5005

DATAPLEX 2 AND EXPERIMENTAL PACKET SWITCHED SERVICES

Modem 15 - Installation and Testing

1 INTRODUCTION The Modem 15 is a proprietary modem operating at 4800 bit/s on private circuits and has been specifically purchased for the PO Dataplex 2 Service and the Experimental Packet Switched Service (EPSS).

2 AUTHORITY The authority to install the Modem 15 will be given by an Advice Note (AN) and other related documents as appropriate.

3 EQUIPMENT REQUIRED Stores requirements at Dataplex 2 installations will be covered by Works Specifications issued by THQ. At EPSS customer installations only a Datel Modem No. 15A and the interface cable and plugs will be required.

4 SHIPPING PINS The Datel Modem 15A issued by Supplies Division will be fitted with two "shipping pins" to prevent damage to the master and control modules during transit. NO ATTEMPT SHOULD BE MADE TO REMOVE THE MASTER OR CONTROL MODULES WITH THE SHIPPING PINS IN POSITION otherwise the modules may be irreparably damaged.

Each of the two shipping pins fitted to the modem consists of a threaded rod screwed into a threaded socket at the top of the modem frame and passes vertically through the modem adjacent to the master and control modules. Each shipping pin is secured by a nut at the bottom of the modem frame. With the shipping pins in position and the nuts tightened the printed circuits boards are clamped in position and cannot be removed.

4.1 Removal of Shipping Pins Firmly hold the modem on its side and unscrew the nuts securing the shipping pins. Remove the shipping pins and store for future use when the modem is either recovered or transported to an alternative site.

4.2 Refitting of Shipping Pins When the modem is required to be transported either as a result of recovery of the installation or removal to another site the shipping pins should be refitted and the lock nut tightened before the modem is removed. Spare shipping pins may be obtained from THQ/NPD/NP3.1.4.

5 MODEM INTERNAL CONNECTIONS Straps, provided by small flexible U-links, are required, depending on the requirements of the system, as detailed in Table 1. (WARNING: NO ADJUSTMENT OR ALTERATION OF STRAPS OR REMOVAL OR INSERTION OF PRINTED CIRCUIT BOARDS OR PLUGS AND SOCKETS SHOULD BE MADE WITH THE AC MAINS CONNECTED TO THE MODEM.)

Table 1 follows

TABLE 1

MODEM STRAPPING

CIRCUIT BOARD	FUNCTION	CHANNEL WORKING (NOTE)	STRAP	REMARKS
1 MASTER MODULE	TRANSMIT CLOCK		EC-1	Internal - Dataplex and Packet Switching Exchanges
			EC-3	External - EPSS customer locations only.
	CARRIER CONTROL		C-INT	Carrier controlled by the modem - Dataplex
			C-EXT	Carrier controlled by DTE - EPSS
	PHASE JITTER		PJ-1	Normal - no phase jitter compensation
2 CONTROL MODULE	CHANNELIZATION	Single	M-1	See Note
		Dual	M-2	
	PREAMBLE		C-1	Inhibits preamble generation
	REMOTE DATA LOOPBACK		R-1	OUTSTATION TERMINAL (REMOTE NODE) or EPSS customer location. Enables Remote Test Facility to be used from the Instation Terminal
			R-2	INSTATION TERMINAL (CONTROLLING NODE) or PACKET SWITCHING EXCHANGE - Disables Remote Test Facility
	TRANSMIT DATA LOOPBACK		Omit T Strap	Not required for normal working (This strap is not provided on later models)
	CLEAR TO SEND (READY FOR SENDING)	Single	1-A	Zero delay
		Dual	1-A 2-A	
	RECEIVED LINE SIGNAL DETECTOR		5-A 6-A 7-A 8-A	Normal working without preamble generation
	BIT BUFFERING		9-A 10-A 11-A 12-A	Not required for normal working. (These straps are only provided on later models)

TABLE 1 (CONTD)

CIRCUIT BOARD	FUNCTION	CHANNEL WORKING (NOTE)	STRAP	REMARKS
3 MOTHER BOARD	EXTERNAL TIMING		E-A	Timing from Channel A
			E-B	Timing from Channel B - Synchronous Intermix only

NOTE: Single-Channel working is applicable to all EPS Services and 1-channel Dataplex 2 systems.

Dual-Channel working is only applicable to 2-channel Dataplex 2 systems.

