

DATEL 1200 DUPLEX SERVICE

Modem 27A - Installation

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1 INTRODUCTION This Instruction describes the installation and testing of the equipment required for the Datel 1200 Duplex Service. It is based on the Modem 27A which is a proprietary modem with minor modifications. The service offers both synchronous and asynchronous 1200 bit/s full duplex data transmission facilities over a single PSTN connection.

All installation wiring details and the stores required are contained in Diagram DT/DTW(L) 1247 (see Appendix I).

2 GENERAL

2.1 Modem Description The Modem 27A comprises a single 3-card unit housed in a metal case measuring 147 mm wide, 50 mm high and 320 mm deep - see Figure 1.

The rear panel of the modem is equipped with 2 D-type connectors as described below - see Figure 2.

2.1.1 One 15-way female connector provides for interconnexion between the modem and the telephone/control equipment. A 15-way 'split' cord, terminated at one end on a male connector, and at the other end on spade terminals, provides the connexion between the modem and the telephone/control equipment.

2.1.2 One 25-way female connector provides for inter-connexion of the modem and Data Terminal Equipment (DTE).

The modem is mains powered by means of a separate plastic encapsulated mains transformer and is equipped with test keys and status indicators mounted on the front panel.

2.2 Authority Given by an Advice Note quoting a Datel Service Code.

2.3 Service Codes The Datel Service Code is a unique three section alphanumeric code.

Each code defines a standard arrangement of Datel equipment. Datel Service codes are used by Sales Divisions to specify customer service requirements to installation Divisions.

