



Haliplex
Communication Systems

**HPX-1600
USER GUIDE**

**Chapter 2-3:
HPX-IM-1633
MPS IM**

TABLE OF CONTENTS

1. GENERAL CHARACTERISTICS 1

2. MPS INTERFACE 2

 2.1. V.35 INTERFACE 2

 2.2. V.24 INTERFACE 2

 2.3. X.21 INTERFACE 2

 2.4. RS-530/RS-530A INTERFACE..... 3

DATA RATES 4

 2.5. V.35/X.21/RS-530/RS-530A DATA RATES..... 4

 2.6. V.24 DATA RATES..... 4

3. IM CONFIGURATION 5

 3.1. INTERFACE PARAMETERS..... 5

 3.1.1. CIRCUIT TIMING..... 5

 3.1.2. MODE & RATE 6

 3.2. PERFORMANCE PARAMETERS 6

 3.3. TESTING PARAMETERS 7

4. IM TESTING 8

5. IM ALARMS 8

 5.1. X.21 IM ALARMS..... 8

 5.1.1. DCE MODE..... 8

 5.1.2. DTE MODE 9

 5.2. V.24/V.35/RS-530/RS-530A IM ALARMS 9

 5.2.1. DCE MODE..... 9

 5.2.2. DTE MODE 10

6. IM INDICATORS 11

7. MPS CABLES 12

 7.1. SERIAL V.24..... 12

7.2. SERIAL V.35..... 13

7.3. SERIAL X.21..... 14

7.4. RS-530..... 15

8. INTERFACE SPECIFICATIONS..... 16

9. INTERNATIONAL COMPLIANCES 17

9.1. ELECTROMAGNETIC COMPATIBILITY (EMC) 18

9.2. SAFETY 18

9.3. IMMUNITY 18

9.4. PERFORMANCE 18

TABLE OF FIGURES

FIGURE 1 – MPS IM VHDCI CONNECTOR	1
FIGURE 2: MPS IM	1
FIGURE 3 – V.35 INTERFACE	2
FIGURE 4 – V.24 INTERFACE	2
FIGURE 5 – X.21 INTERFACE	2
FIGURE 6 – RS-530/RS530A INTERFACE.....	3
FIGURE 7 – MPS IM CONFIGURATION DIALOG INTERFACE TAB	5
FIGURE 8 – MODE & RATE DROP DOWN BOX	6
FIGURE 9 – MPS IM CONFIGURATION DIALOG PERFORMANCE TAB.....	6
FIGURE 10 – MPS IM CONFIGURATION DIALOG TESTING TAB	7
FIGURE 11 – MPS IM LOOPBACK OPTIONS.....	8
FIGURE 12 – MPS IM ALARM MONITOR SETUP WINDOW – DCE X.21 MODE	8
FIGURE 13 – MPS IM ALARM MONITOR SETUP WINDOW – DTE X.21 MODE.....	9
FIGURE 14 – MPS IM ALARM MONITOR SETUP WINDOW – DCE V.24/V.35 MODES.....	9
FIGURE 15 – MPS IM ALARM MONITOR SETUP WINDOW – DTE V.24/V.35/RS-530/RS-530A MODES	10
FIGURE 16 – DB25 FEMALE	12
FIGURE 17 – DB15 X.21 FEMALE	14
FIGURE 18 – WINCHESTER M34 (V.35 FEMALE)	14

LIST OF TABLES

TABLE 1 – SUBRATES SUPPORTED BY V.35 (KBIT/S).....	4
TABLE 2 – SUBRATES SUPPORTED BY X.21 (KBIT/S).....	4
TABLE 3 – SUBRATES SUPPORTED BY RS-530/RS-530A (KBIT/S)	4
TABLE 4 – DATA RATES SUPPORTED IN V.24 MODE (KBIT/S).....	4
TABLE 5 – MPS LED INTERPRETATIONS	11
TABLE 6 – SERIAL V.24 CABLE	12
TABLE 7 – SERIAL V.35 CABLE	13

TABLE 8 – SERIAL X.21 CABLE	14
TABLE 9 – SERIAL X.21 CABLE	15
TABLE 10 – INTERFACE SPECIFICATIONS	16

1. GENERAL CHARACTERISTICS

The Multi-Protocol Serial (MPS) Interface Module (IM) is a data interface card which accepts five standards; X.21, V.24, V.35, RS-530 and RS-530A. The IM interface is a 2 port VHDCI connector (refer to Figure 1) that accepts a V.24/X.21/V.35/RS-530 and RS-530A cable carrying data rates of $n \times 64\text{kb/s}$ per channel and sub-rates. V.24 operates in synchronous or asynchronous modes.

The interface type and various other parameters are configured in software.



Figure 2: MPS IM



Figure 1 – MPS IM VHDCI connector

2. MPS INTERFACE

Different cables are required for each of the three standards, X.21, V.24, V.35, RS-530 and RS-530A. Detailed tables of pin assignments for each cable are found in Section 5, Appendix A: Haliplex cables. A summary of each cable type is included below.

2.1. V.35 INTERFACE

There are two types of cables to connect V.35 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two M34 (Winchester), V.35 connectors.