6 PRELIMINARY MODEM TESTING Carry out the test programme detailed in Table 2 either prior to, or at the time of installation, depending on local arrangements. The following test equipment will be required:

Level Measuring Set No. 5B (or equivalent).

Tester, Line-Earth-Loop-Impedance - see A2 E1006 (only used if Preliminary Test Programme below is carried out at the customer's premises).

TABLE 2

PRELIMINARY TEST PROGRAMME

TEST	METHOD
1 AC MAINS (Perform only if test carried out at customer's premises)	(i) Connect the Tester, Line-Earth-Loop-Impedance to the mains socket outlet. (ii) Perform test described in A2 E1006. (iii) If prescribed limits are not met:- (a) do not connect the Modem 15 to the mains socket, (b) report matter to ADCO.
2 FUSES	(i) Check that the following time-lag type fuse is fitted in the rear of the modem: Fuse No. 36A, 0.5 amp (or equivalent).
3 MAINS PLUG	(i) Depending on the customer's mains socket-outlet terminate the Modem 15 power lead on a 5 amp or 13 amp (fused at 3 amp) 3-pin (BSI) plug and insert in the socket outlet.
4 TRANSMIT SIGNAL LEVEL SETTING	(i) Connect the Level Measuring Set No. 5B to the transmit line terminals of the Telephone Line cable (red and green wires), for a 600Ω terminated level measurement.

TABLE 2 (CONTD)

TEST	METHOD
4 TRANSMIT SIGNAL LEVEL SETTING (CONTD)	(ii) Remove power plug and Master module board. (iii) Operate Switch marked "3" on the Master module board, restore board and connect power. (iv) The output level should be -13 ± 1 dBm. (v) If the output level is greater than -13 ± 1 dBm remove power plug and Master module board, reset switch marked "3" and operate switch marked "4" on the Master module board, (only one switch should be depressed at a time), restore board and connect power. Repeat until an output level of -13 ± 1 dBm is obtained. (vi) If the output level is less than -13 ± 1 dBm remove power plug and Master module board, reset switch marked "3" and switch marked "2" on the Master module board, (only one switch should be depressed at a time), restore board and connect power. Repeat until an output level of -13 ± 1 dBm is obtained. (vii) Disconnect the Level Measuring Set No. 5B from the transmit line terminals.

7 ACCOMMODATION Before commencing installation check that the following accommodation requirements are met. (Further details of accommodation are given in I1000.)

POSITION OF MODEM: Not more than 1.5 m (5 ft) above floor level, and it must be possible to change the modem without removing or requiring access to any Non-Post Office apparatus other than the customer's power socket-outlet and interface connector(s).

VENTILATION: Air must be able to circulate freely at room temperature on all sides of the Modem 15.

TESTING AND MAINTENANCE ACCESS: There must be direct access to the Modem 15 with adequate clearance for testing and maintenance, and it must be possible to remove the connector plugs at the rear of the modem without difficulty.

ACCIDENTAL DAMAGE: There must be minimal risk of damage to the Modem 15 through excess sunlight, condensation etc.

MAINS SUPPLY: The customer must supply a switched a.c. mains socket-outlet of 5 A or 13 A fusing capacity, for use exclusively with the Modem 15, and must connect it to a 230-240 V 50 Hz mains supply and an efficient connection to a protective earth.

8 INSTALLATION The Telephone Line Cable, supplied with the modem, is terminated at one end by a 25-way plug and at the other by four spade terminals.

The Telephone Line plug should be inserted into the telephone line jack at the rear of the modem.

The four spade terminals should be terminated on the 4-wire line as follows:

GREEN wire
RED wire
} 4-wire transmit

YELLOW wire
BLACK wire
} 4-wire receive

9 INSTALLATION TESTING Carry out the test programme detailed in Table 3, with the customer's equipment *not* connected to the Modem 15. The following test equipment will be required:

Datel Tester No. 1C (NOTE).

Tester, Line-Earth-Loop-Impedance - see A2 E1006 (only used if Preliminary Test Programme, para 6, was not carried out at customer's premises).

NOTE: To enable the Datel Tester No. 1C to be connected to Datel Modem 15A interface socket a short adapter-cord should be made up. However, certain installation configurations ie, Synchronous Intermix and EPSS customer terminals, will have the Datel Modem No. 15A interface extended via an adapter cord/socket such that a Datel Modem No. 7 type interface is presented to the customer. In this case the testing should be carried out from this extended interface and the adapter cord for the Datel Tester is not required.