Fig 1 follows

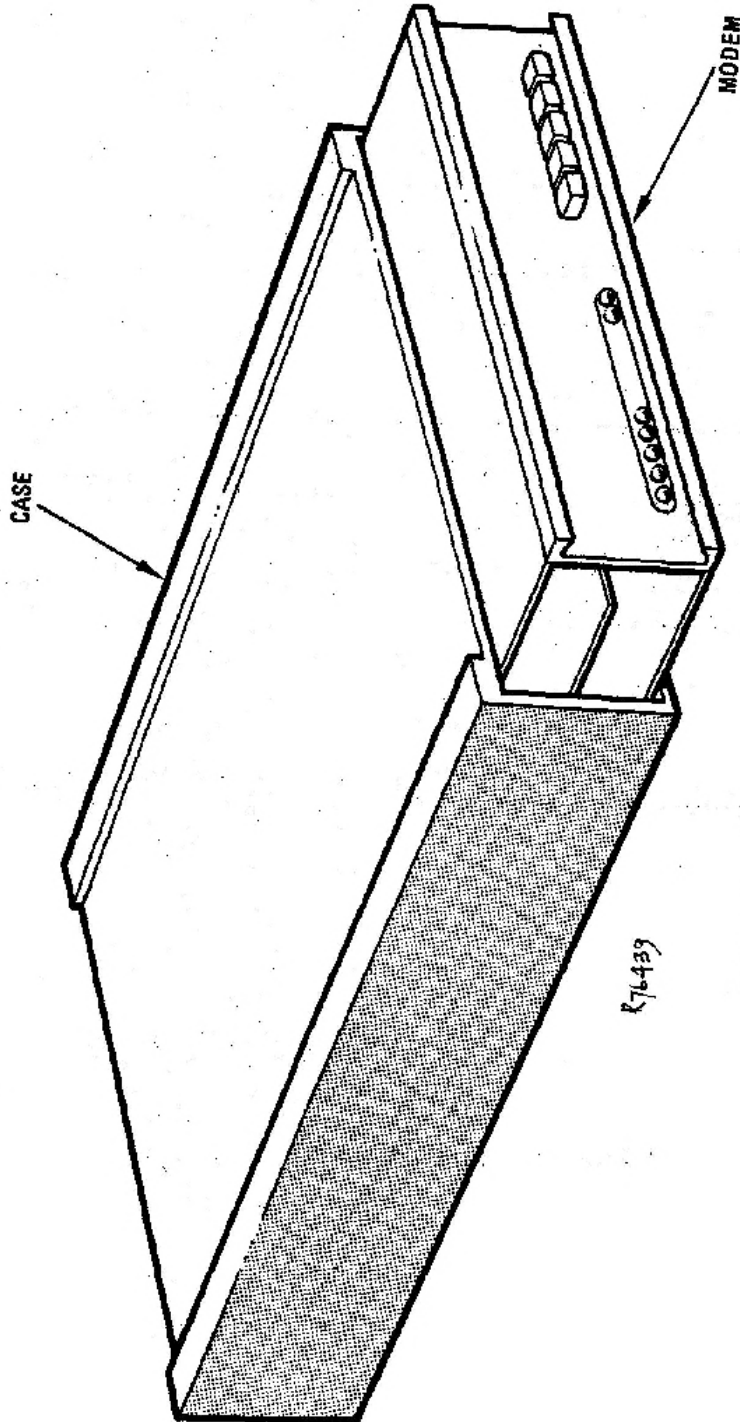


FIGURE 1: MODEM AND CASE ASSEMBLY

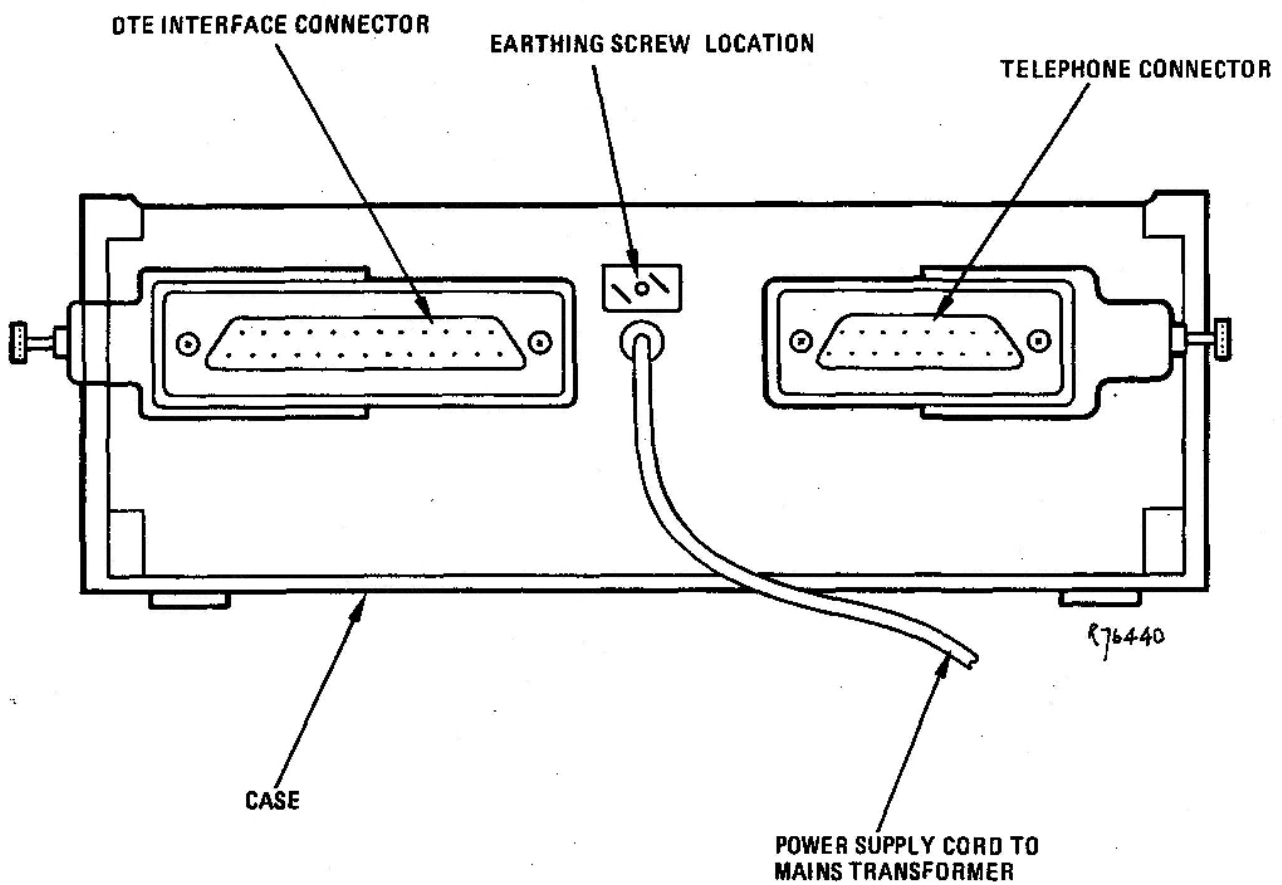
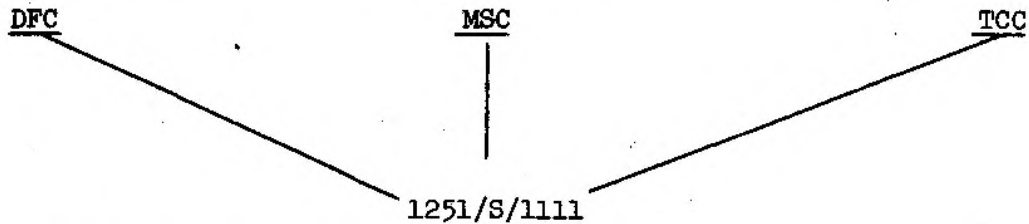


FIGURE 2: MODEM BACK PANEL

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The composition of service codes and a typical example is shown below:-

Datel Facility Code (see para 2.3.1) Modem Switching Code (see para 2.3.2) Terminal Configuration Code (see para 2.3.3)



* 2.3.1 Datel Facility Code (DFC) This 4-digit code comprises two parts.

The first part, the thousands and hundreds digits, always consists of 12 indicating the Datel 1200 Duplex Service.

The second part, the tens and units digits, indicates the equipment provided and the circuit configuration. The Modem 27A operates only on the PSTN and therefore the second part of the code will always consist of the digits 51.

2.3.2 Modem Switching Code (MSC) This code indicates the method of control of modem switching to and from line.

The options available with the Modem 27A are listed in Table 1.

TABLE 1

CODE LETTER	DESCRIPTION	
	CONDITIONS NECESSARY FOR CONNEXION OF MODEM TO EXCHANGE LINE	CONDITIONS NECESSARY FOR DISCONNEXION OF MODEM FROM EXCHANGE LINE
T	cct 108/2 ON <i>and</i> operation of non-locking DATA key OR cct 108/2 ON <i>and</i> locking AUTO ANS key operated <i>and</i> ringing	108/2 OFF OR Operation of non-locking TELE key
S	Operation of non-locking DATA key	Operation of non-locking TELE key

2.3.3 Terminal Configuration Code (TCC) This code defines the operational interface requirements of the DTE which may be provided by the modem.

The Datel 1200 Duplex Service has a 4 digit TCC. This is defined in Table 2.