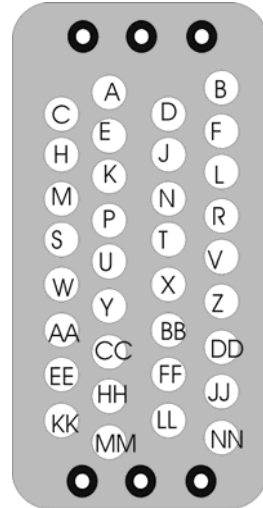


Figure 3 – V.35 Interface

2.2. V.24 INTERFACE

There are two types of cables to connect V.24 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two DB25, V.24 connectors.

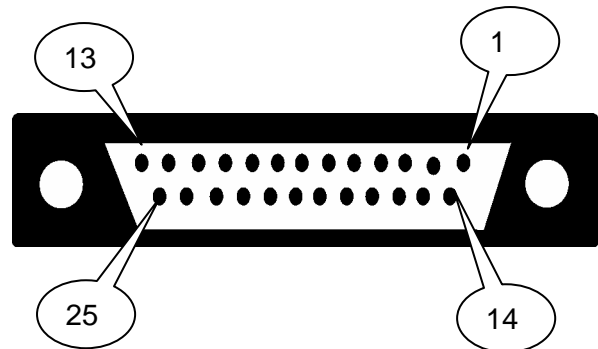
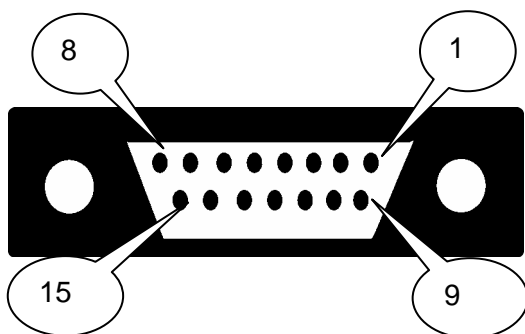


Figure 4 – V.24 Interface

2.3. X.21 INTERFACE



There are two types of cables to connect X.21 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two DB15, X.21 connectors.

Figure 5 – X.21 Interface

2.4. RS-530/RS-530A INTERFACE

There are two types of cables to connect RS-530 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two DB25, RS-530 and RS-530A connectors.

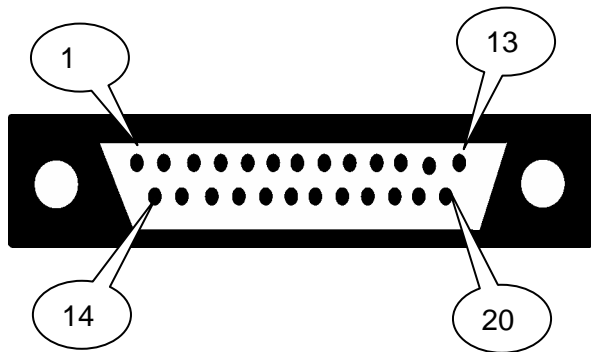


Figure 6 – RS-530/RS530A Interface

DATA RATES

2.5. V.35/X.21/RS-530/RS-530A DATA RATES

In V35/X.21/RS-530/RS-530A mode, the MPS IM is able to support the synchronous data rates Nx64 kbit/s, where N equals 1 to 32. Subrates of Nx64 are also supported and are shown below in Table 1, Table 2 and Table 3.

V.35							48	56
Sync	64	128	192	256	320	384	448	512
	576	640	704	768	832	896	960	1024
	1088	1152	1216	1280	1344	1408	1472	1536
	1600	1664	1728	1792	1856	1920	1984	2048

Table 1 – Subrates supported by V.35 (Kbit/s)

X.21							48	56
Sync	64	128	192	256	320	384	448	512
	576	640	704	768	832	896	960	1024
	1088	1152	1216	1280	1344	1408	1472	1536
	1600	1664	1728	1792	1856	1920	1984	2048

Table 2 – Subrates supported by X.21 (Kbit/s)

RS-530 RS-530A							48	56
Sync	64	128	192	256	320	384	448	512
	576	640	704	768	832	896	960	1024
	1088	1152	1216	1280	1344	1408	1472	1536
	1600	1664	1728	1792	1856	1920	1984	2048

Table 3 – Subrates supported by RS-530/RS-530A (Kbit/s)

The combined bandwidth of 30x64 kbit/s is shared between the two circuits provided by the IM.

2.6. V.24 DATA RATES

In V.24 mode, the IM is able to support the data rates shown below in Table 4. The data rates supported depend on whether the IM is in synchronous or asynchronous mode.

Sync	1.2	2.4	4.8	9.6	19.2	38.4	48	56	64	128
Async	1.2	2.4	4.8	9.6	19.2	38.4				

Table 4 – Data rates supported in V.24 mode (Kbit/s)

3. IM CONFIGURATION

3.1. INTERFACE PARAMETERS

The Interface parameters managed are;

- Interface Type X.21, V.35, V.24, RS-530, RS-530-A OFF (to save power)
- Data Rate Nx64KBps up to 2048 KBps. The data rates available depend on the selected interface type
- Sync/Async Note that only synchronous mode is available with the X.21, V.35, RS-530 and RS-530A Interface
- Operation mode: DCE or DTE*
- Data Inversion Selected generally for long cable lengths and high speed serial connections
- Clock Inversion
- Available Bandwidth To have a data rate greater than 1 on channel B of the MPS IM, 2xDS1 must be selected

*Note: In DTE mode the MPS generates external clock. In DTE mode, the connected device must synchronise to the MPS by using this external clock signal. The MPS cannot be synchronised to an external clock generated by DCE. Refer to Chapter 4.3: MPS DCE/DTE Clocking, for details.

