valid AID codes in the description of the TRAN3270 Intrinsic.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
16	<p>Invalid cursor address.</p> <p>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.</p>
17	<p>Attempt made to write field with input inhibited.</p> <p>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.</p>
18	<p>Communications with the host system have been lost.</p> <p>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.</p>
19	<p>System Operator/Manager has requested disconnect.</p> <p>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.</p>
20	<p>System Operator/Manager killed the Subsystem.</p> <p>The System Operator or the IMF Manager has issued the KILL command. No further communications are possible.</p>
21	<p>Field offset out of range.</p> <p>The offset specified is not within the field length.</p>
22	<p>BASIC calling sequence error.</p> <p>A bad call was made to an IMF BASIC Intrinsic. The parameters may be in the incorrect order.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
23	<p>Keyboard enable timeout occurred.</p> <p>The host computer failed to send a keyboard-enable within the time limit specified in the TIMEOUT parameter of OPEN3270.</p>
24	<p>Receive timeout occurred.</p> <p>The host computer failed to send data to this device within the Transmit/Receive time limit set in the TIMEOUT parameter of OPEN3270.</p>
25	<p>Intrinsic call made in split stack mode.</p> <p>You may only call the Ininsics with DB pointing to your own stack.</p>
26	<p>Intrinsic call made with parameter out of bounds.</p> <p>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.</p>
27	<p>Could not open device, insufficient virtual memory.</p> <p>There was insufficient virtual memory to allocate the extra data segment to contain the screen.</p>
28	<p>Could not open device, insufficient real memory.</p> <p>There was not enough room in the PCBX of your process to allocate a file control entry for the device.</p>
29	<p>Called an intrinsic with a request already outstanding.</p> <p>In no-wait I/O only, you made a call to RECV3270 or TRAN3270 with a previous request to one of these Ininsics still outstanding. Issue a call to IOWAIT or IODONTWAIT to complete the request before issuing any new Intrinsic calls.</p>
30	<p>Internal error in IMF intrinsic.</p> <p>Internal software error. Note circumstances and report them to your Hewlett-Packard representative.</p>



## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
31	<p>IMF subsystem started with different configuration file.</p> <p>IMF is not running with the configuration file you specified. Check with your IMF Manager.</p>
34	<p>Request has been aborted.</p> <p>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.</p>
38	<p>Cannot start OUTBUF on an attribute byte.</p> <p>The stream data you supplied positioned the cursor on top of an attribute byte. You may not write over an attribute character.</p>
42	<p>Specified MAXINBUFLEN too large.</p> <p>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.</p>
45	<p>SDLC reset from the host system. Your host session was terminated.</p> <p>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.</p>
46	<p>Transmit timeout occurred.</p> <p>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</p>
47	<p>IMF START command has not been issued.</p> <p>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.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
49	<p>INBUF is too small to hold the entire data stream.</p> <p>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.</p>
50	<p>Called READSTREAM without calling RECV3270 first.</p> <p>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.</p>
51	<p>Called TRAN3270 without calling WRITESTREAM first.</p> <p>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.</p>
52	<p>Data stream is too long.</p> <p>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.</p>
53	<p>Invalid intrinsic called for data stream mode device.</p> <p>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.</p>
54	<p>Device not opened in data stream mode.</p> <p>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.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
55	<p>Data Stream mode not allowed with BSC line.</p> <p>BSC protocol was specified in your configuration file. Data Stream is supported only with SDLC.</p>
56	<p>The System Request function is not allowed with BSC protocol.</p> <p>BSC protocol was specified in your configuration file. This feature is allowed with SDLC protocol.</p>
60	<p>Invalid spool file priority; must be between 1 and 13 inclusive.</p> <p>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.</p>
61	<p>Failed to open PRINT3270 spool file.</p> <p>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.</p>
62	<p>Failed to write to a PRINT3270 spool file.</p> <p>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 reason for this error is that there is no more disc space.</p>
63	<p>Illegal ACTION number.</p> <p>The value of the parameter ACTION in the PRINT3270 Intrinsic must be between 0 and 4, inclusively.</p>
64	<p>Wrong file type for PRINT3270 output file.</p> <p>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.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
65	<p>Failed to close PRINT3270 spooled output file.</p> <p>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.</p>
66	<p>Failed to open CATIMF.PUB.SYS</p> <p>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.</p>
67	<p>GENMESSAGE failed to extract message.</p> <p>The MPE Intrinsic GENMESSAGE did not execute properly. Check to see that CATIMF.PUB.SYS and the GENMESSAGE Intrinsic are correctly installed properly.</p>
70	<p>Invalid LDEV specified or LDEV is already in use.</p> <p>Verify that the value you used for LDEV is correct. Also, determine what other processes are using the LDEV you have identified.</p>
71	<p>The ENHANCE parameter must be an integer between 0 and 3.</p> <p>Verify that the value you used for the ENHANCE parameter is within the range of 0 through 3.</p>
72	<p>The PRIORITY parameter must be an integer between 1 and 13.</p> <p>Verify that the value you used for the PRIORITY parameter is within the range of 1 through 13.</p>
73	<p>The BLANKS parameter must be either 0 or 1.</p> <p>Verify that the value you used for the BLANKS parameter is a 0 or 1.</p>
74	<p>The FORMAT parameter must be an integer between 1 and 4.</p> <p>Verify that the value you used for the FORMAT parameter is within the range of 1 through 4.</p>