Table 2 follows

TABLE 2

DIGIT	CODE AND SIGNIFICANCE
1st	<p>Modem Transmitter Signal Element Timing (TSET) Source:</p> <p>1 - INTERNAL - TSET derived from the modem and presented to the DTE via interchange circuit No. 114</p> <p>2 - RECEIVER - TSET driven from Receiver Signal Element Timing (within the modem).</p> <p>5 - EXTERNAL - TSET derived from the DTE via interchange circuit No. 113</p>
2nd	<p>Modem Configuration:</p> <p>1 - SYNCHRONOUS</p> <p>3 - ASYNCHRONOUS - 9 bit character format</p> <p>4 - ASYNCHRONOUS - 10 bit character format</p>
3rd	<p>Receive Space Disconnect Option:</p> <p>1 - ENABLED - Modem automatically disconnects from line upon receipt of > 2s of continuous binary 0</p> <p>2 - DISABLED</p>
4th	<p>Loss of Line Signal Disconnect Option:</p> <p>1 - ENABLED - Modem automatically disconnects from line if line signal lost for > 410 ms</p> <p>2 - DISABLED</p>

2.4 Equipment Required

* 2.4.1 Single Modem Installations For single (table mounted) installations the *modem equipment* required consists of a Modem 27A and a Cord Connecting No. 16/2A.

Page 2 of DT/DTW(L) 1247 lists the *complete* equipment required.

2.4.2 Rack Mounted Installations For rack mounted Modem 27A installations see Works Specification TG 19060.

2.5 Handling The Modem 27A should be handled carefully. Cartons from new units should be retained for re-use where modems are to be re-transported.

3 PRE-INSTALLATION SETTING UP AND TESTING Preliminary setting up and testing of the Modem 27A should normally be carried out on British Telecom (BT) premises unless it is judged that the installation is large enough to warrant these tests being carried out on the customer's premises.

If any defects are found in the equipment, a form A646 should be completed and submitted as detailed in C1 A0050.

3.1 Modem Assembly The modem may be withdrawn from the case by gripping the front panel and pulling out from the case.

The assembly of the modem, detailing the relative positions of the individual circuit cards, is detailed in Figure 3.

The cards are interconnected by means of ribbon cables terminated on miniature Dual In Line (DIL) connectors. Care should be taken not to disturb these connectors when dismantling the modem. Pin No. 1 on each DIL plug should be adjacent to the spot on the circuit card beside the relevant DIL socket.

For facility selection, access may be gained to the individual cards by removing the three screws from the *underside* of the Main Card - see Figure 3.

3.2 Selection of Service Facility Options All facility selection is by means of DIL switches located on two of the three modem circuit cards.