3.1.1. CIRCUIT TIMING

Circuit timing configuration buttons are enabled if the MPS circuit is mapped asynchronously. Asynchronous operation means that the MPS signal is timed from the external interfaces and is independent from the Haliplex SDH and PDH network clocks. The MPS circuit across the PDH or SDH/SONET network must be synchronised end-to-end. The “master” MPS interface is set to the internal clock that is generated for the local MPS serial interface. The remote MPS IM is set to recover this clock from the wide area network side of the MPS circuit using “loop timing”.

- Set the “Master” MPS IM interface to **Internal**
- Set the “Remote” MPS IM interface to **Loop**

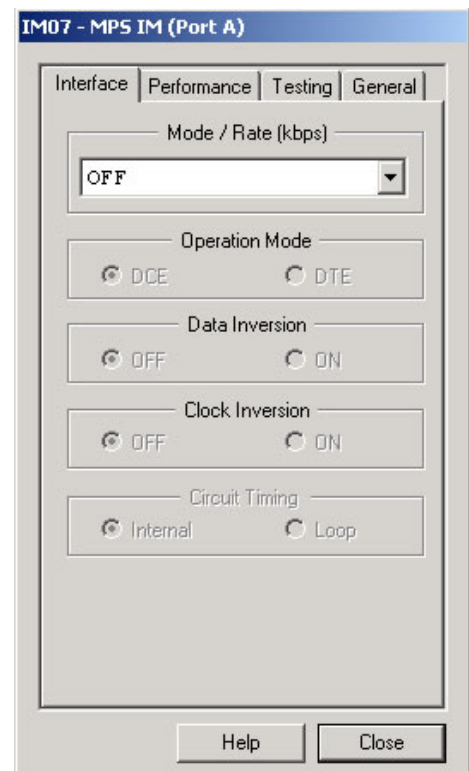


Figure 7 – MPS IM Configuration Dialog Interface Tab

3.1.2. MODE & RATE

The Mode & Rate drop down box allows the user to select the mode (X.21/V.24/V.35/RS-530/RS-530A) and the data rate of the channel.

For X.21, V.35, RS-530 or RS-530A modes, the user may select a data rate of Nx64KBps up to 2048 KBps.

For V.24 mode, the user may select data rates up to 128KBps. They may select their data rate in synchronous or asynchronous (Async) mode.

The Mode & Rate drop down box is shown in Figure 8.

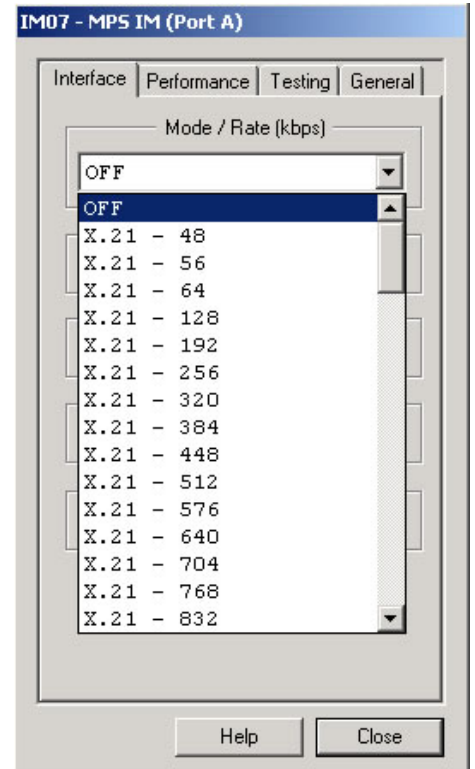


Figure 8 – Mode & Rate drop down box

3.2. PERFORMANCE PARAMETERS

There are no performance parameters currently available.

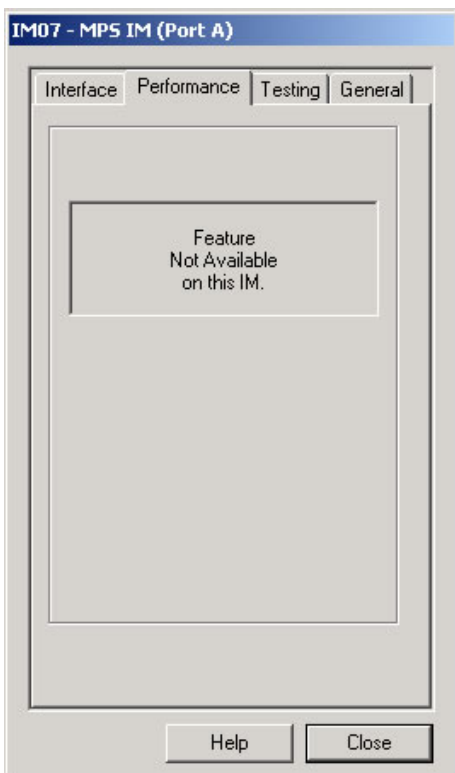


Figure 9 – MPS IM Configuration Dialog Performance Tab

3.3. TESTING PARAMETERS

This screen allows the user to select LIU loopback mode for testing purposes.