If the Datel Tester adapter cord is required it should be made up with the following connections and as detailed overleaf:

Datel Connections follow

MODEM CONNECTOR PIN NO.		TESTER CONNECTOR PIN NO.
1	NOT CONNECTED	NOT CONNECTED 1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
9	NOT CONNECTED	9
10	NOT CONNECTED	NOT CONNECTED 10
11	NOT CONNECTED	NOT CONNECTED 11
12	NOT CONNECTED	NOT CONNECTED 12
13	NOT CONNECTED	NOT CONNECTED 13
14	NOT CONNECTED	NOT CONNECTED 14
15		15
16	NOT CONNECTED	NOT CONNECTED 16
17		17
18	NOT CONNECTED	NOT CONNECTED 18
19	NOT CONNECTED	NOT CONNECTED 19
20	NOT CONNECTED	NOT CONNECTED 20
21	NOT CONNECTED	NOT CONNECTED 21
22	NOT CONNECTED	NOT CONNECTED 22
23	NOT CONNECTED	NOT CONNECTED 23
24		NOT CONNECTED 24
25	NOT CONNECTED	NOT CONNECTED 25

The modem connector is a Connector No. 217A/25A (ie a 25-way male connector), the cover of which should be removed and the special shroud which may be supplied with the modem fitted in its place. (If no special shroud is supplied a Connector No. 219A/25A may be used.) A required length of Cordage Instrument 12AJ should be used to make up the adapter cord, with a Connector 217D/25B (ie a

25-way female connector) used as the tester connector. The shell and retaining clip of this should be removed and the cover from the Connector No. 217A/25A fitted in its place.

TABLE 3

INSTALLATION TESTING PROGRAMME

TEST	METHOD
1 AC MAINS (Perform only if Preliminary Test Programme, para 6, was not carried out at the customer's premises)	(i) Connect the Tester, Line-Earth-Loop-Impedance to the mains socket outlet. (ii) Perform tests described in A2 E1006. (iii) If prescribed limits are not met:- (a) Do not connect Modem 15 to mains socket. (b) Report matter to ADCO.
2 LOCAL MODEM LINE LOOPBACK (MASTER MODULE)	(i) Connect the Datel Tester No. 1 to the Channel A (J1) jack at the rear of the Modem 15 using the special adapter cord or directly to the extended interface if provided. (See NOTE in para 9.) (ii) (a) DATAPLEX Set the tester for EXTERNAL timing. (The Transmitter Signal Element Timing (TSET) being taken from the modem on Pin 15.) (b) EPSS Set the tester to Transmitter Internal Timing (at customer locations) or Transmitter External Timing (at Packet Switching Exchanges) and Receiver External Timing (all locations). (iii) Connect the modem to the a.c. mains supply. (iv) On the Master Module of the Modem 15, press the LINE LOOPBACK (LL) switch and check that the 48/24 switch is in the released (48) position. (v) The LL, 48, SR and SD indicators on the Master Module should be, and should stay, illuminated. (vi) Transmit a steady BINARY 1 from the tester and note that the TX and RX indicators on the Master Module are not illuminated. (vii) Transmit a steady BINARY 0 from the tester and check that the TX and RX indicators on the Master Module are both illuminated. (viii) Transmit the 511 element Pseudo Random patterns from the tester and check that it is received by the tester, via the line loopback, without error for about 3½ minutes. (ix) If the dual-channel Dataplex mode of working is employed perform the following tests (x) to (xiv). (x) Connect the Datel Tester No. 1 to the Channel B (J2) jack at the rear of the Modem 15 using the special adapter cord or directly to the extended interface if provided. (See Note in para 9.)

TABLE 3 (CONTD)