3.2.1 Switches for the selection of standard and customer requested facility options are located on the Main Card.

3.2.2 Switches for the selection of the modem output level are located on the Filter Card.

Fig 3 follows

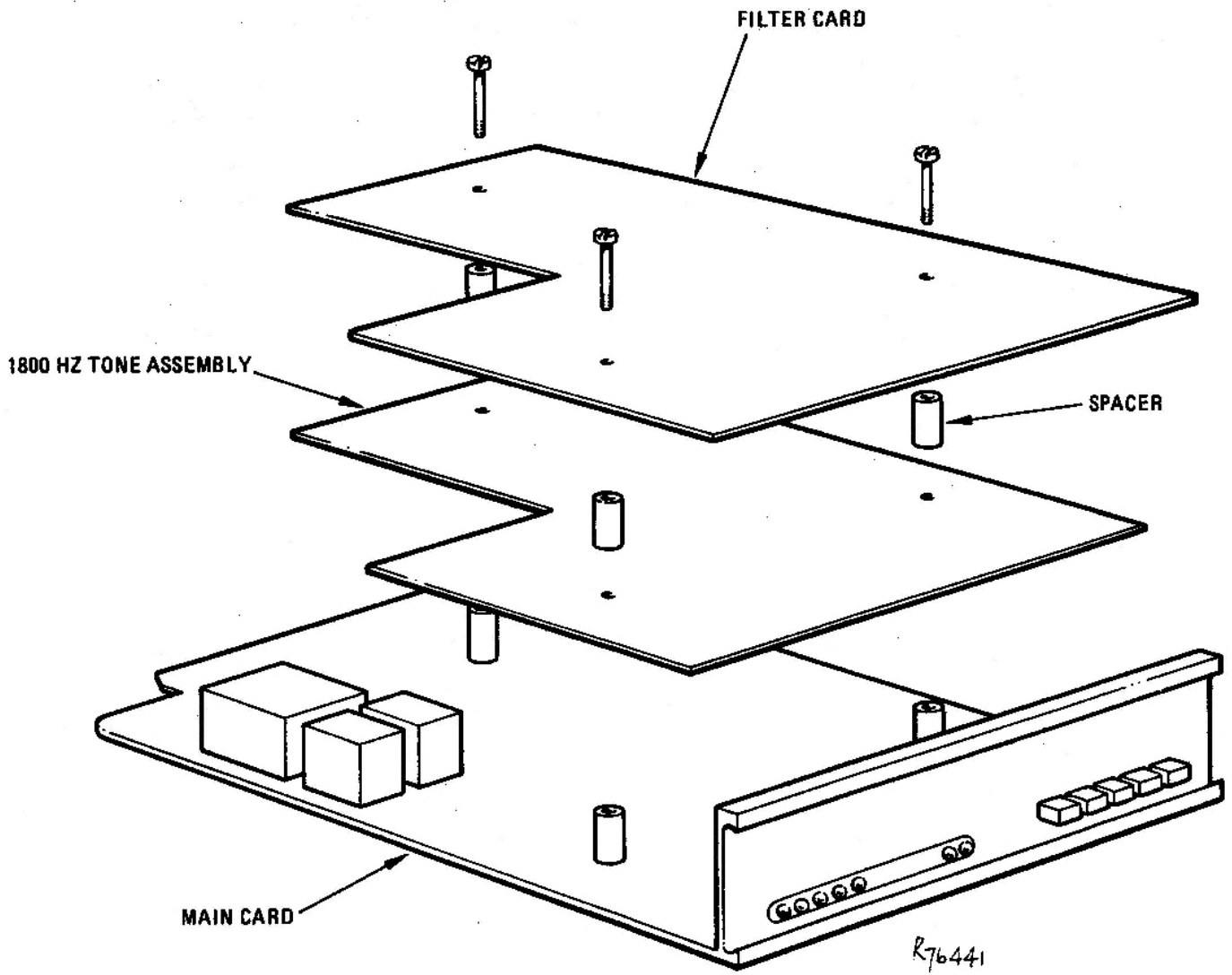


FIGURE 3: MODEM ASSEMBLY

3.2.1 Output Level Setting The modem should be set up for a PSTN output level calculated as follows:-

(i) If the modem is to be connected to an extension of a PBX, through which access may be gained to a private circuit, set the output level to -13 dBm.

(ii) If the modem is to be directly connected to the PSTN:-

(a) Determine the loop resistance of the local line. This may either be obtained from the line record card or measured by the exchange testing officer.

(b) Determine whether or not the local exchange and serving trunk unit are in the same building.

(c) If the local exchange and serving trunk unit are in the same building set the PSTN output level to:-

$$\left\{ \frac{\text{loop resistance of the customer's line in ohms}}{100} - 9 \right\} \text{ dBm}$$

Up to a maximum of 0 dBm.

(d) If the local exchange and serving trunk unit are not in the same building set the PSTN output level to:-

$$\left\{ \frac{\text{loop resistance of the customer's line in ohms}}{100} - 4 \right\} \text{ dBm}$$

Up to a maximum of 0 dBm

Figure 4 details the modem level setting.

3.2.2 Facility Option Selection The modem should be set up, as detailed in Figure 5, to provide:

(a) All the standard facilities listed and

(b) The customer requested options indicated by the Datel Service Code.

All facility selection switches should be set to the OPEN position initially.

Fig 4 follows

PSTN OUTPUT LEVEL SETTING	
SWITCHES SET TO '0DB' POSITION	OUTPUT LEVEL dBm
1, 2, 4, 8	0
2, 4, 8	-1
1, 4, 8	-2
4, 8	-3
1, 2, 8	-4
2, 8	-5
1, 8	-6
8	-7
1, 2, 4	-8
2, 4	-9
1, 4	-10
4	-11
1, 2	-12
2	-13
1	-14
-	-15

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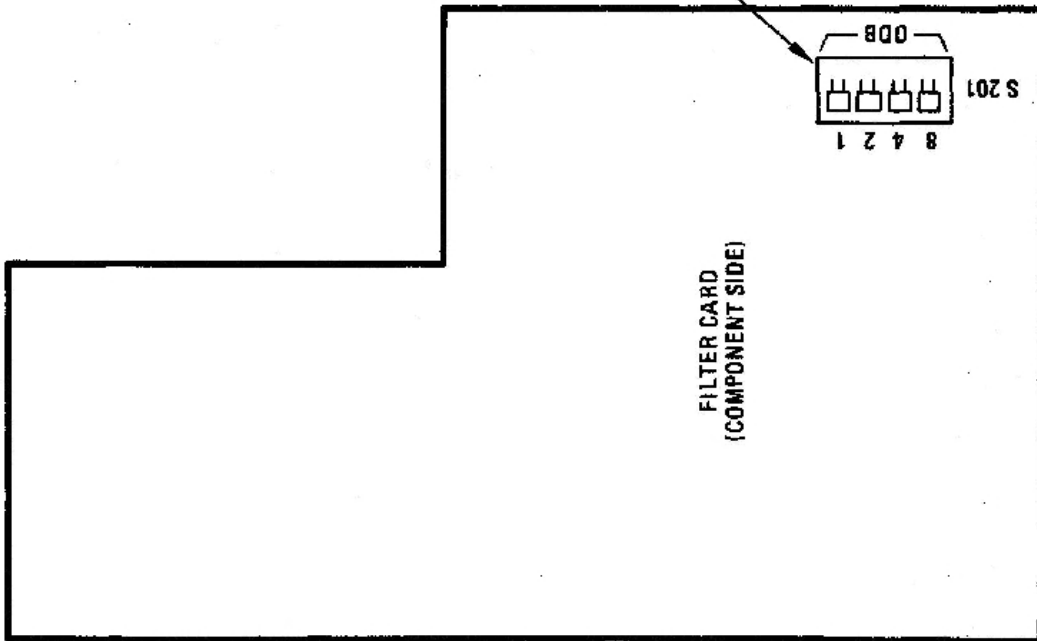


FIGURE 4: MODEM OUTPUT LEVEL SETTING

3.3 Pre-Installation Testing

3.3.1 Modem Operation The Modem 27A utilises a phase shift keying (PSK) modulation technique over two frequency separated channels. This technique is employed for both synchronous and asynchronous operation.

When the modem is in the 'calling mode' data is accepted from the DTE, scrambled and used to modulate a 1200 Hz carrier signal. In the 'answer mode' a 2400 Hz carrier signal is employed, thus achieving separation between the two directions of transmission.