For more information on available loopback options, refer to section 5.

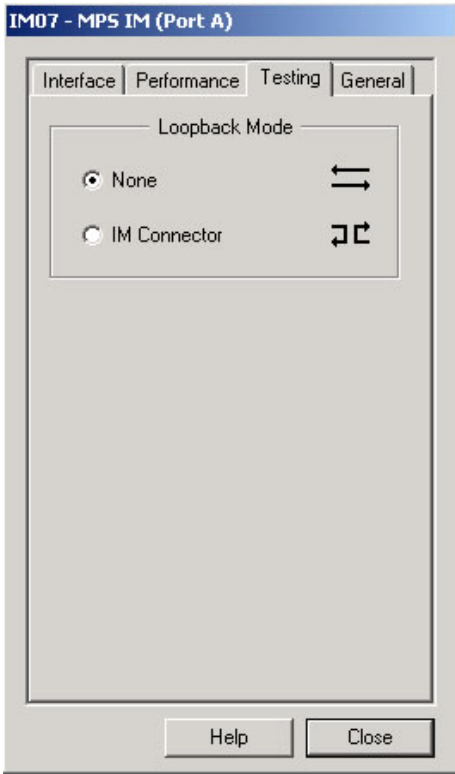


Figure 10 – MPS IM Configuration Dialog Testing Tab

4. IM TESTING

The MPS IM has no loopback selected as the default setting for normal IM operation. However, for testing purposes, LIU loopback may be selected. LIU loopback is a general loopback, and can be used for most tests. Data from the network is looped back to the network and data from the connector is looped back to the connector. This is shown below in Figure 11.

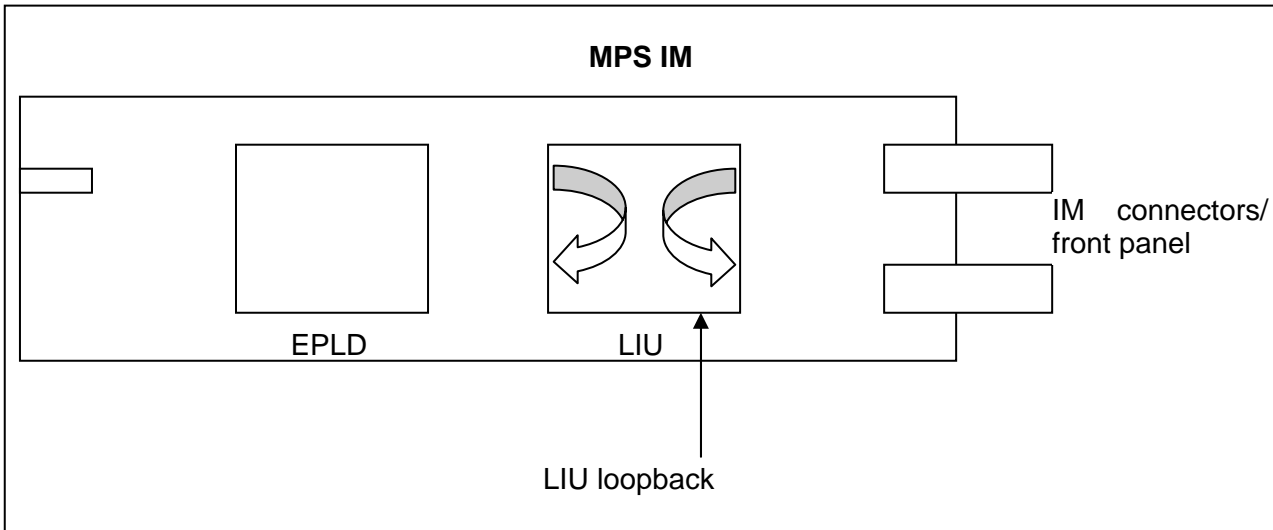


Figure 11 – MPS IM Loopback options

5. IM ALARMS

The user can select which conditions raise a Red or Yellow node alarm. The alarms available on the MPS IM differ according to which interface is being used.

5.1. X.21 IM ALARMS

The X.21 has different alarms for modes DCE and DTE.

5.1.1. DCE MODE

If the IM, in DCE mode, is set for X.21 mode, the following alarm is available;

- Control signal not present.

The alarm is controlled by the DTE to indicate to the DCE the meaning of the data sent on the transmit circuit.

Refer to Figure 12 for the IM monitor setup window in X.21 mode.