## TABLES

### Result Codes Returned to a Program

CODE	MESSAGE, MEANING, AND RESPONSE
75	<p>Invalid FLAGS parameter.</p> <p>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.</p>
76	<p>TTSSON.PUB.SYS is missing.</p> <p>The file TTSSON.PUB.SYS has not been installed. It may be that the file was loaded into an incorrect group and account.</p>



# Data Communications Troubleshooting Guide

**REFERENCES**

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Data Communications Concepts, National Cash Register, 1978  
Technical Aspects of Data Communication, J. E. McNamara,  
 Digital Equipment Corporation, 1977  
Guidebook to: DATA COMMUNICATIONS, Hewlett-Packard Company, 1977  
 Troubleshooting short- and long-haul analog lines, David Levin,  
 Netcomm, Inc., Data Communications, November 1981  
 Various Hewlett-Packard HP3000 manuals including:  
 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

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## 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 DTEST,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



## THE BASICS

### 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)

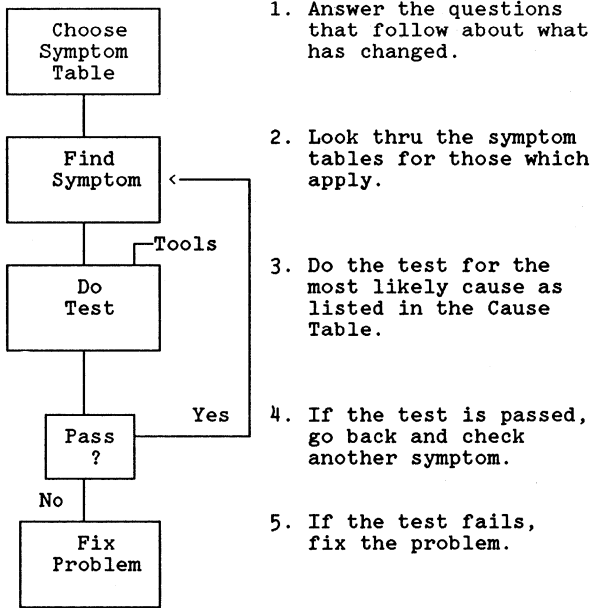
- MPE version
- TERMIO patches level applied
- ATC, ADCC or ATP
- 3-wire (RS-232-C), 5-wire (RS-449), or modem
- Terminal models

### Modems

- Manufacturer
- Model
- Speed
- Synchronous or asynchronous
- Type of phone line or wire
- Communications software

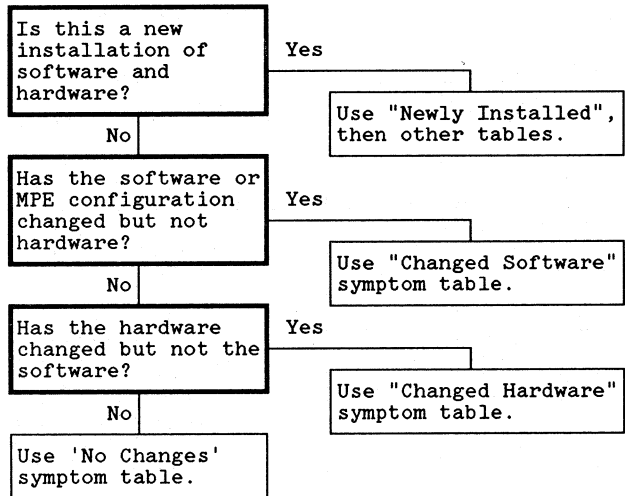
# THE METHOD

## Symptomatic Troubleshooting Flowchart



## THE SYMPTOMS

### Questions to Help Choose a 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.

**THE SYMPTOMS  
Newly Installed**

**Newly Installed  
Symptom Table**

(limited to symptoms encountered prior  
to getting the line open)