Upon connexion to line the modem exercises a 'handshaking' procedure, involving the exchange of answer tones and synchronisation patterns to ensure recovery of receiver timing information.

It is important to note that failure of the 'handshaking' procedure will result in automatic disconnection of the answering modem from line. It is therefore essential that the calling modem be connected to line before, or within 15s of, receipt of the answer tone from the called modem to ensure satisfactory operation.

3.3.2 Testing Procedure Wire the modem and telephone to Diagram DT/DTW(L) 1247, connect a mains plug, fused at 3A to the modem and carry out the test programme detailed in Table 5.

The following test equipment will be required:

- 1 Attenuator No. 70A
- 2 Datel Testers No. 1, 10, 11 or 12
- 1 Meter Multirange No. 12
- 1 Measuring Set No. 44C
- 1 Modem 27A and telephone wired to DT/DTW(L) 1247
- 1 Tester; Line-Earth-Loop impedance
(see A2 E1006) - Only required if the test programme is to be carried out at the customer's premises

3.3.3 Modem Switches and Indicators The front panel of the modem is equipped with five switches and seven LED indicators. The functions of these switches and indicators are explained in Tables 3 and 4 respectively.

TABLE 3

SWITCH	FUNCTION
AL	Analogue Loop - loops modem transmitter output and receiver input
ST	Self Test - connects a pattern generator to transmitter input and an error detector to receiver output.
RDL	Remote Digital Loop - conditions a remote Modem 27A to adopt Digital Loop mode.
DL	Digital Loop - loops output of receiver to input of transmitter.
ANS	Answer - puts modem into Answer mode.

TABLE 4

INDICATOR	INDICATION
AL	Modem in Analogue Loop
108	Interchange circuit 108/2 is ON
107	Interchange circuit 107 is ON
103	Data present on interchange circuit 103
104	Data present on interchange circuit 104
MC	Received data in error during test
142	Modem in test mode

Table 5 follows

TABLE 5

TEST	PROCEDURE
<p>1 AC MAINS (perform only if testing carried out at customer's premises)</p>	<p>(i) Connect the Tester: Line Earth Loop impedance, to the mains socket outlet. (ii) Perform the tests detailed in A2 E1006. (iii) If the prescribed limits are not met:- (a) Do NOT connect the Modem 27A to the mains socket. (b) Report the matter to the Assistant Datel Co-ordination Officer (ADCO)</p>
<p>2 MODEM EARTHING</p>	<p>(i) Set a Meter Multirange No. 12 to measure resistance. (ii) Check for continuity between the earth conductor of the mains supply cord and the front panel, back panel and case of the modem. (iii) Check that the common return earthing screw is removed from the socket above the power supply cord entry on the rear of the modem (see Fig 2). (iv) Using a Tester 12 to access the modem/DTE interface, use the Meter Multirange to ensure that there is NO connexion between common return (pin 7) on the interface and protective earth. (v) If either check (ii) or (iv) fail change the modem.</p>

TABLE 5 (Cont'd)

PROCEDURE	
TEST	METHOD OF SETTING UP EQUIPMENT
<p>3 MODEM OUTPUT LEVEL</p>	
<p>4 LINE SIGNAL FAIL LEVEL</p>	

OBSERVATIONS

- (i) Operate ANS key on modem under test, lift handset and operate DATA button.
- (ii) Lift handset associated with compatible modem and upon receipt of ans tone operate the DATA button.
- (iii) When Ready for Sending (RFS) indicators glow on both testers measure modem output level.
- (iv) Check that level measured is within ± 1 dBm of the level set.
- (v) If the level cannot be adjusted to within this range change the modem.

- (i) For Service Codes 1251/-/ ---l temporarily disable the 'Loss of Line Signal Disconnect' function on the modem under test (S8-4 open).
- (ii) Operate ANS button on modem under test, lift handset and operate DATA button.

Continued on next page

TABLE 5 (Cont'd)

PROCEDURE		OBSERVATIONS									
TEST	METHOD OF SETTING UP EQUIPMENT										
4 LINE SIGNAL FAIL LEVEL (Cont'd)		<p>(iii) Lift handset, associated with compatible modem, and upon receipt of answer tone operate DATA button.</p> <p>(iv) When indicators glow on both testers increase attenuation until line signal fails at modem under test.</p> <p>(v) Note the value of attenuation.</p> <p>(vi) Decrease attenuation until the line signal is restored at modem under test.</p> <p>(vii) Note value of attenuation</p> <p>(viii) Check that the values measured in (v) and (vii) are within the limits:</p> <table border="1" data-bbox="1050 168 1232 705"> <tr> <th colspan="3">Attenuation for line signal:</th> </tr> <tr> <th>Fail (v)</th> <th>Restore (vii)</th> <th>Difference</th> </tr> <tr> <td>$<47 \pm 1$ dB</td> <td>$>43 \pm 1$ dB</td> <td>>2 dB</td> </tr> </table> <p>(ix) For Service Codes 1251/-/- --1 restore switch (S8-4), see (1).</p> <p>(x) If results prove unsatisfactory change the modem</p>	Attenuation for line signal:			Fail (v)	Restore (vii)	Difference	$<47 \pm 1$ dB	$>43 \pm 1$ dB	>2 dB
Attenuation for line signal:											
Fail (v)	Restore (vii)	Difference									
$<47 \pm 1$ dB	$>43 \pm 1$ dB	>2 dB									

TABLE 5 (Cont'd)