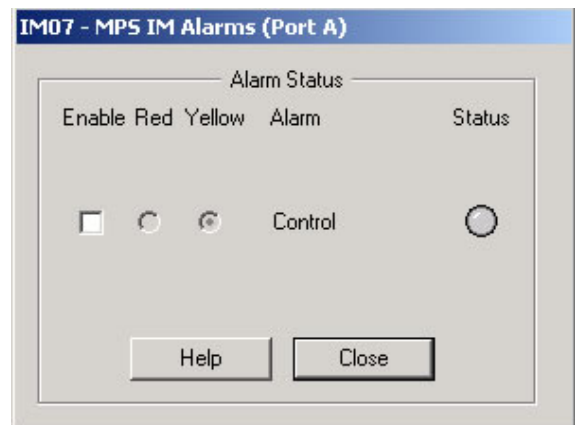


Figure 12 – MPS IM Alarm Monitor Setup Window – DCE X.21 mode

5.1.2. DTE MODE

If the IM, in DTE mode, is set for X.21 mode, the following alarm is available;

- Indication signal not present

This alarm refers to the DCE control of this circuit to indicate to the DTE the type of data sent on the Receive line.

Refer to Figure 12 for the IM monitor setup window in X.21 mode.

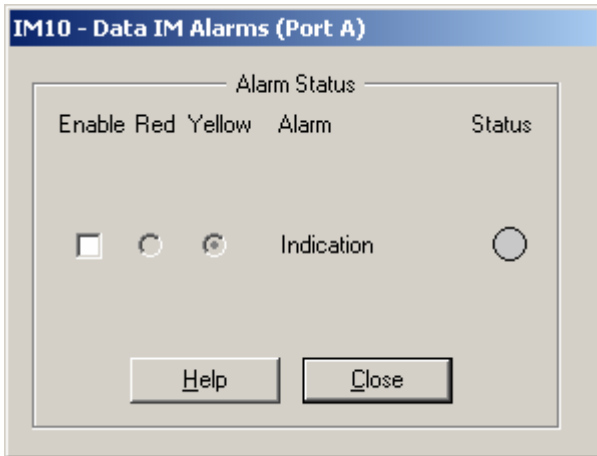


Figure 13 – MPS IM Alarm Monitor Setup Window – DTE X.21 mode

5.2. V.24/V.35/RS-530/RS-530A IM ALARMS

5.2.1. DCE MODE

If the IM is set for V.24, V.35, RS-530 or RS-530A mode, in DCE mode, the following alarms are available;

- DTR not present (Data Terminal Ready)
- RTS not present (Request to Send)

Data Terminal Ready. A control signal sent from the DTE to the modem, usually telling the modem that it is ready to transmit data.

Request To Send. The DTE tells the node it wants to send information to the other DTE.

Refer to Figure 14 for the IM alarm monitor setup window in V.24/V.35/RS-530/RS-530A mode.

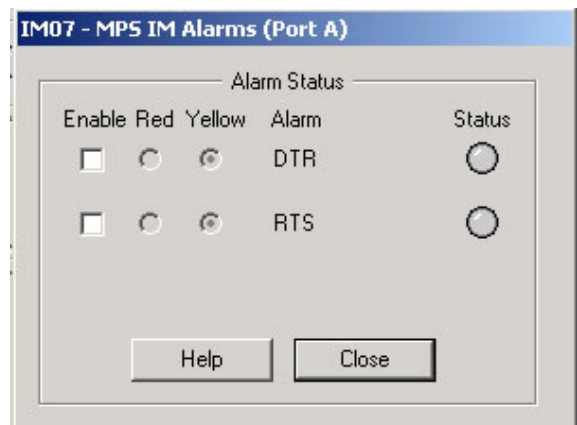


Figure 14 – MPS IM Alarm Monitor Setup Window – DCE V.24/V.35 modes

5.2.2. DTE MODE

If the IM is set for V.24, V.35, RS-530 or RS-530A mode, in DTE mode, the following alarms are available;

- DSR not present (Data Set Ready)
- CTS not present (Clear to Send)
- RLSD not present (Receive Line Signal Detect) (also known as DCD – Data Carrier Defect)

Data Set Ready. This indicates that the node is on, and ready to accept input from the DTE.

Clear To Send. A control signal from the node indicating to the DTE that it may begin data transmission.

Recieve Line Signal Detect. Indicates to the DTE that the node is receiving a valid carrier signal from a remote node.

Refer to Figure 15 for the IM alarm monitor setup window in V.24/V.35/RS-530/RS-530A mode.

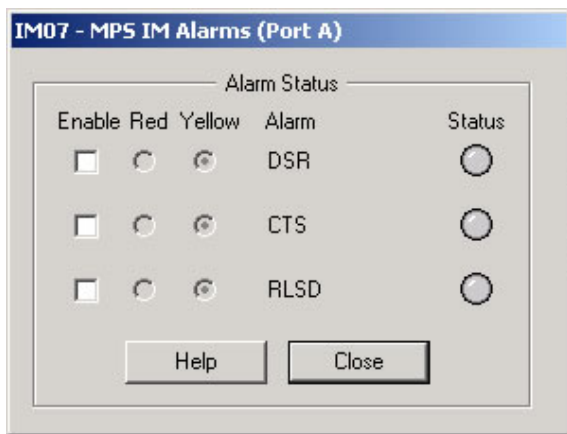


Figure 15 – MPS IM Alarm Monitor Setup Window – DTE V.24/V.35/RS-530/RS-530A modes

6. IM INDICATORS

The MPS IM LEDs indicate the state of the IM software load and the data communications state of each port. There are two LEDs, one for each port.