MRJE	DSN/MRJE	MTS	DSN/MTS
CS	All subsystems	RJE	DSN/RJE
DS	DSN/DS	TERMIO	Terminal I/O
IMF	DSN/IMF		

SYMPTOM	POSSIBLE CAUSES
DS console locked hung console system failures	software installation bad software installation bad software installation bad
IMF can't connect can't sign on printer problems screens don't work various problems	configuration files configuration files host compatibility screen design error configuration files request aborted by host application wrong, IMF is not a 3270 host configuration
MRJE aborts  host shuts line  line closes	MPE resource problem user written procedure line problem modem problems sign on procedure error host configuration line problems modem problems
MTS can't open line  can't open MPMON CS117	software bad controller problem modem problem MPE resource problem INP switches wrong cable bad MPE configuration

**THE SYMPTOMS  
Newly Installed**

RJE aborts	MPE resource problem
host shuts line	user written procedure
	line problem
	modem problems
	sign on procedure error
	host configuration
host won't take input	line problems
	modem problems
line closes	sign on procedure
	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

## THE SYMPTOMS Changed Software

### Changed Software Symptom Table

(same old hardware)

MRJE DSN/MRJE  
CS All subsystems  
DS DSN/DS  
IMF DSN/IMF

MTS DSN/MTS  
RJE DSN/RJE  
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
	CSERR	154	remote device
	CSERR	156	hardware
	CSERR	157-159	software
	CSERR	158	remote device
	CSERR	201	remote device
	CSERR	203-204	remote device
	CSERR	205-207	operator procedure
	CSERR	207-209	operator procedure
			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

## THE SYMPTOMS Changed Software

<p>IMF can't connect can't sign on printer problems screens don't work various problems</p>	<p>configuration files configuration files host compatibility screen design error configuration files request aborted by host application wrong, IMF is not a 3270 host configuration</p>
<p>MRJE can't open line can't sign on didn't get host number back job management doesn't work</p> <p>MRJE user errors no input taken by host no output only one input or output set printer problems</p>	<p>software installation bad configuration file message modified, can't read job log corrupted didn't get host number back banner messed up configuration file corrupted RMT# changed or wrong new user commands user sign on procedure user sign on procedure host configuration changed out of disc space spooler space problem</p>
<p>MTS can't open line poor response</p>	<p>software installation bad download file bad configuration file error software error MPE buffer size</p>
<p>RJE aborts can't sign on</p>	<p>MPE resource problem user written procedure sign on procedure</p>
<p>TERMIO can only logon at one speed can't change speed hang while running program</p> <p>remote spooled printer problems SF 700,701,705,706 SF 708</p>	<p>MPE configuration MPE configuration program busy program changed terminal config. MPE configuration MPE configuration software installation bad configuration bad</p>

**THE SYMPTOMS  
Changed Hardware**

**Changed Hardware  
Symptom Table**

(same software and configuration)

MRJE	DSN/MRJE	MTS	DSN/MTS
CS	All subsystems	RJE	DSN/RJE
DS	DSN/DS	TERMIO	Terminal I/O
IMF	DSN/IMF		

SYMPTOM	POSSIBLE CAUSES
CS CSERR 84 through 109 CSERR 101-105 CSERR 117 CSERR 154 CSERR 207-209 CSERR 212-214 CSERR 217	hardware hardware hardware hardware hardware hardware hardware
DS line closes  poor response REMOTE HELLO fails remote system shuts line system failures	modem problems line problems didn't change configuration line problems line problems configuration
IMF CSERR 117 host shuts line poor response	hardware problem hardware problem MPE configuration error
MRJE can't open line can't sign on didn't get host number back host shuts line line closes poor response	hardware problem host configuration changed hardware problem line problems line problems line problems
MTS all but one remote drop is dead  can't logon can't open line  commands don't work poor response	line problem terminal problem modem problem terminal switches/configuration terminal switches/configuration controller problem modem problem terminal switches/configuration hardware problem line overloaded