PROCEDURE		OBSERVATIONS
TEST	METHOD OF SETTING UP EQUIPMENT	
5 AUTOMATIC LINE DISCONNECTION CHECK		<p>(i) Operate ANS button on the modem, lift handset and operate DATA button.</p> <p>(ii) Check that within ≈ 15s the modem automatically disconnects from line and the 107 indicator extinguishes.</p> <p>(iii) If test proves unsatisfactory change the modem.</p>
6 LOCAL ANALOGUE LOOP SELF-TEST		<p>(i) Check that after 2s the AL, 107, 103, 104 and 142 indicators glow.</p> <p>(ii) Check that the MC indicator does not 'flash' for a period of 2 minutes.</p> <p>(iii) If the test is unsatisfactory change the modem.</p>
7 DIGITAL LOOP SELF-TEST		<p>(i) Operate ANS button on the modem under test, lift the handset and operate DATA button.</p> <p>(ii) Lift the handset, associated with the compatible modem, upon receipt of answer tone operate DATA button.</p>

Continued on next page

TABLE 5 (Cont'd)

PROCEDURE	
TEST	METHOD OF SETTING UP EQUIPMENT
<p>7 DIGITAL LOOP SELF-TEST (Cont'd)</p>	<p>OBSERVATIONS</p> <ul style="list-style-type: none"> (iii) Note that after 2s the 107, 103, 104 and 142 indicators glow on both modems. (iv) Check that the MC indicator in the compatible modem does not 'flash' for 2 minutes. (v) If the test proves unsatisfactory change the modem under test.
<p>8 RESPONSE TO REMOTE DIGITAL LOOPBACK REQUEST</p>	<div style="text-align: center;"> <p>The diagram illustrates the equipment setup for testing a compatible modem. At the top, a box labeled 'DATEL TESTER 108 ON FOR CODES 1251/T' is connected to two modem units. The first unit is labeled 'MODEM UNDER TEST' and contains a 'TRANSMITTER' and a 'RECEIVER'. The second unit is labeled 'COMPATIBLE MODEM RDL AND ST OPERATED' and contains a 'TRANSMITTER', a 'RECEIVER', a 'PATTERN GENERATOR', and an 'ERROR DETECTOR'. Arrows indicate the signal flow between the tester and the modems, and within each modem unit.</p> </div> <ul style="list-style-type: none"> (i) Operate ANS key on modem under test, lift handset and operate DATA button. (ii) Lift handset of telephone associated with compatible modem and upon receipt of answer tone operate DATA button. (iii) Note that after 2s 107, 103, 104 and 142 indicators glow on both modems. (iv) Check that the MC indicator on the compatible modem does not flash for a period of 2 minutes after (iii). (v) Operate TELE keys on both telephones, release RDL and ST on compatible modem, operate RDL and ST on modem under test and repeat (i) - (iv) in <i>opposite direction</i>.

Continued on next page

TABLE 5 (Cont'd)

PROCEDURE		OBSERVATIONS
TEST	METHOD OF SETTING UP EQUIPMENT	
8	RESPONSE TO REMOTE DIGITAL LOOPBACK REQUEST (Cont'd)	(vi) If tests prove unsatisfactory change modem.
9	RECEIVE SPACE DISCONNECT CHECK (SERVICE CODES 1251/-/--1-ONLY)	(i) Operate ANS button on modem under test, lift handset and operate DATA button. (ii) Lift handset associated with compatible modem and upon receipt of answer tone operate DATA button. (iii) When the RFS indicator on the tester glows, transmit BIN 0 from the tester associated with the compatible modem and check that after = 2s the modem under test automatically disconnects from line. (iv) If test unsatisfactory change the modem.

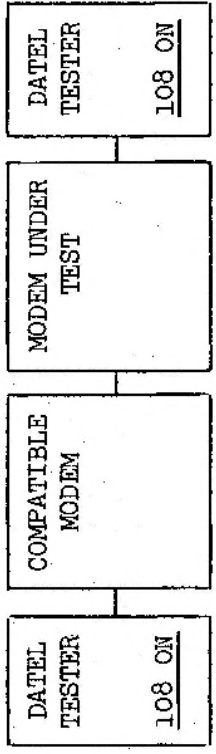


TABLE 5 (Cont'd)

PROCEDURE		OBSERVATION	
TEST	METHOD OF SETTING UP EQUIPMENT	(i)	(ii)
10 LOSS OF LINE SIGNAL DISCONNECT CHECK (SERVICE CODES 1251/-/-1 ONLY)		Operate the ANS button on the modem under test. Lift the handset and operate the DATA button.	Lift the handset associated with the compatible modem and upon receipt of answer tone operate the DATA button.
11 RSET CHECK (SERVICE CODES 1251/-/-1 ONLY)		Check that after 2s the AL, 103, 104 and 142 indicators glow	Using the Tester 12 check that 1200 ± 1 Hz timing signals are present on pin 17 of the interface.
		(iii) When the RFS indicator on the tester glows disconnect the compatible modem from line and note that the modem under test automatically disconnects from line.	If this test proves unsatisfactory change the modem.
		(iv) If the test proves unsatisfactory change the modem.	Check that after 2s the AL, 103, 104 and 142 indicators glow
			Using the Tester 12 check that 1200 ± 1 Hz timing signals are present on pin 17 of the interface.
			If this test proves unsatisfactory change the modem.

4 INSTALLATION

4.1 Accommodation Before installing the modem in the customer's premises ensure that the accommodation and *safety* requirements given in C3 I1000 are met.