Table 5 below shows the LED interpretations for the MPS IM.

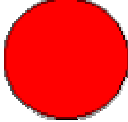
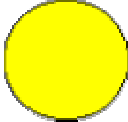
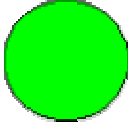
	<p>Red LED CPE is "not ready" i.e. DTR inactive.</p>
	<p>Yellow LED - indicates that the IM firmware has loaded, but configuration files have not. This usually occurs too fast to see, but if on for a period of time may indicate that there is a problem with the load of the configuration files.</p>
	<p>Green LED - flashes at a rate relative to the configure data clock rate. Indicates that the port is ready. Data transmission may or may not be active.</p>

Table 5 – MPS LED Interpretations

7. MPS CABLES

7.1. SERIAL V.24

There are two types of cables to connect V.24 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two DB25, V.24 connectors.

HPX-1600 Cable 004 DCE Mode					HPX-1600 Cable 005 DTE Mode				
P1	P2	P3			P1	P2	P3		
50pin VHDCI male	DB25 female	DB25 female	Circuit Abrev.	ITU-T	50pin VHDCI male	DB25 male	DB25 male	Circuit Abrev.	ITU-T
1	2		BA, TXD	103	1	3		BB, RXD	104
3	3		BB, RXD	104	3	2		BA, TXD	103
5	24		DA, SCTE	113	5	17		DD, RXC	115
7	17		DD, RXC	115	7	24		DA, SCTE	113
9	15		DB, TXC	114	9	15		DB, TXC	114
11	5		CB, CTS	106	11	4		CA, RTS	105
13	4		CA, RTS	105	13	5		CB, CTS	106
15	20		CD, DTR	108.2	15	6		CC, DSR	107
17	6		CC, DSR	107	17	20		CD, DTR	108.2
19	8		CFC, DCD	109	19	8		CFC, DCD	109
21	18		LL, LL		21	18		LL, LL	
22	21		RL, RL		23	21		RL, RL	
25	7		AB, GND	102	25	7		AB, GND	102
26		3	BB, RXD	104	26		2	BA, TXD	103
27		2	BA, TXD	103	27		3	BB, RXD	104
30		17	DD, RXC	115	30		24	DA, SCTE	113
31		24	DA, SCTE	113	31		17	DD, RXC	115
34		15	DB, TXC	114	34		15	DB, TXC	114
35		5	CB, CTS	106	35		4	CA, RTS	105
38		4	CA, RTS	105	38		5	CB, CTS	106
39		6	CC, DSR	107	39		20	CD, DTR	108.2
42		20	CD, DTR	108.2	42		6	CC, DSR	107
43		8	CFC, DCD	109	43		8	CFC, DCD	109
46		18	LL, LL		46		18	LL, LL	
48		21	RL, RL		47		21	RL, RL	
50		7	AB, GND	102	50		7	AB, GND	102

Table 6 – Serial V.24 Cable

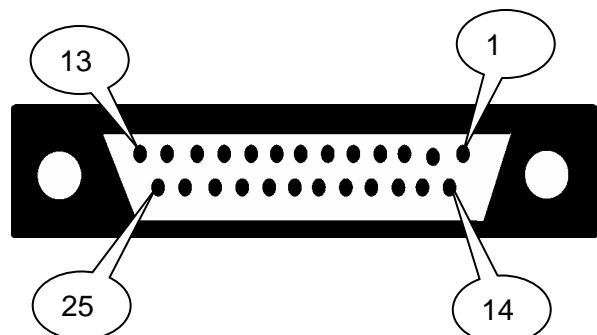


Figure 16 – DB25 Female

7.2. SERIAL V.35

There are two types of cables to connect V.35 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two M34(Winchester), V.35 connectors.

HPX-1600 Cable 002 DCE Mode				
P1	P2	P3		
50pin VHDCI male	M34 female	M34 female	CCITT#	Circuit Name
1	P		103	TXD
2	S		103	TXD
3	R		104	RXD
4	T		104	RXD
5	U		113	TTC
6	W		113	TTC
7	V		115	RXC
8	X		115	RXC
9	Y		114	TXC
10	AA		114	TXC
11	D		106	CTS
13	C		105	RTS
15	H		108	DTR
17	E		107	DSR
19	F		109	RLSD
21	L		141	LL
22	N		140	RL
23	NN		142	TM
25	B		102	GND
26		R	104	RXD
27		P	103	TXD
28		T	104	RXD
29		S	103	TXD
30		V	115	RXC
31		U	113	TTC
32		X	115	RXC
33		W	113	TTC
34		Y	114	TXC
35		D	106	CTS
36		AA	114	TXC
38		C	105	RTS
39		E	107	DSR
42		H	108	DTR
43		F	109	RLSD
46		L	141	LL
47		NN	142	TM
48		N	140	RL
50		B	102	GND