TEST	METHOD
2 LOCAL MODEM LINE LOOPBACK (MASTER MODULE) (CONTD)	(xi) Set the tester for EXTERNAL timing. (The TSET being taken from the modem on Pin 15.) (xii) On the Master Module of the Modem 15, press the LINE LOOPBACK (LL) switch and set the 48/24 switch to the 24 position. (xiii) The EC, LL, 24, SR and SD indicators on the Master Module should be, and should stay, illuminated. (xiv) Perform tests (vi) to (viii).
3 CONTROL MODULE	(i) Restore the LL switch on the Master Module (ii) Connect the Datel Tester No. 1 to the Channel A (J1) jack at the rear of the Modem 15 using the special adapter cord or directly to the extended interface if provided. (See note in para 9.) (iii) Operate the REQUEST TO SEND button on the Datel Tester No. 1. (iv) Check that the upper RS (Request to Send) indicator of the Control Module is illuminated. (v) Check that the upper CS indicator of the Control Module is illuminated indicating that Clear to Send (RFS) is being sent by the modem. (vi) The upper TX, RX and SD indicators of the Control Module should be illuminated at the same time as the similar indicators on the Master Module. (vii) If the dual channel Dataplex mode of working is employed perform the following tests (viii) and (ix). (viii) Connect the Datel Tester No. 1 to the Channel B (J2) jack at the rear of the Modem 15 using the special adapter cord or directly to the extended interface if provided. (See note para 9.) (ix) Perform tests (iii) to (vi) above, but noting the lower indicator lamps of the Control Module. (x) Disconnect the Datel Tester from the modem jack.

10 SYNCHRONOUS INTERMIX FACILITY The Synchronous Intermix facility is only applicable to the PO Dataplex 2 Service. It provides two duplex 2400 bit/s channels over the bearer circuit carrying multiplexed data and can only be provided if the 4800 bit/s bearer circuit is sufficiently under-utilised in terms of low signalling rate asynchronous multiplexor ports, ie the TDM equipment requires only a 2400 bit/s circuit.

It will be the customer's responsibility to ensure that a suitable cable is provided for the 2400 bit/s interface and that it is terminated on a 25-way D-type connector plug of a pattern approved by the Post Office, eg Carr Fastener Company Code Nos. 43/81/047EG (plug body) and 43/81/964 (cover). (See Post Office Techincal Guide No. 2.) Cases of doubtful acceptability should be

referred to Sales Special Services Division who hold a copy of the list of acceptable attachments.

Interchange circuits should be terminated on the connector plug pins as indicated in Table 4.

The connector plug should be inserted into the extended inteface socket which connects into the Channel B (J2) jack at the rear of the modem.

TABLE 4

SYNCHRONOUS INTERMIX INTERCHANGE CIRCUITS

CONNECTOR PLUG PIN NO.	DIRECTION OF SIGNAL	CCITT CIRCUIT NO.	INTERCHANGE CIRCUITS
1	-	-	Not used
2	DTE → Modem	103	Transmitted Data
3	Modem → DTE	104	Received Data
4	DTE → Modem	105	Request to Send
5	Modem → DTE	106	Ready for Sending
6	Modem → DTE	107	Data Set Ready
7	-	102	Common Return
8	Modem → DTE	109	Received Line Signal Detector
9	DTE → Modem	113*	Transmitter Signal Element Timing
10 to 14	-	-	Not used
15	Modem → DTE	114	Transmitter Signal Element Timing
16	-	-	Not used
17	Modem → DTE	115	Receiver Signal Element Timing
18 to 25	-	-	Not used

*NOTE: At the present time the DTE (Data Terminal Equipment) will not be allowed to provide Transmitter Signal Element Timing.

11 CUSTOMER'S EQUIPMENT CONNECTION TO THE MODEM 15 For single-channel working the connector plug should be inserted into the Channel A (J1) jack at the rear of the modem.

For dual-channel working the connector plugs should be inserted into Channel A(J1) and Channel B (J2) jacks at the rear of the modem.

Interchange circuits are terminated on the connector plug pins as specified in Table 5.

Table 5 follows

TABLE 5

INTERCHANGE CIRCUITS

CONNECTOR PLUG PIN NO.	CCITT CIRCUIT NO.	INTERCHANGE CIRCUIT
1	101	Protective Earth (not connected in the interchange cable)
2	103	Transmitted Data
3	104	Received Data
4	105	Request to Send
5	106	Ready for Sending (Clear to Send)
6	107	Data Set Ready
7	102	Common Return
8	109	Data Channel Receive Line Signal Detector
9 to 14	-	Not used
15	114	Transmitter Signal Element Timing
16	-	Not used
17	115	Receiver Signal Element Timing
18 to 22	-	Not used
23	111	Data Signal Rate Selector
24	113	Transmitter Signal Element Timing
25	-	Not used

12 COMPLETION On satisfactory completion of installation and testing supply the customer with a completed card A738 and ensure that the relevant information is given to the Repair Service Control to enable cards A2714 and A2715 to be completed. For A6035 should be completed as described in A8 H0301.

References: A2 E1006 A8 H0301 C3 I1000

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