4.2 Installation Wiring Install the modem (wired to DT/DIW(L) 1247 - Appendix 1) in the customer's premises.

Secure the mains transformer, by means of two woodscrews, within 1 m of the mains socket outlet.

4.3 Label Complete the label, on the right hand side of the modem, in pencil or ball-point pen.

4.4 Installation Testing

4.4.1 AC Mains Test If the pre-installation testing programme detailed in Table 5, was not carried out at the customer's premises, perform the test detailed in Table 6 *before* connecting the Modem 27A to the mains socket outlet.

A Tester Line-Earth-Loop impedance will be required (see A2 E1006).

TABLE 6
AC MAINS TEST

(i)	Connect the Tester Line-Earth-Loop impedance to the mains socket outlet.
(ii)	Perform the tests detailed in A2 E1006
(iii)	If the prescribed limits are not met: <ul style="list-style-type: none"> (a) Do <i>not</i> connect the modem to the mains socket outlet. (b) Report the matter to the ADCO.

4.4.2 Data Tests Co-operate with the Datel Test Centre (DTC) to perform the test programme detailed in Table 7, using a Datel Tester No. 11 if available.

Table 5 follows

TABLE 7

TEST													
1 AUTOMATIC ANSWERING (where provided)	<ul style="list-style-type: none"> (i) Connect a Datel Tester No. 1, 10, 11 or 12 to the modem. (ii) Operate the AUTO ANS button on the telephone or control unit. (iii) Request the DTC to call the telephone (iv) Upon receipt of ringing note that the CALLING INDICATOR lamp glows on the tester. (v) Operate the DATA TERMINAL READY/CONNECT TO LINE control on the tester and note that ringing is tripped. (vi) If the test proves unsatisfactory change the modem. 												
2 DATA CHECKS TO LOCAL DTC	<ul style="list-style-type: none"> (i) If a Datel Tester No. 11 is available set it to simultaneously transmit and receive continuous blocks of 256 binary characters and connect it to the modem. If a Datel Tester No. 11 is unavailable operate the DL button on the modem. (ii) Call the DTC and notify the service code of the modem under test. Request the DTC call the installation. Upon receipt of the call connect the modem to line. (iii) The DTC will connect a modem to line and transmit and receive continuous blocks of 256 binary characters, simultaneously, for a 5 minute period. (iv) The DTC will measure errors as indicated below - if a Datel Tester No 11 is in use with the modem under test do likewise. (v) At the end of the test check with the DTC that the errors recorded (in both directions of transmission if appropriate) are within the following limits: <table border="1" data-bbox="456 1451 1345 1765" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SERVICE CODE</th> <th>MEASUREMENT</th> <th>LIMITS</th> </tr> </thead> <tbody> <tr> <td>1251/-/-1--</td> <td>Block errors</td> <td>≧ 18</td> </tr> <tr> <td>1251/-/-3--</td> <td>Character errors</td> <td>≧ 88</td> </tr> <tr> <td>1251/-/-4--</td> <td>Character errors</td> <td>≧ 79</td> </tr> </tbody> </table> <p data-bbox="456 1787 1374 1906">NOTE: If the 'sync' indicator on the Datel Tester No. 11 indicates loss of synchronism at any stage, resynchronise immediately. Ignore errors incurred during loss of synchronism</p>	SERVICE CODE	MEASUREMENT	LIMITS	1251/-/-1--	Block errors	≧ 18	1251/-/-3--	Character errors	≧ 88	1251/-/-4--	Character errors	≧ 79
SERVICE CODE	MEASUREMENT	LIMITS											
1251/-/-1--	Block errors	≧ 18											
1251/-/-3--	Character errors	≧ 88											
1251/-/-4--	Character errors	≧ 79											

TABLE 7 (Cont'd)