HPX-1600 Cable 003 DTE Mode				
P1	P2	P3		
50pin VHDCI male	M34 male	M34 male	CCITT#	Circuit Name
1	R		104	RXD
2	T		104	RXD
3	P		103	TXD
4	S		103	TXD
5	V		115	RXC
6	X		115	RXC
7	U		113	TTC
8	W		113	TTC
9	Y		114	TXC
10	AA		114	TXC
11	C		105	RTS
13	D		106	CTS
15	E		107	DSR
17	H		108	DTR
19	F		109	RLSD
21	L		141	LL
22	NN		142	TM
23	N		140	RL
25	B		102	GND
26		P	103	TXD
27		R	104	RXD
28		S	103	TXD
29		T	104	RXD
30		U	113	TTC
31		V	115	RXC
32		W	113	TTC
33		X	115	RXC
34		Y	114	TXC
35		C	105	RTS
36		AA	114	TXC
38		D	106	CTS
39		H	108	DTR
42		E	107	DSR
43		F	109	RLSD
46		L	141	LL
47		N	140	RL
48		NN	142	TM
50		B	102	GND

Table 7 – Serial V.35 Cable

7.3. SERIAL X.21

There are two types of cables to connect X.21 devices to the MPS IM, one for DTE and the other for DCE mode of operation. Each cable connects to the IM 50pin VHDCI and provides two DB15, X.21 connectors.

HPX-1600 Cable 000 DCE Mode			
P1	P2	P3	Circuit name
50pin VHDCI male	DB15 female	DB15 female	
1	2		T(A) ↓
2	9		T(B) ↓
3	4		R(A) ↓
4	11		R(B) ↓
5	7		X(A) ↓
6	14		X(B) ↓
7	6		S(A) ↓
8	13		S(B) ↓
11	5		I(A) ↓
12	12		I(B) ↓
13	3		C(A) ↓
14	10		C(B) ↓
25	8		G
26		4	R(A) ↑
27		2	T(A) ↑ ↓
28		11	R(B) ↑ ↓
29		9	T(B) ↑ ↓
30		6	S(A) ↑ ↓
31		7	X(A) ↑ ↓
32		13	S(B) ↑ ↓
33		14	X(B) ↑ ↓
35		5	I(A) ↑ ↓
37		12	I(B) ↑ ↓
38		3	C(A) ↑ ↓
40		10	C(B) ↑ ↓
50		8	G

HPX-1600 Cable 001 DTE Mode			
P1	P2	P3	Circuit name
50pin VHDCI male	DB15 male	DB15 male	
1	4		R(A) ↓
2	11		R(B) ↓
3	2		T(A) ↓
4	9		T(B) ↓
5	6		S(A) ↓
6	13		S(B) ↓
7	7		X(A) ↓
8	14		X(B) ↓
11	3		C(A) ↓
12	10		C(B) ↓
13	5		I(A) ↓
14	12		I(B) ↓
25	8		G
26		2	T(A) ↑ ↓
27		4	R(A) ↑ ↓
28		9	T(B) ↑ ↓
29		11	R(B) ↑ ↓
30		7	X(A) ↑ ↓
31		6	S(A) ↑ ↓
32		14	X(B) ↑ ↓
33		13	S(B) ↑ ↓
35		3	C(A) ↑ ↓
37		10	C(B) ↑ ↓
38		5	I(A) ↑ ↓
40		12	I(B) ↑ ↓
50		8	G

Table 8 – Serial X.21 Cable

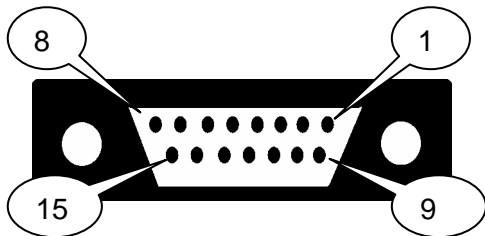


Figure 17 – DB15 X.21 Female

Figure 18 – Winchester M34 (V.35 Female)



7.4. RS-530

HPX-CAB-RS530-DCE			
P1	"A" port	"B" port	
50pin VHDCI	DB25 female	DB25 female	Circuit Abbrev.
1	2		BA(A), TXD
2	14		BA(B), TXD
3	3		BB(A), RXD
4	16		BB(B), RXD
5	24		DA(A), SCTE
6	11		DA(B), SCTE
7	17		DD(A), RXC
8	9		DD(B), RXC
9	15		DB(A), TXC
10	12		DB(B), TXC
11	5		CB(A), CTS
12	13		CB(B), CTS
13	4		CA(A), RTS
14	19		CA(B), RTS
15	20		CD(A), DTR
16	23		CD(B), DTR
17	6		CC(A), DSR
18	22		CC(B), DSR
19	8		CF(A), DCD
20	10		CF(A), DCD
21	18		LL, LL
22	21		RL, RL
25	7		AB, GND
26		3	BB(A), RXD
28		16	BB(B), RXD
27		2	BA(A), TXD
29		14	BA(B), TXD
30		17	DD(A), RXC
32		9	DD(B), RXC
31		24	DA(A), SCTE
33		11	DA(B), SCTE
34		15	DB(A), TXC
36		12	DB(B), TXC
35		5	CB(A), CTS
37		13	CB(B), CTS
38		4	CA(A), RTS
40		19	CA(B), RTS
39		6	CC(A), DSR
41		22	CC(B), DSR
42		20	CD(A), DTR
44		23	CD(B), DTR
43		8	CF(A), DCD
45		10	CF(B), DCD
46		18	LL, LL
48		21	RL, RL
50		7	AB, GND