## THE SYMPTOMS Changed Hardware

<p>RJE can't open line</p> <p>    can't sign on</p> <p>    host shuts line</p> <p>    line closes</p> <p>    no output</p> <p>    poor response</p> <p>TERMIO</p> <p>    can only logon at one speed</p> <p>    can't change speed</p> <p>    can't logon</p> <p>    hardwired worked, but         modem won't work the same</p> <p>    remote spooled printer         problems</p> <p>    SF 208 (HP-IB only)</p> <p>    SF 209</p> <p>    SF 211</p> <p>    SF 709,715</p> <p>    SF 708,710</p> <p>    SF 714-716</p>	<p>controller problems</p> <p>modem problems</p> <p>host configuration</p> <p>modem problems</p> <p>modem problems</p> <p>line problems</p> <p>host configuration</p> <p>line problems</p> <p>modem problems</p> <p>line problems</p> <p>line problems</p> <p>terminal switches/configuration</p> <p>MPE configuration</p> <p>MPE configuration</p> <p>port hung</p> <p>port DOWNed, REFUSED</p> <p>terminal switches/configuration</p> <p>port configured wrong</p> <p>modem problems</p> <p>line problems</p> <p>cable bad</p> <p>modem problems</p> <p>line problems</p> <p>MPE configuration</p> <p>printer switches</p> <p>noisy modems or lines</p> <p>using last port on main with modems</p> <p>noisy modems or lines</p> <p>ADCC hardware problem</p> <p>software bad</p> <p>configuration bad</p> <p>hardware problem</p>
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**THE SYMPTOMS**  
**No Changes**

**No Changes**  
**Symptom Table**

MRJE	DSN/MRJE	MTS	DSN/MTS
CS	All subsystems	RJE	DSN/RJE
DS	DSN/DS	TERMIO	Terminal I/O
IMF	DSN/IMF		

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

**THE SYMPTOMS**  
**No Changes**

<p>DS console locked</p> <p>DSLIN fails</p> <p>DSCOPY aborts</p> <p>DSCOPY fails</p> <p>hung session, can't abort</p> <p>line closes</p> <p>NFT errors 101-110</p> <p>poor response</p> <p>REMOTE command fails</p> <p>remote system shuts line</p> <p>system failures</p> <p>transfer only one way</p> <p>IMF can't connect</p> <p>can't sign on</p> <p>CS errors</p> <p>CSERR 117</p> <p>host shuts line</p> <p>IMF errors</p> <p>line closes</p> <p>poor response</p> <p>printer problems</p> <p>system failures</p>	<p>terminal problem</p> <p>MPE problem, not DS</p> <p>line not open</p> <p>line open one way</p> <p>line errors</p> <p>user error</p> <p>wrong file type</p> <p>copy in wrong direction</p> <p>user errors</p> <p>PTOP program logic</p> <p>subsystem problem</p> <p>application program problem</p> <p>line errors</p> <p>resource errors</p> <p>internal software errors</p> <p>line errors</p> <p>user errors</p> <p>MPE problems</p> <p>lack of psuedo-devices</p> <p>line problems</p> <p>hardware failure</p> <p>software problems</p> <p>missing patches or fixes</p> <p>remote configuration problem</p> <p>line problems</p> <p>configuration file</p> <p>other problems</p>
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**THE SYMPTOMS**  
**No Changes**

MRJE

can't get into console mode  
can't sign on

didn't get host number back

host shuts line  
job management doesn't work

line closes

MRJE console operator errors  
MRJE user errors  
no input taken by host  
no output

only one input or output set  
poor response

printer problems

someone else has console  
host configuration changed  
user signon procedure  
configuration file  
message modified, can't read  
hardware problem  
line problems  
job log corrupted  
didn't get host number back  
banner messed up  
configuration file corrupted  
RMT# changed or wrong  
line problems  
host operator shut line  
file system problems  
user error  
user sign on procedure  
user sign on procedure  
host went down  
devices not open  
user command error  
host configuration changed  
line problems  
systems busy  
out of disc space  
file equation error  
out of file space  
spooler space problem  
operator inhibited printouts  
printer not ready