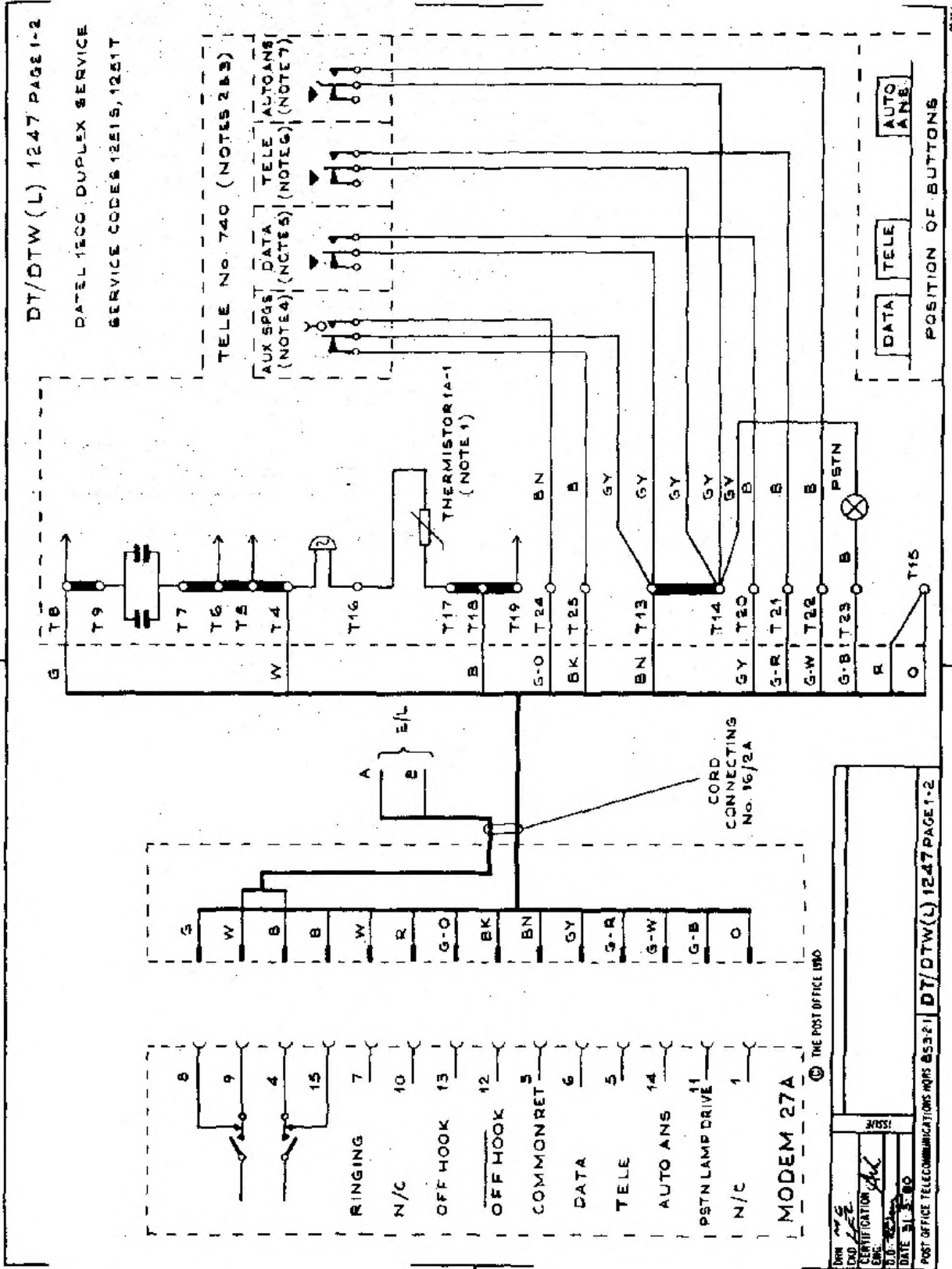
TEST	
2 DATA CHECKS (Cont'd)	<ul style="list-style-type: none"> (vi) Request the DTC release the connexion. (vii) Re-dial the connexion to the DTC - the DTC will connect a modem to line. (viii) Upon receipt of answer tone connect the modem to line. (ix) Repeat tests (iii) - (v). (x) Should either test (v) or (ix) fail re-establish the connexion and repeat. (xi) Should tests repeatedly fail inform the ADCO immediately who will proceed as in C3 I0503.
3 DATA CHECKS TO A REMOTE DTC	<ul style="list-style-type: none"> (i) Ascertain the region to which the customer intends to operate. (ii) Request the DTC appropriate to that region to co-operate in performing the data checks detailed in 2 above.

5 CUSTOMER'S EQUIPMENT CONNEXION TO THE MODEM 27A Interchange circuit pin connections are detailed in C3 I0104.

6 COMPLETION When all installation testing has been satisfactorily completed follow the procedure detailed in C3 I0502.

Appendix 1 follows

APPENDIX 1



A3
A4

PAGES 1, 2, ETC

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POST OFFICE TELECOMMUNICATIONS WORKS 2532-1 DT/DTW(L) 1247 PAGE 1-2

ISSN

DATE 31.3.80

POST OFFICE TELECOMMUNICATIONS WORKS 2532-1

DT/DTW (L) 1247 PAGE 2

DATL 1200 DUPLEX SERVICE
SERVICE CODES 12519, 12517

NOTES :-

1. REMOVE STRAP T16-T17 AND FIT THERMISTOR 1A-1
2. FIT LAMP FITTING No.16A AND LAMP No.48A ON THE LEFT HAND SIDE. FIT PART No.5/DCO/723 REPLACING THE LEFT HAND OPAL WITH A CAPS LAMP No.78A RED
3. FIT PART No. 2/DST/836 AND STRAP T13-T14
4. FIT SWITCH 198-1 (CONTACTS DEPICTED IN ON HOOK POSN. "
5. FIT SWITCH 5A-4 AND PART No.30/DBU/372 (DATA,RED). LATCH SETTING 3
6. FIT SWITCH 5A-4 AND PART No. 29/DBU/372 (TELE,RED); LATCH SETTING 3.
7. FIT SWITCH 23A-1 (LOCKING) AND PART No. 11/DBU/372 (AUTO ANS) - PROVIDE FOR SERVICE CODE 1251T ONLY.

EQUIPMENT REQUIRED	
QTY	ITEM
1	CAPS LAMP No. 78A, (RED)
1	CORD CONNECTING No.16/2A.
1	LAMP No. 48A
1	LAMP FITTING No. 16A
1	MODEM 27A
1	PART No. 5/DCO/723, GREY
1	PART No. 2/DST/836
1	PART No. 11/DBU/372 (AUTO ANS)
1	PART No. 29/DBU/372 (TELE, RED)
1	PART No. 30/DBU/372 (DATA, RED)
2	SWITCH 5A-4
1	SWITCH 23A-1
1	SWITCH 198-1
1	TELEPHONE No. 740, GREY
1	THERMISTOR 1A-1

References: A2 E1006 C1 A0050 C3 I0104
C3 I0502 C3 I0503 C3 I1000
TG 19060

THQ/ME/BS3.2.1

E N D

THE POST OFFICE 1980

DRM	7/6
CID	2/5
CERTIFICATION	ALC
ENC	
DD	100
DATE	31/3/80
BS 3-21	

A3
A4