HPX-CAB-RS530-DTE			
P1	"A" port	"B" port	
50pin VHDCI	DB25 male	DB25 male	Circuit Abbrev.
1	3		BB(A), RXD
2	16		BB(B), RXD
3	2		BA(A), TXD
4	14		BA(B), TXD
5	17		DD(A), RXC
6	9		DD(B), RXC
7	24		DA(A), SCTE
8	11		DA(B), SCTE
9	15		DB(A), TXC
10	12		DB(B), TXC
11	4		CA(A), RTS
12	19		CA(B), RTS
13	5		CB(A), CTS
14	13		CB(B), CTS
15	6		CC(A), DSR
16	22		CC(B), DSR
17	20		CD(A), DTR
18	23		CD(B), DTR
19	8		CF(A), DCD
20	10		CF(B), DCD
21	18		LL, LL
23	21		RL, RL
25	7		AB, GND
26		2	BA(A), RXD
28		14	BA(B), RXD
27		3	BB(A), TXD
29		16	BB(B), TXD
30		24	DA(A), RXC
32		11	DA(B), RXC
31		17	DD(A), SCTE
33		9	DD(B), SCTE
34		15	DB(A), TXC
36		12	DB(B), TXC
35		4	CA(A), RTS
37		19	CA(B), RTS
38		5	CB(A), CTS
40		13	CB(B), CTS
39		20	CD(A), DSR
41		23	CD(B), DSR
42		6	CC(A), DTR
44		22	CC(B), DTR
43		8	CF(A), DCD
45		10	CF(B), DCD
46		18	LL, LL
47		21	RL, RL
50		7	AB, GND

Table 9 – Serial X.21 Cable

8. INTERFACE SPECIFICATIONS

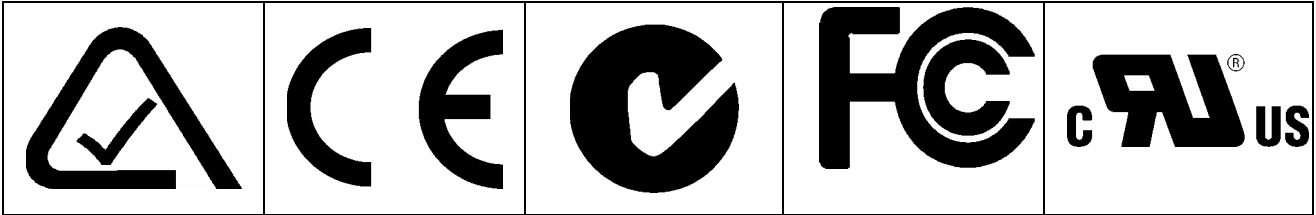
Connector	2 port VHDCI
Interface	V.35 V.24 X.21 RS-530 RS-530A
Power Consumption	< 3W
Trunk Speed	V.35/X.2/RS-530/RS-530A 1: 48kbit/s, 56kbit/s, nx64kB/s up to 2048kB/s V.24: 1.2, 2.4, 4.8, 9.6, 38.4kbit/s, nx64kB/s up to 128kB/s. nx64kbit/s only available to V.24 in Synchronous modes.
Modes	Synchronous: V.24, V.35, X.21, RS-530, RS-530A Asynchronous: V.24
Operation mode	DCE or DTE (both modes locked to node)
Loopback	IM Loopback
Alarms	X.21 <i>DCE mode</i> Control <i>DTE mode</i> Indication V.24/V.35 <i>DCE mode</i> DTR: Data Terminal Ready, RTS: Request to Send <i>DTE mode</i> DSR: Data Set Ready, CTS: Clear to Send, RLSD (DCD): Receive Line Signal Detect RS-530/RS-530A <i>DCE mode</i> DTR: Data Terminal Ready, RTS: Request to Send <i>DTE mode</i> DSR: Data Set Ready, CTS: Clear to Send, RLSD (DCD): Receive Line Signal Detect
LED indicators	Red: DTR/Control inactive Green: Port Active. Yellow: IM hasn't booted correctly
Standards	ITU V.24/V.28, X.21(V.11), V.35

Table 10 – Interface Specifications

9. INTERNATIONAL COMPLIANCES

All HPX-1600 products have achieved the following international compliances;

- CE
- A Tick
- C Tick
- FCC part 15 class B
- UL



FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- *Reorient or relocate the receiving antenna*
- *Increase the separation between the equipment and the receiver*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected*
- *Consult the dealer or an experienced radio/TV technician for help*

Warning: *Any changes or modifications not expressly approved by Haliplex Pty Ltd could void the user's authority to operate this equipment.*

9.1. ELECTROMAGNETIC COMPATIBILITY (EMC)

- CISPR 22 class B
- EN55022
- FCC part 15 class B
- AS/NZS3548

9.2. SAFETY

The MPS IM complies with the following

- EN60950, UL1950, and AS/NZS60950:2000 for General safety

9.3. IMMUNITY

The MPS IM complies with

- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5

9.4. PERFORMANCE

- TS006 for Non Switched Public network