**THE SYMPTOMS  
No Changes**

<p>ITS all but one remote dead is dead</p> <p>can't logon</p> <p>can't open line</p> <p>commands don't work</p> <p>dead terminals, no response</p> <p>hung terminals</p> <p>line shuts</p> <p>no polling on any terminals no polling on some terminals</p> <p>polling, no prompts</p> <p>polling, some prompts poor response</p> <p>read errors write errors</p>	<p>line problem group DOWNed terminal problem modem problem terminal switches/configuration terminal switches/configuration user error MPE resource problem software installation bad download file bad modem problem controller problem terminal switches/configuration user error line not open line problem modem problem terminal switches/configuration program problem line problems modem problems line not OPENned terminals DOWNed line problems modem problems terminal switches/configuration MPE resource problem system busy some terminals DOWNed configuration file error line overloaded software error terminal switches/configuration modem problems MPE buffer size line problem line problem</p>
--	--

## THE SYMPTOMS

RJE aborts	MPE resource problem
can't sign on	user written procedure
	sign on procedure
	host configuration
host shuts line	line problems
	line problems
	modem problems
	sign on procedure error
line closes	host configuration
	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
session logged off	user procedure wrong
	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	modem problems
worked	line problems
	cable bad
remote spooled printer	modem problems
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

## THE CAUSES

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, CSSBSCO, 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 restores 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
application program problem	run ADCC diagnostic
application wrong	check program
ATP problems	IMF is not exactly a 3270
banner messed up	run ATPDSM
BYE in UDC	check banner & configuration file
cable bad	examine UDC files
configuration	check cable part number
configuration file	check cable continuity
configuration file corrupted	check configuration
configuration file error	check configuration file
controller problem	check configuration file
copy in wrong direction	restore configuration file
devices not open	check configuration file
didn't change configuration	run DSM
didn't get host number back	check user procedures for
download file bad	attempts to copy wrong way
DSMON bad	check remote operator procedure
file equation error	check configuration to be sure
file system problems	all changes were made
group DOWNed	check host configuration
hardware	restore from tape
hardware failure	check version
hardware problem	check user procedures
host busy	check file error code
host compatibility	check console log
host configuration	run DSM
host configuration changed	run modem selftest
host not sending data	run terminal selftest
host operator shut line	run hardware diagnostics
host went down	run hardware diagnostics
HP3000 busy	retry later
improper installation	check host specifications
	check configuration
	check changes in configuration
	check host configuration for
	when host sends or terminates
	check remote operator procedure
	call host operator
	try again later
	check versions numbers
	reinstall software



## THE CAUSES

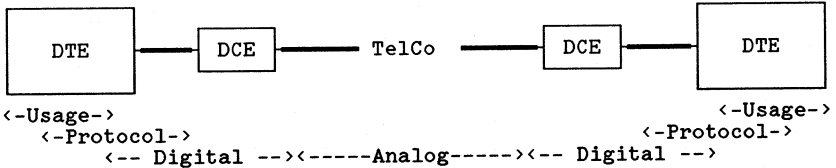
INP switches	check switches for correct setting
internal software errors	check SSB
job log corrupted	reinstall or coldload software
lack of psuedo-devices	check job log
line not OPENned	clean out job log
line not open	check configuration
line open one way	add more devices
line overloaded	check operator procedure
line problem	check operator procedure
message modified, can't read	check remote operator procedure
missing patches or fixes	check line traffic to speed ration
modem problem	run modem diagnostics
MPE buffer size	run terminal data comm tests
MPE configuration	run DSM loopbacks
MPE configuration error	run MPTEST over lines
MPE problem, not DS	check host specifications
MPE problem	check patch list in SYS
MPE resource problem	run modem diagnostic
MPE resource problem (TBUFS)	run terminal data comm test
new user commands	run DSM loopbacks
noisy lines	run MPTEST over lines
noisy modems	check configuration
operator aborted session	check configuration
operator inhibited printouts	check SSB
operator procedure	check SSB
out of disc space	check configuration
out of file space	check user procedure
port DOWNed, REFUSEd	run modem selftests
port configured wrong	run modem remote tests
port hung	run modem selftests
printer not ready	run modem remote tests
printer status not checked	check operator console log
printer switches	do :SHOWOUT SP at console
program busy	check operator procedure
program changed terminal	run FREE2
configuration	do :LISTF,2 and run LISTEQ2
program problem	do SHOWDEV
program not compatible	check configuration
with new MPE	run TABLE
	check printer
	check program
	check printer switches
	wait program to complete I/O, then
	check for hung terminal causes
	check terminal switches/config.
	check program
	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
subsystem 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

## THE TESTS

### Data Communications Tests



#### 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

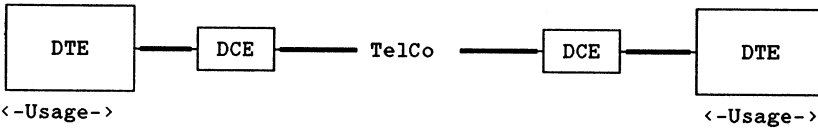
Each of these test can be used to check out possible causes. Most of them can be done with software diagnostics available on the HP3000. Some require very specialized equipment that is generally used by TelCo personnel. Different tests are performed by a different set of tools.

## THE TOOLS

### Usage 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.



#### 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 opened
DFAN4	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

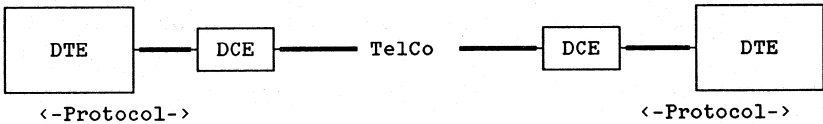
EDITOR	Will display job files and logs
SSB	Contains known problem information

# THE TOOLS

## Protocol Tools

### 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.



Check software versions  
HP1640 Data Analyzer  
CSDUMP  
DSTEST,DIAG

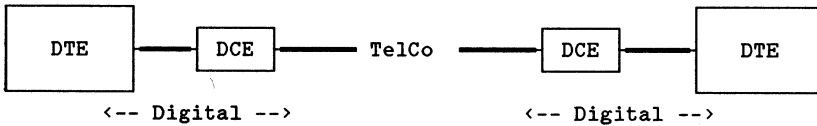
Verifies what protocol is being used  
Displays protocol sequences  
Traces what protocol is being used  
Tests the DS protocol

# THE TOOLS

## Digital Tools

### 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.



#### 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
INPDFAN	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

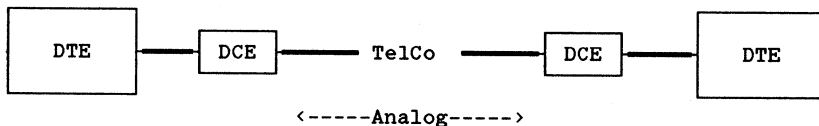
ADCC diagnostic	ADCC hardware
ATC diagnostic	ATC hardware
ATPDSM	ATP hardware
DSM	INP hardware
IOMAP	HP3000 HP-IB system hardware
SLEUTH	HP3000 Series II/III hardware
SSLC diagnostic	SSLC hardware
Data Link Tester	Shows the status of signals on the DATA LINK

## THE TOOLS

### Analog Tools

### 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.



#### Analog TelCo line tests

##### Noise and Loss

BERT (HP1645)

MPTEST

DSM Offboard

Modem remote test

Terminal driver mode

TIMS (HP4943,4935)

Terminal data comm

loopback

Test of TelCo line and modems

Extended test of TelCo line

Extended test of TelCo line

Pass/fail test of TelCo line

Extended test of TelCo line

Many extended tests of TelCo  
line quality

Pass/fail test of TelCo line



## TOOL DESCRIPTIONS

### 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

## TOOL DESCRIPTIONS

### 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 HANDBOOK, 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

## TOOL DESCRIPTIONS

### 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 configuration file
- Find it as :IMFMGR
- Documented in the IMP MANUAL

## TOOL DESCRIPTIONS

### 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



## TOOL DESCRIPTIONS

### 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

## TOOL DESCRIPTIONS

### 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

## TOOL DESCRIPTIONS

### 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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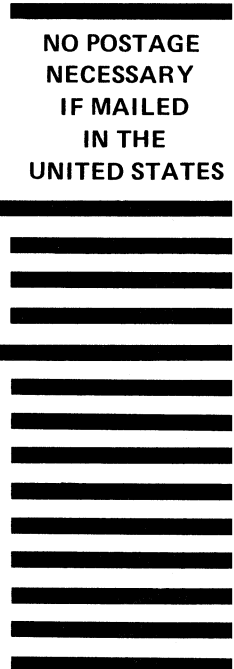
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